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16. Abstract

One of the goals of the public transit system is to provide a high-quality and affordable service while ensuring the system remains cost-efficient. Since the COVID-19 pandemic, public transit systems have experienced substantial changes in passenger ridership, revenue streams, operational costs, and capital costs. In Texas and other regions, rural and small urban transit systems can be significantly challenged by these changes in addition to those caused by high turnover and a lack of comprehensive resources focused on cost management. To address these challenges, this study aimed to develop resources and training materials to assist Texas's rural and small urban transit systems in managing operational and capital costs. To create useful materials for rural and small urban transit systems, the research team identified the cost management needs of transit agencies in Texas, conducted a national review of resources and best practices for operational and capital cost management, and synthesized the findings into cost management guidance and training products, including a guidebook, an instructor-led workshop, and an online course. These products were developed, reviewed, and then pilot tested to ensure they were useful to Texas rural and small urban transit systems.

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OPERATIONAL AND CAPITAL COST MANAGEMENT AT RURAL AND SMALL URBAN TRANSIT SYSTEMS

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DISCLAIMER

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CHAPTER 1: INTRODUCTION

Public transit is continuously charged with the mission to deliver the highest quality service as efficiently as possible. Although always a difficult task, that mission has become increasingly difficult due to many changes stemming from the COVID-19 pandemic. For example, as seen in the latest Texas Department of Transportation (TxDOT) *Transit Statistics Report* from FY 2023, ridership has still not returned to pre-pandemic levels and cost per revenue mile is up statewide by 22 percent when compared to FY 2019 (TxDOT 2024a). Although the causes for the increase in costs are multifaceted (and many are beyond transit systems' direct control), transit systems can benefit from strategies to help them better manage operational and capital costs.[1]

In Texas and beyond, the fiscal challenges facing rural and small urban transit systems are compounded by an increasing population, revenue and ridership losses related to COVID-19, and rapid inflationary pressures. In Texas, there are 25 small urban and 36 rural transit districts[2], all of which receive some form of financial assistance from TxDOT in the form of both state and federal funding. These rural and small urban systems are especially vulnerable to cost increases because they often lack substantial local funding to support their operational and capital needs. Costs like fuel, labor, health insurance, and vehicles continue to increase, while, at the same time, federal and state funding for rural and small urban general public transit service remains limited, and local funding may be flat or non-existent.

In addition to these fiscal challenges, rural and small urban transit systems often face high levels of staff turnover and a lack of procedures for knowledge management—making it difficult to sustain internal cost management practices over time. Texas transit systems need reliable, easy-to-use, and up-to-date guidance and assistance to help them manage costs while still offering the highest-quality service. However, there are very few cost management resources for transit system managers to rely on that are comprehensive and useful for supporting robust cost management activities. Therefore, it is vital that rural and small urban transit systems have documented, go-to guidance and tools to help transit system staff better understand, predict, and manage costs. This research report documents the work performed by the research team to develop three such products for rural and small urban public transit systems to help them better manage costs.

[1] Capital costs are those associated with the acquisition or construction of long-term transit agency assets like vehicles, equipment, and facilities that have a useful life of beyond a year. Operational costs are transit agency costs that are not capital costs and include expenses related to the day-to-day operation of a transit agency (e.g., fuel, labor, and supplies).

[2] In Texas, the term *transit district* refers to an entity recognized by TxDOT to provide public transportation to a specific service area and to receive federal and state funding to support its transit operational and capital costs.

RESEARCH OBJECTIVE

The objective of the research was to develop resources and training materials to assist Texas rural and small urban transit systems with managing operational and capital costs. The research team also sought to make the materials useful for rural and small urban transit management staff. To do so, the research team sought to:

- Understand the cost-management needs of Texas rural and small urban transit systems.
- Conduct a national scan of rural and small urban public transit system practices for operational and capital cost control.
- Synthesize findings into a series of cost management modules, organized by topic, with supporting strategies and tools.
- Compile the modules into knowledge transfer products, including a guidebook, instructor-led workshop, and online course.
- Assess the products by pilot testing them with Texas rural and small urban transit systems.

RESEARCH APPROACH

The research team conducted the project from 2021 to 2024 through the execution of seven tasks.

- Task 1, Project Management—In Task 1, the team performed all project management activities and produced this research report and the project summary report.
- Task 2, Texas Rural and Small Urban Transit Systems Cost Control Needs Assessment—The purpose of Task 2 was to:
    - Identify and assess major transit operational and capital cost drivers for Texas transit systems.
    - Evaluate the needs of Texas transit system managers and staff regarding operational and capital cost control practices.
    - Evaluate the preferences and perceptions of Texas transit system managers and staff regarding knowledge management for cost control practices.
- Task 3, National Industry and Literature Scan and Case Studies—The purpose of Task 3 was to:
    - Inventory and review existing transit cost management materials.
    - Identify highly cost-efficient transit systems in the United States and conduct case studies of them.
- Task 4, Synthesis of Findings and Training Materials Framework—The purpose of Task 4 was to:
    - Synthesize all prior work.

    - Develop the framework (the blueprint) for the guidebook, workshop, and online course.
    - Gather feedback on the framework from project stakeholders.
- Task 5, Guidebook Development and Pilot Testing—The purpose of Task 5 was to:
    - Prepare the first draft guidebook for TxDOT review.
    - Pilot-test the second draft guidebook with Texas rural and small urban transit agencies.
    - Prepare the final guidebook.
- Task 6, Instructor-Led Workshop Materials Development and Pilot Testing—The purpose of Task 6 was to:
    - Prepare the first draft workshop materials for TxDOT review.
    - Pilot-test the second draft workshop materials with rural and small urban transit agencies.
    - Prepare the final workshop materials.
- Task 7, Online Course Development and Pilot Testing—The purpose of Task 7 was to:
    - Convert the workshop materials into an online course.
    - Prepare the first draft online course for TxDOT review.
    - Pilot-test the second draft online course with rural and small urban transit agencies.
    - Prepare the final online course.

BACKGROUND AND SIGNIFICANCE OF WORK

Operational and capital cost management practices and strategies can be identified to help transit systems be as efficient and cost-effective as possible. Often, cost management strategies are developed by functional area to provide supervisors over the function with tools to manage costs. For example, the function of dispatching, scheduling, and service planning can have a great impact on overall operating costs since the effectiveness of these functional areas directly impacts the amount of hours and miles of service. A savings in vehicles hours and miles is directly related to labor, fuel, and maintenance cost line items—the majority of a small urban or rural transit provider's budget. A modest improvement in service productivity can save operating expenses (Edrington and Arndt 2009). Strategies such as effective use of dispatching and scheduling computer-aided systems, use of automatic vehicle locators to find the closest vehicle to waiting patrons, or use of call volumes to set staffing levels of dispatching or reservation agents can decrease or contain operating costs.

As another example, fuel costs account for between 10 and 17 percent of a rural or small urban transit provider's operating budget. Fuel efficiency and type of fuel considerations are important in managing operating costs. Transit Cooperative Research Program (TCRP) Report 146,

Guidebook for Evaluating Fuel Choices for Post-2010 Transit Bus Procurements, provides for each fuel and supporting technology the state of the fuel/technology for potential transit application, emissions information, capital and operating cost information, impacts on operations and facilities, and other appropriate information (Friedman and DeCorla-Souza 2012). Mitigating fuel cost through service planning, fleet mix, efficient scheduling, quality maintenance, and purchasing are all strategies that can reduce the impact of volatile fuel prices.

On the capital side of costs, transit fleets are the most significant cost driver. Rural and small urban transit systems in Texas own and maintain more than 2,500 vehicles for use in public transit. Transit system fleets need to be maintained in a state of good repair to ensure safe and efficient operations, and fleets need to be replaced on a regular basis to keep vehicles safe and reliable and also to ensure life cycle maintenance costs are reasonable relative to new vehicle purchase costs.

Although the importance of cost management strategies in rural and small urban transit systems is easy to recognize, it is difficult for transit system managers and staff to stay up to date on the latest and best practices in cost management. Also, leadership and management staff at transit systems are often spread across various roles and tend to turn over frequently, which means that (a) there is often little time for current staff to dedicate to documenting and passing on cost management practices and procedures to other staff and (b) there is often little time for staff to dedicate to digging up resources from various guides or websites to help improve cost management. In fact, when the National Rural Transit Assistance Program (RTAP) surveyed rural and small urban systems about training needs and concerns, the top challenges included time management, managing human resources, and funding issues (Hough, Taleqani, and Lynch 2020). As such, it is critically important that any guidance and training materials targeting rural and small urban transit systems be designed in such a way that they can be easily understood and applied, and be easily available to transit system staff on their own terms and time. Interactive, self-paced online courses can be an excellent addition to any guidebook to help make guidebook material more consumable and to improve the use and retention of training materials.

Rural and small urban transit systems need approachable, easy-to-apply guidance and training materials for operational and capital cost management. This research provided cost-management guidance and training in the form of a guidebook, an instructor-led workshop, and an online course to better equip Texas transit systems in understanding, managing, and predicting operational and capital costs and to help them maximize every available dollar provided by federal, state, and local revenue sources.

CHAPTER 2: TEXAS RURAL AND SMALL URBAN TRANSIT SYSTEMS COST CONTROL NEEDS ASSESSMENT

Chapter 2 documents the research team's work under Task 2, Texas Rural and Small Urban Transit Systems Cost Control Needs Assessment. Chapter 2 is divided into the following sections:

- Texas Transit Systems Cost Driver Analysis.
- Cost Control Needs Survey.
- Transit Stakeholder Focus Groups.
- Summary of Needs Assessment Findings.

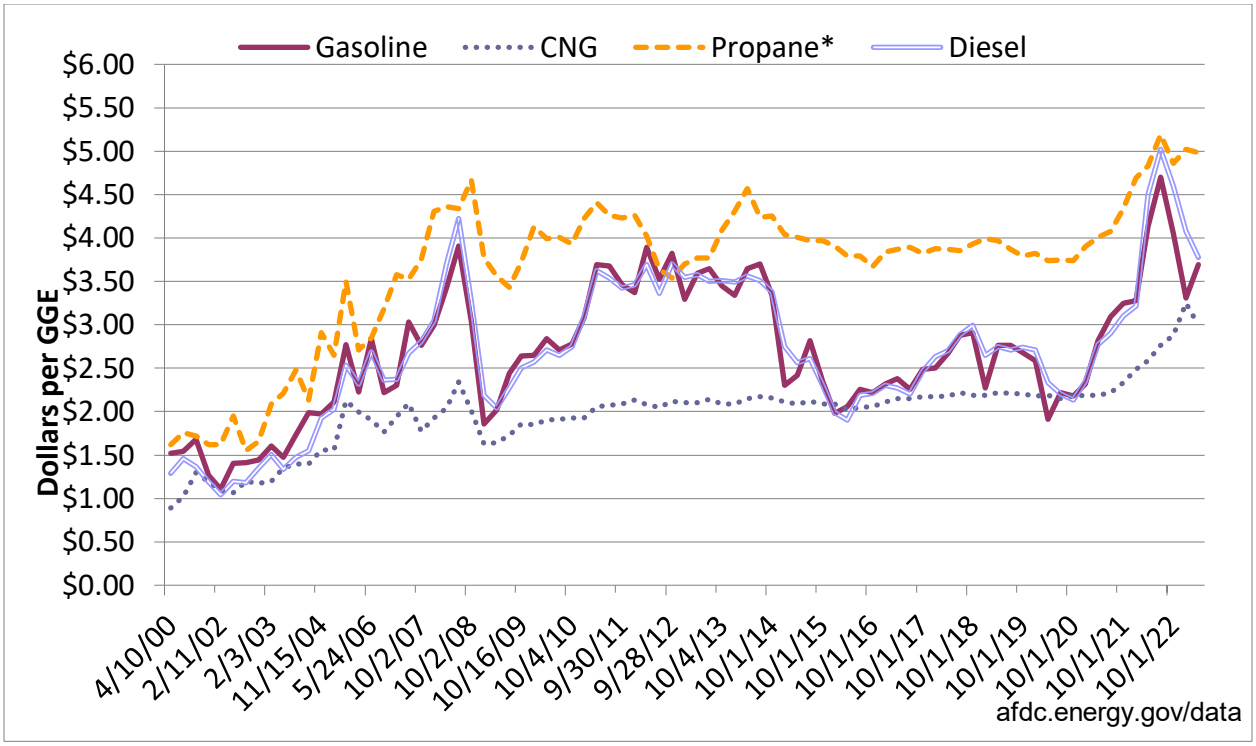
TEXAS TRANSIT SYSTEMS COST DRIVER ANALYSIS

A critical step in developing guidance for operational and capital cost management at rural and small urban transit systems is to first identify the main drivers of operational and capital costs. Costs that account for more of a transit system's operational or capital expenses will provide the most opportunity for cost savings from effective cost management.

Historically, labor and fuel are significant drivers of a transit system's operational budget. According to data collected in RMC 0-6694, *Guidebook: Managing Operating Costs for Rural and Small Urban Transit Systems*, salaries and wages were 44 percent of small urban and 52 percent of rural transit district operating costs (Edrington et al. 2014). Fringe benefits (which include health insurance) were the second highest driver of costs—20 percent for small urban and 14 percent for rural transit districts. The third highest driver of costs was fuel and lubricants at between 10 and 17 percent of operating cost. Together, these three classes of expense have represented approximately 75 to 83 percent of a transit provider's budget.

Another challenge facing transit systems is the volatility of costs. Many transit system costs are market driven. Although service and purchasing strategies can mitigate these costs, the base cost rate is determined outside of transit staff control. Fuel, labor, and health insurance are examples of factors that are difficult to control and affect transit operational costs.

Fuel costs can be volatile, which makes predicting and managing fuel costs difficult. For example, from 2020 to 2022, diesel prices have varied from almost $1.00 per gallon to $5.00 per gallon (see Figure 2.1). Gasoline prices have experienced similar variability.



GGE = gasoline gallon equivalent.
** Propane prices reflect the weighted average of "primary" and "secondary" stations. Primary stations have dedicated vehicle services and tend to be less expensive. Secondary stations are priced for the tanks and bottles market and tend to be more expensive.*
Data Source: (Alternative Fuels Data Center 2023).
Figure Source: (TxDOT 2024b).

Figure 2.1. Average Retail Fuel Prices in the United States

To identify the main cost drivers for Texas transit systems, the research team executed two separate analyses:

- Analyze operational and capital cost data reported by small urban transit systems to the National Transit Database (NTD).
- Analyze operational and capital cost data reported by rural systems using an Excel template.

Data Collection and Analysis Procedures

The research team analyzed cost data from FY 2017 to FY 2019. These years were chosen to avoid the unusual cost fluctuations caused by the COVID-19 pandemic, which affected FY 2020 through FY 2022, and because the analysis was performed in FY 2021. Although more recent cost data are available at the time of writing this report (e.g., FY 2023), the research team did not update the cost driver analysis due to FY 2023 only being one year of updated, post-COVID data and the undue burden such a request would put on rural transit systems. The research team has

no reason to suspect that the relative importance of different cost drivers has changed substantially since FY 2021.

The research team used different data collection methods for rural and urban systems because the expense reporting requirements for rural and urban transit systems are not the same.

Small urban transit systems in Texas are eligible to receive Federal Transit Administration (FTA) Section 5307 (urbanized area formula program) funds. As Section 5307 recipients, many small urban transit systems must report relatively detailed operational and capital cost data to NTD using forms specifically designed for Section 5307 recipients (also called "full urban reporters"). The research team downloaded and summarized NTD operational and capital cost data for Texas's small urban transit systems from FY 2017 to FY 2019. The analysis included only costs reported for directly operated services and excluded costs for purchased transportation services. Purchased transportation services do not have operational costs broken down by category and represent expenses that are not within the direct control of a transit system.

Rural transit systems in Texas are eligible to receive FTA Section 5311 (rural area formula program) funds. As Section 5311 recipients, rural transit systems must report operational and capital cost data to TxDOT using the PTN-128 online data collection tool so that TxDOT can submit the cost data to NTD. However, rural transit systems do not have to report the same level of detail as urban transit systems. To obtain detailed operational and capital cost data from rural transit systems, the research team created a cost data collection template using Microsoft Excel and asked rural transit systems to volunteer to provide three years of operational and capital cost data from FY 2017 to FY 2019. The data collection template contained the same operational and capital cost categories as NTD, making it possible to combine the urban NTD data with the self-reported rural data collected via the template. (Appendix A contains examples of operational and capital data collected by the template.) Although the research team requested volunteers from all Texas rural transit systems, only two systems provided the requested data. One of the rural systems that reported data did not have FY 2017 data available, and both rural systems did not assign a cost to paid absences.

Operational Cost Drivers

Table 2.1 displays, for each operational cost category, the percentage of total operational costs attributed to the category. (The percentages are calculated as the cost category value divided by the total operational cost.) As expected, the largest operational cost category is labor, accounting for between 68 percent and 71 percent of operational costs over the three fiscal years. The most significant category within labor costs was operator[3] pay, which excludes fringe benefits for operators. Operator pay accounted for a total of 29 percent of operational expenses over the

[3] The term operator refers to a person who drives and operates transit vehicles in revenue service.

three-year analysis period. Fringe benefits were also a notable cost category, accounting for 20 percent of operational costs over the analysis period.

Non-labor expenses accounted for around 30 percent of transit system operational costs in the analysis period, with services, fuel and lubricants, and other materials and supplies as the top three non-labor cost categories. The services category includes work provided by outside parties (not purchased transportation), for example, studies by consultants, payments for auditors, software licenses, and other similar expenses. The other materials and supplies category includes materials and supplies (excluding fuel and lubricants or tires and tubes) that are issued from inventory or purchased for immediate consumption; examples include vehicle maintenance parts, cleaning supplies, and office supplies.

Table 2.1 Operational Cost Drivers of Texas Rural and Small Urban Transit Systems FY 2017 to FY 2019

Group	Operational Expense Category	FY 2017	FY 2018	FY 2019	Total[1]
Labor	Operators' Salaries & Wages	28%	27%	27%	27%
	Operator Paid Absences[2]	0%	3%	2%	2%
	Total Operator Pay	**28%**	**30%**	**29%**	**29%**
	Other Salaries & Wages	18%	19%	21%	19%
	Other Paid Absences[2]	0%	2%	2%	2%
	Total Other Pay	**18%**	**22%**	**23%**	**21%**
	Fringe Benefits	21%	19%	19%	20%
	Total Labor	**68%**	**71%**	**71%**	**70%**
Non-Labor	Services	12%	13%	13%	12%
	Fuel & Lubricants	9%	10%	9%	9%
	Tires & Tubes	1%	1%	1%	1%
	Other Materials & Supplies	9%	4%	4%	6%
	Utilities	2%	2%	2%	2%
	Taxes	0%	0%	0%	0%
	Total	**100%**	**100%**	**100%**	**100%**

Sources: Urban operational costs obtained from NTD and include the costs reported for directly operated services only. Rural operational costs were self-reported by two rural transit systems using a data collection template developed by the research team.

[1] The total represents the sum of all three fiscal years.

[2] Paid absences were not assigned a cost by the reporting rural transit systems. Also, there were no paid absence expenses reported to NTD by urban systems in FY 2017.

In summary, the operational cost data indicated that the products would need to address the following operational cost drivers in order to provide rural and small urban systems with the most potential benefit:

- Labor costs, in general, and especially operator pay and fringe benefits.
- Services.

- Fuel and lubricants.
- Other materials and supplies.

Capital Cost Drivers

Table 2.2 displays, for each capital cost category, the percentage of total capital costs attributed to the category. (The percentages are calculated as the cost category value divided by the total capital cost.) As expected, the largest capital cost category is revenue vehicles, accounting for between 58 and 75 percent of capital costs over the three fiscal years. Passenger stations were the next significant capital cost category. Buildings (administration and maintenance) and communication and information systems were consistent yet relatively small categories, accounting for an average of 3–4 percent of capital costs over the three-year period.

Table 2.2 Capital Cost Drivers of Texas Rural and Small Urban Transit Systems FY 2017 to FY 2019

Capital Expense Category	FY 2017	FY 2018	FY 2019	Total[1]
Guideway	0%	13%	0%	4%
Passenger Stations	11%	5%	10%	9%
Administration Buildings	5%	7%	2%	4%
Maintenance Buildings	4%	2%	4%	3%
Revenue Vehicles	72%	58%	75%	69%
Service Vehicles	1%	0%	1%	1%
Fare Revenue Collection Equipment	0%	0%	1%	0%
Communication & Information Systems	2%	5%	2%	3%
Other	4%	9%	6%	6%
Total	**100%**	**100%**	**100%**	**100%**

Sources: Urban capital costs obtained from NTD and include the costs reported for directly operated services only. Rural capital costs were self-reported by two rural transit systems using a data collection template developed by the research team.

[1] The total represents the sum of all three fiscal years.

In summary, the capital cost data indicate the products mostly needed to address the management of revenue vehicle capital costs. Some guidance on passenger stations (including bus stops), facilities, and communication and information systems could also be beneficial for Texas transit systems; however, their content should be limited when compared to vehicle capital costs.

COST CONTROL NEEDS SURVEY

Another method to understand the cost management needs of Texas rural and small urban transit systems is to ask them directly. The research team performed a cost control needs survey that was sent to the transit agencies that operate service in Texas's rural and small urban transit districts. The survey took about five minutes to complete and contained three sections:

- Top-rated cost drivers.
- Tools and help for cost management.
- Knowledge management and staff training.

The research team designed the survey and coded the survey into the online survey tool, Qualtrics. Research team members pilot tested the survey prior to the survey being released. (Appendix B contains a Word version of the online survey.)

At the time the survey was administered, there were 57 rural and small urban transit districts in Texas (36 rural and 21 small urban). The 36 rural districts were managed by 36 different transit agencies, eight of which also operated at least one urban district (referred to as a *dual* agency). Nine of the 21 small urban transit districts were operated by dual agencies. Accounting for stand-alone and dual agencies, the research team sent the survey to 48 transit agencies (these 48 agencies operated 57 rural and small urban districts). Dual agencies were asked to represent their combined rural and small urban experiences into a single survey response rather than responding twice to the survey.

The research team obtained the names and emails for directors or managers of the 48 agencies from its existing contact lists and distributed the survey in November 2021. (Appendix C contains the invitation email.) The research team sent two reminder emails. Thirty-one participants (64.6 percent) started the survey, but only 26 (54.2 percent) completed the survey with valid and complete responses:

- 14 rural agencies.
- 7 small urban agencies.
- 5 dual agencies.

The participants operated a wide variety of transit modes, with most of the participants operating directly operated service (i.e., transit agency employees operate the vehicles). Table 2.3 displays modes operated by survey participants, including the percentages and counts of agencies that directly operate or purchase service for each mode.

Table 2.3 Survey Participant Modes Operated

Service Mode	Directly Operate Percentage	Directly Operate Count	Purchase Service Percentage	Purchase Service Count	Total Count
Local bus (fixed route)	100.0%	11	0.0%	0	11
Americans with Disabilities Act (ADA) Paratransit	83.3%	10	16.7%	2	12
Alternative service for ADA paratransit customers (e.g., taxi/TNC-subsidy program)	0.0%	0	100.0%	2	2
Deviated fixed route (flexible route)	100.0%	3	0.00%	0	3
Commuter/express bus	100.0%	4	0.00%	0	4
General public demand response	85.7%	18	14.3%	3	21
Sponsored human service agency transportation	100.0%	9	0.0%	0	9
Limited eligibility demand response (e.g., only for seniors or people with disabilities)	75.0%	3	25.0%	1	4
On demand microtransit	100.0%	1	0.0%	0	1
Vanpool	0.0%	0	0.0%	0	0

Note: Participants can operate multiple modes.

Top-Rated Cost Drivers

The survey presented participants with a list of operational cost categories and asked participants to select and rank the five operational cost drivers that are most critical for effective cost management. The entire list of operational cost categories is shown in the full survey in Appendix B. Table 2.4 displays the operational cost categories ranked by their average ranking score.[4] A one indicates that the cost category was, on average, ranked higher than all other cost categories. Only cost categories that were ranked by 25 percent or more of the question's respondents are included in the table.

[4] The average ranking score is calculated by averaging the ranks given to the cost category.

Table 2.4 Ranked Operational Cost Categories by Agency Type

Operational Cost Category	Rural (*n* = 11)	Small Urban (*n* = 7)	Dual (*n* = 5)
Operator Salaries & Wages	1	1	1
Other Salaries & Wages	2	3	2
Fuel and Lubricants	3	7	3
Fringe Benefits	4	4	4
Maintenance Contracts	5	—	—
Insurance (General, Vehicle)	6	5	—
Utilities and Telecommunications	7	—	—
Professional and Technical Services (e.g., Training)	—	—	5
Operations Contract/Purchased Transportation	—	2	—
Parts	—	6	—
Vehicle Equipment, Office Equipment, & Administrative Supplies	—	8	—

Note: The values in the table represent the rank of the cost category based on the average ranking score. A rank of 1 indicates that the cost category had the highest average ranking score.
— indicates that the cost category was not ranked by any survey respondent of the agency type.

In general, there was significant agreement in the most critical operational cost drivers among the different agency types. All three agency types had the following three categories ranked as a top-five cost driver:

- Operator salaries and wages.
- Other salaries and wages.
- Fringe benefits.

