10 FARE ANALYSIS

This chapter answers the question, "If Cache Valley Transit District (CVTD) were to introduce a fare, what would it cost from a capital and operating perspective and how much revenue would CVTD expect to gain?" This analysis reveals that with the required capital investments plus ongoing operating costs, introducing a fare at this time is not recommended. The added capital and operating costs associated with fare collection outweigh the revenue potential from a reasonable fare.

This chapter outlines the required capital investments, ongoing tasks, and other prerequisites if CVTD were to implement a fare. The first section of this chapter presents the potential benefits and challenges of establishing a fare. Next, the planning tasks and policy considerations required in advance of introducing a fare are discussed, followed by an analysis of capital requirements, potential ridership losses, and projected farebox revenues generated under three fare scenarios (low, medium, and high), which will be further defined in a later section.

In developing this chapter the consultant team relied on several key assumptions for estimating capital and operating costs and projecting ridership. The assumptions are referenced throughout this chapter when the topics are discussed; however they are also highlighted on page 10-4 and 10-5 for easy reference.

Implementing a Fare Structure: Challenges and Benefits

As a free-fare system for 18 years, CVTD has enjoyed major administrative, operational, and customer service benefits from not charging a fare. From an administrative standpoint, a free-fare system is simple to operate, as there is no need for back-end accounting, secure storage of funds, or marketing and distribution of fare media. From an operational perspective, a free-fare system benefits from short dwell times[9] (no one standing in line to pay, causing bus delays) and avoids disputes between operators and passengers regarding properly paid fares. Finally, from a customer service perspective, one of the most significant community benefits of CVTD's free-fare system is that service is very accessible to low-income residents, students, and seniors on a fixed income. Additionally, a free-fare system is perceived as not having a transaction cost (figuring out the fare, searching for change, etc.) or a marginal cost to ride (for non-pass holders), thereby increasing the opportunity to attract new riders. CVTD's annual ridership of over 2,000,000 riders in 2011 attests to the success of the free-fare system. Free fares are consistent with the mission of the CVTD to be a premier public transportation agency serving the Cache Valley Region. It supports three of the agency's key objectives by offering a service that is very accessible to all members of the public, reduces dependence on the private automobile, and supports community efforts to improve air quality.

[9] Dwell Time: more formally, this refers to the amount of time that a bus will "dwell" at a stop to load and unload passengers.

Benefits of Implementing a Fare

In the current fiscally constrained environment, transit agencies are seeking opportunities to increase their operating revenue by securing new funding sources and increasing or introducing transit fares. CVTD is no exception to this trend and is evaluating the benefits and costs of implementing a fare. Some of the key benefits of introducing a fare include:

- Increasing revenue to help close a funding gap or backfill loss of funding
- Reducing reliance on federal funding
- Helping reduce or prevent service reductions through increased revenues
- Potentially increasing service, if increased revenues are substantial
- Supporting the perception that the public helps pay for public services (addressing the question: why should transit riders get a "free ride"?)
- Addressing potential problems with individuals who may ride the bus seeking shelter or for other non-transportation reasons

Challenges Associated with Collecting a Fare

Although increasing operating revenues through the farebox may be a benefit, many new responsibilities and costs would be incurred by CVTD and it should be clear that making the transition from a free-fare system to one that charges a fare is not a simple matter that immediately results in additional operating revenue. Implementing a fare structure requires significant planning activity and policy considerations by staff and the Board of Directors. In addition, capital investments and new and increased staff responsibilities would also be added. Some of the significant challenges CVTD would face if a fare were introduced are:

- Investment in hardware and physical space necessary to collect fares, including;
  - Fareboxes on buses
  - Secure space for accounting, auditing, and fare reconciliation
  - Vault for secure money storage
  - Ticket vending machines (TVMs)
- Increase in staff resources
  - Accounting, auditing, fare reconciliation
  - Additional marketing and customer service responsibilities to convey and educate passengers and drivers alike about the fare structure and policies
  - Point of sale administration / staffing (selling passes at CVTD and distributing passes to retail locations and TVMs)
  - New and increased responsibilities for drivers in operating the farebox and conducting fare enforcement
  - Resources needed to conduct public outreach around introductions of fares and future increases in fares
  - Additional responsibility for maintenance/administrative staff to "empty" fareboxes and count fares
  - Maintain fareboxes and ticket vending machines

Other challenges include increased dwell times (additional boarding time at bus stops) and operational delays associated with collecting a fare and resulting interactions between operators and passengers. The collection of fares requires operators to oversee fare validation and enforce policies, and can result in altercations with passengers and inconsistent execution of agency policies.

Introducing a fare presents a range of potential benefits and challenges. While this chapter attempts to quantify the costs and revenue-generating potential of introducing a fare, ultimately the CVTD Board of Directors will need to make a policy decision about whether to remain a free-fare system.

Existing Funding

CVTD's operating revenues primarily come from two sources – federal formula funds and a local 0.3% sales tax dedicated to transit services. Adding a fare structure to CVTD's services would supplement this revenue. The level of fare revenue is based on a number of variables, including fare levels, discounts for special populations or pass holders, and customer reaction to the setting of fares. This fare analysis explores the potential financial implications of adding a fare and balancing that information with the benefits and challenges of doing so. The final decision on whether or not to implement a fare should be informed by this analysis, but will also need to be weighed against CVTD's larger organizational goals.

ANALYSIS PROCESS, APPROACH, AND KEY ASSUMPTIONS

The process and approach to this analysis was to be understandable and replicable. The consulting team referred to the Transit Cooperative Research Program (TCRP) for national research on fare policy and technical and operational issues. TCRP is a professional research organization that works cooperatively with the Federal Transit Administration (FTA); the National Academies, acting through the Transportation Research Board (TRB); and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization. The TCRP serves as one of the principal means by which the transit industry develops innovative solutions on a wide variety of topics through transit research in fields such as planning, service configuration, equipment, facilities, fares, operations, human resources, maintenance, policy, and administrative practices.

TCRP Report 94 [10] was referenced to help identify several elements associated with fare collection and corresponding cost factors such as capital equipment needs and ongoing costs to print and distribute passes, handle cash, and perform other administrative tasks. The TCRP research is based on transit industry standards drawn from a cross section of large and small transit agencies. These factors were used in estimating initial capital costs and ongoing administrative expenses. They were verified and supplemented with peer review research, the consulting team's professional experience with fare studies conducted across the country, and consultation with a major manufacturer of farebox equipment and facilities. The final step in the process was collaboration with CVTD staff to ensure that the approach reflects CVTD's unique operating environment and that the ridership and revenue analysis is tailored to Logan's unique atmosphere and high student ridership. Projected administrative costs for new responsibilities were calibrated to CVTD's pay structure.

[10] TCRP 94 – Fare Policies, Structure and Technologies: Updated 2003.

Key Assumptions

In developing this chapter the consultant team relied on several key assumptions for estimating capital and operating costs and projecting ridership. The assumptions are referenced throughout this chapter when the topics are discussed; however they are highlighted below for easy reference.

Capital Investments (Please refer to page 10-12 for additional details)

- Capital costs are presented as low-end and high-end unit costs consistent with TCRP unit costs, and refined based on consultation with major manufacturers
- To ensure high-end equipment is fully functional at all times, 10% of initial costs are added for spare parts.
- Potential grant funds have not been applied, assuming 100% of capital costs are funded by CVTD. It is possible that federal funds could potentially cover up to 80% of the capital costs. Ongoing operating costs include a capital reserve replenishment line item based on capital life-cycle periods.

