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To: Dan Blankenship, RFTA

From: Marc Warner

Date: August 5, 2021

Re: Analysis of the proposed deeply discounted youth fares, and options for implementation

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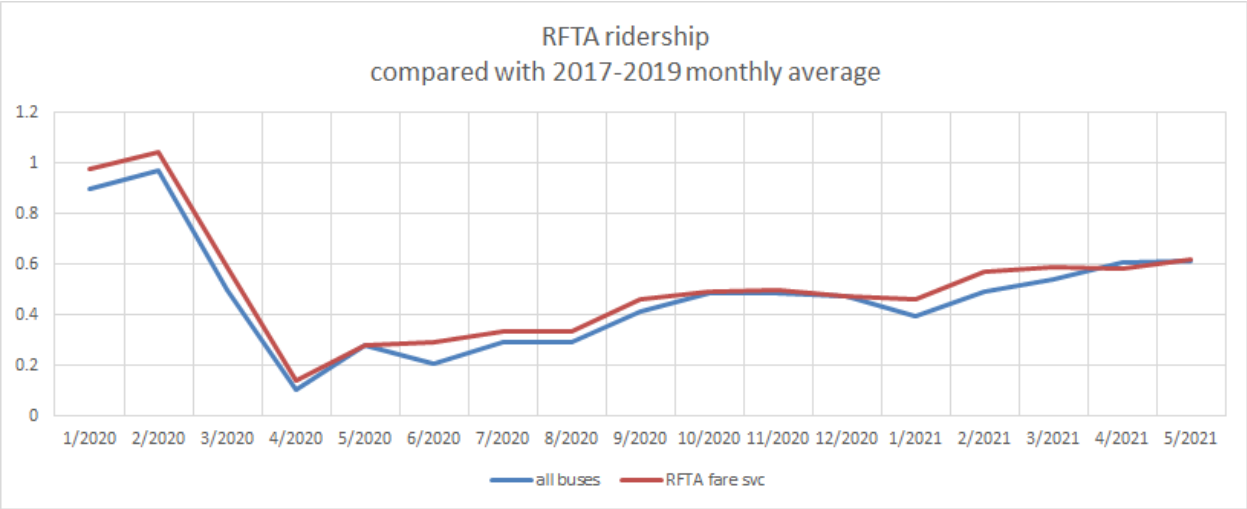
RFTA is considering the introduction of a deeply discounted fare for youth and teenage riders. The proposal calls for a $1 fare for any trip in the system—Valley and Hogback--outside of the existing free zone south of the Intercept Lot. (The fare with the further discounted stored value card would be $.7375.) RFTA has not settled on the upper age limit to qualify for the fare; it may be only for riders up to age 16, but might also be available for riders up to age 17, 18, or 19.

The agency hopes that the measure would boost ridership lost to the pandemic. Buses are still operating with only about 60 percent of normal seasonal demand, as shown in the exhibit below.



The proposed discounts would also be consistent with RFTA's goal of affordability, would improve mobility options for a large group of travelers too young to have a license or available car, and would promote transit among riders who are just starting to get their first taste of greater independence. The measure could thus lead to greater transit ridership and fare revenue in years to come.

RFTA recently asked Warner Transportation Consulting, Inc. to examine the proposal in terms of the impact on transit revenue and ridership, and on other factors that could be pertinent to its implementation. This memo presents our assessment based on information available. The ridership response to major discounts for youth and teenage travelers at other transit agencies could add to the confidence in this analysis. The agencies contacted (listed at the end of this memo) however, could not provide us with this level of detail.

How much revenue would RFTA forego for existing trips?

Past RFTA passenger surveys provide information on ridership by traveler age, trip frequency, and trip origin and destination. This allows us to gauge the information on fare paid. Considering just the fares on the paid routes (SH82, BRT, Snowmass DV, and Grand Hogback), the average fare paid per trip is as follows:

Average fare per boarding		
riders	current rules	proposed fare
up to age 16	2.69	0.84
up to age 17	2.62	0.83
up to age 18	2.65	0.83
up to age 19	2.71	0.83

Note that the average fare reported reflects current RFTA pricing and is for all fares used by travelers in the particular group. In other words, it includes not just those using cash or stored value card, but also monthly or seasonal zone passes. For pass use, the cost per trip is the upfront cost of the pass divided by the number of trips made by the traveler during the period of pass validity.

RFTA riders age 16 and under now have the option of buying a Valley youth pass ($89) good for trips between New Castle and Aspen, and a Hogback youth pass ($64) good for trips between Rifle and Glenwood Springs. Riders age 16 and under also now qualify for $1 off the adult cash fare when the adult cash fare is greater than $1. The RFTA fare boxes do not isolate and track the boardings that use these discounts. The survey data, however, shows that transit trip frequency is higher for the 17 to 19 year olds than for the 15 and 16 year olds. These older travelers also buy more monthly and zonal passes, and this accounts for the lower average fare per boarding compared to the average for those aged 15 and 16. The slightly higher average fare for the 19 year olds reflects the greater preponderance of longer trips with higher fares compared to the younger riders.

