

**Critique  
of  
Nashville's Transit Improvement Plan**

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The views in this essay are my own and not those of Vanderbilt University. I have been a faculty member at Vanderbilt since 1973. I have talked about transit issues with a variety of community groups in Nashville and have published essays on this topic since 1999. My contributions are voluntary and uncompensated. My goal is to help Nashville make good investments in public transportation.

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## Transit Critique

A transit improvement program should attract enough added riders with other benefits to justify the added costs compared to the next best alternative. This essay critiques the “Transit Improvement Program” document from the Metro Government of December 11, 2017 (hereafter, TIP report).<sup>1</sup> The critique focuses on four ideas.

**#1. Transit does not reduce congestion.**

**#2. Street railways slow with stops and transfers.**

**#3. Car-hailing services and express lanes excel.**

**#4. Few who pay the sales tax get benefits.**

The critique also comments on outcomes after the referendum.

**#1. Transit does not reduce congestion.**

The increasing congestion on the Interstates, the arteries, and in local areas like downtown and Green Hills is a main point of conversation about transportation in Nashville. Transit, however, does not reduce congestion. Careful statistical studies of traffic provide compelling evidence that traffic expands proportionately to the available space on the roads. With wider roads, traffic expands to congest them.<sup>2</sup> This well-established fact is the iron law of traffic.

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<sup>1</sup> Metro Nashville Public Works, Nashville MTA, RTA, “Let’s Move Nashville, Metro’s Transportation Solution, Transit Improvement Program” December 13, 2017. <http://letsmoveinashville.com/site/web/assets/2017/12/Nashville-Transit-Improvement-Program-20171213.pdf>

<sup>2</sup> Gilles Duranton and Matthew A. Turner, “The Fundamental Law of Road Congestion: Evidence from US Cities,” American Economic Review 101, October 2011, pp. 2616-52.

Similarly, with more transit, congestion on the roadways does not diminish. When some people shift from cars to transit, other people take their place on the roads. Visit cities with vast transit services—Chicago and Atlanta, for example. Notice that roadways are as congested as those in Nashville, if not more so. Transit may attract riders but does not reduce traffic congestion. The average time to travel to work by car is 24.2 minutes in Davidson County, TN, 27.6 minutes in Fulton County, GA, and 32.6 in Cook County, IL.<sup>3</sup>

Compare Davidson County with Denver County in Colorado. They are of similar area and population. Denver has 86.5 miles of rail transit in nine rail lines in a six county service area. Denver also has many bus routes.<sup>4</sup> In the 2012-16 period, nearly seven percent of workers in Denver County (the central county) traveled to work by public transport. This is about three times the 2.2% rate of use of transit in Nashville.<sup>5</sup> Yet the average time for travel to work by car is 25.1 minutes in Denver and 24.2 minutes in Nashville. The average time by transit is 42.6 minutes in Denver and 41.7 minutes in Nashville. Denver’s major investments in public transportation over many decades has not shortened the time to travel to work by either car or transit at least in comparison to Nashville. **Better transit attracts transit riders while having no effect on traffic.**

Nashville’s \$5.4B transit initiative will not reduce congestion. The transit initiative has little value for people who use private vehicles. With just 2.2% of the residents of Davidson County going to work by transit, the likely number of beneficiaries of transit is small. The trains and other improvements may increase transit usage, but, overall, the proportion of all trips that will use transit will probably remain under Denver’s seven percent.

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<sup>3</sup> US Bureau of the Census, American FactFinder, “Commuting Characteristics by Sex,” 2012-2016 American Community Survey 5-Year Estimates.

<sup>4</sup> Regional Transportation District, Services. <http://rtd-denver.com/Services.shtml> viewed December 21, 2017.

<sup>5</sup> US Bureau of the Census, American FactFinder, “Commuting Characteristics by Sex,” 2012-2016 American Community Survey 5-Year Estimates.

Street railways are likely to reduce the capacity for traffic on the roadways they occupy. For example, reducing the number of lanes for traffic on a roadway in order to make space for transit will clearly reduce the street's capacity for traffic. The TIP report is silent on its effect on the number of traffic lanes. Earlier plans for transit in Nashville involved reducing the number of lanes for traffic. The current plan may do so as well. An image of the bus service proposed for Dickerson Road in 2017 showed five lanes of traffic reduced to two.

