

## NEW URBAN RAIL AND TRAFFIC CONGESTION: IMPLICATIONS FOR TEXAS METROPOLITAN AREAS

In the last 30 years, a number of new rail systems have been built in metropolitan areas around the nation (Table 1). In virtually every case, a principal reason for building the system was to reduce traffic congestion.

| Table 1                           |  |  |  |  |
|-----------------------------------|--|--|--|--|
| New Urban Rail Systems Since 1970 |  |  |  |  |
| Atlanta                           | New metro (subway)                       |  |  |  |
| Baltimore                         | New metro and light rail                 |  |  |  |
| Buffalo                           | New light rail                           |  |  |  |
| Dallas-Fort Worth                 | New light rail and commuter rail.        |  |  |  |
| Denver                            | New light rail                           |  |  |  |
| Los Angeles                       | New metro, light rail and commuter rail. |  |  |  |
| Miami                             | New metro and commuter rail              |  |  |  |
| Portland                          | New light rail                           |  |  |  |
| Sacramento                        | New light rail                           |  |  |  |
| Salt Lake City                    | New light rail                           |  |  |  |
| San Diego                         | New light rail and commuter rail         |  |  |  |
| San Francisco                     | New metro                                |  |  |  |
| San Jose                          | New light rail                           |  |  |  |
| St. Louis                         | New light rail                           |  |  |  |
| Washington                        | New metro and commuter rail              |  |  |  |

**Journey to Work:** Traffic in the morning and evening peak periods is most congested principally because work trip travel is concentrated during those time periods. Thus, journey to work travel trends are an effective measure of transit's performance in reducing traffic congestion.

In fact, automobile (private vehicle) demand has generally increased since before new rail systems have been built. The average increase has been 2.5 percent (Table 2). The largest increase was in Washington (7.0 percent), where the by far the most extensive and expensive

new rail transit system was built.<sup>1</sup> The automobile market share also rose strongly in the metropolitan area that built the second longest metro system, San Francisco (3.4 percent increase). Automobile market shares have declined slightly in Los Angeles and Denver.

In the case of the one Texas urban area with a new rail system, automobile market share increased even in the specific new rail service area. In Dallas County, where light rail and commuter rail systems were opened, transit journey to work travel declined 2,700 from 1990 to  $2000.^2$ 

<sup>&</sup>lt;sup>1</sup> Washington's Metro rail system was nearly 100 miles long in 2000 and cost more than \$10 billion (not inflation adjusted).

<sup>&</sup>lt;sup>2</sup> Questions have been raised about the accuracy of the Census Bureau's journey to work data. Transit industry sources have reported overall ridership increases from 1990 to 2000, while Census Bureau journey to work numbers have declined slightly. There are a number of reasons why these two trends may be accurate without being inconsistent. Transit industry data is for boardings, not passenger trips, so that transfers from one vehicle to another make a single trip count more than once. The transit industry has not counted passenger trips for two decades. Some of the transit increase is related to a major change in transfer policy in New York, which significantly increased the number of transit boardings without increasing transit trips. Moreover, new urban rail systems tend to increase transfers.

| Table 2  |          |               |               |        |
|--|----------|---------------|---------------|--------|
| Automobile Journey to Work Market Share in New Rail Metropolitan Areas |          |               |               |        |
| Metropolitan Area  | Pre-Rail | Automobile    | Automobile    | Change |
|  | Base     | Market Share: | Market Share: |        |
|  | Census   | Base Census   | 2000          |        |
|  | Year     | Year          |               |        |
| Atlanta  | 1980     | 88.1%         | 90.6%         | 2.9%   |
| Baltimore  | 1980     | 81.9%         | 87.0%         | 6.1%   |
| Buffalo  | 1980     | 85.3%         | 91.1%         | 6.8%   |
| Dallas-Fort Worth  | 1990     | 92.5%         | 92.7%         | 0.2%   |
| Denver   | 1990     | 87.4%         | 86.9%         | -0.6%  |
| Los Angeles  | 1990     | 87.8%         | 87.6%         | -0.2%  |
| Miami  | 1980     | 88.5%         | 90.1%         | 1.7%   |
| Portland   | 1980     | 84.3%         | 84.6%         | 0.4%   |
| Sacramento   | 1980     | 86.7%         | 89.7%         | 3.6%   |
| Salt Lake City   | 1990     | 90.3%         | 90.3%         | 0.0%   |
| San Diego  | 1980     | 81.2%         | 86.9%         | 7.0%   |
| San Francisco  | 1970     | 73.1%         | 75.6%         | 3.4%   |
| San Jose   | 1980     | 89.1%         | 89.5%         | 0.5%   |
| St. Louis  | 1990     | 91.8%         | 92.5%         | 0.8%   |
| Washington   | 1970     | 73.9%         | 79.3%         | 7.3%   |
| Average  |          | 85.5%         | 87.6%         | 2.5%   |

Calculated from US Census Data

San Francisco and San Jose, which are in the same consolidated metropolitan area, are separated because the two new rail systems serve only the respective primary metropolitan statistical areas.

