

GOVERNMENT POLICIES TO ALLEVIATE SUBURBAN TRAFFIC CONGESTION:  
AN INSTITUTIONAL AND ECONOMIC ANALYSIS OF THE  
TRANSPORTATION-LAND USE SYSTEM

by

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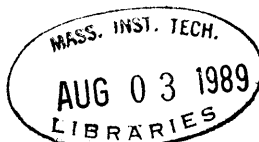
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ABSTRACT

Suburban congestion is a result of an increase in the number of workers, an increase in private vehicle usage, the high rate of population growth in the suburbs, and the high rate of employment growth in the suburbs. The suburb-to-suburb commute trip is the fastest growing commute type, yet with its multiple origins and destinations it does not take advantage of the existing transportation infrastructure. The large number of drive alone commutes mixed with suburban residential traffic adds up to suburban congestion.

Given the causes of suburban congestion, a framework is developed to analyze how existing market system and government activities in transportation and land use are contributing to suburban congestion. Activities that contribute to suburban congestion are termed failures and include the following:

1. A market system failure in transportation. Road users are not paying the congestion cost of their road use.
2. A market system failure in land use. Developers are not paying for the traffic impacts of their development projects.
3. A government planning failure in transportation. (a) The government is permitting unlimited use of roads and is thereby encouraging excessive demand or (b) the government is under supplying the road capacity necessary to meet the demand for travel.
4. A government planning failure in land use. The government is not creating a land use pattern that is well coordinated with transportation infrastructure because: (a) the powers for land use planning are delegated to too small a spatial (land area) and fiscal (taxing authority) unit, or (b) zoning powers and the development approval process are not working to create an efficient land use and transportation pattern within a community.

To correct the failures the government intervenes in the market system to charge road users and land developers for congestion-related costs and the government restructures transportation provision and land use regulation. Particular policies proposed to alleviate suburban congestion are categorized by the type of failure they would correct.

The framework is used to analyze suburban congestion alleviation policies in the Boston Metropolitan region as a whole, and then with specific focus on the Route 20 corridor and Route 114 corridor. The framework is then presented as a mode of analysis by describing ten scenarios with varying institutional and economic constraints on policy actions.

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## TABLE OF CONTENTS

INTRODUCTION		1
	Why the Suburbs are Congested. . . . .	1
	Measuring Congestion . . . . .	3
	What Solutions Have Been Proposed to Alleviate Suburban Congestion . . . . .	9
	The Contribution of This Thesis . . . . .	10
Chapter 1.	<b>A FRAMEWORK FOR VIEWING SUBURBAN CONGESTION</b>	12
	Institutional and Economic Background of the Framework . . . . .	13
	The Framework Itself. . . . .	15
	A Market System Failure in Transportation . . . . .	18
	A Market System Failure in Land Use . . . . .	25
	A Government Planning Failure in Transportation . . . . .	34
	A Government Planning Failure in Land Use . . . . .	45
Chapter 2.	<b>MASSACHUSETTS' EXPERIENCE WITH POLICIES TO ALLEVIATE SUBURBAN CONGESTION</b>	59
	A Review of Suburban Congestion in Metropolitan Boston . . . . .	60
	Policies to Correct a Market System Failure in Transportation . . . . .	61
	Policies to Correct a Market System Failure in Land Use . . . . .	65
	Policies to Correct A Government Planning Failure in Transportation . . . . .	73
	Policies to Correct A Government Planning Failure in Land Use . . . . .	85
Chapter 3.	<b>CONGESTION ALLEVIATION ON ROUTE 20</b>	101
	Market System Failure in Transportation . . . . .	102
	Market System Failure in Land Use . . . . .	102
	Government Planning Failure in Transportation . . . . .	103
	Government Planning Failure in Land Use . . . . .	107
	Summary of Route 20 Initiatives . . . . .	114
Chapter 4.	<b>CONGESTION ALLEVIATION ON ROUTE 114</b>	118
	Market System Failure in Transportation . . . . .	119
	Market System Failure in Land Use . . . . .	120
	Government Planning Failure in Transportation . . . . .	121
	Government Planning Failure in Land Use . . . . .	124
	Summary of Route 114 Initiatives . . . . .	129
Chapter 5.	<b>THE FRAMEWORK AS A MODE OF ANALYSIS</b>	133
	A Framework for Viewing Suburban Congestion . . . . .	135
	Using the Framework to Analyze Different Suburban Congestion Contexts . . . . .	140
	<b>BIBLIOGRAPHY</b>	151
APPENDIX	Commute Forum Survey	155

## LIST OF FIGURES

1.	Level of service speeds by volume-to-capacity ratios	6
2.	Level of service criteria for controlled access highways and for urban and suburban arterials	8
3.	Cycle of market and government activities	14
4.	Cycle of market and government activities in transportation and land use	15
5.	An institutional and economic framework for viewing suburban congestion	17
6.	Socioeconomic characteristics of Route 20 municipalities	101
7.	Level of service at Route 20 intersections	102
8.	Population, employment, land area, and fiscal statistics of Route 20 municipalities	108
9.	Route 20 buildout analysis	113
10.	Route 20 summary	115
11.	Socioeconomic characteristics of Route 114 municipalities	118
12.	Level of service on Route 114	119
13.	Population, employment, land area, and fiscal statistics of Route 114 municipalities	125
14.	Route 114 summary	130
15.	Cycle of failures in suburban congestion	135
16.	Summary of policies to alleviate suburban congestion	136
17.	Suburban congestion alleviation categories	137

## Introduction

"If all these cars carrying only one person had to pay a charge for using this highway, maybe they wouldn't drive alone so much." "It seems like every high tech company is looking for land to build new campus style offices in the suburbs--all with big parking lots." "If the state widens the highway, I think it will be just as congested in a few years time as it is now." "If the citizens wouldn't have protested the widening of this highway ten years ago, we wouldn't be standing in traffic today." "Our town would like to keep traffic levels down along this main route, but we need the tax revenue from new firms who want to develop here in order to keep our residential tax rates low." "The planning board wants to concentrate new development in the east side of town where there is some bus service, but it can't effectively stop development from happening in the west side."

These people are talking about suburban congestion, a public policy problem that has emerged in the 1980s. This introduction explains where suburban congestion came from, how it can be measured, what the literature says about solutions, and, finally, how this thesis contributes to understanding policies that will effectively alleviate suburban congestion.

### Why the Suburbs are Congested

Why is it that traffic `delays, which we are accustomed to in the downtowns of central cities, are showing up in the suburbs? The first reason--one that applies to suburban and urban areas alike--is that more people are commuting to work. The larger work force is a combination of the complete entrance of baby boomers into the work force and the entrance of a higher portion of women into the full-time work force.<sup>1</sup> The second

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<sup>1</sup> In 1960 the first of the baby-boomers had reached labor force age. By 1980 they represented more than 42% of the labor force. In 1950 women represented 28% of the labor force; in 1987 they exceeded 44%. See Alan E. Pisarski, Commuting in America: A National Report on Commuting Patterns and Trends, (Westport, Connecticut: Eno Foundation for Transportation, Inc., 1987), pp. 1-4,19-23.

reason is that private vehicle usage has increased. Two ways of looking at this are: (1) the number of vehicles per worker has increased from 0.85 in 1960 to 1.34 in 1980 and (2) the share of workers travelling by transit declined from thirteen percent in 1960 to six percent in 1980.<sup>1</sup> The third reason--this one is specific to suburbia--is that over 86 percent of the population growth since 1950 has occurred in suburban areas. Since suburbia, in 1984, was the residence of 44 percent of the national population,<sup>2</sup> it will experience more of the effects of the increase in new workers and increased travel than urban and rural areas. The fourth reason--and the one which most affects the suburban transportation system--is that work sites have grown faster in the suburbs than in the central cities. It is estimated that the suburbs now have 60 percent of the job destinations and are receiving about 67 percent of the job growth. The portion of trips that is travelling from suburb-to-suburb is the fastest growing and largest portion of work trips, representing 38 percent of all flows in 1980.<sup>3</sup> These suburban commuting trips are mixed with all the suburban residential traffic, i.e., shopping trips, school trips, etc.

The fourth reason, job growth in the suburbs, is the factor that makes suburban congestion a new problem to be dealt with. Firms are choosing work sites that are dispersed and often distant from the central city. The urban central cities, where most firms have traditionally located, have high land costs and high rents. Firms that do not require co-location with production inputs (raw materials), major transportation nodes, and other complementary firms in the urban core area, can reduce their operating costs by locating in areas where the land values and rents are low. As job growth in the United States has shifted from heavy manufacturing to production of information and ideas, the shift in

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<sup>1</sup> Pisarski, Commuting, pp. 6-8,48-50; Robert Cervero, Suburban Gridlock, (New Brunswick, New Jersey: The State University of New Jersey, 1986), pp. 35-37; see also Ira S. Lowry, "Planning for Urban Sprawl," A Look Ahead Year 2020: Proceedings of the Conference on Long-Range Trends and Requirements for the Nation's Highway and Public Transit Systems, (Washington, D.C.: Transportation Research Board, 1988), p. 305.

<sup>2</sup> Pisarski, Commuting, pp. 24,27.

<sup>3</sup> Pisarski, Commuting, pp. 4,41; and Cervero, Suburban Gridlock, p. 10.

workplaces from the central cities to the suburbs has been possible.<sup>1</sup> Firms also benefit from low density locations because of the employees' perception that it is easier for them to commute to the low density work site: there is ample free parking and you can avoid paying a high daily mass transit fare. This extra benefit to employees is sometimes reflected in a wage rate differential with firms in low density areas paying less than firms in high density areas.

The suburb-to-suburb work trips rely on the private automobile, will likely continue to do so, and won't be able to take advantage of some of the existing transportation infrastructure. First, these trips are circumferential and therefore do not take advantage of existing radially-oriented mass transit that has been designed in past years to accommodate suburb-to-central city work trips. Since these trips have multiple origins and destinations they do not fit the line-haul requirement for cost effective mass transit; so mass transit solutions will not be forthcoming. Second, these suburb-to-suburb automobile trips are not able to take advantage of radially-oriented road networks, such as expressways or freeways. These networks, like the mass transit network, are designed for suburb-to-central city commuting. Third, public funds and public support for new road building have decreased; so building new roads to solve the problem isn't the accepted solution. All of this adds up to a large number of vehicles, most carrying one person, on the limited suburban road network; it adds up to suburban congestion.