Here are several other ways the transit plan is likely to reduce the capacity of streets to carry traffic even where lanes stay open. The plan is likely to narrow traffic lanes. CDM Smith, the international engineering firm that is developing the Transit Improvement Program, shows ten-foot traffic lanes on its website.<sup>6</sup> Narrow lanes slow traffic and reduce the capacity of a street. Transit signal priority (TIP report p. 15) allows more time at traffic signals for transit and less for traffic. Transit signal priority reduces a street's capacity for traffic. The loss of turn lanes and mixing traffic with trains in the middle of streets will reduce the capacity of a street to carry traffic as well.

The TIP report does not show the traffic capacity of the streets scheduled for rail and added bus facilities. The report should provide estimates of the effect of the program on traffic capacity at peak hours. The increase in congestion during construction will also be substantial. Once construction is complete, the flow of traffic will be less than at present at choke points.

## **#2. Street railways slow with stops and transfers.**

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<sup>6</sup> CDM Smith, "Can Bus Rapid Transit and Bicycles Coexist?" <https://cdmsmith.com/en/Client-Solutions/Insights/Can-Bus-Rapid-Transit-and-Bicycles-Coexist> viewed December 17, 2017. U.S. Dept. of Transportation, Federal Highway Administration, "Safety: Lane Width," [https://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3\\_lane\\_width.cfm](https://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_lane_width.cfm) Table 5 reports the reduction in free-flow speed with narrower lanes and narrow or absent shoulders.

The TIP report summarizes each of the five new rail segments. The Gallatin Pike summary (TIP p. 21), for example, forecasts ridership (average daily weekday boardings) at 5,600-6,500. The report, however, does not mention how many people today ride the Gallatin Pike bus service (bus routes 26 plus 56) south of Briley Parkway where the railroad is to go. Showing only the total rider forecast rather than the net gain makes the new service appear to be more attractive than it is.

The Gallatin railway is unlikely to attract more riders than the current bus service. The TIP Report (p. 21) shows an end-to-end scheduled time for the railway of 21 minutes. This is 18 mph for the 6.4-mile route. The current rapid bus service on this route schedules a similar 16 mph speed. The current BRT, however, requires no transfer in its run from Rivergate to downtown. **For trips that begin north of Briley Parkway, the Gallatin railway will require a transfer from a bus or car to the train at Briley.** Because of the time delay and inconvenience of the transfer, the service will lose about 15 percent of the current riders from north of Briley.

Moreover, most downtown traffic from north of Briley flows to Ellington Parkway for a ten-minute non-stop run.<sup>7</sup> That is to say, cars and buses go downtown without transfers in half the time of the train. The south Gallatin corridor is likely to develop in the years ahead but buses will serve this local travel well.

With no net gain in ridership, the Gallatin Roadway will generate no net benefits in terms of added riders. The capital costs of \$789M for the Gallatin railway and the annual operating and maintenance cost is \$8.8M. This expenditure is out of bounds.

The problems with the Gallatin Pike railway are common to street railways generally. First, the cost per mile is high, \$150M per mile to build the railroads in the Nashville plan. In contrast, the average capital cost of rapid bus service is \$9M per mile in the TIP report. A \$billion buys less than seven miles of railroad versus 110

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<sup>7</sup> Tennessee Department of Transportation, "Traffic History," <https://www.tdot.tn.gov/APPLICATIONS/traffichistory> In 2016, average daily flow on Gallatin Pike north of Briley at recording station #31 was 32,274 and the flow south of Briley at station #45 was 23,245. The flow north of Briley is 39 percent higher than the flow south of Briley.

miles of rapid bus routes. Because a given budget buys few miles of railroads, the trains go to few places and many travelers must transfer to use them.<sup>8</sup>

In addition, the number of stops limits the scheduled speed of the train. The train can run faster with fewer stops. But with fewer stops, fewer people will have easy access. Local businesses and residences bear the inconvenience of being near the railway but get little benefit when the stops are distant.

Without growth in ridership, the finance of the transit improvement will fall short. Denver experienced lower than expected ridership on its new Aurora rail line. As a consequence, it trimmed hours and frequency of service.<sup>9</sup> When retrenching won't cover shortfalls, the Metro government must spend more from general funds. When using Federal grants, however, the MTA must operate the service for 30 years or refund the Federal dollars. Jacksonville, Florida continues to operate its transit albatross despite the low value of its services.

