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# WHY LIGHT RAIL DOESN'T WORK

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By  
Wendell Cox  
Senior Fellow, Texas Public Policy Foundation

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# TABLE OF CONTENTS

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I.	The Impact of Transit on Urban Growth in Texas.....	1
	Market Share Trend in New Rail Urban Areas	
	Reducing Traffic Congestion – The Record	
	Theoretical and Practical Ridership Capacity	
	Safety	
	Light Rail as a Transportation Alternative	
	Why New Urban Rail Attracts so Few Automobile Drivers	
	Air Pollution and Urban Rail	
	Energy Efficiency	
	Federal Funding	
II.	Realistic Transportation Alternatives .....	25
	Intelligent Transportation Systems	
	Bus Strategies	
	Telecommuting	
	Objectivity in Transportation Planning	
III.	Does Transit Work? .....	32
	The Effects of Light Rail on the Poor	
	Impact on Existing Riders	
IV.	The Light Rail Experience in Dallas.....	35
	Long Term Transit Planning	
V.	Revitalizing Cities with Light Rail .....	47
	Downtown Employment and Vacancies	
	The Dallas Experience	
	Escalating Operating Costs	
	Comparison to San Diego	
	Comparison to Houston	
	Appendix A: Twenty Questions About Light Rail .....	59

## I. THE IMPACT OF TRANSIT ON URBAN GROWTH IN TEXAS

Like virtually all other metropolitan areas in the developed world, Texas metropolitan areas are struggling to control increasing street and highway traffic volumes. Transit, and particularly rail, is often cited as a strategy for reducing traffic congestion.

Unfortunately, transit's effectiveness in reducing traffic congestion is limited to downtown corridors. This is as much so in areas with extensive rail systems as in areas with little or no rail, such as the large Texas metropolitan areas. The only location to which convenient, quick, no-transfer transit service (bus or rail) is provided is to downtown. But downtowns comprise, on average, 10 percent of employment. The distribution of employment is crucial to traffic congestion, because work trips during the morning and evening peak hours are the primary cause of such congestion.

Even New York, with nearly 300 miles of rapid transit (subways) and 1,000 miles of commuter rail is largely automobile dependent outside the central business district (midtown and downtown).

- Outside the central business district, only 11.9 percent of commuters use transit.
- Outside the central city of New York (by far the most dense city in the nation), only 4.5 percent of commuters to suburban jobs commute to work by transit.

And non-downtown commuters do have far lower incomes than average, suggesting that the lack of automobile availability forces them to use transit. New York has, by far, the highest rate of transit ridership of any metropolitan area in the United States. In the nation's largest metropolitan areas, transit's market share outside downtown areas averages only 3.4 percent.

**Texas:** In Texas metropolitan areas, transit market shares to central business districts are relatively small – ranging from 4.8 percent in Austin to 16.9 percent in Houston.<sup>1</sup> This is short of a single freeway lane's capacity.<sup>2</sup> Outside central business districts, transit work trip market shares range from 0.9 percent in Dallas-Fort Worth to 3.2 percent in San Antonio (Figure 1). In Texas, transit commuters who work outside downtown have incomes 40 percent to 60 percent below average, an indication of low automobile availability (Figure 2). Non-downtown transit commuters tend to use transit because they have no choice. As a result, transit provides virtually no congestion relief for the 90 percent or more of work locations

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<sup>1</sup> Calculated from 1990 US Census Bureau data.

<sup>2</sup> To remove one lane of traffic from a freeway, transit would need to divert 25 percent of automobiles from an eight lane freeway (four lanes in each direction) and 33.3 percent of traffic from a six lane freeway. Houston's 16.9 percent downtown market share, the highest in Texas, falls far short of these thresholds.

outside downtown.

Except for Austin,<sup>3</sup> downtown employment centers in Texas comprise a lower percentage of metropolitan employment than the national average of 10 percent (Figure 3). Further, virtually all employment growth over the next 20 to 25 years is projected to be *outside* the downtown areas (Figure 4).

Yet all four transit systems are implementing or are seeking to implement downtown oriented rail based transit strategies. Moreover, two adopted regional plans anticipate spending levels on transit that are many times that of streets and highways.

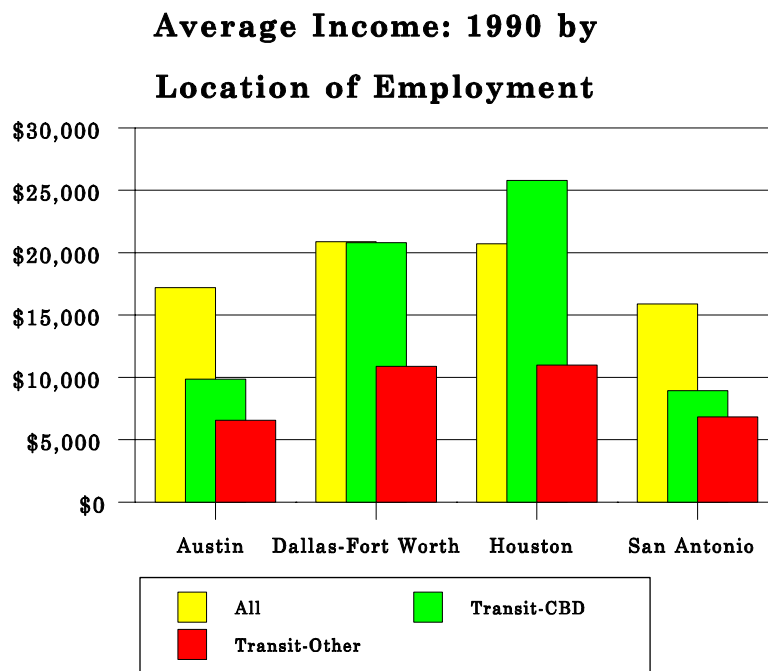
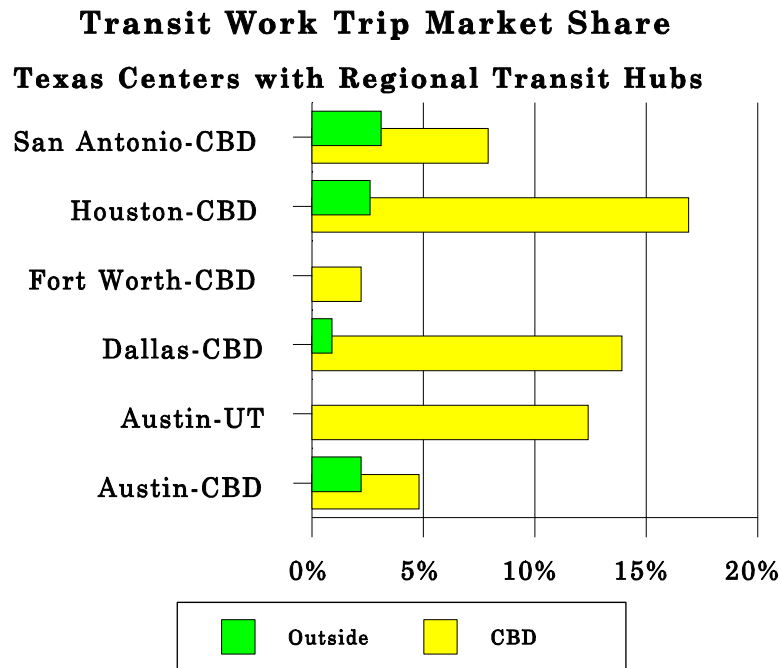
- To 2020, the Dallas-Fort Worth area plans to spend 75 times as much on transit as streets and highways per person mile.<sup>4</sup>
- To 2020, the Austin area plans to spend 72 times as much on transit as streets and highways per person mile.<sup>5</sup>

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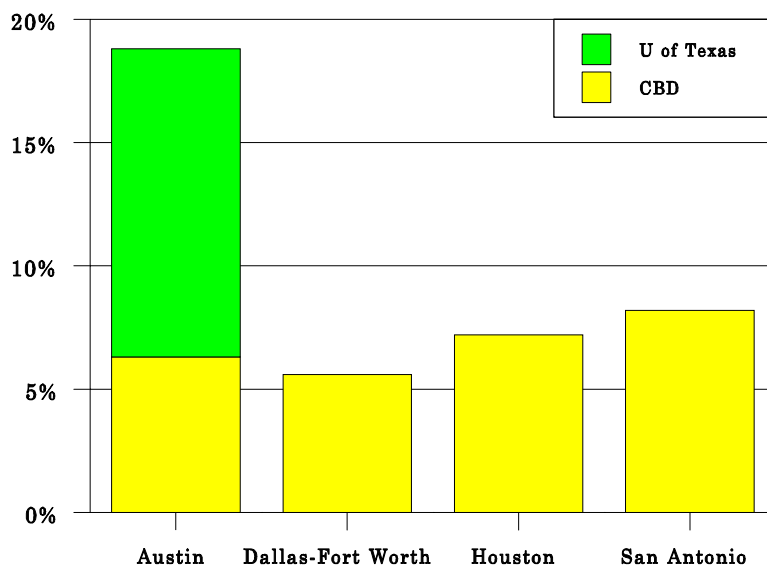
<sup>3</sup> Unlike most transit systems, Capital Metro in Austin provides comprehensive no-transfer service from throughout the service area to more than one location (downtown and the University of Texas).

<sup>4</sup> *The 1999 Texas Transit Opportunity Analysis, Dallas Area Rapid Transit (DART)*, Texas Public Policy Foundation, 1999.

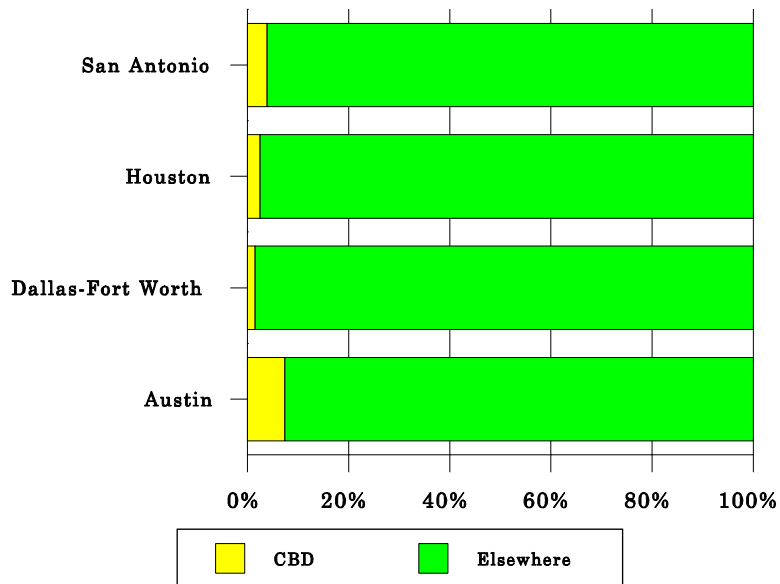
<sup>5</sup> *The 1999 Texas Transit Opportunity Analysis, Capital Metropolitan Transit Authority (Capital Metro)*, Texas Public Policy Foundation, 1999.



### Downtown Employment as a Share of Metropolitan Employment: 1990



### Share of Employment Growth: 20-25 Years Downtown Compared to Other Areas



### Market Share Trend in New Rail Urban Areas

From 1983<sup>6</sup> to 1997, public transit's market share has an average of 17 percent in

<sup>6</sup> Earliest year for which comparable data is available.

new rail urbanized areas. Transit market share dropped in all urban areas that built new rail systems except San Diego, where strong bus and light rail ridership growth raised transit's market share 8.8 percent. However, this increase was on such a small base that only 1.6 percent of new travel was on transit – the *increase* in private vehicle person miles from 1983 to 1996 was more than 25 times the *total* transit usage in 1997.

Significant market share losses were sustained in urban areas with highly rated new light rail systems. Transit's market share dropped 27 percent in St. Louis, 28 percent in Portland and 30 percent in Sacramento (Table 1).

By comparison, Austin's transit market share grew 146 percent over the period. Again, the small base converted this increase into an insignificant 1.5 percent of new travel – the *increase* in private vehicle person miles from 1983 to 1997 was more than 50 times *total* Capital Metro ridership in 1997.

<b>Table 1</b> <b>Estimated Transit Market Share:</b> <b>New Rail and Texas Urbanized Areas: 1983-1997</b>				
Rank	Urbanized Area	Type of New Rail	Change in Market Share (1983 to 1997)	Percentage of New Travel on Transit
New Rail Urbanized Areas				
1	San Diego CA	Light	8.8%	1.6%
2	San Jose CA	Light	-5.8%	1.3%
3	Dallas TX	Light	-7.1%	0.7%
4	Washington DC-MD-VA	Heavy	-14.4%	3.6%
5	Atlanta GA	Heavy	-14.5%	1.8%
6	Baltimore MD	Light & Heavy	-15.6%	1.8%
7	Denver CO	Light	-20.4%	0.9%
8	Miami-Hialeah FL	Heavy	-21.4%	1.1%
9	Los Angeles CA	Light & Heavy	-24.4%	0.5%
10	St. Louis MO-IL	Light	-26.7%	0.4%
11	Portland-Vancouver OR-WA	Light	-28.4%	1.0%
12	Sacramento CA	Light	-29.9%	0.5%
13	Buffalo-Niagara Falls NY	Light	-48.7%	-1.4%
Texas Urbanized Areas				
1	Austin TX	None	146.4%	1.5%
2	Dallas TX	Light	-7.1%	0.7%
3	Houston TX	None	-17.3%	0.8%
4	San Antonio TX	None	-40.4%	0.1%
<b>Estimated from Federal Highway Administration, Texas Transportation Institute and National Transit Database information.</b> <b>1983 is the earliest year for which comparable data is available.</b>				

**Source of Light Rail Ridership:** Despite more than 15 years experience with new light rail systems, there has been no comprehensive national evaluation of the source of light rail ridership.<sup>7</sup> Local rider surveys have identified a number of sources, such as:<sup>8</sup>

- Former bus riders, who have been forced to transfer because their bus routes now feed rail stations instead of the former destinations (usually downtown). In St. Louis virtually all bus service across the Mississippi River has been discontinued, as former bus riders have been forced to transfer to rail. Approximately 55 percent of light rail ridership is former bus riders.
- Riders in “free fare” or reduced fare downtown zones (Buffalo, Dallas, Portland, Sacramento, San Jose and St. Louis). These include a large number of shopping or lunch trips that might have otherwise been taken on foot.

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<sup>7</sup> Such a study would need to comprehensively analyze the travel patterns of riders before and after light rail, including the impact of any altered automobile use. It would need to consider, for example, the extent to which light rail increases traffic volumes by encouraging former express bus riders to use automobiles for part or all of their journey, the extent to which automobile drivers have abandoned their automobiles to use light rail, and a number of other factors. Local rider surveys have not included such comprehensive analysis.

<sup>8</sup> Calculated from data in Metropolitan Washington Council of Governments, *The First Four Years of Metrorail: Travel Changes*, September 1981 and San Diego Association of Governments, *The San Diego Trolley: The First Three Years*, November 1984 and Jonathan E. D. Richmond, *New Rail Transit Investments - A Review* (Cambridge: Harvard University John F. Kennedy School of Government), 1998.

- Drivers who use free downtown peripheral parking at rail stations to avoid downtown parking charges and ride short distances to their jobs. This reduces automobile use by a minuscule amount and because so much of an automobile's pollution occurs in starting and stopping, the air pollution impacts are at best minimal (See Air Pollution and Urban Rail p. 20). In St. Louis, for example, many drivers park free at two East St. Louis stations and ride less than two miles to downtown. They thus avoid expensive downtown parking charges and a system of congested bridges that has suffered from a conscious policy of disinvestment.<sup>9</sup> Even so, the light rail line carries barely three percent of the traffic across the river.<sup>10</sup>
- Former car pool *riders*, whose car pools continue to operate or have become single occupant trips (no automobile has been removed). This does not reduce automobile use, because the automobiles remain on the road.
- New travelers (people who would not have made the trip if rail were not available). These are referred to as "induced" trips, and would include a large percentage of the trips in free fare or reduced fare zones in downtown areas. Induced travel estimates range from 10 percent to 20 percent of ridership.

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<sup>9</sup> One bridge was permanently closed 30 years ago and another has been closed for nearly five years, with renovation still not commenced. Two bridges are open.

<sup>10</sup> Calculated from Missouri Department of Transportation and Bi-State Development Agency data.

- Former automobile drivers who use light rail for a major portion of their journey. It appears that such former automobile drivers represent between 20 and 25 percent of light rail ridership.<sup>11</sup> However, because stations are within walking distance of so little of the urban area, these former drivers tend to access light rail by automobile.<sup>12</sup>

### Reducing Traffic Congestion – The Record:

But more important than the source of light rail ridership is that it carries such modest volumes in relation to traffic on adjacent roadways. In no case has light rail attracted enough drivers out of their cars to materially reduce traffic congestion (Figure 5).<sup>13</sup>

- On average new U.S. light rail lines carry less than 20 percent the volume of a single freeway lane couplet (2 lanes of freeway, one operating in each direction).
- St. Louis has the highest light rail volume, at only 33 percent of a local freeway lane couplet.
- Portland's MAX carries 19 percent of a single freeway lane couplet.
- San Jose has the lowest light rail volume at 9 percent of a freeway lane couplet.

Light rail volumes are also lower than the average two way arterial (major surface street) lane couplet (Figure 6).