### **Measuring Congestion**

Before going on, let me explain two ways of describing or measuring congestion: the drivers' view and the facilities managers' view. Most drivers would say congestion is any traffic level that delays them from travelling at free flow speeds, slowed only by speed limits and traffic signals. The delays, or congestion, could be bumper to bumper traffic on

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<sup>1</sup> Cervero, Suburban Gridlock, pp. 8-9.



a controlled access highway (freeway) or the delays could be waiting through more than one cycle at an intersection on a suburban arterial with uncontrolled access. All in all, the delays add up to more minutes to make the trip, minutes beyond what the travel time would be if you took the trip in the middle of the night when all other drivers were off the road.

In considering congestion from the drivers' point of view, it is important to consider two things. First, drivers are likely to perceive the same traffic level as being more congested in a suburban environment than in an urban environment because expectations of congestion for the two environments are different. Second, some of the complaints about suburban congestion are likely to be correlated with the change in the landscape of suburbia: the rapid growth in employment-related development in the once residential-only suburbs. The easiest way for suburbanites to communicate their apprehension about this landscape change is to point to the increased traffic.

The drivers' view of congestion is not the main focus of my analysis. It is an important consideration, however, because it is the drivers who will both fund and use whatever transportation infrastructure is available. Bearing this in mind, I focus my measure of congestion on how a transportation facilities manager would describe or view congestion, i.e., traffic levels that impede the flow of the maximum number of vehicles on a road during a given unit of time. This more comprehensive view of congestion, while technical, does incorporate the delay concepts described under the driver's view of congestion.

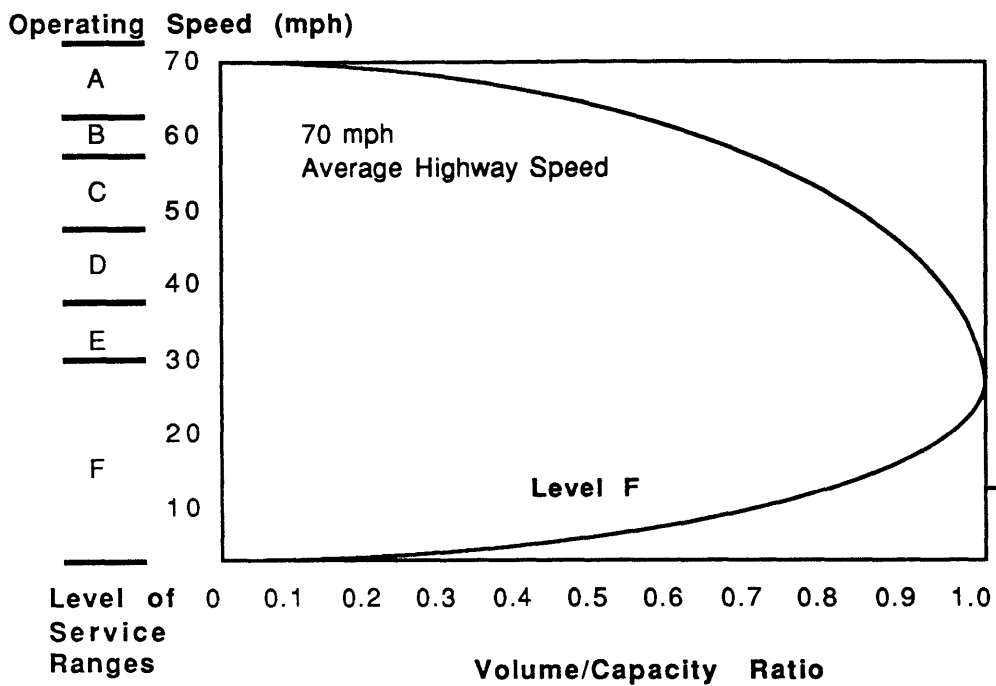
One way of measuring congestion on controlled access highway with uninterrupted traffic flow is the volume-to-capacity ratio. The volume is the number of vehicles using a section of roadway in a given hour; the capacity is the maximum number of vehicles that could travel through the segment of roadway in a given hour. In general, the maximum capacity of a road lane is approximately 2,000 passenger cars per lane per hour when all cars are travelling at a speed of 35 miles per hour. Once this volume to capacity ratio exceeds one, congestion exists. With heavy traffic levels, speeds drop below 35 mph and

fewer than 2000 vehicles can travel the lane during the hour. Traffic engineers have categorized these volume-to-capacity ratios into levels of service, "A" being the least congested level of service and "F" being the most congested. Figure 1 diagrams the relationship between speed and volume-to-capacity ratios. <sup>1</sup>

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<sup>1</sup> American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, (Washington, D.C., AASHTO: 1984), pp. 78-79, 286.

Figure 1. Level of service speeds by volume-to-capacity ratios.



Source: American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, (Wash., D.C.: AASHTO, 1984), pp. 255-6.

A way of measuring congestion on signalized roadways with interrupted traffic flows is the frequency with which vehicles are delayed more than one complete signal change at an intersection. Even when the signals are well-timed, excessive traffic levels in any one direction can require drivers to be delayed more than one signal change. The load factor is a measure of signal delay. It is the ratio of the number of fully utilized green intervals (not all the traffic clears the intersection) to the total number of green intervals within an hour. The higher the number of fully utilized green intervals (indicating more vehicle delays), the higher the load factor. Load factors also have level of service correlations, with a 0.0 load factor associated with level of service "A" and a 0.8 load

factor associated with level of service "F."<sup>1</sup> Figure 2 summarizes level of service conditions for controlled access highways and urban and suburban arterials.

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<sup>1</sup> AASHTO, Design, p. 77, 95.

Figure 2. Level of service criteria for controlled access highways and for urban and suburban arterials.

Level of Service	Controlled Access Highways	Urban and Suburban Arterials
A	Free flow. Operating speed = 60 mph. V/C ratio = 0.35.	Free flow. Operating speed = 30 mph. V/C ratio = 0.6. Load factor = 0.0.
B	Stable flow. Operating speed = 55 mph. V/C ratio = 0.5.	Some intersection delay. Operating speed = 25 mph. V/C ratio = 0.7. Load factor = 0.1.
C	Stable flow. Operating speed = 50 mph. V/C ratio = 0.75.	Some intersection delay. Operating speed = 20 mph. V/C ratio = 0.8. Load factor = 0.3.
D	Approaches unstable flow. Operating speed = 40 mph. V/C ratio = 0.9.	Approaches unstable flow. Operating speed = 15 mph. V/C ratio = 0.9. Load factor = 0.7; delays at intersections may become extensive with some cars waiting two or more cycles.
E	Unstable flow. Operating speed = 30-35mph. V/C ratio = 1.0; bottlenecks, but no long backups develop upstream.	Unstable flow. Operating speed = 15 mph. V/C ratio = 1.0. Load factor = 0.7-1.0; continuous backup on approaches to intersections.
F	Forced flow. Operating speed = 30 mph to stop-and-go. Freeway acts as a storage for vehicles backed up from downstream bottleneck.	Forced flow. Operating speed = 15 mph. Vehicular backups extend back from signalized intersections, through unsignalized intersections.

Adapted  
From:

American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, (Wash., D.C.: AASHTO, 1984), pp. 94-95.

Under my criteria of managing traffic so that maximum capacity flows can be achieved, a level of service "E" on a roadway would be an acceptable travel condition. Therefore, the solutions discussed in the following chapters would be aimed at taking road conditions that are at, or are projected to be at, levels of service "F" and improving them to level of service "E."

One of the difficulties in judging level of service is that it changes over the time periods of the day. A facility may be congested during the AM and PM peak traffic periods but not during the other hours of the day. Thus, during the non-peak hours, there is excess capacity, meaning additional traffic could use the facility without a reduction in operating speeds. Because of this unevenness of facility usage, some judgment has to be made in sizing a facility in relationship to its peak and non peak hour use.

### **What Solutions Have Been Proposed to Alleviate Suburban Congestion?**

The literature on suburban congestion is growing. Some works document what demographic and social factors are behind the growth in traffic congestion in the suburbs. I referred to this information earlier. Other works propose solutions to the suburban congestion problem. Most of them resurrect the techniques developed to battle urban congestion--ridesharing, variable working hours, high occupancy vehicle lanes--and modify them to battle suburban congestion. However, one of the important urban congestion solutions is not recommended: suburban congestion researchers argue that mass transit is not a financially viable transportation option for low density suburbs, especially since it suffers from financial deficits in dense urban areas.<sup>1</sup> Nor is it popular to

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<sup>1</sup> Cervero, Suburban Gridlock, pp. 49-51; Lowry, A Look Ahead, pp. 302-302; Ralph Gakenheimer et al., National Survey of Transportation Actions in Suburban Corridors, Report of the MIT Center for Transportation Studies, prepared for the Massachusetts Department of Public Works, Bureau of Transportation Planning and Development, February 1987, pp. v,ix,65,71.72,74-77; and Elizabeth Deakin, "Land Use and Transportation Planning in Response to Congestion Problems: A Review and Critique," paper presented at the ACSP Annual Conference, Los Angeles, CA, November 1987, p.1.

build new expressways.<sup>1</sup> Still, some of the less powerful techniques introduced to alleviate urban congestion are getting more attention in the battle against suburban congestion. They are techniques that promote the management of the demand for travel, both employer-based traffic mitigation measures and local land development management.

Also included with these measures for travel demand management are efforts to evaluate the funding of transportation resources. Much of the funding of road construction has come from the federal government; now the federal government is scaling back these funds. The three options that state and local governments have remaining are to: (1) slow down and eliminate some road construction, (2) increase taxes on residents and firms to pay for road programs, or (3) capture funds from developers of new projects to construct new road facilities.

### **The Contribution of This Thesis**

This thesis contributes to the literature in two ways. First, it organizes the techniques being proposed for suburban congestion into an institutional and economic framework. The purpose of this framework is to shed light on the actors in the suburban congestion problem, to show how the proposed policies affect these actors, and to make inferences about where responsibilities for the problem and policies lie. As an example, when people talk about impact fees or regional planning authorities, they seldom identify what is it about the way things are done now that these new ways of doing things are going to correct. The framework I present gives a structure for pointing out what may be wrong with the way things are done now.