**Tunnel** Just as many inbound trips by rail will require transfers from buses and cars, so many will require transfers to circulating buses or other vehicles to go from the train to a destination. Concentrating trips on trains in the inbound direction means that train travelers are concentrated at downtown terminals. Many trips, however, extend well beyond the downtown stations.

Trains moving along downtown streets would block cross streets and create gridlock even when traffic is light. A tunnel allows trains to move through downtown without blocking traffic. The subway, however, will be short and offer few stops. As a consequence, many travelers must transfer to complete journeys. Train trips from the airport, for example, will take 25 minutes to reach a station at

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<sup>8</sup> Railroads not a street level with no crossings by vehicles or pedestrians and few stops move faster but are more expensive. Atlanta's MARTA Red Line averages 29 mph.

<sup>9</sup> Jason Gruenauer, "Low ridership on Aurora light rail's R-line prompts possible cuts," The Denver Channel, September 12, 2017.

<http://www.thedenverchannel.com/news/local-news/low-ridership-on-aurora-light-rail-prompts-possible-cuts>

5th and Lafayette and a few more minutes to 5th and Broadway. Few hotels are adjacent to these stops. A traveler with luggage will typically transfer to a car service to reach hotels that are more than a block or two from a station. The full trip with a transfer will approach 40 minutes. Direct car service from the airport is often less than 20 minutes with no transfer.

Buses, in contrast, enter downtown through many corridors and offer more stops in town by circulating more widely than the trains. Buses can follow different routes with some entering along each corridor. Buses can also extend routes to the wider employment area of midtown, Metro Center, and beyond.

Buses adapt to changing demands. With a digital fare system, riders will tap on to initiate a fare and tap off for discounted fares for shorter distances. In this way, bus routes can offer a local circulator service with short hops in route rather than charging everyone as though they were all going downtown. Fares should be discounted in midday and evening when travel is light. The added cost of a ride then relates just to the driver and fuel (including electricity). At peak periods, however, added service requires deploying more buses at significantly higher cost. Discounting off-peak rides will reduce the number of empty ghost buses that have long been a point of criticism of the MTA.

The digital fare system will build a database of trip patterns by route, location, time of day, and traffic conditions. Management will use the database to revise services as the city grows and demands change.

Buses, then, will adapt easily as the ridership changes. Railroads, cast in concrete at \$150M per mile for street railways and \$1B per mile for subways, adapt with difficulty.

The TIP report, however, counts only the expenditure to install the tunnel. It provides no estimate of the disruption to businesses, residents, and visitors that will come with construction. How much harm will the convention, tourism, and

entertainment activities, among others, experience during the years of building the tunnel and street railways?

Tunneling is ripe for cost overruns. The New York Times documents the extreme expense of boring subway tunnels in New York City with costs over \$2B per mile.<sup>10</sup> Some of the same enterprises are likely to be part of Nashville's dig. Cost overruns are less likely with buses.

### **#3. Car-hailing Services and Express Lanes Excel.**

Digital systems are transforming transportation. Mary Barra, the CEO of General Motors, says that GM plans vehicles for an age "with zero crashes, zero emissions, and zero congestion".<sup>11</sup> Although the immediate concern here is congestion, safety and emissions are also important. Many car manufacturers now advertise crash avoidance systems in their latest models.<sup>12</sup> The all-electric Chevy Bolt offers a 200-mile driving range on a charge. The Nissan Leaf will follow. Technical developments are coming to market quickly.<sup>13</sup>

The new services will reduce congestion with the confluence of three factors. A) The car services, including Lyft, are more convenient than owning a car or using conventional transit for many trips. B) The car-service companies are offering increasingly sophisticated shared-ride services. C) Digital systems are managing the flow of traffic in real-time on express lanes to forestall congestion. Taken together, these developments improve mobility, increase the capacity of the road network, and reduce congestion. They are also less expensive than trains.

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<sup>10</sup> Brian M. Rosenthal, "The Most Expensive Mile of Subway Track on Earth," New York Times, December 28, 2017.

