



## **Review of the Triangle Transit Authority's Response to Questions Regarding Costs and Ridership**

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Prepared for the  
**John Locke Foundation**  
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**April 30, 2012**

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## **Overview**

### ***Background***

In November 2011, Wake County NC (the Raleigh, NC urbanized area) in conjunction with the Triangle Transit Authority (TTA) and other agencies, released the *Wake County Transit Plan*<sup>1</sup>. This Plan called for significant expansion of the transit system in Wake County, including doubled bus transit service, new commuter rail service (CR) between Raleigh and Durham, and a new light rail service (LRT) between Cary NC and northeast Raleigh. The cost of this expansion was estimated at \$4.6 Billion, to be paid for largely by a ½-cent sales tax and other federal, state and local funds over 28 years. The Plan's details assert a more than doubling of transit ridership as a result.

Given the Plan's large costs and uncertain benefits, the John Locke Foundation, a Raleigh-based independent nonpartisan think tank, commissioned an independent review<sup>2</sup> of the Plan by the above authors, which was released in early February 2012. That Review found that the Plan contained numerous optimistic assumptions, errors of fact or omission and calculations at variance with standard industry practice. Therefore, the review found that the Plan was not technically nor financially feasible and was unreliable as the basis for decisions regarding transit investment in Wake County.

Since February 2012 the Plan and the John Locke Foundation Review have been described to elected officials and the public on numerous occasions. However, some

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<sup>1</sup> Wake County Transit Plan, November 14, 2011. At [www.wakecounty.gov](http://www.wakecounty.gov).

<sup>2</sup> David T. Hartgen and Thomas A Rubin, Review of Wake County Transit Plan, prepared for the John Locke Foundation, Raleigh NC, February 6, 2012. At [www.johnlocke.org](http://www.johnlocke.org).

presentations of the Plan contained ridership and cost statistics that are different from those implied in the Plan. Aware of these apparent discrepancies, the John Locke Foundation requested that the Triangle Transit Authority clarify the Plan's statistics<sup>3</sup>. The TTA Response to this request was received on April 19, 2012<sup>4</sup>, and the John Locke Foundation then requested its consultants Hartgen and Rubin to review the Response. This document constitutes their review of the TTA Response to the questions raised by the John Locke Foundation.

### ***Summary of our findings***

Based on our review of the TTA Response, we continue to have major reservations concerning the feasibility of the *Wake County Transit Plan*. The TTA Response does not adequately respond to our questions concerning ridership or costs; instead it refers frequently to earlier documents for justification. It does not deal with the inconsistencies in ridership estimated implied in the Plan versus those in the earlier documents and, in fact, introduces new ones. The ridership estimates provided in the TTA Response are several times higher than those implied in the Plan, and the costs per rider are much lower than those implied in the Plan. Further, although we did not ask specifically about them in our most recent request, the Response does not respond to our concerns expressed in the John Locke Foundation's earlier Review regarding other serious issues, including:

- forecasts of employment for downtown Raleigh, NCSU and RTP;
- whether the current transit service is funded in the Plan;
- the need for 'spare' vehicles;
- the need for additional service for ADA requirements;
- the implied large fare increase;
- the stability and likelihood of revenue sources;
- the balance between suburban contribution and service received.

**Therefore the TTA Response is deemed inadequate, and our fundamental concerns regarding the costs and benefits of this Plan remain unaddressed.**

It has also recently come to our attention that the *Wake County Transit Plan* is being substantially revised to address concerns raised by our earlier Review and by others. The anticipated release date of the revision is May 2012<sup>5</sup>. We also understand that the employment forecasts for downtown Raleigh, RTP and NCSU, which we vehemently questioned in our prior review, are now being revised. These changes would have a significant effect on the transit use forecasts used by TTA, since these three destinations probably constitute one-half to two-thirds of the likely transit destinations of the proposed Light Rail and Commuter Rail services. We do not know why this revision now underway was not mentioned in the TTA Response.

As we described in our earlier Review of the *Plan*, there were several items that we not only believed were incorrect, but which suggest misunderstandings regarding

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<sup>3</sup> Michael Sanera, Transit Plan Cost and Ridership Numbers, email to David King, Triangle Transit Authority, April 5, 2012.

<sup>4</sup> Triangle Transit Authority, Response to Email Sent by the John Locke Foundation,, April 19, 2012.

<sup>5</sup> Ed Johnson, Telephone message and follow-up email to D. Hartgen CAMPO Director, April 27, 2012.

how transit systems work and are funded, particularly in regard to Federal transit funding programs, and/or significant errors. Our review of the most recent TTA Response, outlined below, gives us further concerns of this type.

