



WORKSHOP FOR MANAGING SYSTEM COSTS: OPERATIONAL AND CAPITAL COST MANAGEMENT AT RURAL AND SMALL URBAN PUBLIC TRANSIT SYSTEMS

**Instructor Guide |
January 2024**



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Introduction

This Instructor Guide accompanies the workshop of the same name. Inside this Instructor Guide, you'll find:

- General instructions for workshop delivery.
- Schedule guidance.
- PowerPoint slides and instructor notes.

This Instructor Guide is accompanied by several supporting files, including:

- Workshop Schedule (Excel): This Excel file contains several tabs that provide both detailed and summary proposed scheduling for the workshop.
- The Toolkit (Word): The Toolkit Word document contains links to the individual tools in the Toolkit. Because there are several tools, each with its own link, it's best to download the Toolkit from the official workshop URL at <https://tx.ag/TransitCostsToolkit> to ensure that you have the latest version of the Toolkit with the links to the latest versions of each tool.
- Module Evaluation Form (Word): The Module Evaluation Form should be used after each module to obtain feedback from attendees on module content.
- Workshop Evaluation Form (Word): The Workshop Evaluation Form should be used after the entire workshop is delivered.
- Several Handouts: Handouts should be passed to attendees when PowerPoint says to do so. Handouts are numbered sequentially and include:
 - 00—WorkshopSchedule (PDF): Presents the overall workshop schedule to attendees and is generated from the *Workshop Schedule* Excel's *Daily Schedule* tab.
 - 01—ModesDefinitions (Word and PDF): Lists and defines the transit modes that will be mentioned during the workshop.
 - 02—PTN128OpExReferenceByFunction (Word and PDF): Lists and defines the PTN-128 operational expense functions.
 - 03—USOAOpExFunctionClassTable (PDF): Taken from the USOA, displays common examples of the relationship between USOA object classes and USOA functions.
- Several Exercises: Although some exercises in the workshop are small-group breakouts that do not need accompanying material, several exercises have accompanying handouts to be filled out by attendees. These exercises are all in Module A and are generated by an Excel called *A-CostManagementExercises*. The exercise handouts are:
 - A2-CostCharacteristics (PDF).
 - A2-CostCharacteristics-wAnswers (PDF).
 - A3-BudgetVsActualsExercise (PDF).
 - A3-BudgetVsActualsExercise-wAnswers (PDF).
 - A4-PerformanceMeasuresExercise (PDF).
 - A4-PerformanceMeasuresExercise-wAnswers (PDF).

General Instructions for Workshop Delivery

As a workshop instructor, you should be aware that the workshop contains a total of 434 PowerPoint slides, scheduled for delivery across three days. The workshop is divided into six modules. Each module is divided into one or more chapters. There are 17 chapters. Each module and chapter is directly derived from the full Guidebook, which can be provided to attendees via print or electronic means, if desired. The full Guidebook can be downloaded from <https://tx.ag/TransitCostsGuidebook>.

The workshop material listed in the *Workshop Schedule* Excel file is categorized into the following types:

- Content: Presentation of information.
- Discussion: Open discussion among attendees. (You don't break into small groups for discussions, you simply provide the prompt and then encourage attendees to answer and discuss with one another.)
- Exercise: A hands-on or small group activity to help reinforce the content.
- Prize (optional): Prize questions serve to review key concepts by asking attendees to answer one or more questions. You can execute this as you wish, and, of course, prizes are optional.
- Break: A break from material. There is a short break in the morning, a one-hour lunch, and a short break in the afternoon.
- Eval: Evaluations either of the module (each module should be evaluated) or of the entire workshop. (The workshop evaluation is given at the end of the workshop.)
- Tool: Gives attendees a preview of a tool in the toolkit. The goal is to provide only an overview of each tool.

In the PowerPoint Slides and Instructor Notes section of this Guide, you'll find every slide in the PPT and suggested instructor narration in the notes section. Text that appears in square brackets [like this] is instructions for you and are not to be read directly. Instructor notes are sometimes quite detailed, especially when a concept is difficult, or we believed that it might be hard to follow the train of thought using only the bullets on the slide. In other cases, you might be asked to simply use the slide bullets and contents as your narration guide.

Schedule Guidance

Because of the length and breadth of the workshop materials, you may find yourself needing to customize how much material is delivered and how it is organized. Feel free to do so.

Anticipated timing requirements are provided in the *Workshop Schedule* Excel file, which contains three tabs:

- *Full Detailed Schedule*: divides the workshop into its smallest instructional units. The full detailed schedule also gives you an idea of the anticipated time per slide needed to adhere to the schedule. The data on this tab feed the other tabs.
- *Schedule Summary*: analyzes the data on the *Full Detailed Schedule* tab and breaks it into Module activities and non-Module activities to help you see the starting and ending slides and total scheduled duration of each module, including how much of that time is content; discussions, exercises, tools, and evaluations; or breaks.
- *Daily Schedule*: presents the default schedule for delivering the entire workshop over three days. Also is the tab used to create the schedule handout.

As described in Chapter 1 of the Guidebook, you also may choose to deliver the content according to the Guidebook's "routes" and "tracks." Rather than replicating those recommendations here, see the Guidebook and feel free to piece together a PowerPoint and schedule that best fits the parameters of each delivery.

PowerPoint Slides and Instructor Notes

Day 1

Workshop Introduction



Managing System Costs:

Operational and Capital Cost Management
at Rural and Small Urban Public Transit Systems

Version: FINAL Nov. 30, 2023

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

1

INSTRUCTOR NOTES

[Welcome participants and introduce the workshop title.]



Objective of Workshop

This workshop aims to equip transit systems in Texas and beyond to understand and manage operational and capital costs and to provide a go-to-resource for cost management best practices.



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

INTRO

2

INSTRUCTOR NOTES

[Describe briefly the objectives of the workshop using the slide contents.]

Instructor Introduction

INSTRUCTOR NOTES

[Briefly introduce yourself/yourselves.]

- [Describe your job title and affiliation.]
- [Describe your background and expertise.]

Attendee Introductions

- Name
- Role & organization
- Brief description of your transit agency
 - Type (e.g., rural, small urban, etc.)
 - Size and service area
 - Services provided
- What does cost management mean to you?
- What do you hope to gain by attending this workshop?

INSTRUCTOR NOTES

[If time allows, ask participants to briefly introduce themselves. It's a good idea to give per-person time limit (e.g., 1 minute or less).]

- Please briefly introduce yourself and tell us about your roles & organization, the type/size of your agency, and the services your agency provides.
- Please explain What cost management means to you.
- Please explain What you hope to gain by attending this workshop.

[If you can, write down attendees' expectations on a white board or large easel paper so they can be referenced throughout workshop.]

Workshop Development

- Developed between 2021 and 2024 by the Transit Mobility Program at Texas A&M Transportation Institute (TTI) in collaboration with Texas A&M University Kingsville.
- Sponsored by TxDOT's Research and Technology Implementation Division (RTI)
- Overseen by a TxDOT-staffed Project Monitoring Committee
- Reviewed and tested by TxDOT and Texas rural and small urban transit managers
- Guidebook → Workshop → Online Course

Contributors Include:

- Michael Walk (Principal Investigator)
- Kelly Blume
- Will Rodman
- Suzie Edrington
- John Overman
- Roya Etminani
- Amir Hessami (Texas A&M Kingsville)

INSTRUCTOR NOTES

[Briefly describe the project timeline, sponsor, reviewing process, and the outcomes. You do not have to read each point; summarize the key points:]

- Workshop was developed by TTI.
- Workshop was part of a larger project, sponsored by TxDOT (Texas Department of Transportation), which produced three products: a Guidebook, this Workshop, and an Online Course.
- All of the products were reviewed by a TxDOT Project Monitoring Committee and were pilot tested by Texas rural and small urban transit system managers.

Companion Guidebook

- Companion Guidebook available <https://tx.ag/TransitCostsGuidebook>
- Mirrors workshop content
 - Guidebook chapters are cross-referenced in Workshop
- Two main “routes” through Guidebook
 - Directly operated service
 - Outsourced service
- Toolkit included

INSTRUCTOR NOTES

[Briefly explain how Guidebooks and Workshop are related:]

- A free companion Guidebook, accessible via <https://tx.ag/TransitCostsGuidebook>, aligns closely with the workshop content, with chapters cross-referenced within the workshop.
- There are two main “routes” through the Guidebook, one for those who directly operate their service and one for those who outsource their service.
- Both the Guidebook and Workshop reference an accompanying toolkit, which contains 10 tools that may be helpful in your cost management.

Companion Online Course

- Companion self-paced Online Course available <https://tx.ag/TransitCostsCourse>
- Based on workshop content

INSTRUCTOR NOTES

[Briefly explain how Online Course and Workshop are cross-referenced:]

- A companion Online Course, accessible via <https://tx.ag/TransitCostsCourse>, also aligns with the workshop content, however, the Online Course is a series of brief videos that you can watch on your own pace.



Organization of Workshop

The workshop's contents are focused on the main cost drivers at Texas rural and small urban transit systems



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

INTRO

8

INSTRUCTOR NOTES

[Briefly explain how the workshop is organized.]

- The workshop centers around the key factors influencing costs within Texas rural and small urban transit systems.

Operational Cost Drivers in Texas Rural and Small Urban Transit Systems

Group	Operational Expense Category	Total ¹
Labor	Operators' salaries & wages	27%
	Operator paid absences ²	2%
	Total operator pay	29%
	Other salaries & wages	19%
	Other paid absences ²	2%
	Total other pay	21%
	Fringe benefits	20%
	Total labor	70%
Non-labor	Services	12%
	Fuel & lubricants	9%
	Tires & tubes	1%
	Other materials & supplies	6%
	Utilities	2%
	Taxes	0%

Based agency-reported data from FY 2017 – FY 2019.

Notes:

¹ The total column was calculated by summing the dollar values from all three fiscal years and then calculating the percentages based on that sum.

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

INSTRUCTOR NOTES

- During development of the Guidebook, Workshop, and Online Course, data was collected from fiscal years 2017 through 2019 to identify the main cost drivers at Texas rural and small urban transit systems.
- The table shows the results for operational costs.
- Notably, operator pay is a significant cost [click → animation].
- Labor makes up 70% of all operational costs [click → animation].
- And there are several non-labor costs that are significant line items, like fuel and lubricants [click → animation].

Capital Cost Drivers in Texas Rural and Small Urban Transit Systems

Capital Expense Category	Total ¹
Guideway	4%
Passenger stations	9%
Administration buildings	4%
Maintenance buildings	3%
Revenue vehicles	69%
Service vehicles	1%
Fare revenue collection equipment	0%
Communication & information systems	3%
Other	6%

Based agency-reported data from FY 2017 – FY 2019.

Notes:

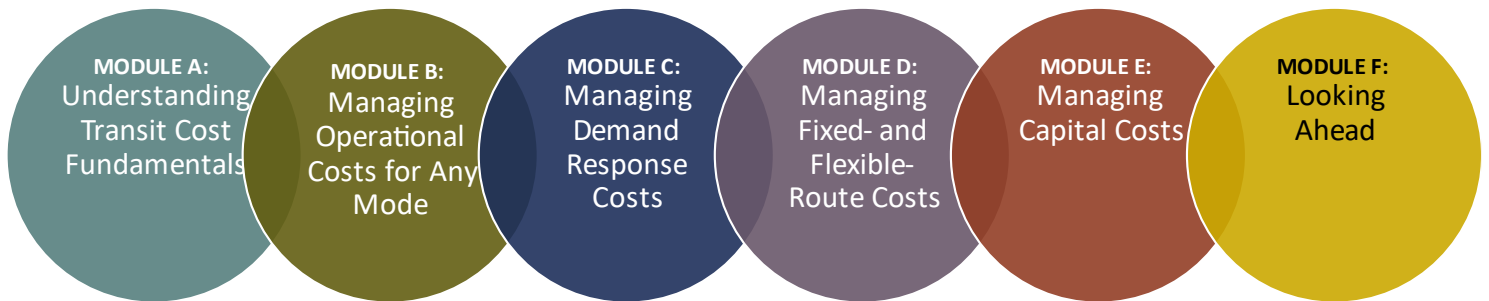
¹ The total column was calculated by summing the dollar values from all three fiscal years and then calculating the percentages based on that sum.

INSTRUCTOR NOTES

- This table shows the results for capital costs.
- You'll note that revenue vehicles is by far [click → animation] the main driver, accounting for almost 70% of reported capital costs.

Organization of Workshop

The workshop is divided into six modules.



INSTRUCTOR NOTES

- Based on this data collection and discussions with Texas rural and small urban transit managers, several key topics emerged, which are the basis for how the Workshop is organized.
- The workshop is divided into 6 modules [read titles and describe how related].
- Each of these modules is comprised of one or more chapters from the Guidebook [next slide].

Workshop Agenda

- See schedule handout
- 3 days
- Each day
 - Start at 9:00 am
 - End at 4:00 pm
 - Scheduled breaks
 - Lunch from 12:00 pm – 1:00 pm

INSTRUCTOR NOTES

[Describe the workshop agenda. Point out the times for each Module, for the breaks, and for closing for the day. It is recommended that you give someone (either an attendee or a co-presenter) the responsibility for monitoring the time to help you stay on schedule.]

Workshop Materials

Toolkit download:

<https://tx.ag/TransitCostsToolkit>

Slides

Handouts

Tools

Bus
Garage

Evaluation
Forms

INSTRUCTOR NOTES

[Describe the materials that have been emailed to or printed for the workshop participants.]

- You are provided with useful materials we have prepared for this workshop, including a copy of the slides and any handouts. [If the materials were emailed or printed, be sure to explain.]
- Feel free to explore these materials as we go along; they are designed to support your understanding and provide additional insights into the topics we will cover.
- [If necessary]: If you have not received the materials or if you need assistance navigating them, please don't hesitate to ask.
- The tools are those items in the Toolkit; during the Workshop, we'll show you how to use each one. You can download the Toolkit, which has links to all the tools, at <https://tx.ag/TransitCostsToolkit>.
- The Bus Garage is where we can park any discussion items or questions that either will take more time than we have or that we don't know the answer to. [You should have a large piece of paper or some other place where you can note down any items that get "parked" in the Bus Garage.]
- We also have evaluation forms for you [change to next slide, which has the details].

Evaluations



End of each
module



End of workshop

INSTRUCTOR NOTES

[Briefly describe the evaluation forms:]

- At the end of each module, we will ask you to fill out an evaluation form for that specified module.
- In addition, you will be asked to fill out an evaluation form to evaluate the overall quality of this workshop at the end of the workshop.
- The feedback you provide on these forms is essential to helping us continually improve this workshop, so, please take the time to fill out the evaluation forms.



What the Workshop Is and Isn't



The Workshop Is

A resource on practices and strategies for operational and capital cost management

A place to learn transit terms, techniques, and tools applicable to rural and small urban systems



The Workshop Isn't

A comprehensive transit management workshop

An accounting workshop

A workshop on sources of revenue or grant management

INSTRUCTOR NOTES

- The workshop is about [read titles and describe what workshop is about and what workshop is not about].



Ground Rules

- Be respectful
- Ask questions
- Participate – be engaged!
- Vegas rules
- Prize questions!!

INSTRUCTOR NOTES

[Explain the ground rules for the workshop.]

- Be respectful of others.
- Ask questions whenever they strike you! Be open with questions and seek to understand.
- Participate in the workshop! Ask questions, respond to questions, and participate in discussions. You'll get more out of the workshop if you actively participate.
- Vegas rules—what happens in Vegas stays in Vegas. In other words, don't be afraid to tell a story or ask a question thinking you might get into trouble. Probably someone else has the same question. What you ask and say in here will stay in here. Can we all agree that we won't go gossiping in order to create a better learning experience during the workshop?
- Also, there are occasional prize questions sprinkled throughout the workshop. [Set your own rules regarding prize questions.]

Alphabet Soup

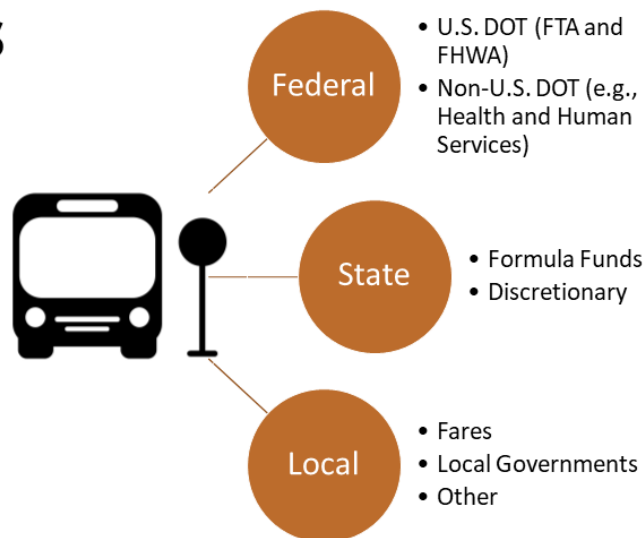
- **U.S. DOT:** United States Department of Transportation
- **FTA:** Federal Transit Administration, a part of the U.S. DOT
- **NTD:** National Transit Database, FTA's web-based system for collecting transit data from all U.S. transit providers
<https://www.transit.dot.gov/ntd>
- **TxDOT:** Texas Department of Transportation
- **PTN:** Public Transportation Division of TxDOT
- **PTN-128:** PTN's web-based system for collecting transit data from all transit systems in Texas
<https://ptn128.tti.tamu.edu/login.aspx>
- **National RTAP:** National Rural Transit Assistance Program

See Chapter 1 in the Guidebook for a list of key terms and abbreviations used in the Guidebook and in transit.

INSTRUCTOR NOTES

- In transit, in the Guidebook, and in this Workshop, there are many different abbreviations that will be used. This slide contains only a few that are foundational.
- [Explain each one and stop for questions.]
- More abbreviations will appear in the later parts of the workshop, but they will be defined when they first appear.

Funding Sources for Texas Transit Systems



Key FTA Grant Programs:

- 5307 Urban Formula
- 5310 Enhanced Mobility for Seniors and People with Disabilities
- 5311 Rural Formula
- 5339 Bus and Bus Facilities

See Chapter 1 in the Guidebook for a review of federal, state, and local funding sources.

INSTRUCTOR NOTES

- Although this workshop is about costs and not directly about revenues and funding, the two are somewhat related, so, we wanted to quickly cover the main funding sources for transit.
- [Briefly introduce the concept of the three main funding sources (i.e., federal, state, and local) and that these will potentially come up from time to time, particularly the Key FTA Grant Programs (i.e., 5307, 5310, 5311, and 5339).]
- [Ask the class if they have any questions about funding sources for transit before you move on.]



Questions?

Any questions about what to expect before we begin?

INSTRUCTOR NOTES

[Ask participants if they have any questions about the Introduction part.]

Module A: Understanding Transit Cost Fundamentals



MODULE A: Understanding Transit Cost Fundamentals



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE A 20

INSTRUCTOR NOTES

[Give a short overview of Module A.]

- Module A explains the basic concepts for managing transit costs.
- Module A is especially beneficial for staff new to transit management.
- Even experienced professionals can find value in these foundational concepts, as they are essential for the strategies discussed in this Workshop.

Module Overview

- **One-sentence summary**
Understand the foundations of transit service and transit cost management
- **Chapters**
 - 2: Factors Related to Service Models and Modes
 - 3: Cost Analysis and Reporting

INSTRUCTOR NOTES

- This module will help you [read one sentence summary].
- The module contains two chapters:
 - Chapter 2: [read the chapter title].
 - Chapter 3: [read the chapter title].



Chapter 2: Factors Related to Service Models and Modes

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE A 22

INSTRUCTOR NOTES

[Introduce Chapter 2 title.]

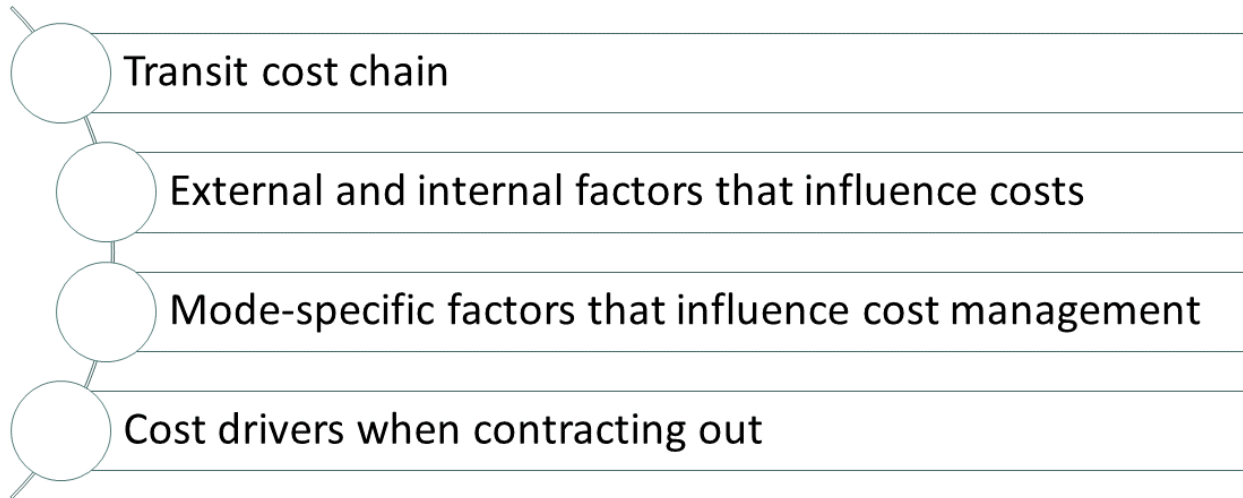
Learning Objectives

- Describe key elements in the transit cost chain
- Identify points in the transit cost chain to manage price and control consumption
- Identify external and internal factors that may influence transit costs
- Describe how different modes and services affect cost management
- Describe how contracting out vs. directly operating service models affects cost management

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics



INSTRUCTOR NOTES

Chapter 2 is divided into the following sections [read the topics].

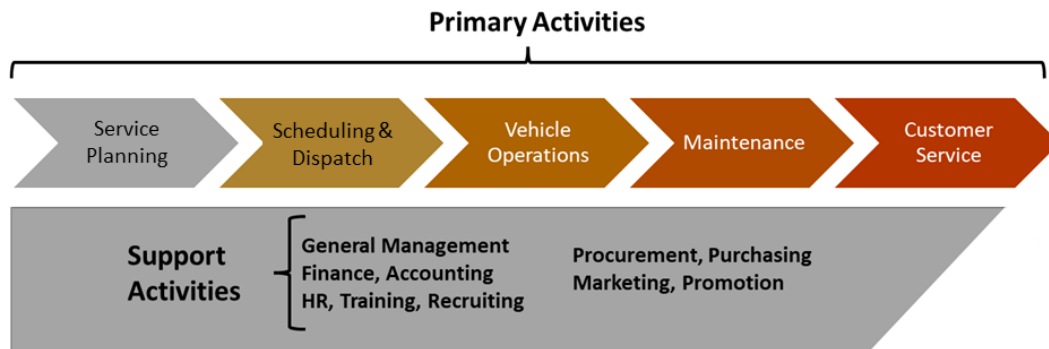


The Transit Cost Chain

INSTRUCTOR NOTES

- The first section describes the transit cost chain, a conceptual model for thinking about transit cost management across transit modes and models.

The Transit Cost Chain Model



Source: Adapted from value chain business model, (Porter, 2008)

Primary activities: Direct activities essential to daily transit services. **Foundation of primary activities are service plans and policies.**

Support activities: Help make the primary activities more effective and efficient. Increasing the efficiency of the support activities benefits the primary activities.

INSTRUCTOR NOTES

The Transit Cost Chain describes how the different transit activities from initial service planning to service delivery are related to one another. The Cost Chain is helpful to identify for each step the factors that influence cost so the transit agency can maximize cost efficiency and cost effectiveness at each step. Transit agency activities can be split into two categories, “primary” and “support.” Primary activities consist of direct activities essential to daily transit services. The role of support activities are to help make the primary activities more effective and efficient. When a transit agency can increase the efficiency of any of the core support activities, it benefits the primary activities. The support activities are generally considered overhead costs.

How to Use the Transit Cost Chain

Use to identify cost points at which the transit agency can seek to manage costs. The Cost Chain conveys that costs are driven by:

- The amount of service the agency seeks to operate
- How the desired service levels and/or requested trips are translated into scheduled service
- How scheduled service is actually operated
- How the hours, miles, and vehicles operated accrue costs

INSTRUCTOR NOTES

- Transit agencies can use the Cost Chain to identify multiple points in the cost chain at which transit agencies can seek to manage costs—service design and planning, policies, scheduling, execution, and unit consumption rates and prices. The Cost Chain model conveys the idea that transit costs are driven by: [highlight bullets].

Create a Culture to Identify Each Activity's Crossover Influences

Crossover influence: A decision in one activity can influence the outcomes of another activity

Example #1: Maintenance purchases a vehicle without input from Planning and Operations. The vehicle purchased may be a minimal-maintenance, hardy, fuel-efficient vehicle but does not meet the capacity needs for the service, resulting in the need to operate additional service with increased operating cost.

Example #2: Deferring maintenance may save some money in the short term but will ultimately cost more from increased maintenance need and increased vehicle failures and downtime.

Can you think of an example of a crossover influence happened at your agency? That is, when someone's decision caused changes in the cost-efficiency or cost-effectiveness of a different unit / department?

INSTRUCTOR NOTES

Creating a culture of evaluation of the crossover influences between activities in a transit agency's cost chain can result in maximizing cost efficiency and cost effectiveness outcomes. Transit agency staff can work to realize reduced costs within their own responsibility, while at the same time work to ensure those decisions create the most desirable outcomes for the transit agency as a whole.

[Encourage a discussion based on the prompt in the discussion box.]

Components of a Cost Activity: *Unit Price and Consumption*

- Cost of activities determined by two components:
 - Unit price (e.g., price per gallon)
 - Consumption (# of units; e.g., number of gallons)
- Basis of cost management is to influence either
 - The unit price of the item being purchased
 - The number of units purchased
- At virtually any point in the transit cost chain
- Hopefully without increasing other costs or reducing service quality

INSTRUCTOR NOTES

The cost of activities along the cost chain that makeup a transit agency's total cost is basically made up of two components: unit price and unit consumption. The basis of cost management is to monitor, evaluate and take action at any point in the cost chain to either influence the unit price of the item being purchased (an hour of service, a gallon of fuel) or to influence the number of units purchased without (hopefully) increasing other costs or impacting service quality. This is true of both directly operated and contracted out service.

Exercise A-1: Small Group Breakout – Unit Price and Consumption

- Form small groups
- For the following examples:
 - *What are the units and what is the unit price?*
 - *What are some strategies for*
 - Managing units consumed
 - Managing unit price
- Examples
 - Operator Labor
 - Maintenance Labor
 - Health insurance for employees
 - Come up with an example of your own

INSTRUCTOR NOTES

- [Ideally, this is a small group exercise, timed for 18 minutes in total.]
- [Read the instructions on the slide.]
- [Pause after 13 minutes to allow for some report outs of the “examples of their own.” And to ask for any questions.]

Prize Question(s)

- Name one of the primary activities in the cost chain and how it influences costs.
- Name a support activity and describe how it can influence cost.



INSTRUCTOR NOTES

[Guide participants through the questions on the slide. Encourage participants to actively engage in answering the questions.]

- **Name one of the primary activities:** [Valid answers would include any of the primary activities listed below:
 - Service planning: sets the blueprint for what services will be provided, which drives hours, miles, and costs.
 - Scheduling & dispatch: turns the service plan and passenger demand into hours, miles, and vehicles.
 - Vehicle operations: generates fuel consumption, operator labor, maintenance, etc.
 - Maintenance: is a cost that includes parts, labor, etc. And also is self-reinforcing—poor, inadequate maintenance = more maintenance.
 - Customer service: costs to handle customer requests, complaints, etc. Also websites and customer information.]
- **Name a support activity and describe how it can influence cost:** [Valid answers would likely include any of the following:
 - General management: controls overall effective functioning of the agency.
 - Finance/accounting: influences costs by accurately accounting for costs, monitoring spending, setting budget. Also generates direct costs in terms of finance/accounting staff and software.
 - HR, training, recruiting: all have direct costs but also influences other costs. For example, inadequate recruitment can lead to open runs, which increases overtime. Poor training may result in higher crash rates and associated expenses. Also influences retention of staff.
 - Procurement/purchasing: Bottlenecks in procurement can cause shortage of supplies or parts, increasing maintenance issues and costs. Poor procurement policies could add unnecessary costs by having limited competition/paying too much for supplies or services.

-
- Marketing/promotion: A direct cost in itself, but also marketing can oversell service (outpacing supply or quality). Marketing can help control costs by effectively communicating services to reduce customer frustration, calls, problems, etc.



Factors That Influence Costs

- Internal vs. External Factors
- Transit Service Modes & Types
- Outsourcing vs. Directly Operating

INSTRUCTOR NOTES

[Explain factors that influence the costs.]

External vs. Internal Factors

- Costs are not entirely within a transit agency's control
- External factors make it difficult to control unit price
 - Labor market
 - Energy market (e.g., fuel & electricity)
 - Vehicles market
 - Rules and regulations (e.g., Buy America)
- Internal factors are in transit agency control (to some degree)
 - Organizational structure
 - Labor hours
 - Energy consumed
 - Vehicles purchased
 - Service policies

INSTRUCTOR NOTES

- Now, let's talk about how there are different internal and external factors that affect transit costs.
- External Factors: Transit agencies generally have no or limited control over the external factors that influence costs. There are three transit agency costs that are largely subject to external factors: Labor costs, Energy costs, and Vehicle purchasing costs.
- Internal factors: Transit staff can control the majority of internal factors that influence cost management. However, some may be uncontrollable such as the organization structure. Understanding how internal factors influence costs is important to monitoring, communicating, and managing costs.

Examples of Internal Factors That Influence Cost Management

- Organizational and operational structure
 - Independent agency or part of umbrella organization (e.g., council of governments, city/county government or human services agency)
 - Directly operated or outsourced service
- Administration—Indirect Cost Allocation
 - Centralized administration (support departments such as human resources, payroll, information technology)
 - Costs born by umbrella organization
- Service design and planning
 - Service policies
 - Scheduling efficiency
- Operations and maintenance
- Technology
- Service monitoring
- Cost monitoring and performance management

INSTRUCTOR NOTES

- Centralized administration and umbrella organization costs.
- If a transit system incurs administration costs that are accumulated in the accounts of another department or division of the organization – often requires an indirect cost allocation plan to the transit department to capture the full-cost. There are several indirect cost allocation methods and dependent on the determination can impact the amount of indirect cost allocated to transit and therefore overall transit cost.

Transit Service Modes & Types

Demand response (DR)

- General Public DR
- ADA paratransit (type of DR—required by ADA law)
- Microtransit (App-based DR service)

See Handout 1
for definitions
of these modes

Fixed- and flexible-route bus transit (Motor Bus—MB)

INSTRUCTOR NOTES

Several factors influence the cost-efficiency and cost-effectiveness of different transit modes. I'll briefly highlight a few of these modes and examples of what external and internal factors influence their cost performance; however, you can also reference Handout 2, which contains definitions of each of these modes. In most cases, we'll unpack these topics later in the workshop.

- Demand Response
 - Definition: Passengers request a trip, and the agency responds to their request.
 - In the National Transit Database, Demand Response is abbreviated DR.
 - Unique External Factors:
 - No two days are scheduled the same.
 - Service area size, population density, customer trip patterns, and even the street network can influence cost.
 - For example, the cost effectiveness of rural service is usually lower—especially in very sparsely populated, large rural areas where customers may have to make very long trips.
 - Unique Internal Factors:
 - Technology, for example, having robust and effective scheduling and dispatching software can help improve cost performance.
 - The skill sets of schedulers and dispatchers can also impact demand response costs.
 - There are many different forms of Demand Response, including general public demand response, ADA paratransit, and microtransit.

-
- ADA paratransit is demand response service provided for eligible people with disabilities by systems with fixed routes. ADA paratransit is required by federal law, and there are specific service level requirements that are outside of the transit agency's control. However, as we'll discuss in Chapter 10, there are also service policies and other strategies agencies can employ to help manage costs while also helping provide service capacity for eligible individuals and trips.
 - Microtransit is demand response service that is typically powered by technology (like a smart phone app) and provides on-demand service on the same day, and sometimes as soon as 15 minutes after a trip request. Microtransit costs can vary widely depending on the way the service is operated (e.g., in-house or contracted out), the promised response time, the size of the service area, and other factors.
 - Fixed-Route Transit
 - Definition: Vehicles operate along specific routes. Passengers board and alight at stops, and vehicles follow a preset schedule.
 - There are also different varieties of flexible-route services, which are when buses follow fixed-routes for some portion of their route but deviate from that route based on customer request.
 - We'll talk more about the different types of fixed- and flexible-route service types in Chapter 12.
 - In the National Transit Database, fixed-route service, including flexible route service, is abbreviated MB for motorbus.
 - Unique External Factors:
 - Traffic, which delays buses and makes them more expensive to operate per mile.
 - Street networks.
 - Topography.
 - Demand and population density.
 - Unique Internal Factors:
 - Service and scheduling policies.
 - Technology for creating schedules and managing buses in real-time.
 - Work rules for paying operators.
 - Fuel/energy source for vehicles and vehicle size.
 - Locations of vehicle storage facilities.

Operating Model Factor: Outsourcing vs. Directly Operating

- Cost drivers may be fundamentally different if outsourcing
 - Contract cost structure is main cost driver (e.g., \$ per hour or mile)
- Costs related to contractor oversight and contract administration
- Different outsourcing approaches:
 - Contract with private company
 - Contract with another transit agency
 - Contract with human services agency or other public entity

INSTRUCTOR NOTES

- Outsourcing: Sometimes, a transit agency might choose to hand over services to another agency. For instance, an urban agency might outsource ADA paratransit to a nearby rural agency, or a rural agency might team up with another to serve a distant county.
- When you outsource service, the cost of that service is mainly a function of how the contract is structured, for example, if the contract charges a unit cost per hour or mile of service, the main way to control the cost of the contracted service is by changing service levels.
- Outsourcing also includes costs related to contractor oversight and contract administration.
- There are many different approaches you can take when outsourcing—here's just a few [read sub-bullets].

Prize Question(s)

- Name an external factor that can influence costs.
- Name some internal factors (those where transit agencies have some control) that can influence costs.



INSTRUCTOR NOTES

[Potential valid answers shown below.]

- **Name an external factor that can influence costs.**
 - Labor market.
 - Energy market.
 - Vehicles market.
 - Rules and regulations.
 - Service area/size/density [mostly for demand response].
 - Topography.
- **Name some internal factors (those where transit agencies have some control) that can influence costs.**
 - Organizational structure.
 - Labor hours.
 - Energy consumed.
 - Vehicles purchased.
 - Service policies and standards.
 - Pay rates for staff.
 - Effectiveness of service monitoring.
 - Budget monitoring.
 - Technology.
 - Operations and maintenance practices.

Chapter Summary

- Key takeaways
 - The cost chain provides a structure for thinking about what influences transit costs
 - Not all transit costs are controllable
 - Transit costs differ by mode
 - If contracting out, costs driven largely by contract cost structure
- Additional information, additional resources, and references provided in Chapter 2 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter.

- The key takeaways of this chapter are [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]



Break

INSTRUCTOR NOTES

- [Inform participants that they have a break (in minutes) and ask participants to be back on time.]
- [As scheduled, break is 10 minutes.]



Chapter 3: Cost Analysis and Reporting

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE A 40

INSTRUCTOR NOTES

[Introduce Chapter 3 title.]

Learning Objectives

- Describe fundamental tasks for staying financially whole
- Describe major characteristics of costs
- Construct and use a chart of accounts
- Describe purpose of service-based cost allocation
- Describe methods to measure and track costs
- Describe process of peer benchmarking

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- Cost management foundations
- Cost characteristics
- Chart of accounts
- Service-based operational cost allocation
- Cost monitoring and cost performance measures
- Peer review and benchmarking

INSTRUCTOR NOTES

Chapter 3 is divided into the following sections [read the topics].



Cost Management Foundations

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE A 43

INSTRUCTOR NOTES

- Fundamental Cost Management Foundations defines cost management and provides the key steps in a cost management system.

Cost Management Foundations

- **Cost management** is a set of processes required to maintain effective financial control, including planning and controlling the transit budget
- Successful operation of transit services requires knowing how much you are spending
 - Ensure financial stability
 - Support proactive planning
 - Identify efficiencies and inefficiencies
 - Make quicker decisions
 - Communicate more effectively with stakeholders

An effective cost management system supports long-term financial health.

INSTRUCTOR NOTES

[Explain how important it is to handle money wisely when running transit services.]

- Cost management means having good plans and control over how much money is spent.
- When we know where our money is going, it helps keep our finances stable. It also lets us plan ahead, find ways to do things better, and make faster decisions.
- Understanding our costs helps us talk better with the people we work with and for—making sure everyone knows what's happening and why.

Cost Management Foundations (Continued)

Key steps in cost management

1. Develop and implement financial structure to identify, track, monitor, and report costs
2. Develop plan that identifies goals and objectives for planned services and projects and all resources needed to provide the services and complete the projects
3. Develop budget (including costs and revenues) to carry out planned transit services and projects (by task and activity)
4. Control costs based on accurate and real-time cost reporting
 - Rely on regular and consistent monthly monitoring
 - Monitor and track cost variances
 - Take action to reduce overruns or accommodate

INSTRUCTOR NOTES

[Discuss important steps in managing costs for transit.]

- First, it's crucial to set up a financial structure that helps us keep track and report costs accurately.
- Then, we create a plan that lays out goals, resources, and budgets for our services and projects.
- We manage our costs based on real-time reports, keeping a close eye on every month to check if everything aligns with the budget.
- If there are differences, we monitor and take action to fix them or adjust our plans.
- Let's explore these key steps together and understand how they ensure efficient and well-managed transit services and projects.

Open Discussion

- How do you employ cost management practices at your agency?
- Provide an example of a time when you successfully reduced or managed a cost to your satisfaction.

INSTRUCTOR NOTES

- Let's discuss how cost management works at your transit agencies.
- [Encourage discussion on the prompts.]
 - Can you share how you use cost management practices at your agency?
 - Maybe you have had a successful experience cutting or handling costs that you're proud of.

Cost Management Foundations (Continued)

- Accrual accounting
 - Required by NTD and USOA (and PTN-128)
 - Records expenses when incurred, even if services or supplies have not been paid for
- Cash-basis accounting
 - Records expenses when cash is paid out
 - Records revenue when cash is on hand or in bank account

INSTRUCTOR NOTES

- Continuing discussion of the foundations of cost management, let's introduce the difference between accrual and cash-basis accounting.
- Accrual accounting, as required by NTD, USOA, and PTN-128, records expenses when they occur, even if you've not received an invoice yet and if you're not paid the invoice yet.
- On the other hand, Cash-basis accounting records expenses when the cash is paid and revenue when it's in hand or the bank.
- [Give an example.]

Cost Management Foundations (*Continued*)

- Must have consistent and reliable processes for cost data:
 - Defining and categorizing costs
 - Gathering cost data
 - Reporting cost data (e.g., to board, PTN-128, to NTD)

INSTRUCTOR NOTES

- Another key foundational element of cost management is to have consistent and reliable processes for cost data.
- You must reliably handle cost data, which involves defining and sorting costs, collecting the data, and reporting it out, for instance, to your board, PTN-128, and NTD.
- It's crucial to ensure consistency and reliability in these processes, otherwise, you'll have difficulty using cost data for decision making.



Cost Characteristics

INSTRUCTOR NOTES

- Now, given how important it is to have consistent processes for cost reporting, it is good to discuss the characteristics of costs to help set up a conceptual framework for accurate tracking and reporting and reimbursement of costs.

Major Cost Characteristics

- Object class
- Function
- Type (Variable vs. Fixed)
- Applicability
- Grant allowability
- Grant activity

When a transit agency's financial cost structure can identify costs by characteristic, transit agencies can more quickly and efficiently report out costs as needed.

This section will frequently reference the Uniform System of Accounts (USOA).

INSTRUCTOR NOTES

- Every transit cost has six major characteristics. We'll unpack each one of these, but I'll list them now.
- In a best-case scenario, a transit agency's financial cost structure and software should allow for easy categorization of every cost in all of these six characteristics.
 - Object Class: the line-item for a cost such as labor, services, fuel, etc. following the Uniform System of Accounts (USOA).
 - Function: vehicle operations, vehicle maintenance, non-vehicle maintenance, general administration costs.
 - Type: variable versus fixed.
 - Allowability: whether the cost can be reimbursed under a grant.
 - Applicability: to what the services the cost applies (e.g., all modes and services or only some).
 - Grant Activity: operating assistance, maintenance, administration, capital. Grant activities determine a cost's maximum federal share.

Example of Cost Characteristics Applied to Cost Records

Amount	Description	Object Class	USOA Function	Type	Applicability	Grant Allowable	Grant / Activity
\$1,000	Monthly dispatching software fee	5039: Other Materials and Supplies	Vehicle Ops.	Fixed	Demand response mode	Yes	5311 / Capital
\$10,000	Monthly operator wages (excluding maintenance activities)	5011: Operators' Salaries and Wages	Vehicle Ops.	Variable	All modes	Yes	5311 / Op. Assistance
\$2,000	Monthly operator wages supporting maintenance activities	5011: Operators' Salaries and Wages	Vehicle Maint.	Variable	All modes	Yes	5311 / Preventative Maint.
\$50	Speeding ticket	5090: Misc. Expenses	Vehicle Ops.	Variable	Fixed route mode	No	N/A
\$3,000	Fuel for revenue vehicles	5031: Fuel and Lubricants	Vehicle Ops.	Variable	All modes	Yes	5311 / Op. Assistance
\$500	Fuel for non-revenue vehicles	5031: Fuel and Lubricants	Vehicle Maint.	Variable	All modes	Yes	5311 / Preventative Maint.

INSTRUCTOR NOTES

- This table demonstrates examples of how operational expenses might be organized across the major cost characteristics.
- The table is not prescriptive—how costs are organized at your agency may differ according to your own procedures, state policy and guidance, or federal policy and guidance.
- [Go through one example, perhaps the \$10,000 operator wages expense, and explain how the cost has an object class, function, type, applicability, allowability, and grant activity assigned to it.]
- Now, we'll go through each of the 6 cost characteristics in more detail.

The USOA

- The public transit industry standard chart of accounts structure
- Defines cost object classes and functions
- Must be followed for NTD reporting (full reporters)

INSTRUCTOR NOTES

- The Uniform System of Accounts (USOA) is the standard chart of accounts for transit agencies to use in reporting to the NTD and is a good structure for tracking and evaluating transit costs. We'll reference the USOA several times throughout our workshop.

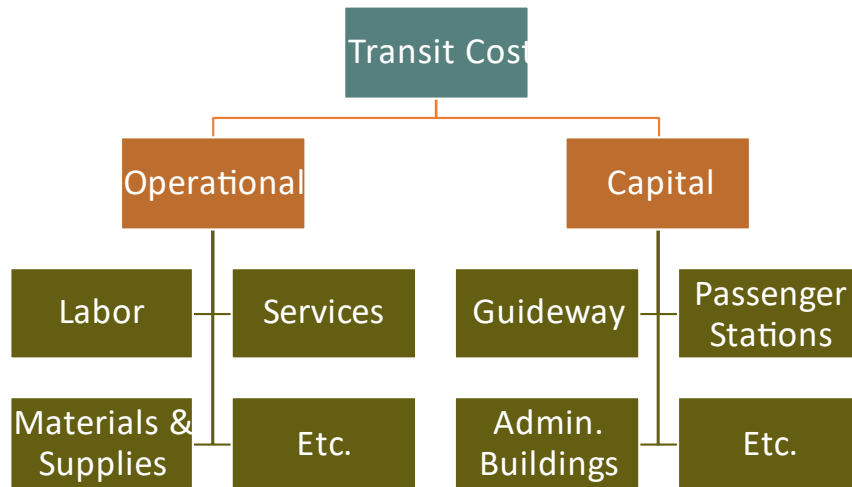
Major Cost Characteristic: Object Class

- Defines the *type of goods or services acquired by an expense*
- USOA provides industry standard for transit object classes
- Transit agency may have own object class codes but should aggregate/map to USOA object classes

INSTRUCTOR NOTES

- A cost's Object Class defines the thing or service purchased from an expense.
- The USOA sets the industry standard for object classes.
- While a transit agency might have its own codes, it's essential to group or match them to the USOA object classes for consistency and clear reporting—especially if your agency is a full reporter to NTD, because reporting costs by object class is required for full NTD reporters.

