



Cuyahoga Valley National Park *Comprehensive Rail Study*



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Report notes

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Definitions

The following terms are used in this report:

| | |
|-------------------|---|
| AAO | All Aboard Ohio |
| AAR | Association of American Railroads |
| ADA | Americans with Disabilities Act |
| ALCO | American Locomotive Company |
| AMATS | Akron Metropolitan Area Transportation Study |
| APTA | American Public Transportation Association |
| B&O | Baltimore and Ohio |
| CARB | California Air Resources Board |
| CMAQ | Congestion Mitigation and Air Quality Program |
| CMO | Chief Mechanical Officer |
| CO | Carbon Monoxide |
| CVNP | Cuyahoga Valley National Park |
| CVSR | Cuyahoga Valley Scenic Railroad |
| CWR | Continuous Welded Railroads |
| DERA | Diesel Emissions Reduction Act |
| DERG | Diesel Emissions Reduction Grant |
| EFLHD | Eastern Federal lands Highway Division |
| EMD | Electro-Motive Diesel |
| EPA | Environmental Protection Agency |
| FCC | Federal Communications Commission |
| FH | Forest Highways |
| FHWA | Federal Highway Administration |
| FRA | Federal Railroad Administration |
| FTA | Federal Transit Administration |
| G/BHP-H | Grams per Brake Horsepower Hour |
| GCRTA | Greater Cleveland Regional Transit Authority |
| HC | Hydrocarbon |
| HEP | Head-End Power |
| MARC | Maryland Area Regional Commuter |
| MCDI | Midwest Clean Diesel Initiatives |
| METRO | METRO Regional Transit Authority |
| MLW | Montreal Locomotive Works |
| MP | Mile Post |
| MPO | Metropolitan Planning Organization |
| MU | Multiple Unit |
| NOACA | Northeast Ohio Areawide Coordinating Agency |
| NO _x | Nitrogen Oxide |
| NPS | National Park Service |
| NREC | National Railway Equipment Company |
| ORDC | Ohio Rail Development Commission |
| OSHA | Occupational Safety and Health Administration |
| PDC | Programming Decision Committee |
| PIDS | Passenger Information Display System |
| PM | Particulate Matter |
| PM _{2.5} | Fine Particle Pollution |
| PMIS | Project Management Information System |
| PRIIA | Passenger Rail Investment and Improvement Act |
| RDC | Railroad Diesel Car |
| RIP | Repair-in-Place |

| | |
|-------|--|
| RRIF | Railroad Rehabilitation and Improvement Financing |
| SARTA | Stark Area Regional Transit Authority |
| STP | Surface Transportation Program |
| TEP | Transportation Enhancement Program |
| TIGER | Transportation Investment Generating Economic Recovery |
| TRIP | Transit in Parks |

Executive summary

The Cuyahoga Valley National Park (CVNP) Comprehensive Rail Study provides a 20-year framework for the growth and development of Cuyahoga Valley Scenic Railroad (CVSR). This study documents the current state of the system as a baseline for analysis, and, using CVNP- and CVSR-defined vision and goals for the system, develops a prioritized program of improvements to achieve stakeholders' desired future state.

Together, CVNP and CVSR developed and prioritized goals and objectives for the railroad over the next 20 years. These goals and objectives relate directly to the issues and needs that CVSR and CVNP currently need to address and will increasingly need to address in the future as they become — if not addressed successfully — more pronounced. The top six goals are to:

1. Provide safe, on-time service to meet passenger demand
2. Improve equipment to accommodate increased ridership and to reduce maintenance
3. Make infrastructure and facility improvements to accommodate increasing ridership
4. Acquire equipment to accommodate demand
5. Provide a customer-friendly experience before, during, and after the trip
6. Communicate schedule and operational information to passengers in real time

Tied to these and other goals are performance measures regarding safety, schedule adherence, passenger satisfaction, air pollutants, and fuel consumption and efficiency. Over time, CVSR and CVNP can gauge their progress and success in meeting their goals by using these performance measures.

In order to more accurately recommend service, equipment, and facility improvements to CVSR and CVNP, the project team considered past and current ridership trends and projected them forward. Based on this analysis, the project team estimates that CVSR will add between 6,500 and 12,500 new riders per year over the next 20 years. With these estimates in mind, CVSR and CVNP can anticipate and prepare for this likely growth and develop, alter, and shape its service and operations accordingly.

Within the context of the goals and objectives, issues and needs, and projected ridership growth, the project team created 27 recommended improvements for the consideration of CVSR and CVNP. These improvements are detailed in the report (with descriptions, timeframe/priority, costs, and sub-improvements where necessary) and are provided as a list — categorized by type of improvement — below.

Operations improvements

1. Improve passenger information
2. Institute a regular data collection and analysis program
3. Review stations served
4. Improve schedule adherence
5. Institute growth management techniques
6. Pilot express Scenic service during peak times
7. Institute new procedures to check and maintain audio tour equipment / upgrade equipment
8. Pilot regular shuttle service between CVSR and CVNP attractions
9. Continue monitoring feasibility of Cleveland extension
10. Create comprehensive transportation plan for CVNP

Communications improvements

1. Improve CVSR radio communications
2. Develop and deploy a passenger information display system (PIDS)
3. Develop a long-range communications plan

Equipment improvements

1. Implement a progressive maintenance plan
2. Procure “green” locomotives
3. Convert equipment to allow for cab control
4. Upgrade coaches for increased passenger comfort
5. Standardize equipment
6. Obtain permanent ownership of entire fleet
7. Supplement existing ADA cars
8. Overhaul concession cars

Infrastructure improvements

1. Add repair-in-place(RIP) track
2. Add sidings
3. Improve accessibility
4. Expand maintenance facility
5. Enhance fuel storage
6. Construct car storage facility

In line with these improvements, CVSR and CVNP can pursue two different approaches as ridership continues to grow. These approaches are not mutually exclusive and can be pursued in concert. They can increase their operations by adding service and capacity as necessary to accommodate demand, and/or they can try to manage growth by employing growth management techniques, which are detailed under operations improvement number five. Compared to the second approach, the first approach necessitates the hiring of more staff and volunteers and the acquisition and construction of more equipment and facilities. The second approach, however, may restrict access for people, yet result in an enhanced visitor experience. CVSR and CVNP will want to decide how to balance these two approaches, and that decision may be informed by the actual rate of ridership growth as well as the availability of funding needed to pursue new capital projects.

Introduction

Since its establishment in 1972, as a 501 (c) 3 not-for-profit organization in the state of Ohio, Cuyahoga Valley Scenic Railroad (CVSR), has operated excursion passenger rail service in the Cuyahoga Valley. With entirely volunteer staff, leased equipment and a very limited budget, occasional service was provided between Hale Farm & Village and the Cleveland Zoo.

Two years after CVSR was established, Cuyahoga Valley National Park (CVNP) was established as the 275th National Park. It was created during the National Park Service's (NPS) "Parks to the People" movement when a number of national parks were created in urban locations so that many more citizens would have the opportunity to visit a national park.

The relationship between CVSR and CVNP during the first decade and a half of each of their existences was very indirect – mainly because the track over which CVSR ran was owned by a freight railroad operator. However, in 1985, CSX Transportation discontinued its freight service and abandoned the line. The rail line within CVNP was a portion of the former Valley Railway, which, in its heyday in the 1880s, provided passenger rail service between Cleveland, Akron, and Canton to upwards of 289,000 passengers. Seeing an opportunity to preserve a piece of history and allow for the continuation of passenger rail service in a national park, in 1987 the NPS acquired 26 miles of track between Rockside Road (the northern terminus of CVSR in Independence, OH) and Howard Street (the southern terminus of CVSR in Akron, OH).

Also in 1989, the NPS and CVSR entered into their first cooperative agreement, formally establishing the relationship between the two organizations – with NPS being responsible for ownership and maintenance of the track and associated infrastructure, and CVSR being responsible for owning and maintaining the rolling stock and providing the rail service.

In the early 1990s, the NPS began a 20-year capital improvement program focused on upgrading the rail, bridges, ties, signals, and stations. Also during the 20-year period, CVSR's ridership steadily increased, ultimately doubling its ridership to a record 210,000 boardings in 2012. CVSR created a variety of new and innovative opportunities for visitors to experience the park, one of which was the Bike Aboard! Program which allowed park visitors to bike the trails in one direction and return by rail for a very low fare of \$2.00. This, along with other popular programs and special events, strategic pricing, and flexible service, has established CVSR as CVNP's Alternative Transportation System – encouraging visitors to experience the park in a one-of-a-kind way.

In the latter half of the 2000s, as CVNP's capital improvement program was winding down, CVSR's ridership was exploding. The need for a comprehensive rail study emerged as a priority for both the park and CVSR. CVNP and CVSR were at a point in both of their evolutions where a strategic analysis of future requirements for infrastructure, equipment, and facilities in order to successfully manage the growth of CVSR needed to occur. As a result, CVNP entered into a contract with the Volpe Center to embark on a comprehensive rail study, which is the content of this report.

Goals, objectives, and performance measures

Goals and objectives

The following goals and objectives were developed collaboratively among representatives of CVNP and CVSR and the project team during an online meeting held on January 19, 2012. On the basis of the discussion during this meeting, the project team refined the goals and objectives to their present form.

Goals and objectives will allow the park and railroad to formally develop and publicly state short-term (within five years) and long-term (five to twenty years) intentions of the rail system. Investment decisions should be defensibly based on the goals and objectives. Eleven distinct goals are listed below under six major headings in priority order, with specific objectives listed under each goal.

Operations (O)

- Goal O-1: Provide safe, on-time service to meet passenger demand – High priority
 - Maintain safe operations at station locations as well as safely operating the train on the tracks – High priority
 - Improve on-time performance – High priority
 - Meet or exceed relevant standards and regulations (Federal Railroad Administration [FRA]/Environmental Protection Agency [EPA]/Occupational Safety and Health Administration [OSHA]/Association of American Railroads [AAR]/American Public Transportation Association [APTA]) [cross-listed under E-2] – High priority
- Goal O-2: Ensure that operations are financially sustainable – Medium priority
 - Perform self-audits and related analysis to monitor fiscal health – Medium priority

Equipment (E)

- Goal E-1: Improve equipment to accommodate increased ridership and to reduce maintenance – Medium-high priority
 - Standardize existing equipment to require less maintenance and promote interchangeability of parts where possible (such as trucks) – Medium priority
 - Create maintenance plan to ensure availability and safety of rolling stock – High priority
- Goal E-2: Acquire equipment to accommodate demand – High priority
 - Identify appropriate/available equipment that will meet growing passenger needs and allow for less demanding and frequent maintenance requirements – Medium priority
 - Enhance communications technology on board to support real-time information-sharing – High priority
 - Obtain “green” locomotives [cross-listed under ES-1] – High priority
 - Obtain cab cars to reduce use of locomotives and increase passenger capacity – High priority
 - Provide head end power (HEP) to coach cars in an efficient manner – Medium priority
 - Obtain permanent ownership of entire fleet of coach cars – Medium priority
 - Improve accessibility of all cars for those with disabilities [cross-listed under VMA-1] – Medium priority
 - Meet or exceed relevant standards and regulations (FRA/EPA/OSHA/AAR/APTA) [cross-listed under O-1] – High priority

Infrastructure and facility improvements (IFI)

- Goal IFI-1: Make infrastructure and facility improvements to accommodate increasing ridership – Medium-high priority
 - Add RIP track – High priority
 - Add sidings and station/platform functions, including capacity and safety, at existing and new locations – Medium-high priority

- Improve accessibility for wheelchairs and bicyclists [cross-listed under VMA-1 and CS-1] – Medium priority
- Expand maintenance facility – Medium priority
- Improve fuel delivery/storage [cross-listed under ES-1] – Low priority
- Provide additional capacity for car storage – Medium-low priority
- Continue exploring expansion to Cleveland when and if appropriate opportunities present themselves – Low priority

Customer satisfaction (CS)

- Goal CS-1: Communicate schedule and operational information to passengers in real time – High priority
 - Provide passengers with real-time train arrival status information – High priority
- Goal CS-2: Ensure trains are clean and comfortable – Medium priority
 - Provide potable water for handwashing – Low priority
 - Provide sanitary restrooms – Medium priority
 - Provide climate-controlled cars (i.e., functioning heating and air conditioning) – High priority
 - Provide comfortable interior furnishings (seating, lighting, etc.) – High priority
- Goal CS-3: Provide a customer-friendly experience before, during, and after the trip – High priority
 - Make it easy for passengers to learn about the service, destinations, and special events – High priority
 - Make ticket purchases simple and easy to complete – Medium priority
 - Ensure interpretive equipment is reliable and well-maintained – High priority
 - Make boardings and alightings as easy as possible [cross-listed under VMA-1 and IFI-1] – High priority

Visitor mobility and access (VMA)

- Goal VMA-1: Provide access to and throughout the park to the community we serve – Medium priority
 - Improve accessibility for wheelchairs and bicyclists [cross-listed under CS-1 and IFI-1] – Medium priority
 - Ensure CVSR cars and facilities are Americans with Disabilities Act (ADA) accessible [cross-listed under E-2] – Medium priority
 - Improve access for underserved populations – Medium priority
- Goal VMA-2: Encourage CVNP access and circulation through alternative modes including CVSR – Low priority
 - Explore opportunities to improve community transit connections to CVSR – Medium priority
 - Explore opportunities to expand CVSR service to other communities [cross-listed under IFI-1] – Low priority
 - Explore concepts for providing additional in-park transit and connections to CVSR – Low priority

Environmental sustainability (ES)

- Goal ES-1: Reduce CVSR’s environmental impacts – Medium priority
 - Improve fuel delivery/storage [cross listed with IFI-1] – Low priority
 - Coordinate with and be an active member of the CVNP Green Team – High priority
 - Obtain “green” locomotives [cross-listed under E-2] – High priority

Goals and objectives by priority

Goals

- High
 - Goal O-1: Provide safe, on-time service to meet passenger demand
 - Goal E-2: Acquire equipment to accommodate demand
 - Goal CS-1: Communicate schedule and operational information to passengers in real time
 - Goal CS-3: Provide a customer-friendly experience before, during, and after the trip
- Medium-high
 - Goal E-1: Improve equipment to accommodate increased ridership and to reduce maintenance
 - Goal IFI-1: Make infrastructure and facility improvements to accommodate increasing ridership
- Medium
 - Goal O-2: Ensure that operations are financially sustainable
 - Goal CS-2: Ensure trains are clean and comfortable
 - Goal VMA-1: Provide access to and throughout the park to the community we serve
 - Goal ES-1: Reduce CVSR's environmental impacts
- Low
 - Goal VMA-2: Encourage CVNP access and circulation through alternative modes including CVSR

Objectives

- High
 - Maintain safe operations at station locations as well as safely operating the train on the tracks
 - Improve on-time performance
 - Meet or exceed relevant standards and regulations (FRA/EPA/OSHA/AAR/APTA)
 - Create maintenance plan to ensure availability and safety of rolling stock
 - Enhance communications technology on board to support real-time information sharing
 - Obtain "green" locomotives
 - Obtain cab cars to reduce use of locomotives and increase passenger capacity
 - Add RIP track
 - Provide passengers with real-time train arrival status information
 - Provide climate-controlled cars (i.e., functioning heating and air conditioning)
 - Provide comfortable interior furnishings (seating, lighting, etc.)
 - Make it easy for passengers to learn about the service, destinations, and special events
 - Ensure interpretive equipment is reliable and well-maintained
 - Make boardings and alightings as easy as possible
 - Coordinate with and be an active member of the CVNP Green Team
- Medium-high
 - Add sidings and station/platform functions, including capacity and safety, at existing and new locations
- Medium
 - Perform self-audits and related analysis to monitor fiscal health
 - Standardize existing equipment to require less maintenance and promote interchangeability of parts where possible (such as trucks)
 - Identify appropriate/available equipment that will meet growing passenger needs and allow for less demanding and frequent maintenance requirements
 - Provide HEP to coach cars in an efficient manner
 - Obtain permanent ownership of entire fleet of coach cars
 - Improve accessibility of all cars for those with disabilities

- Improve accessibility for wheelchairs and bicyclists
- Expand maintenance facility
- Provide sanitary restrooms
- Make ticket purchases simple and easy to complete
- Improve access for underserved populations
- Ensure CVSR cars and facilities are ADA accessible
- Explore opportunities to improve community transit connections to CVSR
- Medium-low
 - Provide additional capacity for car storage
- Low
 - Improve fuel delivery/storage
 - Continue exploring expansion to Cleveland when and if appropriate opportunities present themselves
 - Provide potable water for hand washing
 - Explore opportunities to expand CVSR service to other communities
 - Explore concepts for providing additional in-park transit and connections to CVSR

Performance measures

Performance measurement is a process for collecting and reporting information regarding the performance of an individual, organization, process, or services. It can be used to examine processes/strategies in place, as well as whether outcomes are in line with what was intended or should have been achieved. Performance measures are described extensively in transportation and management literature, and Wikipedia suggests reasons for adopting performance measurement is to evaluate, control, budget, motivate, celebrate, promote, learn, and improve.¹

Performance measurement requires dedicated resources. An organization should focus on measuring performance in cases where the benefit of doing so outweighs the costs. CVSR and CVNP may focus on measuring performance related to its most important goals and objectives. Over time, performance measures will show which improvements have been most cost effective, which goals and objectives have been met or are lagging behind, and which priorities the railroad should target for the future. As goals and objectives are met or change over time, performance measures may be updated accordingly.

Good performance measures are understandable, meaningful, and measurable. Measures should be accompanied by performance targets, or quantitative thresholds, which signify accomplishment of specific goals or objectives. Once a target is met, it can either remain in place while the organization focuses on meeting other targets, or the target can be raised to drive continuous improvement in that area.

Five areas of particular importance noted throughout this comprehensive rail study are passenger satisfaction, schedule adherence, safety, air pollution, and fuel efficiency. Performance measures related to each of these areas that CVSR and CVNP could implement in the short term are summarized in Table 1 and are presented in greater detail following the table. CVSR and CVNP might consider reporting annual progress on its performance measures to its board of directors and/or publishing its measures in an annual performance report.

¹ http://en.wikipedia.org/wiki/Performance_measurement

Table 1
Performance measures

Source: Volpe Center

| Performance Measure | Related Goals | Metric | Suggested Target |
|---------------------------------|-----------------------------------|---|---|
| Safety | Goal O-1 | # of injuries associated with railroad # of fatalities associated with railroad | 2 injuries per 100,000 passengers 0 fatalities per 100,000 passengers |
| Schedule adherence | Goal O-1 | # of on-time arrivals and departures divided by # total arrivals and departures | 95% schedule adherence |
| Passenger satisfaction | Goals CS-1, CS-2, CS-3, and VMA-1 | % “highly satisfied” with <ul style="list-style-type: none"> boardings and alightings passenger information ticket purchase experience on-board comfort | 95% “highly satisfied” with <ul style="list-style-type: none"> boardings and alightings passenger information ticket purchase experience on-board comfort |
| Air pollutants* | Goal ES-1 | Nitrogen oxide (NO _x) grams per brake horsepower hour (g/bhp-h) Carbon Monoxide (CO) g/bhp-h Hydrocarbon (HC) g/bhp-h Particulate Matter (PM) g/bhp-h | 7.4 g/bhp-h NO _x 2.2 g/bhp-h CO 0.55 g/bhp-h HC 0.22 g/bhp-h PM |
| Fuel consumption and efficiency | Goal ES-1 | % of gallons saved per service hour (compared to baseline) | 50% of gallons saved per service hour (compared to baseline) |

* Source: Table 1, Tier 1, <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&SID=0a57ac29b59ade8455648e60e739a181&rgn=div5&view=text&node=40:34.0.1.1.2&idno=40#40:34.0.1.1.2.1.1>

Safety

Safety is described in Goal O-1, “Provide safe, on-time service to meet passenger demand,” and the objective “Maintain safe operations at station locations as well as safely operating the train on the tracks.”

CVSR and CVNP may measure safety by separately tracking the number of injuries and/or fatalities associated with the railroad, normalized by number of total individual passengers (in contrast with the number of boardings).

Some transportation agencies have publicly announced goals toward zero transportation fatalities.² CVSR and CVNP could follow suit by setting targets of zero, or alternatively could identify the historical percentage of injuries and/or fatalities and set a target that is an incremental improvement over that percentage.

² For example, FHWA has a national strategy “Toward Zero Deaths” (http://safety.fhwa.dot.gov/tzd/docs/tzd_summary_v3.pdf) and Michigan DOT’s strategic safety goal “move[s] Michigan toward zero deaths...” (https://www.michigan.gov/documents/mdot/MDOT_mission_vision_and_goals_2_375168_7.pdf).

Schedule adherence

CVSR and CVNP seek to improve schedule reliability and, at the same time, improve real-time information so that visitors can plan accordingly in the event of delays. Improving on-time performance is embodied in Goal O-1, “Provide safe, on-time service to meet passenger demand,” and the objective “Improve on-time performance.”

Tracking on-time performance is often referred to by transit agencies as “schedule adherence.” A common measure of schedule adherence is as follows:

$$\frac{\text{\# of on – time arrivals and departures}}{\text{\# of total arrivals and departures}}$$

Given the high priority to improve schedule adherence, CVSR and CVNP might select a high-performance target of 95 percent. Another approach to selecting a target could be to measure or estimate current schedule adherence and select a realistic target to consistently reach in each of the next three- to five-year time periods. Once that target is reached, it could be increased for the next three- to five-year period.

Passenger satisfaction

Interviews and discussions with both CVSR and CVNP reveal that customer service, passenger satisfaction, and visitor experience are of paramount importance. Goals and objectives related to passenger satisfaction are as follows:

- Goal CS-1
 - “Provide ... real-time train arrival status information...”
- Goal CS-2
 - “Provide potable water [on trains]...”
 - “Provide sanitary restrooms...”
 - “Provide climate-controlled cars...”
 - “Provide comfortable interior furnishings...”
- Goal CS-3
 - “Make it easy...to learn about the service...”
 - “Make ticket purchases...easy...”
 - “Ensure interpretive equipment is reliable...”
 - “Make boardings and alightings...easy...”
- Goal VMA-1
 - “Improve accessibility for wheelchairs and bicyclists...”
 - “Ensure CVSR cars and facilities are ADA accessible...”

Performance measures for passenger satisfaction may be derived from CVSR’s annual passenger surveys. For example the percentage of “highly satisfied” survey responses with respect to boardings and alightings, passenger information, ticket purchase experience, and/or on-board comfort. Given the railroad’s already high marks with passengers, it may seek high target thresholds of 90 or 95 percent “highly satisfied.”

Air pollutants

Goal ES-1 seeks to “reduce CVSR’s environmental impacts,” and the objective “invest in sustainable locomotives” seeks to reduce air pollutants and greenhouse gas emissions. In order to evaluate the efficacy of “green” investments and promote environmental improvements of the railroad, CVSR and CVNP might track emissions of air pollutants and greenhouse gases.

Greenhouse gases include nitrogen oxide (NO_x), carbon monoxide (CO), and hydrocarbons (HC). Air pollutants include coarse and fine particulate matter (PM). Emissions of these pollutants may be either

estimated or directly measured. Targets for pollutant emissions should be reasonably based on existing emissions trends. Accordingly, a baseline of existing emissions should be estimated.

Fuel consumption and efficiency

Goal ES-1 seeks to “reduce CVSR’s environmental impacts,” and the objective “invest in sustainable locomotives” seeks to reduce fuel consumption and increase fuel efficiency. In order to evaluate the efficacy of fuel-efficient investments, CVSR and CVNP might consider performance measures that track fuel consumption and efficiency. Gallons of fuel per year and gallons of fuel per service hours can help CVSR and CVNP understand and communicate the fuel consumption and efficiency of the railroad. Targets for fuel efficiency should be reasonably based on existing consumption patterns and outlooks.

Issues and needs

To establish a list of recommended improvements for CVSR and CVNP to pursue over the next 20 years, the needs of CVSR and CVNP should be articulated. These needs are based on issues that CVSR and CVNP will need to address currently and in the future (to an increasing degree).

Issues

On the basis of observations during site visits and conversations over time with CVSR and CVNP staff, the project team developed the following list of issues that CVSR currently faces. These issues, which are roughly listed in order of magnitude, will become more pronounced as time and ridership increases.

- On-time performance is highly variable and suffers particularly when loading large numbers of passengers, bicycles, and/or people in wheelchairs. Another source of delay is the practice of holding the train at a station while would-be passengers purchase tickets at the ticket window.
- Aside from the occasional outlier year (due to weather, floods, track and/or bridge repairs, etc.), CVSR's ridership has recently been growing at a fast pace. If unmanaged, continued increases in ridership could negatively impact visitor experience.
- CVSR's rolling stock is in various states of disrepair (inside and out).
- Since some equipment is leased to CVSR, it is uncertain if and when its owner will continue its lease. This uncertainty makes it difficult for CVSR to plan for future growth.
- Passengers lack real-time train status information. This will become more of an issue when two-train service is implemented in the summer of 2013.
- A lack of sidings will limit the flexibility of CVSR operations when two-train service begins in 2013.
- The maintenance facility is too small to meet CVSR's repair and maintenance needs.
- The railroad is not as green as it could be; fuel costs are therefore higher than they could be.
- The consists block grade crossings when stopped at certain stations.
- It is uncertain if enough volunteers, and appropriately skilled volunteers for some positions, will be available to effectively staff and maintain CVSR's expanding service as the number of volunteers needed increases.
- Ensuring high levels of customer and staff safety may increasingly become an issue over time, as ridership increases, equipment ages, and as more volunteers (with less experience) are brought on staff.
- As CVSR expands/upgrades its fleet, it should not lose sight of the comfortable yet "rustic" experience passengers may want to have.

Needs

Based on the issues listed above, as well as the Goals and Objectives listed in the previous section, the project team developed the following list of needs, which are categorized as high/more immediate, medium/less immediate, and low/longer-term.

High

- Ensure that customer and staff safety is evaluated, addressed, and upheld or improved as operations expand.
- Provide on-time service to meet passenger demand by effectively managing growth and peak day boardings and alightings.
- Accommodate demand and reduce greenhouse gases by obtaining green locomotives, power cars, cab control cars, and an entire fleet of coach cars.

- Improve communication and operational information by providing passengers with real-time train arrival status information and by making it easy for passengers to learn about the service, destinations, and special events in real time.
- Make the experience more customer-friendly before, during, and after the trip by making boardings and alightings as easy as possible.
- Make infrastructure and facility improvements to accommodate increasing ridership, which includes adding sidings and platforms and expanding maintenance, repair, and storage facilities.

Medium

- Improve equipment to accommodate increased ridership and to reduce maintenance by creating a maintenance plan and standardizing existing equipment to require less maintenance and to promote interchangeability of parts where possible (such as trucks).
- Ensure trains are clean and comfortable by providing climate-controlled cars, sanitary restrooms, and comfortable interior furnishings.
- Provide access to and throughout the park to the community served by improving accessibility for all (wheelchairs, bicycles, underserved populations, etc.).
- Ensure that operations are financially sustainable by performing self-audits and related analysis to monitor fiscal health.
- Recruit and train new volunteers in advance of expanding service so that volunteers will be well trained to proactively staff their positions.
- Reduce CVSR's environmental impacts by being an active member of the CVNP Green Team and investing in sustainable locomotives.

Low

- Encourage CVNP access and circulation through alternative modes to and in the park.

Ridership scenarios

In order to more accurately recommend a program of service, equipment, and facility improvements to CVSR and CVNP, the project team considered past and current ridership trends. However, given a variety of factors (described below), extending the current ridership trend 20 years into the future is too simplistic. Questions such as what services (scenic, special, or charters) should be targeted; what trend (based on the past six to 12 years of ridership data available) should be used; and whether the trend will be linear or exponential need to be evaluated. Based on this evaluation, the project team developed three ridership scenarios: low growth, medium growth, and high growth. Each scenario – described below – is based on a different trend.

Services targeted

To develop the ridership scenarios, the project team examined ridership (actual boarding data) trends in each of CVSR’s services: general ridership and charters, Bike Aboard, education, Day Out With Thomas™, Underground Railroad, Polar Express™, and Beer-Tasting/Wine-Tasting Trains. Ridership data for these services are limited to 2007 to 2012 (CVSR began collecting ridership data by service in 2007). The ridership trends of these services during that time are presented in the Existing Conditions section of this report (Appendix A).

The project team grouped general ridership and charters, Bike Aboard, and education ridership as “Scenic” ridership and the remaining services as “Special” ridership (see Table 2). The project team used Scenic (instead of Special) ridership data and trends to develop its scenarios since these services have experienced the most growth, make up the majority of CVSR’s ridership, and more closely support the park’s mission. In part due to these characteristics, Scenic service faces the most growth-related challenges, such as maintaining or improving schedule adherence in the context of increasing ridership. The project team assumed that while Special service ridership may grow, it will not interfere with Scenic service operation since those two services usually operate at different times of the day and year.

Table 2
Scenic and Special boardings data, 2007-2012

Source: CVSR and Volpe Center

| | 2007 | 2008 | 2009 | 2010 | 2011 ³ | 2012 |
|-------------------|---------|---------|---------|---------|-------------------|---------|
| Scenic Boardings | 66,947 | 81,028 | 89,280 | 124,366 | 90,885 | 141,550 |
| Special Boardings | 57,490 | 63,389 | 57,768 | 65,074 | 64,425 | 63,928 |
| Total Boardings | 124,437 | 144,417 | 147,048 | 189,440 | 155,310 | 205,478 |
| Scenic % of Total | 53.8% | 56.1% | 60.7% | 65.6% | 58.5% | 68.9% |
| Scenic % Growth | | 2.3% | 4.6% | 4.9% | -7.1% | 10.4% |

For trend analyses, statistical texts recommend examining as many observations – in this context years of Scenic and Special boardings data – as possible. Accordingly, the project team estimated the Scenic and Special ridership from 2000 to 2006 by applying the Scenic percentage of total ridership to those years. However, since the Scenic percentage of the total ridership increased over time, the project team subtracted the average Scenic percentage growth (3.0 percent between 2008 and 2012, as shown in Table 3) from the 2007 Scenic percentage of total ridership (53.8 percent) to estimate the Scenic and Special ridership split for 2006. The project team assumed that this resulting split (50.8 percent) should be held constant from 2000 to 2006 since overall ridership remained relatively constant (between 95,000 and 115,000 boardings per year). The results of this split are shown in Table 3.

³ The decrease in the number of boardings in 2011 was largely due to carryover effects from major construction and adverse weather during the 2011 season. These effects are detailed in Appendix A.

Table 3
Scenic and Special boardings data, 2000-2006

Source: CVSR and Volpe Center

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------------------|---------|---------|---------|--------|---------|---------|---------|
| Scenic Boardings (est.) | 50,848 | 57,740 | 52,713 | 47,849 | 55,447 | 57,712 | 56,029 |
| Special Boardings (est.) | 49,282 | 55,962 | 51,088 | 46,374 | 53,739 | 55,934 | 54,302 |
| Total Boardings | 100,130 | 113,702 | 103,801 | 94,223 | 109,186 | 113,646 | 110,331 |
| Scenic % of Total (est.) | 50.8% | 50.8% | 50.8% | 50.8% | 50.8% | 50.8% | 50.8% |

Trend analysis

Using Scenic boardings data from 2000 to 2012, the project team developed four ridership trends based on using six and 12 years of data points. The year 2000 represented the first year boardings were recorded, and 2007 is the first full year that CVSR began making significant changes in its operations under new CEO leadership.

The project team used Microsoft Excel to run regressions and fit an exponential curve and linear trend line to each set of data. These trends (with their R^2 value⁴ in parentheses) were:

1. Linear growth from 2000 to 2012 ($R^2 = 0.73$)
2. Exponential growth from 2000 to 2012 ($R^2 = 0.80$)
3. Linear growth from 2007 to 2012 ($R^2 = 0.69$)
4. Exponential growth from 2007 to 2012 ($R^2 = 0.73$)

After analyzing each trend in detail, the project team discounted all exponential growth trends since, even though some of these trends had slightly higher R^2 values, those trends projected unrealistic increases of boardings (from 60,000 to 200,000 new riders added per year) in the out years of the plan (i.e., 2033). Instead, the project team focused on the linear trends since those trends projected the same increases in boardings (between 6,600 and 12,500 new riders) each year, which the project team feels is more realistic on average as time continues.

Accordingly, the project team identified three trends on which to base the scenarios for ridership growth:

- Low: linear growth from 2000 to 2012 (Figure 1), which estimates an average of 6,567 new riders per year
- Medium: an average between the low and the high scenarios for ridership growth, which estimates an average of 9,536 new riders per year
- High: linear growth from 2007 to 2012 (Figure 2), which estimates an average of 12,505 new riders per year

Though perhaps an unusual year, all trends include 2011 since it is possible that CVSR will face unusual years again in the future, perhaps once every six or twelve years, as are the cases in the datasets on which the trends are based.

⁴ The coefficient of determination R^2 is used in the context of statistical models whose main purpose is the prediction of future outcomes on the basis of other related information. R^2 is most often seen as a number between 0 and 1.0, used to describe how well a regression line fits a set of data. An R^2 near 1.0 indicates that the independent variables explain nearly all of the variation of the dependent variable, while an R^2 closer to 0 indicates that the independent variables are poor descriptors of the variation. In other words, R^2 is the proportion of variability in a data set that is accounted for by the statistical model. It provides a measure of how well future outcomes are likely to be predicted by the model.

