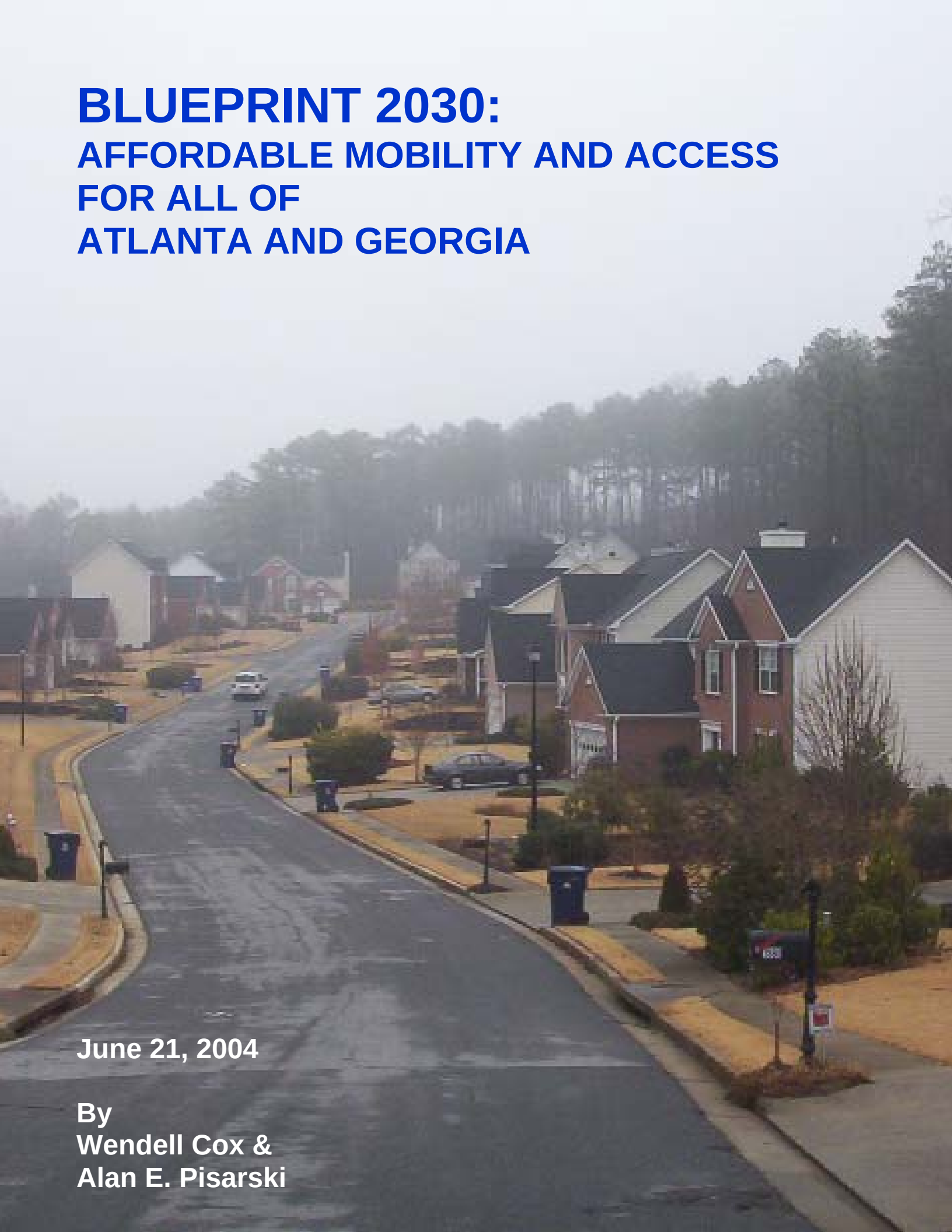
BLUEPRINT 2030:
AFFORDABLE MOBILITY AND ACCESS FOR ALL OF ATLANTA AND GEORGIA



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EXECUTIVE SUMMARY

Growth and Traffic Congestion: Few areas of the nation have experienced greater population and economic growth over the past one-half century than Georgia. Just since 1970, Georgia's population has grown by 70 percent. Much of the growth has been in the rapidly expanding Atlanta metropolitan area, which is the high-income world's fastest growing metropolitan area. Little more than 50 years ago, Atlanta and Birmingham, Alabama were of similar size. Today, metropolitan Atlanta is nearly six times as large as Birmingham. It seems possible that Georgia could grow to as many as 13 million people by 2020, an increase greater than adding another metropolitan area the size of Atlanta.

Atlanta is at a crossroads. Atlanta itself seems poised to become one of the few largest metropolitan areas in the United States. If, for example, 1980 to 2003 growth rates were to continue, by 2030 Atlanta would be similar in size to Washington, DC, Dallas-Fort Worth and Chicago, trailing only much larger New York and Los Angeles.

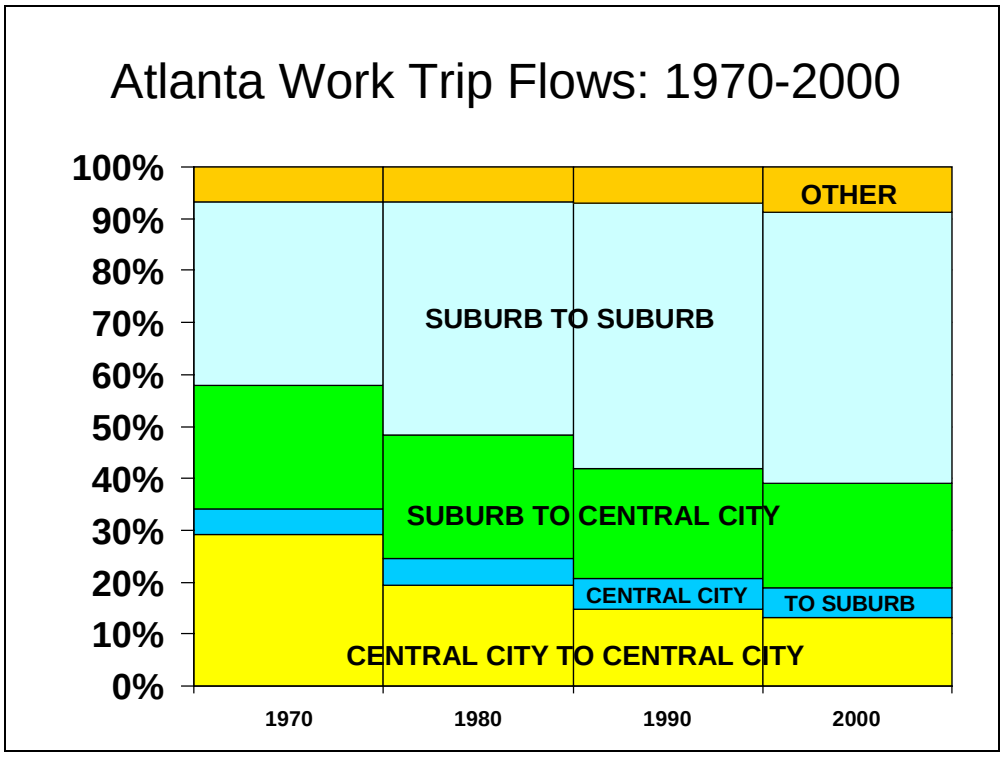
In recent decades, roadway capacity has not been expanded commensurate with demand and metropolitan Atlanta has developed some of the nation's worst traffic congestion. Similarly, traffic conditions are deteriorating in other areas of Georgia. This will only get worse as growth continues unless resolute action is taken to provide sufficient transportation capacity. A recent positive development is Governor Perdue's *Fast Forward* program that will accelerate development of planned transportation improvements so that an 18-year program is delivered over six years. At the same time *Fast Forward* will add improved operations and traffic management strategies. But more will be required.

***Blueprint 2030*:** This report proposes a program (*Blueprint 2030*) by which Atlanta's traffic congestion can be brought under control. It would involve infrastructure investments based upon adoption of a Traffic Congestion Limitation Goal, which would be adopted for the entire state and be achieved in every area by no later than 2030.

Present plans do not take on the challenge of reducing or eliminating congestion from current levels and instead generally call for slowing the rate at which congestion worsens. This will have very deleterious effects on everyone's lifestyles, the productivity of Georgia's economy and the attractiveness of the area. However, an important positive development is Governor Perdue's *Fast Forward* plan, which will accelerate construction of planned projects, and perhaps most importantly, provide funding for a much improved traffic management system in the Atlanta metropolitan area (including regional signal synchronization).

Travel in Georgia: More than 99 percent of urban travel in Georgia and more than 97 percent of travel in the Atlanta metropolitan area is by car. As incomes have risen, household automobile availability has risen to 92 percent. From 1990 to 2000, the share of African-American households without a vehicle available dropped by one-third. The principal reason that traffic congestion is much worse during the morning and evening peak hours is that work trips are disproportionately concentrated in these periods. The dominant work trip travel (commuting) pattern is suburb to suburb, rather than suburb to central city. There has been a steady growth in suburb to suburb commuting in the Atlanta area in recent decades (Figure). This has generally

occurred throughout the major urban areas of the United States and Western Europe, though is more evident in Atlanta.

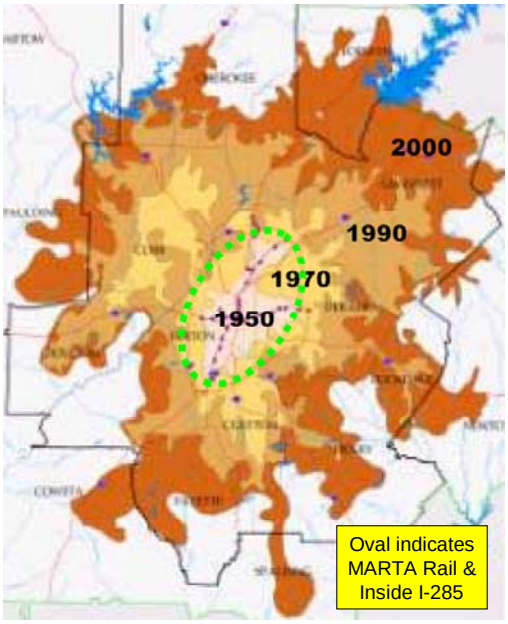


A large percentage of people travel outside their home counties to work, with over 40 percent of residents traveling into other counties, making Georgia fourth in the nation in that category. Census data from 2000 indicates that travel times have increased substantially in the state and Atlanta has one of the longest average commute times in the nation and the longest automobile commute time. Generally, problems are much greater when more than 10 percent of workers travel more than 60 minutes to work. This category jumped from six percent to almost 12 percent between 1990 and 2000. The number of people traveling more than 60 minutes to work increased from 160,000 to 350,000. An area is also better served if at least 50 percent of workers have a commute time of less than 20 minutes. By 1990, only 47 percent of Georgia commuters had a work trip travel time of less than 20 minutes, and by 2000, this had dropped to 40 percent. The overwhelming majority of work trip travel is by car. Transit provides less than two percent of work trips in all metropolitan areas except Atlanta (3.5 percent) and Savannah (2.3 percent). Car-pooling is more prevalent in Georgia than the national average, to the extent that car-pooling plus transit market shares in the state are approximately equal to the national rate. Driving alone is approximately two percent higher in Georgia than in the nation, which is the amount by which walking and working at home are less in the state than in the United States.

The Transportation System: Atlanta has emerged as one of the world's most decentralized urban areas, covering nearly 2,000 square miles. Yet Atlanta's roadway system remains one of the most centrally oriented in the world. There is no greater geographical extent of urbanization without non-radial freeways in the world than that which exists outside the I-285 Perimeter Highway in the Atlanta area. This appears to be largely due to the fact that most of the attention

of transportation planners has been directed to on and within the I-285 Perimeter Highway, while most of the growth since 1960 has been outside (Figure). In recent years, roadway expansion has fallen far behind the increase in demand (which has risen little more than the rate of population since 1990). Atlanta has invested heavily in transit since the late 1970s, having constructed more miles of high-quality Metro (subway or elevated) than all but seven of the world's metropolitan areas. Yet more than 98 percent of new travel in the Atlanta area has been in personal vehicles (cars and sport utility vehicles) over the past twenty years. Roadway expansion has also lagged in the balance of the state, but the extent of traffic congestion has been more moderate.

Atlanta Urbanized Area:
1950-2000



Traffic Congestion: Traffic congestion is a problem throughout Georgia, but the most intense traffic is in the Atlanta area. Because of its location at the state's most critical interstate highway junctions, Atlanta's traffic congestion has a significant impact on the rest of Georgia. While traffic congestion is severe in Atlanta, the density of traffic is rather modest, with some much smaller urban areas in the nation having more vehicle miles per square mile. Atlanta's traffic congestion is intense largely because its roadway system is not sufficiently robust. For example, the freeway and major surface arterial roadway coverage of Los Angeles is 2.5 times that of Atlanta. The Texas Transportation Institute estimates that during peak periods, drivers suffer a 39 percent Congestion Penalty --- a trip that would take 30 minutes in non-congested conditions instead takes 39 percent more, nearly 42 minutes. In addition, as traffic congestion becomes worse, travel time reliability worsens, so that drivers need to plan for additional time as a safety factor to ensure arrival at their destinations on time. It is estimated that this additional "Reliability Penalty" is now also 39 percent. In addition, the Atlanta area is key to large truck travel in Georgia. All large truck traffic must traverse the Atlanta area on the I-285 Perimeter, which is one of the nation's most crowded highways. Perhaps ironically, it is Atlanta's low

density that has kept its traffic congestion from becoming even worse. Atlanta's below-par roadway capacity in the setting of average US urban area densities would produce traffic intensities that would rival those of European and Japanese urban areas.

Funding Trends: Spending by the state per vehicle mile on highways has dropped more than 60 percent since 1960. Over the period, travel has increased 511 percent, while highway spending has increased only 222 percent. This is at the same time as the financial requirements have become much greater. Over the past 40 years, Georgia has become much more urban, and urban roadway expenses are substantially higher than in rural areas.

Projections and Plans: Atlanta Regional Commission forecasts for 2025 indicate that nearly all new travel demand will be roadway, as opposed to transit. Even after building what was anticipated to be more than 300 miles of new urban rail, personal vehicles would account for more than 97.5 percent of travel in the 13 county area. Current plans anticipate that traffic congestion will worsen in the future, with the percentage of travel on severely congested conditions will increasing more than three times from 2003 to 2025. Truck volumes are expected to increase substantially, a factor that has a disproportionate impact because of the greater road space taken by trucks and the ban on large trucks inside Atlanta's I-285 Perimeter, which forces virtually all intercity trucking to be routed along the already congested Perimeter.

Metropolitan Competitiveness: Already some businesses are including traffic conditions in their list of factors used to determine new locations and areas are beginning to advertise themselves as having low levels of traffic congestion. In the much more competitive world of the future, acceptable levels of traffic congestion are likely to become a competitive necessity. This is not just an Atlanta matter. The Atlanta traffic bottleneck is already causing difficulty for shippers and businesses in other parts of the state. In the long run, this could result in stronger commercial relationships being forged between areas outside Atlanta and other states, especially separating northern Georgia from southern Georgia. It was noted earlier that Georgia was fourth among states in the share of workers leaving their home county to work. This level of economic integration and cohesion across a large area creates scale economies in terms of access to employment and access to employees.

THE BLUEPRINT 2030 CONCEPT

Building for Growth: A required element for improving traffic congestion in Atlanta and elsewhere in the state is a vision. This report proposes a traffic reduction vision for Atlanta and Georgia called *Blueprint 2030.* Because of the relative cost effectiveness of building roadway expansions to accommodate the continuing increase in demand for personal mobility, it is anticipated that much, if not all of *Blueprint 2030* would depend upon either roadway expansion or programs to improve the flow of roadway traffic (other programs, such as transit, could be included where they are more cost-effective).

Blueprint 2030 specifically excludes "social engineering" strategies that would force people out of cars. Despite their popularity in planning circles, such strategies tend to be ineffective, with

automobile market shares remaining stable or even rising. Further, attempting to force people to change their behavior entails significant costs both to the economy and to the quality of life.

The view has often been expressed that it is impossible to "build our way out of traffic congestion," because of the perception that more highways induce higher levels of travel. In fact, however, no urban area in the nation has expanded its freeway system at a greater rate than Phoenix since 1985, yet average driving per capita has risen substantially less than in Portland, where conscious policies have been implemented to limit the expansion of roadways. Moreover, most urban areas managed to provide sufficient roadway capacity to control traffic congestion until the early 1980s. But urban roadway expansion was reduced relative to demand after that point, often consciously. Had expansion continued with the demand, much driven by increased automobile ownership by minorities and the fact that women began driving almost as much as men, traffic congestion could have been kept under much better control. In fact, however, traffic congestion can be kept to acceptable levels by providing additional roadways, as the Texas *Governor's Business Council Report*, indicated last year. Policies are being implemented to provide sufficient roadway capacity in the metropolitan areas of Texas.

***Blueprint 2030*: Principles:** *Blueprint 2030* is based upon four principles: (1) adoption of a Traffic Congestion Reduction Goal, (2) evaluation using the cost per reduced delay hour, (3) equitable and comprehensive application throughout each congested area and (4) modal neutrality --- the most cost effective projects, programs and strategies would be used, whether roadway, transit or other.

***Blueprint 2030*: Principles**
• Adoption of a Traffic Congestion Limitation Goal • Evaluation based upon cost effectiveness of traffic delay hour reduction • Equitable application of comprehensive, region-wide set of strategies • Modal neutrality

SOLVING THE PROBLEM IN ATLANTA

Traffic Congestion Reduction Goals: Scenarios: At this time, severe traffic congestion is limited to Atlanta. Five scenarios are examined for implementation, all based upon expanding and building new general purpose capacity on the roadway system (Figure).

- The "Present Plan" Scenario is based upon the adopted Atlanta Regional Commission 2025 Plan and would result in a significant increase in traffic congestion and an estimated Congestion Penalty of 101 percent. This means that a trip during peak periods that would take 30 minutes during non-congested periods would take slightly more than 60 minutes to complete.

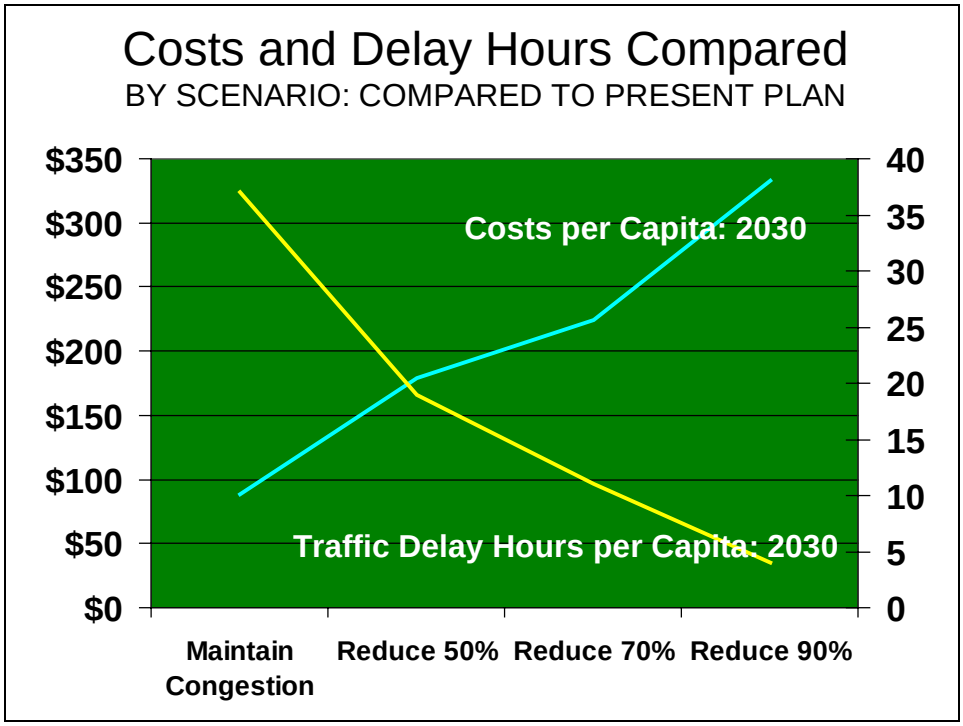
- The "Maintain Congestion" Scenario would keep traffic congestion at the present 39 percent Congestion Penalty (A trip during peak periods that would take 30 minutes during non-

congested periods would take 42 minutes to complete, as the data indicates was the average in 2001). This plan would cost $11.0 billion more than the "Present Plan" and would result in an average of 37 traffic delay hours per capita by 2030. The additional annual cost per capita in 2030 would be $89.

- The "50% Congestion Reduction" Scenario would reduce the Congestion Penalty to 20 percent. (A trip during peak periods that would take 30 minutes during non-congested periods would take 36 minutes to complete). This plan would cost $22.1 billion more than the "Present Plan" and would result in an average of 19 traffic delay hours per capita by 2030. The additional annual cost per capita in 2030 would be $179.

- The "70% Congestion Reduction" Scenario would reduce the Congestion Penalty to 12 percent. (A trip during peak periods that would take 30 minutes during non-congested periods would take approximately 33.5 minutes to complete). This plan would cost $27.6 billion more than the "Present Plan" and would result in an average of 11 traffic delay hours per capita by 2030. The additional annual cost per capita in 2030 would be $224. The analysis that follows recommends the "70% Congestion Reduction" Scenario for adoption by the state of Georgia.

- The "90% Congestion Reduction" Scenario would reduce the Congestion Penalty to four percent. (A trip during peak periods that would take 30 minutes during non-congested periods would take slightly more than 31 minutes to complete). This plan would cost $41.0 billion more than the "Present Plan" and would result in an average of four traffic delay hours per capita by 2030. The additional annual cost per capita in 2030 would be $333.



Evaluation: Because the very nature of traffic congestion is excess delay, it is proposed that the project, program and strategy evaluation criteria be the cost per traffic delay hour reduced.

- The Maintain Congestion Scenario (#2) would result in an annual reduction of 354 million traffic delay hours, at a cost of $2.33 per traffic delay hour reduced (compared to the Present Plan Scenario)

- The 50 % Congestion Reduction Scenario (#3) would result in an annual reduction of 466 million traffic delay hours, at a cost of $3.56 per traffic delay hour reduced (compared to the Present Plan Scenario).

- The recommended 70 % Congestion Reduction Scenario (#4) would result in an annual reduction of 510 million traffic delay hours, at a cost of $4.06 per traffic delay hour reduced (compared to the Present Plan Scenario).

- The 90 % Congestion Reduction Scenario (#5) would result in an annual reduction of 554 million traffic delay hours, at a cost of $5.55 per traffic delay hour reduced (compared to the Present Plan Scenario).

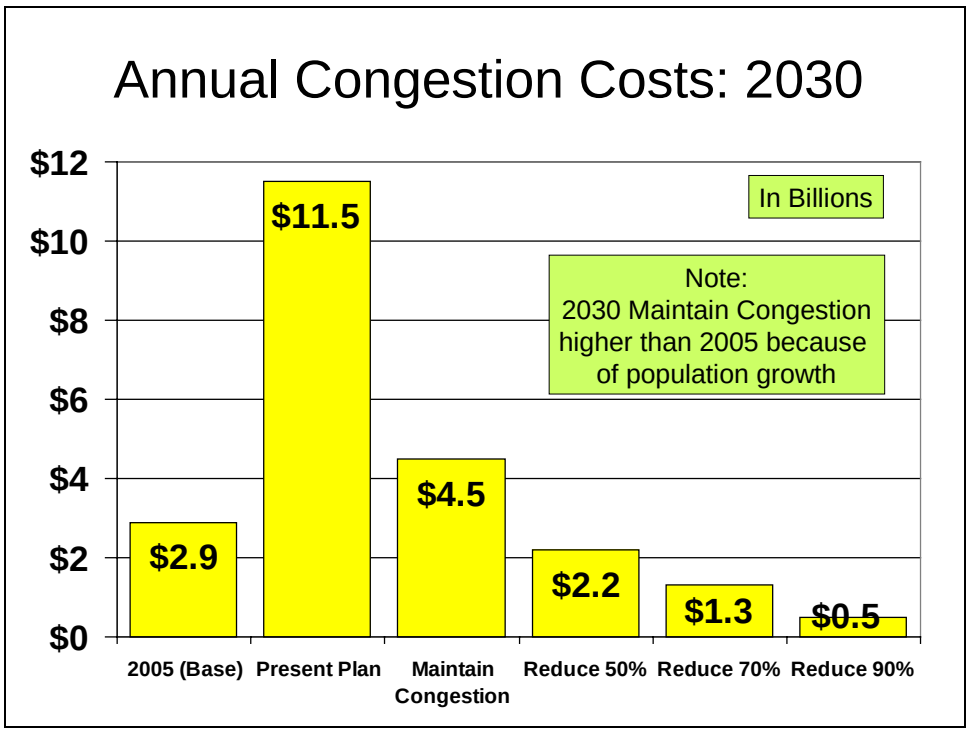
Regional and Sub-regional Comprehensiveness: Under the proposed Traffic Congestion Limitation Goal, the freeway equivalent roadway coverage of Atlanta would be substantially improved, but would still remain 42 percent lower than in Los Angeles. The *Blueprint 2030* Traffic Congestion Limitation Goal (12 percent Congestion Penalty) would be applied at the sub-regional level in the Atlanta area (at least one region for each county and three for Fulton County).

Modal Neutrality: Other strategies, such as improved roadway operations, high-occupancy vehicle lanes and transit programs could be included in *Blueprint 2030* where they are more cost effective in reducing traffic delay hours than roadway expansions. Improved roadway operations hold particular promise, with estimates indicating that traffic conditions can be improved up to 15 percent at substantially lower rates than roadway expansion. To maximize system capacity, any high-occupancy vehicle lane or rapid bus should also be open to vehicles charged a toll, which will improve mobility and make any such qualifying projects more cost effective.

Costs in Context: Through 2030, the most expensive *Blueprint 2030* Scenario ("90% Congestion Reduction") would add $333 per capita to roadway expenses in the Atlanta area. This is less than three percent of the expected increase in income per capita over the same period of time. The recommended "70% Congestion Reduction" Scenario would require an annual per capita roadway funding increase less than 20 percent more than the present per capita MARTA sales tax in Fulton and DeKalb Counties ($190). Under each of the scenarios, the additional funding required would be less than the decline in spending on highways in Georgia per vehicle mile since 1960.

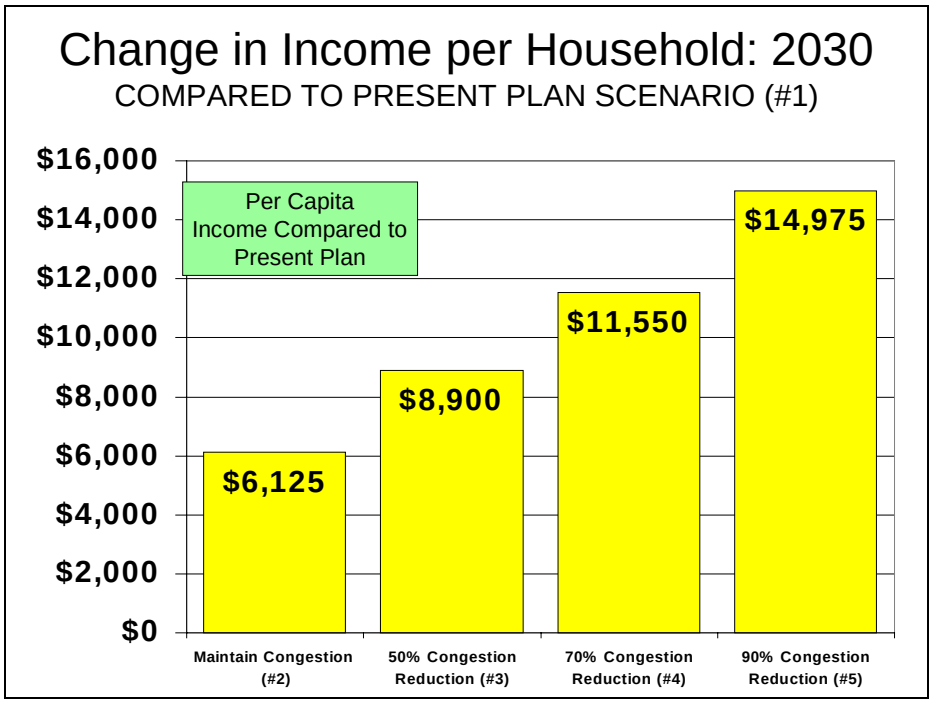
Based upon the Texas Transportation Institute method, annual congestion costs can be expected to reach $11.5 billion annually in 2030 under present plans. This would be reduced from $4.5 billion in the "Maintain Congestion Scenario" to $0.5 billion in the "90% Congestion Reduction"

Scenario. Each of the congestion reduction scenarios would reduce annual congestion costs from the projected 2005 figure of $2.9 billion (Figure).



The more rapid and reliable traffic operations would result in lower fuel consumption levels. It is projected that fuel cost savings would amount to 20 percent or more of the additional costs required for the *Blueprint 2030* Scenarios.

Atlanta Region Economic Performance: More efficient urban areas are more affluent. It is important for people throughout an urban area to be able to conveniently access virtually all of the jobs in the area. And, overall costs are lower where commercial goods and freight is not hampered by excessive traffic congestion. Atlanta is developing serious problems in this regard. Perhaps the most stark evidence is the much worse than average travel times reported in the 2000 census. Recent economic research documents the fact that the income of an urban area increases as the number of jobs that can be accessed in a specific amount of time increases. Prud'homme and Lee of the University of Paris have postulated an 18 percent impact --- that is for each one percent increase (1.00) in jobs accessible increases 10 percent, the gross personal income of an area increases 1.18 percent. This theory would predict that per capita income would be $1,200 higher in 2030 under the "Maintain Congestion" Scenario than under the "Present Plan" Scenario. The recommended "70 Percent Congestion Reduction" Scenario would be associated with an average income $2,250 higher in 2030 than the "Present Plan" Scenario. This escalates to nearly $6,000 per capita by 2030 and nearly $15,000 per household (Figure). Of course, longer term macro-economic forecasting is always risky. It seems certain, however, that greater mobility in 2030 will be associated with a more affluent Atlanta and Georgia.



PREVENTING THE PROBLEM IN OTHER URBAN AREAS

Traffic congestion is increasing in the other metropolitan areas of the state, though there is no indication that the recommended Traffic Congestion Limitation Goal has been exceeded anywhere but in Atlanta. Moreover, some of those metropolitan areas could be consolidated into the Atlanta metropolitan area by the US Census Bureau in the next few years. Columbus, Athens, Macon and Rome are all as close to Atlanta as the most remote parts of the currently defined urban area. As it becomes evident that any urban area is approaching the recommended Traffic Congestion Limitation Goal, plans should be developed to provide sufficient highway capacity to contain traffic congestion within the Goal.

IMPLEMENTATION

Adoption of a State-wide Traffic Congestion Limitation Goal: Based upon the information above, it is recommended that the Georgia Department of Transportation adopt a statewide Traffic Congestion Limitation Goal of a 12 percent Congestion Penalty. This is based on the Atlanta "70% Congestion Reduction" Scenario, which would return traffic congestion levels to mid-1980s levels at a cost that is less per vehicle mile than was spent in Georgia on highways in 1960.

Regional Funding: There is virtually no prospect that there will be sufficient state-wide or federal funding to fund achievement of the Traffic Congestion Limitation Goal in any of the state's metropolitan areas, much less Atlanta. The most promising possibilities are local fuel taxes or general taxes in the impacted areas and greater use of toll road financing.

Administration of *Blueprint 2030*: The state should establish a state implementation corporation to administer *Blueprint 2030* and to oversee delivery of the program. The structure

of the new organization could be similar to the toll road authorities that were established decades ago in states such as Pennsylvania, Indiana or the more recent Harris County Toll Road Authority in Houston. Revenues should be legally dedicated to addressing the Traffic Congestion Reduction Goal in the Serious Congestion urban area in which they are raised.

Planning and Reporting: A more detailed *Blueprint 2030* Plan should be developed to achieve the Traffic Congestion Limitation Goal based upon the concepts in this report. A *Blueprint 2030* Plan should be developed for all Serious Congestion Urban Areas (those with a Congestion Penalty of more than 12 percent). Administration and implementation of these plans should be delegated the proposed state implementation corporation, which would provide detailed annual reports to the Governor and Legislature. The purpose of these reports would be to document progress and consistency with projections.

I. INTRODUCTION

Urban areas around the nation are experiencing rapid growth in traffic congestion. There are few areas in the country, however, with a more intense traffic congestion problem than Atlanta. Atlanta's traffic congestion is a problem not only for the metropolitan area, but also for the entire state of Georgia. At the same time, traffic congestion is increasing elsewhere in the state. Up to this time there has been no comprehensive vision of a future in which traffic congestion is controlled, much less improved. This report outlines the current situation and offers a program, *Blueprint 2030,* which would result in substantial traffic congestion improvements.

II. THE TRAFFIC CONGESTION PROBLEM

A. THE EMERGENCE OF ATLANTA AND GEORGIA

Over the past decade, Atlanta has emerged as the fastest growing urban area in the high-income world.[1] Between 1990 and 2000, the Atlanta urbanized area[2] grew from 2,158,000 to 3,500,000, an increase of 62 percent.[3] Just the growth in Atlanta's urbanized area population since 1990 is greater than the population of the Oregon portion of the Portland urbanized area, a location Atlanta officials have often visited for advice on urban and transportation planning.[4] Nearly all of the urbanized area is in the 13 county "non-attainment" area within the planning purview of the Atlanta Regional Commission.

There has also been strong growth in the larger metropolitan area. Before 2004, the US Census Bureau included 20 counties in the Atlanta metropolitan area, with a 1990 population of 2,960,000. As of 2004, the Census Bureau redefined the metropolitan area to include 33 counties, with a 2000 population of 4,548,000. The metropolitan area now includes Chambers County, Alabama, the core of which is 100 miles from central Atlanta. The Census Bureau estimated the 2003 metropolitan population at 4,930,000.[5] Growth has moderated somewhat, dropping from a 3.2 annual rate in the 1990s to a 2.7 percent rate from 2000 to 2003.[6] Nonetheless, at this growth rate, metropolitan Atlanta will exceed 5,000,000 in 2004.

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[1] The high-income world includes areas with $15,000 per capita incomes or above. This generally includes the United States, Canada, Western Europe, Australia, New Zealand, Japan, Israel, Hong Kong and Singapore. There is no evidence that transit or land use planning has reduced traffic in the middle-income or low-income world, but such urban areas are far different from those in the high-income world, which are used in this section for comparison to Georgia.

[2] An urbanized area is an area of continuous urban development, as opposed to a metropolitan area, which includes rural and discontinuous urban areas that are within the labor market.

[3] Since 1980, virtually all of the developed land area growth of Atlanta has been due to population increase. New development has been at approximately the same density as in 1980.

[4] References will be made to Portland, because the Oregon portion of that urban area has adopted the nation's strongest "smart growth" policies, which discourage highway expansion and would force greater densification. In many ways Portland and Atlanta are near opposites in urban development. In fact, by many important measures, Atlanta's market oriented development pattern is superior to that of Portland (see Wendell Cox, "Portland not Sprawl Free" [op-ed], *Atlanta Constitution*, June 23, 1999).

[5] The Georgia portion estimate is 4,894,000.

[6] From 2000 to 2002, growth was at the same rate as 1990 to 2002 (3.2 percent annually). From 2002 to 2003, growth dropped more than 40 percent, to 1.8 percent.

In contrast, nearby Birmingham has grown very little. In 1950, Atlanta and Birmingham were of similar size. In the succeeding 50 years, however, the Atlanta urbanized area added nearly 3,000,000 residents, while the Birmingham area added a little over 200,000.

At the same time, the balance of the state is also growing rapidly. From 1990 to 2000, the balance of Georgia grew approximately 15 percent, slightly above the national rate.

It is unlikely that any single factor is responsible for the strong growth of Atlanta and the rest of the state. But Atlanta has been perceived as having a favorable business climate and a good quality of life. Atlanta has also been able to preserve exemplary housing affordability, while some other fast growing areas have implemented land use policies that have seriously retarded housing affordability (such as the large California urban areas and Portland, Oregon).

One of Atlanta's principal advantages is its comparatively low cost of living. The *Economist Intelligence Unit* ranked Atlanta as the nation's most affordable metropolitan area in 2002. Atlanta is also an affordable housing market. According to Census Bureau data, housing affordability was 12 percent above the average for urbanized areas.[7] Among the 37 US urbanized areas with more than 1,000,000 population, Atlanta was the 14th most affordable. All of the areas that ranked above Atlanta grew less quickly from 1990 to 2000.

Atlanta is particularly affordable for minority households. In 2000, Atlanta ranked 5th in housing affordability for African-Americans. Housing affordability was 54 percent higher for African-Americans than in Portland and 52 percent higher for Hispanics than in Portland. The nature of Atlanta's suburban growth has made the area more inclusive. From 1990 to 2000, approximately 41 percent of suburban growth has been African-American, 33 percent was White-Non-Hispanic, 18 percent was Hispanic and eight percent was Asian (Figure 1).[8]

Atlanta: At a Crossroads: Atlanta has risen to become the nation's 12th largest metropolitan area. The newly redefined metropolitan area now has 4.9 million people, 1.2 million more than 13th ranking Seattle-Tacoma. Atlanta is now fourth ranked in the South, behind Dallas-Fort Worth, the newly defined Miami-Fort Lauderdale-West Palm Beach and Houston. At the 2000-2003 growth rate Atlanta will pass both Miami and Houston by 2010. Atlanta appears to be poised to become one of few largest metropolitan areas in the nation. If the growth rate since 1990 should continue, Atlanta, Chicago, Dallas-Fort Worth and Washington, DC would be of similar size by 2030, trailing only much larger New York and Los Angeles. This would involve passing long larger metropolitan areas such as Philadelphia, Boston and San Francisco. At the same time, it is reasonable to expect that Atlanta's strong growth could be negatively impacted if severe traffic congestion continues. [9]

[7] Ratio of median house value to median household income.
[8] *Atlanta in Focus: A Profile from Census 2000,* Brookings Institution (Washington, 2004).
[9] There are no national projections of metropolitan population data. This paragraph does not represent a projection of metropolitan data, but is rather meant to give an idea of the Atlanta's potential. Population growth could be less, or it could be more.

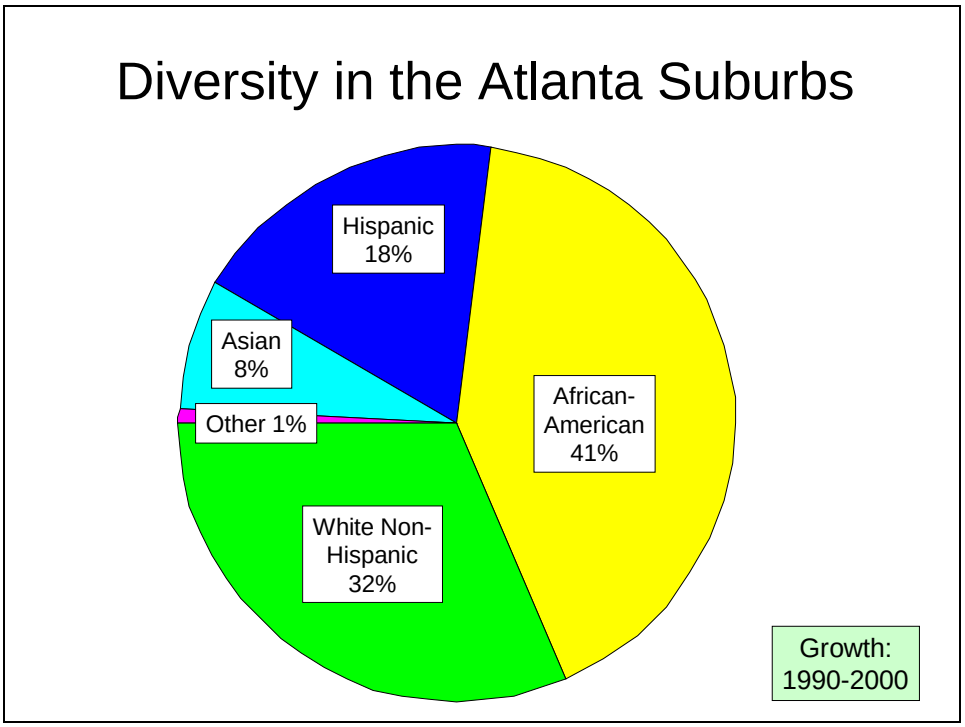

Figure 1

This report reviews current transportation plans in light of their support of future population and economic growth. It also examines costs and benefits that would be associated with more aggressive programs that would adopt specific traffic congestion reduction goals to be achieved over the next 25 years. While the report considers the entire state of Georgia, the concentration of traffic congestion in Atlanta, and the negative impact of that congestion on the rest of the state requires that the principal focus be the Atlanta urbanized area.

The report has been drafted from the perspective that Atlanta must improve its transportation system to remain competitive in the years to come. The challenges are such that sufficient financial resources are simply not available at present. Thus, there is a premium on obtaining the greatest value from transportation expenditures. This is not a question of highways, traffic management strategies or transit. It is rather a question of mobility, for people and for goods. The transportation system that maintains Atlanta's competitiveness must be the most cost-effective, and the extent to which highway expansion, traffic management strategies and transit are a part of the solution should depend virtually entirely on their relative cost effectiveness in contributing to reducing traffic congestion.

B. DEMOGRAPHIC TRENDS IN GEORGIA

Population and Workers

Georgia has "enjoyed" dramatic growth in population in recent decades. From 1990 to 2000 Georgia grew at twice the national rate, adding 1.7 million people to reach a total of 8.2 million

in population (Table 1). This 26 percent growth rate for the decade represented an acceleration of growth from previous decades (approximately 19 percent per decade; 1970-1990) when growth was high but significantly less. More importantly perhaps, the increase in total population for the decade almost equaled the sum of the previous two decades. In short the state's population has grown 80 percent since 1970.