Automobiles (personal vehicles) attracted nearly 90 percent of the additional automobile and transit work trips from the base census year to 2000. Automobile commuting rose more than 5,700,000 in the new rail metropolitan areas, compared to a 211,000 increase in transit commuting. Most of the increase (87 percent) was in Washington and San Francisco, where the most extensive new metro systems were built, and where automobile commute shares also rose strongly..

Meanwhile, transit's work trip market share in new rail metropolitan areas has declined 10.7 percent since before the new systems were opened (Table 3). The largest losses were in Atlanta (-54 percent), Buffalo (-49 percent), Baltimore (-43 percent and Washington (-31 percent). Portland, with its strong policies emphasizing transit improvements and "smart growth," experienced a loss of 22 percent. Denver experienced the strongest transit work trip market share gain, at nearly 10 percent. But Denver's transit work trip market share remains below five percent.

| Table 3   |        |         |         |        |  |
|---|--------|---------|---------|--------|--|
| Transit Work Trip Market Share: Pre-Rail and 2000 |        |         |         |        |  |
| Metropolitan Area                                 | Base   | Transit | Transit | Change |  |
|   | Census | Share:  | Share:  |        |  |
|   | Year   | Base    | 2000    |        |  |
|   |        | Census  | Census  |        |  |
|   |        | Year    |         |        |  |
| Atlanta   | 1980   | 7.6%    | 3.5%    | -54.2% |  |
| Baltimore   | 1980   | 10.2%   | 5.9%    | -42.7% |  |
| Buffalo   | 1980   | 6.6%    | 3.3%    | -49.1% |  |
| Dallas-Fort Worth                                 | 1990   | 2.3%    | 1.7%    | -22.8% |  |
| Denver  | 1990   | 4.2%    | 4.6%    | 9.5%   |  |
| Los Angeles                                       | 1990   | 4.5%    | 4.6%    | 1.7%   |  |
| Miami   | 1980   | 4.9%    | 3.8%    | -23.2% |  |
| Portland  | 1980   | 8.4%    | 6.6%    | -21.6% |  |
| Sacramento  | 1980   | 3.5%    | 2.9%    | -16.2% |  |
| Salt Lake City                                    | 1990   | 3.0%    | 3.0%    | 0.1%   |  |
| San Diego   | 1980   | 3.3%    | 3.3%    | 0.3%   |  |
| San Francisco                                     | 1970   | 14.6%   | 13.8%   | -5.9%  |  |
| San Jose  | 1980   | 3.1%    | 3.5%    | 12.0%  |  |
| St. Louis   | 1990   | 2.8%    | 2.3%    | -18.4% |  |
| Washington  | 1970   | 15.4%   | 10.7%   | -30.9% |  |
| Average   |        | 5.9%    | 5.3%    | -10.7% |  |
| Calculated from US Census Bureau data             |        |         |         |        |  |

**Overall Urban Travel:** Overall, roadway market share has remained constant since before the new rail systems have been opened (Table 4). Small increases occurred in four urban areas, from 0.1 percent to 1.2 percent. Small reductions were experienced in ten urban areas, from -0.1 percent to -0.6 percent. However, in each of the urban areas, overall roadway traffic increased in every new rail urban area. The greatest increases were in Atlanta, Portland, San Diego and Washington. The smallest increase occurred in Salt Lake City, where traffic increased only one percent in the year since the light rail system opened. However, later Federal Highway Administration data indicates that roadway travel increased more than six percent from 2000 to  $2001.^3$ 

<sup>&</sup>lt;sup>3</sup> Calculated from data in *Highway Statistics*.

| Table 4   |            |           |             |         |           |
|---|------------|-----------|-------------|---------|-----------|
| Estimated Roadway and Transit Market Share: Pre-Rail to 2000                                    |            |           |             |         |           |
| (Share of Passenger Miles)  |            |           |             |         |           |
| Urban Area  | Years      | Change in | Roadway     | Roadway | Change in |
|   | Since Rail | Roadway   | Market      | Market  | Roadway   |
|   | Opening    | Traffic   | Share: Pre- | Share:  | Market    |
|   |            |           | Rail        | 2000    | Share     |
| Atlanta   | Note       | 218%      | 97.5%       | 98.7%   | 1.2%      |
| Baltimore   | 16         | 67%       | 97.6%       | 97.7%   | 0.1%      |
| Buffalo   | 14         | 49%       | 98.7%       | 99.3%   | 0.6%      |
| Dallas-Fort Worth   | 4          | 13%       | 99.5%       | 99.5%   | -0.1%     |
| Denver  | 6          | 25%       | 98.9%       | 98.7%   | -0.2%     |
| Los Angeles   | 9          | 11%       | 99.0%       | 98.6%   | -0.4%     |
| Miami   | 16         | 68%       | 98.8%       | 98.7%   | -0.1%     |
| Portland  | 13         | 94%       | 98.1%       | 97.9%   | -0.2%     |
| Sacramento  | 13         | 50%       | 99.2%       | 99.1%   | -0.1%     |
| Salt Lake City  | 1          | 1%        | 99.1%       | 99.0%   | -0.2%     |
| San Diego   | 18         | 88%       | 99.1%       | 98.5%   | -0.6%     |
| San Jose  | 12         | 25%       | 99.2%       | 99.0%   | -0.2%     |
| St. Louis   | 7          | 23%       | 99.3%       | 99.2%   | -0.1%     |
| Washington  | Note       | 85%       | 95.9%       | 96.3%   | 0.5%      |
| Average   |            | 58%       | 98.6%       | 98.6%   | 0.0%      |
| Earliest roadway traffic data is 1982. The Atlanta and Washington metro systems                 |            |           |             |         |           |
| opened before 1983, but expanded significantly after that date (150 percent in                  |            |           |             |         |           |
| Washington and nearly 200 percent in Atlanta). Change is measured from 1982.                    |            |           |             |         |           |
| Assumes 1.6 vehicle occupancy. <sup>4</sup> The San Diego light rail system opened before 1983, |            |           |             |         |           |
| but has expanded 200 percent since that time. San Francisco's metro system is not               |            |           |             |         |           |
| included in this analysis because it has undergone less expansion since 1982.                   |            |           |             |         |           |