Ongoing Operating Costs (Please refer to page 10-18 for additional details)

- Costs are based on three different fare scenarios.
- Tickets/passes assume a hybrid magnetic stripe (transfers and casual pass purchases—30% of monthly passes) and smart card (U-Pass and regular monthly pass users—70% of monthly passes) system.
- Two new full-time employee equivalents (FTEs) would be required: an administrative position and a mechanic @$55,000/year.
- Assumes no federal funds are used for purchasing capital equipment. Replenishes capital reserves based on lifespan of equipment.
- Boarding delay (dwell time impact) is estimated on a per-boarding basis:
  - TCRP research and September 2011 field work
  - Assumes an additional 1.5 seconds per boarding
  - Many trips currently exceed cycle time[11] resulting in additional trips needed on select routes (1, 4, 5, and 6)
  - Cumulative annual hours are 3,925 @$61/hours = $241,000

Ridership and Passenger Revenue Estimates (Please refer to page 10-15 for additional details)

- Ridership estimates are based on 2010 fixed-route ridership of 1.9 million with a 49% transfer rate.
- Ridership elasticity is based on TCRP Research and peer agency experience.
  - LINK (Wenatchee, WA) and SKAT (Mt. Vernon, WA)
  - Assumes Central Business District (CBD) environment where walking is viable option for short trips
  - Fixed-route ridership loss range from low of 28% to high of 39%

[11] Cycle time is the round trip travel time including layover and recovery time. “Recovery time” refers to additional time built into a schedule to accommodate varying levels of congestion and passenger loads as well as variable times for loading both bicycles and passenger mobility devices. Typically sufficient recovery time is given to ensure that the upcoming trip leaves on-time.

  – Call-A-Ride ridership loss less than fixed-route because riders are highly transit dependent. Loss range from low of 20% to high of 30%

- Revenue estimates are based on average fare per rider; lower than actual fare because of passengers paying discounted fares
- Ridership and farebox revenues are based on a "snapshot" in time. The analysis does not provide projections over time.

PRELIMINARY PLANNING ACTIVITY

This section discusses the major policy issues CVTD needs to address if a decision is made to introduce a fare structure. It also identifies the major tasks required in advance of implementing a fare and the one-time requirements for setting up a system for the financial transactions.

There are essentially four fundamental and interrelated factors when introducing a fare. They are:

1. Fare Policy
2. Fare Strategy and Structure
3. Payment Type
4. Fare Validation/Collection

Each of these four elements is discussed in greater detail in the following sections.

Fare Policy

Fare policy generally sets the direction for the strategy and fare structure. Issues related to fare policy affect all aspects of public transit. Fare-related decisions have enormous effects on ridership, revenue, the amount of service that can be offered, and community perceptions of public transportation.

Fare policy establishes the principles and goals and objectives for setting and collecting fares. Principles address the core values of an agency. They tend to be even more basic than goals and objectives and typically remain unchanged even when goals and objectives are refined. Goals set the tone by establishing the overall policy direction and organizational philosophy. Objectives support the goals and are intended to be specific statements of the methods proposed for accomplishing the goals.

Fare policy goals typically address financial matters (revenue), equity, customer relations, simplicity, and cost control (administrative /management issues). Developing and prioritizing fare policy goals are important first steps in establishing a fare structure. A sample of fare policy objectives, how they are traditionally measured, and factors to consider when establishing them are discussed in the following section.

Revenue Objectives and Measurements

Objectives that address a revenue goal are intended to ensure that fares are set to generate "sufficient" farebox revenues. This can be measured as a farebox recovery target[12] or level of subsidy such as:

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[12] Farebox Recovery Ratio is calculated by dividing all passenger (farebox) revenue by total operating costs. Farebox recovery evaluates both system efficiency (through operating costs) and productivity (through boardings).

- Achieve a fixed-route farebox recovery ratio of at least 20%
- Subsidy per fixed-route passenger should not exceed $4.50

Farebox recovery ratio is measured by dividing passenger fare revenues by operating cost. Most—although certainly not all—transit systems have established a target for achieving the percentage of costs to be recovered by passenger fares. Standard transit industry practice is for farebox recovery ratio targets for fixed-route local bus service to range between 15% and 30%. For paratransit and Americans with Disabilities Act (ADA) services, a lower farebox recovery is expected, typically in the range of between 5% and 10%. In California, the Transportation Development Act (TDA), which provides the lion's share of operating funds, requires fixed-route urban systems to achieve a 20% farebox recovery ratio and 10% for paratransit and ADA services. If agencies do not achieve these targets or a system-wide average of 20%, they are given a "warning" and must develop a strategy for increasing their farebox ratio in a subsequent year or be faced with reduced funding levels. An example of an agency with a farebox recovery ratio goal is Denver RTD. The agency has a minimum farebox recovery ratio, and if it is not met Denver RTD has to consider fare increases and/or service adjustments. In recent years, Denver RTD has increased its farebox recovery to 23% compared to about 17% five years ago.

Establishing a farebox recovery target would be an important first step for CVTD to help set fares and balance affordability for passengers versus maximizing revenues. Another valuable measurement is subsidy per passenger, which is calculated by subtracting passenger fares from operating costs and dividing this number by ridership. In addition to these quantitative measurements, CVTD may want to consider some basic qualitative measures such as maximizing revenue while minimizing ridership loss.

Equity Objectives and Measurements

Social equity and environmental justice are increasingly important considerations in establishing and setting transit fares. Transit agencies try to offer equitable fares because they recognize that some passengers who depend on the service for their mobility needs may have a harder time paying for it. Environmental justice considerations also address equitable and fair treatment for all segments of the population. For example, should students pay the same fare as adults? If a discount is offered, what is an appropriate student discount? Should college students get the same discount as elementary school students? Should CVTD consider fare products that are affordable for low-income and transit-dependent passengers? Should special passes be sold in bulk at a discount rate to social service agencies? These are questions that CVTD will need to address and which will influence the policy decision-making process.

When setting fare levels and increasing fares, it is common for transit agencies to consider the ability of passengers to pay transit fares with special emphasis on low-income riders, students, and seniors. Many transit agencies have a variety of fare instruments and discounted fares to address social equity /justice concerns. Reduced and discounted fares for young children and students (elementary and high school) are offered as well as monthly passes or ticket books sold at discounted prices. To keep costs at a reasonable level for parents traveling with young children, many transit agencies offer free fares for children under five years of age, provided they are traveling with a fare-paying adult. For example, the following transit agencies all offer a discounted cash fare for students or youth:

- Valley Regional Transit (Boise, Idaho)
- Mountain Metropolitan Transit (Colorado Springs)

- Albuquerque Ride (Albuquerque, New Mexico)

Agencies also address social equity/justice issues by selling special passes or tickets for social service purposes. Albuquerque Ride (ABQ) offers Indigent Assistance Monthly Passes to organizations that assist with job placement of low-income individuals who earn 150% of the poverty line or less. Sun Tran in Tucson, Arizona, sells discounted passes for social service/nonprofit agencies.

Examples of equity-related measurements CVTD may consider are:

- Ensuring that fares are equitable for different types of service.
- Offering equitable fares that recognize the needs and ability to pay of passengers who depend on transit for their mobility needs.
- Ensuring fares are “in line” with peer agency fares.

When establishing fares for Call-A-Ride (CVTD’s complementary (corresponding) ADA paratransit service)) service, CVTD needs to balance passengers’ ability to pay with the Americans with Disabilities Act, which states that ADA-mandated complementary paratransit service may charge up to twice the cash fare that is charged for a comparable fixed-route trip. If a local adult cash fare is $1.00, then the maximum ADA fare can be $2.00.