<sup>11</sup> Bill Vlasic and Neal E. Boudette, "G.M., and Ford Lay Out Plans to Expand Electric Models," New York Times, October 2, 2017.

[https://www.nytimes.com/2017/10/02/business/general-motors-electric-cars.html?\\_r=0](https://www.nytimes.com/2017/10/02/business/general-motors-electric-cars.html?_r=0)

<sup>12</sup> Nissan USA, "Nissan Intelligent Mobility, Intelligent Forward Emergency Braking with Pedestrian Detection," <https://www.nissanusa.com/intelligent-mobility> viewed December 17, 2017.

<sup>13</sup> Kelly Bluebook, "2018 Chevrolet Bolt EV," <https://www.kbb.com/chevrolet/bolt-ev/2018/> with range of 238 miles and list price at \$37,495

**The car services are growing.** Although careful statistical evidence has yet to appear, many observers believe that the dramatic growth in the use of car services and other paratransit is driving down the use of conventional transit. Ridership on Nashville's MTA has declined at more than three percent per year for at least the last two years.<sup>14</sup> This trend follows national averages.<sup>15</sup> Comparing July 2017 to July 2010, Chicago and Philadelphia are down 6%; Atlanta is down 15%; Charlotte is down 9%; Austin is down 21%; Denver is up 1%. Nashville's decline in ridership is despite a growing population and better transit services. Declining ridership reduces fare revenues and threatens the financial base for transit.

The car services are thriving in Nashville and around the country. They use databases of trip histories to forecast where calls are likely to arise and preposition cars for quick pickup. In urban areas, pickup is often within five minutes. The car goes directly from origin to destination using routes adjusted in light of current traffic conditions. The car services use their database of members to automatically debit charges. They charge higher rates in periods of peak demand to draw in more drivers and assure quick pickups. They have a feedback method for travelers and drivers to promote a pleasant experience on both.

The TIP report (p. 5) mentions "first-mile/last-mile" integrated connections for on-demand services. Car services in this role would be complementary to transit ridership with increased transit usage associated with more use of car services. Declining transit ridership, however, suggests that car services are substituting for transit use. With gentrification, the high-income inner city residents often prefer the

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<sup>14</sup> Nashville MTA, "Operations & Finance Committee Meeting Agenda, November 16, 2017 and November 17, 2016. Author's calculation from:

<http://www.nashvillemta.org/pdf/20171116committeeagenda.pdf>

<http://www.nashvillemta.org/pdf/20161117committeeagenda.pdf>

<sup>15</sup> The Antiplanner, "July 2017 Transit Riders Drop 3.6% from 2016,"

<http://ti.org/antiplanner/?p=13732> Downloaded file reports the change for each transit service. See also: American Public Transportation Association, "Ridership Report Archives,"

[http://www.apta.com/resources/statistics/Documents/Ridership/1996\\_q3\\_ridership\\_APTA.pdf](http://www.apta.com/resources/statistics/Documents/Ridership/1996_q3_ridership_APTA.pdf)

car-service. As lower-income residents move farther out, they use transit less. Conventional transit has little value in the crisscross suburban trips.<sup>16</sup> Suburban residents use many paths to dispersed employment sites and other locations. They do follow the hub-and-spoke focus on downtowns of the 1920s. The problem is particularly important because the rail lines are short. The Murfreesboro line ends at Donelson Pike and does not extend to Antioch. The Charlotte line ends at White Bridge.

**The car services offer shared-ride services.** In December 2017, Lyft began offering its LyftLine and Uber offered UberPOOL in Nashville.<sup>17</sup> People request the discounted shared service, giving their origins and destinations. The car service defines a route on the fly, picks several people up along the way, and drops them at their destinations. In 2017, Uber began offering Uber Express Pool in San Francisco at an even deeper discount than for UberPOOL.<sup>18</sup> The Express Pool service requires a few more minutes of lead-time, then, advises the traveler to walk to a pickup point. Uber accumulates a list of riders, defines a route on the fly, and drops riders off at pre-designated points that may involve a walk to a final destination. Express Pool in San Francisco starts with a \$2.00 fee. The MTA's base fare is \$1.70. MTA's fare covers about 23 percent of the operating cost of the bus service. (TIP report, p.42) This implies an operating cost per bus trip of \$7.43. Ridesharing with car services is cost-effective for many trips. A study at MIT forecasts that carpooling by car services

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<sup>16</sup> Mike Reicher, "Black share of population plummets in some Nashville neighborhoods", Tennessean, December 27, 2017.  
<http://www.tennessean.com/story/news/2017/12/28/black-population-plummets-nashville-neighborhoods/936368001/>

<sup>17</sup> Meg Garner, "Lyft to roll out carpool service in Nashville," Nashville Business Journal, December 12, 2017.

