

DENSITY IN ATLANTA: IMPLICATIONS FOR TRAFFIC AND TRANSIT

by Alain Bertaud and Robert W. Poole, Jr.

Atlanta is one of the most congested and polluted metropolitan areas in America. These high levels of pollution and traffic congestion are linked to the area's fast growth rate and to its spectacular economic success. Atlanta's traffic congestion and air quality were the principal factors underlying the Atlanta Regional Commission's (ARC) 2003 long-range transportation plan. It embraced a strategy commonly used around the country aimed at reducing the number and length of vehicular trips by increasing the number of transit trips. But this approach does not suit the metro area's spatial structure. In fact, Atlanta's spatial structure, and in particular its density, is very different from other metropolitan areas around the world where transit (especially rail transit) is an important mode of transportation. Further, it is geometrically impossible in the foreseeable future to increase Atlanta's density to a level that

would allow transit to play more than a small role in transportation. There are, however, means of reducing emissions and congestion which are compatible with Atlanta's existing spatial structure.

Atlanta's Exceptional Spatial Structure

In his book *The Transit Metropolis*, Robert Cervero tells the story of successful adaptations of transit in cities around the world. However, none of Cervero's success stories takes place in the United States. The lack of U.S. transit success stories might well be explained by the fact that U.S. urban structures are exceptional by world standards and are not well adapted for a wide use of transit. Figure 1 shows the average built-up density in 46 metropolitan areas around the world. On the graph, bars representing cities' density are color coded

by continent. Asian cities have on average much higher densities than European and Latin American cities, and U.S. cities are all clustered in the very low range. Generally, U.S. cities have much lower densities than their Latin, European or Asian counterparts. And, even when compared to other U.S. cities, Atlanta's density is still very low.

In addition to its overall low density, Atlanta's spatial structure is characterized by an extreme dispersion of jobs and people across its metropolitan area. For instance, in 1990 only 2 percent of the total jobs were in the Central Business District, only 8 percent were within three miles of the city center, and 44 percent were not within walking distance of a bus stop or rail station.

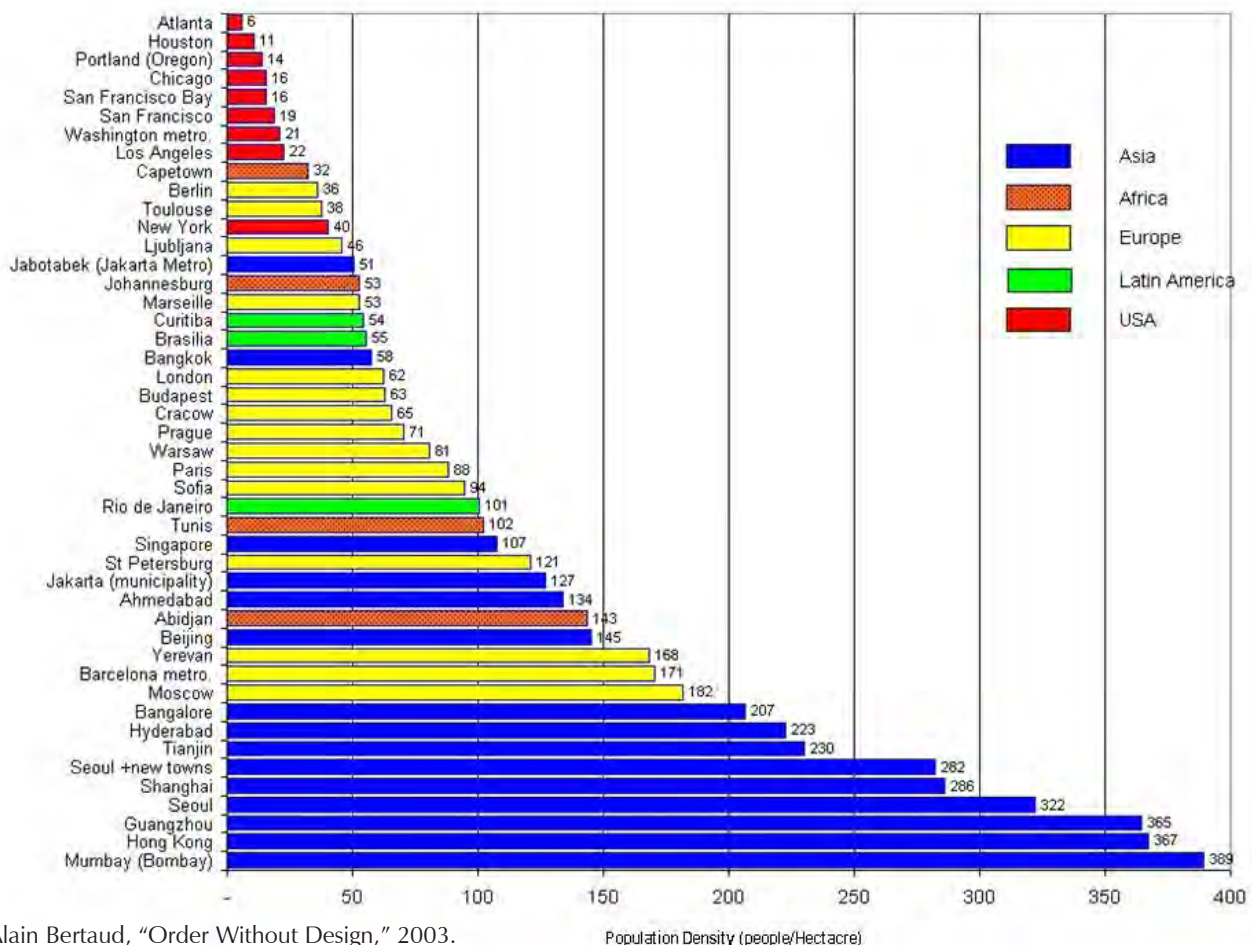
Urban structure matters when designing a strategy that rests on the development of transit as a major mode of transportation. Atlanta's density profile sug-