Major Cost Characteristic: Object Class (*Continued*)



This figure only shows a handful of object classes in the USOA.

INSTRUCTOR NOTES

The figure only shows a handful of object classes in the USOA. Classes are divided first into operational vs. capital. And then, within each of those two groups, there are multiple sub-groups like labor, services [read other examples from the slide].

As you can see a key distinction is whether a cost is considered an operational or a capital cost [next slide].

Operational vs. Capital

- Operational costs
 - Typically consumed within a year
 - Related to daily operations
 - Examples: labor, fringe benefits, fuel and lubricants, materials and supplies, office space, minor equipment, utilities, and administration
- Capital costs
 - Associated with long-term assets (buying or replacing)
 - Includes acquisition and leases of buses, garages, and maintenance facilities
 - NTD defines as costs >\$5,000 or capitalization value established by local government

INSTRUCTOR NOTES

- Operational costs are usually used up within a year and relate to daily operations. They include expenses like labor, fuel, office space, and utilities.
- On the other hand, capital costs are tied to long-term assets, like buying or replacing big things such as buses and maintenance facilities. The NTD defines capital costs as expenses greater than \$5,000 or the capitalization threshold established by the local government.

Remember!

Object class is determined by *what is purchased*, not

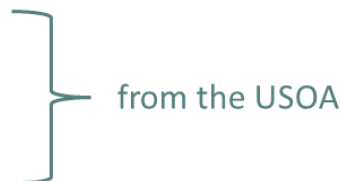
- How it is used
- How it will be reimbursed under a grant

INSTRUCTOR NOTES

An important thing to remember about the object class is that the object class is decided by what's bought, not by how it's used or how it will be reimbursed under a grant.

Major Cost Characteristic: Function

- Defines how the things purchased from the cost *were used*
 - Vehicle operations
 - Vehicle maintenance
 - Facility maintenance
 - General administration
- Areas of accountability for costs by functional area
- Can be used to track grant costs
- Can be used to track actual costs of an activity



INSTRUCTOR NOTES

- Moving on from object class, let's discuss the next characteristic: *function*.
- Understanding the function of costs is crucial as it tells us how the expenses associated with various purchases were utilized.
- The USOA has four main transit functions: vehicle operations, vehicle maintenance, facility maintenance, and general administration.
- Functions help track expenses by different functional areas, providing a clear breakdown of where the costs are applied.
- This breakdown is valuable for tracking grant expenses accurately and monitoring the actual costs incurred in specific activities.
- In simpler terms, it's about knowing where the money goes and ensuring it's accounted for properly.

USOA Functions and Subfunctions

Vehicle Operations	Vehicle Maintenance	Facility Maintenance	General Administration
<ul style="list-style-type: none"> • Revenue Vehicle Operation • Scheduling • Dispatching and Supervising • Ticketing and Fare Collection • Security • Transportation Administration 	<ul style="list-style-type: none"> • Servicing and Fueling Vehicles • Inspection, Maintenance, and Repair of Vehicles • Administration of Vehicle Maintenance 	<ul style="list-style-type: none"> • Maintenance of Vehicle Operations Equipment • Maintenance of Roadway and Track • Maintenance of Tunnels, Bridges, and Subways • Maintenance of Passenger Stations and Stops • Maintenance of Operating and Maintenance Buildings, Grounds, and Equipment • Maintenance of Administrative Buildings, Grounds, and Equipment • Operation and Maintenance of Electric Power Facilities • Administration of Facility Maintenance 	<ul style="list-style-type: none"> • Finance and Accounting • Purchasing and Stores • Real Estate Management • Customer Service • Promotion • Market Research • Planning and General Engineering • Preliminary Capital Project Planning • Risk Management • Safety • Human Resources • Legal • Information Technology • Office Management • General Management • General

INSTRUCTOR NOTES

- This figure shows the four functions and subfunctions in USOA.
- Vehicle operations: includes wages, salaries, and expenses related to all activities associated with dispatching and running vehicles to carry passengers, including management, administrative, and clerical support.
- Vehicle maintenance: includes wages, salaries, and expenses incurred during all activities related to keeping vehicles operational and in good repair, including administrative and clerical support.
- Facility maintenance: includes all activities related to keeping buildings, structures, roadways, track, and other non-vehicle assets operational and in good repair, including administrative and clerical support.
- General administration: includes wages, salaries, and expenses incurred to perform support and administrative activities.

PTN-128 Functions

PTN-128 Function	Matching USOA Function
Operating	Vehicle Operations, but excluding purchased transportation expenses
Maintenance	Vehicle Maintenance and Facility Maintenance, but excluding purchased transportation expenses
Administrative	General Administration, but excluding planning expenses
Planning	A portion of General Administration, including Market Research and Planning and General Engineering sub-functions Also includes Mobility Management expenses
Purchased Transportation	Not applicable, because there is no specific USOA function for purchased transportation. There is an object class for purchased transportation, and full NTD reporters must break purchased transportation expenses into the USOA functions annually (you should require your contractor to do this for you).

INSTRUCTOR NOTES

- It's important to recognize that transit cost functions may be different across different reporting locations.
- For example, PTN-128 uses different functions than the USOA.
- This table shows you how the 5 PTN-128 functions map onto the 4 USOA functions.
- [Walk through each row in the table.]
- You may want to have the account/function codes in your accounting system set up to aggregate costs according to both PTN-128 functions and USOA functions (especially if you're a fully reporter to NTD).

Tool #1: Operational Expenses by PTN-128 Function Guide

- Word document that helps you classify different transit costs into the appropriate functions as defined in PTN-128
- Available for download from Toolkit
- See Handout 2

INSTRUCTOR NOTES

- Tool #1 can be used as a guide understanding operational expenses by PTN-128 function.
- You can download the tool from the Toolkit.
- Handout 2 is Tool #1— [Pass around/reference Handout 2]
- [Pause for any questions or discussion on Tool #1/Handout 2.]

Also see **Handout 3**, which displays similar examples, but for USOA functions.

Remember!

A cost object class should be reported in different functions, depending on how the cost was *used*

Object Class	PTN-128 Function: Operating	PTN-128 Function: Maintenance	PTN-128 Function: Administration	PTN-128 Function: Planning	PTN-128 Function: Purchased Transportation
5011: Operators' Salaries and Wages	Operators' driving time	Operators fueling vehicles Operators cleaning a garage	Operators taking customer service calls	Operators supporting a study of new services	Not applicable
5013: Other Salaries and Wages	Dispatching revenue vehicles Schedulers creating timetables, blocks, and runs	Mechanics repairing vehicles Custodians cleaning offices	Accountants writing a budget	Planners performing a study of new services	Not applicable
5031: Fuel and Lubricants	Fuel for revenue vehicles	Fuel for service vehicles	Not applicable	Not applicable	Not applicable

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE A 61

INSTRUCTOR NOTES

- As a reminder, although a cost's object class and function may be correlated, they are not always consistent. For example, paying an operator will always have an object class of 5011, *Operators' Salaries and Wages*; however, although that cost will usually be reported in the operating function in PTN-128 and vehicle operations in the USOA, if that operator pay was used to maintain vehicles, or help with administration, etc., then the cost should be divided up into the appropriate function or functions.
- [Go through different rows and the associated column. Explain briefly how the cost of the same object class could be used to support different functions.]
- Handout 3 also provides a summary of USOA's functions and how costs in a given class might be reported under one or multiple functions, depending on how the cost was used. [Pass out or reference Handout 3.]
- Now, let's move on to the next cost characteristic: type.

Major Cost Characteristic: Type

- Variable costs
 - Change when service levels change
 - Includes operator wages, fuel costs, and maintenance costs
- Fixed costs
 - Do not change when service levels change
 - Includes administrative salaries, insurance, and professional services

INSTRUCTOR NOTES

- A cost's type refers to whether it is variable or fixed.
- Variable costs, like fuel and wages for operators, increase or decrease based on how much service is provided. When the service levels change, these costs change too.
- On the other hand, fixed costs, such as administrative salaries and insurance, remain steady regardless of service levels. They don't fluctuate with changes in the amount of service provided.
- So, variable costs flex with the level of activity, while fixed costs stay constant. It's like having bills that stay the same each month (fixed) and others that adjust based on how much you use something (variable).
- Whether a cost is considered fixed or variable matters a lot during cost allocation and when costing out or pricing service.

Major Cost Characteristic: Applicability

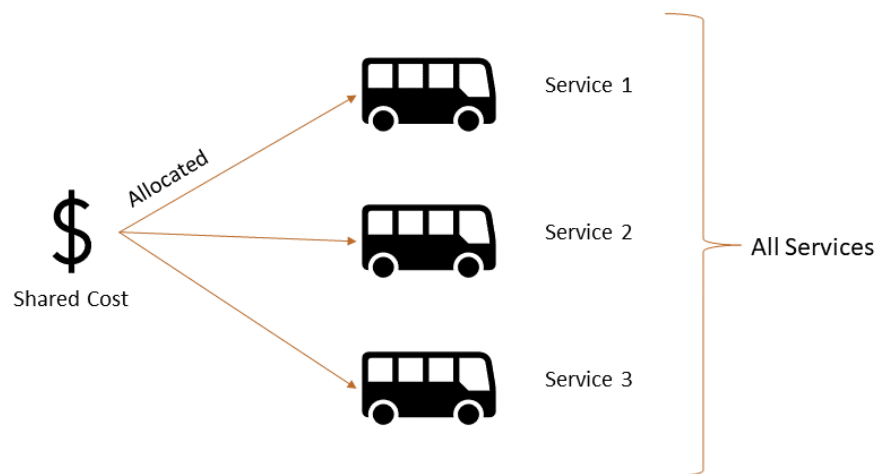
- Especially important with cost allocation
- Shared costs
 - Transit agency costs that apply to multiple services
 - Global shared costs vs. specialized shared costs
 - Must be allocated during cost allocation
- Direct costs
 - Can be assigned to a specific service
 - Does not have to be allocated

The transit agency's financial system or cost-allocation plan should stipulate what modes, services, and programs benefit each cost.

INSTRUCTOR NOTES

- The next cost characteristic is applicability. Applicability is especially important during cost allocation and refers to whether a cost is shared (and applies to all or multiple services) or a cost only applies directly to a single service.
- Shared costs are those that apply to multiple services. There are two main types:
 - Global shared—applies to all services such as payroll, general administration, information technology.
 - Specialized shared—applies to a subset of services often to a particular mode of service.
- Shared costs are typically allocated to services or areas during cost allocation (more on that later).
- Direct costs are those that apply to a single service (e.g., a single route).
 - Direct costs can be assigned directly to a specific service and do not need to be allocated.

Shared Cost

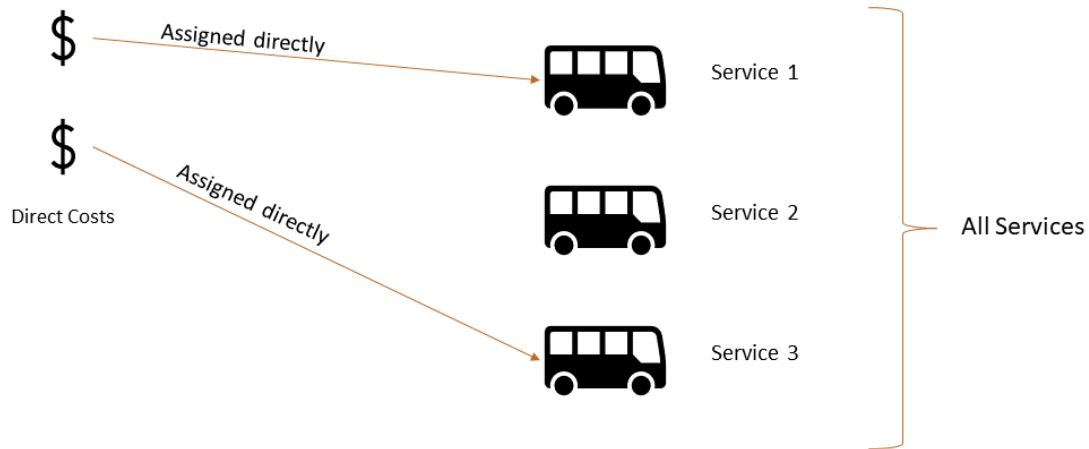


INSTRUCTOR NOTES

[Show the figure and explain it.]

- Shared costs include those expenses across the transit agency (or transit department/program) that cannot be reasonably tracked by transit service and that apply to multiple services. Shared costs must be allocated to services. Shared costs are usually allocated using some form of shared variable like miles or hours (more on that later).

Direct Cost



INSTRUCTOR NOTES

[Show the figure and explain it:]

- Direct costs are expenses that can be easily assigned to a specific service. Direct costs do not need to be allocated to services.

Indirect Costs

- Generated when transit agency is a unit of a local government or other organization
- Cost benefits more than one program or department of the umbrella organization
- To be reportable and eligible for grant reimbursement, may require
 - Federally negotiated indirect cost rate (or using de minimus 10%)
 - Central services cost allocation plan
- See National RTAP *Fundamental Financial Management* Chapter 4

Capturing indirect costs can improve accuracy of cost reporting and possibly allow more use of FTA grants

INSTRUCTOR NOTES

- Not to get confused with the concept of shared costs, let's quickly talk about indirect costs.
- Indirect costs are those incurred by a transit department or unit that is part of a larger umbrella organization like a local government or a council of governments (COG).
- Let's say that your transit program is actually part of a COG, and the COG also houses several other human services programs and even the MPO. Well, some of the COG's expenses (e.g., the lease for the administrative offices, maybe the COG's phone service, etc.) all benefit EVERY program the COG houses, including transit.
- But, since these costs are not paid directly out of the transit program, the COG pays them out of its administrative budget, the COG wishes to allocate a portion of its indirect costs to the transit program and the other programs. This is called an *indirect* cost.
- To be reportable as a transit cost (e.g., in NTD and PTN-128), the COG's indirect costs must be allocable to transit, and the COG must have an approved way to attribute its costs to transit and the other grant programs it manages. There are a few ways to do this, which are beyond the scope of this workshop; however, options include:
 - Having a federally approved indirect cost rate.
 - Using the 10% "de minimus" amount.
 - Having an approved central services cost allocation plan (more likely when the umbrella organization is a local government).
- More details about indirect costs count be found in National RTAP's *Fundamental Financial Management for Rural Transit Providers*, Chapter 4.

Major Cost Characteristic: Grant Allowability

- Whether or not a cost can be reimbursed under a specific grant
- Allowable costs vs. unallowable costs
 - Federal grants often have limitations on costs that are allowable for reimbursement
 - Transit agencies should ensure unallowable costs are tracked and excluded from reimbursement requests
 - Unallowable public transit costs incurred should still be reported as a cost to NTD and PTN-128
- For guidance:
 - See applicable grant circular
 - See 2 CFR 200.403 and 2 CFR 200.420 et seq.

INSTRUCTOR NOTES

[Use the slide content and briefly explain the difference between allowable costs and unallowable costs:]

- It's essential to differentiate between what costs are permissible (allowable) and those that are not (unallowable).
- Federal grants often have set limits on the expenses eligible for reimbursement. Transit agencies must diligently track and exclude unallowable costs from their reimbursement requests. Even if costs aren't eligible for reimbursement, such as some incurred in public transit, they still need to be reported as expenses to reporting systems like NTD and PTN-128.
- To understand what costs are allowable, it's crucial to refer to the relevant grant circular and regulations, particularly 2 CFR 200.403 and 2 CFR 200.420 and the following sections.

Major Cost Characteristic: Grant Activity

- Under what grant activity (i.e., grant line item) is the cost eligible for reimbursement
- FTA grant activity categories are Operating Assistance, Capital, Administrative, and Planning. There are more detailed line items in grant agreements, for example:
 - Preventive maintenance (a “Capital” grant expense)
 - Capital cost of contracting (also a “Capital” grant expense)
 - Mobility management (a “Planning” grant expense)
- Different grant activities have different federal share rates
- Categories should align with budget line items/activity codes in grant agreements

INSTRUCTOR NOTES

- A cost’s Grant Activity is under which grant line item will the cost be reimbursed.
- FTA grants have “Activity Line Items” (or ALIs). There are many, but, we can think of them as falling into a few main categories:
 - Operating Assistance, Capital, Administrative, and Planning.
 - Some of these categories also have more detailed line items, for example:
 - Preventive maintenance, which is a “capital” grant activity.
 - The capital cost of contracting, which allows you to seek the capital reimbursement rate for a share of your purchased transportation expenses.
 - Mobility management, which is a planning grant expense.
- Different grant activities come with different federal share rates.
- It’s essential for these categories to match the budget line items or activity codes specified in the grant agreements. Be sure that, when you are developing a grant budget, you include all the activity line items you expect to use during the period of performance of your grant. And also, when billing to your grant, make sure you are billing to the correct line item.

Remember!

FTA grant activity classifications not always the same as USOA classifications, for example:

- Preventive maintenance
 - Is reimbursable at the capital rate under FTA grants
 - Is an operational expense reported under the Vehicle Maintenance function for NTD and PTN-128
- Mobility management
 - Is reimbursable at the capital rate under FTA grants
 - Is reported as
 - General Administrative in the NTD
 - Planning in PTN-128

INSTRUCTOR NOTES

- It's crucial to remember a key point: FTA grant activity classifications may not always align with USOA classifications. For instance:
 - Preventive Maintenance: Under FTA grants, it's eligible for reimbursement at the capital rate. However, in reporting, it falls under operational expenses within the Vehicle Maintenance function for NTD and PTN-128.
 - Mobility Management: Similarly, it's reimbursable at the capital rate under FTA grants. However, its reporting differs; it's categorized as General Administrative in the NTD and Planning in PTN-128.

Exercise A-2: Small Group Breakout – Cost Characteristics

- Form small groups and complete the exercise
- 10 minutes to work
- 5 minutes for review and discussion

INSTRUCTOR NOTES

- [Break the room into small groups]
- [Pass out the Exercise A-2 handout.]
- [Read the instructions and perhaps do one example with the class.]
- [Give the attendees 10 minutes to fill out the table. Pass out the answers.]
- [Use 5 minutes to discuss the answers and any differences between groups' responses and answers.]



Lunch

INSTRUCTOR NOTES



Chart of Accounts



INSTRUCTOR NOTES

- Now that we've thought about the different characteristics of costs, let's discuss how a chart of accounts can help you have a good financial structure for your transit agency's cost management and cost reporting efforts.

Establishing and Using a Chart of Accounts

- **Chart of accounts:** organizational tool that records financial transactions and classifies them allowing for aggregation and reporting
- A good chart of accounts provides:
 - Consistency in data reporting
 - Ability to track, monitor, and evaluate finances
 - Accountability to budget
 - Ability to make informed business decisions
 - Insight into transit system's financial health

A well-structured chart-of-accounts can help management more readily identify what functions and object classes are driving overall costs or changes in costs.

INSTRUCTOR NOTES

Here's what a good chart of accounts brings to the table [read the slide content].

Characteristics of an Effective Chart of Accounts

Records all expenses

Contains standardized and agreed-upon definitions and data collection procedures

Uses the USOA to the extent possible

Reports costs using the accrual method of accounting

Separates capital costs from program operational costs

Assign costs to functions and modes

Includes overhead and indirect costs

INSTRUCTOR NOTES

Here's what an effective chart of accounts should be [read the slide content].

Reporting Requirements

- Cost reporting requirements differ for depending on transit agency type
- Rural transit districts (5311 subrecipients) in Texas
 - Districts report costs by PTN-128 function into PTN-128
 - PTN inputs data to NTD, classifying costs as operational or capital
- Urban transit districts (5307 recipients; full reporters only)
 - PTN-128: Districts report costs by PTN-128 function into PTN-128
 - NTD: Districts report costs into NTD
 - Report costs by object class
 - Report costs by function
 - Reduced reporter 5307 recipients have similar requirements as rural districts; however, they input data directly into NTD instead of PTN
- Even if object class and function not required for reporting, benefits include:
 - Segregating operating expenses by function (e.g., operating vs. vehicle maintenance vs. non-vehicle maintenance vs. general administration)
 - Providing financial reports by function (e.g., to hold management accountable by function)
 - Determined fixed and variable costs for cost allocation to services

INSTRUCTOR NOTES

- For Rural Transit Districts (known as 5311 subrecipients), the reporting is more streamlined. They report costs by PTN-128 function into PTN-128, which then feeds data into the National Transit Database (NTD), categorizing costs as either operational or capital.
- In contrast, Urban Transit Districts (5307 recipients, especially full reporters) have a more comprehensive reporting structure. Here's the breakdown:
 - PTN-128: Urban districts report costs by PTN-128 function into PTN-128.
 - NTD: They report costs directly into the NTD.
- There are also reduced reporter 5307 recipients who follow requirements similar to rural districts but input data directly into the NTD.
- Now, here's the interesting part: Even if reporting by object class and function isn't mandatory, it holds several benefits [read related content].

Tool #2: Model Chart of Accounts

- Excel workbook that provides a model of a transit agency's chart of accounts, including reporting by object class and function.
- Available for download from Toolkit
- Class discussion/review

INSTRUCTOR NOTES

[Open the Tool and show different sheets quickly.]

- Tool # 2 can be used as a model of a chart of accounts for transit agency—particularly helping you track costs by month and by PTN-128 function for PTN-128 reporting.
- You can download the tool from the Toolkit.

Prize Question(s)



How does budgeting help manage costs?



Explain why a good accounting structure helps manage costs?



INSTRUCTOR NOTES

[Explain factors that influence the costs.]



Service-Based Operational Cost Allocation

INSTRUCTOR NOTES

- Part of effective cost management includes knowing how much your different transit services cost and knowing their cost-efficiency and cost-effectiveness.

Service-Based Operational Cost Allocation

- Distributes operational costs across services, modes, areas, funding sources, sponsors, etc.
- Used to estimate operational cost of a single service, route, or funding program
- Used to support analysis, service planning, performance monitoring, budgeting, financial planning, and reporting
- Particularly useful for transit agencies that operate across local boundaries or have multiple services, routes, or sponsors
- Two-variable cost allocation model is a recognized industry standard

INSTRUCTOR NOTES

- This process involves distributing operational costs across various elements such as services, modes, areas, funding sources, and sponsors.
- Service-Based Operational Cost Allocation helps in several ways, including estimating Operational Costs of individual services and Supporting Various Analyses and Planning.
- This method is particularly useful for transit agencies that operate across local boundaries or have multiple services, routes, or sponsors. It brings clarity and precision to financial management in complex operations.

Two-Variable Cost Allocation Model

- Classifies operational costs as fixed or variable
- Variable costs are classified as either hours-driven or miles-driven

Hours-Driven Costs	Miles-Driven Costs
Typically costs associated with the operating function (except fuel/ lubricants) because these costs correlate with the number of hours of transit service Example: Vehicle operator wages	Typically vehicle maintenance and fuel/lubricant expenditures because these costs correlate with the number of miles driven by transit vehicles Examples: Preventive maintenance and fuel

INSTRUCTOR NOTES

- One widely recognized approach is the two-variable cost allocation model. This model sets an industry standard for accurately allocating costs, making it easier for transit agencies to understand and manage their financial resources.
- In a two-variable cost allocation model, operational costs are first divided into fixed or variable, and then variable costs are categorized as either hours-driven or miles-driven [Use table to help define and give examples of each].

Service-Based Operational Cost Allocation (*Continued*)

- Steps
 - Categorize costs as fixed or variable. Variable costs categorized as miles-driven or hours-driven
 - Establish the cost allocation formula
 - Variable cost per mile = total miles-driven variable cost ÷ actual vehicle miles
 - Variable cost per hour = total hours-driven variable cost ÷ actual vehicle hours.
 - Fixed-cost rate (multiplier) = total fixed cost ÷ total variable cost.
- Cost formula = [(variable cost per mile × ____ miles) + (variable cost per hour × ____ hours)] × fixed-cost rate
- Use cost allocation formula to determine service cost
 - Be logical and consistent
 - More resources:
 - Chapter 3 in Guidebook
 - National RTAP Advanced Topics in Financial Management
 - National RTAP Two-Variable Cost Allocation Calculator

INSTRUCTOR NOTES

- We won't go into the full process of doing cost allocation; however, let's look at the basic steps:
 - Assign operational costs to fixed and variable costs. Assign variable costs as either hours-driven or miles-driven.
 - Calculate the cost allocation formula, which includes three "rates" [explain each shown on slide].
 - Use the cost allocation formula to determine the service cost by plugging a service's hours and miles into the formula.
- Another key pointer is that you should be logical and consistent in how you treat costs in your model. The best cost allocation models are fully documented and 100% transparent.
- There are many other resources that provide more details on service-based cost allocation, including [read the points on the slide].



Cost Monitoring and Cost Performance Measures

- Actuals vs. budget monitoring
- Cost performance measure monitoring

INSTRUCTOR NOTES

- Ok. Now, in our cost management journey, we have a budget, we understand the key cost characteristics, we have methods for accurately tracking costs in our chart of accounts, and we have a cost allocation plan in place to accurately allocate operational costs to services.
- Now, how do we use this awesome data to monitor costs? We'll look at two main methods:
 - Monitoring actual spending versus budgeted spending.
 - Monitoring cost-related performance measures.

Actuals vs. Budget

- Analyze by line item (cost object class) and period (e.g., month and year-to-date)
- Compare actual spending vs. budget
- Explain differences between actual expenditures and budget

Transportation Department
For the Month Ended April 30, 2018

Class Object	Description	This Period - April 2018				Year-to-Date			
		Budget	Actual	Variance	Percent	Budget	Actual	Variance	Percent
501 LABOR									
501.01	Operator's Salaries & Wages	\$ 82,106	\$ 83,227	\$ (1,121)	-1.4%	\$ 985,275	\$ 832,270	\$ 153,005	15.5%
501.02	Other (Operating) Salaries & Wages	\$ 5,852	\$ 5,246	\$ 606	10.4%	\$ 70,225	\$ 52,460	\$ 17,765	25.3%
501.03	Dispatchers Salaries & Wages	\$ 10,467	\$ 10,223	\$ 244	2.3%	\$ 125,600	\$ 102,230	\$ 23,370	18.6%
501.04	Other (Administrative) Salaries & Wages	\$ 19,207	\$ 19,200	\$ 7	0.0%	\$ 230,480	\$ 192,000	\$ 38,480	16.7%
501.99	Other Salaries & Wages	\$ -	\$ -	\$ -	0.0%	\$ -	\$ -	\$ -	0.0%
502 FRINGE BENEFITS									
502.01	FICA	\$ 7,293	\$ 7,310	\$ (16)	-0.2%	\$ 87,518	\$ 72,902	\$ 14,615	16.7%
502.02	Pensions & Long Term Disability	\$ 2,353	\$ 2,265	\$ 88	3.7%	\$ 28,232	\$ 21,117	\$ 7,114	25.2%
502.03	Health Insurance	\$ 10,587	\$ 10,485	\$ 102	1.0%	\$ 127,042	\$ 105,826	\$ 21,216	16.7%
502.04	Dental Plans	\$ -	\$ -	\$ -	0.0%	\$ -	\$ -	\$ -	0.0%
502.05	Life Insurance	\$ -	\$ -	\$ -	0.0%	\$ -	\$ -	\$ -	0.0%
503 SERVICES									

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE A 83

INSTRUCTOR NOTES

- This table provides an example Object Class Report to evaluate actual vs. budget expenditures.
- Negative variances and percentages represent overspending. Positive variances and percentages represent underspending [use pointer and mark the negative and positive values].

Cost Performance Measures

- Cost-efficiency and cost-effectiveness measures
 - Track performance
 - Identify opportunities for improved cost management
 - Help communicate performance to stakeholders

Common Efficiency and Effectiveness Measures

Cost Efficiency Measures

- Cost per Revenue Hour
- Cost per Vehicle Hour
- Cost per Revenue Mile
- Cost per Vehicle Mile

Service Effectiveness Measures

- Passenger Trips per Revenue Hour
- Passenger Trips per Vehicle Hour
- Passenger Trips per Revenue Mile
- Passenger Trips per Vehicle Mile

Cost Effectiveness Measures

- Cost per Passenger Trip
- Farebox Recovery Ratio

INSTRUCTOR NOTES

- Cost-Related Performance Measures help us:
 - Monitor and understand our performance from a cost perspective.
 - Identify Improvement Opportunities: By looking at these measures, we can spot areas where we might do better at managing costs, and ensuring our financial resources are used optimally.
 - Communicate Performance: These measures help us explain to others, like stakeholders or interested parties, how well we're doing in terms of managing costs and using our money wisely.
- The figure on the slide shows several common efficiency and effectiveness measures; we'll not go into each one (you can see the Guidebook for more details), but we'll focus on 4 [next slide].

Operational Cost per Revenue Hour

- A key cost-efficiency measure
- Assesses financial resources needed to produce a unit of service (hour of revenue service)
- Sensitive to service span, demand, vehicle availability, operator assignments, and scheduling
- Does not evaluate usage of service

Operational cost per revenue hour = total operational cost ÷ total revenue hours

What does the transit agency spend to put service on the street for one revenue hour?

INSTRUCTOR NOTES

- This measure helps understand the financial resources required to provide a single hour of service.
- It considers factors like service duration, demand, available vehicles, staff assignments, and schedules.
- It's important to note that while it assesses cost, it doesn't evaluate how much the service is used by passengers.

Operational Cost per Revenue Mile

- Useful for fixed-route route-level assessment and in DR
- Influenced by fluctuations in miles of service scheduled
- Improved by regular maintenance, efficient scheduling, and efficient staff management
- Does not evaluate usage of service
- Somewhat duplicative of cost per revenue hour

Operational cost per revenue mile = total operational cost ÷ total revenue miles

What does the transit agency spend to put service on the street for one revenue mile?

INSTRUCTOR NOTES

- Operational Cost per Revenue Mile is a helpful tool for assessing fixed-route performance and demand response services.
- It shows the cost to provide one mile of service, affected by changes in scheduled service miles.
- It's important to note that like cost per revenue hour, this measure doesn't evaluate service usage (i.e., use by passengers).

Passenger Trips per Revenue Hour

- A key productivity measure
- Often considered the most important single measure for DR
- Measures ability to serve trips effectively on specific routes or where passengers have similar trip-making patterns
- Affected by size of service area, land use patterns, commuting patterns, no-shows, late cancellations, scheduling efficiency, and operating environment
- Not a cost measure, but drives cost-effectiveness

Passenger trips per revenue hour = total passenger trips ÷ total revenue hours

How many passengers were served during an average hour of service?

INSTRUCTOR NOTES

- Passenger Trips per Revenue Hour is a critical productivity measure, especially in demand response services.
- It measures how effectively trips are served on specific routes or for passengers with similar travel habits.
- It's influenced by various factors like service area size, land use, commuting patterns, scheduling efficiency, and operational conditions.
- Remember, it's not about costs, but it strongly influences how cost-effective services are.

Operational Cost per Passenger Trip

- A key cost-effectiveness measure
- Relates productivity and operational cost
- Improved by reducing operating costs or by increasing passenger trips without increasing costs
- Improved by matching service levels to demand

Operational cost per passenger trip = total operational cost ÷ total passenger trips
What does it cost to provide a trip for one passenger?

INSTRUCTOR NOTES

- Operational Cost per Passenger Trip is a crucial measure for assessing cost-effectiveness.
- It looks at how productivity connects with operational expenses.
- This measure gets better by either reducing operating costs or by increasing passenger trips without raising costs.
- It's also improved by aligning service levels with passenger demand.

Exercises

- Budget vs. actuals: Exercise A-3
- Cost performance measures: Exercise A-4

INSTRUCTOR NOTES

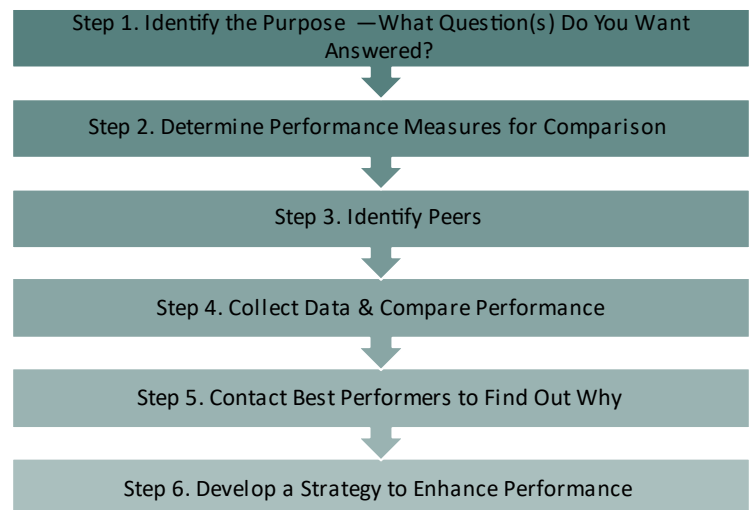
- [Handout the exercise pages to all attendees.]
- [Describe the exercises to the participants and give them a little time to think about it. Encourage their active participation by addressing them individually and motivating them to engage in the activity.]
- [These exercises are ideally done independently. **15 minutes** should be adequate.]
- [At about 12 minutes, pass out the answer sheets.]
- [Before moving on, pause for some discussion of the answers.]

Peer Review and Benchmarking

- Knowing if a measure is "good" or "bad" requires a baseline for comparison
- Benchmarking against peers or past performance can be useful

More details available in Guidebook Chapter 3 and in TCRP Report 141

Steps in Peer Review and Benchmarking



INSTRUCTOR NOTES

[Explain steps in peer review and benchmarking using the figure.]

- Understanding whether a measure is 'good' or 'bad' requires a basis for comparison.
- Comparing against peers or past performance can provide valuable benchmarks to evaluate performance.
- It is important, when conducting peer reviews, to not simply jump to conclusions like “see, we’re super efficient!” or “wow, we’re terrible!” Especially on the first time. A peer review can help you know where you stand against peers and then give you a basis for seeking to understand why. As you do multiple years of comparisons, you can then begin to cheer or sigh when things trend in a desirable or undesirable direction.

Prize Question

- Explain why using cost performance measures is important in comparing costs across time periods or between peers.



INSTRUCTOR NOTES

[Guide participants through the question on the slide. Encourage participants to actively engage in answering the questions. Valid answers include:

- They help us to know our cost-efficiency/cost-effectiveness.
- They can help us identify trends in our costs and our cost-related performance.
- It's important to normalize expenses relative to the size of the agency/amount of service provided.]

Chapter Summary

- Key takeaways
 - A good cost management foundation can ensure financial stability
 - A good financial cost structure allows agencies to readily report for a wide variety of purposes
 - A well-structured chart of accounts is a key tool in cost management
 - Service-based operational cost allocation is a method to allocate costs by mode, jurisdictions, and funding sources
 - Monitoring and tracking cost performance measures leads to positive performance results
 - Peer review and benchmarking is a tool for effecting positive change
- Additional information, resources, and references provided in Chapter 3 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter.

- The key takeaways of this chapter are [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]

Module A Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module A

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

- Please write and mark your selected answers clearly.
- Only select one answer for questions with a circle: ○. |
Select all that apply for questions with a square: □.
- Your 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 **X** or **✓** is fine!



INSTRUCTOR NOTES

[Explain to participants this evaluation form should be filled out based on the Module A contents.]



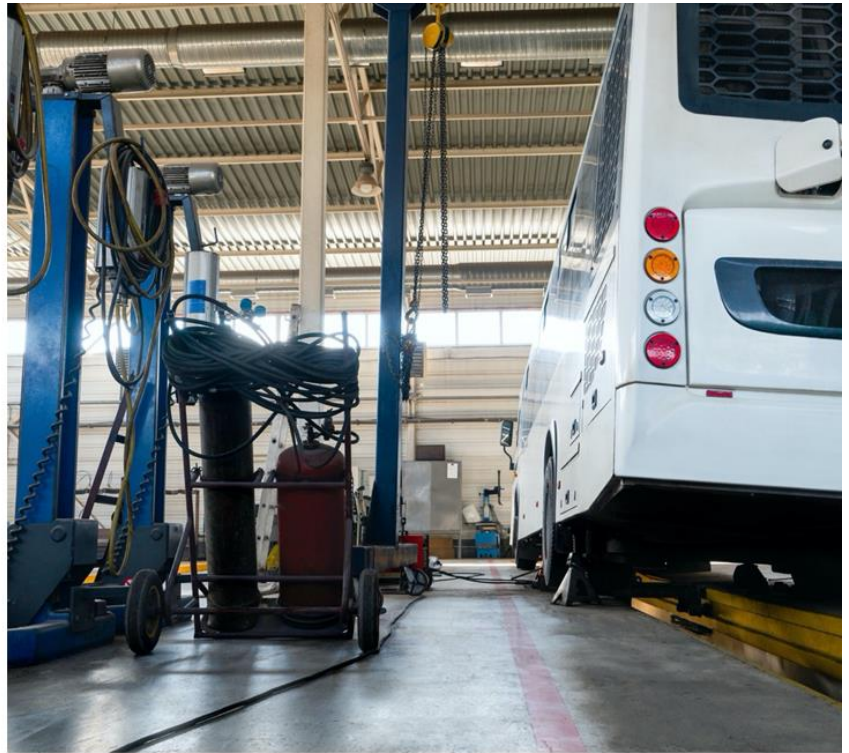
Break

INSTRUCTOR NOTES

- [Inform participants that they have a break (in minutes) and ask participants to be back on time.]
- [Break is scheduled to be 5 minutes.]



MODULE B: Strategies for Managing Operational Costs for All Modes



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE B 95

INSTRUCTOR NOTES

[Give a short overview of Module B.]

- Module B offers strategies for managing costs suitable for various transit modes, especially those used by rural and small urban systems.
- It's most helpful for transit agencies running their own services, but some tips may also benefit outsourced operations, especially if the contractor's costs impact the transit agency or if the contractor is facing challenges in managing expenses in specific areas.

Module Overview

- **One-sentence summary**

Strategies for managing the operational costs of any directly operated service, regardless of mode.

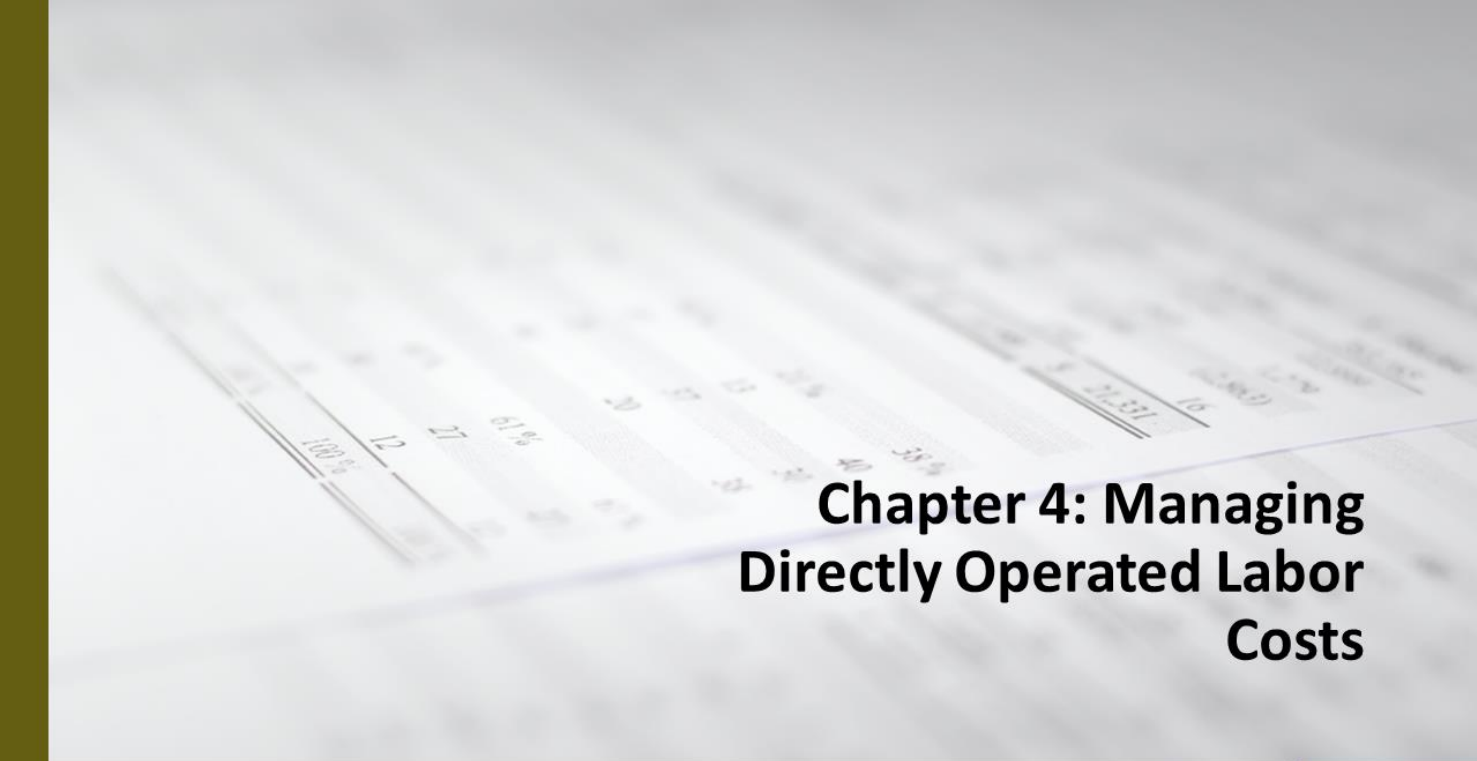
- **Chapters**

- 4: Directly Operated Labor Costs
- 5: Fuel and Energy Costs
- 6: Vehicle Maintenance Costs
- 7: Additional Operational Cost Considerations

INSTRUCTOR NOTES

[Give a short overview of Module B.]

- In one sentence, this module provides [read one sentence summary].
- The module contains four chapters:
 - Chapter 4: [read the chapter title].
 - Chapter 5: [read the chapter title].
 - Chapter 6: [read the chapter title].
 - Chapter 7: [read the chapter title]. This chapter explains contains a few other considerations for operational cost management like insurance, in-kind contributions, and more. It's sort of a "catch all" for other operational cost management topics that didn't fit neatly into other chapters.



Chapter 4: Managing Directly Operated Labor Costs

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE B 97

INSTRUCTOR NOTES

[Introduce Chapter 4 title.]

Learning Objectives

- Describe the elements of operator labor costs for insourced labor
- List strategies for managing labor costs related to non-operator positions
- Describe medical and health benefits strategies to keep benefits costs under control
- List strategies for managing labor costs related to overtime

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- Introduction to labor costs
- Managing operator labor costs
- Managing other labor costs
- Managing unscheduled overtime

INSTRUCTOR NOTES

Chapter 4 is divided into the following sections [read the topics].

Directly Operated Labor Costs

- Every transit agency employs or contracts staff to operate vehicles, conduct scheduling/dispatch, maintain assets, and manage service delivery
- Transit is labor-intensive, so **labor** is the most significant component of many transit agencies' operational costs
- Small efficiency and management adjustments can have a large financial impact

INSTRUCTOR NOTES

- Labor is a major cost in directly operated transit, because [1st bullet].
- [2nd bullet]. If you remember from earlier in the workshop, from FY2017 to FY2019, labor costs averaged 68-71% percent of total operational expenses at Texas rural and small urban transit agencies that directly operated service. Over that period, operator pay was the most significant labor cost category at 29%. Other transit agency staff pay averaged 21%, and fringe benefits for all staff averaged 20%.
- Because labor is such a significant cost driver, [3rd bullet].

Key Labor Cost Types

- Operator labor costs
- Other labor costs
- Paid absences
- Fringe benefits
- Recruiting and training costs

There are always trade-offs with any cost management activity. For example, holding down hourly wages may help reduce labor costs but may also lead to more challenges recruiting and retaining staff.

INSTRUCTOR NOTES

- Key labor cost types, mostly adapted from the National Rural Transit Assistance Program (or National RTAP) are [read the slide content—bullet points].
- It's also important to note, before we get into talking about managing labor costs, that there are always... [text box]. We must always be very strategic and thinking of both the short- and long-term effects of a cost management strategy as well as the potential effects across the transit cost chain.