Customer Relations Objectives and Measurements

Fare structure and policy at many transit agencies have evolved over several years, sometimes resulting in a complex fare structure with a myriad of fare instruments that are confusing to both riders and operators alike. An important consideration when establishing a fare structure is to ensure that fares are relatively simple, easy to understand, and easy to use for both riders and operators alike. This means that if transfers (paper slips issued upon boarding that allow passengers to change from one bus to another without paying additional fare) are offered, the rules governing them should be straightforward. Similarly, it should be simple to understand how tickets and passes work, and it should be easy to pay fares. A typical way to state this laudable goal is to “ensure the fare structure is easy to understand, easy to use, and fair.” But many agencies balance this goal against other goals addressing customers’ ability to pay, and provide various multiple-ride passes with discounts and/or convenience for those who can’t afford a full monthly pass. A growing trend in the transit industry is the introduction of smart cards as a strategy for simplifying fares. Smart cards are discussed in the Payment Type section beginning on page 10-9.

Administrative Objectives and Measurements

There are many administrative responsibilities associated with a fare structure, from printing, selling, and distributing tickets/passes, to procuring fareboxes and other capital investments, to reconciling monthly financial transactions and monitoring and measuring farebox recovery ratios. Systems with a complex fare structure typically devote several full-time staff members to administering fares. While it can be difficult to quantify staff time and expense dedicated to these activities, an increasing concern at many transit agencies is how to reduce the time and effort spent on administering fares. Agencies should quantify the costs to administer the fare collection system and monitor the costs over time. One way to ensure that administrative responsibilities do not become burdensome is to routinely adjust fares so that the cost of fare collection is maintained or declines as a percentage of total fare revenue. Administrative costs typically range between 10% and 15% of total operating costs.

Fare Strategy and Structure

Fare strategy refers to the general type of fare collection and payment structure. Possible approaches include flat fares, differential pricing (by distance traveled, time of day, or type of service), market-based or discounted payment options, and transfer pricing. Other options are fares based on a zonal system, peak/off-peak differentials, and express or other special surcharges. Fare structure represents the combination of one or more fare strategies with specific fare levels.

The process of establishing pricing levels is influenced by political and social equity concerns, and closely tied to revenue objectives. A common practice for transit agencies is to monitor farebox recovery ratio as an indicator of when and how much to raise fares. For example, if a transit agency has a farebox recovery target of 20% for its fixed-route service and this ratio is declining as costs increase, then it will consider increasing fares. However, such decisions need to be carefully considered because ridership typically drops after a fare increase. A rule of thumb in the transit industry is that for every 10% increase in fares, ridership will decrease by 3%. This "–0.3 elasticity" has proven to be a very accurate estimate of the relationship between overall ridership and fares over the years.

When establishing a fare structure, it is important to consider the types of passengers carried and the types of services offered. Typically, transit agencies have four to five categories:

- Adult (full or base fare)
- Seniors and people with disabilities (federally mandated discounted fare)
- Students (discounted fare)
- Children (under five years old ride free with paying adult)
- Premium fares (express or limited-stop service)

The base cash fare for local bus service should be at a level that is reasonably affordable for riders and represents a "fair share" of the costs of operating transit services. A key question arises, "What is considered a 'fair share'?" This is an important policy consideration for the CVTD Board of Directors to address. It will ultimately result in a farebox recovery ratio goal for the District. While there is no one "right" answer, the standard in the industry for a transit agency operating in a relatively compact service area with a fleet size of about 15 buses ranges between a 15% and a 25% farebox recovery ratio systemwide.

Discounted fares should be available for senior citizens, passengers with disabilities, students (through high school) and children five years and younger. Appropriate identification is typically required for discounted fares. The FTA requires that fixed-route services that receive Section 5307 operating assistance charge elderly persons, persons with disabilities, and individuals with a Medicare card a 50% discount from the full fare during off-peak hours. Most transit agencies go beyond the legal requirements and offer a 50% discount throughout the day for cash fares as well as a discounted monthly pass or tickets.

It is very common for transit agencies to also offer discounted fares for students, who typically depend heavily on public transit services. The fare for students through high school should be discounted especially for agencies that carry a high percentage of secondary school students, like CVTD. Many agencies provide students with a 50% discount on the full cash fare while other agencies do not offer a cash discount for students and instead offer a discount pass.

Other key fare strategy considerations are transfers and transfer policy. Many systems like CVTD are designed so that many riders must transfer between bus routes, which requires agencies to address transfers. Transfers are issued at the time of boarding and are intended for passengers who need to change buses to get where they're going without paying a fare every time they board. Approximately one-half of all CVTD riders need to change from one route to another when traveling from their origin to their destination. This means that if CVTD were to introduce a fare structure, transfers would have to be considered.

There are a wide variety of potential transfer policies. The vast majority of transit agencies do not charge for a transfer, although some charge a nominal amount. Many agencies that offer transfers allow a set time for their use, typically a two-hour period, and allow them to be used in one direction only. In this case a driver issues the rider a transfer with the time stamped on it, and the rider can get on and off as many buses as necessary within the allotted time period, as long as travel is generally in one direction. Other agencies allow transfers to function as a two-hour pass, allowing passengers unlimited travel in any direction. Typically the rider displays the valid transfer as proof of payment. Transfers have become an increasingly sensitive and controversial issue at many transit agencies because of problems associated with their use. For example, a common complaint is that passengers use transfers improperly, such as with an expired time stamp or on a return trip when that is not allowed. Such improper use causes conflicts between operators and passengers and boarding delays when operators take time to validate transfers. Agencies lament that improper use of transfers contributes to fare evasion and creates on-time performance problems. An increasing trend in the transit industry is to eliminate transfers and offer day passes which allow passengers unlimited ride privileges in a 24-hour period. Day passes and other types of pre-paid fare instruments are discussed in the following section.

PAYMENT TYPE

Payment type refers to the type of fare payment media (i.e., cash, token, paper ticket, or advanced payment media) and equipment used to collect fares. Agencies are increasingly offering a broad range of payment options that segment the market based on frequency of use and willingness to prepay. Most agencies offer one or more types of multiple-ride pass as well as some form of discounted multi-ride options; the most common types are described below. They include monthly, weekly, and daily passes as well as special or innovative pass types through partnerships with universities, employers, and other institutions.[13] The passes sold below can be sold as "rolling" or calendar date passes. A rolling pass will become valid upon first use for the specific duration on that pass (e.g. 31 days, 7 days, 1 day). A calendar pass will be valid on a specific date or date range.

[13] The multiple-ride instruments in this section are usually sold at several points of sale including retail outlets, agency administrative offices, schools, employers, and through Ticket Vending Machines (TVMs). Day passes are often sold on board buses as is the case at GET (Bakersfield), C-Tran (Vancouver, WA) and Capital Metro Transit (Austin). Passengers deposit cash directly in the farebox and a pass is produced. Drivers are not required to handle cash when passengers purchase day passes on board vehicles.

- **Monthly pass** or 31-day rolling passes allow unlimited rides for a given month or for a 31-day period starting on the day it is issued. Pass prices are based on the cash fare and a multiplier.[14] Agencies also offer discounted monthly passes to seniors and people with disabilities.
- **Weekly passes** provide unlimited rides for seven days or a calendar week. Weekly passes are typically activated when they are first used rather than a set Sunday-through-Saturday schedule.
- **Day passes** are usually offered as an alternative to transfers and priced between 2.5 and 4 times the base cash fare. They are valid for a 24-hour period or a calendar date and are the only type of pass sold on board vehicles.
- **20-ride tickets** are typically provided as a convenience to passengers with a small discount and usually are valid for an unlimited time period. This enables passengers to pay with tickets rather than having to fumble for cash, and tickets can be shared with family and friends.
- **Summer youth pass** is an increasingly common fare instrument at transit agencies to encourage youth ridership. They are typically good for a three-month summer period.