gests that the city's center is a weak attractor of population and jobs. In contrast, European and Asian cities that have well-developed transit systems (London, Paris, Hong Kong, Singapore) have much higher densities overall and, in particular, a heavier concentration of business and retail in the city center.

Why is Density Important for Transit?

In order to understand why density is important in the operation of transit, it is useful to look at concrete examples. When comparing Barcelona and Atlanta, we see that both cities have about the same population, have newly emerged as regional economic powerhouses, and have recently hosted the Olympics. Yet, the spatial structures of the two cities are completely different. The average density of the Barcelona metropolitan area is 28 times greater than Atlanta's. This

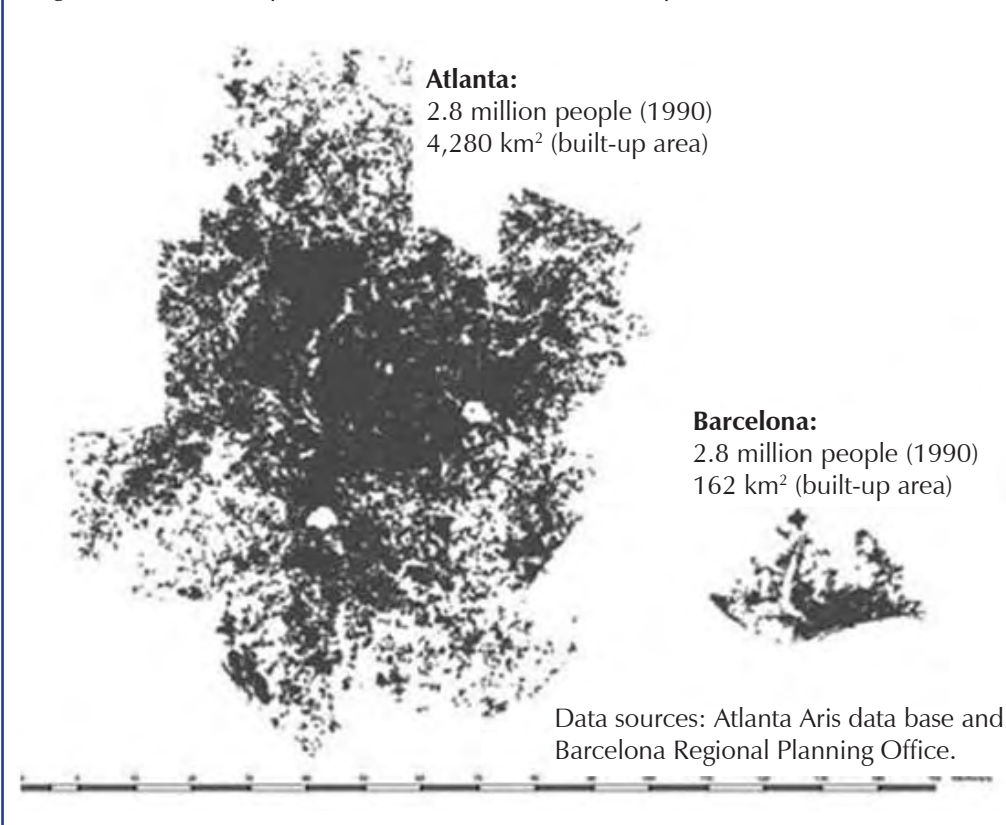
Figure 1: Comparative Average Population Density in the Built-Up Parts of 46 Metropolitan Areas