Again, these errors are of such magnitude that **we urge the Wake County decision-makers, and those of the other counties that will be part of the inter-county components of the *Plan*, to require an *independent* review by external parties that have had no role in the development of the *Plan* and do not stand to benefit from decisions regarding the *Plan*** It is our view that the entire discussion of the appropriateness of the Plan should now be deferred until the revised version is released and has been thoroughly vetted using the new Triangle Regional Model now under development by the region's MPO.

### **Concerns Missing from TTA Response**

The TTA Response does not mention or explain any of the following major concerns raised in the John Locke Foundation's Review:

#### ***Demographics and ridership***

- The Response does not discuss the Plan's assertion that the downtown Raleigh will *quintuple* in employment and that TRP and NCSU areas will more than double in employment, in the next 28 years. We are aware of no studies asserting that such growth in employment is likely, and we seriously questioned them in our prior Review. Further, we are now given to understand that revised employment forecasts for the region are being prepared as part of the update of the Triangle Regional Model. If these revised employment growth rates are substantially lower for these three key destinations, which we believe they should be, then the entire basis of the Transit Plan is brought into question.
- The Response does not mention the Plan's assertion that Wake County will double in population in 28 years. Future population growth is likely to be much slower and be concentrated in suburbs, where transit service is now limited. This means that the threshold population densities needed for effective rail transit service (about 8,000 persons per square mile) are unlikely to be reached. As a result, there will likely be insufficient population near the proposed rail services, and Wake County suburbs will therefore significantly cross-subsidize the transit usage in Raleigh.
- The Response does not mention that the Plan's assumed transit travel times are two-to-four times longer than comparable driving times when access and waiting times are added. The Plan also assumes too-large walking catchment areas for rail stations. All these factors lessen the likely ridership forecasts.

#### ***Revenue sources***

- The Response does not comment on the likelihood of local funds falling short because of slower County growth.
- The Response does not mention that new 'urbanized area' population statistics recently released put the population of the Raleigh Urbanized area at over 885,000. This will probably – depending on the final outcome of the long-

standing standoff over a new surface transportation act in Congress – change possible federal resources, which are different for regions with urbanized area populations greater than 750,000.

- The Response does not mention that increased federal funds, which are necessary for the LRT and other Plan elements, are questionable given the Nation’s inability to balance the Federal budget and debt crisis.

#### ***System costs***

- The Response never comments on our belief that *the costs of operating the current transit systems are missing entirely*. If added, they would increase the total Plan cost to over \$6.8 Billion.
- The Response does not comment on the Plan’s implied fare increase of 54%.
- The Response does not mention the Plan’s implied low vehicle occupancy rates of 11%, or 4.6 riders per bus on average.
- The response does not mention the need for ‘spare vehicles’ and the additional costs they imply.
- The Response contains no mention of ADA requirements and other special services.

### **1. Basis of Ridership Estimates**

#### ***Our question:***

*“We would like to make sure that we understand some of the information that you presented. To start with, [we] would like to be sure that [we] have correctly noted numbers from your PowerPoint presentation:*

*Commuter Rail:*

*\$6.44 cost per trip  
6,900 daily trips by 2030*

*Light Rail:*

*\$2.97 cost per trip  
15,900 daily trips by 2035*

*What is the source of these daily trip counts? Are these numbers produced by transportation demand model runs using assumptions consistent with those in the Wake County Transit Plan? If so, please provide electronic copies of the demand model reports.”*

#### ***TTA Response:***

*“All estimates of daily transit trips for the proposed Light Rail Line and Commuter Rail Transit projects are produced by the Triangle Regional Model (TRM), a tool used to forecast regional travel. The TRM is jointly funded and managed by the Capital Area and Durham-Chapel Hill-Carrboro MPOs, NCDOT and Triangle Transit with staff provided by NC State University. This is a standard four-step model incorporating trip generation, trip distribution, modal choice and trip assignment. LRT and CRT project forecasts are estimated for the horizon year 2035, not 2030. The forecasts are consistent with those in the Wake county Transit Plan (WCTP). The demand*

forecasts have been available to the public since July 2011 at [www.ourtransitfuture.org](http://www.ourtransitfuture.org). The travel demand estimates are in Volume 2 of the Durham-Wake Alternatives Analysis (AA) report (CR) and Volumes 3 and 6 of the Wake AA report (light rail)”

***Our analysis:***

First, the spreadsheet that we were recently provided (along with the TTA Response) to support the above statistics (which we will here-in-after refer to as "*Spreadsheet II*," to differentiate from the spreadsheet that we were provided to support the *Plan* itself, which we will here-in-after refer to as "*Spreadsheet I*"), showed 6,800 "Projected Average Daily Ridership (2035)" for commuter rail, not 6,900 in the narrative and above. This 1.5% difference is not of any great import by itself, but we find it disturbing that the quality control methodology of the *Plan* authors would not find and correct this error.

