Durham Orange Counties Light Rail: An Assessment

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Abstract

This document collects facts about DOLRT. It is intended as a reference document of sorts. The document is work in progress and imcomplete. The most recent version can found here.

1 Key DOLRT Facts

1. The capital cost of DOLRT is currently (as of March 2019) **$3.4 billion**.
2. The FTA will pay $1.25 billion, if the project is approved. The state may pay $190 million. Orange County has limited its commitment to $149.5 million. **The cost share of Durham county is therefore $1.8 billion**. Durham will also have to cover all cost overruns.
3. There will be a single rail track, 18 miles long, connecting UNC Hospitals to downtown Durham.
4. Travel time between Chapel Hill and Durham will be **57 minutes** for an average speed of 18 mph (as of March 2019).

2 Ridership

GoTriangle estimates that each year around 8 million people will ride the one train line that is currently being planned. This estimate is absurd. There is no light rail system in the United States that attracts this many riders in such a small city.

2.1 GoTriangle Ridership Estimates

GoTriangle's ridership figures have varied over time and across documents. It is not clear why the figures vary so much.

- As of February 2019, the estimate on GoTriangle's website is 26,000 riders per day, which works out to 9.5 million riders per year (though my conjecture is that GoTriangle means 26,000 riders per work day).
- GoTriangle (2012a) shows 12,000 daily riders. Why the number of daily riders more than doubled by 2019 is not clear.

The service area corridor:

- GoTriangle (2012b, table 2.1) estimates a population in the corridor around DOLRT or 231,000 in 2035.
- The corridor is a couple of miles wide and covers 12% of the area of Durham and Orange Counties, but is assumed to contain 45% of the area population (table 2-1).
- Only a tiny fraction of the area is within 1/2 mile of a train station.

2.2 FTA Ridership Statistics

For comparison, I use FTA ridership statistics for 2017. The FTA lists 35 U.S. cities with light rail systems. Of these, 12 are small enough that they do not need to report data to the FTA. The following is based on the 23 systems that do report ridership figures.

The key variables are ridership (annual unlinked trips) and city population. Throughout, I am using the urbanized area population as my measure of service area population. This makes a difference for a few cities where the service area population is much smaller than the urbanized area population. Notably, for Phoenix-Mesa, the service area population is only 10% of the urbanized population (which sounds strage to someone who knows the area well). For Charlotte, on the other hand, the service area population is quite a bit larger than the urbanized population.

2.3 Durham/Chapel Hill would be the smallest city with light rail

- The median population among cities that report ridership data is 2.4m. This is **7.3 times larger** than the population of Durham/Chapel Hill (population 330,000).

- The smallest city that reports light rail ridership is Buffalo, NY with a population of 940,000 and 4.7m riders. This is about 3 times larger than Durham/Chapel Hill, but still generates only 58% of the number of riders GoTriangle predicts for Durham/Chapel Hill.

- Charlotte, NC yields 14,000 daily riders out of a population of 1.8m. GoTriangle predicts that DOLRT will yield 50% more riders than Charlotte's light rail which is longer, has more stations, and services a population that is (currently) about 5 times larger.

2.4 Annual Riders Per Capita

- GoTriangle predicts 8m riders per year for a service area of 330,000 persons. This works out to **24** riders per person.

- The median ratio of annual ridership per person for the 23 systems that report ridership statistics is **5.6**; less than one quarter of GoTriangle's prediction.

- NO light rail system in the United States, no matter how dense, achieves 24 annual riders per person.

- Portland (OR-WA) is the system with the highest number of riders per person: 21.4. This is an outlier and likely results from the fact that Portland has deliberately restricted road traffic.

- The second highest number is attained by San Francisco /Oakland (15 riders per person). In other words, GoTriangle predicts a single track connecting Durham with Chapel Hill will produce more riders per persons than San Francisco /Oaklands entire light rail system.

- Charlotte, NC is an obvious comparison: it achieves 3.8 riders per person (4.8m riders out of a population of 1.8m). This is a plausible estimate for a single rail line. It implies annual ridership for Durham/Chapel Hill of 1.1m (about 1/7th of GoTriangle's projection).

- In 2015, the northern part of 15/501 carries about 15,000 riders a day. I refer to the section leading into downtown Durham past the split from 15/501 Business. GoTriangle's ridership numbers imply that more than all of these drivers will switch to light rail. Alternatively, it could be that most light rail riders will not actually travel to/from Durham (even though the density of rail stations will be highest there).

