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EXECUTIVE SUMMARY

By Randal O'Toole

Valley Metro proposes to introduce bus rapid transit to Arizona Avenue/Country Club Road in Chandler and Mesa and to Scottsdale Road/Rural Road in Scottsdale and Tempe. As a part of these proposals, Valley Metro wants to give buses priority at traffic signals and is leaning towards dedicating two of the six lanes on these streets exclusively to buses.

A review of pre-pandemic bus ridership, traffic counts, and projections of new riders on bus rapid transit reveals that there is no chance that bus rapid transit would attract enough riders to make dedicated bus lanes and giving buses priority at signals efficient. Dedicated bus lanes would save time for a few thousand transit riders a day at the expense of delaying tens of thousands of auto drivers and passengers. Giving buses signal priority would save time for a few thousand transit riders a day at the expense of delaying tens if not hundreds of thousands of auto drivers and passengers.

Moreover, the pandemic has cut bus ridership in the Arizona Avenue/Country Club and Scottsdale/Rural Roads corridors in half while driving on those streets has almost recovered to pre-pandemic levels. Given the uncertainties about future transit ridership, Valley Metro should be wary of spending large amounts of money and resources on bus rapid transit. Instead, it should test a super-lite version of bus rapid transit, in which buses operate in mixed traffic, don't have signal priority, and rely on no new infrastructure.

The increased frequencies and speeds from such a lite version of bus rapid transit may result in a significant increase in ridership. If it does not, however, then the slight additional increase in speeds resulting from dedicating lanes to buses and giving buses priority at signals wouldn't have helped either. Valley Metro should focus on emphasizing the positive aspects of bus rapid transit—increased frequencies and speeds—while avoiding the negative aspects—increased traffic congestion for everyone else.

INTRODUCTION

Where transit demand exists, a well-designed bus rapid transit (BRT) line can move more people to more destinations at higher speeds for a far lower cost than any light-rail line. When demand doesn't exist, however, a poorly designed bus rapid transit line can clog up roads while moving hardly any transit riders.

Valley Metro, Phoenix's regional transit agency, is proposing to operate bus rapid transit on several routes in the Phoenix urban area. This paper will look at two of those routes, Arizona Avenue/Country Club Road in Chandler and Mesa and Scottsdale/Rural Road in Scottsdale and Tempe, to see if they make sense from a transportation point of view.

In 2009, the transportation consulting firm Parsons Brinckerhoff provided a report to Valley Metro analyzing these two and three other BRT routes. In 2021, Valley Metro published a final alternatives analysis report for an Arizona Avenue BRT route. This paper will rely on these two reports as well as traffic counts released by the cities of Chandler, Mesa, Scottsdale, and Tempe and Valley Metro transit ridership data.

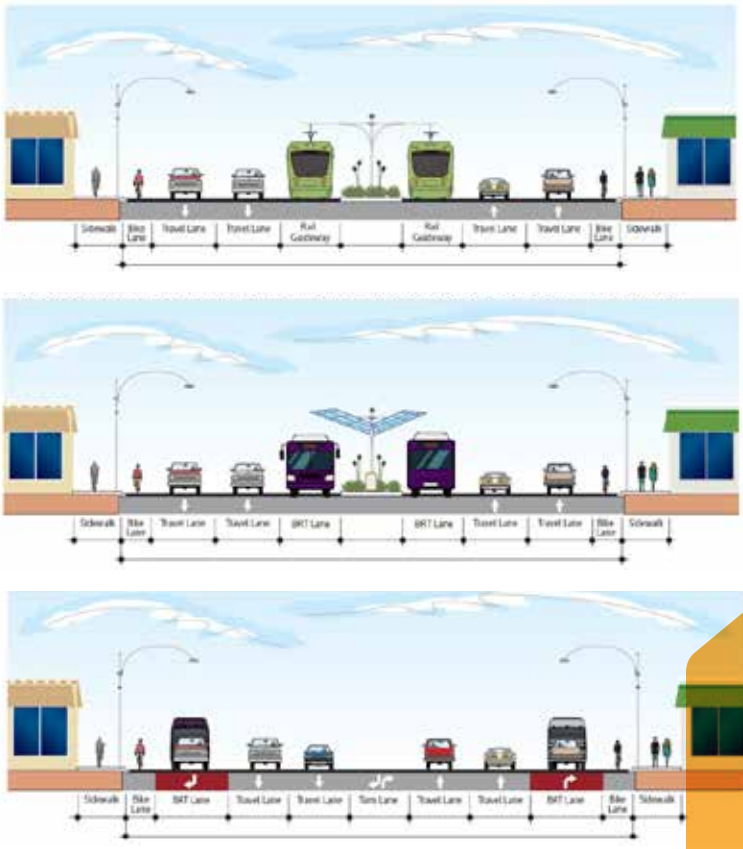
ARIZONA AVENUE / COUNTRY CLUB ROAD PROPOSAL