Spreadsheet II shows annual/working weekday ratio's of 300:1 and 250:1 for light and commuter rail, respectively. These appear low to us, particularly the light rail ratio. Commuter rail, which will evidently only be operated on working weekdays, should have a lower ratio than light rail, but there are approximately 255 non-holiday weekdays in a year, even if there are no plans for any special service on Saturdays, Sundays, or holidays, such as special service for major sporting events or New Year's Eve anti-drunk driving service.

The 2010 National Transit Database "profiles" show a system-wide ratio of 333:1 for Capital Area Transit (CAT) and 309:1 for Charlotte Area Transit System (CATS); also, commonly, light rail systems have higher such ratio's than bus and demand-responsive system.

In addition, from the *Spreadsheet II*, the cost per trip figures presented are for *operating costs only* (see below for details) in 2011 dollars – which are not consistent with the data in *Spreadsheet I*:

- *Spreadsheet I* shows commuter rail operating costs of \$12.584 million in 2030, expressed in 2030 dollars<sup>6</sup>. With the inflation assumptions in the *Plan* of 1.5% inflation for FY12-FY15 and 3.1% thereafter<sup>7</sup>, or 167.78% for 2011-2030. This produces a 2011 dollar operating cost of \$7.500 million in 2011 dollars, but *Spreadsheet II* shows \$10.950 million.
- *Spreadsheet I* shows light rail operating costs of \$29.375 million in 2035, expressed in 2035 dollars<sup>8</sup>. With the inflation assumptions in *Plan* of 1.5% inflation for FY12-FY15 and 3.1% thereafter<sup>9</sup>, or 195.45% for 2011-2035. This produces a 2011 dollar operating cost of \$15.029 million in 2011 dollars, but *Spreadsheet II* shows \$14.170 million.
- The *Spreadsheet II* footnote shows, "Data from Durham-Wake Corridor AA, Volume 2 & Wake Corridor AA, volume MOS Analysis," which may explain why they value are different from those calculated from the data in *Spreadsheet I*, but it does explain why the *Spreadsheet I* and *II* values are different.

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<sup>6</sup> *Spreadsheet I*, "Rail Project – TMC to Garner" tab, cell AC95

<sup>7</sup> *Ibid.*, row 52.

<sup>8</sup> *Spreadsheet I*, "Rail Project – DtCary to Milllbr" tab, cell AH95.

<sup>9</sup> *Ibid.*, row 52.

While we could recalculate the operating costs, we will not bother, as there are so many errors and questions in these and other calculations and representations, we will just renew our suggestion that the entire *Plan* be given a thorough independent expert analysis.

Further, the TTA Response simply asserts that the forecasts are based on work of the MPO and their Triangle Regional Model. But according to the MPO<sup>10</sup>, the most recent regional long range plan has forecasts that end in 2035, not 2040. Also, according to the MPO, the TTA updated the TRM for use in its transit alternatives analysis, so the model used for their Light Rail and Commuter Rail transit forecasts is not the one managed by CAMPO. In addition, the MPO is in the process of updating its model to 2040, with revisions of the forecasts of employment. According to the MPO, the forecasts of employment shown in the WCTP are “erroneous” and their source is not the CAMPO staff. This situation raises serious questions about the basis for the transit ridership forecasts.

## **2. Conversion from Weekday to Annual Trips**

### ***Our question:***

*“When you say, “daily trips,” is this the usual transit industry metric of average daily working weekday (Saturdays, Sundays, and Holidays excluded) trips, or is it something else, such as total annual ridership divided by 365 days/year?”*

### ***TTA Response:***

*“The TRM estimates average annual weekday trips for both work and non-work trip purposes. This is the industry standard. Annual trips for the LRT were estimated by multiplying the average daily trips by 300. This is less than 365 reflecting reduced service pattern and expected ridership on weekends and holidays. This is typical in the transit industry. CRT annual trips were estimated by multiplying the average weekday trips by 250 reflecting that CRT service is only planned to be provided on weekdays.”*

### ***Our analysis:***

The narrative responses to Q.2. are not reasonable, but, as discussed above, the quantities appear to be incorrect.