One of the important lessons of the framework is that the proposed policies to alleviate suburban congestion are highly dissimilar. Different sectors of the economy (road users, land developers) and different levels of government (state, metropolitan, local) are players in the congestion situation. Successful measures to alleviate congestion will need

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<sup>1</sup> Deakin, "Land Use," p.1.

to pull together a set of techniques that cover more than one sector of the economy or more than one government level to make a substantial reduction in congestion.<sup>1</sup>

The Boston metropolitan area is an excellent case study of metropolitan transportation planning juxtaposed with local development decisions. Since the Massachusetts counties offer few governmental services, the State is planning the transportation network and the 101 cities and towns in the Boston area are making the land use decisions.

The chapters which follow this introduction set up a framework for viewing suburban congestion and then apply it to the Boston, Massachusetts metropolitan area. The chapters proceed as follows: Chapter one sets up the framework. Chapter two details what experience Metropolitan Boston has had with the policy options outlined in the framework. Chapters three and four detail the interjurisdictional coordination problems for two transportation corridors in the Boston suburbs. The framework is used as a structure to understand what policy directions are being taken in these suburbs. Chapter five summarizes the framework analysis and shows how the framework can be used to analyze a particular congestion scenario. (Reading just Chapter five is suggested for a reader with limited time.)

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<sup>1</sup> Elizabeth Deakin writes on how responsibilities for transportation planning have been delegated to different layers of government in the past and how the delegation may change given the congestion problem and funding crisis. (See Deakin, "Land Use.")



## CHAPTER 1

### A FRAMEWORK FOR ANALYZING SUBURBAN CONGESTION

In this chapter, I present a framework for viewing suburban congestion. The value of the framework is to better understand suburban congestion from an institutional and economic point of view. The framework identifies causes of suburban congestion, based on the activities of people in the government and in the market system. Each cause is then associated with policies that would correct problems pointed out

My interest in producing a framework to better understand policies to alleviate suburban congestion comes from hearing many debates on how the problem should be solved. I notice that the discussions are often a confused mix of causes and innovative policy techniques that are not clearly linked together. In frustration over the problem, people neglect to clarify what it is about the way things are done now, in our current market and government systems, that is not working and that these policies will correct. I found that by using a framework to break suburban congestion down into categories, even though it isolates congestion effects that are interrelated, I could clarify the linkages between what is amiss in the market and government systems and the corrective policies. With clarity given to each policy, I can then suggest how the policies can be combined across categories to address suburban congestion in a particular context.

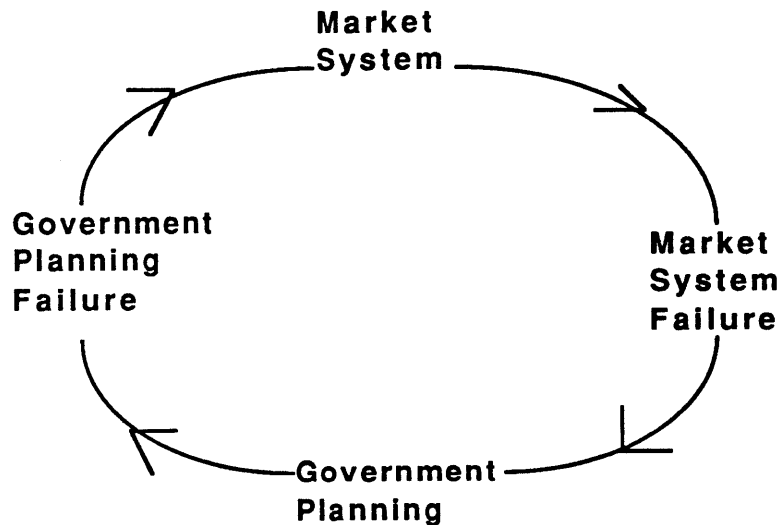
The classification into causes points out dissimilarities in the policy actions proposed to alleviate suburban congestion. The policies are implemented by the government--it may be the state government, a metropolitan planning organization, an ad hoc sub-regional committee, or the municipal government--but are closely linked with activities of the private sector. The policies involve government and private actors in both transportation and land use activities. I look at this array of activity from the viewpoint of the government seeking the alleviation of congestion for the metropolitan area.

There is one significant cause of suburban congestion, pointed out in the introduction, that is exogenous to my framework. It is the increase in the labor force. I do not think we can shrink an existent labor force, but we can look carefully at what other factors are also contributing to congestion, like the increase of business locations in the suburbs, to find effective policies to alleviate current congestion and curtail its future development.

### **Institutional and Economic Background of the Framework**

The planning and provision of transportation and land development takes place in both the public and private realms. When there is something that the market system does not do well, the government intervenes to regulate the activity or provide services. When there is something that the government does not do well, we rely on the market system to do it. Looking at how the activities are part of the market system or part of government planning helps to identify what may not be working well: the failures. The figure below illustrates a cycle from which to view the interrelationship of the market system and government planning:

Figure 3. Cycle of market and government activities.

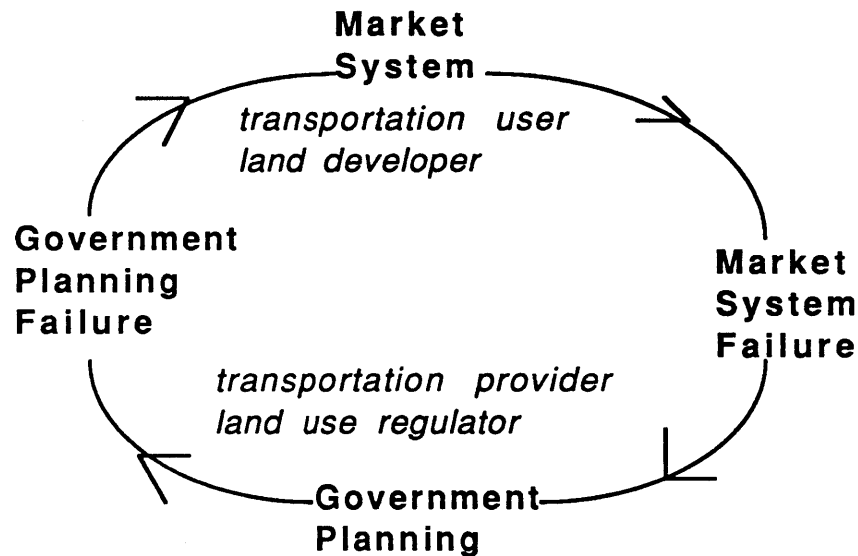


An analysis of transportation planning and provision indicates that it is almost entirely in the government's realm. The market is not successful in providing public goods, like road networks, that everyone can use but no one pays for directly. Hence, the government both plans the road network and constructs and maintains it. In most cases it also plans and provides public transportation, though there is increasing activity of the private sector in mass transit. The main role of the private sector, then, is as the road user. Each individual driver is responsible for his or her own vehicle and is at liberty to use the public road as he or she chooses.

Land use planning and land development have a different structure. The market is successful at developing land insofar as there are certain regulations providing a pattern for land use. So the government is the land regulator. It creates a land use plan which stabilizes the land market by identifying expected land uses in different locations.

These roles of the government and the market in transportation and land use are diagrammed in the figure below:

Figure 4. Cycle of market and government activities in transportation and land use.



### The Framework Itself

I work from in constructing my framework. I analyze how the current activities of the market in transportation and land use are working to determine if the government needs to intervene to correct any failures. These market actors are road users and land developers and the intervention of the government is at either the state or local level. I also look at the government's activities in transportation and land use to determine if there are failures. In a government failure, I rarely suggest the market take over the activity, rather I recommend correcting the flaw in the government's performance. The government actors are at both the state and local level.

The framework presents the causes of suburban congestion as either failures of the market system or of government planning. The type of market failure I refer to, commonly called an externality,<sup>1</sup> is an unpriced effect of market activity. Negative externalities are

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<sup>1</sup> In a market system, all of the inputs and outputs of market activity are expected to carry a price. For example, a plant buys iron ore as an input to its production of steel and then sells that steel. However, during the processing of the steel the plant emitted air pollution. Since there is no "market" for the air pollution, the government intervenes and "prices" the pollution, e.g., having the plant clean it up or pay pollution penalties.

common market failures; pollution and traffic congestion are good examples of externalities. Traffic congestion, the subject of this thesis, is an externality because road users who create congestion do not pay a price for the congestion they create, i.e, my use of the road does detract from your use of the road but I do not pay anything for that effect. In general, a solution to correct an externality is to introduce a new pricing mechanism which then prices what has been unpriced. Most new pricing systems require government intervention to assess a charge or penalty to the unpriced effect.

The other causes of suburban congestion are called government planning failures. The type of government planning failure I refer to is that the government is ineffective in providing transportation services or in regulating the land market. The planning failure may be due to an organizational structure that doesn't distribute authority in a way in which government actors can implement policies to alleviate congestion. Or the government planning failure may be that the governmental actors are not exercising their authority in ways that alleviate congestion. In most cases of government planning failures, the proposed policy actions are to improve governmental operations. In rare cases, the policy action may be to privatize the provision of transportation services or to deregulate the land market.

There are four categories in the framework, representing combinations of market system and government planning failures with transportation and land use functions. The government's roles in transportation provision and land use regulation are so extensive that I subcategorized each planning failure. The resulting framework is:

1. A market system failure in transportation. Road users are not paying the congestion cost of their road use.
2. A market system failure in land use. Developers are not paying all the traffic impacts of their development projects.

3. A government planning failure in transportation. (a) The government is permitting unlimited use of roads and is thereby encouraging excessive demand, or (b) the government is under supplying the roads necessary to meet the demand for travel.

4. A government planning failure in land use. (a) The powers for land use planning are delegated to too small a spatial (land area) and fiscal (taxing authority) unit, or (b) zoning powers and the development approval process are not working to create an efficient land use and transportation pattern within a community.

Figure five illustrates this framework:

Figure 5. An institutional and economic framework for viewing suburban congestion.