State route 87, also known as Arizona Avenue in Chandler and Country Club Road in Mesa, is a principal north-south route through Chandler and Mesa. Valley Metro's alternatives analysis report proposed to operate bus rapid transit from Germann Road in south Chandler to Main Street in Mesa, where it would meet the light-rail line.[1] Arizona Avenue/Country Club is six lanes wide, with intermittent right- and left-turn lanes, over this entire distance.

Currently, one local bus, route 112, follows this route. Local buses typically stop about five or six times per mile while BRT typically stops only about once per mile. BRT also typically operates more frequently than local buses.

Graphics in the alternatives analysis report suggest that Valley Metro considered three different options for what it called "high-capacity transit" in the route 87 corridor. One was to convert the road's two center lanes into light-rail lines. The second was to make the two center lanes exclusive bus lanes. The third was to operate buses in mixed lanes with other vehicles.[2] Of these three options, the only two that were evaluated in detail was light rail and bus rapid transit on dedicated lanes. That suggests that Valley Metro expects to use dedicated bus lanes.[3]

Arizona Avenue Alternatives Analysis Final Report
Valley Metro | June 2021



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The Parsons Brinckerhoff report also evaluated this route. It recommended that Valley Metro plan to eventually operate six rapid buses per hour during peak hours and four per hour during off-peak hours as a supplement to four local buses per hour during peak hours and two per hour during off-peak hours. With this level of service, Parsons Brinckerhoff predicted, rapid and local buses in the Arizona Avenue corridor would attract 3,000 riders per weekday, an increase from 1,800 using local buses at the time the report was written.[4]

Because of the low number of buses per hour, Parsons Brinckerhoff recommended against using dedicated lanes, instead operating buses in mixed traffic, which it called the "lite BRT" option.

However, it did recommend that buses be given priority over other vehicles at traffic signals.[5] Even without dedicated lanes, the report estimated that the reduction in the number of stops would boost average bus speeds by 50 percent, from 12 to 18 miles per hour.[6]

The alternatives analysis report also proposed to "implement transit supportive policies that would encourage Transit Oriented Development, bike and pedestrian friendly connections."[7] Transit-oriented developments are generally multifamily housing, sometimes with shops on the ground floor, built near major transit stops in an effort to create a customer base for transit. "Encouraging" such developments often means subsidizing them using low-income housing tax credits or other grants to developers.

Traffic counts indicate that Arizona Avenue carried 33,000 to 40,000 vehicles per day in Chandler in 2019, while in Mesa Country Club carried 39,000 to nearly 46,000 vehicles per day.[8] Counts in most road segments were about 10 percent lower in 2021, but in 2022 counts recovered to nearly their 2019 levels.[9] Note that these are average traffic counts for all 365 days of the year, so traffic may be greater on weekdays.

Based on these traffic counts, each lane of Arizona Avenue carried around 5,000 vehicles per day, rising above 7,000 vehicles per day on parts of Country Club Drive in 2019. Most Chandler segments also carried 5,000 or more vehicles per day in 2021 and 2022 and Mesa segments carried around 6,000 to 7,000 vehicles per day in 2021. The Federal Highway Administration estimates that the average motor vehicle carries 1.67 occupants.[10] So these traffic counts indicate that each lane moves about 8,000 to 12,000 people per day.

Including Mesa's Main Street and Chandler's Germann Road, the Country Club/Arizona route crosses at least 13 signaled intersections. The latest numbers show that a minimum of about 250,000 vehicles a day cross state route 87 at these intersections.[11] At 1.67 people per vehicle, that represents nearly 420,000 people.