## **3. Definition of ‘Trip’**

### ***Our question:***

*“By, “trip,” we assume you mean what is known in the transit industry as an “unlinked passenger trip,” [that is] one rider getting on one transit vehicle or train for one ride in one direction of travel; is our understanding correct?”*

### ***TTA Response:*** Yes.

### ***Our analysis:***

So-called ‘unlinked passenger trip’ estimates hide the reality that most transit riders

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<sup>10</sup> Ed Johnson, Telephone message and follow-up email to D. Hartgen, April 27, 2012.

are daily riders and use the service for both directions, including, for many, transfers for each one-way origin-to-destination trip. In Wake County, 72% of CAT riders and 55% of TTA riders use transit 5+ days per week<sup>11</sup>. This means that even though ‘trip’ estimates may look high, they actually represent very few individual users who repeat use daily. For example, the Plan’s implied LRT use, 3.2 million trips annually, in reality means that just 4,832 persons will typically use the service on a given day<sup>12</sup> -- and many of these will be previous users of bus transit in the region. That is about 0.5 percent of the population of Wake County. Therefore what appears to be a large utilization (3.2 million ‘trips’ annually) will actually be done by just a few ‘lucky location’ riders.

#### **4. Operating versus Capital Costs**

***Our question:***

*“Turning to “cost,” does this include all operating costs for commuter and/or light rail for the year presented, including operations, vehicle maintenance, facilities maintenance, and administration?”*

***TTA Response:***

*“Yes, all of the operating and maintenance (O&M) costs above are included in the estimates for the LRT and CRT proposals. These materials, with considerable documentation, have been available to the public since July 2011 at [www.ourtransitfuture.org](http://www.ourtransitfuture.org). The O&M costs for CRT are available in the Volume 2 of the Durham Wake CRT Report, and Volumes 3 and 6 of the Wake LRT report. Operating cost estimates from these reports assume 2011 dollars and the Wake County financial model inflates all costs to year of expenditure dollars consistent with the WCTP.”*

***Our analysis***

No comments required.

#### **5. Inclusion of Capital Costs**

***Our question:***

*“Are initial capital costs included as per the Federal Transit Administration’s ‘new starts’ costing methodology, the one that will be required for any application for Federal 49 USC 5309 grant funds, as specified in the FTA Standard Cost Categories (SCC) spreadsheet, whereby the costs of the various assets required are annualized over their useful lives, or have you utilized another methodology? If you have used another methodology, please explain.”*

***TTA Response:***

*“Yes, the FTA costing methodology was used to estimate annualized costs of the project elements. These costs were estimated assuming 2011 dollars and have been*

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<sup>11</sup> HDR Engineering, 2010 Capital Area Bus Transit Rider Survey, Tech. memo #1, Memo to CAMPO, September 22, 2011.

<sup>12</sup> 3.2 million annual trips/333 ‘days’ per year/two directions. If we assume a common industry ratio of unlinked-to-linked trips of 1.3:1 (the average rider would take 1.3 individual unlinked trips to complete each origin-destination trip), the number of linked, origin-destination riders is further reduced.



available at [www.ourtransitfuture.org](http://www.ourtransitfuture.org) since July 2011. The capital cost estimates are available in the Volume 2 of the Durham Wake CTR Report and Volumes 3 and 6 of the Wake LRT report.”

***Our analysis:***

We asked the specific question, “Are initial capital costs included ...,” and their response begins, “Yes” – which sounds like a statement that capital costs are included in the original values we asked about, \$6.44 cost per trip for commuter rail and \$2.97 cost per trip for light rail.

However, if we go to *Spreadsheet II*, we see that the costs we specifically asked about do **not** include capital costs, but that the capital costs have been calculated, producing total costs per trip, in 2011 dollars, of:

Light Rail:	\$21.97
Commuter Rail:	\$37.63

So, while the answer appears to say that the costs that they provided include both the operating cost and annualized initial capital cost, as per the FTA standards, they very obviously don’t – in fact, they don’t even properly represent the operating costs.

We can only conclude that, if we had not specifically asked this question, the rail proponents would have continued to represent that the operating costs alone were their full costs of light and commuter rail trips in their proposal, ignoring the initial capital costs that represent – proponent's calculations – 86% of the total cost of each light rail and 83% of the total cost of each commuter rail trip.

Describing this as a major omission is exceeding kind.

## **6. Inclusion of Capital Renewal and Replacement Costs**

***Our question:***

“Are capital renewal and replacement costs included?”