	Transport	Land Use
Market Failure	Congestion effects are not priced.	Trip generation is underpriced.
Government Planning Failure	Gov't permits unlimited use of roads, encouraging excessive demand.  Gov't is not providing enough roads to meet all of the travel demand.	Powers to plan land use are delegated to too small a spatial and fiscal unit.  Zoning powers & approvals are not creating efficient land & trans. patterns.

The framework is described, box by box, in the following sections of this chapter. Each failure is detailed and associated with policy actions that could correct the failure. While the framework purposely isolates each cause, the causes are interrelated in real situations of congestion. Focusing on each cause one by one, however, should bring clarity to later attempts to create comprehensive policies to alleviate suburban congestion.

## **A Market System Failure in Transportation**

Suburban congestion can be viewed as a failure of the market in pricing transportation services. In this view, road users are not paying for the social cost of their trip: their use of the road detracts from the other drivers' use of the road. Drivers do pay for the majority of their transportation costs. They directly pay for all of the variable costs--the car, insurance, gasoline, and maintenance--and indirectly pay for most of the fixed costs--road construction and maintenance--through the gasoline tax. However, these variable and fixed costs do not include the social cost of congestion, i.e., that one driver's use of the road detracts from the use of other drivers.

If you take the viewpoint that suburban congestion results from a market failure in transportation, the policy solutions that fit it are to price congestion. Possible pricing mechanisms are:

1. Toll gates on roadways, bridges, and tunnels. Toll gates charge users directly for travelling on a particular road. The toll gates can be placed on roads, and segments of roads, that are the most congested with the intention that users pay the social cost (congestion cost) of travelling on the heavily demanded facility. Toll gates are advantageous in their ability to charge directly for road usage in congested areas. Their major disadvantage is that they contribute to congestion levels by requiring each vehicle to pass by a toll taker. Toll facilities can substantially reduce capacity.

The revenue collected at the toll booths can be used to fund the improvements required to construct the toll booth, the operating requirements to pay toll takers, the

maintenance costs of the roadways, or can be transferred to other congestion relief efforts, such as ride sharing or mass transit.

The use of toll facilities will be most effective when done on a metropolitan basis. Toll facilities in some congested areas and not others will likely create irrational travel patterns as drivers make tradeoffs between: (a) using roads with tolls or (b) using roads with no tolls but with a less direct route to the destination.

2. An increase in the gasoline tax. Increasing the out-of-pocket costs of tripmaking is effective in curtailing excessive tripmaking. The energy crisis in the 1970s with its accompanying high fuel prices caused substantial changes to driving habits because the cost of each trip became high. Increases in the gasoline tax are artificial ways of providing this same disincentive for tripmaking. The higher the tax, the larger will be the reduction in tripmaking.

The disadvantage of gasoline taxes as a congestion alleviation measure is that they do not target congestion directly: drivers on congested roads pay the same tax rate as drivers on uncongested facilities; drivers travelling during the peak hour pay the same tax rate as those travelling during the non-peak hour. Nor is there equity consideration for those who must travel long distances (rural areas) compared to those who travel shorter distances (urban areas).

The revenue generated by a gasoline tax can be substantial. The revenue could be used for funding road construction and maintenance, e.g., its traditional federal role to fund the Interstate Highway System, or to cross subsidize other congestion alleviation activities, such as ride sharing and mass transit.

A gasoline tax would be most effective at the metropolitan level because it could target a congested metropolitan region without requiring the political support of the entire state. If the gasoline taxes were administered at any smaller geographical level, i.e., the subregional level, there would be an incentive for tax evasion: drivers would tend to buy their gas in the no local gas tax subregions.



3. Electronic pricing of roadway use. Electronic pricing of roadway use is theoretically the ideal method of pricing congestion. The technical requirements of electronic pricing are the installation of electronic sensors in both the road bed and the underside of vehicles. After the system is installed, a record is made every time a vehicle passed over a sensor and a charge is assessed. The administration of the system is often compared to the way a telephone company charges for long distance service.

One of the advantages of electronic pricing is that vehicles could travel without any extra stops, without the need, for example, to queue and pay a toll. Another advantage is the system's flexibility. The sensors can be installed in any number of roadways, the most congested roads or all major arterials. As needs for pricing change, the sensors can be added to new roads or removed from old ones. The system can also charge variable rates for different roads and different times of travel.

The disadvantages of this system are significant but can be overcome. The main disadvantage is that people are not accustomed to having records kept of their tripmaking. Many drivers would consider this system too great an invasion of their personal privacy. One way to modify the system so that tripmaking remains private is to record trips in a lump sum without itemization by trip, the way long distance telephone service is provided in Europe. The second disadvantage is the system requires the formation of an administrative body to record trips, bill for trips, and collect and disburse revenue. The third disadvantage is that fee avoidance is easy with current designs of electronic systems. Electronic sensors can be covered in the road or on the vehicle, thereby disabling the recording of trips. So to be successful, designs would need to incorporate tamper-proofability.

The disadvantages of this system have precluded its implementation in all but one city, Hong Kong, where a pilot test of the electronic pricing system took place in 1985. The project involved 18 toll sites and over 2,500 vehicles, and the system operated for 18 months. Technically, the Hong Kong Electronic Road Pricing project was a success, but,

politically, it was highly controversial. Drivers had just experienced a tripling in vehicle registration fees and this was considered yet another tax. In addition, people were quite concerned about the government keeping records of their vehicular movements.<sup>1</sup>

The revenue generated by the electronic pricing system could be used to fund the administration and capital needs of the system. Revenues in excess of those needs could be used for road construction and maintenance, ridesharing programs, or mass transit.

The implementation of electronic pricing would be done on a metropolitan or state basis. The system is extremely flexible about which roads the charges would be applied to, but all registered vehicles need to have a sensor and a billing account to make the system charge users equitably. The system would not be able to charge non-residents passing through the area.

4. Area licensing schemes. Area licensing schemes restrict access to congested areas, usually a central business district. Restrictions can be all day long, everyday or just during peak hours. Access to the area is limited to major streets and, on those streets, vehicles must pay a fee to pass through a gate and enter the business district. Regular commuters can buy monthly or yearly licenses to access the area. Carpools and residents could get licenses at reduced fees or free of charge. Vehicles displaying licenses, are allowed to quickly pass through the entry gate. Only infrequent visitors to the area, those without licenses, need to stop and pay at the gate.

The advantage of this system is charging road users in congested activity centers. The increased cost of access can be an effective incentive to get people to rideshare or take available mass transit. Contrastingly, an area license scheme has several disadvantages. First, it is limited to activity centers (the terminus point of the trip) and doesn't affect congested points of the trip en route (highway entrance ramps, major intersections,

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<sup>1</sup> Poole, Robert W., Jr., "Resolving Gridlock in Southern California," Transportation Quarterly, 42 (October 1988), p. 515; and World Bank, Urban Transport: A World Bank Policy Study, (Wash., D.C.: The World Bank, 1986), p. 10.

merging areas, etc.) Second, many suburban areas might not have an activity center of a large enough scale to warrant licensing. Third, requiring vehicles to pass through the entry gate creates bottlenecks at these points.

The area license scheme, like electronic pricing systems, run counter to the notion of the road being a public good. They both work on the premise that some user fee should be paid to travel in congested areas. However, the public in the United States is not accustomed to this notion. Therefore, area licensing schemes are projected to be initially unpopular in the United States. Only one major licensing scheme has been implemented and it was outside the United States. Singapore adopted an area license scheme in 1975. It resulted in a 20 percent increase in traffic speeds and a substantial mode shift to public transportation.<sup>1</sup>

The revenue generated by the charge to enter the licensed area could be used to pay the administrative and construction costs of the program. If revenues are collected in excess of those costs, they could cross-subsidize other congestion alleviation measures.

Area licensing schemes would usually done at the local level and in central cities. The licensed area must have a strong economic base in order not to suffer economically if development shifts away from it to areas where no licensing scheme exists. For this reason, coordination of area license schemes on a metropolitan basis would be helpful.

5. High parking fees in congested terminus points. Extremely high parking fees in congested activity centers work as an incentive for commuters to rideshare or use public transportation instead of arriving alone in a private vehicle. The parking fees greatly add to the out-of-pocket costs of making a drive alone commute, giving incentive to drivers to

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<sup>1</sup> World Bank, Urban Transport, p. 9; and Robert Cervero, "America's Suburban Centers: A Study of the Land Use--Transportation Link," Final Report to UMTA, U.S. DOT, (Wash., D.C.: U.S. DOT, 1988), p. 158.

change modes. Parking cost and availability has been found to be one of the most effective methods of getting people to switch from a drive alone commute to another mode.<sup>1</sup>

Extremely high parking fees, eight dollars and up per work day, are economically justified in densely developed activity centers where the price of land is expensive. Parking construction could range anywhere from \$3000 per space for surface parking to \$12,000 per space for structured parking (multilevel parking garages), depending primarily on land costs.<sup>2</sup>

Parking strategies in suburban areas are not mature and usually suffer from ample pockets of free parking because the land is not densely developed. The high priced parking would, therefore, need to be accompanied with parking restrictions on major streets and in neighborhoods. Enforcement of parking restrictions is also an important part of the policy because the driver's habit is to squeeze out a free parking space whenever he or she can.

Parking, however, has only indirect ties with congestion. As discussed under area licensing schemes, parking strategies can be effective in reducing trips at terminus points but doesn't necessarily reduce trips at other congested points en route.

The revenue collected can be used to finance the enforcement of parking restrictions, the regulation of private garages and the construction of public parking garages. Parking fee revenue in excess of needs could be used to cross-subsidize other trip reduction efforts. Frequently, parking fees are also used to support landscaping, street amenities, and the maintenance of an urban area.

High parking fees can be implemented in small geographical areas. An entire activity center, however, must have a coordinated policy to make the fees effective in alleviating congestion. A metropolitan approach to parking fees is necessary to preclude

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<sup>1</sup> Federal Highway Administration (FHWA), U.S. DOT, Transportation Management for Corridors and Activity Centers: Opportunities and Experiences, (Wash., D.C.: Office of Planning, 1986), p. 24; and Cervero, Suburban Gridlock, p. 129.