<https://www.bizjournals.com/nashville/news/2017/12/12/lyft-to-roll-out-carpool-service-in-nashville.html> and Meg Garner, "Uber to launch Nashville carpool service," Nashville Business Journal, December 19, 2017.  
[https://www.bizjournals.com/nashville/news/2017/12/19/uber-to-launch-nashville-carpool-service.html?ana=e\\_ae\\_set2&s=article\\_du&ed=2017-12-19&u=Kk1GtUK37%2F4MgRILPwY7Mw00b44426&t=1513719091&j=79367771](https://www.bizjournals.com/nashville/news/2017/12/19/uber-to-launch-nashville-carpool-service.html?ana=e_ae_set2&s=article_du&ed=2017-12-19&u=Kk1GtUK37%2F4MgRILPwY7Mw00b44426&t=1513719091&j=79367771)

<sup>18</sup> Uber Express Pool, <https://www.uber.com/ride/express-pool/> viewed December 18, 2017.

may reduce the volume of cars on streets significantly.<sup>19</sup> This conclusion, however, runs counter to the iron law of traffic.<sup>20</sup>

Several major companies will enter the car service industry in the next few years. Waymo, an affiliate of Google, has purchased 600 Chrysler Pacifica vans for use in a car service in Phoenix.<sup>21</sup> Avis will manage Waymo's garage functions. The cars are currently in service in Chandler, AZ. General Motors has driverless cars in test mode on the public streets of San Francisco and plans to test use as taxis in New York City in 2018.<sup>22</sup> GM executives expect their driverless cars to reduce the cost of ride-hail car-services from \$2.50 per mile with drivers to \$1.50 per mile without drivers quickly. Cost will continue to fall to \$1.00 per mile as more consumers use the service. The falling cost of car services with competition from new firms entering the industry, and the technical changes occurring in ridesharing, is creating a significant new way to move in urban settings.

The TIP report does not mention the shared ride services now becoming available through the car-service companies. The report does not recognize the pace of technical change and the likelihood of significant decreases in the cost of car

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<sup>19</sup> Riley McDermid, "Study says Uber, Lyft carpooling could reduce traffic by 75%" San Francisco Business Journal, January 4, 2017.

<https://www.bizjournals.com/sanfrancisco/news/2017/01/04/study-says-uber-lyft-carpooling-could-reduce.html>

<sup>20</sup> Emma G. Fitzsimmons and Winnie Hu, "The Downside of Ride-Hailing: More New York City Gridlock," New York Times, March 6, 2017.

<https://www.nytimes.com/2017/03/06/nyregion/uber-ride-hailing-new-york-transportation.html>

<sup>21</sup> Darrell Etherington, "Waymo now testing its self-driving cars on public roads with no one at the wheel," TechCrunch, November 7, 2017.

<https://techcrunch.com/2017/11/07/waymo-now-testing-its-self-driving-cars-on-public-roads-with-no-one-at-the-wheel/>

<sup>22</sup> Marco della Cava, USA Today, "GM: Driverless Cars Mean Big Savings for Ride-Hailing Service Users," November 30, 2017.

<http://www.wbir.com/mobile/article/news/nation-now/gm-driverless-cars-mean-big-savings-for-ride-hailing-service-users/465-7d0bff35-d372-4f21-870d-17bfd25d0eb2?scroll=0>

services in the years immediately ahead. With new services and falling costs, transit ridership is likely to continue to decline over the decade ahead. Declining ridership undermines both the plausible benefits and the financial base for the transit improvement program.