Relevant Analyses and Measures

- How do you know you have the right number of staff in the right positions?
- How do you know if you are spending the right amount of money on labor?

DISCUSSION:

How have you sought to right-size staff counts and labor costs?

What labor cost metrics have you used or would you like to know more about?

Example Labor Cost Metrics
Ratio of revenue miles operated to number of mechanics
Ratio of vehicles (total or peak) to number of mechanics
Ratio of revenue hours operated to number of operators
Ratio of revenue hours operated to total number of employees
Overtime ratio
Pay-to-platform ratio
Turnover ratio

INSTRUCTOR NOTES

- A key element to managing labor costs is being strategic in having the right number of staff in the right positions.
- One way to “know” whether your staffing levels are correct is by tracking labor cost metrics and by comparing your labor cost metrics against peers.
- The box on the slide presents a few examples of labor cost metrics that may be helpful. We won’t go into each one, but let’s take a quick break to have a discussion. There’s two questions: [read the two questions and then encourage discussion. Follow up, prompt for more information as helpful].

General Practices for Managing Labor Costs

- Make sure labor cost data are accurate and reliable
- Report labor costs in a standardized way
- Use peer evaluations to identify opportunities to reduce labor costs
- Conduct evaluations of historical labor cost data to (a) identify trends and (b) forecast labor costs
- Review salaries, wages, hours, staffing levels, and staff performance against relevant policies
- Adjust staffing levels based on demand
- Review contracts (if applicable) to identify opportunities to save labor costs by switching from outsourcing to insourcing or vice versa

INSTRUCTOR NOTES

There are some additional general practices for managing labor costs such as [read the slide content—bullet points].



Managing Operator Labor Costs

INSTRUCTOR NOTES

This section discusses how to manage the operator labor costs.

Managing Operator Labor Costs

- Includes pay (hourly or salaried) to operators as well as bonuses, premiums, overtime pay, paid absences, and fringe benefits
- Operators might be guaranteed a minimum number of hours per week, even if service was not provided for that many hours

INSTRUCTOR NOTES

- This section covers the compensation given to transit operators, including their regular pay, extra bonuses, overtime, and benefits.
- In some cases, operators might have a guaranteed minimum number of hours per day or per week, even if they didn't work for that many hours. So, it's important to fully understand your current compensation policies.

Managing Operator Labor Costs: Key Topics

- Operator pay and incentives
 - Setting the optimal pay rate
 - Holiday and special work pay
 - Incentives and bonuses
- Hiring CDL vs. non-CDL operators
- Using part-time vs. full-time operators
- Operator retention

INSTRUCTOR NOTES

- Our discussion of managing operator labor costs will focus on these four topics: [read slide bullets].

Tool #3: Vehicle Operator Labor Cost Calculator

- Excel workbook that helps you calculate the full cost of vehicle operator labor (including wages and benefits) across different mixes of runs, operator types, wages, and benefits
- Available for download from Toolkit

INSTRUCTOR NOTES

[Open the Tool.]

- Tool # 3 is a Vehicle Operator Labor Cost Calculator.
- You can download the tool from the Toolkit.
- This tool is an Excel workbook that...[read 1st bullet].
- [Show different sheets quickly and how changing a value (e.g., the number of operators, the hourly wage, etc.) results in changes in the outputs.]
- One way you could use this tool is setting up the workbook with your current conditions and then creating a new version and making some potential changes (e.g., increasing hourly rates) and then compare the outputs from both versions.

Operator Pay and Incentives

- Can vary by operator type/role
 - Fixed route or demand response
 - CDL or non-CDL
 - Part-time or full-time
 - Trainers
- Pay scales might not be identical due to type of vehicle operated, amount of assistance provided to riders, etc.
- Pay scales typically reward seniority
- Pay might be higher for less-desirable routes or shifts

Volunteer drivers will be addressed later in this module.

INSTRUCTOR NOTES

- Operator compensation varies based on several factors, such as the type of role (fixed route or demand response), possession of a Commercial Driver's License (CDL), full-time or part-time status, and whether the operators are trainers.
- Payment differences may arise due to the vehicle type operated and the level of assistance provided to passengers.
- Generally, pay scales reward experience and seniority so that operators who have been with you the longest make the most money.
- Additionally, higher compensation might be offered for less favorable routes or shifts.

Setting the Optimal Pay Rate

- Depends on job market competition
 - Competing opportunities for professional drivers
 - Size of local job market
- Determine who your main competitors are (e.g., other transit systems, school districts, etc.)
- Determine competitive pay rates through market studies and peer comparisons
- Review postings for competing local job opportunities
- Industry norms may be available through organizations like National RTAP, APTA, CTAA, and state and regional transit associations
- Review the balance of wage rates and benefits (e.g., lower wages could be balanced by better benefits)

INSTRUCTOR NOTES

- One of the key elements of managing operator labor costs is paying operators the optimal pay rate. The optimal pay rate is the “ideal” pay rate that helps you attract new operators and also helps you keep the operators you have but without the pay rate being unnecessarily high. Setting the optimal pay rate can be quite difficult and is mainly a function of the competition in the job market for your operators. The more job market competition there is, the more likely you’ll have to offer a higher pay rate. But how do you figure out the right number?
- There are several steps:
 - Identifying your main competitors, such as other transit systems or school districts, is crucial.
 - You may need to conduct market studies or peer reviews, as well as reviewing job postings from similar local opportunities.
 - You can also find industry data from national and regional organizations like National RTAP, APTA, CTAA, and others.
- It’s important to remember that there may be a balancing act necessary between wages and benefits. For example, you may not be able to pay higher wages, but you may be able to provide better benefits, or vice versa.

Incentives and Bonuses

- Types of incentives and bonuses
 - Attendance
 - Safety
 - Tenure/longevity
 - Referral
 - Sign-on
- Costs of incentive and bonus programs might be offset by the benefits of such programs
- Program clarity is critical if a lower base wage is offset by incentives and bonuses
- Program documentation crucial for consistency, transparency, and for cost allowability (can't willy-nilly provide a bonus payment)
- Ensure operators receive full description of program upon implementation, upon hire, and annually

INSTRUCTOR NOTES

- Another part of operator labor costs is from incentives and bonuses.
- Various types exist, such as those related to attendance, safety, tenure/longevity, referrals, and sign-on bonuses.
- [Cover the remaining bullets on the slide.]

Incentives and Bonuses (Continued)

- Programs can achieve multiple objectives

Reduce absenteeism	Reduce overtime	Encourage operator retention	Reduce crashes and injuries	Reduce impacts of no-show operators on service delivery	Reduce maintenance costs
Reduce insurance costs	Improve service delivery	Improve operator recruiting	Reduce recruiting, hiring, and training costs	Improve stability of work environment	Improve transit agency reputation

- Understand objectives when designing the program
- Design with input of operators and use data to assess

INSTRUCTOR NOTES

- When designing the incentives and bonuses, It is important to consider what your objectives are. There are many different objectives such programs can support, including those on the slide [highlight a couple].
- When you're setting up incentives and bonuses, get the input of operators and then use data to evaluate whether your incentive or bonus program is accomplishing what you hoped to accomplish when you set it up.

Hiring CDL vs. Non-CDL Operators

- Industry data shows that operators without a CDL are paid an average of \$6,000 less than operators with a CDL
- Using non-CDL operators might reduce operator labor costs
 - Can also increase the pool of operator candidates
 - Can also reduce hiring/training cost and time
 - But it can impact fleet mix and maintenance needs/costs
 - Fleet mix approaches discussed in Chapter 15 in the Guidebook

CDL not required when vehicle is small enough and is designed to carry less than 16 passengers (including the driver).

INSTRUCTOR NOTES

- Now, moving on, another strategy for managing operator labor costs is using a mix of CDL and non-CDL operators. Although this is not strategy that is guaranteed to have net benefits, it could potentially help, especially when you have the flexibility in your fleet size and services to be able to have some operators no need a CDL.
 - An operator does not need the CDL, assuming the vehicle is a typical passenger vehicle, and is designed to carry less than 16 passengers (including the driver).
- On average, a non-CDL operator is paid \$6,000 less than operators with a CDL.
- Opting for non-CDL operators could potentially decrease overall labor costs and broaden the pool of potential candidates. It may also cut down on hiring and training expenses and time.
- However, this choice can influence the types of vehicles used, which also impacts fleet maintenance needs and associated costs.

Using Part-time vs. Full-time Operators

- An option for more effectively managing labor costs is employing a mix of full-time and part-time operators
- Agency needs to understand how much demand there is for part-time operator work

INSTRUCTOR NOTES

- Another option for managing labor costs is having a mix of full-time and part-time operators, but, this may only work if it makes logical sense for your agency to have part-time operators.

Using Part-time vs. Full-time Operators (*Continued*)

Advantages of Using Part-Time Operators	Disadvantages of Using Part-Time Operators
<ul style="list-style-type: none">• Lower operator costs if part-time operators do not qualify for benefits• Operators who want more flexibility in their schedule might prefer part-time work• Might be easier to staff less-desirable shifts• Might be more efficient to schedule and roster• Operator could pair part-time driving with a part-time role in another agency function• Transition from training to service might be easier for new operators if they are first assigned to part-time shifts	<ul style="list-style-type: none">• Operators might not qualify for benefits, incentives, or bonuses• Turnover might be higher due to lack of benefits• New operators might not apply if they want benefits• Part-time operators might not be able to get as many hours as they want• Might be more challenging to train an operator who is not available full-time

INSTRUCTOR NOTES

Let's talk about some of the advantages and disadvantages of Using Part-time vs. Full-time Operators [briefly explain the table, highlighting and paraphrasing the contents].

Exercise B-1: Small Group Breakout – Operator Labor

- Form small groups
- Discuss these questions (20 minutes)
 - Do you use a mix of CDL and non-CDL operators? Why? Why not? What is working well or not-so-well?
 - Do you use a mix of part-time and full-time operators? Why? Why not? What is working well or not-so-well?
 - What's your operator pay rate / scale and benefits package? How did you determine the pay rate and benefits? What is working well or not-so-well?
- Report out (10 minutes)

INSTRUCTOR NOTES

- [Divide attendees into small groups. Discuss the instructions.]
- [During small groups, walk around room, assess progress, ask questions, etc. Provide reminders when 10 minutes, 15 minutes, and 18 minutes have passed so they know to wrap it up after 20 minutes.]
- [Facilitate report out by going from group to group. Carefully manage report out time to ensure all groups get a chance to report out.]



Break

INSTRUCTOR NOTES

- [Give the attendees a break. Inform them of break duration and ask them to be back on time.]
- [Scheduled break is for 10 minutes.]

Operator Retention

- A key aspect of managing labor costs is managing operator turnover
- Not all turnover is bad
- Not all turnover can be avoided

Improving operator retention is often one of the most significant opportunities for more effectively managing operator labor costs.

INSTRUCTOR NOTES

- Another key aspect of managing operator labor costs is managing operator turnover (i.e., improving operator retention).
- Not all turnover is bad, and not all turnover can be avoided.
- There are many cost management benefits that can come from improving operator retention...[next slide].

Cost Impacts of Operator Turnover

Direct cost impacts of operators leaving the agency

- Remaining operators working overtime to cover open runs
- Recruitment, hiring, and training costs associated with replacing operators

INSTRUCTOR NOTES

- Operator turnover has several direct cost impacts:
 - Other operators need to work extra hours to compensate for those who have left.
 - Costs linked to hiring, recruiting, and training new operators to fill the vacancies increase.
 - Additional expenses due to the overtime required to cover the vacant work shifts.

Cost Impacts of Operator Turnover (Continued)

Indirect cost impacts of operators leaving the agency

- Lower average tenure/experience of operators potentially impacting customer service, service quality, and safety
- Weaker peer relationships among operators as a group = reduced motivation to stay with agency
- Need to maintain a larger extra board, adding cost without adding service
- Higher levels of stress experienced by operations staff (e.g., trainers, dispatchers, and supervisors)

INSTRUCTOR NOTES

- There are also several indirect cost impacts:
 - A potential decrease in the average tenure and experience of operators, which might affect customer service, service quality, and safety.
 - Weaker connections among operators as a group, could lead to reduced motivation to remain with the agency.
 - The necessity to sustain a larger extra board, incurring additional costs without necessarily enhancing services.
 - Higher stress levels experienced by operations staff such as trainers, dispatchers, and supervisors.

Strategies for Retaining Operators

- Paying higher wages
- Offering more benefits
- Offering attractive incentives and bonuses
- Offering opportunities for career advancement and personal growth
- Investing in improvements to working environment
- Conducting employee surveys, communicating the results, and acting on the results

A program of perks for operator seniority might or might not improve operator retention.

INSTRUCTOR NOTES

- There are several strategies that can help you keep the operators you have, including:
 - [Slide bullets.]
 - It's important to note that perks/bonuses that are only earned through seniority might have an undesirable impact on those operators with lower seniority—they might have the “why bother” syndrome, that is, why stay if it takes too long to get the perks or bonuses. So, be sure to think of all angles and to keep operators engaged when designing your strategies.
- Here's few more strategies...[next slide].

Strategies for Retaining Operators (Continued)

- Making agency leaders more accessible
- Improving internal communications and procedures
- Marketing your transit agency and the value of transit
- Focusing on the job's key positives (e.g., security, serving the community, etc.)
- Providing full compensation statements annually and during recruitment
- Modifying recruitment strategies
 - Recruiting the right individuals as operators
 - Providing preview of job responsibilities and challenges
 - Hiring from non-traditional applicant pools

DISCUSSION:
What strategies have you employed or think would help?

INSTRUCTOR NOTES

- [Paraphrase bullets on slide.]
- [Pause for a 5-minute class discussion using the discussion question prompt.]

Tool #4: Vehicle Operator Hiring Cost Calculator

- Excel workbook that helps you calculate the full cost of hiring a vehicle operator, including recruiting, training, and selection costs
- Available for download from Toolkit

INSTRUCTOR NOTES

[Open the Tool and show different sheets quickly.]

- Tool # 4 can be used as a Vehicle Operator Hiring Cost Calculator.
- You can download the tool from the Toolkit.



Managing Other Labor Costs

INSTRUCTOR NOTES

- This section focuses on managing labor costs for transit agency administrative and other staff like receptionists, security, revenue management (e.g., those who count and reconcile fare revenues), and similar positions.

Managing Administrative Labor Costs

- Focus: receptionists, security staff, revenue management staff, and similar positions
- Many considerations applicable to managing operator labor costs also applicable to managing costs of administrative staff
- Key differences:
 - Administrative staff may be exempt from FLSA
 - Administrative staff less likely to be unionized
 - Administrative turnover typically not as high

INSTRUCTOR NOTES

- Operators aren't the only ones that generate labor costs. There are many other positions worthy of more detailed discussion.
- However, we've chosen to focus in on administrative staff like [1st bullet].
- [2nd bullet.]
- However, when you're looking at managing the costs of administrative staff, there are some key differences [3rd bullet].

Strategies for Managing Administrative Labor Costs

- Consolidating administrative office locations
- Using paid internships
- Relying on central services (where applicable)
- Partnering to share technical and staff resources (e.g., with an MPO)
- Contracting out specific staff functions
- Continually reviewing staff responsibilities
- Leveraging technology to streamline processes
- Hiring a smaller number of more-experienced individuals rather than a larger number of less-experienced individuals

Peer comparison can provide insights into managing administrative labor costs.

INSTRUCTOR NOTES

- Here are some examples of ways you might be able to manage the labor costs of administrative staff. [Read through and summarize the bullets.]
- Also, conducting relevant peer comparisons can help you know where you stand regarding administrative cost-efficiency. You might want to calculate some staff-related metrics like the ratio of administrative costs to total costs or the ratio of administrative staff to total staff. The Urban NTD might readily support this kind of analysis, but not the Rural NTD. For rural transit agencies, peer data would have to be obtained through communication with the peer agencies.

Managing Medical and Health Benefits Costs

Strategies

- Right-sizing staffing levels; medical/health benefits are typically a fixed cost per employee and do not depend on hours worked
- Frequently going out to bid for benefits programs (though this may be disruptive to employees)
- Negotiating with providers when agency's liability is lower
- Participating in risk pools
- Implementing wellness programs
 - Can address health issues
 - Can reduce absenteeism and incidents

INSTRUCTOR NOTES

- Medical and health benefits are a major component of labor costs and are applicable to most job positions.
- There are several strategies worth exploring to help manage medical and health benefits costs [read/paraphrase slide bullets].
- TCRP Report 169 discusses bus operator health and retention in more detail.



Managing Unscheduled Overtime

INSTRUCTOR NOTES

- Another aspect of managing labor costs is managing unscheduled overtime.

Managing Unscheduled Overtime

- **Unscheduled Overtime:** Overtime that employees (typically operators and mechanics) work in addition to the hours needed to complete assigned schedules
- Typically occurs when other employees are absent or agency is short-staffed
- Not always used to actually run transit
- Excessive unscheduled overtime can adversely impact employees and service delivery
- Overtime pay rates result in higher labor costs

INSTRUCTOR NOTES

- What is unscheduled overtime? [Use slide definition in 1st bullet.]
- [Paraphrase remaining slide bullets.]
- Unscheduled overtime may be a result of ACTUAL NEED, or a lack of sufficient overtime controls, reduced workforce productivity (intentional or otherwise), or ineffective management.

Managing Unscheduled Overtime (Continued)

Two things incentivize agencies to rely on unscheduled overtime:

- Faster to assign overtime than hire new employees
- Cost of benefits paid to employees do not increase if current employees are assigned overtime, while hiring new employees would increase total benefits cost

INSTRUCTOR NOTES

- There are a few cost-related reasons why unscheduled overtime might actually make sense:
- [1st bullet.]
- [2nd bullet.]
- If unscheduled overtime is out of norm or is a problem, it's important to understand what the root cause of the overtime is and what strategies may help control it [next slide].

Strategies for Managing Unscheduled Overtime

Managing unscheduled overtime is a balancing act that requires continual monitoring.

- Monitoring unscheduled overtime by department, job type, and employee
- Training dispatchers on
 - How to determine the optimal number of backup operators
 - When to call them in and when to release them
- Scheduling mechanics when buses are available to be serviced
- Holding management accountable for unscheduled overtime
- Training management on strategies for managing productivity and the working environment
- Reducing service levels to an amount that is sustainable by the current number of employees

INSTRUCTOR NOTES

- When addressing unscheduled overtime, several strategies can be implemented: [paraphrase slide bullets].
- Remember, that managing unscheduled overtime is a balancing act. Going too strict/forceful on cutting overtime can actually cause problems like missed maintenance or cut service. Being too lax could result in decreased cost efficiency.
- If you want to manage unscheduled overtime, be sure to track it apart from scheduled overtime and monitor its usage...and try to get to the root cause of why the overtime is being used.

Prize Question

- Name three considerations in managing labor costs.



INSTRUCTOR NOTES

[Present the question on the slide. Encourage participants to actively engage in answering the questions. Potential answers include any of the subject areas included in Chapter 4, for example:

- Operator pay, incentives, and bonuses.
- CDL vs. non-CDL operators.
- Part-time vs. full-time operators.
- Operator retention.
- Medical and health benefits.
- Administrative staff.
- Unscheduled overtime.
- Etc.]

Chapter Summary

- Key takeaways
 - Labor costs are significant – typically the most significant component of transit agency operating costs
 - Operator turnover is costly
 - Managing labor costs is a balancing act; consider the long term as well as the short term
- Additional information, resources, and references provided in Chapter 4 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter.

- The key takeaways of this chapter are [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]

End of Day 1

- Any remaining questions or comments?
- Stand and deliver



INSTRUCTOR NOTES

- [Ask if there are any other questions or comments.]
- [Ask at least 3 individuals to “Stand and deliver.” This means that they should stand up and share one thing from the day’s contents that stood out to them and/or that they intend to apply in their work.]

Day 2

Day 2 Introduction



Day 2



Managing System Costs:

Operational and Capital Cost Management
at Rural and Small Urban Public Transit Systems

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

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INSTRUCTOR NOTES

[Welcome back participants and re-introduce self and workshop.]

Today's Agenda

- See schedule handout

Module/Content	Start Time	End Time	Duration
Day 2 Introduction	9:00 AM	9:15 AM	0:15
Module B: Strategies for Managing Operational Costs for All Modes (Continued)	9:15 AM	12:00 PM	2:45
Lunch	12:00 PM	1:00 PM	1:00
Module C: Managing Demand Response Costs	1:00 PM	3:50 PM	2:50
Day 2 Closeout	3:50 PM	4:00 PM	0:10

INSTRUCTOR NOTES

[Describe the workshop agenda. Point out the times for each Module, for the breaks, and for closing for the day. It is recommended that you give someone (either an attendee or a co-presenter) the responsibility for monitoring the time to help you stay on schedule.]

Review – Prize Questions!

- Name and define one of the PTN-128 transit functions.
- What is the USOA?
- What is service-based operational cost allocation?
- Name one cost-related performance measure and describe what it tells you.
- Name two strategies to help retain operators.
- What is unscheduled overtime and what are some ways to manage it?
- Describe a possible bonus or incentive program for operators.
- What are some of the disadvantages and advantages of hiring a mix of CDL and non-CDL operators?

INSTRUCTOR NOTES

- Now, let's do some review of the material yesterday.
- [Give as many of these prize questions as you see fit and have time for. Feel free to add your own. Answers to the slide's questions are below.]
- **Name one of the PTN-128 transit functions.** [Answers:
 - Operating: includes all vehicle operations expenses but excludes purchased transportation, like fuel for revenue vehicles, operator wages, scheduler wages, etc.
 - Maintenance: vehicle maintenance and facility maintenance, but excluding purchased transportation, like maintenance wages, parts and supplies for revenue vehicles.
 - Administrative: General administration like accounting, HR, marketing, etc.
 - Planning: includes market studies, transit development plans, mobility management, etc.
 - Purchased transportation: expenses for purchasing service under a contract.]
- **What is the USOA?** [Answers:
 - The transit industry standard chart of accounts—published by the FTA/NTD.]
- **What is service-based operational cost allocation?** [Answers:
 - A method to allocate operational costs to individual routes or services using service data (e.g., hours and miles).]

-
- **Name one cost-related performance measure and describe what it tells you.** [Answers:
 - Operational cost per revenue hour: Assesses financial resources needed to produce a unit of service (hour of revenue service). OR *What does the transit agency spend to put service on the street for one revenue hour?*
 - Operational cost per revenue mile: What does the transit agency spend to put service on the street for one revenue mile?
 - Passenger trips per revenue hour: How many passengers were served during an average hour of service?
 - Operational cost per passenger trip: What does it cost to provide a trip for one passenger?]
 - **Name two strategies to help retain operators.** [Answers:
 - [see slides on strategies for retaining operators]
 - **What is unscheduled overtime and what are some ways to manage it?** [Answers:
 - Definition: Overtime that employees (typically operators and mechanics) work in addition to the hours needed to complete assigned schedules.
 - Manage:
 - Monitor carefully by department, by job type, by employee.
 - Train dispatchers on cost effective techniques (e.g., extraboard management).
 - Holding management accountable, etc.
 - [see slide on strategies.]
 - **Describe a possible bonus or incentive program for operators.**
 - [Slides on incentives and bonuses.]
 - **What are some of the disadvantages and advantages of hiring a mix of CDL and non-CDL operators?**
 - [See slides on CDL vs. non-CDL.]



Chapter 5: Managing Fuel and Energy Costs

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE B 137

INSTRUCTOR NOTES

- Chapter 5 is [read chapter title].
- In general, we'll often refer to just "fuel;" however, many of the strategies apply to many different energy sources that can power vehicles, including gasoline, diesel, compressed natural gas (CNG), propane, and even electricity.

Learning Objectives

- Describe major factors impacting fuel and energy consumption and costs
- Identify which types of energy sources and fuel prices are most volatile
- Identify important performance measures to determine or compare fuel energy efficiency
- Name major bus fleet characteristics to consider when determining Total Cost of Ownership
- Describe strategies for managing gasoline and diesel costs

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- Managing energy consumption
- Managing diesel and gasoline costs
- Alternative energy options

INSTRUCTOR NOTES

Chapter 5 is divided into the following sections [read the topics].



Managing Energy Consumption

- Fuel and energy costs are significant operating budget items
- Fuel consumption is primarily a function of:
 - Number of miles driven
 - Vehicle fuel efficiency
- Managing energy consumption is done by managing
 - Miles driven
 - Vehicle fuel efficiency

The primary metric to measure is cost per (revenue) mile.

INSTRUCTOR NOTES

- Fuel and energy costs play a crucial role in the operating budget of transit agencies.
- The amount of fuel used is primarily influenced by two factors:
 - The total miles driven.
 - The fuel efficiency of the vehicles.
- Effectively managing energy consumption involves controlling both the miles driven and improving vehicle fuel efficiency.
- Ultimately your main cost management metric when looking at fuel and energy cost management is the cost per mile—typically the cost per revenue mile.

Managing Vehicle Miles Driven

- Revenue miles + deadhead miles + non-service miles
- Optimize each component

Revenue Miles	Deadhead Miles	Non-Service Miles
<ul style="list-style-type: none">• Efficient planning• Efficient scheduling• Efficient dispatching	<ul style="list-style-type: none">• Optimal siting of vehicle storage locations• Deadhead routes as direct as possible	<ul style="list-style-type: none">• Vehicles used only as needed and only for agency-related purposes• Decentralized maintenance (if cost-effective)

- No-show and late cancellation policies helpful for DR
- Audit vehicle usage periodically
- Difficult to control and lead to more miles:
 - Larger service areas
 - Lower-density areas

INSTRUCTOR NOTES

- If the miles driven by vehicles is THE KEY VARIABLE impacting fuel and energy costs, let's start by talking about the miles that vehicles drive.
- Mileage is broken into three types:
 - Revenue miles—operating vehicles in revenue service, when they're meant to pick up passengers. This is the LARGEST mileage component and the one directly impacted by service plans and schedules.
 - Deadhead miles—operating vehicles from the storage location to the first pick-up point or stop and also operating vehicles from their last stop or pick-up point back to the storage location.
 - Other non-service miles—includes things like training, maintenance testing, or traveling to maintenance facilities.
- It's important to try to optimize all three mileage types [use table to describe the types of strategies that could be used].
- Modules C and D will provide more information about mode-specific strategies for efficient planning, scheduling, and dispatching of services to help optimize both revenue and deadhead miles.
- Having strong no-show and late cancellation policies for demand response service is another key strategy for reducing wasted miles.
- You should also occasionally audit vehicle usage, especially if vehicles are not stored centrally or operators have discretion in taking vehicles home or using them for transport to lunch or breaks.
- Also, in general, there are some factors outside of your control that often lead to more miles per passenger served: [final bullets].

Managing Energy Use and Efficiency

- Vehicle energy use mainly based on vehicle-specific factors
 - Energy efficiency
 - Vehicle weight
- Also impacted by:
 - Operator behaviors and dwell time (controllable by agency)
 - Climate and topography (not controllable by agency)

INSTRUCTOR NOTES

- In addition to managing the miles of each vehicle, fuel and energy costs can be managed by managing the energy consumed for each mile, that is, how fuel-efficient your vehicles are. There are two main factors that influence the fuel-efficiency of a vehicle:
 - The vehicle's energy efficiency—how efficiently it's engine and drive system changes fuel into distance.
 - The overall weight of the vehicle.
 - We'll unpack these in the next slide.
- Vehicle fuel efficiency can also be impacted by:
 - Factors like operator behaviors and dwell time, which the agency can work to influence.
 - External elements such as climate and topography, which are beyond the agency's control.

Vehicle Efficiency

- Transit vehicles range from sedans to full-size buses
- Ideally: Fill up each vehicle with passengers
 - DR constrained by max ride time policies, so unlikely to fill larger vehicles
- Possible fuel and energy cost benefits to using smaller, lighter vehicles
 - Smaller vehicles typically more maneuverable as well
 - But fleet mix must include accessible vehicles
- Monitor vehicle fuel efficiency over time
- Vehicle maintenance program affects fuel efficiency

INSTRUCTOR NOTES

- Vehicle energy efficiency is characteristic of a specific vehicle that can be influenced by many factors. One factor is size.
- Transit vehicles come in all sorts of sizes [1st bullet].
- [2nd bullet.]
 - In other words, the most efficient system would have a larger vehicle filling up with lost of passengers and then dropping them off.
 - In DR systems, you typically can't keep riders on the vehicle very long (most policies max at 60 minutes). So, you'll never really be able to have lots of people on the same vehicle at the same time.
 - So, using smaller vehicles becomes an option.
- [3rd bullet.]
- Whatever vehicle size you use, it's important to monitor vehicle fuel efficiency over time to understand true fuel efficiency as well as spot potential problems.
- In addition to the vehicles' designed fuel efficiency, vehicle maintenance can also influence fuel efficiency including:
 - Proper tire inflation, which can improve fuel economy by 0.6% up to 3%.
 - Using recommended motor oil, which can improve fuel economy by 1% to 2%.
 - Performing regular engine maintenance and tune ups, which can improve fuel economy by an average of 4%.

Operator Behaviors

Fuel-efficient driving techniques

- Reduce excess idling
- Maintain consistent vehicle speed (at optimum level)
- Accelerate and decelerate smoothly
- Use momentum to maintain cruise speed
- Avoid filling gas tank to the very top
- Avoid riding the brakes
- Avoid hard turning

Operator training programs can improve fuel economy for a given operator.

Incentive programs for fuel-efficient driving may be useful.

INSTRUCTOR NOTES

- Now, even though vehicles have an average fuel efficiency by design, you can also influence a vehicle's fuel efficiency through operator driving behavior.
- Implementing fuel-efficient driving techniques is key to saving fuel and reducing costs.
- Techniques such as reducing unnecessary idling, maintaining a consistent and optimal vehicle speed, smooth acceleration and deceleration, and utilizing momentum to maintain cruise speed are effective.
- Additionally, avoiding overfilling the gas tank, excessive braking, and hard turns also contribute to fuel efficiency.
- To influence operator behavior, you can implement:
 - Operator training programs.
 - Incentivize fuel-efficient driving by monitoring operator-level fuel efficiency and driving behaviors and rewarding operators who exhibit efficient behaviors.

Tool #5: Fuel-Efficient Driving Checklist

- Excel workbook containing a checklist of several fuel-efficient driving behaviors. The checklist could be used during training, during ride-alongs, or as an operator self-assessment
- Available for download from Toolkit

INSTRUCTOR NOTES

- Tool # 5 can be used as a Fuel-Efficient Driving Checklist [paraphrase 1st bullet].
- You can download the tool from the Toolkit.
- [Open the Tool and show the checklist briefly.]

Energy Theft

- Focus: gasoline and diesel theft
- Occurs when agency's fuel or fueling mechanisms are used to pay for fuel used in non-transit-agency vehicles
- Put in place strategies to detect and deter
 - Electronic fuel monitoring system
 - Operator/vehicle ID required for fueling
 - Monitoring fuel efficiency for sudden changes
 - Monitoring operators' fuel efficiency for outliers
 - Surveillance systems
 - Limited number of fuelers
 - Comparing fuel dispensed vs. fuel delivered

INSTRUCTOR NOTES

- Another focus area for managing fuel and energy costs is preventing gasoline and diesel theft, which happens when an agency's fuel or fueling systems are used for non-transit-agency vehicles. Strategies to detect and deter such theft are crucial:
 - Implementing an electronic fuel monitoring system.
 - Requiring operator or vehicle identification for fueling.
 - Monitoring fuel efficiency for sudden changes.
 - Keeping an eye on operators' fuel efficiency for any unusual or extreme differences.
 - Utilizing surveillance systems.
 - Limiting the number of authorized fuelers.
 - Regularly comparing the amount of fuel dispensed versus the actual fuel delivered to detect discrepancies.

Prize Questions

- Name two operator driving behaviors that could help improve fuel efficiency.
- Name and define the three categories of vehicle miles.
- Name a strategy to help deter energy theft.



INSTRUCTOR NOTES

[Pose these prize questions as time permits. Answers are below.]

- **Name two operator driving behaviors that could help improve fuel efficiency.** [Any of the following:
 - Reduce excess idling.
 - Maintain consistent vehicle speed (at optimum level).
 - Accelerate and decelerate smoothly.
 - Use momentum to maintain cruise speed.
 - Avoid filling gas tank to the very top.
 - Avoid riding the brakes.
 - Avoid hard turning.]
- **Name and define the three categories of vehicle miles.** [Answers:
 - Revenue miles—operating vehicles in revenue service, when they're meant to pick up passengers. This is the **LARGEST** mileage component and the one directly impacted by service plans and schedules.
 - Deadhead miles—operating vehicles from the storage location to the first pick-up point or stop and also operating vehicles from their last stop or pick-up point back to the storage location.
 - Other non-service miles—includes things like training, maintenance testing, or traveling to maintenance facilities.]
- **Name a strategy to help deter energy theft.** [Answers:
 - Electronic fuel monitoring system.
 - Operator/vehicle ID required for fueling.

-
- Monitoring fuel efficiency for sudden changes.
 - Monitoring operators' fuel efficiency for outliers.
 - Surveillance systems.
 - Limited number of fuelers.
 - Comparing fuel dispensed vs. fuel delivered.]



Managing Gasoline and Diesel Costs

INSTRUCTOR NOTES

- Now we'll focus in specifically on strategies related to the most common source of vehicle energy in Texas, which is gasoline or diesel fuel.

Basics

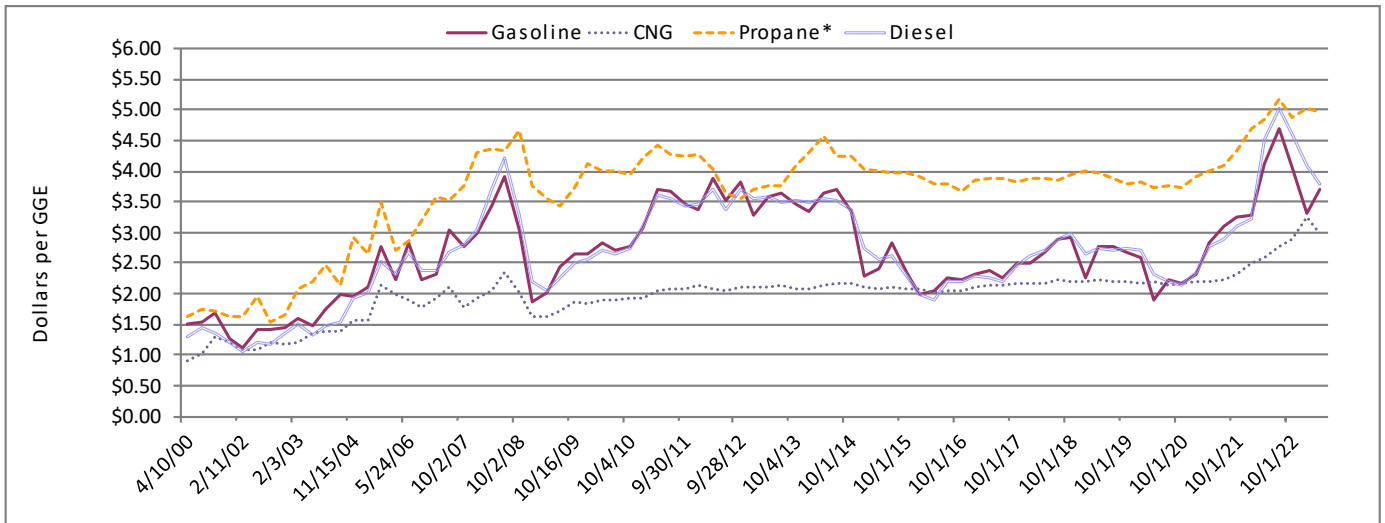
Manage two variables:

- Gallons consumed
- Unit price per gallon, which can be highly volatile (see next slide)

INSTRUCTOR NOTES

Managing gasoline and diesel costs is all about managing fuel consumption (the gallons) and managing the unit price (i.e., the price per gallon).

Fuel Price Volatility



GGE = gasoline gallon equivalent.

* Propane prices reflect the weighted average of “primary” and “secondary” stations. Primary stations have dedicated vehicle fleets and tend to be less expensive. Secondary stations are priced for the tanks and bottles market and tend to be more expensive.

INSTRUCTOR NOTES

- This figure indicates the unit prices for Gasoline, CNG, propane, and Diesel from 2000 to 2022. As you can see the unit prices of all the fuels can be quite volatile—especially Gasoline and Diesel.
- This volatility can make it difficult to plan and budget for fuel but also to effectively manage gasoline and diesel costs.

Managing Gasoline and Diesel Costs

- Work to control unit price volatility
- Be prepared for unit price volatility (use historical data or price projections)
- Typical fueling options:
 - Non-dedicated fueling facilities (shared, might be public)
 - Dedicated fueling facilities (on-site)
 - Delivery service (third-party fueling on site)

INSTRUCTOR NOTES

- Transit agencies need to anticipate and manage potential price fluctuations by leveraging historical data or employing price projections to prepare for changes in fuel costs.
- In terms of fueling options, agencies generally consider three main choices:
 - Non-dedicated fueling facilities.
 - Dedicated fueling facilities.
 - Delivery services.
- Let's unpack these options. [Next slide.]

Non-Dedicated Fueling Facilities

- May be more practical where demand is low and/or service area is large
- Facility types
 - Retail gas stations
 - Agreements with entities that have dedicated fueling facilities
- Fuel card program can be beneficial
 - Discount on market price (might be tax-exempt)
 - Easier fuel administration
 - Customizable (e.g., can limit hours of use)
 - Must train operators on how to use
 - Could also be a backup fuel payment option (if have dedicated facilities)

INSTRUCTOR NOTES

- When demand is low, or the service area is extensive, non-dedicated fueling facilities can be more practical for transit agencies. These facilities can include various types:
 - Retail gas stations: Open to the public, these stations may serve as fueling points for transit vehicles.
 - Agreements with entities that have dedicated fueling facilities: Arrangements with other organizations allow access to their dedicated fueling stations.
- Fuel card programs, when a transit agency uses a single vendor's credit card for fuel purchases at retail gas stations, can offer advantages such as discounts on market prices, potential tax exemptions, simpler fuel administration, and customization options (like limiting hours of use).

Dedicated Fueling Facilities

- More common for urban services, in denser areas, when utilizing alternative fuels, and/or when operate fixed routes and ADA paratransit
- Offers increased control over unit prices via competitive procurements for fueling vendors and ability to purchase in bulk
- Agency must build, maintain, and operate
- Disadvantages include spillage, cost of building/maintaining/operating site and tank, and risk of energy theft

INSTRUCTOR NOTES

- Dedicated fueling facilities (i.e., when a transit agency uses a centralized fueling station it owns) are more commonly adopted in urban settings, particularly in denser areas, especially when utilizing alternative fuels or operating fixed routes and ADA paratransit services, on-site fueling facilities offer several advantages.
- They provide greater control over fuel costs by enabling competitive procurements for fuel vendors and bulk purchasing opportunities.
- However, agencies opting for on-site fueling need to manage the construction, upkeep, and operation of these facilities.
- Disadvantages include potential spillage, the expenses involved in building and maintaining the site and tanks, as well as the risk of energy theft.



Alternative Energy Options

INSTRUCTOR NOTES

- A full discussion of using alternative energy options is beyond the scope of this workshop; however, we'll spend a little time thinking through the cost management implications of energy options outside of gasoline and diesel.

Alternative Energy Options

The U.S. Dept. of Energy's Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool (<https://afleet.es.anl.gov/home>) provides a spreadsheet to estimate TCO

- More options than gasoline and diesel
- To be considered in fleet decision-making
- Evaluate options using total cost of ownership (TCO), including fuel and capital costs

Example Total Cost of Ownership Estimates

Heavy-Duty Bus + Infrastructure	Diesel	Battery Electric Bus	CNG
TCO Single HD Bus 15,000 miles per year	\$937,812	\$1,248,569	\$921,660
TCO Single HD Bus 25,000 miles per year	\$1,173,041	\$1,340,276	\$1,146,122
TCO Single HD Bus 45,000 miles per year	\$1,643,499	\$1,523,691	\$1,595,045

INSTRUCTOR NOTES

- Beyond the conventional choices of gasoline and diesel, there exists a range of alternative fuel options for fleets, which should be carefully considered in the decision-making process.
- To evaluate these alternatives, it's important to use a comprehensive assessment method known as total cost of ownership (TCO).
- The TCO includes both the operational AND capital cost of a vehicle, including the vehicle itself and the infrastructure needed to fuel it.
- There are free tools available to help you calculate the TCO of different types of vehicles. One option is called the AFLEET tool (the link is on the slide).
- The table on the slide shows example outputs from the tool.
- The example shows the TCO for a single vehicle (a heavy-duty bus) but for three different energy sources, including diesel, battery electric, and CNG.
- As you can see from the table, which energy option is more cost-effective actually depends on how much you use the vehicle. For low use (the 15,000 mile per year option), both diesel and CNG are comparable while electric is much more expensive. However, for heavy use (the 45,000 miles per year option), diesel becomes more expensive than the other two options.
- The tool is not perfect and doesn't necessarily weigh in grant funding opportunities that may be favoring electric buses right now; however, from a cost perspective, it can be helpful for evaluating different options.

Zero-Emission Buses (ZEBs)

- *TCRP's Guidebook for Deploying Zero-Emission Transit Buses*, published in 2021
- Supports decision-making and emphasizes importance of building and maintaining relationships with technology providers, utility companies, fuel suppliers, contractors, etc.

INSTRUCTOR NOTES

- The Transit Cooperative Research Program's (TCRP) Guidebook for Deploying Zero-Emission Transit Buses, released in 2021, is a valuable resource supporting decision-making regarding zero-emission buses.
- The guidebook is a valuable resource for decision making.
- The guidebook stresses the significance of establishing and nurturing relationships with various stakeholders, such as technology providers, utility companies, fuel suppliers, contractors, and others involved in the deployment of these advanced transit technologies.

ZEB Deployment Considerations

- Cost and uncertainty
- Workforce (operators, mechanics, schedulers, etc.)
- Route and service planning
- Infrastructure right-sizing
- Fleet and route analysis: right-sizing batteries and charging
- Charging infrastructure and energy strategy
- Working with energy provider

INSTRUCTOR NOTES

- When considering the transition to ZEBs, various critical elements come into play:
 - Obviously the cost of ZEBs is a significant factor—whether it’s the cost of the vehicles themselves or the cost of the energy infrastructure.
 - And there is significant uncertainty about the short- and long-term costs and performance of ZEBs—especially battery electric buses.
- Other considerations include:
 - Supporting and training the workforce to support ZEB operations—covering roles like operators, mechanics, and schedulers.
 - The intricacies of route and service planning and understanding how ZEB deployment impacts routes, service planning, and scheduling.
 - Right-sizing infrastructure, which is essential for effectively accommodating ZEBs. This involves having the right amount and size of refueling or recharging stations.
 - An integral part of this involves fleet and route analysis, particularly in terms of appropriately sizing batteries and understanding charging requirements for battery-electric buses.
 - For battery electric buses, charging becomes a key cost management issue. This includes the complexities of working with energy providers and avoiding peak demand costs.

Exercise B-2: Small Group Breakout – Fuel and Energy

- Form small groups
- Discuss (20 minutes):
 - What fuel and energy types do you use?
 - What, if any, strategies discussed today have you employed already? How did they work?
 - What, if any, strategies discussed today would you like to implement or increase?
 - What other strategies for managing fuel and energy costs would you like to share?
- Report out (10 minutes)

INSTRUCTOR NOTES

- [Divide attendees into small groups. Discuss the instructions.]
- [During small groups, walk around room, assess progress, ask questions, etc. Provide reminders when 10 minutes, 15 minutes, and 18 minutes have passed so they know to wrap it up after 20 minutes.]
- [Facilitate report out by going from group to group. Carefully manage report out time to ensure all groups get a chance to report out.]

Chapter Summary

- Key takeaways
 - Fuel is one of the highest transit agency cost drivers
 - Fuel prices can be extremely volatile
 - Key fuel and energy cost management strategy is managing miles driven
 - Vehicle fuel efficiency can be improved with:
 - Smaller vehicles
 - Regular vehicle maintenance
 - Operator training
 - Energy theft is a risk to be proactively managed

INSTRUCTOR NOTES

Now, let's summarize this chapter.

- The key takeaways of this chapter are [read the key takeaways]...[next slide].