Figure 1
Low linear growth trend line

Source: CVSR and Volpe Center

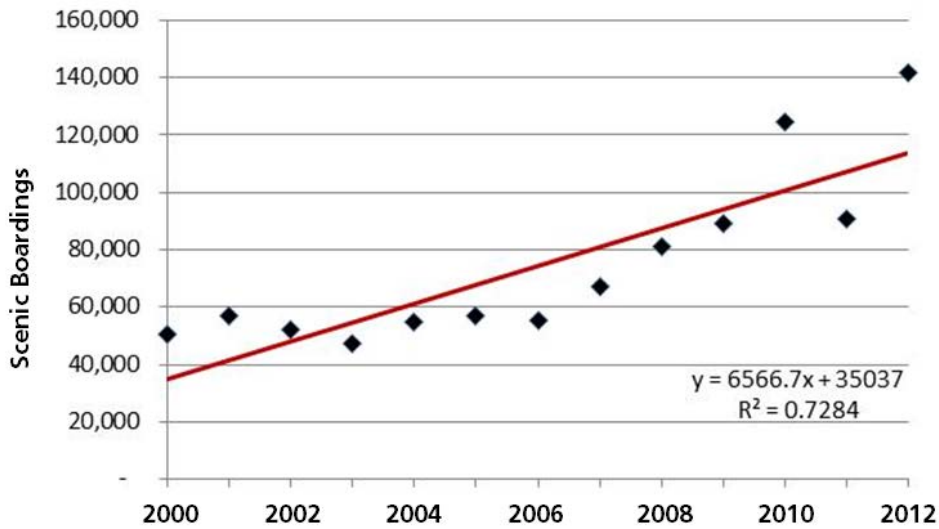
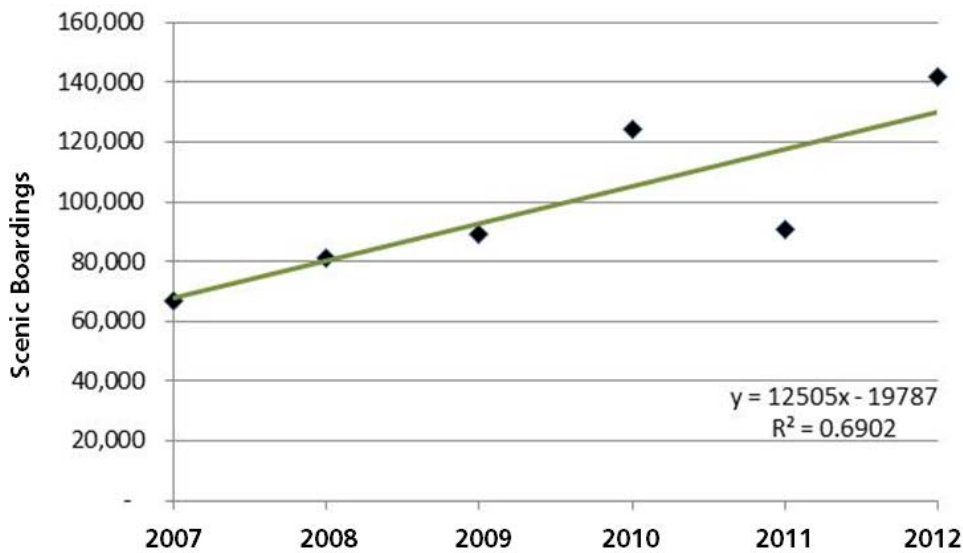


Figure 2
High linear growth trend line

Source: CVSR and Volpe Center

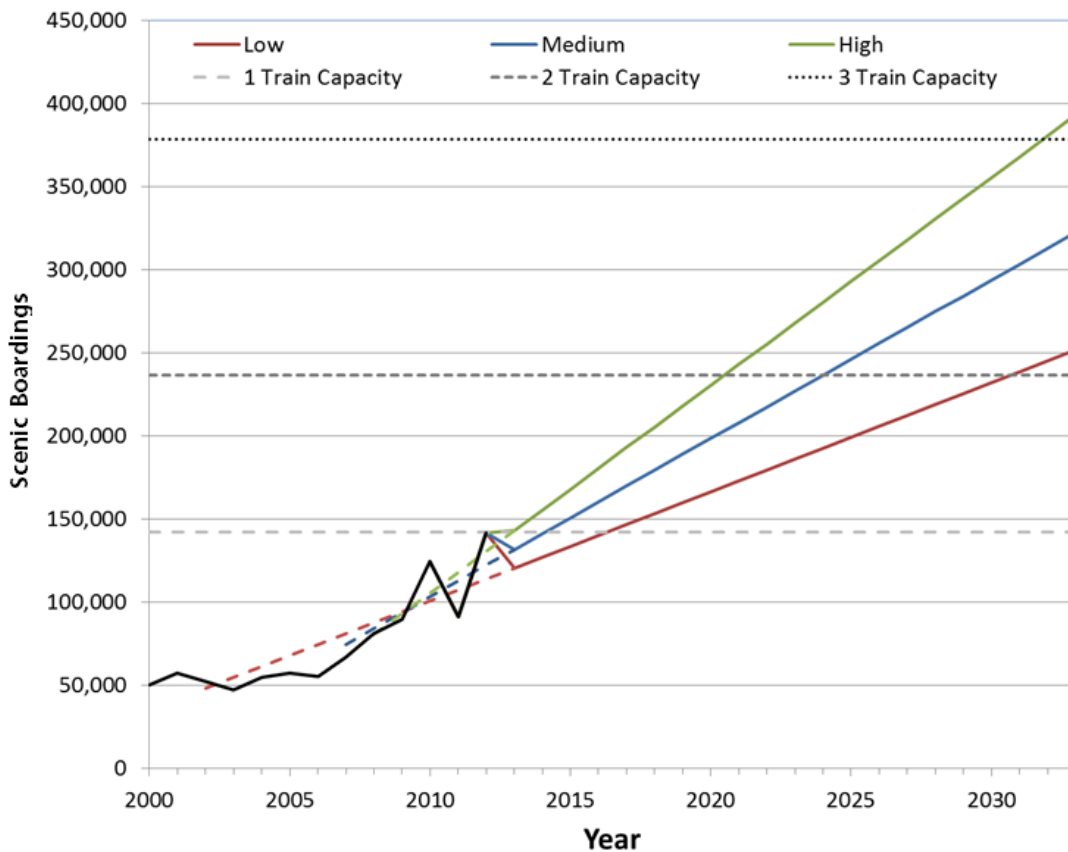


Growth scenarios

Based on these trend lines and the average number of new riders estimated per year, the project team calculated future Scenic ridership for each scenario (Figure 3). Later in the report, the project team provides improvement programs that account for these growth scenarios.

Figure 3
Growth scenarios for scenic boardings

Source: CVSR and Volpe Center



The horizontal dashed lines in the figure above indicate the “comfortable annual operating capacity” of scenic service on the railroad for one-train, two-train, and three-train operations. Comfortable annual operating capacity is assumed to be 50 percent of the maximum annual operating capacity of the railroad. While not specifically tailored to scenic railroads, this figure is a general rule of thumb for many commuter railroads. The maximum annual operating capacity is calculated by assuming there will continue to be 182 days of operation per year, three roundtrips per train are offered per day in operation (except for the second train in service, which, for scheduling reasons, would only be able to offer two roundtrips per day), and that the maximum capacity of a single train will be 520 passengers.

The dashed lines do not mean that once that level is crossed a new train must be put in service. Instead, these lines illustrate that when the projected annual scenic ridership approaches or exceeds the comfortable annual operating capacity for a given number of daily trains, the railroad will want to consider managing demand (discussed in Recommendation 5) or increasing capacity to maintain or improve passengers’ level of comfort.

Implications for two-train service

Regardless of the growth scenario, it is assumed that CVSR will start operating two-train scenic service in 2013 and that it will likely continue for at least the next 20 years. The project team determined that three-train service is not feasible and is included in Figure 3 for conceptual purposes. Although the current system with the siding at Jaite being rehabbed could in theory support three-train service, the time required for boardings and alightings at each station would become problematic. Since the current siding

at Peninsula and the proposed siding at Jaite are so closely located, the scheduled timing of each train's arrival at these sidings becomes critical. If boardings and alightings were to take more than a couple of minutes at any station (which is likely to happen regularly), then that train would be late arriving at the siding that it would need to pull into to allow the oncoming train to pass (or vice versa), and the schedules for all of the trains for the rest of the day would be delayed. Since this delay would occur frequently, the project team does not recommend three-train service for the foreseeable future.

However, to accommodate increasing ridership, the schedule for two-train scenic service may need to change from what is currently planned for 2013 (three roundtrips between Rockside and Akron and two roundtrips between Canton and Fitzwater, Figure 4) to a two-train scenic service that could accommodate more people. For example, CVSR could make another trips to Canton in the afternoon (Figure 5) or, if Canton service is discontinued, the second train could mirror the three roundtrips of the other train so that when one train is in Akron, the other is at Rockside (Figure 6). Other variations are also possible.

Figure 4
Planned two-train service with two roundtrips to Canton

Source: CVSR and the Volpe Center

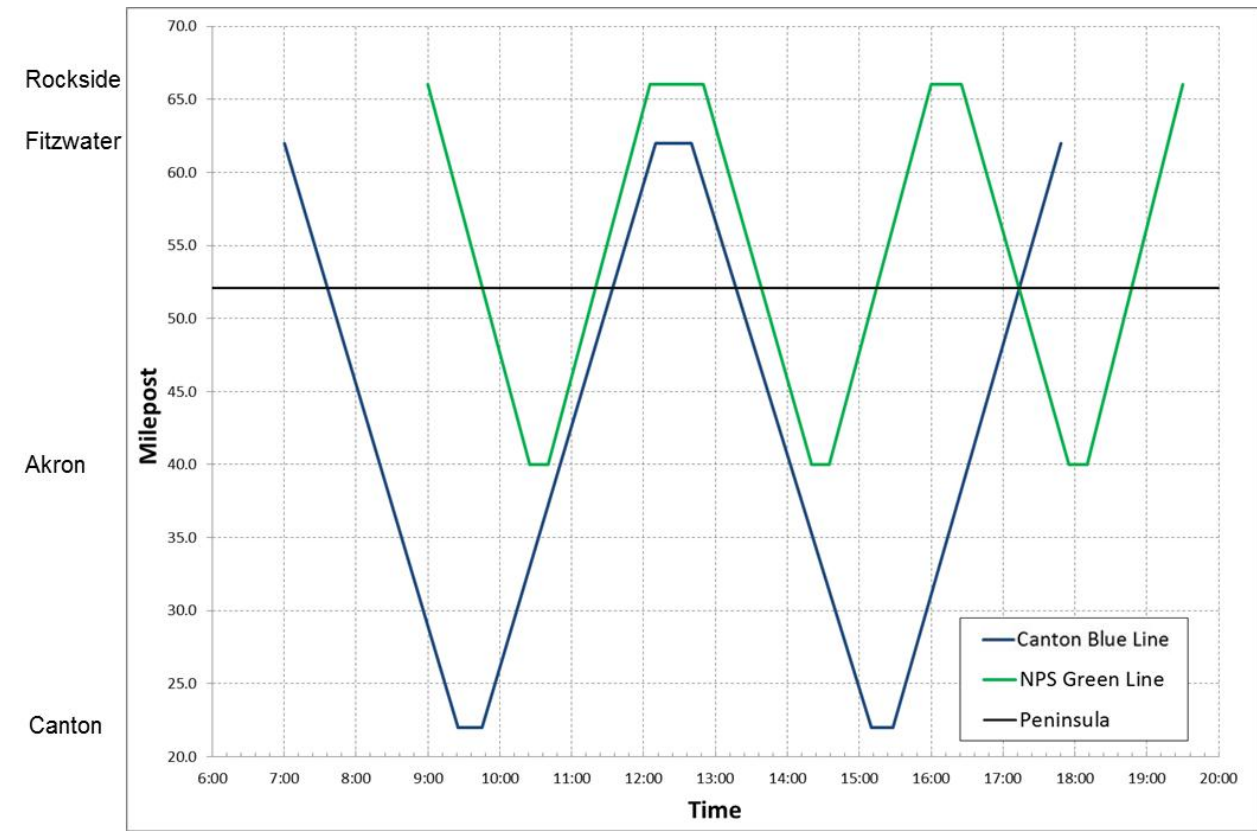


Figure 5
Conceptual two-train service with three roundtrips to Canton

Source: Volpe Center

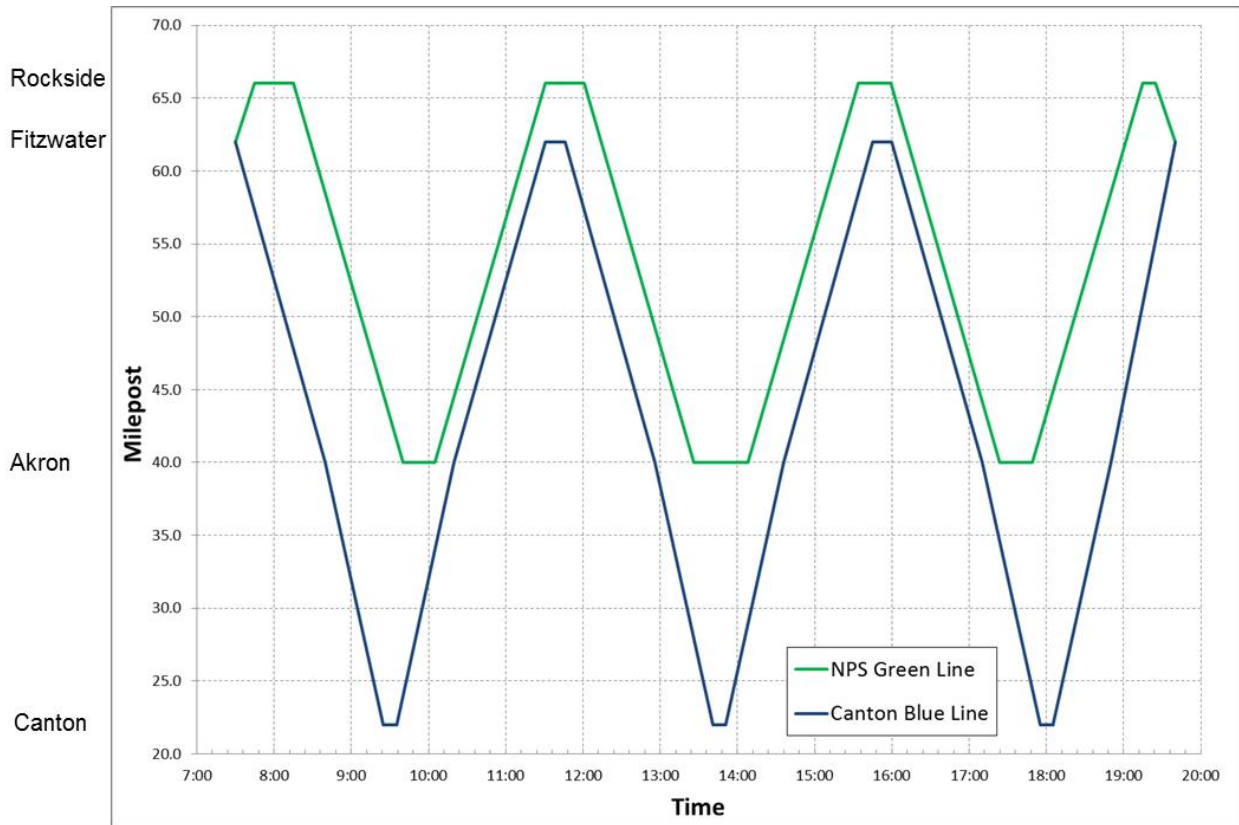
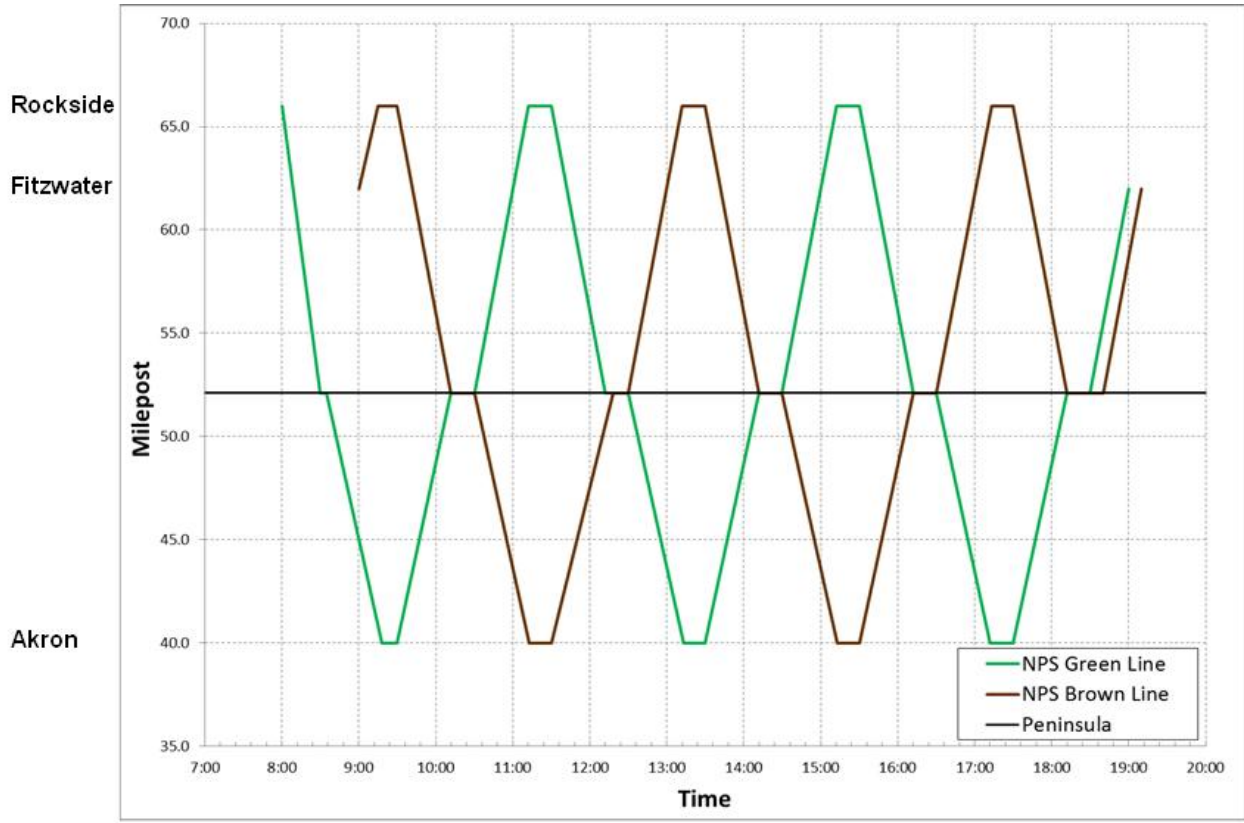


Figure 6
Conceptual two-train "mirrored" service
 Source: Volpe Center



Conclusion

CVSR and CVNP should monitor their ridership regularly to determine which scenario their ridership is in line with; CVSR and CVNP can then seek to implement the appropriate recommendations – presented in the next section – that will efficiently serve their ridership growth.

Operations improvements

This section includes recommendations for operations-related improvements over the next 20 years for CVSR. Many of the recommendations are general and apply equally under all scenarios. Some, however, would only be recommended under higher-growth scenarios, or when ridership has passed certain thresholds. These are noted appropriately below.

1. Improve passenger information

Clear, easy-to-use passenger information has an important role to play in attracting passengers and ensuring a high-quality experience for passengers once they arrive. When passengers already know where to go and what to do, boarding and alighting can be performed more efficiently. This section includes recommendations for both online and on-site passenger information.

1.1 Improve CVSR passenger information on website and perform regular website updates

The website should provide basic information about CVSR services, schedules, destinations, access, and how to ride CVSR so that first-time customers can easily understand their options and purchase a ticket. Most of these elements are already present, but are difficult to find or are spread across several different pages. A station-by-station guide would be a simple but valuable addition. Specific suggestions follow.

- Add Station-by-Station Guide (address, parking, nearby attractions, departures offered, etc.)
- Improve formatting on “Plan Your Visit” pages to aid user navigation (standardize headings, add navigation hyperlinks to top of page, etc.)
- Consider adding much of the content under “Purchase Tickets” to the “Plan Your Visit” pages and making the “Purchase Tickets” tab a gateway to ticket purchases only. Website visitors may not click on the “Purchase Tickets” tab until they have already decided to ride CVSR, so that they may not see information about special events if it is on the “Purchase Tickets” tab. Similarly, “Important Information” content is more applicable to the “Plan Your Visit” tab.
- Establish a twice-yearly review of all pages to flag outdated information for updating. This review would ideally take place 4-6 weeks before the schedule changes, to allow sufficient time for changes to be made.

Timeframe/Priority: Short term (0-5 years). Ideally, website improvements would be made in advance of or in conjunction with the rollout of the new 2013 June-October schedule.

Costs: Initial and Biannual Maintenance. Approximately 100 hours of staff and volunteer time initially and approximately 80 hours per year to review and maintain content.

1.2 Simplify and standardize marketing and sales of CVSR service offerings

Service offerings have been revised in recent years, but marketing materials (brochures, website) have not always been comprehensively revised to ensure that consistent terminology is being used. This lack of consistency can be confusing, especially for first-time riders. For example, in the past, the 9:00 am departure from Canton was listed under “Scenic Excursion” in the heading, and “Canton-Akron Flyer” in the text. Similarly, the website referred to both the “Canton Explorer” and the “Canton Connection.” A review of this type of language should be performed regularly, especially as service changes are made.

Timeframe/Priority: Short term (0-5 years). Ideally, standardization would be completed in advance of or in conjunction with the rollout of the new 2013 June-October schedule.

Costs: Up to 40 hours of staff or volunteer time to identify needed changes and propose and make revisions.

1.3 Improve and maintain static signage at stations

Especially when stations are not staffed, static signage can play a valuable role in orienting boarding or alighting passengers, or attracting future customers. Each station should include a “how to ride” sign, a system map with information on all stations (attractions, connections, etc.), and a current schedule. These signs could be simple documents that are consistent with what is posted on the website, are printed on CVSR printers, and are posted in the glass-covered cases at each station. Standard operating procedures should include reviewing and updating signage as necessary at every schedule or service change.

Timeframe/Priority: Short term (0-5 years). Ideally, new signage would be posted in advance of or in conjunction with the rollout of the new 2013 June-October schedule and any future schedule changes. At minimum, the current schedule should be posted at every station.

Costs: Minimal (up to 80 hours annually of staff or volunteer time to create and print the various documents; posting the documents at stations; reviewing signage periodically).

1.4 Improve online information about transit access to CVSR (See also parking management)

Although limited, transit access to CVSR exists today. However, it is difficult to find information about transit service online. Providing this information will help visitors without access to a personal vehicle to ride CVSR. Improvements include 1) add information on transit access from Akron, Canton, and Cleveland to CVSR’s website, 2) add information on transit access to CVNP’s website, and 3) work with local transit providers to add or improve information on service to CVSR/CVNP on their websites.

Timeframe/Priority: Short term (0-5 years). This is a simple change to make and will help transit-dependent community members to access CVSR.

Costs: Minimal, although some staff time will need to be spent on coordination with other agencies.

2. *Institute a regular data collection and analysis program*

Data collection and analysis are crucial preliminary steps to making service improvements and managing and monitoring ridership growth and changing trends. Better understanding customer travel patterns and preferences will enable CVSR to make schedule adjustments to improve on-time performance and to assess potential service changes (new services, ending services, adding or skipping stations, etc.). Data collection and analysis can be time-consuming and costly; advance planning and structuring routine activities to accommodate data needs (as in 2.1 and 2.2 below) will reduce the time burden greatly, as will tailoring the level of effort to the need. Suggestions are made below based on what is known about CVSR practices today.

2.1 Facilitate analysis of ticket sales data

By using standard naming conventions and tracking data in standardized ways, data analysis will be simplified. “Compatible” fields indicate that the same data are entered in the same way and using the same format, as much as possible. It is important to think about consistency across and within databases or spreadsheets from the beginning, to save effort in the future when analyzing records.

- Standardize naming conventions for services and/or working with WhistleTix, CVSR’s online ticketing system, to add a “category” field to each entry (i.e., Scenic, Event-on-Scenic, Beer-/Wine-Tasting, Polar, etc.). This will make it simpler later to analyze sales trends.
- Create a database (or Excel spreadsheet) for sales of non-WhistleTix trips (education, charter, etc.) with compatible fields to allow analysis of all service types. Fields should include at minimum the date, departure station, departure time, type of service, and passengers. For charters, identify if it is a “whole train” charter. For “car” charters, including the number of cars reserved is recommended, but not critical. Make use of the database a standard operating procedure. Storing these data in a compatible format will simplify the process of analyzing trends for all sales,

regardless of whether they are sold via WhistleTix or offline, allowing for richer analysis of sales trends.

Timeframe/Priority: Short term (0-5 years).

Costs: 60-80 hours initial work; approximately 10 hours/month to enter data and maintain.

2.2 Maintain a database (or Excel spreadsheet) with basic operational data

CVSR has begun tracking key service indicators, such as delay, in the 2012 season. These indicators should be stored in a database, including at a minimum the number of passengers boarding and alighting by station (Scenic and Bike Aboard passengers) and the actual departure time for major stations (Rockside, Peninsula, and Akron). As service frequency increases, schedule adherence will become increasingly critical. Adding actual arrival and departure times to the database (or spreadsheet) will allow the calculation of dwell times by station and will create a more powerful management tool for understanding and addressing delay. Data collection could continue as today, using a slightly modified version of the existing Conductor's Report, entered nightly or weekly into the database. Use of the database should be made a standard operating practice.

Timeframe/Priority: Short term (0-5 years). This could be a phased effort, so that basic spreadsheets are used initially and a database is developed over time.

Costs: 60-80 hours initial work; approximately 16 hours/month to enter data and maintain.

2.3 Conduct a passenger survey to better understand customer travel patterns.

CVSR has conducted a customer service survey in the past, but the survey results have not been methodically analyzed and implemented. An expanded passenger survey should be conducted as a preparatory step to making major service changes. The goal would be to understand passenger demographics, how important it is to passengers to have the ability to board and alight from the train freely, their interest in connecting to additional destinations (such as the Ledges, Brandywine Falls, etc.), as well as which combinations of stations are the most popular. This information would enable CVSR to better consider the impacts of potential service changes and potentially help them design future connecting shuttle service. It is important to enlist someone with survey expertise in designing the survey instrument and methodology, as a poorly designed survey may result in incorrect information. Survey results should be entered into a spreadsheet or database to facilitate analysis.

Timeframe/Priority: Long-term (6-20 years) or before conducting a review of stations served, as below.

Costs: \$15-40K, plus staff time (costs will depend on the balance of work between in-house and a consultant team and the scope of the survey).

3. Review stations served

For any transportation service, there is a tradeoff between serving more destinations and providing faster travel times. While there are relatively few locations where an additional station could be created, it is important to consider the possibilities. Questions to consider include: Are there new attractions? Is there the desire to add connecting shuttle service to park destinations? Is there potential to add additional parking capacity, if needed? For existing stations, the following list of questions should be considered: What is the activity level when the station is served? What destinations or activities does the station serve, and are there alternative means of access for visitors? Would skipping the station improve schedule adherence significantly, perhaps just on selected days (weekdays vs. weekends, etc.)? What are the likely impacts on ridership?

Timeframe/Priority: Long term (6-20 years); changes in CVNP facilities, such as the proposed renovations to the Boston Mill station area, may also prompt such a review.

Costs: The review itself is estimated at about 80 hours of staff time, but is contingent on data collection activities taking place as above.

3.1 Review 2013 Canton service changes

While providing Canton service extends CVSR's operating area to more communities, it has historically had significantly fewer boardings than NPS Scenic service. At current ridership levels, providing Canton service reduces the effective capacity and increases the operating cost per passenger of CVSR, as a train consist is dedicated to Canton-Akron service but serves relatively few passengers. There is an opportunity cost in that the consist is not used for regular Scenic service. As ridership grows and Scenic service becomes more crowded, this may become an increasingly important issue. For the 2013 season, CVSR is contemplating a new schedule for Canton service, which would bring passengers from Canton into CVNP, laying over and changing direction at Fitzwater Yard, and returning to Canton. Questions to be considered during the 2013 season should include:

- How do Canton boardings and alightings compare to previous seasons?
- How did trends change over the course of the 2013 season?
- Was there sufficient marketing of the service?
- Were there external factors (weather, construction, etc.) impacting Canton service?

4. Improve schedule adherence

Delay not only negatively impacts the visitor experience, but it also impacts ridership growth by reducing the effective capacity of CVSR as delay accumulates throughout the day. Improving schedule adherence will reduce delay, improve visitor experience, and maximize the effective capacity of the system. This section focuses on operations, but infrastructure improvements, such as the construction of raised platforms (see Recommendation 19) can also be important factors in improving schedule adherence.

4.1 Understand the extent of delay and the causes of delay

While CVSR staff have provided anecdotal information on the contribution of passengers using wheelchairs, Bike Aboard passengers, and last-minute ticket purchases to delay, a full picture of the causes could be inferred from a more robust data collection process (see data collection, above). Analyzing these data would also suggest additional changes that could be made, such as lengthening scheduled dwell times or making more substantive schedule changes. CVSR has embarked on this process for the 2012 season, but analysis of a full season of data should help CVSR to identify additional changes and assess effectiveness.

The need for additional variables to collect and analyze, such as the number of wheelchair passengers boarding and alighting at each stop or measures of platform crowding, should be assessed before beginning data collection.

Timeframe/Priority: Short term (0-5 years); may need to repeat in subsequent years if schedule adherence falls below acceptable levels (as defined in targets, see below).

Costs: Data collection costs are as above; additional review to focus on delay may involve additional staff time. If in-house expertise is insufficient, consultant review (\$5-\$15K) may be sought.

4.2 Make schedule adjustments and operational improvements to reduce delay

Schedule adjustments and operational improvements should be identified and selected to address the underlying causes of delay identified above. CVSR has already begun making such changes by lengthening dwell times at Peninsula Depot for the 2013 season. After making changes, a second round of data collection should ideally be undertaken to verify the effectiveness of changes.

Timeframe/Priority: Short term (0-5 years); may need to repeat in subsequent years if schedule adherence falls below acceptable levels (as defined in targets, see below). Over time, it is also possible that

some operational changes will no longer be necessary due to changes in underlying conditions. These can be phased out as they are identified.

Costs: Costs cannot be determined at this time; they will depend on the changes selected. Two specific improvements are listed below.

4.2.1 Consider new ticketing practices

CVSR staff have reported that queues at ticket booths as passenger attempt to purchase last-minute walk-up tickets may contribute to delay. This delay could be mitigated through additional staffing during peak times; a strict cut-off in ticket sales, perhaps limiting sales to passengers who have arrived 15 minutes before departure; by eliminating walk-up sales entirely; or by moving to onboard ticket sales. All of these options have customer service and operations implications and should be considered carefully.

Timeframe/Priority: Short term (0-5 years). Ticketing should be reviewed again after another 5-7 years, as technologies are improving rapidly.

Costs: Setting a limit for walk-up sales may result in a small number of lost sales but should not increase operating costs. Eliminating walk-up sales would slightly reduce operating costs, but is likely to result in a higher number of lost sales. Costs for onboard ticket sales would vary significantly based on the choice of method (cash or credit card) and implementation. In recent years, mobile apps have been introduced to reduce the cost of processing credit card payments, but most require an active Internet connection. This area is constantly evolving and new options should be investigated.

4.2.2 Design and implement boarding plans

During the 2012 season, CVSR began the process of identifying boarding-related delays at key stations and designing boarding plans to lessen delay. Plans should consider means of answering passengers' questions, performing crowd control, and helping passengers to identify their train car in advance should help speed up boarding. Boarding plans could include staffing levels by season or day, staff assignments, signage (such as platform placards to tell passengers where to board), and other details.

Timeframe/Priority: Short term (0-5 years). Plans should be reviewed seasonally for any needed changes.

Costs: Up to 120 hours of staff and volunteer time to observe conditions, make recommendations, draft plans, and train staff.

4.3 Set schedule adherence targets

As noted above, delay can accumulate throughout the day and ultimately reduce CVSR's effective capacity. Especially as boardings increase and begin to make demands on capacity, CVSR must improve schedule adherence. While 100 percent schedule adherence should be the ultimate goal, it may not always be possible to achieve. Realistic schedule adherence targets should be set based on the season's operating schedule. Schedule adherence will become increasingly important as ridership approaches capacity. Preliminary analysis by the Volpe Center suggests that when moving to two-train service, the addition of a second siding at Jaite would give a buffer of approximately 20 minutes. Schedules should be designed so that they can be met under normal operating conditions, and with no more than 20 minutes delay (for the run) under peak or unusual conditions.

Timeframe/Priority: Short term (0-5 years). Targets should be reviewed seasonally for any needed changes.

Costs: Up to 60 hours of staff time annually to develop and monitor targets.

5. Institute growth management techniques

While additional service can be provided by adding equipment, making infrastructure improvements, and improving operations, CVSR and CVNP may decide to cap growth at either a “natural” threshold (set by equipment or infrastructure capacity) or at one with which the organizations feel comfortable operating. A train service that accommodates a half-million passengers annually will provide a different passenger experience than one that serves half or a quarter of that number and there may be benefits in restricting or slowing the pace of growth, such as maintaining a high level of visitor comfort or a relaxed atmosphere. In addition, opportunities to expand parking facilities at the primary stations are extremely limited. As the number of passengers served increases, CVSR may need to institute growth and parking management policies and techniques to allow growth to continue comfortably, or to slow growth. Several techniques are listed below; some would allow growth to continue; others would limit or slow growth.

Many of the growth management techniques listed below can be used effectively in combination with each other. Some of the techniques below could be applied selectively to “peak of the peak” demand only, while others should be applied to all service uniformly. For changes which apply only to peak seasons, days, or services special attention should be paid to customer information so as not to confuse passengers.

5.1 Service and Operational Changes

5.1.1 Expand days of service

During the peak season, service could be expanded to six days per week of two-train service, or seven days per week where two of the seven days are one-train service. This schedule would allow for weekly preventative maintenance of each consist. Six day/week service is likely to be somewhat more cost-effective than seven-day service, as there would be one day each week where positions with customer-interaction (such as trainmen or staff at stations) could be unstaffed or staffed at a reduced level. Note that six day/week service could require higher staffing levels overall, to allow staff to rotate in and out for two days/week of leave.

During the off-peak season, Monday or Friday service could be piloted, so that there would effectively be three day/week service. Off-peak demand is inherently more limited than peak-season demand; the benefits from adding additional service days in the off-peak may be less than adding extra service during the peak period.

Costs: Costs will include additional staff and volunteer time to manage sales, operate, and maintain equipment, as well as some wear and tear. Costs will vary according to the extent of additional operations selected.

Timeframe/Priority: Short term (0-5 years). Monitor trends in sales by day of the week, as well as in crowding overall. It is likely that it would make sense to increase peak-season service days sooner; expanding off-season service may be a long-term action.

5.1.2 Expand the peak season

Expand the peak season by adding more weeks of peak service or near-peak (four or five-day weeks) to the operating schedule. As noted above, there are limits to how long peak levels of service would be in demand as it becomes later in the “off” season, but there may be some room to expand in the shoulder season in the future.

Costs: Costs will include additional staff and volunteer time to manage sales, operate, and maintain equipment, as well as some wear and tear. Costs will vary according to the extent of additional operations selected.

Timeframe/Priority: Short term (0-5 years). Monitor trends in sales by week, as well as in crowding overall. Pilot expansion into the shoulder season could begin in the short term.

5.1.3 Schedule special events strategically

Encourage travel at off-peak times by scheduling special events only during off-peak times, preserving Scenic capacity for congested times. CVSR already does this, but as the number of boardings increases over time, special event scheduling may need to be reviewed further.

Costs: Minimal, as this is being done already.

Timeframe/Priority: Short term (0-5 years). Scheduling should be reviewed seasonally for any needed changes.

5.1.4 Improve boarding and alighting procedures

Reducing delay helps to increase CVSR's effective capacity. See 4.2.2.

5.1.5 Add a second Bike Aboard car to the consist

If Bike Aboard passengers grow at a faster rate than general Scenic passengers, adding a second Bike Aboard car to the consist would help accommodate this growth. The green locomotives that CVSR is currently planning to procure should have sufficient horsepower to accommodate one additional car, although the total length of the consist may be problematic for certain crossings. If the consist length or weight were to present an issue, the railroad should consider removing one coach car from the consist when a second Bike Aboard car is added. Additional staff to ticket passengers and load the Bike Aboard car would also be needed.

Costs: CVNP obtained \$137k in FY11 TRIP funds to create a second Bike Aboard car. Once complete, CVSR plans on running both Bike Aboard cars on the Scenic consist. If a second consist is put into Scenic service in the future, then CVSR should plan on running two Bike Aboard cars in that consist as well. Costs are estimated at between \$100K and \$150K to convert an existing car, depending on the state of repair of the car selected for conversion. Staff or volunteer time to ticket passengers and load the car will also increase proportionally with the number of trips on which the second car is added.

Timeframe/Priority: Short term (0-5 years). CVSR plans to implement this recommendation in time for the 2014 peak season, or sooner if possible. Bike Aboard service should be monitored to determine the following: are passengers being turned away due to a lack of capacity more than five days a year? How significant is crowding on Bike Aboard as a factor in delay? Is there a desire to expand Bike Aboard service?

5.2 Ticket Sales

5.2.1 Use pricing to balance passenger loads

Increasing ticket prices can be an effective means of controlling growth, and may potentially increase revenue per passenger. Ticket pricing could help to balance passenger loads throughout the day and week, through a peak-period surcharge or an off-peak discount. However, increases in ticket prices would likely reduce access for lower-income visitors. It should also be noted that leisure travelers may not be very sensitive to ticket price changes and very large changes may be required to produce a significant impact on travel behavior.