Rural and dual agencies included fuel and lubricants and insurance in their top five, but, for small urban agencies, purchased transportation contracts, insurance, and parts were ranked higher than fuel and lubricants.

The survey also presented participants with a list of capital cost categories and asked participants to select and rank the five capital cost drivers that are most critical for effective cost management. The entire list of capital cost categories is shown in the full survey in Appendix B. Table 2.5 displays the top capital cost categories ranked by their average ranking score. Only cost categories that were ranked by 25 percent or more of the question's respondents are included in the table.

Table 2.5 Ranked Capital Cost Categories by Agency Type

Capital Cost Category	Rural (*n* = 11)	Small Urban (*n* = 6)	Dual (*n* = 5)
Revenue Vehicles	1	1	1
Administrative/Operational/Maintenance Facilities	2	2	4
Technology (Hardware and Software)—Facility & In-Vehicle	3	4	2
Telephone System	4	—	—
Maintenance Equipment	5	5	3
Fare Boxes	—	2	—
Passenger Facilities/Bus Stops	—	6	—

Note: The values in the table represent the rank of the cost category based on the average ranking score. A rank of 1 indicates that the cost category had the highest average ranking score. For small urban agencies, two items were tied at rank 2.
— indicates that the cost category was not ranked by any survey respondent of the agency type.

In general, there was significant agreement in the most critical capital cost drivers among the different agency types. All three agency types had the following cost drivers in at least one of the top five positions:

- Revenue vehicles.
- Facilities (administrative, operational, and maintenance).
- Technology (hardware and software).
- Maintenance equipment.

Fare boxes and passenger facilities/bus stops were only ranked as critical capital cost drivers for small urban agencies.

Tools and Help for Cost Management

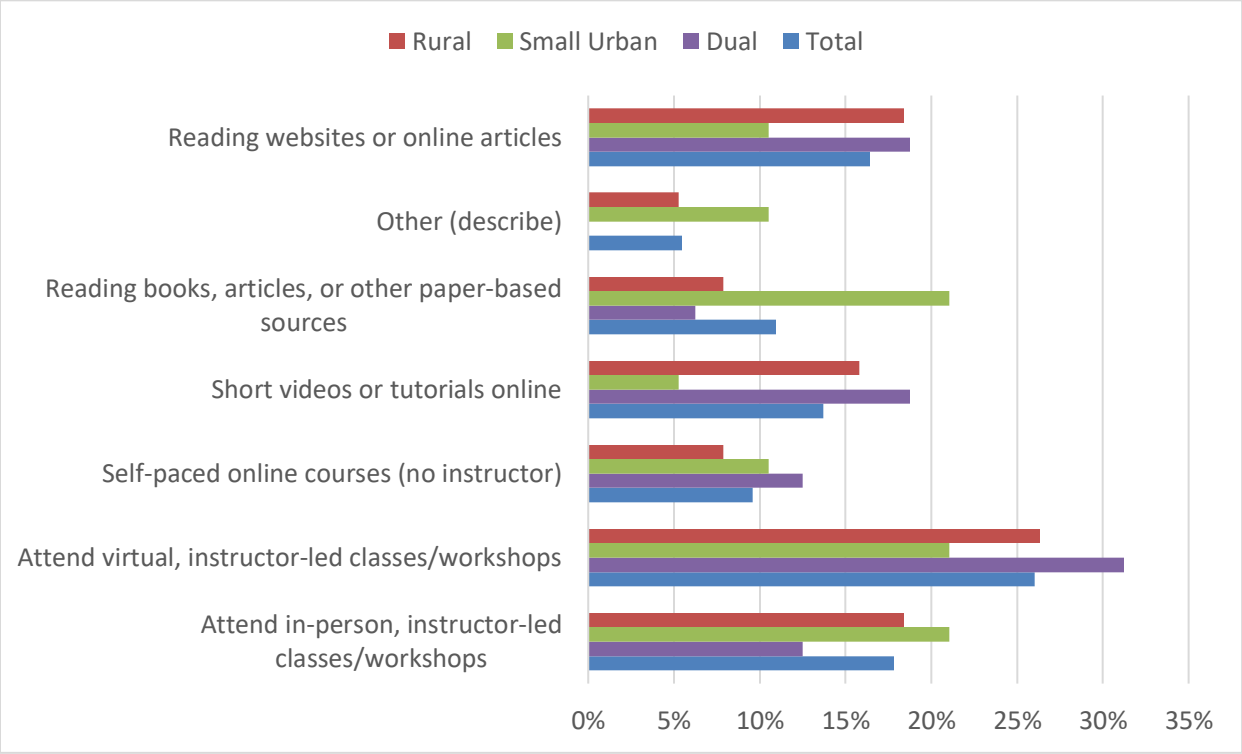
In addition to the ranking questions, the survey asked participants to describe for which cost drivers more help and guidance is needed and what tools would help the participants better manage critical cost drivers. Although very few responses were provided, a few themes emerged. In particular, help and guidance related to managing operators is needed—especially in the areas of managing turnover and hiring, benefits, salaries and wages, and overtime. Another theme was the challenge of managing fuel and insurance costs—which are often outside of a transit agency's direct control.

Regarding helpful tools for managing costs, a handful of participants reported having all the tools they needed; however, the remaining participants suggested a few helpful tools or templates:

- Templates to calculate and compare service costs per hour, mile, and trip.
- Information sharing to help transit agencies see how other systems manage their services and costs.
- Tools to calculate potential cost savings associated with service and/or maintenance contracts.
- Tools to help forecast fuel costs.
- Tools to help breakdown costs for drivers and operations of different types of vehicles.

Staff Training

Last, the survey asked participants about how staff obtain training or information from outside the transit agency—including what methods staff currently use to obtain training and what methods would be best. Figure 2.2 displays the methods currently used by all agency types. The percentages shown in the figure are the number of participants from each agency type that selected the method divided by the number of participants from each agency type that responded to the question.



Note: Participants could select multiple methods.

Figure 2.2 Current Methods for Obtaining Training

As seen in the figure above, all agency types tend to attend instructor-led classes or workshops (in-person or virtually) as their main method for obtaining training, with virtual instructor-led classes or workshops being more commonly used than in-person. Self-paced courses were not commonly used.

When participants were asked about what methods would be *best* for staff to obtain knowledge and information regarding transit cost management, a somewhat similar picture appears. The survey asked participants to rank potential training methods, and Table 2.6 displays training methods ranked by their average ranking score.

Table 2.6 Rankings of Best Cost Management Training Methods by Agency Type

Method	Rural (n = 14)	Small Urban (n = 6)	Dual (n = 5)
Attend in-person, instructor-led classes/workshops	1	1	2
Attend virtual, instructor-led classes/workshops	2	2	1
Short videos or tutorials online	3	3	4
Self-paced online courses (no instructor)	4	4	2
Reading websites or online articles	5	6	5
Reading books, articles, or other paper-based sources	6	4	6

Note: The values in the table represent the rank of the training method based on the average ranking score. A rank of 1 indicates that the training method had the highest average ranking score. For small urban agencies, two items were tied at rank 4. For dual agencies, two items were tied at rank 2.

For all agency types, instructor-led training was the highest-ranked, placing first or second out of all methods. Online videos, tutorials, and self-paced courses were ranked next. Reading materials—whether online or in print—were ranked last.

Two key takeaways emerge from the training method section of the survey:

- Instructor-led training currently is the most commonly consumed training method and remains the best method for obtaining knowledge and information regarding cost management.
- Although online videos, tutorials, and self-paced courses are not often used by transit agencies (see Figure 2.2), these methods were perceived favorably by participants (more favorably than paper-based resources).

TRANSIT STAKEHOLDER FOCUS GROUPS

The research team conducted two focus groups with Texas transit systems: one with rural agencies, and one with small urban agencies. The focus groups provided the research team with a qualitative assessment of the cost control and knowledge management needs of Texas transit systems. Although discussion in the focus group was largely driven by the attendees, the discussion framework included the following topics:

- Operational costs.
- Capital costs.
- General questions about cost allocation.
- Miscellaneous questions based on survey comments.
- Needs for learning.

In both focus groups, most of the time was taken up by discussion of operational and capital costs as well as discussion of learning needs. Very little time was available to discuss cost allocation and the miscellaneous questions based on survey comments.

The rural focus group was attended by six representatives from rural transit providers, two TxDOT public transportation coordinators (PTCs), and two research team members. The small urban focus group was attended by five representatives from small urban transit providers, one TxDOT PTC, and two research team members.

Operational Cost Discussion

Labor Costs: Pay, Turnover, Overtime, and Benefits

Both the rural and small urban focus groups discussed the challenges of managing costs associated with labor, including pay, turnover, overtime, and benefits. The discussion of labor costs tended to center on operators because they are the largest group in the transit workforce.

Transit systems are still struggling with staff losses and high rates of turnover that were exacerbated by the COVID-19 pandemic. Interestingly, many transit systems paid premiums and bonuses during the pandemic (e.g., a hazard bonus for continuing to drive during the pandemic), and some operators came to expect this additional income. Several attendees reported increasing operator pay to remain competitive with other jobs. Competition for employees is currently very high, and drivers may be enticed to work for the energy sector, retail, and other employers because those employers have been ratcheting up starting pay and incentives to attract workers to fill their vacancies.

Some transit systems are challenged by not having much flexibility in setting pay rates. Transit systems that are departments of larger umbrella organizations (e.g., a city or county government or a council of governments [COG]) often must follow the job classification and pay systems

established by those umbrella organizations. While government entities may have more attractive benefits packages, several transit systems reported that—especially for younger employees—the pay rate, and not benefits, was the most important element of compensation.

The amount of turnover—especially with operators—was also discussed as a long-term cost control challenge that has recently become very problematic. Operator turnover not only is an inconvenience but also generates costs associated with:

- Filling the vacant operator position's shifts with other operators being paid overtime.
- Recruitment and hiring (advertising, attending job fairs, screening applicants, and conducting background checks and pre-employment drug tests).
- Onboarding, training, and testing.

The Southwest Area Regional Transit estimated the cost to replace a driver to be around $7,000. Other transit systems did not have this estimate but found the idea of producing an estimate very useful—not only to understand the cost of turnover but also to justify spending money to decrease turnover (e.g., by increasing pay or distributing bonuses).

Other transit systems instituted other methods to decrease operator turnover—especially to decrease the frequency of employees getting trained and then immediately leaving. Many transit systems provide paid training and even cover the cost of getting a commercial driver's license (CDL). However, if operators leave shortly after getting their CDLs, the transit system loses its investment. Some systems reported increasing their probationary periods to try to curtail operators leaving after training. Several of the systems reported having policies that require operators to pay back the costs associated with getting their CDLs if operators leave before their probationary period ends. Attendees generally agreed that the operators that stay three to six years tend to stay long term. So, a key element to reducing turnover is to focus retention efforts on new employees with low tenure (without, of course, being unfair to longer-tenured employees).

In some cases, transit systems have driving positions that do not require a CDL. Non-CDL driving positions can potentially have lower hourly pay rates than CDL driving positions, both because the qualifications are reduced for non-CDL positions and because the competition for non-CDL drivers is less. A 2021 survey of rural transit systems conducted by the Texas Transit Association (TTA) found that the starting rate for non-CDL operators was between $11.35 and $15.00, while the starting rate for CDL operators was between $11.30 and $18.80 (TTA 2021). Even a small difference in the hourly rate for non-CDL operators may produce significant cost savings once the number of hours and overtime hours are considered. However, one attendee reported that the savings they experienced from non-CDL operators was negligible.

Overtime management was another topic discussed by focus group attendees. Most of the attendees reported having some form of overtime management process in place by which

overtime costs are regularly monitored and managed. The processes varied widely; however, the management of *unscheduled* overtime (i.e., overtime not built into operators' schedules) was paramount.

Last, fringe benefits were discussed—especially by the small urban focus group. Fringe benefits were a major cost driver from the Texas transit cost control needs survey. Managing the costs of fringe benefits like retirement and health insurance can be very difficult. (For purposes of this report, the term *health insurance* will be used to cover the whole variety of health-oriented insurance benefits like health, dental, prescription, and vision.) For transit systems that are part of a larger governmental entity, there is not much flexibility or active management of fringe benefit costs because the larger government entity typically manages the fringe benefits for all employees, including the transit employees. However, for transit systems that do have to manage fringe benefits on their own, different strategies are employed. Frequent "shopping around" can be especially important—comparing rates and even regularly putting out a request for proposals can help drive down the cost of benefits. However, several attendees were quick to relate that price is not the only factor that should determine the health benefit provider. Also, the Texas Municipal League (TML) operates a health benefits pool (https://www.tmlhealthbenefits.org/Default.aspx) that is open to most political subdivisions of the Texas. Several of the focus group attendees reported using TML health, and they were happy with the costs, benefits, and service provided. However, there was some uncertainty regarding TML health eligibility for transit systems that were contracting out service or for transit systems that were non-profit community action agencies instead of being members of a municipal government.

Most of the attendees reported providing some form of retirement benefit (e.g., a pension plan or 401k). Although generally recognized as beneficial, the benefit of these programs on attracting younger workers was questionable.

Fuel

Another focus of the discussion centered on managing costs associated with fueling revenue vehicles.

The specific challenges and strategies to manage fuel costs were significantly different between rural and urban transit systems. Rural transit systems, because of their larger geographic service area, often do not have a single or small number of centralized bus garages, where on-site fueling could take place. Instead, rural transit systems tend to use fleet fuel cards (e.g., Fuelman), which provide them with a discount on the market price, freedom to fuel at any participating retail location, and fuel usage tracking and reporting. One rural system reported a 40 percent savings in weekly fuel expenses after switching to a fleet fuel card. In some cases, a fuel card program may have a limited number of participating retailers, so it is important that transit systems understand the availability of fueling sites and that transit systems ensure that operators fuel their vehicles at

the participating locations. At one transit system, operators were entered into monthly drawings for a $50 gift card if they fueled their vehicles at participating locations. This incentive system was highly effective and was able to be phased out over time with no loss in operators using the right fueling locations.

Discussion also included a couple of potential savings ideas that may deserve additional exploration—including establishing a statewide fuel card and partnering with TxDOT districts, all of which likely have their own centralized fueling facilities for TxDOT vehicles. These ideas were explored by the research team as the project progressed.

For urban transit systems, the challenges of fuel cost management were different because the small urban transit systems all reported having a centralized fueling station—either owned by the transit system or by the city or county government in which transit was a department. In these cases, fuel cost management is more a function of controlling use by (a) ensuring that the service is as effective as possible (i.e., having low miles per passenger trip), (b) ensuring that vehicles are fuel efficient and are driven to reduce fuel consumption, and (c) ensuring that the overall fleet mix in terms of vehicle size and fuel type results in optimized fuel consumption. Some of the small urban attendees had fuel management systems to help monitor and control fuel dispensing and usage (e.g., VeederRoot); however, the prevalence of these systems across Texas remains uncertain.

In summary, managing fuel costs can be broken into two main groups of strategies:

- Manage the unit cost: strategies could include implementing fuel card programs and purchasing bulk fuel.
- Manage consumption: strategies could include using smaller, more fuel-efficient vehicles; training operators to improve their fuel efficiency; optimizing routes and schedules of both fixed-route and demand-responsive service; and monitoring fuel consumption to eliminate fraud and misuse.

Insurance

Insurance (i.e., workers' compensation, property, and liability) was another key operational cost driver discussed by both the rural and small urban focus groups. Again, TML offers an intergovernmental risk pool for these insurances. Several focus group attendees reported using TML for at least some insurance needs. Attendees agreed that there is a need for better coordination among transit systems—especially those who cannot benefit from TML's risk pools—to help lower insurance costs.

Bus Route Planning

In the small urban focus group, the research team prompted attendees to discuss their efforts to optimize their fixed bus routes. Most of the attendees either recently conducted or currently are

conducting a network redesign study to take a wholistic look at their bus routes and identify opportunities for savings and service improvements. All small urban attendees recognized the importance of both frequently evaluating their routes and regularly taking a big-picture assessment of their services. However, the attendees reported it can be difficult to make even small changes to routes—especially if these changes will remove service from someone or cause a major inconvenience for some current riders.

None of the small urban attendees have yet seriously examined microtransit as a potential mechanism to replace unproductive fixed routes.

Demand Response Costs

In the small urban focus group, the research team prompted attendees to discuss their efforts to manage the costs of demand responsive service. (At small urban transit systems, demand responsive service was usually complementary ADA paratransit.) Most of the attendees did not have problems with no-shows or late cancellations. Instead, cost management was mainly in the form of efficient scheduling and proactive dispatching. It was recommended that dispatchers stay on top of the service in real time, consistently communicating with operators and making sure every vehicle and operator is used to its full potential. In some cases, adding sponsored service (e.g., Medicaid non-emergency medical transportation [NEMT]) has helped improve vehicle utilization and service productivity.

Vehicle Maintenance

Focus group attendees also discussed vehicle maintenance and fleet management practices that help control costs. Attendees discussed the importance of a robust preventative maintenance and inspection program, analyzing the usage and reliability of specific parts, and balancing vehicle usage so that newer vehicles accrue more mileage and older vehicles accrue less. Some attendees discussed how their vehicle maintenance information systems have helped both improve performance monitoring and reduce long-term maintenance costs by providing better data about vehicles and their maintenance history.

Several rural transit systems do not have in-house mechanics, meaning that maintenance is done by the repair shops closest to wherever the vehicle is located. One attendee reported partnering with another transit system in the region to have it perform vehicle maintenance. However, it is important that, if outsourcing maintenance to other entities, expectations regarding the timeliness of repairs are understood and documented. Otherwise, the transit system's vehicles could receive a lower priority than other vehicles needing repairs. Other attendees reported having in-house mechanics travel to vehicles to perform maintenance, rather than bringing vehicles to a centralized location.

Rural attendees reported having some difficulties obtaining specialized maintenance like air conditioning and wheelchair lift repairs.

Finally, the importance of parts inventory management was also discussed. Effective parts management not only helps ensure that enough parts are on hand, reducing vehicle downtime, but also helps monitor parts' usage rates, identifying potentially defective parts or even employee malfeasance.

Capital Costs

Revenue Vehicles

Both focus groups specifically discussed the challenges of managing revenue vehicle replacement costs—the main capital cost driver for transit systems in Texas. The current vehicle shortage was discussed at length by both focus groups. Attendees reported that new vehicles may have a lead time of two or more years—a backlog caused by many factors, including the shortage of low-floor vehicle chassis. The shortage of vehicles for fleet replacements may make it more likely for transit systems to explore options for fleet rehabilitation programs.

Notwithstanding the vehicle shortage, attendees reported the need to coordinate vehicle procurements and to take advantage of cooperative purchasing instruments such as SmartBuy and the Oklahoma Buy Board. In some cases, rural and small urban transit systems were able to participate in purchases being made by larger transit agencies to help keep vehicle costs down.

Another way to manage the capital costs of revenue vehicles is to optimize the fleet mix to include right-sized vehicles based on services provided and ridership demand. For example, in some regions, a mix of sedans, minivans, and cutaways may be optimal. Smaller, more mass-produced vehicles tend to be cheaper than larger, more transit-oriented vehicles. However, with increased fleet variety comes the additional challenge of a mix of parts and maintenance practices. Most focus group attendees agreed that, even if different vehicle types are in the fleet, it is usually desirable to standardize on one or two vehicle manufacturers for each type. This helps to reduce parts and maintenance complexity.

Farebox Equipment

Small urban systems briefly discussed some of the capital cost challenges associated with fareboxes. Fareboxes can range in cost between $20,000 and $30,000 per electronic registering farebox, which is quite expensive for a small system. In addition to the cost of the farebox itself, electronic fareboxes typically require back-end technology and network systems, which also add to the cost. One attendee, from Amarillo, reported still having non-registering fareboxes.

Some agencies that stopped collecting fares during the pandemic may be carefully considering going fare free—especially compared to the cost of a fare system upgrade.

Training Methods

The final topic discussed during the focus groups was methods for presenting and sharing the cost management guidance that will be developed through this project with the rural and small urban transit systems in Texas. Most attendees agreed about the value of instructor-led workshops—not only for transfer of knowledge but also for the opportunity to learn from other transit systems. Another desired element for a workshop is for the workshop to be repeated and repeatable. First, there is significant turnover at Texas transit systems—even in the administrative and leadership positions. There will be a regular, ongoing need to continue the training to ensure that new staff can attend the workshop. Also, as reported by one attendee, attending the workshop multiple times can really benefit. Although a lot of information can be gleaned from a first time through the workshop, repeating the workshop, perhaps after a year or two of on-the-job experience, can really help drive home the workshop's content.

Some attendees expressed interest in short videos, like the Transit and Paratransit Company's bus driver training courses. All attendees recognized the importance of being able to access and receive the training using multiple methods and platforms—increasing the number of users who could benefit.

A few additional key needs emerged from the discussion about training:

- Training materials should be free from acronyms and transit lingo (or at least have these clearly and easily defined).
- Training materials should be searchable using plain English words and phrases.
- Guidance should be kept up to date, and there should be a way to inform users when materials are updated.
- All rural and small urban transit system staff and their PTCs should be aware of the available guidance.
- Transit managers and administrative staff in various roles should be trained.
- PTCs should also be trained.

Although specific tools or templates were not discussed at length, some attendees recommended some potential tools and templates:

- A cost management performance measures template that includes measures for cost efficiency, cost effectiveness, overtime tracking, etc.
- A tool to calculate the fully loaded cost of replacing a bus operator.
- A tool to help calculate the potential costs and benefits of different fleet mixes.
- A tool to help calculate the potential costs and benefits of using non-CDL operators vs. CDL operators.

SUMMARY OF NEEDS ASSESSMENT FINDINGS

Several key findings emerged from the cost control needs assessment:

- **Labor costs:** Labor costs (i.e., wages, salaries, and fringe benefits) are the main cost driver for rural and small urban transit systems and can be very difficult to manage. Transit systems will likely benefit from guidance and helpful tools to help control labor costs—especially the costs associated with operators.
- **Insurance:** Insurance is another notable cost driver—transit systems may benefit from guidance to help control insurance costs, especially through engaging in shared risk pools to reduce insurance rates.
- **Fuel:** Fuel costs can be difficult to manage—especially when transit systems have very little control over fuel unit prices. However, there are programs and practices that may help decrease the unit cost of or decrease the consumption of fuel, reducing fuel expenses.
- **Service optimization:** A key aspect of controlling costs is optimizing service provided through efficient fixed-route design and scheduling and through careful and proactive demand response scheduling and dispatching. When transit services are optimized, all the variable costs associated with providing service (e.g., labor, fuel, and parts) can be better managed.
- **Vehicles:** Effective vehicle maintenance, fleet management, and fleet planning is important for extending vehicle life, reducing vehicle life cycle maintenance costs, and reducing the capital costs associated with vehicle replacements. The current vehicle shortage may create additional operational costs for transit systems and may increase the complexity of vehicle procurements and fleet planning. Transit systems may benefit from additional guidance on these topics.
- **Facilities:** Although administrative, operational, and maintenance facilities were reported in the survey as a significant capital cost driver, focus group attendees did not express much desire for additional guidance and/or strategies to manage facility capital costs.
- **Training methods:** Instructor-led training (both in-person and remote) appears to be the most effective and most desired method for training rural and small urban transit systems on cost management. Online resources such as short videos and self-paced courses were the next most effective. Static, paper-based resources appear to be the least effective and desired. Rural and small urban transit systems want resources that are easy to use, easy to search, and easy to access. They also want the training and guidance materials to be up to date and to support not only transit system staff but also TxDOT PTCs.

CHAPTER 3: NATIONAL INDUSTRY AND LITERATURE SCAN AND CASE STUDIES

In order to better inform the knowledge transfer products to be created under this project, the research team performed Task 3, National Industry and Literature Scan and Case Studies. The goal of work performed under this task was to determine what, if any, existing cost management training and guidance resources exist, and to look nationally at cost-efficient transit systems to identify potential practices that could help Texas rural and small urban transit systems with cost management. Chapter three documents the research team's work under Task 3 and contains the following sections:

- Inventory of Existing Transit Cost Management Materials.
- Case Studies with Highly Cost-Efficient Entities.
- Summary of Findings.

INVENTORY OF EXISTING TRANSIT COST MANAGEMENT MATERIALS

The research team collected, summarized, and evaluated existing articles, manuals, guidebooks, and other materials related to transit operational and capital cost management. In general, existing guidance for operational and capital cost management at rural and small urban transit systems was found to be relatively scarce. Table 3. contains all the sources the research team reviewed under Task 3. (The sources are sorted in descending order by year of publication and then in ascending order by title.) Brief summaries of each source can be found in Appendix D. During product development, the research team added a few other resources to its list of sources—especially to corroborate or update sources and to gather additional, helpful reference materials. Those other resources are listed in the guidebook, as appropriate.

Table 3.1 Sources Reviewed

Title	Author(s)/Organization	Year Published	Summary of Topics Discussed
7 Strategies for Managing Operating Costs for Rural Public Transit	National Express Transit	2022	This source is a blog post by a private fixed-route and paratransit operator. It is about factors that contribute to effective management of operating costs.
BC Transit announces details of its coming electronic fare collection system	Mass Transit	2022	This source is an article by *Mass Transit*'s editorial staff. It identifies anticipated benefits of British Columbia (BC) Transit's new electronic fare collection system.
Transit Fares Only Partially Cover Public Transportation Costs	Government Technology	2022	This source is an article about the extent to which transit fares cover costs. It mentions techniques that agencies have used to reduce costs.