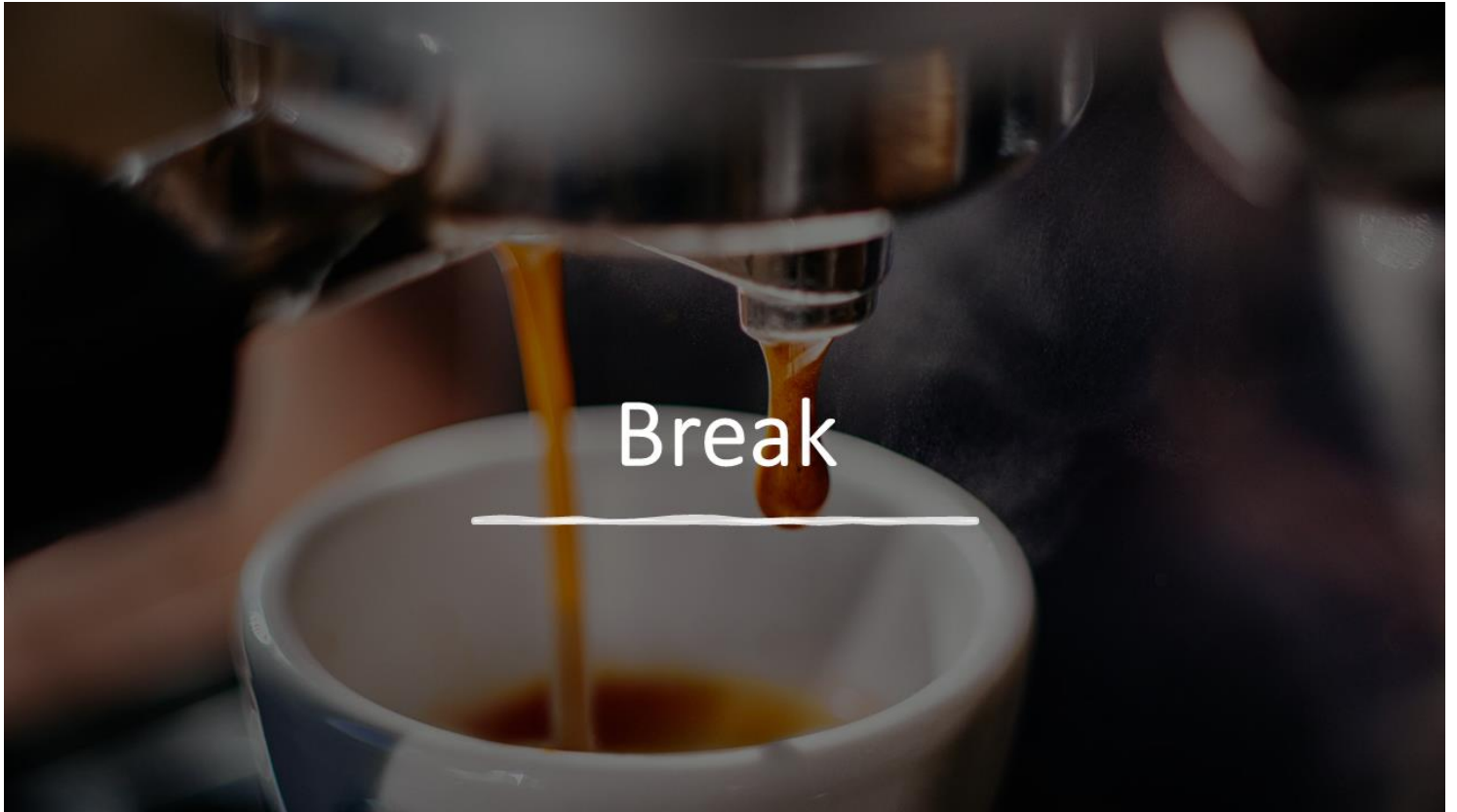
Summary

Continued

- Fuel card programs can manage costs when using non-dedicated fueling facilities
- Evaluating alternative energy options should include the total cost of ownership
- Deploying ZEBs requires careful planning, analysis, workforce training, and ongoing monitoring
- Additional information, resources, and references provided in Chapter 5 in the Guidebook
- Questions and discussion?

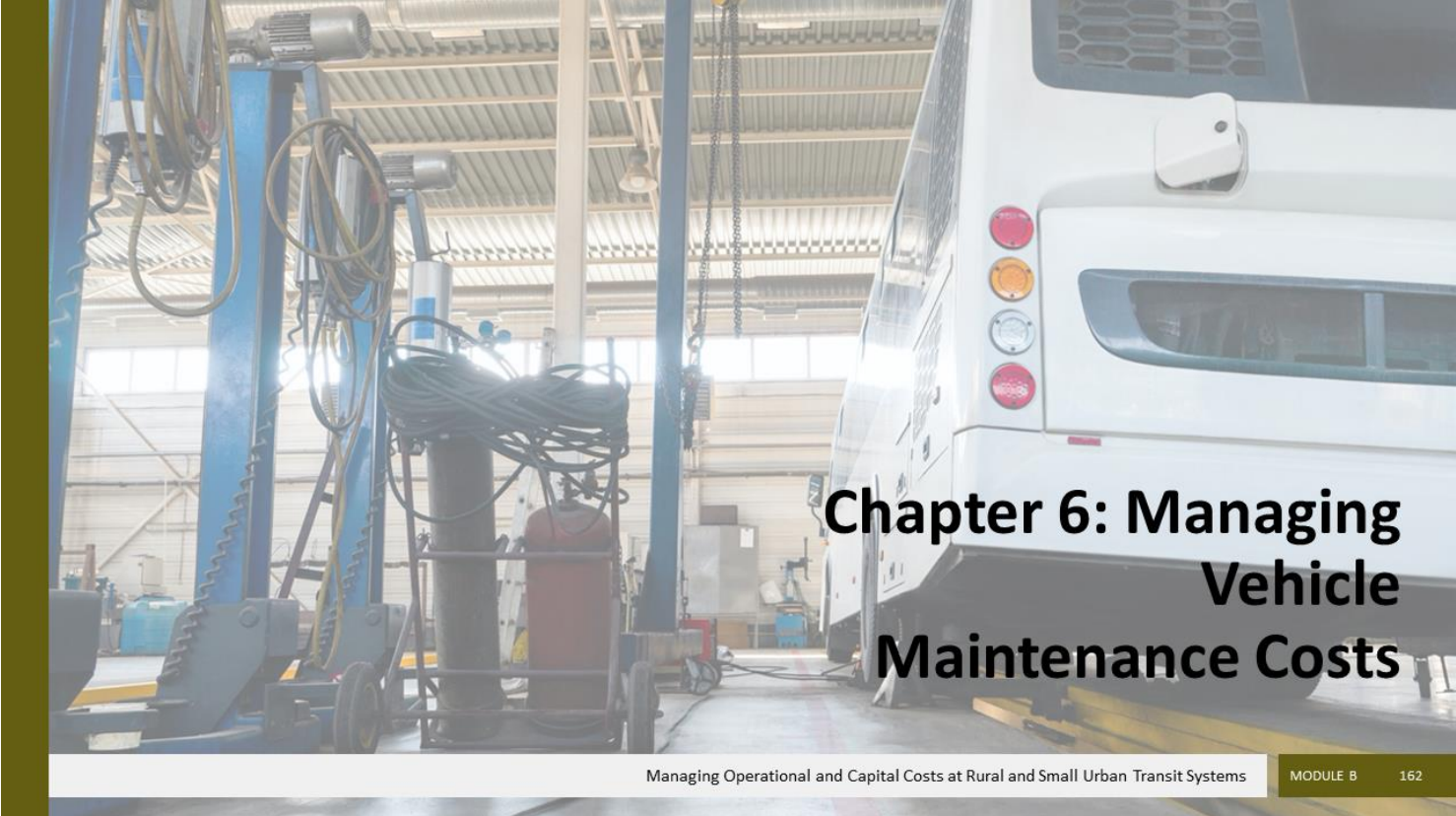
INSTRUCTOR NOTES

- [Continue listing/paraphrasing key takeaways.]
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]



INSTRUCTOR NOTES

- [Give the attendees a short break. Inform them of the length of the break and encourage them to return on time.]
- [Break is scheduled for 10 minutes.]



Chapter 6: Managing Vehicle Maintenance Costs

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE B 162

INSTRUCTOR NOTES

- Chapter 6 focuses on [read chapter title].
- Although this chapter is written mainly for transit agencies that directly maintain their vehicles, transit agencies that outsource maintenance may also benefit from a few of the chapter's strategies.

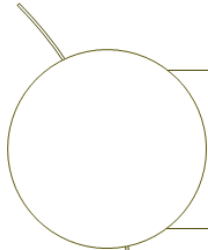
Learning Objectives

- Identify factors that influence vehicle maintenance costs
- List and describe maintenance cost reduction strategies
- Describe potential pros and cons of outsourcing some or all maintenance functions
- Identify vehicle maintenance performance measures and vehicle data management systems

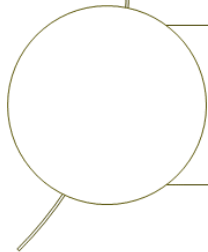
INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics



Reducing maintenance demand



Other strategies
(e.g., parts, labor, outsourcing)

INSTRUCTOR NOTES

Chapter 6 is divided into the following sections [read the topics].



Reducing Maintenance Demand

INSTRUCTOR NOTES

- Let's first focus on strategies for reducing maintenance demand.

Reducing Maintenance Demand

- Reducing maintenance demand can reduce maintenance costs
 - Reduce maintenance demand by optimizing miles driven
 - Miles driven is a direct predictor of amount of maintenance needed
- Other strategies:
 - Robust preventative maintenance practices
 - Consistent fleet replacement
 - Balancing mileage across the fleet
 - Optimizing fleet size

INSTRUCTOR NOTES

- Reducing maintenance demand can be a game-changer in cutting down maintenance costs for transportation systems.
- It's simple: when vehicles cover fewer miles, they typically need less maintenance.
- We'll also discuss four other strategies for managing maintenance costs, including:
 - Preventive maintenance.
 - Consistently replacement your fleet.
 - Balancing mileage across vehicles.
 - Optimizing the fleet's size.

Tool #6: Maintenance Self-Assessment

- Excel workbook containing a checklist to help evaluate your maintenance management
- Available for download from Toolkit

INSTRUCTOR NOTES

- Before we get into the strategies, let's take a quick look at Tool # 6, which is a Maintenance Self-Assessment.
- You can download the tool from the Toolkit.
- [Open the tool and show what it contains/how to use it.]

Preventive Maintenance Practices

- Minimize malfunctions with systematic, regularly scheduled maintenance procedures
 - Less costly than corrective maintenance
 - Less costly than road calls
- Tailor procedures to specific vehicle types
- Use a system to ensure timely preventive maintenance
- Track on-time preventive maintenance as a performance measure
- Program should be adaptable to new vehicle types and changes in operating conditions

INSTRUCTOR NOTES

- Let's start by talking about preventive maintenance.
- [Summarize the slide content using the bullets.]

Preventive Maintenance Practice Considerations

Consideration	Benefits
Establish all the service intervals as multiples of a common denominator.	<ul style="list-style-type: none">• Minimizes vehicle downtime by minimizing the number of times the vehicle has to go in for maintenance.• Improves work and labor efficiency.
Consider seasonal/environmental conditions that can impact maintenance and service intervals.	<ul style="list-style-type: none">• Optimizes vehicle performance by adapting standard maintenance practices to environmental factors.
Include a regular schedule for washing and cleaning your vehicles.	<ul style="list-style-type: none">• Improves public appearance of vehicles (and, thereby, your agency's public image).• Prevents acceleration of standard vehicular degeneration (e.g., rust).

INSTRUCTOR NOTES

- This table shows some additional considerations for designing your preventive maintenance program.
- [Describe/summarize the concepts in the table.]

Predictive Maintenance

- Look for patterns of problems in vehicles of same type (e.g., same year, manufacturer)
- If problem exists in one vehicle, likely may exist or be developing in other similar vehicles
- Repair or replace before problem becomes major repair or road call

INSTRUCTOR NOTES

- Another aspect of preventive maintenance is predictive maintenance. In predictive maintenance, you check for patterns or recurring issues in vehicles of the same kind (e.g., same year, make).
- If one vehicle has a problem, it might be happening or starting in similar vehicles. Fix the issue or replace the part before it becomes a major issue or causes a breakdown.

Consistent Fleet Replacement

- Helps maintain a low fleet age
- Avoids peaks and valleys in vehicle procurement
- Levels peaks in maintenance demand
- Fleet replacement plan
 - Provides annual targets for retirement/replacement
 - Identifies targets for overall fleet growth
- Replacement of a given vehicle type depends on manufacturer, state/federal guidelines, and local operating environment
 - A vehicle's Useful Life Benchmark (ULB) is the target of years and/or miles at which to replace a vehicle
- FTA State of Good Repair and minimum service life

The best way to have consistent fleet replacement is to develop and follow a fleet replacement plan

INSTRUCTOR NOTES

- Another strategy for managing maintenance costs is regularly replacing vehicles in your fleet.
- This:
 - Keeps the average fleet age low.
 - Prevents sudden spikes and drops in getting new vehicles.
 - Smooths out high and low demands for maintenance.
- To help with consistent fleet replacement, it's best to establish and follow a fleet replacement plan, which:
 - Sets yearly goals for retiring and replacing vehicles.
 - Determines objectives for expanding (or even shrinking) the entire fleet.
- When to target vehicle replacements is a function of the individual vehicle type, manufacturer guidelines, your local operating environment, and other factors.
- You also have to adhere to FTA's minimum service life requirements and your agency's Transit Asset Management plan (these concepts are discussed more in Module E).

Balancing Mileage across the Fleet

- Ideally: It is best to have a fleet age proportionally across the fleet
 - Vehicles' miles accrued are in line with their age
 - No individual vehicles are accruing a disproportionate number of miles
- Goal: Ensure that vehicles do not reach one useful life milestone (e.g., miles) far before reaching the other (e.g., age)
- Exceptions: Some agencies may have policies that dictate specific usage (e.g., using newer vehicles on longer-distance trips)

INSTRUCTOR NOTES

- Another strategy for managing vehicle maintenance costs is Balancing Mileage Across the Fleet.
- [Follow slide content.]

Imbalances in Vehicle Mileage

ID	Type	In-Service Year	Age in Years	Odometer Miles	ULB Years	ULB Miles	% to ULB Age	% to ULB Miles
1	Light-Duty Van	2018	5	50,000	6	150,000	83%	33%
2	Light-Duty Van	2020	3	100,000	6	150,000	50%	67%
3	Light-Duty Van	2022	1	10,000	6	150,000	17%	7%
4	Heavy-Duty Small Bus	2019	4	125,000	12	420,000	33%	30%
5	Heavy-Duty Small Bus	2019	4	125,000	12	420,000	33%	30%

ULB = Useful Life Benchmark

INSTRUCTOR NOTES

- This table shows an example of imbalances in vehicle mileage.
- If you look at the three light-duty vans, you can see that the oldest van (ID 1) is 83 percent through its ULB in terms of age (it's five years old out of a ULB of six years) but is only 33 percent through its ULB in terms of miles.
- The van purchased in 2020 (ID 2) has the opposite problem—it is accruing mileage faster than its age—and the newest van is not getting enough miles.
- On the other hand, the transit agency is doing a good job balancing miles on its two heavy-duty buses (IDs 4 and 5); both buses are about one-third through their useful lives in terms of age and mileage.
- Again, this is just an example... an agency's operational environment might dictate different vehicle usage guidelines—ultimately in the end, the goal is still to maximize the amount of use you get out of a vehicle over its lifetime.

Optimizing Fleet Size

- Scheduled service and passenger demand largely dictate number of active vehicles needed to deliver peak service
- Agencies can:
 - Implement strategies to optimize the amount of service provided
 - Control the spare ratio (recommended 10-20% but depends on fleet size)
- Discussed further in other modules (especially Module E)

INSTRUCTOR NOTES

- Another factor that drives vehicle maintenance demand and cost is the number of vehicles in the fleet.
- Therefore, having the optimal fleet size is not only a strategy for controlling capital costs but also for controlling maintenance costs.
- How many vehicles are needed in your fleet is mainly determined by scheduled service and passenger demand.
- The fleet size is mainly a function of the peak vehicle requirement (i.e., the number of vehicles needed to meet peak service demand).
- Transit agencies should continuously work on improving service efficiency by using planning, scheduling, and dispatching methods, alongside service policies to control costs.
- You also need vehicles set aside as spares over and above your peak requirement so you can do maintenance, handle unanticipated demands, do operator training, etc.
- Generally speaking, the goal for your fleet should be to have just enough vehicles to meet peak demand plus have some as spares—but not too many.
- We'll discuss this more in other modules, especially Module E on capital costs.

Prize Questions

- Describe how consistent fleet replacement can help manage maintenance costs.
- Why is it important to balance mileage across your fleet?
- What are some considerations for an effective preventive maintenance program?



INSTRUCTOR NOTES

- [Ask the questions as time allows. Desired answers below.]
- **Describe how consistent fleet replacement can help manage maintenance costs.** [Answers:
 - Keeps fleet age lower (older vehicles tend to have higher maintenance costs).
 - Reduces peak costs associated with getting a bunch of new vehicles or retiring a bunch of vehicles at the same time.
 - Helps flatten maintenance demand (no peak demand).]
- **Why is it important to balance mileage across your fleet?** [Answers:
 - Helps you get the most out of your assets over their lifespan.
 - Helps flatten maintenance demand over a vehicle life.]
- **What are some considerations for an effective preventive maintenance program?** [Answers:
 - Should be regular and systematic.
 - Should be documented.
 - Should be monitored and on-time maintenance measured.
 - Take into account different vehicle types, manufacturer recommendations, and local operating conditions.
 - Try to schedule preventive maintenance activities in multiples of the lowest trigger (e.g., multiples of 5,000 miles).
 - More on other slides.]



Other Strategies

- Parts cost efficiency
- Maintenance labor hour efficiency
- Outsourced maintenance

INSTRUCTOR NOTES

There are other strategies that can be employed to manage vehicle maintenance costs [read the bullet points].

Improving Parts Cost Efficiency

- Commonly replaced parts are those that wear out with regular use (e.g., tires, brakes, fuses, and transmissions)
- **Parts cost efficiency** is miles driven per dollar spent on parts
- Can be increased by:
 - Having robust preventive maintenance practices
 - Carefully choosing parts and parts suppliers
 - Tracking and leveraging parts warranties
- Typically a tradeoff between part cost and part longevity
- Careful record-keeping is important
- Possible to conduct parts tests
- Evaluate cost-effectiveness of tire leasing programs
- Other strategies in Chapter 6 of the Guidebook

INSTRUCTOR NOTES

- Parts cost-efficiency measures how many miles you get for each dollar spent on parts.
- Parts cost-efficiency matters most for replaced that wear out with use and are typically needing replacement such as tires, brakes, fuses, hoses, belts, and even more significant components like batteries, starters, alternators, and even transmissions, etc.
- To improve parts cost-efficiency there are several strategies, including:
 - Robust preventive maintenance practices.
 - Carefully choosing parts and parts suppliers.
 - Tracking and leveraging parts warranties.
- Typically, there is a tradeoff between a part's cost and its longevity—the more expensive the part, the longer it usually lasts (assuming the price is a function of quality).
- To really do a good job of improving parts cost efficiency, you need careful record keeping to help you know how well a given part from a given manufacturer or supplier is working.
- It's also possible to design parts tests to collect data on a part's performance.
- Another option in this area is to look at leasing programs, for example tire leasing, which some agencies have found to be a cost-effective approach to managing tire costs.
- There are other strategies available in Chapter 6 of the Guidebook.

Improving Maintenance Labor Hour Efficiency

- Labor hour efficiency = getting the most maintenance benefit for every hour of maintenance
- Challenge: Knowing you have the right number of mechanics
- Strategies and a tool in Chapter 6 of the Guidebook

INSTRUCTOR NOTES

- Labor hour efficiency means getting the most maintenance benefit for every hour spent on maintenance work.
- One key challenge is knowing if you've got the right number of mechanics [next slide.]

Tool #7: Mechanic Staffing Calculator

- Excel workbook that helps you calculate the necessary number of maintenance staff, given your fleet's maintenance requirements and the number of hours available for maintenance work
- Available for download from Toolkit

INSTRUCTOR NOTES

- Tool # 7 can be used to help you calculate the number of mechanics you need given your fleet's maintenance demand and also mechanic availability.
- You can download the tool from the Toolkit.
- [Open the Tool and show different sheets quickly to help demonstrate how it works.]

Using Outsourced Maintenance

- Common practice for managing costs
 - Major repairs (e.g., engine overhauls, bodywork, and HVAC work)
 - Some agencies may not have sufficient specialized expertise
 - Should consider vehicle transport costs
- Can also work with nearby agencies/governments able to perform needed repairs
- If maintenance is contracted, be sure to monitor the contractor for efficiency and effectiveness
- Best value consideration includes getting quotes or bids

INSTRUCTOR NOTES

- Another potential cost management strategy for maintenance costs is outsourcing some or all of the maintenance function.
- This could involve outsourcing major or specialty repairs like engine and transmission overhauls, bodywork, and HVAC maintenance.
- Outsourcing might be a practical approach, especially in rural areas or places lacking specialized repair expertise.
- When considering outsourcing, it's important to factor in the costs associated with transporting the vehicles, if applicable.
- The maintenance work, even if outsourced, must be monitored and regularly checked to ensure the contractor is doing the work to your satisfaction.
- Getting bids or quotes for service or for specific large jobs could help you keep down the cost of outsourced maintenance.

Prize Questions

- Name and describe a strategy for managing parts costs.
- Why might a transit agency want to outsource some maintenance?
- Name one or more considerations when outsourcing maintenance.

INSTRUCTOR NOTES

- [Ask questions as time allows. Answers can be found below.]
- **Name and describe a strategy for managing parts costs.** [Answers:
 - Having robust preventive maintenance practices.
 - Carefully choosing parts and parts suppliers.
 - Tracking and leveraging parts warranties.]
- **Why might a transit agency want to outsource some maintenance?** [Answers:
 - Common practice for managing costs.
 - Major repairs (e.g., engine overhauls, bodywork, and HVAC work).
 - Some agencies may not have sufficient specialized expertise.]
- **Name one or more considerations when outsourcing maintenance.** [Answers:
 - Should consider vehicle transport costs.
 - Can also work with nearby agencies/governments able to perform needed repairs.
 - If maintenance is contracted, be sure to monitor the contractor for efficiency and effectiveness.
 - Best value consideration includes getting quotes or bids.]

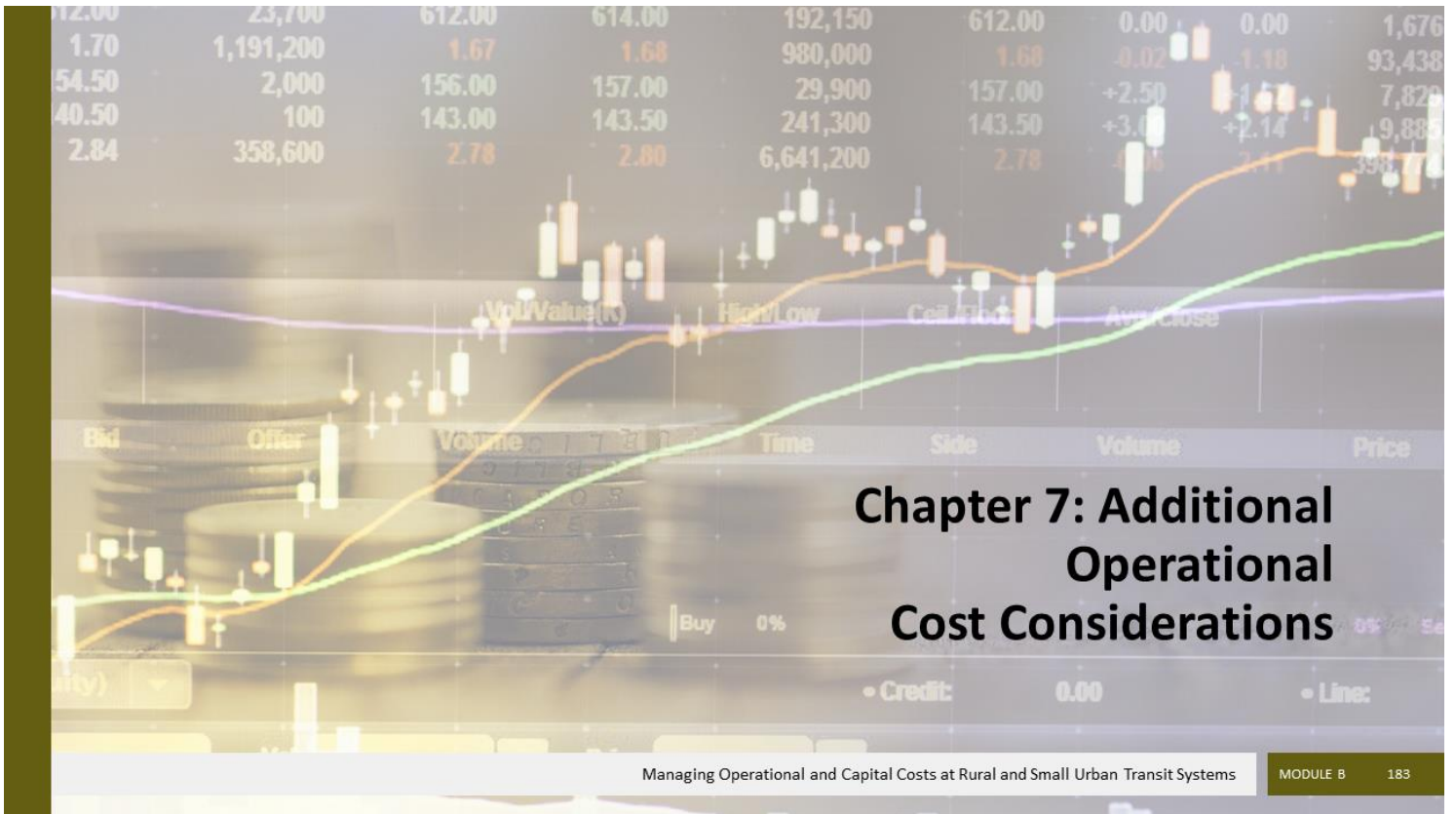
Chapter Summary

- Key takeaways
 - Track and evaluate fleet and maintenance performance measures
 - Conduct pre- and post-trip vehicle inspections
 - Have a robust, standardized preventive maintenance program
 - Have a vehicle replacement plan
 - Keep vehicle miles in line with vehicle age
 - Maintain a target spare ratio
 - Maintain detailed records of parts and parts use
 - Maximize maintenance performed for every hour of maintenance labor paid
 - Outsourcing maintenance can improve cost-effectiveness
- Additional information, resources, and references provided in Chapter 6 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]



INSTRUCTOR NOTES

- Chapter 7 is [read chapter title].
- This chapter discusses selected operational cost management topics that were important to rural and small urban transit agencies but don't really fit well under the labor, fuel, and maintenance cost management chapters.
- Some topics might have limited applicability to transit agencies but can have value as part of an agency-wide commitment to the management of operational costs.

Learning Objectives

- Describe how managing property and casualty insurance impacts costs
- Explain potential cost management benefits of volunteer drivers
- Explain potential cost management benefits of in-kind or contributed services
- Describe factors in a robust fare collection process and its costs

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- Insurance
- Volunteer driver programs
- In-kind contributions
- Fare collection

INSTRUCTOR NOTES

Chapter 7 is divided into the following sections [read the topics].



Managing Insurance Costs

INSTRUCTOR NOTES

- This section discusses managing the costs of various types of insurance coverage carried by transit agencies.

Managing Insurance Costs

- Insurance coverage carried by transit agencies can include Worker's Compensation, general liability, automobile, errors and omissions, property, and cyber events
 - Requirements might be different for agencies and contractors
 - Costs might be split between agencies that share resources
- Agencies concerned for years about rising costs of insurance
- Important to consult with legal professionals regarding requirements and risks

Managing insurance costs means managing risk.

INSTRUCTOR NOTES

- Insurance coverage can include worker's compensation, general liability, automobile, errors and omission, property, and cyber events coverage (e.g., for data breaches).
- Insurance requirements might be different for transit agencies (which are generally considered to be units of local government) and for their contractors.
- Insurance costs continue to be a cost management concern for many agencies, and this workshop is by no means the final say in how to manage insurance costs wisely or given your local situation. We definitely recommend you talk with professionals in this area.
- But, a key takeaway that we've learned from talking to insurance providers is that it's all about RISK—to help manage insurance costs, manage down your risk.

Strategies for Managing Insurance Costs

- Consistent participation in risk management/safety training
- Comprehensive understanding of risks
- Education of insurance providers on agency policies and procedures
- Continual collaboration with insurance providers to identify ways to lower risk and premiums
- Coordination with other public agencies in the region to share approaches, learn, and establish consistent insurance requirements across the region

INSTRUCTOR NOTES

Here are some strategies for managing insurance costs:

- [1st bullet]—This includes training for administrative and operations staff as well as specifically for operators.
- [2nd bullet]—Understand your agency's risks (and work to mitigate them).
- [3rd bullet]—Educating insurance providers about your agency's policies and procedures—particularly your efforts at reducing risk and increasing safety.
- [4th bullet]—If you're proactive in working with insurance providers to learn what you can do to lower premiums and also to share what you are doing, you're better off!
- [5th bullet]—Learning what others have done can help!

Strategies for Managing Insurance Costs (*Continued*)

- Participation in risk pools
- Regular bid process (e.g., every 3-5 years) for better rates
 - Going out to bid too frequently may be counter-productive
- Contracting for service (risks shifted to contractor)

Risk management and safety training for transit agencies on diverse topics and in diverse formats is often available through entities like APTA, CTAA, National RTAP, the National Safety Council, and NTI.

INSTRUCTOR NOTES

- Joining risk pools like the Texas municipal league or others could help give you better insurance deals.
- Regular bidding every 3–5 years for improved rates (however, don't go out to bid too often—this could drive up your rates).
- Using service contracts to shift risks to contractors.
- Risk management and safety is often something that needs to be learned, and there is training available from industry organizations.



Volunteer Driver Programs

INSTRUCTOR NOTES

- This practice is more common in highly rural or frontier areas and often for very specific groups like serving veterans, seniors, etc.

Volunteer Drivers

- Volunteer drivers = individuals who donate their time to operate vehicles that provide public transportation service
- Might also provide critical passenger assistance and positive socialization experiences
- May or may not be owner of vehicle used
- Programs emerged from the need to provide transportation service for seniors
- Modern volunteer driver programs serve other ridership markets as well

INSTRUCTOR NOTES

Volunteer drivers are:

- People who freely offer their time to drive vehicles for public transportation service.
- They may also offer essential help to passengers and create positive social experiences.
- They might or might not own the vehicle they use.
- These programs initially started to assist seniors with transportation needs.
- Today, these programs also cater to various other groups of riders.

Volunteer Drivers (Continued)

See CTAA National Volunteer Transportation Center:
<https://ctaa.org/national-volunteer-transportation-center/>

- Effects on operating costs
 - Volunteer labor can be used as local match +
 - Volunteer drivers can be used in place of paid drivers +
 - Programs dependent on the schedule of volunteers + or --
 - Typically recruited, trained, and scheduled by sponsoring agency +
 - Additional insurance coverage might be required of the transit agency or the volunteer drivers --
- Key to success is recruiting enough volunteers

Volunteer drivers are not necessarily “free.” While some participate without reimbursement, some might receive mileage reimbursement or log trips or travel time that they can apply to their own use of transit.

INSTRUCTOR NOTES

- There are both positives and negatives with volunteer driver programs.
- [read bullet points and explain the impacts].
- It's important to remember that, just because drivers are volunteering, there may still be costs or reimbursements to them.
- Also, if you want more information on setting up or managing a volunteer driver program, check out the CTAA's National Volunteer Transportation Center website.



In-Kind and Contributed Services

INSTRUCTOR NOTES

- Let's move on to talking about in-kind and contributed services [next slide].

In-Kind and Contributed Services

- Items and services donated or lent to transit agency by other parties
 - Labor contributions (e.g., skilled laborers)
 - Donated office space
 - Donated land and buildings
 - Equipment
 - Goods and services
 - Indirect costs
 - Travel expenses
- Not cash contributions, but have cash value

INSTRUCTOR NOTES

- In-Kind and Contributed services are [read 1st bullet].
- For example, [read/summarize 2nd-level bullets].
- These items or services are not cash contributions, but they DO HAVE A VALUE.

In-Kind and Contributed Services (Continued)

- Often represent operational costs that agency would otherwise bear (e.g., leasing of office space)
- Can make up a shortfall in local match or allow agency to qualify for higher level of grant funding
- To be eligible as local match, in-kind and contributed services must be “integral and necessary”
- In-kind and contributed services must be documented as sources of match *in the grant application*

Consult your FTA and/or TxDOT representative if you're thinking of using in-kind and contributed services, especially as match.

Agencies interested in using in-kind and contributed services for local match should analyze the effort (e.g., staff hours) required to track, get approval for, and claim contributed services and compare it to the expected local match benefit.

INSTRUCTOR NOTES

In-Kind and Contributed Services:

- Cover costs the agency would typically have to pay for, like leasing office space, or some sort of professional service.
- They can help fulfill a funding gap or enable the agency to access more significant grant funding, because in-kind and contributed services count as a source of revenue that is typically eligible as match; however,
- To count as local match, these services must be integral and necessary for the operation of public transit.
 - You can't count as local match an in-kind service that has nothing to do with providing transit.
- Also, you must record anticipated in-kind and contributed services in your grant application as part of the matching funds.
- Because you do have to provide a justification and value for any in-kind and contributed service for it to be used as match, it may actually cost you money to value it. This is especially the case for real estate.
- Be sure to consult your FTA and/or TxDOT representative if you're thinking of using in-kind and contributed services, especially as match to your FTA grants.



Fare Collection

INSTRUCTOR NOTES

Now, let's take a look at managing costs of fare collection.

Fare Collection Costs

- Typically include:
 - Acquisition of fareboxes or other fare collection equipment
 - Production of fare media
 - Enforcement of fare payment
 - Securement of fares on board vehicles and at facilities
 - Counting and reconciliation of collected fares
 - Audit of fare revenues to eliminate fraud
- Fare collection costs can be significant

Fare collection processes should be well understood by transit agency staff, fare revenues should be carefully tracked, and procedures should be in place to reduce fraud.

INSTRUCTOR NOTES

Fare Collection usually involves any cost generators, including:

- Getting fare machines or other fare collection tools (and maintaining them).
- Making fare tickets or cards.
- Checking that passengers pay their fares.
- Safely storing fares on vehicles and at stations.
- Counting and balancing collected fares.
- Checking fare income to prevent fraud.
- Fare collection costs can be quite substantial.
- Overall, it's important to fully understand fare collection process—especially the full cost of collecting fares.

Fare Collection Costs (Continued)

Other impacts on operational costs:

- Time operators spend on fare collection-related activities is time not spent keeping service on schedule or performing other duties
- Dwell times might be significantly increased by fare collection-related activities and agency might need to add a vehicle to service
- Maintenance staff are responsible for maintaining fare collection equipment
- Planners responsible for developing, implementing, and administering fare structures and fare programs; changes to fare structures and fare programs require labor and materials

INSTRUCTOR NOTES

Other effects on operational costs:

- Time spent by operators on fare collection tasks takes away from keeping services on time or doing other duties.
- Fare collection activities might notably increase dwell times, leading the agency to add more vehicles for service.
- Maintenance staff handle the maintenance of fare collection equipment.
- Planners oversee creating, applying, and managing fare systems and programs. Changes to these systems demand labor and materials.

Fare Collection Costs (Continued)

- Reducing the burden/cost
 - Measure costs and benefits of fare collection practices to see which aspects deliver the most value and make adjustments
 - Compare costs of fare collection against fare revenues obtained (and other benefits of fare collection, like ridership data collection)
 - Consider electronic fare collection
 - Consider fare-free service
- Fare collection technologies discussed in Module E

INSTRUCTOR NOTES

- So, there are some strategies to help reduce the cost burden and cost of fare collection, including:
 - Have a full measurement of the costs and benefits of different aspects of fare collection and make informed decisions about which maximize the return on your investment. Be willing to make changes and adjustments.
 - Take a hard look overall at the cost of fare collection compared to the fares collected, but don't forget that fare collection may have other indirect benefits like ridership data collection or discouraging rider loafing.
 - Consider forms of electronic fare collection like mobile apps, contactless cards, etc. to help reduce the amount of cash transactions. Cash typically is the most expensive and cumbersome transaction type.
 - Take a look at fare-free service—it might be an option that works if fares are already a very small portion of your budget, and the costs of fare collection are significant.
- We discuss different fare collection options and technologies in Module E.

Chapter Summary

- Key takeaways
 - Carefully managing insurance costs, using volunteer driver programs, and making use of in-kind and contributed services can reduce operating costs
 - Fare collection costs can be a significant contributor to operating costs; can also impact dwell times, operator workload, and maintenance costs
- Additional information, resources, and references provided in Chapter 7 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]

Exercise B-3: Small Group Breakout – Cost Management Strategies

- Form small groups
- Pick a topic:
 - Vehicle maintenance
 - Insurance
 - Fare collection
- For the selected topic, discuss these questions:
 - What are some of your biggest cost-related challenges in this topic?
 - What notable practices does your agency do now that you think helps manage costs?
 - What new practices or strategies are you considering or would you like to pursue?
- Timing
 - Discussion: 15 minutes
 - Report out: 10 minutes

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE B 201

INSTRUCTOR NOTES

- [Divide attendees into small groups. Discuss the instructions.]
- [During small groups, walk around room, assess progress, ask questions, etc. Provide reminders when 5 minutes, 10 minutes, and 12 minutes have passed so they know to wrap it up after 15 minutes.]
- [Facilitate report out by going from group to group. Carefully manage report out time to ensure all groups get a chance to report out.]

Module B Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module B

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

- Please write and mark your selected answers clearly.
- Only select one answer for questions with a circle: ○. |
Select all that apply for questions with a square: □.
- Your 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 **X** or **✓** is fine!



INSTRUCTOR NOTES

[Explain to participants this evaluation form should be filled out based on the Module B contents.]



Lunch

INSTRUCTOR NOTES

[Break for lunch. Remind attendees that lunch is scheduled for 60 minutes and to please return on time.]



MODULE C: Managing Demand Response Costs



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE C 204

INSTRUCTOR NOTES

[Give a short overview of Module C.]

- Module C provides cost management strategies that are specifically related to the primary types of demand response transit services operated or provided by transit agencies such as:
 - Americans with Disabilities Act (ADA) paratransit services.
 - Coordinated paratransit (e.g., services that co-mingle ADA paratransit trips with senior transportation trips and/or sponsored human services agency trips).
 - Paratransit services for seniors and persons with disabilities.
 - Rural general-public dial-a-ride services.
 - On-demand services for the general public (microtransit).
 - On-demand services for ADA paratransit customers (alternative services).
 - User-side subsidy programs.

Module Overview

- **One-sentence summary**

Specific strategies for managing costs of demand response costs

- **Chapters**

- 8: Managing Labor Costs of Call and Control Centers
- 9: Managing Demand Response Service Costs
- 10: Specific Strategies for ADA Paratransit
- 11: Contracting Out Demand Response Service

INSTRUCTOR NOTES

[Give a short overview of Module C.]

- This module will help provide [read one-sentence summary].
- The module contains four chapters:
 - Chapter 8: [read the chapter title].
 - Chapter 9: [read the chapter title].
 - Chapter 10: [read the chapter title].
 - Chapter 11: [read the chapter title].



Chapter 8: Managing Labor Costs of Call and Control Centers

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE C 206

INSTRUCTOR NOTES

[Introduce Chapter 8 title.]

Learning Objectives

- Discuss strategies for optimizing staffing levels across call and control center functions
- Understand role of customer-facing apps and automated booking systems in cost management
- Discuss considerations for outsourcing different call and control center functions

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- Optimizing staff levels and availability
- Use of customer apps and automation
- Outsourcing

INSTRUCTOR NOTES

Chapter 8 is divided into the following sections [read the topics].



Optimizing Staff Levels and Availability

INSTRUCTOR NOTES

- First, let's talk about staffing within a call and control center.

Call and Control Centers Basics

- Four call and control center functions
 1. Reservations
 2. Scheduling
 3. Dispatching
 4. Customers' service day calls ("Where's my ride?")
- Many different ways to manage DR service and operate a call and control center
 - In-house, outsourced, or a mix of both
 - Staff assignments

At smaller agencies, it often is difficult to justify having separate staff for separate functions. As the size of the system grows, staff can be specialized.

INSTRUCTOR NOTES

- There are four main call and control center functions for demand response:
 - Reservations: taking customer's requests for a ride and working with them to agree on a trip reservation.
 - Scheduling: taking the trip requests and putting them into vehicle and operator runs to deliver the requested trips as efficiently as possible and with the desired level of service quality.
 - Dispatching: handling the day-to-day operations of demand response service, including interacting with operators, assigning will-call trips, etc.
 - Service day calls: handing customer calls to ask about their trip and also if they want to file a complaint or request.
- Now, it's not always this simple and straightforward, because there are many different ways to run a call and control center and to operate demand response service.
 - First is whether the service and the call and control center is outsourced, operated in house, or a mix.
 - Second is whether call and control center staff perform single functions or a mix. At larger agencies, these four functions could be performed by staff that specialize in the function. At smaller agencies, individuals often perform multiple functions.
- The use of newer supporting technology—specifically on-demand technology that supports both on-demand requests and advance reservations and subscription trips—is beginning to muddle some of the distinctions between call and control center functions.



Open Discussion

- How are the four call and control center functions staffed at your agency?
- What are the weaknesses of this approach?
- What are the strengths?

INSTRUCTOR NOTES

- [Host a discussion about the call and control center functions using the bullet points in the slide content.]
- [Optionally, break into small groups and have them all discuss and answer the questions for the listed examples.]

DISCLAIMER!

- This chapter mentions technology (i.e., apps and software) to help manage costs and improve cost-effectiveness of call and control centers and demand response service
- HOWEVER:
 - All software has a learning curve – don't overlook the increased workload and cost associated with training
 - All software requires proper installation, set up, and maintenance to be effective
 - All software requires someone to interact with it and to be trained to fully utilize the software's capabilities
 - Software requires qualified staff to maintain the IT infrastructure, imports, exports, reports, configurations, etc.

INSTRUCTOR NOTES

- This chapter discusses utilizing technology such as apps and software to enhance cost management and efficiency in call and control centers as well as demand response services.
- However, it's important to remember that using software usually means it takes time to learn, which can lead to more work and additional training expenses. It's important to set up and maintain the software correctly for it to work well. Also, having trained people who know how to use the software is necessary to make the most of its features. Skilled individuals are needed to handle the IT system, manage data, create reports, and make necessary adjustments.

Call and Control Center Labor Costs

- Example analyses and measures
 - Call and control center labor cost per call answered
 - Call and control center labor cost per call center service hour
 - Call and control center labor cost per passenger trip
 - Agent productivity metrics (e.g., calls answered per hour or agent average call length)
- Track over time
- Use with peer reviews to streamline
- Balance cost-efficiency and service quality
- *Note:* May need phone system software to allow for detailed tracking of call and control center metrics

INSTRUCTOR NOTES

- Monitoring Call and Control Center Labor Costs over time is crucial. Several measures can be used to help manage the labor costs of call and control centers. In centers specifically focused on handling calls, example measures to monitor include:
 - Call and control center labor cost per call answered.
 - Call and control center labor cost per call center service hour.
 - Call and control center labor cost per passenger trip.
 - Agent productivity metrics (e.g., calls answered per hour or agent average call length).
- These measures can be tracked over time for trend analysis; and also used during peer reviews to determine whether more efficient operations may be possible.
- There is a balance between call and control center cost-efficiency and service quality. Be sure to not only measure and address cost-efficiency but also measure service quality to maintain the balance. A call and control center with very few staff may be very cost-efficient; however, customers may be waiting a long time to get through, or some customers may not even be able to get through and may give up calling.
- Detailed tracking of call and control center activities may require phone management software.