Costs: Costs will include staff time to prepare a cost proposal, provide advance information on the change to customers (website, newsletter, etc.), change signage and marketing materials, and to monitor impacts on sales and ridership.

Timeframe/Priority: Short term (0-5 years). In the short-term, monitor crowding and conditions. Implementation would be most likely under the high-growth scenario toward the end of the period. In the long term, some level of price increase is necessary and peak pricing could be part of a larger ticket price change.

5.2.2 *Require advanced ticket purchases*

Requiring advanced ticket purchases allows CVSR to cap growth at the chosen level of service. In addition to total train capacity, the number of tickets available for each departure should be linked to expected parking availability at that station, making it clear to passengers that they may also board at other stations where spaces are more likely to be available.

Bike Aboard could be continued as a first-come, first-served service, but there would need to be a decision made between sometimes turning people away due to lack of capacity and adding a second Bike Aboard car to the consist, if Bike Aboard demand grows faster than or proportionately with overall ridership.

Costs: Costs would decrease slightly, as day-of-sales would no longer be necessary.

Timeframe/Priority: This could be implemented in the short term as a policy choice, to control growth or simplify ticket sales, or as one of many long-term approaches to crowding and growth.

5.3 Parking

5.3.1 *Increase parking capacity*

Add more parking at lots that are regularly reaching 95 percent or greater capacity. While this is the most straightforward approach, it depends on the availability of suitable land, funds to construct new parking lots, and the willingness of NPS management to allow additional lots to be constructed. Consequently, consideration of the techniques below is recommended.

5.3.2 *Improve parking management to efficiently use existing parking capacity.*

The list below includes a range of parking management techniques, which can be used in conjunction or separately. They are listed in roughly increasing order of difficulty below. See Table 4 for impacts, costs, and priorities.

- Add information on parking capacity and ease of parking to website, to suggest that passengers make use of underused lots.
- Improve online information about transit access to CVSR (see also 1.4).
- Staff parking lots during expected peak times to direct motorists to available spaces and park cars as efficiently as possible.
- Use the website and promotional materials to encourage passengers to board at stations with excess parking capacity. For example, Bike Aboard passengers could be encouraged to park at stations (like Brecksville and Botzum) other than Rockside, Peninsula, and Akron. Consider developing events or attractions which board at or are nearby these “secondary” stations.
- Formalize or harden overflow lots, if NPS agrees, to encourage more efficient use of space. Note that there may be environmental impacts (such as runoff) which could limit use of this strategy.
- Consider operating a shuttle service to other parking facilities at CVNP or near terminal stations, especially if the shuttle serves other attractions (Brandywine Falls, the Ledges, etc.).
- Consider piloting a parking fee to encourage carpooling and transit use. While pricing is typically an effective means of managing demand, it is important to note that passengers accustomed to free parking may react negatively. In addition, for CVSR, a leisure destination, passengers would not be making the kinds of regular trips, which lend themselves to carpooling and transit. A parking fee should only be instituted after careful study.

Table 4
Parking management techniques

| Recommendation | Result | Implementation Considerations | Timeframe/Priority | Cost |
|-------------------------------------|---------------------|---|---|---|
| Add parking info to website | Accommodates growth | Low impact, but also very low effort. | Short term | Up to 24 hours of staff time to draft and upload content. |
| Improve transit information | Accommodates growth | Low impact on parking, but also very low effort. Adding transit information may expand access overall, to new passengers. | Short term | Up to 24 hours of staff time to draft and upload content. |
| Staff parking lots | Accommodates growth | Could target key stations only, at peak times, days, or seasons. May be used on an as-needed basis to accommodate peak-of-the-peak days or special events. Staffing functions as a stopgap measure to allow better management of existing capacity until other solutions are implemented. | As needed (both short and long term) | Staff and volunteer time to direct drivers to open spots as needed. |
| Encourage use of lots with capacity | Accommodates growth | This recommendation expands the recommendation above on adding parking information to actively encouraging passengers to board (and park) at underutilized stations. Adding additional programming at these stations may help increase the impact. | Planning should begin in the short term | Up to 80 hours of staff time to draft and upload website content and revise marketing materials, including station and excursion descriptions. Additional staff and volunteer time if new events or attractions are programmed. |
| Formalize overflow lots | Accommodates growth | Hardening surfaces and striping spots should increase the effective capacity of overflow lots, which otherwise (when unstaffed) can vary tremendously from day to day depending on how customers choose to park. | Long term | Costs include environmental review and well as the costs to design and construct the newly-hardened lots. |
| Consider shuttle service | Accommodates growth | Impacts on parking capacity will depend on the route and frequency of service. | Planning should begin in the short term | See Recommendation 8. |
| Consider parking fee pilot | Manages growth | As noted above, parking fees can be complex to implement and administer. CVSR is a scenic railroad, not a commuter service, which will reduce the effectiveness of a parking fee in encouraging carpooling or use of alternate transportation. A simple fare increase may be preferred. | Long term | Up to 400 staff hours to plan pilot. Depending on choice of payment method, staff, equipment, and maintenance costs to operate will vary. |

6. Pilot express Scenic service during peak times

Express Scenic service (with stops at only major stations, possibly Rockside-Peninsula-Akron) would add passenger capacity and reduce the total trip time for Scenic passengers. A pilot implementation of this service would test both the operational characteristics and passenger interest in such a service. If the pilot proved successful, express service could be added as a regular option. Testing pilot service during a month like October, when demand is generally high, offers an opportunity to reach potential passengers. However, offering a new service during a busy time may be judged by CVSR to be operationally too risky. Volpe Center staff have reviewed several options for express Scenic service and conclude that, if offered, it should only be offered as a supplement to single-train service; theoretically it would be possible with the construction of an additional siding to offer express service as a third train, but the schedule would need to be unrealistically precise.

Timeframe/Priority: Short term (0-5 years). Express Scenic service is recommended only during a relatively narrow timeframe: when demand is high enough to warrant additional Scenic service, but before the institution of two-train service.

Cost: Costs should be similar to those for offering Canton service in 2013: staffing and maintenance on an additional consist and marketing. Note that while it is technically possible to add express service with existing infrastructure, one or more additional sidings may be needed before express service could be offered reliably. The estimated cost to reopen the siding at Jaite is \$950K, inclusive of planning and compliance. See Recommendation 20 for more information.

7. Institute new procedures to check and maintain audio tour equipment / upgrade equipment

Including checks and maintenance of the audio tour equipment in the list of regular maintenance activities will help keep the equipment in good working order and ready for use by passengers. On days when the number of volunteer trainmen is higher than needed for the passenger load, volunteers could be asked to go through and methodically test the equipment. If repairs are needed frequently, it may be necessary to upgrade the equipment in the long term. A third option is to develop a smartphone or other portable device app. In this model, CVSR could minimize equipment and maintenance costs (CVSR may still wish to provide headphones), but visitors without their own smartphone would not be able to access the content, which raises equity concerns. Visitors would need to download the app before arriving at CVSR or to have sufficient wireless connectivity (which has been problematic in the past) to download the app before boarding.

Timeframe/Priority: Short-term (0-5 years): maintenance is recommended for the short-term. Long term (6-20 years): review available technology and costs and consider replacement. Any increase in equipment capacity would also likely trigger a review of replacing units or increasing the number of units.

Cost: Low (maintain); \$100K (replace); \$3-50K (app development) App development costs vary greatly depending on the levels of customization and functionality selected.

8. Pilot regular shuttle service between CVSR and CVNP attractions

Coordinated shuttle service between CVSR and attractions like the Ledges or Brandywine Falls would expand access to CVNP to visitors not using a personal vehicle and may attract new or repeat riders. Service could be provided on a weekly or daily basis. For pilot service, a leased vehicle could be operated for a full season (June-October) to assess demand. Weekly service could be as limited as two or three destinations served by a single route on Saturdays only, for example. Daily service could include more frequent service or additional vehicles. Service concepts should be reviewed carefully and a detailed plan, including a marketing strategy and an evaluation plan, should be developed before embarking on a pilot.

Timeframe/Priority: Short-term (0-5 years) for a pilot project. In the short term, weekly or weekend service may be an attractive option to explore, especially under the low and medium growth scenarios. In the long term, or under the high growth scenario, there may be sufficient demand to institute daily service.

Cost: \$50-100K per year to operate, depending on scope of pilot.⁵ Significant CVSR and NPS staff and/or consultant time will be needed to plan, operate, and evaluate the success of the pilot. To minimize operation and maintenance costs, a fee for using the shuttle could be implemented.

9. Continue monitoring feasibility of Cleveland extension

Expanding to Cleveland would make CVNP the only national park with rail access from a major metropolitan center. Regular Cleveland service would likely increase Cleveland-based ridership and would also facilitate additional Cleveland-focused special events and fundraisers. However, past negotiations with CSX have not been fruitful, mainly due to liability concerns. Nonetheless, as the opportunity arises, CVSR and CVNP should continue to explore the possibilities with CSX to purchase the line to Cleveland, transferring the liability to CVSR and providing operational rights for freight trains to CSX. This would require a significant capital investment and increase total operating costs, so should be considered carefully.

Timeframe/Priority: Monitoring should continue for the short-term (0-5 years). Any implementation timing would depend on negotiations with CSX, fund-raising, and management direction.

Cost: Low (monitoring); \$13.5M⁶ (implementation not including operations).

10. Create comprehensive transportation plan for CVNP

Undertaking a CVNP-wide comprehensive, multimodal transportation plan will allow CVNP to review larger issues of park access and circulation that do not tie directly to CVSR, as well as offering an opportunity to consider and articulate the railroad's current and future role in providing transportation and enhancing visitor experience in the park. The transportation plan should characterize existing conditions and trends, develop transportation goals and objectives, analyze access to and within CVNP by personal automobile and alternative transportation, identify challenges and opportunities for improvement, and provide a timeframe for implementing improvements to build a holistic transportation system that, to the extent possible, integrates all transportation modes serving visitors to CVNP.

Timeframe/Priority: Short-term (0-5 years): initiate work on the plan to ensure that CVSR's plan is placed within a larger context that incorporates CVSR's plan for the near and long terms.

Cost: \$250K⁷

⁵ Cost estimate includes vehicle lease and operation or contracted operations and marketing; does not include NPS or CVSR staff time.

⁶ This is a rough estimate based on 8 miles of track at \$1.25M for purchase and \$250K for rehabilitation plus \$1.5M for station rehabilitation or building.

⁷ This estimate assumes that the rail-focused plan that is currently under development will essentially be "wrapped up" into the comprehensive transportation plan.

Communications improvements

Recommended communications improvements are intended to address deficiencies in CVSR's radio system that are critical to ensuring its reliable operation and passenger safety as well as deficiencies in the systems needed to deliver information to its customers. These recommendations are provided below.

1. Improve CVSR radio communications

It is recommended that CVSR invest in a repeater that will enable reliable radio communications between the dispatcher and trains throughout its service area. Currently, there is a large part of the railroad's service area where radio communications is not possible, which includes the low elevation areas near Jaite. Also, if CVSR is considering regular service expansions to the north of Rockside or south of Akron, additional repeaters may be required. CVSR engineers carry a cellular telephone as a backup, but this should be considered a measure of last resort rather than a normal operating procedure. There are many situations where reliable and immediate communications between dispatcher and train are essential.

It should also be noted that on January 1, 2013, many municipal radio users in the United States were required by the Federal Communications Commission (FCC) to adopt "narrowbanding" procedures which required them to replace their existing radio systems with digital radios that use less of the radio spectrum. This mandate only applies to certain frequencies in certain areas, so when CVSR issues a contract for new repeater equipment, it should include an assessment by the contractor of whether or not the narrowbanding requirements (or other FCC licensing requirements) apply to them. All vendors of business and municipal radio systems should be keenly aware of the FCC requirements that apply to the equipment they sell.

Timeframe/Priority: Upgrading the CVSR radio system should be considered a high-priority initiative that can be accomplished in the short term.

Costs: A single channel repeater for the CVSR radio system should cost less than \$10K. Additional costs include leasing a dedicated phone line between the Fitzwater and the repeater location, and vendor labor to conduct its own survey of the topography, to select a repeater site and research applicable FCC requirements, at a total cost of approximately \$25K.

2. Develop and deploy a passenger information display system (PIDS)

CVSR should consider investing in a system that will provide information to passengers at each station about when the next train is expected to arrive in each direction. The system should comprise rugged, weather-resistant display panels that include a section dedicated to daily announcements or alerts. The PIDS system will allow passengers at stations (and other selected nearby locations) to know when trains are expected to arrive, which will enable them to better plan their stay in the park. PIDS information should also be accessible in other locations by visitors with smartphones. Providing better information to passengers is especially important when certain conditions cause the railroad to fall significantly behind schedule, or when special events are added to the schedule. PIDS should use a flexible display concept, so that new information block or display formats can be utilized by CVSR as needed.

Timeframe/Priority: Development and deployment of a PIDS is something that should begin in the short term. It becomes especially important as CVSR considers expansion or continues to experience increases in ridership, as both conditions tend to result in schedule delays.

Costs: Although many public transit systems have some variant of a PIDS, they are not off-the-shelf products—each is tailored to the system and ridership, and therefore requires some level of development. While a great deal of money can be spent developing a PIDS, it should be possible for a small local software development company or even a college or university to develop one as the technology behind a PIDS is not complicated. It simply gathers and extrapolates location data transmitted from a tracking

device on board each train. A PIDS should be able to be developed and deployed for approximately \$310K.

3. Develop a long-range communications plan

It is recommended that CVSR and NPS together develop a long-range communications plan. Both entities have communications requirements within the park, and there may be solutions that will benefit customers and employees of each. Areas of improvement to be considered include improving the existing cellular coverage within the park, or to utilize digital channels on the CVSR or NPS radio systems to deliver digital data such as location information, PIDS data, or provide internet connectivity for passengers. It may also be used to provide a reliable connection for on-board souvenir/food/beverage sales. Future communications requirements for video surveillance, electronic switching/signaling, and grade crossing equipment monitoring should also be considered. It should be recognized that communications improvements will be an ongoing challenge, but a long-range plan will help to weigh the options, prioritize the initiatives, and provide a roadmap to implementation.

Timeframe/Priority: While development of the long-range plan may begin at any time, it should not divert resources needed to address the more urgent near-term needs of CVSR. It is therefore considered a short term, medium priority recommendation.

Costs: Hiring a communications consultant to provide a series of long-term recommendations will require mostly engineering labor and some travel, at an approximate cost of \$150K.

Equipment improvements

Recommended equipment improvements for CVSR are based on two-train scenic service, which is expected to begin in 2013 and continue for at least the next 20 years. For each of the growth scenarios, the configuration of a scenic train is assumed to be one green locomotive, one Bike Aboard baggage car, five coach cars, one accessible coach car, one concession car, and one cab control car capable of providing HEP. Additional alternative configurations could be utilized for non-scenic special charter trains that would include the specialty cars that are owned by CVSR (Saint Lucie Sound, Emerson Dome car, etc.).

1. *Implement a progressive maintenance plan*

The railroad should implement a maintenance plan that anticipates the service life of components and establishes an inventory of standardized parts and components. The current maintenance plan addresses repair work on an as-needed basis, resulting in the potential for coaches and locomotives to be out of service for extended periods of time. By scheduling preventive maintenance events based on known life cycles of parts and components, the railroad can ensure that its rolling stock will be available and in safe operating condition.

A detailed description of the progressive maintenance plan required for CVSR will depend on the equipment selected as discussed in the previous recommendations. An initial assessment of required maintenance appears below.

1. Weekly inspections of all equipment with repairs as needed
2. 5-year scheduled maintenance:
 - a. Inspect / overhaul trucks
 - b. Inspect / replace couplers and draft gear
 - c. Air brake COT&S (clean, oil, test, and stencil)
3. 10-year scheduled maintenance:
 - a. Inspect / replace power and cab control lines and connections
 - b. Coach interior overhaul/upgrade (seats, carpets, upholstery, bathrooms, lighting, etc.)
 - c. Inspect / replace doors and windows

Timeframe/Priority: Having a progressive maintenance plan is an industry good practice. Accordingly, this recommendation does not vary with the projected ridership and should be implemented for all potential growth scenarios.

Costs: The cost of implementing a progressive maintenance plan can vary greatly and is dependent on the type and condition of the coaches and locomotives selected for service. A ballpark estimate for 5-year maintenance costs for a single coach is \$25K and for a single locomotive is \$50K.

2. *Procure “green” locomotives*

It is recommended that the railroad procure “green” locomotives equipped with multiple diesel generators that can provide adequate tractive power for the train. These locomotives can provide up to a 75 percent fuel savings as compared to the existing locomotives and reduce emissions to meet EPA requirements. The railroad has indicated that the minimum power requirement for a new locomotive is 1,500 horsepower. This power requirement is based on the tractive effort that is needed to operate a scenic train in the previously stated configuration. Each train requires only one locomotive, but it is recommended that a spare locomotive be procured to ensure continuous operation in the case of unscheduled maintenance requirements. The spare locomotive may also be used for special charter trains, Polar Express™ service, Day Out with Thomas™ service, and to help reduce wear of the primary locomotive by rotating it into service and reducing the annual mileage on each locomotive.

Timeframe/Priority: Regardless of the growth scenario, to effectively operate two daily scenic trains over the next 20 years, CVSR should procure five green locomotives within the next 10 years.

Costs: The cost of procuring a green locomotive can vary greatly. The expected cost of a single locomotive that meets the service and performance requirements of the railroad is between \$0.9M and \$1.6M.

3. Convert equipment to allow for cab control

It is recommended that the railroad convert its existing (older, non-green) locomotives into cab control units with HEP generators. Cab control cars will allow the railroad to reduce the number of locomotives needed for operations as only a single locomotive will be required for each consist. In addition, by providing HEP in the cab control unit, the need for a separate power car is eliminated. Cab control units will allow the railroad to operate shorter, lighter trains, with less fuel consumed, lower emissions, and reduced maintenance costs and requirements.

The railroad currently owns several MLW (Montreal Locomotive Works) FPA-4 locomotives (numbers 6767, 6771, 6777, and B&O 800) that could be converted to cab control cars by removing the prime mover and traction motors and installing a multiple unit control system. The interior of these cab control cars, which previously contained the locomotive's prime mover, can be used to house diesel generators that will provide HEP to the train, as well as a high-capacity air compressor for the train's air brakes and locomotive's air horn. In addition, coaches currently operated by the railroad that are not equipped with multiple unit (MU) capabilities will need to have MU cables installed in order to allow the cab control unit to control the locomotives engine and air brakes.

Each train requires only one cab control unit, but it is recommended that the railroad plan to convert a spare unit to ensure continuous operation in the case of unscheduled maintenance requirements. The spare unit may also be used for special charter trains, Polar Express™ service, Day Out with Thomas™ service, and to help reduce wear on the primary cab control unit by rotating it into service and reducing the annual mileage on each car.

Timeframe/Priority: Regardless of the growth scenario, to effectively operate two daily scenic trains over the next 20 years, CVSR should convert three cab control units in the immediate near term. FY11 TRIP funds have been obtained to work toward this goal.

Costs: The cost of converting a single locomotive into a cab control unit ranges between \$250K and \$275K. The cost of converting a single non-MU equipped coach into an MU capable coach is approximately \$8,000.

4. Upgrade coaches for increased passenger comfort

It is recommended that the railroad overhaul its fleet of coach cars (on an as-needed basis) to ensure cleanliness and comfort. Upgrades should ensure that as each coach is added to the fleet, it has comfortable interior furnishings, functioning heat and air conditioning, sanitary bathrooms, and potable water. This recommendation applies to coaches as they are added to the fleet, presumably starting in 2013. In addition, the progressive maintenance plan described in Equipment Improvements Recommendation 1 above, endorses overhauls to the coach interiors every 10 years to maintain passenger comfort over the entire service life of the coach.

Timeframe/Priority: Since CVSR should upgrade passenger comfort regardless of its growth rate, this recommendation does not vary with projected ridership and should be implemented (in-line with the progressive maintenance plan described in Equipment Improvements Recommendation 1) for all potential growth scenarios.

Costs: The cost to upgrade coach comfort is contingent on the number of cars to be overhauled and the level of effort required. The maximum number of coaches that would require upgrades in passenger comfort would be the entire fleet of 12 coaches. A rough cost estimate for upgrading a single coach is between \$10K and \$40K.

5. Standardize equipment

It is recommended that standard parts and equipment that can be utilized throughout the entire fleet, including trucks, couplers, and interior components be established. Coaches and locomotives should be standardized to reduce maintenance costs and provide interchangeability of parts and components.

Recommended considerations include:

1. Procuring standard equipment (trucks, couplers, etc.) to be determined based on the coaches and locomotives selected.
2. Maintaining one spare locomotive and one spare cab control unit for the entire fleet and one spare coach for each of the daily scenic trains (as described in the sections above).
3. Maintaining specialty equipment (St. Lucie Sound, Dome car, etc.) for Polar Express™ service, Day Out with Thomas service™, and any other special charter trains.

Timeframe/Priority: This recommendation is an industry good practice and therefore does not vary with projected ridership. Accordingly, for each of the growth scenarios, the railroad should establish standard parts and equipment.

Costs: The cost of standardizing the equipment used by CVSR can vary greatly and depends on the type and condition of the coaches and locomotives selected for service. A ballpark estimate for the cost of standardizing a single train would be between \$125K and \$500K.⁸ This estimate represents the potential range in cost of standardizing a single train set and depends on the type and condition of equipment chosen. Once the equipment is selected and its condition can be evaluated this can be more precisely estimated.

6. Obtain permanent ownership of entire fleet

The railroad should obtain permanent ownership of the entire fleet of coach cars and sell or scrap any cars or locomotives that do not fit into their future plans. CVSR relies heavily on eight coaches that are leased from Akron METRO Regional Transit Authority (METRO). The current lease with METRO is open-ended, which allows METRO to recall these coaches at any time. Such a scenario would leave CVSR without sufficient coaches to operate their scenic service. The railroad should negotiate either a new 20-year lease or plan to purchase these coaches from METRO. Additional coaches will need to be procured from another source.

Each train requires five coaches, but it is recommended that for each train a spare coach be procured to ensure continuous operation in the case of unscheduled maintenance requirements. The spare coach may also be used for special charter trains, Polar Express™ service, Day Out with Thomas™ service, and to help reduce wear of the primary coaches by rotating it into service and reducing the annual mileage on all of the coaches operated by the railroad.

Timeframe/Priority: Regardless of the growth scenario, to effectively operate two daily scenic trains over the next 20 years, CVSR should obtain ownership of twelve coaches in the near term.

Costs: The cost of procuring used railroad coaches can vary greatly, and the potential to renegotiate the current lease with METRO is not known at this time. In general, the expected cost of a single used coach that meets the service and performance requirements of the railroad can be as low as \$20K and as high as \$250K.⁹ This estimate represents the range in cost for used coaches. It is anticipated that the coaches procured by the railroad will be closer in cost to the low end of this estimate. In addition, the potential savings associated with selling all excess equipment is not known at this time, but an estimate of \$10K can be made for the potential scrap value of a single used rail car.

⁸ This estimate represents the potential range in costs, which are dependent on the type and condition of the equipment. It is difficult to come up with a better estimate before the type and condition of equipment is known.

⁹ This estimate represents the range in cost for used coaches. The project team anticipates that the railroad would procure coaches closer to the low-end estimate, but as costs can vary the range of costs is provided.

7. Supplement existing ADA cars

ADA coaches currently operated by the railroad feature one wheelchair lift on each side of the car; each lift requires three minutes to load each passenger. The railroad could make boarding more efficient by adding a second lift to each side of each ADA car. In the infrastructure section, it is recommended that the railroad build high-level platforms and ramps at several key stations. These additional lifts would be required for and utilized at stations that do not have high-level platforms and ramps.

Also, once passengers in wheelchairs have boarded the train, they are restricted to the ADA car, as the passages between coaches are not accessible. This situation prevents passengers in wheelchairs from accessing the concession car. To address this, the railroad could provide concession cart service for the ADA cars.

Each train requires only one ADA car, but it is recommended that a spare car be procured to ensure continuous operation in the case of unscheduled maintenance requirements. The spare car may also be used for non-scenic service trains, and to help reduce usage of the primary ADA car.

The railroad currently utilizes two ADA cars for scenic service: car #727 and car #105. In each of the scenarios described below, it is assumed that these cars will continue to be operated in the future.

Timeframe/Priority: Regardless of the growth scenario, to effectively operate two daily scenic trains during the next 20 years, CVSR should procure and modify a third ADA car in the near term.

Costs: The cost to rehabilitate ADA car #727 is \$144,670. FY11/12 TRIP funding has been obtained for this project. The expected cost to procure and modify an additional ADA car will depend on the condition of the car that is procured. NPS and CVSR continue to seek funding for a third accessible car.

8. Overhaul concession cars

The concession cars currently operated by the railroad lack refrigeration and utilize portable coolers to store cold beverages. These cars should be upgraded to include refrigerators and may require minor upgrades to the interior layout to accommodate the placement of these refrigerators.

The railroad currently owns three concession cars (#89, #8700, and #8704), all of which will require some level of overhaul to meet the above recommendation.

Timeframe/Priority: Regardless of the growth scenario, to effectively operate two daily scenic trains over the next 20 years, CVSR should overhaul two concession cars in the near term.

Costs: The cost to overhaul one of the current concession cars to meet the above recommendation is approximately \$20K.

Infrastructure improvements

Recommended infrastructure improvements for CVSR are based on two-train scenic service, which will begin in 2013 and is expected to continue for at least the next 20 years. Listed in order of decreasing priority are improvements to meet the anticipated demand for each growth scenario and other improvements to facilitate operations, equipment storage, and infrastructure, equipment, and rolling stock maintenance and repairs. The costs listed in this section are based on construction and material costs only and do not include planning, design, compliance, and contract administration costs, which usually add another 30 to 35 percent.

1. Add repair-in-place (RIP) track

To expand operations to meet the medium and long-term ridership growth and timeframes, the construction of a RIP track is required. A RIP track will allow for inspections and minor repairs that can be performed without occupying valuable shop space.

Timeframe/Priority: Short term – under any scenario, repairs and inspections that can be performed while the vehicle is in the RIP track will free valuable shop space to complete major equipment work. In line with the recommendations to procure new/additional equipment, having a RIP track will become more and more important as new equipment is acquired. Since CVSR is proceeding with two-train operation in the coming season, the RIP track will be required within the next few years.

Costs: The cost, \$250K, is based on 1,320 feet (quarter of a mile) of track constructed with secondhand material and a used switch.

2. Add sidings

With the addition of a second scenic train to meet increasing demand, delays in the operation of two trains could have a cascading impact on schedule adherence. An additional siding will allow for two-train schedule flexibility; i.e., by allowing trains to travel in both directions more frequently, and thus providing greater mobility and accessibility to park visitors. Rehabilitating Jaite siding will provide an additional passing location in the event that one of the trains is delayed either by capacity issues or equipment breakdown. Further, if a special excursion train is added during normal operating hours of the scenic trains, operations without a new siding would be quite difficult (though not impossible). One train will have to wait at one siding until the other two trains go by to the next siding, either at Fitzwater or Peninsula. An additional siding will provide for continuation in operation in case one siding becomes inoperative either by emergency switch or track maintenance requirements, temporary storage of broken equipment, etc.

As time progresses, the need for one or two additional sidings may be necessary to accommodate increasing ridership, special trains, or operation expansion toward Cleveland or along the line to Canton. Depending on future expansion policies of the railroad, an area north of Rockside station and at Akron station are two possibilities for installing new sidings. The policy decision with regard to future expansion and need will determine which of these two sidings should be built. Both of these options would be expensive since considerable geotechnical work will be needed, along with any additional land acquisition costs. Each of these sidings would likely cost two to four times more than rehabilitating Jaite.

Timeframe/Priority: Medium term – with the existing siding at Peninsula station and boarding and alighting improvements implemented in-line with the previous recommendation, the existing track structure can meet the growth scenario requirements, and no new siding would be necessary for the 0-5 year timeframes. However, the medium and high-growth scenarios will require more frequent two-train operations (i.e., with more runs than what are scheduled for 2013), which may be necessary to implement as early as 2017. Accordingly, rehabilitating the Jaite siding will be necessary to meet the 5-20 year timeframes of these scenarios.

Costs: The cost, \$950K, is an estimate for rehabilitating the existing siding based on a previous quote and accounted for inflation, inclusive of planning and compliance. This will encompass returning to service approximately 3,000 feet of track, including refurbishing existing switches, culverts, track substructure, ballast, additional ties, and any additional rail that is required.

3. Improve accessibility

A major cause of schedule delays is the boardings and alightings of passengers requiring the use of wheel chairs. Current ADA coaches in operation by the railroad feature two wheelchair lifts, one on each side of the car that require three minutes to load each passenger. Only one lift can be used at a given station since there is only one location for boarding the train. Even with a small increase of wheelchair passengers at any given station, delay can accumulate to a point of disrupting the schedule. Providing a platform of at least one car length with a height up to the car entrance and an attached handicap ramp leading to it will allow passengers using wheelchairs to board the train on their own with minimal assistance. Allowing passengers using wheelchairs to board the train from the platform will reduce the board time at each of three key locations (Rockside, Peninsula, and Akron stations) from a currently estimated three minutes per passenger to approximately 30 seconds or less per ADA passenger.

While providing ramps and raised platforms at key locations would help with on-time performance, the construction and presence of these ramps and platforms may detract visually from the aesthetics of the station area. Accordingly, trade-offs between incremental improvements in on-time performance and accessibility and the visual impact and cost of the ramps and platforms should be considered when pursuing this recommendation.

Timeframe/Priority: Medium term – with two-train operation, small delays in one station due to loading and unloading passengers using wheelchairs will cascade into major schedule problems since the trains have to meet at various points (sidings) in the system. Providing platforms at key stations will reduce the time it takes to load passengers requiring the use of wheelchairs by 2.5 minutes per passenger.

Costs: The cost estimate for the materials for the proposed platform and ramp are estimated at \$37K for each station, and \$111K for the three stations.¹⁰ Bases for this estimate are the platform (approximately 100 feet long by 8 feet wide) and the ramp (approximately 50 feet long by 8 feet wide) leading to the platform. Both of these should be constructed with treated timber. The estimate does not include land or permits. Constructing the raised platform with other materials such as concrete was not considered for aesthetic reasons; for example, wood is a more natural material and more consistent with the park environment than concrete.

4. Expand maintenance facility

The maintenance facility is near capacity under current operating conditions, given the age of, and therefore the maintenance needed by, the equipment. To meet the need for an increasing number of cars under all growth scenarios and timeframes, the facility needs to be expanded to handle two additional cars and at least one locomotive. The logical approach to increasing the maintenance facility is by demolishing the current office building (formerly a garage) and expanding the existing maintenance building to the north with another two-car bay and office space, which will provide the operations and maintenance space needed. At a minimum, the expansion to the building should include continuation of the track pit and additional crane tracks so the existing crane can travel throughout the entire shop area. Office space can be added to the end or to the side of the shop building.

Timeframe/Priority: Medium term – the maintenance facility is near capacity under current operating conditions, but for the 0-5 year timeframe under the scenarios, expansion of the maintenance facility

¹⁰ The estimated costs of the platforms (\$30.83 per square foot) are slightly higher than the platforms that were constructed by CVNP at ground level in 2009 (\$29.95 per square foot, in 2012 dollars).

might be postponed. However, the expansion will be necessary – perhaps as early as 2017 – to meet the need of maintaining the aging equipment for the 5-20 year timeframe.

Costs: The cost for expanding the maintenance facility, \$1,120,000, is based on an additional 80 x 120 foot building at \$93.85 per square foot, plus \$13.20 per square foot for demolishing the old county building (estimated at 5,000 square feet), with an additional 15 percent for engineering, incidentals, and foundation stabilization.¹¹

5. Enhance fuel storage

Fueling facilities at Fitzwater maintenance facility currently exist to capture any spillage from a fueling operation. However, adding a storage tank at Fitzwater would eliminate the need to have a fuel truck fueling the equipment all the time.

The study team considered the option of bringing fuel in with a tank car from a nearby railroad and felt that it was not a viable option for meeting fueling requirements. Having the fuel delivered and stored in the tank car will either require a dedicated track close to the existing fueling facility or the movement of the tank car every time a train needs to be fueled. Fitzwater maintenance facility is already congested with cars and needs free track for train make up or movements for repairs or general maintenance. Moving the tank car from location to location within the yard and fueling vehicles from it also increases the risk for spills compared to having a stationary tank installed.

With more trains in service starting in 2013, the medium-size truck used to fuel the locomotives/cars will struggle to keep pace with demand and more or higher capacity trucks will have to be brought into the operations and maintenance facility, which is already short of space. However, using existing locomotives as cab cars with generated power capabilities for the whole train will improve the current fueling situation by having to fuel only the locomotive and the cab car, which provides the HEP, instead of fueling each individual coach in the train.

Timeframe/Priority: Medium term – the enhanced storage facility does not have any direct impact on the operational schedule for any of the given scenarios or timeframes.

Costs: The cost, \$125K, is a rough estimate for a 10,000 gallon capacity above ground tank, and the location of the storage tank relative to the existing fueling station; the location determines the required pipe length from the fuel tank to the fueling station. This estimate does not take into account any modifications to the existing fueling station. The 10,000 gallon tank is based on the capacity of a large capacity highway tanker capable of handling 9,000 to 10,000 gallons. It is assumed that the existing fueling pit with the catch basin and oil separator will be used as the fueling station.

6. Construct car storage facility

Currently cars and locomotives that are not in use or are used for spare parts or storage are stored in two locations: Fitzwater maintenance facility and at the north entrance to the railroad's property. This arrangement serves the current need but under all growth scenarios and timeframes a facility to store this equipment is required. Providing an equipment storage location will free space at Fitzwater maintenance facility, and it will allow for easier access to the property to bring in new locomotives or cars.

Three options for car storage are available: adding one additional track to the system at Fitzwater yard; double-tracking a section of the track approximately one quarter of a mile to the north of Rockside station between Old Rockside Road and the junction with CSX to store the cars; or negotiating with CSX to acquire or rent about a quarter of a mile of track at the interchange with CSX, for storage purpose only.

¹¹ The square foot cost data is based on "RSMMeans Open Shop Construction Cost Data," 2007 and 2011 Editions. A commercial garage was used as the most similar type of building to the repair shop. An additional 50 percent is added for demolition to cover any uncertainties. Costs are adjusted to 2012 dollars using inflation factors and location factors from the same source.

Each of the three options has its pros and cons. While adding an additional track at Fitzwater yard is more advantageous from the point of view of access, the presence of wetlands to the east of the facility and grade to the west might preclude this option. Even if the park allowed this option, building track on wetlands can be costly. The stabilization of the substructure and high water table (relative to the track) will require substantial geotechnical design and construction, thereby increasing the costs. Double-tracking a section of the track north of Rockside station is a viable option, but land cost and availability might make this option uneconomical. This section of track is also more advantageous as an additional siding for future use rather than as a car storage facility, particularly if CVSR policy is to expand to Cleveland. The CSX option could be the most economical, provided that CSX is willing to negotiate a lease for its track. Once the decision has been made whether to build a car storage facility, costs for each option can be evaluated and the most advantageous option selected.

Timeframe/Priority: Medium term – in line with the recommendations to procure new/additional equipment, a facility to store surplus cars is needed under each growth scenario within the next five years to meet the needs of the next 5-20 years of growth. However, if CVSR manages its storage needs by selling its surplus cars, CVSR could wait 10-15 years to increase its storage capacity.