As a reference point, the table below shows the number of youth passes sold by RFTA over the past few years. A regular 16 year old traveler might have purchased nine or ten of the monthly youth passes over the course of a year. Thus, the 92 youth passes sold in 2019 could represent as few as 10 individuals. The drop in youth pass sales since 2019 reflects the impact of the pandemic.

Monthly youth pass purchases			
	2019	2020	2021
Valley Youth	82	16	2
Hogback Youth	10	4	1
total	92	20	3

RFTA would eliminate the monthly youth pass under the proposed fare rules.

Applying the average fares to average annual ridership between 2017 and 2019 (i.e., pre-Covid) yields the change in revenue as shown in the table below.

Impact of fare change on existing *base year* boardings				
riders	base yr boardings	% of base yr boardings	change in revenue	% of base yr revenue
up to age 16	103,514	5.0%	-191,808	-3.5%
up to age 17	131,829	6.4%	-236,109	-4.3%
up to age 18	159,850	7.8%	-290,950	-5.3%
up to age 19	206,955	10.0%	-387,605	-7.1%

Again, this is just for *existing* riders and does not include any added revenue from new trips taken in response to the change in fares.

The number of current trips by travelers in each age comes from the RFTA passenger surveys. Those surveys, however, asked respondents to indicate their age according to specified age group, with the relevant categories as under age 16, age 16 to 18, and age 19 to 25. This analysis assigned respondents to a particular age based on a number generated randomly for each respondent in the relevant categories. On average, a 16, a 17, or an 18 year old would each be one-third of the total in the group marked as ages 16 to 18. Someone in the age 19 to 25 year old group would be assigned as a 19 year old one-seventh of the time.

How much ridership and revenue would RFTA gain from induced trips?

A drop in the cost of a fare—all else equal—will yield a rise in the number of trips taken. The relationship between the change in fares and the change in ridership is the fare elasticity. Analyses of past fare changes at transit agencies around the country have generally calculated a mid-point arc elasticity around -0.3. This means that a 10 percent increase in the fare would yield a 3 percent drop in ridership, with an adjustment to account for the size of the change in fares. This is more appropriate than the simpler point elasticity because the mid-point arc elasticity works whether the price rises or falls (which is not the case for a point elasticity), and it is more useful for large changes.

That said, the past calculations of elasticities have generally not considered a price change anywhere near as large as RFTA is proposing. Thus, the industry standard -0.3 elasticity value may not apply. Researchers who did look at cases of free or deep-discounted fare changes[1] did calculate fare elasticities of -.38 or even more negative. The applications, however, are for all age groups, off-peak fares, or particular types of services, and are not comparable to the type of fare changes proposed by RFTA.

We have sought to get information from Eco Transit about the number of riders and boardings that use that agency's youth pass allowing *free* transit (compared to a $4 adult cash fare) for travelers age 18 and

[1] The seminal reference for this is Patrick Mayworm, Armando Lago, and Mathew McEnroe, Patronage Impacts of Changes in Transit Fares and Services, 1980. The more recent work, TCRP Synthesis 101. Implementation and Outcomes of Fare-Free Transit Systems, 2012, also lacks any particularly applicable experiences.

under. If we can identify the number of annual boardings per youth pass holder and the number of residents up to age 18 in the Eco Transit service area, then we can assume a similar number of trips by the similarly aged residents of the RFTA service area. Unfortunately, this information is not available.

In the absence of hard data, we need to make some reasonable assumptions about the number of induced new boardings in response to the fare change. These induced trips would be of two types: 1) added boardings by travelers who are eligible to receive the youth discount, and 2) full-fare adults who would take added trips because RFTA is now a more affordable option for a *family* trip.

1) Added boardings by youth travelers

The application of a -0.3 mid point arc elasticity to the fare change for the relevant group of youth travelers is a reasonable **low estimate** of induced youth travel. Based on this assessment, RFTA would add between 40,000 and 85,000 annual youth boardings, depending on whether the new fares apply to just those age 16 or under, or to travelers up to age 19.

Alternatively, it is not unreasonable to forego any application of an elasticity, and instead just assume that the number of RFTA trips by each eligible age groups exactly doubles under the proposed fare change. This would add from 100,000 annual new youth boardings (with the fare applied up to age 16) to 200,000 (with the fare applied up to age 19). This seems like a suitable **high estimate** of induced new youth trips.