2.5 Transit Demand

GoTriangle's ridership predictions are absurdly high relative to demand for public transit

- All of Durham's bus lines combined transport 6.3m riders per year. This is again based on FTA ridership statistics for 2017.
- GoTriangle predicts that *a single rail line* with transport 1.7m more riders than all bus lines combined.
- For comparison: The median ratio of light rail to bus annual ridership in the FTA database is 0.32.
- For Charlotte, NC, the ratio is 0.26 (rail transports about 1/4 of the passengers that travel by bus). This would seem like a reasonable expectation for DOLRT, which will feature only a single rail line.
- If the Charlotte ratio holds for DOLRT, we would expect 1.7m annual riders (less than 1/4 of GoTriangle's prediction).

GoTriangle (2012b), table 2-13, reproduced below as Table 1, breaks down trips inside the DOLRT corridor by origin and destination.

- In 2005, the total number of trips within the corridor is 230,000. These are trips that start and end in the corridor.
- The corridor is sub-divided into 5 areas (Chapel Hill, downtown Durham, Duke, etc). So each area is compact.
- 136,000 of the total trips stay within a sub-area; i.e., they are very short trips. E.g., 45,000 trips stay within Chapel Hill (no rail use possible), 40,000 trips stay within Duke.
- **Only 2,000 trips go from Chapel Hill to downtown Durham or vice versa.**
- Only 13% of all trips leaving Chapel Hill go somewhere into the corridor (but outside of Chapel Hill).Only 7% of trips that originate in downtown Durham go to somewhere else in the corridor (excluding Duke, which has its own buses and is not on the alignment anyway).
- The upshot: the DOLRT will serve a tiny fraction of potential riders. There are only 2,000 daily trips between downtown Durham and Chapel Hill!

Table 1: Daily Trip Patterns in 2005

Table 2-13 2005 Daily Trip and Percentage of Trip Productions and Attractions by Subarea

		Attracted To					
		Chapel Hill	East CH/SW Durham	West Durham	Duke	Downtown Durham	Outside of Study Area
Produced By	Chapel Hill	45,000 (46%)	8,000 (8%)	2,000 (2%)	2,000 (2%)	1,000 (1%)	39,000 (40%)
	East CH/SW Durham	8,000 (9%)	17,000 (21%)	8,000 (9%)	4,000 (5%)	2,000 (3%)	43,000 (52%)
	West Durham	2,000 (3%)	5,000 (8%)	15,000 (24%)	8,000 (12%)	4,000 (7%)	30,000 (47%)
	Duke	1,000 (1%)	2,000 (2%)	5,000 (6%)	40,000 (42%)	10,000 (11%)	36,000 (38%)
	Downtown Durham	1,000 (1%)	1,000 (1%)	4,000 (5%)	15,000 (17%)	19,000 (20%)	52,000 (57%)
	Outside of Study Area	66,000 (1%)	50,000 (1%)	52,000 (1%)	95,000 (2%)	80,000 (2%)	4,264,000 (93%)

Source: Triangle Regional Model| Data presented in the table is based on the Triangle Regional Model V4.

2.6 Train Capacity

DOLRT's planned rail capacity cannot carry more than 6,000 peak hour commuters a day.

- Each vehicle will carry at most 220 passengers, including standing passengers (Go-Triangle presentation at Duke Climate Coalition, Feb 20, 2019).
- Each train has 2 vehicles.
- During rush hour (hours not specified), trains run every 10 minutes. So 6 x 440 = 2,640 passengers per hour, if every vehicle is packed to capacity.
- This capacity doubles because trains run both ways. So we have 5,280 passenger per hour.
- Assume that morning rush hour has passengers arriving at work between 7:30am and 8:30am. That would be 7 trains or 6,160 passengers.

These calculations assume that every vehicle is packed to capacity, which is obviously not possible.

It follows that at most 6,000 of GoTriangle's expected 13,000 riders a day can be peak hour commuters. **More than half of GoTriangle predicted riderhsip will be off peak.**

The actual fraction of peak hour commuters will likely be smaller. Turner (2019, Figure 6B) finds that light rail typically operates at less than 20% of its capacity.