Title	Author(s)/Organization	Year Published	Summary of Topics Discussed
The Dollars & Sense of Free Buses	Baxandall, P./Massachusetts Budget & Policy Center	2021	This is a think tank report on fare-free transit. It argues that fare-free transit is "more efficient, faster, and more convenient."
Want more riders, better service, and lower expenses? See how this town is achieving all three.	Via Transportation, Inc.	2021	This source is an article by a private on-demand operator. It reports the experiences of the City of Gainesville, GA, and Hall Area Transit in replacing three underperforming fixed bus routes with microtransit service.
Fundamental Financial Management Training for Rural Transit Providers	National Rural Transit Assistance Program (National RTAP)	2020	This source is a manual that accompanies a training course on improving the financial management practices of rural, small urban, and tribal transit agencies.
Promising Practices Guidebook: Transit Technology Adoption	National Center for Applied Transit Technology	2020	This guidebook provides overviews of 10 "promising" transit technology practices, some of which could reduce costs.
Transit Asset Management: FTA Should Clarify Performance Data and Develop a Plan to Guide Future Program Improvements	U.S. Government Accountability Office (GAO)	2020	This is a report containing GAO recommendations for coordination of transit asset management plans.
West Virginia Division of Public Transit Group Asset Management Plan	West Virginia Division of Public Transit	2018	This is a "group" transit asset management plan prepared by the State of West Virginia.
Asset Management Guide for Small Providers: Focusing on the Management of Our Transit Investments	C. Roberts, T. Batac, and M. Akofio-Sowah	2016	This is an FTA guidebook about asset management that is targeted to small transit agencies.
Strategy Guide to Enable and Promote the Use of Fixed-Route Transit by People with Disabilities	Thatcher, R. and Ferris, C.	2013	This is a TCRP publication containing information and strategies relevant to facilitating the use of fixed-route transit by individuals with disabilities.
Guidebook for Evaluating Fuel Purchasing Strategies for Public Transit Agencies	D. Friedman and K. DeCorla-Souza	2012	This is a TCRP publication about fuel price risk management and relevant purchasing strategies.

Title	Author(s)/Organization	Year Published	Summary of Topics Discussed
Estimating Soft Costs for Major Public Transportation Fixed Guideway Projects	AECOM, D. Schneck, A. Touran, Raul V. Bravo + Associates, Inc., and Sharp & Company	2010	This is a TCRP publication about soft costs of fixed-guideway projects.
Dispatching Demand Response Transit Service: Maximizing Productivity and Service Quality Guidebook: Final Report	S. Edrington and J. Arndt	2009	This report is about improving the productivity of demand-response transit services via dispatching strategies.
Transit Vehicles for Small Urban and Rural Public Transportation Systems in Texas	TxDOT	2007	This is a white paper about mixed-vehicle transit fleets.
Useful Life of Transit Buses and Vans	Laver, R., D. Schneck, D. Skorupsi, S. Brady, and L. Cham	2007	This is an FTA report about the minimum service life of transit vehicles.
Capital Planning for Small and Medium-sized Transit Systems	DMJM+Harris and AECOM	2006	This is a guidebook about capital asset planning prepared for the Pennsylvania Department of Transportation.

Potentially relevant in-progress research projects at time of the literature scan included the following:

- NCHRP 23-04: Statewide Insurance Pooling for Public Transit (http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4785).
- TCRP F-28: Practitioner's Guide to Bus Operator Workforce Management (http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4887).[5]
- TCRP Synthesis SG-20: Performance Metrics in Third Party Contracts for Bus Operations and Maintenance (https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=5177).[6]

Collectively, the reviewed sources provide relevant background information, examples of specific cost management techniques, and relevant best practices. The sources identify concerns and considerations (i.e., topics) that the products could address; however, some of the sources may be out of date. Therefore, during guidebook development, the research team corroborated or adjusted contents in the sources based on additional literature reviews, discussions with the project monitoring committee (PMC), and discussions with Texas rural and small urban transit

[5] Published as TCRP Report 240 in December 2022. This resource is cited in the guidebook.
[6] Published as TCRP Synthesis Report 171 in June 2023. This resource is cited in the guidebook.

agencies. The research team did not find a stand-alone source that effectively dealt with the core topics identified during the needs assessment.

CASE STUDIES WITH HIGHLY COST-EFFICIENT ENTITIES

The second section of this chapter documents the research team's work to conduct case studies of highly cost-efficient entities. The goal at the outset was to conduct four case studies: one with a state department of transportation (DOT), one with a small urban transit agency, and two with rural transit agencies. Unfortunately, due to the ongoing non-responsiveness many of the potential case study entities, the research team was not able to complete the second rural agency case study. This section:

- Describes the process for selecting case study entities.
- Describes how the research team collected information from selected entities.
- Presents each case study.

Selecting Case Study Entities

The research team selected case study entities using a multi-step selection method:

- Rank rural and small urban transit agencies and states based on cost-efficiency.
- Conduct a desktop review of the most cost-efficient entities to select potential case study entities.
- Perform preliminary inquiries inviting potential entities to participate and to gather basic information from the entity.

Rank Transit Agencies and States Based on Cost-Efficiency

The research team used a similar process to rank both transit agencies and states but used different data sources for each. The research team defined cost efficiency as operational cost per revenue hour and operational cost per revenue mile.

To rank rural and small urban transit systems by their cost efficiency, the research team downloaded NTD data for reporting years 2017 through 2019. The pool of rural transit agencies eligible for ranking included any transit agency that met the following criteria:

- *Reporter Type* is rural reporter or reduced reporter that had an *Organization Type* of tribe.
- *Total System Vehicles Operated at Maximum Service* (VOMS) is at least 10.

The pool of small urban transit agencies eligible for ranking included any transit agency that met the following criteria:

- *Reporter Type* is full reporter or reduced reporter.
- *Primary Urbanized Area Population* is less than 200,000.
- *Total System VOMS* is at least 10.

Once the pool of eligible rural and small urban transit agencies was finalized, the research team calculated the total three-year operational cost per revenue hour and operational cost per revenue mile for each transit agency.[7] The research team then ranked each agency's values—a rank for cost per hour and a rank for cost per mile. Last, the research team averaged these two ranks to calculate a combined rank. The rural and small urban pools were ranked and sorted separately using each agency's combined rank. The research team then identified the top set of transit agencies in both pools and moved them to the next step in the process. In some cases, the research team removed top-ranked agencies if they had less than three years of data reported between 2017 and 2019. Table 3.2 lists the top 20 rural transit agencies, and Table 3.3 lists the top 20 small urban transit agencies.

Table 3.2 Top 20 Most Cost-Efficient Rural Transit Agencies Using 2017–2019 NTD Data

NTD ID	Agency Name	Cost per Rev. Mile	Cost per Rev. Hour	Cost per Mile Rank	Cost per Hour Rank	Combined Rank
8R01-80256	Town of Mountain Village	$0.94	$10.91	3	1	2
4R02-41095	Florida Department of Transportation (FDOT)—Vanpool	$0.44	$21.37	1	5	3
8R02-80200	Missoula Ravalli Transportation Management Association	$1.00	$19.43	6	4	5
4R04-40971	Licking Valley CAP	$1.19	$19.17	13	3	8
7R03-70114	Ripley County Transit, Inc.	$1.22	$22.91	14	7	10.5
4R05-41192	Bolivar County Council On Aging, Inc.	$0.96	$24.82	4	17	10.5
4R05-41044	Community Development Inc.	$1.22	$22.93	15	8	11.5
6R01-60136	Mid-Delta Transit	$1.17	$26.62	11	30	20.5
4R07-41002	Generations Unlimited	$1.35	$25.49	29	20	24.5

[7] This process calculates a single weighted yearly average cost per revenue hour and mile for each transit agency.

NTD ID	Agency Name	Cost per Rev. Mile	Cost per Rev. Hour	Cost per Mile Rank	Cost per Hour Rank	Combined Rank
6R04-60146	United Community Action Program, Inc.	$1.54	$23.94	43	12	27.5
5R01-50252	Macoupin County	$1.47	$25.62	38	21	29.5
4R03-41142	Wayne County Transit	$1.31	$27.72	21	40	30.5
5R05-50293	Monroe County Public Transportation	$1.54	$25.02	44	18	31
4R02-40923	Liberty County Board of County Commissioners	$1.58	$24.48	52	14	33
9R04-91029	Nye County Senior Nutrition	$1.18	$30.11	12	61	36.5
6R04-60226	Northern Oklahoma Development Authority	$1.54	$26.89	42	33	37.5
4R03-41108	Lower Chattahoochee Regional Transit Authority	$1.26	$30.04	19	56	37.5
4R06-41048	Kerr Area Transportation Authority	$1.57	$26.68	49	31	40
6R04-66274	MAGB Transportation, Inc.	$1.32	$30.07	22	58	40
4R06-41004	Chatham Transit Network	$1.40	$29.56	32	54	43

Source: NTD.

Table 3.3 Top 20 Most Cost-Efficient Small Urban Transit Agencies Using 2017–2019 NTD Data

NTD ID	Agency Name	Cost per Rev. Mile	Cost per Rev. Hour	Cost per Mile Rank	Cost per Hour Rank	Combined Rank
90230	California Vanpool Authority	$0.89	$29.16	3	4	3.5
40220	Pitt County, dba: Pitt Area Transit System	$1.82	$32.71	6	10	8
40210	Craven County	$2.08	$31.00	10	7	8.5
70051	Cape Girardeau County Transit Authority	$1.85	$34.03	7	11	9
40950	First Tennessee Human Resource Agency	$1.61	$35.55	5	16	10.5
40131	Davidson County, dba: Davidson County Transportation	$1.49	$36.39	4	17	10.5
40174	Municipality of Yauco	$2.37	$20.33	20	2	11
40103	Wiregrass Transit Authority	$2.10	$35.14	12	15	13.5
60196	Tangipahoa Voluntary Council on Aging	$2.04	$39.07	8	21	14.5

NTD ID	Agency Name	Cost per Rev. Mile	Cost per Rev. Hour	Cost per Mile Rank	Cost per Hour Rank	Combined Rank
40049	City of Gadsden	$2.45	$34.08	24	12	18
80110	Fargo Park District, dba: Valley Senior Services	$2.69	$30.55	32	5	18.5
40068	Northwest Alabama Council of Local Governments	$2.44	$34.81	23	14	18.5
40191	Transit Authority of Central Kentucky	$2.10	$40.76	11	26	18.5
40204	Mid-Cumberland Human Resource Agency	$2.14	$40.71	15	25	20
40225	Alamance County Transportation Authority	$2.43	$38.32	21	20	20.5
41105	Audubon Area Community Services, Inc.	$2.86	$31.36	34	9	21.5
40096	City of Rocky Mount, dba: Tar River Transit	$2.14	$42.36	14	29	21.5
40227	Onslow United Transit System	$2.17	$42.10	17	28	22.5
50202	City of West Bend	$3.13	$31.36	40	8	24
40265	North Central Alabama Regional Council of Governments, dba: NARCOG Regional Transit Agency	$2.58	$40.27	26	23	24.5

Source: NTD.

To rank states by their cost efficiency, the research team obtained data from the *Rural Transit Fact Book* for years 2017 through 2019. The *Rural Transit Fact Book* is published annually by the Upper Grate Plains Transportation Institute at the Small Urban and Rural Transit Center at North Dakota State University. The *Rural Transit Fact Book* contains tables of state-level measures of operating cost per hour and mile based on data reported by 5311 subrecipients in each state. The research team obtained the Excel workbooks containing the 2017 through 2019 data used to generate the *Fact Book* tables.

Using these Excel tables, the research team calculated a rank for both measures (operational cost per hour and operational cost per mile) for each state within each year. Then, the research team averaged the annual ranks to get two average ranks for each state—one for cost per hour and one for cost per mile. Last, the research team averaged the two average ranks to calculate a single, combined rank for each state. The research team then identified the top set of states and moved them to the next step in the process. Table 3.4 displays the top 10 most cost-efficient states based on rural 2017 through 2019 data.

Table 3.4 Top 10 Most Cost-Efficient States Using 2017–2019 *Rural Transit Fact Book* Data

State	2019 Cost per Mile	2019 Cost per Hour	2018 Cost per Mile	2018 Cost per Hour	2017 Cost per Mile	2017 Cost per Hour	3-Year Avg. Rank of Cost per Mile	3-Year Avg. Rank of Cost per Hour	Combined Rank
Arkansas	1.78	34.88	1.66	31.49	1.64	29.43	3.7	4.3	4
Kentucky	2.01	34.72	1.88	33.04	1.82	32.61	5.7	5.0	5
Georgia	1.93	33.92	1.93	33.80	1.87	31.01	6.3	4.7	6
Oklahoma	2.24	33.69	1.94	33.35	1.85	32.48	8.3	4.3	6
Missouri	2.04	37.85	2.06	38.03	1.89	36.95	9.0	10.0	10
Mississippi	2.17	49.87	1.82	42.35	1.74	33.51	5.7	15.0	10
South Carolina	1.71	36.28	2.00	37.50	2.28	45.98	9.0	13.3	11
North Carolina	2.20	40.95	2.13	39.79	2.04	37.24	11.3	11.7	12
Tennessee	2.18	42.40	2.00	41.00	1.92	38.52	9.7	13.3	12
Indiana	2.57	38.90	2.44	37.17	2.25	34.51	14.7	9.3	12

Source: UGPTI (2021).

Conduct Desktop Reviews

After the most cost-efficient entities were identified through the ranking process, the research team conducted desktop reviews by visiting each entity's website, reviewing the entity's NTD data, and reviewing other sources of data. The goal of the desktop review was to obtain more information to help assess whether the potential entity would make a good case study based on its similarity to Texas rural and small urban transit districts.

Table 3.5 contains key statistics for Texas rural and small urban transit systems using 2019 service data. Table 3.6 contains key statewide statistics about the Texas rural transit program.

Table 3.5 Key Statistics for Texas Rural and Small Urban Transit Districts (2019 Data)

Statistic	Rural Transit Districts	Small Urban Transit Districts
Average Land Area (sq. mi.)	6,933	62
Average Annual Operational Expenses	$2,222,797	$3,146,882
Average Annual Ridership	114,603	559,369
Average Annual Revenue Miles	757,543	670,303

Source: PTN-128 (2019).

Table 3.6 Key Statewide Rural Statistics for Texas (2019 Data)

Statistic	Rural Statewide Value
Total Active Vehicles	1,183
Annual Rural Operating Expenses	$54,300,000
No. of Rural Agencies	27
Annual Passenger Trips	3,130,000
State Population	28,995,881

Source: UGPTI (2021).

For example, during the desktop review, the three top rural transit agencies, Town of Mountain Village, FDOT—Vanpool, and Missoula Ravalli Transportation Management Association were all ruled out as potential case studies. The Town of Mountain Village operates an aerial tramway and bus service, which is not like any Texas transit district. Both FDOT and the Missoula Ravalli Transportation Management Association only operated vanpool programs.

Selecting Rural Case Study Entities

Based on desktop reviews, the research team selected two rural transit agencies to receive preliminary inquiries. Both are described below.

Licking Valley Community Action Program operates public transportation, non-emergency medical transportation and Title III-B transportation for seniors and has a service area of five counties. All public transportation trips must be scheduled 72 hours in advance. Service is available Monday through Friday between the hours of 6 a.m. and 6 p.m. Passenger fares are

determined by trip destination and increase for destinations outside of the originating county. Table 3.7 displays key information about Licking Valley Community Action Program.

Table 3.7 Rural: Licking Valley Community Action Program

Variable	Value
Location	Flemingsburg, KY
NTD ID	4R04-40971
VOMS	80
Annual Operating Expenses	$1,496,385
Modes	Demand Response
Annual Passenger Trips	37,573

Source: NTD (2019).

Bolivar County Council on Aging, Inc. (BCCOA) is a non-profit 501(c)3 transportation provider operating public transportation and non-emergency medical transportation as well as trips to work centers and senior activity centers. BCCOA serves 10 counties in the Mississippi Delta region. Trips require a 48-hour advanced reservation. Table 3.8 displays key information about BCCOA.

Table 3.8 Rural: Bolivar County Council on Aging, Inc.

Variable	Value
Location	Cleveland, MS
NTD ID	4R05-41192
VOMS	47
Annual Operating Expenses	$2,034,544
Modes	Demand Response
Annual Passenger Trips	125,707

Source: NTD (2019).

After several weeks of attempting to get responses from the two transit agencies above, the research team began sending preliminary inquiries to additional rural transit agencies, including:

- Mid-Delta Transit (Helena, AR).
- United Community Action Program (Pawnee, OK).
- Kerr Area Transportation Authority (Henderson, NC).
- Macoupin County Public Health Department (Carlinville, IL).
- Northern Oklahoma Development Authority (Garber, OK).

The research team also selected small urban transit systems.

Selecting Small Urban Case Study Entities

Based on desktop reviews, the research team selected the following transit agencies as potential case study entities and sent them preliminary inquiries.

Cape Girardeau County Transit Authority (CGCTA) is a government agency providing public transportation in southeast Missouri. CGCTA operates demand response and fixed-route services in the county. Demand response service is offered 6 ½ days a week and available 24 hours a day (the only exception being from Sundays at 2 p.m. through Mondays at 5 a.m.). This service is on-demand, meaning that riders do not need to request trips in advance like typical demand response services. There are also two fixed routes serving Cape Girardeau. The routes generally run from 8 a.m. to 4 p.m. Monday through Friday on 30-minute headways. Saturday service is available from 8 a.m. to 4 p.m. on hourly headways. Table 3.9 contains key information about CGCTA.

Table 3.9 Small Urban: Cape Girardeau County Transit Authority

Variable	Value
Location	Cape Girardeau, MO-IL
NTD ID	70051
VOMS	30
Annual Operating Expenses	$2,783,663
Modes	Demand Response, Bus, Vanpool
Annual Passenger Trips	223,480
Service Population	78,871

Source: NTD (2019).

In addition to public transportation, the First Tennessee Human Resource Agency (FTHRA) provides a variety of community programs such as adult day services, personal support services, a nutrition program, probation programs, a senior employment program, and a child care food program. FTHRA's transit system is called Net Trans and serves an eight-county area in northeast Tennessee with demand-responsive service. The Net Trans service area includes three urbanized areas outside of city limits: (1) Bristol, (2) Kingsport, and (3) Johnson City. Service hours are Monday through Friday from 6 a.m. to 6 p.m., with limited service on Saturday. Trips are scheduled on a first come first service basis. All trips require reservations to be made by noon the business day before the requested trip. Net Trans also provides Medicaid NEMT service (through contracts with brokers), Veteran's Administration service, and other sponsored service for human services agencies. Table 3.10 contains key information about FTHRA.

Table 3.10 Small Urban: First Tennessee Human Resource Agency

Variable	Value
Location	Johnson City, TN
NTD ID	40950
VOMS	57
Annual Operating Expenses	$4,741,626
Modes	Demand Response
Annual Passenger Trips	162,782
Service Population	120,415

Source: NTD (2019).

Selecting States: Kentucky and Missouri

The research team selected two states, Kentucky and Missouri, as potential case studies. Their key statistics are in Table 3.11.

Table 3.11 Key Statistics for Potential State Case Studies

Variable	Kentucky Value	Missouri Value
Total Active Vehicles	1,430	1,173
Annual Operating Expenses	$55,900,000	$41,000,000
No. of Rural Agencies	21	21
Annual Passenger Trips (rounded)	2,880,000	2,060,000
State Population	4,467,673	6,137,428

Source: Rural Transit Fact Book (UGPTI 2021).

Perform Preliminary Inquiries

After the research team selected the initial entities for potential case studies, the research team contacted each entity by email to perform an initial inquiry. The initial email provided the entity with an overview of the purpose of the study and why they were selected as a potential case study. The email asked all entities the following questions:

- Is your agency willing to participate as a case study, if ultimately selected?
- What strategies, tools, training, or other initiatives are in place to effectively manage transit operational and capital costs?
- Only asked of transit agencies: What were your main sources of federal (e.g., 5307, 5311, 5310, etc.), state, and local funding for public transit in the most recently completed fiscal year? Could you provide rough estimates (%) in terms of the funding sources related to 5307, 5311, 5310, other federal, state, and local (including fares)?

Over the course of several weeks, the research team emailed and called contacts at each potential case study entity. When no responses were heard back from several entities, the research team began adding more entities to the list of potential case studies and also emailed them with preliminary inquiries.

Conducting Case Studies with Selected Entities

Once the selected entity responded to the research team and indicated their interest in participating, the research team set up a video call with the selected entity. The research team also emailed the entity a copy of the discussion guide several days before the video call to give the entity a chance to prepare. The research team used three different discussion guides, one for rural transit agencies, one for small urban transit agencies, and one for states. The discussion guides are included as appendices E, F, and G, respectively.

After the video call was complete, the research team synthesized the information collected into a case study write up and then shared the write up with each case study entity for their review and comment.[8] Once all comments were received, the research team revised the case study write ups for inclusion in this research report.

State DOT Case Study: Missouri Department of Transportation

The Missouri Department of Transportation's (MoDOT's) Transit Section "provides financial and technical assistance to public transit and specialized mobility providers" in the state of Missouri (MoDOT 2022). The Transit Section comprises three program managers and an administrator, who work together to manage all federal and state funding programs for transit. Table 3.12 displays Missouri's statewide rural transit statistics compared to Texas's statistics.

Table 3.12 Summary Statewide Rural Transit Statistics

Statistic	Texas Rural Statewide Value	MoDOT Rural Statewide Value
Total Active Vehicles	1,183	1,173
Annual Rural Operating Expenses	$54,300,000	$41,000,000
No. of Rural Agencies	27	21
Annual Passenger Trips	3,130,000	2,060,000
State Population	28,995,881	6,137,428

Source: Rural Transit Fact Book (UGPTI, 2021).

Funding and Service Overview

Federal Programs. There are 23 subrecipients that participate in Section 5311 in the state (excluding three additional subrecipients that solely receive intercity bus funds). MoDOT allocates Section 5311 funds to subrecipients through an application-based process. The amount of Section 5311 funds awarded to each applicant is based on the applicant's request, historical cost data, and plans for service changes. All Section 5311 funds are used as operating assistance.

In Missouri, the designated recipients in small urban areas are direct recipients of FTA Section 5307 funds.

State Programs. Thirty-four small urban and rural transit providers also receive state funding through a DOT-managed annual application and allocation process. The allocation of state transit funds is governed by state statutes, and amounts are determined by several formula factors using a three-year average. The factors include:

- Operating cost.
- Ridership.
- Cost efficiency (i.e., operational cost per passenger trip).

[8] As of June 30, 2022, the case study entities are still reviewing their case study write ups.

- Population.
- Availability of alternative transportation options.
- Local effort and tax support.

Transit agencies in Missouri can also benefit from the Missouri Elderly and Handicapped Transportation Assistance Program (MEHTAP), which "helps defray a portion of the transportation costs incurred by agencies providing mobility services to senior citizens and persons with disabilities" (MoDOT 2022). Fifty percent of the funds available are distributed to the state's 10 area agencies on aging. The remaining funds are allocated using an application and allocation process similar to state transit assistance; however, 142 government and non-profit organizations receive funding under MEHTAP.

Transit Services Provided

All of the rural transit agencies receiving Section 5311 funds solely provide demand-responsive service, with most agencies requiring 24-hour advanced reservations. Two ferry-boat services were also recently added using pandemic-related funding programs, and it is likely that these ferry-boat services will continue into the future.

Formal Cost Management Training and Guidance

MoDOT does provide regular technical assistance to the transit agencies through their oversight and compliance reviews on financial and cost management of grant funds. However, MoDOT does not have a formal cost management training and guidebook currently.

MoDOT also provides scholarships for transit managers that cover the travel and registration costs to attend industry conferences (e.g., the Community Transportation Association of America). MoDOT also occasionally organizes and/or sponsors training events for its transit agencies. For example, in July 2022, FTA provided Missouri transit agencies a train-the-trainer workshop on the new entry-level driver training requirements. MoDOT also helps to sponsor the annual conference of the state transit association, the Missouri Public Transit Association.

Special MoDOT-Managed Programs Supporting Cost Management

Although MoDOT does not provide formal training specifically on cost management, MoDOT does have several special programs or strategies that help Missouri transit agencies manage their costs.

Vehicle Repair Program. Since at least the 1990s, MoDOT has managed a special funding program to help cover the cost of vehicle repairs. The goal of the vehicle repair program is to help transit agencies keep their vehicles longer, thereby reducing the capital costs associated with fleet replacements. The funding for the program comes from transit agency vehicle sales. When transit agencies sell their transit vehicles (after the end of a vehicle's useful life),

80 percent of the proceeds go to MoDOT. MoDOT will funnel up to $5,000 of the proceeds into the vehicle repair program. Any proceeds over $5,000 go back into the original FTA program, which is used to purchase vehicles within the designated programs.

Vehicle repair program funds can cover a portion of certain types of major repairs:

- 100 percent of the costs of safety-related repairs.
- 50 percent of the cost of replacing a stolen catalytic converter.
- 80 percent of the cost of replacing a failed catalytic converter.
- 80 percent of the cost of other major repairs.