Annual Census surveying since the year 2000 indicates that the population growth rate continues with an observed growth of 185,000 per year.[10]

Table 1
US and Georgia Population

	United States	Georgia
2000	281,421,906	8,186,453
1990	248,709,000	6,478,216
Change	32,712,906	1,708,237
% Change	13.15%	26.37%

Distribution of Population: Although all areas of the state saw some growth in the past decade, with only eight counties showing minor declines in population, most of the population growth occurred within the suburban rings of metropolitan areas around the state (Figure 2).[11] Rates of growth in many of the smaller metropolitan areas were substantial (Figure 3), but not surprisingly the Atlanta metropolitan area absorbed most of the growth (Figure 4). In fact 75 percent of growth was in the Atlanta area (Figure 5). Thirty-three counties grew by more than 10,000 in population, 22 of them in the Atlanta area. The big gainers were Gwinnett with almost a quarter million, and the counties of Fulton, Cobb and DeKalb with greater than 100,000. These four counties accounted for 40 percent of the state's population growth.

[10] American Community Survey Comparisons (U.S. Census Bureau).
[11] Some of the state's metropolitan areas stretch across state borders, including Augusta (also in South Carolina). Chattanooga (with the central city in Tennessee) and Columbus (also in Alabama). All of the metropolitan data in this section applies only to the Georgia portions of these metropolitan areas.

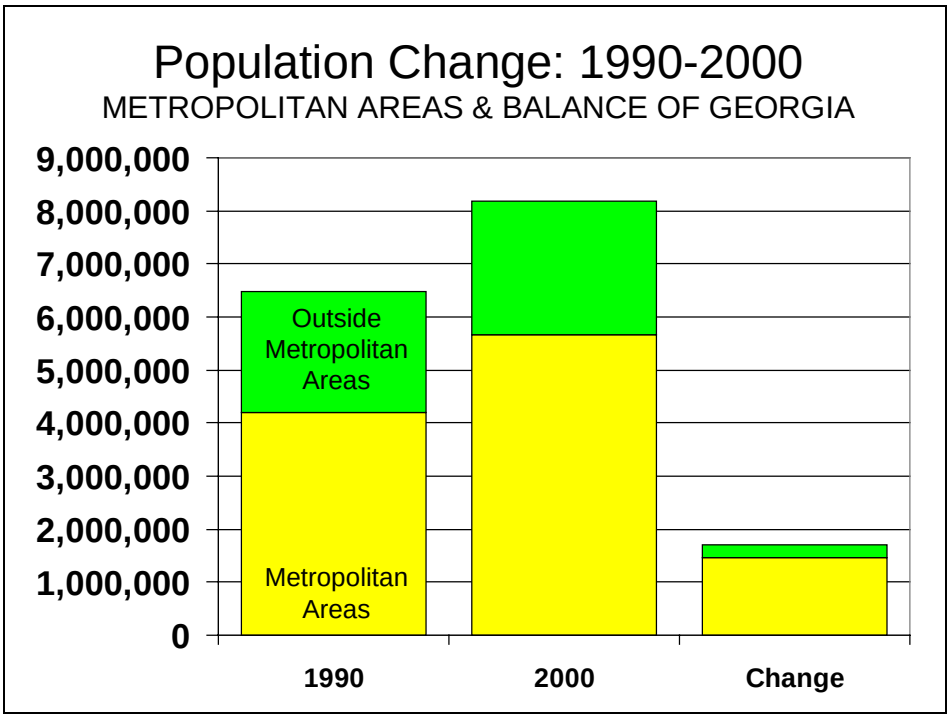

Figure 2

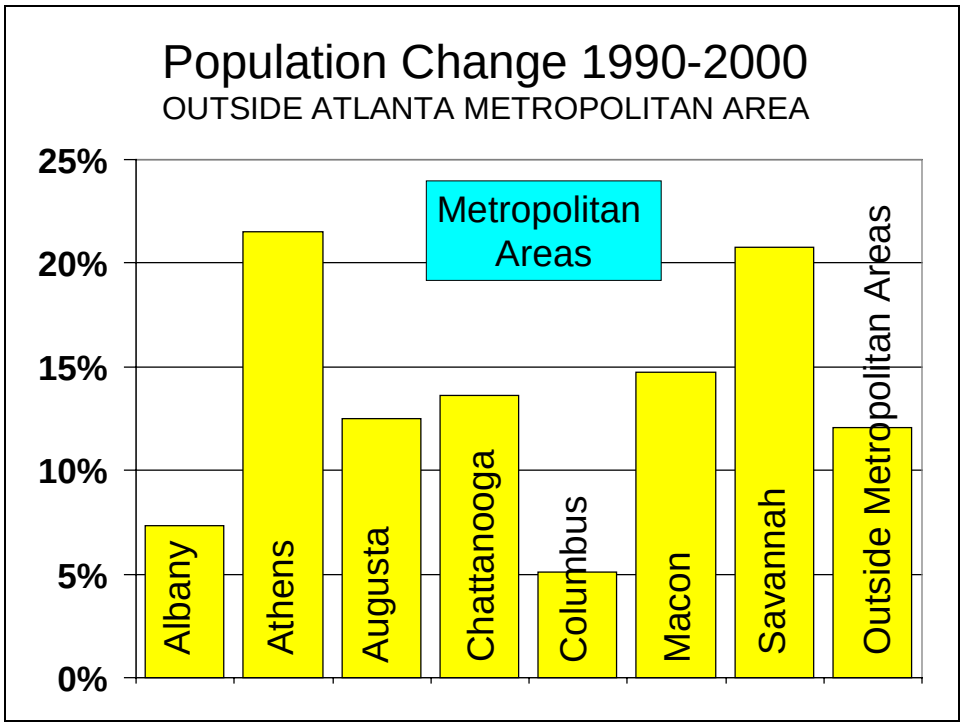

Figure 3

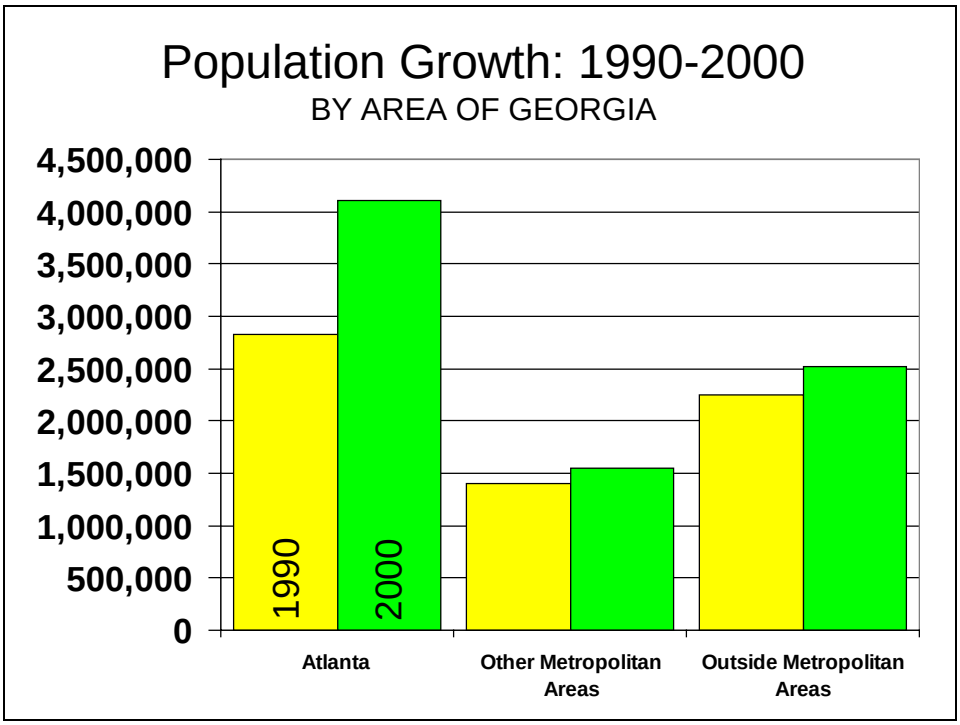

Figure 4

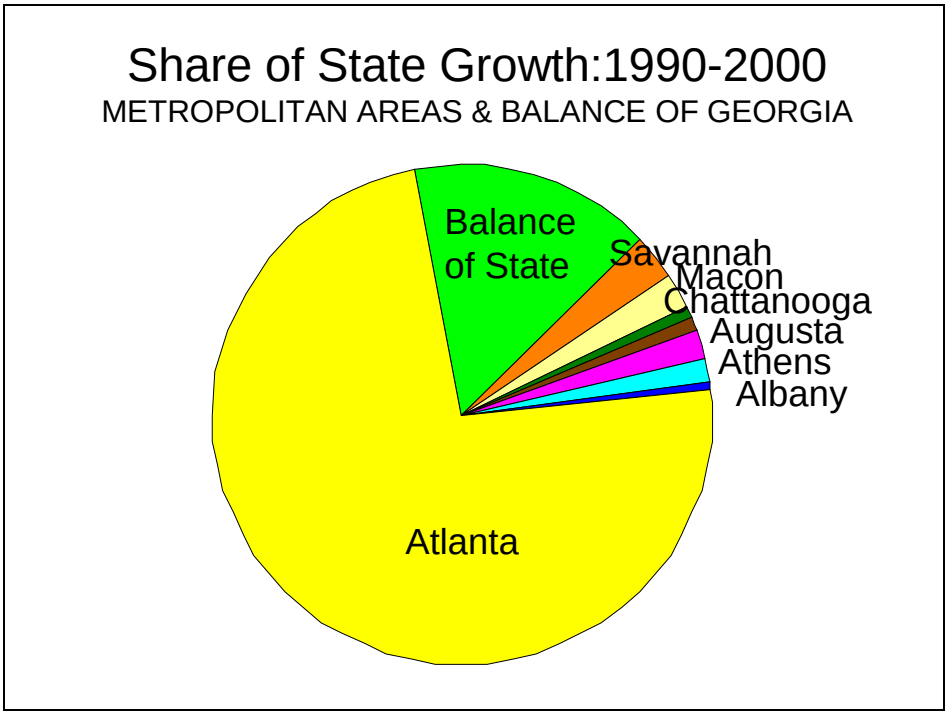

Figure 5

The city of Atlanta itself, with only 10 percent of the region's population, has regained some part of the population losses observed in the eighties, but in 2000 was still lower in population than in 1980 as the region grew by 42 percent in the 1980s and 44 percent in the 1990s.

The city saw declines in its African-American population and increases in White, both Hispanic and non-Hispanic, populations. The suburbs absorbed the greater share of the Hispanic influx. The city is characterized by a young adult population with low levels of children and very small households.[12]

But a crucial fact to recognize about the city is that it has changed substantially despite a rather slow shift in population level. Despite small swings in overall population over 20 years (on the order of 5 percent per decade) about 30 percent of the population of the city has arrived in the last 5 years either by immigration or birth.[13]

New US Census Bureau Estimates: Recently released U.S. Census Bureau county estimates indicate that growth continues outside the core. The central counties of Fulton, DeKalb and Clayton are growing much less quickly than before, accounting for less than 10 percent of metropolitan growth. Between 1950 and 2000, Fulton and DeKalb counties had accounted for from 21 percent to 72 percent of growth in the 20 county area. From 2000 to 2003, these two counties represented only three percent of the metropolitan population increase. Fulton County, including the city of Atlanta,[14] has virtually stopped growing, having added only 0.3 percent to its population from 2000 to 2003, less than one percent of the metropolitan growth[15] (Table 2).[16] The city of Atlanta, which had been 37 percent of the metropolitan population in 1960, now has less than 10 percent of the population, with approximately two-thirds of the population outside Fulton and DeKalb Counties (Figure 6), which themselves constitute most of the land area inside the I-285 Perimeter highway.

Of the top ten fastest growing counties in the nation between 2000 and 2003, five were in Georgia, and four of the five were in the Atlanta metropolitan area. Overall 20 Georgia counties were in the top 100 counties in growth rate and accounted for 13 percent of the total growth of the group.

[12] *Living Cities Profile*: Brookings Institution 2004
[13] *Living Cities Profile*: Brookings Institution 2004
[14] US Census Bureau 2003 population estimates for cities are not yet available.
[15] Metropolitan area as defined in 2000.
[16] U.S. Census Bureau county population estimates for 2003 released April 9, 2004.

Table 2 Atlanta Metropolitan Area Population Growth: 2000-2003					
Area	2000	2003	Change	% Change	Share of Growth
Fulton County	816,006	818,322	2,316	0.3%	0.7%
DeKalb County	665,865	674,334	8,469	1.3%	2.4%
Core	1,481,871	1,492,656	10,785	1.6%	3.1%
Other 18 Counties	2,630,367	2,971,544	341,177	2.8%	96.9%
Metropolitan Area	4,112,238	4,464,200	351,962	4.4%	100.0%
Metropolitan area as defined in 2000 (20 counties) Source: U.S. Census Bureau (2003 based on county population estimates).					

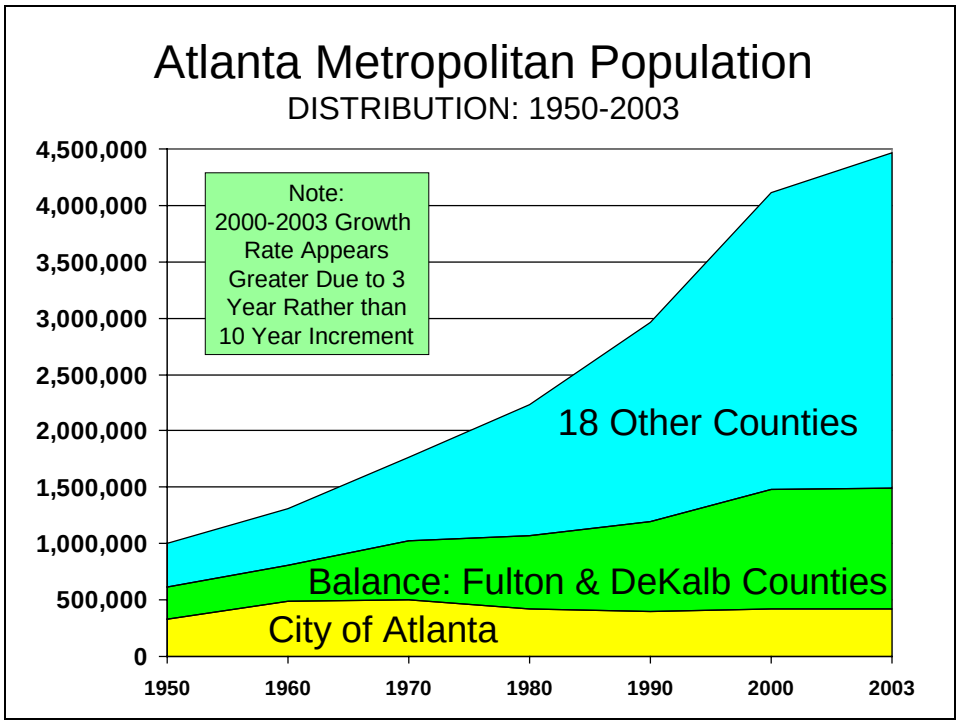

Figure 6

Foreign Immigration: While many parts of the US have seen population growth primarily fueled by foreign immigration this is not the case in Georgia. Foreign immigration has increased significantly but it remains a relatively small part of the growth picture. In 2000 there were only about 580,000 total foreign born in the state and although more than half had arrived in the last ten years and almost 230,000 in the last five years they accounted for only about 20 percent of state-wide growth. The Atlanta region absorbed about 75 percent of this population growth in line with its overall state share.

Worker Growth: The key to travel demand growth is worker growth. Even though work trips are now a relatively small share of total local travel they are a major determinant of other travel, much of which centers around work travel or that are made by workers; and they are still central

to understanding peak hour travel. In Georgia, as in the United States at large, worker growth as measured by those reporting work trips in the census was lower than population growth. Although lower than population growth, the Georgia worker growth was double national rates (Table 3).

Table 3
Metropolitan Employment: 1990 & 2000

	1990	2000	Change	% Change
United States	115,070,274	128,279,228	13,208,954	11.48%
Georgia	3,106,393	3,832,803	726,410	23.38%
Albany	46,752	49,928	3,176	6.79%
Athens*	73,331	73,401	70	0.10%
Atlanta	1,481,781	2,060,632	578,851	39.06%
Augusta	183,517	209,438	25,921	14.12%
Chattanooga	198,708	219,506	20,798	10.47%
Columbus	110,773	123,185	12,412	11.20%
Macon	127,583	140,678	13,095	10.26%
Savannah	108,092	133,060	24,968	23.10%

* Athens, like many other university towns around the country, saw strange worker growth rates as a result of student mishandling of the census questionnaire.

Key Trends: Projecting recent demographic trends from more recent surveying as part of the American Community Survey (ACS), at a minimum shows that the trends cited above continue at least at rates seen in the last decade (Table 4).

Table 4
Estimated Change per Year: 2000-2002

Georgia	Increase per year
Population	185,000
Households	65,000
School Age Children	88,000
Population over 16	140,000
Workers	73,000
Vehicles	100,000
From other state a year ago	137,000
From other country a year ago	36,000
Source: *American Community Survey* (US Census Bureau)	

All of these factors indicate that the population and related elements are continuing to grow and the travel demand effects of that growth will continue as well.

Future Population: The current state plan calls for a population increase of 2.4 million (31 percent) from 1997 to 2025. These plans based on previous census projections need revision based on the recent census and current projections. The current census projections are considered only interim projections and will be refined over the coming year but there is no doubt that they will increase the expectations for population growth in Georgia. At the national level they increase the total population estimate for 2020 by about 11 or 12 million, most of them

of working age. Given Georgia's current shares of national growth that would add about a half million to the state's 2020 population estimate.

At a minimum the current census projections from 1999 set the population of Georgia at 7.8 million rather than the 8.2 million observed in the census. In addition the differences in the rate of growth that that difference implies must be taken into account.

A very simple approach to these adjustments, permitting a perspective on an approximation of future population for the state, would indicate a 2020 population on the order of 12 million under a reduced expectation of levels of growth derived from national interim projections (Figure 7). The present census projections treat the national 13 percent growth rate of the past decade as an anomaly and project a return to rates under 10 percent per decade. The projections shown here maintain the ratio of Georgia growth at about twice national growth. Under this scenario Georgia would reach 3.5 percent of the nation's population by 2020. Were the levels of the present decade (26 percent) to continue to pertain it would suggest a population of closer to 13 million.

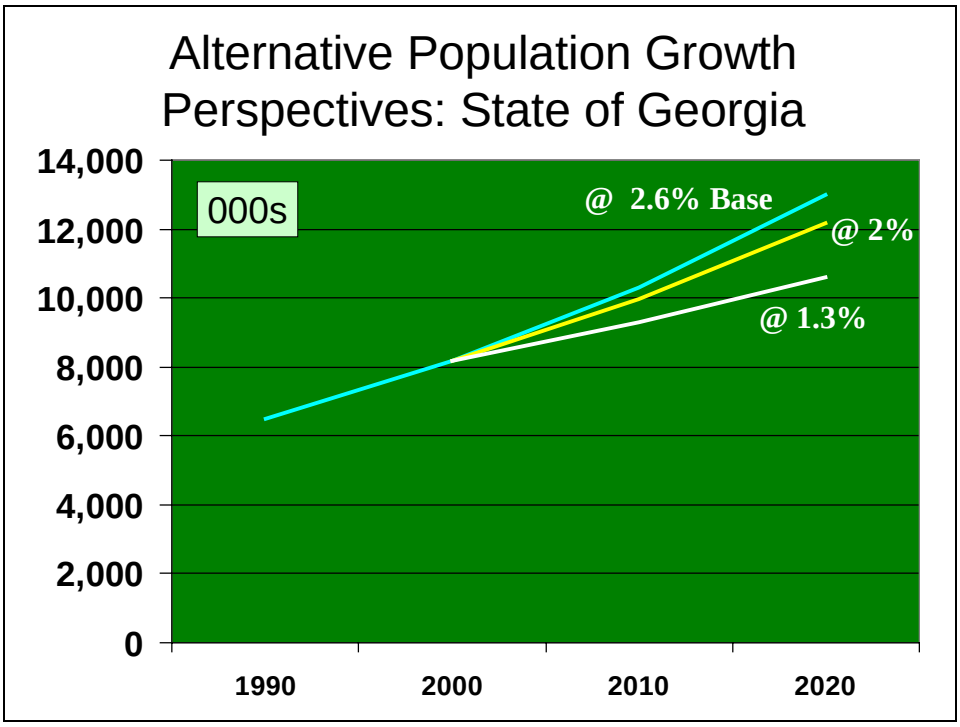

Figure 7

C. TRAVEL TRENDS IN GEORGIA

Nearly all travel in Georgia is by car.[17] As in the rest of the nation, the continuing increase in travel per capita has been the result of a number of factors, most notably that women now drive

[17] The analysis in this section is based upon U. S. Census Bureau data.

approximately as much as men, that minority households and lower income households have greater access to automobiles and that incomes are rising.[18]

Vehicles Available

A reasonable estimate of the number of vehicles available to households in the state of Georgia today would be on the order of 6 million vehicles. In 1990 the total fleet of vehicles available to households was 4.18 million. This grew to 5.34 million by 2000; an addition of over 1.14 million vehicles. Assuming the continuation of rates of over 100,000 added vehicles per year would place ownership in the "ball park" of 6 million today not including the commercial truck fleet.

A review of household vehicle availability for the period shows that the trend, unlike patterns of the 1970s and 1980s, did not show big increases in multi-car households. Rather, the share of households without a vehicle declined significantly, from 10 percent to 8 percent, the share of one vehicle households grew from 31 percent to 32 percent, two vehicle households grew from 38 percent to 40 percent, but 3 and greater vehicle households either declined in share or held constant (Figure 8). This pattern, similar to the national pattern, suggests the significant increase in ownership is among lower income households that formerly did not have vehicles rather than an expansion of the vehicle fleet among households that already had vehicles.

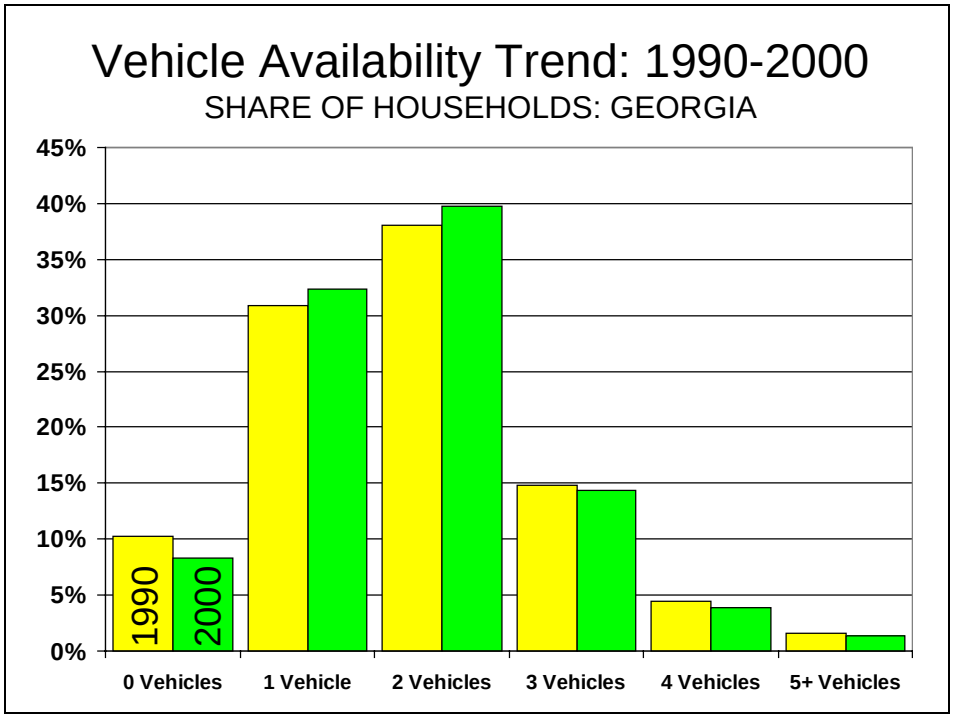

Figure 8

[18] See, for example Alan E. Pisarski, "Cars, Women, and Minorities: The Democratization of Mobility in America," Competitive Enterprise Institute, 1999.

How does Georgia's pattern compare with national patterns? Georgia has a considerably smaller share of households without vehicles than the national pattern (Figure 9); the nation is today where Georgia was in 1990. In addition Georgia has higher levels of multi-car households than the nation in general.

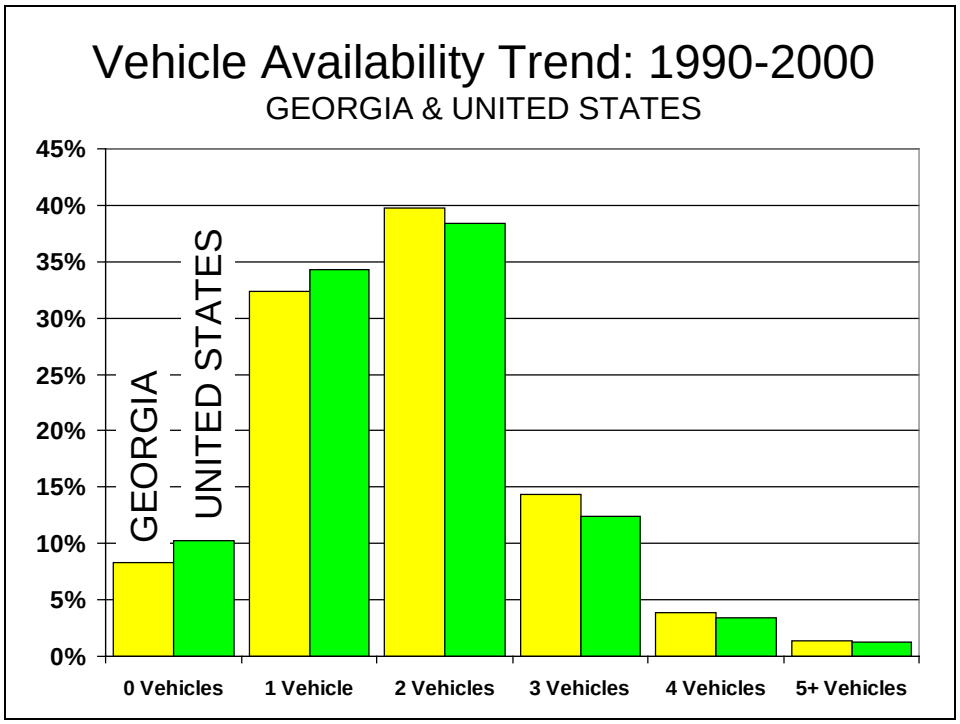

Figure 9

The distribution of the vehicle fleet across the state is of interest. In particular the households without vehicles are important because they are often the main users of transit. Despite the decline in percentage it would be expected that some areas would see some increase in the actual number of vehicle-less households as part of the tremendous overall population growth in the state. Overall there was only an increase of fewer than 5,000 vehicle-less households between the decennial censuses to reach a number in the state just below 250,000 such households in 2000, and that round number would serve as a reasonable estimate today. As would be expected most households without vehicles are rental households with about 172,000 renters and the remaining 77,000 owning homes. About 140,000 of the households that are vehicle-less are headed by an African-American householder.

Across the state about 100 counties saw actual declines in the number of households without vehicles. These decreases were not great, with Chatham, Fulton, Dougherty and Bibb Counties, all notably central counties in metropolitan areas, the only counties with decreases on the order of a 1000 households. Most increases in vehicle-less households in other counties were similarly of a small order with only 30 counties exhibiting increases of more than 100 such households. The big increases in the state occurred in four counties in the suburbs of Atlanta: DeKalb, Gwinnett, Cobb and Clayton. Between them these counties saw an increase of over 11,000 such households.

Only two counties in the state, both in the Atlanta metropolitan area, had substantial shares of their households without vehicles; those were DeKalb with just over 9 percent of households without vehicles and Fulton approaching 20 percent. Otherwise lack of vehicle ownership is broadly and lightly distributed across the state with only four other counties over 3 percent and no others above 2 percent.

Half of the vehicle-less households in the state are in the nine counties with more than 5,000 such households shown (Table 5). This would be the natural focus of services to mobility-impaired households. Six of these nine counties also would be on the list of counties with more than 5,000 African-American households without vehicles.

Table 5
Counties with more than 5,000 No Vehicle Households

	All Households	African-American Households
Fulton	48,859	36,221
DeKalb	22,763	14,458
Chatham	10,678	7,309
Richmond	8,969	6,207
Cobb	8,675	
Muscogee County	8,154	5,715
Gwinnett	6,294	
Bibb	7,423	5,541
Dougherty*	4,597	

* Dougherty County is included because it had been above 5000 in 1990 dipping below in 2000

Important trends are emerging among racial minorities most likely to be without vehicles. In the Atlanta Urbanized Area in 1990 almost a quarter of African-American households had no vehicle available. This has dropped dramatically to about 15.5 percent in the year 2000 (Figure 10). Because of population growth the number of households without vehicles actually increased about 6,000 to 60,000 in the area. The great growth in Hispanic households saw both the number and share of Hispanics without vehicles available increase. Again almost 6,000 were added to reach about 7,200 such households. The year 2000 share of Hispanic households without vehicles rose to over 12 percent. White Non-Hispanic households had the lowest rate at less than 4 percent but still a sizeable number at about 29,000 households.

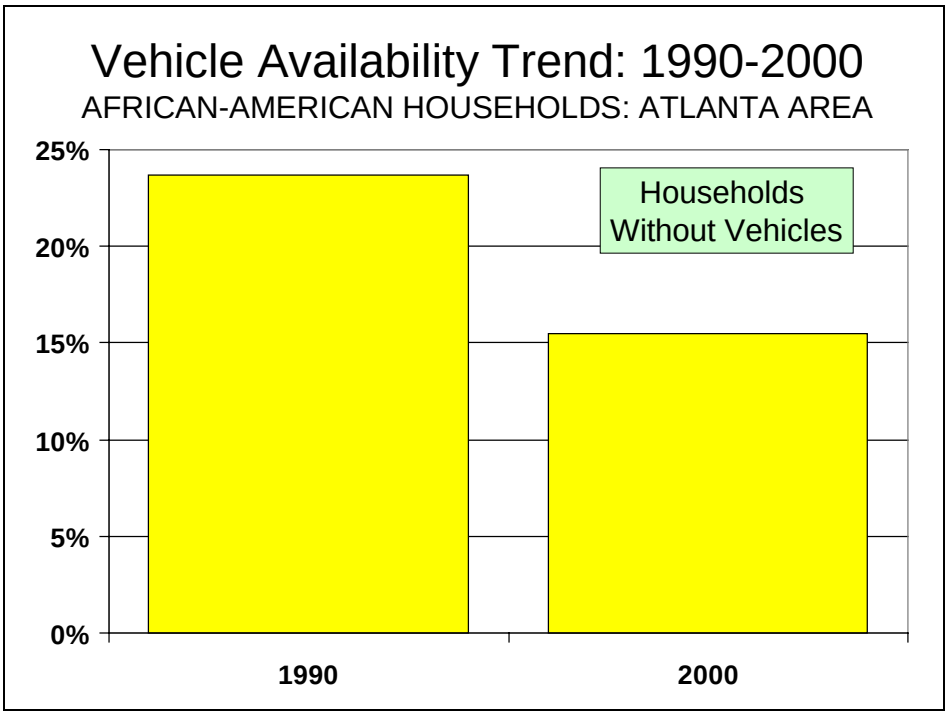

Figure 10

Importantly, Georgia does not seem to have large disparities in shares of households without vehicles between urban and rural areas. All racial groups seem to have approximately the same percentage level of auto-less households in rural areas of the state as in urban. Across the state levels of African-American households without vehicles are higher in the smaller urbanized areas of the state than in Atlanta, often at levels close to 20 percent, yielding an overall rate for the state of 18 percent in no vehicles available for African-American households (Table 6).

Table 6 Vehicles Available by Ethnicity			
Georgia: Urban and Rural			
VEHICLES AVAILABLE	Total Households	Households with No Vehicles	% of Households with No Vehicles
African-American	802,456	142,171	17.72%
Hispanic	99,026	11,526	11.64%
White Non-Hispanic	2,021,482	89,232	4.41%
All	2,922,964	242,929	8.31%
Georgia: Rural			
VEHICLES AVAILABLE	Total Households	Households with No Vehicles	% of Households with No Vehicles
African-American	121,497	17,994	14.81%
Hispanic	12,468	1,230	9.87%
White Non-Hispanic	702,456	27,891	3.97%
All	836,421	47,115	5.63%
Atlanta metropolitan area			
VEHICLES AVAILABLE	Total Households	Households with No Vehicles	% of Households with No Vehicles
African-American	389,619	60,314	15.48%
Hispanic	58,693	7,192	12.25%
White Non-Hispanic	782,932	28,659	3.66%
All	1,231,244	96,165	7.81%

The Importance of Work Trips

The U.S. Census obtains substantial information on work trips around the nation. Work trips, while not a majority of urban travel, are an important determinant of traffic congestion. It is principally the concentration of work trips during the morning and evening peak periods that makes traffic congestion the worst at these times. As a result, significant attention is paid to work trips.

Commuting Flows

The nature of commuting flows is difficult to depict, especially in a state like Georgia with such a broad range of areas and area types.

Commuters Leaving Their Home County to Work: Perhaps the key indicator of commuting flow is the percentage of workers leaving their residence county to work. The nation has seen an explosion in such behavior. Georgia reflects that pattern as well (Figure 11).

In Georgia 41.5 percent of workers leave their home county to work, with a small share of them actually leaving the State to work. This represents a substantial increase from the 38 percent leaving their home county to work in 1990. To achieve that level of change effectively 58 percent of the new workers added between the 1990 to 2000 censuses left their home county to work. In actual numbers, of the 725,000 new workers in the state at 2000 over 420,000 worked outside their home county. The total workers leaving their home country grew from 1.17 million to almost 1.6 million an increase of 36 percent. This is in contrast to an overall increase in workers of 23 percent.

This statistic is strongly affected by the Atlanta metropolitan area. Almost 50 percent of metropolitan Atlanta workers work in counties other than their residence. In contrast in all other metropolitan areas it is about 30 percent.

Across the state eleven counties exported more than 10,000 workers each day and three of them had exports above 25,000. Only one county in this group (Houston in the Macon metropolitan area) at 9,977 was not in the Atlanta metropolitan area. Other counties outside Atlanta with significant export growth were Columbia County in the Augusta area with about 5,000 and Effingham and Bryan in Savannah with greater than 3,000 exports.

Only six counties showed a decline in the actual number of workers leaving each day. However a notable factor was that even with rising exports in the number of workers, the growth in total workers was such that many counties showed *declines* in the percentage of those leaving. This suggests a growing balance between jobs and workers at least in some suburban counties.

Figure 11 plots for all of the counties in the state the actual number of workers who depart their residence county each day to work elsewhere. This shows dramatically the scale of activity in the Atlanta metropolitan area.

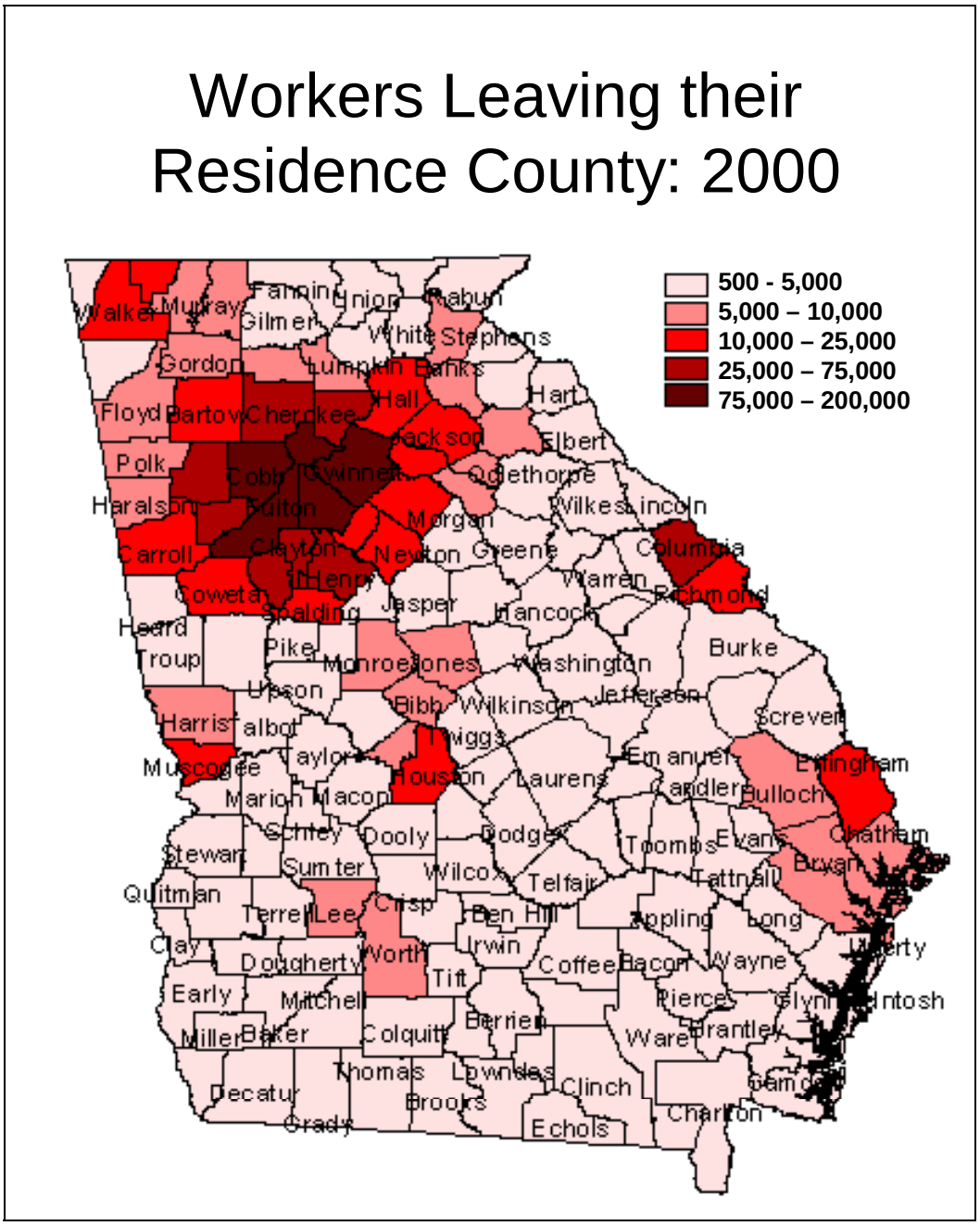

Figure 11

Metropolitan Flows: Table 7 provides a broad overview of flows within and around the state. It employs the census definitions of metropolitan areas and central cities; defines suburbs as the remainder of metropolitan areas outside central cities; and defines rural as all areas that are not metropolitan areas.

Table 7 2000 Census Commuting Flows: Georgia				
	Total	Work in Central City	Work in Suburbs	Work in Rural Areas
Live in Central City	513,999	378,034	123,087	12,878
Live in Suburbs	2,245,144	479,464	1,699,658	66,022
Live in Rural Areas	1,073,660	53,258	102,568	917,834
All	3,832,803	910,756	1,925,313	996,734
This table employs the geographic definitions in place at the time of the census.				

Among the key points observable in this table is the dominance of suburbs in most categories and the overall dominance of suburban flows. Throughout both the United States and Western Europe, virtually all employment growth has been outside the core cities in recent decades. This trend is evident to an even greater degree in Atlanta, where there has been strong growth in the suburb-to-suburb commuting share (Figure 12). This is due in part to the fact that the city of Atlanta is a relatively small city at the center of a very large metropolitan area. Of the 3.8 million workers in the state more than 2.2 million live in suburbs; and of the job locations half of them, 1.9 million, are in suburbs of metropolitan areas.

- This produces a job/worker ratio[19] of 0.86, very good for suburbs, which normally have more workers than jobs for those workers, although suburbs are no longer the bedroom communities they once were. But this still means that were all suburban workers to work in their county of residence that could, the suburban areas of the state still would have to export about 300,000 workers per day.

- The job/worker ratio for central cities should be above one, representing a source location for jobs. In Georgia the ratio is 1.8, extraordinarily high; as a result of 900,000 jobs and only 500,000 resident workers located in central cities. This means that were all central city workers to work in the central city there would still need to be another 400,000 workers imported every day.

- As expected, like most rural areas around the country, rural areas of the state are close to self-sufficient in jobs, with a ratio of 0.91, and with only a 77,000 surplus of workers over jobs. As expected some rural workers commute into the suburbs and central cities for the jobs there. As metropolitan areas are redefined it is those rural counties sending workers to the present metropolitan area that are incorporated into the new metropolitan area boundaries.

[19] The job/worker ratio is the number of jobs in a county, counted by the total work trip destinations of workers from anywhere by the census, divided by the total workers who are resident in that county.