<sup>2</sup> Cervero, Suburban Gridlock, pp. 65,174.

major shifts in development activity away from the areas with parking fees to areas with no fees.

6. Increase automobile ownership charges. A final way to increase the cost of driving a car in order to induce a reduction in tripmaking is to increase the costs of owning a car. These taxing policies don't affect tripmaking directly, rather they affect the likelihood that an additional vehicle will be purchased and used. The state government has the authority to tax vehicle sales and to charge fees for vehicle registration and operator licensing. In some states, a yearly personal property tax is also assessed on the car and paid with the personal income tax.

Fewer vehicles should correlate with fewer trips, based on research findings that correlate vehicle availability and tripmaking patterns. Many associate the increase in vehicle miles travelled over the past decades with the increase in the vehicles available per worker. In every household category, the majority of households had at least one vehicle per worker.<sup>1</sup> Correlated statistics of this time period show that workers with one or more vehicles available use transit at one-fifth the rate of those who have less than one vehicle available per worker. Workers who carpool also have significantly lower rates of vehicles per worker than other groups.<sup>2</sup>

The advantage of a policy to increase automobile ownership costs is that the taxes or user fees; only increases would be needed. The exception is in taxing vehicles as personal property, which is not a practice in most states. The disadvantage of the policy is that auto ownership charges don't target congestion directly and, therefore, they affect all drivers in the state alike, whether or not they are travelling on congested facilities.

The revenue generated by this policy could be modest or substantial, depending on the amount of the fees. Most of the fees that are now collected fund highway programs.

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<sup>1</sup> Pisarski, Commuting in America, pp. 8,48; and Lowry, A Look Ahead, p. 307.

<sup>2</sup> Roger F. Teal, "Carpooling: A Comprehensive Analysis," ITS Review 11 (November 1987):4.

This practice would likely continue and it is also possible to cross-subsidize other congestion alleviation measures with this revenue.

Usually, the state government assesses fees for vehicle ownership and operation. No change is recommended because taxing automobile ownership at the local level gives people an incentive to register in the locality with the the lowest fee.

#### Summary of a Market System Failure in Transportation

The basic premise of charging drivers for the social cost of their trip is to discourage them from making trips. Toll gates and electronic pricing discourage travel in congested areas by charging directly for driving in the congestion. Area licensing schemes and high parking fees discourage drivers from travelling alone to their destinations of travel. Increases in the gas tax and auto ownership charges discourage tripmaking by increasing vehicle operating and ownership costs.

Each of these policies generates revenue since the correction is to charge drivers for the congestion effects of their road trip. Since these policies have potential to raise large amounts of revenue, both effects of the policy should be studied carefully. The setting of the fees should cover: (a) at least the cost of implementing and administering the program, (b) an additional amount that appears to increase the intended reduction in tripmaking without being excessively burdensome to drivers, and, possibly, (c) an additional amount to cross subsidize other congestion alleviation efforts. If maximum congestion alleviation is to come from the policy, the revenues raised should be earmarked to fund other policies that alleviate congestion but do not raise enough revenue to be self-funding, such as ridesharing programs or mass transit.

#### **A Market System Failure in Land Use**

Another view of the suburban congestion problem is a failure of the market to charge developers for all the effects of their commercial development. In this view,

developers are not paying for the social cost of their development: the development generates additional traffic on the roads. Developers pay for the land, construction, utility connections, and site-related road improvements. They typically do not pay any cost for the upstream and downstream trip effects of their development.

Developers are conscious of traffic congestion at different sites, but their concern is with site access and not areawide traffic levels. Developers also have many considerations in their development decisions. Many developers have intentionally moved from areas that are densely developed to areas that are sparsely developed. The reason is that many business firms can save money if they locate in suburban locations: the land is cheaper and they can pay employees less, since employees don't have to travel into the congested central city. This shift from high to low density is also a shift in transportation alternatives available to commuters. The high density central city areas have a variety of transportation modes and a concentration of transportation infrastructure, while the suburbs are typically accessible only by private automobile and have limited transportation infrastructure.

Development outside the central city can relieve or exacerbate overall metropolitan congestion. It relieves congestion by reducing central city congestion, eliminating some peak directional flows as destinations multiply, and shortening commutes for some residents living and working in the suburbs. At the same time, the multiple effects of many firms choosing low density locations without a corresponding shift of their employees to live near the suburban work site creates suburban congestion as workers commute between distant suburbs or from exurbs to suburbs. If suburban and exurban commuting increases in its proportion of commute trips, overall metropolitan congestion is exacerbated. This is because less transportation infrastructure exists in suburban and exurban areas to support the volumes of traffic, particularly when the suburban trips tend to have low vehicle occupancy rates and mass transit ridership rates. In addition, there is more competition on suburban roads with non-commuting drivers, i.e. shopping trips, school trips, etc.

Suburb-to-suburb commuting (intra-suburban and inter-suburban) has become the dominant type of commute in metropolitan areas. Patterns of this flow show that the share of inter-suburban trips is increasing, suggesting that suburb-to-suburb commuting may be increasing in length.<sup>1</sup> These trip increases are directly attributable to commercial developments in suburban locations. Each suburban development contributes a part to this major change in commuting patterns, with the process happening incrementally. For most of this development activity, no mechanism was in place to make developers pay the congestion effects of their development. Increasingly, governments are requiring developers to account for the traffic impact of their development.

If you take the view that suburban congestion is a market failure where developers are not paying the social cost of their development on low density suburban land, possible pricing mechanisms are:

1. Negotiated agreements or exactions. Negotiated agreements or exactions are made between the local government and the developer on a case by case basis. The exaction can include a broad range of items, including: engineering improvements to the road, ridesharing programs, or flextime work schedules. The entire set of exactions can include non-transportation amenities, such as sites for schools, etc. Developers pay for exactions as a way to get their development approved, and may pay 100 percent of needed facilities or some portion. The trigger of the negotiation process between the local government and the developer is when the development requires a special permit.<sup>2</sup>

Both the advantages and disadvantages of negotiated exactions lie in their flexibility. Some developers prefer exactions to impact fees (discussed next) because they have more control over what the money is spent on. Some local officials also feel that they can get a better association between the project and its affect on infrastructure on a case by

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<sup>1</sup> Pisarski, Commuting in America, pp. 41,44.

<sup>2</sup> Special permits are required for some developments. The zoning may permit the land use but only with additional review, called the special permit process.



case basis. The relative strength of the bargaining positions of the developer and the local officials depends on the market demand for development in the municipality: municipalities with the most robust economies can require the largest exactions from developers.

The negotiation flexibility also has disadvantages. Both developers and city officials feel they are at a disadvantage in negotiating the exactions. Developers complain that the exactions are sometimes excessive, and the only recourse they have is to go through lengthy and costly appeals. Developers also complain that the variability of the process may mean developers in the approvals process in different years will have different requirements. For example, if a series of developments use up all the existing transportation capacity, the next developments may be required to have extensive traffic mitigations. So there is need for the process to have some uniformity over time. On the side of the municipal officials, there is a feeling that they don't have as much money as the developers to study the case and, therefore, can't present their position as strongly as the developer. They also say that some developers threaten to move elsewhere, taking their employment with them, if the exactions are not to their liking. Besides the negotiation risk, the municipality takes the risk of the development project failing and the infrastructure improvement remaining only half complete.<sup>1</sup>

Negotiated exactions are typically part of the local development review process, so are both administered at the local level and are limited to improvements in the vicinity of the parcel being developed. There is also some bases for the negotiated exactions to take place between the metropolitan or state governments and the developer. These are cases where the project requires an environmental impact review or or a curb cut permit onto a state highway. Examples of these exactions will be discussed in the next chapter.

2. Transportation impact fees. Impact fees increase the cost of developing land in the area covered by the fees. The fees are usually calculated based on the total square feet

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<sup>1</sup> Cervero, Suburban Gridlock, pp. 131-132; Deakin, "Land Use," p. 17-18; and Gakenheimer, National Survey, pp. 126-132.

of the commercial building and go toward paying for the transportation improvements--sometimes other capital improvements like water and sewer lines are included--that the traffic generated by the building requires. Before impact fees can be assessed, a plan for transportation improvements must be drawn up by the jurisdiction. Each developer is allocated a portion of the improvement costs according to the share of trips generated by the developer's project. When the fees are paid, they go into an account that is earmarked to fund projects in the transportation improvement plan. The legal justification of impact fees requires that there be a rational linkage between the improvement being funded and the development for which the fee is assessed.<sup>1</sup>

Some jurisdictions use impact fees instead of negotiated exactions because they are able to overcome inequities in the exactions required of different developers. However, many developers still do not feel that the fees are calculated on good enough data. For their part, government officials may find the fees are too low and too inflexible: the fees are usually set on the low side to prevent legal challenges and cannot be adjusted to meet the particulars of a project.<sup>2</sup>

Some proponents of impact fees support them as a disincentive to developing projects where the transportation infrastructure is less developed. Since impact fees must be based on a transportation improvements plan that has direct association with the development project, they are used in areas where the infrastructure is planned for expansion. The fees can, therefore, enable development, instead of stopping it.

An impact fee program can either be implemented at the metropolitan or local level. The metropolitan level would allow a more uniform plan for transportation improvements and more equity if fees are charged to all development projects. However, the allocation of charges to a developer must have a local component to tie the development project's contribution to a set of improvements that serve that development.

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<sup>1</sup> Gakenheimer, *National Survey*, pp. 148,149,157.

<sup>2</sup> Deakin, "Land Use," p. 19.

3. Areawide transportation improvement fees. Areawide transportation improvement fees charge developers for the traffic their development will generate on roads distant from the project site, as opposed to impact fees which charge for near site road improvements. Thus, areawide development fees fill the gap in funding infrastructure improvements for the roads that will not be covered by impact fees. These fees are effectively a tax on all new development for the metropolitan area, with the revenue going into a transportation improvement fund for the entire metropolitan area.

Areawide transportation improvement fees are more talked about than implemented as the legal justification for the fees remains untested.

Because these are areawide fees, they would have to be implemented at the metropolitan or state level.