Why is this important? Because off-peak hour riders can be transported inexpensively with buses. They are irrelevant for most of DOLRT's goals: traffic congestion, CO2 emissions, access to jobs. More than half of GoTriangle's predicted ridership could be transported at much lower cost without building new infrastructure.

Another bottle neck for ridership is parking. 70% of DOLRT riders will travel to their train stations by car (source?). 6,000 peak hour commuters would then require 4,200 parking spots near train stations, again assuming that parking is fully utilized.

There will be parking at South Square, MLK, Leigh Village, Gateway, Friday Center. It is not known (to me) how many spots each station will have, but I doubt that the number adds up to 4,200 (the figure is 3,900 according to railway_technology.com). Note that all of the planned parking spots are "half way" between Durham and Chapel Hill. Evidently, GoTriangle expects that most commuters will drive to train stations that are located half way along the track so they can take rail at 18mph to cover the remaining 9 miles to work. This would easily double the time a typical commuter spends on commuting.

2.7 Conclusions

I draw two conclusions from this comparison:

1. The Durham/Chapel Hill area is too small to support a light rail system. No other U.S. city this small has light rail. For light rail to be economically viable, it would have to connect Raleigh to surrounding cities (Cary, Apex).

2. GoTriangle's ridership estimates are pure fantasy numbers that bear no plausible relationship to reality.

Overstated ridership estimates are, by the way, standard practice in the industry. On average, light rail ridership estimates were 70% higher than actual ridership outcomes.

What are the alternatives to light rail?

Clearly, transportation has to move away from cars carrying one or two persons each. Fortunately, alternatives are coming online as I am writing this. Several cities are experimenting with self-driving van services. In contrast to rail, these will solve the "last mile problem." Instead of discharging passengers at a handful of train stations, vans drop off passengers where they actually need to go.

By the time the planned DOLRT would come online (2028, if everything goes according to plan), it will be technologically obsolete.

2.8 Ridership fact summary

1. On average, light rail ridership estimates were 70% higher than actual ridership outcomes.
2. Charlotte, NC light rail: Service area population 1.8m; annual riders: 4.77m. Source: National Transit Database, Monthly Module, retrieved Nov-2018.
3. DOLRT: Service area population (for Durham/Chapel Hill transit area): 240,000 (source: NTD). Assuming 50% population growth by 2035, the service area population is 360,000 (1/5th of Charlotte's current service area). Projected ridership in 2035 (GoTriangle): at least 6m (figures vary across documents).
4. Population densities:
   (a) at the city level: Durham: 2,100 persons per sq mile; Charlotte: 2,800; Raleigh: 3,200.
   (b) at the county level: Durham: 1,000 (source: Wikipedia); Mecklenburg county (Charlotte): 2,013; Wake county (Raleigh): 1,254. The claim (made by GoTriangle during the Feb 2019 meeting orgainized by the Duke Climate Coalition) that Durham is suitable for light rail because of population density while Raleigh is not does not hold up.

3 Cost

3.1 Cost Facts

GoTriangle's capital cost figures have greatly increased over time.

- In 2012, GoTriangle (2012a) expected capital costs of $1.37b.
- As of Feb 2019, GoTriangle typically lists capital costs of $2.45b, although there are currently no capital cost figures on GoTriangle's website (except in the regulatory documents, which the public likely will not read).
- As of Feb 2019, the actual capital cost appears to be $3.4b, consisting of $2.45b construction costs, $800m in accrued interest by the time DOLRT is scheduled to open, and $100m for the downtown Durham tunnel.

Cost per mile:

1. If DOLRT costs $3.4 billion for 18 miles of track, this works out to $190m per mile.

2. Bus Rapid Transit typically costs $6 to $20 million per mile of dedicated bus lanes.

Cost overruns:

- The average cost overrun among 56 light rail project was 50%. More recent projects tended to suffer greater cost overruns.

3.2 DOLRT as a Lifetime Commuter Pass

Here is my way of thinking about DOLRT. GoTriangle offers a few thousand people lifetime commuter passes that shuttle riders between 18 permanently fixed stations at 18 mph. How much does one commuter pass cost? About $1 million.

Here is how the $1 million cost figure is computed:

- Capital cost: $3.4 billion.
- Daily roundtrip riders: let's say half of Charlotte's 7,000. To make the math easy, say 3,400 daily roundtrips (see section 2).
- Cost per commuter pass: $3.4b /3,400 = $1m.