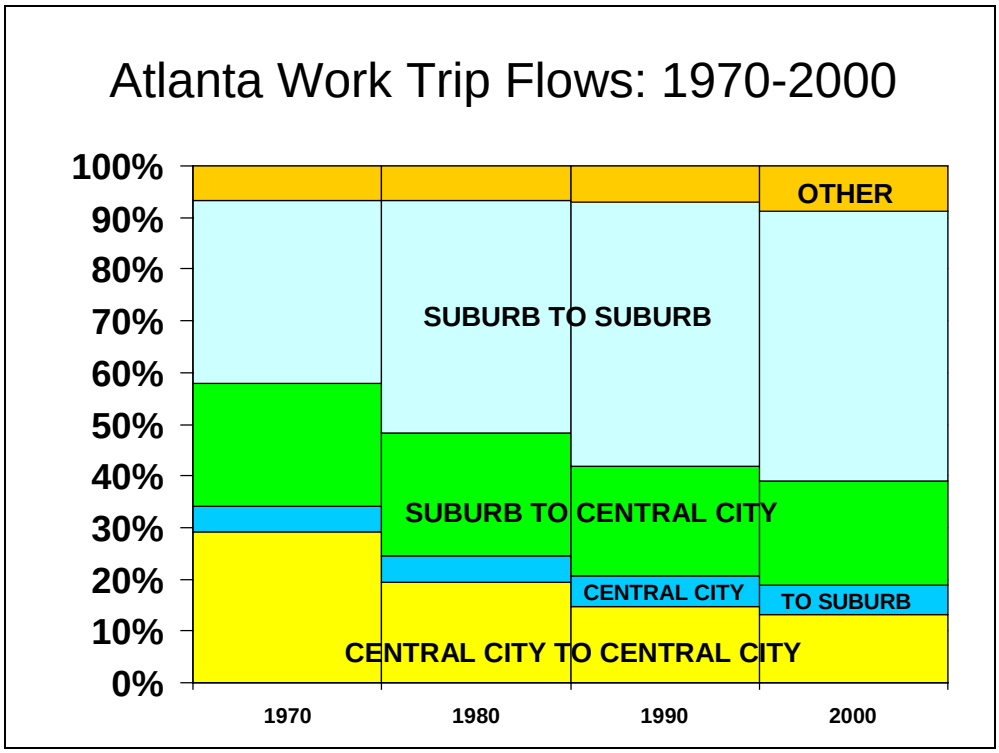

Figure 12

Figure 13 depicts much of the discussion above graphically. The central cities meet only about 42 percent of their worker needs and have a strong demand for workers met by the suburbs and to a minor extent by rural areas. In fact jobs filled in the central city by workers from the suburbs exceeds that of the residents. The suburbs meet most of their job needs with resident workers, and with roughly equal small inputs from rural and central cities. Rural areas receive only minor flows outward from the metropolitan areas.

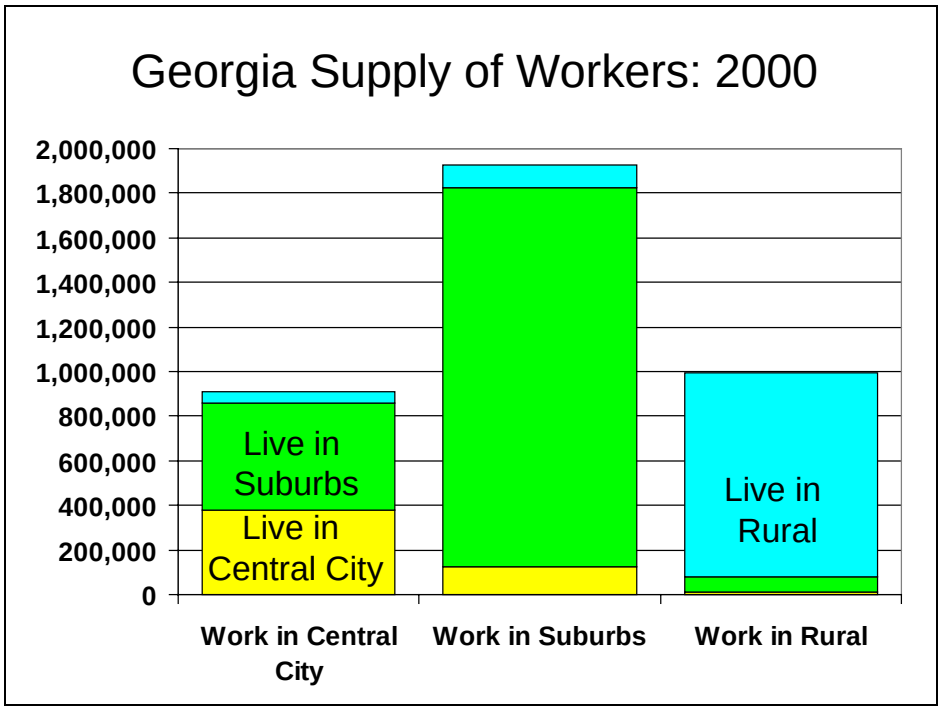

Figure 13

If the converse question is asked, where do residents work, it is revealed that about 75 percent of both central city and suburban residents and about 85 percent of rural workers (Table 8) work in their home groups (central city or suburbs).[20]

Table 8
2000 Census Commuting Flows: Atlanta Metropolitan Area

Live in	Total Residents	Work in Central City	Work in Suburbs	Work in Other Metropolitan Area	Work in Rural Area
Central City	178,970	106,145	69,851	1,876	1,098
Suburbs	1,881,662	313,865	1,512,864	24,783	30,150
Metropolitan Area	2,060,632	420,010	1,582,715	26,659	31,248

The Atlanta share of metropolitan flows is an important component of understanding state flows. Table 9 shows the share of each cell represented by the Atlanta metropolitan area. For example

[20] The fact that suburban workers work in a suburb by no does not mean that they are working in their residence county. This simplified description also misrepresents the actual situation in a minor way. Some metropolitan area workers may work in a central city or suburb of a *different* metropolitan area. This is a very small factor in the state of Georgia with less than 45,000 flows between metropolitan areas for the entire state, much of it in the border between Atlanta and Athens. In some states it can be quite significant and may become so in Georgia in the future as metropolitan area boundaries move even closer together.

metropolitan Atlanta is 75 percent of the total state metropolitan worker activity, but this is comprised of 84 percent of its suburban flows, but only 35 percent of its central city resident flows. The chart shows that other areas are far more center city oriented that is Atlanta (it has only 28 percent of the center city to center city flows; but 90 percent of the suburban to suburban flows). This is not unexpected; as metropolitan areas increase in size the influence of the center declines and they become more suburban oriented.

Table 9
Atlanta Metropolitan Area Commuter Flows as a Share of the State

Live In	Total Residents	Work in Central City	Work in Suburbs	Work in Other Metropolitan Area	Work in Rural Area
Central City	35%	28%	60%	17%	9%
Suburbs	84%	68%	90%	75%	46%
Metropolitan Area	75%	50%	88%	60%	40%

What is striking is that the center cities in other metropolitan areas have a greater share of jobs than the suburbs do (Table 10). Table 9 shows that the reverse is true for Atlanta by a lot. For those living in Atlanta the table below shows the distribution of work flows. ***Only about 17 percent work of suburbanites work in the central city, whereas more than 80 percent work in their own or other parts of the suburbs. Thus the dominant flow tends to be circumferential rather than radial.***

Table 10
Employment Locations by Residence Locations

Live In	Work in Central City	Work in Suburbs	Work in Other Metropolitan Area	Work in Rural Area	Total Residents
Central City	59.31%	39.03%	1.05%	0.61%	100.00%
Suburbs	16.68%	80.40%	1.32%	1.60%	100.00%
Metropolitan Area	20.38%	76.81%	1.29%	1.52%	100.00%

Non-metropolitan Flows: Of the 3.8 million workers identified in the State in the year 2000 census slightly more than a million of them reside in non-metropolitan areas. About 40 percent of them reside in small urban centers that are not considered metropolitan and the remainder are in more truly rural surroundings. Those in small urban centers are much more oriented to their community with only slightly above 20 percent commuting outside their home county – half the average for the state; those in the more truly rural areas are very close to the state average. That group of so-called "rural" workers who reside inside metropolitan areas but outside the urbanized area are the most likely group observed to leave their home county to work. More than 54 percent of the 400,000 workers in those areas, leave their residence county to work, most of them staying within their own metropolitan areas suburbs. Less than 10 percent of those living in urban centers in non-metropolitan areas travel to work inside metropolitan areas while about 18 percent of those other rural workers work in metropolitan areas. Thus there is a flow of about 150,000 workers per day into metropolitan areas from non-metropolitan areas and a small reverse flow from metropolitan areas of about half that.

Travel Times

In the 2000 census Georgia's average work trip travel time was 27.7 minutes in contrast to 25.5 minutes for the national average. In fact Georgia's average was identical to the average of all metropolitan areas in the country over a million in population. This is despite the fact that nearly one-half of the state population lived outside the one metropolitan area (Atlanta) of more than one million population. Some counties experienced substantial deterioration of work trip travel times over the period (Figure 14).

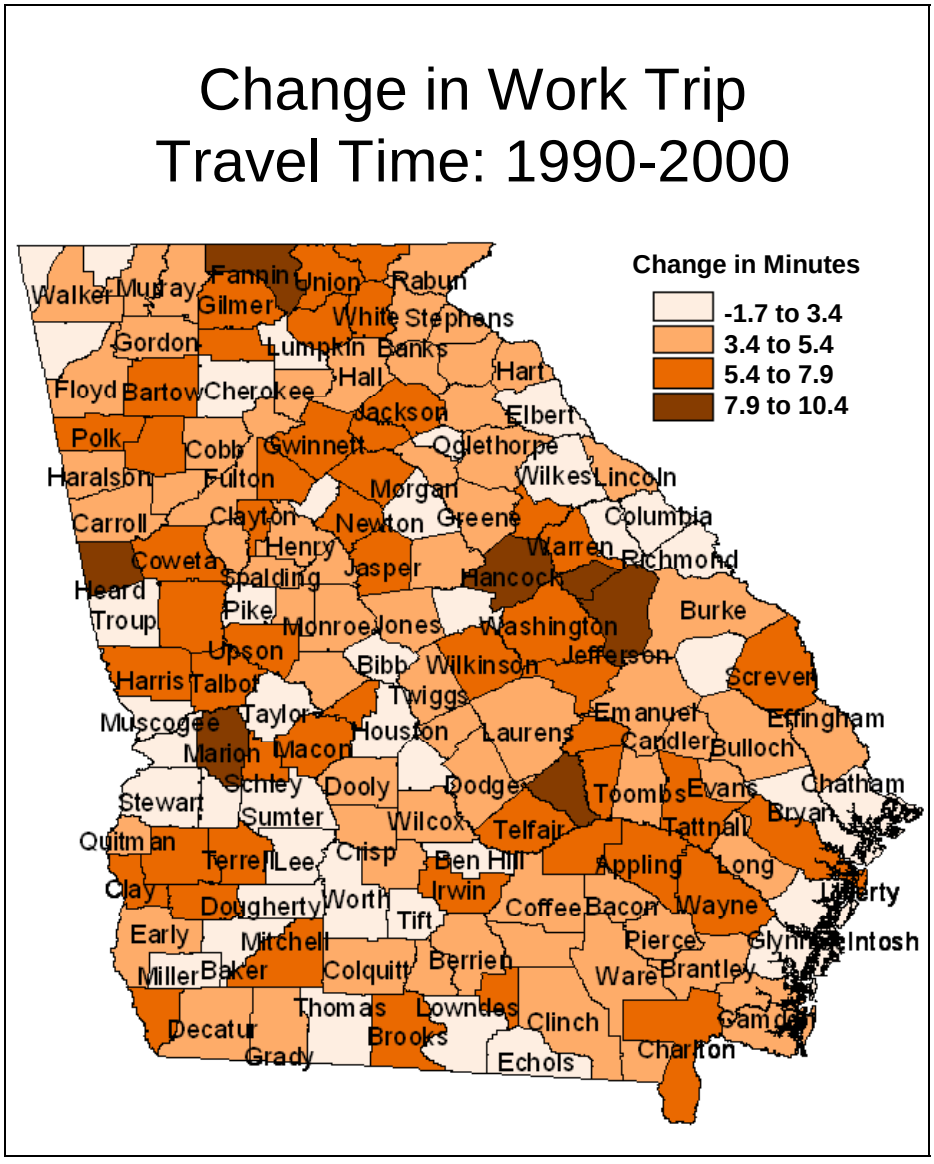

Figure 14

Note in the travel time distribution below that Georgia is below the nation in all percentages of travel time below 30 minutes and above it for all categories above 30 minutes (Figure 15). Most particularly 66 percent of the nations commuting is below 30 minutes and only about 60 percent of Georgia's travel is in that category.

A comparison of Georgia's travel times in 2000 compared to 1990 shows dramatic increases in longer travel times. Only the categories above 35 minutes have grown and the share increases at levels above 60 minutes are dramatic (Figure 16).

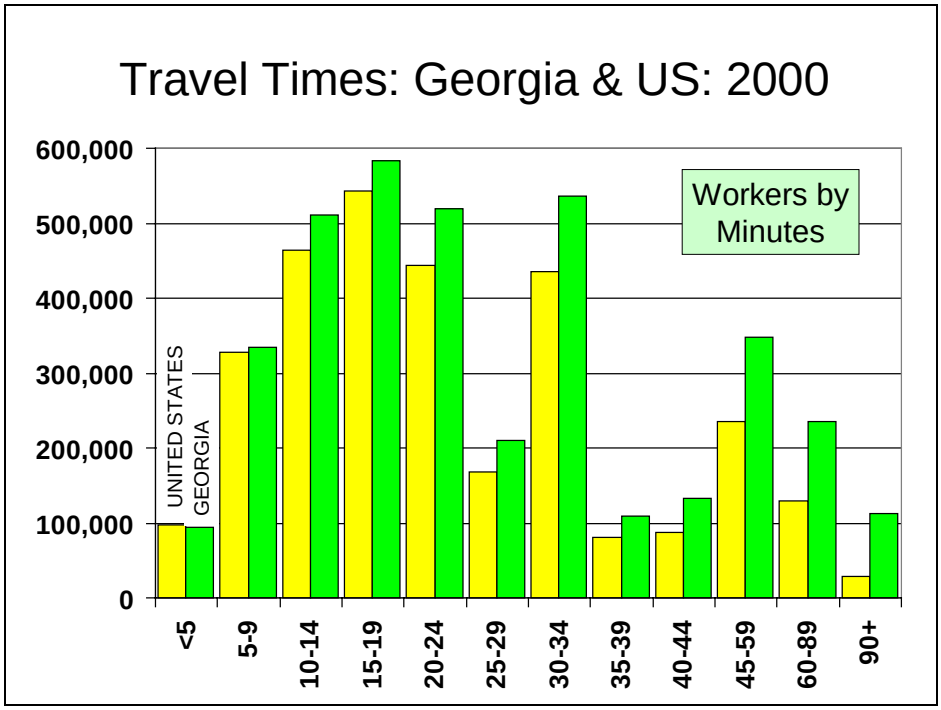

Figure 15

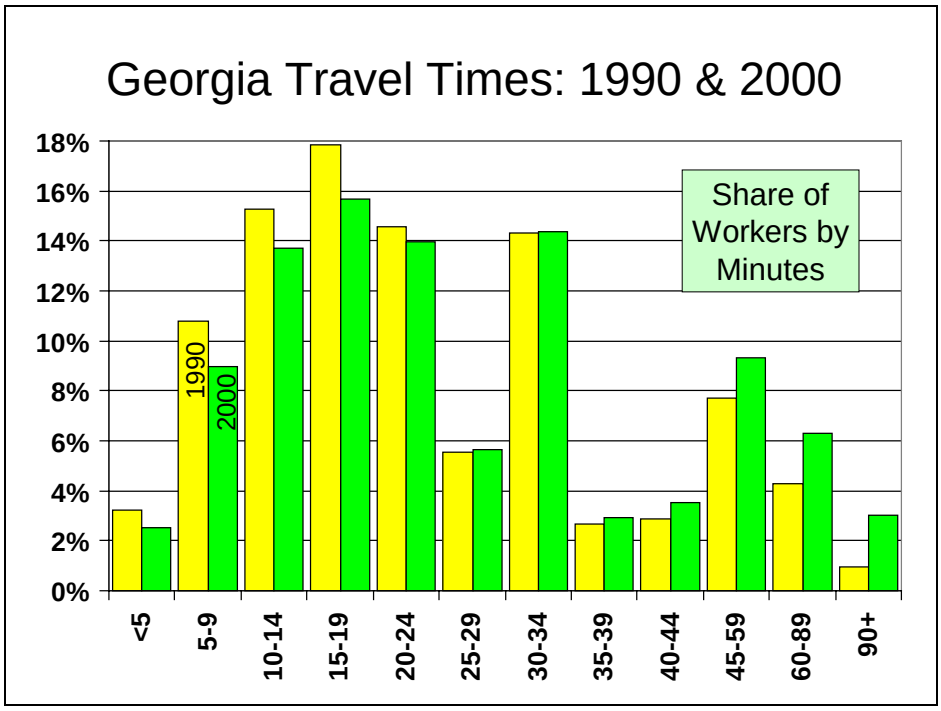

Figure 16

Although the problem appears to be statewide it is no surprise that the biggest problems were in Atlanta. While the State's average travel time grew from 22.7 to 27.7 in the 1990 to 2000 period, twice the national average growth, Atlanta's increased from 26 minutes to over 31 minutes, both showing the same level of growth.[21] The State rose from 9th to 6th in national travel time ranking and attained the second highest growth in travel time in the nation. Figure 17 shows the Atlanta 1990 to 2000 trend. While the state share of commuters traveling more than 60 minutes grew from 5 percent to 9 percent in the period the Atlanta share grew from 6 percent to over 11 percent. In fact 76 percent of the increase in the numbers of workers commuting more than 60 minutes occurred in the Atlanta area. Atlanta, growing from 90,000 in just ten years, had 233,000 of the State's 345,000 commuters taking more than 60 minutes to get to work,

Often one explanation for long travel times in large metropolitan areas is the use of transit, which tends to be slower than auto travel. But this is clearly not the explanation in Georgia or Atlanta travel times have grown while transit use is small and declining in share. In fact, Atlanta has the longest travel times for auto users in the country among major metropolitan areas. In 2000, average work trip travel by modes other than transit (nearly all automobile) was 29.4 minutes, a substantial 0.5 minutes above second place Washington-Baltimore and 7.1 minutes higher than the average of all metropolitan areas.[22] Only Atlanta, Washington-Baltimore and Stockton, California have average work trip travel times above 27.5 minutes. Commute times in Stockton have been lengthened by the long commutes to the San Francisco Bay Area (San Francisco-San

[21] The census understated travel times by about a minute in 1990; therefore the increase was on the order of 4 minutes not 5.

[22] Census data available only for two categories (transit and other). The overwhelming majority of "other" trips are automobile and thus the "other" category is representative of automobile travel times.

Jose) made necessary by "smart growth" land use policies, such as urban growth boundaries and high development impact fees, which have driven the price of housing to the highest in the nation.

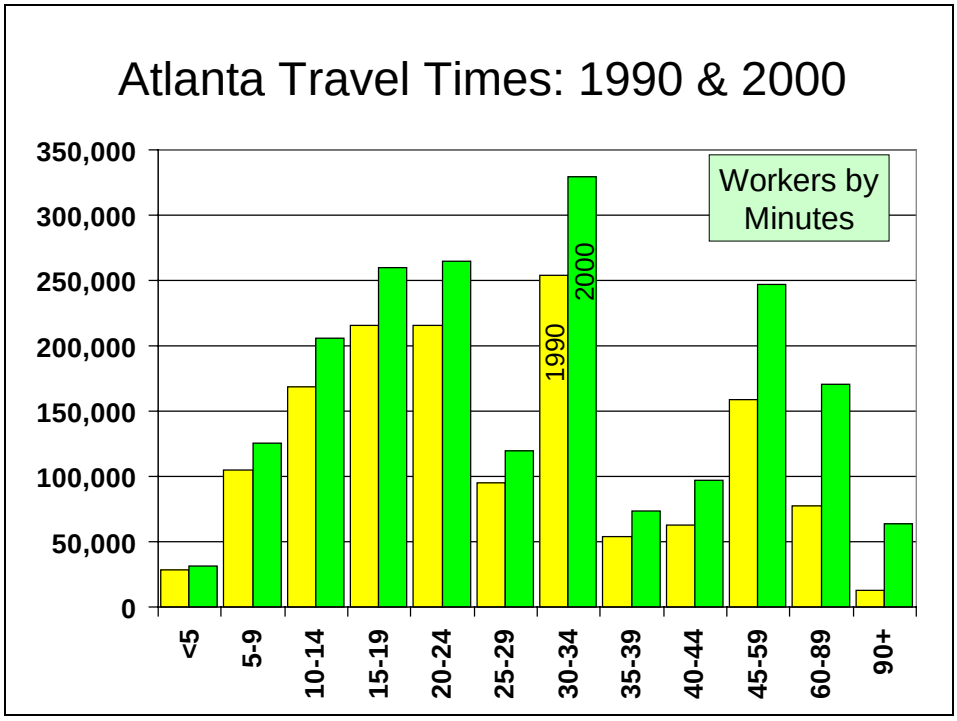

Figure 17

Longer Term Atlanta Trends: Since 1980, average work trip travel times have risen substantially more than average in Atlanta. In 1980, Atlanta's average work trip travel time was 12 minutes less than New York, which had the longest average commute. By 2000, Atlanta had risen to within three minutes of New York, which continues to have the longest overall travel times. Among metropolitan areas of more than 1,000,000 population, only New York and Washington have longer average overall travel times than Atlanta. The longer commute times in New York and Washington are the result of higher transit market shares, with the longer transit commute times raising the overall average (travel time by transit is nearly double that of automobile travel[23]). Atlanta now has average work trip travel times closer to the higher European average than the US average, where long travel times are driven by higher transit market shares.[24]

Other Metropolitan Areas: Across the state, travel times were more moderate among metropolitan areas other than Atlanta, generally well below national averages (Figure 18). The

[23] Based upon U.S. Census data.

[24] In this regard, Atlanta is unique. Among urban areas in the high-income world with average travel times to work of more than 30 minutes, virtually all are much more dependent upon transit, which tends to be slower than automobiles for commuting.

distribution of travel times also showed greater shares below 20-minute travel times, generally on the order of 70 percent (Figure 19). While increases in travel time in other metropolitan areas were not of the level of Atlanta they were substantial (Table 11).

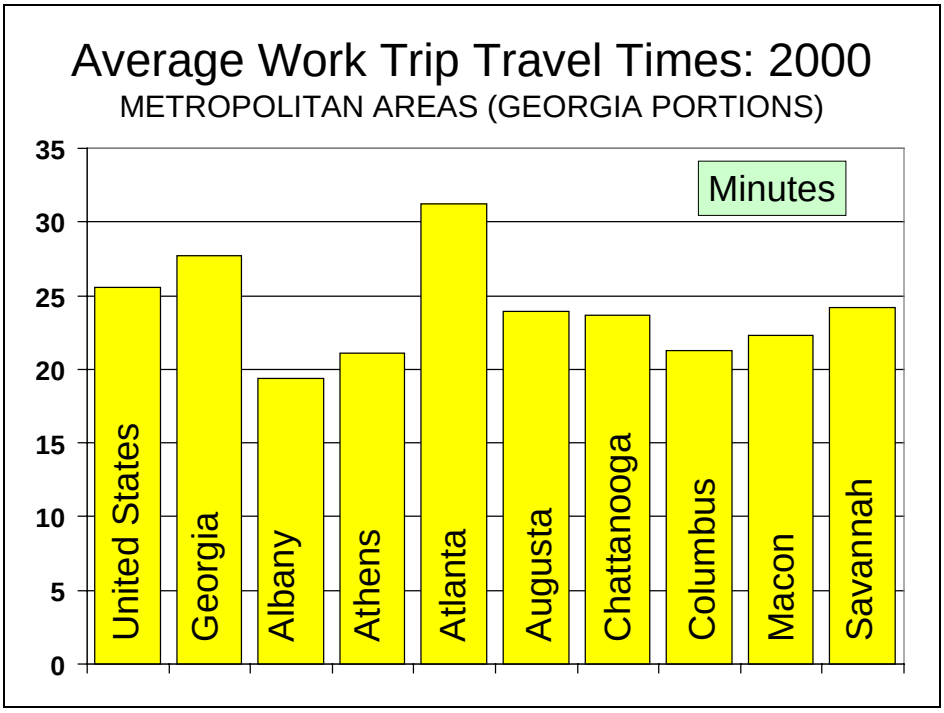

Figure 18

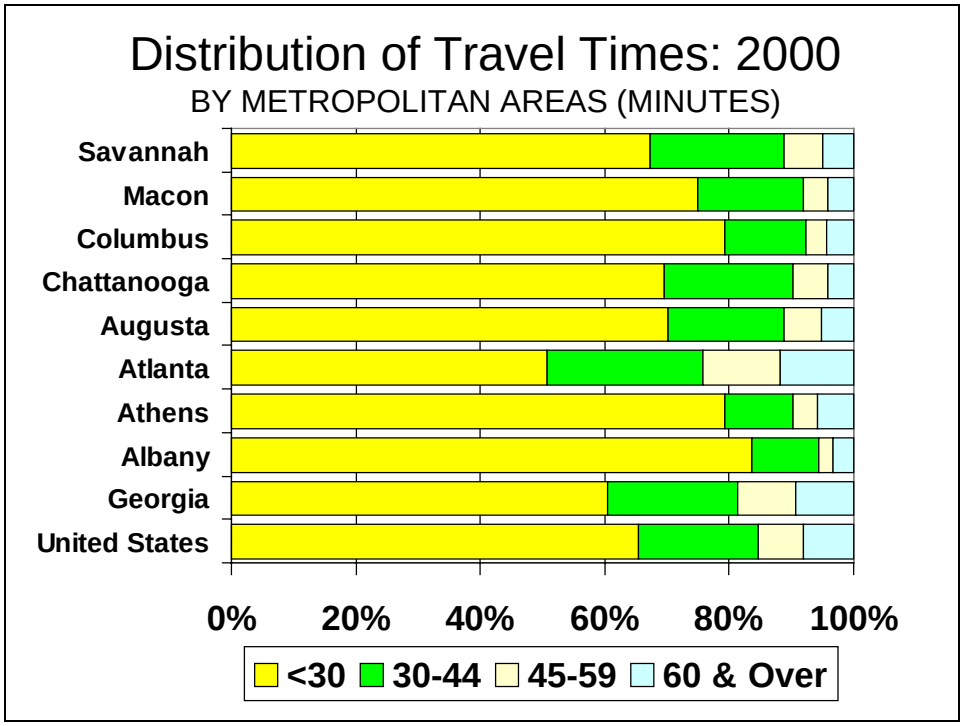

Figure 19

Table 11 Georgia Metropolitan Area Work Trip Travel Time: 1990-2000			
Metropolitan Areas	1990 Travel Time	2000 Travel Time	1990-2000 Change
Albany	16.7	19.4	2.6
Athens	18.7	21.1	2.4
Atlanta	26.0	31.2	5.2
Augusta	21.6	23.9	2.3
Chattanooga	22.1	23.7	1.6
Columbus	17.4	21.3	3.9
Macon	18.6	22.3	3.7
Savannah	20.5	24.2	3.7
In minutes per one-way trip.			

Rural Travel Times: It has been noted earlier that the non-metropolitan population of Georgia is rather significantly split between those in small urban centers and those in what might be called truly rural settings. That split is reflected in their work trip travel times. Those in the small urban centers with the highest levels of walking to work and working at home and also most likely the shortest distance, have the lowest travel times, with an average of just at 20 minutes and almost 80 percent under 30 minutes. In the truly rural areas, that drops to 64 percent under 30 minutes and an average travel time of 27 minutes. This produces an average non-metropolitan travel time of about 24.4 minutes compared to the state average of 27.7 minutes. The longest travel times are exhibited by those identified as in a rural setting but inside a metropolitan area. These are almost always on the outer edges of urbanizing counties and generally areas where housing is new and jobs are sparse.

Travel Time by Transportation Mode: Throughout the state of Georgia, the shortest average work trip lengths were by bicycle or walking. The longest trips were by transit. On average, people who drove alone had slightly lower than average work trip travel lengths (Table 12).

Table 12 Travel Times by Transportation Mode	
Means of Transportation	Mean travel time to work (minutes)
Workers who did not work at home	27.7
Drove alone	26.8
Carpooled	30.2
Transit (including taxicab)	47.4
Bicycle or walked	13.1
Motorcycle or other means	42.9
In minutes per one-way trip.	

Means of Transportation to Work (Transportation Mode)

Table 13 provides the broad sense of modal usage for commuting in the state compared with the rest of the country. A number of factors stand out. First Georgia is not dramatically different than the nation at large. Some of the pertinent differences are:

- If the personal vehicle-based modes are summed then the Georgia average of 92 percent is 4 percentage points above the nation's 88 percent.
- If all transit related modes are summed the Georgia share of 2.15 percent is less than half the national transit share of 4.57 percent.
- Both working at home and walking to work in Georgia are well below national shares.
- As it works out the amount by which carpooling is above the national norm (2.4 percentage points) equals the amount by which transit is under the national average (carpool plus transit is about the same share in Georgia as in the nation at large).
- The amount by which Driving Alone exceeds the national norm (1.9 percentage points) about equals the shares below the norm for walking and working at home.

Table 13
Work Trips by Transportation Mode: United States & Georgia

	Total		Share	
	United States	Georgia	United States	Georgia
Total:	128,279,228	3,832,803	100.00%	100.00%
Drove alone	97,102,050	2,968,910	75.70%	77.46%
Carpooled	15,634,051	557,062	12.19%	14.53%
Bus or trolley bus	3,206,682	59,355	2.50%	1.55%
Streetcar or trolley car (publico in Puerto Rico)	72,713	843	0.06%	0.02%
Subway or elevated	1,885,961	20,116	1.47%	0.52%
Railroad	658,097	1,762	0.51%	0.05%
Bicycle	488,497	5,588	0.38%	0.15%
Walked	3,758,982	65,776	2.93%	1.72%
Worked at home	4,184,223	108,986	3.26%	2.84%
Other means	1,287,972	44,405	1.00%	1.16%
* includes bus, streetcar, subway, railroad and ferry (but not taxis)				

When comparing 2000 to 1990 the state again parallels national patterns. The state registered a slight increase in the share driving alone, about one percentage point, while carpooling shifted slightly lower. Walking and transit shares also declined. Overall transit declined in share from about 2.6 percent in 1990 to 2.1 percent in 2000. The major factor here was the decline in transit share in Atlanta (Figures 20), where most of the state's transit ridership occurs, from 4.6 percent

to 3.5 percent, a loss of 24 percent. The only other gainer in addition to Driving Alone was working at home which jumped almost a full percentage point.

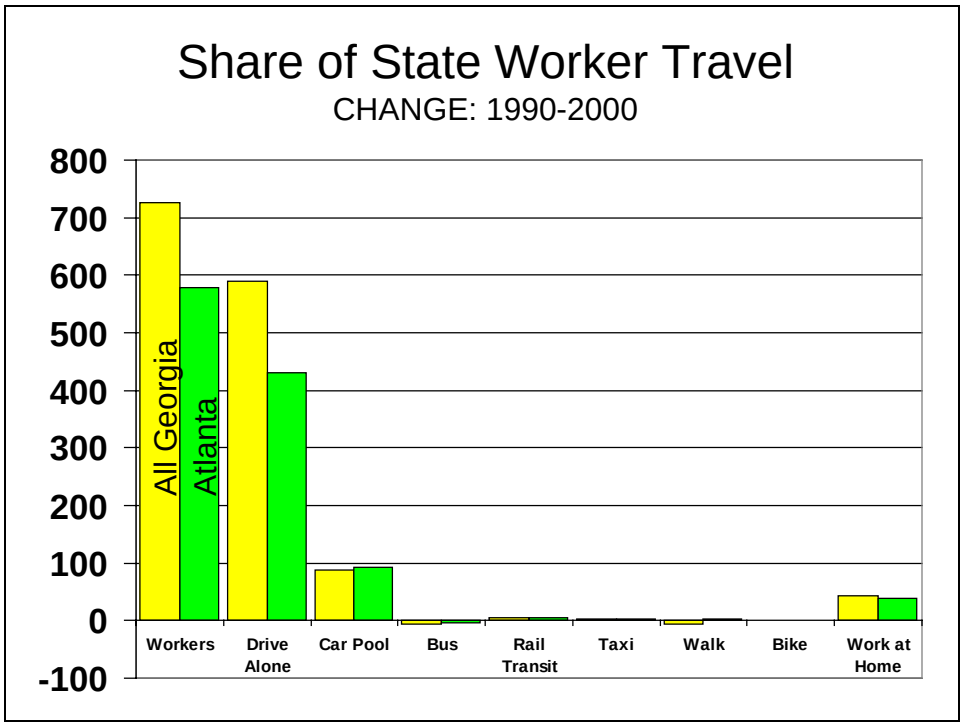

Figure 20

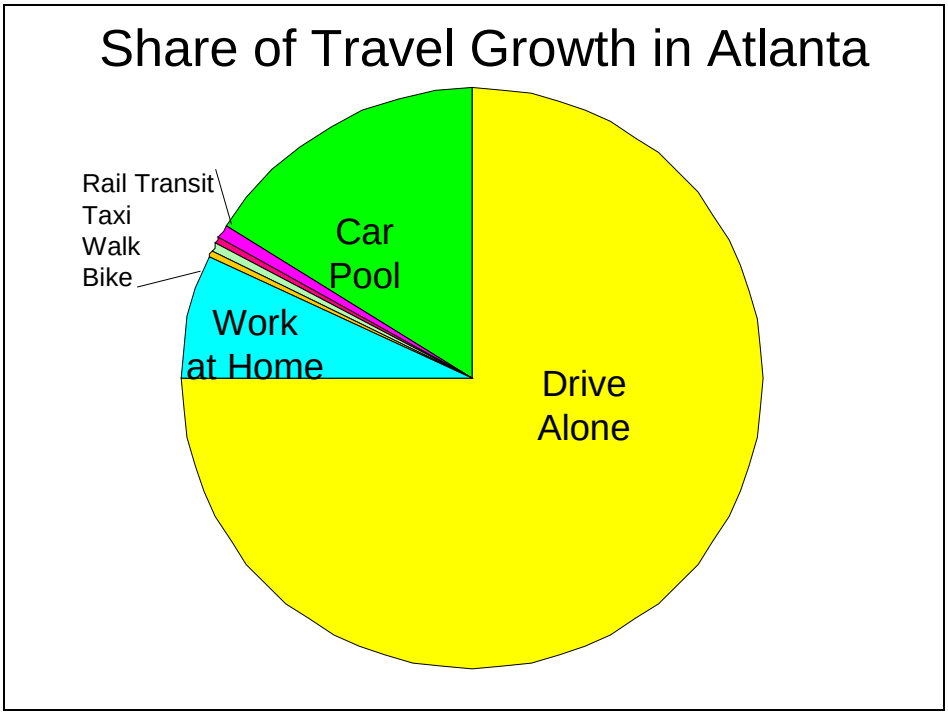

Figure 21

Overall the state had an increase of 726,000 new workers in the decade, a growth rate of over 23 percent. Atlanta area's growth rate was almost 40 percent and accounted for 80 percent of the State's worker growth. Atlanta accounted for about 73 percent of the State's carpooler increase and a whopping 89 percent of working at home workers and of course all of the transit rail increase.

Atlanta: In Atlanta 90 percent of worker growth was accounted for by driving alone and carpooling with working at home accounting for another 7 percent (Figure 21). All other modes: bus, rail, walking, biking, and taxis accounted for the remaining one and a half percent. In the overall state the three modes that handled 97 percent of all growth in Atlanta accounted for ***all*** growth as bus declines statewide counter-balanced rail growth in metropolitan Atlanta (Tables 14 and 15).

Table 14
Work Trips by Transportation Mode: Georgia Metropolitan Areas: 1990

	Atlanta	Albany	Athens	Augusta	Chattanooga	Columbus	Macon	Savannah
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Drove alone	78.0%	79.8%	76.1%	76.0%	79.4%	74.7%	79.5%	75.3%
Carpooled	12.7%	13.7%	14.3%	16.6%	14.7%	13.9%	14.7%	14.0%
Transit	4.6%	1.4%	1.5%	1.0%	1.2%	1.2%	1.1%	3.6%
Bicycle	0.1%	0.3%	0.5%	0.2%	0.0%	0.1%	0.2%	0.5%
Walked	1.5%	2.6%	3.9%	3.6%	1.9%	6.9%	2.2%	3.3%
Worked at home	2.2%	1.1%	2.7%	1.5%	1.9%	1.7%	1.4%	1.8%
Other	0.9%	1.2%	1.0%	1.2%	0.9%	1.5%	1.1%	1.6%

Table 15
Work Trips by Transportation Mode: Georgia Metropolitan Areas: 2000

	Atlanta	Albany	Athens	Augusta	Chattanooga	Columbus	Macon	Savannah
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Drove alone	77.0%	79.8%	77.2%	80.3%	82.7%	75.8%	81.3%	77.8%
Carpooled	13.6%	15.0%	14.1%	13.6%	12.2%	14.2%	13.6%	13.4%
Transit	3.5%	0.8%	1.5%	0.6%	0.6%	0.9%	0.7%	2.3%
Bicycle	0.1%	0.1%	0.6%	0.2%	0.1%	0.1%	0.1%	0.5%
Walked	1.3%	2.0%	3.2%	2.7%	1.5%	5.2%	1.3%	2.4%
Worked at home	3.5%	1.5%	2.6%	1.7%	2.1%	1.9%	1.8%	2.4%
Other	8.3%	0.7%	0.8%	1.0%	0.7%	1.9%	1.1%	1.1%

Other Metropolitan Areas: There is not substantial change in the patterns of mode usage from 1990 to 2000 across the state, primarily a continuation of past trends. Declines in carpooling, walking and transit shares; growth in driving alone and working at home, paralleling generally the national pattern. Most notable are the changes in Atlanta where driving alone declined slightly but carpooling increased significantly, while transit declined. Atlanta may be joining in a national trend that is seeing some resurgence in carpooling, often fed by Hispanic

immigrants.[25] The particular high and low ranges across the state among the modes are shown in Table 16.

Table 16
Highest and Lowest Transportation Mode Share by Metropolitan Area (Excluding Atlanta)

	Highest	Lowest
Total:		
Drove alone	82.7% (Chattanooga)	77.2% (Athens)
Carpooled	15.0% (Albany)	13.6% (Augusta & Macon)
Transit:	1.5% (Athens)	0.6% (Augusta)
Bicycle	0.6% (Athens)	0.1% (Albany, Chattanooga, Columbus & Macon)
Walked	5.2% (Columbus.)	1.3% (Macon)
Worked at home	3.5% (Athens)	1.5 % (Albany)

Rural areas: There are multiple ways to define rural areas in any state. By whatever definition is employed the characteristics of mode choices vary little. Working at home, for instance, never exceeds 3 percent of all commuters under any definition. Surprisingly, walking is also a minor factor with small urban communities in rural areas the highest level at not quite 3 percent. In a state where overall transit use is not 2 ½ percent it is not a surprise that no rural defined area exceeds 1 percent transit use. Fewer than 6,000 transit users in a non-metropolitan population of over one million. Of course the transit services provided in these areas are extremely limited. Overall the private vehicle is dominant with the range running from 93 percent to 95 percent of all travel depending on the definition of rural employed. The significant variations are in the degree of carpooling with variations from as low as 13 percent in rural areas within metropolitan areas to as high as above 18 percent in small urban communities with non-metropolitan areas.

D. THE TRANSPORTATION SYSTEM

As will be outlined later, the greatest traffic congestion problems in Georgia are in the Atlanta metropolitan area.

Atlanta has some of the widest and most advanced design freeways in the nation. However, the system largely serves and feeds the urban form as it existed 30 or more years ago. Since that time, the emerging growth and development patterns have not been accompanied by the roadway expansion that would have been necessary to provide adequate service.

A Georgians for Better Transportation report provides additional information on the mismatch between roadway supply and demand. From 1988[26] to 1998, traffic in the seven county core of Atlanta increased 59.6 percent. This is 3.7 times as great as the expansion of freeways,[27] arterials, and collectors,[28] at 16.2 percent (Figure 22).[29] Traffic volume increased 2.5 times the

[25] This issue is discussed in greater detail in the Texas *Governor's Business Council Report.*
[26] Earliest year for which data is available.
[27] For the purposes of this report, the term freeway includes limited access toll roads (such as Georgia 400).
[28] Surface thoroughfares (signalized through streets).
[29] Calculated from The Road Information Program, *Metropolitan Atlanta: Breaking the Gridlock* (Atlanta: Georgians for Better Transportation, 2000).

rate of population growth in the seven county area and more than five times the rate of roadway expansion in Clayton, Fulton, and Rockdale Counties.