Costs: The cost estimates for the car storage facility can range from approximately \$12K per year for rental from CSX to about \$425K for a quarter of a mile of track at one of the locations described above, which would require grading and subgrade work, two switches, and construction. Land is not included in this estimate.

Funding possibilities

Category III funding

NPS has received \$240 million annually for its transportation program under SAFETEA-LU since 2009. NPS will receive the same amount under MAP-21. NPS divides this funding into three categories and distributes it to its seven regions. Category III funds alternative transportation projects. CVNP has received Category III funds from NPS in the past.

To apply for Category III funds, CVNP must enter an eligible project into its Project Management Information System (PMIS) by the deadline provided by the Midwest Region's transportation program manager (currently Wayne Vander Tuin). After the deadline, the Midwest Region will determine what Category III projects will be funded in the given fiscal year. The amount of Category III funds that the Midwest Region has available varies year to year.

Federal Lands Access Program funding

(<http://www.efl.fhwa.dot.gov/programs/fed-lands-ohio.aspx>)

MAP-21 initiated a new funding source for Federal land management agencies and local governments known as the Federal Lands Access Program (Access Program). The goal of the Access Program is to improve transportation facilities that provide access to, are adjacent to, or are located within Federal lands. The Access Program supplements State and local resources for public roads, transit systems, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators.

In sum, this program will distribute \$250 million to all fifty States annually. This program in part replaces a similar program, known as the Forest Highways program (FH), which was not renewed under MAP-21. FH distributed \$198 million annually to all States, but only National Forests were eligible.

Funds made available under the Access Program can be used to pay the cost of:

- Transportation planning, research, engineering, preventive maintenance, rehabilitation, restoration, construction, and reconstruction of facilities located on or adjacent to, or that provide access to, Federal land, as well as:
 - adjacent vehicular parking areas;
 - acquisition of necessary scenic easements and scenic or historic sites;
 - provisions for pedestrians and bicycles;
 - environmental mitigation in or adjacent to Federal land to improve public safety and reduce vehicle-caused wildlife mortality while maintaining habitat connectivity;
 - construction and reconstruction of roadside rest areas, including sanitary and water facilities; and
 - other appropriate public road facilities, as determined by the Secretary;
- Operation and maintenance of transit facilities; and
- Any transportation project eligible for assistance under title 23 that is within or adjacent to, or that provides access to, Federal land.

As part of the Access Program, Ohio will receive \$849,192 annually. Under FH, Ohio received \$282,683 annually. Accordingly, Ohio will receive \$566,509 more annually under the Access Program than it did under FH. This positive balance means that there is a greater opportunity for non-National Forest Federal land management agencies, such as NPS, to receive funding in Ohio than in States where there is less of a positive balance. This greater opportunity is because in many States there is a "backlog" of National Forest projects that were scheduled to be funded in later fiscal years and had yet to be funded under FH. However, CVNP will have to compete against all of the other Federal land management agencies that are now eligible in Ohio as well.

As the first step to establish the Access Program within each State, Eastern Federal Lands Highway Division (EFLHD) is responsible for creating a Programming Decision Committee (PDC) in Ohio to set-up the program (i.e., establish criteria and a timeline for Ohio's program) and prioritize applications. A

PDC is to be composed of a staff member of the State DOT and EFLHD as well as a local government representative. At the time of this writing, EFLHD has created a PDC and has released an application that will be used in all EFLHD states. However, it is not yet clear when EFLHD will start accepting applications in Ohio; it may be late summer 2013.

CVNP must partner with a local, county, or State agency (usually a city, county, or State DOT) to submit an application to this program. In fact, MAP-21 requires that eligible facilities be owned or maintained by a State, Tribal, or local government. A local match will be required. The percentage of the local match in Ohio has yet to be determined, but it will not exceed 20 percent, and Category III funds can be used as the match.

Congestion Mitigation and Air Quality Program (CMAQ)

(http://www.fhwa.dot.gov/environment/air_quality/cmaq/)

The Congestion Mitigation and Air Quality (CMAQ) Program was implemented to support surface transportation projects and other related efforts that contribute air quality improvements and provide congestion relief. Jointly administered by FHWA and FTA, the CMAQ program began in 1991 under the Intermodal Surface Transportation Efficiency Act and has been reauthorized in each subsequent transportation bill. Through the close of the SAFETEA-LU period in 2012, the CMAQ program has provided nearly \$30 billion in just under 29,000 transportation-environmental projects to State DOTs, metropolitan planning organizations (MPOs), and other sponsors across the country. In Northeast Ohio, CMAQ funding supports the Ohio Diesel Emissions Reduction Grant (DERG) Program and the activities of the region's two primary MPOs: the Northeast Ohio Areawide Coordinating Agency and the Akron Metropolitan Area Transportation Study (AMATS).

As with its predecessor legislation, MAP-21 provides funding to areas in nonattainment or maintenance for ozone, carbon monoxide, and/or particulate matter. In addition, those States that have no nonattainment or maintenance areas still receive a minimum apportionment of CMAQ funding for either air quality projects or other elements of flexible spending. MAP-21 provides just over \$2.2 billion in CMAQ funding for each year of the authorization-2013 and 2014. While project eligibility remains basically the same, the legislation places considerable emphasis on diesel engine retrofits and other efforts that underscore the priority on reducing fine particle pollution (PM 2.5).

Ohio Diesel Emissions Reduction Grant Program (DERG)

(<http://www.epa.state.oh.us/oeel/EnvironmentalEducation.aspx#LiveTabsContent131362>)

The DERG Program awarded \$10 million in FHWA CMAQ funding for clean diesel projects in 2012, will award another \$10 million in 2013, and will likely issue an additional request for proposals for another \$10 million in the fall of 2013. From the March 2012 application cycle, the review committee of Ohio DOT and Ohio EPA representatives reviewed applications from 73 diesel fleets requesting \$44.5 million. The committee recommended awarding 18 grants, for a total of \$10,376,763.30, based on the total cost effectiveness of the projects in reducing diesel emissions. Ohio EPA estimates that these projects will achieve an estimated annual emission reduction of more than 309 tons of air pollutants.

CVSR can send contact information to DERG@epa.state.oh.us in order to receive email notifications about the grant program. DERG's website contains the application and information to help applicants complete their applications. CVSR must partner with a public entity to apply to this program. An Ohio EPA employee who works on the DERG Program suggested that Julianne Kaercher at the Ohio Rail Development Commission (jkaercher@dot.state.oh.us, 614-728-9497) would be able to help CVSR secure a public sponsor. The contact for the DERG program is currently Carolyn Watkins (614-644-3768, carolyn.watkins@epa.ohio.gov).

Northeast Ohio Areawide Coordinating Agency (NOACA)

(<http://www.noaca.org>)

Each year, the Northeast Ohio Areawide Coordinating Agency (NOACA) receives approximately \$49 to \$55 million in Federal funds from the FHWA and the Ohio DOT to allocate to projects in its five counties.

Per Federal law, the NOACA Governing Board determines which transportation improvement projects will be funded for NOACA-controlled funds.

In the NOACA region, CMAQ funds may be used for traffic signal upgrade projects, bus replacements, bike facilities, intelligent transportation system improvements, transit center and Park-N-Ride construction, and for conducting NOACA's Air Quality Program.

According to NOACA's website,¹² NOACA encourages project sponsors to not get overly concerned about project funding categories, but to simply submit an application. NOACA is committed to funding good projects, and many projects can be funded with more than one type of funding. NOACA staff and committees will work to determine which funding category is most appropriate for a given project at a given time. Project sponsors seeking funding should download NOACA's application packet, which can be found here: <http://www.noaca.org/tipappl.pdf>. Once completed, applications should be emailed to projects@mpo.noaca.org.

Akron Metropolitan Area Transportation Study (AMATS)

(<http://www.amatsplanning.org/>)

AMATS is responsible for CMAQ funding in Summit and Portage Counties and the Chippewa Township area of Wayne County. AMATS receives over \$17 million dollars a year to invest in the region's transportation infrastructure. AMATS receives funding from three Federal programs; in 2012, those allocations were:

- Surface Transportation Program (STP): \$10,654,622
- CMAQ: \$5,467,716
- Transportation Enhancement Program (TEP): \$1,101,609

AMATS uses these funds to help communities pay for road maintenance, safety improvements, congestion relief, and bike and pedestrian infrastructure. For more information on how to apply to AMATS, the current contact is Krista Beniston (330-375-2436, KBeniston@AkronOhio.gov).

Transportation Investment Generating Economic Recovery (TIGER)

(<http://www.dot.gov/tiger>)

The Transportation Investment Generating Economic Recovery, or TIGER Discretionary Grant program, is a DOT-wide program investing in critical road, rail, transit, and port projects across the nation, managed by DOT's Office of the Secretary. While there was a call for projects in 2013 (applications were due June 3), due to the discretionary nature of this program, it is unclear if there will be future calls for proposals for this program.

Congress dedicated \$1.5 billion for 51 projects through TIGER I in 2009, \$600 million for 42 projects through TIGER II in 2010, \$527 million for 46 projects through TIGER III in 2011, and nearly \$500 million for 47 projects through TIGER IV in 2012. The program is highly competitive: 1,400 applications were submitted for TIGER I alone.

The program funds projects that have a significant impact on the nation, a region, or a metropolitan area. "These are innovative, 21st century projects that will change the U.S. transportation landscape by strengthening the economy and creating jobs, reducing gridlock and providing safe, affordable, and environmentally sustainable transportation choices," said Secretary LaHood. "Many of these projects could not have been funded without this program."¹³

¹² <http://www.noaca.org/fundsapp.html>

¹³ <http://www.dot.gov/tiger>

Railroad Rehabilitation & Improvement Financing Program (RRIF)

(<http://www.fra.dot.gov/Page/P0128>)

The Railroad Rehabilitation & Improvement Financing (RRIF) program is currently accepting applications. Under this program, the FRA Administrator is authorized to provide direct loans and loan guarantees up to \$35.0 billion to finance development of railroad infrastructure. Up to \$7.0 billion is reserved for projects benefiting freight railroads other than Class I carriers. The funding may be used to:

- Acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops;
- Refinance outstanding debt incurred for the purposes listed above; and
- Develop or establish new intermodal or railroad facilities.

Direct loans can fund up to 100 percent of a railroad project with repayment periods of up to 35 years and interest rates equal to the cost of borrowing to the government. Eligible borrowers include railroads, State and local governments, government-sponsored authorities and corporations, joint ventures that include at least one railroad, and limited option freight shippers who intend to construct a new rail connection.

U.S. Department of Energy – Clean Cities program

(<http://www1.eere.energy.gov/cleancities/>)

The U.S. Department of Energy's Clean Cities initiative advances the Nation's economic, environmental, and energy security by supporting local actions to reduce petroleum consumption in transportation. Clean Cities accomplishes this work through the activities of nearly 100 local coalitions. These coalitions provide resources and technical assistance in the deployment of alternative and renewable fuels, idle-reduction measures, fuel economy improvements, and new transportation technologies, as they emerge.¹⁴ For CVNP, funding from this program may be available through the Northeast Ohio Clean Cities Coalition and/or the Clean Cities National Parks Initiative.

Northeast Ohio Clean Cities Coalition

(<http://www.afdc.energy.gov/cleancities/coalition/northeast-ohio>)

The Northeast Ohio Clean Transportation (Cleveland) coalition works with vehicle fleets, fuel providers, community leaders, and other stakeholders to reduce petroleum use in transportation. The region's Clean Cities Coordinator works to develop a robust stakeholder community and program initiatives; to support, market and expand the area's clean fleets; and to collaborate with local agencies and organizations to promote a diversified energy portfolio.

Clean Cities National Parks Initiative

(http://www1.eere.energy.gov/cleancities/national_parks.html)

Clean Cities partners with NPS through the Clean Cities National Parks Initiative to support transportation projects that educate park visitors on the benefits of reducing dependence on petroleum, cutting greenhouse gases, and easing traffic congestion. This initiative complements the NPS Climate Friendly Parks program by demonstrating the environmental benefits of reducing petroleum use.

With help from Clean Cities, Mammoth Cave National Park is deploying propane buses and electric vehicles, and rangers in Grand Teton National Park are cutting fuel use with hybrid electric vehicles. Yellowstone National Park is deploying a variety of electric-drive vehicles, including a hybrid bus that uses biodiesel.¹⁵

The program is currently accepting proposals for transportation-related projects that use renewable and alternative fuels, electric-drive and advanced vehicles, and other technologies and practices that reduce

¹⁴ http://www.afdc.energy.gov/uploads/publication/clean_cities_overview.pdf

¹⁵ http://www.afdc.energy.gov/uploads/publication/clean_cities_overview.pdf

petroleum use and benefit air quality. Eligible applicants include NPS units and Clean Cities coalitions only. Information on the application process and the types of eligible and ineligible projects can be found here: http://www.eere.energy.gov/cleancities/national_parks_application.html.

Environmental Protection Agency (EPA)– Diesel Emissions Reduction Act (DERA)

National Clean Diesel Campaign and the National Funding Assistance Program

(<http://www.epa.gov/diesel/prgnational.htm>)

Since 2008, the Environmental Protection Agency (EPA) has funded nearly 60,000 pieces of clean diesel technology through the National Clean Diesel Campaign, which is funded by the Diesel Emissions Reduction Act (DERA). Seventy percent of DERA funds are to be used for national competitive grants (through the National Funding Assistance Program), with the remaining 30 percent allocated to the States.¹⁶ DERA 2012-2016 authorizes up to \$100 million annually for FY2012 through FY2016; \$29.9 million was appropriated by Congress for FY2012. Currently, professionals in the field believe that it is unlikely that Congress will appropriate any funds for DERA in future years.

EPA's National Clean Diesel Funding Assistance Program awards competitive grants to fund projects that reduce emissions from existing diesel engines through a variety of strategies. These strategies include, but are not limited to, emission control and idle reduction technologies, cleaner fuels, engine upgrades or replacements, and/or vehicle or equipment replacements. Under this grant program, funding is restricted to the use of technologies, fuels, and engines that have been verified or certified by EPA or California Air Resources Board (CARB).

Relevant to CVNP and CVSR, the following types of fleets may qualify for funding: buses, medium or heavy-duty trucks, and locomotives. EPA awarded \$20 million for FY 2012 to clean up diesel engines nationwide. The program's website contains a list of FY 2012 funded projects, which include retrofitting and repowering locomotives. This website also lists a regional representative to contact with questions or for more information about the program. In 2012, requests for proposals were due in June.

CVNP or CVSR would need to partner with an eligible agency to be eligible for funding under this program. Eligible entities include:

- Regional, State, local or Tribal agencies/consortia, or port authorities with jurisdiction over transportation or air quality;
- Nonprofit organizations or institutions if they represent or provide pollution reduction or educational services to people or organizations that own or operate diesel fleets, or have, as their principal purpose, the promotion of transportation or air quality; and

School districts, municipalities, MPOs, cities, and counties are also eligible to the extent that they fall within the definition above.

Midwest Clean Diesel Initiative (MCDI)

(<http://www.epa.gov/midwestcleandiesel/index.html>)

The Midwest Clean Diesel Initiative (MCDI) is a collaboration of federal, state and local agencies, along with communities, non-profit organizations, and private companies working together to reduce emissions from diesel engines in the Midwest. MCDI will accomplish this through operational changes, technological improvements, and the use of cleaner fuels. The Initiative also supports EPA Region 5 state clean diesel coalitions in order to foster clean diesel activities that reduce fuel use and emissions.

¹⁶ Ohio has directed their funding – which has been between \$250,000 and \$350,000 per year over the past five years – through this program to their Clean Diesel School Bus Fund.

MCDI issues a request for proposals annually that lists specific eligibility and proposal requirements. Generally, eligible applicants include states, federally recognized Indian tribes and Tribal consortia, international organizations, public and private universities and colleges, hospitals, laboratories, and other public or private nonprofit institutions. The contact for this program is currently Sharleen Phillips (312-353-3486, phillips.sharleen@epa.gov).

Ohio Rail Development Commission (ORDC)

The Ohio Rail Development Commission (ORDC) provides direct loans and grants and may issue bonds for qualified rail projects. While the maximum grant or loan amount approved under ORDC programs is flexible, grants are reserved for cases where there is an extraordinary need or where there is no direct revenue stream that can be used to retire debt. In some instances, "need" may be defined as incentives necessary to ensure that a project is located in Ohio rather than another state.

Interest rates for the loan program are flexible. Applicants may contact ORDC for current interest rates. Factors that will be considered when determining a final interest rate include loan term, loan amount, strength of cash flow coverage, economic distress factors, and strength of security. The maximum term for a loan is decided on a project-by-project basis; but as a rule, loan terms are limited to five years.

Public and private entities may apply for funding of Ohio rail projects. Qualified applicants include railroads and industries requiring rail service, political subdivisions, government agencies, boards, commissions, regional transit boards, and port authorities. According to its funding guidelines and application.¹⁷ ORDC administers its programs using prudent financial guidelines related to the desirability, timing, and relative risk of the project. Only projects of public benefit are undertaken.

The ORDC meets bi-monthly to approve projects. As a result, the approval process takes approximately four to ten weeks. After approval is received, legal and other documentation normally requires an additional two to three months.

Other

- [Grants.gov](#) – A single access point for over 900 grant programs offered by the 26 Federal grant-making agencies. The "Find Grant Opportunities" feature allows organizations to electronically find and apply for competitive grant opportunities from all Federal grant-making agencies.
- [Catalog of All Federal Domestic Assistance](#) – This online Catalog of Federal Domestic Assistance provides access to a database of over 1,900 Federal assistance programs available to State and local governments (including the District of Columbia); federally-recognized Indian Tribal governments; Territories (and possessions) of the United States; domestic public, quasi-public, and private profit and nonprofit organizations and institutions; specialized groups; and individuals.
- [Alternative Fuels and Advanced Vehicles Data Center](#) database – Compiles state and Federal incentives and laws related to alternative fuels and vehicles, air quality, fuel efficiency, and other transportation-related topics.
- [The Cleveland Foundation](#) and the [Akron Community Foundation](#) – CVSR has established a good relationship with these local foundations; in fact, these foundations currently host three endowment funds for CVSR.¹⁸ CVSR and CVNP should continue to build their relationships with these foundations in order to pursue grant opportunities as the opportunity and need may arise.

¹⁷ <http://www.dot.state.oh.us/Divisions/Rail/Programs/Documents/ORDC%20-%20Funding%20Guidelines%20and%20Application%2010-5-2010.doc>

¹⁸ <http://donate.cvsr.com/page.aspx?pid=356>

Conclusion

Several funding possibilities exist for CVNP and CVSR to pursue. Below is a list of these possibilities prioritized by the project team's views on likelihood of success based on its research conducted. Because the air quality improvements are significant and quantifiable, new or repowered locomotives or maintenance vehicles would fit many of the funding possibilities; depending on the program, grant requests for other equipment and infrastructure may not fare as well.

1. Category III
2. DERG Program – specifically for new or repowered locomotives or maintenance vehicles.
3. Clean Cities
4. Access Program – particularly for improving the connection between Cleveland and Rockside, or between Canton and Akron.
5. TIGER
6. ORDC
7. CMAQ Program funding through the NOACA or the AMATS
8. DERA
9. RRIF funding

The amount of funding through all of the listed programs will likely be less than the amount of funding CVNP has received under the TRIP program; most grants would be in the tens or hundreds of thousands – not millions – of dollars.

Conclusions/recommendations

To provide CVSR and CVNP with a method for comparing the relative importance of each improvement, the study team ranked each improvement within each of the four focus areas of this study: operations/service, equipment, facilities, and communications. For each improvement, this section also presents connections to plan objectives and, as described in the previous chapter, ballpark cost estimates and a recommended timeframe and priority for implementation.

Rankings are based on the knowledge and expert opinions of the study team based on current and projected conditions. To stay relevant, these rankings should be revisited and revised by CVSR and CVNP every three years.

Operations/service

Many of the operations improvements in Table 5 can and should be implemented as a package for maximum effect. Accordingly, the rankings in this section group passenger information (rank 1), data (rank 2), and delay-related improvements (rank 4) into three packages. It is possible to implement each improvement individually if that is more practical for CVSR; however, the synergistic impact of implementing them as a package may not be realized. Recommendation 9, monitoring the feasibility of the Cleveland extension, is technically not an “improvement,” so is not ranked as such.

Table 5
Operations and service recommendations

| Rank | Improvement | Ties to Objective | Ballpark Cost Estimate | Timeframe (Priority) |
|------|---|----------------------|--|--|
| 1 | Improve CVSR passenger Information on website and perform regular website updates (1.1) | CS-3-1; CS-3-2 | Low-Medium – biannual maintenance; 80-100 hours | Short term; ideally before new 2013 schedule (High priority) |
| 1 | Simplify and standardize marketing and sales of CVSR service offerings (1.2) | CS-3-1; CS-3-2 | Low – 40 hours | Short term; ideally before new 2013 schedule (High priority) |
| 1 | Improve and maintain static signage at stations (1.3) | CS-3-1 | Low – 80 hours annually | Short term; ideally before new 2013 schedule (Medium priority) |
| 1 | Improve online information about transit access to CVSR (1.4) | VMA-1-3; VMA-2-1 | Low – minimal staff time for coordination | Short term (Low priority) |
| 2 | Facilitate analysis of ticket sales data (2.1) | O-1-2 | Low-Medium – 60-80 hours initially; 10 hours/month to maintain | Short term (High priority) |
| 2 | Maintain a database with basic operational data (2.2) | O-1-2 | Low-Medium – 60-80 hours initially; 16 hours/month to maintain | Short term (High priority) |
| 2 | Conduct a passenger survey to better understand customer travel patterns (2.3) | O-1-2 | \$15-40K plus staff time | Long term (Medium priority) |
| 3 | Create comprehensive transportation plan for CVNP | VMA-1-3; VMA-2-1; | \$250K | Short term (High priority) |

| Rank | Improvement | Ties to Objective | Ballpark Cost Estimate | Timeframe (Priority) |
|-----------------|---|---------------------------------|---|---|
| | (10) | VMA-2-2; VMA-2-3 | | |
| 4 | Understand the extent of delay and the causes of delay (4.1) | O-1-2 VMA-1 | \$5-15K for consultant or equivalent staff time | Short term (High priority) |
| 4 | Make schedule adjustments and operational improvements to reduce delay (4.2) | O-1-2 | TBD (see below options) | Short term (High priority) |
| 4 | Consider new ticketing practices (4.2.1) | O-1-2 CS-3-2 | Up to 200 hours of staff time for analysis. Implementation varies depending on extent of change | Short term (Medium priority) |
| 4 | Design and implement boarding plans (4.2.2) | O-1-2 CS-3-4 | Low – 120 hours | Short term (High priority) |
| 4 | Set schedule adherence targets (4.3) | O-1-2 | Low – 60 hours annually | Short term (Medium priority) |
| 5 | Review 2013 Canton service changes (3.1) | O-1-2 VMA-1 | Low – 80 hours | Short term (High priority) |
| 6 | Institute new procedures to check and maintain audio tour equipment / upgrade equipment (7) | CS-3-3 | Low (maintain); \$3-50K to develop an app; \$100K to replace current system | Short term (High – maintain; Low – replace) |
| 7 ¹⁹ | Pilot regular shuttle service between CVSR and CVNP attractions (8) | VMA-2-3 | \$50-100K, depending on scope of pilot | Short term (Medium priority) |
| 8 ²⁰ | Pilot express Scenic service during peak times (6) | O-1-2 | Low, but might need new siding at Jaite (see 20) | Short term (Medium priority) |
| 9 ²¹ | Review stations served (3) | O-1-2 | Low – 80 hours | Long term or as needed (High priority) |
| N/A | Continue monitoring feasibility of Cleveland extension (9) | VMA-1-3; VMA-2-2; IFI-1-7 | Low (monitoring); \$13.5M (implementation) | Short term to monitor (Low priority) |

¹⁹ Or, depends on Transportation Plan results

²⁰ Or, depends on Transportation Plan results

²¹ Or, depends on Transportation Plan results

Growth management

The growth management-related improvements in Table 6 are not ranked. They should be considered a “menu” of approaches that could be pursued once ridership has reached levels where intervention is needed. These improvements should be reviewed when crowding is of concern.

Table 6
Growth management recommendations

| Improvement | Ties to Objective | Ballpark Cost Estimate | Timeframe (Priority) |
|---|-------------------|--|------------------------------|
| Expand days of service (5.1.1) | VMA-1 | Varies, depending on extent of change | Short term (Low priority) |
| Expand the peak season (5.1.2) | VMA-1 | Varies, depending on extent of change | Short term (Low priority) |
| Schedule special events strategically (5.1.3) | VMA-1 | Minimal | Short term (Medium priority) |
| Improve boarding and alight procedures (5.1.4 and see 4.2.2) | O-1-2 CS-3-4 | Low – 120 hours | Short term (High priority) |
| Add a second Bike Aboard car to the consist (5.1.5) | VMA-1-1 | \$100-150K to rehab a baggage car into a Bike Aboard car | Short term (High priority) |
| Use ticket pricing to balance passenger loads (5.2.1) | VMA-1 | Modest staff time | Short term (Low priority) |
| Require advanced ticket purchases (5.2.2) | VMA-1 CS-3-2 | Slight decrease in staff time | Short term (Low priority) |
| Increase parking capacity (5.3.1) | VMA-1 | Varies, depending on extent of change | (Low priority) |
| Improve parking management to efficiently use existing parking capacity (5.3.2) | VMA-1 | Varies, depending on extent of change | (Low priority) |

Communications

The priorities for the three communications recommendations are listed in Table 7.

Table 7
Communications recommendations

| Rank | Improvement | Ties to Objective | Ballpark Cost Estimate | Timeframe (Priority) |
|------|--|-------------------|------------------------|------------------------------|
| 1 | Improve CVSR radio communications | IFI-1; E-1; O-1 | \$25K for the repeater | Short term (High priority) |
| 2 | Develop and deploy a Passenger Information Display System (PIDS) | CS-1; E-2-8 | \$240K | Short term (High priority) |
| 3 | Develop a long-range communications plan | O-2; IFI-1 | \$150K | Short term (Medium priority) |

Equipment

Recommendations for improvements to CVSR’s equipment are listed in Table 8. These recommendations are prioritized based on the degree to which the improvements maintain or enhance the safe and reliable operation of the railroad. As such, the highest priority improvement relates to the establishment of a progressive maintenance plan, which should be re-evaluated yearly as changes are made to the railroad’s

equipment and maintenance facilities. Improvements that address rider comfort, while still important to the railroad, are listed as a lower priority than improvements that address safety.

Table 8
Equipment recommendations

| Rank | Improvement | Ties to Objective | Ballpark Cost Estimate | Timeframe (Priority) |
|------|---|----------------------------|--|------------------------------|
| 1 | Implement a progressive maintenance plan | E-1-2 | \$25K-50K per coach for 5 years of maintenance | Short term (High priority) |
| 2 | Procure "green" locomotives | E-2-1; E-2-3; E-2-5; E-2-8 | \$0.9M-1.6M | Short term (High priority) |
| 3 | Convert equipment to allow for cab control | E-2-4; E-2-8; E-2-2 | \$250-275K to convert a locomotive to a cab car | Short term (High priority) |
| 4 | Upgrade coaches for increased passenger comfort | CS-2 | \$10K-40K per coach | Short term (High priority) |
| 5 | Standardize equipment | E-1-1; E-2-1; E-2-8 | \$125K-500K per train | Short term (Medium priority) |
| 6 | Obtain permanent ownership of entire fleet | E-2-6; E-2-8 | \$20K-250K per coach | Short term (Medium priority) |
| 7 | Supplement existing ADA cars | E-2-7; E-2-8 | \$145K to rehab existing car, \$473K to create new | Short term (Medium priority) |
| 8 | Overhaul concession cars | E-1 | \$20K per car | Short term (Low priority) |

Facilities

Recommended infrastructure improvements for CVSR and CVNP are based on two-train scenic service, which will begin in 2013 and will likely continue for at least the next 20 years. Rankings for each recommendation (see Table 9) are based on train operation improvements and reducing delays due to infrastructure impediments. The cost of each improvement was not factored into the ranking process.

Table 9
Facilities recommendations

| Rank | Improvement | Ties to Objective | Ballpark Cost Estimate | Timeframe (Priority) |
|------|--------------------------------|-------------------------|---|------------------------------------|
| 1 | Add RIP track | IFI-1-4 | \$250K | Short term (High priority) |
| 2 | Add sidings | IFI-1-3 | \$950K | Medium term (Medium-high priority) |
| 3 | Improve accessibility | IFI-1-1; CS-3; E-2; O-1 | \$37K per station | Medium term (Medium priority) |
| 4 | Expand maintenance facility | IFI-1-5 | \$1,143K | Medium term (Medium priority) |
| 5 | Enhance fuel storage | IFI-1-2 | \$125K | Medium term (Low priority) |
| 6 | Construct car storage facility | IFI-1-6 | \$12K to lease up to \$425K to purchase/rehab | Medium term (Medium-low priority) |

Appendix A: Existing conditions

Background

Cuyahoga Valley Scenic Railroad (CVSR) has been operating in partnership with Cuyahoga Valley National Park (CVNP) under a cooperative agreement since 1989. CVSR is a private sector, volunteer-supported, not-for-profit 501(c)(3) organization that has successfully developed and expanded services and ridership for the past 20 years along with the National Park Service (NPS), which has also developed and expanded railroad infrastructure and facilities to meet the growing needs of CVSR.

CVSR alignment is generally north to south along the banks of the Cuyahoga River²² and primarily follows the old Valley Railway alignment that was the first railroad built in this area. Ownership of the railroad has changed from when it was built by the Valley Railway in 1882²³ to Baltimore and Ohio (B&O) in 1915, to the Chessie system in 1972, which was consolidated with Seaboard Coast Line to form CSX in 1980.

In 1972, the Cuyahoga Valley Preservation and Scenic Railroad Association, now CVSR, which celebrated its 40th anniversary in 2012, entered into an agreement with the Chessie System to operate passenger service between the Cleveland Zoo and Hale Farm and Village. In 1987, NPS bought 26 miles of CSX track, from Akron station to approximately 1.5 miles north of Rockside station.

Congress established the Cuyahoga National Recreation Area in 1974, which became CVNP in 2000. In 1993, NPS developed the Ohio & Erie Canal Towpath, which follows the historic route of the Ohio & Erie Canal, which is a popular multi-use trail through CVNP for both bicyclists and pedestrians. From the towpath, visitors can connect to several of the natural and historic sites in the park and to other trails that intersect it along the way.

CVSR is currently responsible for operation of the railroad through the park. In 2000, operations were extended from Hale Farm & Village to Akron, Ohio. In 2011, CVSR developed *Destination 2016: Cuyahoga Valley Scenic Railroad Five-Year Strategic Plan*. In addition to providing a road map for implementing strategies over the next five years, the Strategic Plan articulates CVSR's mission and vision:

- **Mission Statement:** To provide educational, recreational, and heritage railroad experiences and provide alternative transportation to and within Cuyahoga Valley National Park and the Ohio & Erie Canalway.
- **Vision Statement:** Cuyahoga Valley Scenic Railroad will be America's premier excursion railroad in terms of safety, overall passenger experience, quality of facilities and equipment, and commitment by staff and volunteers to total customer satisfaction. We will make significant contributions to economic development in Northeast Ohio and to the overall quality of life of the region's residents.

The following section documents the existing site and transportation conditions at CVNP as they relate to the facilities and operation of CVSR. This section is based on a review of CVNP and CVSR planning and rail system reports, studies, and other documentation, as well as information collected during a site visit in the fall of 2011 and subsequent conversations with CVSR and CVNP staff. Documenting existing conditions provides an overview of the current state of the rail system, establishes a foundation upon which to base performance measures, and provides a baseline to help CVNP and CVSR identify gaps between the current state and future desired state.

The following transportation characteristics relevant to the facilities and operation of CVSR are described in this Appendix:

- Operating service and ridership;
- Inventory and condition of rolling stock;

²² See Figure 7

²³ <http://scripophily.net/valrailcom18.html>

- Inventory and condition of fixed infrastructure; and
- Revenue and cost streams.

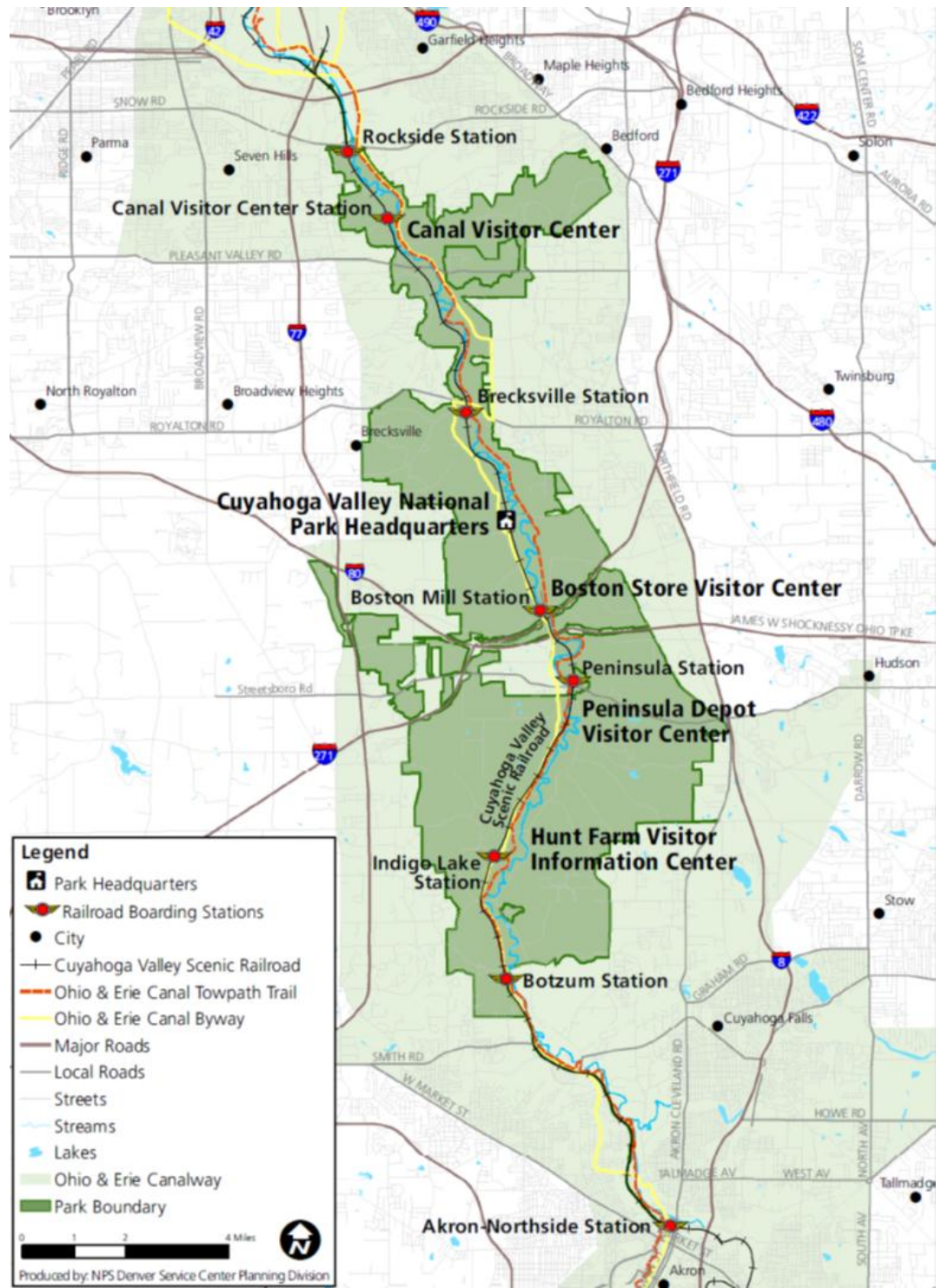
Operating service and ridership

Service overview

CVSR's service has evolved and grown since it began operating in partnership with CVNP under a cooperative agreement in 1989. In 2008, CVSR adopted its current single-train operational model for service between its northern terminus at Rockside Station and its southern terminus for year-round service at Akron Northside Station, which eliminated a transfer to a second train at Peninsula Depot. Currently, CVSR operates regular service on weekends between Rockside and Akron Northside stations (Figure 7) during most of the year with additional service Wednesday to Friday during the peak season (June to October). During the months of June, July, and August, a second train runs between Akron Northside Station and Canton Lincoln Highway Station. Several special event trains operate throughout the year.