4. Trip reduction requirements. Trip reduction requirements seek to make the developer account for the social or congestion cost of the development by reducing the number of trips the development generates. Trip reduction programs require new development to reduce, by an amount between 15-45%, the total number of trips the project generates, according to the rates established by the Institute of Traffic Engineers. The firms are usually granted a large degree of latitude in determining what actions it will take to reduce the trip generation.<sup>1</sup> One option firms have for reducing trips is a variable work hour program. The program could be staggered starting and stopping work times, flexible hours (let employees choose how they can time their work schedule to avoid congestion), or compressed work weeks (working more hours per day but fewer hours per week). These programs can substantially reduce congestion in the vicinity of the employment site, but the benefit decreases with distance from the site. Another option that employers have is to promote ridesharing. Employer-based programs can be as successful as increasing the share of commuters who carpool by four to ten percent.<sup>2</sup>

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<sup>1</sup> Cervero, Suburban Gridlock, pp. 118-121.

<sup>2</sup> Gakenheimer, National Survey, pp. 47-51,60,84; and Teal, "Carpooling," p. 5.

The difficulty in using traffic reduction requirements is monitoring the actual reductions. People who report on the commuting activities of the firm, including employees reporting on their own commuting behavior, have an incentive to underestimate trips. Reliance on government staff to do the job requires a large work effort. Without accurate monitoring of trip reduction, the government cannot identify and impose penalties on firms in violation of their reduction requirements. Firms, knowing they won't be monitored or penalized will find it difficult to enforce trip reductions, which are unpopular with employees. And without monitoring, it is questionable if these programs will remain effective into the future as conditions at the employment site change.<sup>1</sup>

Trip reduction requirements are usually implemented at the local level, but some coordination at the metropolitan level would be helpful to reduce inequities in the reduction requirements of different municipalities. The requirements are a policy that municipalities may not want to implement or, at least, will not find easy to implement. The policy is a radical change in the usual municipal practice of attracting new commercial development and then relying on the state to alleviate the congestion the development creates.<sup>2</sup>

5. Parking reduction requirements. Parking reduction ordinances limit the number of parking spaces that a development can have. It is an indirect way of making the developer responsible for the trips associated with his or her development. By controlling available parking for autos, the ordinances serve as a disincentive for commuters to make drive alone trips. Traditionally, developers have been required, by local zoning ordinances, to provide ample parking for the trips their development generates. Parking reduction requirements reverse that policy direction to discourage ample parking to further discourage drive alone trips. Some types of parking reduction ordinances are:

(a) Maximum limits of allowed parking: the complete opposite of current zoning ordinances with minimum parking requirements.

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<sup>1</sup> Gakenheimer, National Survey, pp. 84; and Deakin, "Land Use," p. 24.

<sup>2</sup> Gakenheimer, National Survey, pp. 87.

(b) Eliminate parking requirements entirely: the developer is left free to decide how much parking to provide. Since parking is expensive to provide, it is hoped that the flexibility is an incentive to the developer to reduce parking on his or her own accord.

(c) Count parking reduction actions as efforts to comply with mandatory trip reduction ordinances.

Results from locations where parking reduction ordinances have been implemented show that, without requirements to do so, developers have little incentive to reduce parking spaces, particularly when there is no significant mass transit alternative available as is the case in the suburbs. Providing plentiful parking for the development is a more sure way of guaranteeing future access to the developer's site than reliance on ridesharing programs. There has, in fact, been opposition to reduced parking by local lenders who think that lack of parking lessens a property's marketability. Inasmuch as this is true, mandatory parking reduction ordinances in suburban settings can actually discourage commercial growth. It is also questionable how the reduction requirement would fair over time because covenants on land titles requiring the parking reduction to stay in effect and pass from owner to owner are untested in the legal system.<sup>1</sup>

It is also somewhat doubtful that the reduced parking spaces in the suburbs would greatly reduce drive alone commuting. It is likely that drivers would tend to shift their parking place instead of their commute mode since the suburbs have many places where you can park your car outside your firm's lot. Many drivers would tend to shift their parking place to unregulated spaces in neighborhoods.<sup>2</sup>

Parking reduction requirements are implemented at the local level as part of the development review process. Metropolitan coordination of parking reduction ordinances would help to avoid inequities in development requirements among municipalities.

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<sup>1</sup> Gakenheimer, National Survey, pp. 87-97; and Cervero, Suburban Gridlock, pp. 128-130.

<sup>2</sup> Deakin, "Land Use," p. 26.

## Summary of a Market System Failure in Land Use

If the government charges developers the cost of the transportation improvements their development requires--through negotiated exactions, impact fees, or areawide fees--future congestion will be curtailed by using the revenue to improve roads and thereby increasing capacity. The government also has the option of requiring the developer to reduce the amount of trips the development generates through trip or parking reduction requirements, where no increases in capacity are made. Of the two, developers are least willing to abide by requirements to manage the trip generation of their development. Developers, under reasonably good economic conditions, are willing to pay fees particularly when it means traffic congestion is alleviated in the vicinity of their development. But they are not interested in policing and penalizing the mode choice behavior of those coming to the development.

Over the long run, localities which charge developers for the traffic impacts of their development discourage development. Land values would likely decrease, reflecting the higher cost of developing in the area. Whether or not developers actually move from the location depends on its overall economic advantages, and if those advantages outweigh the development costs. In some cases, suburban land, once considered an inexpensive place to develop, may not appear as inexpensive when the new development charges are added on.

Since the land development approval process is a local prerogative, most of these policies are suggested for implementation at the local level. The exception is areawide fees that cover a metropolitan area. Even if implemented at the local level, coordination of the policies at the metropolitan level would balance development costs in a multijurisdictional area, avoiding a situation where some municipalities price development and other municipalities don't. Without coordination of the governments, developers can play one municipality against another.

## **A Government Planning Failure in Transportation**

You can view the government planning failure in transportation as either of two types. The first type is that the government is allowing unrestricted use of the highways which is inducing excessive demand for road travel, and the second is that the government is not providing enough road capacity to meet the demands for travel.

### **Unrestricted Use of the Highways**

The first government planning failure is allowing unrestricted use of the highways which induces excessive demand for road travel. Transportation has traditionally been viewed as a public good provided by the government. In this view, it is the government's role to provide facilities for fast, efficient, and safe movement as travel demand requires them.<sup>1</sup> A new policy that charges fees for road use or limits access is a radical change, in fact, it changes the notion of transportation as a public good: based on the premise that there is rivalry of consumption, you charge users for consumption or exclude some users.

Many of the suburban highways built as part of the interstate highway program are being used to carry more local traffic than intercity traffic. The highways were built for one purpose, but are being used for another. The attractiveness of the controlled access or partially controlled access highways has become a selling point for suburban parcels abutting the roads. Developers are attracted to suburban land because of its low cost, but usually there must be some major highway access for substantial commercial development to take place. Traffic from the new development on the highways now competes with the pre-existing interstate and residential traffic.

Highways also suffer from induced demand. The highway is designed to meet demand projected several years into the future based on current trends of road use. When the highway is built and has excess capacity, it attracts additional road users, and the capacity can be used up several years before it was planned to.

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<sup>1</sup> Deakin, "Land Use," p. 9.

If you view suburban congestion as a result of a government planning failure to restrict access on roads, policy options for controlling the excess demand for travel are:

1. Charge for road use, especially on congested highway segments.

Pricing is a way of excluding some users, i.e. some users are unable to pay and other users are not willing to pay the price of the service. The policies that would be effective in eliminating some users are: road use tolls, electronic pricing, and area license schemes which restrict access to congested activity centers. These policies are detailed in the section on a market failure in transportation, since charging the congestion cost of a trip to drivers achieves the purpose of eliminating some trips.

Since most highways are built and operated by the state government, these policies need to be implemented at the state level. The pricing schemes are most successful when they have metropolitan coverage so that drivers don't drive circuitous routes, clogging local streets, in order to avoid charges.

2. Scale back highway building programs. This policy recognizes how improved access usually results in increased levels of traffic in an area. A new facility may be designed to meet projected traffic levels some years into the future, however the free flow speeds on the facility may actually induce demand so that the road capacity is used up decades ahead of the design year. The increased traffic volume comes from drivers who switch from their current routes to the new facility or developers who construct new developments along the new facility based on the access that new facility provides. This increase in traffic volume because of the facility itself is induced demand. So instead of continually building new roads in the suburbs to meet demands for travel, some governments seek to stop the vicious cycle of induced trips by not building new roads or not significantly improving roads.

Since most of these roads are built by the state transportation department, scaling back a highway building program will be at the state level. The municipalities also have a role in communicating to the state government how much scaling back they want and if



they require some other transportation infrastructure as a substitute for the road, i.e., bus service.

3. Encourage higher vehicle occupancy rates.

a. Construct high occupancy vehicle (HOV) facilities. HOV facilities give an incentive to drivers to rideshare by reserving one lane for vehicles carrying two or more passengers. Congestion levels in the HOV lane are lower than the other lanes and so the HOVs can travel at faster speeds. The goal of the policy is to reduce the volume of vehicles while maintaining or even increasing the number of passengers using a road facility. This happens as the rate of vehicle occupancy increases. Time savings of two to twelve minutes, varying with length of the HOV trip, have been experienced on HOV facilities, and auto occupancy rates for the entire corridor have increased four to five percent as a result of the lanes.<sup>1</sup>

HOV lanes are most successful where there is a congested corridor leading to a concentrated destination; the HOV facility is usually a reversible lane. Since suburbs don't usually have one concentrated destination, it is unlikely there would be many circumstances in which the HOV facilities could substantially reduce congestion. Experience with HOV facilities also shows that public acceptance of the facility is much higher when the HOV lane is a new lane and not a conversion of an existing lane. In these cases, the HOV lane can benefit non-HOVs if enough HOVs reduce congestion in the non-HOV lanes. An HOV facility is not successful whenever the volume of passengers in the HOV lane is lower than the volume of passengers carried in a non-HOV lane.<sup>2</sup>

Since HOV facilities are implemented on major roadways, the state government would lead efforts to implement the facilities. The municipalities affected by the HOV facilities should participate in the decision-making process.

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<sup>1</sup> FHWA, Transportation Management, p. 3.