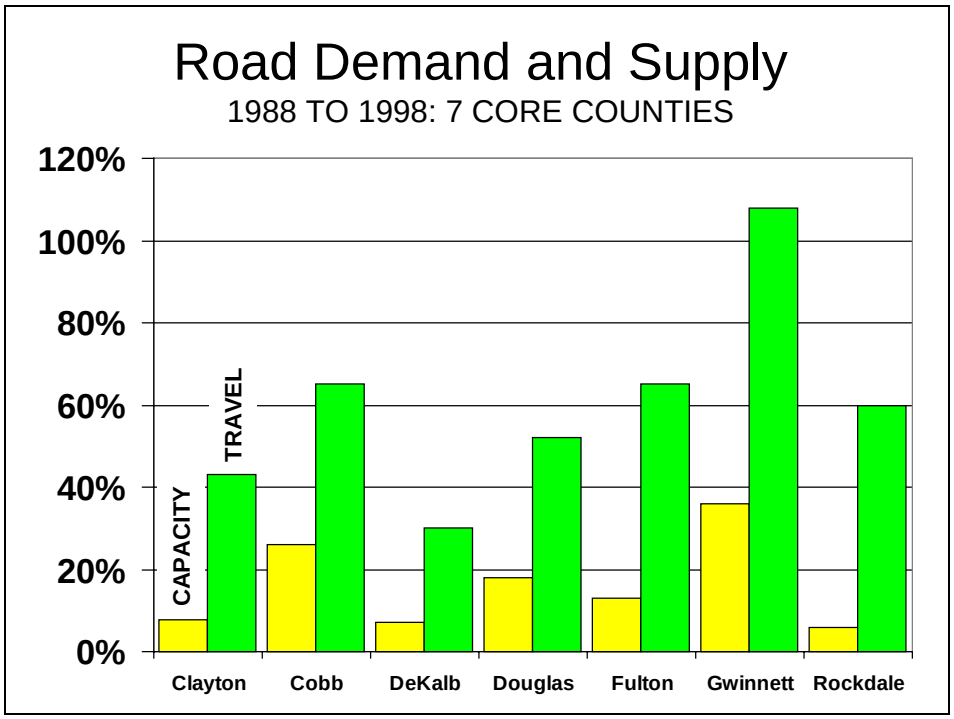

Figure 22

Freeways

The freeway system is predominantly radial---oriented toward downtown. Virtually the only non-downtown oriented (non-radial or "cross-town") freeway is the I-285 Perimeter, which is located well within the core of the urban area. For the most part, the I-285 Perimeter is located within the urbanized area as it was constituted in 1970. ***The 1,500 square miles that have been added to the Atlanta urbanized area since 1970 are by far the largest expanse of urbanization in the world with virtually no non-radial freeways.***

The other ten largest urbanized areas[30] average from nearly two to more than three times the non-radial freeway mileage per square mile of Atlanta. Canadian urban planners often point with pride to fewer freeways than in the United States. But the two largest urban areas, Toronto and Montreal are much better served by non-radial freeways than Atlanta.[31] Even Tokyo, the world's most populated urban area and the third most sprawling (after New York and Chicago)[32] has non-radial freeway coverage superior to Atlanta and has embarked upon plans to more than double the extent of its urban freeway system. [33]

[30] Atlanta is the 11th largest urbanized area in the United States.
[31] www.publicpurpose.com/hwy-nonrad.htm.
[32] www.demographia.com/db-worldua.pdf.
[33] Toronto has more than six times the freeway mileage per square mile as Atlanta, and Tokyo has nearly twice as much. Tokyo's outer perimeter highway is under construction, with approximately one-half in operation.

The lack of non-radial, or cross-town freeways, combined with the substandard surface arterial system (below) artificially increases vehicle trips on the I-285 Perimeter and the freeways inside I-285 because these less direct routes save time, even with the significant congestion. Part of Atlanta's high roadway use per capita could be due to the indirect travel patterns that this overly core oriented highway system forces upon drivers. From 1988 to 1998, roadway use expanded at a far greater rate relative to population in centrally located Fulton and DeKalb counties (3.9 and 2.8 times population growth, respectively), which would tend to indicate that much of the traffic increase is due to travel by people from outside these two core counties who use the highly-congested roadways of the Perimeter and inside.[34] There is a serious need for additional freeway and arterial roadway capacity outside the Perimeter.

The traffic congestion problem is exacerbated by the imbalance of jobs relative to workers in the core of Atlanta. The counties that ring Fulton County (Cobb, Gwinnett, Clayton and DeKalb) have the most favorable balance of jobs and workers. Fulton County, on the other hand, has an imbalance, with an excess of jobs over workers. This results in an over-attraction of workers to the regional core. This is a major factor in the core traffic congestion of the Atlanta area.

Further, the core-oriented nature of the freeway system intensifies the impact of trucks on traffic congestion. Trucks play a crucial role in moving the nation's freight. The competitiveness of the trucking industry, combined with a largely free-flowing interstate highway system, has contributed importantly to the comparatively low cost of living in the United States. But intercity trucks have only one practical way of traversing the Atlanta area --- the I-285 Perimeter, which has a reputation as one of the most congested roadways in the nation. Traffic on this roadway is made worse by the fact that trucks are not permitted on the freeways within the Perimeter.

A recent report by American Highway Users Alliance (AHUA) ranked three Atlanta interchanges among the nation's 20 worst (Figure 23).[35] This analysis again underscores the over-centralized nature of the Atlanta area, with each of the interchanges being on or within the I-285 Perimeter Highway, inside of which less than one-half of the urbanized area population and less than one-third of the metropolitan area lives.

- The I-75/I-85 interchange (northern interchange of the "downtown connector") ranked sixth worst in the nation. More intense traffic growth has made the situation worse. In 1999 the interchange ranked 12th in the nation. AHUA projects that failing necessary improvements (which are not planned), travel delays through this interchange will nearly triple in 25 years.

- The I-85/I-285 interchange ("Spaghetti Junction") ranked 10th worst in the nation. In 1999 the interchange ranked 11th in the nation. AHUA projects that failing necessary improvements (which are not planned), travel delays through this interchange will nearly double in 25 years.

[34] Calculated from The Road Information Program, *Metropolitan Atlanta: Breaking the Gridlock* (Atlanta: Georgians for Better Transportation, 2000).
[35] American Highway Users Alliance, *Unclogging America's Arteries: Effective Relief for America's Highway Bottlenecks*, 2004.

- The I-75/I-285 interchange ranked 17th worst in the nation. In 1999 the interchange ranked 16th in the nation. AHUA projects that failing necessary improvements (which are not planned), travel delays through this interchange will nearly double in 25 years.

AHUA further projects that failure to make needed improvements will result in 74 more fatalities, 7,800 more injuries and 16,000 more traffic accidents over the next 25 years.

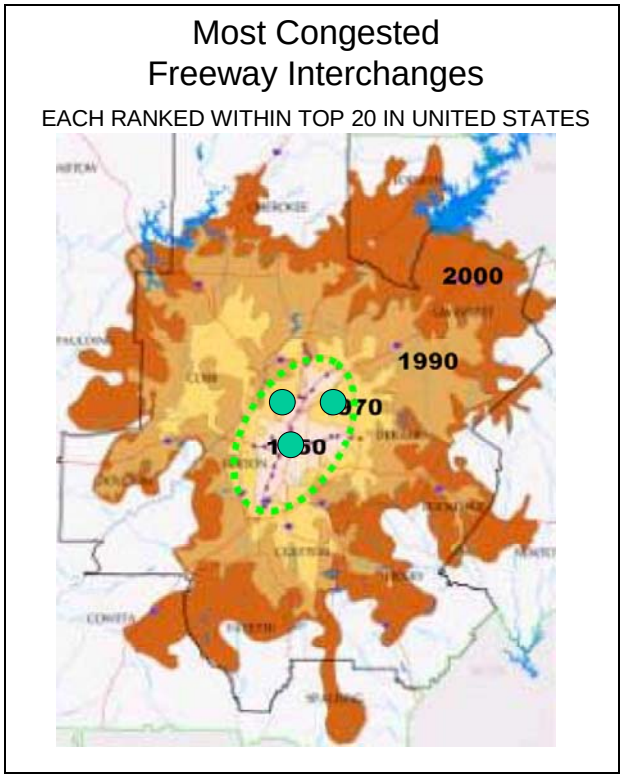

Figure 23

Surface Arterials

In many urban areas, surface arterials provide effective alternatives to freeways and are routinely used by drivers to avoid recurring or incident congestion. This is well illustrated in major portions of the Los Angeles area, where four to eight lane surface arterials are found each mile and often four lane arterials are found in the intervening one-half mile.[36]

The Atlanta area has an under-developed surface arterial system, which does not provide effective alternatives to the freeway system. Moreover, the arterial system, like the freeway system provides little non-radial access.

[36]Los Angeles is the nation's most densely populated urban area, at 7,100 per square mile, more than four times that of Atlanta. This high density makes Los Angeles traffic congestion the worst in the nation, despite this comparatively dense roadway system.

Many arterials outside central Atlanta are two lane roadways, often without shoulders. In some cases arterial roadways are simply the county roads that pre-dated development. Besides the inherently low capacity of two lane roads, the lack of shoulders increases traffic congestion, due to incidents, left turns or right turns. Public transit buses are forced to impede traffic where there are no shoulders as they stop for passengers.

The lack of an effective surface arterial system places additional burden on the freeway system and generally makes traffic worse throughout the area. The Atlanta Regional Commission has recognized the deficiency of the arterial system and is proposing a cross-regional grid of higher capacity surface arterials.[37] And, both Cobb and Gwinnett Counties have undertaken effective programs to build and expand surface arterial streets, using sales tax funding.

Atlanta Traffic in Context

Traffic could get much worse, as growth continues to be greater on the urban periphery. From 2000 to 2003, growth inside Fulton and DeKalb Counties (the only counties principally within I-285) accounted for only three percent of metropolitan growth, while 97 percent occurred in the 18 other counties.[38] For each person added in Fulton and DeKalb Counties, more than 30 were added in the other 18 counties (Figure 24).[39] Nearly all of the expansion of the urbanized area since 1960 has been outside the I-285 Perimeter. Yet the overwhelming majority of transportation improvements have been made within the I-285 Perimeter (Figure 25).

Ironically, Atlanta, which is one of the least core-oriented urban areas in the world, has one of the most core-oriented roadway systems. And as indicated above, the decentralized population growth is continuing. ***The underdeveloped roadway system is a principal cause of Atlanta's severe traffic congestion.*** For example, Los Angeles has 2.5 times the roadway density of Atlanta (freeway equivalent lane miles per urbanized square mile). If Atlanta's roadway density were at the Los Angeles level, there would be little, if any traffic congestion because of Atlanta's much lower population (and thus traffic) density (Figure 26).[40]

Given the under-investment that has occurred in roadways throughout the Atlanta area, it is fortunate that population density is so low (that sprawl is so extensive). If Atlanta had the population density of the average large U.S. urbanized area, it is likely that traffic congestion would be the worst in North America and would rival the levels of European and even Asian urban areas, which are characterized by much greater traffic congestion.

There is a balance between population density and roadway system. A more dense area will require a more robust roadway system to control traffic congestion, while a less dense area will be able to preserve more free flowing traffic with a less comprehensive roadway system. ***Atlanta's problem is that, even though it is a very low-density urban area (with comparatively modest traffic volumes, as is indicated below), its roadway system is so under-developed that***

[37] Such a grid was suggested in Wendell Cox, *A Common Sense Approach to Transportation in Atlanta*, Georgia Public Policy Foundation, 2000.
[38] 20 county metropolitan area as defined in 2000.
[39] Calculated from US Census Bureau estimates.
[40] Estimated from Texas Transportation Institute data, 2001.

traffic congestion is intense. For example, by comparison, Kansas City is 30 percent more dense than Atlanta and has a similar average per capita driving distance. Kansas City has approximately double the freeway and arterial density of Atlanta, and has a peak hour Congestion Penalty of only 11 percent, less than 1/3 of Atlanta's 39 percent. There are six urbanized areas of more than 1,000,000 population with a Congestion Penalty of less than 20 percent. Each of them is more dense than Atlanta, but more than compensates by having a more intense network of freeways and arterials.[41]

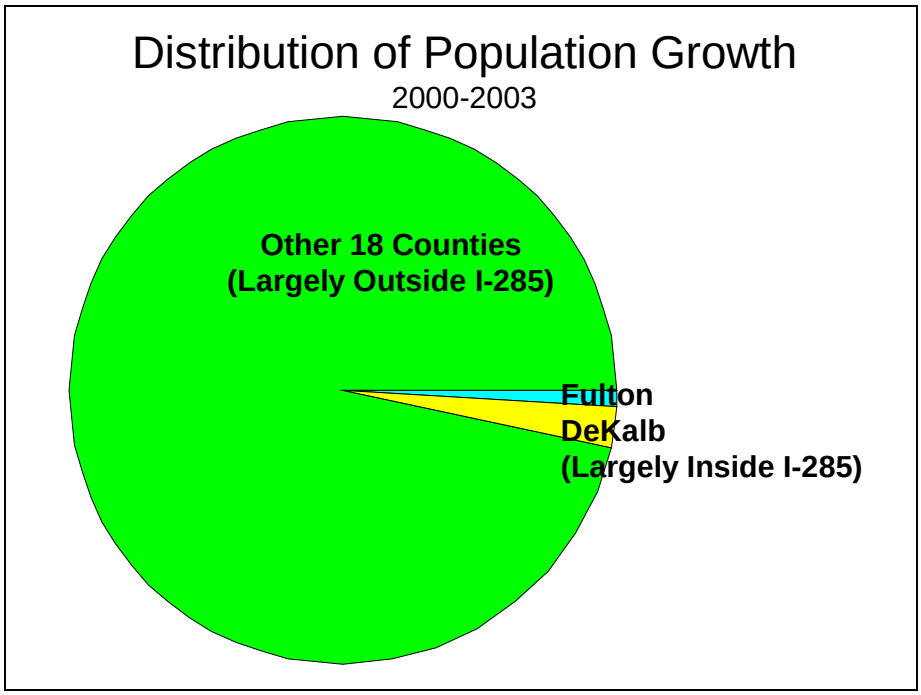

Figure 24

[41] Estimated from the US Census Bureau and the Texas Transportation Institute.

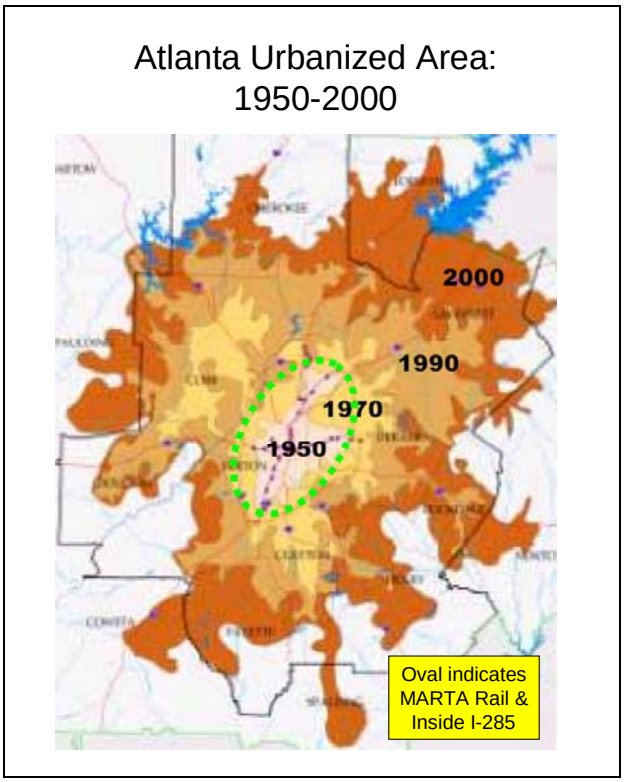

Figure 25

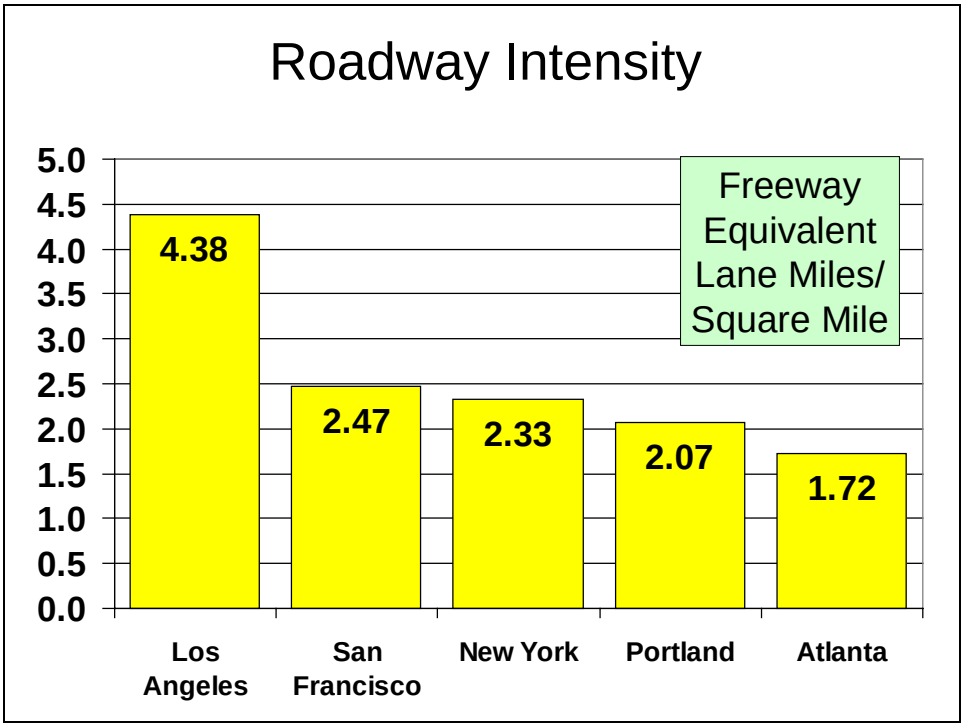

Figure 26

Transit

At the same time, Atlanta has invested heavily in public transit. Since 1980, Atlanta has opened a high-quality Metro system (MARTA) of world-class standards. Metros are fully grade separated urban rail systems that run either in subway or elevated configurations.[42] The lack of grade crossings allows trains to operate faster, somewhat like freeway speeds are faster because there is no cross-traffic. In fact, Atlanta's MARTA has the fastest average operating speed of any US Metro system, with the exception of San Francisco's BART and the Philadelphia Port Authority line. These systems operate with Metro technology but have a service design more akin to that of a regional rail system (commuter rail or suburban rail), with less frequent station stops.[43] This allows faster travel times that are more akin to commuter rail than metros.

Only seven of the world's urban areas have opened more Metro mileage than Atlanta in the last 25 years.[44] Moreover, each of the six urban areas is larger than Atlanta. In addition, within the MARTA service area (Fulton and DeKalb Counties), transit ridership is high. MARTA carries the second highest ridership per capita (passenger miles) of any major transit system in the United States. Only the New York City Transit Authority carries higher per capita ridership.[45]

At various times, comparisons have been made between the Portland and Atlanta transit systems. Proponents of "smart growth" have claimed that Portland's transit performance is superior to that of Atlanta. But Portland lacks high-quality urban rail and its ridership density is lower. Portland has built only light rail (trolley or street-car), with grade crossings, slower operations and a daily ridership approximately one-third that of MARTA (Figure 27).[46] Ridership in passenger miles per capita within the MARTA service area is more than 75 percent higher than in Portland's (Tri-Met) service area (Figure 28).[47]

[42] Metros are the highest quality and highest capacity urban rail systems. Unlike light rail, streetcars and commuter rail, Metros generally do not have at-grade crossings by roadways or other rail lines. This allows faster operation and more frequent service. Metros are also much more expensive, averaging $200 million per mile or more. This compares to $50 million per mile for light rail and $5 to $10 million per mile for commuter rail. Well-patronized Metro systems have lower costs of operation per person mile, because they carry so many more people.
[43] Based upon U.S. Department of Transportation, Federal Transit Administration, National Transit Database, 2002.
[44] Seoul, Washington, Tokyo, Hong Kong, Singapore, Pusan (Korea) and Madrid, all of which are larger than Atlanta. List developed from information in *Jane's Urban Transport*, multiple editions.
[45] Calculated from U.S. Department of Transportation, Federal Transit Administration National Transit Database, 2002.
[46] Overall Portland area bus and rail ridership is also less than rail ridership alone in Atlanta. Calculated from FTA National Transit Database.
[47] Calculated from Federal Transit Administration National Transit Database.

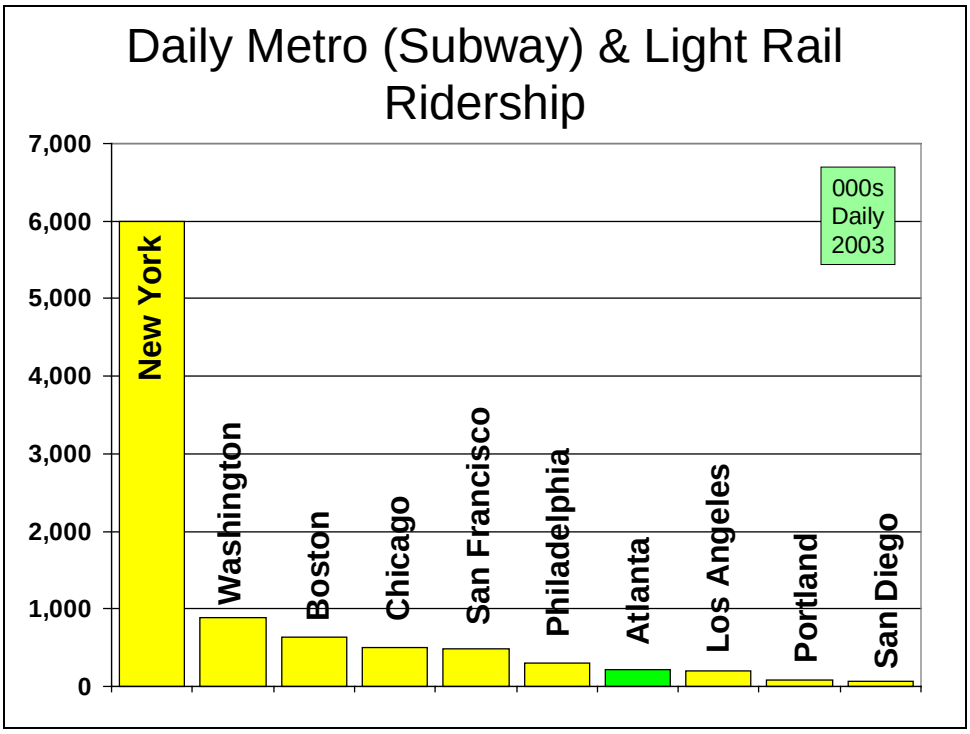

Figure 27

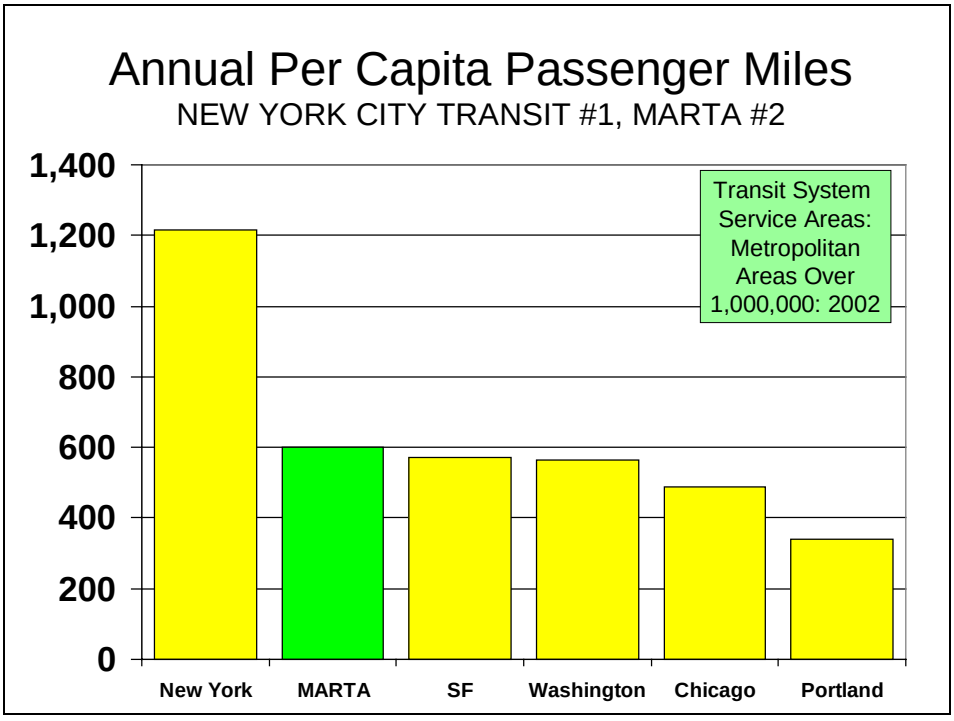

Figure 28

Atlanta's transit system is oriented toward the core even more than the freeway system and it serves little beyond the 1970 urbanized area. Unlike freeways, however, this core-oriented design is typical of virtually all major urban areas in the high-income world. A core oriented design is appropriate because the core areas (central business district or "downtown") alone typically have an employment density sufficient to justify the high-quality transit services that are fast enough to compete with automobiles and are therefore able to attract large numbers of drivers from their cars. The lower employment densities outside downtown makes it cost prohibitive to provide transit services of a quality that would attract drivers from automobiles (automobile competitive services). As a result, non-downtown transit market shares tend to be miniscule.

Further large capital investments tend to have substantially diminishing returns. This is illustrated by the ARC *2025 Plan*, which proposed adding more than 300 miles of rail, which would add more than six times the present rail mileage to the transit system. While proposing to spend 55 percent of resources on transit, transit's share of trips in the area were projected to rise only modestly, from 2.6 percent to 3.4 percent.[48] Automobile use would rise 18 times that of transit. At the proposed rate of transit spending, it would take more than 25 times the planned highway and transit spending levels on transit alone to simply stop the growth in traffic congestion, much less to reduce it from what may be considered the currently intolerable levels. In short, there are no projections suggesting that massive investments in transit would have more than a negligible effect on future levels of traffic congestion.

This is not just an Atlanta issue. Throughout the high-income world, transit ridership is concentrated within the comparatively small dense cores and to the central business district. In most urban areas, transit is already attracting virtually all of the automobile market that can be cost-effectively attracted.

Projections such as these are evident throughout the high-income world. Nowhere are there plans, much less a serious vision of transit system improvements that would materially reduce the market share of automobiles, because it would be far too costly (Appendix II).[49]

At the same time, transit can be improved to the benefit of both transit riders and people who travel by automobile. The growing support for bus rapid transit (BRT) in the Atlanta area is a healthy development. Bus rapid transit, when combined with high-occupany toll lanes (HOT Lanes) provides faster trips for transit riders, while making car pool and toll-based single-occupancy vehicle travel more convenient.

But, in the future, highway and transit improvements should be subjected to the same evaluation standard --- the extent to which they cost effectively contribute to the reduction of traffic delay hours.

[48] Atlanta Regional Commission, *2025 Regional Transportation Plan.*

[49] Hong Kong is seeking to maintain its high transit market share (over 70 percent) by a significant expansion of its urban rail system. This can be accomplished because the urban area covers so little area and is so dense.

E. TRAFFIC CONGESTION AND AIR POLLUTION

Traffic has increased throughout the state. ***From 1990 to 2002, traffic on Georgia freeways increased 75 percent, while the capacity***[50] ***increased only 17 percent***.[51] Atlanta is the only Georgia urbanized area included in the Texas Transportation Institute annual mobility study, so there is less comprehensive data on other urban areas. However, based upon urban areas with similar traffic intensities in the Texas Transportation Institute database, it appears likely that the Congestion Penalty could already exceed 15 percent in Augusta and 10 percent in Columbus and Savannah.

Traffic intensities have already exceeded one-half the Atlanta rate in Augusta and are approaching one-half of Atlanta in Columbus and Macon. Daily traffic volumes per freeway lane mile exceed one-half the Atlanta rate in Macon and are approaching one-half of Atlanta in Augusta, Savannah and Albany (Table 17).

Table 17
Georgia Urbanized Areas: Population & Traffic

Urbanized Area	2000 Population	2002 Traffic Intensity (Daily Vehicle Miles per Square Mile)	2002 Daily Vehicle Miles/ Freeway Mile
Atlanta	3,500,000	57,713	19,266
Augusta	354,000	35,458	9,270
Columbus	242,000	26,680	8,213
Savannah	209,000	27,657	8,825
Macon	135,000	NA	10,221
Warner Robins	90,000	NA	NA
Athens-Clarke County	106,000	NA	7,509
Albany	95,000	NA	9,081
Rome	58,000	NA	8,500

Data from Federal Highway Administration and US Census Bureau

While metropolitan Atlanta has by far the worst traffic conditions in the state, the impacts are felt throughout Georgia. Atlanta, located at the state's most important crossroads of interstate highways, has intense traffic congestion. Large trucks are permitted to travel through the Atlanta area only on the highly congested I-285 Perimeter highway. This congestion makes travel times difficult to predict, complicating transportation logistics for manufacturing and distribution facilities located along interstate highways that eventually reach Atlanta. The Atlanta traffic bottleneck could hamper, for example, the competitiveness of the port of Savannah, especially with respect to truck shipments to and from Midwest or Western locations.[52]

[50] Measured in lane miles. For example, an eight-lane freeway will have 8 lane miles in single mile of freeway.
[51] Calculated from Federal Highway Administration, *Highway Statistics 2003.*
[52] Elsewhere the challenge of accommodating increased truck traffic is discussed. There may be some value in considering strategies to encourage greater use of freight rail through the Atlanta area to reduce traffic congestion.

The Anomaly: Low Density and Traffic Congestion: Both the US and international data indicates that greater traffic intensities and traffic congestion tend to be associated with higher urban population densities (Figure 29). As would be expected, the intensity of traffic in Atlanta is comparatively low, reflecting its very low urban density (Figure 30). Atlanta's heavy traffic congestion, overall traffic volumes are not as intense as in urban areas that are far smaller. Atlanta's vehicle miles traveled (VMT) per urban square mile of urbanized land area ranked 24th among the 37 areas above 1,000,000 as reported by the Federal Highway Administration. Much smaller urban areas, such as Fort Wayne, Indiana (approximately the same size as Columbus, Georgia), with a population less than 1/10th that of Atlanta (250,000) had greater traffic intensity than Atlanta. Atlanta's traffic intensity is also below that of Portland, reflecting the impact of that urban area's higher density. The nation's highest traffic intensity is in Los Angeles, which is, by far, the nation's most densely populated urban area. [53]

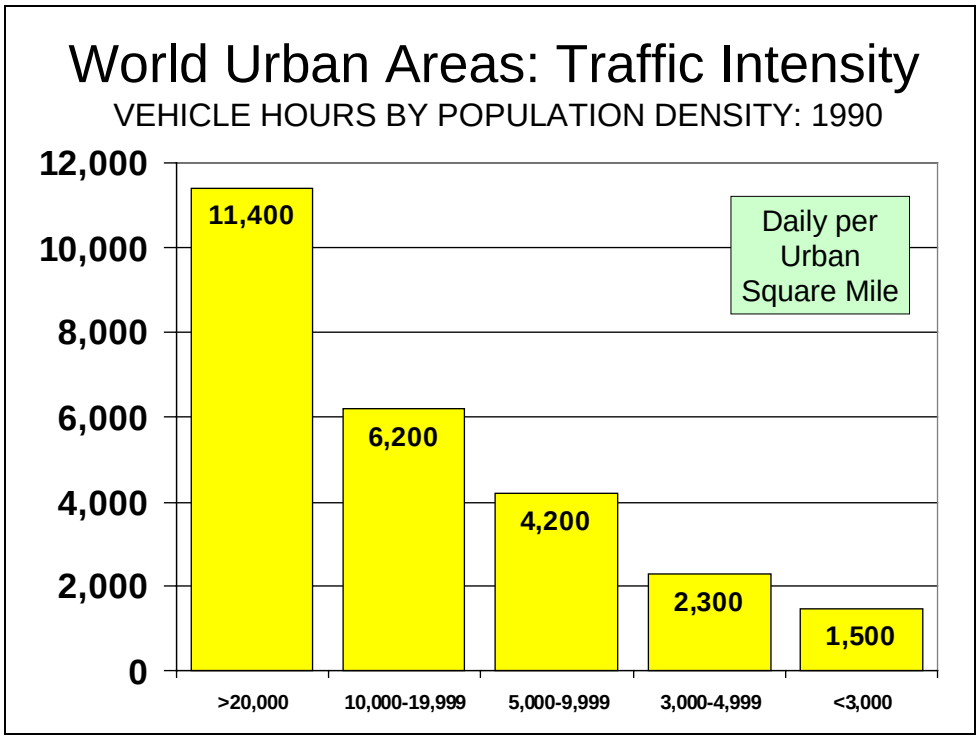

Figure 29

Such a program has been developed in the Los Angeles area (Alameda Corridor) and at least two additional corridors are being considered. This report does not analyze the potential for establishing new infrastructure that would encourage greater freight intermodalism through the Atlanta area.

[53] Despite the fact that Los Angeles is often considered the ultimate example of urban sprawl, 2000 Census data indicates that its overall urban population density is at least 15 percent greater than that of any other US urban area, and more than 30 percent greater than that of New York. Unlike New York, the population density of Los Angeles is comparatively high in the suburbs, which more than makes up for the much higher core area density of New York.

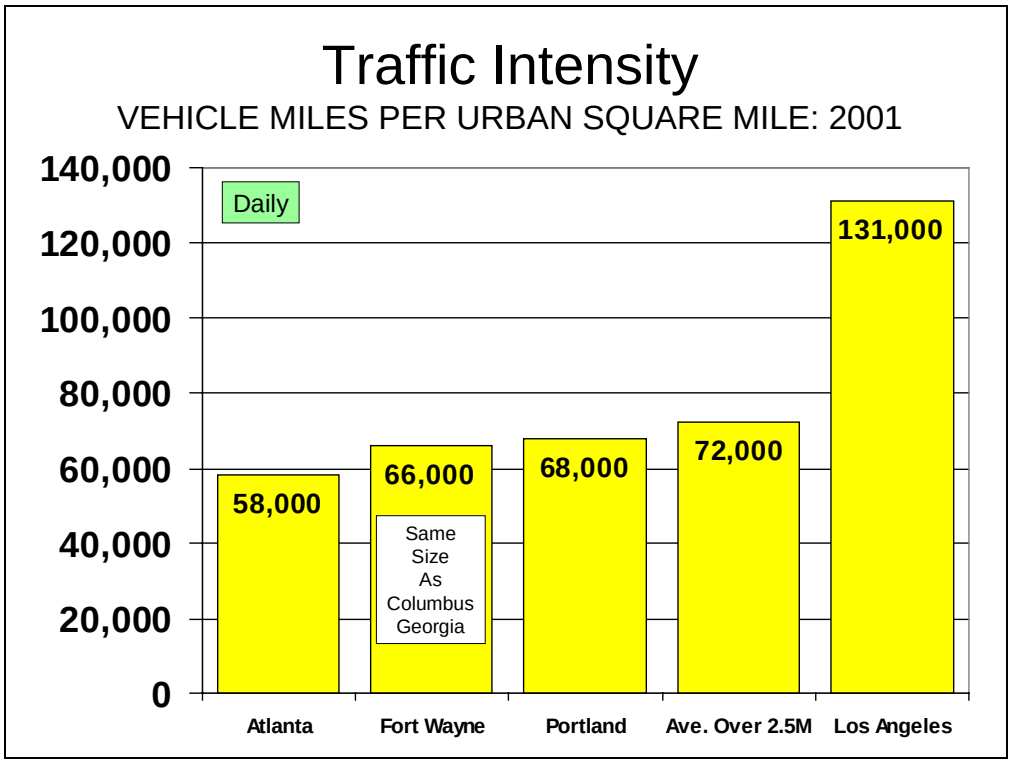

Figure 30

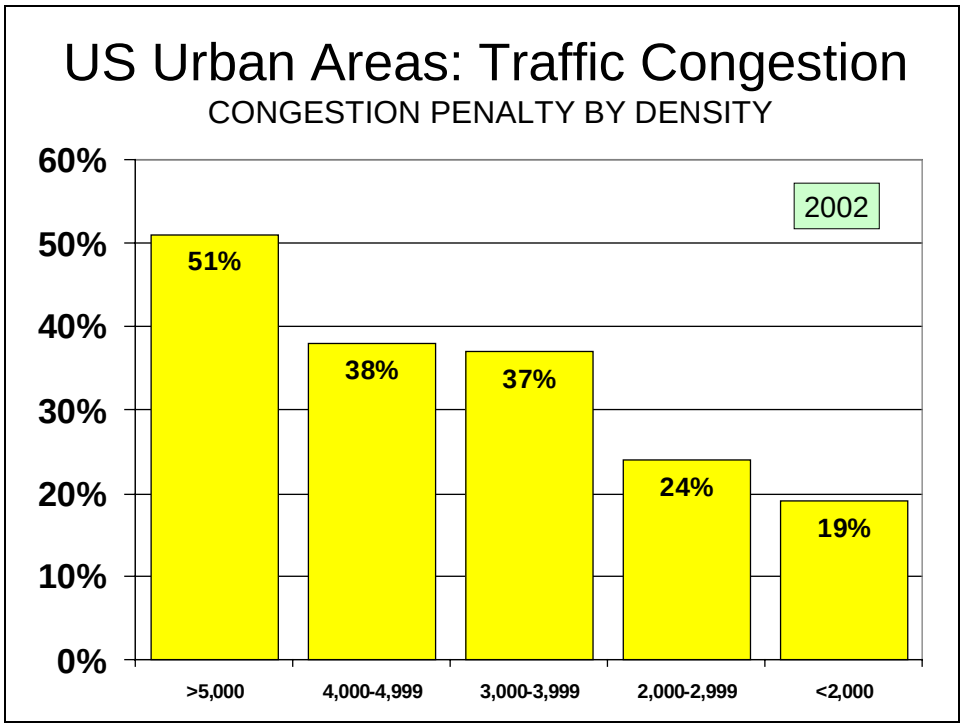

Figure 31

Similarly, the US data indicates that traffic congestion itself is less where urban densities are lower (Figure 31). The nation's worst traffic congestion is in Los Angeles,[54] where traffic intensities are more than double that of Atlanta. With Atlanta's very low urban population density, it would be expected that traffic congestion would be comparatively favorable. But, to the contrary, Atlanta's traffic congestion is severe. This is caused by the fact that Atlanta's modest traffic volume is concentrated on a roadway system that has insufficient capacity (described in greater detail below).

Further, other urban areas have similar average daily per capita travel distances,[55] such as higher density Dallas-Fort Worth and Kansas City.[56] The national media has often suggested that average daily driving per capita is highest in Atlanta. While it is high, a number of other urban areas have similar or higher rates (such as Houston, Kansas City, Nashville, etc.). Moreover, according to ARC data, Atlanta's per capita roadway travel increased only five percent from 1990 to 2001. This is well below the national average of 25 percent.[57]

Air Pollution: Some analysts have suggested that higher density urban areas have lower *overall* levels of motor vehicle produced air pollution. This depends on a number of factors, such as the average speed of traffic and the extent to which "stop and go" conditions prevail. But the health effects of air pollution are not regional; they are individual --- related to the intensity of air pollution in the specific area where the air is breathed. Air pollution is more intense in local areas where traffic volumes are greater, and even more intense where traffic operates more slowly and in "stop and go" conditions. More intense air pollution in a local area is a more significant health risk that the gross amount of pollution in an entire urban area.[58] Generally, lower levels of air pollution are associated with the higher speeds (Figure 32) typical of lower density urban areas.[59]

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[54] Even the traffic congestion of Los Angeles, however, is modest compared to that of more dense international urban areas. For example, vehicle hours per square mile are lower in Los Angeles than the average of Western European urban areas (http://www.i2i.org/SuptDocs/Enviro/AirPollutionSmartGrowth.htm).

[55] In a number of recent years, Atlanta has been identified as the urban area with the longest daily per capita travel distances. This is the result of erroneous data used by the Federal Highway Administration. In 2000, FHWA estimated the Atlanta urbanized area population at 2.98 million. The Census Bureau figure for the same year was 3.50 million. As a result, the Federal Highway Administration estimated Atlanta's daily travel rate at 33.8 miles per capita. The Atlanta Regional Commission has estimated the figure for the 13 county region at a more modest 31.8, which is more consistent with the actual (Census Bureau) population data (*Fact Book* 2002). As of the 2002 *Highway Statistics* annual publication, FHWA had not reconciled its estimates to the Census count, which is conducted once every ten years.

[56] In 2000, Dallas-Fort Worth had a density 65 percent above Atlanta, and average peak period travel delays 11 percent less. Kansas City had an average density 31 percent above Atlanta, but average peak period travel delays were 70 percent less.

[57] Calculated from Texas Transportation Institute data.

[58] This can be illustrated by the following example. The state of Alaska is more than 500 times the size of the state of Rhode Island. If, for the sake of discussion, air pollution volumes were the same in Alaska as in Rhode Island would indicate little about the comparative health risks. In Alaska, the air pollution would be far more dispersed, so that generally, people would be exposed to far less intense pollution. In Rhode Island, the air pollution would be concentrated in an area 1/500th the size of Alaska, and would be much more intense than in Alaska. People in Rhode Island would be generally exposed to much more air pollution, as a result. The critical issue with respect to the

Generally, more severe air pollution classifications in the United States are associated with higher density urban areas (Figure 33).[60] This mirrors the international evidence, with air pollution production per square mile being lower where population densities are lower. [61] But, again, Atlanta is an anomaly. With its moderate levels of traffic crowded onto an under-developed roadway system, traffic congestion is worse, and Atlanta has some of the nation's worst air pollution.