Figure 7
Location map of the Cuyahoga Railway and its relation to the Cuyahoga River and major roads south of Cleveland²⁴

Source: CVSR



²⁴ Note that service continues another 25 miles south from Akron to Canton.

Rockside, Peninsula, and Akron Northside are CVSR’s three primary stations; Canton Lincoln Highway Station is the southern terminus when Canton service is operating. Other stations may see heavy activity as the boarding station or site of activities for a particular special event. With the exception of Bike Aboard passengers, who typically make one leg of their trip by bicycle, customers usually depart from and return to the same station.

A roundtrip journey on CVSR between Rockside and Akron Northside usually takes approximately three hours. The trip between Akron Northside and Canton usually adds approximately another hour and a half in each direction. Actual running times vary based on the presence or absence of “slow orders,” which reduce the maximum permissible operating speed for safety reasons. At CVNP, water and mud impacts account for many of these orders.

Service offerings

This section provides an introduction to both CVSR’s regularly scheduled and special event service offerings.

National Park Scenic

The National Park Scenic is the heart of CVSR’s operation. Passengers may board at either Rockside Station or Akron Northside Station for a three-hour round trip through the National Park. Volunteer “Rail Rovers” provide interpretation and answer questions, and GPS-enabled audio tours, “Voices of the Valley” are provided through headsets, available on board at no additional cost. The audio tours provide different information on northbound and southbound trips.

As shown in Table 10, three round-trip departures from Rockside Station were offered daily on Wednesdays through Sundays from June to October 2012. Also, two departures from Rockside per day were offered on weekends November through May 2012 (

Table 11). When Canton-Akron service is operating in June, July, and August passengers have the option to transfer at Akron Northside and continue on to Canton Lincoln Highway Station.

Table 10
CVSR Schedule (June – October 2012 departures; Wednesdays – Sundays; SB [southbound], NB [northbound])

Source: CVSR

| Station | SB | NB | SB | NB | SB | NB |
|----------------------|----------|----------|----------|---------|---------|---------|
| Rockside | 9:00 AM | 12:00 PM | 12:45 PM | 3:40 PM | 4:05 PM | 7:00 PM |
| Canal Visitor Center | 9:05 AM | 11:55 AM | 12:50 PM | 3:35 PM | 4:10 PM | 6:55 PM |
| Brecksville | 9:20 AM | 11:40 AM | 1:05 PM | 3:20 PM | 4:25 PM | 6:40 PM |
| Boston Mill | 9:30 AM | 11:30 AM | 1:10 PM | 3:10 PM | 4:35 PM | 6:30 PM |
| Peninsula Depot | 9:40 AM | 11:20 AM | 1:20 PM | 3:00 PM | 4:45 PM | 6:20 PM |
| Indigo Lake | 9:50 AM | 11:05 AM | 1:35 PM | 2:50 PM | 5:00 PM | 6:10 PM |
| Botzum | 10:00 AM | 11:00 AM | 1:45 PM | 2:45 PM | 5:10 PM | 6:05 PM |
| Akron Northside | 10:20 AM | 10:40 AM | 2:05 PM | 2:25 PM | 5:25 PM | 5:45 PM |

Table 11
CVSR Schedule (November 2011 – May 2012 departures; weekends only)

Source: CVSR

| Station | Southbound | Northbound | Southbound |
|-----------------|------------|------------|------------|
| Rockside | 10:00 AM | 1:10 PM | 1:30 PM |
| Akron Northside | 11:20 AM | 11:35 AM | 3:00 PM |

CVSR offers multiple excursions and services using the National Park Scenic train as a base, such as Bike Aboard, “Explorer” excursions, and special events. Groups may also charter one or more cars on the Scenic.

Bike Aboard

Bike Aboard service was introduced in 2007. Passengers can ride one-way on the Scenic with their bicycle, for a \$2 fare, a significant discount over the regular \$15 fare on the Scenic (See Table 13 for more information on ticket prices). Bicycles are loaded in a baggage car, which accommodates 156 bicycles. Bike Aboard passengers ride in a dedicated coach car next to the baggage car containing their bicycles, with no audio tour, but some snacks and drinks for sale. No advance reservations are required and trains can be flagged down at all stations between Rockside and Akron. The fare is collected on board in the designated Bike Aboard coach car. Bike Aboard service operates on weekends during April and May and Wednesday to Sunday from June through October.

Canton-Akron Service

During June and July, CVSR operates a second train to provide two round trips between Canton Lincoln Highway Station and Akron Northside on Wednesdays through Sundays, with the option to transfer at Akron Northside and continue on to Rockside Station. CVSR operates this service in August on Fridays and Saturdays as well. There is a morning and an afternoon departure (Table 12), scheduled to meet the National Park Scenic at Akron Northside. The transfer is complicated by the lack of a siding at Akron. The Canton train pulls in, passengers disembark, and the train pulls out; the Scenic pulls in, passengers disembark and others board, and the train pulls out; and finally the Canton train pulls in again to pick up passengers transferring from the Scenic.

Table 12
Canton Explorer schedule, 2012 (June – July: Wednesdays to Sundays; August: Fridays and Saturdays)

Source: CVSR

| Station | Departure Time | Return Time |
|--------------------------------|----------------|-------------|
| Akron Northside Station | 10:45 AM | 5:00 PM |
| Canton Lincoln Highway Station | 12:00 PM | 3:45 PM |

Explorer Excursions

Explorer itineraries build a layover into round-trip transportation on CVSR’s National Park Scenic train so that passengers can alight and visit area attractions. Destinations include Peninsula, Canal Visitor Center, Akron, and Canton. In the past, Explorer service required purchase of a separate ticket. Currently, these are suggested itineraries and any passenger on the Scenic may alight at any station.

Explorer itineraries include the following:

- Peninsula Explorer: Passengers selecting the Peninsula Explorer alight at Peninsula Depot for sightseeing, dining, etc. in this village within Cuyahoga Valley National Park.
- Canal Explorer: Passengers disembark for an approximate one-hour layover at the Canal Visitor Center, where they may learn about life on the canal.
- Akron Explorer: Passengers selecting the Akron Explorer package are met at Akron Northside Station by a Metro circulator bus serving many of Akron’s major attractions.
- Canton Explorer: Passengers selecting the Canton Explorer package are met at Canton Lincoln Highway Station by a Stark Area Regional Transit Authority (SARTA) bus serving many of Canton’s major attractions. The bus does not operate on Sundays, however.

Special events

CVSR offers two types of special events: those that are held on designated cars on CVSR's regularly scheduled National Park Scenic and special event trains, which represent additional service. Special event offerings change from season to season and year to year. They are often holiday-related or seasonal in nature, such as a festive Christmas trip to select and cut down a Christmas tree. Special event programming is typically created by the CVSR marketing group working with NPS interpretive staff.

For illustrative purposes, a selection of winter-spring 2012 special event trains is described below.

Polar Express™

Polar Express™ is by far the most popular special event at CVSR and, although trips are limited to November and December, accounts for approximately 20-25 percent of all riders annually. Polar Express™ trips include costumed volunteers, storytelling, and refreshments and depart from either Rockside or Akron Northside Stations to the "North Pole" at Peninsula Depot. An intensive volunteer effort is required to host the Polar Express™, which, along with Day Out with Thomas™, is a major method of revenue generation for CVSR.

Day Out with Thomas™

Day Out with Thomas™ includes children's activities and rides on a "Thomas the Tank Engine"-themed train. After Polar Express™, it is the most popular special event offered by CVSR, representing 10-20 percent of total annual ridership. In 2012, Day Out with Thomas™ was offered on five days: May 19, 20, 25, 26, and 27, departing from Boston Mill Station.

Grape Escape

Grape Escape wine tasting trips depart from Rockside, Akron Northside, or Boston Mill Stations and are round-trip, offered monthly in 2012.

Ales on Rails

Eight round-trip Ales on the Rails beer tasting trips were offered in 2012, departing from Rockside, Akron Northside, or Boston Mill Stations.

Other Events

As noted above, many events are held in reserved cars on board the National Park Scenic. Two are described below:

- Feed the Penguins Adventure. This event combines a train ride on the National Park Scenic with a visit to the Akron Zoo. An Akron Metro bus takes passengers from the Akron Northside station to the Zoo. This service was available on four weekend days in February 2012.
- Maple Sugar Festival Express. This event combines a train ride on the National Park Scenic with a visit to Hale Farm to learn about maple sugaring and to be served a pancake breakfast. This service was offered on two weekends in March 2012.

Charters

While it is possible to charter an entire train, groups often will reserve a single coach or coaches on the National Park Scenic train. Charter groups often include senior centers, corporate outings, bus tour groups, and nursing homes. Costs to charter a train ranged from \$1,500 to \$3,552 in 2012; costs to charter a car began at \$1,080. In 2012, CVSR had \$52,205 in charter sales, 35 percent of which were for eight full-train charters. In 2012, there were 44 charter groups in total and August and October were the most popular months for charter groups, with nine and 13 groups, respectively.

Education

CVSR offers several educational programs designed for schools, daycares, and camps. During November through May, trips may be booked on Wednesdays, Thursdays, or Fridays, and depart from Rockside, Akron Northside, Brecksville, or Botzum Stations. Education trips that are scheduled in these months will be on a dedicated train since the Scenic does not run during the week. Summer programs offered during June through August typically run in designated cars on board the Scenic trains.

Ticketing

Tickets can be purchased online, on board, or at Rockside, Peninsula, and Akron Northside Stations; a \$2 processing fee applies to all sales, with the exception of charters, education trips, and Bike Aboard. Tickets may also be purchased at Canton Lincoln Highway Station when Canton service is running. Ticket prices vary widely depending on the ticket package, from \$2 for Bike Aboard passengers to \$90 for premium seating for wine tastings. “Premium” or “Upgraded” seating refers to tickets for one of CVSR’s premium cars, such as the Emerson Dome Car or St. Lucie Sound. A selection of ticket prices is shown in Table 13.

Table 13
CVSR 2011-2012 ticket prices

Source: CVSR

| Service | Ticket price ²⁵ | Comment |
|---------------------------------------|-----------------------------|--|
| National Park Scenic – Coach | \$15 | Discounted to \$10 in the winter and early spring; Children (3-12 years) receive a \$5 discount |
| National Park Scenic – Premium | \$20-\$25, depending on car | Children (3-12 years) receive a \$5 discount |
| Bike Aboard | \$2 | One-way only, with bicycle; not subject to \$2 processing fee |
| Education | \$6/student | 1 chaperone may ride for free for every 10 students; additional chaperone tickets are \$8; not subject to \$2 processing fee |
| Ales on the Rails | \$45-\$80, depending on car | |
| "Grape-Escape" Wine-Tasting Excursion | \$55-\$90, depending on car | |
| Maple Sugar Festival Express | \$25 | Children (3-12 years) receive a \$5 discount; includes a pancake breakfast and activities at the destination |
| Polar Express™ – Standard Seating | \$40 | Children under 1 year old ride free |
| Polar Express™ – Upgraded Ticket | \$55 – 72 | Children under 1 year old ride free |

Passengers

Understanding passenger demographics allows a more thorough assessment of the suitability of the existing equipment, infrastructure, and schedule to passengers’ needs. The project team reviewed three data sources: a 2011 onboard customer satisfaction survey, zip code data from credit card billing addresses for ticket sales in 2011, and the 2005 Cuyahoga Valley National Park Visitor Study.²⁶

²⁵ In 2011, as in previous years, a fuel surcharge was added to the cost of each ticket. For 2011 the surcharge was \$1 for Bike Aboard, \$2 for the Scenic, and \$3 for events.

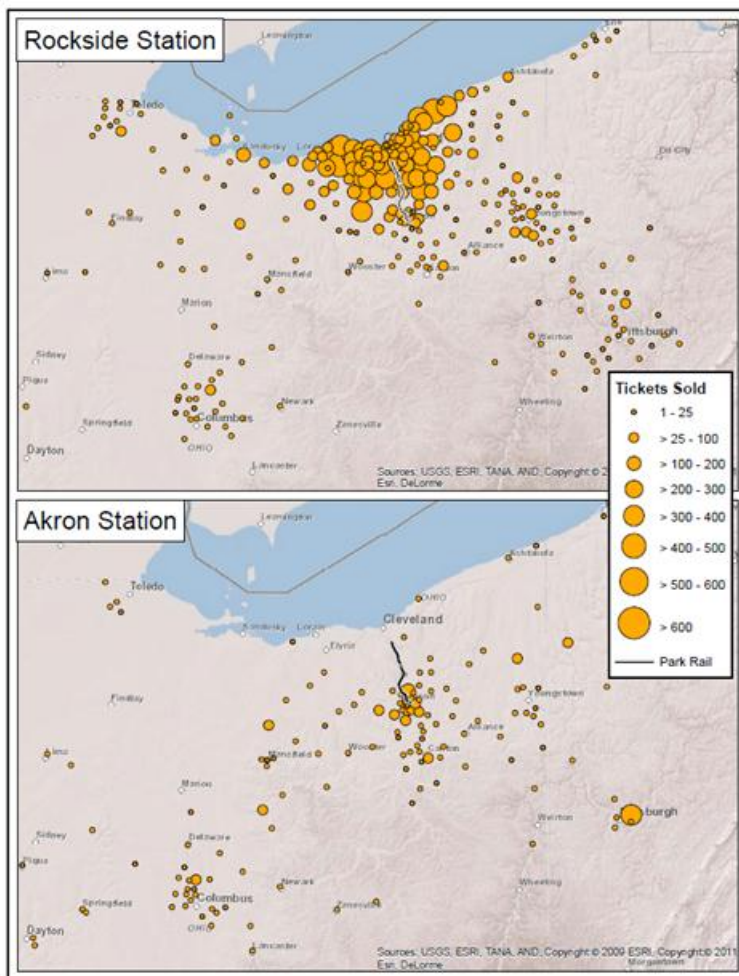
²⁶ University of Idaho Park Studies Unit. Cuyahoga Valley National Park Visitor Study, Summer 2005.

CVSR has limited data on passenger demographics from a 2011 onboard customer satisfaction survey (see below for more results), which found that most passengers were 45 or older (70 percent), female (65 percent), and first-time riders (85 percent). The onboard survey was conducted on a weekday and a weekend day in October. Most passengers stated that their primary reason for riding CVSR was either to “take an old fashioned train ride” (43 percent), to “relax with family and friends” (28 percent), or to “see Cuyahoga Valley National Park” (26 percent). Few selected Bike Aboard or alternative transportation as motivation. The survey was not administered to special event passengers, so no passengers selected special events. The survey was conducted at the tail end of the Bike Aboard operating season, which may have influenced both passengers’ motivations for riding as well as the passenger demographic.

A proxy for where passengers are from is the credit card billing address used for online ticket purchases. A review of a sample set of online ticket data (over 20,000 tickets) purchased for the Akron 10:40 AM Scenic departure from June to October 2011 and Polar Express™ (Rockside Departures in 2011) found that 94 percent of the billing addresses were in Ohio, from locations as shown in Figure 8.

Figure 8
Billing addresses for CVSR Ticket Purchases, 2011

Source: CVSR/WhistleTix



In addition, the team reviewed results of the 2005 Cuyahoga Valley National Park Visitor Study. Fifty-two percent of visitor groups interviewed in that study had ridden CVSR, so CVNP visitors may be considered as a reasonable proxy for CVSR passengers. However, riding CVSR is a different type of experience from visiting CVNP and likely appeals to a slightly different group of people. There may be an unknown

number of CVSR passengers who differ in significant ways from those passengers who are also park visitors.

As noted previously, park visitors were overwhelmingly from Ohio and a majority was in the 30-60 year age group. Most were in family groups or with friends and in groups of between two and four people. Fifteen percent of those surveyed were first-time visitors and 61 percent visited between 1 and 51 times annually.

While only 4 percent of park visitors surveyed reported disabilities, it seems likely that the percentage of CVSR passengers with disabilities may differ, as many of the park visitors also reported their primary reason for visiting was taking part in active recreation such as bicycling or hiking and walking.

Customer satisfaction

Customer comments and complaints are generally received via email sent to cvsr@cvsr.com. CVSR investigates each customer comment or complaint by contacting CVSR personnel or volunteers who may have witnessed an incident. On the basis of the information received, CVSR determines whether the comment or complaint was substantiated and whether the customer is due compensation in the form of a full or partial refund or other satisfactory remedy. Once the complaint is resolved, the matter is considered to be closed. Comments and complaints are not retained and were not available for analysis, but CVSR staff note that fewer than 12 are received each month.

An onboard customer satisfaction survey conducted on Friday, October 7 and Saturday October 8, 2011, found that customers were overall very satisfied with CVSR service, with ratings of “excellent” for customer experience elements by most respondents. Many respondents who provided additional comments praised CVSR on-board personnel (likely volunteers) for their friendliness and helpfulness.

Results of the 2005 Cuyahoga Valley National Park Visitor Study were also reviewed for information on customer satisfaction. As noted above, CVNP visitors may be considered as a reasonable proxy for CVSR passengers, but there may be an unknown number of CVSR passengers who differ in significant ways from those passengers who are also park visitors. In addition, CVSR service has changed since the 2005 season, so respondents were considering a slightly different service than is now offered. In 2005, CVSR was one of the two top-rated attractions at CVNP, second only to Brandywine Falls, with 96 percent of interviewed groups who had ridden CVSR rating it as “good” or “very good.” Additionally, of park visitors surveyed who rode CVSR, 98 percent responded that the train ride met their expectations.

Data limitations

Understanding passenger demand and travel behavior is a key step in assessing the ability of a transportation service to meet the needs of its passengers and to make recommendations for future operations. To better understand the preferences and travel behavior of existing passengers and place CVSR operations in context, the project team reviewed data from two sources: conductors’ reports and ticket sales data. When reviewing the sections below, readers should note that only limited conclusions can be drawn given the following constraints for the data available:

- Conductors’ reports were available as monthly totals and only for the following categories: general and charters, Polar Express™, Day Out with Thomas™, Bike Aboard, Canton, and Underground Railroad.
- To compile conductors’ reports, trainmen use “clickers” to count boarding passengers; these numbers are verified by conductors and totaled into a daily report. These reports would count a passenger who alights and then boards again twice. Consequently, the sections below often refer to the results in these reports as “unlinked passenger trips,” rather than riders or passengers.
- The team hand-coded a sample of more detailed boarding and alighting data by station for Bike Aboard and National Park Scenic service, drawn from conductors’ reports, for the month of August 2010. While these more detailed data are illuminating, they only reflect travel patterns for a single month and should not be taken as conclusive. Accordingly, these data are presented separately.

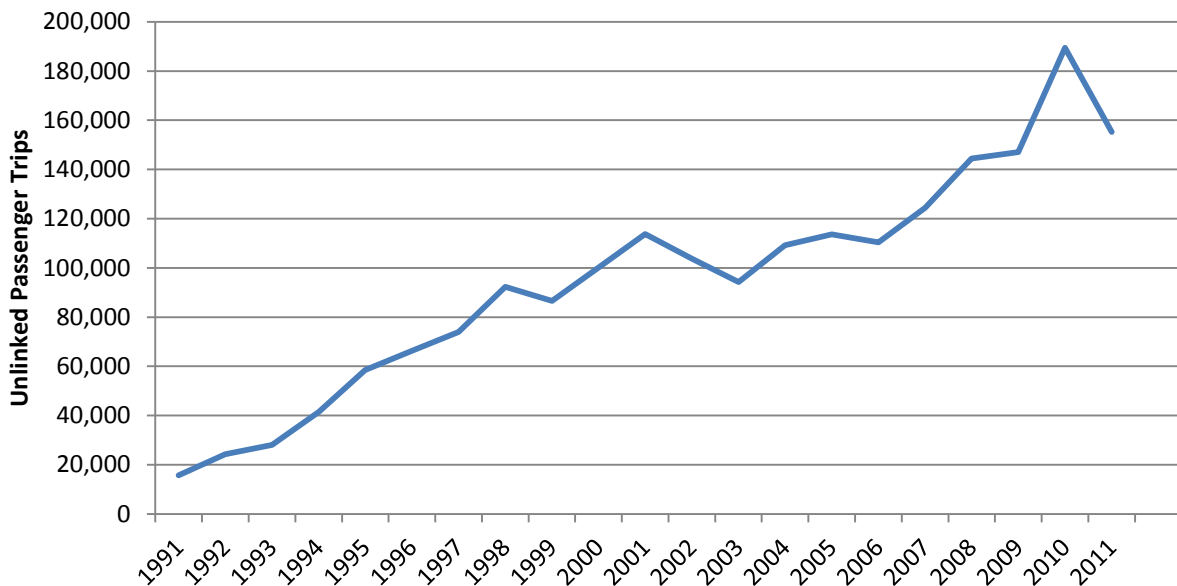
- Ticket sales data were available for 2009 (partial year only), 2010, and 2011. As 2011 service was interrupted due to construction and flooding, as noted below, several of the sections below focus on 2010 data only. Ticket sales also do not reflect actual passenger counts on particular trains, as passengers have the option of alighting at any station and then boarding a later train.
- Ticket sales data do not account for passengers using complementary tickets or lap children and also do not distinguish passenger type (i.e., adult, child, senior citizen, etc.).

Passenger demand

CVSR ridership grew steadily from 1991 to 2010 largely due to increases in the variety and frequency of offerings and improved sales and marketing. For example, where customers could previously only purchase tickets by phone during limited hours, tickets can now be purchased online at any time, at selected stations, or on board the train. While 2011 saw an 18 percent decrease in the number of trips, the decline is likely due to carryover effects from major construction and adverse weather during the 2011 season. CVSR was out of service entirely for three weeks and operated only between Peninsula and Brecksville for another three weeks in the spring and summer of 2011. Rockside Station, the northern terminal station, was closed for the entire season due to construction. In addition, the Towpath Trail was closed due to heavy floods on many days during the spring and summer when the train was operating, which reduced Bike Aboard ridership. CVSR staff noted that once service was largely restored, potential passengers were confused about what was open and closed due to inconsistent and confusing messaging. There were similar, although less severe, drops in ridership in 2003 and 2006, due to flooding and associated damage. In 2012, ridership increased 32 percent over 2011 numbers and 8 percent over 2010. Figure 9 shows the growth in number of trips on CVSR between 1991 and 2012, as recorded in conductors' reports²⁷.

Figure 9
CVSR annual trips, 1991-2012

Source: CVSR Conductors' Reports



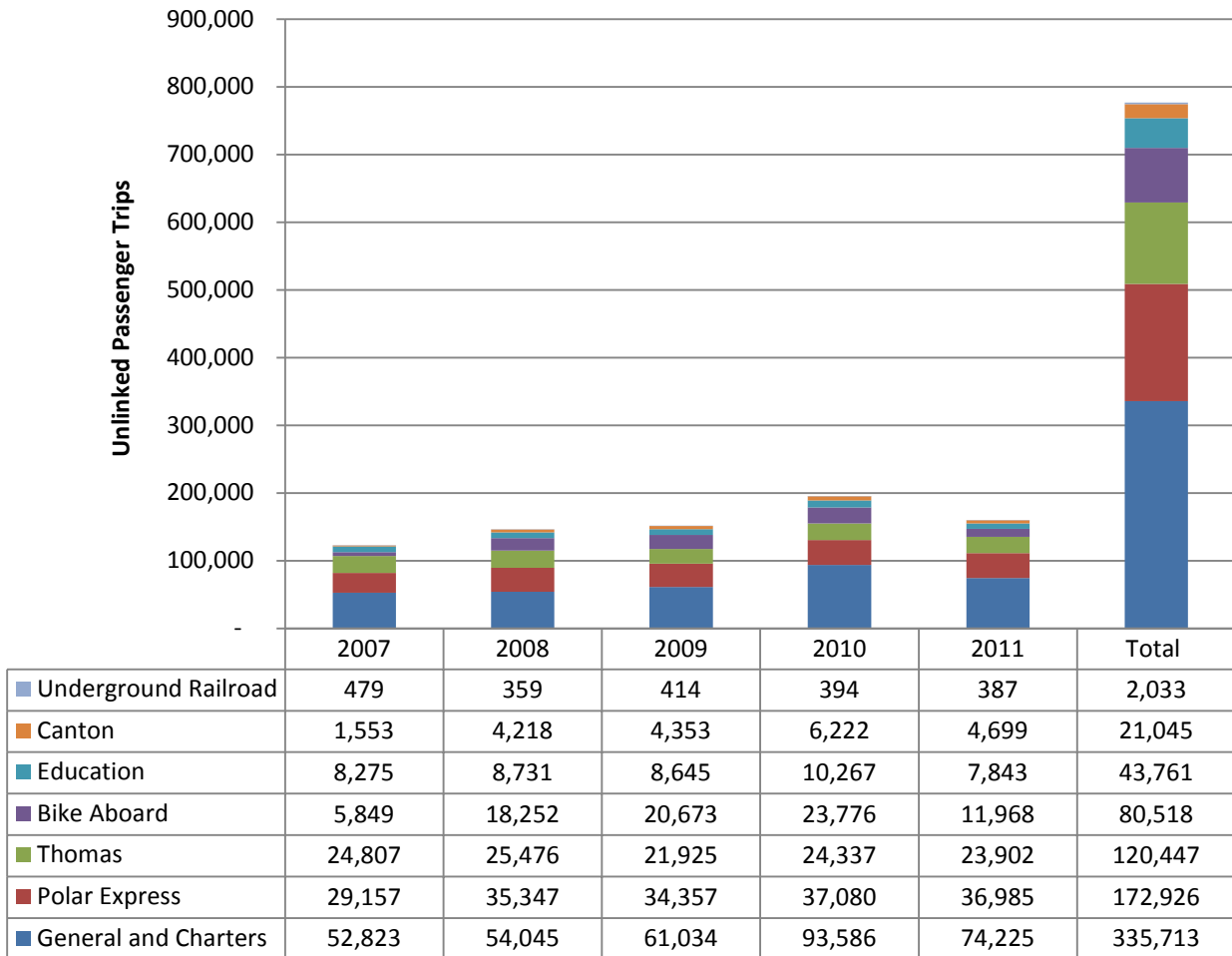
²⁷ Trainmen use “clickers” to count boarding passengers; these numbers are verified by conductors and totaled into a daily report. These reports would count a passenger who de-boards and then boards again as taking two trips.

Trips by category

In conductors' reports, CVSR collects data in seven categories: general and charters, which includes the National Park Scenic, events on the Scenic, and charter groups; Polar Express™; Day Out with Thomas™; Education, which includes all education charter groups; Canton service (between Akron Northside and Canton Lincoln Highway); and Underground Railroad, a special event held on board the Scenic. On an annual basis, the “general and charters” category represents the majority of trips, followed by Polar Express™, A Day Out with Thomas™, and Bike Aboard, as shown in Figure 10.

Figure 10
CVSR trips by category

Source: CVSR Conductors' Reports

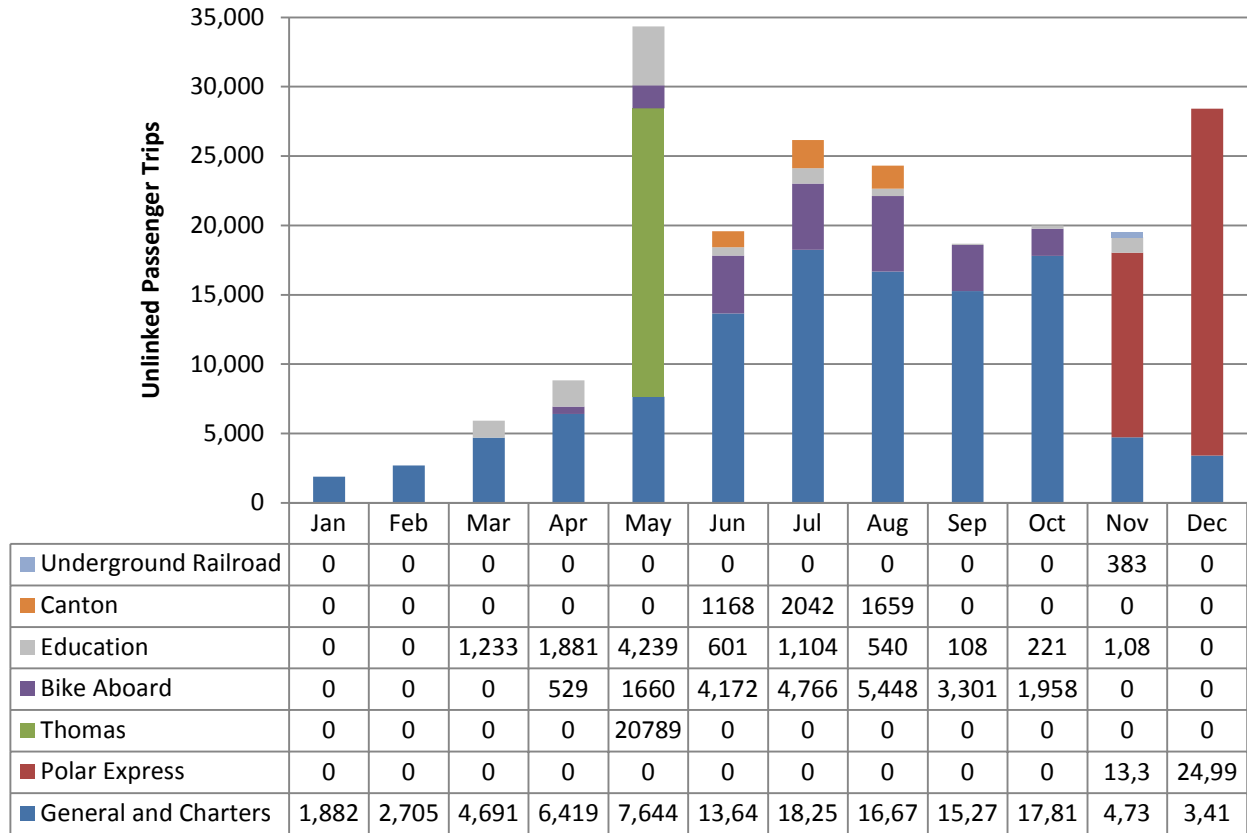


Seasonal trends

As noted previously, CVSR operates regular service five days a week from June to October and on weekends only from November to May, with special event trains throughout the year. The number of passengers peaks notably in May and is fairly strong through December, the peak season being bookended by Day Out with Thomas™ and Polar Express™. The total numbers of riders is lowest from January to April, which are months outside of the peak season with no major special events. Figure 11 shows the number of unlinked passenger trips captured in conductors' reports for 2012.

Figure 11
Total unlinked passenger trips by month, 2012

Source: CVSR Conductors' Reports

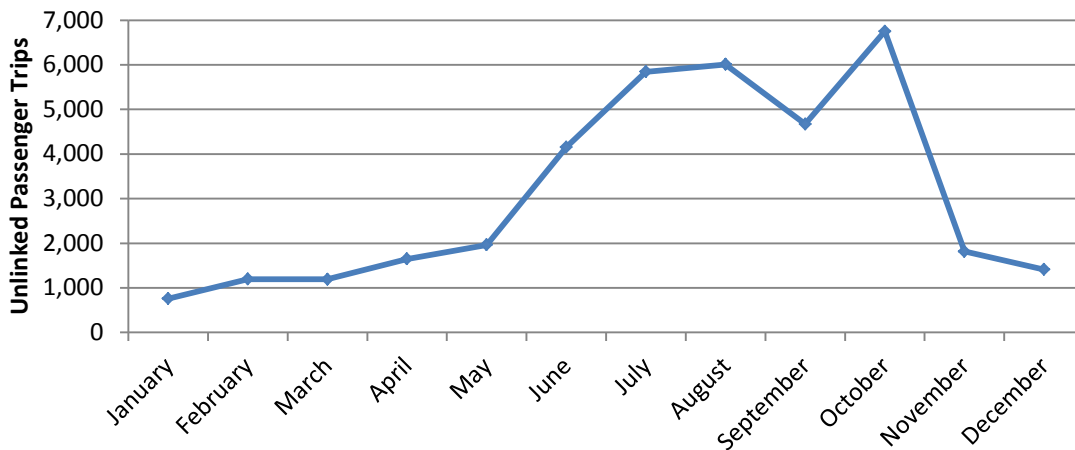


General ridership and charters

Ridership in this category is strongest in the summer and early fall, with dual peaks in July or August and October (Figure 12). The latter peak is due to fall foliage viewing.

Figure 12
CVSR average unlinked trips (general ridership and charters), 2007-2012

Source: CVSR Conductors' Reports

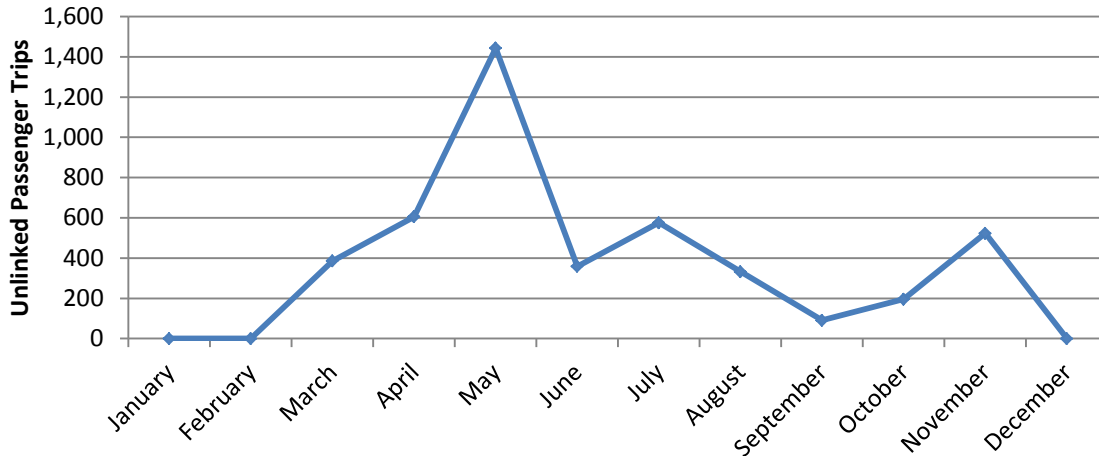


Education

Education ridership has a clear peak in May – double that of any other month – and drops off in December and January (Figure 13). Trips during the summer months serve summer schools, day camps, and child care facilities.