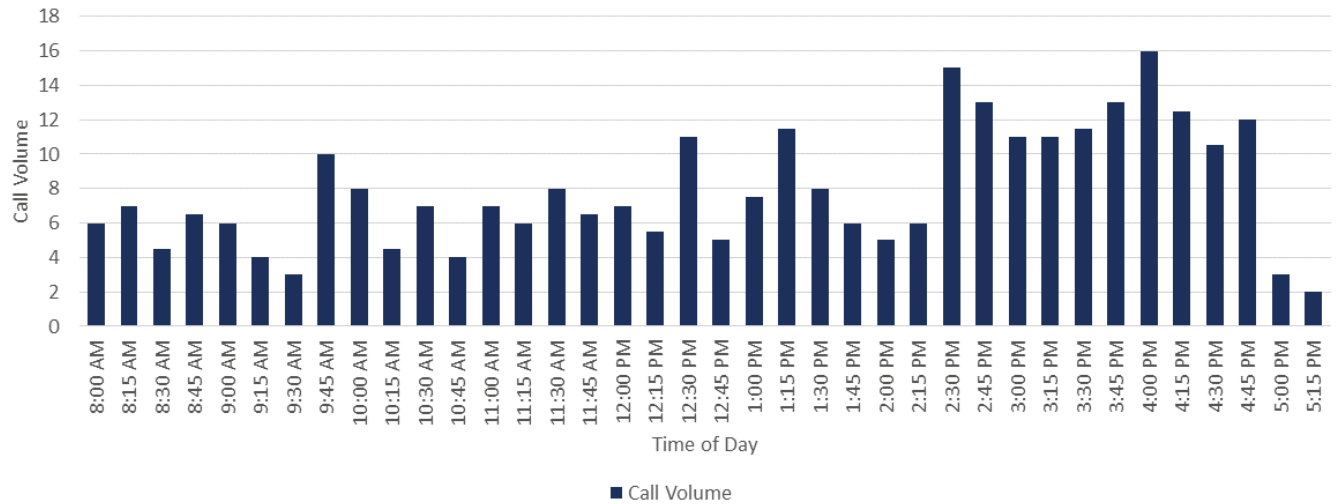
Call-Taking Staff

- Directly interface with customers
- Size call-taking staff to handle peaks and valleys of call demand
 - Try to match staffing with call demand to minimize average call hold time
 - Setting not-to-exceed standards for average and maximum hold time per day and per hour. Maximum hold time is important
 - Stagger call-taker shifts or supplement with cross-trained staff
- Establish individual standards or performance guidelines for call-taking staff (e.g., target call handling time or calls answered per hour)
- Service-day calls might be assigned to reservations staff or dispatchers or both

INSTRUCTOR NOTES

- For functions that directly interface with customers, transit agencies generally try to match the call-taking staff with the call demand in order to minimize the average call hold times as much as possible.
- Setting not-to-exceed standards for average hold time per day and per hour and maximum hold time is important so that the call center staff can be sized accordingly—the staffing level is matched to the peaks and valleys of call demand.
- A design decision that may affect staffing levels is how to handle service-day customer calls (e.g., where's my ride). Many transit systems same-day service calls to the reservations staff, while other agencies assign this function to the dispatching staff. Other agencies use a hybrid approach, having reservations staff handling all calls from customers and transferring those service-day calls they cannot handle to the dispatchers.

Example of Call Volumes by Time of Day

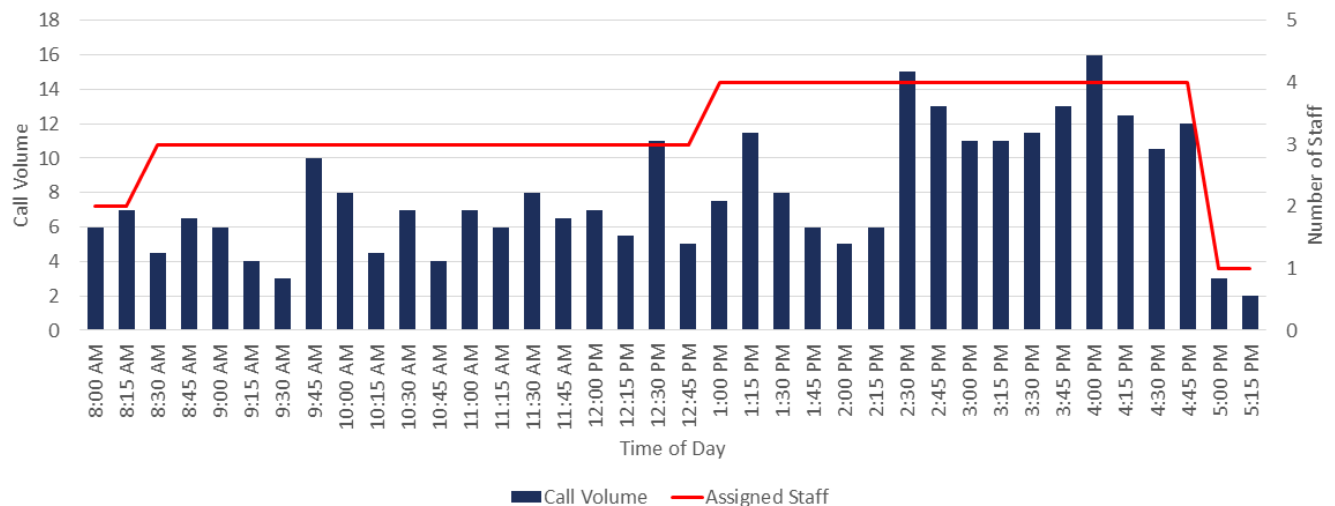


INSTRUCTOR NOTES

- This figure is an example of call volumes by time of day.
- Now, let's take a look at how a transit agency might optimally staff according to call volumes [next slide].

Example of Optimizing Staff Availability

This is the “ideal.” Often, the ideal solution is not possible.



INSTRUCTOR NOTES

- The figure presents the “ideal” scheduling of staff, which may or may not be possible with the designated call taking staff dependent on employee’s desired shifts and break requirements and availability of part-time staffing.
- Transit agencies can target to staff by time of day and day of the week using a variety of approaches.
 - For example, if call volumes peak in the afternoon on Wednesdays and Fridays, the transit agency could devote extra call-taking staff to these days and times. This might be done by staggering call taker shifts appropriately, by adding part-time staff at key times, or by borrowing—and training—staff from other functional areas to supplement the core call-taking staff during these periods.

Remote Call-Taking Staff

- Post-pandemic, new telephone technologies have made remote-working call-taking staff more commonplace
- Possible for increased retention of remote of call-taking staff = less time/cost is spent on recruiting and training
- New tech also facilitates real-time monitoring of call-takers
- Can Use to bolster call-taking resources during high-demand times

INSTRUCTOR NOTES

- Remote call-taking staff is more common due to the pandemic and new telephone technologies, potentially replacing in-person call centers.
- Transit agencies have observed that remote call-taking broadens the pool of available staff, especially for those unable to commute.
- Increased staff retention due to remote work reduces the need for extensive recruitment and training efforts, saving on costs.
- Supervisors can monitor remote call-takers in real time using these technologies.
- Transit agencies can turn to remote part-time call takers to bolster call-taking resources during high-demand times.

Tool #8: Call and Control Center Staffing Calculator

- Excel workbook to help calculate the number of call and control center staff needed across the day based on call demand and other tasks performed by call and control center staff
- Available for download from Toolkit

INSTRUCTOR NOTES

[Open the Tool and show different sheets quickly.]

- Tool # 8 can be used for calculating the Call and Control Center Staffing requirements by hour of day.
- You can download the tool from the Toolkit.

Scheduling Staff

Remember, automation and software may help, but still need qualified schedulers to interact with and use software!

- Scheduling can be carried out in different ways
 - Automated scheduling technology, manual scheduling, or a mix
 - At the end of booking period (e.g., day before) or in real time
 - Various optimization capabilities and processes
 - Lead scheduler oversight
- Approach to scheduling directly impacts number of call and control center staff
 - Fewer schedulers typically needed when software assists
 - Reduced scheduler workload allows support of other functions
 - Reducing number of unassigned trips eases dispatcher workload on day of service

INSTRUCTOR NOTES

- Scheduling can happen in various ways: using automated tools, doing it manually, or combining both methods. It can occur at the end of the booking period or instantly. There are different optimization processes available.
- Some transit agencies have the scheduling staff—and often a lead scheduler—to review the schedules on the afternoon before the trip date and make cleanup revisions as needed.
- Lead schedulers may also work on the same day of service to run an optimization process on demand, at certain times or intervals, or set to run continuously to optimize the schedule throughout the day.
- The way scheduling is handled affects the staff needed at call and control centers:
 - Using software to optimize the schedule often means fewer schedulers are required.
 - This lighter workload for schedulers lets them assist in other tasks such as providing scheduling subscription trips providing input to the run structure, scheduling the remaining unassigned trips and fixing assignments that are not making sense—and the scheduler could potentially be available for other call-taking or dispatching functions.
 - Having time to schedule unassigned trips the prior day eases the workload for dispatchers on the service day.

Dispatching Staff

- Dispatching can be organized in different ways with basic parameters
 - Dispatcher shifts should be aligned with operator shifts
 - Need to ensure adequate vehicle-to-dispatcher ratio
 - Ratio needs to be adequate during peaks
 - Dispatchers can be assigned to specific vehicle groups or areas
 - Lead dispatchers can provide proactive dispatching
- Approach to dispatching directly impacts number of staff
 - Fewer dispatchers typically needed when software assists
 - Dispatching and handling service-day calls often peak at the same time, so it can be more effective to dedicate staff to each function
- "Today's scheduler is tomorrow's dispatcher"

INSTRUCTOR NOTES

Transit systems have reported a 20 vehicle-to-1 dispatcher, and at most a 25 vehicle-to-1 dispatcher, ratio as ideal for systems where dispatching is carried out by persons (and is not fully automated).

- Dispatching can be structured in various ways:
 - First, the dispatcher shifts should be scheduled to ensure coverage at all times an operator is operating a vehicle (to ensure safe, productive, quality of service).
 - Next, there should be enough dispatchers to ensure a vehicle-to-dispatcher ratio that provides adequate coverage; and maintained during peaks.
 - Dispatchers can be assigned to different vehicle groups or areas. This is primarily meant to funnel operator radio calls to certain dispatchers, rather than have a free-for-all, which may be far less effective.
 - A lead dispatcher can be highly beneficial for proactive dispatching—looking ahead and solving potential problems before they manifest themselves in real time. With fewer problems to solve in real time, the number of dispatchers can potentially be reduced.

Use of Customer Apps and Automated Booking Systems

- Increasingly part of DR/paratransit services, especially on-demand services
- Customers might be able to self-book, cancel, and get ETAs and notifications
- Apps and automated booking systems reduce booking calls and service-day calls—and potentially call-taking staff need
- Must consider equity, Title VI, and accessibility
- Must consider access by individuals without smart phones or internet (call-in option)
- Consider providing training to customers (e.g., training at senior centers)
- *Note:* your agency may have a policy that prioritizes person-to-person communication, so, automated booking is not a priority

INSTRUCTOR NOTES

Customer apps are now part of many DRT/paratransit services of all kinds but especially on-demand services such as microtransit and alternative services.

- Apps enable customers to self-cancel booked trips, get confirmation, and see the location and ETA of the vehicle.
- Apps may also allow customers to book trips.
- These technologies reduce service-related calls, potentially lessening the need for call-taking staff.
- Transit equity, Title VI, and accessibility issues may come into play with customer apps with consideration of customers without access to a smartphone or the internet have a way to access the service. A call-in option may be considered.
- Providing customer training, such as sessions at senior centers, is important for use of APP systems.
- Some agencies prioritize person-to-person communication, so automated booking might not be the top priority.



Outsourcing Call and Control Center Functions

INSTRUCTOR NOTES

- Another potential way to manage call and control center labor costs is to use a contractor for all or some of these functions.

Common Outsourcing Options for Call and Control Center Functions

- Use contractor for some or all call and control center functions
 - Reducing costs
 - Taking advantage of contractor expertise
- Turnkey: All functions contracted out as a package

INSTRUCTOR NOTES

- An agency's motivation for outsourcing the call and control center functions is to lower cost—primarily accomplished through the lower compensation packages provided by contractors.
- Another motivation is to take advantage of a contractor's expertise in scheduling and dispatching, which can help with service- and cost-efficiency if the transit agency does not have the expertise.
- A common approach for outsourcing these functions includes outsourcing all functions as a package, for example, to a turnkey contractor or to a third-party entity.

Common Call and Control Center Outsourcing Arrangements

1. Retain customer-facing functions in house and outsource scheduling and dispatching
2. Retain customer-facing and scheduling functions in house and outsource dispatching
3. Retain advanced book and scheduling functions in house and outsource service-day functions (including dispatching and same-day booking)

Performance-related contract incentives and disincentives can help ensure productivity and quality of service. Without such controls, contractors' strategies may be to maximize revenue.

INSTRUCTOR NOTES

There are a variety of other approaches where the transit agencies and their contractors split the call and control center functions—and approaches where the transit agencies assign certain functions to their call and control center manager or to their broker. For example [read the combinations 1 to 3 in the slide].

If the transit agency does not have the expertise, performance-related contract incentives and disincentives can help ensure that productivity and quality-of-service goals are met. Without such controls, contractors' strategies for scheduling may be to maximize revenue.

Chapter Summary

- Key takeaways
 - Right-size amount of available call-taking labor to match call volume on an hour-by-hour basis
 - Provide customers with self-service apps and technology to reduce call volume and call-taking labor costs
 - Scheduling software can perform real-time optimization processes and can help reduce costs if tuned to local needs and policies
 - Give reservation agents tools to handle service-day calls
 - Organize dispatch labor based on specific tasks
- Additional information, resources, and references provided in Chapter 8 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]



Chapter 9: Managing Demand Response Service Costs

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE C 226

INSTRUCTOR NOTES

- Chapter 9 is [read chapter title].
- This chapter provides several strategies that transit agencies can use to manage the operational costs of demand response transit (DRT) service.

Learning Objectives

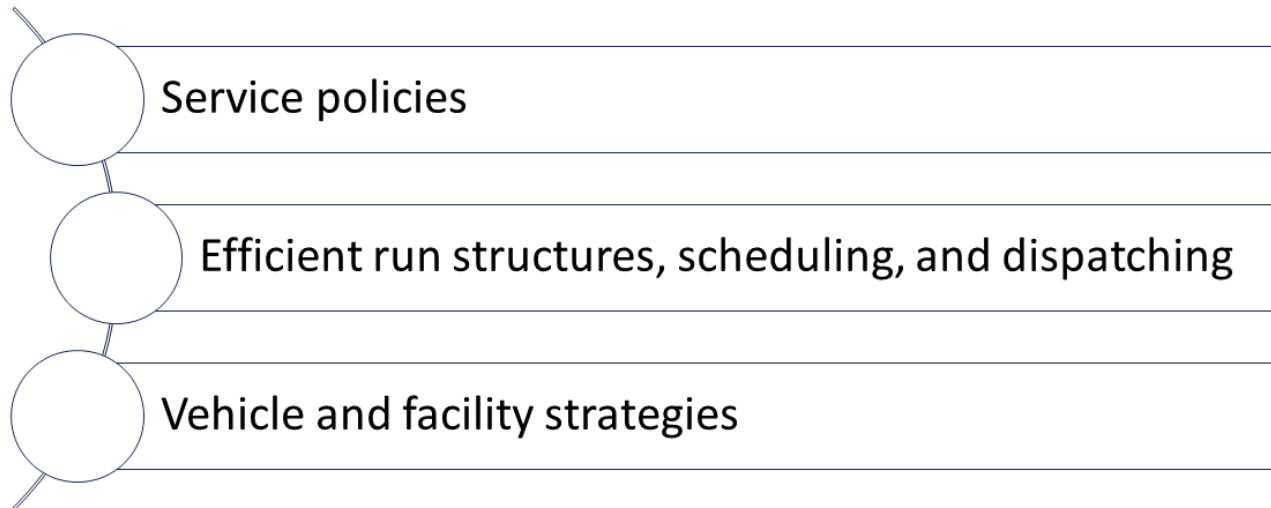
- Describe how service policies can impact demand response transit (DRT) productivity
- Explain the cost management benefits of efficient scheduling and dispatching
- Describe the cost management strategies associated with DRT fleets and facilities

Strategies specific to ADA paratransit will be discussed in Chapter 10.

INSTRUCTOR NOTES

- By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].
- Although some of the strategies in this chapter will also apply to ADA paratransit, Chapter 10 will cover strategies specific to ADA paratransit.

Topics



INSTRUCTOR NOTES

Chapter 9 is divided into the following sections [read the topics].

DISCLAIMER!

- This chapter mentions technology (especially scheduling and dispatching software) to help manage costs and improve cost-effectiveness of demand response service
- HOWEVER:
 - All software has a learning curve – don't overlook the increased workload and cost associated with training
 - All software requires proper installation, set up, and maintenance to be effective
 - Scheduling software *especially* must be “tuned” to local needs and policies to achieve maximum benefit
 - All software requires someone to interact with it and to be trained to fully utilize the software's capabilities
 - Software requires qualified staff to maintain the IT infrastructure, imports, exports, reports, configurations, etc.

INSTRUCTOR NOTES

- This chapter discusses using technology, like scheduling and dispatching software, to save money and make demand response services more cost-effective.
- However, software involves a learning curve, leading to extra training workload and costs. Proper installation, setup, and tuning to local needs are essential for its effectiveness. Trained personnel are needed to interact with the software and maximize its potential, while qualified staff are required to maintain IT infrastructure and handle various functions such as imports, exports, reports, and configurations.



Service Policy Impacts on Service- and Cost- Efficiency

INSTRUCTOR NOTES

- Much of DRT cost management is driven by service policies and the implementation of those policies. Service policies dictate who receives service, how the service is delivered, and how much priority is placed on service quality, passenger convenience, and service productivity.
- This section describes these service policies and the cost-management implications of the policies themselves and their implementation.

ADA Service Policy Impacts on Productivity

- ADA-required service policies associated with service equivalency
- With DRT, the comparison is between the experiences of (1) a person with a disability using the service and (2) a non-disabled person using the service
- Seven characteristics for determining service equivalency



INSTRUCTOR NOTES

- First, even though we're talking about general DRT service – and not specifically ADA paratransit – it's important to note that some of the ADA requirements for DRT have cost management implications.
- The ADA regulation requires that the DRT level of service provided be equivalent for persons with a disability and persons without a disability. There are differences in ADA complementary paratransit service policy that will be discussed in Chapter 10.
- The seven characteristics for determining service equivalence are [read the 7 characteristics from the slide]:
 - **Response time:** The elapsed time between a request for service and the provision of service is the same for all riders with and without disabilities, and the days and hours are the same—typically measured as on-time performance. Response time for a trip that requires a wheelchair accessible vehicle must be roughly equivalent to a trip that does not require a WAV.
 - **Fares:** For a given trip, the fare is the same for all riders.
 - **Geographic area of service:** Riders with disabilities can request trips in the same area or areas as other riders
 - **Hours and days of service:** Riders with disabilities can request trips on the same days and during the same hours as other riders.
 - **Restrictions or priorities based on trip purpose:** The same restrictions or priorities must apply to all riders.
 - **Availability of information and reservations:** Riders with disabilities must have access to the same information and reservations systems as other riders; this includes providing information in alternative formats and providing individuals with hearing or speech disabilities equal access to trip reservations systems.
 - **Any constraints on capacity or service availability:** For DRT services with capacity constraints, those constraints must be the same for all riders. This means that riders with disabilities would encounter trip denials with the same frequency as riders without disabilities.

Eligibility and Eligibility Determination Policies and Practices

- A service eligibility process may be required for specific DRT programs
- Good eligibility process: Ensures agencies are using resources to provide quality, sustainable service to meet demand
- Providing service to individuals who truly meet eligibility criteria helps agencies ensure service sustainability

INSTRUCTOR NOTES

- Some DRT programs might need a service eligibility process.
- A good eligibility process makes sure the agency uses resources wisely to offer quality and long-lasting service.
- Providing service only to those who genuinely meet the eligibility criteria helps agencies ensure the service is available to meet demand and maintain the service for a longer time.

Fare Policies, Sponsor Rates, and Subsidies

- Generally, fare level (as well as municipal/agency sponsor rates and subsidy levels) can be used to encourage use or dampen use
- ADA paratransit: Fares can be no more than twice local fixed-route fare
- Other DRT: Agencies may set fares at the level that seems appropriate or as sponsoring (funding) entities dictate

INSTRUCTOR NOTES

- For ADA paratransit services, fares can be no more than twice the local fixed-route fare.
- In cases where the fixed-route service is free, the ADA paratransit service must be free as well.
- With other DRT services, transit agencies may set fares at whatever level seems appropriate or whatever the funding entities dictate in terms of a farebox recovery ratio.
- Some DRT services are completely free, making up the fare revenue with federal, state, or local grants. Free-fare DRT services tend to attract a much larger ridership than DRT services with fares. Generally, the higher the fare, the lower the demand.
- Requiring a transfer between zones or regions can dampen demand; charging a transfer fee or a fare on the second leg can dampen demand further.

Fare Policies, Sponsor Rates, and Subsidies (*Continued*)

- Coordinated (commingled) services
 - Sometimes transit agency can negotiate the rate paid by sponsoring entity to provide trips
 - Sometimes the rate is fixed by a state agency or broker
 - Transit agency can decide to serve trips or not
 - Are trip costs fully covered?
 - Or does serving the trips increase system productivity (cost/trip)?
 - Transit agencies should strive to recoup as much of the cost of serving sponsored trips as possible
 - Can require sponsor to cover full cost
 - But the higher the sponsor rate, the fewer trips are likely to be purchased

INSTRUCTOR NOTES

- Transit agencies that operate coordinated DRT systems—that is, commingling municipal or agency-sponsored trips with ADA paratransit services or dial-a-ride service—may negotiate a rate with the sponsorship agency to provide the trips.
- Sometimes a rate is preset (and non-negotiable) by the state agency or a broker, and the transit agency can decide to serve these trips at that rate or not. The key here is to evaluate whether the amount of subsidy per trip that the transit agency must come up with is worth the benefit of serving these trips—where the transit agency subsidizes the trip because the trip is not 100 percent cost covered by the sponsoring entity.
- In other cases, the transit agency is free to fully negotiate sponsorship rates.
- As an objective, transit agencies should strive to recoup as much of the cost of serving sponsored trips as possible to better ensure sustainability.

Advance Reservation Policies

- Most DRT systems have advance reservation policies
- Advance reservations are a convenience to riders as some DRT services are capacity-constrained
- In the past, advance reservations gave schedulers more time to find scheduling solutions; advances in technology increasingly support real-time scheduling

A major consideration that ultimately impacts productivity (cost/trip) is how far in advance to allow advance bookings.

An advance reservation window of 3-7 days reduces speculative "placeholder" trips that can result in sub-optimal scheduling.

INSTRUCTOR NOTES

ADA paratransit services are only required to provide next-day reservations. Microtransit and alternative services are typically geared toward immediate-response and same-day bookings.

- Most DRT systems have advance reservation policies.
- Advance reservations are a convenience to riders as some DRT services are capacity-constrained.
- In the past, advance reservations gave schedulers more time to find scheduling solutions; advances in technology increasingly support real-time scheduling.

Same-Day Reservation Policies

- A feature of on-demand microtransit and alternative services
- Rate for other DRT services
- Other DRT systems that allow for same-day reservations tend to do so on a space-available basis
 - Works if the agency has automated capability to determine whether the trip can fit into a run schedule or not
 - To minimize disruptions, many agencies require 2 hours notice for same-day reservations

INSTRUCTOR NOTES

- Same-day reservation policies are commonly found in on-demand microtransit and similar services but are uncommon in other DRT services (e.g., ADA paratransit).
- In cases where other DRT systems allow same-day reservations, it's usually based on available space.
- This works when the agency can automatically determine if a trip fits the schedule or not. To reduce disruptions, many agencies ask for a minimum of 2 hours notice for same-day reservations to better optimize schedules and meet response time requirements.

Subscription Trip Policies and Practices

- Subscription trips are "standing orders"
- Typically in the best interest of transit agencies to maximize subscription trips
 - Passengers don't have to reserve trips one at a time
 - Productivity typically improves when scheduling the same client trips with the same driver or run from day to day
 - Fewer passenger calls
- Re-optimization of subscription trip schedules at least once a month is important: subscription trips change over time

INSTRUCTOR NOTES

- A subscription trip is a standing order for trips to the same facility with the same periodic schedule.
- Customers like it because they do not have to call in for each trip.
- Transit agencies benefit because productivity typically increases. In addition, more subscription trips translate into fewer calls, possibly resulting in the need for fewer reservation agents.
- It's crucial to review and adjust subscription trip schedules at least once a month since these trips can change over time.

Will-Call Returns Policies

- Certain types of return trips (especially medical trips) frequently result in either no-shows or long wait times for passengers
- To reduce no-shows, many agencies allow will-calls for trips more likely to have a no-show
 - Rider can "call when ready"
 - Common response time for will-calls is 60 minutes
- The agency could rely on a non-dedicated service provider (NDSP) instead of disrupting the dedicated fleet and decreasing its productivity
- Some agencies have "on-call" operators to help with will-call trips. For example, on-call operators must be able to report to work in 1 hour, if needed to operate will-call trip

No-shows are costly. No-shows will be discussed later in this module.

INSTRUCTOR NOTES

- Specific return trips, especially medical ones, often face no-shows or long passenger wait times because appointment durations often cannot be predicted.
- To address this, many agencies permit 'will-calls' for trips prone to no-shows.
- With will-calls, riders can phone when they're ready for pickup, typically with a 60-minute wait time.
- Instead of disrupting the main fleet and reducing its efficiency, some agencies use a non-dedicated service provider (NDSP).
- Additionally, certain agencies employ 'on-call' operators who must be available within an hour to manage these will-call trips.

Denial Policies

- Denials will happen when capacity of dedicated vehicles is taken up and/or trip time negotiation is unsuccessful
- Ideally: Adjust supply from days/times when service is oversupplied to days/times when service is undersupplied
- Some agencies have zero-denial policies but that can result in trips that are late or excessively long
- Capacity constraints due to patterns of denials on ADA paratransit services are prohibited; definition of denials is more specific

Recording of denials is important because it provides information about when more service is needed.

INSTRUCTOR NOTES

Most DRT systems operated or partially operated with dedicated vehicles only have so much capacity available.

- Denials occur when dedicated vehicles are full or negotiating trip times fails.
- The ideal approach is to shift supply from times when there's too much service to times when there's not enough.
- While some agencies aim for zero denials, this can lead to late or very long trips.
- ADA paratransit services cannot have capacity restrictions due to denial patterns, and the definition of denials is more precise.

Pickup and Dropoff Window Policies and Response Time Standards

- For trips scheduled in advance: pick-up windows and drop-off windows define when the DRT vehicle is on-time
- For on-demand services and will-call return pick-ups: response time standards define when the vehicle is on-time
- Defined by agency, sometimes with community input
- Important to educate customers on these policies
- Affects productivity and on-time performance

Wider Windows or Longer Response Times	Narrower Windows or Shorter Response Times
More opportunities to improve productivity	Fewer opportunities to improve productivity but preferred by passengers

INSTRUCTOR NOTES

- Advance scheduled trips have pick-up and drop-off windows that determine the DRT vehicle's timeliness.
- For on-demand or will-call services, response time standards define on-time arrivals. These standards are set by the agency, sometimes with community input, and it's crucial to inform customers about these policies. They greatly impact productivity and on-time performance.

No-Show/Late Cancellation Policies

- No-shows and late cancellations have an adverse impact on DRT service productivity and cost per trip
- If agency has more than 5% no-shows/late cancellations, a solution is a policy that progressively suspends service for passengers who no-show/cancel late
- Another proven solution: Provide customers with confirmation and imminent arrival and arrival calls/texts via Interactive Voice Response (IVR) system or app
- Some agencies allow riders to directly book and cancel trips, which can reduce number of call-takers needed

INSTRUCTOR NOTES

- Missed trips and last-minute cancellations harm DRT service efficiency and trip costs.
- To address this, if an agency faces over 5% no-shows or late cancellations, a solution is to create a progressive policy that can lead to service suspension.
- A solution to reduce is to make a concerted effort to communicate the policy—surprisingly, communication alone has proven to reduce the rate.
- Another effective solution is offering customers confirmation and arrival notifications through an IVR system or app.
- Some agencies allow riders to self-book and cancel trips, reducing the need for call-takers.

Service Area Policies

- Larger DRT service areas typically result in longer average trip lengths
- The longer the trips, the less productive the service and the higher the cost per trip
- Common solution: Split large service area into regions/zones
 - Works best where majority of trips originating from a particular region/zone are destined for same region/zone
 - Develop policies for transfers between regions/zones

INSTRUCTOR NOTES

- Bigger DRT service areas usually mean longer trips on average. Longer trips make the service less efficient and increase the cost per trip.
- A common solution is to divide the large service area into smaller regions or zones.
- This works well when most trips within a region or zone stay within that same area.
- It's important to create policies for the provision of service to include transfers as appropriate between these regions or zones.

Dedicated vs. Non-Dedicated Service Provider (NDSP)

Transit agencies have implemented NDSPs to increase cost efficiency

- Pros of NDSPs:
 - Augment transit agency fleet—overflow to prevent denials, serve low-demand periods and areas, react to unexpected demand
 - Serve long, out-of-the-way trips
 - Use in subsidy programs—limit financial exposure
 - Provide will call service to maintain system productivity
 - Use to introduce new or under performing service
 - Cover peak supply service to create straight shifts for operators
- Cons of NDSPs:
 - Subject to fleet supply sufficiency and coverage
 - Administration/ oversight required to ensure quality, prevent fraud, manage demand
 - Lack of accessible vehicles

INSTRUCTOR NOTES

- Transit agencies use NDSPs to reduce costs.
- Pros:
 - Expand transit agency capacity to handle overflow and prevent denials, especially during low-demand times or in less accessible areas.
 - Cater to long, out-of-the-way trips and sudden spikes in demand.
 - Employ subsidy programs to limit financial risks.
 - Offer will-call services to maintain overall system productivity.
 - Introduce new or underperforming services.
 - Manage peak demand by creating consistent work shifts for operators (offloading peak trips to NDSPs).
- Cons:
 - Dependent on having enough vehicles and coverage in the fleet.
 - Needs administration and oversight to ensure quality, prevent fraud, and manage demand.
 - Sometimes lack accessible vehicles.

Service Days and Hours Policies

- Policies that lead to serving low-demand service days and hours require more budget and can have an adverse impact on systemwide dedicated fleet productivity and cost per trip
 - Some transit agencies rely on NDSPs for these areas and times
 - Transit agency then pays only for trips served and not for extra slack time on dedicated vehicles
- Can start service on new days or at new hours with NDSPs or a mix of dedicated and non-dedicated

INSTRUCTOR NOTES

- Some agencies have policies to serve lower-demand service days and hours that requires more budget and can affect the overall productivity and cost of dedicated fleets.
- Some transit agencies use NDSPs during these periods to respond to service requests as occur.
- With NDSPs, the agency only pays for the trips taken, avoiding extra costs for idle time on dedicated vehicles.
- Agencies can introduce services on new days or at different hours using NDSPs or a combination of dedicated and non-dedicated services.

Inter-Carrier Transfer Policies

- Can increase productivity if timed connections are consistent and reliable
- Unreliable connections play havoc with schedules and productivity of dedicated-vehicle services
- Two common transfer policies

"Drop and Go" Policy	Driver-to-Driver Handoff Policy
<ul style="list-style-type: none">• Usually limited to transfer points• Goal of not delaying first vehicle (i.e., not decreasing productivity)	<ul style="list-style-type: none">• Avoids duplicate service (decreased productivity) by requiring first vehicle to wait for arrival of second vehicle

- "No strand" policy means that rider making a transfer is not stranded is 2nd vehicle is late/no show. In a drop-and-go
 - First vehicle would go back and pick up rider or
 - NDSP would be dispatched (duplicate service)

INSTRUCTOR NOTES

- Policies regarding how inter-carrier transfers are handled can also impact cost management.
- An inter-carrier transfer is when a rider has to transfer from one DRT provider to another. This may happen in regions with multiple DRT providers covering specific geographies.
- If done well, inter-carrier transfers can help increase productivity if connections are consistent and reliable. However,
- If customers have unreliable connections, this can not only mess up a customer's day, but it can also impact the DRT provider's scheduled service.
- There are two common transfer policies:
 - Drop-and-go [use table contents].
 - Driver-to-driver handoff policy [use table contents].
- In the end, it really depends on whether the DRT provider has a "no strand" policy. If the transit agency commits to never letting someone be stranded, then, they are committing to making sure the person is able to complete their trip or at least get back home.
- If an agency has a no-stand policy but uses a drop-and-go policy, they might need to come back and care for the customer if their connection doesn't show. The agency could dispatch its own vehicles or could dispatch service on an NDSP.
- Yet another strategy involves a drop-and-go policy combined with a neutral helper at the transfer point who has access to each carrier's dispatcher.

Driver Assistance Policies

- Curb-to-curb service: Operator assists rider in getting into and out of vehicle
- Door-to-door service
 - Operator assists rider in getting to/from the vehicle
 - Usually limited by number of steps, remaining in sight of vehicle, and not entering buildings
- Studies inconclusive on which approach is more productive
 - Curb-to-curb vs. door-to-door is not proven more productive and most likely a wash in time difference
 - But rider is not always waiting at the curb when vehicle arrives
 - Door-to-door theoretically helps passengers get to/from vehicle faster

INSTRUCTOR NOTES

- Two types of services: curb-to-curb and door-to-door.
 - In curb-to-curb, the operator helps the rider in and out of the vehicle.
 - For door-to-door, the operator assists the rider to and from the vehicle, usually with limits like steps and staying within view of the vehicle, without entering buildings.
- Studies haven't clearly shown which approach is more productive.
 - Comparing curb-to-curb and door-to-door services, there isn't a proven difference in productivity.
 - However, sometimes riders aren't waiting at the curb when the vehicle arrives.
 - The door-to-door service theoretically helps passengers get to and from the vehicle faster.

Stop Type Policies

Requested Pick-Up Stop	Virtual Stop	Physical Stand
<ul style="list-style-type: none"> • Vehicle routed directly to rider's location (akin to traditional DRT) • Provides customers with increased convenience • Tends to decrease productivity because it is not conducive to shared rides 	<ul style="list-style-type: none"> • Customer required to travel to/from a dynamically created pickup point (virtual stop) based on their location and the vehicle's location • Tends to increase productivity because riders are grouped to streamline routing and maximize efficiency • Usually located at an intersection within a specified distance of rider's requested pick-up and drop-off 	<ul style="list-style-type: none"> • Located at scheduled anchor point or other designated place as a permanent stop • Can increase ridership through walk-on trips and perceptions of available travel connections to key attractors • Can also enhance the safety of the rider in difficult-to-serve areas • Can reduce no-shows and increase productivity because they facilitate grouping of riders

INSTRUCTOR NOTES

- Related to whether the agency performs curb-to-curb or door-to-door service is the question of stop types.
- In most traditional DRT, the common stop type is *Requested Pick-Up Stop* [use table contents].
- However, some technology platforms—especially in microtransit—support different kinds of stops like a *Virtual Stop* [use table contents].
 - Regarding virtual stops, some transit agencies have policies where riders using wheelchairs or mobility devices are picked up at their requested pick-up locations while all other riders must go to a virtual stop.
- Another option is actually having physical stops or stands to pick up DRT passengers. [Use table contents.]

Policy Follow-Through

- Having a policy is only the first step
- Policies must be continually
 - Enforced
 - Evaluated
 - Updated

INSTRUCTOR NOTES

- A key takeaway about contactless all of these policies we've just discussed! They only work if they are applied consistently.
- Having a policy is the first step. After the policy is in place, they must be continually:
 - Enforced.
 - Evaluated.
 - Updated.

Exercise C-1: Small Group Breakout – DRT Policies

- Form small groups
- Select 2 or 3 DRT policies (see box) & answer these questions overall: (20 minutes)
 - What policy area has the biggest positive impact on cost management? Biggest negative impact?
 - What policy area is the most difficult to implement / adhere to?
 - What changes would you group members like to see in their own policies to help with cost management?
- Report out (10 minutes)

Policy Areas

- Fares
- Sponsored service rates (coordinated transportation)
- Advanced reservation/same day reservation
- Will call
- No shows/late cancellations
- Transfers

INSTRUCTOR NOTES

- [Divide attendees into small groups. Discuss the instructions.]
- [During small groups, walk around room, assess progress, ask questions, etc. Provide reminders when 10 minutes, 15 minutes, and 18 minutes have passed so they know to wrap it up after 20 minutes.]
- [Facilitate report out by going from group to group. Carefully manage report out time to ensure all groups get a chance to report out.]



INSTRUCTOR NOTES

- [Inform participants that they have a break (in minutes) and ask participants to be back on time].
- [Break is scheduled to be 10 minutes.]



Efficient Run Structures, Scheduling, and Dispatching

INSTRUCTOR NOTES

- Now, we'll move on to talking about the cost management strategies related to structuring runs, designing schedules, and dispatching.

Efficient Run Structures (Dedicated Service)

- Run structure: how many runs are in service at any period of time during the service day
- Usually defined in one-hour or half-hour increments
- Flat run structures may have undersupply of service during peaks and oversupply of service during off peak periods
- Should build a run structure that mirrors demand profile
 - Typically has two peaks
 - Could convert straight shifts to split shifts (which has pros and cons)
- Could also supplement peak service with NDSPs

INSTRUCTOR NOTES

- Run structure means the number of runs in operation during the service day, usually in one-hour or half-hour slots.
- Flat structures might cause shortages during busy times and too much capacity during quieter periods.
- To meet demand, it's important to match the run structure with the demand profile, typically with two peak times.
- Changing from straight to split shifts is an option, but it has pros and cons.
- Also, NDSPs can assist during peak services.

Efficient Scheduling

- DRT scheduling can be labor-intensive and challenging
- Most services today use computerized scheduling systems
 - Real-time scheduling
 - Batch optimization
 - Or both
- Approaches vary in labor-intensiveness and quality of scheduling solutions
 - Can affect scheduler workload
 - Can affect staffing levels

INSTRUCTOR NOTES

- DRT scheduling is often labor-intensive and tough.
- Most services now use computerized scheduling systems, which can involve real-time scheduling, batch optimization, or a mix of both.
- These methods vary in the effort needed and the quality of scheduling solutions. This affects the workload of schedulers and staffing levels.

Efficient Scheduling (Continued)

- Some transit agencies erroneously do not tune scheduling software to their service area, policies, or desired balance between service quality and efficiency
 - Productivity and on-time performance of dedicated-vehicle DRT service tend to have an inverse relationship
 - Impactful parameters include defined load/unload time and maximum on-board time
 - Scheduling solution can be scored based on minimizing total hours/ miles traveled, minimizing deadhead hours/ miles traveled, etc.
 - Can prioritize and weight various factors
- Tuning software appropriately in scheduling system can be iterative and time-consuming—an art
- Software *only knows what you tell it!* (Make sure data feeds, maps, etc. are up-to-date)

INSTRUCTOR NOTES

- Some transit agencies overlook customizing scheduling software for their specific needs, impacting the balance between service quality and efficiency.
 - In dedicated-vehicle DRT services, higher productivity might slightly affect on-time performance.
 - Key factors involve setting load/unload times and passenger maximum onboard duration.
 - Scheduling solutions can be measured by reducing total hours/miles or deadhead hours/miles.
- Agencies can prioritize different factors, but adjusting the software is a time-consuming process. It's essential to ensure accurate and up-to-date data feeds and maps since the software operates based on this information.

Efficient Dispatching

- Except with on-demand services, dispatching takes over after the schedule is complete
- DRT dispatching typically involves several functions

Monitoring the dispatch screen

Re-assigning trips as needed

Communicating changes to operators

Processing no-show requests

Assigning re-emerging no-shows to runs

Responding to operators requests for help

Monitoring "performed" arrivals and departures

Responding to service-day calls

- Dispatching module of DRT scheduling/dispatching systems usually supports most functions

INSTRUCTOR NOTES

- Once the schedule is finished, dispatching takes charge, except for on-demand services.
- DRT dispatching generally includes various functions including [read the contents in the squares].
- The dispatching part of DRT scheduling systems usually handles many of these functions.

Efficient Dispatching (Continued)

- Proactive dispatching: Process of looking ahead in the day's schedule to take advantage of opportunities and to identify and solve problems before they materialize in real-time
- Often overlooked or not prioritized but can have a profound impact on productivity
- Many transit agencies designate a dispatcher to be the proactive dispatcher
 - Proactive dispatching requires dedicated attention and focus
 - Some scheduling/dispatching systems can assist/automate

INSTRUCTOR NOTES

- Problems that can decrease productivity include driver callouts and downed vehicles, late cancellations and no-shows, incidents and breakdowns, and vehicles running late due to unforeseen traffic congestion and other factors.
- Proactive dispatching involves planning ahead in the day's schedule to find opportunities and solve issues before they happen.
- It's often underestimated but can significantly improve productivity.
- Many transit agencies assign a specific dispatcher to handle proactive dispatching, which needs focused attention.



Vehicle and Facility Strategies

INSTRUCTOR NOTES

Vehicle and Facility Strategies is the next discussion.

Remote Vehicle Storage and Fueling Strategies

- Many agencies serving large areas station vehicles at satellite parking or operators' homes
 - Minimizes nonproductive and deadhead time, and can significantly reduce fuel costs, labor costs, and vehicle wear and tear
 - Might also be more convenient for operators and ability to recruit
 - Written policies and protocols for vehicle remote storage is a good practice
 - Cons: loss of in-person contact with operators; potential liability issues, and maintenance may not have ready access
- How vehicles are fueled is central to the strategy
 - Works well if vehicles are fueled at gas stations with fuel cards
 - Not so well if vehicles are fueled at a central facility (unless vehicles travel there while delivering service)

INSTRUCTOR NOTES

- Agencies serving large areas often park vehicles at satellite locations or operators' homes to save time and reduce fuel costs and vehicle wear. This practice may offer convenience and aid in recruiting.
- Having clear protocols for remote vehicle storage is wise.
- The cons of remote vehicle storage is that it can reduce in-person contact with operators, may pose liability concerns, mechanics may not have ready access to the vehicles.
- How vehicles are fueled is vital. Fueling at gas stations with cards works well, but fueling at a central facility might not, unless vehicles go there during service.

Using NDSPs to Augment Dedicated Fleet

- Can serve peak overflow at reduced cost
- Can serve lower-demand areas or lower-demand times more cost-effectively
- Can serve will-call return trips, re-emerging no-show trips, long-distance single trips, interrupted trips, or any other trip that would adversely impact productivity of dedicated fleet
- Service mix: the split between trips scheduled on dedicated vehicles and trips assigned to NDSPs; 95%/5% to 85%/15% is typical

The transit agency must be strategic in the types of trips that are assigned to NDSPs.

INSTRUCTOR NOTES

- Another cost management strategy related to vehicles is using NDSPs. They often:
 - [1st bullet].
 - [2nd bullet].
 - [3rd bullet].
- However, taxis and TNCs often do not flock to rural communities because of the sparse demand and so the opportunities to utilize this strategy in these communities may be limited. However, both taxis and TNCs have been known to expand their service area to rural areas if demand for their services presents itself. Often, this is contingent on a transit agency having a program that will guarantee trips for them.
- There's no magic bullet to figuring out how many trips should be operating on your dedicated vehicles versus NDSPs, however, when service is mixed, it is typical for NDSPs to provide between 5% and 15% of trips.

Diversifying the DRT Fleet

- Uniform fleets
 - Provide flexibility to schedulers and dispatchers
 - Minimize breadth and expense of parts inventory
 - Uniform accessible fleet can be beneficial with NDSPs strategically used for overflow
- Diverse fleets (i.e., adding smaller vehicles)
 - Reduced capital cost
 - Reduced operating cost
 - Opportunity to hire non-CDL operators (which might reduce labor costs and improve recruiting)
- Must consider percent of trips requiring a wheelchair-accessible vehicle as well as supply chain issues

INSTRUCTOR NOTES

- Having uniform fleets offers flexibility for schedulers and dispatchers, cutting down on parts inventory.
- A uniformly accessible fleet can work well when using NDSPs for overflow.
- On the other hand, diverse fleets with smaller vehicles can lower capital and operating costs.
- They also allow the hiring of non-CDL operators, potentially reducing labor expenses and enhancing recruiting efforts.
- However, it's important to consider the percentage of trips needing wheelchair-accessible vehicles and potential supply chain challenges.