Transit agencies across the country are increasingly transitioning to smart card technology and others are opting for magnetic stripe cards. While this would be an issue for CVTD to address in the longer term if fares were introduced, advantages and disadvantages of each have been outlined in the following figure. This high-level evaluation is based on peer experiences from other transit agencies that have implemented magnetic stripe or smart card fare media.

Figure 10-1 describes two types of smart card systems. An "open" system is a smart card system that is reliant on existing "third party" cards with built-in RFID (proximity card) capabilities. As an example, if one already has a proximity-enabled debit or credit card or employer ID, these can be used as a "smart" card on transit vehicles. A "closed" system is a more traditional smart card where a transit agency is in control of the fare media which includes sales, distribution, reconciliation, and support.

[14] The term "multiplier" refers to the number that is multiplied by the cash fare to determine the price of a monthly pass. This can also be considered the "break even" point for a customer purchasing the pass. For example, a multiplier of 30 would mean a monthly pass price of $30 with a base cash fare of $1.00. A customer would need to ride a system using their monthly pass 30 times within a month before breaking even on their purchase.

Figure 10-1 Electronic Fare Collection: Advantages and Disadvantages

	Magnetic Stripe Card	Smart card (Open System)	Smart card (Closed System)
Enhanced Data Collection	+	++	++
Safeguards against fare evasion	+	++	++
Enables fare simplification	+	++	++
Provides information for focused marketing	+	++	++
Reduces printing and cash handling	0	+	+
Requires technology upgrades and infrastructure	-	--	--
Improves customer experience and fare security	+	++	++
Costs of distribution network infrastructure [15]	0	+	-
Transit agency experience with this technology	0	0	-

Negative Impact **-** ←--------- O Neutral----------→ **+** *Positive Impact*

Partnerships

Many transit agencies are entering into partnerships with employers that offer special discounted passes to their employees. The major benefit of these arrangements is increased pass sales and distribution channels to a large number of riders. Although there are many ways to structure these programs, from bulk discounts to on-site sales, employers typically purchase passes (or stickers) for their employees at a given worksite for a discounted price, based on the number of employees and other factors. Employees have unlimited use of transit for a set period at a fraction of the full pass price. This type of arrangement may be appropriate for any employer including the military, small businesses within one business park, or a large standalone employer.

Transit agencies are also increasingly entering partnerships with local colleges and universities to implement transit pass agreements providing a University Pass (U-Pass), which benefits students, transit agencies, and the community as a whole. These types of passes typically are eligible to any college or university student regardless of age. Research has shown that in communities where there is a U-Pass that is free to students (and sometimes faculty and staff too), transit ridership increases significantly, and there is a corresponding reduction in the number of auto trips to

[15] Includes required new equipment for participating retailers to sell and recharge smart cards

campus in the area. An in-depth discussion with Utah State University (USU) would be necessary to determine the level of interest in a U-Pass program if a fare on CVTD were introduced.

Another option that may be especially relevant for CVTD given the high number of students it carries is to enter into a partnership with the local school districts. The districts could negotiate bulk sales of passes and allow students to ride free (which could require a student ID for high school students). CVTD would then bill the school district monthly based on ridership. Not having students pay a fare directly would allow CVTD to continue to carry large numbers of students, and reduce the need for additional yellow school bus service. If there were a fare-related decrease in the number of students riding public transit, then the local school district may need to add school bus service, which will take resources away from educational purposes.

Establishing partnerships with employers, USU, and schools are valuable strategies for transit agencies to increase marketing exposure, attract non-traditional and/or choice transit riders, and increase operating revenues.

FARE VALIDATION/COLLECTION

The type of fare validation refers to the manner in which fares are enforced or inspected. The basic fare validation options are fare purchase or validation upon boarding, barriers (such as turnstiles) to validate fares and control access to the transit vehicle, and proof of payment (POP), which could be enforced by random inspection or 100% conductor validated. Of the four options, only fare purchase or fare instrument validation on board is relevant for a bus operator like CVTD. The other three options are generally appropriate for light rail or heavy rail systems.

The latest generation fareboxes are “validating” fareboxes, such as GFI’s “Odyssey.” They can verify that magnetic stripe or smart card passes and/or transfers are valid. In addition they can validate cash payments, verifying the amount and authenticity of bills and coins. The use of older fareboxes require the operator to examine paper passes and transfer slips and watch for invalid cash payments.

CAPITAL COSTS AND ONGOING COSTS TO IMPLEMENT A FARE

Introduction of a fare structure and fare collection system involves numerous up-front and ongoing costs to establish and maintain fare collection equipment, as well as internal and external processes to print and distribute tickets and passes, collect and reconcile fares, and conduct other customer relations and financial transactions. This section presents a detailed review of all equipment that would be necessary to begin fare collection at CVTD and a range of corresponding costs. It also estimates ongoing operating costs that reflect new administrative responsibilities for CVTD. These cost estimates are used in tandem with ridership and fare revenue projections to determine the “bottom line,” i.e., whether a net income gain or loss would result if CVTD were to introduce a fare.

As a prerequisite to estimating future costs, a good understanding of existing resources and operational characteristics is needed. The basic CVTD facts that are used as inputs for this analysis are listed in Figure 10-2 below.

Figure 10-2 Inputs for Estimating Costs

Annual Fixed Route Ridership (unlinked)*	1,898,000
Estimated Transfer Rate **	49%
Fixed Route Vehicles (total)	26
Annual Call-a-Ride Trips	26,468
Call-A-Ride (Paratransit) Vehicles	8

* 2010 Ridership. A linked trip represents the entire passenger trip from trip origin to trip destination regardless of the number of transfers that may be involved. An unlinked trip represents a single bus boarding whether at the trip origin or at a transfer location.

** A transfer rate of 49% is assumed due to the timed-transfer design of the CVTD system coupled with 2011 survey results

To estimate the potential impacts on ridership and the resulting farebox revenues if a fare were introduced, three different fare scenarios were included in this analysis.

Figure 10-3 lists the proposed base fares (for a single ride) for fixed route and Call-A-Ride service. The three scenarios were designated "Low," "Medium," and "High," to reflect corresponding fare levels. The low-end fare could reflect a "charge something" fare to address potential concerns about riders not paying their way, or could be seen as an introductory fare to get passengers accustomed to a fare structure. The high-end fare represents a level used in a number of peer systems, while also acknowledging CVTD passengers' ability to pay given the high number of low-income, student, and senior passengers.

Figure 10-3 Three Fare Scenarios Used for Analysis

Service	Base Fare Level		
	Low	Medium	High
Fixed Route	$0.50	$1.00	$1.25
Call-A-Ride	$1.00	$1.25	$1.50

INITIAL CAPITAL INVESTMENTS

Figure 10-4 presents ranges for the one-time capital investments required to implement a fare. The cost estimates list the quantity or number needed of each item and the estimated total cost based on a low and high unit cost. For example, 26 fareboxes would be required to equip the CVTD fleet, with estimated costs ranging between $260,000 and $338,000. All capital costs are listed separately in the figure including initial marketing and education costs plus a 10% contingency of all capital costs. On the low end, the required capital costs are estimated at $712,000, and the high end costs are estimated at just over $1.1 million.