As an example, MoDOT recently approved an application for a 2015 vehicle that needed a new engine. MoDOT covered 80 percent of the engine replacement cost, and the transit agency contributed the other 20 percent. Other typical repairs include transmission and air conditioning system replacements or overhauls.

MoDOT reports that the program has been very successful in helping reduce costs and is becoming increasingly important with the current vehicle shortage and price increases causing transit agencies to hold on to vehicles beyond their useful life. On average, the program spends between $300,000 and $400,000 annually.

Regular Reviews and Helpful Toolkits. MoDOT conducts compliance reviews for Section 5311 subrecipients at least every two years and for Section 5310 subrecipients at least every three years. MoDOT also computes an annual risk assessment score[9] for every subrecipient. If the score indicates the transit agency may need help, MoDOT may conduct a compliance review and/or may provide technical assistance before the agency's scheduled review. During these reviews, if MoDOT determines there are issues (e.g., in financial controls, preventative maintenance, or other areas), MoDOT works with transit agencies to give them the tools and resources they need.

MoDOT provides transit agencies with time- and money-saving toolkits and checklists so that transit agencies do not have to start from nothing and to help transit agencies ensure they are in compliance with FTA and MoDOT requirements. Some examples of MoDOT-provided toolkits or templates include:

- Title VI plan templates.
- Vehicle preventative maintenance program development templates.
- Pre-trip checklists for drivers.

[9] The risk assessment score considers several factors, for example: Did the agency have a change in management? Is the agency struggling to invoice MoDOT timely?

Other Programs and Strategies. MoDOT also has several other programs and strategies that directly or indirectly help Missouri transit agencies save money or control costs:

- As is typical for state DOTs, MoDOT has a statewide vehicle procurement contract that all transit agencies use to purchase vehicles.
- MoDOT has an on-board consultant that helps subrecipients ensure compliance with FTA regulations regarding all projects.
- Transit agencies can apply for and use Section 5304 funds to conduct transit studies with 80 percent federal assistance.
- In general, MoDOT allows for the use of in-kind contributions (e.g., volunteer drivers and contributed space) as local match to federal grants. This can help leverage more federal funds while also decreasing administrative and operating costs. In-kind contributions can also be used as match when public-transit human-services coordination plans are funded with federal funds.

MoDOT does not have a statewide fuel purchasing program; however, virtually all rural transit agencies in the state use a fuel card program. Missouri transit agencies also do not have access to a pooled-risk insurance program—every transit agency must purchase their own insurance.

Current Initiatives and Studies

Since 2019, over 30 agencies and organizations in Missouri have come together to start a transportation taskforce, which provides leadership, promotes collaboration, and gathers best practices to improve transportation coordination in the state of Missouri to enhance the quality of life for all Missourians through improved transportation access, accessibility, and affordability.

Also, the Missouri Public Transit Association is working on a statewide transit needs assessment study that will identify service gaps across the state. According to MoDOT, most rural transit agencies provide a very minimal level of service (e.g., weekdays only with limited daily spans of service). This study may help demonstrate the need for increased transit service levels and funding statewide.

Provider-Specific Programs Supporting Cost Management

At the research team's request, MoDOT reached out to a few Missouri public transit systems to ask them for some of their cost management strategies and programs. Two transit agencies responded, and a summary of their responses is provided below.

Operating Above the Standard (OATS) Transit. OATS Transit serves 87 counties in Missouri and offers a variety of services, including (OATS 2021):

- Deviated-fixed routes.
- Medical and dialysis transportation.

- Disability programs.
- Intercity express routes.
- Rural general public service.
- Senior transportation.
- Veteran hospital and clinic transportation.

OATS Transit described some of the strategies it employs to help effectively management costs. The strategies can be summarized into the following.

- Strategic Planning: OATS Transit updates its strategic plan every five years. This helps OATS Transit identify new trends, evaluate its progress, and revaluate and establish its goals.
- Networking: OATS Transit regularly networks with peers at both the state and national levels through membership in transportation associations. Networking helps OATS Transit learn from peers, identify best practices, and stay in tune with industry trends.
- Performance Measurement: OATS Transit monitors a variety of performance measures, for example operating costs per mile and hour, passengers per hour, on-time performance, accidents per 100,000 miles, maintenance cost per mile, and percent of vehicle useful life remaining.
- Budgetary Monitoring and Financial Reporting: OATS Transit prepares an annual budget that is approved by its board of directors and then produces monthly financial reports that compare actual spending against the budget and against the prior fiscal year.
- Annual Review of Sponsored Service Rates: OATS Transit performs an annual review of sponsored service rates (i.e., the prices charged by OATS Transit to operate transit service sponsored by third parties) to ensure sponsored service rates are covering the sponsored service costs.

Southeast Missouri Transportation Service, Inc. (SMTS). SMTS offers door-to-door transportation to everyone in its 21-county service area (SMTS 2022a). Services include long-distance medical service, local service, and sponsored service (e.g., Medicaid NEMT) (SMTS 2022b).

SMTS described some of the strategies it employs to help effectively manage costs. The strategies can be summarized into the following.

- Constant Service Monitoring: SMTS constantly monitors its routes and services to carefully track their efficiency and effectiveness. Of particular importance to SMTS is monitoring service ridership and cost per trip, mile, and hour.
- Close Tracking of Accidents: SMTS closely monitors its safety program by tracking reportable accidents and making adjustments as needed. Keeping accidents to a minimum helps SMTS reduce its costs.

- Networking: SMTS takes advantage of networking opportunities provided by the Missouri Public Transit Association. Open dialog with other transit agencies across the state and the nation helps SMTS stay aware of trends, challenges, and the best practices of others.
- Hiring Practices: SMTS employs thoughtful, deliberate hiring practices to ensure that qualified, trainable individuals are in the right positions to allow SMTS to operate as efficiently as possible.
- Strategic Approach: SMTS conducts a periodic review of its strategic and long-term plans as well as its personnel guidelines and employee handbook. SMTS also strives to maintain a strategic approach toward technology by carefully considering the potential benefits and the potential pitfalls of technologies before wholeheartedly adopting (or rejecting) innovations.
- Budgetary Monitoring and Financial Reporting: SMTS prepares a budget that is approved by its board of directors. SMTS regularly monitors its finances against budget projections and reports on its budgetary performance to its board of directors. SMTS also analyzes changes in its revenues to determine where revenues are shifting, changing, or needing attention.
- Review of Sponsored Service Rates: SMTS regularly reviews its sponsored services rates and monitors the revenues received from sponsored service contracts.

Cost Management Challenges

MoDOT described what it thought of as some of the biggest cost management challenges facing rural and small urban transit agencies.

- Fuel: MoDOT saw the cost management challenges related to fuel as the biggest challenge for transit agencies in the state. Currently, all rural transit agencies use conventional fuels (gasoline or diesel), and some small urban transit agencies are using a small number of electric vehicles. The price for gasoline and diesel is extremely high and has risen quickly, making it difficult for transit agencies to adapt. In fact, MoDOT has requested additional state transit funds to help with the higher cost of fuel.
- Driver Retention: Driver retention is also a significant cost management challenge in the state (and, in fact, the nation). MoDOT transit agencies are having difficulties getting applicants and retaining the drivers they already have. MoDOT believes that COVID-19 also caused many drivers to quit or retire due to health concerns. Attracting and retaining drivers may be especially difficult, at least in part, because of the current competition coming from the fast-food industry and from other companies that recruit drivers such as Amazon. Some of these competitors offer a starting wage of $15 to $20 per hour, which is difficult to compete with. Missouri transit agencies have been trying out strategies to encourage drivers to apply and stay such as signing bonuses, bonuses for successfully completing training, and increasing wages as much as possible.

- Increased Vehicle Costs: Another significant challenge facing Missouri transit agencies is the sudden increase in the cost for new vehicles as well as the delays in receiving vehicles from manufacturers and re-sellers. MoDOT reported that new vehicle prices have increased by as much as 30 percent in the last seven to eight months.

MoDOT also saw finding adequate local match to federal grants as a key issue for rural and small urban transit systems in the state. Although not a cost-management issue, per se, not having adequate local match certainly has direct consequences on the ability of transit agencies to draw down federal funds, which, in turn, has consequences on the level of service transit agencies can provide.

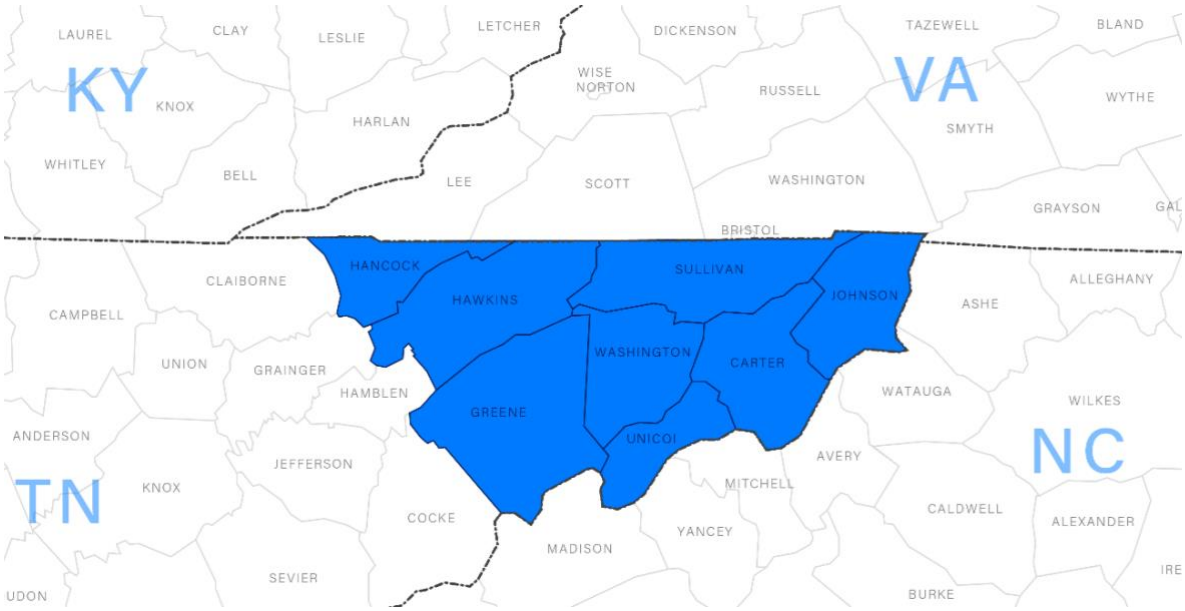
Cost Management Successes

MoDOT reported some successes that it is especially proud of in its rural and small urban transit programs. First, transit agencies are largely compliant with federal and state regulations, and transit agencies continue to work hard to maintain that compliance. Recent FTA reviews have had very few findings.

Another success reported by MoDOT is related to the Section 5339 Bus and Bus Facilities program. MoDOT reported being very successful in its pursuits of Section 5339 discretionary grants, helping to fund bus acquisitions and facility projects. Also, the way that formula-based Section 5339 funds are distributed by MoDOT is unique in that the rural and small urban funds apportioned to Missouri are combined into a single pool of funds. Large urban areas each receive $50,000, and the remaining funds are equally spilt between small urban and rural areas by MoDOT.

Small Urban Case Study: First Tennessee Human Resource Agency

FTHRA provides a variety of community programs such as adult day services, personal support services, a nutrition program, probation programs, a senior employment program, a child care food program, and public transit services (FTHRA 2022). FTHRA is governed by a board of directors, comprising elected officials of the counties and cities served by FTHRA. NET Trans, the name for FTHRA's transit service, serves an eight-county area in northeast Tennessee (see Figure 3.1). NET Trans's service area includes both the rural and urban areas that fall outside the city limits of Bristol, Kingsport, and Johnson City. NET Trans operates door-to-door demand responsive service that is open to the general public and available Monday through Friday from 6:00 a.m. to 6:00 p.m. Limited service is available on Saturday. Trip requests must be made by 12:00 p.m. on the business day before the trip.



Source: NET Trans Who We Are webpage (https://www.nettrans.org/about-us/who-we-are/).

Figure 3.1 NET Trans Service Area Map

NET Trans also operates sponsored service, including Medicaid NEMT, Veterans' Administration service, and transportation for other human services provides. NET Trans directly operates its service and does not use volunteer drivers. Table 3.13 displays a comparison of NET Trans's key operational statistics with the average for small urban transit districts in Texas.

NET Trans reports data to the urban NTD because it is a direct recipient of Section 5307 funds for its service to the small urban areas within its eight-county service area. However, the bulk of NET Trans service area is rural. Despite the largely rural nature of NET Trans's operation, the research team decided to keep NET Trans as a small urban case study because the way (1) it serves urban areas, (2) it has innovative programs for cost management, and (3) it operates as both a rural and urban provider is similar to many of the small urban transit districts in Texas.

Table 3.13 Summary Statistics for NET Trans Compared to the Average Small Urban Transit District in Texas

Statistic	NET Trans	Average Small Urban Transit District in Texas
Annual Operating Expenses	$4,741,626	$3,146,882
Modes	Demand Response	Demand Response, Fixed Route
Annual Passenger Trips	162,782	559,369

Source: NTD (2019).

The following are highlights of the cost management strategies or programs employed by NET Trans, organized by cost area or major topic.

Fuel and Vehicle Energy

NET Trans employs two main strategies to help control costs related to vehicle fuels:

- An alternative clean fuels project.
- A fuel card program for conventionally fueled vehicles.

Alternative Clean Fuels Project. NET Trans started its Alternative Clean Fuels Project (hereinafter referred to as the *project*) in 2015. The project converted 25 percent of the NET Trans fleet to run on propane, which was a first in Tennessee. NET Trans funds the project using funding from the Tennessee DOT (TDOT), including some state and federal funds, and by providing 10 percent match.

The project installed conversion kits on existing gasoline vehicles. The conversion kits allow the vehicles to first start up using gasoline. Once the engine reaches the required temperature for burning propane (80 degrees Fahrenheit), the vehicles switch to using propane. If the vehicles run out of propane, they automatically switch back to using gasoline. The conversion kits and the propane fuel were procured competitively, and the company providing the propane fuel also provides the conversion kits and necessary fueling equipment. NET Trans provided the basic infrastructure for the fueling station at the maintenance facility in Carter County, which is where the first propane fueling station was installed. NET Trans partnered with the state's correctional system to obtain the labor (e.g., work release trustees) needed to install the basic infrastructure for the fueling station. The conversion kits are installed by the certified NET technicians.

To date, the program has been so successful that NET Trans has been slowing expanding propane refueling locations through partnerships and memorandums of understanding (MOUs) with community partners. These MOUs allow NET Trans to now fuel propane vehicles at four additional locations including Green County, Hancock County, Washington County, and Sullivan-Kingsport. The community partners each bill NET Trans for the propane NET Trans uses.

Because propane fueling stations are still much more limited than gasoline stations, NET Trans assigns propane vehicles to drivers in each county based on which drivers are closest to available propane fueling stations.

NET Trans has had a very positive experience with this project. The agency is saving a considerable amount of money on fueling costs because the price of propane per gasoline gallon equivalent has remained lower than the price of gasoline. The difference between propane and gasoline is even more significant now that gasoline prices have recently been trending sharply upward. In addition, the propane vehicles do not have any issues with reliability or with increased maintenance costs compared to gasoline vehicles. According to NET Trans, propane also burns cleaner than gasoline, which is an added environmental benefit. Last, although NET

Trans is working to buy additional conversion kits, NET Trans can also re-use conversion kits from retired vehicles after some basic repairs to the kits.

Fuel Card Program. For about 10 years, NET Trans has used a fuel card program to buy gasoline for the remainder of NET Trans's vehicles. The vendor providing the fuel cards is Fuelman, which was awarded a statewide fuel card contract managed through Tennessee's central procurement office. Fuel cards are assigned to individual vehicles. NET Trans administrative staff receive weekly reports on fuel usage and questionable transactions, which helps administrative staff monitor fuel usages and ensure adequate controls are in place over fuel purchases.

Upon implementation, NET Trans had some issues with operators incorrectly keying odometer miles, which created many questionable transactions. NET Trans added a section on fueling to new-hire training that covers how to use the fuel card and the importance of writing down the odometer value before leaving the vehicle to begin fueling.

Vehicle Maintenance and Replacement

To help manage vehicle maintenance and replacement costs, NET Trans has strategically modified its fleet mix and has adopted a vehicle replacement plan. Historically, NET Trans's fleet was mostly larger vehicles—Ford E-150s. NET Trans analyzed its passenger loads and found that vehicles were typically carrying around two passengers at the same time. To reduce the overall cost of the fleet, NET Trans began purchasing smaller vehicles. About 40 percent of the fleet is now the Dodge Grand Caravan with a spring-loaded wheelchair ramp. These smaller vehicles get approximately 21 to 22 miles per gallon, which is more efficient than the larger Ford vehicles. The smaller vehicles are also easier to maneuver and drive.

The remainder of NET Trans's fleet is the Ford Transit T-150. (The Ford Transit fleet has been partially converted to propane as described in the previous section.)

NET Trans also proactively works to balance the accrual of mileage on its vehicles to help ensure that vehicles accrue miles in line with their expected useful life. This helps NET Trans avoid some vehicles accruing a disproportionate number of miles compared to their age. When operators bring their vehicles in for service, NET Trans analyzes their mileage against their age and will assign the driver a different vehicle if there is an imbalance. NET Trans tries to get at least 200,000 miles out of every vehicle before retiring the vehicle.

Safety and Training

NET Trans helps control its costs associated with safety incidents and crashes through several notable programs including:

- The Safe Transport training program.
- A certification program for operators to work as trainers.
- A consistent performance evaluation process.

Safe Transport Training Program. NET Trans has deployed a comprehensive operator training program called Safe Transport (hereinafter referred to as the *program*). Before Safe Transport, NET Trans had a bus operator training program; however, it was not well-defined and needed improvement. NET Trans developed the program, described below, to ensure that all operators receive exhaustive and consistent training.

Under the program, new hires receive one week of classroom training and then additional field training. The field training includes training on specific skills like wheelchair loading and unloading, driving vehicles to and at maintenance locations, fueling vehicles, and more.

The program also includes an ongoing training component with quarterly cycles to help ensure that all critical topics are included and that all operators have a chance to attend. In the first quarter (January through March), yearly retraining occurs that includes a review of general policies and procedures, safety procedures, customer service, and ethics. In the second quarter (April through June), operators are retrained on course training and wheelchair boarding securement and car seat securement. In the period from June through September, operators break into teams of seven to eight drivers. Each week, an operator from the team takes a safety test to earn points for their team. Also, during this period, safety issues in the field will cause operators' teams to gain or lose points. For example, crashes, safety incidents, and calling out sick will cause an operator's team to lose points. NET Trans maintains a large "leaderboard" that lists all the teams and shows where the teams stand. The winning team gets a special day out (e.g., one year the winning team earned a trip to the local race track for the day).

In September, NET Trans has its safety roadeo. The top three winners get cash prizes, and the top two go to the state roadeo. NET Trans has been very successful in the state roadeo. In fact, a NET Trans driver has won the state roadeo four out of the last five years.

From October through December, operators undergo emergency evacuation training.

As previously mentioned, the program has been very successful—not only being picked up and shared by NET Trans's vehicle liability carrier but also actually resulting in a reduction in insurance claims. The program has helped NET Trans to develop a culture of safety.

Certified Safety Training Program. To help train operators, NET Trans uses specific operators to train other operators. These training operators must get certified through NET Trans's Certified Safety Training Program. The program uses a consistent curriculum, and the certified operators perform the on-the-road training with new hires. Certified operators are paid $2 more per hour when performing training.

Performance Evaluation. NET Trans also uses a quarterly performance evaluation process for operators that incorporates all performance factors into an operator's evaluation. Factors include on-time performance, accidents, pre- and post-trip inspections, valid customer complaints, customer commendations, on-time deposits, and other items. An operator's quarterly performance results helps NET Trans direct re-training resources or may result in additional operator coaching or operator discipline.

Annually, NET Trans reviews all operator quarterly evaluations and conducts unannounced ride-alongs with every operator to make sure operators are following all required policies and procedures. The summary of quarterly evaluations and the ride-alongs help NET Trans select operators for the Certified Safety Training Program.

Centralizing Administration and Operations

Another way that NET Trans has worked to manage its costs is by recently centralizing its operations. NET Trans's service area is approximately 2,800 square miles and was historically operated by eight offices—one for each county served. Each county office had its own scheduling, reservations, and administrative staff. Now, all operations are consolidated into a single location in Washington County, which is more-or-less central to the service area (see Figure 3.1).

NET Trans performs all general maintenance in-house, although body (e.g., crash) repairs are outsourced. Operators are assigned a vehicle that they take home—operators start and end their runs at home. When vehicles need to be serviced, operators drive their assigned vehicle to the central maintenance location (if possible) and then receive a different vehicle to take back home.

All scheduling, call center, and dispatcher functions have been consolidated into the Washington County location. NET Trans used to have eight schedulers, and now it has one. This consolidation of duties was also supported by a careful and deliberate implementation of Routematch. NET Trans employs three call center representatives and two dispatchers for the entire eight-county service area. Thanks to automated vehicle location (AVL) data, dispatchers can track vehicles in real time.

NET Trans randomly selects 10 percent of drivers' runs each pay period to conduct an audit comparing timesheets with AVL data.

Although NET Trans was unable to provide an analysis on the benefits of centralization, NET Trans wholeheartedly agrees that the consolidation has helped to improve its efficiency (even though not all staff were originally in favor of the change).

Customer Online Booking and Payments

NET Trans has also implemented an online trip booking and payment platform to help reduce the number of phone calls from customers and to reduce cash handling onboard vehicles.[10] The online booking and payment interface was created by Younger and Associates, a research and marketing agency in Tennessee. When customers book and pay online, the trip details are forwarded to the NET Trans call center, which then enters the trip request into Routematch on the customer's behalf. On some occasions, call center staff need to call customers back to correct the trip request or to negotiate a modified time. Call center representatives can also take payment by credit or debit card over the phone. For both online and over-the-phone payments, the 4 percent transaction fee is passed on to the customer as a convenience fee.

Currently, the online booking system is not integrated with Routematch, and NET Trans has no immediate plans to implement an integration.

Rural Case Study: Macoupin County Public Health Department

The Macoupin County Public Transit (MCPT), located in Macoupin County, IL, is administrated by the Macoupin County Public Health Department and is governed by the Macoupin County Board. The Macoupin County Board receives all the contractual obligations and is the legal owner of MCPT. The Macoupin County Public Transportation Advisory Board, comprising elected officials and voluntary representatives (e.g., transit-dependent users) from the community, has been formed to develop new proposals such as fare and service changes. The recommendations made by the advisory board are then presented to the Macoupin County Board for final determination. Macoupin County is the direct recipient of the Section 5307 rural formula program, accounting for approximately 10 percent of the annual applied revenue (NTD 2019). Most (70 percent) of the yearly applied revenue came from Illinois Downstate Operating Assistant Program, and the remaining came from sponsored service contracts and transit pass programs.

MCPT has a service area of 868 square miles and a service area population of 47,765. MCPT provides demand response service in Macoupin County and also out-of-county service for medical trips, limited to a 70-mile trip from the rider's address. Trips must be reserved 24 hours in advance if in-county and 72 hours in advance if out-of-county. Service is available Monday through Friday, 7:00 a.m. to 7:00 p.m., and Saturdays from 7:00 a.m. to 1:00 p.m.

[10] Because operators do not return to a central facility daily, operators are required to collect cash fares and then deposit them at the bank at the end of their shifts.

MCPT also operates sponsored services, including Medicaid non-emergency medical transportation, disability programs, senior transportation, and transportation for other human services providers. MCPT directly operates its service and does not use volunteer drivers. MCPT inclines to work out service contracts with different human service providers to help community mobility and increase revenue. The pricing structure for sponsored services is identical to the fares for the standard services. Table 3.14 compares MCPT's key operational statistics with the average for small urban transit districts in Texas.

Table 3.14 Summary Statistics for Macoupin County Transit Compared to the Average Rural Transit District in Texas

Statistic	Macoupin County Transit[1]	Average Rural Transit District in Texas[2]
Annual Operating Expenses	$1,372,186	$2,222,797
Modes	Demand Response	Demand Response
Annual Passenger Trips	75,348	114,603

Sources: [1] NTD (2019). [2] PTN-128 (2019).

The following are highlights of the cost management strategies or programs employed by MCPT, organized by cost area or major topic.

Cost Management Training and Guidance

MCPT staff reported having no formal training, guidebooks, or other resources specifically focused on helping manage costs. However, MCPT does develop a pretty organized and extensive library containing administrative and financial manuals and guidebooks to provide needed policies and procedures for cost management. Through the organized and comprehensive library, key staff quickly access and learn helpful information regarding effective cost management.

Fuel and Vehicle Energy

As of September 2019, MCPT has used a fuel card program to buy gasoline for MCPT's vehicles. Macoupin County Public Health Department owns the contract for the fuel card program. The vendor providing the fuel cards is Wex Fleet, which offers fuel discounts off the market prices. Fuel cards are assigned to individual vehicles, and each driver has been provided an access code to use the fuel card. MCPT administrative staff receive reports on fuel usage and questionable transactions via an online portal, which helps administrative staff monitor fuel usage and ensure adequate controls are in place over fuel purchases.

