

Survey Results for Rural Bus Rapid Transit (BRT) VelociRFTA and Future Human Factor Considerations

Conne Bazley¹, Peter Vink³

^{1,3}Delft University of Technology, Industrial Design Engineering, Delft, NL
Dan Blankenship²

²Roaring Fork Transportation Authority, Colorado, USA

With the uncertainty of light rail for public transportation in the USA, Bus Rapid Transit (BRT) is a growing trend. The Roaring Fork Transportation Authority (RFTA) has been in operation since 1983, and functions as a Regional Transportation Authority. RFTA is the second largest public transit system in Colorado, after Denver Rapid Transit Delivery (RTD). RFTA is also the largest rural public transit system the United States of America (USA) and BRT VelociRFTA is the first Rural Bus Rapid Transit system in the USA. Results are positive for rider satisfaction and bus and bus station safety and comfort from a recent customer survey of RFTA's VelociRFTA Bus Rapid Transit Program service and amenities. Ridership is up 22% for RFTA overall from 2013 with the introduction of the VelociRFTA BRT in the fall of 2013. Survey results will assist in training, productivity, well-being and sustainability for the existing and future RFTA programs. HFE recommendations for an updated dispatch control room are scheduled for fall of 2014.

1 INTRODUCTION

Proponents of light rail argue that the operating costs of Bus Rapid Transit (BRT) are not necessarily lower than light rail. The typically larger light rail vehicles enjoy reduced labor costs per passenger, and the unit capital cost per passenger can be lower than BRT (Mapco, 2014). However the general US population is leaning towards BRT for public transportation, particularly in smaller cities and rural areas (Wright and Hook, 2007).

There are two ways to shift more commuters out of single-occupancy vehicles and into other modes of transportation; incentivize transit by making other options more attractive, whether that's biking, carpooling, walking, or transit, or we can disincentivize driving by making it less attractive. It is increasingly apparent that the United States (USA) makes little progress to the first strategy without incorporating the second (Badger, 2014).

The Roaring Fork Transportation Authority (RFTA) is attempting the two strategies. In rural settings the options for public transportation are generally slim to none. Most public transportation is found in larger more densely populated cities. After 32 years of operation RFTA has introduced the first Rural Bus Rapid Transit (RBRT) system in the USA (RFTA, 2012).

The first BRT system was the Rede Integrada de Transporte ('Integrated Transportation Network') in Curitiba, Brazil, which entered service in 1974. This inspired many similar systems around Brazil and the world, such as TransMilenio in Bogotá, Colombia, which opened in 2000. As of November 2013 more than 166 cities around the world have implemented BRT, accounting for 4,336 km (2,694 mi) of BRT lanes. (Brtdata, 2014, SBS, 1996).

It is estimated that about 27 million passengers use BRT worldwide everyday, of which about 17 million are in Latin America, which has the most systems (Brtdata, 2014). To be considered BRT, buses should operate for a significant part of their journey within a fully dedicated right of way in order to avoid traffic congestion.

Due to the many differences and distinct features among existing BRT systems, the Institute for Transportation and Development Policy formed a BRT Standard Technical Committee in 2011, and in 2013 it set a minimum definition of what features must be part of a system to qualify as BRT and created a BRT Standard to rate existing systems (ITDP, 2014).

RFTA has been in operation since 1983, and functions as a Regional Transportation Authority. The RFTA region includes the communities of Aspen, Snowmass Village, Pitkin County, Basalt, a portion of Eagle County, Carbondale, Glenwood Springs and New Castle. RFTA provides commuter bus service from Aspen to Glenwood Springs (Roaring Fork Valley), Glenwood to Rifle (Hogback), intra city service in Aspen and Glenwood Springs, ski shuttle service to the four Aspen Skiing Company ski areas, Maroon Bells Guided Bus Tours, and a variety of other seasonal services. In 1996, RFTA was named the "Best Mass Transit System of North America" by Mass Transit Magazine. In 2003 RFTA was awarded three of the top honors by the Colorado Association of Transit Agencies (CASTA) including the award for "Large Transit Agency of the Year." The RFTA website has a list of awards, 1996-2013, and more information about RFTA (RFTA, 2013).