Figure 13
CVSR average ridership (Education trips), 2007-2012

Source: CVSR Conductors' Reports

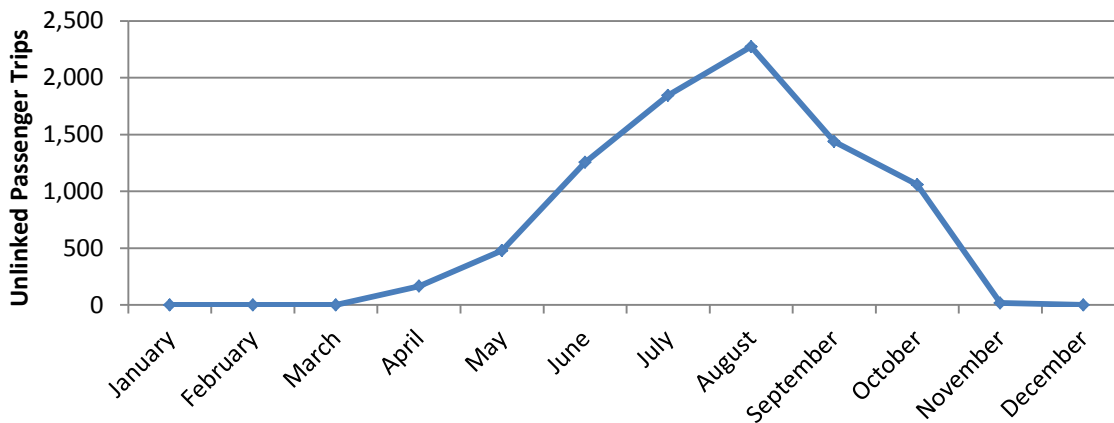


Bike Aboard

The number of Bike Aboard riders is highest in the summer months (July, August, and September) with a strong peak in August (Figure 14). Usage of the service grew steadily from its introduction in 2007 through 2010, but fell by 50 percent in 2011 due to adverse weather and construction impacts.²⁸ In 2012, ridership increased 82 percent from 2011 levels, but was down 8 percent from the peak in 2010.

Figure 14
CVSR average unlinked trips (Bike Aboard), 2007-2012

Source: CVSR



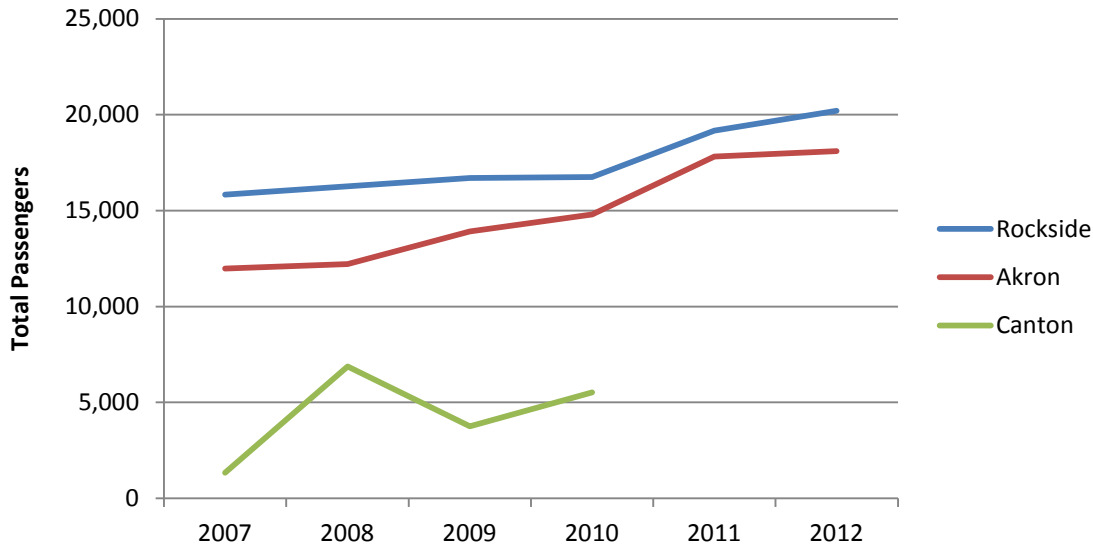
²⁸ CVSR was out of service entirely for three weeks and operated only between Peninsula and Brecksville for another three weeks in the spring and summer of 2011. Rockside Station, the northern terminal station, was closed for the entire season due to construction. In addition, the Towpath Trail was closed due to heavy floods on many days during the spring and summer when the train was operating, which reduced Bike Aboard ridership.

Polar Express™

As noted earlier, Polar Express™ is CVSR's most popular event, with approximately 35,000 passengers annually during November and December. The Polar Express™ has departed from Rockside, Akron Northside, and Canton Lincoln Highway Stations, with most passengers using Rockside or Akron Northside Stations. Figure 15 shows the overall growth in passengers in recent years. Note that Canton service was suspended for 2011 due to impacts from construction and was not resumed in 2012.

Figure 15
Polar Express™ ridership by departure station

Source: CVSR Conductors' Reports

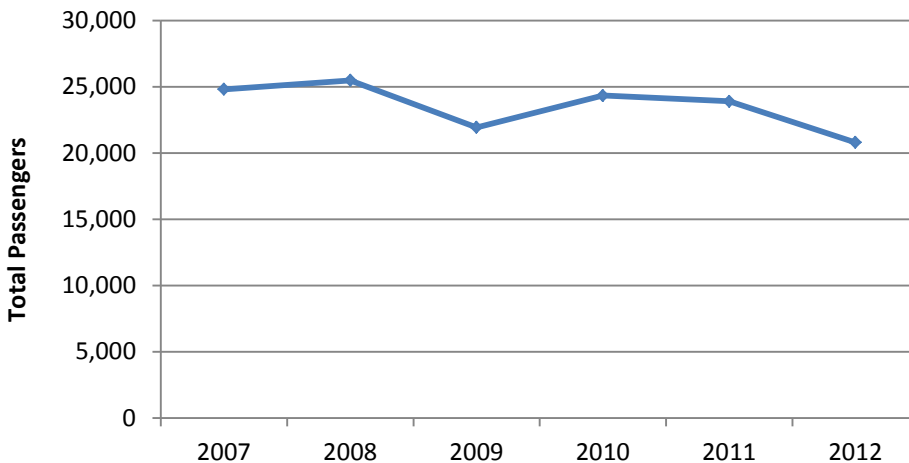


Day Out with Thomas™

The Day Out with Thomas™ event is held in May annually and has brought in an average of approximately 24,000 riders each year since 2007. Note that the ridership numbers for this event include complimentary rides for volunteers. Figure 16 shows passenger numbers for 2007 to 2012.

Figure 16
Day Out with Thomas™ Ridership

Source: CVSR Conductors' Reports

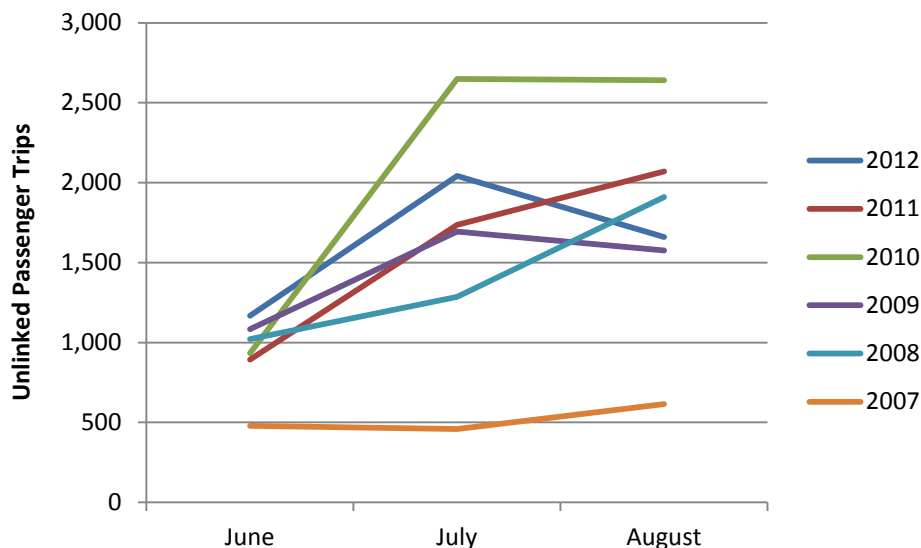


Canton-Akron Service

During the months of June, July, and August, CVSR provides service between Akron Northside Station and Canton Lincoln Highway Station. In June 2010, four and a half service days were lost due to a derailment on June 23, 2010. Service resumed June 30, 2010. Figure 17 shows the changes in Canton service over the last five years, with lower ridership in June and higher ridership in July and August. The total number of passenger trips is relatively minor compared with service on the NPS Scenic.

Figure 17
Canton Service Unlinked Passenger Trips, 2007-2011

Source: CVSR Conductors' Reports



Underground Railroad

The Underground Railroad event is a smaller scale event than the other categories of service reported above and has attracted approximately 400 passengers each year since 2007.

Ticket sales

Overview

An examination of 2010 ticket sales data clearly shows the importance of Polar Express™ and other special events as sources of revenue for CVSR. Revenue from special events is critical to CVSR operations. Ticket sales vary greatly with the type of event being offered, from less than 10 for a poorly selling excursion or special event to more than 500 tickets sold for a single train offering Polar Express™. Figure 18 shows the number of tickets sold in 2010; Figure 19 shows the value of those tickets for the same year.

Figure 18
Number of tickets sold, 2010

Source: CVSR Ticket Sales Data

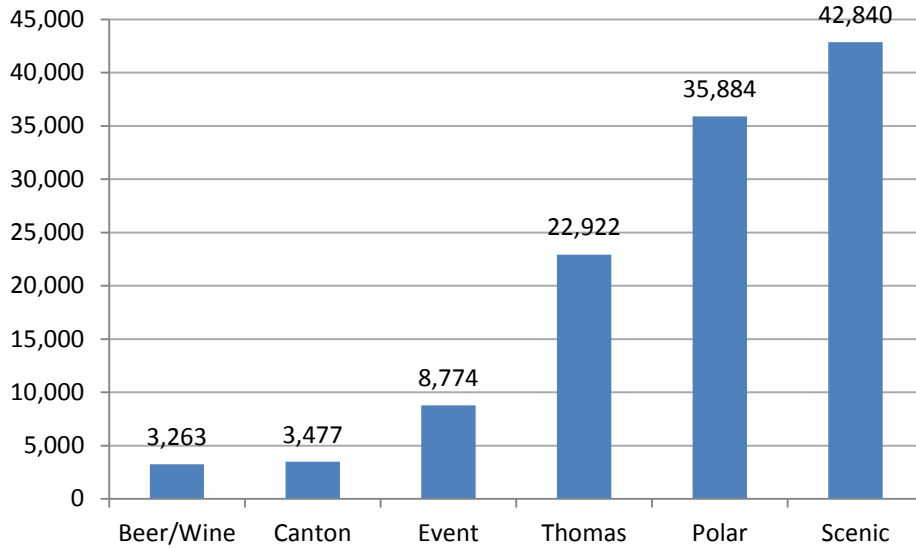
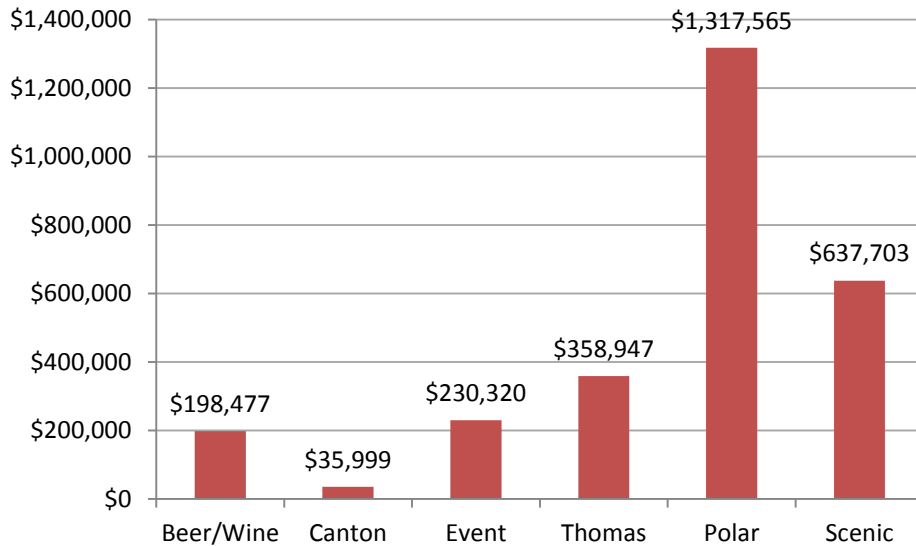


Figure 19
Value of tickets sold, 2010

Source: CVSR Ticket Sales Data



Travel patterns

While ticket sales do not perfectly correlate with ridership patterns since Scenic passengers may alight at any station, examining ticket sales data allows some insight into passenger demand. CVSR does not offer the same type of service every day – special events may only be offered once or twice a year and schedules for regular service change over the year. Ticket sales data do not account for passengers using complimentary tickets or lap children and they also do not reflect actual passenger counts on particular trains, as passengers have the option of alighting at any station and then boarding a later train.

Reviewing ticket sales data reveals the following:

- Passenger trips most frequently originate at Rockside Station, followed by Akron Northside Station (Figure 20).
- Saturdays were the most popular day for travel on CVSR (Figure 21).

Figure 20
Tickets sold by departure station, 2010²⁹

Source: CVSR

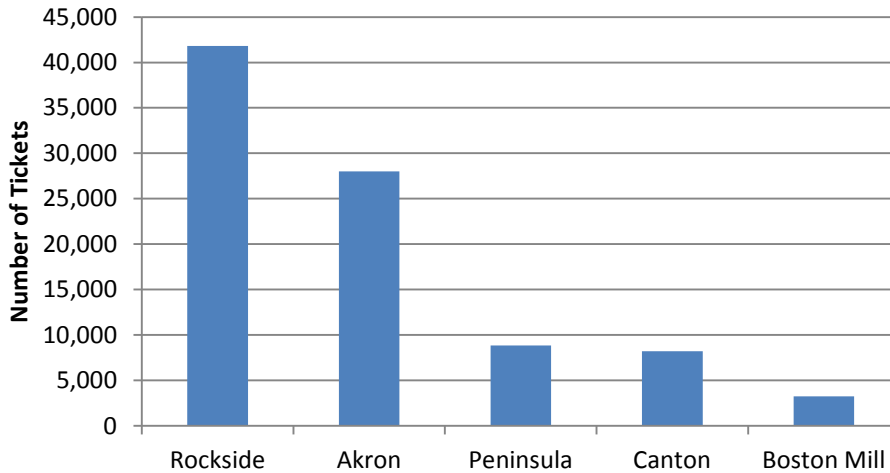
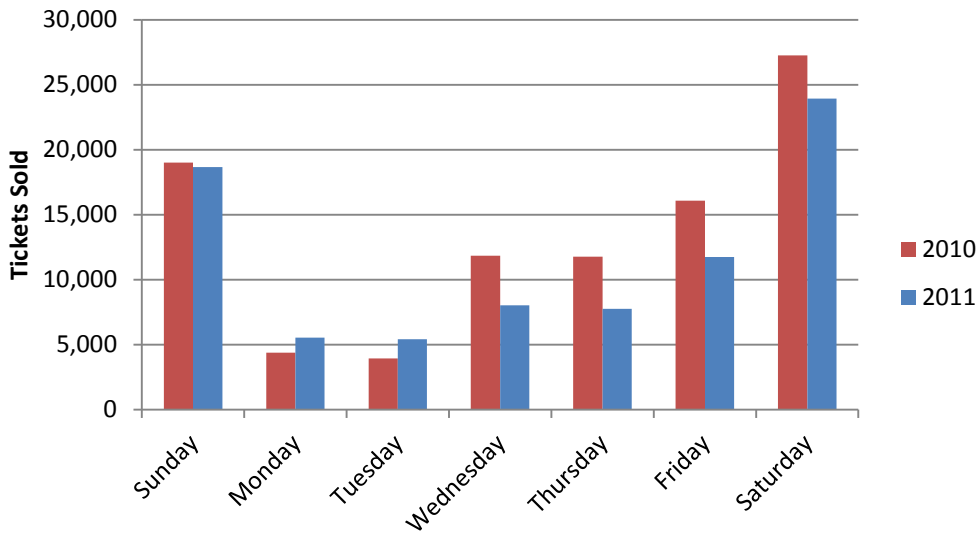


Figure 21
Total tickets sold by day of week

Source: CVSR Ticket Sales Data



Ticket sales and capacity

With the exception of major events such as Polar Express™ or Day Out with Thomas™, the number of tickets sold on CVSR does not approach the actual capacity of the train. The typical capacity of a CVSR train is 500 passengers and it is possible to accommodate up to 650 passengers by adding passenger cars.

²⁹ Boston Mill departures are the Wine-Tasting and Beer-Tasting trains.

Maintaining excess capacity is necessary to allow all-day boarding and alighting for CVSR passengers, spontaneous ticket purchases by park visitors, and spontaneous use by Bike Aboard passengers. Given the nature of CVSR as a family or group-oriented scenic railway, maintaining excess capacity is also desirable to avoid perceived crowding and to facilitate groups sitting together.

In 2010, the average number of tickets sold for a Polar Express™ train was 472 per departure. Sales for Ales on Rails and Grape Escape trains also tend to be relatively strong, with an average of 192 tickets sold per departure in 2010. The team examined sales for all other special events, such as “Easter Bunny Express” or “Sunday Matinee,” as a separate group. Ticket sales for these special events were more modest, with an average of 55 tickets sold per departure in 2010. Note that this number is not an indicator of the number of riders on a given train, as many special events are offered aboard the National Park Scenic, for which passengers may purchase tickets separately.

Detailed boarding and alighting patterns

Overview

As noted previously, the team hand-coded a sample of more detailed boarding and alighting data by station for Bike Aboard and National Park Scenic service, on the basis of conductors’ reports, for the month of August 2010. While these more detailed data are illuminating, they only reflect travel patterns for a single month and are not conclusive.

Findings

Overall, the review of detailed boarding and alighting data underscored the differing preferences of NPS Scenic and Bike Aboard passengers. This difference is likely due to the different types of experiences offered by the two services. The differences highlight the difficulty of crafting a single schedule to meet the needs of all customers.

- While National Park Scenic passengers tend to board and alight at Rockside, Peninsula Depot, and Akron Northside Stations, Bike Aboard passengers are more evenly dispersed along the alignment. Several stations have gone almost unused by Scenic passengers, which are popular with Bike Aboard passengers (Figure 22).
- Bike Aboard activity is highest on weekends, followed by Friday. Scenic ridership was highest on Wednesday during the sample month (Figure 23).
- National Park Scenic passengers strongly prefer midday trains. This preference is also seen with Bike Aboard passengers, although not as strongly (Figure 24).
- While there was Bike Aboard activity at all CVSR stations between Rockside and Akron, Peninsula Depot, Rockside, Brecksville, and Akron Northside Stations were the most frequently used by Bike Aboard passengers in August 2010. The top origin-destination pairs for the same period are shown below in Table 14.

Figure 22

Total boarding and alighting by station, August 2010, NPS Scenic and Bike Aboard

Source: CVSR Conductors' Reports

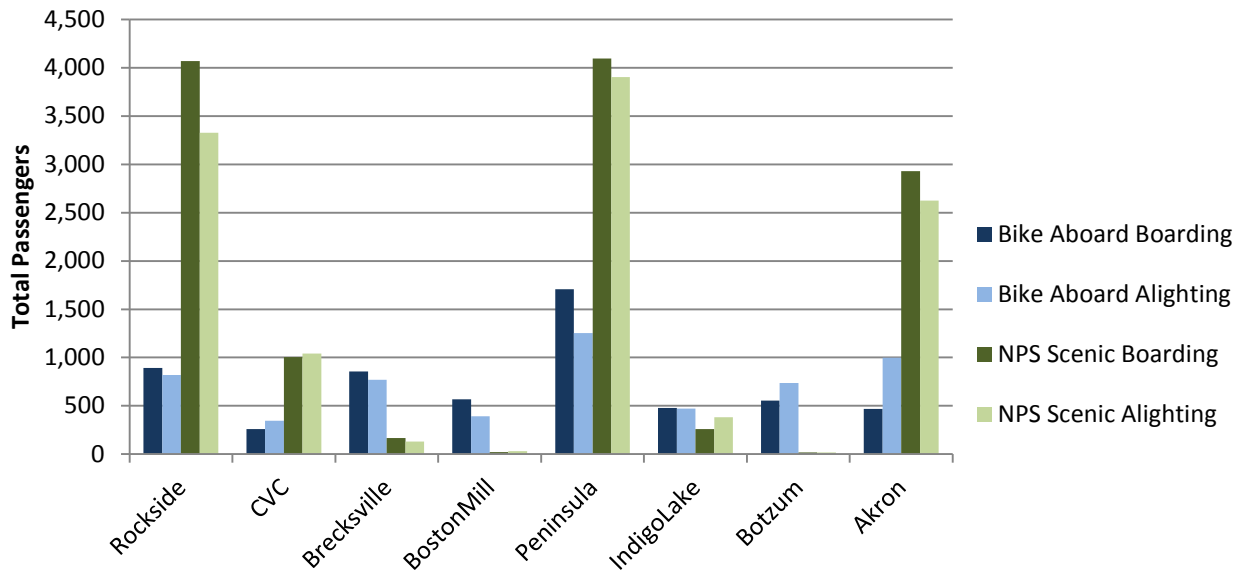


Figure 23

Total daily passengers, August 2010, NPS Scenic and Bike Aboard

Source: CVSR Conductors' Reports

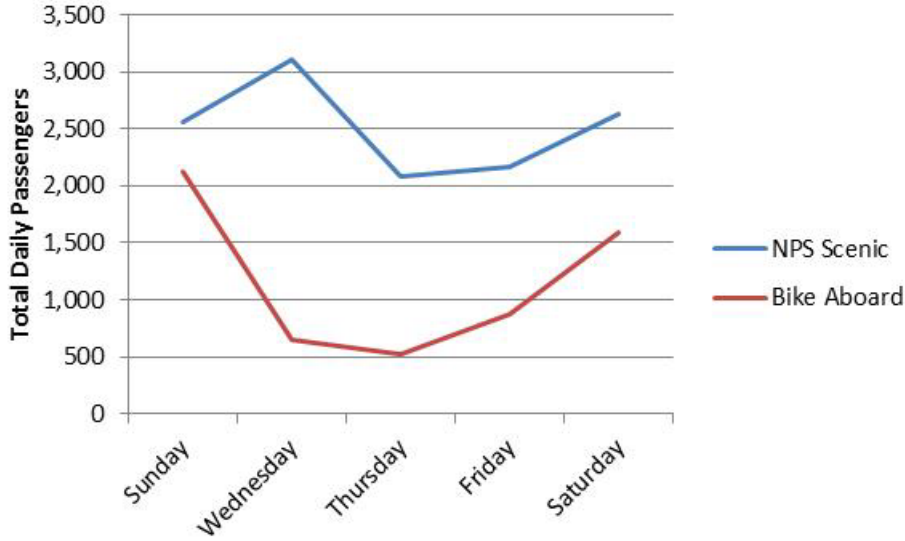


Figure 24

Boarding passengers by time of day, August 2010, NPS Scenic and Bike Aboard

Source: CVSR Conductors' Reports

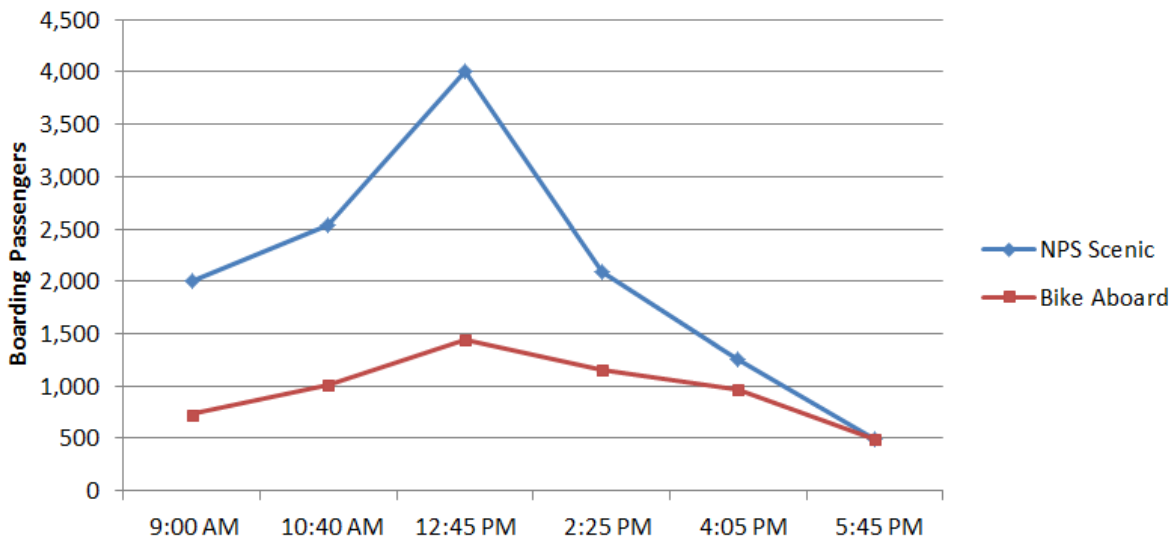


Table 14

Top origin-destination pairs, August 2010, Bike Aboard

Source: CVSR Conductors' Reports

| Boarding | Alighting | Total Passengers |
|-------------|-------------|------------------|
| Peninsula | Brecksville | 402 |
| Peninsula | Rockside | 359 |
| Rockside | Peninsula | 355 |
| Peninsula | Akron | 349 |
| Brecksville | Peninsula | 285 |
| Rockside | Akron | 257 |
| Peninsula | Botzum | 229 |

On-time performance

Though CVSR does not track schedule adherence, CVSR staff observed anecdotally that maintaining schedule adherence is generally difficult and trains may be delayed by as much as 45 minutes to an hour and a half. As a rule of thumb, on days with over 400 passengers, 600 bicycles, or 10 wheelchair passengers per stop, the train will lose approximately 20 minutes per stop at Akron, Peninsula, and the Canal Visitors Center and 10 minutes per stop at Indigo Lake, Botzum, Boston Store, and Brecksville. There is some slack time built into the schedule at layovers at Rockside Station, but it is often insufficient to get back on schedule on busy days during the peak summer and fall foliage seasons, when the accumulated delay may have reached an hour and a half. An estimate of on-time performance for one of these peak days, from CVSR staff experience, is as follows:

- Approximately 20 percent of trains depart 1.5 hours late.
- Approximately 25 percent depart between ½ and 1 hour late.
- Approximately 20 percent of trains depart less than ½ hour late.
- Approximately 35 percent of trains depart on time.

Operational delays have a significant negative impact on the passenger experience, particularly where real-time schedule updates are not available and passengers experience not just delay but also uncertainty. Contributing factors to operating delays, as identified by CVSR staff, include the following:

- **Unpredictable passenger flows.** Bike Aboard passengers take longer to board than other passengers, due to the need to load bicycles into the baggage car before boarding. Similarly, only one car per train is ADA-accessible for wheelchair passengers and a passenger using the car's only wheelchair lift takes approximately three minutes to board. While CVSR sometimes – but not always – knows when and where a group of wheelchair passengers is going to arrive, the number of Bike Aboard passengers is not known in advance. When large numbers of wheelchair passengers and/or bicyclists board or alight at one station, it adds significantly to the boarding time at that station.
- **Equipment/infrastructure mismatch.** CVSR currently operates trains which are longer than the platforms or boarding areas at some stations. For example, a train may need to make three stops at a single station – one for general passengers, one for Bike Aboard passengers, and one for passengers using the ADA-accessible car.
- **Large group boarding and alighting.** Large groups, such as school groups boarding and alighting at Canal Visitor Center, may also contribute to delay.

Service frequency

As a scenic railroad, CVSR does not provide rapid-transit or commuter-railroad frequencies of service. Rather, CVSR provides longer trips at relatively infrequent intervals. While this level of service is generally appropriate to CVSR's mission and passenger demand levels, it does not lend itself to the type of spontaneous boarding seen on high-frequency transit. Passengers must plan ahead. During the peak season, the National Park Scenic makes three daily roundtrips. If a passenger misses his or her train, there will be a long wait at that station until the next opportunity to board, if there is one. This increases the importance of providing accurate passenger information, as passengers waiting for a delayed train may become anxious that they have already missed it.

Passenger information

CVSR lacks an infrastructure-based passenger information system to provide real-time updates on train arrival times. Passengers may download a smartphone app which provides real-time train location information; however, not all passengers will have done so and cellphone service in CVNP is inconsistent. General information about service offerings, departure times, and special events is available on CVSR's website.

At each station, an informational display includes a permanent park map showing CVSR stations and a map of the station area. A bulletin board in a glass case allows CVSR to display announcements and other variable information. During the site visit, the bulletin boards displayed promotional information for upcoming events, membership and donation information, and a flyer promoting the CVSR smartphone app. Some stations included a flyer with the distance in miles to other stations or departure times, but not a full schedule.

According to CVSR staff, most passengers seek additional information about destinations and attractions from volunteers or CVSR personnel, as they alight from or board the train.

Accessibility

Currently, only one car per CVSR train is lift-equipped and retrofitted to be accessible to passengers using wheelchairs or other mobility devices. While the current setup makes it possible for passengers with mobility impairments to use CVSR, they cannot move about the train (for example, to visit the concessions car) and must board a specific car. Given the lack of platforms at CVSR stations and short boarding areas at some stations, this arrangement also contributes to operational delays, as described previously.

Access to CVSR

General passengers most typically access CVSR by driving to a station and parking, although charter passengers may arrive as a group in a bus or van. While access by bicycle, on foot, or transit bus is possible, these modes represent a smaller number of passengers. As expanding access to CVSR and CVNP is a long-term goal for both agencies, particularly for households without access to an automobile, transit access is considered in more detail, below.

Transit service in CVSR's service area

Overall, existing transit connectivity with CVSR is relatively limited. City buses provide access to two major stations (Akron Northside and Canton Lincoln Highway Stations) and three stations (Rockside, Akron Northside, and Canton Lincoln Highway Stations) are located within walking distance of a bus stop.

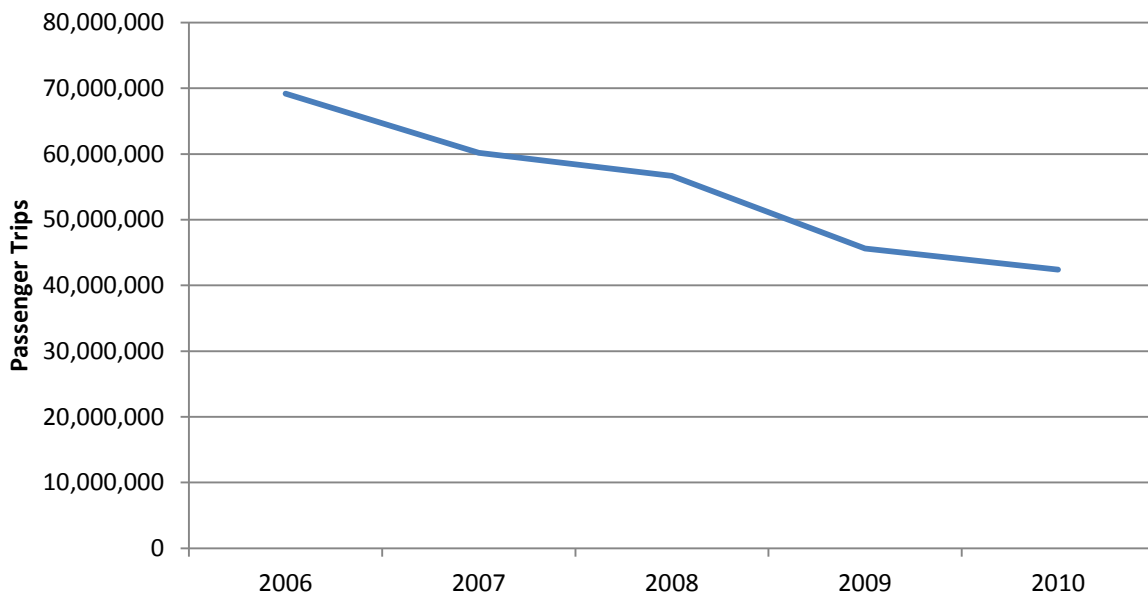
To place transit access in context, in the three largest cities served (Cleveland, Akron, and Canton) transit agencies have seen significant ridership decreases in recent years. This decrease is in line with nationwide trends and likely due to the generally poor economic conditions during the five-year period reviewed. However, while 2011 figures were not available from the National Transit Database at the time of writing, at least one agency saw ridership increasing in 2011³⁰. An overview of these transit agencies appears below.

Cleveland / Greater Cleveland Regional Transit Authority

Cleveland and the surrounding suburbs of Cuyahoga County are served by the Greater Cleveland Regional Transit Authority (GCRTA), which operates bus, bus rapid transit, trolley, light rail, and heavy rail service. Unlinked passenger trips for GCRTA in the years from 2006 to 2010, as reported to the National Transit Database, are shown below in Figure 25.

Figure 25
GCRTA unlinked passenger trips, 2006-2010

Source: National Transit Database



³⁰ <http://www.riderta.com/newsroom/releases/?listingid=1692>

CVSR’s Rockside Station is accessible by GCRTA Routes 35 and 77F, although low service frequencies and poor walking conditions make GCRTA an unappealing access mode for potential passengers. Construction of a new pedestrian footbridge, linking the Rockside Station parking lot with the Lock 39 trailhead and parking lot on the Towpath Trail, will improve access to GCRTA by allowing faster and safer pedestrian access to a bus stop at Canal and Rockside Road.

Currently, GCRTA Route 35 provides approximately hourly service from early morning through evening on weekdays only. The nearest stop is at Rockside Road and Canal Road, approximately a five-minute walk from the station. It is a semi-industrial area and with limited sidewalks between the bus stop and the station.

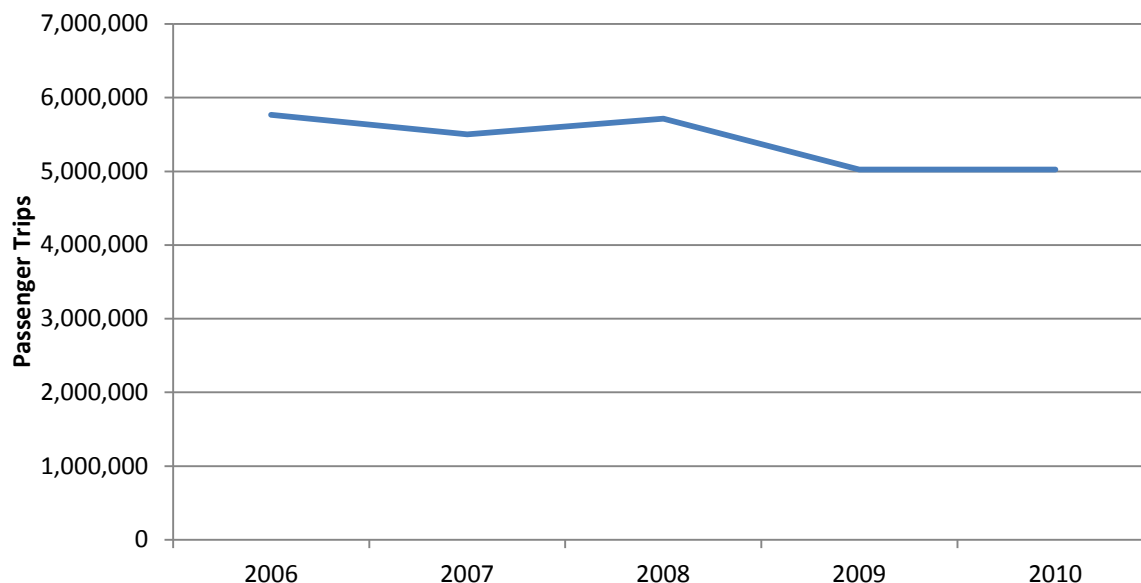
Route 77F provides approximately hourly service early mornings, late evenings, and midday, with approximately half-hourly service during the morning and evening peaks. The nearest stop is at the intersection of Brecksville and Rockside Roads and is a 23-minute walk from the station.