Figure 10-4 One-Time Capital Investments

Fare Collection Implementation Costs					
One-Time Capital Investments	**Qty**	**Unit Cost Low**	**Unit Cost High**	**Total Cost Low**	**Total Cost High**
Fixed Route Fareboxes [1]	26	$10,000	$13,000	$260,000	$338,000
Call-a-Ride (CAR) Fareboxes [1]	8	$2,000	$8,000	$16,000	$64,000
Farebox Installation Costs [1]		3%	10%	$8,280	$40,200
Ticket Vending Machines (TVMs) [1]	4	$30,000	$55,000	$120,000	$220,000
Attended Card Encoders [1]	2	$13,000	$19,000	$26,000	$38,000
Data Processing Software and Hardware [1]	1	$35,000	$55,000	$35,000	$55,000
Vault (on wheels) [1]	1	$30,000	$40,000	$30,000	$40,000
Spares Parts (10% of fareboxes and TVMs) [2]				$39,600	$62,200
Money Room and Clean Room Build Out [3]	1	$160	$222	$72,000	$99,900
Contingency Budget (10% of all Capital Costs) [4]				$60,688	$95,730
One-Time Capital Costs [5]				$667,568	$1,053,030
Initial Marketing and Education				$45,000	$60,000
Total Capital Costs				**$712,568**	**$1,113,030**

Notes:

Bus probes and garage probes will be needed for data collection from vehicles (these will likely be provided by hardware vendor at no cost as noted from Gfi, a farebox manufacturer).These are needed for downloading data from fareboxes into data processing computers. Typically they are via infrared emitters/sensors. Attended Card Encoders are devices to program (encode) blank fare media (magnetic stripe or smart cards). They can be used to generate multi-ride passes and/or smart cards from individuals participating in partner program.

1. Farebox, TVM, other hardware and installation costs based on figures from TCRP Report 94.

2. Cost for spares (additional spare parts and pieces) is factored only for high-use equipment such as fareboxes and TVMs. Ongoing spare parts costs is determined by taking 10% of the initial capital cost of spare parts.

3. Room Build Out costs assumes 360 Sq Ft (small) and 450 Sq Ft (large), per unit costs reflect per-square-foot costs.

4. Contingency budget has been developed to cover 10% of all above capital costs.

5. Capital costs are FTA eligible; however this analysis assumes capital costs would be funded by CVTD. If federal funds are secured, then it would cover 80% of the cost, reducing CVTD's contribution to 20%.

PROJECTED RIDERSHIP LOSS AND REVENUE GENERATION

Significant research over time has examined the sensitivity of transit ridership to fare increases. In economic terms, the change in the product purchase pattern with respect to the change in price is referred to as "elasticity." Ridership elasticity with respect to fare (commonly referred to as "fare elasticity") measures the percentage change in ridership in response to a change in transit fare. In transit, the standard fare elasticity is –0.3. This means that for every 10% increase in fares, ridership will decrease by three percent.

The notion of fare elasticity is not applicable to the case when fares are instituted for a free-fare system as this represents an infinite increase in fares. But research into fare elasticity for the elimination of fares can be used to predict ridership losses when reversing the situation and adding a new fare.

Based on limited research into fareless demonstration projects for a number of years, TCRP Report 95, Chapter 129[16] demonstrates the effect of eliminating fares. This implies the percent increase in ridership is equal to elasticity value given the 100% drop in fares. The report found that in central business districts (CBDs), a higher average fare elasticity of -0.52 (+/- 0.13) can be applied, since in a CBD short walking trips and transit trips are more interchangeable than longer trips. For example, in London, trips under one mile in length were found to be almost twice as sensitive to fare changes as longer trips; fare elasticity for trips shorter than a mile ranged from £0.50 to £0.55. The average fare elasticity for a limited number of non-CBD studies averaged -0.32. The higher CBD elasticity value is also applicable to CVTD, as walking is an option for a number of trips, especially those to/from USU.

Therefore, the nominal elasticity value of -0.52 suggests that a 52% increase in ridership will result if fares are eliminated in a CBD or other area where transit competes with other modes. Conversely the addition of a fare under these conditions will result in a (34%) loss in ridership. Figure 10-5 highlights the range of expected ridership losses given the range of elasticity cited for the free-fare systems. When analyzing a potential fare for the CVTD system, the greater loss (39%) is assumed for the high-end fare assumption and the lesser loss (28%) is assumed for the low-end fare assumption.

The predicted percentage range of ridership loss was also compared to two small systems where fares were implemented recently. While not directly comparable, the percentage of ridership loss at LINK in Wenatchee, Washington and SKAT in Mount Vernon, Washington are within the ranges predicted in Figure 10-5 below.

Figure 10-5 Elasticity-Based Ridership Losses when Instituting a Fare

Case	Elasticity	Loss if Free Fare is Eliminated
CBD – high end	-0.65	(39%)
CBD – nominal value	-0.52	(34%)
CBD – low end	-0.39	(28%)

[16] TCRP 94 – Fare Policies, Structure and Technologies: Updated 2003.

The elasticity is less for dial-a-ride services because many of these passengers are seniors and/or persons with disabilities who rely heavily on these services (these individuals' demand would be considered fare inelastic). The transit industry has generally found that ADA ridership does not decline after a fare increase, primarily because there is enough pent-up demand that any rider who does discontinue using the service is immediately replaced by another rider. As an example, the Metropolitan Transit District (MTD) in Santa Barbara reports that when it doubled its ADA fares (from $1.00 to $2.00) and also eliminated multi-ride discounts, there was no measurable impact on ADA ridership. However, it is reasonable to assume that when transitioning from a free-fare system to charging a fare, there would be a small percentage of riders who would seek alternative travel options before paying a fare. Therefore a range between 20% and 30% is used when estimating a loss in ridership.

The ridership and revenue assumptions are based on three fare scenarios shown in Figure 10-6 on the following page. The top third of the figure presents current (2010) Call-A-Ride and fixed-route ridership with an assumed 49% transfer rate based on CVTD 2011 ridership surveys. The estimated ridership loss under the three fare scenarios is shown for each service.

The middle portion of the figure lists the low, medium, and high fares, the percent of the fare collected, and the average fare per rider. For fixed-route service it is assumed that 55% of the full fare would be collected, based on the high percentage of riders that would be paying a reduced fare.

Based on these parameters, CVTD would receive between $257,700 and $546,250 in fare revenues, depending on the fare level. These figures do not include the cost of collecting fares, capital costs, or additional operating costs. These costs are discussed in detail in subsequent sections of this chapter.

Figure 10-6 Ridership and Revenue Estimates

Current (2010) Ridership	Low	Medium	High
Annual Fixed Route Ridership (**Unlinked** Trips)			1,898,000
Annual Fixed Route Ridership (**Linked** Trips) (1)			1,275,538
CVTD Call-A-Ride/Lifeline Service			26,468
Assumed Transfer Rate (2)			49%
Estimated Fixed Route Ridership			
% Loss due to Fare (3)	(28%)	(33%)	(39%)
Estimated Ridership Loss	(357,151)	(420,927)	(497,460)
New Linked Trips with Fare	918,387	854,610	778,078
Potential Transfers	448,173	417,050	379,702
Estimated Call-a-Ride Ridership			
% Loss due to Fare (4)	(20%)	(25%)	(30%)
Estimated Ridership Loss	(5,418)	(6,567)	(7,946)
Ridership with Fare	21,050	19,901	18,522