In 2013 RFTA was recognized by Washington, DC as a recipient of the White House Champions of Change Transportation Innovator and is the second largest public transit system in Colorado after Denver Rapid Transit Delivery (RTD). The implementation of VelociRFTA is a fundamental part of RFTA's 2017 Vision Statement (RFTA,

2013). It is the largest rural public transit system and the first (RBRT) system in the USA. (Sneak Peek, 2013)

A play on the word, “velociraptor”, the VelociRFTA (Figure 1), pronounced ve’las-e-raf’ta, is a cutting edge Bus Rapid Transit system comprised of thirteen bus stations that span 42-miles of State Highway 82 (Figure 2). This is a main travel artery for many area commuters and the very first of its kind in any rural U.S. area. Most Bus Rapid Transit systems operate in urban areas that are typically seven to ten miles long.



Figure 3 Compressed Natural Gas station inside maintenance facility.

RFTA has learned from its long-extinct namesake, and is confident VelociRFTA will prove the key to survival is the ability to rapidly adapt to changes in the economic environment. Eventually by 2025, if savings and efficiencies go as predicted, RFTA will transition its entire fleet of 92 buses to Compressed Natural Gas (CO&GA, 2012).

2 BRT BUS & STATION FEATURES

BRT buses (Figure 4) come by stations every 10 to 15 minutes during peak times and every half an hour during less busy times of the day. The low-floor buses allow for easy boarding on and off and have an easy to access and operate wheelchair ramp. Onboard wireless internet is free at the stations and real time electronic signs tell passengers when the next bus is due.



Figure 4 A new BRT VelociRFTA bus during operation.

There is free Wi-Fi at all of the 10 of VelociRFTA stations. Passenger shelters include enclosed waiting and seating areas, lighting, bicycle storage (covered and uncovered) and outside seating, trash and recycling bins. Restrooms and parking are optional at designated stations (Figure 5). Eight of the BRT stations are equipped with ticket vending machines.

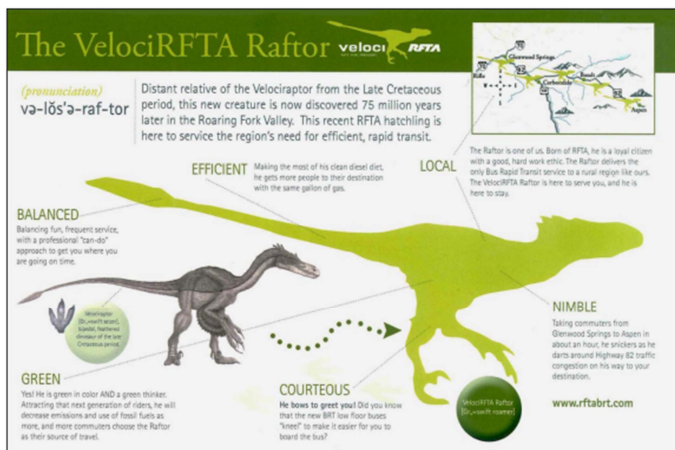


Figure 1 Inception and branding of VelociRFTA, the first rural bus rapid transit in the US that is fun, fast and frequent.

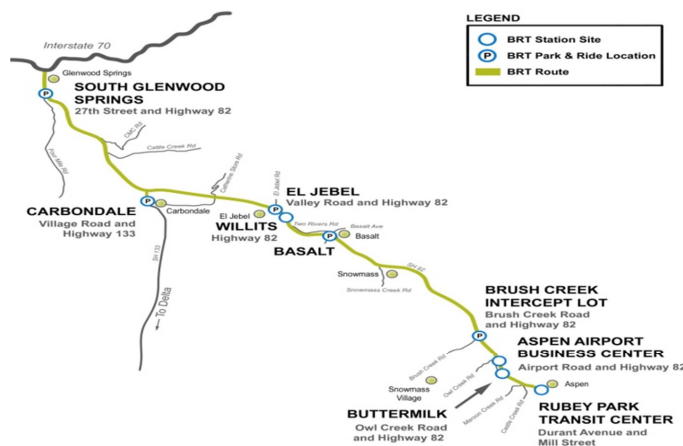


Figure 2 A map of the BRT VelociRFTA 42 mile route on State Highway 82.

RFTA currently operates a fleet of over 82 vehicles and carries about 4.5 million passengers annually and manages the Rio Grande Trail (bike and pedestrian trail) which goes from Glenwood to Aspen, and serves 10 communities and three counties with transit. In the fall of 2013, RFTA began the first rural bus rapid transit system in the nation. RFTA uses Biodiesel fuel in all of its fleet of diesel power vehicles including the hybrid buses, and ethanol in the gasoline vehicles. RFTA ordered 22 compressed natural gas (Figure 3) buses for the BRT VelociRFTA program (RFTA, 2013).