- On average new U.S. light rail lines carry 50 percent of a single arterial lane

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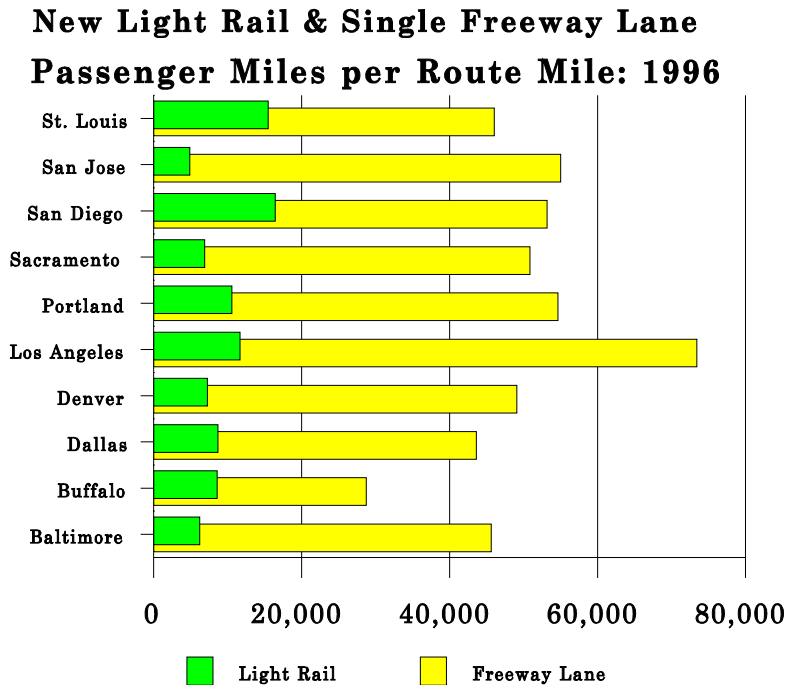
<sup>11</sup> John W. Neff, *"Prior Travel Mode of Rail Transit Passengers"* has estimated former automobile drivers at 30 to 35 percent. This result, however, is excessively optimistic with respect to light rail, for the following reasons. (1) The study includes commuter rail, heavy rail and light rail lines. Commuter rail and heavy rail lines operate significantly faster than light rail and are therefore more effective in attracting automobile drivers. (2) Some of the systems included operate over routes that had little or no transit service before rail service began, so that it would be expected that a large percentage of riders would be former automobile drivers. (3) An incomplete survey of St. Louis light rail riders indicating that the share of former public transit riders on light rail was less than one-half that of any other light rail system was included. This study was criticized by the local metropolitan newspaper, which has been a stalwart supporter of light rail. (4) A large portion of the surveys were performed in the 1960s and 1970s, when downtown areas were more dominant than today, and the potential for attracting people from automobiles to public transit was therefore greater.

<sup>12</sup> Generally, few former automobile drivers are attracted to feeder bus systems, the use of which tends to make light rail even less competitive with the automobile in terms of travel time.

<sup>13</sup> This is not to suggest that some of the nation's older, heavy rail systems do not reduce traffic congestion. Systems serving the nation's largest central business districts (downtowns), most notably in New York, carry substantial numbers of passengers who might otherwise commute by automobile. It should also be noted that New York's central business district employment is more than five times greater than that of any other U.S. central business district and nearly 15 times as large as the largest Texas central business district (Houston).

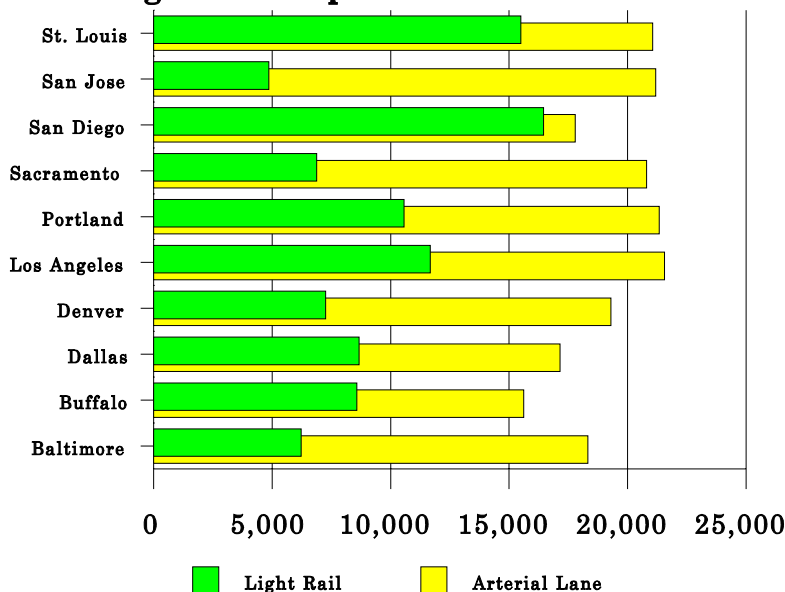
couplet with traffic signals (2 lanes, one operating in each direction).

- San Diego has the highest light rail volume, at 92 percent of a local arterial lane couplet.
- Portland's MAX carries 50 percent of a single arterial lane couplet.
- San Jose has the lowest light rail volume, at 23 percent of an arterial lane couplet.



## New Light Rail & Single Arterial Street Lane

### Passenger Miles per Route Mile: 1996



It is sometimes suggested that light rail is not intended to reduce traffic congestion so much as it is intended to reduce future traffic congestion growth. A related argument is that light rail will be available to respond to the more intense traffic congestion that is expected in the future. Neither of these arguments, however, is compelling because virtually all projections around the nation indicate that commercial and residential development will continue to be dominated by the suburban areas that cannot be served by light rail.

Even in downtowns with light rail, transit encounters significant difficulty in maintaining its market share. In the past two years, transit's overall work trip market share in downtown St. Louis has dropped by more than one third, and light rail's market share has dropped by 10 percent.<sup>14</sup> Moreover, a Mississippi River bridge repair that doubled commuting times failed to divert a significant number of drivers to St. Louis' light rail line (below).

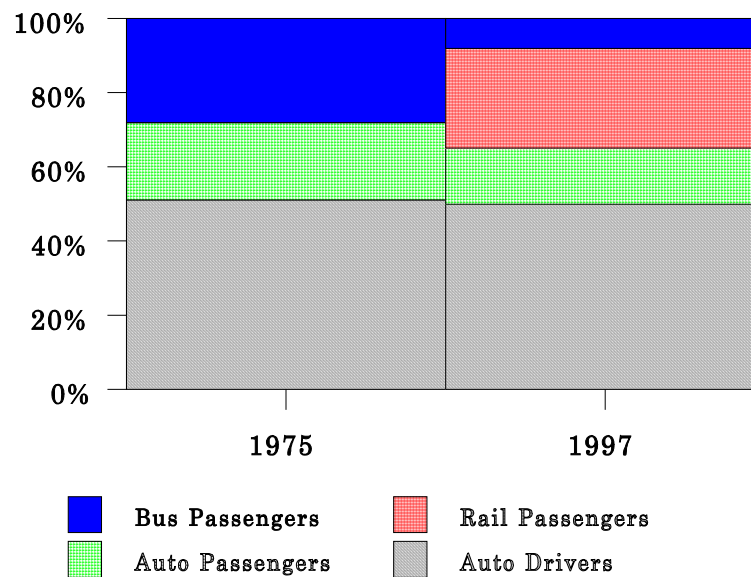
**Large Investment, Little Impact:** By far the nation's most comprehensive, extensive and expensive new rail system is the Washington Metro (heavy rail). This system has been key to a transit ridership increase in the Washington area of more than 100 percent over the last two decades. Yet, the rail system has done virtually nothing to reduce automobile use. The percentage of people driving into central Washington during peak hours has fallen only marginally (Figure 7), while the percentage of people driving across the suburban beltway has increased since the opening of Metro (Figure 8). Overall traffic level volumes have continued to grow,

<sup>14</sup> Charlene Proust, "Downtown gains workers and businesses, survey shows," *St. Louis Post-Dispatch*, March 4, 1999. This survey further indicated that all downtown employment growth was outside the core of the downtown area, where light rail is most effective.

barely impacted by this \$10 billion system. Metro's new ridership has largely been taken from buses and car pool passengers. Washington's transit work trip market share has fallen 13 percent since before Metro, and the overwhelming majority of new employment and *all* of the new population has been in the suburbs.

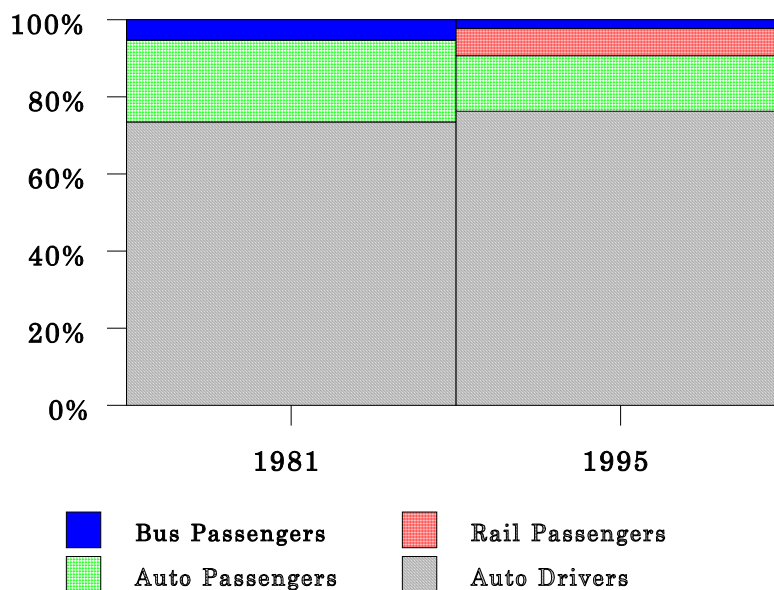
### Central Washington Peak Trips

Before and After Rail



## Suburban Washington Peak Trips

Crossing I-495 Beltway: Before and After Rail

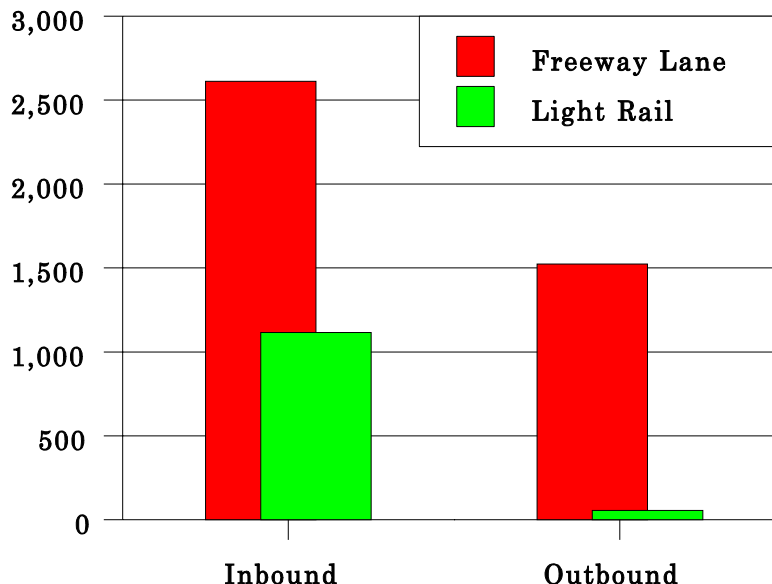


**Peak Hour Volumes:** Even during peak travel hours, light rail carries comparatively few riders compared to freeway lanes, though data is not generally available.

In Portland inbound (toward downtown), light rail volume averages approximately 1,100 per hour during the 6:00 a.m. to 9:00 a.m. peak period. By comparison, each lane of the adjacent Banfield Freeway (Interstate 84) carries approximately 2,600 people per hour – nearly 2.5 times the volume of the light rail line. In the outbound direction, each freeway lane carries 1,500 persons hourly, 28 times the light rail average of 55 passengers during the same period (Figure 9). Overall, during the morning peak period, the freeway carries more than 10 times the volume of the light rail line.<sup>15</sup>

<sup>15</sup>

Oregon Transportation Institute, *Max Versus Banfield Freeway: A Comparison of Actual Passenger Usage*, Internet: [www.hevanet.com/oti/MVFE.htm](http://www.hevanet.com/oti/MVFE.htm), based upon Oregon Department of Transportation and Tri-County Metropolitan Transit District data, 1994.

**Portland: Peak Hour Volumes:****I-84 Freeway Lane & Eastside Light Rail**

In St. Louis, inbound peak hour light rail ridership is approximately 60 percent less than the capacity of a single freeway lane. When an approach to the bridge was closed for weeks due to accident damage, many commuters experienced 100 percent increases in their travel times. Yet, even in this short term crisis light rail's passenger volume remained 40 percent *below* that of a single freeway lane.<sup>16</sup>

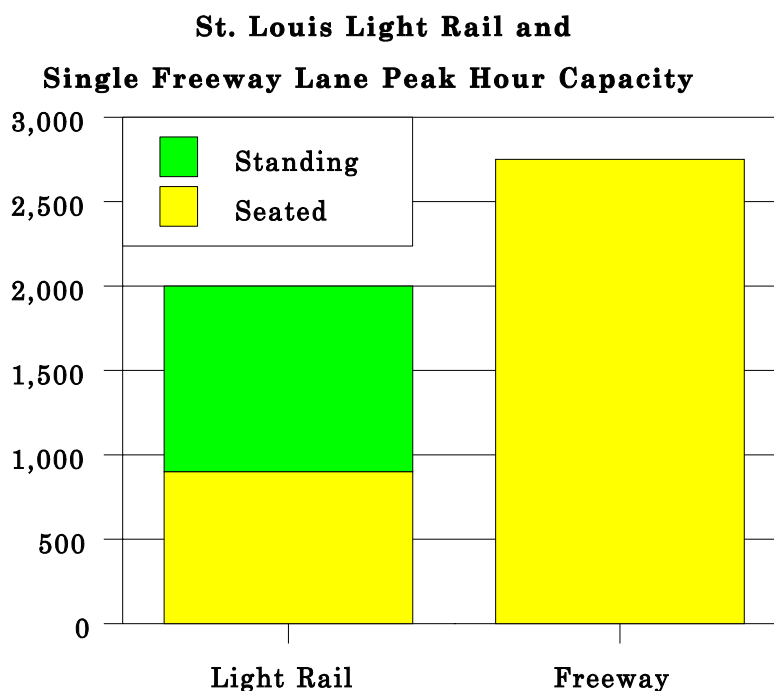
**Theoretical and Practical Ridership Capacity**

These findings appear to contradict the often cited claim that a light rail line has the same person carrying capacity as up to six freeway lanes. Yet U.S. transit agencies do not even provide a sufficient amount of service to carry such a large number of passengers.

For example, St. Louis, with one of the nation's most intensively used new light rail lines, provides seating capacity for fewer than 900 passengers each peak hour – one-third the capacity of a freeway lane. With a “crush” load of standing passengers, the St. Louis line could only achieve a passenger volume of nearly 2,000, still 25 percent below a freeway lane's capacity (Figure 10). Moreover, it is apparent that the St. Louis line has not reduced traffic congestion. Traffic on the adjacent Mississippi River Bridge (I-55/64/70) has increased by more than 20 percent since before the light rail line opened. Despite being able to save between \$4.00 and \$11.00 in parking charges by taking light rail, the vast majority of

<sup>16</sup> Ellen Perlman, “The Little Engine that Might,” *Governing Magazine*, August 1998. Highway volumes from the Missouri Department of Transportation.

commuters continue to drive. The reason is that, even though the Mississippi River bridge is immediately adjacent to downtown St. Louis, the great majority of travelers are not going downtown, which is the only high density employment center served by light rail (downtown is also the only high density employment center in the St. Louis area).



It is theoretically possible<sup>17</sup> for light rail to carry the volume of six freeway lanes,<sup>18</sup> but it would require both passenger demand far greater than exist in any new light rail urban area. Like the Interstate 10 freeway between Fort Stockton and Van Horn, new light rail systems have the capacity to carry much more volume. Interstate 10 does not carry more traffic because there is insufficient travel demand in that area. Light rail does not carry even a lane of traffic because there is insufficient passenger demand.

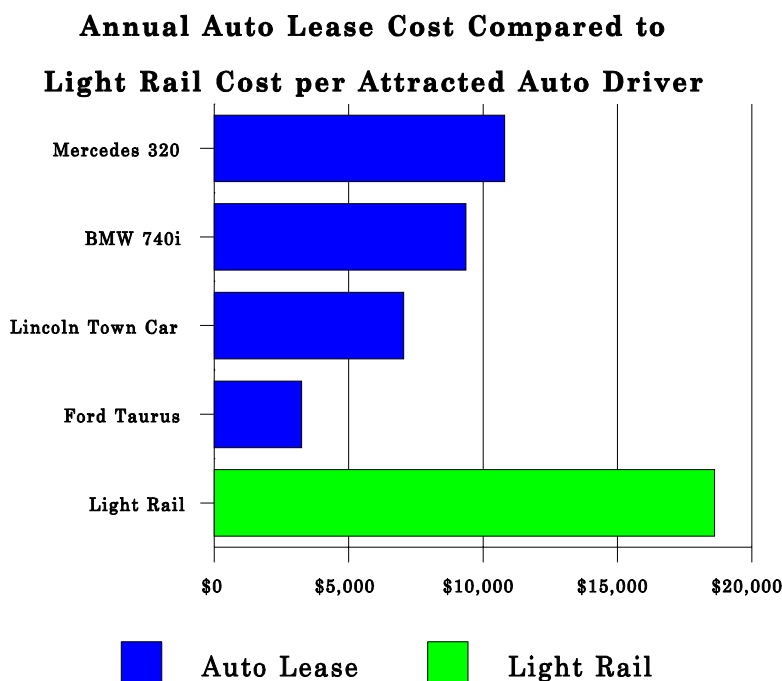
**A Costly Strategy:** Generally, light rail lines are five times as costly to build as busway programs providing the same level of service.<sup>19</sup> U.S. government research has shown that where bus service is equivalent to rail service, passengers have no

<sup>17</sup> Similarly, it would be possible to build a baseball stadium for the “Astros” to seat 500,000 rather than 50,000 spectators. However, like light rail, rarely, if ever, would demand approach the capacity.