Akron Metro

Akron is served by the Metro Regional Transit Authority (Metro), which operates bus and paratransit service in Summit County, Ohio. Metro provided over five million unlinked trips in 2010 as shown below in Figure 26. While Metro does not provide rail service today, there has been interest in pursuing rail transit service and Metro purchased several former Maryland Area Regional Commuter (MARC) cars, now on loan to CVSR. In 2011, Metro received a \$270,000 FTA discretionary grant for the Akron North-South Corridor Alternatives Analysis study, which is examining rail transit service on eight miles of the CVSR corridor extending from Merriman Valley through downtown Akron and on to south Akron. This is considered an extremely preliminary step and any kind of rail operations would be several years in the future.

Figure 26
Metro unlinked passenger trips, 2006-2010

Source: National Transit Database



CVSR’s Akron Northside Station is served by a tourist-oriented circulator bus, which meets CVSR trains and serves major attractions in downtown Akron. Akron Northside is also proximate to Metro Routes 34 and 12. Route 34 stops at 203 North Howard Street, approximately a five-minute walk from the station. Although it is a primarily auto-oriented area, sidewalks are available. Route 34, which runs from the Chapel Hill Mall to Metro’s Transit Center in downtown Akron, provides approximately half-hourly

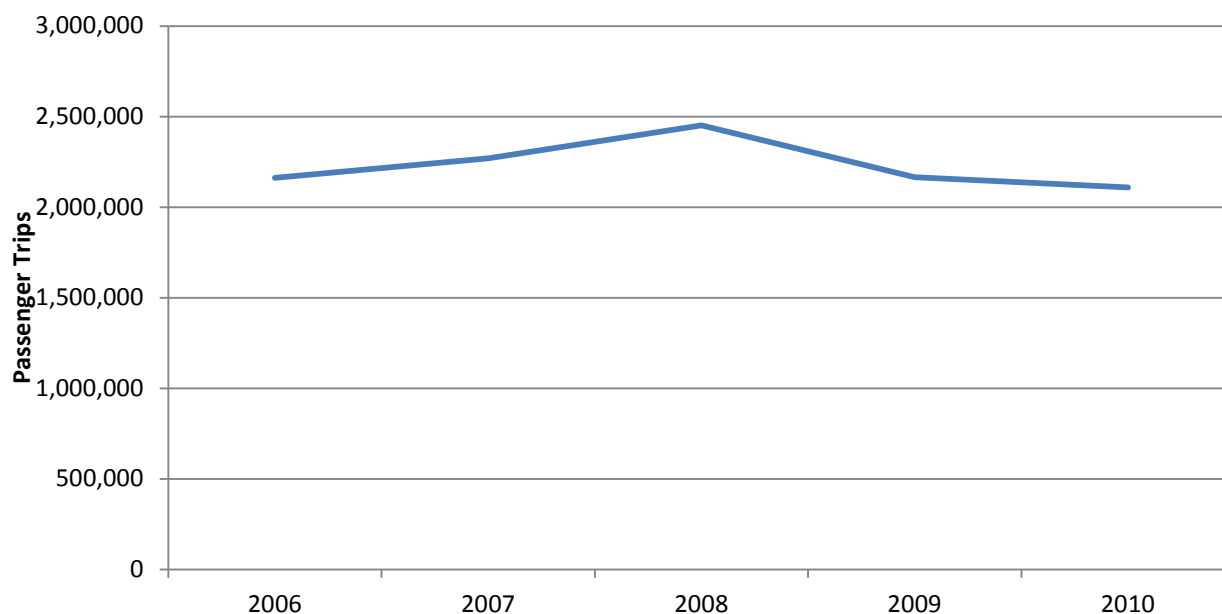
service from early morning through late evening. Route 12 stops at 42 North High Street, an approximate eight-minute walk from the station with similar walking conditions. Route 12, which also runs from the Chapel Hill Mall to Metro’s Transit Center, provides approximately hourly service early mornings, late evenings, and midday, with approximately half-hourly service during the morning and evening peaks.

Canton

Canton is served by the Stark Area Regional Transit Authority (SARTA), which operates bus and paratransit service in Stark County, Ohio, of which Canton is the capital city. SARTA provided 2,108,333 unlinked trips in 2010, as shown below in Figure 27.

Figure 27
SARTA unlinked passenger trips, 2006-2010

Source: National Transit Database



During the summer months, SARTA’s Downtown Loop Bus (801) provides service to CVSR’s Canton Lincoln Highway Station, with free bus service and discounted admission to local attractions for CVSR ticket holders.

Expanding service to Cleveland

The northern-most CVSR station is Rockside Station in Independence, OH. While NPS owns 1.5 miles of track north of Rockside Station, the track north of that point is owned by CSX. This track extends another eight miles along the Cuyahoga River, through an industrial area, and terminates in downtown Cleveland. This rail line used to serve several industries along the river, particularly steel mills, which are now mostly out of service.

Since CVSR was established in 1972, stakeholders have periodically discussed extending CVSR service to downtown Cleveland. Though CVSR has expressed interest in at least considering this expansion, CSX has concerns about CVSR operating along that corridor, so expansion on the CSX track is currently not being considered.

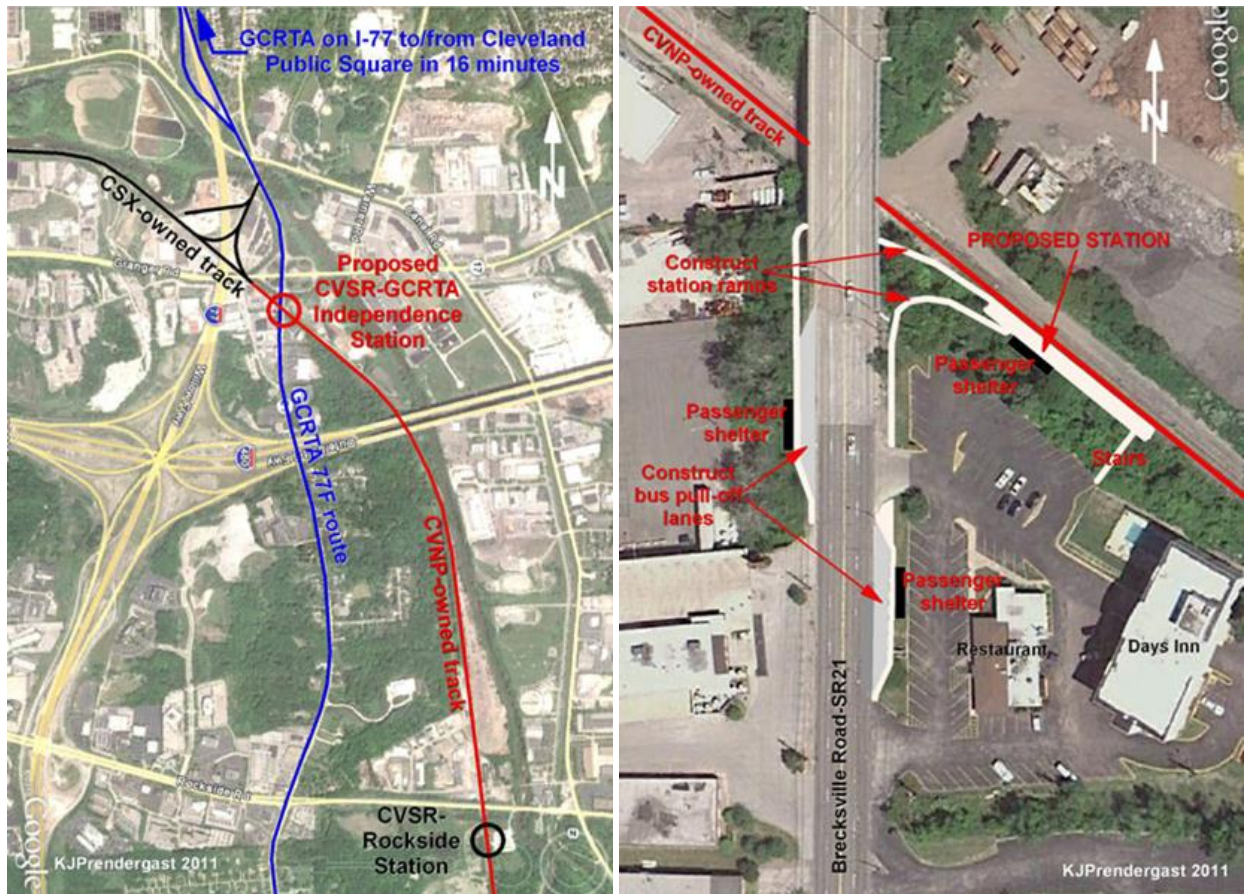
CVSR has, however, been engaged in discussions with various stakeholders about expanding service north of Rockside Station, even if the expansion would only be a mile or two. Most recently, a group called All Aboard Ohio (AAO), which is an advocacy group for intercity travel in Ohio composed of citizens, businesses, and organizations, prepared a presentation called “Downtown Cleveland access to

the Cuyahoga Valley National Park: Creating a quick, convenient linkage between CVSR and GCRTA; An All Aboard Ohio proposal.”

AAO’s proposal calls for CVSR to extend service 1.5 miles north to a site just south of the intersection of Granger and Brecksville Roads (Figure 28). This new stop would be called Independence Station and would be composed of a small, ADA-accessible intermodal station facility. The site would intersect with two existing GCRTA bus lines: #35, which runs on city streets to reach downtown in about an hour; and #77F, which runs on Interstate 77 and SR 21 to reach downtown in 10 to 20 minutes depending on traffic. Currently, the #35 runs hourly during weekdays and the #77F runs hourly (and every 30 minutes during weekday morning and afternoon rush hours) seven days a week.

Figure 28
Independence Station conceptual plan and station site proposal

Source: All Aboard Ohio



AAO suggests that this connection would enable new visitors to better access CVSR and the park. According to AAO, these constituencies include the 25 percent of Cleveland households that have no car; public, charter, and parochial students; college students (particularly at Cleveland State University and Case Western Reserve University); and tourists/visitors to Cleveland who arrive by plane, train, or bus.

AAO’s proposal calls for rebuilding the 1.5 miles of track so that CVSR can seamlessly serve the new station. AAO’s station site proposal includes (see Figure 28):

- An ADA-compliant facility with gentle ramps to track/platform level
- Safe bus pull-off lanes on SR21 exclusive of through-traffic lanes
- Direct access to/from Days Inn hotel, adjacent restaurant

- Little/no on-site CVSR parking; Rockside stays CVSR park-n-ride
- Station-area development opportunities

AAO cites several considerations and potential challenges in developing the station. These considerations include “small” increases in operating expenses for CVNP to maintain the station and for CVSR to service the new station. AAO mentions that this expense could be offset by increase in operating, grant and school program-related revenues. Other considerations include Cuyahoga River flooding issues in the extension area and that, due to potentially large connecting ridership and demand, GCRTA may need to make future schedule/service changes.

AAO estimates that the cost of the station and required improvements would be between \$700,000 and \$1 million. This estimate includes property acquisition/easements for bus pull-off lanes, boarding area, shelters, ramps, and a small amount of parking.

Inventory and condition of fixed infrastructure

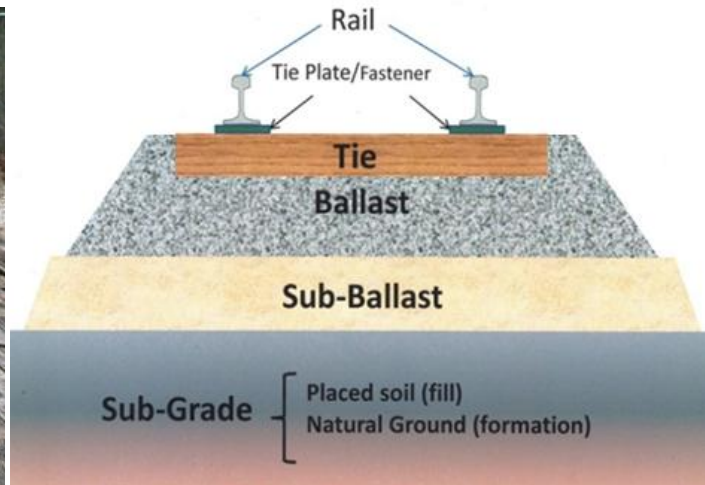
This section describes the existing condition of the fixed infrastructure of CVSR and CVNP. Included are the assessment and condition of track structures along with bridges, stations, grade crossings, station parking, and communications and maintenance facilities. Information for the evaluation was obtained from a site visit, maintenance records, track charts and/or communication between CVSR and CVNP. This information is provided for planning purposes and should not be used for design, evaluation, or safety assessment.

Track

The track over the current 26-mile corridor is conventional North American track consisting of two rails at 60 inches on center (56.5 inches gage) with timber tie on top of a layer of ballast, sub-ballast, and finally subgrade, which consist of fill or natural ground (see Figure 29 and Figure 30).

Figure 29 and Figure 30
Track structure components

Source: Volpe Center



Alignment

The curvature and vertical alignment pose no restriction to railroad operation with regard to loads and power (single locomotive) requirement or to the speed of operation for the railroad. Alignment of the track is a mix of tangent and curve track with undulating grades. The ruling grade over the entire section of track is 0.88 percent running over a quarter mile of track entering the Akron station. The overall elevation or general slope of the track is from elevation 883 feet at Akron to elevation 48 feet at the north

end, giving an average grade to the north of 0.006 percent. The biggest curvature is 3 degrees, with curves of this magnitude at a few locations along the line.

Rail

The majority of the rail consists of 131 RE³¹ with 132 RE in few sections. Both 131 and 132 RE are common rail types used in North American railroads for all operations and classes of track. All new rail for replacement or maintenance is 132 RE.

The entire section of track consists of continuous welded rail (CWR), with the final nine miles converted to CWR in 2011. Some sidings and yard track consist of jointed rail. On the basis of tests conducted by Sperry rail flaw detection car in 2011, no problems exist as to the rail condition from fatigue or internal defects.

CVSR's rail is a light tonnage line, less than 5 MGT (million gross tons), with light axle loads. Usually any line carrying below 5 MGT/year is considered light tonnage; a conservative estimate for CVSR traffic is less than 1.2 MGT/year.

Ties

Ties are timbers spaced at 21 to 22 inches with cut spike fasteners. Rail anchors are installed on every other tie to provide longitudinal rail restraint and to transfer the loads from the rail to the tie and ballast. A major tie replacement program was conducted concurrent with the rail conversion to CWR completed in 2011. At that time 8,423 ties were replaced between MP 40.32 to 43.2 and MP 51.25 to 57³². Ties are usually inspected during the weekly track inspection for soundness and the ability to maintain gage.

Ballast

Other critical components in the track structure are the ballast/subballast and subgrade, which support the tie and provide a critical element in maintaining a well performing track system. The only issue with subgrade that might affect the entire line is the threat of washout and/or erosion due to the proximity of the track to the river and the topography of the area. However, these are not maintenance issues, but rather conditions that require monitoring. A good inspection program can highlight washout or erosion of critical locations to help inspectors focus on critical zones. Since the rail line has been in service over 130 years, the subgrade in locations of the track that are performing well is likely well compacted from years of service. Ballast failures due to the light load associated with this passenger service are very uncommon.

During the upgrading of the track to CWR, new ballast was added and tamped for approximately 8.4 miles, from MP 40.3 to 43.4 and from 51.7 to 57. Since these sections have been in operation since August 2011, no ballast consolidation issues exist.

Sidings

Three sidings on the 26 miles of track are owned by the park. Additionally, a spur track is located to the north of Rockside station, which is mainly used to store equipment or for repairs. The three sidings from north to south are located at Fitzwater maintenance facility (MP~61.5), Jaite (MP ~56.75), and Peninsula (MP ~52.25). The Jaite siding is not operational at this time since the switches have been spiked shut and ties are in poor condition. The sidings as currently configured cannot accommodate passing trains at any speed; i.e., one train has to stop while the other passes since the sidings are too short to accommodate trains even at crawling speed. Based on current operation conditions with one train, this is not an issue.

³¹ A rail section designation RE with a weight of 131 lb./yard of rail length as described in the American Railway Engineering and Maintenance-of-Way Manual of Recommended Practice.

³² As per Build Drawings by Bergmann and Associates provided by Cuyahoga Valley National Park

Switches

The original track chart, last revised in 1987 shows eight switches, six of which are still in service – four at Peninsula, one at the Fitzwater maintenance facility, and one at the north end of Akron station. Six additional switches were installed at Fitzwater to facilitate equipment maintenance and storage and train makeup. Due to light traffic and operational speed, with continued regular maintenance the current switch arrangement is sufficient to meet current train operation practice.

Railroad bridges

CVSR has a variety of bridges and culverts that have been replaced and updated from the time of acquisition by the National Park Service. Table 15 lists the type and location by milepost of the existing bridges and culverts that the track goes over. Structures crossing above the railroad are covered in the Crossings section. Inspection of the main structures is performed by the Federal Highway Administration (FHWA). The other structures, which include mostly culverts, are inspected by qualified NPS and CVSR track inspection personnel. Many of the structures inspected by FHWA have been upgraded.

Combined, the low frequency of train operations and light loading, the recent upgrades and replacements since the late 1980s, and the current program to upgrade/replace up to six more structures in 2013, likely preclude any major structural problems. Washouts and/or erosion around the culverts, bridge abutments, and piers are the primary concerns for the railroad structures. Land developed in the vicinity of the park and unusually high rainfalls are the primary sources for erosion or washouts. Diligent monitoring of development activities around the park land and inspection after unusually high rainfall events will help catch any erosion- or washout-associated threats to the structural inventory for a considerable time.

Table 15**CVSR structural inventory³³**

Source: Volpe Center and CVSR track chart and maintenance plans

| Structure Number | Mile post | Type | Crossing |
|--|-----------|----------------------|-------------------|
| <i>Bridges inspected by FHWA</i> | | | |
| 436 | 40.3 | Structural Steel | Howard Street |
| 437 | 40.4 | Structural Steel | Ohio & Erie Canal |
| 437 1/4 | 41.7 | Structural Steel | Memorial Pkwy. |
| 438 | 44.9 | Pre-Cast Box Beams | Sand Run |
| 439 | 47.0 | Stone Arch | Yellow Creek |
| 440 | 48.3 | Pre-Cast Box Beams | Stream |
| 443 | 49.9 | Structural Steel | Furnace Run |
| 445 | 52.3 | Structural Steel | Cuyahoga River |
| 447 | 53.4 | Structural Steel | Cuyahoga River |
| 451 | 55.4 | Structural Steel | Pantry Creek |
| 452 | 57.9 | Structural Steel | Dogwood Creek |
| 453 | 58.7 | Structural Steel | Chippewa Creek |
| 454 | 62.5 | I Beams | Tinkers Creek |
| 455 | 63.3 | Structural Steel | Greiner Creek |
| <i>Structure inspected by qualified NPS and CVSR personnel</i> | | | |
| 437 3/8 | 43.9 | Culvert Pipe | Stream |
| 437 1/2 | 44.5 | Culvert Pipe | Stream |
| 438 1/4 | 45.5 | Rails | Stream |
| 438 1/2 | 45.8 | Rails | Stream |
| 438 3/4 | 46.2 | Rails | Stream |
| 441 | 49.4 | Rails | Creek |
| 443 1/4 | 51.0 | Pre-Cast Box culvert | Stream |
| 443 1/2 | 51.7 | RC Box | Stream |
| 445 1/2 | 53.0 | Culvert Pipe | Stream |
| 449 | 54.3 | Pre-Cast Box culvert | Kellogs Run |
| 450 | 54.8 | RC Box | Stream |
| 456 | 63.8 | Structural Steel | Hemlock Run |
| 456 1/2 | 65.0 | Culvert Pipe | Stream |

Stations

Seven stations in the park and two stations outside the park are served by the railroad: Akron-Northside and Canton Lincoln Highway Stations are located outside the park; Canton Lincoln Highway Station is used for special trains or special events. All stations inside the park are handicapped accessible. Table 16 shows the stations from north to south. Figure 31 shows Rockside Station. Tickets can be purchased at

³³ Data From Railroad Track Chart and CVNP Structure Inventory

Rockside Station, the Peninsula Depot, the Akron-Northside Station, and the Canton Lincoln Highway Station.

Table 16
Station location and parking spots for each station

Source: Landscape Architect CVNP

| Mile Post | Station Name | Platform | Parking spots |
|-----------|--------------------------------|------------|---|
| 66.0 | Rockside | Timber | 101 (9 HCP*) 114 Stab Turf 5 Buses |
| 63.5 | Canal Visitor Center | Timber | 92 (2 HCP) |
| 58.4 | Brecksville | Paved | 143 (6 HCP) 15 Pull thru |
| 56.1 | Boston Mill | Paved | 45 (2 HCP) Overflow lot 8 + 5 pull thru gravel |
| 52.6 | Peninsula | Paved/dirt | 43 paved 2 HCP paved 85 Overflow lot |
| 45.6 | Indigo Lake | Paved | 12 gravel |
| 43.8 | Botzum | Paved | 127 (6 HCP) |
| 40.0 | Akron-Northside | Paved | ** |
| | Canton Lincoln Highway Station | ** | ** |

* Handicap parking

** Station/parking areas are not owned/maintained by NPS

Figure 31
Rockside Station



Parking

Table 16 shows the number of parking spots available to passengers at each station. The vicinity of the park to a large metropolitan center attracts users that travel by car to the park. Due to limited public transportation, parking is a critical element, especially at the beginning and end of the corridor, at Rockside and Akron Northside Stations. All parking lots are paved except the Peninsula Overflow Parking Lot.

Grade crossings

Table 17 shows a list of crossings that include all at-grade and overhead crossings, i.e., bridges or walkways that are running over the railroad. This list is identical to the list maintained in the Federal Railroad Administration's (FRA's) inventory of grade crossings for the US system of railroads. Five of these grade crossings were upgraded during 2008 and 2011 track and rail upgrade. Maintenance drawings from recent construction projects show there are nine additional grade crossings not shown in the table that are non-public crossings such as park trails, overflow parking lots, pedestrian, or private crossings. Track charts from 1987 show an additional number of private grade crossings; usually these are deeded grade crossings that have never been installed or operated as a crossing.

Table 17
Grade and overhead crossings as recorded FRA's inventory data

Source: CVSR track chart, FRA inventory data, CVSR maintenance drawings

| | Street | Type | ID# | FRA Inventory Data | |
|---------------------------|--------------------|---------------|---------|--------------------|-----------------|
| <i>At Grade Crossings</i> | | | | | |
| 46.8 | Bath Ch 42 | FL | 142942U | 142942U | W Bath Rd |
| 48.2 | Ira Rd Ch 46 | FL | 142944H | 142944H | Ira Rd |
| 49.9 | Everett Rd Sh7 | FL | 142947D | 142947D | Everett Rd |
| 40.5 | Walnut St | FL | 142949S | 142949S | Walnut St |
| 40.5 | North St | FL | 142950L | 142950L | North St |
| 40.7 | Hickory St | FL | 142952A | 142952A | Hickory St |
| 41.1 | Hickory St | FL | 142953G | 142953G | Hickory St |
| 44.1 | Portage Meriman | FL | 142956C | 142956C | Merriman Rd |
| 45.2 | Smith Rd | FL | 142957J | 142957J | Smith Rd |
| 51.0 | Akron-Boston Rd | FL | 142959X | 142959X | Riverview Rd |
| 52.8 | Main St Sr303 | FL | 142962F | 142962F | Main St |
| 54.5 | Boston Mill Rd | FL | 142967P | 142967P | Boston Mills Rd |
| 56.4 | Vaughn Rd | FL | 142973T | 142973T | Vaughn Rd |
| 63.3 | Hillside Rd | FL | 142986U | 142986U | Hillside Rd |
| 65.0 | Old Rockside Rd | FL | 142990J | 142990J | Old Rockside Rd |
| <i>Overhead Crossing*</i> | | | | | |
| 53.9 | Ohio Turnpike I80 | OHBR# 448A | 1429658 | | |
| 53.4 | Private | OHBR# 445A | 142953H | | |
| 54.3 | SH 271 | OHBR# 4488 | 142966H | | |
| 58.9 | Brecksville Rd | OHBR# 453A | 142979J | | |
| 62.0 | Pleasant Valley Rd | OHBR# 453B | 142981K | | |
| 66.3 | SH 17 | OHBR# 456A | 142992X | | |
| 64.9 | New Rockside Rd | OHBR# 456AA | 142989P | | |
| 66.1 | SR 480 | OHBR# 456AB | 142991R | | |
| 66.4 | Private | OHBR# 456B | 142993E | | |
| 40.3 | Howard St | OHBR# 436 | 142936R | | |
| 41.6 | West Tallmadge | OHBR# 437-1/4 | 142954N | | |

* OHBR# is the overhead bridge designation from the existing track chart for the CVSR

Maintenance facilities

Storage for equipment and CVSR track inspections (i.e., hi-rail vehicles used by track inspectors) is located at the Fitzwater Maintenance Yard. Equipment used for track maintenance is stored in other areas in the park since track maintenance is the responsibility of NPS. The larger building at the yard consists of an enclosed structure with two bay pits used for inspection and maintenance of rail equipment as well as storage of supplies, parts, and machinery. The smaller building at the yard provides office space, the central dispatching location, a meeting room, and storage for both merchandise inventory and rail supplies and parts.

CVSR's vehicle storage is sufficient for the current operating condition. Vehicles that have been refurbished and are considered to be in "operational condition" are stored at Fitzwater Maintenance Yard to be included in the train consists. Other vehicles acquired that are awaiting substantial repairs are stored at the access track north of Rockside station, outside the park boundary.

Locomotives and passenger cars requiring diesel are fueled at a shed located at the Fitzwater Maintenance Yard. The fueling tank at this shed has been removed due to a spill, and a catch basin was built under the track, approximately a locomotive in length, to catch any spilled fuel during fueling operations. Each vehicle that requires fuel must be moved over the catch basin. This is an acceptable practice, but it is time consuming.

Inventory and condition of rolling stock

Current usage

In the height of the season, June through October, CVSR runs three round-trip excursions Wednesday through Sunday. The train consists of two locomotives, one locomotive on either end of the train, a dome car, four or five coach cars, a car with handicap access, a concession car, a baggage car for the Bike Aboard program, and a baggage car with a generator to supply head-end power to the train. The number of cars in the train varies slightly depending on the expected passenger make up. There are several special cars, described later in this section, which can be added to the train for charter groups. Figure 32 shows an example of a full train at Brecksville Station. For a detailed description of each car and locomotive that operates on the CVSR, please refer to Appendix B in the *Cuyahoga Valley Scenic Railroad Five-Year Equipment Plan* from February 2012. This document contains information on the condition, major repair needed, and future plans for all rolling stock used by the railroad. It also includes five-year maintenance costs for all rolling stock that the railroad intends to retain over that period.

Figure 32
Entire train at Brecksville Station

Source: Richard Thompson



Locomotives

Currently eight locomotives are on site at CVSR. The locomotives are listed in Table 18. Seven locomotives were made by American Locomotive Company (ALCO) or Montreal Locomotive Works (MLW) and are owned by CVSR. Since MLW was owned by ALCO at the time the locomotives were manufactured, these locomotives are very similar. These locomotives range in horsepower from 1,600 to 2,400 hp.

The eighth locomotive, an Electro-Motive Diesel (EMD), is being leased by CVSR. This locomotive is an onsite back up and is only used by CVSR when needed. The leasing agreement is arranged so that CVSR only pays for the locomotive when it is used. This lease is open-ended; the locomotive may not be available in the long term.

As shown in Table 18, the existing fleet of locomotives ranges in age from 54 to 47 years old. Two of these locomotives (365 and 6767) are out of service entirely. CVSR has recently been awarded \$994,000 by the Paul S. Sarbanes Transit in Parks (TRIP) program to use locomotive 365 as a platform for a locomotive rebuild with green technology. CVSR is also exploring the potential for stripping locomotive 6767 of its prime mover and traction motors and using it as a non-powered control unit. This control unit would allow CVSR to operate in push-pull mode without the need for an additional locomotive, providing train control when oriented in the leading position of the train.

Table 18
Locomotives at CVSR

Source: CVSR

| Number | Manufacturer | Horse-power | Leased or owned? | In service? | Year built | Model | Five Year Planned Maintenance Cost |
|---------|--------------|-------------|------------------|-------------|------------|---------|--|
| 365 | ALCO | 2000 | Owned | No | 1965 | C-420 | \$994,000 TRIP funding for rehab/rebuild |
| 1822 | MLW | 1800 | Owned | Yes | 1958 | RS-18 | \$0 |
| 4241 | MLW | 2400 | Owned | Yes | 1966 | C-424 | \$0 |
| 6767 | MLW | 1800 | Owned | No | 1958 | FPA-4 | Looking to convert to control car |
| 6771 | MLW | 1800 | Owned | Yes | 1959 | FPA-4 | \$10,000 |
| 6777 | MLW | 1800 | Owned | Yes | 1959 | FPA-4 | \$8,000 |
| B&O 800 | MLW | 1800 | Owned | Yes | 1959 | FPA-4 | \$20,000 |
| 1420 | EMD | 1500 | Leased | Yes | 1979 | GP-15-1 | |

Even though there are two locomotives on each train, only the lead locomotive provides tractive effort. In rare instances of foul weather or when operating with an unusually large consist, the trailing locomotive can provide tractive effort, but will not be controlled by the lead locomotive. In this case, a separate engineer is in the trailing locomotive, communicating with the lead locomotive engineer by radio.

The railroad has had a leased GP15 EMD locomotive (#1420) with 1500 hp on site since December of 2011. This level of horsepower was found to be sufficient for the operating environment at CVSR. From April 9th to July 1st of 2012, a 1400 hp genset switcher locomotive on loan from National Railway Equipment Company (NREC) was on site at CVSR to test the feasibility of a 1400 hp locomotive for their operations and to measure the fuel savings from using this locomotive compared to the ALCO/MLW locomotives currently on site. Genset locomotives utilize multiple diesel engines that can be turned on or off at any given time, depending on the power required by the operational conditions. This loaned locomotive has two 700 hp engines mounted to individual electrical generators. While switcher locomotives are typically used for assembling trains and moving cars around rail yards, the power requirements and low speed operation of the CVSR make this unit a suitable alternative to a passenger locomotive. As a result of this test, the railroad has been able to confirm that a 1400 hp switcher locomotive can provide sufficient power for their operating conditions and provide significant fuel savings over their existing locomotives.

The Baltimore and Ohio (B&O) locomotive, Figure 33, is from the Ohio region and has sentimental value to the neighboring community. Although the exact locomotive never ran on the CVSR line, there is local interest and private funding to keep this locomotive in service.

Figure 33
B&O 800 locomotive

Source: Richard Thompson



Passenger cars

Twenty-three passenger cars are on site at CVSR. Eleven of these are currently in service. Table 19 lists the cars on site and gives basic information on ownership status, service condition, build date, and Multiple Unit (MU) capabilities.

Some of these cars are capable of running as MU trains, meaning they already have the connections that would enable a cab/control car to communicate with a trailing locomotive. A train configuration with a cab/control car at one end would allow the train to operate in shove mode and use only one locomotive. CVSR estimates that it would cost \$5,000 to \$6,000 to bring a non-equipped car to MU capacity.

CVSR relies heavily on eight cars owned by METRO Regional Transit Authority (METRO). These cars, numbers 161, 163-169, were manufactured by Budd in 1949. The lease agreement allows CVSR to use the cars free of charge, but CVSR must maintain the equipment. This is an open-ended lease; METRO has signaled no intention of recalling these cars in the near future. These cars were refurbished in the early 1990s, and now need additional repairs to remain in operation. In the next five years, CVSR is estimating that it will cost approximately \$25,000 each to maintain these cars. Repairs include roof repairs, restroom upgrades, and disk brake indicators. Car 162, also from METRO, is not in service and is being used as a parts car for the other METRO cars. This car would require repairs in excess of \$100,000 to return to service.

Five cars owned by CVSR are used for special occasions and charter events. The St. Lucie Sound, car 1 (Figure 34), features a wet bar, comfortable plush couches and chairs, a sleeping area, and entertainment center. CVSR has received an endowment from the family of Dennis Haslinger which pays for the yearly maintenance required for this car. The Cuyahoga Inn, Lounge Car 3126, includes a small kitchen area for serving drinks and food. The Malahat Mountain Parlour Car, 3052, includes tables and seating for 46 passengers. This car will require extensive repairs, estimated at \$55,000, which CVSR is planning to perform in 2013. The Emerson Dome, car 1105, includes dome seating on the upper level. The A.A. Augustus, 2914, is a coach car that is occasionally used for special events and charters. This car has had significant sponsorship in excess of \$100,000 over the course of its time at CVSR; the railroad is currently in search of a long term sponsor for this car.

Three Budd cars built in 1939 are on the property: Corbin (110), Renner (111), and Stark (112). Currently, none of these cars is in service. It would require extensive shop repair to return them to service. At this time, there is no estimate for the cost of repairs.

Four railroad diesel cars (RDCs) are on the property of CVSR, M-3, 9801, 9802, and 6003. CVSR is currently looking into the possibility of rehabilitating these cars to supplement their passenger fleet. If it is determined that these cars cannot be rehabilitated at a reasonable cost, CVSR will most likely scrap them in the near future. The Boston and Maine coach car, 6146, is also recommended for scrap.

CVSR's cars and locomotives range in age from 56 to 73 years old. Considerable challenges exist in keeping a fleet of this age safely and reliably operating. A summary of repair costs anticipated by CVSR for the next five year is found in Appendix B in the *Cuyahoga Valley Scenic Railroad Five-Year Equipment Plan*.

Table 19
Passenger cars on site at CVSR

Source: CVSR

| Number | Name | Leased or owned? | In service? | Year built | Equipped with Multiple Unit? | Five Year Planned Maintenance Cost |
|--------|-----------------------------------|------------------|-------------|------------|------------------------------|------------------------------------|
| 161 | METRO | Leased | Yes | 1949 | Yes | \$24,500 |
| 162 | METRO | Leased | No | 1949 | Yes | Used for parts |
| 163 | Beaver Cove (METRO) | Leased | Yes | 1949 | Yes | \$24,500 |
| 164 | Jesse A. Hall (METRO) | Leased | Yes | 1949 | Yes | \$24,500 |
| 165 | Key Bank (METRO) | Leased | Yes | 1949 | Yes | \$24,500 |
| 166 | Omnova (METRO) | Leased | Yes | 1949 | Yes | \$24,500 |
| 167 | Simon Perkins (METRO) | Leased | Yes | 1949 | Yes | \$24,500 |
| 168 | Reinberger (METRO) | Leased | Yes | 1949 | Yes | \$24,500 |
| 169 | Spirit of Summit (METRO) | Leased | Yes | 1949 | Yes | \$24,500 |
| 1 | Saint Lucie Sound Observation Car | Owned | Yes | 1947 | No | Estimate needed |
| 3126 | Cuyahoga Inn | Owned | Yes | 1949 | No | \$9,600 |
| 3052 | Malahat Mountain Parlour Car | Owned | Yes | 1946 | No | \$55,000 |
| 1105 | Emerson Dome | Owned | Yes | 1948 | No | Estimate needed for roof repair |
| 2914 | A.A. Augustus | Owned | No | 1948 | No | \$11,000 |
| 110 | Corbin | Owned | No | 1939 | No | N/A |
| 111 | Renner | Owned | No | 1939 | No | N/A |
| 112 | Stark | Owned | No | 1939 | No | N/A |
| M-3 | RDC | Owned | No | 1950 | No | N/A |
| 9801 | RDC | Owned | No | 1953 | No | N/A |
| 9802 | RDC | Owned | No | 1952 | No | N/A |
| 6003 | RDC | Owned | No | 1956 | No | N/A |
| 6217 | Coach | Owned | No | 1947 | No | \$51,000 |
| 6146 | Boston and Maine | Owned | No | 1955 | No | To be sold for scrap |

Figure 34
Interior of St. Lucie Sound

Source: Volpe Center



Handicap accessible cars

CVSR has two cars, listed in Table 20, which have been redesigned and rebuilt by CVSR staff as handicap accessible cars. These cars feature wheelchair lifts and fold-up seats. Passengers who require the use of a wheelchair are restricted to the car once on board as the passages between the cars are not accessible. Seating for passengers who do not require the use of a wheelchair is available in this car. There is one lift on each side of the car. The lift takes approximately three minutes to board each passenger in a wheelchair. Figure 35 shows the loading of a passenger onto car 105 at Rockside Station. Figure 36 shows the inside of car 105, with the retrofitted passenger seats folded up.