Prize Questions

- Name the four DRT call and control center functions.
- Describe the cost-management benefits of customer-facing apps and/or automated booking systems.
- Name and describe at least two DRT service policies, including how they influence cost management.
- Describe proactive dispatching.
- What value does scheduling software add to DRT scheduling and *what's important to do when using scheduling software?*

INSTRUCTOR NOTES

[Select one or more questions on the slide as prize questions, as time allows. Encourage participants to actively engage. Potential answers described below.]

- **Name the four DRT call and control center functions.** [Answer:
 - Reservations.
 - Scheduling.
 - Dispatching.
 - Customers' service day calls ("where my ride?")]
- **Describe the cost-management benefits of customer-facing apps and/or automated booking systems.** [Answer:
 - Can reduce the number of booking and service-day calls, potentially reducing staff needed.]
- **Name and describe at least two DRT service policies, including how they influence cost management.** [Potential answers:
 - Eligibility: impacts *who* is eligible to use service—ultimately driving demand.
 - Fare policies, sponsor rates, and subsidies: Can be used to encourage or dampen demand...Higher out-of-pocket costs for passengers or higher charge to sponsors likely will reduce demand.
 - Advance reservation policies:
 - Too far in advance can result in too many "speculative" bookings, creating sub-optimal schedules, increased no-shows, or cancellations.

-
- Same day policies are enticing, but definitely can cause increased demand and also likely more difficult to find most cost-efficient schedule.
 - Subscription trips: Help reduce reservations calls and improve productivity, because subscriptions can form the base of the DRT schedule.
 - Will-call: Allowing can help reduce no-shows, but need to be able to accommodate—either adding trip to existing vehicles, using an NDSP, or an on-call operator.
 - Denials: Allowing denials (in non-ADA) may be necessary to control costs. Important to record denials accurately to have data on service needs.
 - Pickup and dropoff window policies and response time standards: One of the BIGGEST factors. Wider windows and longer response times = more opportunity to improve productivity.
 - No-show/late cancellations: Not having these policies can result in wasted vehicle hours and cost.
 - Service area policies: the larger the service area, the longer average trip lengths = more cost per trip. Common to split service area into zones.
 - Using NDSPs: can be a way to off load peak demand and reduce dedicated fleet size and dedicated operator counts.
 - Transfer policies: drop-and-go can increase productivity, but results in passengers being stranded and then re-work if agency has no-strand policy. Handoff policies best for passenger, but may add dead time and reduce productivity of service.
 - Driver assistance: no real difference between door-to-door and curb-to-curb.
 - Stop types: virtual stops can help increase productivity, because passengers walk to a location that reduces deviations from most efficient route.]
 - **Describe proactive dispatching.** [Answer:
 - Process of looking ahead in the day's schedule to take advantage of opportunities and to identify and solve problems before they materialize in real-time.]
 - **What value does scheduling software add to DRT scheduling and *what's important to do when using scheduling software?*** [Answer:
 - Can help improve efficiency of schedule.
 - Can help reduce demand/workload on scheduling staff.
 - MUST tune software and also ensure that data feeds are accurate!!!]

Chapter Summary

- Key takeaways
 - Revisit and modify policies that adversely impact the balance between service/cost efficiency and service quality
 - Serving/adding sponsored trips may improve productivity and decrease cost per trip
 - An alternative to serving sponsored trips on same service platform is providing vehicles to human service agencies
 - Matching supply of service to demand profiles will result in improved service/cost efficiency
 - Using paratransit scheduling/dispatching software to full capabilities can improve service/cost efficiency if:
 - Scheduling parameters are properly tuned
 - Scheduling and dispatching staff are adequately trained and motivated
 - Software data feeds and base maps are accurate

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways]. [next slide...]

Chapter Summary (cont'd)

- Proactive dispatching results in higher productivity and quality of service
- Remote vehicle parking and fuel cards can reduce deadheading and driver pay hours
- Using NDSPs for overflow and other trips may help improve service/cost efficiency by lowering overall cost/trip
- Altering fleet configuration to include smaller vehicles can reduce capital and operational costs
- Additional information, resources, and references provided in Chapter 9 in the Guidebook

INSTRUCTOR NOTES

- [continue with key takeaways.]
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]



Chapter 10: Specific Strategies for ADA Paratransit

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE C 264

INSTRUCTOR NOTES

[Introduce Chapter 10 title.]

Learning Objectives

- Describe how ADA service policies, service area and hours, fares, and eligibility criteria influence cost management
- Explain considerations related to setting ADA paratransit fares
- List strategies to help encourage ADA paratransit customers to use fixed-/flexible-route services
- Define alternative services and their potential role in ADA paratransit cost management

INSTRUCTOR NOTES

- This chapter focuses on (1) *additional* cost management strategies (over and above those in Chapter 9) that pertain to ADA paratransit services and (2) the interrelationship between ADA paratransit services and transit agencies' fixed-route and on-demand services.
- By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- General service requirements and policy choices
- Conditional eligibility
- Encouraging use of fixed-route service
- Providing alternative services
- Opt-In Agreements

INSTRUCTOR NOTES

Chapter 10 is divided into the following sections [read the topics].

Policies Dictated by FTA/ADA Requirements

Transit agencies must provide ADA paratransit service where and when local fixed route bus (or rail) is provided.

The minimum ADA paratransit service area is $\frac{3}{4}$ -mile route corridors as well as small areas surrounded by the corridors. Origin to destination service must be provided.

Customers must be allowed to book a trip on the day before the trip during normal business hours.

ADA paratransit fares cannot exceed twice the fare of the local bus route that would be used to make the same trip at that same time.

Trips cannot be prioritized or restricted based on trip purpose.

The number of trips made by an individual cannot be limited; nor can there be a waiting list.

A transit agency may conduct trip negotiations for ADA paratransit trips but only within one hour of the requested pick-up time and within reason.

There cannot be an operational pattern or practice that significantly limits the availability of service to an eligible customer

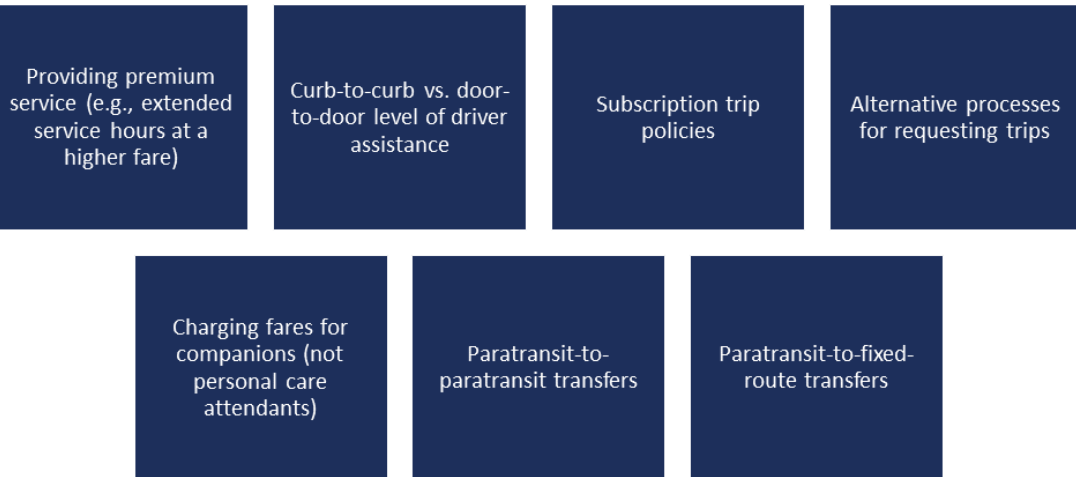
All drivers must be trained to proficiency and must be drug and alcohol tested.

Transit agencies must provide solutions for reasonable accommodations.

INSTRUCTOR NOTES

- [Summarize that there are certain aspects of ADA paratransit service that are dictated by the FTA and the ADA. These are non-negotiable items and cost management strategies cannot cause you to fail to adhere to these requirements.]
- [Do not spend much time explaining each one; paraphrase each point and then, when done, stop and ask if there are any questions.]

Policy Choices



INSTRUCTOR NOTES

Additional policies are discretionary and can impact costs. Examples are [read the content in the shapes and explain briefly each policy].

Managing Demand through Conditional Eligibility

- An eligibility process that involves in-person interviews and functional assessments can help identify applicants who are truly eligible for ADA paratransit services
 - 100% paper processes tend to be more lenient and inaccurate
 - In-person assessments also better indicator of persons who are conditionally eligible for ADA paratransit services
- Conditionally eligible = eligible for certain trips or under certain conditions
- Reservation agents need to be able to readily identify which trips are eligible and which trips are not
- Eligibility of specific trips needs to be ruled on in advance

INSTRUCTOR NOTES

- One strategy important for ADA paratransit cost management is the eligibility policy and process.
- In-person interviews and assessments help identify who's truly eligible for ADA paratransit services.
- Paper-based processes can be less accurate and more lenient.
- In-person assessments are better at recognizing those conditionally eligible for these services—eligible under specific circumstances.
- Reservation agents need to quickly distinguish eligible trips.
- Deciding trip eligibility should happen beforehand.

Encouraging Use of Fixed-Route Service

- Goal: Divert trips from an expensive service to one where serving that trip yields no additional cost
- Potential strategies (from TCRP Report 163)
 - Improve bus stop and pedestrian facility accessibility
 - Marketing and public information
 - Trip planning and travel training
 - Fare incentives (e.g., discounted or free fares on fixed route for conditionally-eligible ADA paratransit customers)
 - Alternative service designs (e.g., flexible-route, paratransit-to-fixed-route feeder service, etc.)
 - Robust eligibility program/conditional eligibility
- Note: if offering fare incentives on fixed route, agency must have strong ADA eligibility determination/certification program to prevent abuse

INSTRUCTOR NOTES

- Another strategy for managing the costs of ADA paratransit is trying to encourage the use of fixed-route any possible trips.
- The main goal for encouraging FR service is to move trips from a costly service to one without extra expenses.
- Possible methods (from TCRP Report 163):
 - Enhance accessibility at bus stops and pedestrian facilities.
 - Promote through marketing and public information.
 - Provide trip planning and travel training.
 - Offer fare discounts or free rides on fixed routes for conditionally eligible ADA paratransit customers.
 - Explore different service designs (e.g., flexible routes, paratransit connecting to fixed routes, etc.).
 - Establish a strong eligibility program for ADA with conditional eligibility.
- Do note that, if you are offering a discounted fare on fixed-route for ADA-eligible riders, make sure you have a strong eligibility determination process, because people might want to try to become ADA eligible just for the discounted fixed-route fare.

Providing Alternative Services

- Alternative service = an on-demand or same-day transportation option subsidized and offered to ADA paratransit riders
 - An alternative to next-day service ADA paratransit
 - Typically uses taxis or TNCs under contract
 - Sponsoring agency subsidizes costs (provider-side or user-side)
 - Must provide equivalent service for ADA compliance
- Same-day service provides ADA paratransit customers greater travel flexibility
- Can reduce overall paratransit costs; trip limits might be needed

INSTRUCTOR NOTES

- An alternative service is [1st bullet].
- An alternative service can be less than the operating cost per trip of its ADA paratransit service largely because a transit agency can set the maximum subsidy per trip that it pays an alternative service provider for provider-side subsidy programs or can limit the subsidy per month for user-side subsidy programs.

Opt-In Agreements

- Customer opt-in program: Customers agree to allow transit agency to assign an ADA paratransit trip request to service provider with drivers who are not ADA-paratransit certified
- Uses operators who do not have same training and drug/alcohol testing standards
- Goal: Expand the supply of lower-cost overflow providers
- ADA paratransit trip request converted to non-ADA paratransit trip request

INSTRUCTOR NOTES

- An opt-in program is [1st bullet].
- Customers permit the transit agency to assign an ADA paratransit trip to a service provider whose drivers aren't ADA-paratransit certified.
- These operators might not have the same training and drug/alcohol testing standards. The aim is to increase the use of lower-cost service providers to handle overflow trips.
- This turns an ADA paratransit trip request into a non-ADA paratransit trip request.

Prize Questions

- Name at least 2 strategies to help encourage people with disabilities to use of fixed-route service.
- What is an “alternative service?”
- What is conditional eligibility?



INSTRUCTOR NOTES

[Select one or more questions on the slide as prize questions, as time allows. Encourage participants to actively engage. Use slide materials to check answers.]

Chapter Summary

- Key takeaways
 - Conditional eligibility works if operationalized
 - Free fixed-route service may provide greater mobility options for ADA paratransit customers
 - Alternative services may reduce costs and increase ADA paratransit customer mobility
 - Opt-in programs can help improve supply of NDSPs
- Additional information, resources, and references provided in Chapter 10 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]



Chapter 11: Contracting Out Demand Response Service

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE C 275

INSTRUCTOR NOTES

[Introduce Chapter 11 title.]

Learning Objectives

- Describe different options for outsourcing DRT service, including pros and cons
- List key considerations when outsourcing DRT service
- Explain strategies and procedures for contractor management and oversight

Topics

- Options for outsourcing
- Procuring DRT service

INSTRUCTOR NOTES

- This chapter is focused mainly on cost management strategies associated with contracting for demand response transit (DRT) service.
- By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].
- This chapter is divided into two sections: [list from slide].

Options for Outsourcing

- Turnkey contract
- Turnkey contract with overflow providers
- Turnkey contract with agency assets
- Operations contracts with the transit agency or a third party performing the call and control functions
- Operations contracts that include some call and control center functions
- Brokerage and call and control center contracts

These options are described in more detail in Chapter 11 in the Guidebook.

INSTRUCTOR NOTES

- There are several different options for outsourcing demand response service.
- In a turnkey contract model, one contractor is retained to perform all of the call and control center functions, to deliver service, and provide all of the supporting assets for the entire service. In some cases, a transit agency will retain multiple turnkey contractors with each assigned to a specific service zone or service type. Using a turnkey contractor or contractors tends to reduce operational cost through lower employee compensation packages. A turnkey contractor may have the operational experience and expertise that the transit agency lacks. With turnkey contracts, transit agencies give up direct control over service quality as well as the balance between service quality and cost efficiency.
- As a variant to a turnkey contract, you could use a turnkey provider for your core service and also use one or more non-dedicated service providers (NDSPs) to augment the dedicated DRT fleet. The primary benefit of an overflow provider is to serve trips that cannot be accommodated on the transit agency's or turnkey/operations contractor's dedicated fleet. Using a non-dedicated overflow provider can also be strategic way to reduce overall cost by serving trips that would otherwise negatively impact the productivity and quality of service of the dedicated fleet.
- Last, and not truly turnkey, is a model in which the transit agency provides supporting assets (such as vehicles) to the turnkey or prime contractor.
- In the operations contract models, the responsibility for service delivery falls on the contractor or contractors, while the call and control center functions (all or some) is the responsibility of the transit agency or a third-party entity such as a broker or call and control center manager.
- In the case of a broker model, the transit agency has one contract with the broker and the broker directly contracts with the service providers. In the case of a call and control center manager model, the transit agency retains the call and control center manager and directly contracts with the service providers. From the transit agency's perspective, the broker model eases administration as there is only one entity to procure and monitor; however, control over

service quality is once removed with a broker. In contrast, with a call and control center manager model, the transit agency has multiple contracts but has more control over service quality because it holds the contracts with the service providers.

- If all of this seems confusing, that's because there are many drop-off ways to outsource DRT...Chapter 11 of the Guidebook describes these options in more detail.
- Which one is right for you really depends on local factors and your own policies and goals.

Procuring DRT Service

- The four most important elements of procuring a DRT contractor are defining/providing in the request for proposals (RFP):
 1. A detailed description of the service, historical service data, and contractual responsibilities
 2. The contract term and schedule for implementation
 3. How the contractor is paid
 4. Service standards tied to balance of service/cost efficiency and service quality, matched with performance-based incentives, penalties, and liquidated damages

INSTRUCTOR NOTES

- The key aspects to include in the request for proposals (RFP) when seeking a DRT contractor are:
 - Clear service description, historical data, and contractual duties.
 - Contract duration and implementation schedule.
 - Payment structure for the contractor.
 - Service standards balancing efficiency, quality, and costs, linked to incentives, penalties, and damages based on performance.
- Each of these elements are described in more details on the following two slides [next slide...]

Procuring DRT Service

Element	Selected Guidance
1. A detailed description of the service, historical service data, and contractual responsibilities	Give proposers an accurate picture of functional responsibilities in consideration of the size of the service. The more comprehensive the description, the less risk a proposer will face. Generally, contractors will build in a risk factor to their rates to compensate for the unknown. The more they know, the less risk, and the more accurate (and lower) their proposed rates.
2. The contract term and schedule for implementation	Be clear about the contract term. There are three contract phases: implementation, service delivery, and transition to a new contractor. Generally, an implementation period should be no less than 6 months to ensure that a new contractor has sufficient time to get ready.

Continued on next slide

See Chapter 11 in the Guidebook for more information about procuring a DRT contractor.

INSTRUCTOR NOTES

The transit agency needs to take great care in procuring the right partner because the transit agency does not wish to be stuck with a poor performer for the duration of the contract.

Therefore, it is important to describe an accurate picture of the DRT service [refer to the elements and selected guidance columns in the table].

Procuring DRT Service (Continued)

Element	Selected Guidance
3. How the contractor is paid	The two most prominent payment structures for dedicated DRT service are rates per revenue vehicle hour and rates per passenger trip. A common variation is to use those rates to cover a contractor’s variable costs and also include a monthly rate to cover a contractor’s fixed rates. In this way, a contractor is assured that its fixed costs will be covered, regardless of the fluctuations in service (i.e., contractor risk is reduced). Payment type can have a profound impact on the proposed rate as well as contractor behavior; up to 70% of DRT cost structure is tied to driver wages and fringe benefits, which are based on hours.
4. Service standards tied to balance of service/cost efficiency and service quality, matched with performance-based incentives, penalties, and liquidated damages	Productivity has long been a metric by which the efficiency of DRT service has been measured; percent of shared rides and cost per passenger trip are alternative metrics. The transit agency should clearly state how its efficiency metric(s) is to be measured and reported. Further, the transit agency should clearly state the standard that the agency expects to be achieved. The standard should be accompanied by incentives and/or penalties tied to that standard. Ensure balance between cost-efficiency/productivity metrics and on-time performance standards.

INSTRUCTOR NOTES

[Continue referring to the elements and selected guidance columns in the table.]

Chapter Summary

- Key takeaways
 - A comprehensive RFP for a DRT contractor can reduce risks
 - Recognize that transition activities have additional costs
 - Consider a longer contract term to reduce cost
 - Contract payment structures should match responsibilities; match the payment structure to the type of service and contractor's responsibilities
 - Include incentives and/or penalties for cost efficiency and on-time performance
- Additional information, resources, and references provided in Chapter 11 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]

Exercise C-2: Small Group Breakout – DRT Strategies

- Form small groups
- Each group select one Chapter from Module C (Strategies for DRT)
 - Chapter 8: Call and Control Center Labor
 - Chapter 9: Demand Response Service Costs
 - Chapter 10: ADA Paratransit
 - Chapter 11: Outsourcing Demand Response
- For your chapter, answer the following: (10 minutes)
 - What is the most important take away (in your opinion)?
 - What strategy(ies) or takeaways would you like to apply or implement?
 - What's one thing you'd like to know more about?
- Report out (5 minutes)

INSTRUCTOR NOTES

- [Divide attendees into small groups. Discuss the instructions.]
- [Try to have at least one group on each chapter. If no one wants a chapter because it doesn't apply to any attendees, that's OK. For example, there might not be any attendees that operate ADA paratransit.]
- [During small groups, walk around room, assess progress, ask questions, etc. Provide reminders when 5 minutes, 8 minutes, and 9 minutes have passed so they know to wrap it up after 10 minutes.]
- [Facilitate report out by going from group to group. Carefully manage report out time to ensure all groups get a chance to report out.]

Module C Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module C

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

- Please write and mark your selected answers clearly.
- Only select one answer for questions with a circle: ○. |
Select all that apply for questions with a square: □.
- Your 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 **X** or **✓** is fine!



INSTRUCTOR NOTES

[Explain to participants this evaluation form should be filled out based on the Module C contents.]

End of Day 2

- Any remaining questions or comments?
- Stand and deliver



INSTRUCTOR NOTES

- [Ask if there are any other questions or comments.]
- [Ask at least 3 individuals to “Stand and deliver.” This means that they should stand up and share one thing from the day’s contents that stood out to them and/or that they intend to apply in their work.]
- [Give any instructions/reminders for when to attend the next workshop or day.]

Day 3



Day 3



Managing System Costs:

Operational and Capital Cost Management
at Rural and Small Urban Public Transit Systems

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

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INSTRUCTOR NOTES

[Welcome back participants and re-introduce self and workshop.]

Today's Agenda

- See schedule handout

Module/Content	Start Time	End Time	Duration
Day 3 Introduction	9:00 AM	9:15 AM	0:15
Module D: Managing Fixed and Flexible-Route Costs	9:15 AM	12:00 PM	2:45
Lunch	12:00 PM	1:00 PM	1:00
Module E: Managing Capital Costs	1:00 PM	3:25 PM	2:25
Module F: Looking Ahead	3:25 PM	3:40 PM	0:15
Workshop Closeout	3:40 PM	4:00 PM	0:20

INSTRUCTOR NOTES

[Describe the workshop agenda. Point out the times for each Module, for the breaks, and for closing for the day. It is recommended that you give someone (either an attendee or a co-presenter) the responsibility for monitoring the time to help you stay on schedule.]

Review – Prize Questions!

- Name one cost-related performance measure and describe what it tells you.
- Name two strategies to help retain operators.
- Why is it important to balance mileage across your fleet?
- Name one or more considerations when outsourcing maintenance.
- Name at least one DRT policy decision and its implications on cost management.

INSTRUCTOR NOTES

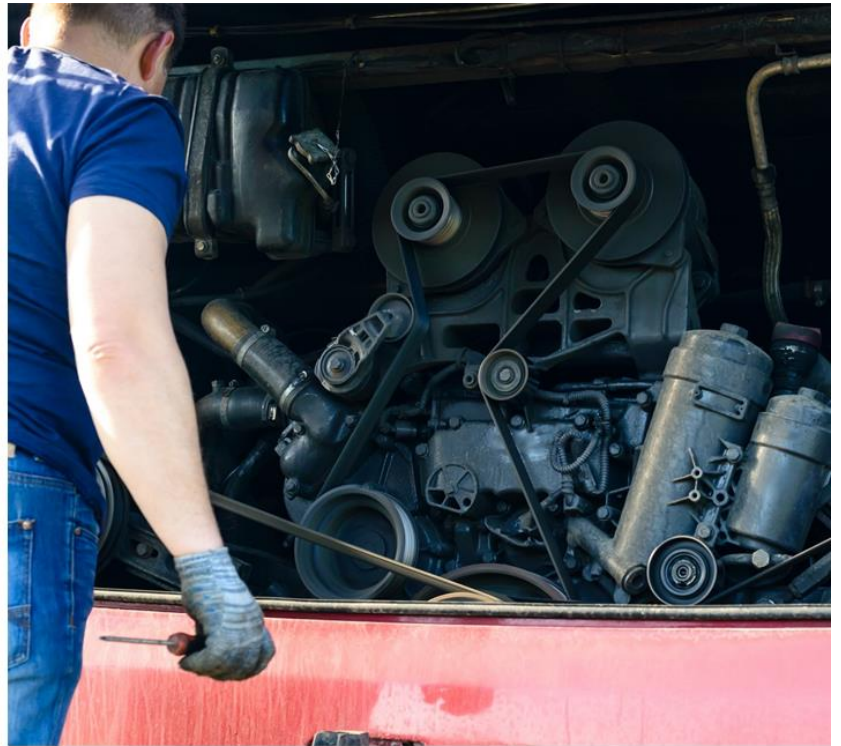
- Now, let's do some review of the material from the prior day(s).
- [Give as many of these prize questions as you see fit and have time for. Feel free to add your own. Answers to the slide's questions are below.]
- **Name one cost-related performance measure and describe what it tells you.** [Answers:
 - Operational cost per revenue hour: Assesses financial resources needed to produce a unit of service (hour of revenue service). OR *What does the transit agency spend to put service on the street for one revenue hour?*
 - Operational cost per revenue mile: *What does the transit agency spend to put service on the street for one revenue mile?*
 - Passenger trips per revenue hour: *How many passengers were served during an average hour of service?*
 - Operational cost per passenger trip: *What does it cost to provide a trip for one passenger?]*
- **Name two strategies to help retain operators.** [Answers:
 - See slides on strategies for retaining operators.]
- **Why is it important to balance mileage across your fleet?** [Answers:
 - Helps you get the most out of your assets over their lifespan.
 - Helps flatten maintenance demand over a vehicle life.]
- **Name one or more considerations when outsourcing maintenance.** [Answers:
 - Should consider vehicle transport costs.
 - Can also work with nearby agencies/governments able to perform needed repairs.

-
- If maintenance is contracted, be sure to monitor the contractor for efficiency and effectiveness.
 - Best value consideration includes getting quotes or bids.]
 - **Name at least one DRT policy decision and its implications on cost management.** [Potential answers:
 - Eligibility: impacts *who* is eligible to use service—ultimately driving demand.
 - Fare policies, sponsor rates, and subsidies: Can be used to encourage or dampen demand...Higher out-of-pocket costs for passengers or higher charge to sponsors likely will reduce demand.
 - Advance reservation policies:
 - Too far in advance can result in too many “speculative” bookings, creating sub-optimal schedules, increased no-shows, or cancellations.
 - Same day policies are enticing, but definitely can cause increased demand and also likely more difficult to find most cost-efficient schedule.
 - Subscription trips: Help reduce reservations calls and improve productivity, because subscriptions can form the base of the DRT schedule.
 - Will-call: Allowing can help reduce no-shows, but need to be able to accommodate—either adding trip to existing vehicles, using an NDSP, or an on-call operator.
 - Denials: Allowing denials (in non-ADA) may be necessary to control costs. Important to record denials accurately to have data on service needs.
 - Pickup and dropoff window policies and response time standards: One of the BIGGEST factors. Wider windows and longer response times = more opportunity to improve productivity.
 - No-show / late cancellations: Not having these policies can result in wasted vehicle hours and cost.
 - Service area policies: the larger the service area, the longer average trip lengths = more cost per trip. Common to split service area into zones.
 - Using NDSPs: can be a way to off load peak demand and reduce dedicated fleet size and dedicated operator counts.
 - Transfer policies: drop-and-go can increase productivity, but results in passengers being stranded and then re-work if agency has no-strand policy. Handoff policies best for passenger, but may add dead time and reduce productivity of service.
 - Driver assistance: no real difference between door-to-door and curb-to-curb.
 - Stop types: virtual stops can help increase productivity, because passengers walk to a location that reduces deviations from most efficient route.]

Module D: Managing Fixed- and Flexible-Route Costs



MODULE D: Managing Fixed- and Flexible-Route Costs



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE D 288

INSTRUCTOR NOTES

[Give a short overview of Module D.]

- Module D provides cost-management strategies that are specifically related to fixed- and flexible-route modes typically operated by rural and small urban systems such as circulators, neighborhood shuttles, local bus service, and express or commuter-type services.
- Module D is written largely for traditional bus services although some of the concepts could also apply to certain types of rail or fixed-guideway bus services like BRT.

Module Overview

- **One-sentence summary**

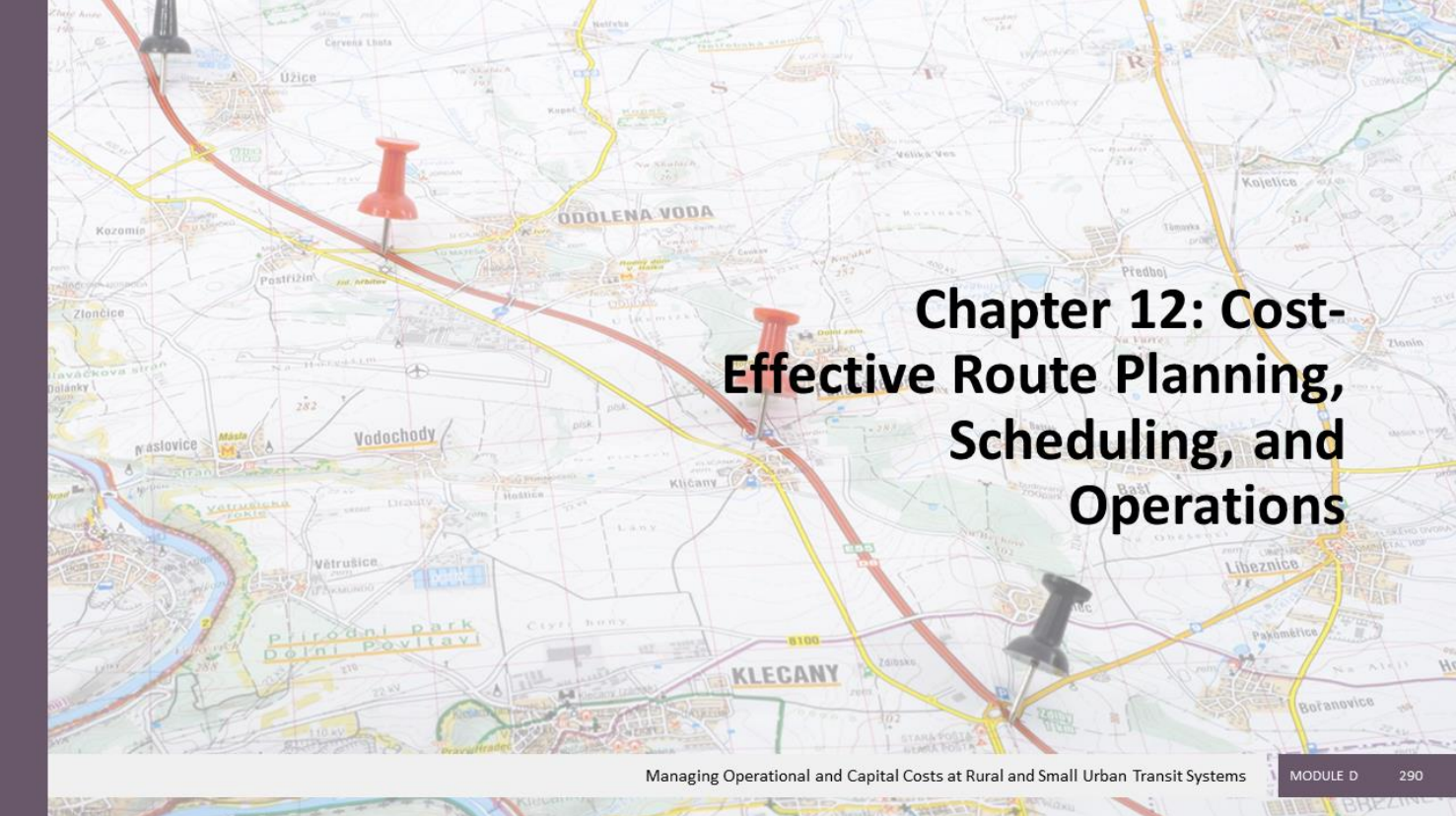
Specific strategies for managing costs of fixed- and flexible-route service

- **Chapters**

- 12: Cost-Effective Route Planning, Scheduling, and Operations
- 13: Contracting Out Fixed- and Flexible-Route Service

INSTRUCTOR NOTES

- This module will provide [read one-sentence summary].
- The module contains two chapters:
 - Chapter 12: [read chapter title].
 - Chapter 13: [read chapter title].

A topographic map of a region in the Czech Republic, showing several towns and a network of transit routes. The routes are highlighted in red and yellow. Three pushpins are placed on the map: two red ones and one black one. The red pins are located near the towns of Vodochody and KLECANY. The black pin is located near the town of Libeznice. The map also shows a river, a park, and various roads and landmarks.

Chapter 12: Cost-Effective Route Planning, Scheduling, and Operations

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE D 290

INSTRUCTOR NOTES

[Introduce Chapter 12 title.]

Learning Objectives

- Describe how service policies can impact fixed- and flexible-route productivity and cost effectiveness
- Explain cost-efficient approaches when planning, scheduling, and operating fixed and flexible routes
- Describe how to evaluate route performance

INSTRUCTOR NOTES

- This chapter discusses strategies to help improve the cost-efficiency and cost-effectiveness of directly operated fixed- and flexible-route service in rural and small urban operating environments.
- By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- Service policy impacts on cost management
- Planning and scheduling routes
- Operating routes
- Reviewing route performance

INSTRUCTOR NOTES

Chapter 12 is divided into the following sections [read the topics].



Service Policy Impacts on Cost Management

INSTRUCTOR NOTES

Just like demand response service, service policies have a significant place in cost management of fixed-route service. So, we'll first begin by discussing the impacts of service policies on fixed- and flexible-route cost management.

Types of Flexible-Route Transit

Route deviation	Can work well where deviations are a small part of overall trip demand, most riders do not have time-sensitive trips, and there are defined origins and destinations
Point deviation	Can allow driver more routing options for maintaining the schedule
Request stops	Falls between fixed-route bus transit and route deviation
Flexible route segments	Hybrid of fixed-route bus transit and flexible-route bus transit

INSTRUCTOR NOTES

There are different types of Flexible Route Transit, as shown in the table [summarize the table content].

Types of Fixed-Route Bus Transit

- Local
- Feeder
- Circulator
- Express
- Park-and-ride (P&R)
- Bus rapid transit (BRT)

INSTRUCTOR NOTES

And, there are different types of Fixed Route Transit such as [read the table content].

Service Policy Impacts on Cost Management

- Service policies help determine:
 - Where to provide service
 - How much service to provide
 - How to integrate routes to make a network
 - Where to place bus stops and provide amenities
 - How to respond to service requests
 - How to evaluate route performance
 - What corrective actions to take
- Can be used to decide where service can be added, improved, reduced, or eliminated
- Can inform capital investment decisions

Transit agencies should have documented service policies.

INSTRUCTOR NOTES

- Service policies help in determining: [summarize series of sub-bullets].
- Service policies also help guide where to add, improve, reduce, or even eliminate service and can help guide capital investment decisions.

Service Standards and Service Changes

- If service standards have been established, service policies can guide transit agencies toward implementing/maintaining service only in locations where service is cost-effective
- Service standards help make the case
- Service standards provide objectivity and transparency

Example: If an existing fixed route is carrying 2.0 passengers per revenue hour on average (a low level of productivity), it might be more cost-effective for the agency to discontinue the route and serve the passengers with DRT instead.

One service standard might not be enough to inform service change decisions.

INSTRUCTOR NOTES

Changes intended to increase productivity might be changes that increase costs or have a negative impact on service quality. The agency can consider the impacts of a productivity change on a cost-based metric like operating cost per revenue hour or a quality-of-service metric like on-time performance and try to find a balance. The ideal situation is, of course, one in which passengers per revenue hour can be increased without increasing operating cost per revenue hour or decreasing on-time performance—at the route level or system-wide. In some cases, it might be more important to an agency to provide lifeline service to key communities than to provide the most productive and cost-effective service possible. In such a case, a service standard related to how many people in the service area have access to transit might be given more weight than a productivity service standard or a cost-effectiveness service standard; cost management is not the only consideration.

Performance Measurement

- If the right key performance metrics are being tracked—and tracked accurately—the agency will be collecting data that can be used to help identify opportunities to streamline fixed- and flexible-route operations
- Agency might track productivity, cost-effectiveness, on-time performance, and passenger load metrics
- Regularly looking for patterns in performance data provides chances to meaningfully improve service delivery and better manage operating costs

See Chapter 3 in the Guidebook for more information.

INSTRUCTOR NOTES

- Tracking accurate key performance metrics enables the agency to identify ways to improve both fixed and flexible route operations.
- Metrics such as productivity, cost-effectiveness, on-time performance, and passenger loads should be monitored.
- Regularly analyzing performance data reveals patterns that can significantly enhance service delivery and effectively control operating expenses.

"Core" Transit Performance Measures

Performance Measure	Category
Annual boardings per capita	Mobility
Revenue miles between service disruptions	Service Reliability
Average fleet age	Passenger Comfort, Service Reliability
Average vehicle miles per gallon	Fuel Economy
Boardings per revenue hour	Productivity
Farebox recovery ratio	Cost-Effectiveness
Operating cost per revenue hour	Efficiency
Percent of bus stops accessible	Accessibility
On-time performance	Reliability
Revenue miles per revenue hour	Average Speed
CO2 emissions per mile	Environment
Crashes per thousand miles of revenue service	Safety

Source: Oregon DOT Transit Development Plan Guidebook

INSTRUCTOR NOTES

- This table shows the example performance metrics that can be used by agencies [go through some examples in the Performance Measures column and explain their respective category].
- We'll discuss evaluating route performance later on in this chapter.

Tool #9: Fixed- and Flexible-Route Service Policy Template

- Word document that can serve as a template for a service policies document for fixed- and flexible-route service
- Based on existing service policy documents from multiple Texas transit districts
- Available for download from Toolkit

INSTRUCTOR NOTES

[Open the Tool and show quickly.]

- Tool # 9 can be used as a Fixed- and Flexible-Route Service Policy Template.
- You can download the tool from the Toolkit.



Planning and Scheduling Routes

INSTRUCTOR NOTES

Now, the next step is actually taking those service policies and standards and turning them into actual service plans and schedules.

Planning Fixed and Flexible Routes

- Generally:
 - Route planning decisions should be made to balance available resources, service policies, and community needs
 - Operating costs are lower when routes are more productive
- Chapter 12 in the Guidebook provides fixed-route service planning rules of thumb as a starting point
- Transit planning software
 - Can help with the planning process
 - Helps agencies iterate through multiple scenarios to try to identify optimal service plan
 - Can provide rapid demographic analysis (e.g., people served and their characteristics, jobs served, etc.)

INSTRUCTOR NOTES

- Let's start by talking about planning.
- [Use slide content.]
- [3rd major bullet:] Transit agencies can benefit from use of transit planning software to [explain briefly the bullet points].

Planning Fixed and Flexible Routes (Continued)

Service Planning Strategies That Can Positively Impact Costs

Strategy	Notes
Understanding the market	If a route does not meet users' needs, they will not use it, and the route will not be productive.
Understanding resources available	It is important to have a thorough understanding what resources (e.g., funding, staff, and vehicles) are available to provide the service and under what conditions.
Understanding the street network	It is important to consider street network characteristics. A street network with lower connectivity is one in which travel times are likely to be longer.
Optimizing vehicle usage	Transit agencies can minimize non-productive time (e.g., layovers) by adjusting headways and/or routing.
Matching vehicles to demand	A smaller vehicle might be more cost-effective on a route where ridership is low, if the smaller vehicle is cheaper to operate and maintain than a larger bus.
Keeping routes as direct as possible	Minimizing out-of-direction travel reduces travel time and travel distance.

Continued on next slide

INSTRUCTOR NOTES

- Let's talk through some of the service planning strategies that can positively affect the transit costs.
- [Go through the table and explain each strategy.]
- [Continued on next slide...]

Planning Fixed and Flexible Routes (Continued)

Service Planning Strategies That Can Positively Impact Costs

Strategy	Notes
Using timed transfers	In low-demand areas, planning for timed transfers at key hubs can be more cost-effective than increasing route frequencies.
Optimizing bus stop spacing	Longer distances between stops can help speed up service and reduce operational and capital costs associated with installing and maintaining bus stops and/or shelters.
Using flexible-route service – route deviation	A fixed route could be transitioned to a flexible route by adding a route deviation component to the service. The primary advantages of this are (a) meeting ADA requirements without implementing a separate ADA paratransit service and (b) increasing service coverage. There are also disadvantages to weigh.
Using flexible-route service – point deviation	A fixed route could be transitioned to a flexible route by transforming it into a point deviation route. The primary advantages of this are (a) having no ADA requirements to meet and (b) increasing service coverage. There are also disadvantages to weigh.
Managing deviations	For flexible-route service, each deviation off the “base” alignment of the route adds travel time and cost.

Continued on next slide

INSTRUCTOR NOTES

- [Go through the table and explain each strategy.]
- [Continued on next slide...]

Planning Fixed and Flexible Routes (Continued)

Service Planning Strategies That Can Positively Impact Costs

Strategy	Notes
Using fixed-schedule service	A fixed-schedule route is a route that operates in different parts of the service area on different days. Serving users in one part of the service area only on, say, Mondays and Thursdays, might be enough to satisfy those users' transportation needs at lower cost to the agency.
Using service routes	A service route is one that is designed to connect a particular user group to a specific set of destinations on specific days (e.g., a "shopper shuttle"). Service routes might meet users' needs at lower cost to the agency as well as attract sponsorship from the destinations.
Diligently adhering to service standards	Service standards provide an objective and defensible starting point for allocating resources to routes.
Reviewing route performance regularly	Reviewing route performance on at least a quarterly basis can identify opportunities for productivity improvements and cost savings.

INSTRUCTOR NOTES

[Go through the table and explain each strategy.]

Scheduling Fixed and Flexible Routes

- Scheduling fixed and flexible routes: the process of determining how routes will be operated and assigning vehicles and operators to routes
- Four steps
 1. Trip building
 2. Blocking
 3. Run cutting
 4. Rostering
- In an optimal scheduling solution, the most of every operator's paid time is used to provide revenue service

Outcome: a scheduling solution

Software systems are available to automate various scheduling steps and allow for finding multiple scheduling solutions.

INSTRUCTOR NOTES

- Now, let's move on to scheduling.
- Scheduling is a rather niche field of practice that not many people have the chance to really do. However, its: [1st bullet].
- Scheduling contains four main steps: [use 4 steps listed].
- Let's define those terms quickly:
 - A trip is a segment of the service scheduled for a specific route in a specific direction. For example, Route 1 leaves the 1st stop at 6:00 am, hits a bunch of stops at various times and arrives at the other end of the route by 7:00 am. That's a single trip.
 - A block is the schedule that a specific vehicle will be assigned to on a given day. It includes which trips and routes the bus will operate on and when it will operate, and it includes pull-out and pull-in times.
 - A run is the schedule that a given operator is assigned to on a given day. An operator's run is built from one or more blocks.
 - A roster is a combination of runs that result in weekly work schedules, or "packages," for operators. Operators usually get to choose, based on seniority, the packages they would like to work.
- When doing fixed- or flexible-route scheduling, there are typically lots of rules and factors at play, and there are usually multiple scheduling solutions (or different ways) that you could operate the scheduled trips on any given day. The goal is to find the **OPTIMAL SCHEDULING SOLUTION**—the one where most of operators' paid hours are used to provide actual revenue service.
- Software systems can help automate the scheduling process and assist in finding optimal solutions; **HOWEVER**, you still need qualified, capable schedulers and good data to make scheduling systems work!

Scheduling Fixed and Flexible Routes (Continued)

Scheduling Strategies That Can Positively Impact Costs

In general, placing restrictions on the scheduling process leads to less efficient scheduling solutions.	Schedulers' familiarity with the service area is critical.
Matching operators with vehicles consistently and assigning them to routes they know can promote system efficiency through familiarity.	Schedulers should be well-trained, experienced, and detail-oriented.
It can be more difficult to build trips for complex routes.	Interlining can be used to eliminate route overlaps, reduce excessive recovery/layover time, and access better layover locations.
Providing significantly more recovery/layover time than needed (e.g., to ensure on-time performance) can result in inefficient use of operators and vehicles.	Flexible-route scheduling is less efficient if deviations are unpredictable in timing and/or duration.

Continued on next slide

INSTRUCTOR NOTES

- There are several scheduling strategies that can be used by the agency to help management costs such as [go through the table and explain some strategies].
- [Continued on next slide...]

Scheduling Fixed and Flexible Routes (Continued)

Scheduling Strategies That Can Positively Impact Costs

Agencies should have access to reliable travel time data for different times of day to inform trip building.	To optimize use of operators and vehicles, deadhead travel time and deadhead mileage should be minimized.
The more pull-outs and pull-ins there are at the yard, the more deadhead travel time and mileage are accrued. Where possible, driver relief should occur on the route, not at the yard.	Headway-based routes might not be as efficient as schedule-based services if the former requires vehicles to wait excessively at recovery/layover points to maintain the headway.
The more blocks there are, the more opportunities there are to optimize. However, more blocks typically means more deadhead and potentially more vehicles to operate.	Traditional rostering tends to produce more cost-effective schedules, and agencies have more control over overtime.
Balance scheduling operators for more overtime work with the risk of lower levels of performance and higher turnover.	Agencies can more effectively manage productivity and optimize costs by monitoring trends and patterns over time and adjusting staffing levels to meet targeted service goals.