***TTA Response:***

*“We are assuming this question refers to the rail project elements of the WCTP. Yes, using annualized costs for each element directly implies that replacement costs are included.”*

***Our analysis:***

Our question refers specifically to ‘renewal and replacement’ capital costs that will be required beginning almost immediately after these systems go into service, which are major on-going costs of any transit system, but particularly rail transit systems. This is an important issue because, as recently noted, the backlog of costs needed to bring existing transit systems up to a ‘state of good repair’ is about \$ 78 B<sup>13</sup>, mostly in rail infrastructure, and that an additional \$ 18 B annually is needed just to maintain existing systems in their current state of repair.

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<sup>13</sup> US Dept of Transportation, 2010 Status of the Nation’s Highways, Bridges and Transit: Condition and Performance, Report to Congress, March 19, 2012. p. 46. At [www.fhwa.dot.gov](http://www.fhwa.dot.gov)

The TTA Response does not respond to this issue, nor was there any consideration of this major cost item in the original Plan. For the transit industry as a whole, in 2010, commuter rail capital renewal and replacement costs were 71%, and light rail 32%, of operating subsidies<sup>14</sup> – a figure that is undoubtedly going to increase for light rail as the many newer systems begin to age. And at the same time as these capital renewal and replacement costs will be growing, operating costs would be much higher, eating into the availability of funds from the proposed 1/2-cent sales tax. Although bus vehicle replacement costs are included in the Plan, clearly the much larger costs of re-capitalizing the track and other fixed physical infrastructure of the LRT or the CR are not included. Therefore the entire system would have to be re-funded with an even higher sales tax, maybe a 1-cent tax, for a *second round* of even higher costs to repair and recapitalize the whole system. This means that Wake County is entering into a ‘dark pipe’ of rising costs and unlikely ridership for its transit service, from which no clear relief is in sight.

This is still another case of our major concern being that those that are preparing the Plan evidently do not understand a matter as key as what costs are included in the costs presented to the Federal Transit Administration for a proposed new major capital project – these, most definitely, have never and do not currently include capital renewal and replacement costs. This is another major error that again causes us to strongly recommend that the entire *Plan* be given a strong, independent external expert analysis, conducted by those who have no monetary or other interest in the outcome of their analysis – other than that it be done properly and produce correct data for decision-makers and the public to utilize.

## **7. Debt Service**

### ***Our question:***

How are debt service payments (interest and repayment of principal) on borrowings to construct these lines provided for?

### ***TTA Response:***

*“Debt service payments for the rail projects are included in the County’s financial plan.”*

### ***Our analysis:***

This answer appears to be proper and correct.

## **8. Consistency of Costs with Plan Statistics**

### ***Our question:***

“Are the various costs utilized for these calculations consistent with those presented in the *Wake County Transit Plan* and the supporting spreadsheet?”

### ***TTA Response:***

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<sup>14</sup> Authors' calculations from Federal Transit Administration, National Transit Database 2010, "Capital Use," "Fare Revenue Earned by Mode," and "Operating Expense" spreadsheets:  
<http://www.ntdprogram.gov/ntdprogram/data.htm>

*“Yes, all costs for portions of projects located within or assigned to Wake County are included in the WCTP.”*

***Our analysis:***

As we have documented above, no, the costs utilized in this response are **not** those from the *Plan* and *Spreadsheet I*, but, in fact, appear to be taken from prior reports. Here, even though *Spreadsheet II* clearly discloses that the data is **not** from *Spreadsheet I*, the answer above is that it is.

**9. Current Dollars for Out-Years**

***Our question:***

“Are costs presented in 2030 and 2035 dollars for commuter rail and light rail, respectively, 2012 dollars, or on some other basis?”

***TTA Response:***

*“All cost estimates for the LRT and the CRT project were calculated in 2011 dollars, the year the Alternatives Analysis for the major transit corridors was completed (see [www.ourtransitfuture.org](http://www.ourtransitfuture.org) for more complete details. This is necessary to compare alternatives on a common basis. The WCTP projects revenues and costs to confirm the projects will be paid for and built in the years shown in the Plan and operated in perpetuity.”*

***Our analysis:***

This answer appears to be proper and correct.

**10. Availability of Calculations**

***Our question:***

“We would appreciate if, besides answering these questions, you would also provide us with the schedule showing how these cost calculations were performed.”

***TTA Response:***

*“Please see the attached spreadsheets for the cost per trip calculations. These are based on the same methodology included for the Wake (LRT) Report Volume 6 (Minimum Operable Segment Analysis on the [www.ourtransitfuture.org](http://www.ourtransitfuture.org) website and also applied to the Durham-Wake commuter rail project.”*

***Our analysis:***

The analysis was provided, and was useful in understanding how the calculations were performed, but, as we have discussed above, they serve also to produce more unanswered questions and concerns.