**The third component of the path to lower congestion deploys express lanes.**

Many cities have express lanes in use along Interstate and other limited access highways. California introduced express lanes in 1995. Atlanta began HOV lanes to express lanes in 2011 and is building a broad network of express lanes across the Atlanta region. Denver, Houston, Dallas and Northern Virginia have them in use as well. Although cars and buses account for most of the vehicles in express lanes, buses use them as well. Twenty-six percent of the people using the I-85 Express Lanes in Atlanta are traveling in commuter buses.<sup>23</sup>

Express lanes are an important strategy for transit. The TIP report, and the nMotion plan that preceded it, do not mention express lanes. Many express lanes are less expensive to build per mile than the \$150M per mile of the street railways in the TIP report.

The TIP report mentions a range of transport services but most of the money goes to trains. The plan misunderstands the role of the car services and ignores the possibility of express lanes along the Interstates.

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<sup>23</sup> Georgia State Road & Tollway Authority, "I-85 Express Lanes...Keeping Georgians Moving," <http://s.com/peach-pass-toll-facilities/about-i-85-express-lanes> "Approximately 2% of vehicles in the Express Lanes during the morning rush hour are commuter buses...but they make up around 26% of the people moving through the lanes." See Georgia State Road & Tollway Authority, "I-85 Performance Statistics Dashboard," [https://public.tableau.com/views/I-85-Performance-Statistics-2017/I-85ExpressLanesPerformanceStatisticsDashboard?:embed=y&:display\\_count=no&:tooltips=no&:showVizHome=no](https://public.tableau.com/views/I-85-Performance-Statistics-2017/I-85ExpressLanesPerformanceStatisticsDashboard?:embed=y&:display_count=no&:tooltips=no&:showVizHome=no) for more information about the express lanes.

#### **#4. Few who pay sales taxes get benefits.**

The discussion above notes that the transit program will not reduce traffic congestion. As a consequence, tracking those who ride is key to identifying who benefits. There are deeper implications, however. Where better transit improves access to a location, the value of real estate increases. Market rents on housing and commercial space increase. The benefits of the transit improvement, then, go to the landlords, the owners of the real estate with better access, not to the transit riders. When transit is well used, real estate development comes along. In this way, transit improvement will accelerate gentrification with benefits going to the owners of well-located real estate.<sup>24</sup>

Tenants do not gain. About 46 percent of the households in Davidson County rent their homes.<sup>25</sup> Some tenants may choose to use transit but are likely to see significant increases in rent as potential transit users bid-up values for rentals in locations with better transit access. The value of real estate distant from train stops may fall with the relative loss of advantage.

The TIP report does not identify the primary beneficiaries of the transit improvement program. It does not consider measures of finance that would allow the primary beneficiaries of the program to bear more of its costs. An increase in the property tax in the Central Business Improvement District would be an example. Special property tax districts along the rail corridors would be another possibility. Instead, transit proponents propose tax reductions for real estate developments in the rail corridors through the Transit Oriented Development District legislation. These tax subsidies increase the share of Metro public services paid for by taxpayers who are not subsidized. That is to say, the principal beneficiaries will pay less for

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<sup>24</sup> Justin Feldman, "Gentrification, urban displacement and affordable housing: Overview and research roundup," Journalist's Resource, August 15, 2014.

<https://journalistsresource.org/studies/economics/real-estate/gentrification-urban-displacement-affordable-housing-overview-research-roundup>

<sup>25</sup> US Bureau of the Census, American FactFinder,

[https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_12\\_3YR\\_NP01&prodType=narrative\\_profile](https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_3YR_NP01&prodType=narrative_profile)

the transit improvement than people of similar circumstance who are distant from the railroads.

Understanding the transit taxes helps identify who gains and who pays. The TIP report (pp. 39-43) describes the four taxes that will pay for the transit initiative. A 44% increase in the local option sales pushes the rate from 2.25 to 3.25 percent of retail sales by 2023. These taxes will last for a long time. The sales tax will generate about \$225M in 2023, a little less than 94% of the total transit tax revenue. The tax on the gross income of businesses, hotel fees, and rental car fees complete the total transit tax sources. The burden of these taxes falls primarily on local residents and local businesses.

**Sales Tax** The immediate effect of the sales tax is an increase in cost of retail goods that are subject to the sales tax. The Consumer Expenditure Survey produced by the Bureau of Labor Statistics provides a basis for estimating the sales payment by level of income. The average sales tax payment for transit will be \$324 per year per household in 2023. The average for households in the bottom quintile is \$146 per year and the average in the top quintile is \$582. With only 2.2% of the workforce currently using transit for the journey to work and with declining transit ridership in Nashville even as population grows and transit service expands, a large majority of the households who pay the transit sales tax will receive little or no benefit from it.