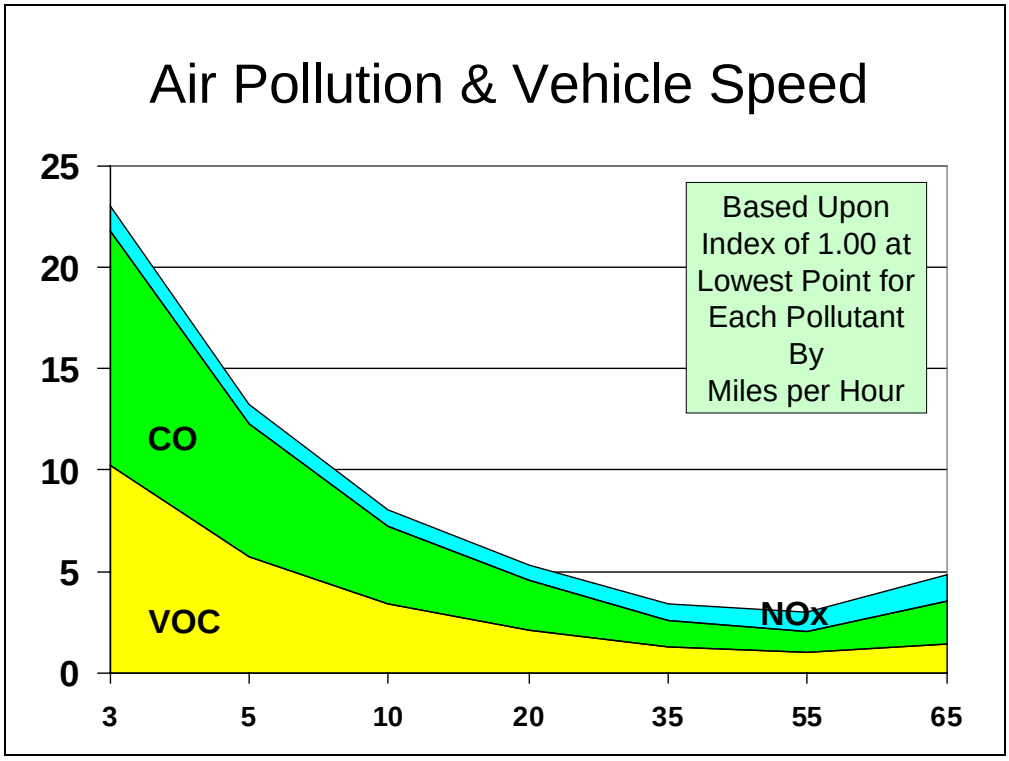

Figure 32

health impacts of air pollution is not the gross pollution levels of a large area, but rather the micro-area pollution that is breathed by individual human beings.

[59] The optimal average urban speed (for minimizing air pollution) of up to 55 miles per hour is much higher than average speeds in any urban area.

[60] Randall O'Toole, "Dense Thinking," *Reason*, January 1999, based upon US Environmental Protection Agency data.

[61] http://www.demographia.com/db-intlapdens.htm.

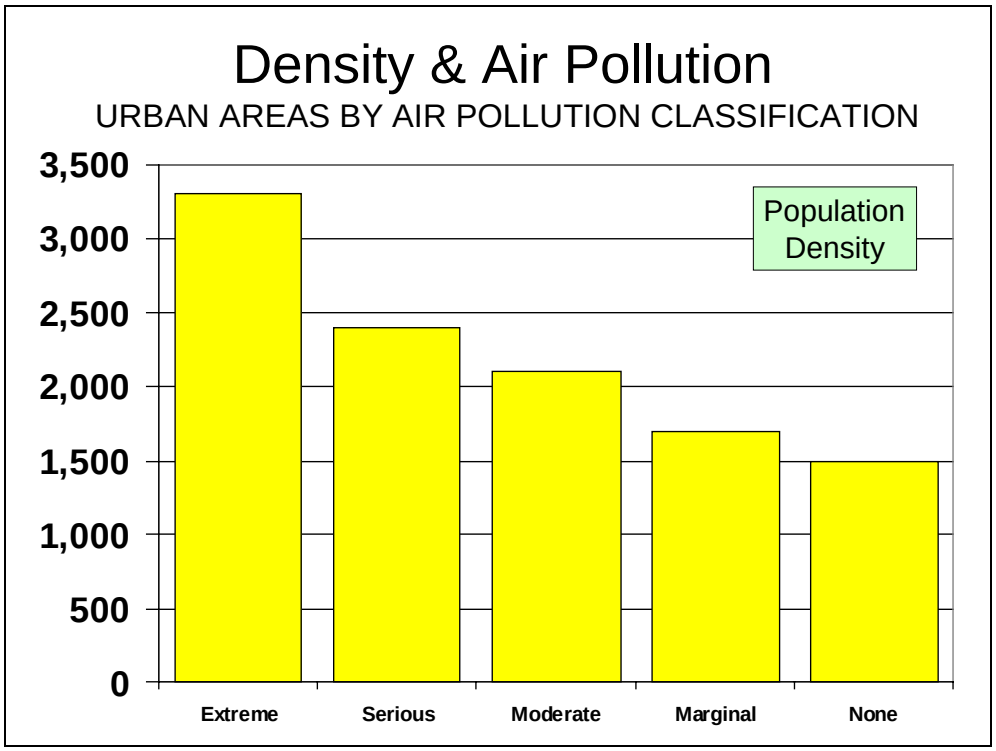

Figure 33

Urban Travel Trends in Atlanta

From 1982 to 2002, more than 98 percent of new travel in the Atlanta urbanized area has been on roadways.[62] Transit ridership more than doubled over this period, but roadway travel more than tripled. In 2002, roadways represented more than 97 percent of travel in the Atlanta urbanized area.[63]

Atlanta's freeway traffic is among the most intense in the nation. In 2002, Atlanta's freeways carried 19,200 vehicle miles of travel per lane mile, 17 percent less than first-ranked Los Angeles. Atlanta now ranks fifth in freeway traffic intensity, trailing only California urban areas (Los Angeles, San Francisco, Riverside-San Bernardino) and Chicago. The situation has deteriorated since 1990, when Atlanta freeways had the 20th most intense traffic volume and carried 43 percent less traffic than in Los Angeles.

In 2001, the Texas Transportation Institute (TTI) estimated Atlanta's peak period Congestion Penalty at 39 percent --- the average trip during peak periods takes 39 percent more time than the same trip during non-congested periods.[64] This is nearly triple the 14 percent Congestion Penalty that was estimated in 1990 (Box: Measuring Traffic Congestion). Over the last decade and one-half, Atlanta's traffic congestion has increased more than that of most other fast growing urbanized areas.

[62] Person miles, estimated using FHWA, Texas Transportation Institute and Federal Transit Administration data.
[63] Estimated using person miles. ARC estimated the person trip market share for transit at 2.6 percent in 2000.
[64] Texas Transportation Institute *2003 Urban Mobility Report.*

Box:
Measuring Traffic Congestion

Congestion Penalty: This report uses a Congestion Penalty to measure traffic congestion (based upon the Texas Transportation Institute Travel Time Index[65]). The Congestion Penalty is the average amount of additional time required to complete a trip during peak periods (weekday morning and evening "rush hours"), compared to uncongested conditions. In 2001, Atlanta's Congestion Penalty was 39 percent. This means that the average trip during peak period took 39 percent longer than it would have during non-congested conditions . For example, a 30-minute trip in non-congested conditions is estimated to average approximately 42 minutes during peak periods in Atlanta. The table below illustrates Congestion Penalties based upon various travel times.

Travel Time During Non-Congested Periods (Minutes)	Congestion Penalty										
	0% (No Congestion)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	Travel Time in Minutes During Peak Periods										
10	10	11	12	13	14	15	16	17	18	19	20
20	20	22	24	26	28	30	32	34	36	38	40
30	30	33	36	39	42	45	48	51	54	57	60
40	40	44	48	52	56	60	64	68	72	76	80
50	50	55	60	65	70	75	80	85	90	95	100
60	60	66	72	78	84	90	96	102	108	114	120

Reliability Penalty: Roadway travel times are less reliable as traffic congestion becomes worse. This reduced reliability requires commuters to "budget" additional time to ensure that they arrive promptly at their destinations. The Texas Transportation Institute estimates an average additional time of 39 percent must be added in Atlanta to ensure on-time arrival 95 percent of the time. The Reliability Penalty is based upon the TTI "buffer time index."[66] With the Reliability Penalty, a traveler will need to "budget" nearly 54 minutes for a trip that would take 30 minutes in uncongested periods to ensure prompt arrival 95 percent of the time. This means that often the traveler will arrive early at the destination.

[65] The Travel Time Index indicates the amount of time necessary to make a trip during peak period compared to non-congested times. A Travel Time Index of 1.10 would mean that a trip that would take 30 minutes in uncongested traffic would take 33 minutes during peak period (30 * 1.10). The Congestion Penalty is the Travel Time Index minus 1. Thus a Travel Time Index of 1.10 would convert to a Congestion Penalty of 10 percent.

[66] The Buffer Time Index indicates the amount of additional time necessary to ensure on-time arrival 95 percent of the time. A Buffer Time Index of 1.10 would mean that an additional 10 percent must be added to the travel time to ensure on-time arrival 95 percent of the time. The Reliability Penalty is the Buffer Time Index minus 1. Thus a Buffer Time Index of 1.10 would convert to a Reliability Penalty of 10 percent.

But even this is just the beginning. TTI has begun to measure travel reliability and the additional time that must be added to anticipated travel times to ensure punctual arrival 95 percent of the time. TTI has estimated that an additional 39 percent must be added to actual average travel time to ensure on-time arrival 95 percent of the time. This is because more intensely crowded roads are less reliable due to the wide variations in travel times that severe traffic congestion can create.[67] Travel time unreliability most significantly impacts commuters, who travel to and from work virtually every weekday (Figure 34).

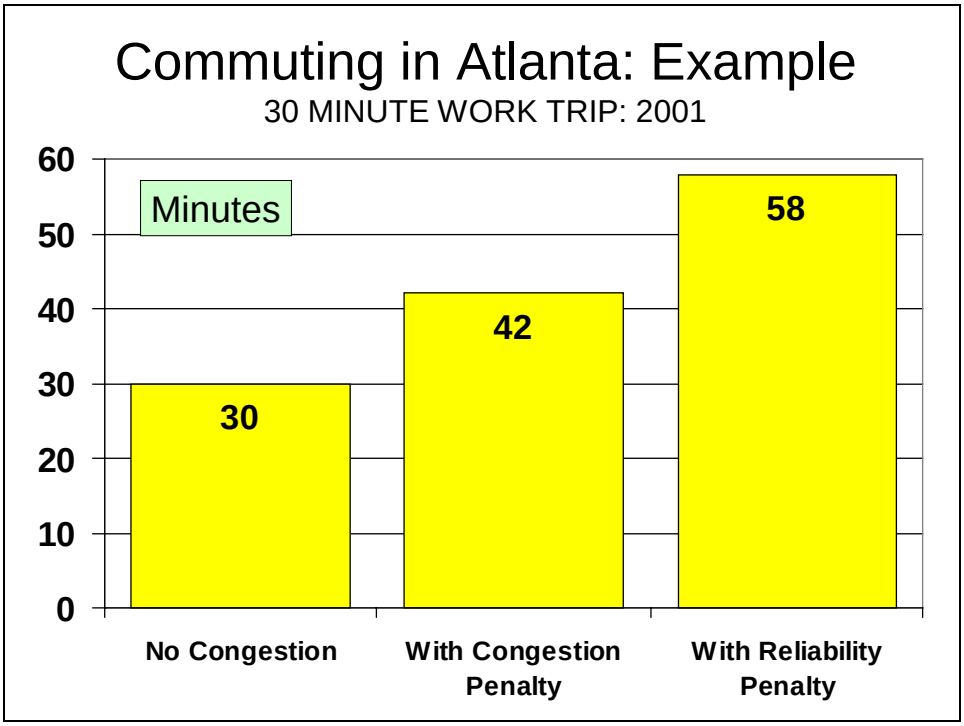

Figure 34

Atlanta commuters are already paying a price for severe congestion, as evidenced by the longest automobile work trip travel times in the nation (above).

As traffic worsens and population growth continues, Atlanta is likely to experience more increases in average commute times. This will make Atlanta less competitive with other urban areas. Even worse, if population growth continues at the present strong rate, and roadway expansion is minimal, as planned, the average work trip travel time could increase more.[68]

F. ROADWAY MANAGEMENT AND OPERATIONS IMPROVEMENTS

While the central focus of this review has been on the need for greater capacity to support past and future growth it is also an important goal of this work to promote the better use of the existing facilities that are now available. At a minimum one reason for this is to provide

[67] This measure of reliability is in its preliminary stages of development by the Texas Transportation Institute.
[68] For example, in Tokyo, which has 2.2 times the traffic intensity of Atlanta (1990 data), work trip travel time increased from 46 to 53 minutes in just five years (1995-2000) and is now more than 60 percent greater than Atlanta.

whatever extra capacity is possible, but the more important point is the need for recognition of the fact that public officials must assure the public that before new capacity development is undertaken that everything that could be done to wring whatever extra capacity out of the existing system has been done. It is simply good public policy to use the limited resources available as effectively as possible. These improvements often have the advantage of providing substantial safety and environmental benefits as well.

As capacity has become more strained and the ability quickly to provide relief has been reduced by increasing costs, as well as funding and planning constraints there has been an increasing focus on using assets better. A new focus has developed on the best possible management of transportation infrastructure assets consistent with safety. Moreover, these approaches often have the additional benefit of rapid implementation.

One way to consider this topic is to recognize that the existing capacity of the system is challenged every day by events, as illustrated in Figure 35. Special planned events such as facility construction or other work zones take away some of the capacity of the system. Other planned events such as parades, sports events and demonstrations also can impact capacity. But the most important drains on capacity are usually those unplanned events such as weather problems or traffic incidents that can occur anywhere on an unscheduled – but regular – basis. Finally there are what are considered the sources of recurring delay; the misfit between the level of demand of the public and the capacity or design characteristics of the facilities available. To respond to these needs a full array of technological skills and activities are needed. It can be looked upon as using technological means to get back some of the capacity lost due to the challenges identified just above.

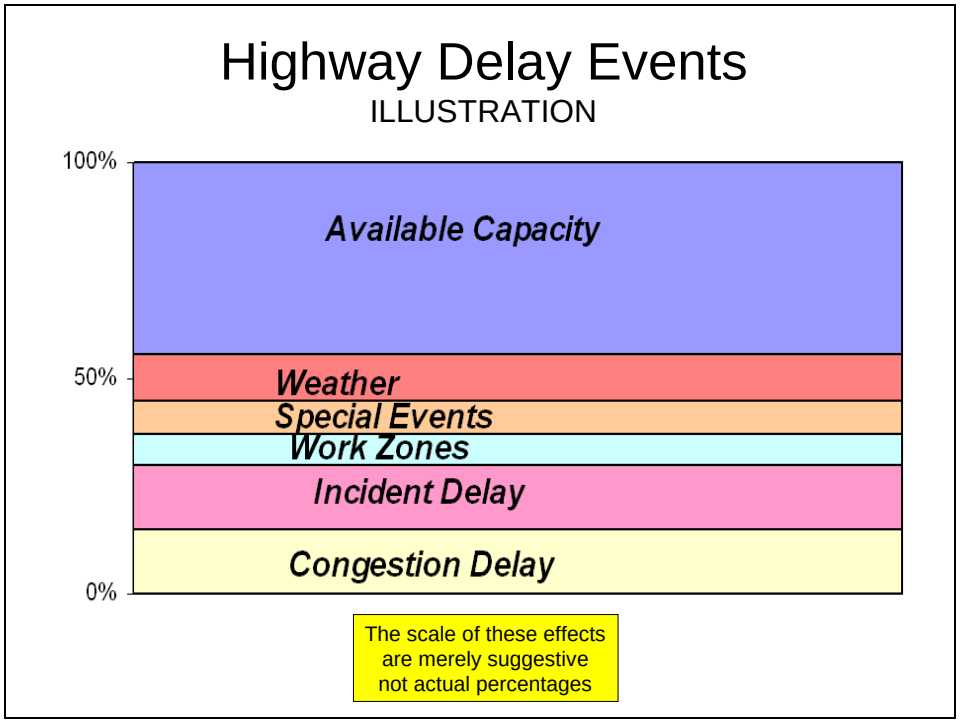

Figure 35

The present set of tools available to respond to these needs are limited but growing. They use communications and other computer based technologies to assist operators to manage the system. Some of the tools are facility-based such as better signalization timing at arterial intersections, and ramp metering or message signs on freeways; others are vehicle-based such as communication systems to notify vehicle operators of problems ahead and to guide their routing. Often these strategies are referred to as Intelligent Transportation Systems (ITS).

- Putting scale to the costs and benefits of implementing these Intelligent Transportation Systems technologies is difficult. There are no definitive statistical mechanisms at this time to assert that a particular percentage of capacity can be gained by spending specific amounts of money. But limited experience has shown that on an anecdotal basis there are high payoff opportunities that must be evaluated to assess whether their potential benefits can be appropriate to a given circumstance.

- One series of estimates[69] put crashes as the cause of almost 800 million hours of delay per year; vehicle breakdowns at another 200 million; weather effects at 550 million; work zones at 500 million; and poor traffic signalization at 300 million. These estimates show that there are colossal opportunities to make improvements. Present congressional legislative consideration is focused on a ten billion dollar program over 6 years to attack these issues.

- Other estimates[70] place incidents on freeways at more than half of the causes of overall delay, often even more significant because they cannot be anticipated. This suggests that rapid response systems that alert emergency vehicles and drivers to accidents can save both lives and time. The experience of Atlanta during the Olympics with its ITS system was quite important in this area. It yielded response time savings between 40 percent and 50 percent and clearance times at the accident scene also were reduced by more than 50 percent.

- Ramp metering has been shown to be highly cost-effective. An experiment in Minneapolis-St. Paul showed speed improvements between 8 percent and 26 percent as a result of an effective increase of throughput on the order of 30 percent. This result was achieved not by perfect tuning of the system but rather via an accommodation of the best traffic flow theory with citizens' views on fairness. Estimated costs were on the order of $50,000 per ramp and an overall annual maintenance cost of $200,000 in 2000.

- Recent growth in congestion places greater emphasis on reliability. This suggests that commercial activities as well as individuals benefit tremendously from improvements in the predictability of travel.

- In addition many of these tools have large-scale safety benefits and can provide strong rewards regarding national emergencies or terrorist threats as well. These include Traffic Management Centers, variable message road signage, etc. For example, the ramp metering experiment in Minneapolis showed a 21 percent improvement in accidents.

[69] Oak Ridge National Laboratories, for the US DOT Condition and Performance Report
[70] Texas Transportation Institute, Urban Mobility Reports

There is a particularly successful example of travel and environmental improvement from improved traffic management operating between the Athens and Atlanta metropolitan areas. The Georgia Department of Transportation and Gwinnett County undertook a project to improve traffic signal synchronization between Lawrenceville and Atlanta on State Route 316. The result was a reduction in average travel times of 16 percent. This was accomplished by eliminating more than 50 percent of the stops the average driver encounters on the route. A further benefit was a reduction in air pollution emissions ranging from nine percent to 13 percent. The cost of this project was estimated at less than 1/40th of the annual benefits.[71]

Overall it is not inappropriate to estimate that improvements in capacity of the system on the order of 10 percent to 15 percent can be achieved by these means at high benefit to cost ratios.

Governor Perdue's new *Fast Forward* program adds an important dimension to transportation planning in the Atlanta area in its incorporation of roadway management and operations improvement strategies. Perhaps the most important element will be the proposed region wide traffic signal synchronization program. There will also be improved roadway operations strategies, such as freeway ramp metering and greater use of expedited traffic accident response systems.

G. TRANSPORTATION FUNDING TRENDS IN GEORGIA

Throughout the world, increased affluence has been supported by the mobility and access made possible by the automobile-based roadway system and the flexibility it affords to trucking. For decades, state and local governments in the United States built sufficient capacity to accommodate rising travel demand. In 1960, $0.057 was spent per vehicle mile on roadways in Georgia. This had fallen to $0.042 by1980. In the last two decades, however, capacity expansion has lagged significantly behind travel growth. This has been particularly true in Georgia, where spending per vehicle mile dropped by 50 percent from 1980 to 2000 (Figure 36). Since 1960, roadway use has increased 511 percent, while expenditures on roadways has increased a much lower inflation-adjusted 221 percent (Figure 37).

[71] Gray, Calhoun & Associates, *Signal Timing Plan Development Report: SR 316*, November 2003.

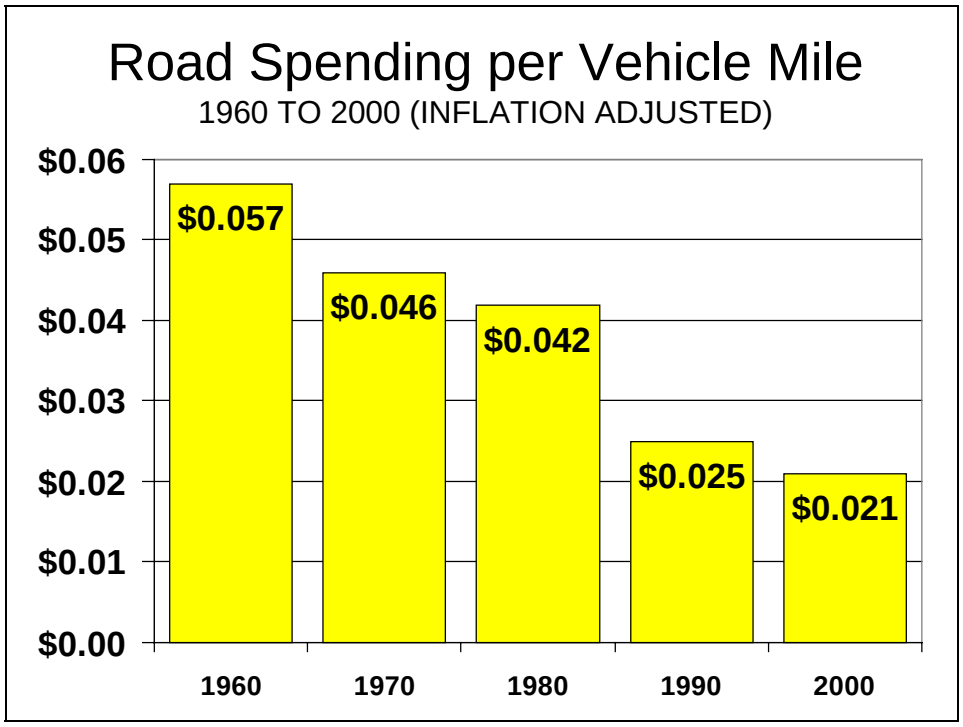

Figure 36

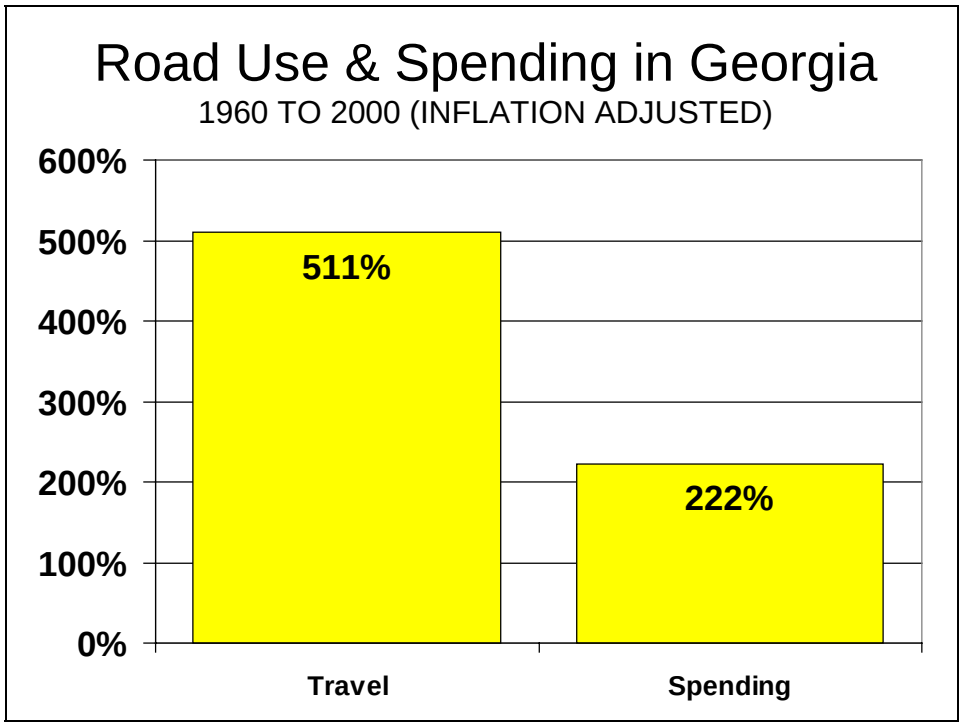

Figure 37

In comparison, per capita state and local taxation rose 77 percent from 1980 to 2000. Per pupil primary and secondary expenditures rose 209 percent during the same period (Figure 38). If education expenditures had fallen at the same rate per pupil as highway expenditures per vehicle mile, teacher salaries would have been approximately $8,000 in 2000, $33,000 less than the actual average of $41,000 and $26,200 less than the average Georgia salary of $34,200.[72]

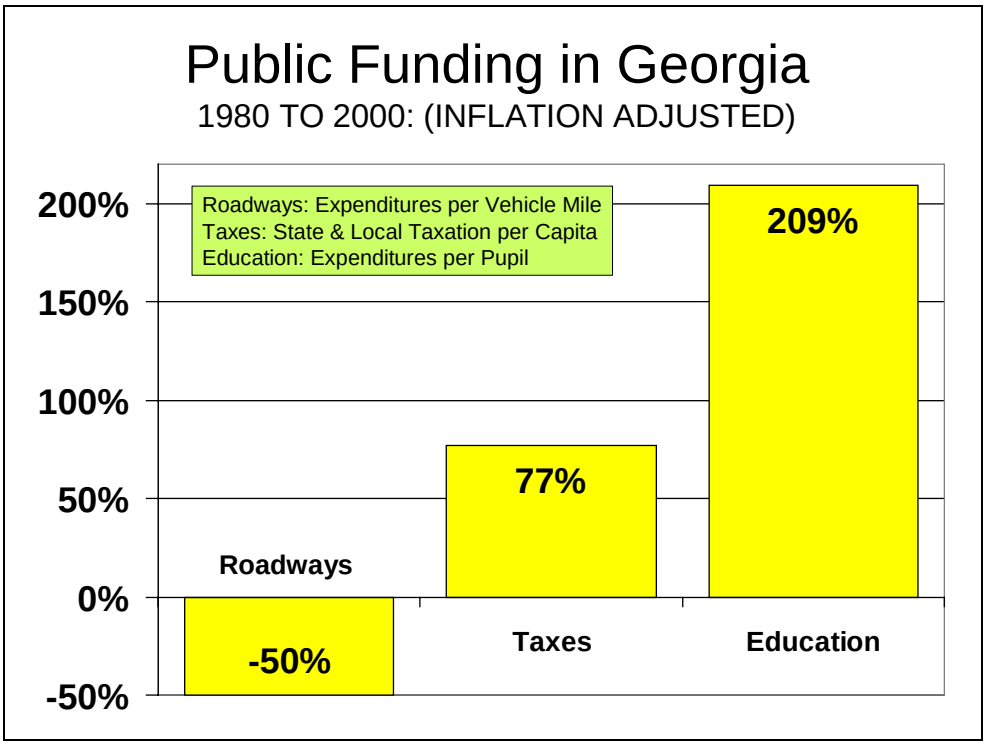

Figure 38

But the shortfall could be considered to be even greater. From 1980 to 2000, Georgia was urbanizing significantly. Travel within urban areas rose 203 percent, more than 40 percent above the statewide average. Now urban vehicle miles traveled are 54 percent of the state total.[73] Roadway construction is much more expensive per lane mile in urban areas. The higher percentage of driving that now occurs in urban areas thus imposes a greater funding burden than would be the case if the previous rural-urban ratio had been maintained.

With respect to the critical issue of providing sufficient expanded urban roadway capacity to meet demand, funding has fallen even further. From 1990 to 2002, new construction and expansion expenditures dropped 57 percent, while vehicle miles grew 50 percent (Figure 39).

[72] Assumes that teacher's salaries would change at the same rate as overall education expenditures.
[73] Calculated from FHWA *Highway Statistics*, 2002.

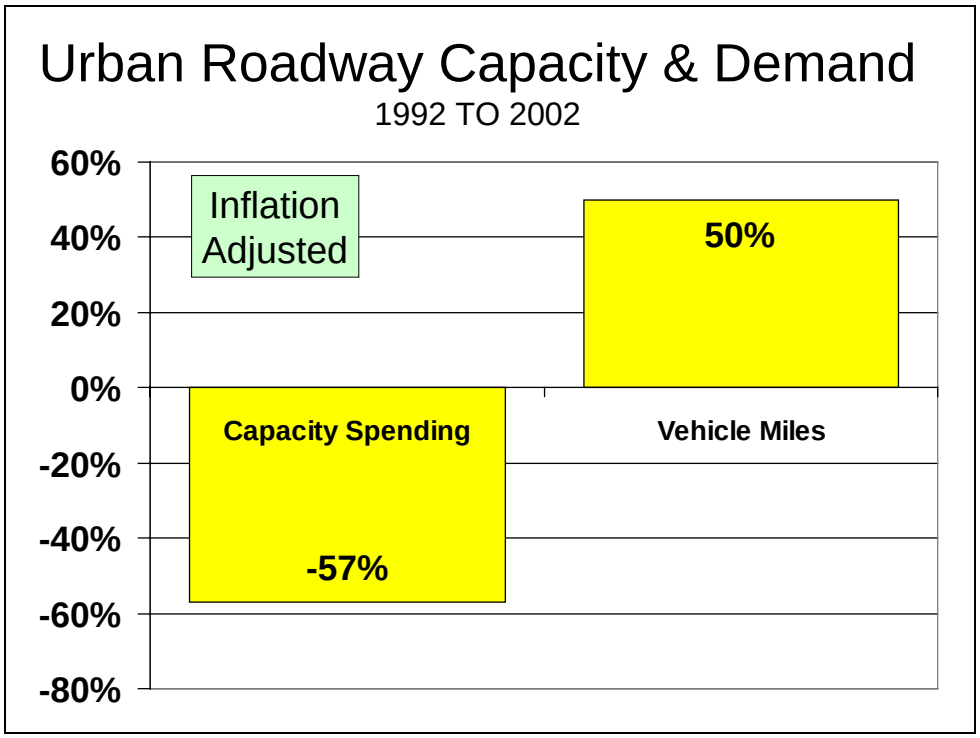

Figure 39

In the most recent years, little new capacity was added. Most capacity expansion was high-occupancy vehicle lanes. During the same period of time, the population of the 13-county area grew more than 230,000, nearly as many people as live in the state's second largest urbanized area (Augusta).

The highway funding situation could become even more constrained in the future. Highway funding is generally based upon a user fee per gallon of gasoline. This fee is raised only by state or federal legislation and does not rise with inflation. As vehicles have become more fuel efficient, even the nominal (non-inflation adjusted) return per vehicle mile has declined. In the future, with further anticipated improvements in fuel economy and the introduction of hybrid and fuel cell vehicles, it is likely that further declines in funding will occur.

I. PROJECTIONS AND PLANS

Atlanta Regional Commission (ARC) forecasts for 2025 indicate that nearly all new demand will be roadway, as opposed to transit (Figure 40). Even after building what was anticipated to be more than 300 miles of new urban rail, personal vehicles would account for more than 97.5 percent of travel in the 13 county area in 2025. Current plans anticipate that traffic congestion will worsen in the future. The adopted ARC long term plan projects that the percentage of travel on severely congested conditions will increase more than three times from 2003 to 2025 (Figure 41). Even the more aggressive "Aspirations Plan" projected a tripling of severe congestion by 2030, despite requiring resources $27 billion greater than are likely to be available. While complete data is not yet available on ARC's resource constrained 2030 plan, it seems likely that it will project traffic congestion to become worse. ARC is now preparing a new long-term plan,

fiscally constrained according to federal requirements. Because of the financial constraints, it seems likely that congestion in the horizon year of 2030 will be worse than in the "Aspirations" plan.

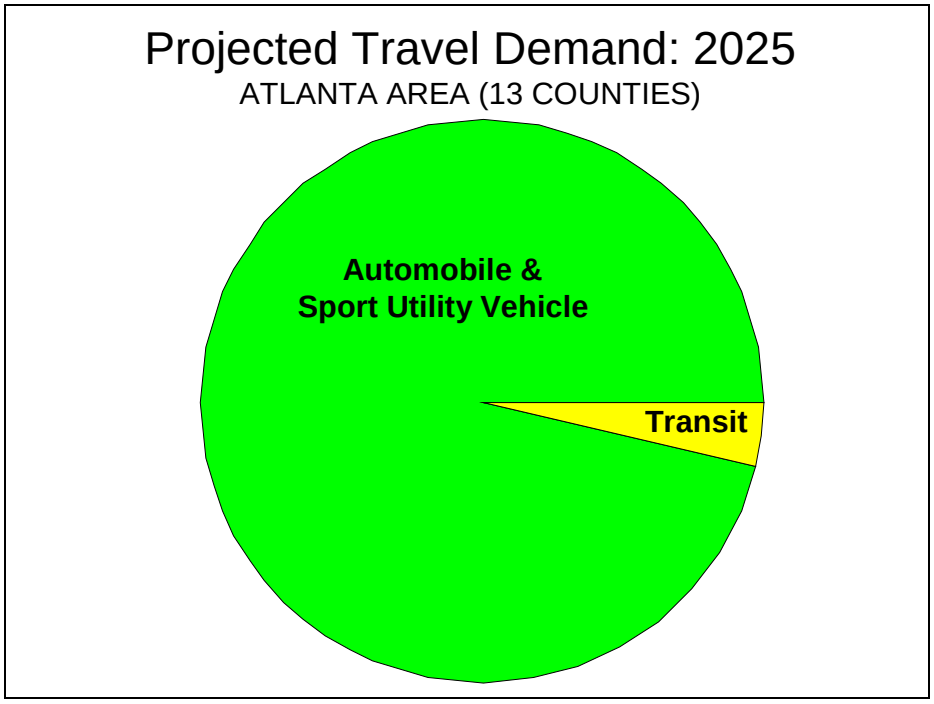

Figure 40

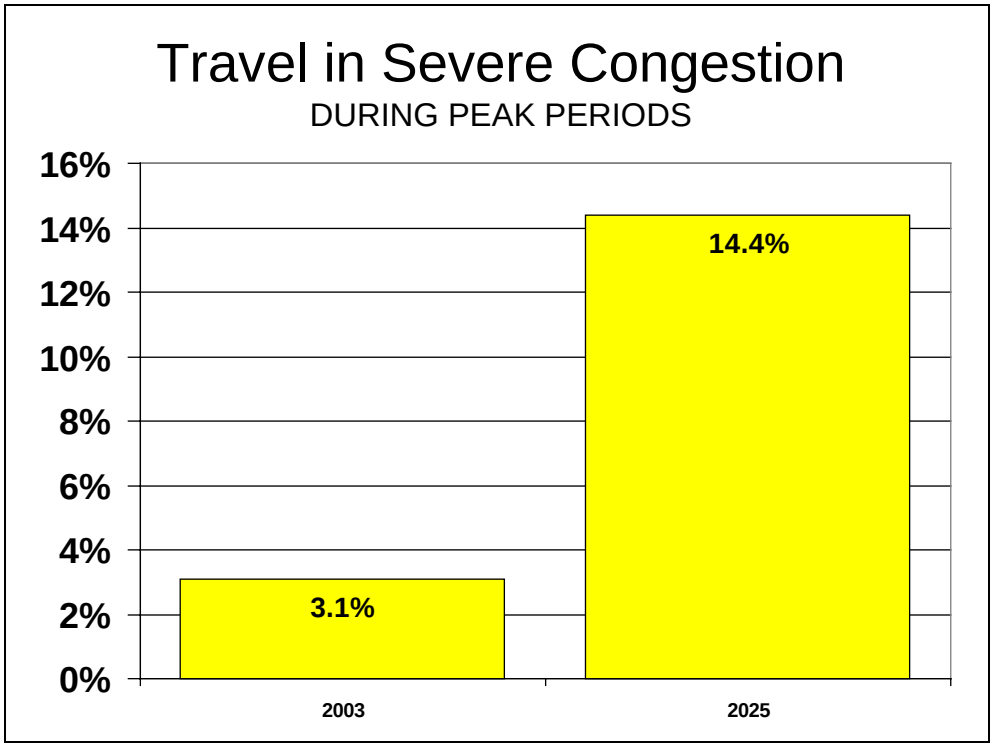

Figure 41

Freight Issues and Trends

The movement of freight, especially truck freight has been often neglected in transportation planning considerations. That time is past. The movement of products by truck is as key to economic strength in many areas as is passenger travel. In most areas trucking and freight movement on highways is growing faster than passenger travel. The impact of trucking on congestion must be considered – trucks take up a lot of space. The impact of congestion on trucking must also be recognized – the delays and time lost due to congestion affects the price of goods and economic competitiveness nationally and internationally. FHWA estimates that the cost of delay among truckers varies over a range of $144- $192 per hour. These costs are ultimately absorbed by consumers or by reduced competitiveness of goods in world competition.

The most recent US Census estimates indicate that trucks carried about 70 percent of all tonnage in the country and about 80 percent of the value of all products shipped.[74] According to US DOT, truck traffic moving to and from Georgia accounted for 13 percent of average annual traffic on the main road network. [75] This compares well with the Georgia DOT estimates of 14.4 percent of VMT on rural routes related to trucking and about 10 percent on urban routes.[76] About 12 percent of the truck traffic was in-state movements and 18 percent involved trucks passing through the state. The current and future flows estimates by mode, as prepared by US DOT, are shown in Table 18:

Table 18
Freight Traffic: 1998 and Projections

	TONS (Millions)			VALUE (Billions)		
	1998	2010	2020	1998	2010	2020
State Total	657	995	1,240	$523	$1,084	$1,765
Air	1	3	4	$78	$185	$317
Highway	531	821	1,026	$407	$831	$1,341
Rail	119	164	200	$37	$67	$104
Water	2	4	4	$1	$1	$1

As can be seen from the table tonnages by truck will double in the period and the value of products moved will more than triple. This makes two key points:

1. The overall growth rates in freight are expected to be remarkable;

2. The shift toward high value goods will place emphasis on high speed, high flexibility and high reliability modes of transportation, which will mean air and truck movements.

More specifically, The Road Improvement Program has projected a 59 percent increase in Georgia truck traffic (mileage) over the next 20 years.[77] This is the largest increase projected for any state with more than 6,000,000 residents. Trucks consume approximately 3.5 times the road

[74] Census of Transportation, 1998
[75] Freight Analysis Framework 2003
[76] Highway Statistics, 2002
[77] *America's Rolling Warehouses*, The Road Information Program (Washington: February 2004).

space of cars. The larger space required by trucks will make the challenge of controlling traffic congestion even more difficult. The roadway capacity consumed by the additional truck traffic on Interstate 285 alone over the next 20 years is approximately double the equivalent[78] of the ARC *2025 Plan* transit ridership increase that assumed expanding the regional rail system by more than 300 miles.[79] Perhaps as important, international flows will be growing faster than domestic.

At the same time as personal vehicles have shown substantial growth, the state's commercial truck fleet has grown dramatically. The emphasis has been on construction vehicles, wholesale and retail trade vehicles and particularly on heavy tractor-trailers. Intrastate trucking by vehicles registered in the state has grown from about 20 percent of freight activity in 1992 to 25 percent in 1997.[80] Many activities associated with the population growth boom such as household goods moving have seen high levels of growth as well.

The accompanying maps (Figures 42 to 48) generated by US DOT show the current levels of activity in the state by trucks and rail; and also show the expected future levels of growth by facility. The maps for truck freight flows in Florida and South Carolina are also shown to demonstrate how much impact their freight activities have on the state.

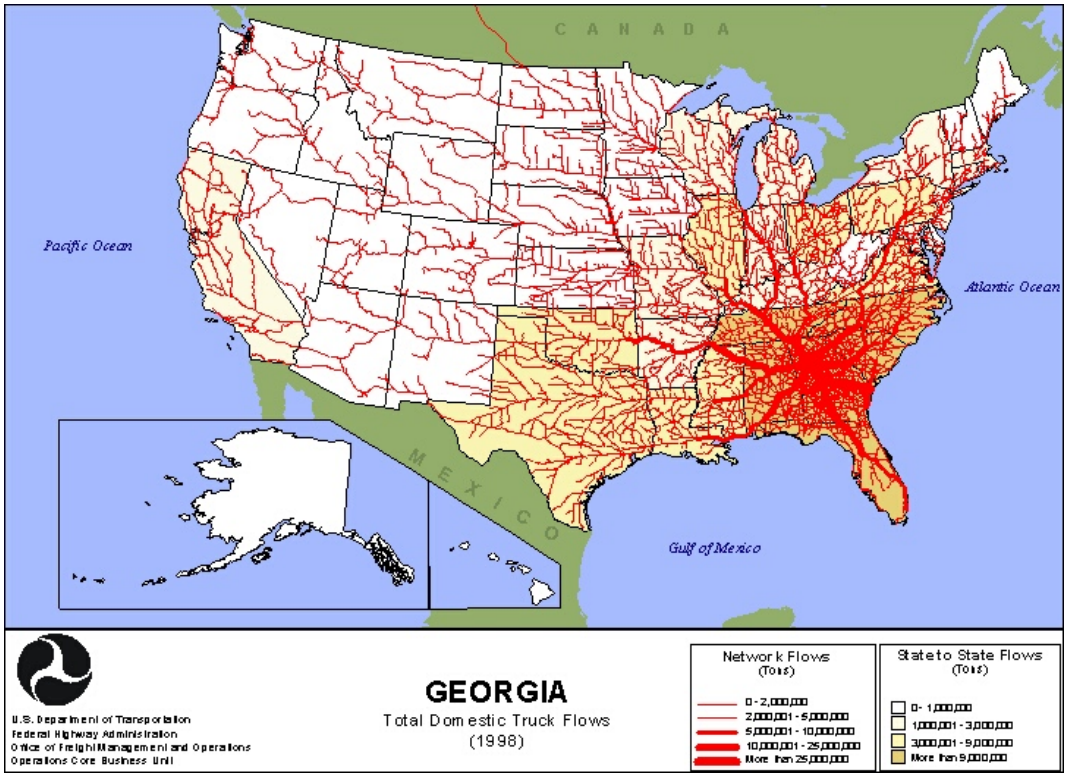

Figure 42

[78] Assumes that all new transit riders would instead drive cars by themselves.
[79] Assumes the Georgia large truck interstate traffic share, truck road space at 3.5 passenger car equivalents at annual rates over 20 years.
[80] Vehicle Inventory and Use Survey (VIUS), 1997, US Bureau of the Census. The new VIUS for 2002 may be available by May of this year.