2) Added boardings by accompanying full-fare adults

No six year old would ride the bus alone; most 19-year olds would be mortified to have dad come along for the ride. For this analysis, we assume the share of induced youth trips with an accompanying full-fare adult would be as follows:

Percent of added youth boardings with an accompanying full fare adult			
up to age 16	17 year olds	18 year olds	19 year olds
20%	10%	5%	0%

We can assume that the added fare revenue paid by the full-fare adult would be the current RFTA average of $2.65.

Combining these results

The following two tables show the net ridership and revenue impacts of these low and high estimates.

net effects--low estimate						
riders	added youth boardings	added accompanying full fare	% of base yr boardings	revenue from added boardings	net revenue (with existing youth riders)	% of base yr revenue
up to age 16	40,091	8,018	2.3%	54,837	-136,971	-2.5%
up to age 17	50,207	9,030	2.9%	65,467	-170,642	-3.1%
up to age 18	58,826	9,461	3.3%	73,951	-216,999	-4.0%
up to age 19	84,533	9,461	4.6%	95,548	-292,057	-5.3%

net effects--high estimate riders	added youth boardings	added accompanying full fare	% of base yr boardings	revenue from added boardings	net revenue (with existing youth riders)	% of base yr revenue
up to age 16	103,514	20,703	6.0%	141,587	-50,221	-0.9%
up to age 17	131,829	23,534	7.5%	171,433	-64,676	-1.2%
up to age 18	159,850	24,935	9.0%	198,903	-92,047	-1.7%
up to age 19	206,955	24,935	11.3%	238,623	-148,981	-2.7%

Would these added boardings create a bus capacity issue on RFTA buses? This would not be an issue now, as the ridership is still down 40 percent from pre-Covid levels. In any case, the increase in youth (and family) ridership would also disproportionately occur during off-peak time periods, when RFTA buses have enough otherwise empty seats to handle the added demand. Thus, it seems unlikely that the induced riders in response to the fare change would lead to a crowding problem, or otherwise discourage demand by full-fare adults.

Is this analysis consistent with RFTA service demographics?

The previous analysis relies on the results of RFTA passenger surveys. There is always the chance that the survey respondents are not a fair representation of full RFTA travelers. There is also the possibility that the estimate of induced trips is outside the range that is really feasible given the true number of residents up to age 19 in the RFTA service area. A review of service area demographics provides alternative data points on which to gauge the reasonableness of the change in transit demand.

The 2020 census data that would provide information about the age of residents at the census block level are not yet available. The 2010 data, is available, but seems unsuitable to apply given the significant population growth in the RFTA service area. The American Community Survey estimates for 2019 are available at the county level, and these are also unsuitable for estimating residents by age within the RFTA service area.

The following table is our alternative approach based on enrollment in area school districts by grade and at Colorado Mountain College by age group. For CMC, the data was for 16 year olds, and 17 to 24 year olds by campus. We thus had to make some assumptions about the division of the 17 to 24 year olds at each campus. We also assume that the 16 to 18 year olds enrolled at CMC are distinct from the 16 to 18 year olds enrolled in the area school districts. For other, unenrolled residents, we assumed that the 19 year olds who left the valley are exactly matched by the 19 year olds who moved into the valley.

The table shows the derived resident population in each group. This would correspond with from 11 to 44 annual trips per resident in the respective age group, as shown in the last row of the table. The analysis is within a plausible range. As a basis for comparison, the average annual RFTA boardings per person for all 59,931 residents estimated for the RFTA service area in 2019 would be 50.06. Note that this assumes that all of these boardings with fares are by area residents, and not also by visitors on short stays in the region.

school districts	6 to 16 (grades 1 to 10)	age 17 (grade 11)	age 18 (grade 12)	age 19
Aspen	1071	126	127	
Roaring Fork RE-1	3950	381	382	
Garfield RE-2	3800	403	365	
CMC, private schools	**up to age 16**	**17**	**18**	**19**
CMC-Aspen	21	20	20	20
CMC-Carbondale	70	19	19	19
CMC-Glenwood Spri	93	53	53	53
CMC-Spring Valley	5	56	56	56
CMC-Rifle	78	55	55	55
CO Rocky Mtn Schoo	86	43	43	
other schools	300			
non-students, others	**up to age 16**	**17**	**18**	**19**
Aspen				127
Rest of Valley				382
Hogback				365
total residents	**up to age 16**	**17**	**18**	**19**
Aspen	1092	146	147	147
Rest of Valley	4504	552	553	510
Hogback	3878	458	420	420
total	9474	1156	1120	1077
% of full area pop.	15.8%	1.9%	1.9%	1.8%
RFTA boardings	**up to age 16**	**17**	**18**	**19**
base year	103514	28315	28022	47105
bdgs/yr per resident	10.93	24.49	25.02	43.74