Employers who compete to hire employees from across the country must pay more as the cost of living increases. The local cost of living includes the sales tax. Higher salaries compensate employees for the higher cost of living here. Employees not paid more will tend to move elsewhere. Higher wages are hallmarks of larger cities. Some people who have limited mobility may suffer a lower standard of living as the cost of living increases without increases in income.

A less expensive transit strategy with better services over a wider area will yield net gains for more employers in more locations. Buses are fairer than trains. The car service and express-lane strategy is likely to benefit more employers in more

locations. Nashville will attract more employers and employees with less expensive but effective transport. The City will grow faster with more cost-effective mobility strategies.

**Hotel Tax** The hotel tax increases from 6.0 percent to 6.375 percent by 2023. This tax will yield about \$6M in 2023, a little less than three percent of the total transit tax revenue.

Hotels in the convention business will bear the burden of both the added hotel and sales taxes. Professional convention managers solicit bids from several cities. Among cities able to offer the necessary services, the manager will choose a city with the lowest hotel room rate for a large block of rooms, inclusive of all taxes. Any increase in sales and hotel tax causes the hotels to accept a lower room rate net of taxes. In this setting, the hotels bear the tax through lower prices, not the conventioners who pay the bills. Tourists are also quite sensitive to prices. Hotels and other businesses in the convention and tourism business will bear most of the burden of the hotel and sales taxes that appear on their bills. Nashville's total of sales plus hotel tax will be 16.625% in 2023. Las Vegas has the highest rate in 2015 at 18%. In 2015, nineteen of 150 large cities in 2015 had total lodging tax rates above Nashville's proposed rate<sup>26</sup>

The TIP report (p. 41) mentions a Chamber of Commerce estimate that people from outside Davidson County pay 47% of all sales taxes collected in Davidson County. This estimate uses an accounting view of who pays the tax. Someone from Indiana pays for a hotel room with her credit card, for example. The analysis here considers who bears the burden of the tax. If the hotel bill including the tax stays that same even as the tax increases, then the hotel is bearing the burden of the tax by accepting a lower price net of tax. Estimating who bears the burden of a tax is more important than identifying whose credit cards pay the bills.

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<sup>26</sup> HVS, "2016 HVS Lodging Tax Report—USA," <https://www.hotelnewsresource.com/pdf16/HVS082916.pdf> Page 9 reports the total rates for the top 150 cities in the US in 2015.

**Rental Car Tax** The local tax on car rental fees will rise from 1.0% to 1.2% and generate about \$0.4M annually in 2023. This is less than 0.2% of the total transit tax revenue. Conventioneers and tourists account for an important share of car rentals. The rental car companies may bear a substantial share of the tax among price sensitive customers.

**Business Tax** The local business tax applies to the gross income of businesses. This tax is to increase by 20% from a current average of \$1,673 per business per year. This tax will raise about \$8M in 2023, less than four percent of the total transit tax revenue.

**Jobs** The TIP report (p. 7) notes jobs and affordable housing as additional benefits. The transit program has little benefit in either case.

The supplemental analysis about added jobs is deeply flawed. The “Technical Memorandum” from Wilmot, Inc. of December 12, 2017 estimates that the capital improvement component of TIP will generate 44,753 job-years over the 14 years of construction. The expenditures on operations and maintenance, Wilmot says, will generate 9,136 local job-years over the same period.

This analysis does not account for the loss of employment that results from decreased consumer and business expenditure due to the increase in local taxes. Funding transit from local taxes will have little if any net employment effect. A Federal grant for transit would have a temporary effect on employment. The prospects for a Federal grant declined with the adoption of the Federal income tax law in December 2017.