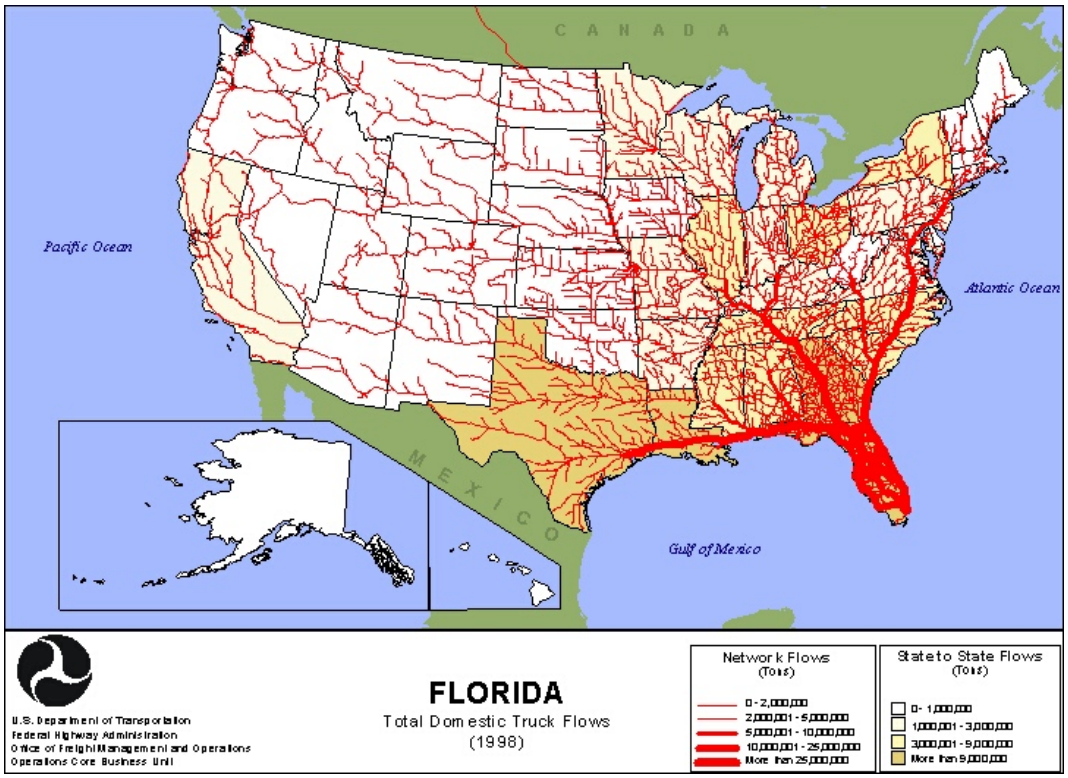
C A N A D A
Pacific Ocean
Atlantic Ocean
M E X I C O
Gulf of Mexico
U.S. Department of Transportation
Federal Highway Administration
Office of Freight Management and Operations
Operations Core Business Unit
FLORIDA
Total Domestic Truck Flows
(1998)
Network Flows
(Tons)
0 - 2,000,000
2,000,001 - 5,000,000
5,000,001 - 10,000,000
10,000,001 - 25,000,000
More than 25,000,000
State to State Flows
(Tons)
0 - 1,000,000
1,000,001 - 3,000,000
3,000,001 - 9,000,000
More than 9,000,000

Figure 43

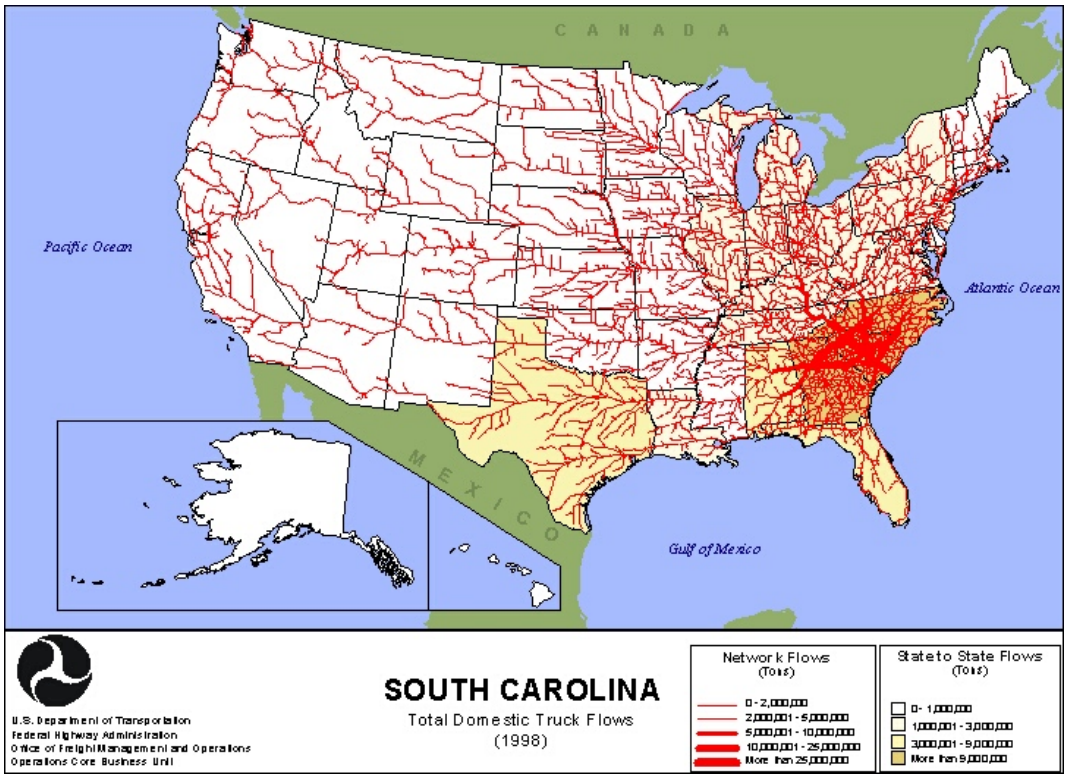

Figure 44

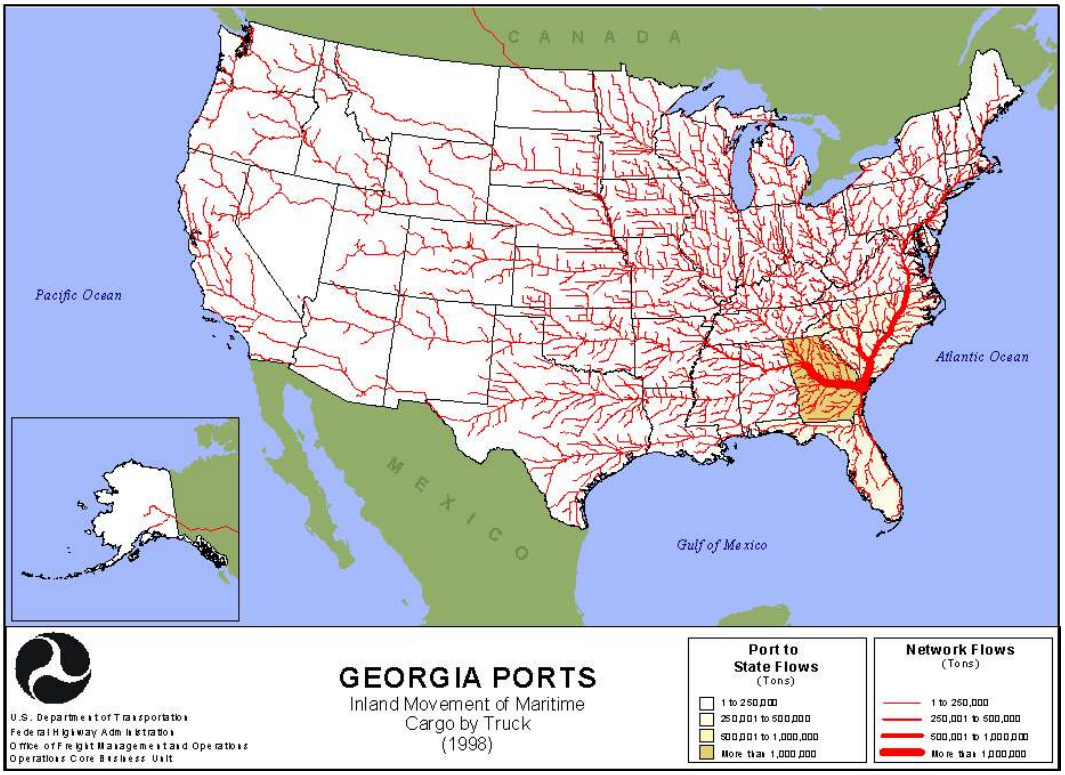

Figure 45

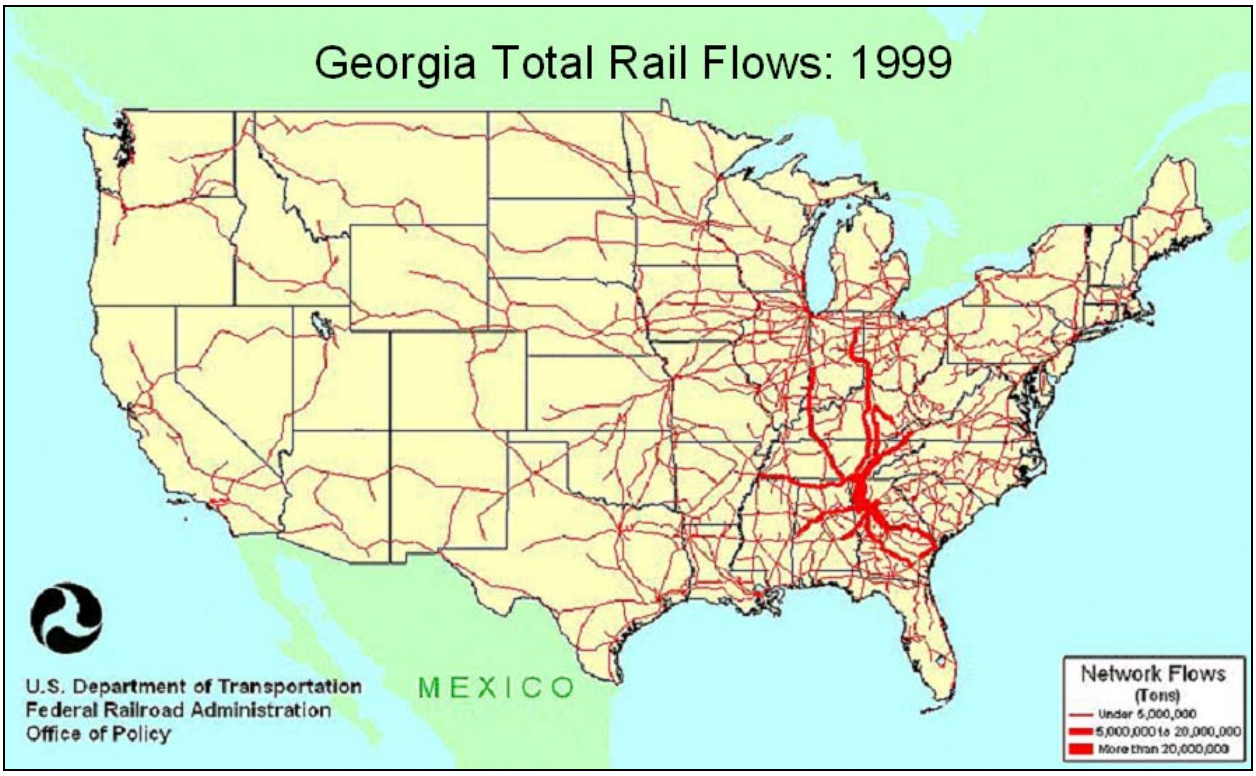

Figure 46

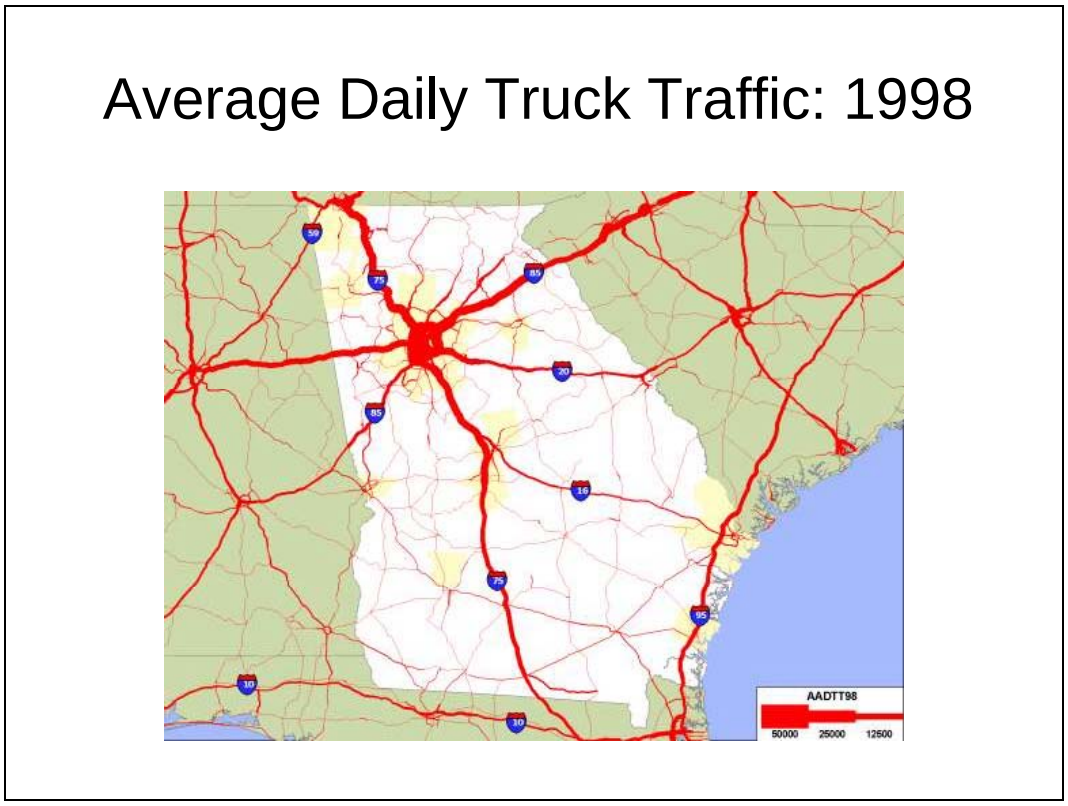

Figure 47

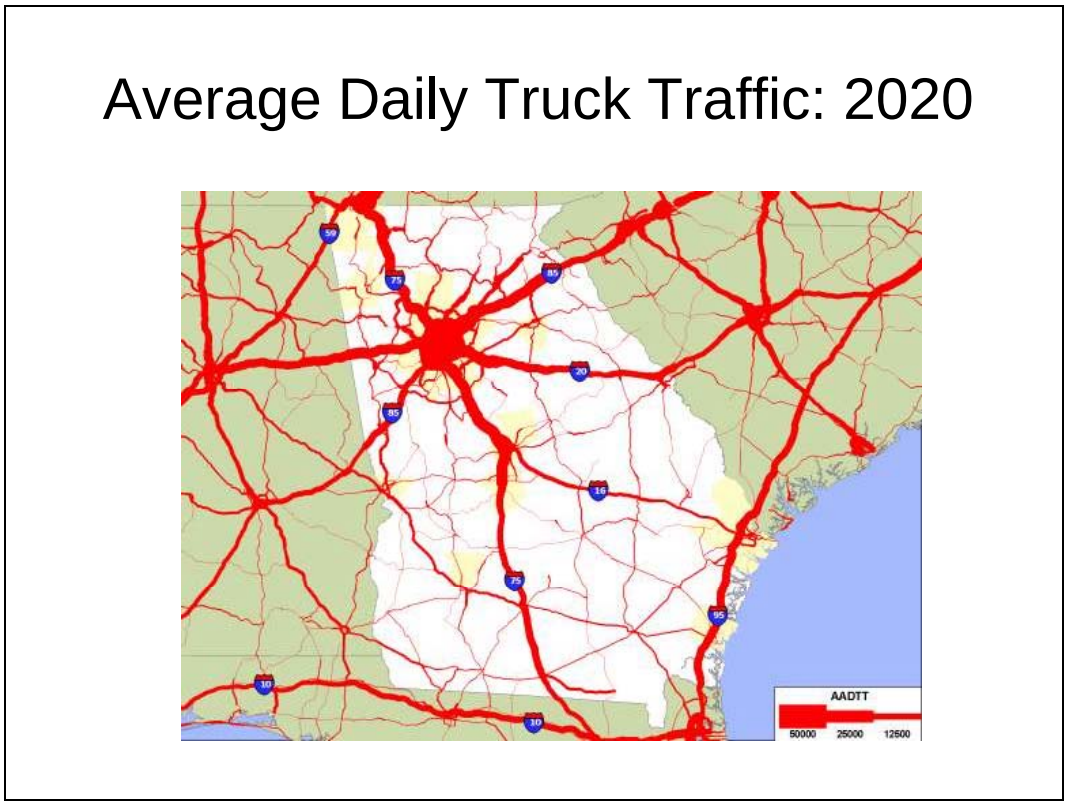

Figure 48

The US DOT has recently identified the major national intermodal connectors that need addressing as part of the nation's overall logistical system. Eighteen of those facilities are in Georgia, connecting trucks to ports, to railroads or to pipelines. While these routes typically do not represent a major segment of the road system, they often represent the key "last mile" from the Interstate to a major intermodal facility, and may generate costs in delays and safety impacts to freight movement and to other road users well beyond their scale. The summary list appears in Table 19:

Table 19
Intermodal Connectors in Georgia Requiring Attention

Type	Location	Number
Rail	Atlanta	3
	Savannah	1
Water Port	Savannah	2
	Brunswick	2
Airport	Hartsfield-Jackson	1
Pipeline	Miscellaneous	9

J. ECONOMIC COMPETITIVENESS

Transportation is important both to the quality of life and economic growth. Predictable highway mobility is a principal consideration for manufacturing and distribution businesses that rely on ground transportation to deliver and receive materials and products. For example, as traffic congestion increases:

- Effective labor markets become smaller as employees are able to access fewer jobs in a specific period of time (such as 30 minutes). This reduces both the number of jobs that are accessible and the number of employees that are available for recruitment by business. As a result, there is a significant negative impact on urban area economic growth (below), the individual employee and employers.

- The travel time between suppliers and commercial customers becomes longer, increasing costs.

- Travel times become more unreliable. This is a particular problem where businesses rely on "just-in-time" component delivery (such as automobile assembly plants). Atlanta and the rest of Georgia are becoming less attractive to these "state-of-the-art" businesses and it is possible that some such businesses located in the state will go elsewhere.

- Housing affordability becomes more of a problem, because as commute ranges are reduced, there are fewer affordable houses.

- Emergency services take longer to reach and emergency vehicles (such as ambulances) encounter more delays.

- Recreation opportunities become more limited because of longer travel times.

As traffic becomes more congested and delivery schedules become less reliable, Atlanta and the rest of Georgia become a less favorable location for business expansion and relocation. Severe traffic congestion makes Atlanta a less attractive place for executive transfers and young families looking to establish households. There is no shortage of attractive, smaller and less congested metropolitan areas that would be prepared to take the growth that could be driven away from Atlanta by increasingly severe traffic congestion, whether in the South or elsewhere.

There is also the possibility that parts of Georgia will begin to forge more significant economic relationships with nearby states as it becomes more difficult for commerce to traverse the traffic bottlenecks of Atlanta. For example, northern Georgia could become more economically tied to Tennessee, especially Chattanooga.

Thus far, Atlanta has continued to grow strongly in spite of the traffic congestion. But as was shown above, conditions are deteriorating more quickly in Atlanta than elsewhere. At current rates of change, it will not be long before Atlanta's work trip travel time will be much worse than elsewhere. Fast growing Atlanta competitors such as Dallas-Fort Worth, Houston, Greensboro, Nashville, Raleigh-Durham and Charlotte would have work trip travel times from five to 10

minutes shorter daily by 2010 if the 1990s rates continue.[81] Smaller, growing metropolitan areas such as Greenville-Spartanburg, Richmond, Boise and Chattanooga could be expected to have average work trip travel times of 10 to 15 minutes less than Atlanta --- up to 125 hours less in travel each year per commuter.

But there is more than the growth of the Atlanta area at stake. Atlanta's traffic congestion could have a strong negative impact on future growth throughout the state of Georgia. For example, businesses along the I-75 corridor between Atlanta and Chattanooga are already facing difficulties in expeditiously moving goods toward more northerly locations along the Atlantic seaboard. There is no feasible alternative to using the most congested, and most unreliable section of the I-285 Perimeter (from I-75 to I-85) to make the necessary connection to I-85 (or even I-95). Businesses located virtually in any direction from Atlanta on I-20, I-75, or I-85 face similar difficulties. Atlanta and Georgia will grow and prosper more if Atlanta's traffic now worsening congestion is brought under control.

Austin, Texas has already experienced a major corporate loss due to its failure to control traffic congestion. Dell Computer is a "home-grown" Austin business that has achieved world prominence in information technology. Until recently, virtually all of Dell's major facilities were located in the Austin area. It was therefore major news when Dell announced that it would build a new facility in Nashville. Austin has the worst traffic congestion among urban areas of similar size. Dell announced that Austin's traffic congestion was a principal reason why Nashville, rather than Austin was chosen.

Similarly, areas with lesser levels of traffic congestion are beginning to market themselves on that basis. For example, the metropolitan planning organization (MPO) in Milwaukee now touts that metropolitan area as having the shortest average work trip travel time among major metropolitan areas, at 22 minutes (Atlanta is 31 minutes). The MPO further notes that traffic congestion is two-thirds less than average on area freeways.

As larger urban areas with intense traffic congestion, such as Atlanta, become less competitive, other smaller areas with less intense traffic congestion become more attractive. There is no shortage of potential locations well placed along the national interstate highways system that could siphon off much growth in the future. Further, smaller more efficient aircraft, especially the regional jets, are already improving access to smaller markets. This combined with the continuing technological revolution could make larger, more congested urban areas less competitive. Further, there is concern in the United States about the loss of quality jobs in the information technology industry to places such as India and China. While controlling traffic congestion is not sufficient in itself to give an urban area a competitive advantage, it can be a contributing factor. A more congested Atlanta and Georgia will be less attractive with severe traffic congestion.

[81] www.publicpurpose.com/ut-jtw2010forecast.htm.

III. SOLVING THE PROBLEM: BLUEPRINT 2030

A. BUILDING FOR THE FUTURE

This report seeks to provide a preliminary estimate of the funding levels that would be required to achieve particular levels of mobility improvement. It is based upon the concept of adopting a specific traffic congestion reduction goal, on the basis that with more than 90 percent of travel in the Atlanta metropolitan area being by automobile, the travel time improvement requires improvement of roadway congestion. The transportation vision outlined for 2030 below (*Blueprint 2030*) is thus principally based upon highway strategies involving capacity expansions for all traffic. In addition, highway system expansions tend to be much less costly than transit system expansions and serve a broader range of community needs, such as freight movement and accommodation of public service vehicles.[82] The costs of these highway expansions could be moderated somewhat by operational and management strategies (below) and by focusing attention on the worst traffic bottlenecks. No sufficiently reliable method was identified to estimate the program savings that might occur from such strategies.

Behavior Modification Excluded: *Blueprint 2030* specifically avoids the use of any behavior modification or social engineering strategies that would seek to directly or indirectly force people out of cars into alternative transport modes, whether car pooling, transit, walking or other. Beyond the philosophical difficulties with such punitive strategies is the practical reality that makes them inappropriate as public policies --- they don't work. Some transport and urban planners express the view that if traffic congestion is allowed to become intense enough, people will forsake their cars for other modes. There is little more than hope, and based upon the international experience, vain hope. Automobile market shares continue to be stable where they have reached saturation and growing where they have not in virtually all high-income world urban areas. This is despite hundreds of billions, if not trillions of dollars in expenditures on expensive transit programs and exclusive car pool lanes. The problem is that modern life-styles depend upon the ubiquitous and relatively quick mobility and access that only the automobile can provide, even in urban areas that have far more intense traffic congestion than Atlanta.

But the philosophical and economic reasons for rejecting social engineering are also important. Econometric research indicates that personal income and gross domestic product per capita are higher where people are allowed greater freedom.[83] Further, as is outlined below, Prud'homme and Lee of the University of Paris have found that greater access to employment tends to increase the personal income per capita of an urban area. Therefore, policies that seek to limit people's preferences for broader and quicker mobility or to limit where they can live tend to have the undesirable impact of retarding the quality of life. This is the very opposite of what public policy should seek to do. Philosophically, it is hard to imagine a more bankrupt public policy

[82] For example, all expenditures on automobiles and sport utility vehicles in the United States were approximately $0.20 per person mile in 2000 (vehicle acquisition, operation, insurance and taxes). By contrast, transit expenditures were more than $0.75 per person mile in 2002. Calculated from U.S. Department of Commerce, Gross Domestic Product National Income and Product Accounts.

[83] Marc A. Miles, Edwin J. Feulner, Jr., Mary Anastasia O'Grady and Ana I. Eiras, *2004 Index of Economic Freedom,* Heritage Foundation (Washington), 2004 and James D. Gwartney and Robert A. Lawson, *Economic Freedom of the World: 2003 Annual Report,* Fraser Institute (Vancouver, BC), 2003.

than one that seeks to make 90 percent of workers miserable enough so that a few percent of them change their behavior in prescribed ways.

Building Out of Congestion? There has been a perception among urban planners and transportation planners that we "cannot build our way out of traffic congestion." This view is used to justify various policy initiatives intended to "socially engineer" people out of their cars to travel instead by transit, bicycles or by walking. But even where such policies are proposed, projections throughout the high-income world indicate that roadway traffic will continue to grow at least consistent with population and even more closely in relation to the increase in Gross Domestic Product (perhaps the ultimate measure of affluence). More importantly, there are simply no examples of urban areas that have materially reduced the market share of highway travel, much less the actual volume.[84] Thus, a modern metropolitan dilemma is that traffic congestion will continue to intensify if capacity is not expanded. The result is likely to be less job creation and weaker economic performance.[85]

Much of current urban transportation policy appears to be based upon an assumption that conditions will simply get much worse and that skillful management of the decline is all that can be accomplished.

The view has been expressed by some economists that it is futile to attempt to control traffic congestion by adding capacity because demand will always outstrip supply due to inefficient pricing. Their view is that there is an insufficient connection between the prices people pay for the highway system in gasoline taxes and their use. It would be more economically efficient for each driver to pay the cost of each particular trip,[86] rather than just paying a flat rate tax per gallon of gasoline consumed. Theoretically, if drivers were charged variable rates based upon congestion levels, there would be a better relationship between payment of highway user fees and highway use.

But, if it were impossible to provide sufficient roadway capacity, virtually all urban areas would be similarly and severely congested. In fact that is not the case.

- Phoenix, for example, has expanded its freeway system far more than any other US urbanized area over the past 15 years, yet has experienced a smaller than average increase in driving per capita and an increase less than one-half that of Portland, which has sought to constrain expansion of freeways.[87]

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[84] The much-heralded London congestion charge has reduced traffic congestion in a very small portion of central London that represents less than one percent of the London metropolitan area (an area only slightly larger than downtown and mid-town Atlanta). There are few places in the world where such an approach could be effectively applied and certainly no overall metropolitan areas.

[85] Generally, where economic performance is constrained, the largest toll is paid by lower income households who face a less lucrative labor market or may experience greater levels of unemployment.

[86] Theoretically, it would have been preferable from the start to have provided highways based upon a road pricing system, through the commercial market. It would be most difficult, however, to convert to such a system at this time. Nonetheless, road pricing strategies, such as automated tolls on new roadways, could be effectively implemented in the future to reduce traffic congestion.

[87] From 1985 to 2001, per capita driving in Phoenix increased 20 percent, compared to the 24 percent urbanized area average and a 47 percent increase in Portland (calculated from Texas Transportation Institute information),

- Traffic congestion is considerably less than Atlanta's in some urbanized areas, such as Kansas City or Cincinnati.

- Most urbanized areas had much less congestion in the early 1980s and before. Had roadway expansion continued consistent with demand, as before, congestion levels would be much less than now.

It is principally the failure to supply sufficient roadway capacity, not the inefficiency of its pricing that is the principal cause of today's severe traffic congestion. Sufficient capacity can be provided. And, as was indicated above, Atlanta has a sparse, overly centralized roadway system. It would be possible to provide a roadway system in Atlanta as dense as the Los Angeles system. With a more competitive roadway system in Atlanta, there would be much less traffic congestion.

The "we cannot build our way out of traffic congestion" philosophy has arisen largely as ideology, not the conclusion of objective research. Very few attempts have been made to review what it would indeed take to "build our way out of traffic congestion." It seems to be assumed that the strategies that would be required to build out of congestion are too terrible to even be considered. This, in effect, "forbidden option" approach to urban transportation is not to be found in other areas of public policy. For example, fast growing urban areas like Atlanta are not responding to growing elementary and secondary enrollments by refusing to build more school capacity, based upon a "you cannot build your way out of enrollment increases" ideology, or a fear that building more schools will induce a greater demand, through a higher birth rate.

The appropriate operation of the democratic process requires that decision-makers and the electorate be provided with alternatives rooted in data and analysis and not simply on opinions. In the end, urban areas may choose to simply let traffic congestion become worse rather than paying the price to reduce it. On the other hand, urban areas may commit to building the necessary capacity to improve traffic congestion, job creation and the quality of life.

In recent years, some analyses have begun to appear that attempt to describe the requirements for "building our way out of congestion." Perhaps the most significant is the Texas Governor's Business Council Report, *Texas Roadways --- Texas Future.*[88] This report recommended a 25-year goal of reducing the Congestion Penalty in major Texas metropolitan areas so that the average delay during peak travel periods would average 15 percent. This would be a significant reduction in the larger areas --- 33 percent in Dallas-Fort Worth and 39 percent in Houston. The report found that traffic congestion in the major urban areas of Texas could be significantly reduced by 2025 for a modest, though higher than presently planned level of investment in expanded highways. Texas Governor Rick Perry has directed the Texas Department of Transportation to begin implementation of the program.[89]

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[88] Alan E. Pisarski, Tim Lomax, David Ellis and Wendell Cox, *Texas' Roadways, Texas' Future: A Look at the Next 25 Years of Roadway Supply, Demand, Costs and Benefits,* Governor's Business Council (Austin: 2003).

[89] If the cost factors used in Texas report (Pisarski, Lomax, Ellis & Cox, above) were applied to *Building Our Way Out of Congestion*, the cost would be somewhat lower, at less than $8 billion.

Already, Houston had provided an example of what can be accomplished with higher levels of highway investment. In 1985, Houston had the worst traffic congestion in the nation, according to the Texas Transportation Institute. By building sufficient capacity to meet new demand, Houston had the same traffic congestion level in 2001 as in 1985, and had fallen to 14th in national traffic congestion, tied with Minneapolis-St. Paul. During the same period, traffic congestion in the Twin Cities, Los Angeles and Portland increased between 30 and 35 percent.

Similarly, the Minnesota Department of Transportation published a report (*Building Our Way Out of Congestion*)[90] estimating the highway capacity expansion that would be required in Minneapolis-St. Paul by 2020 to ensure traffic would operate at free flow conditions (100 percent Congestion Penalty reduction). The report did not provide an estimate of the cost, but Gary Davis, one of the authors of the report, separately estimated the cost of the required freeway expansion at $20 billion. Over the 20 year period this would be approximately $300 per capita per year --- approximately 1.5 times the per capita tax raised by MARTA.[91] Thus, it is clear that Minneapolis-St. Paul can "build its way out of traffic congestion," if it chooses. This analysis will demonstrate the same with respect to Atlanta and that a careful program can prevent development of significant traffic congestion elsewhere in the state.

B. THE *BLUEPRINT 2030* CONCEPT

Up to this time, there has not been a transportation planning vision (traffic management, highway, transit or land use) that would substantially reduce traffic congestion throughout the Atlanta region. The proposed *Blueprint 2030* would provide such a vision, based upon the following characteristics (Table 20).

- A goal-based, rather than resource based examination of future needs. A specific Traffic Congestion Limitation Goal (traffic congestion reduction goal) would be adopted. Based upon the analysis that follows, it is recommended that a Traffic Congestion Limitation Goal of 12 percent be adopted --- during peak periods travel should average no more than 12 percent more than during non-congested periods. Thus, a trip that would take 30 minutes in non-congested periods would average 33.6 minutes during peak periods.

- Project evaluation based upon the cost effectives of traffic delay reduction.

- Equitable application of a comprehensive region-wide set of strategies, rather than a core-oriented set of strategies. This would require achievement of the traffic reduction goal in virtually every part of the Atlanta region.

- Modally neutral strategies, whereby highway, traffic management or transit projects are chosen based upon the cost-effectiveness of their contribution to the traffic congestion reduction goal.

[90] Gary A Davis and Kate Sanderson, *Building Our Way Out of Congestion? Highway Capacity for the Twin Cities*, Minnesota Department of Transportation, October 2001.
[91] Calculated using population projections from the Metropolitan Council of the Twin Cities.

Table 20 *Blueprint 2030*: Principles
• Adoption of a Traffic Congestion Limitation Goal • Evaluation based upon cost effectiveness of traffic delay hour reduction • Equitable application of comprehensive, region-wide set of strategies • Modal neutrality

C. TRAFFIC CONGESTION LIMITATION GOALS

Virtually all of long term transportation planning has been limited to strategies for which funding can be readily identified. This "financial resource based" planning is required by the federal government to obtain federal funding for highway and transit projects. But the federal requirements do not forbid planning that would be goal based, and require additional financial resources. For example, in Atlanta, the ARC "Aspirations Plan" could have been a goal-based plan, but in the end did not adopt a traffic congestion reduction goal.[92]

Without estimates of the cost to reduce traffic congestion, state, regional and local officials and the electorate are not in a position to objectively consider whether or not the costs of solving the traffic congestion problem are too high. Solving Georgia's traffic congestion problem will be simplified by adoption of a statewide Traffic Congestion Reduction Goal that should become the basis of resource allocation.

III. SOLVING THE TRAFFIC CONGESTION PROBLEM IN ATLANTA

As was indicated above, Atlanta's traffic problems have become among the worst in the nation. The principal reason is that the state failed to maintain a highway building program that matched the growth rate in vehicle miles. Further, local jurisdictions failed to provide sufficient arterial street capacity. The result has been a substantial waste of resources, such as excess energy consumption from slower traffic and higher costs for vehicle operation. The failure to provide sufficient capacity to keep Atlanta's traffic congestion from becoming severe is also a principal cause of its air pollution problem. *Blueprint 2030* would provide the capacity to improve mobility and access in Atlanta, making up for the under-investment that has typified the past two decades.

[92] The *Aspirations Plan* projected approximately $15.7 billion in spending on general purpose freeway lane expansions and $10.6 billion for high-occupancy vehicle lanes. All of these projects would have been on existing freeways. As was described above, there is a serious need for new roadway capacity outside the present system, which is strongly oriented to the core and forces much roadway travel through the core (I-285 Perimeter and inside) that could otherwise be handled on non-radial roadways.

A. TRAFFIC CONGESTION LIMITATION GOALS: SCENARIOS

Four scenarios with four Traffic Congestion Limitation Goals were projected through 2030, based upon a base year of 2005 (Figure 49):[93]

- Scenario #1: Present Plan (ARC *2025 Plan* extrapolated to 2030, which would result in a 101 percent Congestion Penalty. The average trip during peak period that would take 30 minutes in non-congested periods would average more than 60 minutes.)

- Scenario #2: Maintain Congestion at Present Levels (39 Percent Congestion Penalty. The average trip during peak period that would take 30 minutes in non-congested periods would average 42 minutes.)

- Scenario #3: 50% Congestion Reduction (20 percent Congestion Penalty, The average trip during peak period that would take 30 minutes in non-congested periods would average 36 minutes.)

- Scenario #4: 70% Congestion Reduction (12 Percent Congestion Penalty. The average trip during peak period that would take 30 minutes in non-congested periods would average 33.6 minutes.)

- Scenario #5: 90% Congestion Reduction (4 Percent Congestion Penalty. The average trip during peak period that would take 30 minutes in non-congested periods would average slightly more than 31 minutes.)

[93] Modeling notes are in Appendix II.

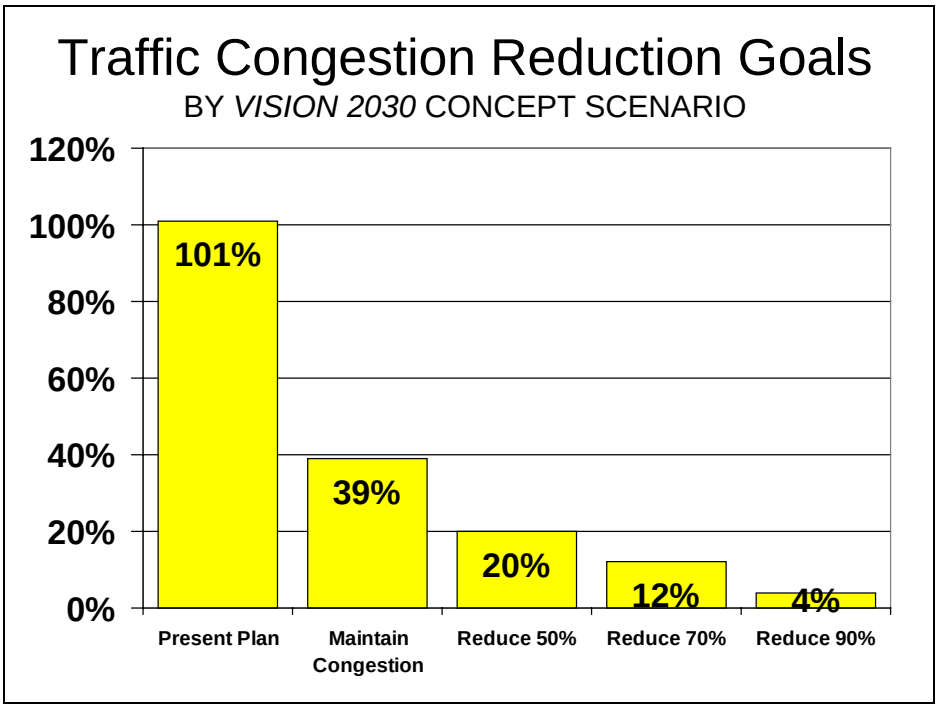

Figure 49

Scenario #1: Present Plan:

The ARC Regional Transportation Plan extends through 2025, and efforts are underway to adopt a new plan that outlines strategies through 2030 (*Mobility 2030*). This report uses a "Present Plan" scenario based upon the adopted 2025 Plan, with extrapolation of trends to 2030. Based upon traffic projections and roadway expansion plans, the Congestion Penalty during peak hours would increase to 101 percent in 2030. This is 159 percent more than the present Congestion Index of 39 percent. The average trip during peak period that would take 30 minutes in non-congested periods would average more than 60 minutes.

- The average automobile work trip is projected to take 43.4 minutes in 2030, compared to the present 30 minutes.

- It is estimated that commuters would need to add an 82 percent additional Reliability Penalty to their normal travel time to ensure punctual arrival at work 95 percent of the time. This additional Reliability Penalty would require the average commuter to plan on a maximum work trip time of 79 minutes. This is nearly double the 2001, including the Reliability Penalty.

- The average commuter would spend 96 hours more traveling than if there were no traffic congestion. Commuters would need to budget an additional of 297 hours annually (including the Reliability Penalty) to ensure on time arrival.

- Overall, it is projected that annual traffic delay hours per capita would increase from 37 in 2005 to 96 in 2030.

The present Regional Transportation Plan achieved compliance with federal air quality standards, though new standards being implemented by the U.S. Environmental Protection Agency will again place the Atlanta area out of compliance.

Scenario #2: Maintain Congestion:

In 2001, the average Congestion Penalty during peak periods was 39 percent. The Maintain Congestion Scenario (#2) would establish a Traffic Congestion Reduction Goal that would maintain the 2001 Congestion Penalty of 39 percent. The average trip during peak period that would take 30 minutes in non-congested periods would average 42 minutes. This would require providing substantial additional roadway capacity, due to population growth. It is estimated that the Maintain Congestion Scenario would require approximately $11.0 billion in freeway and arterial capacity enhancements above the Present Plan Scenario.[94] This would require $89 annually per capita more than under the Present Plan Scenario, or approximately $0.005 per incremental vehicle mile (5/10ths of one cent).

- The average automobile work trip is projected to be the present 30 minutes.

- It is estimated that commuters would need to add a 39 percent Reliability Penalty to their normal travel time to ensure punctual arrival at work 95 percent of the time. This additional Reliability Penalty would require the average commuter to plan for a work trip of 42 minutes (unchanged from 2001).

- The average commuter would spend 63 hours more traveling than if there were no traffic congestion. Commuters would need to budget an additional of 88 hours annually (including the Reliability Penalty) to ensure on time arrival.

- Overall, it is projected that annual traffic delay hours per capita would remain at the 2005 level of 37.

Because average traffic speeds will be generally higher in the Maintain Congestion Scenario than in the Present Plan Scenario (#1), air quality will be improved.

Scenario #3: 50% Congestion Reduction:

The 50% Congestion Reduction Scenario would establish a Traffic Congestion Reduction Goal of 50 percent. This would reduce the Congestion Penalty to approximately 20 percent from the present 39 percent. The average trip during peak period that would take 30 minutes in non-congested periods would average 36 minutes. It is estimated that the 50% Congestion Reduction Scenario would require approximately $22.1 billion in freeway and arterial capacity enhancements above the Present Plan Scenario. This would require $179 annually per capita more than under the Present Plan Scenario, or approximately $0.012 per incremental vehicle mile (1.2 cents).