INSTRUCTOR NOTES

[Continue going through the table and explaining strategies.]

Exercise D-1: Small Group Breakout – FRT Planning and Scheduling

- Form small groups
- Discuss the following questions (20 minutes)
 - Do you have service standards/guidelines/policies for your fixed- or flexible-route services?
 - If so, how do they help you cost management? How do they challenge cost management?
 - If not, why not?
 - Discuss the hard and soft rules used when creating fixed- or flexible-route schedules. Which help and which hinder cost management?
- Report out (10 minutes)

INSTRUCTOR NOTES

- [Divide attendees into small groups. Discuss the instructions.]
- [During small groups, walk around room, assess progress, ask questions, etc. Provide reminders when 10 minutes, 15 minutes, and 18 minutes have passed so they know to wrap it up after 20 minutes.]
- [Facilitate report out by going from group to group. Carefully manage report out time to ensure all groups get a chance to report out.]



INSTRUCTOR NOTES

- [Inform participants that they have a break (in minutes) and ask participants to be back on time.]
- [Break is scheduled to be 5 minutes.]



Operating Routes

INSTRUCTOR NOTES

Now, let's move from policies, planning, and scheduling to discussing strategies for day-to-day operations.

Operating Fixed and Flexible Routes

Optimal extra board size

- Extra board: the pool of operators who do not have assigned runs
- Sizing extra board correctly is a key to managing costs of operator labor
- Ideally should be sized to minimize the amount of overtime worked by regular operators
- Spreadsheet tool developed by Dallas Area Rapid Transit estimates operator staffing needs, including size of extra board

INSTRUCTOR NOTES

- One strategy is to establish and maintain the optimally sized extra board.
- In case you don't know, the term extra board refers to a pool of operators who do not have assigned runs. Extra board operators fill in for absent regular operators and they also drive blocks that schedulers have not been able to include in regular operators' straight or split runs. Having an adequate number of extra board operators on standby means that transit agencies can continue to provide service when regular operators are not available—and without relying on non-extra board operators to work overtime. Operators on the extra board must be paid for their availability, whether they are actively driving or not, so sizing the extra board correctly is one of the keys to managing the costs of operator labor.
- In the ideal, you should have just the right number of extra board operators—not too few and not too many.
- Finding the ideal number takes some analysis of your staffing requirements, including training, absences, drug testing, and other factors.
- Some agencies, like Dallas Area Rapid Transit, have developed a spreadsheet to help them keep the right number of operators—both regular operators and extra board.

Operating Fixed and Flexible Routes (Continued)

Proactive dispatching techniques

- Dispatchers have to make sure operators and vehicles are available to provide service
- Being proactive in making decisions about covering operator absences can reduce operating costs
 - Affects how overtime is used
 - Affects how quickly a replacement operator can start providing service
- Proactivity requires well-trained, experienced dispatchers who have a strong knowledge of available resources (labor and vehicles)
- Ideally, operators are incentivized to communicate absences and late reports as far in advance as possible

INSTRUCTOR NOTES

- Proactive dispatching ensures operators and vehicles are ready for service, cutting operating costs.
- In the best-case scenario, dispatchers are making the best possible decision to cover operator absences with a focus on reducing overtime while also maintaining service quality.
- Skilled dispatchers familiar with available resources are crucial. Encouraging early communication of absences by operators is ideal.
- One thing that helps with making good decisions is having advanced notice from operators if they are going to miss. Rules or incentives can be used as tool to motivate advanced notice of misses and penalize late notice.

Operating Fixed and Flexible Routes (Continued)

Proactive service oversight

- Creates opportunities to address delays and service issues as soon as they arise or as soon as they become likely to occur
- Can mean the difference between having to send out another revenue vehicle (which would increase operating costs) or not
- Can lessen adverse impacts of disrupted/delayed service on riders
- Street supervisors play an important role
- Robust communication systems and dispatcher and street supervisor training are essential
- Technology can facilitate real-time monitoring

INSTRUCTOR NOTES

- Another cost-management strategy is proactive service oversight.
- Attentive street supervisors can observe boardings and alightings, delays, customer behavior, vehicle mechanical operations, and other issues in the field.
- When issues or potential issues are identified, street supervisors might be able to correct them directly. If a vehicle mechanical issue can be assessed in the field, a replacement vehicle might not be needed, or at least not needed immediately. If a street supervisor can identify a feasible detour route based on their knowledge of the area roadway network, service might continue to be delivered on schedule. If one vehicle is late arriving to a timed transfer point, a street supervisor could hold other vehicles until the late vehicle arrives. At minimum, street supervisors are positioned to convey accurate information to dispatchers.
- Overall, the idea is for identification of issues or potential service problems before they become complex or before they require additional resources (in the form of another vehicle and driver) or have a negative impact on the customer experience.
- Technology can help with this activity, particularly having automated vehicle location (AVL) systems on buses.

Operating Fixed and Flexible Routes (*Continued*)

Monitoring delays

- Can occur as part of proactive service oversight
- Agencies should also review historical data about times, locations, extents, and causes of delay
- Goal: streamline service and make it more cost-effective

INSTRUCTOR NOTES

- Tracking delays is also part of proactive service monitoring.
- Agencies should analyze historical data on delay times, locations, and causes to improve service efficiency and cost-effectiveness.
- If delays are significant and consistent, they could be causing unnecessary unscheduled overtime or having other cost impacts.



Reviewing Route Performance

INSTRUCTOR NOTES

- This section discusses practices associated with managing the cost of service by monitoring routes' fiscal performance (i.e., cost-efficiency and cost-effectiveness).

Reviewing Route Performance

- Managing routes' fiscal performance (cost-efficiency and cost-effectiveness)
- Service policies are strategic starting point for selecting performance measures

Typical Cost-Efficiency Measures	Typical Cost-Effectiveness Measures
Cost per revenue hour	Cost per passenger
Cost per revenue mile	Cost per passenger-mile
	Farebox recovery ratio

- Productivity measures might also be useful
- See Chapter 3 in Guidebook for more information

INSTRUCTOR NOTES

- To assess route performance, it's vital to manage the fiscal aspects (cost-efficiency and cost-effectiveness) of routes.
- Service policies are the starting point for effective route performance management. As previously discussed, service policies should define performance measures and desired targets for those measures.
- The table on the slide shows typical cost-efficiency and cost-effectiveness measures. [Read the measures from the table.]
- We've discussed most of these before—does anyone need these defined or need a quick review on them? [Pause and answer questions as needed.]
- When monitoring route performance, you may also want to move beyond “cost” measures and focus on service effectiveness (i.e., productivity) measures like passenger per revenue hour or mile.

Chapter 3 of the Guidebook has more information on transit performance measures.

Reviewing Route Performance (Continued)

- Collect passenger trips by route
- Collect revenue and total hours and miles by route
- Allocate costs to routes. Options include:
 - Allocate all costs based on revenue hours or revenue miles
 - Use a cost allocation model (recommended)
- Route-level performance measures can be used to inform decisions about route changes

INSTRUCTOR NOTES

- To evaluate Route Performance: [use slide bullets].
- [Remind them that Chapter 3 contains more information on cost allocation, and there are several tools available to help with allocating costs, like National RTAP's Two-Variable Cost Allocation Calculator.]

Example Route Performance Report

Route	2022 Goal	2022 Actual	2023 Goal	2023 Actual
1	9.00%	21.30%	10.00%	20.66%
2*	9.00%	8.81%	10.00%	9.07%
3	9.00%	22.10%	10.00%	21.88%
10	9.00%	17.55%	10.00%	17.37%
11	9.00%	17.19%	10.00%	16.16%
12	9.00%	11.33%	10.00%	11.10%
20*	9.00%	5.97%	10.00%	6.15%
21	9.00%	19.38%	10.00%	19.77%
22	9.00%	22.28%	10.00%	24.39%
23	9.00%	18.47%	10.00%	17.73%
24	9.00%	21.78%	10.00%	22.22%
26	9.00%	22.38%	10.00%	21.48%
30	9.00%	15.34%	10.00%	15.49%
31	9.00%	23.43%	10.00%	23.66%
41	9.00%	26.45%	10.00%	23.71%
42	9.00%	21.77%	10.00%	22.21%
43	9.00%	18.97%	10.00%	18.21%
44	9.00%	10.45%	10.00%	10.66%
50*	9.00%	7.56%	10.00%	7.33%
52	9.00%	9.97%	10.00%	10.87%

- Route-level fare recovery ratios report
- Bold text and * denote routes that may be candidates for modification because they do not meet the goal in 2023

INSTRUCTOR NOTES

- Here's an example of a route performance report for FY22 and FY23 that shows how farebox recovery ratio might be monitored.

Open Discussion

- What are some activities you might do if you were presented with this information?

Route	2022 Goal	2022 Actual	2023 Goal	2023 Actual
1	9.00%	21.30%	10.00%	20.66%
2*	9.00%	8.81%	10.00%	9.07%
3	9.00%	22.10%	10.00%	21.88%
10	9.00%	17.55%	10.00%	17.37%
11	9.00%	17.19%	10.00%	16.16%
12	9.00%	11.33%	10.00%	11.10%
20*	9.00%	5.97%	10.00%	6.15%
21	9.00%	19.38%	10.00%	19.77%
22	9.00%	22.28%	10.00%	24.39%
23	9.00%	18.47%	10.00%	17.73%
24	9.00%	21.78%	10.00%	22.22%
26	9.00%	22.38%	10.00%	21.48%
30	9.00%	15.34%	10.00%	15.49%
31	9.00%	23.43%	10.00%	23.66%
41	9.00%	26.45%	10.00%	23.71%
42	9.00%	21.77%	10.00%	22.21%
43	9.00%	18.97%	10.00%	18.21%
44	9.00%	10.45%	10.00%	10.66%
50*	9.00%	7.56%	10.00%	7.33%
52	9.00%	9.97%	10.00%	10.87%

INSTRUCTOR NOTES

[Encourage open discussion of the question; potential discussion points include:

- Also examine ridership data.
- Analyze cost-effectiveness and cost-efficiency measures.
- Analyze route by segment.
- Try to advertise / promote the routes.
- Talk with riders or nearby communities to determine why routes have low ridership.
- Make sure that operators are collecting fares!
- Etc.]

Tool #10: Route Performance Template

- Excel workbook to help calculate performance measures for fixed- and/or flexible-route service for ongoing performance monitoring
- Available for download from Toolkit

INSTRUCTOR NOTES

[Open the Tool and show different sheets quickly]

- Tool #10 can be used as a Route Performance Template.
- You can download the tool from the Toolkit.

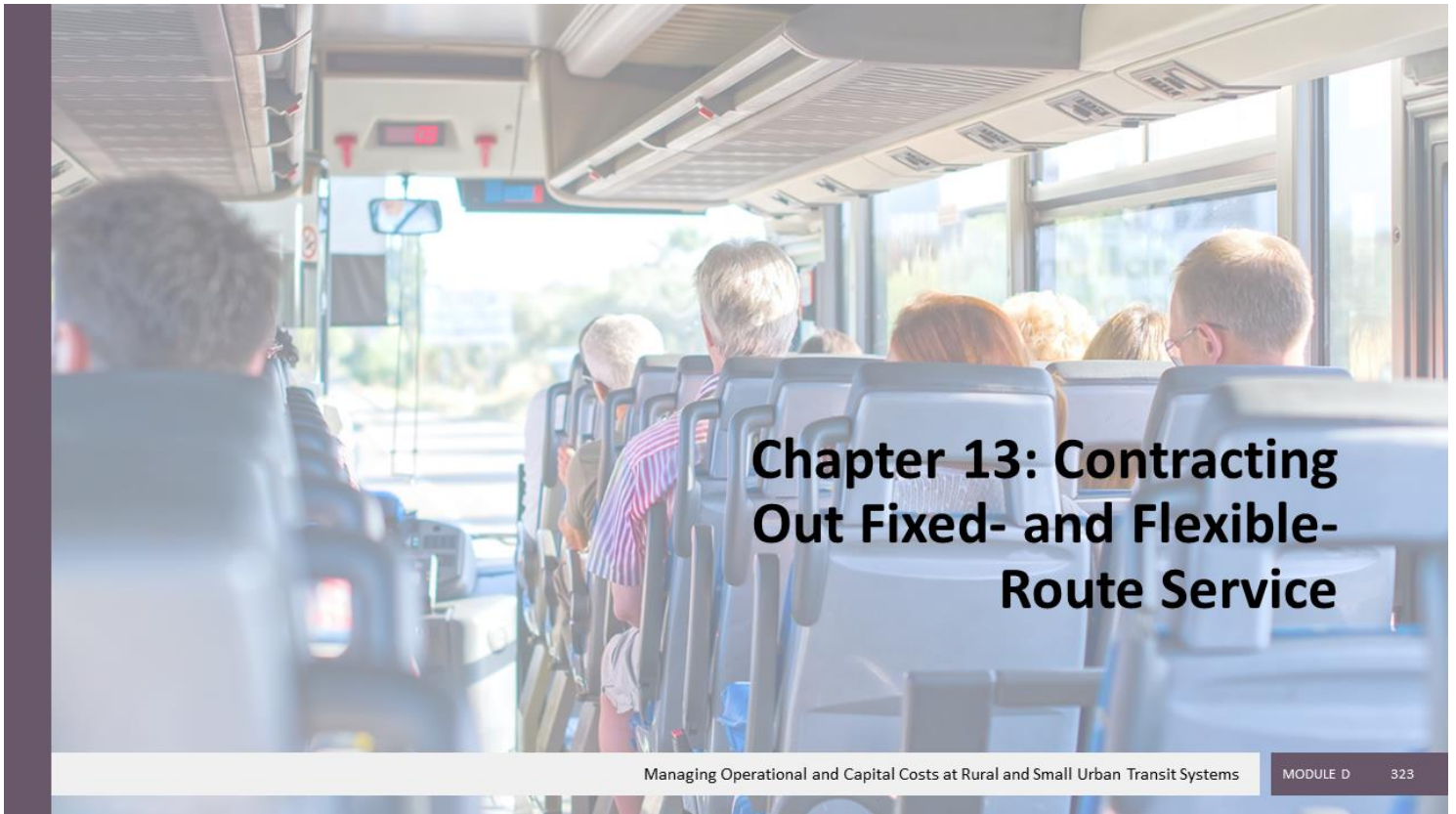
Chapter Summary

- Key takeaways
 - Service policies can achieve cost effective service goals
 - Tracking the right metrics can result in good cost management decisions
 - Route productivity can translate to cost effectiveness
 - Service policies and standards can impact schedule performance
 - Highly trained schedulers and dispatchers are critical
- Additional information, resources, and references provided in Chapter 12 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]



Chapter 13: Contracting Out Fixed- and Flexible-Route Service

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE D 323

INSTRUCTOR NOTES

[Introduce Chapter 13 title.]

Learning Objectives

- Describe considerations and the options available in outsourcing fixed- and flexible-route service and those options' pros and cons.
- Describe important elements to include in the procurement of fixed- and flexible-route service.
- Explain cost and quality management considerations when procuring, managing, and overseeing outsourced fixed- or flexible-route services.

INSTRUCTOR NOTES

- By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

FRT = Fixed - or
Flexible-Route Transit

- Models & Options for Outsourcing FRT
- Decision to Outsource FRT
- Procurement of FRT
- Management & Oversight of Outsourced FRT

INSTRUCTOR NOTES

Chapter 13 is divided into the following sections [read the topics].

Open Discussion: Outsourcing FRT

- If you currently outsource FRT:
 - Why do you outsource?
 - What have been the benefits?
 - What have been the challenges?
 - Have you ever thought about insourcing?
- If you currently operate FRT in-house:
 - Why do you insource?
 - What have been the benefits (vs. outsourcing)?
 - What have been the challenges?
 - Have you ever thought about outsourcing?

INSTRUCTOR NOTES



Models and Options for Outsourcing FRT

INSTRUCTOR NOTES

Models (Structure) for Outsourcing FRT

- Model used is based on transit agency needs and resources
- Models include:
 - **Management Contract**—contractor provides general manager (+ additional key staff). The transit agency retains capital asset ownership, operations, and maintenance.
 - **Turnkey Contract**—contractor provides management team, capital assets, operations, and maintenance.
 - **Function Contract**—contractor provides specific transit functions—such as operations only, vehicle maintenance only, or combination of functions.

In all cases, the transit agency continues responsibility for applying for and administering grants, establishing policies, and overseeing contract.

INSTRUCTOR NOTES

- There are many different models (or structures) possible when outsourcing FRT.
- Which model is the best depends on a transit agency's needs and resources.
- The main models include: [use slide bullets].

Options for Outsourcing

- No one-size-fits-all solution for outsourcing FRT
- Variety of contracting options:
 - Contracting for specific services or portions of service
 - For all routes or a subset of routes
 - By service type—e.g., peak service, park & ride, urban or rural
 - Contracting to different contractor types—another transit agency, a human services agency, a private for-profit company
 - Contracting to one or multiple contractors

INSTRUCTOR NOTES

There's no universal outsourcing solution for FRT. And even with a specific model, you also have several contracting options at your disposal, including:

- Contracting for specific services or parts of the service, for example, a single garage, a single route, a collection of routes, etc.
- Contracting for various service types like peak service, park, and ride, urban, or rural areas.
- Considering different contractor types such as another transit agency, a human services agency, or a private for-profit company.
- Contracting with one or multiple contractors.



Decision to Outsource FRT

INSTRUCTOR NOTES

- With all those options out there, let's talk about how you might even go about making the decision of *whether* to outsource or operate service in-house.

Factors to Consider & Evaluate in Outsourcing FRT

- Specific service or function cost drivers and overall cost
- Availability of staff and the level of expertise
- State or local laws, union work-rules
- Larger planning strategies
- Control over operations, customer service, and training standards

Organization's mission, vision, and long-range plans should guide the decision-making process



INSTRUCTOR NOTES

When outsourcing FRT, consider and evaluate these factors:

- Service or function cost factors and total costs.
- Staff availability and expertise level.
- State or local laws, union regulations.
- Comprehensive planning strategies.
- The degree of desired control over operations, customer service, and training standards.

Potential Benefits of Contracting Out



Cost efficiency (more service at a lower cost),



Elimination or reduction of pension and benefits costs,



Increased flexibility to make changes to service and service levels,



Overall contractor competency and excellence in delivering high quality service,



Access to a national reservoir of best practices, and



Reduced need to be engaged in day-to-day operations and bus operator management.

INSTRUCTOR NOTES

Here are some of the potential advantages of outsourcing FRT: [read the slide contents and explain briefly each item].

Potential Challenges of Contracting Out



Costs of service increasing over time,



Operator shortages, especially recently,



Billing disagreements,



Turnover of key personnel (e.g., contractor management staff),



Inadequate documentation of performance measures or NTD data,



Quality training of contractors' employees, and



Quality of maintenance.

INSTRUCTOR NOTES

On the other hand, there are challenges. Here are some of the potential challenges agencies may face when outsourcing FRT: [read the slide contents and explain briefly each item].

Other Possible Cons of Contracting

- Loss of control over operations
- Reduced quality of workforce
- Employee turnover of operators and mechanics/low wages
- Poor customer service
- Time and effort to ensure contractor performs up to expectations
- Less savings over time
- Local environment might not be competitive; therefore, low anticipation of cost savings and little reason for changing practices

INSTRUCTOR NOTES

Additional potential downsides of contracting include:

- Loss of operational control.
- Decreased workforce quality.
- High turnover among operators and mechanics due to low wages.
- Decline in customer service quality.
- Time and effort needed to ensure contractors meet expectations.
- Reduced long-term savings.
- Local environment may lack competitiveness, resulting in low-cost savings and minimal motivation to change practices.



Contracting to Reduce Costs

- Lower labor cost and/or less costly fringe benefits
- Less stringent work rules and schedule flexibility
- Less administrative staff and/or lower supervisor to staff ratios
- Specialized expertise may provide cost efficiency
- Maintenance expertise efficiencies
- Change flexibility (e.g., quicker procurement, new hires)

INSTRUCTOR NOTES

Contracting out can impact the costs in several ways such as [read the bullet points in the slide content].

Costs That May Offset Savings

- Procurement cost to contract
- Contract oversight
- Performance monitoring
- Service coordination

Other considerations:

- Service quality
- Workforce motivation and morale
- Response to changing service demands or ability to add new services

INSTRUCTOR NOTES

Expenses that might counterbalance savings are:

- Contract procurement costs.
- Oversight of the contract.
- Monitoring performance.
- Coordinating services.



Procurement of FRT

INSTRUCTOR NOTES

Ok, so, let's say you've decided to outsource your FRT. This section discusses some of the steps and considerations before, during, and after the procurement.

Before You Start on the RFP To Do List before Development



DETERMINE
CONTRACT TERM
PERIOD



PROJECT SERVICE
LEVELS OVER
CONTRACT TERM
(HOURS, MILES,
VEHICLES)



FINALIZE
PERFORMANCE
MEASURE
THRESHOLDS AND
STANDARDS



DETERMINE
TECHNOLOGY
REQUIREMENTS



DETERMINE
PAYMENT
STRUCTURE

INSTRUCTOR NOTES

To-Do List before starting RFP for contracting out are listed here as [read the items].



Scope Elements

Model/Options Are the Determining Factors of What to Include

- Background and purpose
- Overview of each service
- Service levels by year
- Technology/communication
- Key and general personnel
- Organization structure
- Training requirements
- Vehicle operator requirements
- Control center operations
- Window dispatch duties
- Road supervision duties
- Facility/equip. maintenance
- Vehicle requirements
- Vehicle maintenance
- Policies and procedures
- Fare collection requirements
- Safety/security requirements
- Data reporting requirements
- Complaint procedures
- Emergencies and disruptions
- Service quality/performance
- **Performance Incentives & Penalties**
- **Liquidated damages**
- NTD reporting
- Drug and alcohol policies
- Marketing and public relations
- Contractor oversight
- **Mobilization/transition**

INSTRUCTOR NOTES

- What's in a typical scope for an RFP? Here's a list of potential sections.
- Which sections to include really depend on which model and option you're going with.
- Because there's too much here to go over each element, we'll unpack three of these items:
 - Performance incentives and penalties.
 - Liquidated damages.
 - Mobilization/transition.

Incentives & Penalties vs. Liquidated Damages

Incentives and penalties are tied to performance standards and can have a motivational force and are very common in transit service contracts. Common incentives/penalty performance metrics include:

- Schedule adherence (OTP)
- Missed trips or blocks
- Crash/accident rate
- Complaint rate
- Pull-out adherence

Liquidated damages (LDs) are a means to recover when certain contract requirements are not met. Common LDs include:

- Key staff vacancy
- Failure to report complete NTD
- Violation of DOT/FTA Drug and Alcohol policy program
- Vehicle maintenance compliance
- Customer complaint response

INSTRUCTOR NOTES

- First, a bit of definitions. There IS a difference between incentives & penalties and liquidated damages.
- Incentives and penalties are linked to performance standards are often used in transit service contracts to motivate and ensure quality. Common metrics for these incentives/penalties include [read the bullet points].
- In contrast, liquidated damages LDs serve as a way to recoup losses when specific contract terms aren't fulfilled. Examples of LDs include [read the bullet points].

Example Incentive/ Penalty Matrices

On-Time Performance Range	Bonus	Assessment
88.0% or better	\$7,500	
86.0% to 87.99%	\$5,000	
85.0% to 85.99%	\$2,500	
84.0% to 84.99%	-----	-----
81.0% to 83.99%		(\$7,500)
Less than 80.00%		(\$10,000)

Prev. Accidents per 100K Miles	Bonus	Assessment
0.90 or lower	\$20,000	
0.91 – 1.10	\$10,000	
1.11 – 1.20 (Neutral)	-----	-----
1.21 – 1.60	-----	(\$5,000)
1.61 or higher		(\$10,000)

INSTRUCTOR NOTES

- Here's examples of what an Incentive and Penalty matrix might look like. These examples are from Denver RTD and are found in *TCRP Synthesis Report 171: Third Party Contracts for Fixed-Route Bus Operations and Maintenance*.
- You'll note that this agency took both the carrot and the stick approach in their incentives and penalties—rewarding exceeding the standard and penalizing if they standard isn't met. And the incentives and penalties are in relation to the magnitude of exceeding or failing to exceed the standard.

Mobilization and Transition Five-to-Six-Month Period

The mobilization requirements may include:

- Recruit and hire employees.
- Provide start-up training
- Acquire and inspect new assets
- Stand-up the routes and runs to ensure design, tested, and training is working.
- Software setup and deployment (scheduling, dispatch, maintenance, payroll)

The transition requirements may include:

- Contractor's management to participate in weekly meetings
- Vehicle list and plan for vehicles inspection in time for training
- Facility inspection
- Driver training plan and evaluation—to include technology training specific needs
- Driver drug and alcohol testing plan
- Fueling schedule coordination plan
- Scheduling and dispatch training and evaluation
- Training plan for new mechanics and operations staff
- Reporting requirements to include data for start-up incentives (if desired) such as drivers hired by date, on-time pull-outs completed, on-time performance

INSTRUCTOR NOTES

- It's also important to remember that when procuring outsourced service, any new contractor is going to need at least 5 to 6 months to start up the new service.
- This period of time is referred to as the mobilization and transition period.
- The contract mobilization period is critical to fostering the contractor agency relationship, to ensure equipment is in proper condition, and that technology systems are fully set up and tested. Engaging contractors and the internal team early and often during the transition to collaborate on critical transition element.
- Some mobilization requirements include: [use bullet points].
- Also, during the transition to the new contractor, you may need to require your new contractor accomplish certain tasks/milestones, for example: [use bullet points].

Procurement Process Elements



INSTRUCTOR NOTES

The procurement process is a financial investment and can be complex to ensure a balanced evaluation team that includes expertise in critical elements, that potential suppliers are encouraged to participate with adequate time and information to develop a comprehensive response, and the process and structure for evaluation is well planned. Elements to a comprehensive RFP process includes the following: [use slide contents].



Management and Oversight of Outsourced FRT

INSTRUCTOR NOTES

Now, once you have awarded a contract and you have a firm onboard providing your outsourced service, there are a few things to keep in mind.

Inspect What You Expect

Activities to assess the quality of contracted services include:

- Periodic reports and meetings
- On-site inspections
- Performance metrics
- Real time monitoring

Strategies for management and oversight include:

- Consistent transit agency and contractor interaction and communication
- Adequate and dedicated staffing to the oversight activities with defined responsibilities
- Performance monitoring of measures and standards

INSTRUCTOR NOTES

- First, management and oversight of outsourced FRT is key to contracting success. Build an oversight plan as part of the scope of work, described clearly, and follow through with a thorough and regular monitoring system to track contractor performance. Hold the contractor to the terms of the contract from the start. Provide adequate funding for an oversight staff and have the oversight team or person help in the transition. As one agency expressed: “Inspect what you expect.”
- [Summarize contents of slide.]

Monitoring By Performance Measure

Performance Measure	Not Monitored	Daily/ Weekly	Monthly	Quarterly	Total That Monitors
Crash / Accident Rate*	0%	41%	50%	9%	100%
Schedule Adherence	3%	51%	40%	6%	97%
Missed Trips or Blocks	3%	63%	31%	3%	97%
Complaint Rate	6%	40%	51%	3%	94%
Passenger / Employee Injury Rate*	6%	29%	56%	9%	94%
Cost-Efficiency	11%	11%	63%	14%	89%
Complaint Response Time	14%	49%	31%	6%	86%
Cost-Effectiveness	14%	6%	60%	20%	86%
Service Effectiveness	14%	14%	51%	20%	86%
Pull-Out Adherence	17%	49%	26%	9%	83%
Customer Satisfaction	17%	34%	34%	14%	83%
First Time Point On-Time Performance	20%	43%	31%	6%	80%
Headway Adherence or Headway Reliability	23%	40%	31%	6%	77%
Overcrowding	31%	46%	23%	0%	69%
Operator Absenteeism / Call Outs	37%	37%	14%	11%	63%
Operator Overtime Usage	60%	11%	20%	9%	40%

Note: Percentages are rounded and may not add up.
*These measures had 34 respondents.

INSTRUCTOR NOTES

- Monitoring outsourced FRT contracts involves using performance measures. The table on the slide shows the frequency of these measures used by agencies. It reveals that metrics like OTP, Missed Trips, Crash Rate, Complaint Rate, Complaint Response Time, On-time Pull-outs, and Overcrowding are among the most common measures used daily/weekly to monitor outsourcing performance.

Chapter Summary

- Key takeaways
 - Consider multiple models and options prior to deciding on one approach
 - Guide the decision-making process with the transit agency's long-range plans and evaluate factors
 - Weigh benefits with tradeoffs and transaction costs in the decision to contract
 - The scope of work provides the opportunity to clarify expectations, rules, requirements, and agency goals
 - Take time to plan an effective procurement process
 - Requirement for communication is needed in performance management
- Additional information, resources, and references provided in Chapter 13 of the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter.

- The key takeaways of this chapter are [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]

Prize Questions!



- Describe the role that service policies have in FRT cost management.
- FRT scheduling software – how does it help? What does it need to succeed?
- Name and define two performance measures for monitoring route performance.
- Name one daily operational strategy that helps with cost management. How does it help?
- What is the difference between a penalty and a liquidated damage in a contract for service?

INSTRUCTOR NOTES

[Select one or more questions on the slide as prize questions, as time allows. Encourage participants to actively engage. Potential answers described below.]

- **Describe the role that service policies have in FRT cost management.** [Potential answers:
 - Set the blueprint for service (where, when, how much, etc.).
 - Help set standards for route performance (including cost-effectiveness).
 - Help guide decisions for adding, improving, reducing, or eliminating service.
 - Help guide capital investment decisions, etc.]
- **FRT scheduling software – how does it help? What does it need to succeed?** [Potential answer:
 - Helps automation scheduling tasks and makes it easier to iterate through potential scheduling solutions to find the optimal solution. HOWEVER, needs qualified schedulers and accurate data.]
- **Name and define two performance measures for monitoring route performance.** [Potential answers:
 - Cost-efficiency measures:
 - Cost per revenue hour OR cost per revenue mile.
 - Cost-effectiveness measures:
 - Cost per passenger.
 - Cost per passenger mile.
 - Farebox recovery ratio.

-
- Passengers per revenue hour or revenue mile.
 - Service quality measures (e.g., complaint rates, OTP, etc.) are less desirable answers, but can be accepted.]
 - **Name one daily operational strategy that helps with cost management. How does it help?** [Potential answers:
 - Optimal extraboard size: reduces unscheduled overtime, reduces need for unnecessary extraboard operators, maintains service quality.
 - Proactive dispatching techniques: helps ensure open runs are covered and ensures optimal utilization of available operators and vehicles.
 - Proactive service oversight: reduces unscheduled overtime and need for additional operators & vehicles to help correct service issues.
 - Monitoring delays: helps reduce recurrent unscheduled overtime and detect potential problems with service that need correcting.]
 - **What is the difference between a penalty and a liquidated damage in a contract for service?** [Answer:
 - Penalty is tied to a performance standard and is assessed when the standard is not met (e.g., OTP).
 - Liquidated damages is a way to recoup a loss tied to failure to perform (e.g., not adhering to FTA requirements or failure to report data).]

Module D Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module D

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

- Please write and mark your selected answers clearly.
- Only select one answer for questions with a circle: ○. |
Select all that apply for questions with a square: □.
- Your 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 **X** or **✓** is fine!



INSTRUCTOR NOTES

[Explain to participants this evaluation form should be filled out based on the Module D contents.]



Lunch

INSTRUCTOR NOTES

[Break for lunch. Remind attendees that lunch is scheduled for 60 minutes and to please return on time.]



MODULE E: Managing Capital Costs



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE E 351

INSTRUCTOR NOTES

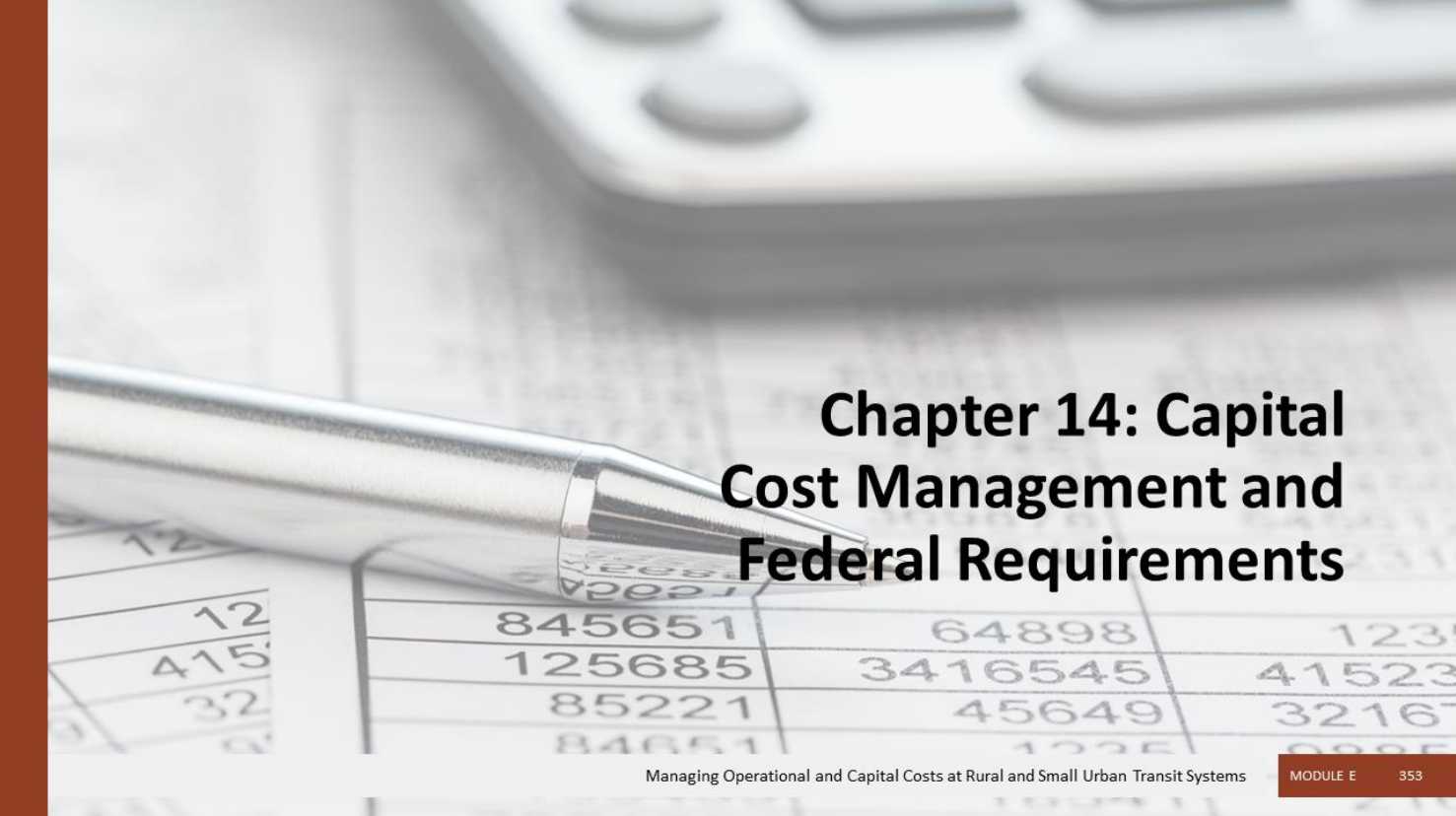
- Module E provides cost management strategies that are specifically related to the capital expenses most commonly encountered by rural and small urban transit systems, with particular attention paid to vehicles and technology.
- Module E will be the most useful for transit agencies that procure, own, and maintain their own capital assets.

Module Overview

- **One-sentence summary**
Strategies for managing capital costs
- **Chapters**
 - 14: Capital Cost Management and Federal Requirements
 - 15: Managing Vehicle Capital Costs
 - 16: Managing Technology Costs

INSTRUCTOR NOTES

- This module will help you with [read one sentence summary].
- The module contains three chapters:
 - Chapter 14: [read chapter title].
 - Chapter 15: [read chapter title].
 - Chapter 16: [read chapter title].



Chapter 14: Capital Cost Management and Federal Requirements

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE E 353

INSTRUCTOR NOTES

[Introduce Chapter 14 title.]

Learning Objectives

- Describe categories of capital cost expenditures
- Identify major components of a capital improvement plan
- Discuss upper-level strategies for managing capital costs
- Discuss importance of transit asset management (TAM)
- Outline federal requirements under the TAM rule

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- Overview of capital expenses
- Capital cost estimation and management
- Capital improvement plans
- Transit asset management

INSTRUCTOR NOTES

Chapter 14 is divided into the following sections [read the topics].



Overview of Capital Expenses

INSTRUCTOR NOTES

Let's begin with a quick overview of what we mean by capital expenses and general guidance regarding managing capital assets.

Capital Investments

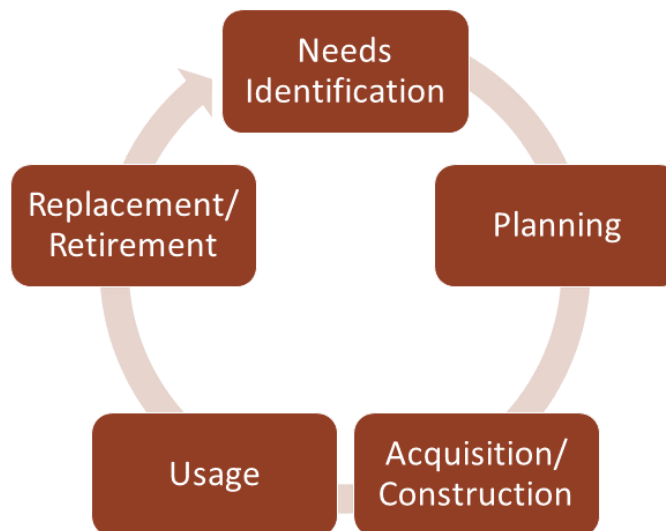
- One of the cornerstones of enhancing and maintaining level of service of transit system
- Include a wide range of one-time expenditures on physical assets (office buildings, stations, terminals, equipment, vehicles, right-of-way, etc.)
- In FY2017-19, most significant capital cost driver for Texas rural and small urban transit systems was revenue vehicles (69% of capital costs across all three fiscal years)

Chapter 14 provides basic capital cost management strategies for all asset types. Chapter 15 focuses on revenue vehicles.

INSTRUCTOR NOTES

- Capital Investments cover various one-time expenses for physical assets like office buildings, stations, equipment, vehicles, and more.
- Capital investments are a key foundation for service—without vehicles and buildings, we'd not be able to operate transit.
- In FY2017–19, the main cost driver for Texas rural and small urban transit systems was revenue vehicles, accounting for 69% of all capital expenses during those three fiscal years.

Capital Asset Life Cycle



INSTRUCTOR NOTES

This diagram represents the life cycle of capital assets. As depicted [explain briefly the cycle using the slide content].

- Needs identification is the process of determining what capital assets are needed and also when current assets need rehabilitated or replaced.
- Planning is taking those needs and putting them into a plan that lays out the costs, sources of revenue, timeline/phasing, etc. for acquiring or building the asset.
- Obviously, you then obtain the asset, use it, and eventually have to replace or retire the asset.

Drivers of Capital Costs

- Important to understand what is included in capital cost
- Important to have agency-wide categorization schema
- USOA uses two categories
 - Rehabilitation, reconstruction, replacement, and improvement of existing service
 - Expansion of service
- USOA uses nine asset types (object classes)



INSTRUCTOR NOTES

- For consistent and effective cost management, it's important to understand what expenditures are included in capital costs and to have an agency-wide categorization scheme for cataloging these costs.
- The default capitalization threshold in the USOA is an asset (vehicles, infrastructure, land, buildings, machinery, equipment, etc.) with a useful life over one year and a value of \$5,000 or more. However, you can set your capitalization dollar value level lower, if you want—this has pros and cons (e.g., you'll be able to “capitalize” more of your asset purchases, but you'll also have to have those assets in your capital inventory and transit asset management plan).
- Although not directly applicable to rural reporters to NTD, the USOA divides capital expenses into two categories
 - Rehabilitation... [bullet contents].
 - Expansion of service.
- Once that division is made, expenses must be further reported by asset classification (there are nine). [Slide content SmartArt.]
- We'll not go into defining each of these—consult the USOA if you want all the details and definitions.



Capital Cost Estimation and Management

INSTRUCTOR NOTES

Cost Estimation and Decision-Making

- Estimating capital costs accurately is important and difficult
 - Avoiding budgetary problems
 - Maintaining public and stakeholder trust in the project
- Volatility of capital costs and project returns
 - Supply chain challenges
 - Evolving market conditions

INSTRUCTOR NOTES

- Overall, a crucial and challenging part of managing capital expenses is accurately estimating both the initial capital and ongoing operational costs, starting from the project's planning stages.
- [Summarize slide content.]

Cost Estimation and Decision-Making (Continued)

- Evaluate capital costs with respect to procurement strategy, training/consulting costs, maintenance costs, investments in related infrastructure, useful service life, and end-of-life salvage value
- Select options with highest return on investment
 - Take into account time value of money
 - Consider interest rates on loans

INSTRUCTOR NOTES

- When choosing between different capital investment options, it's crucial to carefully assess these costs accounting for all factors like procurement strategy, new training or consulting expenses, maintenance costs, extra infrastructure investments (e.g., charging stations for electric vehicles), service life (defined by the Federal Transit Administration [FTA] for most categories), and salvage value at the end of life, among other factors.
- When you've assessed these factors, you can select investment options that provide the best return on your investment (or result in the "biggest bang for your buck!").

Cost Pressures and Overruns

- Expect to encounter continuous pressures toward increasing cost of capital projects
- Cost overrun: increase in capital cost above initial estimate, resulting from factors unrelated to the economy
 - Usually result from poor cost estimation, expansions in project scope, and poor cost control
 - Extremely common in transit projects
- Cost escalation: unexpected increases in capital costs related to the economy
 - Beyond the agency's control
 - Major driver is above-average inflation
 - Conditions of high market demand or low supply in some cost categories

INSTRUCTOR NOTES

- When making major capital investments—especially in new transit services and projects (e.g., a new BRT line or rail line), the general trend will be for the cost of the project to increase.
- Cost overruns are when the cost goes above the initial estimate due to factors unrelated to the economy.
- Cost overruns are extremely common in transit projects; for example, a study by Flyvbjerg indicated that 45 percent of U.S. rail transit projects among the study population had experienced this issue.

Cost escalation is an unexpected increase in the cost of a capital project related to the economy. Escalation is usually beyond the transit agency's direct control and result from inflation or market demand.

Avoiding Overruns

- Transparent, structured process for estimating capital costs can help prevent overruns
- Spend time and resources clearly defining project scope
- Obtaining as much capital cost detail as possible in early planning
- Cost estimate review by independent consultants
- Cost comparison with recently completed similar projects
- Peer review of cost estimates
- Identify capital cost risks and set aside contingency
- Consider historical price fluctuations, not just average inflation rates

INSTRUCTOR NOTES

- To prevent overruns:
 - Gather comprehensive capital cost details in early planning.
 - Compare costs with similar completed projects.
 - Consider historical price changes, not just average inflation rates.



Capital Improvement Plans

INSTRUCTOR NOTES

Creating a Capital Improvement Plan

- Capital improvement plan (CIP): primary instrument for planning, estimating, and controlling capital expenditures
- Two aspects
 - Analysis of each specific potential project
 - Project selection and development of 20-year capital plan
- Usually includes information about ongoing management of current capital assets and provides a combined overview of major funding sources and costs for all projects
- CIP is a compilation of selected project capital plans

INSTRUCTOR NOTES

- A capital improvement plan is the primary instrument for planning, estimating, and controlling capital expenditures to ensure that funding is effectively used and the benefits and efficiency of the transit system are maximized.
- [Summarize slide bullets.]