Valley Metro's 112 bus currently operates four times an hour during 12 hours of the day and an average of 2 times per hour during seven other hours of the day, with no service from 11 pm to 4 am.[12] Valley Metro's F.Y. 2019 ridership report indicates that route 112 carried nearly 924,000 riders, which is an average of about 2,500 per day. Counting weekdays only, the route carried 754,000 riders, or about 3,000 per weekday.[13]

The pandemic greatly reduced transit ridership. In F.Y. 2021, route 112 carried 482,621 riders, a 48 percent drop from 2019. Valley Metro's fiscal year ends on June 30, so F.Y. 2021 was the first full year of the pandemic. Ridership on the 112 bus in F.Y. 2022 was even lower at 446,427, or 52 percent less than in 2019. This works out to an average of about 1,223 riders per day and 1,457 per weekday.[14]

Fare revenues dropped by even more than ridership as Valley Metro responded to the pandemic by asking bus riders to board at the rear door for the safety of drivers and other riders, effectively allowing riders to board for free. The share of people riding the 112 bus for free exploded from 3 percent in 2019 to nearly 100 percent in 2021 and remained a relatively high 30 percent in 2022.[15] The end of the effectively free-fare program explains why ridership was lower in 2022 than 2021, but even with the end of that program total fares collected in 2022 were just 35 percent of 2019.[16]

SCOTTSDALE ROAD / RURAL ROAD PROPOSAL

Scottsdale Road, which is called Rural Road in Tempe, is a north-south route that parallels and is about five miles east of state route 87. The 2009 Parsons Brinckerhoff report proposes a BRT line from the Scottsdale Airpark to University Drive. Similar to the Arizona Avenue route, the report suggested a lite BRT with buses operating in mixed traffic but given priority over other vehicles at traffic signals.[17] However, the Maricopa Association of Governments' 2021 regional transportation plan shows a BRT line going from old town Scottsdale to Chandler Road.[18]

Scottsdale Road is six lanes wide over most of its distance south of the airpark, but in Tempe, Rural Road tapers to four lanes south of Baseline Road. This means that, if two of the lanes were dedicated to BRT, only two lanes would be left for other traffic between Baseline and Chandler Road.

Before the pandemic, most segments of Scottsdale Road carried between 36,000 and 48,000 vehicles per day.[19] Scottsdale has not yet released traffic counts for 2021 or 2022, but 2020 counts showed 30,000 to 42,000 vehicles per day.[20] Tempe's 2022 traffic counts show 27,000 to 36,000 vehicles per day north of Baseline Road and 18,000 to 33,000 south of Baseline.[21]

Including Camelback Road and Chandler Road, a BRT route from old town Scottsdale to Chandler Road crosses at least 17 signaled intersections. The latest data indicate that more than 350,000 vehicles a day typically cross Scottsdale/Rural roads at these intersections.[22] At 1.67 occupants per vehicle, that represents nearly 600,000 people.

The entire route from Scottsdale Airpark to Chandler Road is served by Valley Metro bus route 72. Currently, bus 72 operates three buses an hour from 5 am to 7 pm, two an hour from 7 to 10, and one between 10 and 11 pm.[23] The Parsons Brinckerhoff report proposed to add six BRT buses per hour during peak hours and four BRT buses an hour during off-peak hours.[24] The report did not estimate ridership for this route.

In 2019, route 72 carried 1.05 million riders, or an average of nearly 2,900 per day and 3,450 per weekday. This declined to 414,000 riders in 2021 but recovered slightly to just under 470,000 riders in 2022. As with route 112, about 97 percent of riders paid fares in 2019, falling to 2 percent in 2021 but recovering to 79 percent in 2022. ■

ASSESSMENT OF BRT

Both the Arizona Avenue and Scottsdale Road BRT routes are designed to feed into Phoenix's east-west light-rail line. Valley Metro obviously considers the light rail to be its trunk line, which makes it disappointing that the agency decided to build light rail on that route. Although Valley Metro is fond of calling light rail "high-capacity transit," it is in fact low-capacity transit.