Even if we assume that DOLRT will be a smash hit success with as many daily riders as Charlotte (service area population 1.7m; source FTA), the cost per commuter pass will be $500,000.

It would literally be cheaper to give away free electric cars every 10 years to the few thousand people who are expected to take the train every day.

3.3 DOLRT Cost per Trip

GoTriangle has not calculated (or made public) an estimate of the cost per rider. However, a simple back-of-the-envelope calculation reveals that each round-trip could easily cost $100 per passenger.

As a starting point, the following is a simple capital cost calculation, based entirely on the numbers provided by GoTriangle (likely optimistic):

1. Capital cost of the project: $3.4b (see subsection 3.1)
2. Assumed interest rate: 5% (my assumption)
3. Interest cost per year: $170m

4. Annual number of round-trips: 4m (see section 2)

5. Interest cost per round-trip: **$42**

This calculation does not account for operating costs (about $7 per round-trip based on GoTriangle's estimate of $30m in annual operating costs).

A more likely scenario:

- Capital costs double (the typically cost overrun for public transit projects in the U.S. is over 100%), increasing the cost of a round-trip to $84
- Ridership will be at best half of GoTriangle's projection, increasing the cost of a round-trip to $168 (see section 2).

For comparison: the FTA reports that Durham buses cost $3.17 per rider (operating costs only, but then buses do not incur road construction costs).

Another way of looking at cost: Assume that GoTriangle is correct and we have 12,000 commuters taking the train every day. The interest cost of the project alone would be **$14,000 per commuter** per year. If my calculations are correct, that cost would likely be $50,000 per commuter. In other words, each commuter's average after tax earnings would be spent entirely on commuting to work.

Why are these costs so high? There are two simple reasons:

1. The Durham/Chapel Hill areas is too small. Its population of 330,000 is about 40% of Bufallo's (NY) which is the smallest city that reports ridership data to the FTA (see section 2).

2. The construction cost of the DOLRT is quite high (before cost overruns). $3.4b for 18 miles of track works out to $190m per mile. Even by U.S. cost standards, this figure is high.

My conclusion from this is simple: Light rail belongs in large, densely populated cities. Phoenix recently completed its first rail line at a cost of $65m per mile. The area population exceeds 3m. This is a case where the numbers can make sense. If the DOLRT connected the major population centers of the area (e.g., Raleigh with Cary and Apex), its numbers could work out as well. However, connecting smallish cities in the periphery just makes no sense; which is why it has never been done before.

Fortunately, there is a cheaper alternative: Bus Rapid Transit.

3.4 Construction Costs: The Big Picture

DOLRT's cost problem is shared by other light rail projects that are located outside of very large, very densely populated cities. Turner (2019) discusses these issues in detail. He argues (p. 19):

> Economists have long argued against subways and light rail except as a last resort. This argument follows from the high cost of building fixed-rail urban transport.

U.S. light rail construction costs are far higher than European costs. The reasons are not entirely clear. See the blog post at Pedestrian Observations for an illuminating discussion.

4 Benefits: Traffic, Congestion, Energy Use

GoTriangle asserts that DOLRT will not solve traffic congestion: "In general, the project is not expected to have a significant effect on traffic on nearby roadways. However, the project will provide a competitive and reliable travel alternative to the congestion on these roadways, particularly during peak traffic hours."

The Draft Environmental Impact Study GoTriangle (2015) shows that, relative to "no build", DOLRT will

1. reduce auto vehicle miles driven by 0.1% (table 4.13-1);
2. reduce direct transportation energy use by 0.06 (both for year 2040) (table 4.13-2);
3. account for 0.96 out of 24,274 million miles driven per year (table 4.13-1). This figure is likely a mistake. GoTriangle predicts several million riders a year. Hence rail miles traveled must be in the tens of millions. But that does not change the conclusion that the traffic and energy use impact will be negligible.

Note: As of Feb 2019, GoTriangle advertises the reduction in energy use of 83b BTU per year as a major environmental benefit ("The Business Case for the DOLRT", Feb 2019). GoTriangle does not mention that 83b BTU amounts to 0.06% of transportation energy use in the service area.

4.1 External evidence

- Spears et al. (2017) finds that Los Angeles light rail car trips for persons living within walking distance of stations.