Vehicle Maintenance and Replacement

To help manage vehicle maintenance and replacement costs, MCPT has strategically modified its fleet mix based on different service purposes and has adopted a vehicle replacement plan. MCPT owns 43 vehicles (as of 2022). To reduce the overall cost of the fleet, MCPT owns six sedans

and uses sedans for longer (e.g., out-of-county to St. Louis) and low-productivity trips. These smaller vehicles get more efficient fuel consumption than larger ones, such as minivans and cutaways. The smaller vehicles are also easier to maneuver and drive.

The remainder of MCPT's fleet consists of 17 ADA-accessible minivans, mostly equipped with a wheelchair ramp and securement, 18 14-passenger cutaways, and two multi-purpose vehicles, which can be loaded with seven passengers and a wheelchair passenger. The 14-passenger cutaways are mainly used for high productivity and high demand routes to save operating costs.

MCPT proactively works to balance the accrual of mileage on its vehicles to help ensure that vehicles accrue miles in line with their expected useful life. MCPT also continuously monitors each type of vehicle's mileage in order to retire vehicles accordingly.

MCPT has continuously monitored maintenance costs and repairs to manage overall vehicle maintenance expenses. Currently, MCPT outsources general maintenance to local shops where vehicles are garaged. Historically, MCPT signed an MOU with Springfield Mass Transit to have the Springfield Mass Transit maintain and repair a portion of MCPT's fleet mainly used for its Senior Transportation Program. After monitoring the overall maintenance expenses and efficiency (i.e., Springfield Mass Transit is approximately 50 miles north of Macoupin County), MCPT decided that it is more efficient to outsource maintenance services to its local shops. Vehicle maintenance expenses have been effectively reduced since. MCPT has had a positive experience outsourcing vehicle maintenance to local shops. The agency is saving considerable money on vehicle maintenance and delivery costs instead of contracting the services to nearby larger transit agencies/authorities.

As for the fleet replacement, MCPT fully utilizes the consolidated vehicle procurement process (FTA Section 5310) to procure vehicles for senior and ADA transportation and pursues competitive funds managed by the Illinois Department of Transportation (IDOT). For better cost management and safety, staff monitors the vehicle conditions and life expectancy and continues proactively deciding the need to replace vehicles.

Operator Shift Structure and Hiring Practices

MCPT has implemented a unique shift structure practice, reducing overall operating costs and overtime costs. Currently, there are 30 drivers that operate MCPT demand response services. Three driver shifting categories are being developed:

1. Drivers working under 20 hours weekly.
2. Drivers working above 20 hours but below 30 hours weekly.
3. Drivers working over 30 hours weekly.

For the drivers who fall into Category 1, the benefits such as Social Security, unemployment, and Workers' Compensation are offered. For Category 2, drivers not only enjoy the benefits in

Category 1 but are enrolled in the county's pension plan. The Category 3 drivers enjoy paid health insurance in addition to all benefits mentioned in the previous two categories. During the recruiting process a candidate can decide which category to apply for based on the candidate's availability and flexibility. For example, some drivers are close to the retirement age and already enrolled in Medicare, and those prefer lower-hour shifts. Some younger drivers count on this as a full-time job. After receiving drivers' availability and flexibility, MCPT inputs those time slots in its scheduling and dispatching software to schedule shifts for drivers. MCPT is operating on-demand services, and the demands vary every day. Hence, MCPT claimed that the shift structure practices benefit their operations in many ways. Implementing these shifting practices helps drivers meet their life expectations and keeps overtime down.

Driver recruitment and retention is a significant cost management challenge across the nation. Most of the current competition comes from delivery companies offering a competitive starting wage. However, MCPT does not have difficulties getting applicants and retaining the drivers it already has. MCPT believes that a flexible shifting practice helps it be competitive for drivers because drivers can pick their work hours.

Performance Evaluation

MCPT monitors service financial status quarterly to ensure the actual service operations expenses are aligned with the budgetary amounts. The service operations expenses include vehicle maintenance expenses, salaries and benefits, and fuel costs. Investigations and changes are conducted if significant variances are found.

Also helping MCPT perform better cost efficiency is monitoring monthly and quarterly productivity reports. MCPT uses productivity reports to monitor different services to ensure productivity and cost-effectiveness. Monthly performance results help MCPT examine service levels and are used for driver training, customer service initiatives, and other cost-saving strategies. MCPT often works with drivers to identify even more efficient routes—especially for school routes. If an underperformed service is observed, that service may be terminated quickly instead of waiting long to avoid extra spending on that service. An example provided by MCPT staff showed that a college route initially created for college students to school was consequently canceled due to low ridership and utilization. The decision took less than six months, saving MCPT on vehicle maintenance and operation costs.

MCPT staff regularly review demand geographically based on the origin/destination (O/D) provided during the trip reservations. Based on the review of trip O/Ds, MCPT can effectively shift the service sources to provide more service in high-demand areas. Additionally, other cost-saving strategies conducted regularly include (a) analyzing the cost-effectiveness of different trips/routes to decide whether to keep or terminate the service and (b) regularly monitoring trip refusal percentages and trip requests that are not serviced to examine the service source distributions.

Annually, MCPT self-examines the year's performance and compares it with previous year's performance reported to NTD. Also, MCPT tries to balance service sources based on productivity comparisons among different service regions. From the comparisons, MCPT also has the opportunity to investigate the reasons behind the productivity differences between the two regions and also initiate activities to boost performance.

Service Optimization

Another way that MCPT has worked to manage its costs is to optimize its service throughout the county. Currently, MCPT's vehicles are garaged at six locations where demand is high. Demand is monitored monthly, and locations are checked to be in the most efficient places. Overnight parking and storage are offered by the community and are free of charge. MCPT hires drivers locally at six locations to reduce operator travel and deadhead time costs.

All scheduling, call center, and dispatcher functions have been consolidated into the main office in Gillespie, IL. MCPT uses scheduling and dispatching software, Trip Master, developed by CTS Software, for dispatching, scheduling, billing, reporting, and fleet management. Due to the unique sifting practices mentioned earlier, operators are allowed to input their weekly availability first in the CTS software, and the software can optimize shifts and reduce overtime. The software also provides AVL functions to let admins and dispatchers track their fleets in real-time, allowing them to accommodate schedule changes quickly and efficiently. The software provides regular reports on demand and productivity. MCPT utilizes those reports to make service adjustments, such as "grouping trips" for the customers to the same destination.

Cost Management Successes

MCPT reported some successes in cost management to increase the agency's cost-efficiency and cost-effectiveness. The first is to monitor system performance measurement regularly to self-assess and optimize service procedures and policies. MCPT routinely reviews service performances to make significant service adjustment decisions such as service termination or service resource balance/adjustment. The second success is practicing a unique shift structure to meet drivers' needs better and improve service quality. The shift flexibility helps MCPT be competitive for drivers. Also, MCPT can easily get applicants and retain the drivers it already has. The drivers are satisfied with the working arrangements and working environment. Lastly, MCPT stores and dispatches its vehicles at six locations instead of one central garage. The locations were checked periodically to be in the most efficient places. MCPT hires drivers locally at six locations to reduce operator travel and deadhead time costs.

Summary of Case Studies

The research team conducted three case studies of three highly cost-efficient entities: one with a state DOT, one with a small urban transit agency, and one with a rural transit agency. The

interviews with each entity were tailored to each entity type to collect essential cost management information. The summary of case studies is prepared below and is organized into six categories.

1. Cost management guidance

Transit agencies must balance their decisions for how to deliver needed services to consumers with the costs of providing those services. Understanding of what drives costs and market demand can help agencies make better decisions when balancing finite resources. Hence, providing cost management-related training, guidebooks, or other handbooks allows transit agencies to improve efficiency, effectiveness, and sustainability.

MoDOT: MoDOT does provide regular technical assistance to the transit agencies through its oversight and compliance reviews on financial and cost management of grant funds. However, MoDOT lacks a statewide formal cost management training and guidebook.

NET Trans: NET Trans lacks a formal cost management training and guidebook. However, NET Trans provides comprehensive training to its staff in various aspects, including basic operations, financial, etc.

MCPT: MCPT has no formal training, guidebooks, or other resources specifically focused on helping manage costs. However, MCPT does develop a pretty organized and extensive library containing administrative and financial manuals and guidebooks to provide needed policies and procedures for cost management.

2. Fleet management, fleet mix, and vehicle maintenance

Fleet maintenance and replacement costs are unavoidable operating expenses. Proactively managing and optimizing preventive maintenance practices, fleet mix practices, and vehicle replacement plans can effectively control maintenance expenses and other state-of-good repair costs.

MoDOT: MoDOT has managed a unique funding program to help cover the cost of vehicle repairs. The vehicle repair program aims to help transit agencies keep their vehicles longer, thereby reducing the capital costs associated with fleet replacements. MoDOT has a statewide vehicle procurement contract that all transit agencies use to purchase vehicles.

NET Trans: NET Trans has strategically modified its fleet mix and has adopted a vehicle replacement plan. NET Trans proactively works to balance the accrual of mileage on its vehicles to help ensure that vehicles accrue miles in line with their expected useful life. NET Trans also continuously monitors each vehicle's mileage to retire vehicles accordingly.

MCPT: MCPT has strategically modified its fleet mix based on different service purposes and has adopted a vehicle replacement plan. For example, MCPT uses sedans for longer (e.g., out-of-

county to St. Louis) and low-productivity trips. MCPT proactively works to balance the accrual of mileage on its vehicles to help ensure that vehicles accrue miles in line with their expected useful life. MCPT also continuously monitors each vehicle's mileage to retire vehicles accordingly. MCPT fully utilizes the consolidated vehicle procurement process (FTA Section 5310) to procure senior and ADA vehicles and pursues competitive funds managed by IDOT.

3. Performance and budgetary monitoring

Routine service performance and budgetary monitoring can carefully track overall operational efficiency and effectiveness, allowing transit agencies to self-assess and optimize service procedures and policies.

MoDOT: MoDOT conducts compliance reviews for Section 5311 subrecipients and Section 5310 subrecipients. MoDOT also computes an annual risk assessment score for every subrecipient. If MoDOT determines issues (e.g., in financial controls, preventative maintenance, or other areas), it works with transit agencies to give them the necessary tools and resources.

NET Trans: NET Trans uses a quarterly performance evaluation process for drivers that incorporates all performance factors into a driver's evaluation. Routine performance monitoring helps examine service levels and can be used for driver training, customer service initiatives, and other cost-saving strategies.

MCPT: MCPT monitors service financial status quarterly to ensure the actual service operations expenses are aligned with the budgetary amounts. MCPT monitors monthly and quarterly productivity reports. MCPT uses productivity reports to monitor different services to ensure productivity and cost-effectiveness. Monthly performance results help MCPT examine service levels and are used for driver training, customer service initiatives, and other cost-saving strategies.

4. Driver hiring, training, and retention

Driver recruitment and retention is a significant cost management challenge across the nation. Hence, well-designed, comprehensive, consistent driver recruitment and training programs can help manage labor costs associated with driver turnover and new driver training.

MoDOT: MoDOT transit agencies are having difficulties getting applicants and retaining the drivers they already have. Attracting and retaining drivers may be especially difficult at least partly because of the current competition from the fast-food industry and from other carrier companies that recruit drivers. Missouri transit agencies have been trying out strategies to encourage drivers to apply and stay, such as signing bonuses, bonuses for completing training, and increasing wages as much as possible.

NET Trans: NET Trans has deployed a comprehensive driver training program (i.e., Safe Transport program and Certified Safety Training), which successfully resulted in a safe operating environment, thereby retaining drivers and saving other labor-related costs.

MCPT: MCPT provides competitive benefits and has adopted a flexible shifting practice, allowing drivers to select weekly shifts. As a result, MCPT can easily get applicants and retain the drivers it already has. MCPT believes that a flexible shifting practice helps it be competitive for drivers because drivers can pick their work hours.

5. Fuel purchase and management

Fuel is a significant driver of every transit agency's operating budget. In fact, fuel is the highest transit agency cost after labor and fringe benefits. Efficient purchasing and managing fuel consumption can significantly impact the overall operational cost.

MoDOT: MoDOT does not have a statewide fuel purchasing program; however, virtually all rural transit agencies in the state use a fuel card program. MoDOT saw the cost management challenges related to fuel as the biggest challenge for the transit agencies in Missouri.

NET Trans: NET Trans has employed two main strategies to help control costs related to vehicle fuels, including an alternative clean fuels project and a fuel card program for conventionally fueled vehicles. NET Trans is saving a considerable amount of money on fueling costs by employing the alternative clean fuel project. Also, NET Trans has a fuel card program to buy gasoline for conventional fossil-fueled vehicles. NET Trans administrative staff receive weekly reports on fuel usage and questionable transactions.

MCPT: MCPT has used a fuel card program to buy gasoline for MCPT's vehicles. MCPT administrative staff receive reports on fuel usage and questionable transactions via an online portal, which helps administrative staff monitor fuel usage and ensure adequate controls are in place over fuel purchases.

6. Centralizing administration and operations (transit agency only)

Centralized administration and operations assist transit agencies in streamlining planning, scheduling, and operations, which allows transit agencies to decrease costs, minimize human error, and boost efficiency. Centralized administration and operations can consolidate transit data and optimize decision-making to manage costs effectively.

MCPT and NET Trans consolidate all scheduling, call center, and dispatcher functions into a centralized call center. A centralized center practice reduces the overall number of office staff (e.g., schedulers, call center agents, and dispatchers), can improve effectiveness in scheduling and dispatching, and reduces the need for facilities.

SUMMARY OF FINDINGS

Work performed under Task 3 uncovered several key findings.

- **Much existing cost management guidance is too general or narrowly focused.** The research team found several sources that either discussed transit cost management generally (e.g., five tips on cost management, in brief) or that covered specific cost-management topics (e.g., strategies for buying fuel). However, the research team did not find any comprehensive source of information that focused on several cost management topics in depth for rural and small urban transit systems. This lack of existing comprehensive material supported the need for the guidebook, workshop, and online course.
- **Fleet management, fleet mix, and vehicle maintenance guidance are needed.** Although there are resources available to transit agencies for the creation of transit asset management plans and to comply with FTA transit asset management (TAM) requirements, the research team did not find much guidance for rural and small urban transit agencies on managing their fleets, selecting the right fleet mix, and developing robust vehicle maintenance programs. This is ironic, given that vehicles are the most significant capital cost of rural and small urban transit systems and that maintaining vehicles is a major operational cost driver.
- **MoDOT created a successful vehicle repair program to help agencies retain vehicles longer.** MoDOT's vehicle repair program, funded by the proceeds from vehicle sales, helps Missouri rural and small urban transit agencies by providing application-based grants to fund major vehicle repairs like engine replacements, transmission replacements, etc. This program has been quite successful and will likely become even more important as vehicle prices and lead times increase.
- **Vehicle energy (i.e., fuel) costs continue to be a significant challenge.** All three interviewed entities reported vehicle fueling costs as a significant cost management challenge. NET Trans launched its Alternative Clean Fuels Program to convert a portion of its vehicle fleet to propane and has saved due to propane being cheaper than gasoline and experiencing no increased maintenance costs or reduction in vehicle useful life. NET Trans also takes advantage of a statewide fuel card contract to purchase gasoline for its conventionally powered vehicles. MCPT has an online portal to monitor fuel usage and to ensure adequate controls are in place over fuel purchases.
- **Analysis and monitoring are an important part of cost management success.** A common theme in the case studies was the importance of using data and performance monitoring to make decisions. This theme was echoed by OATS and SMTS in Missouri, by NET Trans, and by MCPT. Analysis and monitoring include reviewing costs versus budget and examining service performance measures (e.g., cost per hour and mile), accidents, operator performance, sponsored service rates, etc.

- **Investing in operators can pay off.** Well-designed, comprehensive, and consistent operator recruitment and training programs can help manage labor costs. For example, NET Trans's Safe Transport Program and Certified Safety Training Program help NET Trans ensure its operators are well-trained, are operating safely, and are engaged in the ongoing improvement of NET Trans's quality of service. These programs can help reduce costs associated with turnover, vehicle repairs, claims payments, and liability insurance premiums. Similarly, MCPT trains its staff and operator consistently. Additionally, MCPT has adopted a flexible shifting practice, allowing drivers to select weekly shifts, and has no difficulty attracting and retaining operators.
- **Centralizing operations may help reduce administrative costs.** Centralized administration and operations have more efficient and lower-cost planning and scheduling operations. Both NET Trans and MCPT equip with a centralized operations system. When NET Trans changed from a decentralized to a centralized operation, it was not easy. However, the switch allowed NET Trans to reduce the number of office staff (e.g., schedulers, call center agents, and dispatchers) and to eliminate the need for facilities in each county. Interestingly, NET Trans's operators take their vehicles home, reducing the deadhead associated with traveling to and from a central operations and maintenance facility. Although centralization may not be a solution for all transit agencies, it should be a carefully considered option for transit agencies seeking to make structural changes to reduce costs.

CHAPTER 4: DEVELOPING AND PILOT TESTING THE RESEARCH PRODUCTS

Chapter 4 documents the research team's work under Task 4, Synthesis of Findings and Training Materials Framework. The goal of Task 4 was to compile and synthesize the work from previous tasks and to develop a framework for developing the guidebook, the instructor-led workshop, and the self-paced online course. The framework was essentially a detailed blueprint of all three products, describing their organization, content, formatting, and any other features foundational to the products' design and development. Chapter 4 contains the following sections:

- Framework review process and results.
- Product pilot testing.

FRAMEWORK REVIEW PROCESS AND RESULTS

The framework was foundational to the research project because it laid the groundwork for the design and development of all three products. Therefore, it was critical that both the PMC and Texas transit managers had an opportunity to review and comment on the framework. The research team developed the framework using the following steps:

- Develop the first draft framework.
- Collect PMC comments on the first draft framework.
- Develop the second draft framework.
- Collect feedback from Texas rural and small urban transit managers.
- Develop the final framework and submit to the PMC.

First Draft Development and PMC Review

The research team developed the first draft framework by reviewing the results of all prior chapters, particularly focusing on the cost management topics most important to Texas rural and small urban transit managers. Through a series of internal discussions, the research team developed a first draft of the framework, which was submitted to the PMC for review.

PMC members received an email from the research team with an attached Word document containing review instructions. The Word document also provided links to several other files:

- The full guidebook outline.
- A sample of the guidebook look and feel.
- A sample of the workshop slides look and feel.
- A sample of the workshop instructor guide look and feel.
- A URL to a sample of the online course look and feel.

The research team asked PMC members to review the materials, with a special focus on the full guidebook outline, and to provide comments. In total, three PMC members provided feedback on the first draft framework.

Second Draft Transit Manager Review and Focus Groups

After receiving comments from the PMC, the research team revised the framework (mainly the guidebook outline) to create a second draft framework. The research team asked a selection of Texas rural and small urban transit agency managers to review the second draft framework and to attend focus group discussions on the framework. This section summarizes the methodology and results of the transit manager review and focus groups.

Methodology

To identify potential participants, the research team contacted the transit managers who were asked for their input in the Task 2 focus groups regarding manageable cost drivers. The research team sent an initial invitation email to the rural and small urban transit managers and asked them if they were interested in participating in this round of focus group meetings. After receiving the participants' responses, the research team scheduled three virtual focus group meetings, based on the availability of the respondents—two meetings for transit managers from rural transit districts, and one meeting for the managers from small urban transit districts.

The research team provided participants with the second draft framework, which also included a cover memo and instructions for reviewing the materials and preparing for the focus group. The research team provided participants with seven files including:

- A condensed guidebook outline with chapter learning objectives.
- The full guidebook outline.
- A list of topics removed from the workshop and online course.
- A sample of the guidebook (complete with formatting).
- A sample of the workshop slide deck (complete with formatting).
- A sample of the workshop instructor (complete with formatting).
- A link to sample online course.

In preparation for the focus group meetings, the research team developed a focus group discussion guide, which was a semi-structured agenda to help moderate the meetings and ensure that key topics were raised, as time allowed. (The full discussion guide is included as Appendix H.) The discussion guide organized the focus group meetings into the following parts:

- **Introductions**. Included moderators' and participants' backgrounds and the purpose of the study.
- **Guidebook Overall Organization**. Discussed the content and organization of the guidebook outline. Explained the parts, chapters, and then sections of chapters, reviewing the learning objectives of each chapter. Obtained feedback on the overall organization of the guidebook. The research team used open-end questions during the focus groups to identify participants' perceptions of the guidebook outline and the extent to which participants consider the guidebook as being logical and easy to understand for rural and small urban transit managers. In addition, the research team explored to what extent different parts, chapters, and sections of the guidebook cover the topics that are the most critical for cost management at rural and small urban transit systems in Texas and if there is a need to add or remove any parts.
- **Guidebook Chapter-by-Chapter Review**. Reviewed each chapter of the guidebook and obtained feedback on the chapter's contents. The research team used open-ended questions to help the participants understand how comprehensive the chapter's contents are and how relevant the chapter's contents are to transit managers' jobs both now and five years from now.
- **Look and Feel of Samples**. Finally, the discussion guide asked questions about the look and feel of the samples provided, including the guidebook, workshop slide deck, instructor's guide, and online course. This part was designed to ask respondents' perceptions and feelings about the design, including whether the look and feel was visually appealing and appropriate for this project and whether the materials would be able to be used by the manager with any physical/visual ability. Unfortunately, the earlier parts of the focus groups ran long and no or only a little amount of time was available to discuss the look and feel of the samples.

The two-hour focus group meetings were conducted online and were moderated by two facilitators. Overall, 12 individuals participated in the focus group discussions; eight attended the rural meetings, and four attended the small urban meeting. Table 4.1 lists the focus group participants.

Table 4.1 Rural Focus Group Discussion Participants (*n* = 12)

District Type	Name	Agency	Participant's Role
Rural	Sarah Hidalgo-Cook	Southwest Area Regional Transit District	General Manager (covers eight counties in the middle Rio Grande region)
Rural	Nancy Hoehn	Texas Department of Transportation	Public Transportation Coordinator (Serving Northeast)
Rural	Katey Pilgram	East Texas Council of Governments	Operations Manager

District Type	Name	Agency	Participant's Role
Rural	Bolivar Bolanos	Laredo District	Public Transportation Coordinator
Rural	Serena Stevenson	Waco Transit System (McLennan County Rural)	General Manager
Rural	Donna Moore	Rolling Plains Management Corporation	Program and Transportation Director
Rural	Sarah Santoy	Brazos Transit District	Deputy General Manager
Rural	Martin Ornelas	Rural Economic Assistance League (R.E.A.L Inc.)	Director of Transportation
Small Urban	Jana Svacina	Waco Transit Systems	Director of Finance
Small Urban	Scott Lewis	City of Longview Transit	General Manager
Small Urban	James Oliver	Island Transit Department	Public Transportation General Manager
Small Urban	Millisa Frazier	Waco Transit System	Management Assistant

Focus Group Results

The focus groups were audio and video recorded and transcribed by the research team. The research team then analyzed the textual content and explored the large unstructured text to identify the latent trends and patterns underlying the textual contents (Das et al. 2017). Since the research team had limited textual data, they used the human-based content analysis method. Following this method, the research team re-read the textual information and cleaned the data. The research team then constructed the trends/data in the text to categorize the attributes stated by participants, representing their perceptions towards the second draft framework.

Perceptions towards Guidebook Overall Organization. In this section, the research team asked participants about the overall proposed organization of the topics to explore whether it seemed logical and easy to understand for rural and small urban transit managers. Respondents were also asked if they recommend any changes to the overall organization of the outline and if the proposed parts, chapters, and sections of the guidebook covered the topics that are the most critical for cost management at rural and small urban transit systems in Texas.

Serena Stevenson stated that the overall organization seems clear, concise, comprehensive, streamlined, and logical. She stated that the proposed toolkit items are user-friendly, particularly for those who may not be fully familiar with transit. Serena Stevenson also mentioned the importance of separating the chapters on fixed-route and paratransit, which makes the guidebook more user-friendly for managers. She believed that dividing the guidebook based on the transit modes helps participants reach their desired topic and not be overwhelmed with information.

Sarah Hidalgo-Cook stated that the overall organization seems comprehensive; however, it would be helpful if the guidebook had a section about partnership or contracts in providing

sponsored service. The facilitator explained that the current outline has a section titled "providing sponsored service" under the demand response chapter.

Nancy Hoehn noted that the goal should be to develop the guidebook in such a way that it is not overwhelming; it should be usable for all potential readers.

Martin Ornelas pointed out the necessity of categorizing and prioritizing the chapters and sections based on (a) level of user experience and (b) the timeframe of the fiscal year. For instance, identifying the chapters/section that new managers should review and learn by the early stage of their careers, clarifying the parts of the guidebook that managers need to check at the beginning of a fiscal year, parts they have to check monthly, and the items that should be evaluated by the end of the fiscal year should be considered in the final draft of the guidebook. Similarly, Donna Moor confirmed the need to prioritize chapters based on the managers' level of experience and skills. As an example, she stated that Chapter 3, which discusses cost analysis, could be critical to new transit managers. She believed that the guidebook should be developed to educate new financial staff on what to look for and how to understand and use cost information.