Source: Alain Bertaud, "Order Without Design," 2003.

Population Density (people/hectare)

Figure 2: The Built-Up Area of Atlanta and Barcelona Represented at the Same Scale



linking multiple origins to multiple destinations. Atlanta's current spatial structure differs greatly from the "transit cities" of Europe and Asia and makes it incompatible with mass transit as a significant provider of trips.

Could Atlanta's Spatial Structure Become More "Transit Oriented" in the Future?

In order to increase transit trips at the expense of car trips, Atlanta would need to increase its density while simultaneously increasing the number of jobs and amenities located in the city center. Metropolitan authorities have two tools at their disposal to stimulate an increase in built-up density:

- Increase the supply of transit (the number of lines as well as their frequency).
- Regulate land use (for instance, allowing higher densities in areas close to transit and restricting the development of land in areas outside the reach of transit).

Increasing the supply of transit may have the effect of increasing density in areas where transit use is already high. In most European cities, land is more expensive around metro stations and land prices drop to much lower levels in areas not covered by transit. Higher land prices can generate higher densities. However, the effect of higher density does not depend on the transit supply itself but on demand for transit. If there is no demand for new transit, increasing supply will have no effect on density.

Trends in Atlanta show that transit-served areas did not attract many new people or jobs between 1990 and 1998. In fact, the share of the total population living within half a mile of a rail station or bus line decreased from 40 to 34 percent. Among the 690,000

implies that in Atlanta the area covered by the transport network would have to be 28 times larger than in Barcelona, while carrying about the same number of people (see Figure 2). If greater Atlanta wanted to provide its population with the same transit accessibility that exists in Barcelona, Atlanta would have to build an additional 2,100 miles of rail tracks and about 2,800 new rail stations.

The simple fact is that the lower the density of a city, the more difficult it is for transit to operate. And yet, population density is not the only factor affecting transit operation; the spatial concentration of jobs and people is as important in determining its viability. The city center of traditional European and Asian cities ("transit cities") is usually the place where the major number of jobs, retail space and cultural amenities are found. In these cities, the city center is also the focal point for the majority of transit trips. Simply stated, it is easier for transit authorities to operate transit lines with multiple origins (the suburbs) but one destination (the city center) than it is to operate transit lines

people added to the Atlanta metropolitan area during this time, 85 percent settled outside the reach of public transit. During this time about 400,000 new jobs were created in the Atlanta metropolitan area, yet the downtown area (the area served best by rail) lost 10,000 jobs. These spatial trends do not support the idea that the provision of transit will increase density or reinforce the concentration of employment in Atlanta’s downtown area.

Some land use regulations may also result in higher densities. Restricting the supply of land for greenfield development by establishing an urban growth boundary would indeed increase density. Additionally, the city could increase the permissible floor area ratio and number of units per acre in developed areas. This change will only be effective if households and firms are willing to trade off land consumption for a location that they consider privileged. Given that in many areas of Atlanta the authorized floor area ratio is not fully used, it is unlikely that increasing permissible floor area ratios would have much effect. However, simultaneously increasing the permissible floor area ratio and establishing an urban growth boundary should result in some increase of density in Atlanta’s built-up areas.