Figure 5 BRT VelociRFTA bus station complete with heaters in the shape of dinosaur eggs.

3 BEHIND THE SCENCES

RFTA runs 24 hours a day, 7 days a week for 365 days a year. Operations and Maintenance are located together in two different locations on either end of the 42 mile route and have a full staff of IT technicians, dispatchers, maintenance professionals and bus drivers. The majority of workers are employed in the tourism industry. The bus riders are a mix of work commuters and tourists. Winter is the high peak season for tourists, followed by summer. Due to a significantly higher number of bus riders, more drivers are required to work longer hours and have additional routes. Fall and spring ridership is lower and therefore fewer drivers. Each season comes with a set of challenges. There are several styles of buses and each style has different controls and seating (Figure 6 & Figure 7). Drivers often drive several different busses with seats and controls during an eight hour shift. Therefore training for bus drivers is very important. Experience and skill are imperative in order to switch from one set of controls to another under stressful situations e.g., snow and ice on the road.



Figure 6 The main control center for a bus driver.



Figure 7 Bus Driver seat and seat controls.

4 SURVEY

A 57 question RFTA passenger survey (including the BRT VelociRFTA) was distributed on all buses operating on one weekday in March 2014, although people were also advised that they could also complete a survey online. A similar survey was sent out in 2012. A total of 1,915 surveys were completed in 2014 compared with 1, 808 in 2012.

Some bus drivers were more proactive in handing the surveys out than others and, generally, the surveys were only handed out in the up-valley direction on the Highway 82 corridor buses and, perhaps, in both directions on the Aspen Snowmass Direct service, but primarily during the morning commuting hours. The potential total of people surveyed was ~ 6,000–8,000 participants, assuming that 50% of the daily ridership was comprised of individuals who took the survey in one direction during the morning, but did not bother completing it on the return trip. Also, drivers rarely distributed the surveys at night, since people could not see them without the lights turned on.

5 RESULTS & CONCLUSIONS

Total ridership showed an increase of 22% in early 2014 with the advent of the BRT VelociRFTA, which began in the fall of 2013 (Table 1).

Table 1.Subset of Roaring Fork Valley Commuter Service with BRT in 2014

Service	YTD May 2013	YTD May 2014	Dif +/-	%
Highway82 Corridor Local/Express	627,269	432,863	(194,406)	- 31%
BRT VelociRFTA		333,004	333,004	+ 33%
Total	627,269	765,867	138,598	22%

The survey results are quite extensive (WTCL, 2014). Therefore, for the purpose of this paper only a few areas will briefly be discussed and overview charts will be used. Figures 8-12 show demographic information.

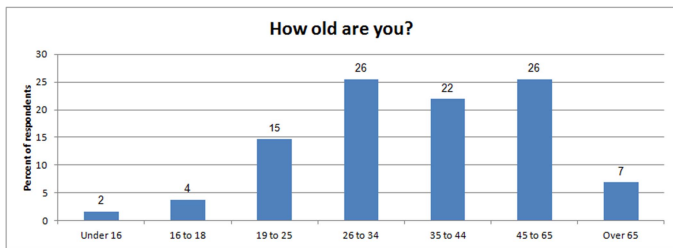


Figure 8 Most participants are 26-65, the prime years for working.

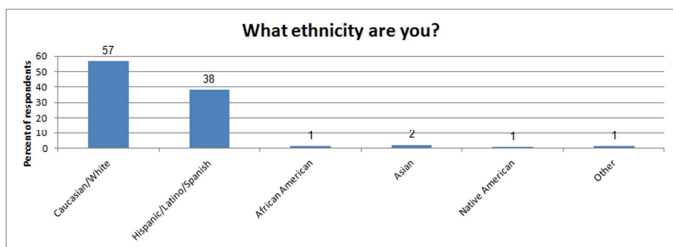


Figure 9 The majority of participants were Caucasian, followed by Hispanic.

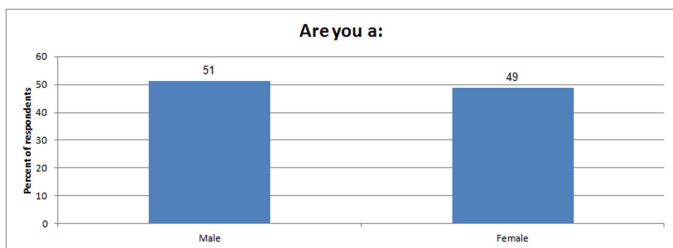


Figure 10 Gender is slightly more male than female.