Martin Ornelas also noted the importance of including a section about the automation of call centers due to its impact on the level of service and cost management. In addition, he pointed out that a section should be included to discuss the importance of incentives and safety bonuses to assist with public transit retention of drivers. The facilitator explained that the guidebook included a section in Chapter 4 on different mechanisms for operator pay and incentive. However, the safety bonus aspect could be addressed and added as a whole separate section. He also stated that there is a need for the guidebook to have a chapter or section in terms of the best managing approaches for expansion of current transit service, shifting to alternative service, demonstrating the new services, and implementing new technology platforms.

James Oliver mentioned that the guidebook should have sections to familiarize the audience with the appropriate approaches to matching the service with the funding. To support this suggestion, Jana Svacina agreed that it would be useful if the guidebook included a section about the formula funding related to one-time funding or emergency funding because TxDOT has a priority on spending the emergency funds before other funds. James Oliver confirmed this idea and added that managers need to know how and when to be flexible in spending emergency funding.

Perceptions towards Chapters. In the second part of the focus groups, the research team reviewed the guidebook chapter by chapter. The research team asked respondents how comprehensive the chapter's content was, whether there was anything that should be added to or removed from each chapter, and to what extent they felt the chapter's contents were relevant to their job both now and five years from now. The participants' perceptions, concerns, preferences, and suggestions regarding each chapter are as follows:

- Chapter 1: Introduction.

  Abbreviations and key terms were the first questions regarding Chapter 1. Katey Pilgram discussed how abbreviations could be very helpful for new transit staff and managers. The facilitator explained that the abbreviations and key terms could also be added to the end of the guidebook as a glossary. Serena Stevenson thought that the abbreviations might be more accessible to readers when placed at the beginning of the guidebook. Sarah Hidalgo-Cook brought out the question of whether the abbreviations and key terms would include information about the various federal and state grants. She believed that adding the federal and state grant information (e.g., 5311, 5307, 5310) in the Introduction section of Chapter 1 can be beneficial, particularly for those who are new to managing transit. Jana Svacina suggested that the chapter should also include some cross-references to additional resources (e.g., National RTAP and APTA), including "Transit 101" resources and other similar material. The facilitator explained that each chapter will have an additional resources section and that he would add such a section to Chapter 1.

- Chapter 2: Factors Related to Service Models and Modes.

  Sarah Hidalgo-Cook raised a point on the necessity for including a topic in Chapter 2 to explain the difference in the transit agency's relationship with its umbrella organization for the standalone system versus the county system. Similarly, Serena Stevenson discussed the importance and the relationship between indirect cost allocation and being under different types of umbrella organizations. James Oliver mentioned not complicating the cost structure and developing Chapter 2 at a basic and entry level to make the foundations of cost management understandable for all types of readers with any level of experience. Performance metrics are the same between different services and agencies, although the strategy for cost management is different.

- Chapter 3: Cost Analysis and Reporting.

  Nancy Hoen from TxDOT suggested mentioning other national resources—especially regarding financial management and cost allocation. Participants stated that the proposed toolkit items in this chapter would be instructional because they provide guidebook users with examples of how they can perform their cost analyses or construct budgets. In addition, Jana Svacina suggested considering a part after Section 3.5 explaining how to monitor grant balances and expiration dates.

- Chapter 4: Managing Directly Operated Labor Costs.

  For this chapter, Serena Stevenson suggested adding unions and how they can affect wages. Sarah Hidalgo-Cook mentioned the importance of labor costs and their relationship with the safety incentives or annual performance incentives that would be

added to this chapter. Accordingly, it was suggested to provide a separate section on incentives.

- Chapter 5: Managing Fuel and Energy Costs.

  Serena Stevenson had a positive evaluation of how the outline of this chapter provides audiences with information about different fleets and routes to help them manage their fuel costs. She mentioned the direct association between agency goals and the fleet and fuel type they would select. Similarly, Sarah Hidalgo-Cook pointed out that even rural transit agencies are different from each other; the nearest metro or nearest large area to the rural agency would affect the type of vehicle and fuel they choose for their system. Sarah Hidalgo-Cook and Martin Ornelas discussed how it is important to plan ahead where to buy fuel, working to purchased fuel from the gas stations with the lowest price.

- Chapter 6: Managing Vehicle Maintenance Costs.

  Jana Svacina suggested it would be helpful to include a discussion of utilizing outside maintenance providers as a strategy in some sections of this chapter. Some transit agencies could partner with other transit systems for maintenance services that may cost less than purchasing maintenance from private companies. In addition, James Oliver stated that the beginning of this chapter could discuss the priorities that need to be addressed for managing maintaining costs, such as what data are needed and how to measure the cost-effectiveness of the maintenance program.

- Chapter 7: Safety and Training.

  James Oliver stated that he feels this is an important chapter because safety training can help manage costs by feeding into the overall cost. However, he believed it cannot be included in the top five priorities that a manger should know about.

- Chapter 8: Additional Operational Cost Considerations.

  Jana Svacina stated that this chapter could be helpful in knowing how to eliminate some costs and allow more funding to go toward actual operation costs. In addition, Sarah Santoy brought up the idea of partnership strategies for cost management, such as reaching out to other transit agencies with staff certified for CDL testing.

- Chapter 9: Managing Call Center Costs and Chapter 10: Managing Demand Response Service Costs.

  James Oliver believed that for demand response mode, the focus is managing the cost efficiency of the service. Hence, cost efficiency is driven by efficient scheduling and dispatching. The facilitator asked a follow-up question about the usefulness of the toolkit

item for demand response service policies. Jana Svacina responded that any type of template or policy is always beneficial no matter what information it covers.

- Chapter 11: Specific Strategies for ADA Paratransit.

  Sarah Santoy raised a question about whether this chapter includes any explanations regarding the fare policies based on the fixed-route and ADA paratransit services and how doing fare free on the fixed route can affect the fare policy for paratransit service. The group discussed this issue, and the facilitator agreed to include it in the guidebook.

- Chapter 12: Contracting Out Demand Response Service.

  No comments obtained during the focus group sessions.

- Chapter 13: Cost Effective Route Planning, Scheduling, and Operations.

  Sarah Santoy pointed out the need for adding some strategies for reviewing the cost efficiency performance of fixed-route service. She stated it would be helpful for managers to know if their service is not cost-efficient in terms of performance standards, what factors they should look at, and what potential actions they could use to improve the service cost performance. In addition, she suggested this chapter to provide some strategies about how shifting from a fixed-route service to microtransit is an option if the fixed route is not cost-efficient.

- Chapter 14: Contracting Out Fixed- and Flex-Route Service.

  No comments obtained during the focus group sessions.

- Chapter 15: Introduction to Capital Cost Management.

  Martin Ornelas stated that capital costs are probably one of the costs that managers have the least control over and are less able to manage, especially around vehicles and facilities because of the current unpredictable market. Accordingly, it would be useful to discuss the difficulty of managing capital costs in this chapter or Chapter 16, which is established for managing vehicle capital costs.

- Chapter 16: Managing Vehicle Capital Costs.

  Serena Stevenson noted that in terms of fleet planning, it is important to discuss in this chapter that transit managers should reach out to local and regional long-term planning organizations (e.g., city planning, county planning, metropolitan planning organizations, councils of governments, etc.) to know about the fleet types that have been considered there. Accordingly, purchasing vehicles should be aligned with the visions and goals in

those future plans. Katey Pilgram confirmed this idea and mentioned the importance of considering five-year plans in fleet planning. To Martin Ornelas, managers need at least five years of experience before achieving the authority to purchase vehicles since it is very complicated. He discussed the decisions that must be made when purchasing a vehicle (e.g., are wheelchair lifts in the front or rear) and how these decisions have tradeoffs and unintended consequences.

- Chapter 17: Managing Technology Costs.

  No comments obtained during the focus group sessions.

- Chapter 18: Future Trends and Forward-Thinking Approaches to Cost Management.

  Martin Ornelas brought up the idea of a section on fare collection and related strategies. He discussed the amount of effort and cost the agencies have to put into collecting fares and auditing fare collection. Hence, managers should know that the amount they spend for collecting fares may be greater than the fare they actually collect, and this can be developed through some general guidelines in this chapter.

Perceptions toward Look and Feel. As stated previously, the focus groups usually ran out of time and were not able to discuss the look and feel of the samples provided. However, no critical comments were received, and, in one focus group, one of the managers commented positively on the use of photos of actual Texas transit systems in the samples.

Key Changes Made Based on Focus Groups

The following is a list of the key changes the research team made to the framework based on feedback from the focus groups. The key changes are grouped into additions or changes and removals. Although the following key changes were agreed upon as a part of finalizing the framework, the research team may have made additional minor changes to content and structure as it was developing the actual products.

Additions or Changes. The research team made several additions or changes to the framework, listed below.

- Added a section to the introduction of the guidebook to clearly explain that the guidebook is focused on managing costs and is not a revenue generation, accounting, grant management, or even a transit management guidebook.
- Added a new section to Chapter 1 called Funding Sources for Texas Transit Systems that lists the main FTA grant programs (e.g., Section 5307, 5311, 5310, etc.). The section briefly names each grant program, its eligible uses, and local match requirements. The section also briefly describes state funding, sponsored service funding, and emergency funding.

- Added content to Internal Factors that Influence Cost Management to describe the differences between being a stand-alone agency vs. being a department or division within an umbrella organization like a city, county, COG, or regional planning commission.
- Renamed the Administrative Staff section to Administrative Staffing and Services and added discussion of umbrella organization's indirect costs or central cervices costs.
- Restructured and added contents to the Managing Operator Labor Costs section, including:
    - Increased heading level of Hiring CDL vs. Non-CDL Operators and Using Part-Time vs. Full-Time Operators.
    - Added new sub-sections to deal with holiday and special work pay and with incentives and bonuses.
- Corrected Fleet Procurement Strategies section to show that all transit providers, whether rural or small urban, have the option to participate in cooperative purchasing agreements outside of Texas's SmartBuy system (with permission).
- Added a section in Chapter 1 called How to Use This Guidebook. In this section, readers will be guided to a reading order of chapters based on their personal experience with transit, the most critical sections for cost management of key cost drivers, and type(s) of service operated.
- Added a section in Chapter 3 called Fundamental Cost Management Foundations. In this section, readers receive very basic guidance to help them stay in the black. At the core, agencies should have a budget (with costs and revenues), monitor actual spending, monitor grant balances and periods of performance, and adjust as necessary.
- Added a section in Chapter 3 called Peer Review and Benchmarking. In this section, readers receive guidance on conducting a peer benchmarking study, including how to select peers, how to obtain data, and also how to interpret findings.
- Added a section to the introduction of each chapter, as applicable, that introduces analyses and measures that transit managers could perform or calculate to (a) track specific types of cost performance and (b) to identify potential areas for improved cost management. The section is titled Analyses and Measures for…, followed by the chapter's particular topic area.
- Changed the name of the chapter Managing Call Center Costs to Managing Call and Control Center Costs to reflect that many smaller systems do not have dedicated staff performing only call center duties (i.e., simply answering calls and making reservations). Instead, agents may be responsible for reservations, scheduling, dispatching, and handling customers' day-of-service calls. Updated other parts of this chapter to reflect this reality.
- Several other smaller changes throughout the guidebook to accommodate focus group feedback.

Removals. Some guidebook content was removed due either to needing to shorten the guidebook (to keep the guidebook to a manageable length and cost) or to receiving mixed feedback on the content's importance relative to other content. The research team also removed some of the potential toolkit items to focus development on those toolkit items most helpful for rural and small urban agencies.

- National Case Studies (which would be included in the guidebook's Appendix A). This content was removed, because the case study write ups will be in the research report deliverable and have limited value in the guidebook.
- Sections on call center staff and mechanics in Chapter 4, Managing Directly Operated Labor Costs. Strategies for these two positions are contained in other chapters of the guidebook.
- Section on Managing per-hour Labor Costs. This section only has applicability and benefit to transit agencies with larger vehicle fleets and enough maintenance demand to afford specializations in mechanic types. Also, the cost-related benefits of the strategies are relatively small compared to the other sections of this chapter.
- Chapter on Safety and Training. This whole chapter is removed from the guidebook. Although the PMC and the focus group attendees did not suggest that it be removed, the research team decided that its contents were only tangentially focused on cost management and more on best practices. Also, the cost savings possible are merely indirect outcomes from the actual safety and training practices.
- Section on Coordination with Other Transit Services. This section is also not directly associated with cost management, and, although likely useful, the material in this section is covered in other parts of the guidebook that discuss sponsored service and outsourcing service to another transit agency.
- Section on Exploring Alternative Energy Sources for Facilities. This section will only be marginally useful to rural and small urban transit agencies in Texas, and the recommendations and strategies it would contain would be likely be too vague to be useful.

PRODUCT DEVELOPMENT AND PILOT TESTING

This research developed three primary products: the guidebook (with accompanying toolkit), the instructor-led workshop, and the self-paced online course. To ensure that each of the products met the expectations of Texas rural and small urban transit managers, the research team carried out a pilot test of each product. This section details the procedures involved in developing and pilot-testing the project's products and highlights the key findings derived from the pilot-testing phase.

General Development and Pilot Testing Methodology

Across all three products, the research team's development and pilot testing methodology was as follows:

1. Developing a First Draft of the Product.

   Based on the final framework, the research team fully developed a first draft of the product, with all sections, tools, and materials that accompanied it.

2. PMC Review of the First Draft Product.

   The research team then asked the PMC to review the first draft product. In some cases, due to the size of the products, the products were split into modules or sections so that one or two individual PMC members reviewed each module or section and provided feedback.

3. Developing a Second Draft of the Product.

   Based on PMC feedback, the research team revised the product and created a second draft. The second draft is what would be pilot tested.

4. Selecting a Sample of Pilot Testers.

   The research team selected a sample of Texas transit system managers to serve as pilot testers, ensuring a diverse and representative group for rural and small urban areas.

5. Recruiting the Pilot Testers

   The selected sample was sent an invitation to participate in the pilot testing of the produced materials, emphasizing the importance of their feedback.

6. Establishing a Standardized Feedback Mechanism

   A standardized method was established to collect feedback from pilot testers. This feedback method included a survey questionnaire for assessing the product as a whole product, as well as assessing the product's individual modules or sections, and any each accompanying tool.

7. Requesting Further Recommendations for Improving the Products

   Pilot testers were encouraged to offer suggestions for key concepts that could be emphasized or featured in the guidebook, the instructor-led workshop, and the self-paced online course, promoting a collaborative process to content refinement.

8. Compiling the Pilot Test Feedback

   The research team systematically compiled the results of the pilot test, consolidating feedback on strengths, weaknesses, and potential areas for improvement.

9. Generation of Potential Changes

   A list of potential changes was created based on the compiled feedback, considering both the perceived importance by pilot testers and the feasibility of implementation.

10. Ranking and Prioritization

    These potential changes were systematically ranked and prioritized, taking into account the feedback from pilot testers and the suggested modifications.

11. Revising the Products

    The research team modified the product and shared the final draft product with the PMC and TxDOT's Research, Technology, and Implementation Division (RTI).

12. Finalizing the Revised Products

    If there was any additional feedback from the PMC on the final draft product or the research team identified other necessary changes (e.g., finding a spelling error in the guidebook while developing the online course), the research team itemized and made those final changes to resubmit the final products to the PMC and RTI.

The following sections detail the specific development and pilot testing procedures for each of the three products.

Developing and Pilot Testing the Guidebook

Once the final framework was created, the research team began developing the guidebook as a collaborative authoring effort. To accompany the guidebook, the research team developed 10 tools to be included in the toolkit. Each guidebook chapter and tool underwent an initial review by the project's principal investigator and TTI researchers. Subsequently, all chapters were reviewed by at least one member of the PMC. After PMC comments were received, the research team finalized each chapter and then began pilot testing, following the pilot testing methodology outlined above.

Data Collection, Survey Design, and Criteria

To develop a standard and user-friendly feedback mechanism, the research team developed an online survey while taking into account the following:

- The guidebook pilot testing goals:
    - Developing a methodology to evaluate the RTI Transit Cost Management Guidebook.
    - Reviewing and validating the guidebook product by experts.
    - Receiving input from experts to improve the guidebook.
- The content, modules, key sections, template, and format of the guidebook.
- Current practices and existing literature on pilot testing textbooks.

Accordingly, the survey was designed to evaluate the respondent's perceptions towards the following criteria:

- Material (topics and content).
- Visual Aspects.
- Presentation Aspects.
- Usability.
- Overall Quality.

Each criterion was broken down into a set of measures (see Table 4.2). Respondents were asked to rate the quality of measures based on a five-point Likert scale from 1 = Unacceptable to 5 = Outstanding. The survey also included two open-ended questions asking for extra comments in addition to the examples or practices implemented by respondents' agency in terms of the guidebook contents. The final survey was created online through the Qualtrics platform (see Appendix I for the Word version of the full survey).

Pilot Testers

To pilot-test the guidebook, the research team reached out to the Texas small urban and rural transit agencies. The contact information of transit agencies was obtained from PTN-128 contact lists; the research team attempted to contact the director, assistant director, general manager, or assistant general managers of associated transit agencies.

An invitation email with a brief introduction about the guidebook and the pilot testing approach was sent out to the transit agency managers and they were asked if interested in participating in the pilot testing. The invitation email described that the volunteer participants needed to read and review Chapter 1 (the Introduction Chapter) and one (or more) additional chapters based on their expertise. They were told how to provide their comments and feedback and the timeline for completing their task (two weeks).

The invitation email contained the link to a short survey that assisted potential participants in selecting the chapters they were interested in evaluating. After receiving the responses, a group of participants who showed their interest in the pilot testing was selected. The research team

prepared the pilot testers with the pilot test instructions, required materials, and the online Qualtrics survey link. Pilot testers were also asked to provide any suggestions/recommendations for the key concepts to highlight or feature in the future workshop and online course.

Data Analysis Results

Out of the total pilot testing invitations sent, 18 pilot testers responded and thoroughly assessed the guidebook chapters. The evaluation results, presented in Table 4.3, highlight the feedback provided by the pilot testers on the guidebook chapters. In general, the average scores for all criteria ranged between 4 and 5, indicating a consensus of either "Better than Average" or "Outstanding Quality."

Examining the Material criteria, having "up-to-date content" for the guidebook garnered an average score of 5, while "accuracy" and "coverage" received scores of 4. In terms of Visual aspects, all three measures (layout, font, and format) obtained an average score of 4. Moving to the Presentation, "consistency" and "logic" earned an average score of 5, while "illustration" received a score of 4.

Considering Usefulness, the aspects of "prediction," "self-direct," "new to transit," and "real-world challenge" all ranked at an average score of 4. The Overall Quality of sections such as "introduction," "organization," "summary," "takeaways," and "additional resources" all received a score of 5, whereas the "learning objectives" section achieved an average score of 4.

The final version of the guidebook was revised based on feedback from the guidebook pilot test.

Table 4.2 RTI Guidebook Criteria Evaluation

Criteria	Measure Short Phrase	Full Survey Question Wording	Average Rating
Material	Coverage	The extent to which this chapter covers its subject without missing necessary contents	4
	Accuracy	The accuracy of concepts, definitions, examples, facts, and illustrations provided in this chapter	4
	Up-to-date content	The extent to which this chapter's content is updated compared to similar resources	5
Visual	Layout	The layout of the contents	4
	Font	Font size and color	4
	Format	Format and order of writing the contents	4
Presentation	Consistency	Consistency in presenting the material in this chapter	5
	Logic	The logic in presenting the material	5
	Illustration	Presenting material in the form of tables, maps, pictures, or illustrations	4

Criteria	Measure Short Phrase	Full Survey Question Wording	Average Rating
Usefulness	Of information and tools	Using the information and tools contained in this chapter to identify, analyze, and/or predict costs	4
	For self-directed learning	Using this chapter for self-directed learning	4
	For those new to transit	Using this chapter for people new to transit cost management for understanding the material and topics discussed	4
	For real-world challenges	Using the information and tools in this chapter based on real-world challenges in transit management systems	4
Overall Quality of Chapter Section	Introduction	Chapter Introduction	5
	Learning objectives	Learning Objectives	4
	Organization	Organization of Chapter	5
	Summary	Chapter Summary	5
	Takeaways	Take-Aways	5
	Additional resources	Additional Resources	5

Developing and Pilot Testing the Instructor-Led Workshop

Once the final version of the guidebook and toolkit was created, the research team then began developing the materials for the workshop, following both the guidance in the final framework and the contents in the guidebook. During PMC review, the workshop materials were divided up by module, and each module was reviewed by one to two PMC members. The research team then created the second draft workshop materials and followed the pilot testing methodology described earlier.

Data Collection

To test and evaluate the instructor-led workshop, the research team conducted two one-day virtual workshop deliveries with pilot testers. During each delivery, the research team delivered different parts of the instructor-led workshop and asked attendees for their feedback. Data for pilot testing the workshop were collected through participants of a one-day virtual workshop conducted by the research team. Feedback from pilot testers was provided by participants' engagements in learner-centered activities during the workshop including:

- Small group exercises.
- Written exercises.
- Questions and answers and guided discussion.

In addition, the pilot testers were asked to fill out two Module and Workshop Evaluation Forms for the workshop modules that were delivered during the virtual workshop (Appendix J).

Pilot Testers

Pilot testers were recruited utilizing the Texas small urban and rural transit agencies contact information. The research team contacted the director, assistant director, general manager, or assistant general managers of associated transit agencies through emails. Similar to the pilot testing of the guidebook, the invitation email started with a brief introduction about the instructor-led workshop and the pilot testing approach. The invitation email described the pilot-testing of the instructor-led workshop is based on the developed guidebook and explained the activities that would occur during the workshop. The invitation email contained the link to a short survey that assisted interested participants in signing up for the workshop and selecting dates that would work for participants to attend. After receiving the responses, a group of participants who showed their interest in the pilot testing were invited to the one-day online workshop. The research team prepared the pilot testers with the pilot testing instructions, required materials, workshop slide decks, and evaluation forms. A total of 10 participants attended in pilot testing across the two deliveries in October 2023.

Results

The workshop contains an extensive amount of content, and the research team was not able to cover all of it in a single day. Therefore, during the two days of the workshop pilot testing, different modules and chapters of the workshop were delivered. Overall, the pilot testers provided the following feedback:

Timing

- **Reduce the time/discussion on the cost chain further**: Participants suggested that the workshop spent too much time discussing the cost chain, which includes the costs involved in providing transit services. They recommended cutting back on this topic to allocate more time to other areas.
- **Reduce the time/discussion on modes further**: Similar to the cost chain, the discussion on different modes of transportation was deemed too lengthy. Participants felt that this topic should be squeezed to allow a better balance in the workshop modules.
- **Increase the length of the one-day workshop to a two-day or two-and-a-half day workshop**: Participants believed that the content covered in the workshop was too extensive for a single day. They recommended extending the workshop to two or two-and-a-half days to ensure a more comprehensive and less rushed exploration and discussion of the topics.
- **Focus on topics that are less specialized**: The feedback indicated that some topics covered in the workshop were too specialized and may not have been relevant to all participants. They suggested focusing on more general topics that would be beneficial to a broader audience within rural and small urban transit management.

Redundancy

- **Reduce the redundancy in the slides of Chapters 2 and 3:** Participants stated that the slides in Chapters 2 and 3 of the workshop contained duplicated information. This redundancy made the content feel repetitive and potentially less engaging for attendees.

Clarity

- **Explaining the formula anywhere needed:** Participants suggested that whenever a formula is presented during the workshop, it should be thoroughly explained. This includes defining each variable in the formula, the rationale behind it, and step-by-step instructions on how to use it.
- **Provide instructions on how to find the performance measures in PTN-128:** Participants requested clear instructions on how to find and interpret the public transit performance measures within PTN-128 website.

Adding

- **Add more about wage rates and benefits**: Include detailed information on current wage rates and benefits for transit staff.
- **Add the importance of documenting the incentives/bonuses programs**: Emphasize the need for thorough documentation of incentive and bonus programs used in transit systems.
- **Add marketing the value of transit**: Incorporate strategies for effectively marketing the benefits of public transit to the community.
- **Add that fuel tank and site preventive maintenance and corrective maintenance is an issue with centralized fueling facilities**: Address the specific maintenance challenges associated with centralized fueling facilities.
- **Add policies that dictate usage (e.g., using newer vehicles on longer-distance trips)**: Introduce policies that optimize the use of transit vehicles based on their condition and capabilities.
- **Add predictive maintenance**: Include information on predictive maintenance techniques, and describe the concept of predictive maintenance.
- **Add the websites and/or the URL sources where needed**: Ensure that all referenced materials, tools, and resources are accompanied by their corresponding websites or URL links.
- **Add leasing vs. purchasing in the maintenance and capital cost section**: Discuss the pros and cons of leasing versus purchasing transit vehicles and equipment.
- **When implementing new passenger-facing technology (e.g., self-service booking), add budget for user training to help increase use (e.g., providing hands-on training at senior centers, etc.)**: Highlight the importance of budgeting for user training when introducing new technologies to ensure high adoption rates.

- **Add discussion of challenges to bus replacement**: Include a discussion on the challenges faced during the bus replacement process.