Table 20
Handicap accessible cars at CVSR

Source: CVSR

| Number | Name | Leased or owned? | In service? | Equipped with Multiple Unit? | Five Year Planned Maintenance Cost |
|--------|----------------|------------------|-------------|------------------------------|---|
| 727 | Invacare | Owned | Yes | No | TRIP program awarded \$144,670 for rehabilitation |
| 105 | Accessible Car | Owned | Yes | Yes | \$2,000 |

Figure 35
Accessible car 105 loading a passenger
Source: Volpe Center



Figure 36
Interior of accessible car 105
Source: Volpe Center



Concession cars

CVSR owns three concession cars (Table 21). The two main concession cars are 8700 and 8704. Car 89 is used when the need arises for a third concession car. The concession cars sell coffee, tea, light snacks, drinks, and CVSR gift shop items. The cold drinks are stored in coolers since there is no refrigeration on the concession cars. Figure 37 shows a portion of the interior of concession car 8700.

Table 21
Concession cars at CVSR

Source: CVSR

| Number | Name | Leased or owned? | In service? | Year built | Equipped with Multiple Unit? | Five-Year Planned Maintenance Cost |
|--------|-------------------|------------------|-------------|------------|------------------------------|------------------------------------|
| 89 | Lone Star (steel) | Owned | Yes | 1947 | No | Need estimate |
| 8700 | Café | Owned | Yes | 1950 | No | \$7,000 |
| 8704 | Café | Owned | Yes | 1950 | No | \$7,000 |

Figure 37
Interior of concession car 8700

Source: Volpe Center



Equipment cars

CVSR currently owns three baggage cars, two of which are in service (Table 22). Cars #1129 and #3450 are used for Bike Aboard service and other special events. Car #9108 is currently not in service. Within the next few years, Amtrak will be retiring approximately 50 to 60 baggage cars, and CVSR hopes to obtain some of those cars. Figure 38 shows a baggage car being loaded with bikes for the Bike Aboard program.

Table 22
Baggage/Bike Aboard cars
 Source: CVSR

| Number | Name | In service? | Leased or owned? | Year built | Equipped with Multiple Unit? | Five Year Planned Maintenance Cost |
|--------|-------------------|-------------|------------------|------------|------------------------------|---|
| 1129 | Baggage (Steel) | Yes | Owned | 1947 | No | Transit in Parks Awarded \$137,000 for rehabilitation |
| 3450 | Stainless Baggage | Yes | Owned | 1942 | No | No estimate available |
| 9108 | NYC Baggage | No | Owned | 1947 | No | No estimate available |

Figure 38
Baggage Car being loaded for Bike Aboard
 Source: Steven Melvin (with permission)



Head-end power

Head-end power (HEP) is power that is supplied by the locomotive and used for the electrical needs of the train, such as lighting, air conditioning, heating, and any other electrical needs. The Passenger Rail Investment and Improvement Act (PRIIA) specification for diesel electric locomotives, which will be used to purchase many locomotives across the country with government funds, requires 600 kW of head-end power from the locomotive. This is greater than what the current trains at CVSR require, but it is a good target for future power solutions.

Currently one generator car, 688 (Figure 39), is on site at CVSR. This car is a baggage car with the roof partially cut out, which allows for a 225 kW Caterpillar generator to be placed inside. The generator is leased. While this car is currently in service, CVSR is looking to replace it this year and have received \$575,000 in TRIP funds for its replacement. The money will be spent to purchase the power car and refurbish it by painting it and replacing one of the genset engines.

Figure 39
Locomotive 4241 and HEP car 688 crossing Bridge 437 in Akron

Source: Richard Thompson



The coach cars need approximately 20 kW each, the metro cars need 40 kW each, and a typical full-service concession car requires 150 to 200 kW. While the current concession cars do not need 200 kW, the future power solutions should keep this possibility in mind. In addition to the generator car, some of the coach cars have underbody generators. Table 23 lists these cars.

Table 23
Cars with underbody generators

Source: CVSR

| Name | Number | Generator power |
|----------|--------|-----------------|
| Café | 8704 | 50 kW |
| Coach | 6217 | 80 kW |
| Lonestar | 89 | 140 kW |
| ADA | 105 | 150 kW |

Maintenance shop and vehicle

The maintenance shop has equipment necessary to perform most repairs. The inventory of tools includes jacks, welding equipment, air compressors, overhead crane, and machining tools. The shop does not have a drop table or a wheel truing machine. Wheels are sent out to be trued. The brakes are sent to a certified brake shop.

The shop is staffed by a chief mechanical officer (CMO), who is on contract to CVSR and works 108 hours or more each month. Two full-time mechanics with basic wiring and shop skills are also employed. Recently, the shop at CVSR has started maintaining records of the shop report, in line with FRA requirements.

With FY2012 TRIP funds, CVSR purchased a new Ford F-250 hi-rail vehicle for track inspection and maintenance.

Revenue and cost streams

Introduction

CVSR faces many of the same financial challenges and opportunities that similar operators in the industry are experiencing. The scenic railroad industry in the United States is defined by relatively low-operating and capital costs. The industry frequently utilizes existing rail rights-of-way to enhance recreational enjoyment, create economic development, and demonstrate the popularity of non-automobile transportation.

Industry operators frequently utilize volunteer labor to organize and staff operations. Capital expenditures are kept low due to the surplus of heritage rail equipment predating the creation of Amtrak in 1971 entering the market. Reinvestment in rail systems' rolling stock by States and transit agencies has made rolling stock accessible and affordable. In addition to having a strong management team and community support, CVSR has benefitted from these industry trends, which has resulted in a stable financial position with no long-term debt and a high-revenue recovery ratio from operations.

The Cuyahoga Valley Preservation and Scenic Railway Association maintains financial responsibility for the maintenance and operations of its train services along trackage owned and maintained by the NPS. A cooperative agreement outlines the roles and responsibilities of both CVSR and NPS. This agreement will expire on December 20, 2016.

Revenue overview

CVSR derives most of its revenue from two key sources: financial contributions (support) and revenues derived from operations (direct revenues). Within each source are individual sub-sources. In FY 2010, direct revenues constituted 90 percent of total yearly revenue, with support comprising 10 percent of the total. In FY 2011, direct revenues constituted 72 percent of total revenues, while support comprised 28 percent of revenues. Figure 40 summarizes each source and sub-source as a percentage of total revenues in both FY 2010 and 2011. This section details each source and sub-source and potential risks and opportunities for the future.

Figure 40
Revenue snapshot, 2010 and 2011³⁴

Source: CVSR

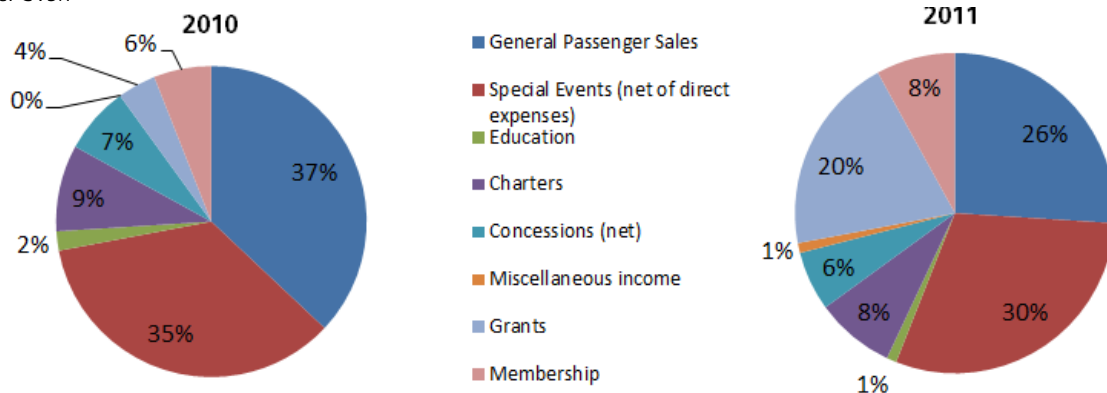


Table 24 outlines the nominal dollar amounts for direct revenue, support, and operating expenses for FY 2010 and FY 2011. Direct revenues declined by roughly 5 percent, support grew by 90 percent, and expenses grew 15 percent on a year-to-year basis. Total revenues rose 9.7 percent from FY 2010 to 2011.

³⁴ The grants portion is much larger in 2011 than in 2010 because CVSR was more successful in securing federal grants in 2011. Also, revenue from ticket sales was lower in 2011 than in 2010 due to track work, so revenue was smaller overall in 2011 than in 2010.

Table 24
Operating financial snapshot
 Source: CVSR

| Category | 2010 | 2011 |
|-----------------------------|-------------|-------------|
| Direct revenue | \$2,522,701 | \$2,377,142 |
| Support (donations, grants) | \$487,172 | \$925,807 |
| Operating expenses | \$2,430,896 | \$2,795,414 |

Direct revenue

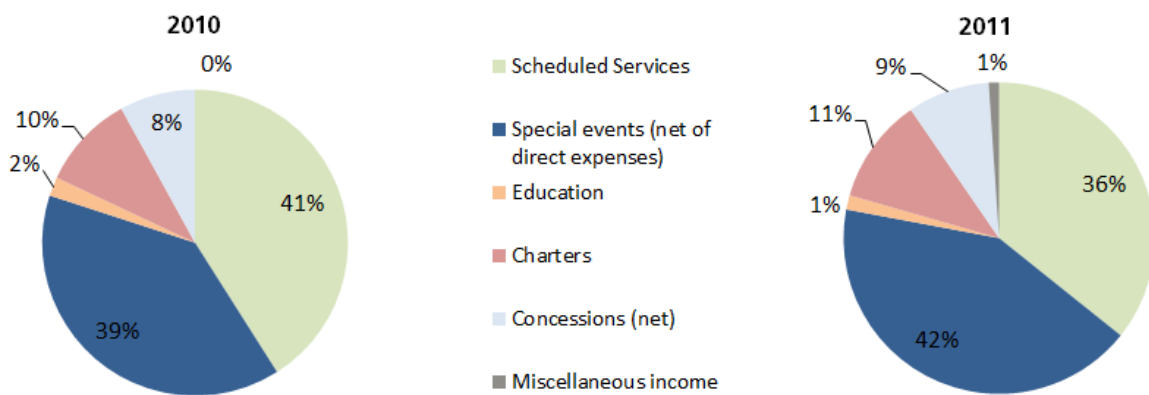
Direct revenues, defined as all forms of income earned through activities, comprises the most significant portion of CVSR’s revenue sources. In FY 2010, direct revenues accounted for 90 percent of total revenue figures. Ticket sales comprised the bulk (91.2 percent) of direct revenues with concessions comprising roughly 6.5 percent. Miscellaneous income and income related to investments comprised the remaining 2.3 percent of revenues in FY 2011.

Ticket sales were further divided between six major categories of revenue generation:

- Regularly scheduled services
- Special events
- Education
- Charters
- Concessions
- Miscellaneous income

Figure 41 outlines the relative importance of each category of direct revenue for FY 2010 and 2011. Revenues derived from ticket sales of scheduled services and special events comprised roughly 80 percent of direct revenues.

Figure 41
Direct revenues by category, 2010 and 2011
 Source: CVSR



Scheduled service fares

CVSR currently operates a simplified fare structure for its standard scenic tours and for its special events. In FY 2010, scheduled services, including the Canton Flyer and the scheduled scenic trains brought in \$1,039,909. In FY 2011, this figure declined to \$849,567, a decrease of 18 percent, which was due partially to a series of unforeseen events discussed previously, which prevented CVSR from running its services as

scheduled during the peak season. Ridership surpassed 2010 figures in FY 2012, with a record ridership of 213,347.

Risks

None.

Special events

Special Events are an extremely important part of CVSR’s revenue base, comprising 39 percent of direct revenues in FY 2010 and 42 percent in FY 2011. This revenue source, totaling roughly one million dollars per year, is heavily driven by programmatic decisions made by CVSR leadership. Special events are a tool to extract greater value out of the rolling stock by increasing utilization of the capital stock when it would otherwise not generate revenue. In addition, special events generate more revenue per rider than scheduled services, offering CVSR an opportunity to use the profits from these services to accomplish other strategic goals.

CVSR runs a number of successful themed trains including Ales on the Rails, Grape Escape, Polar Express™, and A Day Out with Thomas™. Table 25 outlines the net margin for CVSR for each venture in FY 2010 and FY 2011, which suggests that each of these events is a lucrative form of income.

Table 25
Recurring event trains

Source: CVSR³⁵

| Event | 2010 | | | 2011 | | |
|------------------------|-------------|-----------------|------------|-------------|-----------------|------------|
| | Revenue | Direct Expenses | Net Margin | Revenue | Direct Expenses | Net Margin |
| A Day Out with Thomas™ | \$394,895 | \$214,079 | 45.8% | \$360,612 | \$231,165 | 35.8% |
| Ales on Rails | \$55,545 | \$21,045 | 62.1% | \$40,227 | \$16,437 | 59.1% |
| Grape Escape | \$149,021 | \$56,266 | 62.2% | \$142,532 | \$52,132 | 63.4% |
| Polar Express™ | \$1,194,722 | \$365,468 | 69.4% | \$1,332,970 | \$442,452 | 66.8% |

Risks

Although the special events are well-subscribed, it is important to understand their impact on operating costs. As it is challenging to track and allocate costs where they are incurred, Table 26 illustrates the importance of recognizing that indirect costs, such as advertising, personnel costs, insurance, and other overhead related expenses can reduce the perceived profitability of a given service. Although the direct costs of operating and staffing the additional runs are a relatively insignificant portion of total operating costs, CVSR should closely track revenues generated from new services.

Table 26
Allocation of special events costs

Source: CVSR

| | 2010 | 2011 |
|--|-----------|-------------|
| Net Revenue | \$991,468 | \$1,003,435 |
| Operating Costs Allocated by Percentage of Direct Revenues | \$948,089 | \$1,174,073 |
| Net Margin | 9.5% | -11.6% |

³⁵ The revenue numbers in this table are different than the value of the tickets sold in Figure 15. This difference is due to revenue not equating to the value of the tickets sold, which is reflected in the data sources used for this information.

Charters

In FY 2010, CVSR earned \$238,419 from charters, growing to \$260,420 in FY 2011, an increase of 9.2 percent, and providing roughly 11 percent of yearly direct revenues. CVSR offers a variety of pricing structures for charters, including three different types of privately chartered train-runs and chartered cars attached to regularly scheduled service. Table 27 outlines the pricing and options for charters as of 2012.

Table 27
Rail charter options

Source: CVSR

| Train Type | Price | Rolling Stock | Length |
|--|-----------------------------------|---|---------|
| Scenic Charter | \$3,240 | Three standard coaches | 3 hours |
| Executive Charter | \$3,552 | St. Lucie Car, Lounge Car, standard coach | 3 hours |
| Coach Charter | \$1,600 | One standard coach | 2 hours |
| Caboose Charter | \$1,500 | Caboose | 2 hours |
| <i>Chartered Car on Scheduled Services</i> | | | |
| Chartered Car | \$1,080 \$1,150 (October only) | One standard coach | 3 hours |
| St. Lucie | \$912 | St. Lucie Car | 3 hours |
| Lounge | \$1,120 | Lounge Car | 3 hours |
| Parlour | \$1,176 | Parlour Car | 3 hours |
| Emerson | \$1,536 | Emerson Dome | 3 Hours |
| Additional Coaches | \$480 | One standard coach | 3 hours |

Risks

CVSR should remain cognizant of the direct and indirect costs of operating individual private charters. Although chartered cars on scheduled services offer an excellent opportunity to increase revenue with very little additional incremental costs, privately chartered trains have start-up, operating, and maintenance costs. For instance, the Caboose charter at \$1,500 is considerably less lucrative than the standard scenic charter, considering the relatively similar costs for providing the two services.

Concessions

Concessions form a small but significant portion of CVSR's direct revenue mix. In FY 2011, CVSR earned \$202,694 (7.2 percent of direct revenue), roughly even with the FY 2010 figure of \$204,704, when concessions comprised roughly 8 percent of direct revenues. Scheduled services are equipped with a concessions car that helps make the ride more pleasant and provides a useful method of increasing revenue per passenger. The concessions car is also available for use during chartered services.

Risks

CVSR has taken new steps to reach out to local food providers to add diversity to its catering offerings. Although outsourcing has the potential to improve the visitor experience and bring additional revenues from a more appealing array of concessions, adding outside vendors introduces quality control and management demands on CVSR staff.

Miscellaneous income and educational services

Miscellaneous income, which includes scrap sales, metal recycling revenue, and the sale of miscellaneous equipment, comprised less than 2 percent of revenue for both FY 2010 and FY 2011.

Risks

None.

Revenues per rider

Given the diversity of the scenic railroad industry in the United States, it is useful to examine the revenue position of industry peers. There is significant variety in the revenues collected per rider by different scenic railways in the United States and Canada (Table 28). The Hocking Valley Railway, also located in Ohio, is typical among the small, volunteer-led organizations in terms of revenue per rider. However, another nonprofit operator, the Western Maryland Scenic Railway, earned significantly more revenue per rider on a similar route length and travel time period.

Table 28
Revenue and ridership

Sources: Adirondack Scenic Railway, CVSR, Internal Revenue Service

| Organization Name | Revenue Per Rider | Ridership | Revenue | Trip Length (Round-Trip) | Ride Duration |
|---|-------------------|----------------|--------------------|--------------------------|--------------------|
| Hocking Valley Railway (N.P.), 2010 | \$12.48 | 39,000 | \$486,896 | 14 Miles | 1 hour 45 minutes |
| Adirondack Scenic Railway (N.P.) | \$13.43 | 32,945 | \$442,451 | 20 miles | 3 hours |
| Berkshire Scenic Railway & Museum (N.P., 2010) | \$19.82 | 16,000 | \$317,060 | 18 miles | 2 hours 30 minutes |
| Cuyahoga Valley Scenic Railway (N.P.) 2010 | \$24.07 | 195,662 | \$4,710,194 | 50 miles | 3 hours |
| Cass Scenic Railway State Park | \$29.59 | 14,000 | \$484,387 | 22 miles | 4 hours 30 minutes |
| Western Maryland Scenic Railroad (N.P., 2010) | \$47.69 | 38,000 | \$1,812,327 | 32 miles | 3 hours 30 minutes |
| White Pass and Yukon Railway (F.P., 2008) | \$68.03 | 438,000 | \$29,800,000 | 40 miles 135 miles | 3 hours 6 hours |
| Cumbres & Toltec Scenic Railway (N.P.) | \$84.09 | 29,326 | \$2,466,000 | 64-128 miles | 6 hours |

Case study

The Cumbres & Toltec Scenic Railway has been very successful in attracting passengers in the United States. Chartered jointly by the States of New Mexico and Colorado and operated by a concessionaire overseen by a joint commission, the railroad's revenues have generally been sufficient to cover all operating costs, except in years that natural disasters have inhibited the railroad to operate during the peak tourist season.

A request for proposals was issued in the fall of 2011 by the Cumbres & Toltec Scenic Railroad Commission, with the goal of having a new operator attract passengers up from roughly 30,000 yearly riders to a long-term goal of 60,000. Expected revenues generated from the greater number of riders will allow the railroad to also become self-sufficient for capital expenditures. The C & T has one of the highest revenue per rider figures in the industry as its train rides are normally six hours or longer and travel on the longest and highest narrow-gauge trackage in the nation.

Financial contributions/support

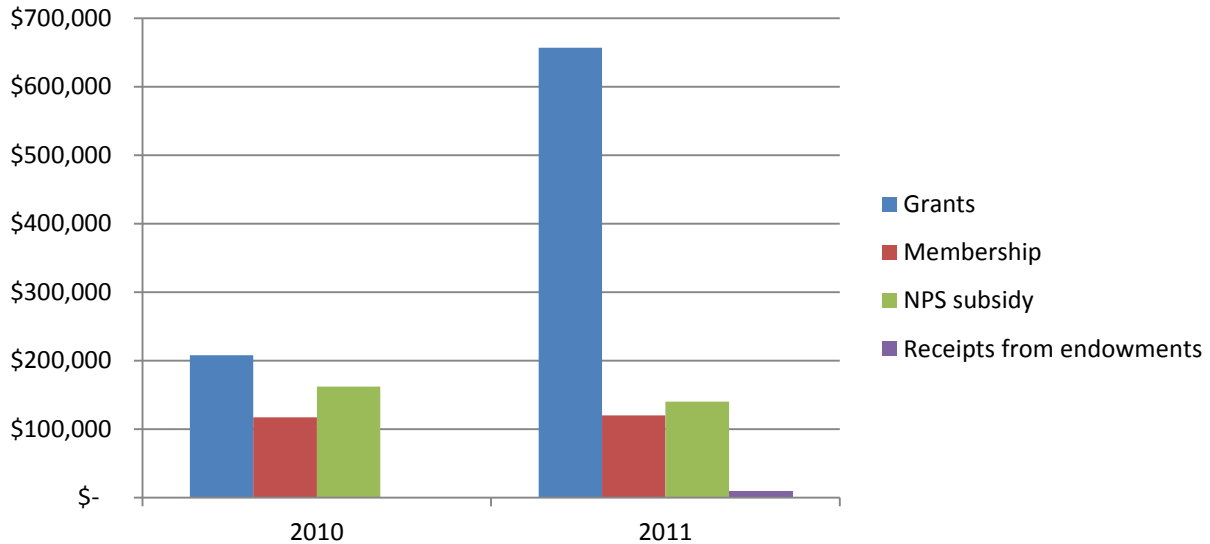
CVSR has an active development strategy and has received over \$1.7 million in donations from 98 foundations, trusts, and businesses over the last five years, mostly from locally based donors. The fundraising goal for 2012 is \$670,000, which is in line with donations received in recent years.

In FY 2011, support reached \$925,807, up from \$487,172 in FY 2010. Various events in FY 2011 resulted in support constituting a larger percentage of the budget than was historically true (28 percent in 2011 vs. 10 percent in 2010). This change was chiefly due to track repairs and bad weather that resulted in the railroad

remaining idle for a portion of the 2011 season, which reduced ticket revenues. CVSR was able to fill this gap with additional grant support. It is expected – based on fundraising goals outlined in the “Strategic Fundraising Plan 2012-2016” – that support should return closer to its historical averages in the near future. Figure 42 presents the value of each category of support in both FY 2010 and FY 2011.

Figure 42
Levels of support by category, 2010 and 2011

Source: CVSR



Grants

CVSR created a strategic fundraising plan in 2012 that put an emphasis on increasing grant support. For organizations such as CVSR, the majority of gifts often come from a small number of generous individuals, along with grants from foundations. However, the previous recession has shown that although grants can be a lucrative source of support, reliance on these sources can increase the instability of revenue sources. CVSR has been successful in reaching its goal of increasing grant support; in 2010, grants totaled \$207,728, while in 2011, grants reached \$656,582, a greater than 300 percent increase year to year. While this growth suggests that CVSR has been successful in realizing its goals outlined in the strategic fundraising plan, these figures do highlight the variability inherent in the grant process.

Risks

The variability of the grant process speaks strongly to the need to take a conservative approach to utilizing grants to fund operations. Going forward, a prudent approach to relying on grants for operations may not be a financially viable strategy to managing the risks inherent in the grant award process. When possible (according to the grant stipulations), CVSR should utilize grant funds to finance capital investments and programs that are easily retired or reduced to avoid becoming over reliant on grant to fund operations.

Memberships

CVSR categorizes its fundraising efforts into three major categories of gifts: Individual Support, Foundation Support, and Corporate Support. Individual memberships have proved relatively successful, raising \$100,000 in FY 2010, although the 2010 fundraising goal was \$160,000. Individual memberships are structured with the tiers listed in Table 29.

Table 29
Individual membership classes

Source: CVSR

| Class | Dollar Amount | Broader Benefit | Priority Access to Polar Express Tickets |
|---------------------------------|---------------|--|--|
| Sectionhand | \$50 | Discount on scheduled services and concessions | - |
| Brakehand | \$100 | Discount on scheduled services and concessions | 8 seats |
| Stationmaster | \$250 | Discount on scheduled services and concessions | 12 seats |
| Conductor | \$500 | Discount on scheduled services and concessions | 16 seats |
| Engineer | \$1,000 | Discount on scheduled services and concessions | 20 seats |
| St. Lucie Sound Founder Society | \$1,500 | Donors may reserve the Saint Lucie Sound luxury car for their private use on a regularly scheduled trip. | 24 seats |

Corporate and foundation memberships are available for purchase and the cost and benefits are negotiated on an ad-hoc basis. In FY 2010, CVSR reported only one foundation membership and no corporate memberships. According to the “Strategic Fundraising Plan 2012-2016,” corporate and foundation memberships are expected to be an opportunity for revenue growth.

Risks

The lack of clarity in the process of creating corporate and foundation memberships creates a potential risk that different sponsors will receive varying levels of benefits not commensurate with levels of support. In addition, the current individual membership structure does not appear to incentivize higher levels of giving. The “Conductor” level of membership costs \$500 per year and entitles a member to discounts plus the ability to buy 16 priority tickets on the Polar Express™ train. The “Brakehand” membership, at \$100 per year, entitles a member to enjoy the same discounts and half the number of Polar Express™ tickets (8) at 20 percent of the cost. Significant opportunities exist to reevaluate the membership structure to provide a more compelling set of benefits for significant donors.

Receipts from endowment

CVSR encourages planned giving to increase the stability of its revenue base. To that end, CVSR has created an endowment to provide a permanent source of revenue for the organization. As of 2011, all donations to the endowment restrict use of the principal, but allow CVSR to expend all the income generated yearly. Endowment balances were \$347,917 and \$370,274 at the end of FY 2011 and 2010, respectively. The distribution of income from invested assets was \$18,074 in FY2011 and \$22,242 in FY 2010 for returns of 5.2 percent and 6.06 percent, respectively.

Risks

Volatility in the investment climate presents a potential risk to the stability of the current endowment. The gifts that comprise the endowment are administered by the Cleveland and Akron Foundations. Investments, which consist largely of equities and money market accounts, have fluctuated from year to year. One gift, which earmarks all income for maintenance of the St. Lucie Sound train car, demonstrates the importance of maintaining enough flexibility in the operating budget to cover essential maintenance if endowment income is less than anticipated.

NPS subsidy

NPS currently provides CVSR with annual financial assistance that totaled \$140,000 in 2011 and \$162,000 in 2010. This grant will be reduced by \$28,000 per year until FY 2015, when the grant will be maintained at \$50,000 per year, contingent on appropriation by Congress and approval of the budget by NPS officials.

Risks

Subject to annual appropriations from Congress, the current agreement between NPS and CVSR outlines anticipated financial support each year. Congress retains the authority to increase, reduce, or end this support. Since the NPS funds constituted 15 percent of total support and only 5 percent of total revenues in FY 2011, CVSR should be able to adapt its revenue mix to avoid any serious impact from unanticipated changes in the NPS financial support.

Capital stock

The Federal Transit Administration (FTA) and NPS have been instrumental in providing capital funding to enable CVSR to improve its rolling stock and infrastructure. Grants have enabled CVSR to avoid long-term debt obligations.

As of 2011, CVSR has roughly \$4,481,869 in property and equipment. Rolling stock accounts for the bulk (87 percent) of CVSR's capital stock, with machine and equipment, track truck, office equipment, furniture, and seasonal fixtures, such as holiday decorations for Christmas and Independence Day accounting for the remainder.

CVSR funds capital investment and renewal of its rolling stock through grants and long-term lease of equipment, usually at no cost to the organization. Although this strategy ensures that CVSR has no long-term debt, it also ensures that the organization is dependent on grants for capital expenditures, limiting its ability to acquire the rolling stock that might attract more riders and offer premium rider services, procure more efficient locomotives, and add accessibility improvements that would speed operations.

Federal funding

In recent years, an important capital funding source for CVSR has been through the TRIP program. One of CVSR's strengths is its lack of long-term debt because it has relied heavily on TRIP grants to finance capital investments. Through this program, NPS has received \$5,792,266 in discretionary grants for CVSR planning, capital improvements, and equipment purchases from 2006 to 2012 (Table 30).

Passage of Moving Ahead for Progress in the 21st Century (MAP-21) eliminated funding for the TRIP program. CVSR will have to be aggressive in identifying new Federal grant sources. These and other potential sources for future funding are discussed later in this paper.

Table 30
TRIP funding received, 2006-2012

Source: Federal Register

| Fiscal Year | Project | Amount Received |
|--------------------|--|------------------------|
| 2006 | Develop plans to rehabilitate existing rail in CVNP | \$185,000 |
| | Prepare design documents to allow for upgrade of railroad signals at grade crossings of CVSR | \$170,000 |
| | Purchase a railroad maintenance vehicle to maintain 51 miles of railroad track | \$170,000 |
| | Purchase an additional ADA accessible railcar | \$373,000 |
| 2007 | Upgrade Rockside Railroad Boarding Station Area | \$187,000 |
| 2009 | Rehab/Replace Railway Bridges #454, #437 and #443 | \$970,000 |
| 2010 | Develop a Systematic Rail Transportation Plan for CVNP | \$300,000 |
| | Purchase Railroad Track Inspection Truck | \$65,000 |
| | Replace CVNP Scenic Railroad Knuckle Boom Support Vehicle | \$165,000 |
| 2011 | Rebuild Locomotive with Green Technology | \$994,000 |
| | Rehabilitate Accessible Car #727 | \$144,670 |
| | Rehabilitate Baggage Car for Bicycle Transport | \$136,620 |
| 2012 | Install Pedestrian Bridge | \$1,356,976 |
| | Replace Railroad Power Car | \$575,000 |
| | Total | \$5,792,266 |

Depreciation

CVSR uses straight-line depreciation for its capital stock. For rolling stock, the Internal Revenue Service depreciation life-cycle is ten years, machines and equipment, 3-10 years, vehicles five years, office equipment three years, furniture ten years, seasonal fixtures ten years, and uniforms five years. In FY 2010, \$268,317 worth of depreciation was expensed.

Expenses

CVSR's expenses may be categorized as those directly related to operations and maintenance, volunteer expenses, and those related to capital expenditures and improvements. Each is discussed in greater detail below.

Although operating expenses vary less than operating revenues, they are driven by the level of activity of CVSR programs. For instance, building and grounds expenses, salaries, wages, and temporary services largely remain fixed; locomotive fuel, program expenses, repairs, maintenance of rolling stock, and advertising, among other costs are largely driven by the scope of CVSR programs. Operating expenses can be largely categorized as follows:

Human capital costs:

- Salaries, wages, and temporary services
- Payroll taxes
- Employee insurance
- Employer retirement contribution
- Volunteer expenses
- Education and training expenses

Program and asset maintenance costs:

- Program expenses
- Fuel and oil
- Repairs and maintenance of rolling stock

- Building and grounds expenses
- Fitzwater maintenance
- Depot and boarding site expenses

Marketing and outreach:

- Advertising and promotional expenses
- Postage
- Licenses, permits, and subscriptions
- Travel
- Meetings

Other expenses

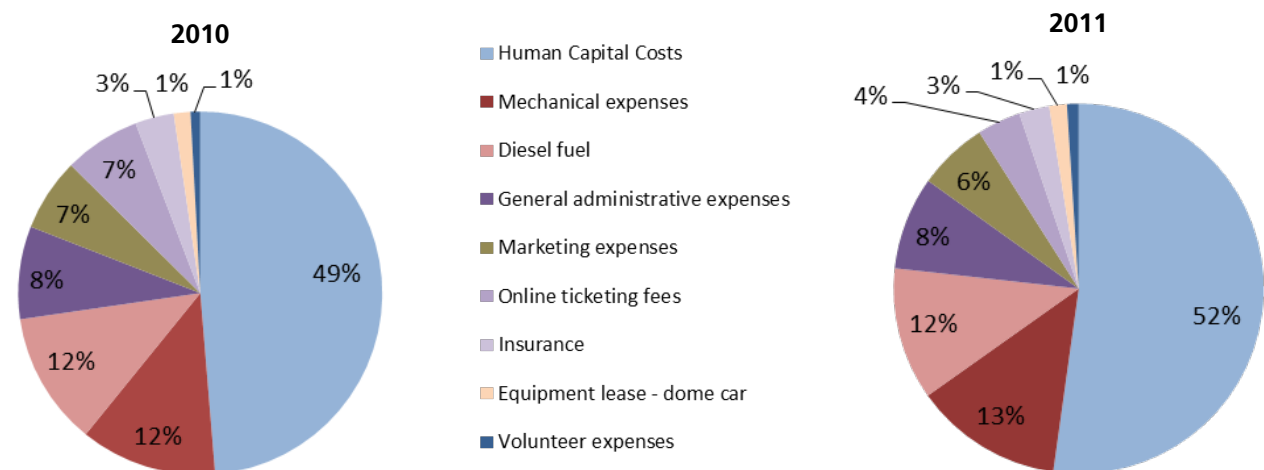
- Professional fees
- Credit card and bank charges
- Insurance
- Utilities and communication expenses
- Office supplies, leases, and expenses
- Miscellaneous expense
- Interest expenses
- Public transportation

In kind

- Volunteer hours
- Gifts

Figure 43 demonstrates the relative significance of human capital costs in CVSR’s budget. Constituting roughly 50 percent of total expenses, these costs will likely continue to grow in line with broad macroeconomic trends in health-care and retirement.

Figure 43
Expenses, 2010 and 2011
 Source: CVSR



Risks

Growth in pension, healthcare, and other human capital costs will be an increasingly significant portion of expenses incurred by CVSR. Although CVSR has an active volunteer base that reduces the need for staffing levels relative to the high level of activity, CVSR must be cognizant that employee costs have the potential to crowd out activities unless there is commensurate growth in revenues. Additionally, there is a risk that the volunteer pool will decline or fail to grow in proportion to growth in ridership, forcing CVSR

to increase the size of its staff. In fiscal year 2011, there were 67,414 volunteer hours, of which 44,127 were in the fourth quarter, mainly due to Polar Express™.

Conclusion

CVSR is in a relatively strong financial position. It has no long-term debt, a solid revenue recovery ratio, and a growing base of support from memberships, grants, and donations. Although recent passage of the new surface transportation bill has removed a key source of capital funding, CVSR has worked judiciously to introduce improvements to its asset base and rolling stock since 2006. In addition, with the development of its strategic fundraising plan and growth of its special events services, CVSR is in a good position to respond to growing costs and new initiatives with increased revenues to support the challenges and opportunities it faces.

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