<sup>18</sup> Curitiba, Brazil has two non-grade separated busways that carry a peak hour volume equal to five freeway lanes in a single direction.

<sup>19</sup> John Kain, Ross Gittell, Amrita Danieri, Tsur Summerville and Liu Zhi, *Increasing the Productivity of the Nation’s Urban Transportation Infrastructure*, United States Department of Transportation Federal Transit Administration, January 1992.

preference for rail (or bus).<sup>20</sup> Of the seven metropolitan areas that increased their per capita ridership by more than 20 percent since 1980 (including Houston), six relied on expanded bus service. The seventh ranking metropolitan area, San Diego, relied on both light rail and expanded bus service (See [www.tppf.org/tran4ape.html](http://www.tppf.org/tran4ape.html) Metropolitan Areas Ranked by Change in Annual Boardings per Capita: 1980 - 1996). Moreover, light rail systems have proven to be excessively costly. The cost per attracted automobile driver averages more than \$18,500 annually – or nearly \$750,000 over a 40 year career.<sup>21</sup> This is considerably more than would be required to lease each attracted automobile driver a luxury automobile in perpetuity (retail prices of \$30,000 to \$65,000).<sup>22</sup> It is 80 percent more than the average household expenditure on housing<sup>23</sup> (Figure 11).



<sup>20</sup> Moshe Ben-Akiva, *Ridership Attraction of Rail Compared with Bus* (U.S. Department of Transportation, 1991).

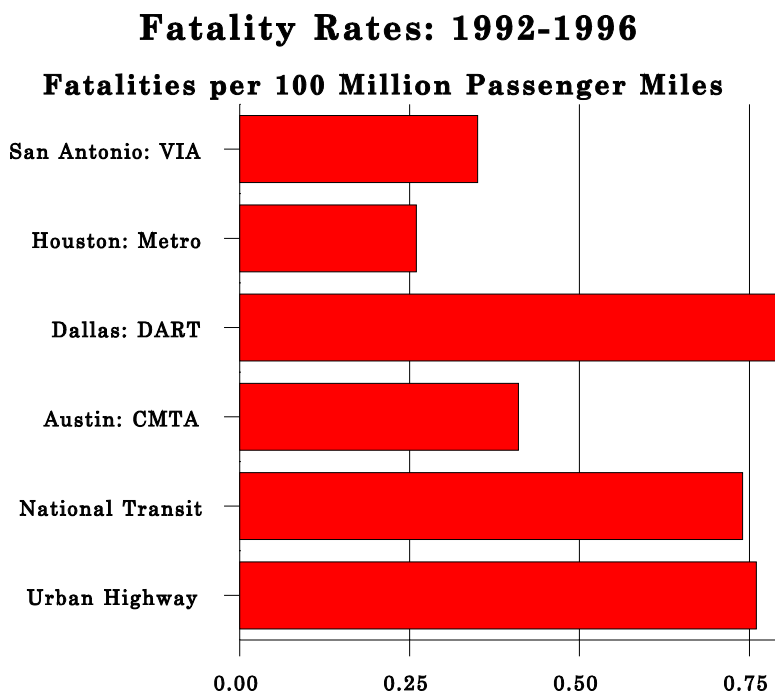
<sup>21</sup> Calculated from U.S. Department of Transportation data. Assumes two way commute 225 days annually and that 60 percent of new riders are automobile commuters.

<sup>22</sup> Includes down payment, taxes, license fees and monthly lease payments.

<sup>23</sup> Calculated from U.S. Department of Labor Bureau of Labor Statistics data.

## Safety

DART's services are slightly less safe than the national transit average and the urban highway (automobile) average. DART's fatality rate is more than double that of Houston Metro and San Antonio's VIA, and nearly double that of Capital Metro in Austin (Figure 12).

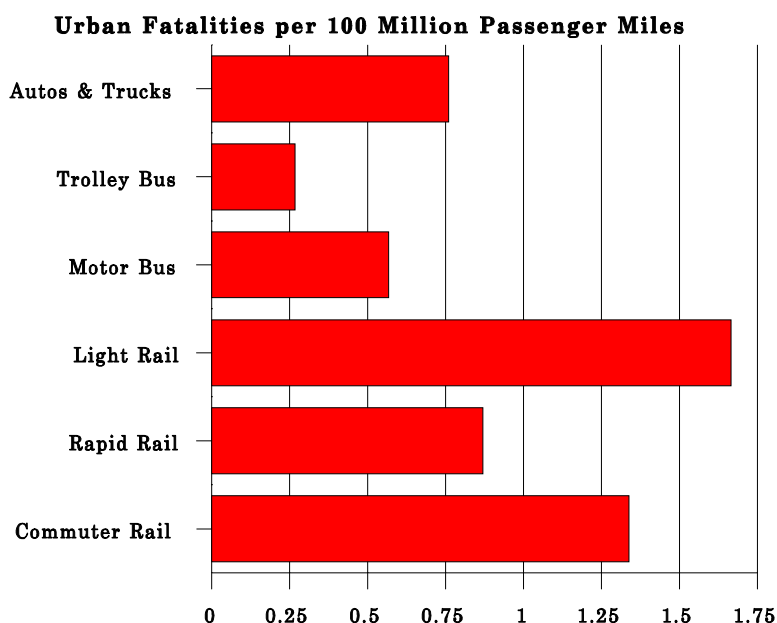


U.S. transit is also popularly believed to be considerably safer than the automobile. Transit bus services are safer than automobiles. However, urban rail (light rail, heavy rail and commuter rail) is generally less safe than automobiles. (Figure 13).<sup>24</sup>

<sup>24</sup>

Calculated from U.S. Department of Transportation data.

## U.S. Fatality Rates: 1990-1995



### Light Rail as a Transportation Alternative

Some advocates contend that, even though urban rail does not reduce traffic congestion or its growth, it is important to provide an alternative for people so inclined to use it. There are significant problems with the goal of alternative transportation and light rail:

- Urban rail can serve only a very limited market. No new light rail system carries even one percent of travel in any metropolitan area.
- Urban rail primarily serves downtown, which is the only destination to which there is already a practical transportation alternative – transit buses.

Urban rail provides no alternative to the overwhelming majority of urban travelers whose trips do not begin or end in downtown. Busways and HOV lanes, on the other hand, can provide alternatives to virtually all people using the freeway system.<sup>25</sup>

### Why New Urban Rail Attracts so Few Automobile Drivers

New urban rail systems have failed to reduce traffic congestion for two fundamental reasons (Box 1):

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<sup>25</sup>

In the nation's 50 largest urbanized areas, nearly 40 percent of travel is on the freeway system.

**Most locations in the urban area are not served:** In new rail cities, more than 99.2 percent of the urbanized area is beyond the typical maximum one-quarter mile walking distance from a station (Figure 14).<sup>26</sup> As a result, the overwhelming majority of jobs cannot be reached by urban rail. At least 99.7 percent of the Metro service area would be beyond walking distance from the light rail line.

**Slow speed:** Even in the few corridors served by new light rail systems, it provides no speed advantage compared to highway alternatives (Figure 15). New light rail systems average 17.2 miles per hour, and the fastest at-grade<sup>27</sup> system operates at 18.2 miles per hour.<sup>28</sup> This is faster than the bus average of 12.8 per hour.<sup>29</sup> By comparison, the average automobile commuting speed

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<sup>26</sup> Calculated from 1996 National Transit Database and Texas Transportation Institute data.

<sup>27</sup> At-grade systems cross major arterials at street level, requiring crossing gates, and causing roadway traffic to stop. Grade separated systems operate in subway (underground) or on elevated structures and do not cross major arterials at street level.

<sup>28</sup> Calculated from 1996 National Transit Database. Light rail systems with downtown subways (Los Angeles and St. Louis) operate faster than 18.2 miles per hour, but are still slower than commuting by automobile.

<sup>29</sup> Wendell Cox, Jean Love and Samuel A. Brunelli, *Reinventing Transit: Putting Customers First* (Washington: American Legislative Exchange Council, 1996).

is more than 30 miles per hour (nearly double the new light rail operating speed).<sup>30</sup>

Because of these factors, travel surveys generally show that the majority of new urban rail riders are former bus riders,<sup>31</sup> whose bus service no longer takes them directly to their destinations (by virtue of forced transfers).<sup>32</sup> In fact, light rail feasibility studies invariably come to the same conclusion – that rail makes little difference in reducing either traffic congestion or its growth. However, when proposals to build rail are marketed, reduction of traffic congestion is usually the principal justification.<sup>33</sup>

**A Consensus Assessment:** The conclusion that transit solutions offer virtually no hope to control traffic congestion is shared by most transportation and urban planning experts who do not receive funding from transit agencies or government transit departments. For example, at a recent Government Accounting Office

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<sup>30</sup> Light rail speed calculated from 1996 National Transit Database. Express bus speed calculated from 1990 National Transit Database (which because of its design had more comprehensive speed data for express bus systems). Automobile commute speed from Nationwide Personal Transportation Survey, 1995.

<sup>31</sup> Much of the new ridership on the new light rail lines has been a parking lot to sporting events or other special events, school field trips to attractions such as zoos and parks and lunch hour ridership, which is encouraged by lower fares or free fares in the downtown area (such as Buffalo, Dallas, Portland, Sacramento, and St. Louis). None of these functions materially impacts peak period traffic congestion.

<sup>32</sup> Jonathan E. D. Richmond, *New Rail Transit Investments - A Review* (Cambridge: Harvard University John F. Kennedy School of Government, 1998).

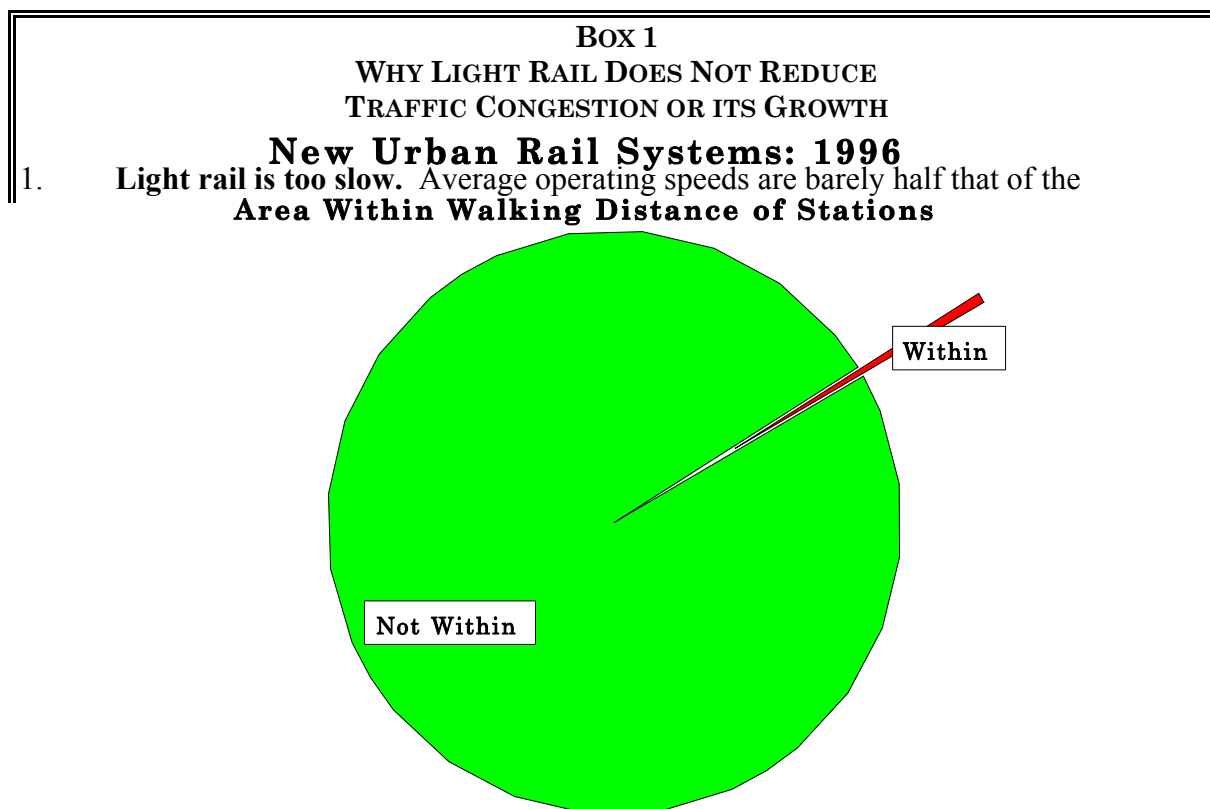
<sup>33</sup> The author is often labeled as “anti-rail” by rail proponents. In fact, when a member of the Los Angeles County Transportation Commission, Wendell Cox authored the amendment that dedicated 35 percent of transit sales tax receipts to building rail (1980), in the hope of reducing traffic congestion. This measure provided the local funding for three rail lines on which construction was begun in the 1980s. As new urban rail systems were opened in the 1980s and 1990s, it has become clear that their traffic impact has been minimal. The author operates from the assumption that traffic congestion is a serious problem and that the resources available for alleviation are limited. Misallocation of resources to ineffective strategies, as urban rail systems have proven to be, has the effect of worsening traffic congestion. The author would be eager to endorse any rail program that cost effectively and materially reduced traffic congestion or its growth.

conference, Anthony Downs of the Brookings Institution said:

*Attempts to cope with rising traffic congestion by shifting more people to public transit are not going to work.*<sup>34</sup>

At the same conference, David Luberoff of Harvard University's Kennedy School of Government summarized the situation as follows:

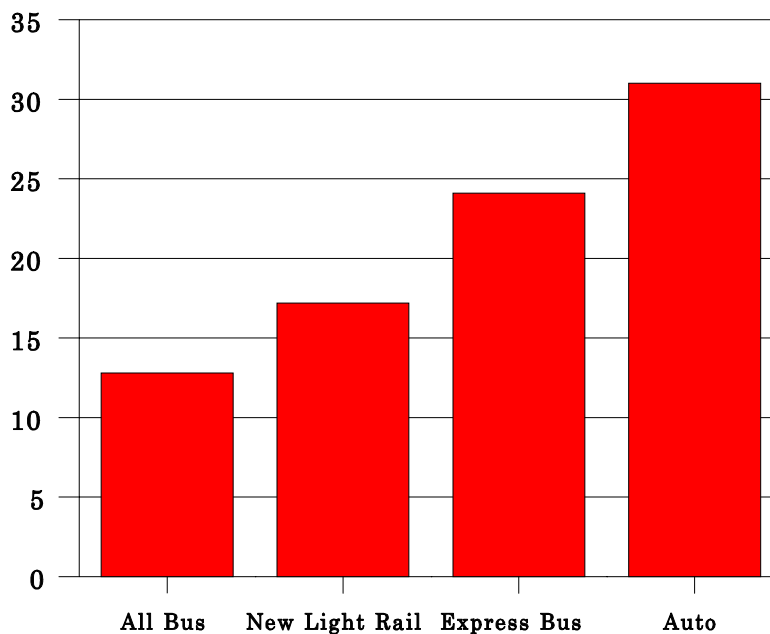
*Why are we still investing in mass transit despite 20 years of data showing that rail transit generally does not have significant impacts on either mobility or air quality?*<sup>35</sup>



<sup>34</sup> United States Government Accounting Office, *Surface Transportation: Moving into the 21<sup>st</sup> Century*, May 1999.

<sup>35</sup> United States Government Accounting Office, *Surface Transportation: Moving into the 21<sup>st</sup> Century*, May 1999.

### Average Commute (Work Trip) Speed



### Air Pollution and Urban Rail

Considerable progress has been made in improving air quality in the United States. Virtually none of the air pollution improvement is attributable to transit, much less urban rail. Because urban rail does not materially reduce automobile use, it cannot materially reduce air pollution. This is confirmed by United States Department of Transportation reports.<sup>36</sup>

- The nation's most comprehensive and expensive new rail system (Washington, D.C.) is credited with removing barely one percent of emissions in the area.<sup>37</sup>
- New rail systems make only modest air quality improvements because ... *only part of the additional ridership of these systems is drawn from SOV (single occupant vehicle) users. Others are drawn from buses, carpools and latent demand.*<sup>38</sup>

Despite perceptions to the contrary, there is no possibility that rail strategies can play a material role in achieving air quality requirements, in Texas or elsewhere.

<sup>36</sup> *Report on Funding Levels and Allocation of Funds*, Report of the Secretary of Transportation to the United States Congress, annual reports 1985-1998.