<sup>2</sup> Gakenheimer, National Survey, pp. 9-21.

b. Promote ridesharing. Ridesharing makes better use of road space by increasing the vehicle occupancy rate. A program to promote ridesharing could include: publicity of ridesharing concepts and methods, ride matching services, leasing of vans, and tax incentives to employers who have ridesharing programs. Ridesharing alone, without some other factor such as high commuting or parking costs or increased travel times from HOV facilities, does not provide enough incentive to commuters to create a shift from drive alone commutes. People with the most incentive to rideshare are those with the longest trip lengths, the lowest levels of automobile availability, and/or the highest costs of commuting. Area based vanpool programs increase carpool and vanpool share from 1 to 2.5 percent; employer based programs can be as successful as four to ten percent increases in carpool share.<sup>1</sup>

There are several years of experience with ridesharing programs that point out their limits. One lesson learned is that those who are most inclined to rideshare include many of the same people who are willing to use transit for their commute, so ridesharing and transit may be in competition for the same trips. Another lesson is that tax incentives have not made a large difference to firms' willingness to encourage ridesharing. A third lesson is many people need to use a vehicle during the workday to run personal errands and activities, making ridesharing unattractive. And, finally, the ability of ridesharing programs to endure over time is uncertain.<sup>2</sup>

Ridesharing promotion can be done at the local, metropolitan, or state level. Local governments will usually do ride matching and publicity programs, while state government will usually do van leasing and tax incentive programs.

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<sup>1</sup> Gakenheimer, National Survey, pp. 55-62; Teal, "Carpooling," p. 5-8.

<sup>2</sup> Gakenheimer, National Survey, pp. 55-62; Teal, "Carpooling," p. 5-8; and Cervero, Suburban Gridlock, p. 102.

## Not Providing Enough Road Capacity

The second way of viewing the government planning failure in transportation is: the government is not providing enough road capacity to meet the current and future demand of highways users. In this view, the demand for travel is considered legitimate and transportation facilities are still considered a government provided public good. Congestion, then, will be reduced when the government provides enough road capacity to accommodate all users.

There are two reasons why the government may not be building as many new roads as some consider necessary. The first is that the government is financially unable to pay for the new roads that are required to meet the demand. The second is that the government is unable to get the majority of the public to support funding of additional roads, i.e., there is not a public consensus about the view that the government is building too few highways.

Another option the government has is improving road facilities to increase their capacity.

If you view suburban congestion as a failure of the government to plan and build enough road capacity, policy options are:

1. Increase the physical capacity of existing roads through transportation systems management (TSM) actions within existing rights of way.

a. Meter entrance ramps. The uneven flow of vehicles entering a controlled access roadway can reduce the volume of vehicles that can use the facility. Electronic devices that regulate the flow of vehicles on the roadway can be effective in increasing traffic volumes and traffic speeds. The use of meters can increase speeds from five to fifteen miles per hour, thereby increasing travel volumes.<sup>1</sup> Ramp metering has the problem that other capacity improvements also have, i.e., it can induce new trips. A ramp metering program will likely be operated by the state and is limited to controlled access highways.

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<sup>1</sup> Gakenheimer, National Survey, p.27.

b. Traffic engineering improvements. Engineering improvements are aimed at increasing the flow of traffic by physically improving the road design. Examples are: channelization at intersections, turning lanes, and improved road surfaces.

c. Traffic control systems. Signalized roadways have delicate flow characteristics. Signal timing can greatly affect the overall volume of traffic that can use the road facility. Proper signal timing can increase the carrying capacity of a road and can improve levels of service. In order to maintain the benefits of signal timing, signals should be retimed every three to five years.<sup>1</sup>

d. Limit access points to highway. Controlling the access to a highway is an important way of stabilizing the flow of traffic on the highway. Every time a new vehicle enters the stream of traffic it interrupts the current traffic flow. Unlimited access highways allow vehicles to enter almost continuously on the highway's length and the entering vehicles can greatly reduce flow on the highway. At the other extreme, fully controlled access freeways only allow traffic to enter on ramps miles apart. These facilities mitigate the effects of entering traffic.

e. Expedite clearing of traffic accidents. Traffic accidents cause the worst congestion conditions because they often cause traffic to stand still until the accident is cleared, so more traffic is added to the queue but no traffic is leaving the queue. Accidents occurring on congested facilities are even harder to clear because emergency vehicles have difficulty getting to the scene of the accident. Special equipment and plans to expedite the clearing of accidents can work to alleviate the worst congestion effects of accidents.

## 2. Increase the revenue available to finance road building.

a. Charge **impact fees** to developers to pay for new highways.

Impact fees charge developers for the increased infrastructure that their development requires. Impact fees have been applied to commercial and residential development and the

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<sup>1</sup> Deakin, Land Use, p. 25.

revenue raised is used to fund transportation infrastructure in the vicinity of the development. The fees are usually calculated based on the total square feet of the commercial building or number of units in the residential development. Before impact fees can be assessed, a plan for transportation improvements must be drawn up by the jurisdiction. Each developer is allocated a portion of the improvement costs according to the share of trips generated by the developer's project. When the fees are paid, they go into an account that is earmarked to fund projects in the transportation improvement plan. The legal justification of impact fees requires that there be a rational linkage between the improvement being funded and the development for which the fee is assessed.<sup>1</sup>

Since an impact fee policy adds to the cost of development, the policy is also listed as a solution to the market failure in transportation. When used to overcome a government planning failure, impact fees are intended to raise funds, not necessarily make developers pay the social cost of their development. Impact fees used to raise funds for improvements would be most effective at the metropolitan or state level.

b. Increase the local component of the **gasoline tax**. The price of gasoline can include federal, state, and local taxes. These taxes are used to fund highway programs at the different levels. For example, the federal gasoline tax is nine cents on the gallon and funds 70 percent of the Highway Trust Fund. State and local taxes average thirteen cents on the gallon and are a major resource for highway programs. The revenue generated has difficulty keeping up with inflation because: (1) the tax is a number of cents per gallon and not a percentage rate and (2) federal and state legislative actions to increase gasoline taxes are infrequent.<sup>2</sup> This explains, in part, why both federal and state government have been having difficulty financing the entire road program, including new construction and maintenance.

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<sup>1</sup> Gakenheimer, National Survey, pp. 148,149,157.

<sup>2</sup> Highway Users Federation, "Reasons Why a Higher Gasoline Tax For Deficit Reduction Purposes is Unfair," (Wash., D.C., December 1988).

Since a policy to increase gasoline taxes adds to the cost of driving, the policy is also listed as a solution to a market failure in transportation. When used to overcome a government planning failure, increased gasoline taxes are intended to raise funds, not necessarily make drivers pay the social cost of their trip. Increased gasoline taxes used to raise funds for improvements would be most effective at the metropolitan or state level.

c. Increase the **property tax**. Property taxes fund the general revenues of local governments. While it is unpopular to raise property taxes, small increases in the tax are approved by local governments regularly. It is possible for the local government to raise property taxes with the intent of increasing the budget for roads. The roads financed would be owned by the locality as it is without precedence for the local government to raise property taxes to pay for state roads.

d. Charge **special assessments**. Special assessments are charges levied to properties to recoup the cost of infrastructure improvements to a defined area. The charge is based on the increased value the infrastructure improvement will add to the property and is calculated according to a physical characteristic of the property, such as frontage on a roadway. The special assessments can be used for developed areas and for areas under development.<sup>1</sup>

Special assessments require enabling legislation by the state government and coordination with the locality that comprises the special assessment district. One advantage of special assessments is that they can overcome the limitations of the project by project improvements of negotiated exactions which leave the areawide congestion problems unresolved.<sup>2</sup>

3. Allow and arrange for the private construction and ownership of some roadways. The government provides almost all roads and allows free access to any driver. The alternative exists for some private entity to construct and operate roads, charging user

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<sup>1</sup> Gakenheimer, *National Survey*, pp. 167-168.

<sup>2</sup> Deakin, "Land Use," p. 19.

fees to or restricting roads to certain users. The only current examples of private roads are some of the roads in planned residential or business communities. Fees are not charged for these roads, but they do have restricted access. There are also quasi-private roads where a non-profit authority is set up by the government to manage the financing, construction, and operation of the road. The turnpike authorities in New Jersey and Massachusetts are examples.

Only major roads built by the private sector would provide substantial congestion relief. However, since there are no examples of major private roads, we can't evaluate the success of the private sector in highway provision.

4. Organize the planning and construction of road building in ways that mitigate public opposition. Consensus about the need to build new roads doesn't usually exist. It is often the opposition, large or small, that can campaign the loudest and convince the public that a road that the government officials are planning is not necessary. Some highways planned to relieve congestion were never built because of public opposition waged against them.

In order to avoid this failure, it is necessary for government officials to anticipate what the opposition will be and plan accordingly. For example, when public meetings are held in the various communities affected by the new road, government officials should make sure that groups that support the new road attend the meeting. Many who support the highway won't attend the meeting, especially if they feel the government is already planning to do what they want. On the other hand, groups opposed to the highway will gather a large crowd to attend the meeting. If the proponents are not there to balance out the opponents, the public meetings can quickly become imbalanced and cause defeat of the highway.

5. Increase planning coordination amongst the localities and between the localities and the state, to more expeditiously implement road improvements and construction. The state owns and manages most of the major roads in the municipalities and has the major

decision power to determine how and when the road is changed. The municipalities use the roads and are concerned about the road configuration in their particular jurisdiction. If the state wants to improve the road, the process of improving it will happen much more smoothly if there is consensus in the affected municipalities on the improvement design. The municipalities also benefit from coordination with the state: if they want an improvement to happen they must have a good working relationship with the state government. New road construction follows this same pattern, with coordination between the state and the localities being even more important.

Coordination is also needed between the municipalities that share the same transportation corridor or are in the path of a newly planned transportation route. Unless the communities can develop a consensus about how the transportation corridor should be designed--number of lanes, signalized intersections,etc.--the state government will be unable to do anything. The communities will need to reach a compromise between their individual needs for local access and the state's need to keep through traffic moving.

6. Give more authority to the municipalities to design highways. State and metropolitan officials have been the dominant actors in transportation planning for interjurisdictional arterials and freeways. Local governments have relied on the state governments to plan all but the smallest scale road facilities. With extensive commercial development in the suburbs, state officials no longer feel they can build enough new roads to cover all of the congestion problems. They are requiring the local governments to do more on their own.<sup>1</sup> If the local governments had more authority to coordinate their major roads with their development plans, it might be easier to implement capacity increasing road improvements.