We have seen that the current trend does not show any evidence of high demand from households or firms for locating within reach of the existing transit network. But it could be argued that demand could change over time. It is therefore useful to look at the possibility of densification from a purely geometric point of view. Is there any “geometric” possibility for Atlanta to reach an average built-up density of around 7,800 people per square mile, assuming that this change would have to be triggered either by an abrupt change in consumers preference or by some dictatorial urban planning regulations?¹ While neither of these two assumptions seems likely, it is necessary to address the argument of future densification, as it is central to many “smart growth” strategies.

Table 1 illustrates two densification scenarios.² Under the assumptions of the first scenario—Atlanta reaches a density of 7,800 people per square mile over a period of 20 years; it is assumed that the histori-

cal population growth rate of 3.14 percent per year between 1990 and 2000 continues uninterrupted until the end of the 20-year period. In order for Atlanta’s density to reach 7,800 people per square mile, and taking into account the increase in population, the current built-up area would have to shrink by 64 percent. To reach 7,800 people per square mile, about two-thirds of the existing real estate stock would have to be destroyed, two-thirds of the built up area would have to revert to nature and its population and jobs would have to be moved into the 36 percent of the urban area which would remain. We can safely affirm, given the likelihood of this scenario, that Atlanta will never come close to the 7,800 people per square mile density threshold required to justify an extension of transit.

Under the second scenario, during a period of 20 years the metropolitan population grows at its historical growth rate of 3.14 percent. The local governments take the drastic measure of allowing only densification of existing built-up areas without any greenfield extensions. Assuming that the effect of these measures on real estate prices has no impact on the 3.14 percent growth rate, the density of Atlanta after 20 years would only reach 2,823 people per square mile (less than half of the current density of Los Angeles).

Thus, even when using draconian land use regulations over periods as long as 20 years, it is difficult to change the density of a large metropolitan area. In the

Table 1: Densification Scenarios

Scenario 1: Atlanta reaches a density of 7,800 p/sqmi by 2010				
	1990	2010	Difference	% change
Population	2,513,000	4,664,000	2,151,000	86%
Annual Population Growth Rate	3.14%			
Built-Up Density (p/sqmi)	1,520	7,800		
Built-Up Area (square miles)	1,652	600	(1,052)	-64%
Scenario 2: No addition to built-up area, infill only and densification of existing built-up area.				
	1990	2010	Difference	% change
Population	2,513,000	4,664,000	2,151,000	86%
Annual Population Growth Rate	3.14%			
Built-Up Density (p/sqmi)	1,520	2,823		
Built-Up Area (square miles)	1,652	1,652	-	0%

case of Atlanta, these studies illustrate that the geometric possibility of reaching a density level high enough to achieve a significant demand for transit, is not high enough to warrant the costs.

Reducing Congestion in Atlanta

Our analysis concludes that the current fashion in transportation planning—of investing heavily in mass transit, carpooling, and land-use changes to reduce the extent of driving—is not compatible with the goal of reducing traffic congestion. Despite devoting the majority of its funding to transit and carpool lanes, Atlanta’s 2003 long-range plan was predicted by the ARC itself to lead to no increase in the fraction of commute trips made by carpool, and a less than two percentage point increase in transit’s low market share—while overall congestion would go from today’s travel time index of 1.46 to a projected 1.67 by 2030. Atlanta’s transportation agencies are working on more effective approaches as they produce the new long-range plan. We hope our analysis will help in their efforts.

The new approach we recommend deals with both major sources of congestion. For the half that is caused by incidents (accidents, work zones, weather, etc.), Atlanta should continue worthwhile efforts under way such as quicker identification of, response to and clearance of incidents, as well as improvements in traveler information systems and work-zone management.

