



How Much Does Traffic Congestion Cost?

Ray R. McKenzie, P.E., BIPE, MBSE, IRPE, MITE
Caribbean Civil Group Ltd. Consulting Engineers



PROBLEM STATEMENT

The Bahamas is an archipelago of islands with approximately 70 percent of the population residing in New Providence, which is the capital and main economic center of the Bahamas. The island of New Providence is 80 square miles with a population density of 2650. As a result of the migration to New Providence, considerable growth has been experienced over the years. Therefore, a unique transportation and urban sprawl challenge due to demographics, roadway capacity, and vehicular ownership has emerged.

Demographics

The total population of the Bahamas as recorded by the 2000 census is 304,000, with approximately 70 percent (212,000) of that population inhabiting the island of New Providence. This percentage distribution has been increasing an average of 3 percent each decade since 1970. Given the existing trend, approximately 73 percent of the population of the Bahamas will reside in New Providence by 2010. This is a direct result of New Providence being the main attractive economic center for most Bahamians.

Traffic in New Providence

Presently there are 136,000 licensed drivers on the island of New Providence and 90,000 registered automobiles. The automobile ownership per square miles is 1,125 This is comparable with most developed countries see Table 1.

Table 1 (Comparison with other Developed & Developing Countries)

COUNTRY	POPULATION	SQUARE MILES	REGISTERED VEHICLES (100,000 Population)	LICENSED DRIVERS (100,000 Population)	VEHICLES (Per 1000 Inhabitants)
United States	280,000,000	3,717,813	84,047	68,214	686
Canada	31,050,700	3,612,187	60,456	66,321	605
Jamaica	2,600,000	4,243	21,739	---	192
Barbados	275,000	166	26,071	45,886	265
Bermuda	65,000	22	67,038	53,846	670
New Providence	212,000	80	42,453	64,151	424

Levels of Service (LOS)

A study of the critical intersections in New Providence (1994) undertaken by M. M. Dillon, Canada, at that time suggested that each intersection was either approaching capacity, at capacity, or over capacity. If that traffic growth trend remains consistent, there will be over 140,000 individual trips by the year 2020. The average peak hour trip takes between 15 minutes and 1 hour; however, the same trip in 2020 will take closer to 4 hours. The study also indicated that approximately 40 percent of the travel time is non-productive (spent in queues). This amounts to about 9,000 hours per day.

REVIEW OF LITERATURE

Review and documentation of the previous research in the area of Smart Growth, Urban Sprawl, Congestion, and Transportation Management Strategies to combat congestion depicts the daunting challenges ahead for most growing metropolitan cities. In his paper "Transportation Planning, Policy, and Data" Alan Pisarski [1999] lamented the fact that "transportation is the fascinating interaction of sociology, economics, and technology...its connections and impacts are inextricable from the understanding of the Society itself." That encapsulates very adequately the challenges faced from continual growth, development, and sprawl. However, I add another key component, in a developing country such as the Bahamas the political factor must also be considered, because its omnipresence impacts most decisions.

John Poorman [2001] indicated in his paper, "Addressing the Artificial Dilemma of Societal Demands on Transportation," that transportation engineers and planners should endeavor to apply solutions that "make sense." In essence, scale the investments to the physical context, system function, funding availability, and priority of competing needs. This is particularly important in developing countries where budgets are severely constrained, and transportation and planning initiatives considered an afterthought.

Review of the literature also made known various solutions to address congestion as a result of growth, development, and unrestricted sprawling. Scott Shaw [1994] in his paper "Buildings Don't Clog Our Roads, People Do" acknowledges that new trips related to residential population growth is the real driving force behind traffic projection problems generated by proposed buildings or developments.

The research conducted in the smart growth, planning, and traffic congestion area is topical, relevant, extensive, and continual. This paper highlights applicable research completed to date and its potential implementation to address the considerable lost in personal revenue each motorist incurs yearly and the collective lost to the country.

WHAT DOES IT COST?

Surface transportation is the primary means by which people, goods, and services are moved across the island of New Providence accounting for the great percentage of trips generated that impact the country in the following ways: The Bahamas is a tourist destination with 4 million visitors each year with expenditures accounting for about 50 percent of our GDP. Fifty nine percent of those visitors frequent New Providence on their stay in the Bahamas. The efficiency in which those visitors are transported to the various attractions unencumbered by congestion is important to the overall pleasant experience of each visitor. The Department of Transport, UK, defines congestion as the average delay encountered by a vehicle traveling one kilometer (about 1/2 mile). Also, the hidden cost of that congestion in person delay per year in New Providence using the methodology of standard economic analysis of travel delay is \$20.5 million dollars (inclusive of school pick-ups). The yearly automobile ownership and operating cost (your driving cost) for the island of New Providence for small, medium, large cars, and SUV's at 10,000 miles per year are: \$6,116, \$7,198, \$8,862, and \$9,155 respectively. Projected to 2020, the cost of congestion in person delay would be \$58.3 million for a do nothing alternative. The respective cost to each vehicle group would be \$13,401, \$15,772, \$19,418 and \$20,060.