Fare Revenue Alternatives	Low	Medium	High
Fixed Route			
Fixed Route Fare Structure ***(Three fare scenarios)***	*$0.50*	*$1.00*	*$1.25*
Percent collected (5)	55%	55%	55%
Assumed Avg Fare Per Passenger	$0.28	$0.55	$0.69
Fixed Route Passenger Revenue	**$252,556**	**$470,036**	**$534,929**
Call -A- Ride			
Call-A-Ride Fare Structure ***(Three fare scenarios)***	*$1.00*	*$1.25*	*$1.50*
Percent collected (5)	95%	95%	95%
Assumed Avg Fare Per Passenger	$0.95	$1.19	$1.43
Call-A-Ride Passenger Revenue	**$5,147**	**$7,799**	**$11,323**
Estimated Total Fare Revenue (Fixed Route + Call-A-Ride)	***$257,704***	***$477,834***	***$546,252***

1. A linked trip represents the entire passenger trip from trip origin to trip destination regardless of the number of transfers that may be involved. An unlinked trip represents a single bus boarding whether at the trip origin or at a transfer location.
2. A transfer rate of 49% is assumed due to the timed-transfer design of the CVTD system coupled with 2011 survey results.
3. Loss of fixed-route ridership due to fare increases is assumed at all three levels, with losses between 28-39%.
4. Loss of ADA ridership is assumed at all three levels. Since ADA riders are highly transit dependent, they have few travel choices, and the projected loss is lower than the fixed-route ridership loss rate.
5. Assumed 55% of the full fare would be collected because of discounted fares, pre-paid passes, etc. This percentage is within the industry norm for a small-sized system like CVTD.

ONGOING OPERATING COSTS

The ongoing annual operating costs related to fare collection are presented in Figure 10-7. The costs to implement a fare collection system are estimated based on the three different fare scenarios defined above and the resultant ridership projections. Reoccurring direct costs include purchasing fare media and spare parts plus ongoing marketing activities and other routine administrative tasks. The figure also highlights the change in fixed route operating costs associated with the additional dwell time resulting from slower boarding times. Replenishing the capital reserve account is calculated based on annualized costs of capital equipment. The $105,658 amount for the low, medium, and high fare scenarios assumes that 100% of capital projects will be covered by CVTD. A ten-year life cycle is assumed for all capital equipment (fareboxes, TVMs, etc.) and a 30-year life cycle for the money room. An additional $241,000 is added for dwell time costs (see the following section on Operational Impacts). The total annual operating costs are approximately $504,000.

Figure 10-7 Ongoing Costs Associated with Fare Collection

Annual Costs for Fare Media and Personnel Functions	Unit Cost	Low Fare	Medium Fare	High Fare
Procure annual transfer media (paper stock, mag stripe)[1,2,7]	$0.02	$5,378	$5,005	$4,556
Procure annual pass media (plastic stock, mag stripe)[1,2]	$0.03	$13	$12	$11
Procure annual smartcard media[1,2]	$1.45	$1,344	$1,251	$1,139
Ongoing Purchase Farebox and TVM Spare Parts		$10,180	$10,180	$10,180
Procure annual Call-A-Ride smartcard media [1,2]	$1.45	$29	$28	$26
Equipment Maintenance Costs [3]	6%	$30,540	$30,540	$30,540
Additional Ongoing Marketing Costs		$5,000	$5,000	$5,000
Annual FTE Employee Costs: includes media distribution and reconciliation, maintenance, revenue handling, and software maintenance [4]	2 FTE	$105,000	$105,000	$105,000
Capital Reserve Replenishment [5]		$105,658	$105,658	$105,658
Estimated Dwell Time Cost [6]		$241,103	$241,103	$241,103
Annual Ongoing Operating Costs		**$504,245**	**$503,776**	**$503,213**

1. Assumes hybrid smart card/mag stripe system
2. Assumes that pass media is purchased at 50% over required demand for that fare class, based on ridership projections from Figure 10-6.
3. Equipment maintenance costs range between 5% and 7% of equipment costs, average of 6% used on fareboxes and TVMs.
4. Assumes one new full-time mechanic ($55,000) and one new full-time administrative employee ($50,000). To reflect customer service CVTD employees have come to expect, additional administrative/customer relations staff may be needed.
5. Capital Reserve Replenishment takes the average between low and high FTA-eligible capital costs and annualizes it over the intended lifespan (10 years for farebox related equipment and 30 years for structures).
6. Dwell Time Costs: We assumed four lines would require an additional 15.5 hours total of operating time per day, 255 weekdays/year times $61/hour, which is based on $35/hour for marginal costs and $26/hour for the capital costs of acquiring new buses. These additions in service hours were to address instances when the bus could not meet its "cycle time" or time needed to meet its time schedule given its route.
7. Transfer rate is estimated to be 49% given 2011 survey results.

OPERATIONAL IMPACTS

With the introduction of fare payment on transit vehicles, it is inevitable that there will be additional boarding delay. This delay is predominately related to fare payment itself, but can also be caused by questions and dialogue related to fare payment between the customer and the operator. Stop by stop, these small delays may seem insignificant. However, over the course of a full route, they can aggregate and create noticeable issues with on-time performance and schedule adherence. This section will briefly outline the potential operations impacts that can be caused by the introduction of fare payment and how it specifically may impact CVTD.

Boarding delay caused by fare payment is quantifiable and is often measured on a per-boarding basis. However, the magnitude of the delay can vary depending on the fare payment type. Fare media that require visual inspection only (such as flash passes) are likely to cause the least delay per boarding whereas an individual paying cash fare (and requiring exact change) may take significantly longer. As one can imagine, fareboxes that require exact change may prompt customers to spend several seconds digging for correct change. Other fare media such as swipe (magnetic stripe) cards or proximity smart cards fall between the above two examples in terms of delay.

Figure 10-8 below provides information on national research [17] that has been conducted on boarding delay as a result of various types of fare payment types. Based on CVTD's existing free-fare service model and this research, it is assumed that current CVTD boardings take approximately 2.5 seconds per passenger. If CVTD were to introduce fare payment on its services, it would likely add boarding delay on top of the existing 2.5 seconds.

Figure 10-8 Boarding Delay by Fare Payment

Situation	Suggested Default Passenger Service Time (sec/pax)
Pre-Payment (includes no fare)	2.5
Exact change	4.0
Swipe or dip card	4.2
Smart card	3.5

Based on TCRP research on passenger service time under various fare payment types, this analysis will assume that fare payment on CVTD routes will add approximately 1.5 seconds to each boarding (the difference in time between free fares and delay from requiring exact change). It is understood that not all future passengers will have exact change; 4.0 total seconds per boarding is a middle ground between those using smart cards, change, and swipe cards.

Most CVTD routes currently operate with a 30-minute frequency. Over the past years, as passenger trips and traffic congestion have increased, CVTD has experienced more and more on-time performance issues. CVTD has already taken steps to ensure that buses are able to operate routes every 30 minutes, including consolidating bus stops and shortening routes. Despite these steps, many routes have absolutely no margins for adding running time. Figure 10-9 shows the number of

[17] Transit Cooperative Research Program (TCRP 100- Transit Capacity and Quality of Service Manual)

trips currently exceeding "cycle time"[18] based on a count the week of September 12, 2011. "Exceeded Cycle Time" refers to the trip exceeding its scheduled cycle time. For instance, if Route 1 is scheduled for a 30-minute round trip and has a trip that took 31 minutes to complete, it exceeded its cycle time.

The travel time plus recovery time per trip collected in September 2011 was correlated to ridership by trip to determine the existing amount of dwell time experienced by each route. Then the ridership of each trip was reduced by 34%, the mid-range assumption for ridership loss if fares were implemented. The longer boarding time was then applied to the reduced ridership for each trip. In Figure 10-9, the "Max Added Dwell Time per Trip" column shows the additional dwell time added to each trip. While this amount may not seem significant in many cases, it pushes trips at their current scheduling limit over the edge. For instance, Route 1 only has 2 minutes of scheduled recovery time at the transit center, a time in which transfers are made before departing for the next scheduled bus trip to maintain on-time schedule reliability. Data showed that 17% of Route 1 trips were arriving after the scheduled transfers were to take place, causing passengers to miss their connecting buses, experience longer travel time, and suffer personal inconvenience. If a fare were implemented, 27% of trips would miss their scheduled arrival and departure times.