But for the other half of congestion—the kind that occurs every day during rush hours because demand greatly exceeds roadway capacity—there is no alternative to increasing the capacity of the roadway system. To be sure, better management of the existing system can help—such as ramp meters on freeway on-ramps and traffic signal coordination on arterials. But the sheer growth in numbers of people and cars means more highway capacity must play a major role. This does not mean paving over the landscape with ever more freeways, nor does it mean ignoring air quality mandates. Our modeling (using the ARC’s traffic model) shows that a careful program of value-priced capacity additions over the next 25 years can substan-

tially reduce congestion (vehicle hours of travel) without increasing total driving (vehicle miles of travel). Preliminary modeling suggests no adverse impacts on air quality. The result would be the elimination of the worst congestion by 2030, and achievement of the Congestion Mitigation Task Force’s travel-time index goal of 1.35 (versus the ARC’s projected 1.67). We recommend four major projects as follows:

1. A network of express toll lanes added to the entire freeway system instead of the currently planned (but only partially funded) set of high-occupancy vehicle (HOV) lanes. These priced lanes would also function as the guideway for regionwide express bus service.
2. A double-decked tunnel linking the southern terminus of Georgia 400 with I-20 and later with the northern terminus of I-675, providing major relief to the Downtown Connector (I-75/85), the most congested portion of the freeway system.
3. Extension of the Lakewood Freeway eastward to I-20 as a tunnel, and westward to I-20 as a freeway, providing an additional east-west corridor and new access to the airport.
4. A separate toll truckway system, improving safety and permitting heavy trucks to bypass Atlanta’s congestion in exchange for paying a toll; a portion of this system would be tunneled below downtown.

By using value-priced tolling on nearly all of this new capacity, we estimate that about three-quarters of the estimated \$25 billion cost could be financed based on the projected toll revenues. These recommendations are described in detail in the November 2006 report, “Reducing Congestion in Atlanta: A Bold New Approach to Increasing Mobility” (reason.org/ps351.pdf).

There would be large benefits from implementing this approach. Valuing the time saved at a conservative \$12 per hour, the time saving over 20 years would be more than \$98 billion. But there would also be major economic benefits. Studies have shown that by allowing employers to recruit from a wider radius (and employees to seek jobs within a wider radius), better matches of skills with needs would occur, making Atlanta’s economy more productive.

Conclusion

Atlanta, long known as the crossroads of the South, is at a crossroads in transportation policy. Following other U.S. cities down the status-quo road leads to a future of costly transit and carpool-lane expansion and much worse congestion. The dream held by many of turning Atlanta into a European-style transit metropolis is unattainable. But by embracing cutting-edge engineering and pricing technology, Atlanta can make possible the dreams of its current and future residents: the flexibility to choose homes, jobs, and activities that fit their needs, not just their commutes.

About the Authors

Alain Bertaud is an urban planner with over 30 years of international professional experience in America, Europe, and Asia. He is currently working as a consultant. In the World Bank, he was a Principal Urban Planner in the Urban Development Division. His most recent work involves advising municipalities in land use and land regulatory issues as they relate to land markets. His work can be found at www.alain-bertaud.com.

Robert W. Poole, Jr. is Director of Transportation Studies and founder of Reason Foundation in Los Angeles. He has advised the U.S., California, and Florida departments of transportation, and has also advised the last four White Houses on various transportation policy issues.

Endnotes

1. For a review of the literature on required density for effective transit operation, see Alain Bertaud, "Clearing the Air in Atlanta: Transit and Smart Growth or Conventional Economics?" http://alain-bertaud.com/images/AB_Clearing_The_Air_in%20Atlanta_1.pdf.

2. The projection is done using the 1990 census base as at the time the original paper was written the 2000 census was not available. The results, however, are robust enough to show that the same conclusion would be obtained if the base year had been 2000 and the target year 2020.



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Transportation Planners and Officials

Amy Pelletier

Outreach Director

(949) 444-8703

Amy.Pelletier@Reason.org

Robert Poole

Director of Transportation Studies

(310) 292-2386

Robert.Poole@Reason.org

Government Officials

Mike Flynn

Director of Government Affairs

(703) 626-5932

Mike.Flynn@Reason.org

Media

Chris Mitchell

Director of Communications

(310) 367-6109

Chris.Mitchell@Reason.org

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