<sup>37</sup> *Clean Air through Transportation: Challenges in Meeting National Air Quality Standards*, United States Department of Transportation and Environmental Protection Agency, August 1993.

<sup>38</sup> *Clean Air through Transportation: Challenges in Meeting National Air Quality Standards*, United States Department of Transportation and Environmental Protection Agency, August 1993.

Moreover, attracting drivers from automobiles does not always reduce air pollution.

Many of the automobile drivers attracted to rail drive to rail stations (at “park and ride” lots). The shorter trips to rail stations may produce nearly as much pollution as the former longer trips:

*... many riders access rail stations by automobile, meaning their trips still entail engine cold starts and subsequent cooling down. This generates the bulk of HC (hydrocarbon) emissions – 65 from a 10 mile trip – because of an automobile’s relative inefficiency and higher emission rates while warming up and higher gasoline evaporation rates when cooling down.<sup>39</sup>*

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<sup>39</sup>

*Clean Air through Transportation: Challenges in Meeting National Air Quality Standards*, United States Department of Transportation and Environmental Protection Agency, August 1993.

Rail systems are not necessarily less polluting than the automobile. The electricity that powers rail is more often than not generated by burning fossil fuels, which in their production consume three times as much energy as they produce. At best, electrified rail moves pollution from the urban area to the power plant. Because of its scant contribution to improved air quality, there is virtually no hope that rail can play an important role in achieving the Kyoto greenhouse gas reduction targets.<sup>40</sup>

Automobile and light truck travel has expanded substantially, at the same time that a major reduction in air pollution has occurred. Virtually all of the motor vehicle air pollution improvement is the result of improved emission technology. From 1970 to 1992, annual road travel increased by more than 100 percent. At the same time, transportation related carbon monoxide emissions fell 32 percent, volatile organic compound emissions fell 53 percent and nitrogen oxide emissions rose by one percent.<sup>41</sup> The number of unhealthy air quality days dropped by more than two thirds in U.S. metropolitan areas from 1987 to 1996,<sup>42</sup> and automobile pollution is expected to drop approximately 25 percent from 1996 to 2010,<sup>43</sup> despite continued growth in miles traveled. A recent press report indicated that 1997 was the best year for air pollution in the Los Angeles area for the past 50 years<sup>44</sup> – this despite a tripling of population. Most of the improvement in air quality is attributable to improved vehicle emission technology. And further improvements are on the way. Recently, Daimler-Chrysler announced its intention to market a zero emission fuel cell vehicle by 2004.<sup>45</sup> This follows previous announcements by

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<sup>40</sup> Whether or not human induced “global warming” exists or is significant is beyond the scope of this paper.

<sup>41</sup> United States Department of Transportation Federal Highway Administration, *Transportation Air Quality: Selected Facts and Figures*, 1996.

<sup>42</sup> United States Environmental Protection Agency, *National Air Quality and Emissions Trends Report, 1996*.

<sup>43</sup> Calculated from United States Environmental Protection Agency, *National Air Pollutant Emission Trends Report, 1900-1996*, 1997.

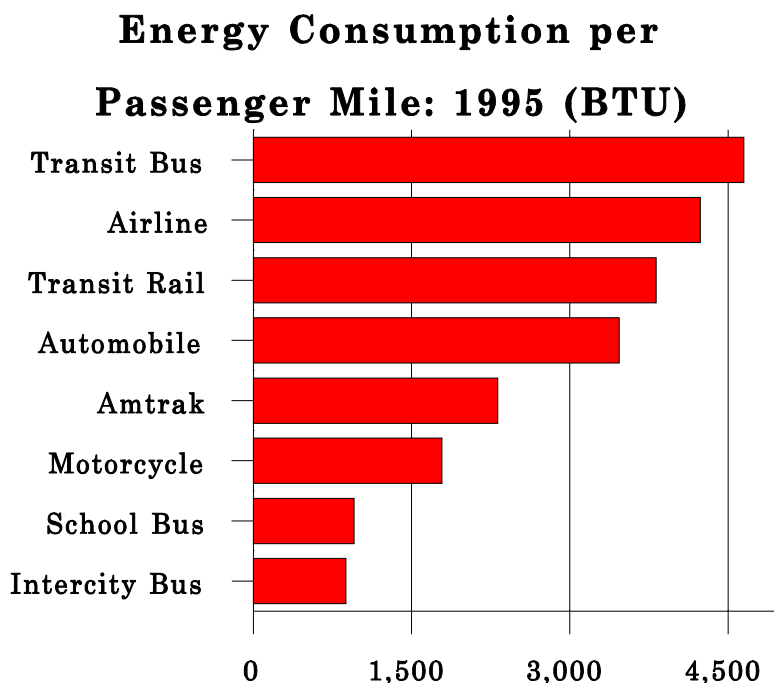
<sup>44</sup> “Skies Blue Again in L.A. – Cleanest Air in 50 Years,” *San Francisco Chronicle*, December 30, 1997.

<sup>45</sup> Jeffrey Hall, “Auto Makers Are Racing to Market ‘Green’ Cars Powered by Fuel Cells,” *The Wall Street Journal*, March 15, 1999.

Toyota and Honda to market very low emission gasoline and hybrid (gasoline-electric) cars in the near future.

## Energy Efficiency

Transit is popularly thought of as an energy-efficient mode of travel – and it is if buses and trains operate at or near capacity. But transit vehicles average closer to empty, at 18.3 percent of capacity.<sup>46</sup> As a result, both transit buses and rail consume more energy per passenger mile (4,650 British Thermal Units or BTUs) than automobiles (3,467 BTUs). Transit buses now consume one-third more energy than automobiles and have become less energy-efficient than airlines (Figure 16).



## Federal Funding

Perhaps the principal driving force in public transit infrastructure improvements such as light rail is the availability of federal discretionary funding. Local areas have the potential to obtain up to 80 percent federal funding match rates. But there is not enough federal or local funding available to provide the extent of conventional bus or rail public transit service that would make a material difference in traffic congestion and air pollution. The scarce resources available should be spent on strategies that improve *regional* transportation – strategies that make it possible for non-single occupant travelers to quickly and conveniently travel from any location in the metropolitan area to any other location.

<sup>46</sup>

1990 data. Later capacity usage data excluded by FTA from National Transit Database reports.

## II. REALISTIC TRANSPORTATION ALTERNATIVES

The following roadway expansion strategies should be considered:

- New highways could be constructed and additional capacity might be provided on existing highways. Houston and Phoenix have successfully *reduced* traffic congestion through expansion of their freeway systems, and are the only urbanized areas to have accomplished such a reduction between 1982 and 1996.<sup>47</sup> This does not require a return to the neighborhood destroying highway construction that was associated with urban renewal in the 1950s and 1960s. For example, some European cities are building “metroroute” auto-only freeway tunnels to alleviate traffic congestion. Paris, with the western world’s most intensely developed urban rail system, will build 60 miles of under city tunnels to alleviate traffic congestion.<sup>48</sup>
- Traffic bottlenecks should be removed. For example, in some cities the number of through lanes is substantially reduced through freeway interchanges. The result is traffic congestion, which could be alleviated by the addition of relatively short lane sections. In Milwaukee, the addition of a freeway lane in each direction for three miles would eliminate a serious capacity problem anticipated on the entire Interstate 94 corridor in 2010.<sup>49</sup>
- High occupancy vehicle lanes (HOV lanes) should be considered. HOV lanes are express freeway lanes reserved for car pools and other high occupancy vehicles. High occupancy vehicle lanes (HOV lanes) offer the opportunity to reduce traffic congestion in corridors leading to the 80 percent of jobs not in downtown or the University of Texas area. HOV lanes can provide improved commuting speeds to many areas, rather than just to the downtown area where transit and rail benefits are concentrated. This is because car pools and buses can access the HOV lane for part of the trip, even though the origin and destination may be some distance from the freeway. Houston Metro indicates that HOV lanes improve travel times by from 12 to 22 minutes during peak hours.<sup>50</sup> Federal transit funding can be used to construct HOV lanes.
- High occupancy toll lanes (HOT lanes) should also be considered. HOT lanes are a variation on HOV lanes, in which tolls are charged for single occupant automobiles and waived for car pools. The Route 91 high occupancy toll lane in the Los Angeles area has reduced the period of peak congestion by an hour

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<sup>47</sup> Texas Transportation Institute.

<sup>48</sup> Christian Gerondeau, *Transport in Europe* (Boston, MA: Artech House, Inc.), 1997.

<sup>49</sup> Wendell Cox, *Light Rail in Milwaukee* (Milwaukee: Wisconsin Policy Research Institute), 1998.

<sup>50</sup> Houston Metro, *Guide to Using Houston’s High Occupancy Vehicle Lanes*, January 1998.

in each direction daily.

## Intelligent Transportation Systems

Greater use of computer technologies, through intelligent transportation systems (ITS) is expected to improve traffic congestion without major system expansion.

- Improved traffic signalization is already improving travel times in some corridors.
- On-board navigation systems are already assisting automobile drivers in identifying less congested alternative routes and thereby improving average travel speeds in urban areas.
- The automated highway will bring interactive speed control, with computers controlling steering and braking on congested urban freeways. It is expected that roadway capacities could be more than doubled by this technology. Japan plans to have an automated highway in operation in a decade.<sup>51</sup>
- In the more distant future “autonomous automobiles” would combine the features of both the automated highway and navigation systems. Autonomous automobiles would rely on geo-positioning systems capable of guiding automobiles within tolerances measured in inches. The autonomous automobile will be capable of quickly transporting its passengers to virtually any destination on the road network (freeways to local streets), improving roadway capacity, average speeds and safety. It is possible that technology will eventually deliver highway based systems that combine the personal mobility advantages of the automobile with the theoretical advantages of mass transit.

## Bus Strategies

In addition to rail, a high quality bus alternative should be studied (Box 2). U.S. government research has shown that where bus service is equivalent to rail service, passengers have no preference for rail (or bus).<sup>52</sup> Other U.S. government research

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<sup>51</sup> Internet: *ITS Online* <http://www.itsonline.com/nahsc1.html>.

<sup>52</sup> Moshe Ben-Akiva, *Ridership Attraction of Rail Compared with Bus* (U.S. Department of Transportation,

indicates that equivalent bus systems can be developed for one-fifth the cost of light rail systems.<sup>53</sup> Finally, high quality bus systems tend to attract a higher percentage of their ridership from automobiles than do rail systems, largely because of their higher operating speeds.<sup>54</sup>

<b>Box 2</b>
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1991).

<sup>53</sup> John Kain, Ross Gittell, Amrita Danieri, Tsur Summerville and Liu Zhi, *Increasing the Productivity of the Nation's Urban Transportation Infrastructure*, United States Department of Transportation Federal Transit Administration, January 1992.

<sup>54</sup> Jonathan E. D. Richmond, *New Rail Transit Investments - A Review* (Cambridge: Harvard University John F. Kennedy School of Government, 1998), p. 27.

Of the seven metropolitan areas that increased their per capita ridership by more than 20 percent since 1980, six relied on expanded bus service. The seventh ranking metropolitan area, San Diego, relied on both light rail and expanded bus service.

A high quality express bus/HOV system would operate in the planned exclusive light rail rights of way, and would qualify for federal fixed guideway funding.

Further, a busway/HOV strategy would be regional in nature, unlike the fixed route (bus and rail) transit system, which serves only downtown oriented corridors, and that operate at speeds insufficient to attract significant numbers of commuters from their automobiles. The regional effectiveness of high occupancy vehicle strategies is illustrated by Dallas projections that 95 percent of HOV passengers in 2010 will be in carpools, rather than the buses (that are oriented to downtown). A

busway/HOV system is capable of providing alternative transportation throughout the entire service area.

#### THE DRIVING FORCE: FEDERAL FUNDING

Perhaps the principal driving force in public transit infrastructure improvements such as light rail is the availability of federal discretionary funding. Local areas have the potential to obtain up to 80 percent federal funding match rates. But there is not enough federal or local funding available to provide sufficient conventional bus or rail public transit service to make a material difference in Austin's traffic congestion and air pollution. The scarce resources available should be spent on strategies that improve *regional* transportation --- strategies that make it possible for non-single occupant travelers to quickly and conveniently travel from any location in the metropolitan area to any other location. In modern sprawling urban areas like Austin (or Dallas, Chicago, New York, Seattle, etc.) the evidence indicates that bus and car pool based rapid transit systems are by far the most effective and efficient strategy for using the federal money that is earmarked to public transit.

### Telecommuting

As the information technology revolution continues, expanded use of the Internet, personal computers, mobile telephones and other communications technologies is already moderating travel demand.

- Some companies are "hoteling," a strategy by which employees who spend considerable time outside the office are assigned temporary instead of permanent offices.
- Telecommuting is increasing, and it is likely to increase even more in the future. From 1995 to 1997 telecommuting increased nearly 30 percent.<sup>55</sup> In 1990 it was projected that telecommuting will remove between 50 billion and

<sup>55</sup>

"U.S. Telecommuting Trend Surpasses 11 Million: Strong Economy, Internet Spur Growth," Emerging Technologies Research Group, Internet: <http://etrgr.findsvp.com/prls/pr97/telecomm.html>.

150 billion passenger miles nationally from roadways by the year 2000.<sup>56</sup> By 1997 there were indications that the lower projection for 2000 had already been achieved.<sup>57</sup> It would thus appear that telecommuting has already removed considerably more passenger miles than are carried by all public transit bus, light rail, heavy rail and commuter rail services combined (approximately 50 million).

- Telecommuting is likely to be expanded by the establishment of “telework” centers that allow employees to commute shorter distances and be connected by computer to offices that are farther away.
- Telecommuting is also likely to be expanded to the extent that new urbanist land use policies are successfully implemented. As urbanized areas are constricted in their physical growth, traffic congestion will increase substantially, creating incentives to avoid the work trip altogether and convert to telecommuting. Moreover, as people continue to express their preferences for less dense housing patterns, much more rapid development of larger lots is likely to take place outside bureaucratically delineated urban growth boundaries, which will also increase telecommuting.

### Objectivity in Transportation Planning

Recently, U.S. House of Representatives Majority Whip Tom DeLay<sup>58</sup> recommended three criteria with respect to urban rail development. It would be appropriate for Austin officials to observe these principles with respect to rail or any other planned transportation improvement (Table 2).

*Whether we build rail should depend upon three criteria.*

- *The first has to do with reducing traffic congestion. Rail's success is not demonstrated by the number of people on the train, rather it is demonstrated by how many cars it takes off the road. The number must be material.*

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<sup>56</sup> “Telecommuting Forecasts Released,” Telecommuting Research Institute (Los Angeles), 1990. By 1997, the year 2000 forecast of total telecommuters had been exceeded.

<sup>57</sup> The Emerging Technologies Research Group Internet report noted above indicated that the number of telecommuters in 1997 exceeded the projection for 2000 made in 1990.

<sup>58</sup> A member of the Transportation Appropriations Subcommittee.

- *The second test is financial – that whatever rail accomplishes, it should do so for less than any other alternative.*
- *And the third criteria is just as important – that the alternative finally selected must be the result of objective and rigorous planning and studies, whose design and processes are not skewed for or against any alternatives.<sup>59</sup>*

TABLE 2 DELAY MAJOR TRANSPORTATION IMPROVEMENT PRINCIPLES EVALUATION CRITERIA	
No.	Criteria
1	<b>EFFECTIVENESS:</b> The proposed project must materially reduce traffic congestion during peak hours.
2	<b>COST EFFICIENCY:</b> The proposed project must be the most cost effective strategy for achieving the traffic congestion reduction.
3	<b>OBJECTIVITY:</b> The planning process must have included an objective analysis of all reasonable alternatives.

### III. DOES TRANSIT WORK?

Paul M. Weyrich and Paul Lind have contributed useful concepts for analysis of public transit in their recent paper, *Does Transit Work? A Conservative Reappraisal*. *Does Transit Work?* argues that transit should be judged on its effectiveness in providing “transit competitive trips,”<sup>60</sup> which is defined as “...trips for which high quality transit service is available.”<sup>61</sup> It is further indicated that transit competitive trips are largely limited to work and entertainment trips. *Does Transit Work*’s “transit competitive trips” is similar to the *1999 Texas Transit Opportunity Analysis* characterization of “frequent, no-transfer” bus and rail service, which transit largely provides only to downtown areas.<sup>62</sup> *Does Transit Work?* expresses similar sentiment in noting:

<sup>59</sup> “Look at the data before climbing aboard light rail,” by Representative Tom DeLay (U.S. House of Representatives Majority Whip), op-ed in the *Houston Chronicle*, June 21, 1998. Highlighting not in original.

<sup>60</sup> Weyrich and Lind.

<sup>61</sup> Other disciplines might benefit from similar measures. For example, organized labor might consider its market share in terms of a “labor union competitive job” measure, inasmuch as the labor union market share remains strong in industries with particular characteristics, while its overall market share has dropped precipitously (organized labor’s private sector market share has dropped 72 percent, from 35 percent to 10 percent, while public transit’s urban market share has dropped 89 percent, from 18 percent to 2 percent).

<sup>62</sup> Because it is infeasible to provide meaningful volumes of frequent, no transfer service to other areas.

*The fact is, in today's America, very, very few people have high quality transit service available.<sup>63</sup>*

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<sup>63</sup>

Weyrich and Lind.