Table 4.3 Feedback on Instructor-Led Workshop

Feedback Topic	Details
Timing	Reduce the time/discussion on the cost chain
	Reduce the time/discussion on modes
	Increase the length of the one-day workshop to a two-day or two-and-a-half-day workshop
	Focus on topics that are less specialized
Redundancy	Reduce the redundancy in the slides of (i.e., there was overlap in Chapters 2 and 3)
Clarity	When providing a formula for calculating something, explain the formula
	Provide instructions on how to find the performance measures in PTN-128
	Some learning objectives don't match with the topics covered in the chapter
Adding	Add more about wage rates and benefits
	Add the importance of documenting incentive/bonus programs
	Add more content about marketing the value of transit
	Add that fuel tank and site preventive maintenance and corrective maintenance is an issue with centralized fueling facilities
	Add that some agency policies may dictate vehicle usage (e.g., using newer vehicles on longer-distance trips) beyond the desire to balance our vehicle mileage across the fleet
	Add that predictive maintenance can help with cost management
	Add the websites and/or the locations for any sources referenced or deemed helpful
	Add leasing vs. purchasing in the maintenance and the capital cost section (e.g., in the discussion of tire costs and vehicle costs)
	When implementing new passenger-facing technology (e.g., self-service booking), add that budgeting for user training can help increase use of the technology (e.g., providing hands on training at senior centers, etc.).
	Add to bus replacement section a discussion of challenges currently experienced by transit agencies

Developing and Pilot Testing the Online Course

This section will not be included until the online course videos are completed and pilot tested.

Data Collection

Results

REFERENCES

AECOM, D. Schneck, A. Touran, Raul V. Bravo + Associates, Inc., and Sharp & Company. 2010. *TCRP Report 138: Estimating Soft Costs for Major Public Transportation Fixed Guideway Projects.* The National Academies Press, Washington, DC.

Alternative Fuels Data Center. 2023. "Fuel Prices." https://afdc.energy.gov/fuels/prices.html. Accessed June 16, 2023.

Baxandall, P. 2021. *The Dollars & Sense of Free Buses.* Massachusetts Budget & Policy Center, Boston, MA.

Das, S., Dixon, K., Sun, X., Dutta, A., & Zupancich, M. 2017. "Trends in Transportation Research: Exploring Content Analysis in Topics." *Transportation Research Record*, *2614*(1), 27–38. https://doi.org/10.3141/2614-04

DMJM Harris and AECOM. 2006. *Capital Planning for Small and Medium-Sized Transit Systems: A Resource Guide.* PennDOT, Harrisburg, PA.

Edrington, S., Brooks, J., Cherrington, L., Hamilton, P., Hansen, T., Pourteau, C., and Sandidge, M. 2014. *Guidebook: Managing Operating Costs for Rural and Small Urban Transit Systems* (Report RMC 0-6694).

Edrington, S. and J. Arndt. 2009. *Dispatching Demand Response Transit Service: Maximizing Productivity and Service Quality Guidebook: Final Report.* University Transportation Center for Mobility, College Station, TX.

First Tennessee Human Resource Agency (FTHRA). 2022. Homepage. https://fthra.org/ [accessed July 5, 2022].

Friedman, D., and DeCorla-Souza, K. 2012. *TCRP Report 156: Guidebook for Evaluating Fuel Purchasing Strategies for Public Transit Agencies.* The National Academies Press, Washington, DC.

Hough, J., Taleqani, A.R., and Lynch, R. 2020. Assessment of Immediate Small and Rural Transit Training Needs (UGPTI Staff Paper No. 185). Upper Great Plains Transportation Institute. https://www.ugpti.org/resources/reports/downloads/sp-185.pdf

Johnson, S. 2017. "Transit Fares Only Partially Cover Public Transportation Costs," Government Technology. https://www.govtech.com/fs/transit-fares-only-partially-cover-public-transportation-costs.html [accessed Feb. 22, 2022].

Laver, R., Schneck, D., Skorupski, D., Brady, S., Cham, L., Hamilton, B. 2007. *Useful Life of Transit Buses and Vans.* Report No. FTA-VA-26-7229-07.1. Federal Transit Administration, Washington, DC.

Mass Transit. 2022. "BC Transit announces details of its coming electronic fare collection system." *Mass Transit.* https://www.masstransitmag.com/technology/fare-

collection/article/21254723/bc-transit-announces-details-of-its-coming-electronic-fare-collection-system [accessed Mar. 16, 2022].

Mattson, J. and Mistry, D. 2021. *Rural Transit Fact Book 2021.* North Dakota State University, Upper Great Plains Transportation Institute, Small Urban and Rural Transit Center. Fargo, ND.

Missouri Department of Transportation (MoDOT). 2022. Transit. https://www.modot.org/transit-general-information [accessed July 1, 2022].

National Academies of Sciences, Engineering, and Medicine. 2011. *Guidebook for Evaluating Fuel Choices for Post-2010 Transit Bus Procurements* (TCRP Report 146). The National Academies Press. Washington, DC.

National Center for Applied Transit Technology. 2020. *Promising Practices Guidebook: Transit Technology Adoption.* Washington, DC.

National Express Transit. 2018. "7 Strategies for Managing Operating Costs for Rural Public Transit." https://www.nationalexpresstransit.com/blog/7-strategies-for-managing-operating-costs-for-rural-public-transit/ [accessed Feb. 22, 2022].

National RTAP. 2020. *Fundamental Financial Management for Rural Transit Providers*. National Rural Transit Assistance Program, Washington, DC.

National Transit Database (NTD). 2019. NTD Transit Agency Profiles. https://www.transit.dot.gov/ntd/transit-agency-profiles [accessed various dates].

Operating Above the Standard (OATS) Transit. 2021. Homepage. https://www.oatstransit.org/ [accessed July 1, 2022].

PTN-128, Full Year Reports. 2019. [Available online to TxDOT and Texas transit systems.]

Roberts, C., Batac, T., Akofio-Sowah, M. 2016. *Asset Management Guide for Small Providers.* FTA Report No. 0092. WSP | Parsons Brinckerhoff, Washington, DC.

Southeast Missouri Transportation Service (SMTS). 2022a. Homepage. https://ridesmts.org/ [accessed July 1, 2022].

SMTS. 2022b. Services. https://ridesmts.org/services/ [accessed July 1, 2022].

Texas A&M Transportation Institute. 2007. "Transit Vehicles for Small Urban and Rural Public Transportation Systems in Texas." White Paper for TxDOT. College Station, TX.

Thatcher, R. and Ferris, C. 2013. *Strategy Guide to Enable and Promote the Use of Fixed-Route Transit by People with Disabilities.* TCRP Report 163. The National Academies Press, Washington, DC.

TTA. 2021 (December). *Rural Wage and Benefit Survey.* Obtained from Texas Transit Association email distribution.

TxDOT. 2024a. *2023 Texas Transit Statistics*. https://www.txdot.gov/content/dam/docs/ptn/2023-texas-transit-statistics-report.pdf [accessed May 20, 2024].

TxDOT. 2024b. *Managing Operational and Capital Costs at Rural and Small Urban Transit Systems: A Guidebook.* 0-7133-P1.

U.S. Government Accountability Office. 2020. *Transit Asset Management: FTA Should Clarify Performance Data and Develop a Plan to Guide Future Program Improvements*. Report to the Committee on Banking, Housing, and Urban Affairs, US Senate. Washington, DC.

Via Transportation. 2021. "Want more riders, better service, and lower expenses? See how this town is achieving all three." https://ridewithvia.com/resources/articles/want-more-riders-better-service-and-lower-expenses-see-how-this-town-is-achieving-all-three/ [accessed Feb. 22, 2022].

West Virginia Division of Public Transit. 2018. *Group Asset Management Plan.* Charleston, WV.

BIBLIOGRAPHY

Energy Information Administration (EIA). 2021. Weekly Retail Gasoline and Diesel Prices. https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_nus_a.htm

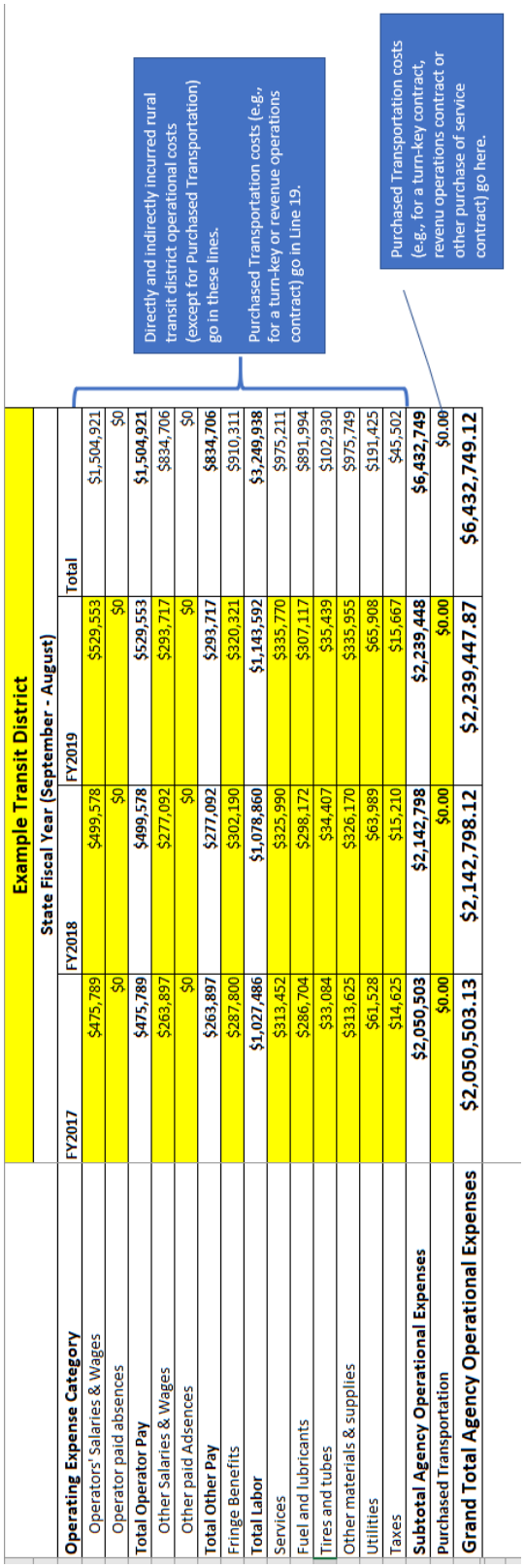
Fu, L. and Ishkhanov, G. 2004. "Fleet Size and Mix Optimization for Paratransit Service" (Transportation Research Record 1884).

National Academies of Sciences, Engineering, and Medicine. 2023. *Third-Party Contracts for Fixed-Route Bus Operations and Maintenance: Performance Metrics*. Washington, DC: The National Academies Press. https://doi.org/10.17226/27074.

National Academies of Sciences, Engineering, and Medicine. 2023. *Bus Operator Workforce Management: Practitioner's Guide*. Washington, DC: The National Academies Press. https://doi.org/10.17226/26842.

Walk, M.J. and S. Tan. 2020. *Census 2020 Impacts on Texas Transit—Technical Briefing: Texas State Funding for Transit* (technical report).

APPENDIX A: RURAL COST DATA COLLECTION TEMPLATE EXAMPLES



Example Transit District

State Fiscal Year (September - August)

Operating Expense Category	FY2017	FY2018	FY2019	Total
Operators' Salaries & Wages	$475,789	$499,578	$529,553	$1,504,921
Operator paid absences	$0	$0	$0	$0
Total Operator Pay	$475,789	$499,578	$529,553	**$1,504,921**
Other Salaries & Wages	$263,897	$277,092	$293,717	$834,706
Other paid Absences	$0	$0	$0	$0
Total Other Pay	$263,897	$277,092	$293,717	**$834,706**
Fringe Benefits	$287,800	$302,190	$320,321	$910,311
Total Labor	$1,027,486	$1,078,860	$1,143,592	**$3,249,938**
Services	$313,452	$325,990	$335,770	$975,211
Fuel and lubricants	$286,704	$298,172	$307,117	$891,994
Tires and tubes	$33,084	$34,407	$35,439	$102,930
Other materials & supplies	$313,625	$326,170	$335,955	$975,749
Utilities	$61,528	$63,989	$65,908	$191,425
Taxes	$14,625	$15,210	$15,667	$45,502
Subtotal Agency Operational Expenses	$2,050,503	$2,142,798	$2,239,448	**$6,432,749**
Purchased Transportation	$0.00	$0.00	$0.00	$0.00
Grand Total Agency Operational Expenses	$2,050,503.13	$2,142,798.12	$2,239,447.87	$6,432,749.12

Directly and indirectly incurred rural transit district operational costs (except for Purchased Transportation) go in these lines.

Purchased Transportation costs (e.g., for a turn-key or revenue operations contract) go in Line 19.

Purchased Transportation costs (e.g., for a turn-key contract, revenu operations contract or other purchase of service contract) go here.

Example Transit District					
State Fiscal Year (September - August)					
Capital Cost Category	FY2017	FY2018	FY2019	Total	
Stations			$16,500	$16,500	
Administrative Buildings				$0	
Maintenance Buildings				$0	
Passenger Vehicles	$435,600	$98,700		$534,300	
Other Vehicles		$36,300	$36,900	$73,200	
Fare Collection Equipment	$44,500	$12,300		$56,800	
Communication & Information Systems		$24,000		$24,000	
Other				$0	
Total Capital Expenses	**$480,100**	**$171,300**	**$53,400**	**$704,800**	

APPENDIX B: TEXAS COST CONTROL NEEDS SURVEY

Managing Operating and Capital Costs

Start of Block: IntroPage

Q13 The Texas A&M Transportation Institute (TTI) is assisting the Texas Department of Transportation (TxDOT) by updating its *Guidebook on Managing Operating Costs for Rural and Small Urban Public Transit Systems* to reflect changes since the guidebook was last published in 2014 and to also cover capital costs. Your input on this short, 10-question survey will help TTI shape the structure and content of the guidebook and supporting materials.

This survey is meant for Texas rural and small urban state-funded transit districts and should be answered from that perspective. Agencies that also operate / manage large urban transit districts should answer the questions from the perspective of their rural and/or small urban systems.

Click on the “Begin" button to get started and don’t forget to click on the “Submit” button when you are done.

We need your survey response by **November 19, 2021**. Thank you for your input!

If you have any questions, please contact the Principal Investigator:

Michael J. Walk
m-walk@tti.tamu.edu
512-407-1135.

End of Block: IntroPage

Start of Block: Survey

Q16 The following two questions ask you to rank the operational and capital *cost drivers* that are most critical for effective cost management. Select elements of cost that, in your opinion, must be most carefully managed to maintain cost effectiveness and efficiency.

Q2 Please place a 1, 2, 3, 4 and 5 to rank your top 5 operational cost drivers that are most critical for effective cost management.

_____ Labor – Operator Salaries and Wages (1)
_____ Labor – Other Salaries and Wages (2)
_____ Fringe Benefits (3)
_____ Services – Operations Contract / Purchased Transportation (4)
_____ Services – Maintenance Contract (Vehicles, Facilities, Bus Stops) (5)
_____ Services – Professional and Technical Services (e.g., Training, D&A Testing, Background) (6)
_____ Services – Hardware / Software Maintenance (7)
_____ Leases – Administrative / Operational / Maintenance Facilities (8)
_____ Leases – Passenger Parking Facilities (9)
_____ Leases – Revenue Vehicles (10)
_____ Leases – Non-Revenue Vehicles (11)
_____ Materials and Supplies – Fuel and Lubricants (12)
_____ Materials and Supplies – Tires and Tubes (13)
_____ Materials and Supplies – Parts (14)
_____ Materials and Supplies – Vehicle Equipment, Office Equipment, Administrative Supplies, etc. (15)
_____ Utilities and Telecommunications (16)
_____ Insurance (General, Vehicle) (17)
_____ Taxes (Fuel tax, lubricant tax) (18)
_____ Other (describe) (19)

Q3 Please place a 1, 2 and 3 to rank your top 3 capital cost drivers that are most critical for effective cost management.

_____ Administrative / Operational / Maintenance Facilities (1)
_____ Passenger Facilities / Bus Stops (2)
_____ Revenue Vehicles (3)
_____ Non-Revenue Vehicles (4)
_____ Fare Boxes (5)
_____ Maintenance Equipment (6)
_____ Technology (Hardware and Software) – facility and in-vehicle (7)
_____ Telephone System (8)
_____ Radio / Driver Communication System (9)
_____ Other (describe) (10)

Q4 When thinking about managing or controlling your most critical cost drivers, what are the cost drivers (from the previous lists) for which you need the most help, i.e., where guidance is lacking?

_____

_____

_____

_____

_____

Q5 What tools (e.g., specific types of spreadsheets, templates, or checklists) would help you better manage those critical cost drivers?

_____

_____

_____

_____

_____

Q6 How do staff at your agency CURRENTLY obtain useful knowledge and information from external sources regarding transit cost management? Select all that apply.

- ☐ Attend in-person, instructor-led classes / workshops (1)
- ☐ Attend virtual, instructor-led classes / workshops (2)
- ☐ Self-paced online courses (no instructor) (3)
- ☐ Short videos or tutorials online (4)
- ☐ Reading websites or online articles (9)
- ☐ Reading books, articles, or other paper-based sources (5)
- ☐ Other (describe) (6) _____
- ☒ None of the above (7)

Q8 What methods would be BEST for staff at your agency to obtain useful knowledge and information from external sources regarding transit cost management? Rank all the options below by placing numbers next to each option (put a 1 on the best option).

_____ Attend in-person, instructor-led classes / workshops (1)
_____ Attend virtual, instructor-led classes / workshops (2)
_____ Self-paced online courses (no instructor) (3)
_____ Short videos or tutorials online (4)
_____ Reading websites or online articles (7)
_____ Reading books, articles, or other paper-based sources (5)

Display This Choice:

If Q6 = Other (describe)

_____ ${Q6/ChoiceTextEntryValue/6} (6)

Q7 Name of your transit agency

_____

_____

Q9 What type(s) of Texas transit district is your transit agency? Select all that apply.

- ☐ Rural (1)
- ☐ Small urban (2)
- ☐ Large urban (3)

Q10 What types of transit services do you operate? Select all that apply.

- [ ] Local bus (fixed route) (1)
- [ ] ADA Paratransit (4)
- [ ] Alternative service for ADA paratransit customers (e.g., taxi/TNC-subsidy program) (8)
- [ ] Deviated fixed route (flexible route) (2)
- [ ] Commuter / express bus (3)
- [ ] General public demand response (5)
- [ ] Sponsored human service agency transportation (9)
- [ ] Limited eligibility demand response (e.g., only for seniors or people with disabilities) (6)
- [ ] On demand microtransit (7)
- [ ] Vanpool (10)

Carry Forward Selected Choices from "Q10"

Q11 Do you directly operate or purchase service from a third party? Select all that apply

	Directly Operate (1)	Purchase Service (2)
Local bus (fixed route) (x1)	☐	☐
ADA Paratransit (x4)	☐	☐
Alternative service for ADA paratransit customers (e.g., taxi/TNC-subsidy program) (x8)	☐	☐
Deviated fixed route (flexible route) (x2)	☐	☐
Commuter / express bus (x3)	☐	☐
General public demand response (x5)	☐	☐
Sponsored human service agency transportation (x9)	☐	☐
Limited eligibility demand response (e.g., only for seniors or people with disabilities) (x6)	☐	☐
On demand microtransit (x7)	☐	☐
Vanpool (x10)	☐	☐

Q12 Please provide your name and contact info in case we need to ask you questions.

_____

End of Block: Survey

Start of Block: Closing Page

Q14 To submit your responses, click the "Submit" button below!

Thank you for your participation in this survey. The results will be used to help shape the structure and content of TxDOT's *Guidebook on Managing Operating and Capital Costs for Rural and Small Urban Public Transit Systems*, due to be completed and available to you in 2023.

If you have any questions, please contact Michael J. Walk at m-walk@tti.tamu.edu or 512-407-1135.

End of Block: Closing Page

APPENDIX C: SURVEY INVITATION EMAIL

Dear ${m://FirstName} ${m://LastName},

Howdy! The Texas A&M Transportation Institute (TTI) is assisting the Texas Department of Transportation (TxDOT) by updating its *Guidebook on Managing Operating Costs for Rural and Small Urban Public Transit Systems*, last prepared in 2014. The update will reflect changes that have occurred in transit tools, service provision, and administration since the guidebook was published. In addition, TxDOT wishes to add guidance on the management of capital costs.

As part of this project, we are reaching out to you with this brief 10-question survey. Your input will help determine what manageable cost drivers are most important for effective cost management. Your input will also shape the structure and content of the updated guidebook and supporting materials.

Please respond by **November 19, 2021**.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

This survey is meant for Texas rural and small urban state-funded transit districts and should be answered from that perspective. Agencies that also operate / manage large urban transit districts should answer the questions from the perspective of their rural and/or small urban systems. Thank you very much for your input!

If you have any questions, please contact me at m-walk@tti.tamu.edu or 512-407-1135.

Michael Walk
Principal Investigator

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

APPENDIX D: SUMMARIES OF SOURCES FOUND IN LITERATURE SCAN

This appendix contains brief summaries of the sources found during the Task 3 inventory of transit cost management materials. The summaries describe the author, audience, and topics of each source and assess the value of each source in contributing to the products.

1. 7 Strategies for Managing Operating Costs for Rural Public Transit

   "7 Strategies for Managing Operating Costs for Rural Public Transit," written by National Express Transit (2018) is a blog post written for rural transit agencies by a private fixed-route and paratransit operator. The blog post presents recommendations for effective management of operating costs, for example, standardizing cost reporting, performing peer comparisons, and regularly reviewing salaries, wages, suppliers, contracts, and vehicle maintenance costs. The recommendations are relatively basic and do not provide much detail; however, they corroborate several of the topics and recommendations that the research team will likely include in the Guidebook.

2. BC Transit announces details of its coming electronic fare collection system

   "BC Transit announces details of its coming electronic fare collection system," written by the editorial staff of Mass Transit magazine (2022), is an article for all transit agencies. It identifies anticipated benefits of British Columbia (BC) Transit's new electronic fare collection system. Some of these benefits could be associated with reduced operating costs, which is where the article provides value for the Guidebook.

3. Transit Fares Only Partially Cover Public Transportation Costs

   "Transit Fares Only Partially Cover Public Transportation Costs," an article in *Government Technology* (2022), was written for local governments that have a role in providing or operating transit service. The article is about the extent to which transit fares cover costs. Its value for the Guidebook is in its examples of cost-reduction techniques (e.g., paying individuals to drive their neighbors and donating retired vehicles to nonprofit organizations that use the vehicles to carry some transit riders).

4. The Dollars & Sense of Free Buses

   The Dollars & Sense of Free Buses, written by P. Baxandall for the Massachusetts Budget & Policy Center (2021), is a report written for Massachusetts policymakers. The report presents the argument that fare-free transit service can (1) be more efficient and more effective than transit service with fares and (2) benefit the local economy. The value of the report for the Guidebook is in its provision of cost data and identification of specific cost items. The report acknowledges a significant concern related to paratransit (i.e., complying with federal rules on maximum ADA paratransit fares while trying to shift paratransit riders to more cost-effective transit services) but does not elaborate on it. This is a significant concern; if fare-free transit is a strategy included in the Guidebook,

more information will be needed about how transit agencies operating fare-free have addressed the paratransit concern.

5. Want more riders, better service, and lower expenses? See how this town is achieving all three

   "Want more riders, better service, and lower expenses? See how this town is achieving all three," written by Via Transportation, Inc. (2021) is an article by a private on-demand transportation provider for all transit agencies. The article is about one case in which an agency reduced costs by replacing fixed-route services with microtransit service operated by the author. Given that replacing underperforming fixed-route service (or demand-responsive service) with technology-driven microtransit may a topic in the Guidebook, this source could be considered as a single reference for that topic. More references and resources will need to be collected during Guidebook preparation to treat the topic of microtransit effectively.

6. Fundamental Financial Management Training for Rural Transit Providers

   Fundamental Financial Management Training for Rural Transit Providers, published by National RTAP (2020) is a training course and manual written for rural, small urban, and tribal transit agencies. The manual is intended to help the target transit agencies improve their financial management practices and operate as efficiently and effectively as impossible. The manual discusses effective financial management systems and fundamental accounting principles and recommends best practices. Although the manual does discuss financial management, much of the manual's content is focused on regulatory and procedural issues related to financial management (e.g., cost allowability, indirect costs, cost allocation, and cash management). Specific guidance for reducing or controlling operational and capital costs (e.g., how to manage overtime or to build efficient schedules) is not discussed. The manual is a relatively recent publication, and it could be included in the Guidebook in a list of "For More Information" resources.

7. Promising Practices Guidebook: Transit Technology Adoption

   Promising Practices Guidebook: Transit Technology Adoption, written by the National Center for Applied Transit Technology (2020) is a guidebook intended for all transit agencies. The guidebook provides overviews of 10 technology practices (e.g., a fleet electrification project and an IoT-enabled transit asset management system project) that the authors assessed with respect to innovativeness, replicability/scalability, cost-effectiveness, customer usability, operational/organizational efficiency, impact on performance measures, risks/barriers, and life cycle/sustainability. The guidebook includes case studies and recommendations that would inform the Guidebook.