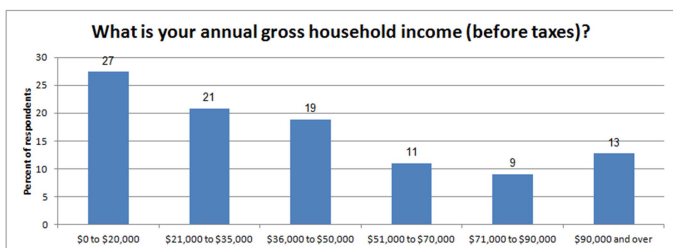


Figure 11 Lower income appears to have the higher ridership.

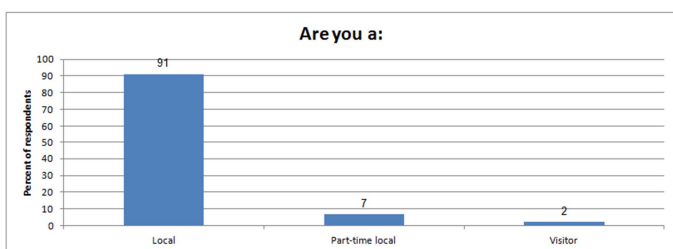


Figure 12 Local residents are the majority of survey participants.

The perceived quality of VelociRFTA is shown in Figure 13. Most responses were excellent or good for access to stations Or bus, stations amenities and operational service. This information is further detailed by station in additional charts. The information is vital for improvements and issue tracking for each station and operational service overall.

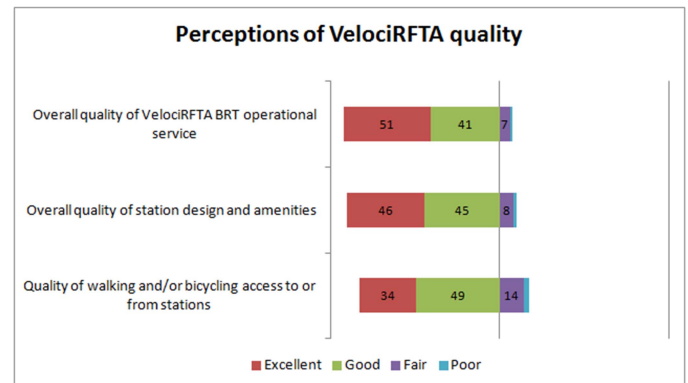


Figure 13 Chart showing excellent to good overall quality of BRT VelociRFTA.

General comments and suggestions from participants on comfort, safety, cleanliness, service and scheduling are shown in Figure 14.

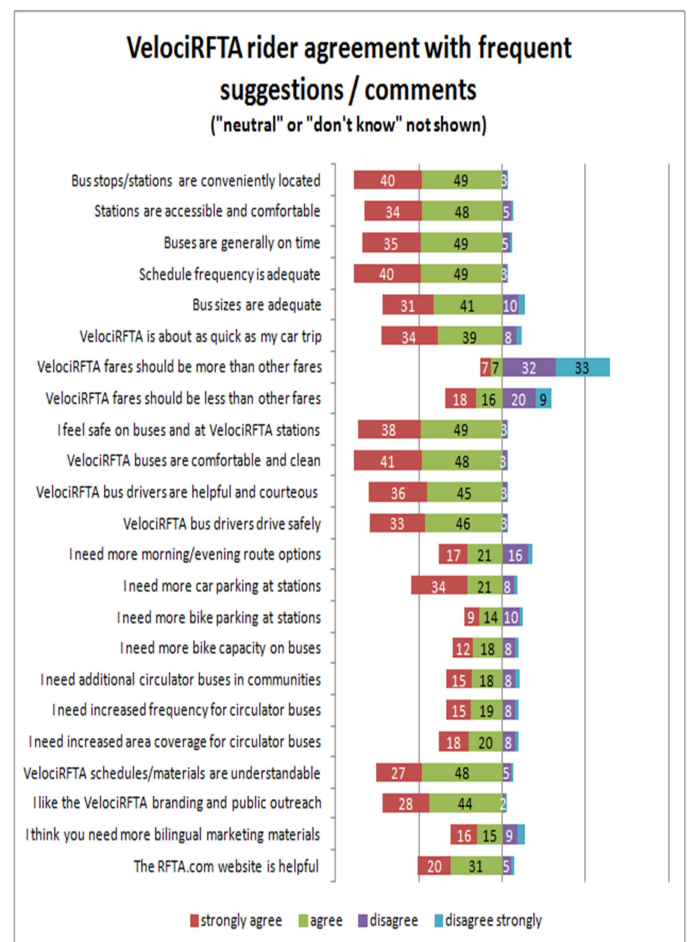


Figure 14 Participant needs for safety, bus schedules, fare rates, comfort, and parking and RFTA information distribution.