This is troubling because annual transit subsidies are nearing \$20 billion – a figure equal to one-fifth of spending on the nation's streets and highways, which carry 100 times as many person miles as transit. A principal reason that so few people have quality transit service is transit's inferior productivity, which has prevented transit from providing considerably higher levels of service (above).<sup>64</sup>

Nonetheless, as *Does Transit Work?* argues, transit does serve a large market share to major downtown areas, such as New York (74 percent), Chicago (61 percent), Brooklyn (56 percent) and San Francisco (50 percent). It has already been noted above that transit serves more than 30 percent of work trips to nine downtown areas in the nation. The problem, however, is that market developments have passed transit by. Downtown represents, on average, 10 percent of metropolitan employment, and is losing market share virtually everywhere. And traffic congestion is no longer simply a downtown issue – in many metropolitan areas, the greatest traffic congestion is in suburban areas, not in downtown areas.<sup>65</sup> In addition, transit is simply incapable of capturing a significant market share of non-downtown employment, because of insufficient employment densities (even in suburban “Edge Cities”) and its failure to provide high quality transit service (frequent, no-transfer service).

Despite transit's continually falling market share, *Does Transit Work?* indicates that the annual ridership per capita of households having “satisfactory” transit service doubled between 1976 and 1993. This is both indeterminable from the data sources referenced and implausible.<sup>66</sup>

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<sup>64</sup> *Does Transit Work?* does not evaluate transit productivity.

<sup>65</sup> A recent poll by the *Atlanta Journal-Constitution* found that only four percent of respondents considered the worst traffic in the Atlanta area to be in suburban areas, not downtown (Cheryl Crabb, “Commuting in Atlanta: Where Should MARTA Go Next,” *Atlanta Journal-Constitution* Internet site, June 27, 1999).

<sup>66</sup> According to *Does Transit Work?*, “And here's the kicker: while annual transit rides per household nationwide remained virtually steady from 1974 to 1993, annual trips per household where satisfactory

*Does Transit Work?* includes three case studies (Chicago's commuter rail system, San Diego's light rail system and the St. Louis light rail system) and, noting transit ridership increases, suggests that transit in these urban areas is attracting a significant number of "transit competitive trips." While a principal justification for building urban rail systems is alleviation of traffic congestion, *Does Transit Work?* provides no information on the traffic impacts of new rail systems. As a recent Orange County, California grand jury report noted:

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transit was available doubled over the same period, from a low of 150 in 1976 to 300 in 1993 (emphasis in original)." These data are calculated by dividing the annual transit ridership reported in 1976 and 1993 by the American Public Transit Association by the number of households that had adequate public transit service in the corresponding years, according to the *American Housing Survey*. There are two problems with this: (1) The 1976 *Survey* did not seek information on the number of households that used public transit, and so the 1976 figure cannot be known from this data. (2) The 1993 *Survey* did report information on the number of households that used public transit, but approximately 10 percent of such households considered public transit to be inadequate. Again, from the data, it cannot be known how many trips were taken by households with "adequate" public transportation. Moreover, transit's stagnant ridership trend and declining market share undermine any claim that ridership has increased among households with "quality" transit service (which *Does Transit Work?* equates with "satisfactory" service). It would seem more likely that casual use by people with automobiles has declined over the past two decades, leaving a core of high volume riders, most of whom have no choice because they do not have automobiles available (approximately 75 percent of transit riders in 1995 did not have an automobile available to make the transit trip, according to the Nationwide Personal Transportation Survey).

*A test of light rail's success is not how many people are on the trains; it is how many cars light rail has removed from the road, especially during peak hours.*<sup>67</sup>

Indeed, as was noted above, the \$400 million St. Louis light rail line, considered by many to be the most successful new line in the nation, has had virtually no impact on adjacent freeway traffic volumes. The reason is not that light rail is inherently ineffective, it is rather that the primary destination it serves is no longer so dominant. In 1930, 75 percent of downtown commuters traveled by transit in St. Louis;<sup>68</sup> in 1990 the figure had dropped to less than 11 percent. Moreover, despite ridership increases in the *Does Transit Work?* case studies of Chicago (commuter rail only) and San Diego, work trip market share dropped between 1980 and 1990.<sup>69</sup>

Transit competitive trips – work trips and entertainment trips – account for no more than 30 percent of travel. Even so, transit competitive trips represent only a small portion of those trips. Only 10 percent of employment is located where transit provides quality (frequent, no-transfer) service – downtown – and downtown continues to decline in relative importance. Entertainment trips are even less significant. They contribute little to the morning and evening peak hours in which so much of the day-to-day traffic congestion and air pollution occurs. It seems unwise to spend billions to construct expensive new rail systems that are incapable of materially reducing traffic congestion.

Finally, strong work trip market shares to a handful of downtown areas and downtown entertainment complexes would not seem to justify metropolitan, much less state or federal subsidies.

*Does Transit Work?*, itself sponsored by the transit industry, and the *1999 Texas Transit Opportunity Analysis* both reach similar conclusions – that transit is competitive only with respect to a small portion of the urban travel market. It is to be hoped that rail transit advocates will take this conclusion to heart and no longer promise communities that new rail transit systems can make a material contribution to reducing traffic congestion.

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<sup>67</sup> Report of the Orange County Grand Jury, May 27, 1999 “Orange County Transportation Authority and Light Rail Planning. Internet: [www.publicpurpose.com/lib-orcorail.htm](http://www.publicpurpose.com/lib-orcorail.htm).

<sup>68</sup> *Report of the Transportation Survey Commission of the City of St. Louis*, July 1930.

<sup>69</sup> Latest data available.

## The Effects of Light Rail on the Poor

Light rail has caused some negative impacts on existing public transit ridership, especially low income citizens.

- Public transit dependent riders often face a degradation of service, as a result of being forced to transfer from connecting buses to light rail, which tends to lengthen travel times.
- In some urban areas, higher than expected light rail costs have resulted in larger fare increases, lower levels of bus service and severe overcrowding of bus services. In Los Angeles, this led to litigation in which advocates for the public transit dependent have obtained a moratorium on further rail expansion, as funding is now being directed back into the bus system.<sup>70</sup>

## Impact on Existing Riders

More affluent express bus service customers can also experience longer trip times as a result of a forced transfer to light rail. This can drive such passengers away, or as in the case of Denver, encourages automobile use by former bus patrons to light rail stations that are closer to downtown. In this case, light rail has encouraged greater automobile use. The cross-Mississippi River corridor in St. Louis has experienced a similar phenomenon, with former express bus riders transferring to automobile use for travel to downtown.<sup>71</sup>

## IV. THE LIGHT RAIL EXPERIENCE IN DALLAS

The 1983 campaign for the DART tax referendum made impressive claims to the voters. Voters were told that DART trains were needed to reduce traffic congestion, and that within 25 years:

- 160 miles (14 routes) of rail would be built, including a downtown subway.

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<sup>70</sup> It has been suggested that light rail can provide public transport dependent riders with access to employment in suburban locations. Light rail, however, makes so little of the urban area accessible that it makes little difference. In fact, because of its higher costs, light rail has the potential to retard access for the public transport dependent, by consuming resources that could be used to provide higher levels of access with expanded bus service.

<sup>71</sup> Richmond.

All of this was to be built for \$17.8 million per mile.<sup>72</sup>

· 500,000 daily riders would be carried on DART buses and trains.

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<sup>72</sup>

*Vote DART. It's the Best Way to Go*, 1983 campaign brochure produced by the Transportation Task Force.

As has become typical in transit,<sup>73</sup> the results fell far short of the promises.

- The rail system was scaled back by more than two-thirds, even though the tax rate remained at the level that was to finance the 160 mile system. Costs were grossly underestimated in the plans presented to taxpayers, with costs per mile for the first 20 miles approaching \$45 million, more than a 60 percent increase (inflation adjusted).<sup>74</sup>
- Present projections indicate that in the *entire* Dallas-Fort Worth area (not the DART service area), transit boardings will be 376,900<sup>75</sup> in 2020.

Voters were also told that without DART, Dallas traffic congestion would soon reach Houston levels and that traffic congestion would get increasingly worse without DART. In fact, with DART, traffic congestion in Dallas now equals that of Houston (see above). Traffic congestion has become considerably worse in Dallas as little of the travel growth since before DART's establishment has been on transit (Figure 17). According to the *Mobility 2020* projections, even further expansion of the rail system will have an imperceivable impact on traffic – all of the anticipated transit ridership increase over the next 29 years is nullified by less than four months of street and freeway traffic growth.<sup>76</sup>

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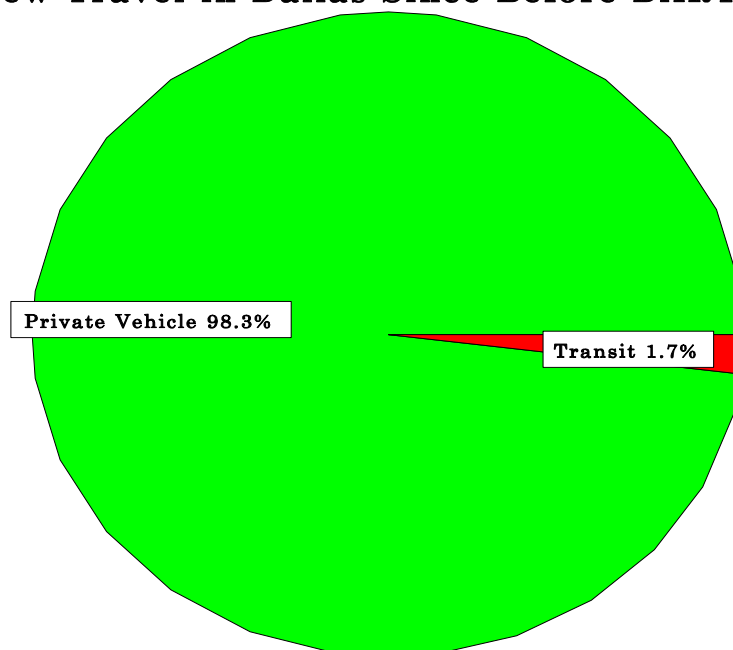
<sup>73</sup> Rail transit systems usually cost much more than originally estimated, carry fewer riders than projected and cost more to operate. See Don Pickrell, *Urban Rail Transit Projects: Forecast Versus Actual Ridership and Costs*, United States Department of Transportation, Urban Mass Transportation Administration, October 1989.

<sup>74</sup> Things could be worse. Like Dallas, Los Angeles over promised on its transit expansion plans. A 1980 tax initiative was to have built 11 urban rail lines. Because costs were higher than planned, the tax was doubled in 1990. Then, the agency ran out of money in 1998 and suspended rail development following completion of the *third* line. Annual debt service will soon rise to \$400 million annually and transit ridership is down more than 25 percent since 1985.

<sup>75</sup> *Mobility 2020*.

<sup>76</sup> Estimated from *Mobility 2020*, Texas Transportation Institute, Federal Highway Administration and DART data.

## New Travel in Dallas Since Before DART



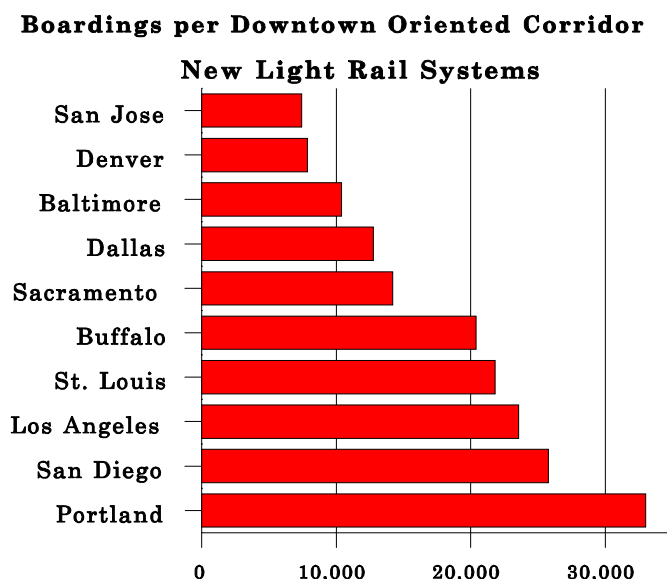
Since the DART tax was enacted, approximately \$3.5 billion has been collected. Ridership has increased 63 percent, operating revenues (principally fares) have declined eight percent,<sup>77</sup> while the annual transit budget has expanded by nearly 700 percent (Table 3).

TABLE 3 BEFORE DART AND 1999: PASSENGER AND FINANCIAL INDICATORS			
	Boardings (Millions)	Spending (Millions) 1999\$	Operating Revenues (Millions) 1999\$
1983	37.4	\$82	\$37.0
1999 Budget	61.0	\$655	\$34.0
Change	63.1%	699.0%	-8.2%
<i>Operating revenues include all non-tax revenues, including fares and advertising revenues.</i>			

DART has opened 20 miles of the scaled back 53 mile light rail system. The system consists of three downtown oriented corridors and carries 40,000 daily boardings. The light rail system ranks 12<sup>th</sup> in boardings per downtown oriented corridor among the 20 new rail systems and 7<sup>th</sup> out of the 10 new light rail systems (Figure 18 and Table E-21 <http://www.tppf.org/tran4ape.html>). The most heavily used new light rail systems carry more than twice the DART volume per downtown oriented

<sup>77</sup> Inflation adjusted.

corridor (Portland and San Diego).



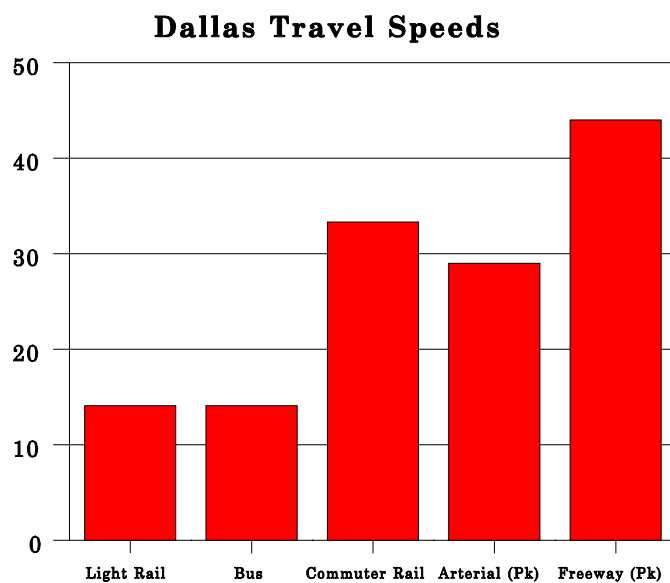
**Speed:** DART light rail services average 14.1 miles per hour.<sup>78</sup> This is slower than the 17.2 mile per hour average speed of other new light rail systems. DART buses also average 14.1 miles per hour. Light rail average speeds are approximately half that of autos on arterial streets (surface streets) during peak hours and one-third the average operating speed of freeways during peak hour.<sup>79</sup> By comparison, Dallas peak period arterial travel speeds, at 29 miles per hour (automobile), are double that of light rail, but slower than commuter rail. Average peak hour freeway speeds (44 miles per hour) are triple that of light rail and nearly one-third faster than commuter rail (Figure 19).

Because of its slow operating speed, DART's light rail provides no time savings relative to automobiles. Moreover, time savings with respect to buses are limited by the fact that light rail operates at virtually the same speed as DART's buses.

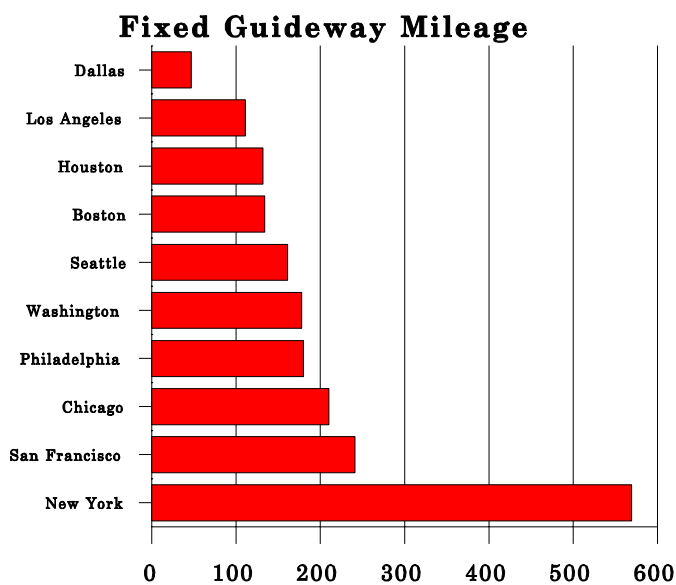
Rail and busways (including high occupancy vehicle lanes, or "HOV" lanes) are classified as "fixed guideways." In 1996 Dallas ranked 16<sup>th</sup> nationally in one-way fixed guideway (rail and busway) mileage, 64 percent less than Houston (Figure 20).