Creating a Capital Improvement Plan (Continued)

- Project capital plan should describe, in detail:
 - Methods used to acquire or construct the asset
 - Estimated life-cycle costs
 - Timeline for acquisition
 - Funding sources
 - Project capital plan needs a funding source analysis
 - Document funding commitments, including alternative funding when sources are variable or unreliable
 - Conducted separately from cost estimation
- Level of detail to be refined as project moves into new phases

INSTRUCTOR NOTES

- Proposed project capital plans should detail:
 - How assets will be acquired.
 - Estimated life-cycle costs.
 - Timelines for use and acquisition of capital assets.
 - Identify funding sources.
- As projects move from planning to implementation, the plan becomes more precise. Initial cost estimates are in constant dollars for easy comparison and are later converted to reflect actual spending during project implementation.
- The project manager must secure confirmed funds before the final design phase.
- The capital plan details federal and non-federal funds and their commitments. If primary funding is uncertain, the plan should include backup sources like reserves or additional debt capacity. This funding analysis should be separate from estimating project costs and market changes.



Transit Asset Management (TAM)

INSTRUCTOR NOTES

Transit Asset Management and Federal Requirements

- Final TAM rule published in 2016
- Applies to recipients of Chapter 53 funds that "either own, operate, or manage capital assets used in providing public transportation services"
- Compliance tasks depend on provider size and operation (Tier I or Tier II)
- Generally, all agencies develop a TAM plan and submit TAM reports to NTD
 - Some develop their own TAM plan
 - Some participate in a group TAM plan (under state DOT)

INSTRUCTOR NOTES

- The 2016 TAM rule, in 49 CFR 625, affects all recipients of Chapter 53 funds (like Section 5307 and Section 5311).
- It applies to entities managing public transportation assets.
- This chapter doesn't cover TAM comprehensively but aims to give an outline of federal TAM requirements and its benefits regardless of federal rules.
- Tasks to comply with the TAM rule vary based on the transit provider's size and operations.

TAM Tiers

Tier 1	Tier 2
Operates rail OR 101 or more peak vehicles across all fixed-route modes OR 101 or more peak vehicles in one non-fixed-route mode	Subrecipient of 5311 funds OR American Indian Tribe OR 100 or fewer peak vehicles across all fixed-route modes OR 100 or fewer peak vehicles in one non-fixed-route mode

INSTRUCTOR NOTES

- As seen in the table, the main differences between Tier 1 and Tier 2 is whether the transit agency operates rail (automatically puts them in Tier 1) and how many vehicles the agency operates.
- Most small urban and rural transit agencies in Texas are Tier 2 providers, so, we'll focus on Tier 2.

Transit Asset Management Plan

- Tier I plan
- Tier II plan
 - Inventory of capital assets
 - Asset condition assessment
 - Decision support tools
 - Investment prioritization
- Asset condition relies on FTA-defined performance measures in four asset categories:

The overall goal of a TAM plan is to identify capital asset maintenance or replacement needs, report performance targets, and create an investment schedule.

Rolling Stock

Equipment

Facilities

Infrastructure

INSTRUCTOR NOTES

- Both Tier 1 and Tier 2 providers must create a TAM plan.
- A Tier 2 plan must include:
 - [slide bullets].
- When conducting condition assessments, FTA provides performance measures for four asset categories:
 - Rolling stock.
 - Equipment.
 - Facilities.
 - Infrastructure.
- Apart from complying with the TAM rule, TAM plans also provide a decision-support tool for scheduling vehicle fleet renovations and facility updates.
- We'll get more into how TAM is tied to vehicles in Chapter 15.



Prize Questions

- What is a capital improvement plan?
- What is one strategy for helping reduce the likelihood of not underestimating the cost of a capital asset or project?
- How many tiers (system size categories) are there in the TAM rule? What defines a Tier 2 system?

INSTRUCTOR NOTES

[Select one or more questions on the slide as prize questions, as time allows. Encourage participants to actively engage. Potential answers described below.]

- **What is a capital improvement plan?** [Answer(s):
 - Primary instrument for planning, estimating, and controlling capital expenditures.
 - Usually 20-years long.
 - Project-specific analyses that includes costs and funding for all projects.]
- **What is one strategy for helping reduce the likelihood of not underestimating the cost of a capital asset or project?** [Answers:
 - Maintain adequate project control.
 - Avoid scope creep/changes to project scope.
 - Spend the time and resources necessary to clearly define the scope.
 - Obtain as much detail as possible in early planning.
 - Peer reviews of cost estimates.
 - Obtain cost estimates from independent consultants.
 - Consider historical price fluctuations, not just average inflation rates.
 - Etc.]
- **How many tiers (system size categories) are there in the TAM rule? What defines a Tier 1 system?** [Answer:
 - Two tiers.
 - A Tier 1 system:

-
- Operates rail OR
 - Operates 101 or more peak vehicles across all fixed-route modes OR
 - Operates 101 or more peak vehicles in one non-fixed-route mode.]

Chapter Summary

- Key takeaways
 - Acquiring a capital asset comes with operational costs as well
 - Start the process of detailed cost estimation when planning a capital investment project; account for cost escalation and carefully avoid cost overruns
 - Implement performance-based TAM and integrate project plans into an agency 20-year plan
 - Transit agencies receiving Chapter 53 funding are required to comply with the TAM rule
- Additional information, resources, and references provided in Chapter 14 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]

A photograph of two business professionals in suits sitting at a desk. One person is holding a pen over a document, and the other is holding a calculator. The scene is brightly lit, suggesting a window in the background. The text 'Chapter 15: Managing Vehicle Capital Costs' is overlaid on the right side of the image.

Chapter 15: Managing Vehicle Capital Costs

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE E 374

INSTRUCTOR NOTES

- Now, let's move on to specifically focusing on managing vehicle capital costs, which is Chapter 15.
- This chapter is mainly focused on transit agencies that operate their own service or at least own some of the vehicles used to operate service.

Learning Objectives

- Describe relevant federal TAM rules and requirements
- Explain Useful Life Benchmark (ULB), its relationship to TAM, and its relationship to minimum service life requirements under FTA grants
- Explain strategies for optimizing size of fleet and spare ratio
- Understand potential benefits of having a mixed fleet and using non-dedicated vehicles
- Recognize strategies and requirements for vehicle procurements

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics

- TAM for vehicles
- Optimizing fleet size and mix
- Procuring vehicles

INSTRUCTOR NOTES

Chapter 15 is divided into the following sections [read the topics].



TAM for Vehicles

INSTRUCTOR NOTES

Let's pick up by talking about Transit Asset Management for vehicles (both specific to TAM Rule requirements and also generally to best practices for asset management).

Transit Asset Management for Vehicles

- Federal regulations require revenue vehicles purchased with federal funds be maintained in State of Good Repair (SGR)
- Maintenance program must include:
 - Documented maintenance plans
 - Preventive maintenance inspections and services
 - Accessibility provisions
 - Management of maintenance resources
 - Warranty compliance and recovery
 - Standards for maintenance subcontractors

Effective maintenance procedures and practices are powerful tools for managing maintenance costs. Effective maintenance also helps with managing capital costs.

INSTRUCTOR NOTES

- Federal regulations require that revenue vehicles purchased using federal funds should be maintained in a state of good repair (SGR).
- Therefore, transit agencies must develop a maintenance program that, at a minimum, includes [read the bullet points].
- Effective maintenance has a two-fold benefit:
 - It helps manage maintenance costs (as discussed in Chapter 6).
 - Helps manage capital costs by ensuring the longevity of your vehicles.

Transit Asset Management for Vehicles (*Continued*)

- Useful Life Benchmark (ULB): expected lifespan of a transit capital asset
 - Used to guide transit agencies in deciding when to replace/upgrade assets
 - Based on original design life, current technology, and historical data for similar assets
 - Not the same as the minimum service life requirement for retiring vehicles purchased with federal funds
- Useful performance measure: percentage of vehicles expected to be within ULBs in upcoming years

INSTRUCTOR NOTES

- One key concept in the discussion of transit asset management is the useful life benchmark, or ULB.
- A ULB is the expected lifespan of a transit capital asset (e.g., 12 years or 420,000 miles) and is used...
 - [Summarize sub-bullets.]
- For your own internal purposes and for TAM reporting, the ULB is used as a fleet performance measure. You calculate the percentage of vehicles exceeding their ULB (the goal would be to be as close to 0% as possible). You can also calculate your projected ULB over the duration of your vehicle replacement plan and see if your planned purchases/replacements will help decrease the percentage of vehicles exceeding their ULB over time.

Transit Asset Management for Vehicles (*Continued*)

Minimum Service Life and ULB for Vehicle Types in TxDOT Group TAM Plan

Category	FTA Minimum Life	TxDOT ULB
Heavy-Duty Large Bus (35' to 40' and all articulated buses)	12 years or 500,000 miles	14 years or 600,000 miles
Heavy-Duty Small Bus (30' to 35')	10 years or 350,000 miles	12 years or 420,000 miles
Medium-Duty and Purpose-Built Bus (25' to 35')	7 years or 200,000 miles	9 years or 260,000 miles
Light-Duty Small Bus and Cutaways (20' to 25')	5 years or 150,000 miles	7 years or 210,000 miles
Light-Duty Van, Modified Van, Automobiles (16' to 20')	4 years or 100,000 miles	6 years or 150,000 miles

INSTRUCTOR NOTES

- It's important to point out that there is a difference between the FTA's minimum service life for purposes of replacing vehicles bought with FTA funds and the ULB.
- FTA minimum service life is the minimum use you must get out of a vehicle purchased with FTA funds before it can be replaced.
- The ULB is the vehicle use at which you target replacement (almost like a maximum use target).
- This Table displays the FTA minimum service life and the TAM ULBs for different vehicle types in the TxDOT group plan [explain some of the categories].
- Texas rural agencies and some small urban agencies are in the TxDOT Group Plan; however, some small urbans have their own TAM plans and therefore may have different ULBs.

Transit Asset Management for Vehicles (*Continued*)

- Consistency in fleet replacement is a key cost management strategy
 - Avoid higher maintenance costs associated with older vehicles
 - Avoid large peaks and valleys in vehicle procurement needs
 - Avoid surges in staff training and maintenance needs
 - Spread out vehicle purchases to balance distribution of costs
 - Create continuity in level of service and quality of vehicles customers experience
 - Gradually introduce new technologies and vehicle forms and features to improve public perception of transit service

INSTRUCTOR NOTES

- Consistently replacing your fleet is a key cost management strategy because it [summarize slide bullets].



Optimizing Fleet Size and Mix

INSTRUCTOR NOTES

Beyond maintaining and replacing your fleet regularly, this section looks at how to determine the right size and mix of vehicles in your fleet.

Optimizing Fleet Size

- Active vehicles
 - Intended for regular use in revenue service
 - Number dictated by scheduled service and passenger demand
- Contingency vehicles
 - Not intended for regular use in revenue service
 - Often older vehicles kept for emergencies or special events
- Number of spare vehicles in fleet is difference between total number in active fleet and number needed for peak service

$$\text{Spare Ratio} = \frac{(\text{Total Active Fleet} - \text{Peak Vehicle Requirement})}{\text{Peak Vehicle Requirement}}$$

INSTRUCTOR NOTES

- The optimal fleet size means the “perfect” number and mix of vehicle types that minimizes capital and operational costs while also allowing you to meet 100% of your service demands.
- When discussing optimal fleet size, it’s important to define a few key terms.
- There are two main statuses of vehicles in a transit agency’s fleet: **Active & Contingency**. [Define each using slide bullets.]
- Once you have your active fleet count, then you can calculate your number of spare vehicles and your spare ratio.
- The number of spare vehicles is the difference between the total number of vehicles in your active fleet and the number needed for annual peak service.
- Your spare ratio is the number of spares divided by your annual peak vehicle requirement.

Optimizing Fleet Size (Continued)

- Increase reliability by providing viable backup vehicles
- Smaller spare ratios generally better so long as maintenance and service needs can be met
 - Limits capital expenditures
 - Limits vehicle maintenance and storage needs
- FTA states transit agencies with 50+ fixed-route revenue vehicles should not exceed 20% spare ratio
- FTA has not set a threshold for smaller fleets beyond stating it must be "reasonable"
- Very little spare ratio guidance or guidelines otherwise
- Guidebook recommends 10-20% (higher for very small fleets)

INSTRUCTOR NOTES

- When working to optimize your fleet size, it's important to recognize that there's not a one-size-fits all spare ratio, especially for smaller systems.
- Spare vehicles help increase service reliability, because you have back-up vehicles to replace vehicles down for maintenance or used for other purposes (e.g., training).
- From a cost-management standpoint, it's generally better to have a smaller spare ratio as long as your maintenance and service needs are being met.
- FTA states transit...[slide bullet].
- FTA as not set...[slide bullet].
- TCRP research from 2014 found that 49% of transit agencies surveyed were within the FTA's 20% spare ratio guideline, and most transit agencies had spare ratios of 25% or less.
- Apart from that, there's not much other industry guidance on spare ratios.
- We recommend working to hit a spare ratio between 10 and 20 percent, but it can be higher for smaller fleets (i.e., less than 50 vehicles).

Optimizing Fleet Size (Continued)

Discussion Question:
What is your spare ratio? Is your spare ratio proactively managed/evaluated?

Factors Influencing Number of Spare Vehicles Needed

Operating environment	Annual bus mileage	Bus operating speeds	Ridership fluctuations	Planned service/route adjustments
Age of fleet	Peak-to-base ratio	Fleet mix of bus makes and models	Service modes	Road calls
Vehicles per mechanic	Alternative fuel buses	Management and finance	Bus purchase/retirement schedule	Inventory management

INSTRUCTOR NOTES

- These are all factors that play into determining the number of spare vehicles needed.
- [Don't read every single one. Simply highlight two or three.]
- [Pause for a brief class discussion on the discussion prompt.]

Exercise E-1: Calculating Spare Ratios

Scenario	Total Active	Peak Vehicle Requirement	Number of Spares	Spare Ratio
Calculate Spares and Spare Ratio	5	3		
Calculate Total and Spare Ratio		20	5	
Calculate Spares and Spare Ratio	55	40		
Same agency as above, but determine how many spares and total vehicles needed to reduce to 20% spare ratio		40		20%
Calculate Spares and Spare Ratio	60	45		
Same agency as above, but determine new peak vehicle requirement to reduce to 20% spare ratio	60			20%

INSTRUCTOR NOTES

[In this exercise, have the class calculate the requested values (they are hidden). Have people raise their hand or shout out the answer when they have it. Advance the slide for the animation to reveal each answer.]

Optimizing Fleet Mix

- Fleet mix: the quantity of different vehicle sizes and body types in the fleet
 - Can also refer to vehicles using different energy sources
 - This chapter focuses on vehicle sizes and body types

Homogeneous Fleet Example

20 cut-aways

Mixed Fleet Example

20 cut-aways

10 minivans

5 sedans

Advantages of Mixed Fleets

Saving fuel and costs

Flexibility to meet demand

Less wasted capacity

Disadvantages of Mixed Fleets

More-complex maintenance

Larger parts inventories

Inconsistent branding

INSTRUCTOR NOTES

- When we use the term *fleet mix*, we're referring to the quantify of different vehicles sizes and body types in the fleet. Fleet mix can also refer to different vehicle energy sources, but this chapter focuses on vehicle sizes and body types.
- A homogenous fleet would have all of the same type of vehicle in it with the only variation being the year. There could be some variation in make and model, but, for the most part, the agency might attempt to keep the same manufacturer and model throughout the fleet.
- A mixed fleet might have several different types of vehicles, for example some cut-aways, some minivans, and even some sedans.
- There are advantages and disadvantages of mixed fleets [use slide contents].

Optimizing Fleet Mix (Continued)

- Optimizing fleet mix means having the best number of each type of vehicle to meet service demands while minimizing capital and operating costs
 - Different vehicle types have different purchase and maintenance costs
 - Generally, smaller vehicles cost less and vehicles with fewer customizations cost less
 - Generally, heavy-duty vehicles have longer ULBs
- Selecting vehicle types for fixed-route service is often more straightforward than for DRT

INSTRUCTOR NOTES

- When we talk about *optimizing* fleet mix, we're referring to having the best possible combination of vehicles that minimizes operational and capital costs while allowing you to meet all service demands.
- When you have a mixed fleet, it's important to recognize that:
 - Different vehicle types... [slide bullet].
 - Generally, smaller... [slide bullet].
 - Generally, heavy-duty... [slide bullet].
- In fixed-route service, the quantity and type of vehicles is chosen by knowing peak passenger demand on each route and balancing that against vehicle capacity.
- In shared-ride DRT service, it can be more difficult.
 - The most-cost-efficient thing to do would be to fill up each vehicle, grouping as many trips as possible onto the same vehicle and spreading the cost of the vehicle, the driver, and the fuel across multiple passengers. However, even with a larger vehicle, how many passengers can be grouped together is constrained by passenger on-board times. Most transit agencies limit the maximum amount of time a passenger can be on a DRT vehicle.
 - Therefore, it's mathematically impossible to fill up larger vehicles in many DRT systems.
 - So, smaller, mixed fleets with smaller, cheaper vehicles may be an option, especially in DRT.

Optimizing Fleet Mix (Continued)

- Considerations for optimizing fleet mix
 - Analyze current average peak productivity with respect to simultaneous passengers on board and check if smaller vehicles could accommodate it
 - Prepare hypothetical DRT schedules and see if trip demand from busier days can still be met
 - Smaller, lighter-duty vehicles may have more maintenance costs under heavy, continuous use
 - Change fleet mix slowly and learn as you go

INSTRUCTOR NOTES

No up-to-date calculator or model is currently publicly available to help a transit agency optimize its fleet mix; however, some helpful considerations include [read and explain briefly the bullet points].

Using Non-Dedicated Vehicles to Supplement a Dedicated Fleet

- Applicable to DRT
- Relying on NDSPs (taxi companies, TNCs, etc.) under contract
 - Provide additional capacity during peaks
 - Provide additional capacity at all times
 - Provide alternate service
- Limitations
 - Might be few NDSPs in rural areas, if any
 - NDSPs might have different service policies and procedures than transit agency
 - NDSPs might require guaranteed minimum number of trips

INSTRUCTOR NOTES

- NDSPs can be used as a peak-demand relief valve for your service by providing capacity for passenger demand during peak periods or can be used as a constant option available to customers.
- There are several limitations and caveats to using NDSPs, including [read and explain briefly the bullet points].



Procuring Vehicles

INSTRUCTOR NOTES

Fleet Procurement Strategies

- Revenue vehicles typically replaced using a mix of federal, state, and local funds
- Federal regulations and state policies and procedures apply
- TxDOT has a web site with requirements and resources
- Strategies for maximizing success of vehicle procurements
 - Participating in group procurements to reduce costs
 - Less customization of vehicles generally equates to lower cost
 - Have clearly defined specifications; know what you need and be as specific as possible
 - Have discussions with manufacturers to learn their pain points and cost drivers
- Investigate and evaluate cost-effectiveness of vehicle leasing

INSTRUCTOR NOTES

- Revenue vehicles are typically replaced using a mixture of federal, state, and local funds.
- FTA may cover up to 80 percent of the costs of replacing some vehicles—or even more, depending on whether the vehicles help with compliance with the Clean Air Act or ADA.
- When purchasing vehicles with federal funds, rural and small urban transit agencies must follow federal regulations and also their state's policies and procedures.
- There are some strategies you can employ to maximize the value of vehicle procurement including [read and explain the bullet points].
- You may also want to consider investigating and evaluating the cost-effectiveness of leasing vehicles.

Fleet Replacement Challenges

- Post-COVID supply chain challenges causing long delays
- Lack of funding for capital may cause deferring replacements

Discussion: What have been some of your biggest challenges procuring/replacing vehicles? How have you overcome or mitigated those challenges?

INSTRUCTOR NOTES

- Currently, there are many challenges surrounding procuring transit vehicles related to supply chain issues.
- Generally, transit agencies, especially rural systems, may lack the necessary funds to replace their vehicles, deferring replacements and causing longer-term challenges with maintaining the fleet.
- [Open discussion prompt.]

Exercise E-2: Small Group Breakout – Vehicle Management

- Form small groups
- Pick **one scenario**: You are a transit agency that:
 - Wants to see if it can save money by reducing its fleet size
 - Wants to see if it can save money by introducing a mix of vehicles
 - Wants to procure vehicles to replace its vehicles exceeding their ULB
- As a group discuss (20 minutes)
 - What steps would you take?
 - What are some important considerations to keep in mind during the process?
- Report out (10 minutes)

INSTRUCTOR NOTES

- [Divide attendees into small groups. Discuss the instructions.]
- [During small groups, walk around room, assess progress, ask questions, etc. Provide reminders when 10 minutes, 15 minutes, and 18 minutes have passed so they know to wrap it up after 20 minutes.]
- [Facilitate report out by going from group to group. Carefully manage report out time to ensure all groups get a chance to report out.]

Chapter Summary

- Key takeaways
 - Key strategy for managing vehicle capital costs is maintenance
 - TAM rule requires that transit agencies have their own TAM plan or participate in a group plan
 - Consistent vehicle replacement helps avoid large peaks and valleys in vehicle-related capital expenses and increases in maintenance requirements
 - Optimizing number/type of vehicles is a capital cost management strategy
 - Control vehicle capital costs by having the optimal spare ratio
 - Use existing resources (e.g., group procurement contracts) to help maximize value of vehicle procurements
- Additional information, resources, and references provided in Chapter 15 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]



INSTRUCTOR NOTES

- [Inform participants that they have a break (in minutes) and ask participants to be back on time.]
- [Break is scheduled to be 5 minutes.]



Chapter 16: Managing Technology Costs

Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE E 397

INSTRUCTOR NOTES

[Introduce Chapter 16 title.]

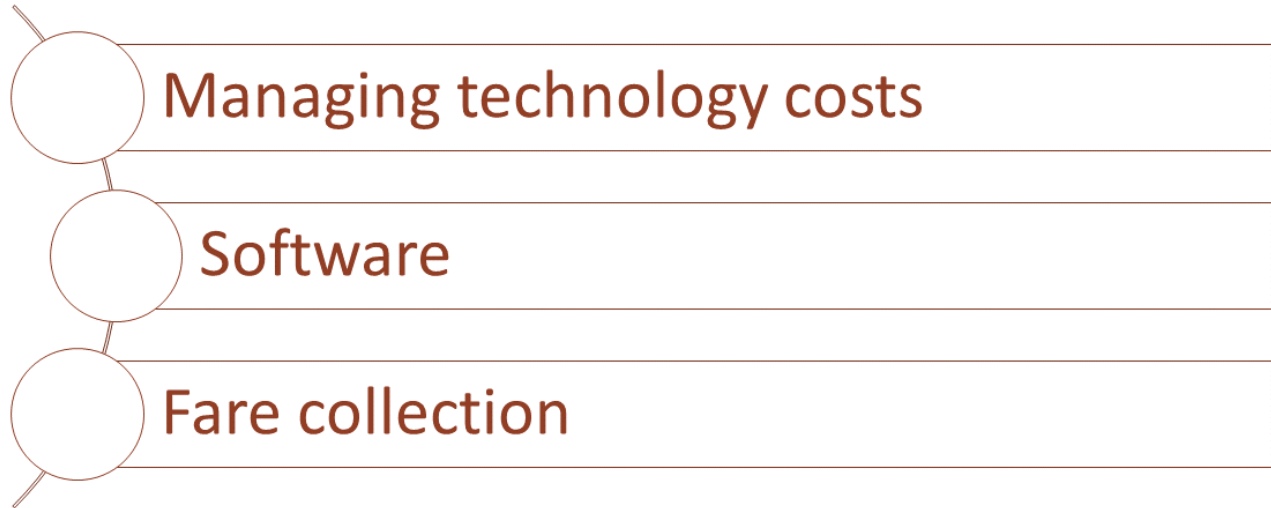
Learning Objectives

- Describe importance of effective technology planning for managing technology costs
- Explain cost management considerations related to DRT scheduling and dispatch software, fixed-route scheduling and operations software, and fare collection
- List low-cost technologies available to support transit agencies

INSTRUCTOR NOTES

By the end of this chapter, you should be able to: [Briefly describe the learning objectives using the slide contents].

Topics



INSTRUCTOR NOTES

Chapter 16 is divided into the following sections [read the topics].



Managing Technology Costs

INSTRUCTOR NOTES

First, let's start by focusing on general concepts related to managing the costs of technology.

Managing Technology Costs

- Technology investments usually have costs of procurement, implementation, training, and replacement/upgrade
 - May also have costs of managing data security/privacy
 - Not all are capital costs
- Focus of Chapter 16 is non-energy technology costs

Non-Energy Transit Technologies

<ul style="list-style-type: none">• Computer-aided scheduling and dispatch technology• Rider communication and information technology• Fare collection technology• Automatic vehicle location (AVL)• Maintenance and asset management technology	<ul style="list-style-type: none">• Safety and security technology• Business administration technology• Mobility as a Service (MaaS) apps• Hardware and communication systems to support all listed technologies
--	---

INSTRUCTOR NOTES

- When purchasing technology, it is important to remember that there is more to the cost than may initially be considered. [First set of bullets.]
- Technology can mean a lot of things, including technologies for vehicle and facility energy sources. This chapter will focus on non-energy-related technologies like [highlight the contents of the table].
- It should be noted that most technology procurements and even license agreements can be covered as a capital cost under FTA grants. Consult your relevant circular or talk with your FTA or TxDOT representative to learn more.

Technology Planning and Management

- Leveraging technology to better manage costs requires preparation
 - Know what is available
 - Know how technology can help you
 - Know skill sets needed to deploy and maintain
 - Know how to adapt technology to your circumstances
 - Know what supporting infrastructure is needed

INSTRUCTOR NOTES

- To benefit from technology, you must first know what is available, how each technology can help you, the skill sets required to deploy and maintain technological solutions, and how you can adapt the technology for your circumstances.

Technology Planning and Management (*Continued*)

- Strategies for acquiring, managing, and getting the most out of technology investments
 - Contract out service to a technology-capable contractor
 - Develop and use a technology plan
 - Better coordination of investments
 - More cost-effective and impactful investments
 - Phase implementation (for easier adaption to changes)
 - Use innovative procurement approaches (e.g., performance-based)
 - Maximize training opportunities (peers and vendor)
 - Work with vendor to configure technology to local needs/procedures
 - Work with partners to share costs, resources, and knowledge
 - Educate the public and partners about your technology investments

INSTRUCTOR NOTES

Here's some general strategies for acquiring technology, managing technology, and getting the most out of technology investments include [read and explain the bullet points].



Software

- Demand Response Scheduling and Dispatching
- Fixed-Route Scheduling and Operations

INSTRUCTOR NOTES

Now, let's talk specifically about software, including:

- Demand response scheduling and dispatching software.
- Fixed route scheduling and operations software.

Demand Response Scheduling and Dispatching Software

- Software for demand response scheduling and dispatch can
 - Improve service efficiency
 - Improve staff efficiency
 - Support real-time vehicle location and expected time of arrival (ETA) info
 - Generate real-time data
- Some scheduling and dispatch software also supports routing and operator scheduling
- Requires investment in hardware such as on-board tablets
- Can be difficult to justify expense if ridership is low
 - Software can be expensive to acquire and maintain
 - Significant training investment needed
 - Effort required to tune software and ensure input data accuracy

INSTRUCTOR NOTES

- When operating demand response service, software for scheduling and dispatch can [use bullets].
- Some software includes routing and operator scheduling features. It needs hardware like on-board tablets and might be hard to justify if ridership is low.
- The software can be costly to get and maintain, and it requires significant training.
- Also, like we've previously mentioned, the software must be "tuned" to meet your operating environment, policies, and goals. And the input data (e.g., base maps) must be kept up to date.
- There are continual developments in this industry that are helping to reduce the cost and increase the flexibility of purchase options.

Fixed-Route Scheduling and Operations Software

- Software for fixed-route scheduling and operations can
 - Improve efficiency of vehicle and operator schedules
 - Facilitate quick changes to assignments
 - Develop more realistic/manageable schedules
 - Monitor service delivery and inform service adjustments
 - Provide real-time vehicle location and ETA information
 - Improve customer satisfaction
- Schedulers must be well-trained and input data must be accurate
- Operations supervisors must understand how the software works
- Can be difficult to justify expense if there are few routes and ridership base is stable
 - Software can be expensive to acquire and maintain (operations software requires on-board hardware)
 - Significant training investment needed

INSTRUCTOR NOTES

- Fixed-route scheduling software and operations software can [use slide bullets].
- However, as with all software, you need well-trained schedulers for the scheduling side and the input data must be accurate.
- When you have dispatchers, controllers, or other operations supervisors using operations software, those staff also must be well-trained to get the best benefit from the software.
- Justifying the expense might be tough with few routes and a stable rider base.
- The software may be costly to get and maintain and needs significant training, so don't overlook these challenges.
- However, there are continual developments in this industry that are helping to reduce the cost and increase the flexibility of purchase options.

Scheduling and Dispatching Software Implementation Strategies

Implementation strategies for smaller agencies

- Contract out service (or a portion of it) to entity that has the software and trained staff
- Partner with other transportation agencies to license software, acquire hardware, and/or share trained staff
- Evaluate extent to which software costs could be offset by staffing efficiencies enabled by the software
- Take advantage of vendor demos and Requests for Information to learn more about vendors and platforms

INSTRUCTOR NOTES

Ways for smaller agencies to implement:

- Outsource service to a company with software and trained staff.
- Collaborate with other agencies for software, hardware, or trained staff.
- Assess if software costs can be balanced by staffing efficiencies.
- Use vendor demos and Requests for Information to explore different vendors and platforms.

Open Discussion

- Does your agency have demand response and/or fixed-route scheduling, dispatching, or operations software?
 - If so, are you happy with it? What are the biggest benefits? Biggest challenges? Lessons learned?
 - If not, why not? Have you explored procuring the software? What are the biggest hurdles?

INSTRUCTOR NOTES

[Encourage attendees to answer the question. Host a discussion as time allows. Discussion is scheduled for 10 minutes.]



Fare Collection

INSTRUCTOR NOTES

Now, let's move on to talking about the costs of fare collection technology, another major component of capital costs for transit systems.

Fare Collection Technology

- Fare collection technologies generally refer to *automatic fare collection*, which is the collection and processing of fares by electronic means
 - Includes mobile app payments, swipe cards, smart cards, transponders, and credit cards
 - Automatic fare collection also referred to as cashless fares and electronic fares
- Can be on-board/off-board or open/closed systems
- Potential benefits of electronic fares include
 - Increased customer satisfaction and ridership
 - Reduced revenue handling costs and improved operational efficiency
- Might also provide ridership/vehicle location data and facilitate fare program modifications/promotions

INSTRUCTOR NOTES

- Fare collection technologies usually mean automatic fare collection, which uses electronic methods to collect and process fares.
- This involves mobile app payments, swipe cards, smart cards, transponders, and credit cards.
- It's known as both cashless and electronic fares and can be on-board/off-board or open/closed systems.
 - An “open” system is one that uses technology for payment that is generally accepted for all forms of commerce (e.g., debit and credit cards).
 - A “closed” system is one that is specifically designed only to pay for your transit fares (e.g., many transit smart cards are closed systems).
- Benefits include improved customer satisfaction, increased ridership, lower revenue handling costs, and better operational efficiency.
- They may also offer ridership/vehicle location data and help in changing or promoting fare programs.

Fare Collection Technology (Continued)

- Fare collection technology cost drivers
 - Equipment (e.g., fareboxes)
 - Website development and maintenance
 - Staffing of locations that sell fare products
 - Computer systems and software (including apps)
 - Systems for counting and reconciling fares
- Can also include service fees (e.g., for managing fare media)
- Ongoing expense to maintain and upgrade equipment and systems

INSTRUCTOR NOTES

- However, like all things, there is a cost.
- Factors influencing fare collection technology costs include equipment (like fareboxes), website development, staff for selling fare products (if applicable), computer systems and software (including apps), systems for counting and reconciling fares, and service fees (e.g., for managing fare media).
- Additionally, there are continuous costs for maintaining and updating equipment and systems.

Fare Collection Technology (Continued)

- Implementation considerations
 - Interoperability of systems and hardware
 - Level of effort to design and implement program of technologies
 - Testing systems and hardware
 - Maintaining backup systems
 - Ensuring security of passenger data
 - Procurement challenges for hardware and software
- Purchasing and producing fare media
- Maintenance and repair of systems and hardware
- Marketing technologies
- Processes for managing fare revenues
- Administration of technologies
- Training
- Passenger response
- Accessibility for all (including the unbanked)

INSTRUCTOR NOTES

There are many considerations when implementing fare collection technology, as you can see on this slide. A few to highlight include: [highlight a few of the slide bullets].

Fare Collection Technology (Continued)

- Implementation strategies
 - Use peer data to get insights into potential reductions in fare collection costs
 - Accepting cashless fares might reduce costs of developing and issuing fare media and handling fare revenues
 - Go fare-free (has advantages and disadvantages)
 - Simpler fare structures, policies, and payment options might offer some advantages of fare-free transit while avoiding disadvantages of fare-free transit
 - Partner with other transportation agencies to acquire and implement fare collection technologies and/or share staff; regional fare system is another option

INSTRUCTOR NOTES

- Strategies for Fare Collection Technology Implementation:
 - Analyze peer data for ideas to cut fare collection costs.
 - Accepting cashless fares could lower expenses for fare media development and revenue handling.
 - Consider going fare-free (has pros and cons).
 - Simpler fare structures, policies, and payment options can offer fare-free benefits while avoiding some fare-free drawbacks.
 - Collaborate with other transportation agencies to adopt and use fare collection tech or share staff; a regional fare system is also an option.



Leverage What's Available

INSTRUCTOR NOTES

Finally, we want to highlight some technology cost management strategies that encourage you to focus on free or reduced cost technologies that might work just as well as something more expensive.

Leveraging What's Available

- Chapter 16 of Guidebook lists resources and tools that transit agencies might be able to use to manage technology costs and which are free or heavily discounted
- Many involve the creation or use of General Transit Feed Specification (GTFS) data
- See some on next slide

Open-source tools might be useful in helping transit agencies manage technology costs, as such tools are often free to acquire and use. However, extensive training and adaptation might be needed to make the tools work for the agency.

INSTRUCTOR NOTES

- Chapter 16 of the Guidebook has examples of resources and tools that you might be able to use for free or for cheap.
- Of course, often, things that are free may be a little less plug-and-play and may require you to invest staff time to get trained up on the tool or resource.
- Let's take a look at some examples...[next slide].

Examples of Free or Low-Cost Software

Inclusion in this list does not constitute endorsement or recommendation.

- **1-Click:** open-source multimodal trip planning software focused on transportation-disadvantaged travelers.
- **Florida Transit Information System (FTIS):** a collection of data tools for querying urban National Transit Database (NTD) and rural NTD data.
- **Google Earth Pro:** supports map creation and provides aerial and street-view imagery.
- **National RTAP GTFS Builder:** a macro-enabled Microsoft Excel workbook to help transit agencies create a GTFS data set.
- **National RTAP ProcurementPRO:** a free web-based application that guides rural and tribal grantees and state departments of transportation through FTA procurement procedures.
- **National RTAP Two-Variable Cost Allocation Calculator:** available for Microsoft Excel or Access, supports service-based operational cost allocation.
- **National RTAP Website Builder:** allows transit agencies to create and design websites that are hosted on the National RTAP server free of charge.
- **OneBusAway:** an open-source suite of transit information tools, including tools that support providing real-time transit information and alerts to passengers.
- **OpenStreetMap:** a world map created by many individuals and free to use under an open license.
- **OpenTripPlanner:** an open-source multimodal trip planner that relies on OpenStreetMap and GTFS data.
- **QGIS:** a free, open-source geographic information system software.
- **RidePilot:** open-source demand response scheduling software for small and mid-sized transit agencies. It also supports federal reporting, operator communications, and vehicle management.
- **TheTransitClock:** This open-source tool predicts bus arrivals and supports providing real-time transit information to passengers.
- **TransAM:** This tool is open-source transit asset management software that supports capital planning.

INSTRUCTOR NOTES

Potentially useful resources and tools for managing technology costs include [read some of the examples from the bullet points].

Chapter Summary

- Key takeaways
 - Transit technology costs include ancillary costs
 - Scheduling software and fare collection technologies can have the most impact
 - Contractors and partners can reduce technology costs
 - Technology plans can provide cost-efficiency
 - Many free or low-cost resources exist
- Additional information, resources, and references provided in Chapter 16 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]

Module E Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module E

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

- Please write and mark your selected answers clearly.
- Only select one answer for questions with a circle: ○. |
Select all that apply for questions with a square: □.
- Your 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 **X** or **✓** is fine!



INSTRUCTOR NOTES

[Explain to participants this evaluation form should be filled out based on the Module E contents.]

Module F: Looking Ahead



MODULE F: Looking Ahead



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

MODULE F 419

INSTRUCTOR NOTES

[Give a short overview of Module F.]

- Module F discusses new or trending concepts relevant to cost management for rural and small urban transit systems.

Module Overview

- **One-sentence summary**
Current and future trends through a cost-management lens
- **Chapter**
 - 17: Future Trends and Forward-Thinking Approaches to Cost Management

INSTRUCTOR NOTES

- This module discusses [read one-sentence summary].
- The module contains one chapter, Chapter 17: [read chapter title].

Learning Objectives

- Describe importance of planning ahead when implementing new services and technologies
- Explain the difference between microtransit and traditional demand response
- Describe advanced driver assistance systems and automated transit vehicles and their potential for cost savings

INSTRUCTOR NOTES

By the end of this chapter (and module), you should be able to: [Briefly describe the learning objectives using the slide contents].

Future Trends and Forward-Thinking Approaches

- Tremendous advances in technology in past two decades have greatly affected transportation systems
 - Information access
 - Mobile technology
 - Accessibility barriers
- Potential improvements in productivity, efficiency, and reliability
- Chapter 17 focuses on microtransit, advanced driver assistance systems, and shared autonomous vehicles

INSTRUCTOR NOTES

- Significant technological progress in the last 20 years has greatly impacted transportation by enhancing access to information, introducing mobile devices both to transit users and as tools for transit agencies, reducing accessibility barriers for people with disabilities, access technology.
- These advancements hold promise for boosting productivity, efficiency, and reliability.
- This chapter will focus on three of those technologies, including:
 - Microtransit.
 - Advanced driver assistance systems.
 - Shared autonomous vehicles.

Microtransit

- Microtransit: publicly operated on-demand transit service that typically use apps to book trips
 - Booking via app, web site, or phone
 - Innovative software and communications tools
 - Usually offered in small, low-density areas and/or off-peak periods
 - Provides first-mile/last-mile option
 - Multiple models for service structure, stops, and vehicle types/ownership
 - Can be operated by transit agency, private sector entity, or partnership
 - Ridesharing component reduces trip cost compared to TNCs and taxis
- Further research needed to identify factors that result in successful implementation
- Clear goals, service policies, and evaluation frameworks needed

INSTRUCTOR NOTES

- Microtransit is a flexible on-demand transit service that's more adaptable than fixed routes and scheduled demand response.
- Microtransit is typically app-driven and allows for trip requests to be made and fulfilled on the same day—often within an hour or less.
- Transit agencies set service area boundaries, enabling riders to travel freely within the boundary or from specific pickup spots or bus stops.
- There are many different service models and operational approaches for microtransit from only purchasing the enabling software and operating the service with your own vehicles and drivers to contracting the entire service out turnkey.
- However, like all transit services, having clear goals, service policies, and evaluation frameworks are needed during the planning stages and throughout implementation to help ensure the success of the service and avoid ballooning costs.

Other Technologies

- Advanced Driver Assistance Systems (ADAS)
 - Collision warning systems
 - Collision intervention systems
 - Driving control assistance
- Vehicle automation
 - Autonomous Vehicles (AVs)
 - Shared Autonomous Vehicles (SAVs)

See Chapter 17 in the Guidebook for more information about these technologies.

INSTRUCTOR NOTES

- Last, we want to address to two other technologies.
- Advanced Driver Assistance Systems (ADAS) are the technologies used by automobile manufacturers to improve the safety of drivers, reduce drivers' errors and therefore vehicular crashes. While ADAS are usually designed for drivers' safety, some inventions help drivers avoid crashes. Currently, National Highway Traffic Safety (NHTS) categorizes driver assistance technologies into four major categories, three of which are listed here.
 - ADAS technologies are being slowly piloted and rolled out on transit vehicles—especially collision warning systems, including systems that detect and alert operators to potential conflicts with pedestrians, bicyclists, and other vehicles.
 - The full benefit of these systems remains to be seen, but, on the surface, they seem to have the potential to help improve transit safety.
- Another technology is vehicle automation.
 - Autonomous Vehicles (AVs) are an emerging technology that combines multiple sensors, computer processors, and data repositories to take over tasks or responsibilities otherwise undertaken by human operators. AVs, also known as self-driving vehicles, are categorized into five levels of automation.
 - Shared Autonomous Vehicles (SAVs) are a public transportation mode that let passengers share a ride in an AVs. The most common type of SAV deployed today is the automated shuttle, which are smaller, specialized vehicles operating in closed environments on a fixed route.
 - There are some examples of SAVs operating in an on-demand service, but these are less common.
 - Must research and testing remains to be done to see what benefits, if any, SAVs may have for the public transit industry.

Chapter Summary

- Key takeaways
 - New technologies can potentially help improve safety, service quality, cost-effectiveness, and customer satisfaction
 - Technology adoption should be guided by goals and accompanied by consistent evaluation
 - Passenger perceptions and experiences with new technology are critical
 - The characteristics of technology-driven transit services can impact adoption
- Additional information, resources, and references provided in Chapter 17 in the Guidebook
- Questions and discussion?

INSTRUCTOR NOTES

Now, let's summarize this chapter:

- Key takeaways of this chapter include: [read the key takeaways].
- [Describe where participants can find further information, resources, and references (in Guidebook).]
- [Pause for any questions or additional discussion.]

Module F Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module F

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

- Please write and mark your selected answers clearly.
- Only select one answer for questions with a circle: ○. |
Select all that apply for questions with a square: □.
- Your 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 **X** or **✓** is fine!



INSTRUCTOR NOTES

[Explain to participants this evaluation form should be filled out based on the Module F contents.]

Workshop Conclusion



Conclusion



Managing Operational and Capital Costs at Rural and Small Urban Transit Systems

CONCLUSION 427

INSTRUCTOR NOTES

Ok, let's wrap things up!



Quick Review

INSTRUCTOR NOTES

Instructor will conduct a “pop quiz” of attendees, making sure to cover the most central items discussed during the workshop.



Final Prize Questions

INSTRUCTOR NOTES

[Ask a few prize questions, as time allows. Base what you ask on what seemed most important to the attendees and/or what they found more difficult to understand.]

Main Points

- Cost management is an ongoing, consistent activity needing
 - Consistent planning
 - Consistent accounting and reporting of costs
 - Consistent evaluation and corrective action
- Much of transit cost management *starts with service policies*
- Specific cost management strategies will vary across transit mode, transit function (e.g., maintenance vs. operations), and operational model (e.g., outsourced vs. insourced)
- Be creative! Find where you want to improve, do your research, implement strategies, and evaluate outcomes

INSTRUCTOR NOTES

If you don't remember anything from this workshop, there's what we think are the main points! [Use slide contents.]



Stand and Deliver

Stand and share at least one thing you learned during the workshop that you hope to use or implement in your job



INSTRUCTOR NOTES

- [Read the slide content and ask participants to share at least one insight or knowledge gained from the workshop that they plan to apply in your job.]
- [Try to get a response from everyone in the room.]

Companion Resources

- Toolkit available <https://tx.ag/TransitCostsToolkit>
- Companion Guidebook available <https://tx.ag/TransitCostsGuidebook>
- Online Course available <https://tx.ag/TransitCostsCourse>

INSTRUCTOR NOTES

- [Remind participants that the tools presented in this workshop are collected as a Toolkit that is available to download @ <https://tx.ag/TransitCostsToolkit>]
- [Remind participants that this workshop is accompanied by a Guidebook and an Online Course that are available to download @ <https://tx.ag/TransitCostsGuidebook> and <https://tx.ag/TransitCostsCourse>, respectively.]

Workshop Evaluation

- Please fill out the Workshop Evaluation Form
- Write in the date and location

Workshop Evaluation Form

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) Your 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 **X** or **✓** is fine!



INSTRUCTOR NOTES

[Explain to participants this evaluation form should be filled out considering the quality of the whole workshop.]



Final Questions?

INSTRUCTOR NOTES

[Ask respondents if they have any questions. Leave your contact information, if desired.]