Three potential solutions to the additional dwell time are possible:

1. Adjust the route alignment. This option is possible for Routes 3, 10, CVN, CVS, and CVS Express, and thus no costs are assigned to these routes even though additional dwell time may affect them.
2. Add additional trips to accommodate the additional running time. The costs and time for adding additional trips to Routes 1, 4, 5, and 6 are shown in Figure 10-9. An estimated $241,000 annually would be required to address the additional dwell time.
3. Change the timed transfer from every 30 minutes to every 35 minutes. Ultimately, retiming the routes would not require additional buses or service hours, but it represents a service cut, resulting in 16% less trips throughout the day. Ridership will decrease between 16% and 23%[19] as a result of the service cut. To avoid this additional ridership loss, the option of adding additional buses was selected.

The estimated costs to address additional dwell time are $241,000 annually. Figure 10-9 does not include the capital costs for adding four additional buses to the fleet.

In addition to direct delay caused by fare payment activities, operators may see an increased role in helping to explain, educate, and enforce fare policies to CVTD customers. Again, on a case-by-case basis, the delay caused by these activities may seem minor, but can quickly accumulate over the course of a route. These types of interactions were not factored into the above estimations given their unpredictable nature, but should be considered, particularly during the initial rollout of fare collection when numerous customers would have questions and concerns about the policy and each time the fare structure is changed.

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[18] Route cycle time includes the scheduled route round trip travel time to and from the Transit Center plus recovery time of three to four minutes. Wait or recovery time allows the bus driver to recover from traffic and passenger boarding delay resulting in being able to leave the next bus trip "on time" and avoid an ongoing off-schedule "domino effect."

[19] Ridership loss percentages are based on experiences in Colorado Springs, CO and Lansing, MI, where routes were adjusted from 35-minute frequencies to 30-minute frequencies. This 14% service increase resulted in more than 20% increases in ridership. We assume that this relationship will also exist in the converse situation and have been conservative in our estimated decrease of 16% to 23% given a five-minute increase in headway.

Figure 10-9 Estimated Dwell Time Analysis

		Existing Conditions		With Fare and Additional Dwell Time						
Route	Daily Trips 1)	Current Trips Exceeding Cycle Time 2)	Percent Trips Missing Transfers 3)	Max Added Dwell Time Per Trip 4)	Trips Exceeding Cycle Time 5)	Percent Trips Missing Transfers 6)	Recommendation	New Daily Hours Needed	Annual Hours	Annual Cost ($61/hr)
1	41	7	17%	11 seconds	11	27%	Add a bus between 8:30 AM and 6:00 PM	11.5	2932.5	$178,883
2	30	1	3%	9 seconds	1	3%				
3	10	1	10%	3 seconds	2	20%	Address at no cost with routing recommendation			
4	27	1	4%	12 seconds	2	7%	Add a bus between 2:30 and 3:30 PM	1	255	$15,555
5	30	0	0%	6 seconds	2	7%	Add a bus between 2:00 PM and 4:00 PM	2	510	$31,110
6	30	1	3%	8 seconds	2	7%	Add a bus between 2:30 and 3:30 PM	1	255	$15,555
7	30	2	7%	10 seconds	2	7%				
8	20	0	0%	7 seconds	0	0%				
9	30	0	0%	8 seconds	0	0%				
10	14	1	7%	5 seconds	2	14%	Address at no cost with routing recommendation			
11	13	1	8%	10 seconds	1	8%				
CVN	13	4	31%	12 seconds	5	38%	Address at no cost with routing recommendation			
CVS EXP	9	1	11%	11 seconds	1	11%	Address at no cost with routing recommendation			
CVS	13	9	69%	5 seconds	10	77%	Address at no cost with routing recommendation			
Total	**310**	**29**	**9%**		**41**	**13%**		**15.5**	**3952.5**	**$241,103**

Notes: Current Trips Exceeding Cycle Time means trip has no recovery time and no time for transfers
For instance, if Route 1 takes 0:30 minutes, it is counted as exceeding the cycle time.
Ridership data are averages collected from Jan 26-Feb 2, 2011
On-time performance by trip was collected the week of September 12, 2011

1) Daily Trips - The number of round trips to/from the Transit Center
2) Current Trips Exceeding Cycle Time - This counts the number of trips that currently exceed their scheduled cycle time. For instance, if Route 1 has a trip that took 0:31 minutes to complete, it exceeded its cycle time. The time by trip was taken from data collected the week of September 12, 2011.
3) Percent Trips Missing Transfers - If the cycle time was not hit, then transfers were likely missed. This is the percentage for the week of September 12, 2011.
4) Maximum Added Dwell Time per Trip - Using Ridership data collected the week of Jan 26-Feb 2, 2011, the number of passengers per trip for each trip was calculated, as was the dwell time for this trip, using 2.5 seconds/passenger. If a fare is instituted, ridership will drop by an estimated 34% and the dwell time will increase to 4 seconds/passenger. The maximum difference between the existing dwell time and the projected dwell time per trip is reported in this column.
5) Projected Trips Exceeding Cycle Time - This counts the number of trips that are projected to exceed their scheduled cycle time with the additional dwell time caused by a fare.
6) Percent Trips Missing Transfers - If the cycle time was not hit, then transfers were likely missed. This is the projected missed transfer rate.

A graphic representation of scheduling practices is shown in Figure 10-10. The actual schedule experience on several existing CVTD routes is presented in Figure 10-11 followed by projected schedule practices (Figure 10-12) if a fare was introduced. These figures demonstrate the impact a fare would have on the schedules and the need to add buses to maintain 30-minute headways.

Figure 10-10 Existing Scheduling Practices

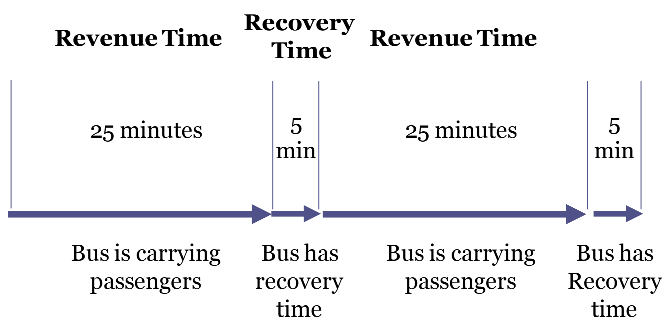


Figure 10-11 Actual Schedule Experience

What is happening on several CVTD routes:
Four routes currently have little/no recovery time
Any additional travel time would break timed transfer system

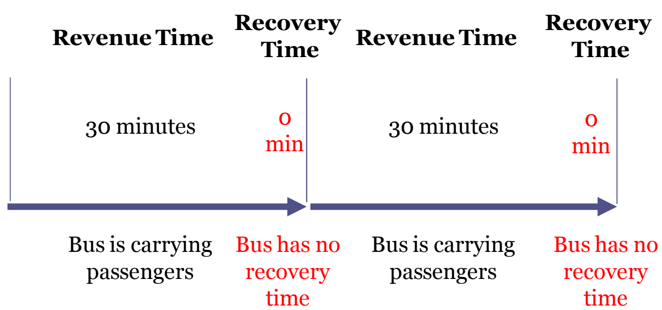
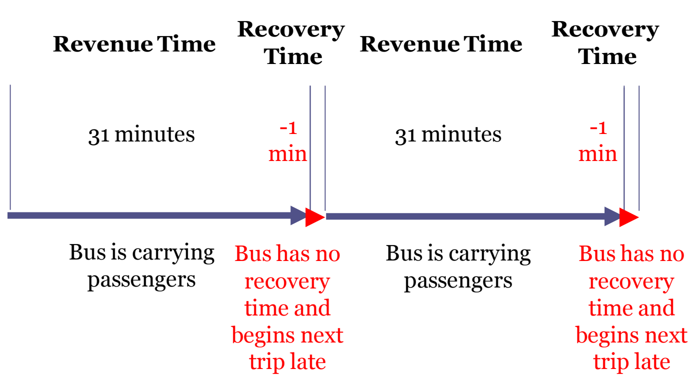


Figure 10-12 Projected Schedule Practices with Fare

For four routes, timed transfers with other routes would break down.
Additional buses are necessary to maintain 30-minute service.