According to the American Public Transportation Association's transit glossary, light rail is "an electric railway with a 'light volume' transit capacity."[25] Although a light-rail train can hold more people than a bus, for safety reasons only about 20 such trains per hour can be operated on a single rail line, limiting the line to about 12,000 people per hour. For comparison, Istanbul has a busway that carries more than 250 buses per hour for a capacity of up to 30,000 people per hour, and it routinely carries well over 20,000 people an hour.[26]

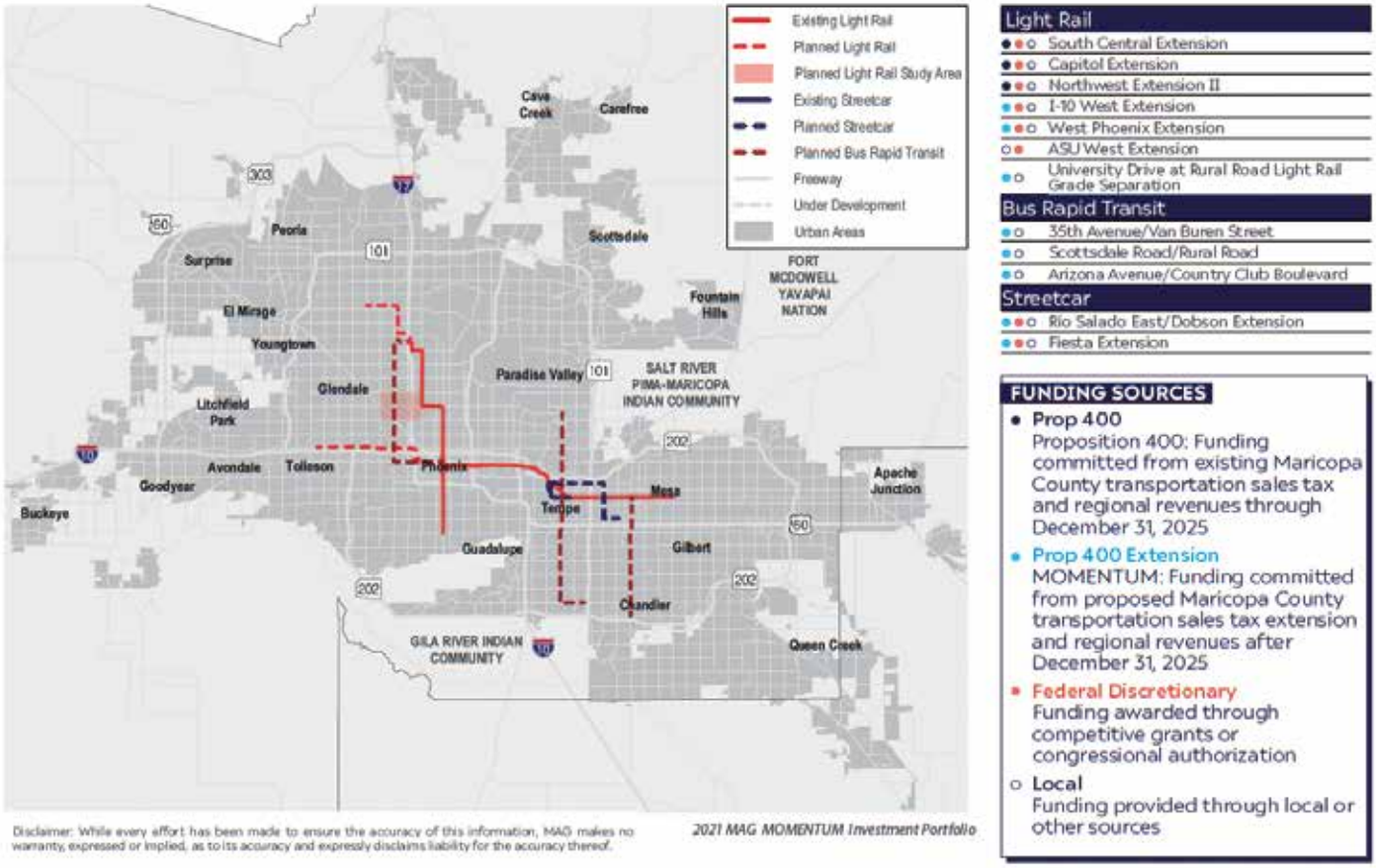
Istanbul's line is built in the median strip of a freeway, but dedicated bus lanes on streets can also move many buses per hour. Portland has dedicated bus lanes on two different streets that have an estimated capacity of 166 buses per hour. In actual practice, Portland's transit agency, TriMet, has scheduled as many as 160 buses per hour on each of these lanes.[27] With articulated buses capable of carrying more than 100 people, that works out to more than 16,000 people per hour, a third more than Valley Metro's light-rail line.