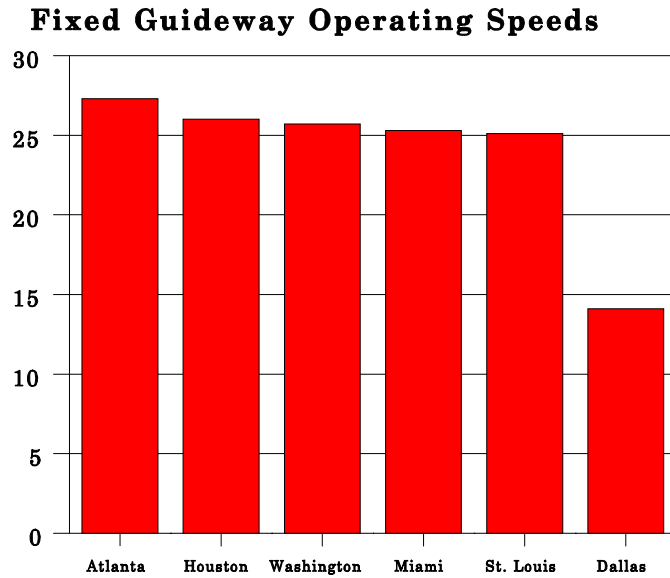
<sup>78</sup> Average speed per revenue hour, including operation on HOV lanes and surface streets. Calculated from DART data.

<sup>79</sup> Roadway operating speeds from Texas Transportation Institute.



DART's light rail system ranks 18<sup>th</sup> in speed among the 20 transit agencies reporting fixed guideway speed information. Atlanta's heavy rail system operates almost twice as fast, while Houston's busway system operates 84 percent faster (Figure 21).





**Light Rail and the DART Ridership Increase:** DART's 3.0 percent boarding increase from 1991 has been achieved at a considerable price. The operating cost per each new boarding (\$15.99) has been more than five times the average 1991 cost per boarding (Figure 22).<sup>80</sup> Moreover, DART's ridership increase has been much more costly than a similar ridership increase at Houston Metro:

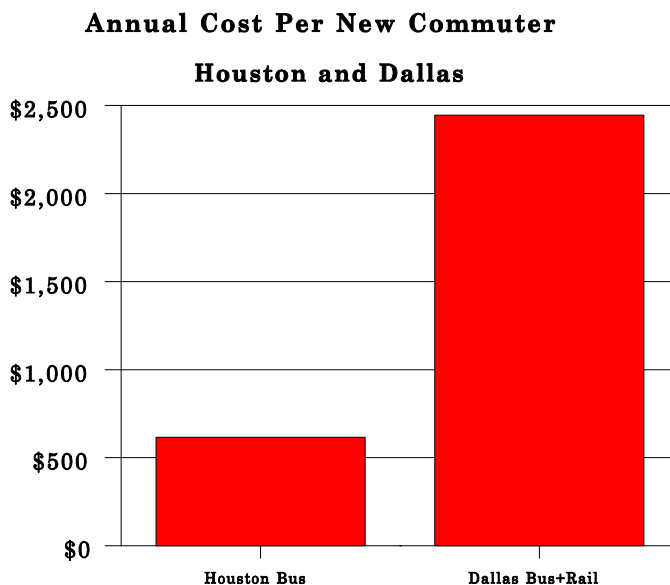
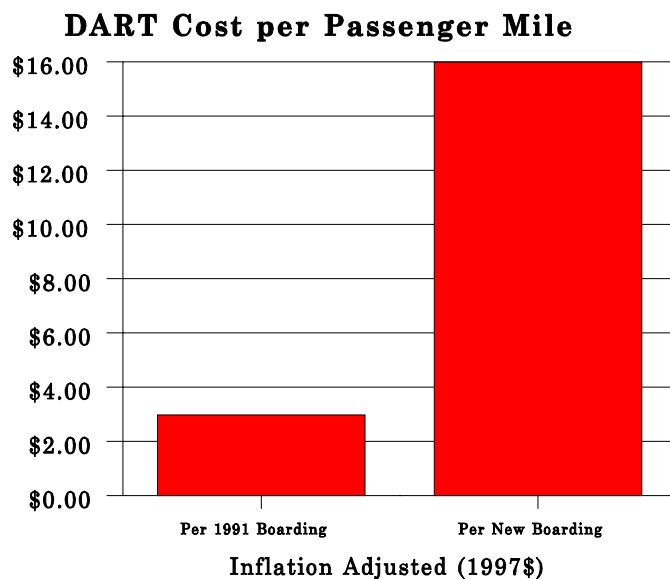
- By 1997, Dallas (DART) boardings had increased 7.7 million since the year before light rail was opened<sup>81</sup> (1995). At the same time, operating costs rose nearly \$42 million (inflation adjusted), for a cost per new boarding of \$5.43. This represents an annual cost per new commuter of nearly \$2,500.<sup>82</sup>
- Over the same period, Houston Metro experienced a 6.8 million increase in boardings, while operating costs rose \$9.3 million, for a cost per new boarding of \$1.37 (Figure 23).<sup>83</sup> This represents an annual cost per new commuter of \$600.

<sup>80</sup> Inclusion of capital costs would increase this gap substantially. It is estimated that DART light rail capital costs are 2.5 times operating costs.

<sup>81</sup> Commuter rail was opened in 1997.

<sup>82</sup> Assumes two work trips daily, 225 days per year.

<sup>83</sup> Houston's cost advantage is probably greater. The addition of rail systems tends to artificially increase boardings by requiring new transfers between bus and rail for former bus riders.



Moreover, it is possible that the ridership increase attributable to light rail is less significant than is immediately apparent.

- Addition of light rail has increased transfers, resulting in an artificial increase in DART ridership. A number of bus routes that used to operate all the way to downtown are now truncated at light rail stations, where passengers are forced to transfer. This has increased boardings, without increasing the actual number of people taking transit trips.

- New light rail feeder bus routes were established. Any ridership increase attributable to these routes might have been obtained by establishing feeder routes to the previous downtown oriented bus routes.
- DART charges only half fare on light rail services in the downtown area. This is likely to have increased ridership, especially during mid-day (such as for lunch trips). Any such ridership increase is not likely to have materially impacted traffic.

**Non-transportation benefits:** David Gunn, former general manager of the New York City Transit Authority, the Toronto Transit Commission, Philadelphia's SEPTA and Washington Metro has noted that urban rail is being built for reasons having nothing to do with transportation. His characterization of the trend toward urban rail is stated in terms of worship:

*... today subways and light rail have become icons of development.*<sup>84</sup>

The DART light rail system has been credited with non-transportation benefits, such as an improved civic “psyche” and the generation of economic development. This issue is discussed in Appendices B and D. Light rail, however, is precluded from having a material impact upon traffic congestion, which was its justification, by its slow speed and limited geographical access.

## Long Term Transit Planning

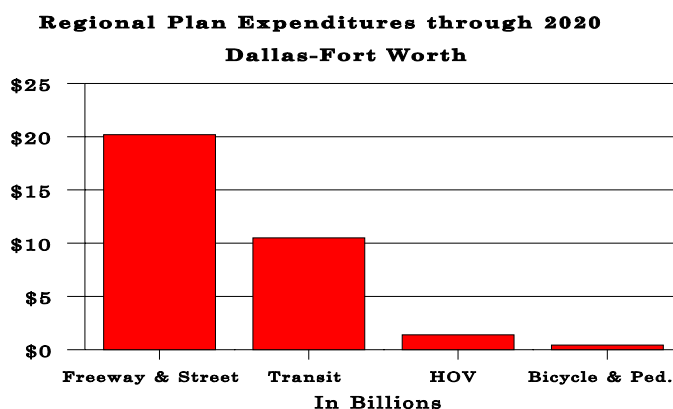
DART plans to expand the 20 mile light rail system to 53 miles and to complete the commuter rail line to Fort Worth and Dallas-Fort Worth International Airport. The adopted regional transportation plan, *Mobility 2020*, anticipates a significant additional expansion of the rail system. The plan also includes construction of nearly 200 lane miles of high occupancy vehicle lanes, a large percentage of which would be one-way reversible.<sup>85</sup> An additional 200 lane miles of freeways would also be built.

Through 2020, \$32 billion would be spent under *Mobility 2020*, more than \$20 billion on streets and freeways, \$10.5 billion on transit, \$1.5 billion on high occupancy vehicle lanes and \$400 million on bicycle and pedestrian facilities (Figure 24).

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<sup>84</sup> Robert Koch, “Gunn Leaves with Both Barrels Blazing,” *NovaeResUrbis*, November 2, 1998.

<sup>85</sup> Morning peak hour operation would be inbound toward Dallas, and evening peak hour operation would be outbound from Dallas.



Despite the considerable expenditure on transit, there would be virtually no change in transit's market share by 2020 according to *Mobility 2020* projections.

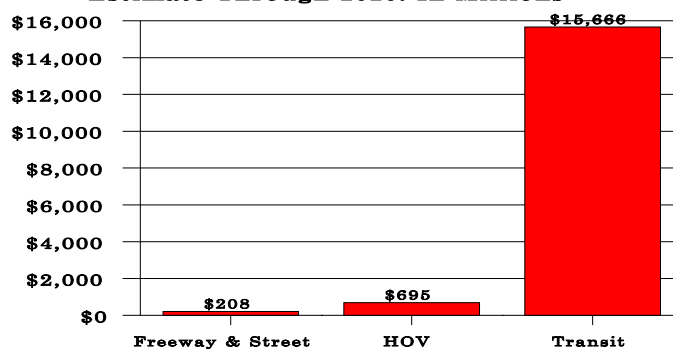
- Per point of market share, HOV lane costs would be more than three times as much as freeway and street expenditures. Transit expenditures would be 75 times that of streets and highways per point of market share and 22 times that of HOV lanes (Figure 25).<sup>86</sup>
- High occupancy vehicle lane capital expenditures would be 2.2 times that of freeway expenditures per new passenger mile. Transit expenditures would be more than 30 times greater than that of streets and highways and 14 times greater than that of HOV lanes (Figure 26).

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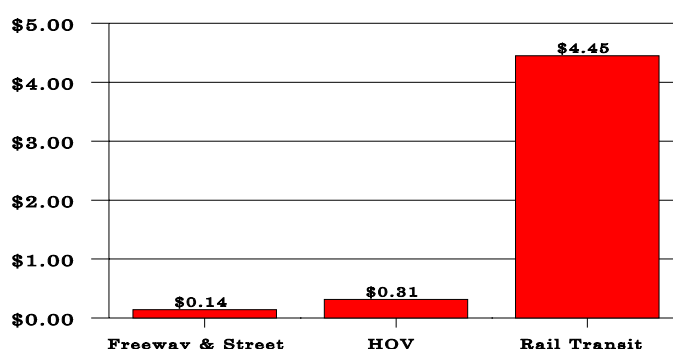
<sup>86</sup> All congestion management costs allocated to streets and highways. Street and highway maintenance and operating costs allocated based upon lane miles to HOV lanes and freeways/streets.

Projected Spending per Market Share Point

Estimate Through 2020: In Millions



New Capital Cost per New Passenger Mile  
Dallas-Fort Worth



*Mobility 2020* would spend 2.5 times as much to build rail extensions as to build HOV lanes, despite the fact that HOV usage will be greater than total transit ridership, *including rail*. Rail's inherent disadvantages preclude its being an effective regional transportation strategy.<sup>87</sup>

**Excessive cost:** Generally, rail lines are five times as costly to build as bus programs providing the same level of service.<sup>88</sup> U.S. government research has shown that where bus service is equivalent to rail service, passengers have no preference for rail (or bus).<sup>89</sup> Of the seven metropolitan areas that increased their per capita ridership by more than 20 percent since 1980, six relied on expanded bus service. The seventh ranking metropolitan area, San Diego, relied on both light rail and expanded bus service (Table E-5 <http://www.tppf.org/tran4ape.html>). Moreover, light rail systems have

<sup>87</sup> Despite this, there is a strong national regional planning movement, the "new urbanism" that views light rail as a critical tactic in a strategy to control "urban sprawl."

<sup>88</sup> John Kain, Ross Gittell, Amrita Danieri, Tsur Summerville and Liu Zhi, *Increasing the Productivity of the Nation's Urban Transportation Infrastructure*, United States Department of Transportation Federal Transit Administration, January 1992.

<sup>89</sup> Moshe Ben-Akiva, *Ridership Attraction of Rail Compared with Bus* (U.S. Department of Transportation, 1991).

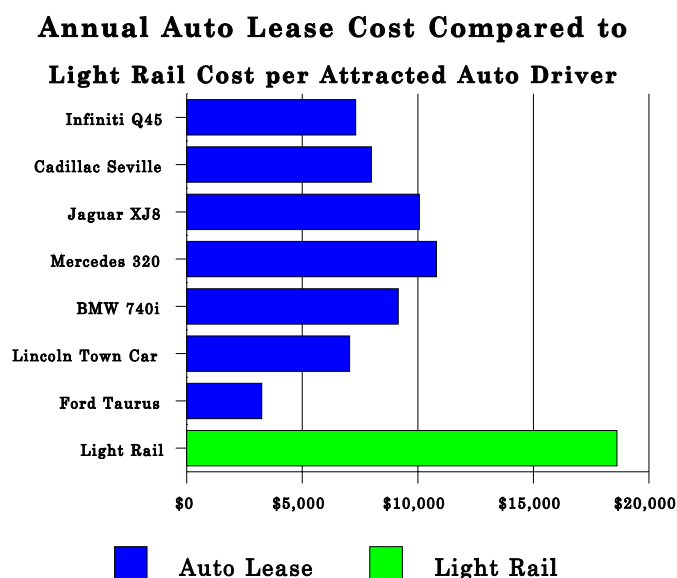
proven to be excessively costly. The cost per attracted automobile driver averages more than \$18,500 annually --- or nearly \$750,000 over a 40 year career.<sup>90</sup> This is considerably more than would be required to lease each attracted automobile driver a luxury automobile in perpetuity (retail prices of \$30,000 to \$65,000).<sup>91</sup> It is 80 percent more than the average household expenditure on housing (Figure 27).<sup>92</sup>

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<sup>90</sup> Calculated from U.S. Department of Transportation data. Assumes two way commute 225 days annually and that 60 percent of new riders are automobile commuters.

<sup>91</sup> Includes down payment, taxes, license fees and monthly lease payments.

<sup>92</sup> Calculated from U.S. Department of Labor Bureau of Labor Statistics data.



**Not a regional strategy:** Rail is a downtown strategy rather than a regional strategy. Downtown is already very well served by transit. The potential for increasing transit's market share in the downtown area is limited. Most new employment is expected to be created *outside* downtown. A rail system would thus provide little additional benefit, while consuming funding that could be better spent in areas where there will be a substantial increase in travel demand.

## V. REVITALIZING CITIES WITH LIGHT RAIL

Light rail has been credited with non-transportation benefits, such as improving the civic "psyche" and generating commercial and residential development. Downtown oriented metropolitan newspapers have often editorialized about positive civic psychological benefits of light rail systems.<sup>93</sup>

Frequently cited cases are:

Portland, where it is claimed that light rail played an important part in the placement of a new basketball arena (the "Rose Garden") and a new convention center in central Portland. Moreover, the renovation and expansion of a regional shopping center (Lloyd Center) has also been cited as a result of light rail.

<sup>93</sup> Such as *The Dallas Morning News*, the *Portland Oregonian*, the *St. Louis Post-Dispatch*, and the *Denver Post*.

St. Louis, where it is claimed that light rail was important in the placement of a new domed football stadium (the “TWA Dome”), a new basketball and hockey arena (“Kiel Center”) and a new convention center<sup>94</sup> in the downtown area.

On closer examination, however, the light rail development claims are less persuasive.

All of the sports facilities cited above were partially or fully tax funded --- arising from decisions of government, not by decisions of private investors who were attracted to develop land along light rail lines. Publicly assisted sports facilities may be built anywhere in a community, and have been built in both central city and suburban areas. Two new sports facilities are planned in central Detroit, which has no rail system. Major sports facilities have recently or will be sited in the central areas of other non-light rail cities, including Phoenix, Seattle, Minneapolis, Indianapolis, and Charlotte. It is notable that in Washington, D.C., with the nation’s most effective new urban rail system,<sup>95</sup> the new football stadium (Jack Kent Cooke Stadium) was constructed beyond walking distance from the rail system.

Convention centers are routinely developed with tax subsidies, and the largest are invariably built in or near downtowns, adjacent to hotels<sup>96</sup> and downtown shopping. For example, major convention centers have been built in the central areas of Detroit, Seattle, Kansas City, Indianapolis, Milwaukee, San Antonio, and Los Angeles (long before construction of urban rail became a serious prospect).

There are further indications of the difficulty of attracting private investment to light rail lines. Because there has been little high density private development adjacent to most light rail stations, the city of Portland is offering 10 years of property tax forgiveness for qualifying projects within walking distance (1/4 mile) of light rail stations. This demonstrates light rail’s minuscule impact on development. If light rail drove development it would not be necessary to subsidize the private development along the route.

The tax supported development in central city areas does not represent a net gain

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<sup>94</sup> *Dollars & Sense.*

<sup>95</sup> Washington’s heavy rail Metro system carries one-half of the ridership of all new rail systems in the nation and 15 times the ridership of the most heavily patronized new light rail system.