Youth discounts and lessons learned from other agencies

RFTA peer agencies tend to offer youth discounts for riders up to age 18 or beyond, and at a discount rate much greater than that offered now by RFTA, as shown on the list below:

- Denver RTD: 70% off for ages 6 to 19 (This is a recent change: the rate was 50% pre-Covid).
- Colorado Springs: 50% off for ages 6 to 18
- Eco Transit (Eagle): 18 and under ride FREE after purchase of $25 annual youth pass.
- Steamboat Springs: 50% off for students (no age restriction)
- TransFort (Fort Collins) 17 and under ride FREE
- Greeley Evans Transit (Greeley) 18 and under ride FREE
- Key West (long linear corridor like RFTA): 40% to 50% off up to age 21
- Rio Metro RTD (Albuquerque to Santa Fe rail--long corridor with zone fares like RFTA): 50% off ages 10 to 17 or for students with a valid student ID
- Southern Teton (Jackson WY with long regional services): 50% off for grade 12 and under; free if grade 12 and under in Teton County, WY schools

Also, consider these examples of youth fares from some non-peer agencies:

- Muni (San Francisco): Fares for all youth 18 years and under will be free beginning on August 15, 2021. No application or proof of payment/Clipper card will be required to ride Muni vehicles with the exception of Cable Cars.
- Youth over the age of 16 are encouraged to carry an ID in case they are asked to provide a proof of age.
- MBTA (Boston): 65% off monthly pass for ages 12 to 21 regardless of school enrollment and up to age 25 for low income youth (enrollment in food assistance, Mass Health, or job training program)
- AC Transit and other agencies using Clipper Card in Bay Area: 50% off for ages 5 to 18 (and free Clipper Card)
- Tri Met (Portland, OR): 50% off and total daily are capped at $2.50 per day for ages 7 to 17 and older students in high school or pursuing a GED.

These examples do support RFTA's proposal to make the youth discount more generous than at present, and to extend the youth discount beyond age 16.

Greeley Evans Transit

Leighton, operations supervisor at Greeley Evans Transit;

- Program around for 8 to ten years.
- General program works with school district. Primarily used for people outside of school bus range
- During the summer, the free pass continues
- City council (no transit board) is favorable to youth fare
- Challenge is requiring students to show ID; high school kids sometimes look > 18
- Youth ridership is enough to affect dwell time, especially at schools.
- Agency would have liked to have school IDs scanned; local school IDs, however, not compatible with GenFare.
- Bus ops have no problem with program; occasionally give a youth a hard stare if they know they're traveling at an hour when they should be in school (but let them ride free anyway).

TransFort, Fort Collins

Denise, customer service rep

Agency doesn't currently collect fares, but base fare (pre-Covid) is $1.25

- Youth age 17 or under with school, state, or agency issued ID ride free.
- Special Requirements for Youth Pass:
    - Transfort defines a "youth" rider as: anyone age 17 or younger or students actively enrolled in a secondary school program.
    - Transfort requires youth 17 and under to show an approved ID or ride with an accompanying adult (for those under age 12).
    - Acceptable forms of ID include: a valid student ID from any elementary, middle or high school showing current school year and enrollment; or a valid, state-issued Colorado Identification Card or Driver's License; or
- Denise says this is mostly for school or after school trips but not all that large a share of total ridership. There have been no problems, and the bus drivers keep an eye on the kids to make sure that they're ok (e.g., not being harassed by the homeless).

Utah Transit Authority

- UTA regularly offers half off for age 6 to 17 or while still attending highschool; e.g., $85 per month full fare monthly--$42.50 for youth. $2.50 per trip full fare--$1.25 youth
- Fare good on all routes (local and express); only not valid is premium bus to Park City.
- "Riders License" June through August is $49 for youth ($16.33 per month); in effect for at least three years.
- Would have like to have Smart phone app. If kids now lose card and didn't write down number on front, they're out of luck.

Eco Transit, Eagle County

Mike in dispatch

- Only year-round residents of Eagle County up to age 18 can qualify for the free youth pass.
- Accounts for "a significant" share of system ridership.
- Two key benefits of annual youth pass:
    - Minimizes dwell time
    - No issue of operator having to authenticate passenger age
- Particularly heavy youth ridership by Edwards Trailer Park into schools. The district does provide dedicated school bus, but students here prefer to ride Eco Transit. Mike says the times may be inconvenient, but he believes that it's way more cool to ride Eco Transit than to ride the local school bus.
- Left messages with Diana and Jeff at Eco Transit to find out about number of youth passes and usage.

Other messages left at:

- RTD Denver,
- Capital Metro, Austin
- Kansas City (recent introduction of free transit),
- SF Muni