Operating Costs and Revenue Gains/Losses

Figure 10-13 shows operating costs and projected farebox revenues for each fare scenario and the resultant farebox recovery ratios. Fixed-route service is projected to collect between 7% and 14%, which is slightly below transit industry standard for a system like CVTD. For Call-A-Ride, the service is projected to recover only 1% of costs from passenger fares with a fare structure ranging between $1.00 and $1.50. While these projected farebox recovery ratios are somewhat lower than industry standard, modest fares are initially proposed to help the riding public adjust to a fare structure. CVTD would need to revisit fares on a periodic basis to adjust them for inflation, fuel price increases, and other considerations.

Figure 10-13 Operating Costs and Net Revenue Gains/Losses

Total Costs vs. Revenues (Fixed Route and Call-A-Ride) - all costs annual - Includes Costs Operational Impacts			
Costs	Low	Medium	High
Existing Fixed-Route Operating Costs	$3,275,000	$3,275,000	3,275,000
Existing Call-A-Ride Operating Costs	$725,000	$725,000	$725,000
Existing Costs[1]	***$4,000,000***	***$4,000,000***	***$4,000,000***
Estimated Fare Collection Operating Costs	$504,246	$503,776	$503,213
Projected Total Operating Costs	**$4,504,246**	**$4,503,776**	**$4,503,213**
Farebox Revenues			
Estimated Fixed-Route Farebox Revenue	$252,556	$470,036	$534,929
Estimated Call-A-Ride Farebox Revenue	$5,147	$7,799	$11,323
Total Fare Collection Revenues	**$257,704**	**$477,834**	**$546,252**
Fare Collection Net Gain/Loss[2]	**($246,542)**	**($25,942)**	**$43,038**
Fixed-Route Farebox Recovery Ratio	7%	12%	14%
Call-A-Ride Farebox Recovery Ratio	1%	1%	2%

Notes:

Fare Collection Related Costs and Revenues are highlighted in blue

1. Existing costs are presented for the purpose of determining farebox recovery ratio
2. Fare collection net gain/loss is a comparison of fare collection revenues versus costs only.

From Figure 10-13 above, the *total fare revenues* reveals that with a modest $0.50 fixed-route fare and $1.00 fare for Call-A-Ride, there would be an annual revenue gain of just over $257,704. If fixed-route fares were set at $1.00 and $1.25, and Call-A-Ride fares at $1.25 and $1.50, then the annual revenue gain is projected at approximately $477,800 and $546,000 respectively. Again, these figures reflect only revenue and do not include any cost of fare collection.

When factoring in the potential fare revenue and costs of collecting a fare, a fare structure set at the lowest level ($0.50) would generate an overall net *loss* of approximately ($247,000). With a fare of $1.00, the projected annual net *loss* would be ($26,000), and with a fare set at $1.25 there would be an estimated net *gain* of approximately $43,000. These net gains and losses consider projected farebox revenues and costs, including both operational costs and annualized capital costs, associated with fare collection. *Thus, implementing fare collection, would result in a net loss in the $0.50 to $1.00 scenarios and would produce a modest net increase in revenue in the $1.25 fare scenario.*

SUMMARY, CONCLUSIONS, AND NEXT STEPS

This chapter has attempted to answer the question, "What will implementing fares cost from a capital and operating perspective, and how much revenue can CVTD expect to gain?"

A summary of the costs, ridership projections, and revenue gains is presented in Figure 10-14. The required capital investments are estimated at $712,000 on the low end and $1.1 million at the high end, and include equipping the entire fixed-route and Call-A-Ride fleets with fareboxes and purchasing supporting equipment and facilities. No federal funding is assumed to help cover the cost of capital equipment, given uncertainty with the pending reauthorization of the Federal transportation bill.

Operating costs to support a fare structure are estimated at approximately $504,000 per year. This includes the estimated annual cost for the additional boarding time at $241,000.

Ridership and farebox revenues were projected for each fare scenario. With a nominal $0.50 fixed route fare and $1.00 Call-A-Ride fare, the net revenue *loss* has been estimated at just under ($247,000). If fixed route fares were set at $1.00 and $1.25 and Call-A-Ride fares slightly higher, then CVTD is projected to experience a net annual revenue *loss* of ($26,000) and a net revenue *gain* of $43,000, respectively. At this fare level, fixed-route farebox revenues are expected to cover between 7% and 14% of total operating costs. This analysis concludes that, given the estimated net revenue loss with a $0.50 and $1.00 fare and the minimal revenue gain with a $1.25 fare, introducing a fare at this time is not recommended.

This fare analysis chapter addresses in further detail our recommendation that CVTD not change its fare policy, for the following reasons:

1. The expense of collecting the fare is generally greater than the revenue generated from the fare.
2. Charging a fare causes significant ridership loss.
3. Collecting a fare causes scheduled travel times to be lengthened because of the additional time needed for passengers to deposit the fare.
4. Charging a fare makes it more difficult for CVTD to meet its mission of reducing the dependency on the automobile and supporting efforts to improve air quality, by reducing ridership.
5. Collecting fares creates real and perceived barriers to using public transit, known as "Hassle Factors."
6. Charging a fare makes it more difficult for CVTD to meet the Envision Cache Valley principle to "Provide a balanced transportation with enhanced public transportation options" by reducing ridership.

When demographic and economic conditions are such that charging a fare does not negatively affect these key objectives, CVTD should consider implementing a fare. In considering a fare CVTD will need to address the following key questions:

- What is our primary objective in establishing a fare?

- What should the District's farebox recovery goal be? That is, what percentage of the District's operating costs should be covered by farebox revenues?
- Who are our key markets and what fare discounts should we offer to attract and maintain them?
- What type of fare instruments should we offer, given our ridership base?

With these key policy questions answered, the District will be better positioned to decide a course of action regarding fares when this issue is revisited at a future date.

Figure 10-14 Summary of Ridership, Collection Costs, and Projected Farebox Revenue

Fare Scenarios	Low	Mid	High
Fixed Route Fare Structure	$0.50	$1.00	$1.25
Call-A-Ride Fare Structure	$1.00	$1.25	$1.50
Farebox Revenue Projections			
Fixed Route Service	$252,556	$470,036	$534,929
Call-A-Ride Service	$5,147	$7,799	$11,323
Total Farebox Revenues	$257,704	$477,834	$546,252
Annual Fare Collection Costs			
Fare Collection Costs	$504,245	$503,776	$503,213
Projected Farebox Recovery Ratio			
Fixed Route Service	7%	12%	14%
Call-A-Ride Service	1%	1%	2%
Fare Collection Net Gain/Loss	**($246,542)**	**($25,942)**	**$43,038**