[94] Includes road maintenance.

- The average automobile work trip is projected to take 25.8 minutes in 2030, compared to the present 30 minutes.

- It is estimated that commuters would need to add a 26 percent Reliability Penalty to their normal travel time to ensure punctual arrival at work 95 percent of the time. This additional Reliability Penalty would require the average commuter to plan for a work trip of 32 minutes, an improvement of 22 percent compared to 2001 and 59 percent from the Present Plan Scenario.

- The average commuter would spend 32 hours more traveling than if there were no traffic congestion. Commuters would need to budget an additional of 40 hours annually (including the Reliability Penalty) to ensure on time arrival.

- Overall, it is projected that annual traffic delay hours per capita would decline to 19 in 2030, from the 2005 level of 37.

Because average traffic speeds will be generally higher in the 50% Congestion Reduction Scenario, air quality will be improved from both the Present Plan and the Maintain Congestion scenarios.

Scenario #4: 70% Congestion Reduction:

The 70% Congestion Reduction Scenario would establish a Traffic Congestion Reduction Goal of 70 percent. This would reduce the Congestion Penalty to approximately 12 percent from the present 39 percent. The average trip during peak period that would take 30 minutes in non-congested periods would average 33.6 minutes. It is estimated that the 70% Congestion Reduction Scenario would require approximately $27.6 billion in freeway and arterial capacity enhancements above the Present Plan Scenario. This would require $224 annually per capita more than under the Present Plan Scenario, or approximately $0.016 per incremental vehicle mile (1.6 cents).

- The average automobile work trip is projected to take 24.1 minutes in 2030, compared to the present 30 minutes.

- It is estimated that commuters would need to add a 20 percent Reliability Penalty to their normal travel time to ensure punctual arrival at work 95 percent of the time. This additional Reliability Penalty would require the average commuter to plan for a work trip of 29 minutes, compared to the present 42 minutes. This is a 31 percent improvement compared to 2001 and a 63 percent improvement compared with the Present Plan Scenario.

- The average commuter would spend 19 hours more traveling than if there were no traffic congestion. Commuters would need to budget an additional of 29 hours annually (including the Reliability Penalty) to ensure on time arrival.

- Overall, it is projected that annual traffic delay hours per capita would decline to 11 in 2030, from the 2005 level of 37.

Because average traffic speeds will be generally higher in the 70% Congestion Reduction Scenario, air quality would be improved from the first three scenarios.

Scenario #5: 90% Congestion Reduction:

The 90% Congestion Reduction Scenario would establish a Traffic Congestion Reduction Goal of 90 percent. This would reduce the Congestion Penalty to approximately 4 percent from the present 39 percent. The average trip during peak period that would take 30 minutes in non-congested periods would average slightly more than 31 minutes. It is estimated that the 90% Congestion Reduction Scenario would require approximately $41.0 billion in freeway and arterial capacity enhancements above the Present Plan Scenario. This would require $333 annually per capita more than under the Present Plan Scenario, or approximately $0.025 per incremental vehicle mile (2.5 cents).

- The average automobile work trip is projected to take 22.4 minutes in 2030, compared to the present 30 minutes.

- It is estimated that commuters would need to add an additional 15 percent Reliability Penalty to their normal travel time to ensure punctual arrival at work 95 percent of the time. This additional Reliability Penalty would require the average commuter to plan for a work trip of 26 minutes, compared to the present 42 minutes. This is a 38 percent improvement compared to 2001 and a 67 percent improvement compared with the Present Plan Scenario.

- The average commuter would spend six hours more traveling than if there were no traffic congestion. Commuters would need to budget an additional of seven hours annually (including the Reliability Penalty) to ensure on time arrival.

- Overall, it is projected that annual traffic delay hours per capita would decline to four in 2030, from the 2005 level of 37.

Because average traffic speeds will be generally higher in the 90% Congestion Reduction Scenario, air quality would be improved from the first four scenarios.

Comparison of Scenarios: Data for the five scenarios is summarized in Tables 21 and 22. Figure 50 compares projected annual costs per capita in 2030 are compared to annual traffic delay hours in 2030.

Table 21 Scenarios: Summary of Projections					
	Present Plan (#1)	Maintain Congestion (#2)	50% Congestion Reduction (#3)	70% Congestion Reduction (#4)	90% Congestion Reduction (#5)
Congestion Penalty (Peak Period)	101%	39%	20%	12%	4%
Congestion Penalty Compared to 2001	159%	0%	-50%	-70%	-90%
Daily Automobile Work Trip with Congestion	43.4	30.0	25.8	24.1	22.4
Annual Hours of Delay: Work Trips	163	63	32	19	6
Reliability Penalty	82%	39%	26%	20%	15%
Daily Additional Minutes Budgeted for Work Trip including Reliability Penalty	78.9	41.7	32.4	29.0	25.8
Annual Additional Hours Budgeted for Work Trip including Reliability Penalty	297	88	40	23	7
Annual Traffic Delay per Capita (Hours)	96	37	19	11	4

Table 22 Scenarios Compared to Present Plan Scenario (#1) Incremental Changes				
	Maintain Congestion (#2)	50% Congestion Reduction (#3)	70% Congestion Reduction (#4)	90% Congestion Reduction (#5)
Additional Freeway Lane Miles	765	1,764	2,283	3,551
Additional Arterial Lane Miles	1,148	2,648	3,426	5,330
Capital & Maintenance Cost (Billions)	$11.0	$22.1	$27.6	$41.0
Annual Per Capita Cost (2005-2030)	$89	$179	$224	$333
Cost per Vehicle Mile	$0.005	$0.012	$0.016	$0.025
Cost per Person Mile	$0.004	$0.011	$0.014	$0.022

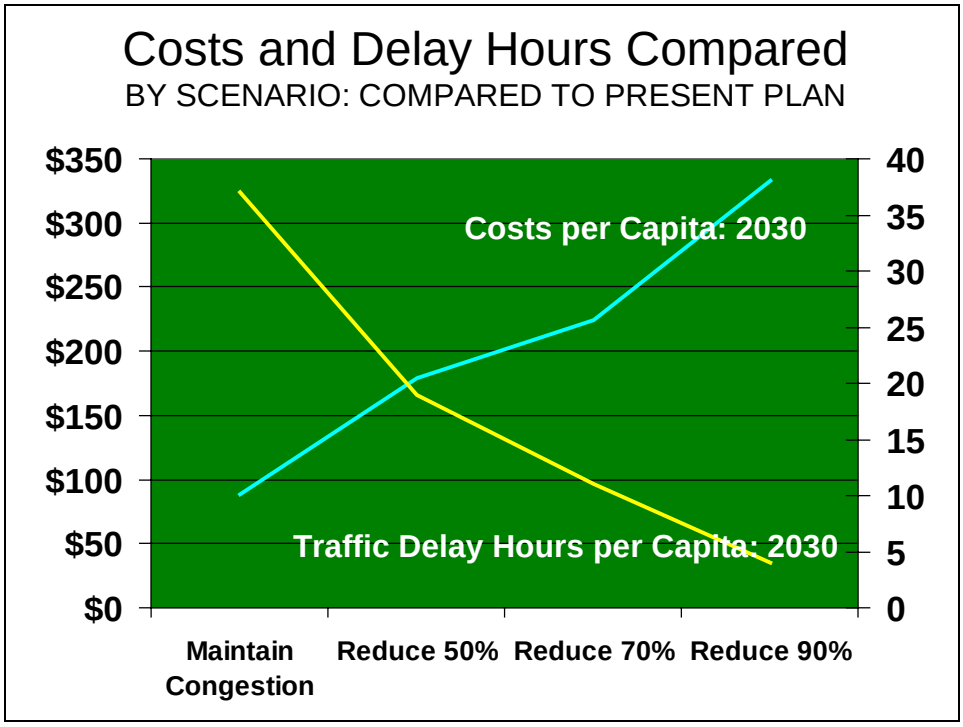

Figure 50

B. GOVERNOR PERDUE'S *FAST FORWARD* PROGRAM

Governor Sonny Perdue's recently announced *Fast Forward* program will advance construction of much needed projects around the state, completing 18 years of scheduled work over the next six years. In addition to advancing previously planned projects, *Fast Forward* will include implementation of a coordinated traffic management system in the Atlanta area, the most important element of which could be the region-wide traffic signal timing and coordination system. There are currently insufficient details to estimate the amount by which construction

requirements might be reduced. But the experience noted above ("Roadway Management and Operations Improvement") would indicate a reasonable expectation that the costs of the proposed *Blueprint 2030* program could be between $3 billion and $5 billion less than projected above.

C. EVALUATION: COST PER TRAFFIC DELAY HOUR REDUCTION

To implement the Traffic Congestion Limitation Goal, it would be necessary to establish a project, program and strategy evaluation system that effectively addresses the objective. Because the very nature of traffic congestion is excess delay, it is proposed that the project, program and strategy evaluation criteria be the cost per traffic delay hour reduced.

With respect to the *Blueprint 2030* scenarios, the annual cost per reduced traffic delay hour[95] was estimated for 2030 (2003 constant dollars), with the following results (Figure 51):[96]

- The Maintain Congestion Scenario (#2) would result in an annual reduction of 354 million traffic delay hours, at a cost of $2.33 per traffic delay hour reduced (compared to the Present Plan Scenario)

- The 50 % Congestion Reduction Scenario (#3) would result in an annual reduction of 466 million traffic delay hours, at a cost of $3.56 per traffic delay hour reduced (compared to the Present Plan Scenario).

- The 70 % Congestion Reduction Scenario (#4) would result in an annual reduction of 510 million traffic delay hours, at a cost of $4.06 per traffic delay hour reduced (compared to the Present Plan Scenario).

- The 90 % Congestion Reduction Scenario (#5) would result in an annual reduction of 554 million traffic delay hours, at a cost of $5.55 per traffic delay hour reduced (compared to the Present Plan Scenario).

An "incremental-incremental" analysis projects that only between Scenario #4 and Scenario #5 does the additional cost per reduced traffic hour delay exceed $10.00 (Table 23).[97]

[95] These estimates and all other long term economic estimates are based only on actual travel delay hours (Congestion Penalty) and include no economic calculation with respect to the Reliability Penalty.
[96] Annual costs determined by discounting the total capital expenditures over 40 years at seven percent, and adding the annual maintenance expense in 2030.
[97] Each of these figures is well below the top figure used by the United States Department of Transportation Federal Transit Administration (FTA) for evaluating proposed "new starts" (rail and bus) projects as achieving "high" cost effectiveness. FTA requires a cost per hour of user benefits of below $10.00 for a "high" rating. This includes both traffic delay reduction and time reduction for people who already use transit. As a result it can be expected that the cost per traffic delay hour for such a project would be greater. None of the 20 "new starts" projects around the nation evaluated in 2004 by the FTA achieved a "high" rating. The most cost-effective was more than twice as costly as the "70% Congestion Reduction" Scenario proposed in *Blueprint 2030* for Atlanta.

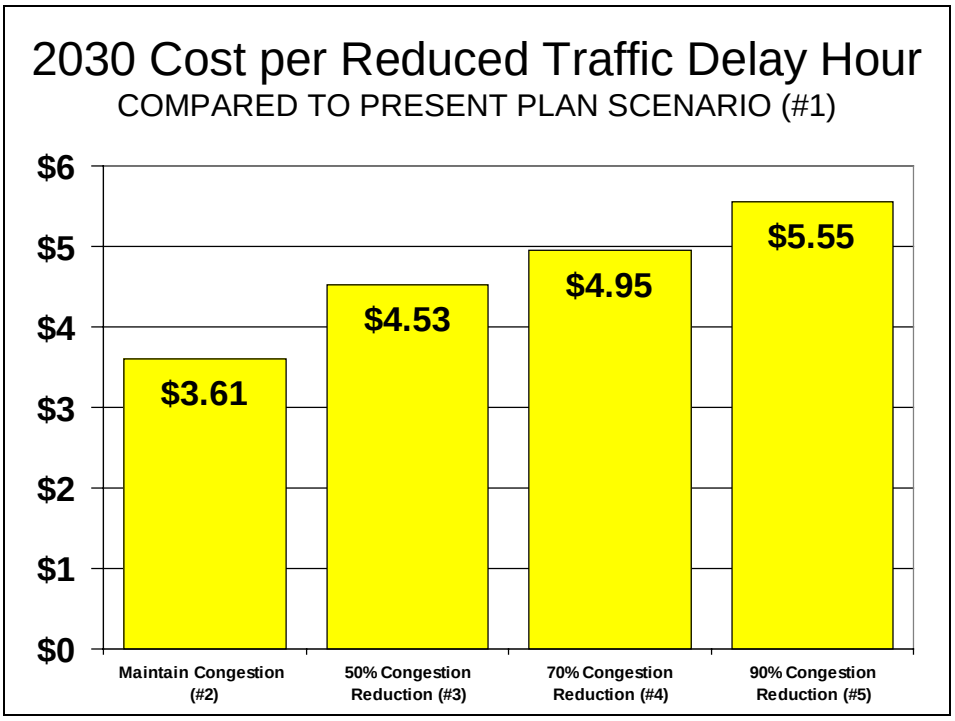

Figure 51

Table 23 Cost per Reduced Traffic Delay Hour: "Incremental-Incremental"	
Scenarios	Cost per Reduced Traffic Delay Hour
#2 Compared to #1	$2.33
#3 Compared to #2	$7.47
#4 Compared to #3	$9.28
#5 Compared to #4	$22.86

D. COMPREHENSIVE REGIONAL AND SUB-REGIONAL STRATEGIES

As is indicated above, Atlanta's urban transport strategies have been strongly skewed toward serving the urban core and has had the effect of under serving the location of most growth, outside the core. Such a distorted emphasis would be inappropriate virtually anywhere, but is particularly so in Atlanta, which is one of the world's least core oriented urban areas. Future urban transport plans should seek to address suburb-to-suburb travel as comprehensively as they address suburb-to-core travel. Suburb-to-suburb travel volumes are much higher than suburb-to-core volumes, though their concentration on particular routes is less (because of the more dispersed nature of suburban origins and destinations. For example, approximately 95 percent of

work trips in the 13-county non-attainment area are to locations outside downtown, a figure that will rise to 96 percent by 2025.[98]

The resulting program would need to include programs to address the most important deficiency --- the fact that the present roadway system unnecessarily concentrates a disproportionate share of travel on the I-285 Perimeter and inside. More capacity will be required on these roadways but there is an even greater need for new capacity outside the Perimeter.

One particularly critical need is for capacity to provide an alternative around the Atlanta area for intercity trucks. Informal estimates indicate that as much as 15 percent of the traffic on I-285 is large trucks, which on average consume the road space of 3.5 cars. This means that trucks could be consuming up to 40 percent of the capacity of I-285. Providing a viable alternative around Atlanta would provide substantial new capacity and could make further expansions of I-285 unnecessary. This could be accomplished by special truck-only roadways, tollways or lanes in new outer freeways.

Transportation officials will need to turn their attention to the long neglected issue of mobility and access outside I-285, where most growth has occurred in recent decades and where virtually all growth has occurred since 2000 according to the new Census Bureau estimates. Additional capacity will need to be provided outside the Perimeter, which should principally be non-radial freeways and arterials. This would produce the dual benefits of reducing traffic congestion in the suburbs and also reducing traffic in the core of the area through which people are forced now to minimize travel times. This would produce an important improvement in public health in the city of Atlanta and elsewhere in the core, with the lower levels of air pollution that will occur from less traffic and traffic that moves faster and at more constant speeds.

To deliver the improved roadway system throughout the Atlanta area, as outlined in the scenarios above, the Traffic Congestion Limitation Goal and any related standards should be applied at the sub-regional area (at least one sub-region corresponding to each county and three sub-regions for Fulton County).

A More Comprehensive System: As was noted above, Los Angeles has the most intense roadway system in the nation, with approximately 4.38 lane miles of freeway equivalent roadway per urbanized square mile. At approximately 1.75 lane miles per square mile, Atlanta has 61 percent less roadway coverage per square mile than Los Angeles.

- Under the Present Plan Scenario, Atlanta's roadway coverage would fall to 69 percent below that of Los Angeles.

- Under the Maintain Congestion Scenario, Atlanta's roadway coverage would remain little changed, at 60 percent below that of Los Angeles.

- Under the 50% Congestion Reduction Scenario, Atlanta's roadway coverage would fall to 48 percent below that of Los Angeles.

[98] According to the ARC *2025 Plan.*

- Under the 70% Congestion Reduction Scenario, Atlanta's roadway coverage would fall to 42 percent below that of Los Angeles.

- Under the 90% Congestion Reduction Scenario, Atlanta's roadway coverage would fall to 26 percent below that of Los Angeles.

The much improved traffic conditions that would occur in the Congestion Reduction Scenarios are achievable with less freeway coverage than Los Angeles (Figure 52), because Atlanta's lower density produces lower traffic intensities.

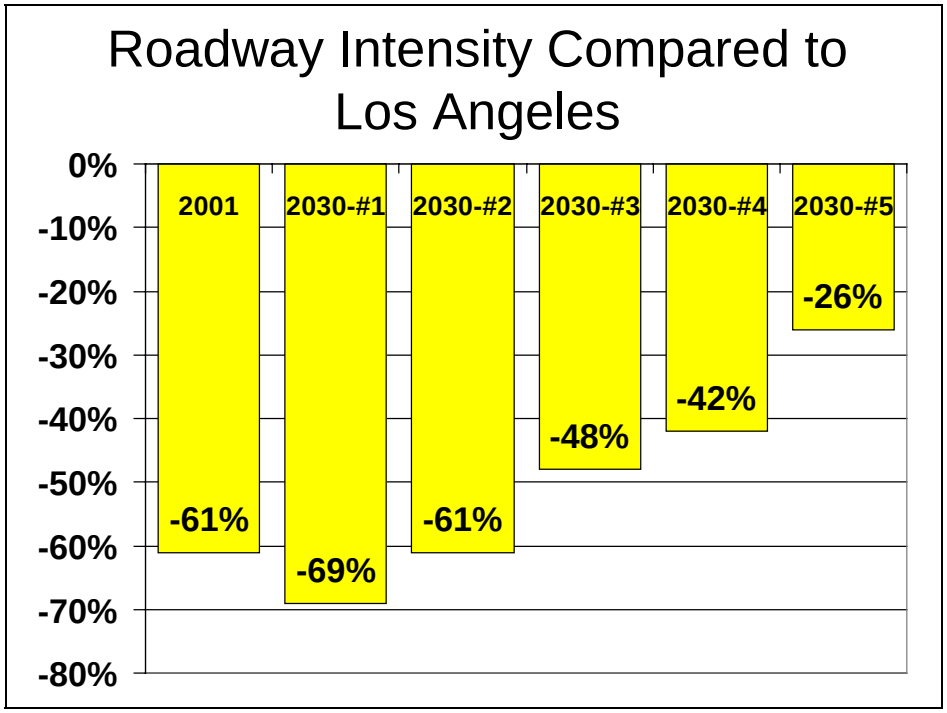

Figure 52

E. MODAL NEUTRALITY

A goal-based urban transportation policy would promote the development of the most cost effective program for achieving the travel time improvement objective, without regard to how much of the program is based upon traffic management, highway expansion or transit. It would not be skewed toward or against any particular mode of transport. To achieve the most favorable results, urban transportation policy needs to be modally neutral, allowing for multi-modalism (or intermodalism) that would fund transportation investments solely based upon the cost-effectiveness of their contribution to the traffic congestion reduction goal.

Blueprint 2030 assumes for the sake of financial planning that all strategies to reduce traffic delay hours will involve new freeway and arterial capacity. Other strategies should also be

employed, however, to the extent that they deliver reduced traffic delay hours, in the locations required, at a cost less than that of roadway expansion.

Roadway Management and Operations Improvements in *Blueprint 2030*:

As described above, it is estimated that improvements in roadway capacity of 10 percent to 15 percent can be achieved by improve roadway management and operations. Such programs should be integrated into the *Blueprint 2030* concept to the extent that they produce reduced traffic delay hours more cost-effectively than other approaches.[99]

High Occupancy Vehicle Lanes in *Blueprint 2030*:

The Atlanta area has invested heavily in high-occupancy vehicle lanes and there are plans to expand the system. ***Car-pooling is important. But the current traffic intensity and projected increases are far too substantial for the substantial behavioral changes to occur that would produce material improvements from car-pooling.*** Generally, as noted below, high-occupancy vehicle lanes should also serve as bus rapid transit lanes and high-occupancy-toll lanes. Such facilities could be incorporated into *Blueprint 2030* to the extent that they produce superior progress toward achievement of the 2030 Traffic Congestion Reduction Goal (by more cost effective reduction of traffic delay hours[100]).

Transit in *Blueprint 2030*:

In recent years, the success of South American busway systems, combined with the escalating costs of urban rail systems have induced an interest in lower cost bus rapid transit (BRT) programs. Generally, bus rapid transit costs much less to build, while attracting sufficient ridership to keep operating costs well below that of rail systems. But buses do not require the same exclusivity of right-of-way as rail. It is possible to allow a limited amount of automobile traffic on rapid bus rights of way, which can reduce traffic congestion freeway lanes that are open to all traffic (general purpose freeway lanes). The most promising approaches would permit use of busways by drivers paying tolls and perhaps without tolls by car pools. Such an approach, referred to as express toll lanes[101] or "HOT Lanes" (high-occupancy toll lanes where car pools are allowed to use the lane without charge) would produce additional revenue to support construction of the busways, making them more cost effective. This makes it possible to increase transit service more than would be possible if bus rapid transit rights-of-way were limited to bus operations. The result would be a region-wide rapid transit system, delivered cost effectively that would also contribute to improved traffic flow. Any bus rapid transit program built should also be an express toll lane or HOT Lane project.

[99] The *Blueprint 2030* Scenario cost projections do not include roadway management and operations improvement strategies.

[100] Traffic delay hours are the gross number of hours spent in roadway traffic congestion by all road travelers. Thus, a car with two occupants experiencing a delay of one hour would account for two traffic delay hours.

[101] Maryland's Governor Robert Ehrlich has proposed a statewide network of express toll lanes. Car pools would be charged tolls along with single occupant vehicles.

As described above, *Blueprint 2030* would consider and include those transit projects (bus, rail or other) that reduce traffic delay hours more cost effectively that general purpose highway expansion projects that serve the same need.

F: COSTS IN CONTEXT

In 2001, the 13 county ARC region had a gross personal income of approximately $131 billion.[102] It is likely that gross personal income will rise to approximately $375 billion by 2030.[103] In the context of such an increase, virtually all of the scenarios would appear to be affordable. Over the period, per capita income would rise approximately $14,500 annually, considerably more than even the most expansive Scenario (#5), which would cost $333 per capita more than the Present Plan Scenario.

On a person mile basis, the congestion reduction scenarios (#3 through #5) would require annual additional expenditures of $0.011 to $0.022 per additional person mile in 2030. By comparison, total public transit expenditures at the national level averaged more than $0.77 per person mile in 2002, 35 to 70 times the cost of the congestion reduction scenarios.

Even at a $27.6 billion increase over the Present Plan Scenario, the 70% Congestion Reduction Scenario (#4) would add less than 20 percent more per capita ($224) in the 13 counties than the annual per capita sales tax collections for MARTA in Fulton and DeKalb Counties (approximately $190 in 2002). The most aggressive scenario (90% Congestion Reduction) would require an increase in annual per capita revenues of somewhat more than 1.5 times ($300) the current per capita MARTA tax in its service area)

The higher costs per capita of the congestion improvement alternatives (#3 through #5) would increase costs per vehicle mile by less than the decline since 1960. From 1960 to 2000, statewide roadway expenditures per vehicle mile fell $0.036 (3.6 cents). The largest expenditure increase (under the 90% Congestion Reduction Scenario) would increase per vehicle mile expenditures in the Atlanta area $0.025 (2.5 cents).

Congestion Costs: Based upon the Texas Transportation Institute methodology, it is projected that the annual costs of congestion in the Atlanta area will be approximately $2.9 billion in 2005.[104] By comparison, it is projected that (Figure 53):

- Under the "Present Plan" Scenario, annual congestion costs would increase approximately three times, to $11.5 billion by 2030.

- Under the "Maintain Congestion" Scenario, annual congestion costs would increase approximately 50 percent, to $4.5 billion b 2030.[105]

[102] Calculated using US Department of Commerce per capita income estimates assuming a population of 3.75 million (based upon the ARC 2000-2010 projection).
[103] Based upon ARC population projections and an assumption of two percent annual inflation-adjusted per capita growth, consistent with shorter-term Congressional Budget Office projections. For the purposes of this projection, traffic congestion is assumed to continue at present levels (Maintain Congestion Scenario)
[104] Assumes that traffic delay hours per capita will increase from 2001 to 2005 at the same annual rate as from 1996 to 2001.

- Under the "70% Congestion Reduction" Scenario, annual congestion costs would decrease approximately 40 percent, to $1.3 billion by 2030.

- Under the "50% Congestion Reduction" Scenario, annual congestion costs would decrease more than 75 percent, to $0.5 billion by 2030.

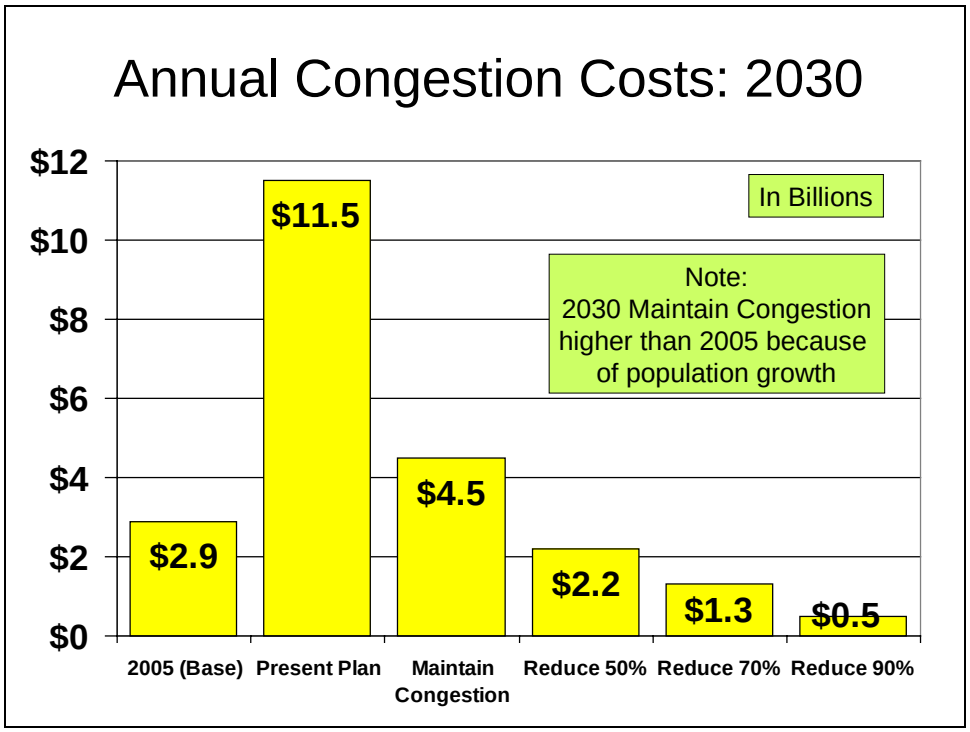

Figure 53

Fuel Efficiency: Generally, faster, more constant urban traffic speeds improve fuel efficiency (and reduce air pollution emissions). The improved fuel efficiency that would result from higher traffic speeds is projected to be from $4.5 billion to $8.3 billion through 2030.[106]

- Under the "Maintain Congestion" Scenario (#2), the fuel cost savings would be $4.5 billion, equaling 41 percent of the incremental capital and maintenance cost ($11.0 billion).

- Under the "50% Congestion Reduction" Scenario (#3), the fuel cost savings would be $6.5 billion, equaling 29 percent of the incremental capital and maintenance cost ($22,1 billion).

[105] This increase reflects the projected increase in population.
[106] Estimated using the Texas Transportation Institute fuel savings equation.

- Under the "70% Congestion Reduction" Scenario (#4), the fuel cost savings would be $7.3 billion, equaling 27 percent of the incremental capital and maintenance cost ($27.6 billion).

- Under the "90% Congestion Reduction" Scenario (#5), the fuel cost savings would be $8.3 billion, equaling 20 percent of the incremental capital and maintenance cost ($41.0 billion)

G. ATLANTA REGION ECONOMIC PERFORMANCE

More efficient urban areas are more affluent. It is important for people throughout an urban area to be able to conveniently access virtually all of the jobs in the area. And, overall costs are lower where commercial goods and freight is not hampered by excessive traffic congestion. Atlanta is developing serious problems in this regard. Perhaps the most stark evidence is the much worse than average travel times reported in the 2000 census.

Moreover, it is increasingly apparent that urban economic output can be retarded by excessive traffic congestion. Recent research by Remy Prud'homme and Lee[107] at the University of Paris sought to estimate the economic impact of changes to the size of labor markets that can be accessed by area residents. In a study that included European and Asian urban areas, they examined the output of urban areas based upon the size of the metropolitan labor market that could be accessed in fixed amounts of time (such as 30 minutes). They found, generally, that as the number of jobs that can be reached in a fixed amount of time is reduced, the economic efficiency of the urban area is reduced at a rate of approximately 0.18. For example, if an urban area experienced a 10 percent reduction in its 30-minute labor market access, it would be estimated that the economic output (measured in gross personal income) would be reduced 1.8 percent.[108]

If the economic performance predicted by the Prud'homme-Lee thesis were duplicated in Atlanta over the 2005-2030 period, the following results would be obtained:[109]

- The Maintain Congestion Scenario (#2) would result in a 2.4 percent increase in gross personal income ($147 billion) compared to the Present Plan Scenario (#1). This is approximately $1,200 annually per capita and would equal $2,450 per capita or $6,125 per household in 2030 .

- The 50% Congestion Reduction Scenario (#3) would result in a 3.5 percent increase in gross personal income ($213 billion) compared to the Present Plan Scenario (#1). This is approximately $1,750 annually per capita and would equal $3,560 per capita or $8,900 per household in 2030.

[107] Remy Prud'homme and Chang-Woon Lee, "Size, Sprawl, Speed and the Efficiency of Cities," Observatoire de l'Économic et des Institutions Locals (Paris, 1998).
[108] 10 percent times 0.18 (0.10 * 0.18).
[109] Based upon an assumption of 90 percent of work trips being by automobile, approximately 70 percent of work trips being during peak periods (6:00 to 9:00 a.m.) and a reduction in employment density of one-third as the accessible area becomes larger.

- The 70% Congestion Reduction Scenario (#4) would result in a 4.5 percent increase in gross personal income ($275 billion) compared to the Present Plan Scenario (#1). This is approximately $2.250 annually per capita, and would equal $4,620 per capita or $11,550 per household in 2030 .

- The 90% Congestion Reduction Scenario (#5) would result in a 5.9 percent increase in gross personal income ($355 billion) compared to the Present Plan Scenario (#1). This is approximately $2.900 annually per capita and would equal $5,990 or $14,975 per household in 2030 (Figure 54).[110]

The Prud'homme-Lee analysis would suggest that the additional income attributable to improved mobility would range from 12 to 18 times the cost of the program in 2030 (Figure 55).

Of course, it is very difficult to accurately predict economic performance over such a long period of time. The actual differences attributable to the varying levels of traffic congestion could be less, or they could be more. But, perhaps more importantly, the economic projections based upon higher levels of traffic congestion could be overly optimistic, because overall population growth (and as a result, economic growth) could well be reduced by extreme traffic congestion levels.[111] Indeed, it seems inconceivable that a continuation or worsening of Atlanta's traffic congestion would not interfere with both population and economic growth in the long run.

The Prud'homme-Lee finding that incomes increase with improved mobility is consistent with recent research on minority unemployment. Steven Raphael and Michael Stoll at the University of California estimated that 45 percent of the gap between African-American and White-Non-Hispanic unemployment could be erased by making automobiles available to those without auto access.[112]

[110] Assumes 2.5 persons per household.
[111] All projections are based upon the assumption that population growth would be the same under each traffic congestion scenario.
[112] Steven Raphael and Michael Stoll, *Can Boosting Minority Car-Ownership Rates Narrow Inter-Racial Employment Gaps?* National Science Foundation, June 2000.

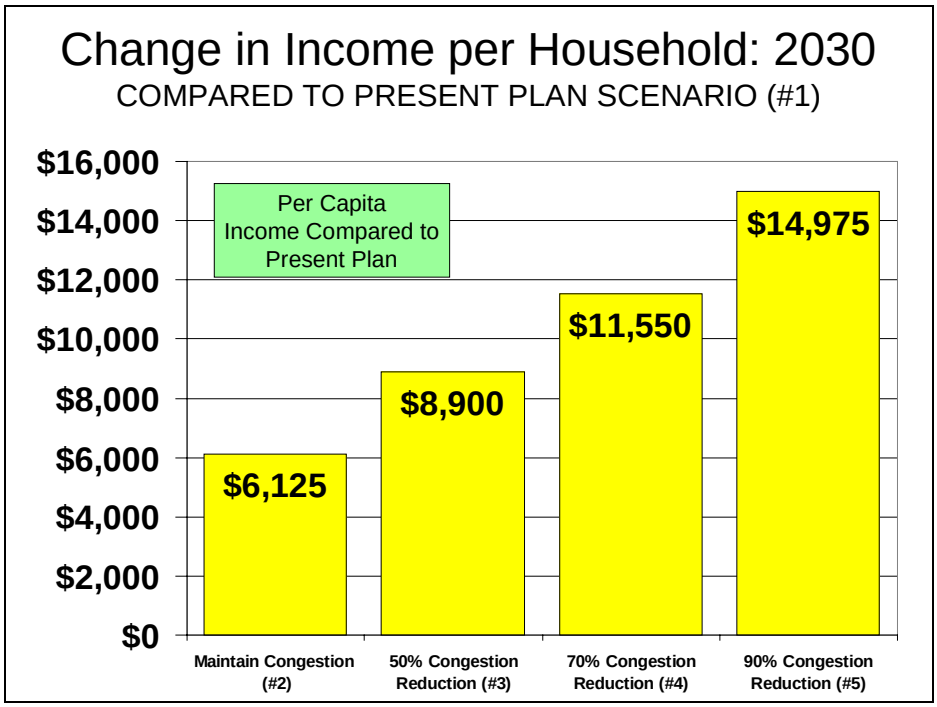

Figure 54

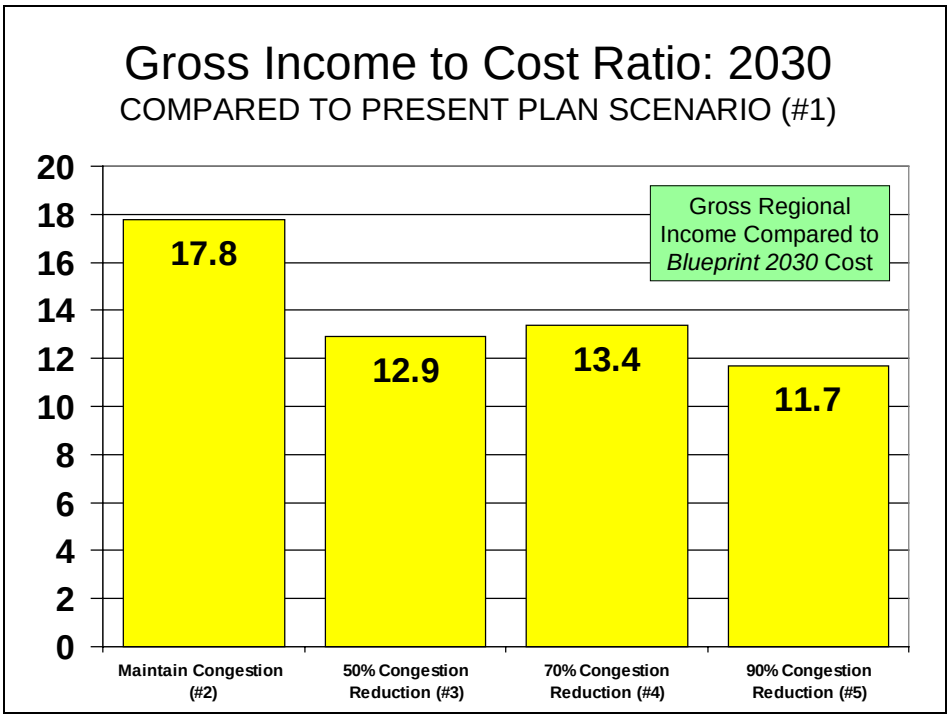

Figure 55

V. PREVENTING THE PROBLEM IN OTHER GEORGIA URBAN AREAS

Blueprint 2030 would prevent traffic congestion from becoming severe in the other metropolitan areas of the state. As was noted above, traffic congestion has not yet reached serious levels in urban areas outside Atlanta and appears to be at a level lower than the recommended Traffic Congestion Limitation Goal of a 12 percent Traffic Congestion Penalty. However, as growth continues, it can be expected that metropolitan areas outside Atlanta will begin to experience higher levels of traffic congestion. In addition, the continued expansion of the Atlanta "commuter shed" could well lead to U.S. Census Bureau designation of a much larger Atlanta consolidated metropolitan area, which could include any or all of the Athens, Macon, Rome and Columbus areas, each of which is as close or closer to Atlanta as Chambers County, Alabama, the present farthest extent of the metropolitan area. Mechanisms should be established to expand the Atlanta *Blueprint 2030* planning area and funding base to ensure that the Traffic Congestion Limitation Goal is achieved and maintained throughout the area, regardless of geographical size.

In addition, the new Environmental Protection Agency standards are expected to place some smaller metropolitan areas into non-attainment, which will require a more intense level of transportation planning than before. *Blueprint 2030* would apply the same analysis and traffic limitation standards to other urban areas as soon as they are determined to be approaching the Traffic Congestion Limitation Goal (below).

VI. IMPLEMENTATION

Implementation of *Blueprint 2030* would involve establishing a statewide Traffic Congestion Limitation Goal, development of regional funding mechanisms and establishment of the planning processes and organizations to ensure efficient delivery of the program.

A. ADOPTION OF A STATEWIDE TRAFFIC CONGESTION LIMITATION GOAL

The State of Georgia should adopt a statewide Traffic Congestion Limitation Goal (a four percent Congestion Penalty, which would involve adoption of the "70% Congestion Reduction" Scenario in the Atlanta area) and the same ultimate Traffic Congestion Limitation Goal in all of the state's urban areas. This would result in a comprehensive state standard of a maximum 12 percent Congestion Penalty.

In Atlanta, adoption of a 12 percent maximum Congestion Penalty would return traffic congestion and average traffic delay hours per capita to 1986 levels. Adoption of the "70% Congestion Reduction" Scenario (#4) would achieve a substantial reduction in traffic congestion that could improve the efficiency of the labor market, and according to the Prud'homme-Lee thesis, produce economic income 13 times the cost (and 18 times the net cost including fuel cost reductions). While the Maintain Congestion Scenario (#2) would achieve a better income increase to cost ratio, it would not improve traffic congestion. As a result, such a program would be unlikely to achieve substantial political support in a metropolitan area where there is an interest in improving traffic congestion. Further, the 70% Congestion Reduction Scenario is affordable based upon per vehicle mile funding levels from the past (above).

B. REGIONAL FUNDING BY USERS

Because of the significant differences in traffic congestion levels and capacity requirements between Atlanta and other metropolitan areas in Georgia, broad based funding approaches are unlikely to be the most efficient method for delivering *Blueprint 2030.* In general federal or statewide funding is unlikely to provide sufficient resources for the program.

Federal Funding: The 70% Congestion Reduction Scenario in Atlanta, even if funded at the maximum 80 percent by the federal government would require a tripling of the federal gas tax.[113] Further, Georgia does not receive an equitable return on its federal gasoline tax revenues, having obtained little over 80 percent of its contribution since the beginning of the federal program.[114] This appears to extend to the metropolitan level as well. A recent report indicates that the Atlanta metropolitan area receives 20 percent less in federal revenues than it contributes.[115]

Currently, it is unlikely that there will be any immediate increase in the federal gasoline tax and a tripling is simply beyond the realm of probability. Similarly, at present funding ratios, at least a 60 percent increase would be required in the state gasoline tax.

Statewide Funding: Alternatively, if all of the "70% Congestion Reduction" Scenario were funded by the state gasoline tax, a quadrupling would be necessary. Solving the Atlanta traffic congestion problem must principally be financed by local sources, rather than state or federal sources.

Regional Funding: It would therefore seem that the funding for *Blueprint 2030* should be raised principally, if not exclusively, in the metropolitan areas that benefit, in proportion to their benefit. There are at least two promising funding sources.

- Regional taxes: Regional funding from any Serious Congestion Urban Area, such as Atlanta. This could include higher gasoline taxes imposed at the local level, rather than throughout the state. It could also include a metropolitan area sales tax that would not be levied in the balance of the state. It is estimated that the recommended program could be financed with a 1.25 percent sales tax in the Atlanta area. These funds might be spent on a cash basis ("pay-as-you-go") or there could be bonding.

- Tolls: Some of the new roadways (especially freeways and freeway expansions) could be developed with the assistance of toll financing, whether through a state administered program or through private road developers. Privately developed toll roads have been successfully implemented in Richmond (Virginia), Toronto and in European nations. Moreover, there seems to be a strong possibility that the next federal highway reauthorization act will include strong encouragements for the development of toll express lanes in urban areas.

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[113] Estimated based upon federal funding identified by ARC in the *2025 Regional Transportation Plan.*
[114] Ronald D. Utt, *Reauthorization of TEA-21: A Primer on Reforming the Federal Highway and Transit Programs*, Heritage Foundation (Washington), 2003.
[115] *Metropolitan Areas Get Short End of Gasoline Tax Funds*, Environmental Working Group (Washington: 2004).