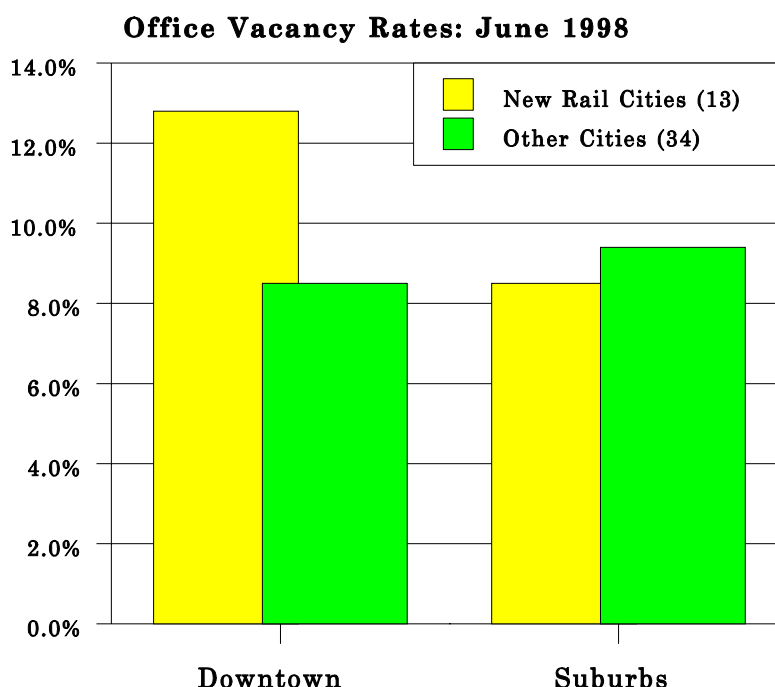
<sup>96</sup> In recent years, convention oriented downtown hotels have been developed increasingly with tax subsidies.

to the urban areas (from other urban areas) --- the projects would have been built somewhere within the same urban area. The critical element in any resulting development is not light rail --- it is tax subsidies.

### Downtown Employment and Vacancies

If new urban rail were able to reshape city development, it would be expected that downtowns in new rail cities would have lower office vacancy rates than in other cities, and rates that are lower than suburban areas. Yet, the average downtown vacancy rate in new rail cities is more than half again higher than the average of other cities (June 1998).

- In eight of 13 new rail cities for which data is available, the downtown office vacancy rate is higher than that of the other cities.
- In eight of the 13 new rail cities for which data is available, the downtown office vacancy rate is higher than that of the adjacent suburbs (Figure 28).



The downtowns of some new light rail cities are experiencing considerable difficulty.

- Portland's central city employment has increased by 1,000 from 1990 to 1994, while suburban employment grew by nearly 94,000. The central city share of metropolitan employment fell by nine percent over the period.<sup>97</sup> Further, the

<sup>97</sup>

"The Central City 2000 Strategy" recommendations of the Central City Task Force - July 23, 1996.

city of Portland government has recently relaxed parking development restrictions to make downtown more competitive,<sup>98</sup> and at least three major multi-story parking structures have recently been under construction along the rail line. A downtown area that had been transformed by light rail would have an excess, not a shortage of parking.

- Downtown St. Louis has been characterized as “fading fast.”<sup>99</sup> A major downtown enclosed shopping center --- which the developer claimed to be the largest in the nation when it opened in 1985 --- may close.<sup>100</sup> The downtown office vacancy rate is more than 1.5 times the national average and more than double the St. Louis suburban vacancy rate.
- Dallas continues to have one of the nation’s highest downtown office vacancy rates --- nearly double that of its suburbs. As of the third quarter of 1999, downtown Dallas was among only four downtown areas in the U.S. with vacancy rates above 20 percent, at 32.0 percent, and second worst only to Oklahoma City. This is unchanged from the fourth quarter 1998 rate of 31.9%.<sup>101</sup> The Dallas downtown vacancy rate is 54<sup>th</sup> out of 55 markets and nearly double that of nearby downtown Fort Worth, which is not served by light rail (Figure 29).
- In June 1995 the downtown Dallas vacancy rate was 126 percent higher than the downtown national average. By September 1999 it had escalated to 256 percent (Table 4).
- Among the 40 largest metropolitan markets surveyed (to provide some perspective, number 40 is Columbus, Ohio), downtown Dallas’ vacancy rate exceeds the second most distressed (downtown Detroit, at 19.3 percent) by more than 80 percent, and remains well above the 17.3 percent rate of Fort Worth/Arlington, the 9.8 percent rate of Houston and the national downtown average of 9.0 percent.
- By comparison, a year before light rail opened in Dallas (June 1995), the

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<sup>98</sup> “Portland Lifts Limits on Parking Spaces,” *The Oregonian*, October 2, 1997.

<sup>99</sup> “Special Report: Downtown St. Louis: Fading Fast,” *St. Louis Post-Dispatch*, December 8, 1996.

<sup>100</sup> “St. Louis Centre’s Owner Considers Cutting Losses, Abandoning Mall,” *St. Louis Post-Dispatch*, January 25, 1998.

<sup>101</sup> Latest data available.

downtown vacancy rate was 34.6 percent, compared to 20.4 percent in Detroit, 19.1 percent in Fort Worth/Arlington, 22.4 percent in Houston and the national downtown average of 15.3 percent.

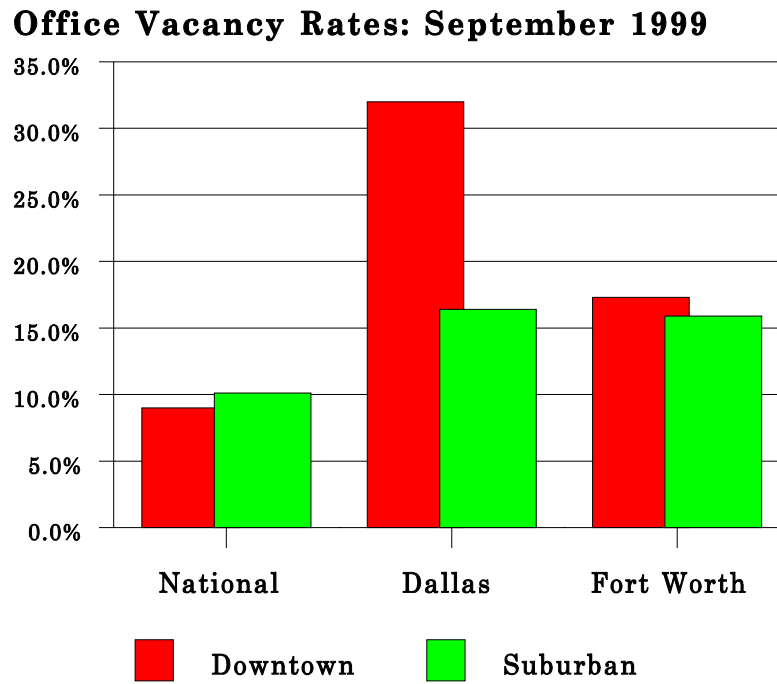
Vacancies and trends in downtown Dallas are worse than that of other Sun Belt cities (such as Phoenix, Atlanta and Austin) and worse even than cities known for some of the most “at risk” downtown areas (Cleveland and St. Louis).

**TABLE 4**  
**DOWNTOWN DALLAS VACANCY RATES COMPARED TO**  
**OTHER DOWNTOWNS AND THE NATIONAL AVERAGE**

Downtown Areas	9/1999	6/1995	Change
Dallas	32.0%	34.6%	-7.5%
Selected Downtown Areas			
Atlanta	13.0%	18.0%	-27.8%
Austin	7.1%	20.4%	-65.2%
Cleveland	10.4%	19.2%	-45.8%
Detroit	19.3%	20.4%	-5.4%
Fort Worth/Arlington	17.4%	19.1%	-8.9%
Houston	9.8%	22.4%	-56.3%
Indianapolis	12.4%	18.1%	-31.5%
Minneapolis	5.8%	10.4%	-44.2%
Phoenix	10.1%	16.9%	-40.2%
Portland	6.1%	9.7%	-37.1%
Seattle	2.6%	6.3%	-58.7%
St. Louis	16.5%	18.9%	-12.7%
Number in Survey	46	48	
National Downtown Average	9.0%	15.3%	-41.2%
Dallas Compared to National Average	255.6%	126.1%	
<b>Source: CB Richard Ellis Data.</b>			

National downtown vacancy rates have declined at a rate more than seven times that of downtown Dallas’ rate since before light rail opened. Downtown Fort

Worth's vacancy rate dropped at more than double the downtown Dallas rate (Figure 30).<sup>102</sup>



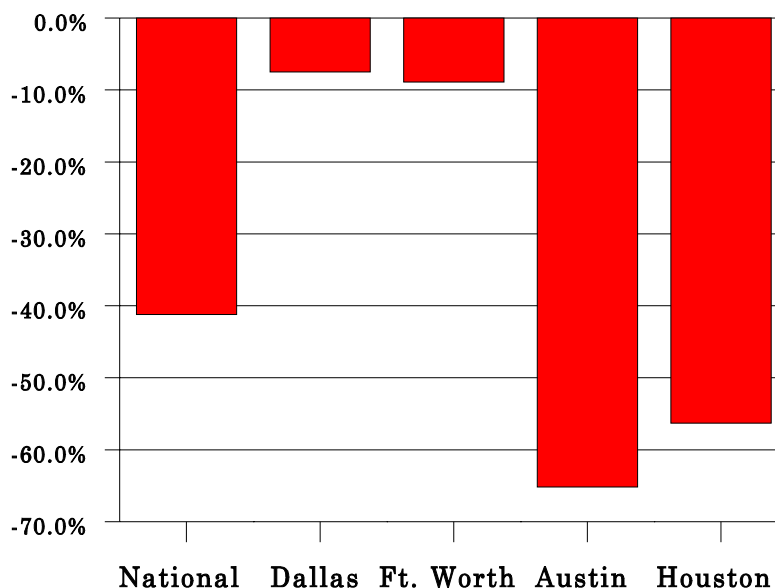
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<sup>102</sup>

All vacancy information from CB Richard Ellis, (Internet: <http://www.cbcommercial.com>).

## Change in Downtown Office Vacancy Rates

June 1995 to September 1999



If new rail were an effective city shaper, the cities that have made the greatest investments would have become more dense and less automobile dependent. But, the two cities that have built the most extensive rail systems,<sup>103</sup> Washington and Atlanta, have experienced greater than average sprawl<sup>104</sup> and significant declines in public transit work trip market share since rail was opened.

### The Dallas Experience

Nonetheless, development impacts have been noted with respect to the DART light rail system, especially in central area residential development. The increasing popularity of the central Dallas area for residences mirrors a trend that is occurring in both rail and non-rail cities. Moreover, one of the two most impressive central city residential recurrences (Denver) is occurring well away from that city's light rail line.<sup>105</sup> The ultimate evaluation of light rail's impact upon Dallas will require years of experience. It will also require comparison of the Dallas experience with that of Dallas suburban areas not served by light rail and with the experience in other cities.

<sup>103</sup> Washington and Atlanta account for two-thirds of the nation's new rail ridership (out of 20 new systems).

<sup>104</sup> The Sierra Club cited Atlanta's urban sprawl trend as the "most threatening" in the nation in a 1998 report analyzing trends since 1990. Washington was ranked third. Light rail urban area St. Louis was ranked second.

<sup>105</sup> "A Rise in Downtown Living," (Washington: The Brookings Institution Center on Urban and Metropolitan Policy and the Fannie Mae Foundation), November 1998.

It is likely that Dallas development induced by light rail will, as in other areas before it, be of a very localized rather than regional significance. Whatever the ultimate impact upon the civic “psyche” or development, the fact will remain that DART’s rail program, which was sold to the community as a strategy for containing traffic congestion, will have virtually no such impact, because it is so slow and serves such a small percentage of origin and destination pairs.

## Escalating Operating Costs

A higher than necessary portion of the DART sales tax has been used to fund rapidly escalating operating costs, which are by far the highest in Texas and among the most costly in the nation. This is illustrated by comparison to two other public transit agencies, Houston’s Metro and San Diego’s Metropolitan Transit Development Board.

## Comparison to San Diego

The extent of fixed route cost escalation is illustrated by comparing Dallas transit costs to those of San Diego from 1979 to 1997.<sup>106</sup> In 1979, the Dallas and San Diego transit systems were of similar size in boardings (Figure 31) and service levels. Like Dallas, San Diego opened a light rail system (the first line began operating in 1982).

- Since 1979, the Dallas service level has increased slightly more than that of San Diego, while boardings have increased at a lower level.
- In 1979, Dallas operating costs were approximately \$50 million compared to \$70 million in San Diego (1997\$). In 1997 Dallas operating costs were \$192 million, double the San Diego figure of \$96 million (Figure 32).<sup>107</sup>

As a result, there were significant differences in performance indicators.

- Dallas operating costs per boarding rose 147 percent,<sup>108</sup> while San Diego’s *declined* 28 percent (Figure 33).
- Dallas operating costs per service hour rose 58 percent, while San Diego’s *declined* 35 percent (Figure 34).

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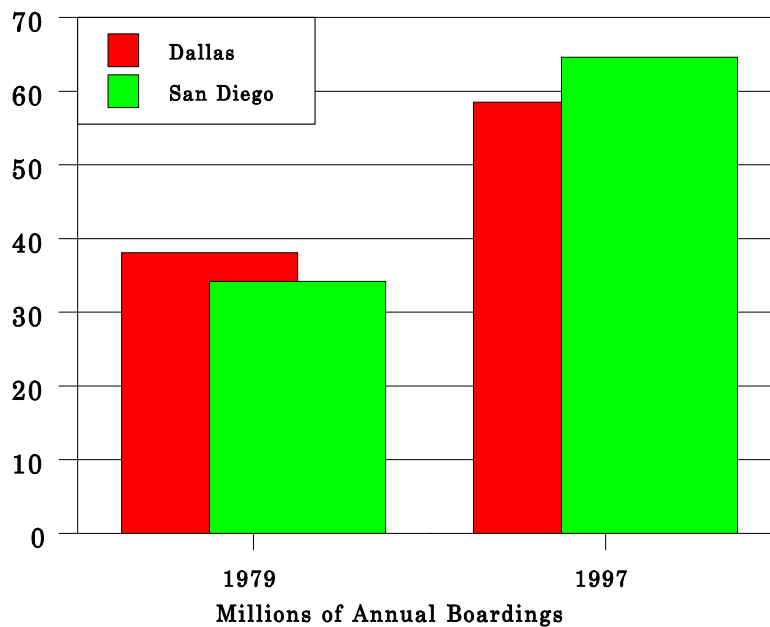
<sup>106</sup> Latest information available.

<sup>107</sup> Inflation adjusted bus and light rail operating costs.

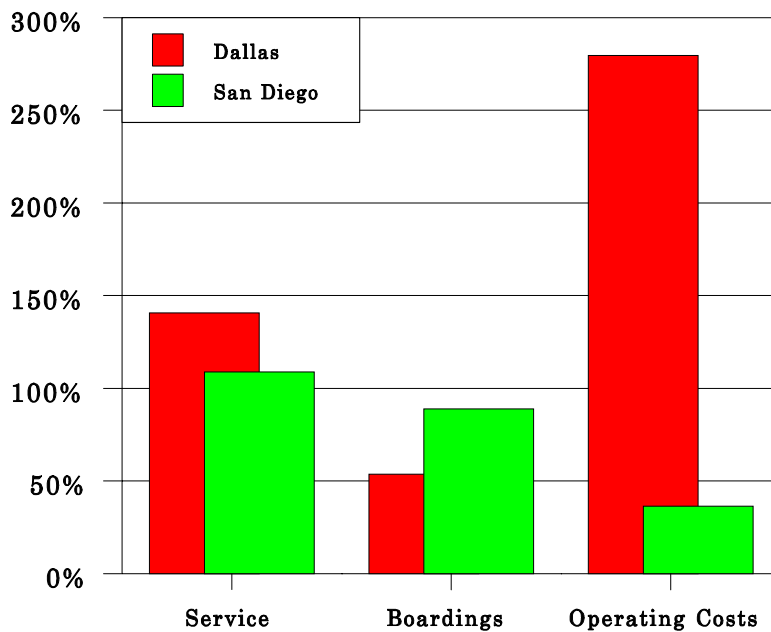
<sup>108</sup> DART’s 1997 annual operating cost per vehicle hour rose more than 80 percent (inflation adjusted) in comparison with the costs of the Dallas Transit System in 1975. Local officials suggested that a major cause could be assumed of Dallas Transit System pension liabilities by DART. An analysis of this issue indicates that rising pension costs have been only a minor contributor to transit cost escalation in Dallas. The increase in annual pension costs per vehicle hour were less than 1/30th of the total cost escalation (calculated from American Public Transit Association data and the National Transit Database).

San Diego has been a national leader in controlling operating costs. After an expensive labor contract settlement in 1979, San Diego transit officials began a program of gradual conversion to competitive contracting for bus services. This has created a competitive environment in which the former public monopoly (San Diego Transit Corporation) has been required to substantially improve its cost performance to minimize its losses in the regional transit market. This dynamic is called the “ripple effect” (See [www.tppf.org/tran4apc.html](http://www.tppf.org/tran4apc.html) Appendix C: Transit and the Market). San Diego’s model culture of cost effectiveness could be replicated in Dallas.