If feeding BRT lines to the east-west light-rail line were truly successful, the higher-capacity BRT routes would overwhelm the light rail route with riders. Fortunately, BRT is not likely to attract enough riders to fill up the light-rail line. This also means, however, that BRT is not likely to attract enough riders to justify a heavy investment in BRT facilities.

Transit agencies expect BRT to attract new riders because it operates more frequently and at higher average speeds than local buses. According to a literature review by Todd Litman of the Victoria Transport Policy Institute, doubling bus frequencies increases ridership by about 50 percent.[28] Adding BRT to Arizona or Scottsdale roads would roughly triple bus frequencies, meaning ridership might double. Even at pre-pandemic levels, a doubling of ridership on the 72 or 112 routes would not overwhelm the light rail (especially since many bus riders would not transfer to the light rail).

Less information is available about the effects of increased transit speeds on ridership. However, it is important to note that much of the increase in speeds of BRT over local buses is due to BRT making fewer stops, not to having lanes dedicated to buses. As previously noted, the Parsons Brinckerhoff report projects that the average speed of BRT buses operating in mixed traffic will be 50 percent greater than local buses.[29]

Figure 6-07: High-Capacity Transit Projects



The choice of BRT using dedicated or shared bus lanes depends on two factors. First, will the lanes be used by enough buses per hour that there will be little room available for other vehicles? Second, will those buses carry enough riders that dedicating a lane to the buses is an efficient use of road space? Arizona and Scottsdale road BRT proposals in the Parsons Brinckerhoff report would increase bus frequencies from three or four buses per hour to nine or ten buses per hour. Based on the Portland experience, ten buses per hour is only about 6 percent of the capacity of a bus lane, which leaves lots of room for other motor vehicles. Unless a transit demand can support a substantial share of a lane's capacity—say, 50 percent or more than 80 buses per hour—dedicating a lane exclusively buses would be a waste.

Before the pandemic, route 72 carried about 2,900 people per day while route 112 carried about 2,500 people per day. If BRT doubles ridership, then buses would carry 5,800 riders a day on Scottsdale/Rural and 5,000 a day on Arizona/Country Club. Each lane of those roads typically carried 8,000 to 12,000 people per day. Closing two lanes that together moved 16,000 to 24,000 people per day in order to dedicate those lanes to buses carrying no more than 5,800 people per day is not an efficient use of road space.

The difference is even greater since the pandemic. By 2022, traffic on Arizona and Scottsdale roads had recovered to about 90 percent of pre-pandemic levels, while transit ridership on routes 72 and 112 was only about 50 percent of pre-pandemic numbers.

Overall Phoenix transit ridership appears to have plateaued at around 55 percent of pre-pandemic levels as it has hovered around that number since late 2021.[30] Ridership appears to be permanently depressed by the increased number of people working at home since the pandemic.[31]