- Nasri and Zhang (2014) find that transit oriented development reduces car trips in Washington, DC and Baltimore. The paper does not link this benefit to light rail.
- Golub et al. (2012) finds that Phoenix light rail reduced energy use.

5 Benefits: Economic Development

Claims made by supporters:

- News & Observer Op-Ed by Schewel et al. claims 30,000 jobs created by DOLRT (no supporting evidence given).

As an economist, my reaction to such claims is:

1. Where is the supporting evidence? GoTriangle's Alternatives Analysis (GoTriangle, 2012b) is remarkably vague about DOLRT's "economic development" benefits, even though they are the main reason why LRT was chosen over BRT.
2. Any competent economist will dismiss the jobs argument as nonsense, unless the argument is that 30,000 additional residents will be attracted to Durham (not exactly a benefit).
3. Essentially all of the empirical evidence suggesting that light rail generates investment near rail stations fails to show that this is new net investment as opposed to investment that was merely relocated from elsewhere in the city (see subsection 5.2). GoTriangle's Alternatives Analysis (GoTriangle, 2012b) does not address this issue.
4. If the goal is generate high density, mixed use development, why would rail be the most cost effective policy? An obvious alternative would be zoning policies.

5.1 GoTriangle's Alternatives Analysis

GoTriangle (2012b) provides evidence for economic development benefits due to light rail. The evidence consists of five (!) examples where light has generated

1. higher rental rates near rail stations;
2. additional construction near rail stations.

No more sophisticated evidence is presented. No evidence is presented that the additional construction investment is new net investment rather than relocation from areas farther away from rail stations.

Why higher rental rates are a benefit is not explained.

Evidence that BRT (the alternative that outperforms LRT according to most criteria) creates less economic development is limited.

- GoTriangle cites a single study on the issue as: "According to the Transportation Research Board, full-featured BRT systems can experience a level of TOD similar to that of LRT." (p. 5-87)
- GoTriangle points to "highly successful BRT systems found in South America." (p. 5-88)
- The conclusion that BRT may create less economic development than LRT is based on the observation that it works well in other countries, but that U.S. BRT systems "include significant comprises in design" (p. 5-88) that may reduce their economic development impact.
- The comparison does not consider that BRT systems tend to be shorter and far cheaper than light rail.

5.2 External Evidence

A detailed review of the evidence relating light rail (and other public transit as well as highway construction) to economic development is Turner (2019). He summarizes the evidence as follows (p. 4):

> Claims about the ability of highways or transit to promote economic growth or economic opportunity for the poor should also be regarded skeptically. Highways and transit play an important role in determining where people live and work but probably do not much affect how productive they are or the probability that they are employed. Therefore, simply spending more on transportation infrastructure to increase economic opportunity, particularly for the poor, is unlikely to be cost effective. In particular, the available evidence suggests that the annual investment in subways required to cause a single low-educated worker to enter the workforce is at least equal to the income such a worker could earn and could be much larger.

The last point is key and aligns with my own analysis of DOLRT. Even if light rail improves access to jobs, the costs are so high that it would be cheaper to simply pay rail passengers a "salary" for staying home.

Brief summary of pertinent studies:

- Schuetz (2015) finds not evidence that light rail increases retail activity near rail stations in 4 U.S. metro areas.
- Hurst and West (2014) finds little evidence that light rail changed land use near rail stations in Minneapolis.
- Billings (2011) finds small increases in land values (4%) near rail stations in Charlotte.
- Chatman et al. (2012) finds no evidence of increases in property values in New Jersey when declining property values farther away from light rail are taken into account.
- A University of MN study found that Minneapolis light rail had economic development benefits. It is not clear whether the additional investment along the rail line was relocation or new net investment.

5.3 Access to Jobs

Brief summary of pertinent studies:

- Pang (2017) finds that a 10% increase in light rail miles per capita causes a 0.5% increase in labor force participation for low-skilled men. He finds no effect on labor force participation of low-skilled women.
- Based on Pang's evidence, Turner (2019, p. 16) calculates that creating one low-skilled jobs through rail construction costs about $40,000 per year in interest (assuming a construction cost of $100m per mile). The average low-skilled worker in Pang's sample earns about $17,000 per year.

5.4 Connecting to RTP and Raleigh

Proponents of DOLRT often point out that DOLRT will connect to a planned commuter rail project that will link Durham with Raleigh and RTP. The details of the Wake County commuter rail plan can be found here.