Estimated from Texas Transportation Institute data and National Transit Database. Base transit ridership uses average of three years before rail opening.

At the same time, there has been a slight overall market share loss in the new rail metropolitan areas (Table 5). San Diego and Los Angeles experienced strong gains of 62 percent and 41 percent respectively, but after the increases, their overall market shares are 1.5 percent or less. Greater than 40 percent declines were registered in Atlanta and Buffalo.

<sup>&</sup>lt;sup>4</sup> This is the national urban average occupancy figure for automobiles.

| Table 5  |            |           |      |        |  |
|--|------------|-----------|------|--------|--|
| Transit Market Share: Pre-Rail and 2000  |            |           |      |        |  |
| Urban Area   | Years      | Base Year | 2000 | Change |  |
|  | Since Rail |           |      |        |  |
|  | Opening    |           |      |        |  |
| Atlanta  | Note       | 2.5%      | 1.3% | -45.7% |  |
| Baltimore  | 16         | 2.4%      | 2.3% | -4.7%  |  |
| Buffalo  | 14         | 1.3%      | 0.7% | -46.2% |  |
| Dallas-Fort Worth  | 4          | 0.5%      | 0.5% | 14.6%  |  |
| Denver   | 6          | 1.1%      | 1.3% | 14.5%  |  |
| Los Angeles  | 9          | 1.0%      | 1.4% | 40.7%  |  |
| Miami  | 16         | 1.2%      | 1.3% | 9.3%   |  |
| Portland   | 13         | 1.9%      | 2.1% | 8.3%   |  |
| Sacramento   | 13         | 0.8%      | 0.9% | 10.5%  |  |
| Salt Lake City   | 1          | 0.9%      | 1.0% | 19.5%  |  |
| San Diego  | 18         | 0.9%      | 1.5% | 62.1%  |  |
| San Jose   | 12         | 0.8%      | 1.0% | 20.0%  |  |
| St. Louis  | 7          | 0.7%      | 0.8% | 14.8%  |  |
| Washington   | Note       | 4.1%      | 3.7% | -10.5% |  |
| Average  |            | 1.4%      | 1.4% | -1.2%  |  |
| Earliest roadway traffic data is 1982. The Atlanta and Washington metro            |            |           |      |        |  |
| systems opened before 1983, but expanded significantly after that date             |            |           |      |        |  |
| (150 percent in Washington and nearly 200 percent in Atlanta). Change is           |            |           |      |        |  |
| measured from 1982.  |            |           |      |        |  |
| Assumes 1.6 vehicle occupancy. <sup>5</sup> The San Diego light rail system opened |            |           |      |        |  |
| before 1983, but has expanded 200 percent since that time. San                     |            |           |      |        |  |
| Francisco's metro system is not included in this analysis because it has           |            |           |      |        |  |
| undergone little expansion during since 1982.                                      |            |           |      |        |  |

Estimated from Texas Transportation Institute data and National Transit Database.

Base transit ridership uses average of three years before rail opening.

**Comparison to Non-Rail Urban Areas:** The new rail urban areas have experienced an average 1.38 percent increase in per capita roadway usage (vehicle miles) since before the rail systems were opened. By comparison, the 16 urban areas of more than 1,000,000 that have do not have urban rail have had an average annual increase in roadway use of 1.04 percent over the last ten years (Figure 7c).

<sup>&</sup>lt;sup>5</sup> This is the national urban average occupancy figure for automobiles.



Figure 1

**Conclusion: New Rail Has Little Impact on Traffic Congestion:** The experience generally supports the conclusion that new rail systems have do not reduce traffic congestion. Transit work trip market shares have dropped in urban areas that have built new rail systems., while automobile shares have increased. Overall transit market shares have declined slightly, while automobile shares have remained constant. In both cases, overall traffic levels have increased, with the bulk of the new demand being accommodated by personal vehicles rather than transit. Finally, new rail urban areas have done no better than non-rail urban areas in controlling the increase in per capita automobile use.