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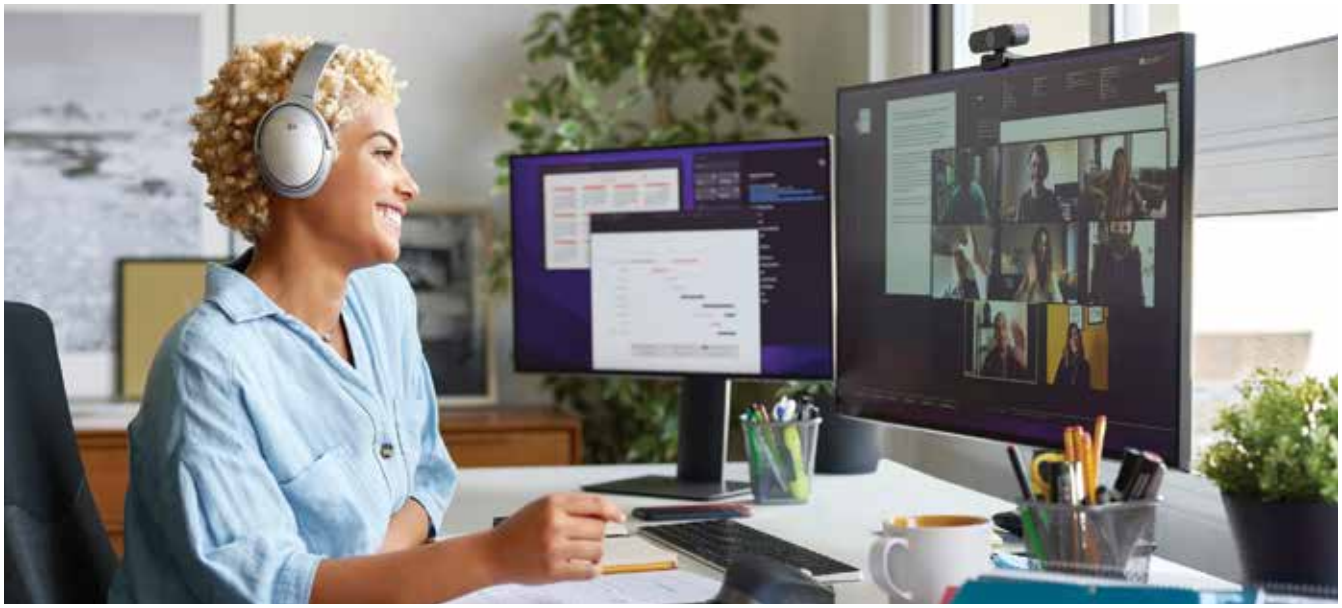

Between 2019 and 2021, telecommuting in the Phoenix urban area tripled, which had the greatest impact on transit. While the number of people driving to work declined by 18 percent and the number of people walking fell by 12 percent, the number of people taking transit to work fell by 50 percent.

The impact of telecommuting on transit was even greater in the main cities that would be served by these BRT routes. Between 2019 and 2021, the number of Chandler residents commuting to work by transit declined by 97 percent while the number in Scottsdale declined by 88 percent. The decline was 72 percent in Tempe and 42 percent in Mesa. For the four cities together, transit commuting declined by 66 percent.[32] Since numerous surveys have found that most people working at home want to continue working from home, transit ridership is not likely to ever recover fully.[33]

This means that adding BRT to Arizona and Scottsdale roads will not increase ridership to double 2019 numbers, and probably won't even increase it above 2019 numbers. No matter what the frequencies, buses on these routes are not likely to ever carry many more than 3,000 people per day, much less the 8,500 to 12,000 being carried on each lane of those roads.

Giving buses priority at traffic signals is also questionable when buses carry only a few thousand people a day while cross streets at the signaled intersections move hundreds of thousands of people a day. Phoenix and its suburbs are built with a gridded street network with signaled intersections typically located one mile apart. On such a grid, a dynamic traffic signal coordination system can easily be designed to minimize the amount of delay travelers experience in both north-south and east-west directions.[34]

Giving buses priority at traffic signals interferes with such an optimized system. Giving buses on the Scottsdale/Rural route priority at traffic signals, for example, might save 3,000 to 5,800 people a day a few seconds of time. But it would add to the delays experienced by nearly 600,000 people traveling on east-west streets crossing the BRT route. That's not an efficient use of resources.

Transit advocates may argue that efficiency should not be the only criterion for designing transit improvements as environmental and social justice

issues should also carry weight. But neither of these justify favoring buses over other vehicles by giving them dedicated lanes or signal priority.

In 2019, Phoenix buses used almost four times as much energy and emitted three times the greenhouse gases, per passenger-mile, as the average car.[35] The disparity was even greater since the pandemic as Valley Metro continues to operate almost as many buses as before the pandemic even though it is carrying far fewer riders. Moreover, dedicating two of the lanes on these streets to buses will increase the congestion in the remaining lanes, and motor vehicles use more energy and emit more greenhouse gases in congestion than in free-flowing traffic.