This combination of funding sources could also be used to ensure that traffic improvements are made in other Georgia urbanized areas as required to ensure that traffic congestion does not become unmanageable, should statewide resources be insufficient at any point in the future. Such a program, regardless of in which area, would require local beneficiaries to pay, rather than imposing urbanized area costs on other areas of the state.

C. ADMINISTRATION: STATE IMPLEMENTATION CORPORATION

Because the Atlanta metropolitan region has become so geographically large and because its traffic congestion has such serious statewide implications, the congestion reduction program should be administered at the state level by a special state corporation organized ("state implementation corporation") to implement the *Blueprint 2030* program. A statewide approach is also justified by the prospect that a number of the state's smaller metropolitan areas could be consolidated into the Atlanta metropolitan area in coming years.

The state implementation corporation could be similar to the toll road authorities that were established decades ago in states such as Pennsylvania, Indiana or the more recent Harris County Toll Road Authority in Houston. The implementation corporation should be established in such a way that it is generally not susceptible to political influences and is solely committed to the delivery of the program. It should also have bonding authority secured by *Blueprint 2030* revenues and there should be a requirement that revenues be expended in the Serious Congestion area in which they were raised. It will be important to ensure that the implementation corporation is the sole recipient of any non-commercial *Blueprint 2030* revenues and that the integrity of the revenue dedication to the *Blueprint 2030* Traffic Congestion Reduction Goal is guaranteed. Funds should not be available for use in general budget balancing or for any use other than cost effectively reducing hours of traffic delay, consistent with the Traffic Congestion Reduction Goal.

D. PLANNING AND REPORTING

To achieve the recommended Traffic Congestion Reduction Goal would require adoption of planning, programming and evaluation procedures that identify the projects that are most cost effective in reducing congestion.

Congestion Reduction Plan for Serious Congestion Urban Areas: Any urban area with a 12 percent or greater Congestion Penalty during the 2005 to 2030 period would be considered a "Serious Congestion" urban area, which would require a *Blueprint 2030 Plan* to be prepared.

Atlanta: The Georgia State Department of Transportation (G-DOT) should begin developing interim studies to support preparation of a Traffic Congestion Reduction *Blueprint 2030 Plan* (*Blueprint 2030 Plan*) for metropolitan Atlanta consistent with the concepts outlined in this report. Once established, the state implementation corporation would assume responsibility and complete the *Blueprint 2030 Plan.* During this process, final financial projections would be prepared, including the infrastructure cost reductions made possible by Governor Perdue's *Fast Forward* traffic management initiatives. The legislation establishing the state implementation corporation should include provisions for adding other metropolitan areas to the Atlanta

metropolitan area where it becomes clear that their traffic congestion conditions will become interwoven with those of Atlanta.[116]

Outside Atlanta: The state implementation corporation should also be required to conduct an annual review of traffic conditions in all of the state's urban areas that have not yet been designated as "Serious Congestion" urban areas. At any point that it appears an urban area will exceed the Traffic Congestion Limitation Goal within five years, the state implementation corporation should be required to prepare a Traffic Congestion Reduction *Blueprint 2030 Plan* for that area.

The purpose of the *Blueprint 2030 Plan* in metropolitan Atlanta would be to achieve the Congestion Reduction Goal of a 12 percent Congestion Penalty by 2030. In other urban areas, the purpose of the *Blueprint 2030 Plan* would be to ensure that the Traffic Congestion Limitation Goal is never exceeded.

As noted in the analysis above, the intensity of Atlanta's traffic congestion would require adoption of a 70 percent Traffic Congestion Reduction Goal to be achieved by 2030.[117]

- The *Blueprint 2030 Plan* should establish an annualized cost per reduced traffic delay hour in 2030 (constant dollar) that would be the basis of evaluating the consistency of annual performance and individual projects with the Traffic Congestion Reduction Goal.

- The *Blueprint 2030 Plan* should include intermediate (no more than five year) Congestion Penalty targets that reduce congestion at no less than a generally constant rate throughout the 25-year period. In addition, the *Blueprint 2030 Plan* should establish an annual delay hour budget target calculated consistent with the Congestion Penalty interim targets.

- The plan should include sub-regional analysis elements (in the Atlanta area this would be, at a minimum, one for each county outside Fulton and one each for south, central and north Fulton). The Congestion Reduction Goal not to exceed a 12 percent Congestion Penalty should be established for each of the sub-regions, together with the intermediate goals.

- The *Blueprint 2030 Plan* should be updated every five years.

In identifying individual projects, the principal evaluation standard should be the lowest cost per hour of reduced traffic delay. This standard should apply to roadways and projects built with general tax and gasoline tax funds (toll facilities would be self-funding and would thus not compete for general tax funds and gasoline tax funds). To achieve the most favorable results, the cost per reduced traffic delay hour standard should also be applied without regard to mode

[116] Based upon the discussion above. This could include Macon, Rome, Columbus and Athens, all of which are closer to downtown Atlanta than the farthest reaches of the Atlanta metropolitan area.

[117] As noted above, this would reduce the Congestion Penalty from 39 percent to 12 percent, a goal that is similar to the 15 percent Congestion Penalty proposed in the Texas *Governor's Business Council Report* for major Texas metropolitan areas.

(modal neutrality or multi-modalism) to virtually all proposed strategies. For example, where transit projects can achieve the cost effective reductions in traffic delay hours as required by the ultimate, intermediate and sub regional traffic congestion reduction goals, they should be implemented in preference to highway projects that would be less cost effective per reduced traffic delay hour.

Once a *Blueprint 2030 Plan* has been adopted, the state should identify alternatives for funding the program (regional gasoline taxes, regional general purpose taxes, tolls or other sources of funding). One promising alternative is the private roadway developers that could build and operate sections of the system. G-DOT and the state implementation corporation should invite private road developers to participate in the planning process and seek proposals from private roadway developers to construct and operate segments of the system. Use of the private sector could reduce the funding needed to provide the required roadways.

Annual Reporting Requirement: An annual report should be provided to the Governor and the Legislature detailing progress toward intermediate and long-term goals. The Annual Report should include, at a minimum, the reporting requirements outlined in Appendix I.

- A form summarizing overall performance with respect to progress toward the 2030 Traffic Congestion Reduction Goal in each Serious Congestion Urban Area (Form #1).

- Actual Traffic Congestion Reduction Goal performance for all completed program years compared to the annual interim targets. A separate form would be required for each Serious Congestion Urban Area (Form #2)

- Actual performance relative to the annual Traffic Delay Hours Budget Goals. A separate form would be required for each Serious Congestion Urban Area (Form #3)

- Actual Traffic Congestion Reduction Goal performance for all completed program years compared to the annual interim targets for sub-areas of Serious Congestion Urban Areas. A separate form would be required for each sub-area (Form #4)

- A listing of all *Blueprint 2030* projects planned for the next five years, including the relative contribution of each to the Traffic Congestion Reduction Goal (Form #5).

In addition, the state implementation corporation should ensure that its internal project evaluation procedures are consistent with the *Blueprint 2030* Traffic Reduction Goal. An accounting of each project, program or strategy should be maintained with information on the cost per traffic delay hour reduced for each alternative considered and the cost per reduced traffic delay hour compared to the 2030 Cost Effectiveness Goal reported on Form #5 (Individual Project, Program or Strategy Evaluation Report, Appendix I).

Because of the disproportionate impact and growth of large truck traffic, the Georgia Department of Transportation should implement measures to monitor truck volumes in its day-to-day traffic volume reporting and to assist the implementation corporation in the longer-term *Blueprint 2030* planning process.

Appendix I:
ANNUAL REPORTING AND EVALUATION

A. ANNUAL REPORT TO THE GOVERNOR AND LEGISLATURE

FORM 1: OVERALL SUMMARY: ALL SERIOUS CONGESTION URBAN AREAS

BLUEPRINT 2030 PLAN TRAFFIC CONGESTION REDUCTION PROGRAM ANNUAL REPORT TO THE GOVERNOR AND LEGISLATURE SUMMARY OF OVERALL PERFORMANCE Annual Report Form 1 All Serious Congestion Urban Areas		
Year of Report:	Date:	
Traffic Congestion	Urban Areas	
	Atlanta	Each other "Serious Congestion" urban area
1. Base Year (2005) Congestion Penalty	40.0%	
2. Report Year Traffic Reduction Goal (Congestion Penalty)	4.0%	
3. Report Year Traffic Congestion Penalty		
4. Variance (%)		
Source of information: Line 1: *Blueprint 2030 Plan* (Atlanta 40% Congestion Penalty is an example, actual to be determined) Line 2: *Blueprint 2030 Plan* Line 3: Actual data		

FORM 2: INDIVIDUAL URBAN AREA TRAFFIC CONGESTION REDUCTION GOAL

(One form for each "Serious Congestion" urban area)

BLUEPRINT 2030 PLAN TRAFFIC CONGESTION REDUCTION PROGRAM ANNUAL REPORT TO THE GOVERNOR AND LEGISLATURE TRAFFIC REDUCTION GOAL AND ACTUAL PERFORMANCE: URBAN AREA Annual Report Form 2 Atlanta Urban Area			
Year	Traffic Congestion Reduction Goal (Congestion Penalty)	Actual Congestion Penalty	Variance (%)
Base Year: 2005		40.0%	
2006	38.6%		
2007	37.1%		
2008	35.7%		
2009	34.2%		
2010	32.8%		
2011	31.4%		
2012	29.9%		
2013	28.5%		
2014	27.0%		
2015	25.6%		
2016	24.2%		
2017	22.7%		
2018	21.3%		
2019	19.8%		
2020	18.4%		
2021	17.0%		
2022	15.5%		
2023	14.1%		
2024	12.6%		
2025	11.2%		
2026	9.8%		
2027	8.3%		
2028	6.9%		
2029	5.4%		
Target Year: 2030	4.0%		
Notes: Atlanta form shown as an example 2005 40.0% Congestion Penalty shown is an example, actual to be determined One form for each Serious Congestion urban area Each year's form would contain the same information, with the most current actual data added			

FORM 3: INDIVIDUAL URBAN AREA TRAFFIC DELAY BUDGET OBJECTIVES

(One form for each "Serious Congestion" urban area)

BLUEPRINT 2030 PLAN TRAFFIC CONGESTION REDUCTION PROGRAM ANNUAL REPORT TO THE GOVERNOR AND LEGISLATURE TRAFFIC DELAY BUDGET GOALS AND PERFORMANCE Annual Report Form 3 Atlanta Urban Area					
	Peak Period Traffic Delay Budget Goals		Actual Achieved		
Year	Millions of Annual Traffic Delay Hours	Annual Traffic Delay Hours per Capita	Millions of Annual Traffic Delay Hours	Annual Traffic Delay Hours per Capita	Variance (%)
Base Year: 2005	146.7	37.1	146.7	37.1	
2006	143.5	35.8			
2007	140.3	34.6			
2008	137.1	33.3			
2009	133.9	32.1			
2010	130.7	30.9			
2011	127.5	29.6			
2012	124.3	28.4			
2013	121.1	27.1			
2014	117.9	25.9			
2015	114.7	24.8			
2016	111.5	23.7			
2017	108.3	22.6			
2018	105.2	21.5			
2019	102.0	20.5			
2020	98.8	19.5			
2021	95.6	18.5			
2022	92.4	17.6			
2023	89.2	16.7			
2024	86.0	15.8			
2025	82.8	15.0			
2026	79.6	14.2			
2027	76.4	13.4			
2028	73.2	12.6			
2029	70.0	11.9			
Target Year: 2030	66.8	11.1			
Notes Values shown for illustrative purposes Actual objectives to be taken from *Blueprint 2030 Plan*					

FORM 4: INDIVIDUAL SUB-AREA SUMMARY

(One form for each sub-area in each "Serious Congestion" urban area)

BLUEPRINT 2030 PLAN TRAFFIC CONGESTION REDUCTION PROGRAM ANNUAL REPORT TO THE GOVERNOR AND LEGISLATURE TRAFFIC REDUCTION GOAL AND ACTUAL PERFORMANCE: SUBAREA OF URBAN AREA Annual Report Form 4 Atlanta: Cherokee County (Urbanized Portion)			
Year	Traffic Reduction Goal (Congestion Penalty)	Actual Congestion Penalty Achieved	Variance (%)
Base Year: 2005		40.0%	
2006	38.6%		
2007	37.1%		
2008	35.7%		
2009	34.2%		
2010	32.8%		
2011	31.4%		
2012	29.9%		
2013	28.5%		
2014	27.0%		
2015	25.6%		
2016	24.2%		
2017	22.7%		
2018	21.3%		
2019	19.8%		
2020	18.4%		
2021	17.0%		
2022	15.5%		
2023	14.1%		
2024	12.6%		
2025	11.2%		
2026	9.8%		
2027	8.3%		
2028	6.9%		
2029	5.4%		
Target Year: 2030	4.0%		

Notes

A separate form would be required for each sub-area of each urban area

In the Atlanta urban area, a minimum of one sub-area would be established corresponding to each county, except for Fulton County, which would have a minimum of three (north, central and south).

Cherokee County form shown as an example

2005 40.0% Congestion Penalty shown is an example, actual to be determined

Interim Congestion Penalty goals would be adopted based upon actual 2005 Congestion Penalty and annual progress required to achieve the 4.0% 2030 Congestion Penalty goal.

One form for each Serious Congestion urban area

Each year's form would contain the same information, with the most current actual data added

FORM 5: URBAN AREA PROGRAM OF PROJECTS (5 YEARS)

(One form for each "Serious Congestion" urban area)

BLUEPRINT 2030 PLAN TRAFFIC CONGESTION REDUCTION PROGRAM ANNUAL REPORT TO THE GOVERNOR AND LEGISLATURE TRAFFIC REDUCTION GOAL AND ACTUAL PERFORMANCE: SUBAREA OF URBAN AREA Annual Report Form 5 Atlanta: 5 Year Program of Projects						
2030 Cost Effectiveness Goal: Annualized Cost per Peak Period Reduced Traffic Delay Hour (From *Blueprint 2030* Plan)						$4.06
Year	Project, Program or Strategy	Total Cost	Annualized Cost: 2030	Traffic Delay Hour Reduction: 2030	Cost per Reduced Traffic Delay Hour	Variance (%) from 2030 Cost Effectiveness Goal (Above)
2006						
	Listing of projects					
	Total					
2007						
	Listing of projects					
	Total					
2008						
	Listing of projects					
	Total					
2009						
	Listing of projects					
	Total					
2010						
	Listing of projects					
	Total					
Total: 5 Years						

B. INDIVIDUAL PROJECT, PROGRAM OR STRATEGY EVALUATION REPORT

Part 1

BLUEPRINT 2030 PLAN TRAFFIC CONGESTION REDUCTION PROGRAM ANNUAL REPORT TO THE GOVERNOR AND LEGISLATURE INDIVIDUAL PROJECT, PROGRAM OR STRATEGY EVALUATION REPORT Part 1 Summary Information				
PROJECT				
DATE				
HORIZON YEAR				
Alternatives Considered (Data from Part 2)	Annualized *Blueprint 2030* Resources Required	Annual Delay Hours Reduced: 2030	Cost per Reduced Delay Hour	Variance Relative to 2030 Cost Effectiveness Goal ($4.06: From Annual Report Form 5)
Alternative Adopted				
Other Alternatives Considered				
List including each alternative				

INDIVIDUAL PROJECT, PROGRAM OR STRATEGY EVALUATION REPORT
Part 2

(One form for each alternative considered)

BLUEPRINT 2030 PLAN TRAFFIC CONGESTION REDUCTION PROGRAM ANNUAL REPORT TO THE GOVERNOR AND LEGISLATURE INDIVIDUAL PROJECT, PROGRAM OR STRATEGY EVALUATION REPORT Part 2 Alternatives Considered					
PROJECT					
ALTERNATIVE					
DATE					
Section 1: ANNUAL TRAFFIC DELAY HOURS PROJECTIONS: 2030					
Data		Base Year	Null Case	With Proposed Alternative	Change (Null to Proposed)
DVMT					
Delay Hours: Commercial					
Delay Hours: Other					
Total Delay Hours					
Section 2: COST PER TRAFFIC DELAY HOUR REDUCED					
Item				Total	Annualized
1. Total Cost of Alternative (Constant $)					
2. Less Toll Revenues					
3. Net *Blueprint 2030* Resources Required (#1-#2)					
4. Annual Reduction in Traffic Delay Hours (From Table 1)					
5. *Blueprint 2030* Cost per Traffic Delay Hour Reduced (#3/#4)					

Appendix II
TRANSIT AND TRAFFIC CONGESTION: INTERNATIONAL PERSPECTIVE

THE EXPERIENCE

Transit market shares and usage are considerably higher in the more dense urban areas urban areas of high-income Western Europe and Asia. In Western Europe, approximately 20 percent of urban motorized travel is on public transit, 10 times the US and Atlanta market shares.[118] High-income Asian transit market shares average 45 percent, more than double the Western Europe figure (Figure 56) The differences in transit market share are more substantial than the differences in population density (Figure 61). Western European urban densities are approximately more than three times that of the United States,[119] while Asian densities are more than 10 times US densities (Figure 57).[120]

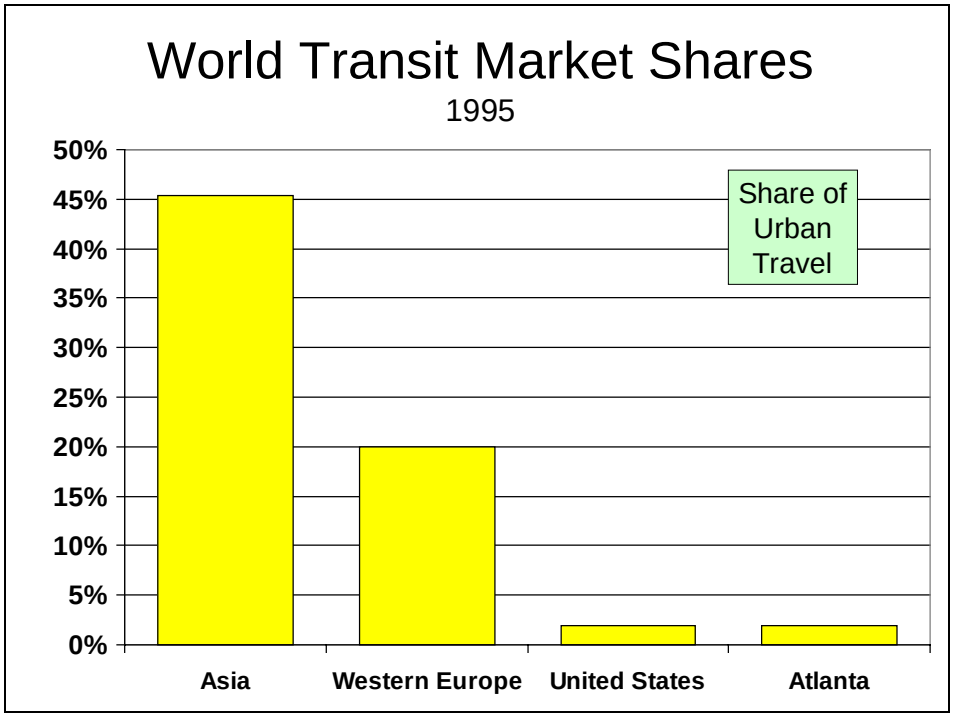

Figure 56

[118] US transit shares are misleadingly low because most school trips, which are on Western European transit systems are carried by dedicated "yellow bus" school systems. If school trips are included, the urban share of transit travel in the United States is estimated at a much larger five percent (www.publicpurpose.com/ut-ptsharewsch.htm), but still only one-quarter of the European average.
[119] Japanese urban densities are over 12,000 per square mile, approximately 5 times US densities (http://www.demographia.com/db-worldua.pdf).
[120] Cox.

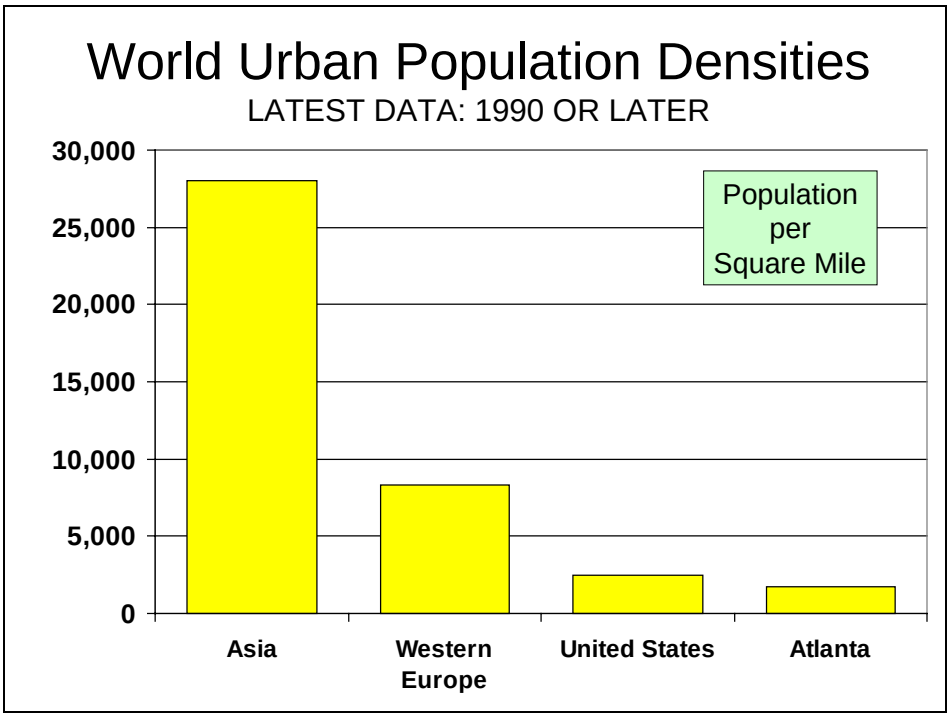

Figure 57

However, the high transit market shares of Western Europe and Asia have not been achieved by attracting market share from automobiles. As in the United States, urban population densities have been declining markedly in Western European and Asian urban areas.[121] At the same time transit market shares have fallen in nearly all major urban areas. For example, transit market shares have declined 15 percent in Tokyo-Yokohama and 20 percent in Osaka-Kobe-Kyoto over the past 25 years.[122] These two urban areas have the high-income world's largest transit systems and highest transit market shares outside Hong Kong.[123] Market share has declined in Western European urban areas since 1980. Overall, the annual loss has been 1.7 percent (18 percent per decade).[124] These declines are similar to the US experience, where transit's share of work trips dropped from 12 percent in 1960 to 4.6 percent 2000 (down from 5.1 percent in 1990).[125] Since 1985, transit's overall share of urban travel has declined 2.5 percent annually.[126]

There is a popular conception that there are "density" thresholds above which transit will be much more productive. Much of this is based upon research published by Pushkarev, Zupan and

[121] http://www.demographia.com/db-intldensarea.htm.
[122] Calculated from data in *Japan Yearbook 2000* (http://www.stat.go.jp/english/data/nenkan/1431-10.htm).
[123] Hong Kong is an historical accident. The colony's early growth occurred following the Opium Wars of the 19th century, as British traders moved from Guangzhou to Hong Kong. The communist takeover of mainland China in 1949 also spurred further growth, as refugees settled in Hong Kong. The result is by far the highest population densities in the high-income world.
[124] Calculated from data in Vivier (above) and Jeffrey R. Kenworthy, Felix B. Laube and others, *An International Sourcebook of Automobile Dependence in Cities: 1960-1990* (Boulder: University Press of Colorado), 1999.
[125] 2000 US Census.
[126] http://www.publicpurpose.com/ut-usptshare45.htm

Cumella (Pushkarev)[127] in 1982 that sought to categorize the densities that would support different types of transit systems (buses, light rail, commuter rail and subways or elevated systems similar to MARTA). This is useful research, but has been stretched far beyond its applicability by some analysts. The Pushkarev conclusions relate to corridors focused on downtown areas and do not address non-core trip patterns. Today, most travel is to outside downtown areas and the complex travel patterns makes the concept of density thresholds irrelevant with respect to most urban travel.

Even where there are high densities in the United States transit market shares are much lower than in areas with similar density in Western Europe or Asia (Table 24). The five most dense US urban areas have a transit market share one-fifth that of the European areas and one-third that of the Canadian areas. If New York is excluded,[128] the Western European and Japanese urban areas have average densities 1.2 times that of the US, but transit market shares are ten times as high.

There are a number of differences that account for the lower transit market shares in the United States. Perhaps the most important are:

- US urban areas do not have the pre-automobile urban cores that account for most of the ridership in Western European and Japanese urban areas. This will not be replicated in US urban areas. Urban developments with the characteristics of pre-automobile urban cores are simply not being built anywhere in the high-income world.

- Personal incomes are higher in the United States and have been for decades. This facilitates higher levels of automobile ownership and more travel by automobile.

- Tracking relative income levels, US automobile ownership per household has been higher for some time. Western European nations achieved U.S. 1930 automobile ownership rates only after 1970, while Japanese urban areas reached the same level in approximately 1985. Population growth in the years of high automobile ownership has been much more in the United States, with the result that more urban land use is automobile oriented and urban densities are lower (Table 25). Approximately 55 percent of the housing stock in the United States has been developed just to accommodate the population growth since household automobile saturation has been achieved. This compares to only four percent in Japan, six percent in the United Kingdom and 14 percent in France (Figure 58). Of course, during the same period many older homes have been replaced, so that the portion of US urban areas that have been built in the automobile era is much higher. It is likely that the early market penetration of automobiles, more than any other factor, is responsible for the low-density urban development of the United States, Canada and Australia.

[127] Boris Pushkarev, Jeffrey Zupan and Robert Cumella, *Urban Rail in America* (Bloomington: University of Indiana Press), 1982.

[128] New York has by far the nation's highest transit market share, more than double that of any other urban area. Nearly 40 percent of transit ridership is in New York, which contains nearly 90 percent of the nation's census tracts with more than 50,000 population per square mile (2000 US Census).

And, even in the rare cases where population density has increased, little or no gain is achieved in transit market share. Los Angeles is one of the few world urban areas with increasing population density, having risen approximately 50 percent from 1960 to 2000.[129] Yet, over that period, public transit's market share has declined more than 50 percent.[130] As is well known, traffic congestion has become much worse in Los Angeles (the most intense in the United States). In fact, there appear to be no cases, in either the United States or elsewhere in the high-income world, where a material share of automobile market share has been transferred to public transit, regardless of transit expansion or land use policies.

Further, it is significant that transit market shares are similar in Los Angeles and Atlanta, despite the fact that Los Angeles has four times Atlanta's population density, and that Portland, with double Atlanta's density has a similar transit market share.

Transit's practical inability to reduce traffic congestion is further illustrated by the Atlanta Regional Commission *2025 plan*, which would have spent 55 percent of the regional financial resource on transit, while increasing transit's share of trips from 2.56 percent to 3.44 percent. This is despite the planned urban rail additions of more than 300 miles over the period (MARTA and commuter rail).

[129] Virtually all major urban areas that have increased their population density are in the United States, where densities had dropped to a much lower level than in Western Europe and Asia and even strong density increases would leave them well below other international urban areas.
[130] Calculated from Kenworthy-Laube, Federal Highway Administration and National Transit Database.

Table 24
Comparison of Similar Density Urban Area Transit Shares
Urban Areas with 5,000-10,000 per Square Mile
US, Japan, Western Europe & Canada

Urban Area	Urbanized Area Population per Square Mile	Public Transit Market Share
Paris	9,200	24%
Copenhagen	9,000	17%
Nagoya	7,600	25%
Los Angeles	7,100	2%
Toronto	6,800	15%
San Francisco	6,100	4%
Ottawa	5,900	9%
San Jose	5,900	1%
Essen-Dusseldorf (Rhine-Ruhr)	5,800	11%
Milan	5,600	23%
New York	5,300	11%
New Orleans	5,100	2%
Exhibit: Portland	3,300	2%
Exhibit: Atlanta	1,700	2%
Averages (Urban Areas in Table)		
Japan & Western Europe	7,400	20%
Canada	6,400	12%
US Over 5,000 Density	5,900	4%
Without New York	6,100	2%

Transit share of transit and roadway passenger miles.
Population density from http://www.demographia.com/db-intl-ua2001.htm
Transit market share from Kenworthy & Laube, http://www.publicpurpose.com/ut-lonsemkt.htm, estimated from Texas Transportation Institute data, National Transit Database, Kenworthy.

Table 25 Years Since Achieving U.S. 1930 Automobile Ownership Rate			
Country	Years Since US 1930 Automobile Ownership Rate Achieved (As of 2000)	Population Growth in High Automobile Ownership Years	Urban Population Density
Japan	15	4%	12,200
United Kingdom	20	6%	9,800
France	30	16%	8.200
Australia	35	68%	3,200
Canada	45	92%	3,200
United States	70	123%	2,800
1930 U.S. household automobile ownership rate: 0.77. Source: Calculated from *Statistical Abstract of the United States* (multiple editions), INSEE and *World Motor Vehicle Data* (1993 Edition), American Automobile Manufacturers Association and www.demographia.com.			

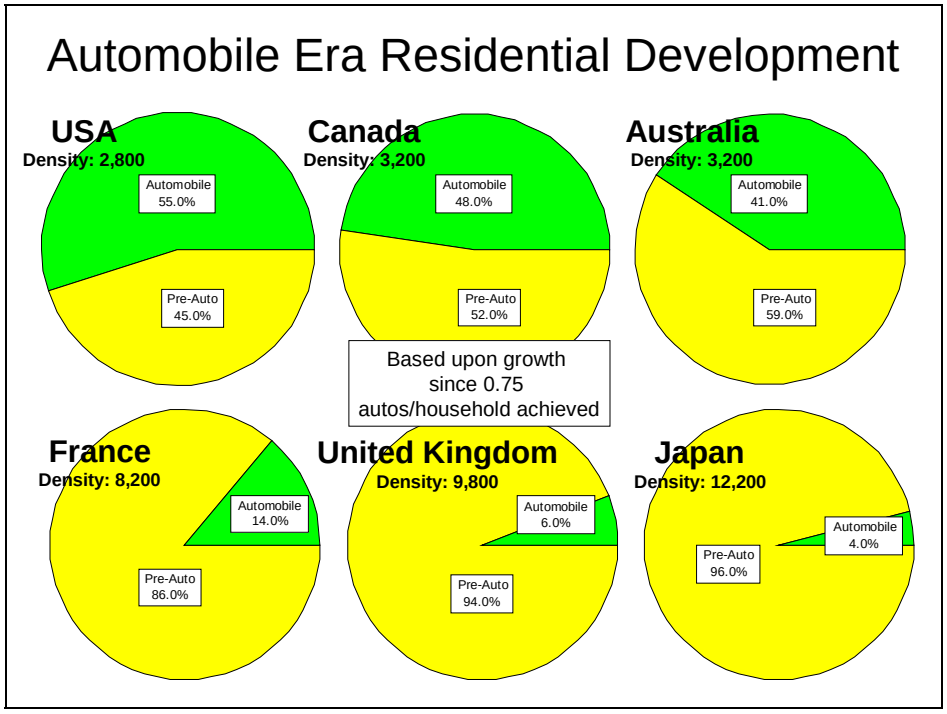

Figure 58[131]

[131] Does not include adjustment for renewal of existing housing stock.

AUTO-COMPETITIVE TRANSIT (TRANSIT CHOICE?)

Another approach to reducing traffic congestion through greater transit use would involve greatly expanding transit systems within today's urban areas. This concept, known as "transportation choice," or "transit choice" seeks to provide people with automobile competitive transit service.

Public policies around the high-income world have sought to transfer travel demand from automobiles to transit. As the discussion above indicates, these policies have been largely unsuccessful. The principal reason is that transit provides automobile competitive service for so few of the trips in the urban area. This is the case in Atlanta, the United States and Western Europe.

- In Western European urban areas, such as Paris and Munich, one quarter or more of travel is on transit systems that are more extensive than in the United States, Much travel to and within the urban core is on public transit. However, virtually all Western European urban areas have suburbanized substantially,[132] and transit travel between destinations in the suburbs is generally not auto-competitive. As a result, automobile travel is dominant throughout most of the land area of Western European urban areas. It is true that suburb-to-suburb transit market shares are higher than in the United States. There are two principal reasons for this --- lower incomes, which mean less access to automobiles, and the fact that urban poverty is concentrated in suburbs rather than in central cities, as in the United States. The result is that in many cases low-income households have better transit options in the United States because the transit systems are more focused in the core areas where incomes are lower.[133]

- The largest downtowns (central business districts) in the United States attract large public transit work trip market shares. For example, the Manhattan business district,[134] the second largest in the world after Tokyo, had a nearly 75 percent transit work trip market share in 1990. Chicago's central business district, the second largest in the United States, attracted more than 50 percent of its workers by transit. Travel by transit to central business districts such as these is competitive with the automobile. Indeed, it is often faster. This demonstrates the fact that people will ride transit when it is competitive with the automobile.

The prerequisite to shifting demand from cars to transit is automobile competitiveness. But automobile competitive transit simply does not exist for most trips to locations other than downtown or the urban core. For example:

- A review of suburban to suburban commuting in the Chicago area, which has one of the nation's most extensive transit systems, found that work trip times on transit could

[132] Among Western European central cities that had achieved 400,000 population by 1960 that were fully developed and have not expanded their boundaries, all have lost population.
[133] Western European suburban transit shares are also higher because low-income households are much more concentrated in suburban areas (instead of the core), which is the opposite of in the United States.
[134] South of 59th Street.

average two hours and forty minutes (2:40). This compares to an average automobile work trip travel time of less than 30 minutes.[135]

- A review of suburban commuting in the Portland area found that auto-competitive service is available to downtown from 70 percent of the urban area. However, less than five percent of residential locations were found to be within range of auto-competitive service to suburban locations.[136]

The automobile is dominant for work trip commuting in virtually all large non-downtown employment centers in the United States. Similarly transit has a very low work trip market share to the much more dispersed low-density job locations that are spread throughout the urban area and which generally constitute a majority of employment. In the United States, downtown employment shares tend to average approximately 10 percent. Even in New York, the central business district employment share is only 20 percent. To provide automobile competitive service to the vast majority of jobs that exist outside downtown areas would require many radial transit systems virtually as comprehensive as the regional transit systems that already exist for serving downtown areas.[137]

Transit commuting to non-downtown locations is disproportionately by people who do not have access to automobiles. In 1990, the average downtown transit commuter had a household income within six percent of the metropolitan average. The average transit commuter to suburban locations had a household income 41 percent below average, and barely above poverty level.[138]

Automobile Competitive Transit? There is a single high-income world in which automobile competitive transit is available for most trips --- Hong Kong. Hong Kong urban densities are nearly 100 times that of Atlanta and 20 times that of Western Europe. Hong Kong transit service levels[139] are nearly 250 times the intensity (vehicle miles per square mile) of Atlanta and more than 15 times Western European levels.[140] This difference in service level is not the result of materially different levels of expenditure. In Hong Kong, 1.2 percent of Gross Regional Product (GRP)[141] is spent on transit. On average, Western European urban areas spend a higher 1.7 percent of GRP on transit, yet have transit market shares averaging somewhat more than one-

[135] This analysis used the Regional Transportation Authority (http://tripsweb.rtachicago.com/) trip planner for work trips from the suburban Orland Mall area to approximately 60 suburban locations built into the trip planner.
[136] Wendell Cox, "The Illusion of Transit Choice," *Veritas* (Texas Public Policy Foundation), March 2002. This analysis classifies transit travel times 1.5 times that of the automobile as automobile competitive, a somewhat liberal standard.
[137] A principal problem in attracting automobile drivers to transit is much slower travel times. Most trips to locations outside downtown would require at least one transfer from one transit line to another. Often, the time required for transferring alone is greater than the total automobile travel time for the trip.
[138] http://www.publicpurpose.com/ut-25cbd$.htm.
[139] The Hong Kong transit system operates with little or no capital or operating subsidy, including the subway (metro) system and the commuter rail system.
[140] Wendell Cox, *Public Transport Competitiveness: Implications for Emerging Urban Areas*, paper presented at CODATU XI, Bucharest, 2004 (http://www.publicpurpose.com/c11-icators.pdf).
[141] The value of all personal income and locally produced commercial income. Gross regional product is to the metropolitan area what gross domestic product is to the nation.

quarter of that of Hong Kong. US transit spending is 0.5 percent of GRP, while Atlanta spends a slightly lower 0.4 percent of its GRP on transit. [142]

To provide the same intensity of transit service in Atlanta as in Hong Kong would require more than the gross regional product of the metropolitan area *each year*. This high cost is the principal reason that *none* of the world's urban areas, except for the very special case of Hong Kong, has developed a transit plan *or* system that would provide a competitive alternative to the automobile for all but a small portion of urban trips.

Thus, it is not feasible to provide transportation choice to all but a small part of the urban travel market --- downtown and the urban core, whether in Paris or Atlanta. As a result, transportation choice does not represent a strategy that can make a material contribution to reducing traffic congestion. The dispersed nature of land use and travel that has developed in virtually all high-income world urban areas outside Hong Kong is an insurmountable barrier. Transit is already performing virtually all of the traffic congestion relief that it can in the downtown and core markets it is well positioned to serve.[143]

The Role of Transit: Nonetheless, transit will continue to be an important strategy in the markets that it serves effectively, such as commuting to downtown Atlanta (where transit's work trip market share was 16 percent in 1990[144]) and for inner-city residents who do not have access to automobiles. MARTA's effectiveness in this latter market is demonstrated by its high transit ridership per capita, second only to New York City in its service area (above). Further, the interest developing in Atlanta in expanding transit through bus rapid transit programs can improve transit at the same time that the dedicated lanes can improve mobility options for car pools and single-occupant vehicles paying tolls (HOT lanes).

[142] Based upon International Union of Public Transport, *Millennium Cities Database* (Brussels), 2002.
[143] This Hong Kong urban density is more than three times that of the second most densely populated urbanized area in the high-income world, Singapore (based upon available data) and more than six times the density of the most dense European or Japanese urban areas (http://www.demographia.com/db-worldua.pdf). Hong Kong's high density is an historical accident. Hong Kong was developed as a British enclave following the Opium Wars of the 19th century and received millions of immigrants who fled China after the communist takeover in 1949.
[144] Calculated from 1990 Census Transportation Planning Package.

Appendix III
MODEL NOTES

The financial and traffic projections are based upon the 13 County region used by the Atlanta Regional Commission for regional planning purposes.

Peak period traffic congestion was projected for 2030, using ARC planned roadway improvements and traffic congestion to estimate a Roadway Congestion Index (RCI) though 2025.[145] It was assumed that the rates would continue to 2030. The Congestion Penalty was estimated from a normalized table of corresponding RCI and Travel Time Index values for urban areas from 1982 to 2001.

Additional Roadway capacity improvements required above the Present Plan scenario were estimated based upon the Traffic Congestion Reduction Scenarios from the RCI:Travel Time Index table for the Maintain Congestion (#2) and Traffic Reduction Scenarios (#3, #4 and #5).

ARC cost assumptions were used for the single-occupant-vehicle freeway expansions included in the *Aspirations Plan*, all of which were assumed to be a part of the Scenarios.[146] Generally, the *Aspirations Plan* freeway improvements would have been limited to expansions of present roadways, which is likely to be more expensive than building new roadways outside the I-285 Perimeter. It is possible that the *Blueprint 2030* program could be made less expensive by relying less on expanding the present roadway system, which is overly core-oriented and building more new roadway capacity in the larger part of Atlanta that is outside the I-285 Perimeter.

Other freeway expansion and development costs[147] were assumed at $6,000,000 per lane mile and arterial costs were assumed at $3,000,000 per lane mile (based upon the Texas Governor's Business Council Report). It was assumed that 40 percent of the new capacity would be freeway lane miles and 60 percent would be surface arterials. Currently, approximately one-half of Atlanta's freeway and arterial lane mileage is freeway. This lower freeway assumption results in a financially conservative estimate, because it increases overall costs. Generally, surface arterials are approximately 30 percent more expensive to build than freeways per vehicle mile.[148]

Maintenance costs for the new roadways were assumed at the state average per mile for freeway lane miles and arterial lane miles. This method tends to overestimate costs, since maintenance costs on the new roadways would be less in the early years following construction.

The number of traffic delay hours was estimated under each scenario for freeways and arterials only and only for peak travel periods. This is consistent with Texas Transportation Institute methodology. Future traffic delay hours were estimated using the Texas Transportation Institute

[145] The Northern Arc was not included in the "Present Plan" scenario.
[146] The *Aspirations Plan* included nearly 1,500 miles of general purpose freeway lane expansions at a cost of approximately $13 billion. Another $13 billion would have been spent on projects to expand high-occupancy vehicle lane capacity.
[147] Including preliminary engineering and right-of-way costs.
[148] Based upon Texas Transportation Institute data.

2001 estimates as a base,[149] adjusted to account for changes in vehicle miles and population as projected in 2005. This method results in a lower than actual traffic delay hour reduction because it does not account for the travel time improvements that could be expected on local streets (for which a reliable estimation methodology was not identified) and during non-peak periods.

Peak period vehicle occupancy was assumed at 1.15.

The economic analysis (Prud'homme-Lee thesis) is applied only to jobs mobility in the peak hour (70 percent of jobs) and assumes that as specific time labor markets increase, job densities decline one-third. It is further assumed that 90 percent of commuting would be by car. All three of these assumptions yield conservative economic impacts.

All of the estimates related to delay related costs and long term economic (personal income) performance are based only on the actual traffic delay hours (Congestion Penalty) during peak travel periods and include no economic calculation related to the Reliability Penalty. This treatment is also likely to produce more conservative economic impacts.

[149] It was assumed that per capita traffic delay hours would increase from 2001 to 2005 at the same annual rate as from 1996 to 2001.