Requests for RFTA improvements (Figure 15) include; on demand heaters at bus shelters, Wi-Fi availability on all buses, and solutions to standing on some routes. This information is useful for bus schedule changes, budgeting for future added equipment on all buses and improving station amenities for a more comfortable and pleasant riding experience.

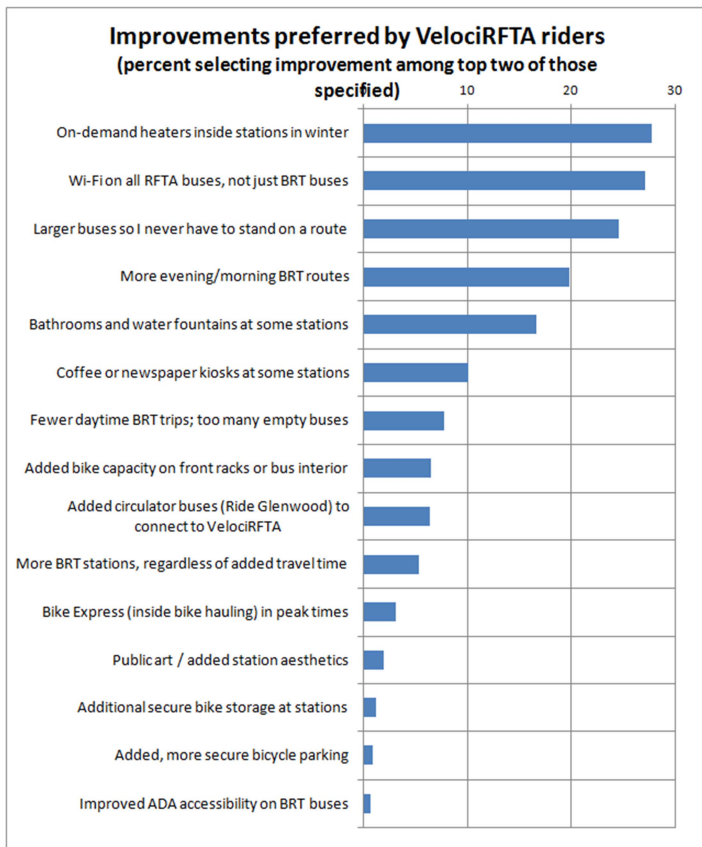


Figure 15 Participant suggested improvements for the fast growing RFTA and BRT VelociRFTA bus systems.

In addition to the recent survey, there are modifications and building improvements in both operations and maintenance sites. Improvements to the main dispatch control room and administrative offices prompted interest in a human factors engineering (HFE) assessment on usability and layout. The HFE assessment is in progress with a scheduled completion by early 2015. These are important factors for worker well-being, retention, safety and sustainability (Salvendy 2012, Stanton, 2005, Vink, 2005, IEA, 1996, and Brooks, 1974).

6 NEXT STEPS FOR VELOCIRFTA

Future surveys and HFE assessments may include; driver comfort and tasks, scheduling, team work, customer interaction, and situation awareness. Management is receptive to human factors engineering considerations and feedback. “Good ergonomics is good economics”, (Hendrick, 1996).

RFTA is expanding parking for the growing fleet of buses. It already includes innovative design changes to their bus fleet to transport bikes, skis, snowboards and strollers. More changes are coming with the advent of more people considering riding the bus and additional routes. Future rural BRT projects around the US and the globe may enlist the experience and lessons learned from the RFTA programs for the BRT VelociRFTA in rural areas.

RFTA continues to seek out creative ways to increase revenue and garner continued support and satisfaction from the customers and the communities it serves.

7 ACKNOWLEDGMENTS

Thank you RFTA for the opportunity to report on progress of the BRT VelociRFTA and the findings from the 2014 survey.

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