Transit improvements are also far from socially just. In 2021, only 1.7 percent of commuters earning under $25,000 a year in Chandler, Mesa, Scottsdale, and Tempe took transit to work, while 76 percent went to work in an automobile. Even before the pandemic, in 2019, only 3.0 percent of workers in these four cities earning under $25,000 a year took transit to work. The share of low-income workers getting to work by car was actually greater than the share earning more than $35,000 a year because a larger share of those workers telecommuted.[36] Most subsidies to Phoenix transit come from regressive taxes, and spending more money on transit while reducing the capacity of roads to move automobiles particularly hurts low-income workers who are not only more likely to commute to work by car but are also more likely to have fixed work hours forcing them to commute during the busiest times of the day.

Valley Metro's proposal to promote transit-oriented development is also problematic. In essence, Valley Metro is admitting that it doesn't know how to serve a low-density, 21st-century urban area like Phoenix, so instead it wants to reshape the region into an urban area that it can serve better. There are two problems with this policy.

First, most people don't want to live in high-density developments. People are moving to Phoenix to get away from denser regions. Valley Metro wants to use a variety of subsidies to encourage people to live in ways they don't want to live. Yet Valley Metro is supposed to serve people in the region; people shouldn't have to reshape their lives to serve Valley Metro.

Second, there is little evidence that transit-oriented development has a significant effect on transit ridership. Cities throughout the country have been promoting transit-oriented development for nearly two decades, yet transit ridership has been declining in most urban areas since the early 2010s.

A study of transit-oriented developments along Portland's light-rail line found that people living in those developments were not significantly more likely to ride transit to work than people living elsewhere.[37] To the extent that there is a difference in travel habits, this is more due to self-selection: people who want to ride transit decide to live in such developments, but people who don't want to ride transit continue to drive. As economist David Brownstone notes, after accounting for self-selection, the effects of changes in urban form on transportation habits are "too small to be useful" in trying to reduce driving.[38]

CONCLUSIONS

The COVID-19 pandemic has had a major effect on urban transportation in the United States. At worst, it may have permanently reduced Phoenix-area transit ridership by more than 40 percent. At best, the demand for transit in the Phoenix area remains uncertain.

Given this uncertainty, spending a lot of money and resources on transit improvements is questionable at best and a complete waste of taxpayer resources at worst. Given this is true, why would Valley Metro want to spend a lot of money on bus rapid transit, dedicate lanes to such transit, and give buses priority over other traffic?

One answer was provided by Phillip Washington, who was CEO of Los Angeles Metro in 2019. In 2018, Los Angeles was ranked as the world's most congested city.[39] Yet Washington told the Wall Street Journal that, "It's too easy to drive in this city." Los Angeles bus ridership had been declining for several years, and for him the way to restore bus ridership was by "making driving harder" by dedicating lanes exclusively to buses so as to increase congestion for auto users.[40]

Since they have a personal stake in the future of transit, it is too easy for transit officials to assume that transit is somehow morally superior to automobiles and therefore transit should be given distinct advantages including dedicated bus lanes and priority at traffic signals. But the average voter supports transit in the hope that spending more money on transit will relieve congestion.[41] Once voters realize that transit agencies seek to make congestion worse in order to boost their own ridership, voter support for transit could disappear.

If Valley Metro wants to test bus rapid transit, it should start out by doing so in a super-lite

way. Noting that "paint is cheap," Peter Rogoff, who was the administrator of the Federal Transit Administration from 2009 to 2011, observed that "you can entice even diehard rail riders onto a bus, if you call it a 'special' bus and just paint it a different color than the rest of the fleet."[42]

Valley Metro should paint BRT buses distinctive colors so they won't be confused with local buses. Bus stops served by BRT should also have large, distinctive signs. Buses should operate in mixed traffic with no priority given to buses at traffic signals. Valley Metro should not build expensive bus shelters and other infrastructure improvements that would be a waste of resources if transit ridership does not recover to pre-pandemic levels.

Super-lite BRT might triple the frequency of bus service along designated routes and increase average bus speeds by 50 percent. If these improvements lead to large increases in ridership, then Valley Metro could experiment with other improvements to see whether they would produce even more ridership increases without significantly delaying non-transit travelers. If, however, these improvements do not significantly increase ridership, then it is unlikely that the modest additional speed increases that would come from dedicated lanes and traffic signal priority would do any better.

Lite bus rapid transit can be a cost-effective way of increasing transit ridership. BRT should not be used to clog up roads in order to discourage driving. Valley Metro's implementation of bus rapid transit should emphasize its positive attributes and avoid the negative ones. ■

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