The economical threats discussed have far reaching national implications that are somewhat overt in nature attributed to the level of congestion experienced on the roadways of New Providence. Traffic congestion is a significant threat to the economy of New Providence and by extension the Bahamas, perhaps as important as the Free Trade Area of The Americas (FTAA) or the Caribbean Single Market and Economy (CSM&E). We are not without company in this area of concern. Recently in an article by Larry Copeland, USA TODAY, officials in Atlanta considered traffic congestion generated by sprawl as the number one local domestic issue or a close second. Local businesses consider congestion an "urgent threat" and urge the policy makers to pay close attention to this clear and present danger. Traffic congestion has and will continue to escalate the cost of doing business in New Providence. This places the country at a distinct disadvantage when competing against other Caribbean Countries where congestion is not a major impact.

ADDRESSING THE CHALLENGE

Given the physical and budgetary constraints, and the existing population density, there is little or no available land to build additional capacity. Therefore, the first step on the road to providing effective sustainable solutions would be to recognize that a problem exists, and that it has to be addressed to maintain the economic vitality of the country.

This recognition must fuel an initiative for a paradigm shift in how we develop, create and administer transportation policies, and practice as transportation professionals. The decision makers and practitioners must accept that New Providence is no longer the quaint tourist destination of the 1970s. It has matured and as a result it is challenged with traffic problems consistent with a mature metropolis. This reality is encapsulated best by the philosophy of Peter Drucker "the first policy-and the foundation of all others-is to abandon yesterday."

The foundation of any solution must be firmly rooted in the establishment of a Transportation Center that is tasked with research, policy, planning, operations, and the active recruitment of professional transportation staffing. Given our evolution to a mature metropolitan city, solutions that are systemic and comprehensive such as smart growth and planning must be the action terms to service the existing and latent demand. A few ideas to reduce motorist cost and non productive hours (queuing) are presented below for discussion.

- The smart growth objectives and goals to be pursued vigorously in New Providence should be the effective and efficient use of land patterns so that transportation efficiency could be maximized and the quality of life improved.
- A school busing system for both private and public school systems which would decrease dramatically the number of trips on the roadway in the morning and afternoon peak periods.

- Streamline the existing public transit system that operates currently as a Jitney Service. This bus service is provided by individually owned and operated bus franchises assigned a fixed route by the Ministry of Transport. The current system does not have the confidence of the masses as there are no organized or adhered to headways, a lack of consistent observance to good practice or safety guidelines, and transfer capability. Each trip on a different bus incurs a separate cost.
- Encouraging companies to introduce immediate flexible work schedules would introduce an alternative for motorists not willing to pay congestion charges during the peak travel periods, and also flatten out the peak travel times. This flexible work schedule should be lead by the public sector, which accounts for about 20-30 percent of the work force.
- Implement a policy that mandates any newly established company with a defined "minimum number of employees" has in place a viable transportation demand management program for its employees.
- Implement a policy that ensures that developers adhere to smart growth and planning policies and also share in the cost of impact through traffic impact fees and proportionate share impact fees.
- The development of a physically separated bicycle lane that is safe, continuous, and comprehensive. This would provide a viable alternative for local trips and a means for the tourist to "see" the island unencumbered.
- Implement a closed loop traffic signal system that would allow capacity management at key intersections real time.
- Currently the government receives \$1.06 from each gallon of gasoline purchased, however, this revenue goes directly to conducting the business of the country. Retaining \$0.05 of this amount or introducing an additional \$0.05 tax would generate an estimated \$6.5 million each year that could be placed in escrow/trust fund and earmarked for transportation purposes only. These monies would bridge the shortfall in existing yearly budgets that relegate transportation initiatives to the back burner preventing any sustained long term planning.
- Give thoughtful consideration to relocation of the capital to Andros Island, which is located approximately 30 miles west of the island of New Providence. Andros has a total area of 2300 square miles (43 percent of the total area of the entire Bahamas) and a density of 3.3 persons per square mile.

All of the measures and policies discussed would go a long way in ameliorating the existing cost to you and the country by reducing the traffic demands and providing adequate capacity long term

CONCLUSION

Most of the solutions discussed in this paper can be implemented without great cost to the taxpayers and without political hardship to the decision makers. It is critical for all involved in the process to be acutely aware that we cannot apply yesterday's thinking to today or tomorrow's transportation problems. Shakespeare said, "The readiness is all," in this situation it is perhaps most apt to say "The appropriate action is all."

REFERENCE

1. Force Task Growth Smart ITE (2000). "Smart Growth? Sensible Growth? Sustainable Growth?...Responsible Growth What are the Transportation Needs to Achieve This Growth." ITE Journal, 28-31.
2. Pisarski A. E. (1999). "Transportation Planning, Policy, and Data; Inextricable
3. Poorman J. P. (2001). "Societal Demands on transportation: Addressing an Artificial Dilemma." ITE Journal, 34-37.
4. Shaw S. L. (1994). "Buildings Don't Clog Our Roads, People Do!" ITE Journal, 30-33.
5. AAA Association Communication Pamphlet/Runzheimer International (2003). "Your Driving Cost."
6. Statistics of Department, Bahamas (1970, 1980, 1990). "Census of Population and Housing."
7. Department Traffic Road The, New Providence, Bahamas.
8. MacDonald Mott (1999). "Transport Strategies for New Providence Island." 14.
9. Limited Dillon M.M., Canada, Corporation Hickling, Canada, Ltd. Co. & Cox V. George, Bahamas (1994). "Level of Service Appendix Document Interim Report." 3-5.
10. Institute Policy Transport Victoria. "Transportation Cost and Benefit Analysis – Congestion Cost." 5.5-1-5.5-12.