**Dallas & San Diego Boardings: 1979-1997**

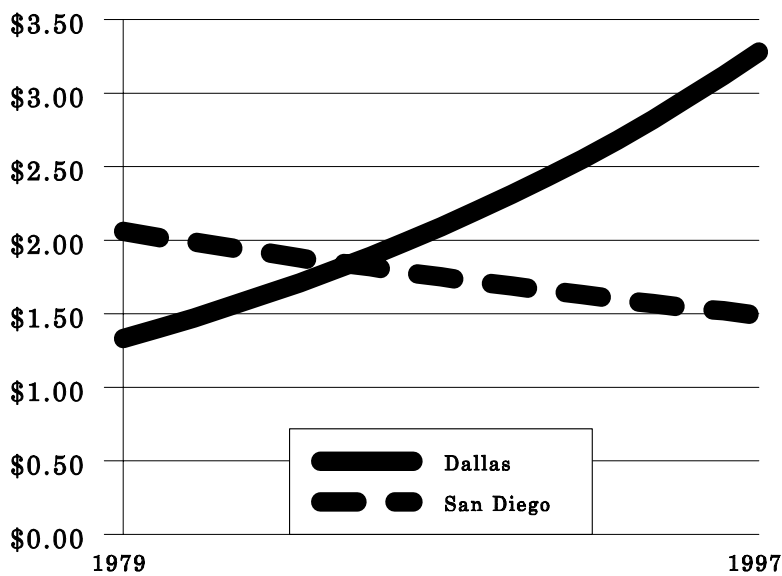


### Dallas & San Diego Trends: 1979-1997



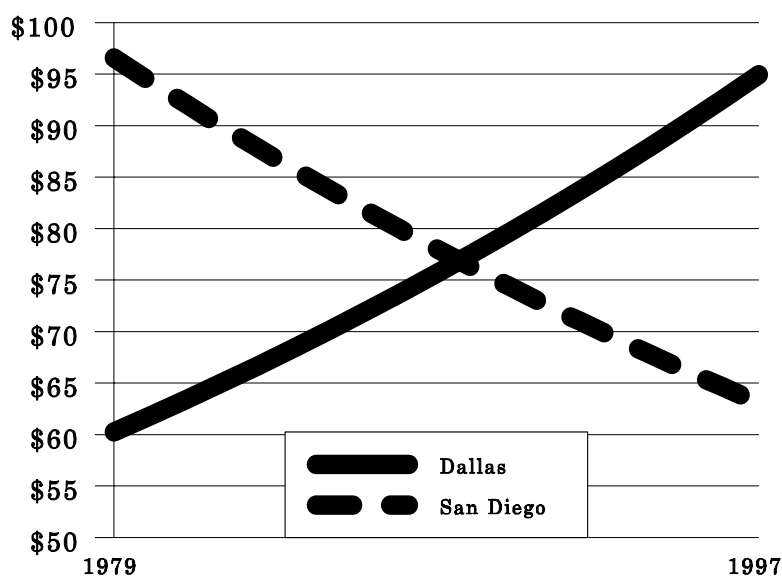
### Dallas & San Diego Trends: 1979-1997

#### Bus & Light Rail Cost per Boarding



## Dallas & San Diego Trends: 1979-1997

### Bus & Light Rail Cost per Service Hour



### Comparison to Houston

DART's 3.0 percent boarding increase from 1991 has been achieved at a considerable price. The operating cost per each new boarding (\$15.99) has been more than five times the average 1991 cost per boarding (Figure 35).<sup>109</sup> Moreover, DART's ridership increase has been much more costly than a similar ridership increase at Houston Metro:

- By 1997, Dallas (DART) boardings had increased 7.7 million since the year before light rail was opened<sup>110</sup> (1995). At the same time, operating costs rose nearly \$42 million (inflation adjusted), for a cost per new boarding of \$5.43. This represents an annual cost per new commuter of nearly \$2,500.<sup>111</sup>
- Over the same period, Houston Metro experienced a 6.8 million increase in boardings, while operating costs rose \$9.3 million, for a cost per new boarding of \$1.37 (Figure 36).<sup>112</sup> This represents an annual cost per new commuter of \$600.

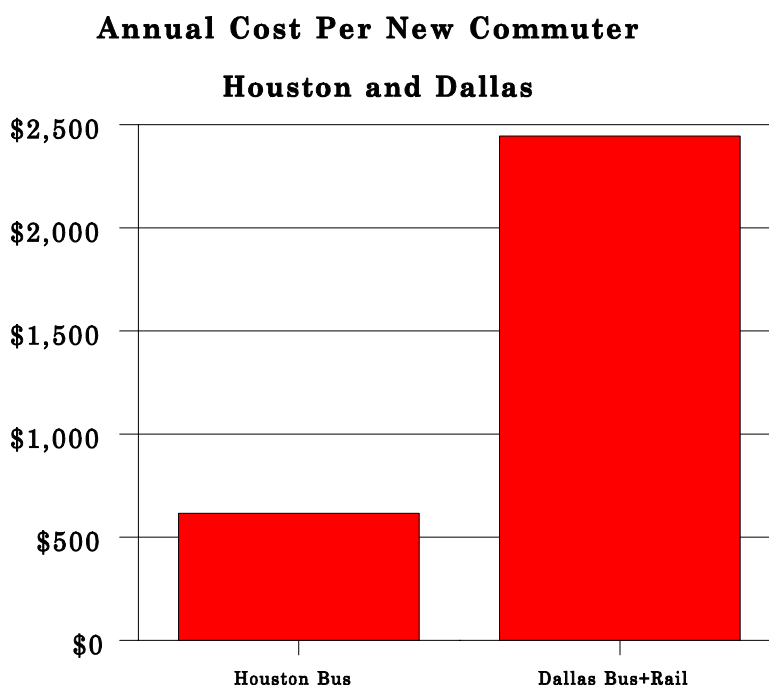
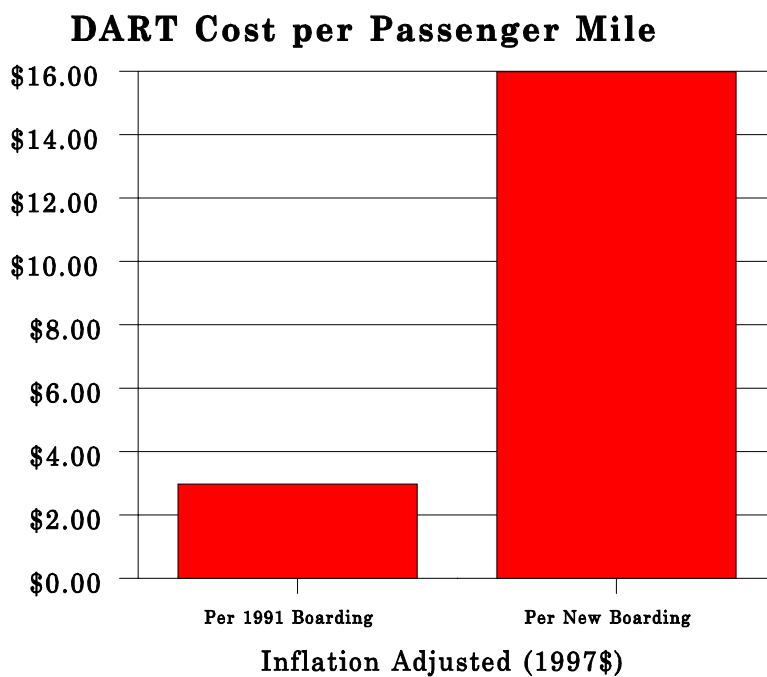
<sup>109</sup> Inclusion of capital costs would increase this gap substantially. It is estimated that DART light rail capital costs are 2.5 times operating costs.

<sup>110</sup> Commuter rail was opened in 1997.

<sup>111</sup> Assumes two work trips daily, 225 days per year.

<sup>112</sup> Houston's cost advantage is probably greater. The addition of rail systems tends to artificially increase boardings by requiring new transfers between bus and rail for former bus riders.

Virtually all of the Dallas ridership increase was attributable to light rail, while all of Houston's ridership was attributable to bus services.



# **APPENDIX A**

## **TWENTY QUESTIONS ABOUT LIGHT RAIL**

(these questions should also be asked of transit agencies regarding busways and high occupancy vehicle lanes)

1. What is the cost per passenger mile, including capital and operating costs, for light rail, busways, expanding highways, and expanding arterial streets?
2. What is the cost per new trip on the light rail system (Federal Transit Administration Cost Effectiveness Index)? What, therefore, is the annual cost per new commuter (cost per new trip X 450 = annual cost per new commuter)?
3. What guarantees will be provided to ensure that service to the transit dependent (low income, elderly and disabled) will not be reduced if light rail costs are higher than projected? Will layoffs of transit personnel or wage and salary reductions be considered? If increasing taxes is not an option, where will funds come from to cover cost overruns?
4. How will bus routes be altered to feed into light rail lines? If so, how will this affect the travel time, length and cost of trips of those who used to ride the bus but now have to transfer to light rail?
5. What percentage of the road traffic, and number of cars, in the corridor along which light rail is running will be removed at the planning horizon?<sup>113</sup> What are the total vehicle miles traveled in the corridor (1) currently, and at the planning horizon, (2) with light rail; and, (3) without light rail?
6. Will light rail provide service between outlying suburban communities that will reduce congestion along loop freeways as opposed to just along downtown-oriented corridors?
7. What will be the metropolitan area production of volatile organic compounds, nitrous oxides, and carbon monoxide (1) now, and at the planning horizon, (2) with light rail; and, (3) without light rail?
8. What percentage of light rail passengers are projected to be (a) former bus riders, (b) former automobile passengers, (c) former automobile drivers, (d) former walkers; and, (e) how many are induced (would not have taken the trip were it not for light rail)?
9. What is the downtown work trip market share for transit (1) currently, and what will it be at the planning horizon, (2) with light rail; and, (3) without light rail?
10. What percentage of jobs in the metropolitan area are downtown and what will the

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<sup>113</sup> The planning horizon is the furthest date in the future at which impacts of the project are projected.

percentage be at the planning horizon, with and without light rail?

11. What percentage of the employment *growth* in the metropolitan area will be downtown over the planning period, with and without light rail?
12. What will be the transit work trip market share at the planning horizon for other major suburban employment centers that are in the light rail corridor, with and without light rail?
13. What are the fatalities per hundred million passenger miles since 1990 for light rail, urban automobiles, and buses? What will be the frequency (in months) of fatalities resulting from the light rail system?
14. What is the per passenger mile energy consumption, including the cost of electricity generation and transmission, for light rail, autos, car pools, and buses?
15. How much new unsubsidized *commercial* development (no tax abatements, impact fee forgiveness, or direct subsidies) will be induced by light rail? How much new subsidized development will be induced by light rail? How many employees are projected for these new developments? What percentage of the trips to these new developments will be carried by all transit?
16. How much new unsubsidized *residential* development (no tax abatements, impact fee forgiveness, or direct subsidies) will be induced by light rail? How much new subsidized development will be induced by light rail? How many residents are projected for these new developments? What percentage of the trips to these new developments will be carried by all transit?
17. What percentage of trips in the metropolitan area are carried by transit (1) currently, and what percentage are projected to be carried at the planning horizon, (2) with light rail; and, (3) without light rail?
18. What will be the maximum peak one way hourly ridership on light rail at the planning horizon? How many of these passengers are projected to be former automobile *drivers* (as opposed to passengers)?
19. What is the maximum peak one way hourly person count on a freeway lane in the light rail corridor? What is the maximum peak one way hourly person count on the entire freeway?
20. What is the highest current daily traffic volume on each of the metropolitan area's freeways and what will that volume be at the planning horizon with light rail and without light rail?

# **ABOUT THE AUTHOR**

## **WENDELL COX**

Wendell Cox Consultancy  
P.O. Box 841 - Belleville, IL 62222  
618-632-8507 ♦ Facsimile: 618-632-8538  
Internet: <http://www.publicpurpose.com>  
and  
<http://www.demographia.com>  
E-mail: [policy@publicpurpose.com](mailto:policy@publicpurpose.com)

### **Summary**

International public policy consulting firm with specializations in economics, public transit, transportation, land use policy, demographics, labor policy, and strategic planning.

- Established in 1985.
- Completed projects in the United States, Canada, the United Kingdom, Australia, New Zealand, Europe, Asia and Africa.

### **Mission**

*To facilitate the ideal of government as the servant of the people by identifying and implementing strategies to achieve public purposes at a cost that is no higher than necessary.*

### **Representative Projects**

- Prepared an analysis of proposed “smart growth” policies in Pennsylvania for the Commonwealth Foundation (with Ronald Utt of the Heritage Foundation and Howard Husock of the JFK School of Government, Harvard University).
- Prepared “Keeping Kalamazoo Competitive,” a plan for improving the competitive positioning of this Michigan metropolitan area, including a critique of the David Rusk Kalamazoo report (with Howard Husock of the JFK School of Government, Harvard University).
- Assisted the state of Victoria (Australia) in privatization of its light rail, urban rail and intercity rail system (1997-98).
- Assisted the city of Toronto in its efforts to block a merger into a sub-regional government (produced a widely used research paper and made presentations on behalf of the city in public meetings.)
- Prepared an analysis for the Southeastern Pennsylvania Transportation Authority (SEPTA) of the potential for public-private competition to improve service to riders and taxpayers. Included cost-benefit analysis of labor protective arrangement buy-out (may have been first such analysis in US urban public transport industry).
- Prepared a policy report and ridership critique on the proposed \$29 billion Florida High Speed Rail Project for the James Madison Institute (1997-98). The project has since been canceled.
- Prepared a policy report on the proposed \$775 million Chicago Central Area Circulator project (light rail) for Taxpayers United of Illinois (1994). The project has since been canceled.
- Prepared an “opportunity analysis” on VIA Metropolitan Transit in San Antonio for the Texas Public Policy Foundation. The report recommended reversal of a major fare increase, administrative cost savings and competitive contracting of transit services (1997).
- Prepared a policy report on light rail transit for the New South Wales (Australia) Department of Transport (1992).
- Directed State Legislation and policy program for the American Legislative Exchange Council (ALEC) (Washington), 1992-1995. Included policy oversight of programs, publications, and

conferences. This organization includes approximately 3,000 U.S. state legislators (parliamentarians).

- Drafted model state legislation adopted by the American Legislative Exchange Council on privatization of state and local government services and functions.
- Strategic review of public transport programs for the state of Washington Legislative (parliamentary) Transportation Committee (1996).
- Performed review and cost evaluation of the Denver public transport competitive tendering program and cost-benefit study on public versus private purchase of capital equipment used in competitively tendered services.
- Drafted guidelines conversion of public transit in New Zealand to competitive tendering (contracting).
- Produced an analysis of the determinants of competitive intensity in competitive tendering for the New Zealand central government organization responsible for transport (Transit New Zealand). Study included the United States, Canada, the United Kingdom and South Africa.
- Conducted performance audit of British Columbia Transit (public transport system in Vancouver, Victoria, and other urban areas in the province).
- Drafted legislation requiring 20 percent of Denver bus system to be competitively contracted and deregulating transit.
- Drafted Michigan legislation to restructure transit governance and organization in metropolitan Detroit.
- Seminars on public policy, economics, privatization, competitive tendering government management for public officials from thirty-five U.S. states, Canada, Netherlands, Australia, New Zealand, Slovenia, Ukraine, Belarus, the Czech Republic, Slovakia, the Peoples Republic of China and Russia.
- Drafted amendments to principles adopted at the Federalism Summit (National Governors Association, Council of State Governments, National Conference of State Legislators, and American Legislative Exchange Council) in Cincinnati, 1995.
- Op-eds published by the *Atlanta Constitution*, *Los Angeles Daily News*, *Los Angeles Times*, *Orlando Sentinel*, *South Florida Business Journal*, *The Wall Street Journal*, *The Washington Times*, *Dallas Morning News*, *Charlotte Observer*, *Detroit News*, *Engineering News Record*, *Honolulu Advertiser*, *Las Vegas Review-Journal*, *Philadelphia Daily News*, *San Antonio Express-News*.
- Member, international steering committee, International Conference on Competitive and Ownership in Public Transport (Finland, 1991; Canada, 1993; New Zealand 1995; England, 1997 and South Africa, 1999).

## Public Service

Principal appointed to the Amtrak Reform Council by Speaker of the House of Representatives Newt Gingrich (replacing New Jersey Governor Christie Todd Whitman, 1999). Appointed chair of the Financial Analysis Committee (1999).

Principal appointed to three terms on the Los Angeles County Transportation Commission by Mayor Tom Bradley (1977-1985). Served as chair of the Service Coordination Committee, and member of the Finance Review Committee and Rail Construction Committee.

- While on the Commission, chaired two American Public Transit Association Committees (Governing Boards and Planning & Policy).
- Chaired Transportation Research Board (National Academy of Sciences) Energy Contingency Planning Conference.

## Publications

Principal is author or co-author of numerous publications, such as:

- *The Livable American City, 1993*
- *People, Markets and Governments: U.S. State Legislators Guide to Economics, 1994*
- *Competition in Public Transport: International State of the Art, 1997*
- *Reinventing Transit, 1994*
- *Sovereignty of the People and Devolution, 1995*
- *Designing Competitive Tendering Systems for the Public Good, 1989*
- *Moving America Competitively: U.S. State Legislators Guide to Privatization of Public Transport, 1988*
- *Environmental Partners, 1992*
- *America's Protected Class, 1992,1993, 1994*
- *Controlling the Demand for Taxes, 1992, 1993, 1994*
- *International Experience in Competitive Tendering, 1995*
- *Overview of Public Transport in Canada and the United States, 1999*
- *US Competitive Tendering: Comprehensive Cost Analysis: 1999*
- *The President's Urban Sprawl Agenda: Program in Search of a Problem, 1999*
- *Amtrak at 25: End of the Road for Taxpayer Subsidies, 1996*