8. Transit Asset Management: FTA Should Clarify Performance Data and Develop a Plan to Guide Future Program Improvements

Transit Asset Management: FTA Should Clarify Performance Data and Develop a Plan to Guide Future Program Improvements, written by Government Accountability Office (GAO, 2020), is a report containing GAO's recommendations for coordination of transit asset management plans. The audience for the report is a Senate committee. The value of this report for the Guidebook is in its discussion of FTA's TAM plan requirements and its note that FTA anticipates that most rural transit agencies will participate in group TAM plans instead of developing their own TAM plans.

9. West Virginia Division of Public Transit Group Asset Management Plan

   West Virginia Division of Public Transit Group Asset Management Plan is a group TAM plan prepared by West Virginia Division of Public Transit (2018). The value of the plan for the Guidebook is as an example of a TAM plan that (a) was developed for smaller transit agencies and (b) is intended to help transit agencies use funds more efficiently. This plan is one of the many group TAM plans that will be available for the research team to review during Guidebook development.

10. Asset Management Guide for Small Providers: Focusing on the Management of Our Transit Investments

    Asset Management Guide for Small Providers: Focusing on the Management of Our Transit Investments, written by C. Roberts, T. Batac, and M. Akofio-Sowah (2016), is a report providing guidance to smaller transit systems about management of capital assets. This report was developed in the early stages of MAP-21 transit asset management (TAM) implementation efforts in 2016. In the absence of other publications on this topic, the general framework of this publication could be used to inform the Guidebook, with specific information updated using more-recent sources.

11. Strategy Guide to Enable and Promote the Use of Fixed-Route Transit by People with Disabilities

    Strategy Guide to Enable and Promote the Use of Fixed-Route Transit by People with Disabilities, written by TranSystems Corp., The Collaborative, KFH Group, Inc., and Disability Rights Education & Defense Fund (2013), is a TCRP report for all transit agencies. It presents five strategies that facilitate the use of fixed-route transit by individuals with disabilities (e.g., improved transit stop accessibility and fare incentives for using fixed-route transit instead demand-response transit). The report is relevant to the Guidebook because fixed-route transit services have historically tended to be more cost-effective than demand-response transit services. The report was published in 2013. Most of its content appears to be timely, but its premise should be re-examined in the context of the increasing implementation of non-traditional demand-response services and programs that might actually be more cost-effective than fixed-route transit.

12. Guidebook for Evaluating Fuel Purchasing Strategies for Public Transit Agencies

Guidebook for Evaluating Fuel Purchasing Strategies for Public Transit Agencies, written by D. Friedman and K. DeCorla-Souza (2012) is a guidebook intended for all transit agencies. It is about fuel price risk management fundamentals, alternative fuel purchasing strategies, and fuel price risk management programs. It recognizes that fuel costs are a significant part of operating expenses yet can be difficult to predict. The document could be included in the Guidebook in a list of "For More Information" resources. However, it was published in 2012 and was written for transit agencies that primarily use gasoline and diesel to fuel vehicles. While the document contains content relevant to alternative-fuel vehicles, the document's recommendations should be re-examined in the context of increasing availability of, usage of, and funding for alternative-fuel vehicles.

13. Estimating Soft Costs for Major Public Transportation Fixed Guideway Projects

    Estimating Soft Costs for Major Public Transportation Fixed Guideway Projects, written by AECOM, D. Schneck, A. Touran, Raul V. Bravo & Associates, Inc., and Sharp & Company (2010), is a TCRP guidebook/report for transit agencies or other entities involved in capital planning. The guidebook/report is about soft costs, or costs of professional services like project management and design. While the guidebook is targeted to rail projects, some of the concepts might be expanded to other types of capital projects (e.g., dedicated running ways for bus services). However, the report is 12 years old and might contain out-of-date content. The report will be weighed against other sources gathering during Guidebook development to see if the source is still timely and has relevance for rural and small urban transit systems.

14. Dispatching Demand Response Transit Service: Maximizing Productivity and Service Quality Guidebook: Final Report

    Dispatching Demand Response Transit Service: Maximizing Productivity and Service Quality Guidebook: Final Report, written by S. Edrington and J. Arndt (2009), is for agencies that operate demand-response transit services. The report is based on the experiences of 42 Texas transit agencies and includes dispatching strategies that can be used to improve the productivity of demand-response transit services while maintaining a high level of service quality. The report is relevant to the Guidebook because demand-response transit services have historically not been transit agencies' most productive services. However, the report was published in 2009, so its strategies should be re-examined (1) in the context of the increasing implementation of non-traditional demand-response services and programs that might be more productive and (2) with respect to newer technologies and tools for scheduling, routing, and dispatching.

15. Transit Vehicles for Small Urban and Rural Public Transportation Systems in Texas

    "Transit Vehicles for Small Urban and Rural Public Transportation Systems in Texas" is a white paper written for TxDOT by TTI (2007). The white paper discusses the impact of fleet mix on regional service coordination, operations, and maintenance, which are topics of relevance to the Guidebook. However, the report is 15 years old and might

contain out-of-date content. If this source is included in the Guidebook, its information should be corroborated by more-current sources.

16. Useful Life of Transit Buses and Vans

    Useful Life of Transit Buses and Vans*,* written by R. Laver, D. Schneck, D. Skorupsi, S. Brady, and L. Cham (2007), is a report for FTA decisionmakers. It evaluates FTA's minimum useful life policies for transit vehicles. The information about useful life of transit vehicles and extending the life of vehicles has value. However, the report is 15 years old and might contain out-of-date content. If this source is included in the Guidebook, its information should be corroborated by more-current sources.

17. Capital Planning for Small and Medium-sized Transit Systems

    Capital Planning for Small and Medium-sized Transit Systems, written by DMJM+Harris and AECOM for PennDOT (2006), is a resource guide for smaller Pennsylvania transit agencies. The resource guide presents relevant content, including a capital planning model, best practices, and trade-offs of insourcing vs. outsourcing. However, the resource guide is 16 years old and might contain out-of-date content. It should be reviewed in more detail to see if it is still timely.

APPENDIX E: RURAL CASE STUDY DISCUSSION GUIDE

Introduction and Purpose

On behalf of the Texas Department of Transportation (TxDOT), the Texas A&M Transportation Institute (TTI) is conducting research to develop a guidebook and training materials to help rural and small urban transit agencies manage their operating and capital costs.

Based on our analysis, your transit agency is among the top agencies serving a rural area with respect to managing transit costs per hour and per mile. Our discussion will help us learn more about your service area, transit services provided, funding structure, and operational model(s). And most of all, we're interested in learning about (a) how your agency manages operational and capital costs and (b) notable cost-management practices and lessons learned that other transit providers in the U.S. could benefit from.

When this research is complete, we will compile our findings into a guidebook and share this final product with each case study participant. Individuals will not be identified by name in any documentation associated with this research project.

Background Questions

1. Briefly describe your agency's governance, funding, and organizational structure to help us get the big picture of how your agency works.
2. Briefly describe your agency's transit services and how they are operated, specifically:
    a. Your different transit programs and their service areas.
    b. What modes of service are operated and what are their fares and basic service policies (e.g., reservation windows, trip purpose eligibility, etc.)?
    c. Are any of your services sponsored by human services agencies in whole or in part? What about other local governments or businesses (aside from general funding support)?
    d. What operational model is in place for each service (what functions are operated directly or contracted out)?
    e. Do you utilize volunteer drivers for any of your services?

Cost Management Questions

In general, we want to know what practices, procedures, or strategies you have that help support your operational and/or capital cost efficiency? For example:

3. Do you have any existing training, guidebooks, or other handbooks (either internally or externally developed) that help you effectively manage costs?
4. What practices or strategies have you implemented that you think contributed to your cost efficiency? Focus areas include:
    a. Operator wages, benefits, and overtime.
    b. Fuel / vehicle energy costs.
    c. Vehicle maintenance and replacement.
    d. Insurance (general liability and vehicle).
    e. Service optimization (including route optimization and/or dispatching).
    f. Facilities.

g. Staff retainment and training.
h. Emergency management.

5. How do you monitor or evaluate your agency's cost-efficiency and cost-effectiveness? What staff members/departments are a part of this process? How frequently does monitoring or evaluation take place?
6. What do you see as the main challenges facing your agency regarding cost management?
7. What do you see as the main opportunities for your agency to further improve cost efficiency without compromising service quality?
8. How does your agency balance the needs of riders with the need to maintain cost efficiency? *For example, riders would benefit from higher level of service that operates for as many hours per day as possible, however the resources to fund service are finite.*

Staffing and Knowledge Management

In general, we want to know how you go about keeping good cost-management practices in place across years and through staff transitions.

9. Do you have internal documents that help with knowledge transfer (e.g., guides or manuals, SOPs)?
10. How are new staff members trained by existing staff on cost-management practices at the agency? Does your agency do any cross-training between staff members on certain cost-management functions?
11. How do you (or would you like to) ensure that key staff are trained and knowledgeable regarding effective cost management?
12. What types of resources or tools would you find most helpful in sustaining or improving your agency's cost management?

APPENDIX F: SMALL URBAN CASE STUDY DISCUSSION GUIDE

Introduction and Purpose

On behalf of the Texas Department of Transportation (TxDOT), the Texas A&M Transportation Institute (TTI) is conducting research to develop a guidebook and training materials to help small urban and rural transit agencies manage operating and capital costs.

Based on our analysis, your transit agency is among the top 10 agencies serving a small urban area with respect to managing transit costs per hour and per mile. Our discussion will help us learn about your service area, transit services provided, funding structure, and operational model(s). And most of all, we're interested in learning more about (a) how your agency is managing operational and capital costs and (b) notable cost-management practices and lessons learned that other transit providers in the U.S. could benefit from.

When this research is complete, we will compile the findings into a guidebook and share this final product with each case study participant. You will not be identified by name in any documentation associated with this research project.

Background Questions

1. Briefly describe your agency's governance, funding, and organizational structure to help us get the big picture of how your agency works.
2. Briefly describe your agency's transit services and how they are operated. We'll want to know about:
    a. Your different transit programs and service areas.
    b. What modes of service are operated and what are their fares and basic service policies (e.g., reservation windows, trip purpose eligibility, etc.)?
    c. Are any of your services sponsored by human services agencies in whole or in part?
    d. What operational model is in place (what functions are operated directly or contracted out)?
    e. Do you utilize volunteer drivers for any of your services?

Cost Management Questions

In general, we want to know what practices, procedures, or strategies you have that help support your operational and/or capital cost efficiency? For example:

3. Do you have any existing training, guidebooks, or other handbooks that help you effectively manage costs?
4. What practices or strategies have you implemented that you think contributed to your cost efficiency? Focus areas include:
    a. Operator wages, benefits, and overtime.
    b. Fuel / vehicle energy costs.
    c. Vehicle maintenance and replacement.
    d. Insurance (general liability and vehicle).
    e. Service optimization (including route optimization and/or dispatching).
    f. Facilities.
5. How do you monitor or evaluate your agency's cost-efficiency and cost-effectiveness?

6. What do you see as the main challenges facing your agency regarding cost management?
7. What do you see as the main opportunities for your agency to further improve cost efficiency without compromising service quality?
8. How does your agency balance the needs of riders with the need to maintain cost efficiency? *For example, riders would benefit from higher level of service that operates for as many hours per day as possible, however the resources to fund service are finite.*

Staffing and Knowledge Management

In general, we want to know how you go about keeping good cost-management practices in place across the years and through staff transitions.

9. Do you have internal documents that help with knowledge transfer (e.g., guides or manuals)?
10. How do you (or would you like to) ensure that key staff are trained and knowledgeable regarding effective cost management?
11. What types of resources or tools would you find most helpful in sustaining or improving your agency's cost management?

APPENDIX G: STATE DOT CASE STUDY DISCUSSION GUIDE

Introduction and Purpose

On behalf of the Texas Department of Transportation (TxDOT), the Texas A&M Transportation Institute (TTI) is conducting research to develop a guidebook and training materials to help small urban and rural transit agencies manage operating and capital costs.

Based on our analysis, your state is among the top 10 states with respect to managing transit costs per hour and per mile. We're interested in learning more about (a) how your agency is helping its transit providers manage operational and capital costs and (b) notable practices that transit providers in your state are using to manage costs. We expect this discussion will review information about supportive policies, procedures, trainings, successful agency practices and policies, funding and grant-making, and relevant state legislation.

When this research is complete, we will compile the findings into a guidebook and share this final product with each case study participant. You will not be identified by name in any documentation associated with this research project.

Background Questions

1. What is your DOT's process to allocate and distribute federal funds (e.g., 5311, 5310, 5307 small urban) to transit providers in the state?
2. How many transit providers (if any) are eligible for state funds, and what is the process to allocate those funds?
3. Regarding allocation of federal and/or state funds is cost-efficiency/effectiveness considered in the allocation process?

DOT-Focused Questions

In general, we want to know what practices, procedures, or resources the DOT has that help support transit operational or capital cost efficiency in the state? For example:

4. Does the DOT have any existing training, guidebooks, or other information that help transit providers manage costs?
5. Does the DOT provide staff extension, technical assistance, or other support to transit providers that could help the provider reduce costs?
6. Does the DOT provide resources to fund consultants/researchers to work directly in support of transit providers? What makes a provider eligible for this opportunity?
7. Beyond the requirements for National Transit Database (NTD) submissions, does the DOT conduct any sort of review of transit providers that includes measures of cost efficiency? If yes, what is that process?

External Factor Questions

In general, we want to know if there are practices, procedures, or resources outside of the DOT that you think might help support transit operational or capital cost efficiency in the state? For example:

8. From the DOT perspective, what are some examples of practices or policies used by transit providers in your state to help ensure cost efficiency?

9. Can you think of examples of specific transit providers that you think are doing an excellent job in cost management? What are they and what are the providers doing?
10. Are there any complementary policies, practices, or legislation at the state level that might support cost efficiency for transit providers? *For example, in Texas, transportation network companies are allowed to operate in all jurisdictions in the state which may make it easier for transit operators to assign some demand response trips to more affordable service providers.*

Additional Comments

Is there anything else you'd like to share regarding effective operational and capital cost management for rural and small urban systems, including:

11. What do you think are the two or three biggest cost management challenges facing rural and small urban transit providers in your state?
12. What do you think are the two or three biggest transit cost management wins in your state in which the DOT has been a part of?

APPENDIX H: SECOND DRAFT FRAMEWORK FOCUS GROUP DISCUSSION GUIDE

INTRODUCTION (10 MINUTES)

1) Moderator introduction
   Welcome to the focus group today. Thank you for taking time out of your busy schedules to talk with us. Let's start with introductions. My name is _____ and [EXPLAIN ROLE].

2) The purpose of this focus group meeting is to discuss the files we shared with you earlier including:
   - Guidebook, Workshop, and Online Course Outline (3 Word documents)
   - Guidebook Sample (PDF File)
   - Workshop Slide Deck (PowerPoint File)
   - Workshop Instructor Guide (PDF File)
   - The Online Course (link to webpage)

3) Attendee self-introductions: Now, please briefly introduce yourself to the rest of the group.
   a) Name
   b) Transit agency and role
   c) What types of services do you operate (e.g., local fixed route bus [and ADA paratransit] and/or general public demand-responsive service for all or part of the area?)?
   d) Does your agency provide all service in-house or do you contract out or a mix of both? If contracted out, what type of contract do you have?
4) Does anyone have any questions? [ALLOW TIME FOR QUESTIONS / DISCUSSION]
5) If anyone wants to discontinue their participation, please feel free to leave, and we'll remove you from the list of participants. [ALLOW TIME FOR PARTICIPANTS TO QUIT]

DISCUSSION ABOUT CONTENT AND ORGANIZATION (90 MINUTES)

Focused on Attachments 1a, 1b, and 1c. To perform this activity, use Attachment 1b, but collapse all headings and go through down to the 2nd-level chapter heading (i.e., #.#). Explain that we'll start big-picture and then will go chapter-by-chapter and discuss each chapter's contents.

1) Facilitator will go through Attachment 1b, with all headings collapsed, and explain the parts, chapters, and then sections of chapters. Review the learning objectives of each chapter.
2) Overall Organization
   a. QUESTION: Is the overall proposed organization of the topics logical and easy to understand for rural and small urban transit managers? Would you recommend any changes?
   b. QUESTION: Do the proposed parts, chapters, and sections of the Guidebook cover the topics that are the most critical for cost management at rural and small urban transit systems in Texas?
      i. What, if anything, needs to be added?
      ii. What, if anything, could be removed?
3) Chapter-by-Chapter Review (4-5 minutes each)

Go to a chapter, show all levels of heading and summarize what will be discussed. Ask the following questions

a. How logical is the chapter's organization? What, if any, changes would you recommend?
b. How comprehensive are the chapter's contents? Is there anything that should be added? Anything that could be removed?
c. How relevant are the chapter's contents to your job both *now* and *five years from now*? Is there anything that would help improve relevance for your agency?
Is there any topic that seems to need more detail? Less detail?

4) Workshop and Course Topics Removed (5 minutes)
Review the topics that will NOT BE in the Workshop and Online Course, contained in Attachment 1c.
a. Are the topics NOT to be included in the Workshop and Online Course reasonable? Are there any additional topics you think we could exclude from the Workshop and Online Course? Are there any that need put back in?
b. Do you feel the overall length of the workshop would fit within 2 full days?

DISCUSSION ABOUT LOOK AND FEEL (10 MINUTES)

Review the look and feel of the Guidebook (Attachment 2).

1) Does the cover page content and design seem appropriate for this project?
2) Does the overall look and feel of the sample seem appropriate for this project? Are the samples visually appealing? What should be changed?
3) Do you think the look of the sample seems appropriate to use by the manager with any type of physical/visual ability?
4) Would you be willing to share any photos of your agency for use in the Guidebook, Workshop, and Online Course?

Review the look and feel of the Workshop (Attachment 3).

1) Does the cover page content and design seem appropriate for this project?
2) Does the overall look and feel of the sample seem appropriate for this project? Are the samples visually appealing? What should be changed?
3) Do you think the look of the sample seems appropriate to use by the manager with any type of physical/visual ability?
4) Do you have any comments or guidance about the contents of slides and visual elements?

Review the look and feel of the Online Course

1) Does the landing page content and design seem appropriate for this project?
2) Does the overall look and feel of the sample seem appropriate for this project? Are the samples visually appealing? What should be changed?
3) Do you think the look of the sample seems appropriate to use by the manager with any type of physical/visual ability?
4) Do you have any comments or guidance about the contents of the visual elements?
5) Do you think narration (voice over) will be beneficial?

THANK YOU AND CLOSE OUT

Thank participants. Ask them to provide any additional comments ASAP, as we'll be drafting the Guidebook over the next two months.

APPENDIX I: SURVEY FOR PILOT TESTING THE GUIDEBOOK

TxDOT RTI Managing Costs Guidebook Pilot Testing Survey

Q1 Chapter Number

Q2 Pilot Tester Full Name

Q3 Pilot Tester Email Address

Q4 Please rate this chapter in terms of its **material** (i.e., the topics and contents), based on the following criteria.

	Unacceptable (1)	Below average (2)	Average (3)	Better than average (4)	Outstanding quality (5)
The extent to which this chapter covers its subject without missing necessary contents (1)	○	○	○	○	○
The accuracy of concepts, definitions, examples, facts, and illustrations provided in this chapter (2)	○	○	○	○	○
The extent to which this chapter's content is updated compared to similar resources (3)	○	○	○	○	○

Q5 Please rate this chapter in terms of its **visual aspects,** based on the following criteria.

	Unacceptable (1)	Below average (2)	Average (3)	Better than average (4)	Outstanding quality (5)
The layout of the contents (1)	○	○	○	○	○
Font size and color (2)	○	○	○	○	○
Format and order of writing the contents (4)	○	○	○	○	○

Q6 Please rate this chapter in terms of its **presentation aspects,** based on the following criteria.

	Unacceptable (1)	Below average (2)	Average (3)	Better than average (4)	Outstanding quality (5)
Consistency in presenting the material in this chapter (1)	○	○	○	○	○
The logic in presenting the material (2)	○	○	○	○	○
Presenting material in the form of tables, maps, pictures, or illustrations (3)	○	○	○	○	○

Q7 Please rate this chapter's usability in terms of the following criteria.

	Unusable (1)	Below average usable (2)	Average usable (3)	Better than average usable (4)	Highly usable (5)
Using the information and tools contained in this chapter to identify, analyze, and/or predict costs (1)	○	○	○	○	○
Using this chapter for self-directed learning (2)	○	○	○	○	○
Using this chapter for people new to transit cost management for understanding the material and topics discussed (3)	○	○	○	○	○
Using the information and tools in this chapter based on real-world challenges in transit management systems (4)	○	○	○	○	○

Q8 Please rate the **overall quality** of the following sections in this chapter.

	Unacceptable (1)	Below average (2)	Average (3)	Better than average (4)	Outstanding quality (5)	Not applicable to this chapter (Chapter 1) (6)
Chapter Introduction (1)	○	○	○	○	○	○
Learning Objectives (2)	○	○	○	○	○	○
Organization of Chapter (3)	○	○	○	○	○	○
Chapter Summary (4)	○	○	○	○	○	○
Take-Aways (5)	○	○	○	○	○	○
Additional Resources (6)	○	○	○	○	○	○

Q9 If you have any other comments about this chapter that you didn't already include in the Word document, please provide them below.

Q10 If you're not already done so, can you give us examples or practices implemented by your agency related to the content of this chapter that could be presented as a mini case study, anecdote, or story? If yes, please describe it here.

APPENDIX J: MODULE AND WORKSHOP EVALUATION FORMS

Managing System Costs: Module Evaluation Form

Directions

A) Please write and mark your selected answers clearly.
B) Only select one answer for questions with a circle: ○.
   Select all that apply for questions with a square: ☐.
C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

You don't have to completely fill in the circles and squares. Using ✘ or ✓is fine!

Part A: Workshop and Module Information

1. Please answer the questions below.

Question	Response
Workshop name	Managing System Costs: Operational and Capital Cost Management at Rural and Small Urban Public Transit Systems
Workshop date	
Workshop location	
Module (*select one*)	☐ A: Understanding transit cost fundamentals ☐ B: Managing operational costs for any mode ☐ C: Managing demand-response costs ☐ D: Managing fixed- and flexible-route costs ☐ E: Managing capital costs ☐ F: Looking ahead

Part B: Module Evaluation

2. Please rate your level of satisfaction with this module. Select one.

Very unsatisfied	Unsatisfied	Neutral	Satisfied	Very satisfied
○	○	○	○	○

3. How useful was the module content for your job? Select one.

Extremely useful	Very useful	Moderately useful	Slightly useful	Not at all useful
○	○	○	○	○

4. How much did you learn from this module? Select one.

A lot	A moderate amount	A little	Nothing at all
○	○	○	○

5. Is there anything in this module that should have been covered less?

_____

_____

_____

_____

_____

_____

6. Is there anything in this module that should have been covered more? Or anything that should be added?

_____

_____

_____

_____

_____

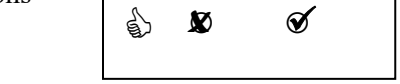
_____

Managing System Costs: Workshop Evaluation Form

Directions

A) Please write and mark your selected answers clearly.
B) Only select one answer for questions with a circle: ○.
   Select all that apply for questions with a square: ☐.
C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

You don't have to completely fill in the circles and squares. Using ✘ or ✓is fine!



Part A: Workshop Information

1. Please answer the questions below.

Question	Response
Workshop name	Managing System Costs: Operational and Capital Cost Management at Rural and Small Urban Public Transit Systems
Workshop date	
Workshop location	

Part B: Workshop Evaluation

2. Why did you take this workshop? And what were your expectations?

_____

_____

_____

_____

_____

_____

3. Rate how well this workshop met your expectations. Select one.

Far exceed expectations	Exceeds expectations	Equals expectations	Short of expectations	Far short of expectations
○	○	○	○	○

4. Rate the overall quality of the visual aids (PowerPoint) and handouts used? Select one.

Excellent	Good	Average	Poor	Terrible
○	○	○	○	○

5. Do you have any comments about the visual aids and handouts?

_____

_____

_____

_____

_____

_____

6. Rate the overall quality of the workshop instructor(s)? Select one.

Excellent	Good	Average	Poor	Terrible
○	○	○	○	○

7. Do you have any comments about the instructors?

_____

_____

_____

_____

_____

_____

8. How appropriate was the workshop's level of difficulty compared to your background and expertise? Select one.

Above my level	Just right	Below my level
○	○	○

9. How useful was the workshop content for your job? Select one.

Extremely useful	Very useful	Moderately useful	Slightly useful	Not at all useful
○	○	○	○	○

10. Overall, how much did you learn from this workshop? Select one.

A lot	A moderate amount	A little	Nothing at all
○	○	○	○

11. Would you recommend this workshop to others? Select one.

Definitely yes	Probably yes	Might or might not	Probably not	Definitely not
○	○	○	○	○

12. Why or why not?

13. What portions or topics in this workshop stood out as being especially relevant or helpful?

14. What portions or topics in this workshop stood out as being especially irrelevant or not helpful?

15. OPTIONAL: If you want, you can provide your contact information. We may follow up with you to ask about your responses. **You do not have to fill this out.**

Question	Response
Name	
Agency/organization	
Title/role	
City	
State	
Postal code	
Email address	
Phone number	