The Nashville region is booming. Non-farm employment grew by 2.7 percent in the Metropolitan Statistical area from October 2016 to October 2017.<sup>27</sup> The unemployment rate is a 2.3% in October 2017, a sign of full employment. The construction, professional services, and leisure sectors are leading the surge. Many

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<sup>27</sup> Bureau of Labor Statistics, “Economy at a Glance: Nashville-Davidson—Murfreesboro—Franklin, TN,” [https://www.bls.gov/eag/eag.tn\\_nashville\\_msa.htm](https://www.bls.gov/eag/eag.tn_nashville_msa.htm) viewed December 20, 2017.

people are moving to Nashville because of the employment opportunities. There is no reserve of skilled but unemployed people in Nashville. Pulling more employers and employees into Nashville from elsewhere will tend to increase real estate values and increase the cost of living here. The added workers will come from somewhere else. Moving jobs to Nashville has little value to people currently paying the sales tax here.

**Affordable Housing** TIP will make housing within a few miles of downtown more expensive. The TIP program increases gentrification along the rail corridors. Rental rates and housing prices will increase with increased access. Increasingly dense real estate development inherently increases with the price of housing and commercial space. In short, the transit initiative decreases affordable housing in the core of the city. Atlanta's Beltline offers an example of a project to offer more affordable housing that led to more gentrification instead.<sup>28</sup>

The TIP report (p. 7), however, proposes transit-oriented communities as providing affordable housing. A lower-cost transit program with buses and car services will support better service without transfers to more locations. Trains are not necessary to support communities with affordable housing.

By adopting a less expensive transit strategy, Metro will have more funds to raise the pay scales for its police officers, teachers, and other employees. Metro will be better able to develop subsidized housing with services for the homeless, seniors, and low-income households. More funding for Metro schools is essential as well. Expensive transit will crowd out funding for other services.

In short, the expensive rail transit initiative will accelerate gentrification and the associated disruptive relocation of many lower-income households and traditional businesses. TIP also increases sales and business taxes. The alternative of more

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<sup>28</sup> Willoughby Mariano, Lindsey Conway, and Anastacia Ondieki, "How the Atlanta Beltline broke its promise on affordable housing," Atlanta Journal Constitution, July 13, 2017. <http://www.myajc.com/news/local/how-the-atlanta-beltline-broke-its-promise-affordable-housing/0VXnu1BIYC0IbA9U4u2CEM/>

buses and ride-sharing car services—possibly with subsidies for low-income households—has the advantage of more gradual change, lower taxes, and greater mobility. The car services have particular advantages in lower density areas away from downtown. The expensive rail-based transit initiative makes the problem of affordable housing more challenging.

### **After the Referendum**

The referendum may fail. They often do. Austin, TX passed a referendum and built a railroad. So few people rode it, locals called it the ghost train. In 2014, voters turned down a referendum for a second rail line. Austin expanded its bus service using conventional finance much as Nashville has improved its transit service recently.

The referendum may pass. In 2008, Honolulu’s voters adopted a referendum for a sales tax dedicated to a rail project with 53% approval.<sup>29</sup> A 20-mile railroad was to cost \$4B and open in 2019. By 2017, the project cost rose to \$10B with opening pushed out to 2025.<sup>30</sup> In a recent poll, the project drew only 15 percent approval.<sup>31</sup>

The referendum may pass but the Federal Transit Administration may not provide the \$1.5B grant that is part of the financial plan. The \$5.4B plan then becomes a \$3.9B plan. Construction of some of the rail lines will be postponed indefinitely.

The referendum may pass with the project built as planned. The number of daily riders, however, may fall short of expectations. With rising incomes and continued gentrification, the shift away from conventional transit will continue. With fewer

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<sup>29</sup> “Honolulu Rail Transit,” Wikipedia, viewed December 29, 2017.

<sup>30</sup> Honolulu Authority for Rapid Transportation, “Recovery Plan,” September 15, 2017, pp. 13-17. <http://hartdocs.honolulu.gov/docushare/dsweb/Get/Document-21210/20170915-hart-recovery-plan.pdf>

<sup>31</sup> Adam Nagourney, “Hawaii Struggles to Keep Rail Project From Becoming a Boondoggle,” New York Times, March 20, 2016. <https://www.nytimes.com/2016/03/21/us/hawaii-struggles-to-keep-rail-project-from-becoming-a-boondoggle.html? r=0>

people using transit, the expected \$29M in annual revenue from fares in 2032 will fall short. The Metro general budget will cover shortfalls as it has for the Music City Star. The MTA is likely to scale back service where ghost runs are common.