As of February 2019, the details are sketchy. There will be "up to eight trips in each direction during peak hours" and "one to two trips each way during midday and evening hours." No information on trip duration is provided.

Now envision how this might tie in with DOLRT. A Chapel Hill commuter would have to drive to the nearest DOLRT station (because there are essentially no stations in walking

distance of anyone living in Chapel Hill) and park their car. Then there would be a 5 minute wait for the train (10 min headway during peak hours), followed by a 57 minute train ride to downtown Durham. The commuter would then walk over to the commuter rail track and embark on another train ride of unknown length. Assuming the trip to Raleigh only takes 30 minutes, our hypothetical commuter would spend about 1 hour and 45 minutes on commuting each way.

I venture the guess that nobody will find this kind of travel time acceptable.

Moreover, the commuter would have ensure that they return during peak hours (whenever they will be), lest they be stranded in Raleigh for the night.

6 Light Rail Alternatives

6.1 Bus Rapid Transit

Bus Rapid Transit offers most of the benefits of light rail at a fraction of the cost (see Reason foundation).

- Hook et al. (2013) find that BRT projects cost, on average, 1/3 of LRT projects.
- Because BRT is much cheaper than LRT, multiple lines can be built for the cost of one LRT line. As a result, "BRT can create more TOD investment" (Feigenbaum, 2014)

6.1.1 Cost per mile

Average cost per mile for dedicated bus lanes:

- $11.5 m per mile (based on projects currently under review with the FTA).
- $6 to $20 million per mile
- The Cleveland Health line is somewhat of a poster child for BRT. It is 6.8 miles long and cost $200m to build (in 2008). It carries 16,000 riders per day. At $29m per mile, the Health Line is one of the most expensive BRT projects in the U.S. – it still cost less than 1/6th of DOLRT per mile.

Seattle's Swift II BRT cost $48 m (12.5 miles). The proposed Light Rail line would have covered the same path for $4.5 to $5 billion – 100 times more expensive than BRT.

Wake County's transit plan includes 20 miles of BRT, 66 miles of high frequency bus service, and 37 miles of commuter light rail at a projected cost of $2.3 billion.

6.1.2 GoTriangle Alternatives Analysis

When GoTriangle evaluated alternatives to light rail in 2012, BRT did quite well.

- BRT outperformed LRT according to "Goal 1: Improve mobility through and within the study corridor, Goal 2: Increase transit efficiency and quality of service, and Goal 3: Improve transit connections" (p. ES-5).
- "Each of the three alternatives LRT, BRT High, and BRT Low also meet Goal 5: Foster environmental stewardship" (p. ES-6).
- "From a cost perspective, the BRT High and BRT Low Alternatives best meet Goal 6: Provide a cost-effective transit investment" (p. ES-6).

The only reason why LRT was preferred was its expected impact on "economic development": "While the BRT Alternatives are competitive regarding most project goals, the LRT Alternative clearly surpasses the BRT Alternatives under Goal 4: Support local and regional economic development and planned growth management initiatives" (p. ES-7). The supporting evidence is very weak (see subsection 5.1).

The assumptions underlying the Alternatives Analysis were biased in favor of light rail:

1. The Alternatives Analysis assumed that LRT would cost $1.37b (actual cost as of Feb 2019: $3.4b), while BRT was expected to cost between $810m and $960m. The assumptions imply a BRT cost per mile between $45m and $53m per mile. To my knowledge, the most expensive BRT project in the U.S. is the Cleveland Health Line at $29m per mile.
2. Travel from Chapel Hill to Durham was assumed to take 35 minutes on DOLRT (table ES-1). The current (Feb-2019) estimate is 57 minutes.

Note that the alternatives analysis was conducted before Wake County replaced its light rail project with BRT and expanded bus services. Thus, DOLRT lost its connection to the main economic and population centers of the region (Raleigh and RTP).

6.2 Technologies Under Development

Waymo has launched its first consumer self-driving car service in Arizona in early 2019. It is now (not in 10 years) possible to call a shared ride using a phone app, similar to an Uber or Lyft. Unlike Ubers, these are minivans, so that riders who travel similar routes can share a vehicle (if the wish) and thereby reduce cost and road congestion.

7 Sources of Information

- GoTriangle's documents can be found in their Resource Library.
- Affordable Transit for All: website with DOLRT facts and analysis.
- Stop the Train

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