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<sup>1</sup> Deakin, "Land Use," pp. 8,10.



## Summary of a Government Planning Failure in Transportation

To correct a government failure in transportation, the government must decide to either: (a) take an active role in measures that will reduce the demand for travel or (b) continue its traditional role of providing transportation facilities according to the demands made by road users. If the government wants to begin to regulate road use, it can do so either by providing incentives for increased vehicle occupancies--ridesharing programs and HOV lanes--or by charging users directly--toll facilities and electronic pricing. With these policies, the state government could act on its own.

Governments wanting to increase transportation capacity are finding the roles of decision-making, provision, and financing of transportation infrastructure changing. Traditionally, these three functions have been done by the federal and state governments. Currently local governments are seeking and are being required to take more active roles with the state in decision-making and provision of services. A major reason for this is that federal and state funds to finance infrastructure are being cut back. In many cases, governments are turning to developers to pay for some of the capital improvements costs in areas where new infrastructure is being provided. This coordination with the developer, is usually through the local government during the development approval process. The challenge, then, is to change governmental operations to better accommodate these shifting functions.

Increasing capacity can be improvements to existing roads or construction of new roads. Deciding on the scale of improvements requires coordination between state and local governments and between the government and the public.

## **Government Planning Failure in Land Use**

You can view the government planning failure in land use as one of two types. The first type is that the state has delegated land use planning authority to too small a spatial and fiscal governmental unit and the second type is that the zoning powers and the development approval authority are not working to create an efficient land use and transportation pattern.

### **Land Use Planning Authority is Delegated to Too Small a Governmental Unit**

The first type of government failure in land use is that the powers for land use planning are delegated to too small a spatial (land area) and fiscal (taxing authority) unit. This organizational flaw creates an imbalance in spreading the benefits of development, such as tax base increases, with the cost of development, such as traffic congestion increases. Each municipality has an incentive for allowing commercial development within its borders: it alone benefits from the property taxes that the firms pay. On the other hand, the traffic generated by that development is not necessarily contained by municipal boundaries. In general, many of the employees that will commute to that development will live in neighboring municipalities, and traffic levels will be affected in points beyond the boundaries of the municipality housing the development. The municipalities' benefit of tax base enhancement doesn't automatically carry with it the responsibility for mitigating the traffic effects on neighboring municipalities.

Another aspect to this problem is that the planning of land use at the municipal level is mismatched with planning of highways at the state level. No one municipality is assured that the amount of road capacity going through its borders will match the number of trips generated by the development it wants: it might be a highway that has too many lanes or a highway that has too few.

If you view suburban congestion as a problem caused by the state delegating land use planning authority to too small a governmental unit, alternative ways of exercising the authority are:

1. Convene a task force with representation from each municipality sharing a transportation corridor. The task force is an ad hoc committee organized to meet the need for a multijurisdictional approach to solve problems of land use coordination in a specific area. The task force provides a forum for dialogue and informal compromise on land use development and plans for highway improvements. The task force usually forms based on a memorandum of understanding, setting terms on objectives and operations of the task force. The memorandum is signed by all of the municipalities involved. Once the task force is organized, it may continue until it meets its initial objectives or it may continue indefinitely.

Multijurisdictional approaches can help to avoid the problem of developers moving from one city to another in search of the least restrictive development regulations. Areawide planning efforts are also less subject to influence of parochial interest groups. In fact, a strong incentive for many task forces to form is to avoid having citizens groups stop development altogether. Whether task forces will succeed in the long run, without an institutional reward structure, remains to be seen.<sup>1</sup>

2. Formal negotiations among the municipalities sharing a transportation corridor. Formal negotiations would allow involved municipalities to bargain over the benefits and externalities of development. The negotiations may involve a dispute over current development or the future development plans of each community. Bargains could be struck on the amount of development and traffic mitigation measures for new development.

Formal negotiations are a technique used to allocate benefits and costs when the existing system is not functioning to do so. Much of the experience with negotiated

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<sup>1</sup> Deakin, "Land Use," p. 27.

settlements is in the area of environmental disputes. When applied to traffic generated by development, the negotiations would revolve around allocation among municipalities of the amount of commercial and residential development and the trips they generate. Numbers of employees can be assigned to each commercial development based on the square footage of the building and the activity--retail, office, or industrial uses. Each employee counts as one am and pm peak hour trip.

Larry Susskind, an experienced environmental dispute negotiator, stresses the importance of parties not going into the negotiation process desiring to win as much as they can for their interest. Instead he recommends that the parties enter the process looking for a solution in which all parties can gain as much as possible. He outlines four ways of achieving a political compromise that makes everybody somewhat better off:

(a) Fairness. The process should allow all to participate with equal power and should be open to continuous modification by the disputants.

(b) Efficiency. The time and costs of the negotiation should produce effective outcomes. An efficient process is usually one where a climate of side-by-side problem solving is created so that each participant trusts the others enough to reveal the participant's true priorities.

(c) Wisdom. The participants must be informed about which policies will work and which won't. The parties must develop an approach to analyzing technical information that allows the best possible evidence to be presented no matter who's position it supports. The problem should be broken down into a series of mutually agreed-upon pieces.

(d) Stability. The agreement must be enduring. Stability is enhanced when the participants make realistic policies and develop a good working relationship that will continue after the formal negotiation process.<sup>1</sup>

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<sup>1</sup> Lawrence Susskind and Jeffrey Cruikshank, Breaking the Impasse: Consensual Approaches to Resolving Public Disputes, (New York: Basic Books, Inc., 1987), pp. 16-34.

Formal negotiations have been used in few, if any, cases to assign development rights to various communities. It is a radical change from the tradition of complete local control over development and is likely to be resisted except in severely congested transportation corridors where extensive spillovers of traffic on neighboring jurisdictions exists. It might require prodding from the state government to work out an agreement. If a negotiated agreement on development in a transportation corridor were made, it would have potential to substantially reduce future congestion.

3. Allow tax base sharing of commercial property tax among neighboring municipalities. This policy seeks to mitigate the incentive for excessive development by any one community to enhance its own tax base. If all of the municipalities benefit from commercial (all nonresidential) development, whether or not the development is in its boundaries, any one municipality will likely be less enthusiastic about attracting new development within its borders.<sup>1</sup>

Tax base sharing would probably have a more negative reception by municipalities than negotiated agreements on development and might, therefore, require prodding from the state before it took place.<sup>2</sup> At the very least, tax base sharing would require state enabling legislation.

4. Empower a metropolitan or regional authority to plan land use. Depending on the land area of municipalities and the scale of development, it may be that municipalities are now too small a governmental unit to plan land use. When the major commercial development was occurring in the central city, residential suburban municipalities had few commercial development decisions to make. Now that commercial development is occurring more rapidly in the suburban cities than in the central city, land planning at the municipal level may be at too small a geographic scale for the wisest development decisions

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<sup>1</sup> Lowry, A Look Ahead, p. 316.

<sup>2</sup> Cervero, "Suburban Centers," p. 154.

to be made, i.e. ones that concentrate development where the transportation infrastructure is the most developed.

The authority that is empowered might be the metropolitan planning organization or the county government. This presents a problem when either the metropolitan planning organization or the county government is considered weak, and this is usually the case where municipal government planning powers are strong. The position of this metropolitan or regional authority could be enhanced by giving it taxing authority or making it the unit for tax base sharing, as explained above.

Experience in metropolitan and regional planning varies. Some metropolitan areas are now organized so that the metropolitan planning organization or the county governments are the key decision makers over land use. These systems have more potential for coping with regional development and traffic congestion problems, particularly where land development powers are aligned with transportation provision powers. The conversion of a city-based land use planning authority to a regional one is a difficult task. The examples of how this might be done come from serious environmental problems that have led to the establishments of regional authorities. The empowerment of metropolitan or regional authorities would take extensive action by the state legislature to rearrange the state governmental hierarchy.

5. Withdraw land use planning powers from the municipalities and reactivate them at the state level. Planning powers are state powers that are delegated to localities. The state government may be in a better position to balance out the fiscal effects of development over the various municipalities and to coordinate development with transportation infrastructure.

There were extensive movements in the 1960s and 1970s to expand the state role in land use planning. By 1978, almost one-fourth of the states had passed land use acts; Hawaii, Oregon, California, Florida, and Vermont passed the most noteworthy legislation. The emergence of these state acts was called the "Quiet Revolution" and represented a

realization that zoning had serious weakness, including the practice of local governments to engage in zoning patterns that benefited themselves but were not in the best interests of the state at large. The problems communities were creating for the state were fourfold:

- (a) Urban sprawl was using up prime agricultural land,
- (b) Growth was degenerating the environment,
- (c) Unique lands were being developed, and
- (d) Urban sprawl created higher infrastructure costs for the state.<sup>1</sup>

The state legislation passed in the 1970s generally: provided regulation in areas previously excluded from zoning, encouraged comprehensive planning at the local level, and provided financial support for planning activities. Local communities retained an important role in planning. While only a minority of the states passed land use acts, they represent a development of sentiment that land use controls should be active at the state level.<sup>2</sup>

While most of the state land use legislation came about as a result of the environmental impacts of growth, the legislation led to both the state and local governments increasing their growth management and land regulation authority as a result of the new laws. The states first intervened and developed new policies and programs, then worked out partnerships with the local governments, and, finally re-delegated implementation authority at the local level. The states continue to review local plans and to issue permits for development proposals.<sup>3</sup>

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<sup>1</sup> Richard H. Jackson, Land Use in America, (U.S.A.: V.H. Winston & Sons, 1981), pp. 63-66.

<sup>2</sup> Jackson, Land Use in America, pp. 63-66.

<sup>3</sup> Godschalk, David R., review of Land, Growth, and Politics, by John M. DeGrove, in Journal of the American Planning Association 50 (Autumn 1984):534-535.

## Zoning Powers and Development Approval Authority are Not Creating an Efficient Land Use and Transportation Pattern

The second type of government planning failure in land use is that the zoning powers and the development approval process are not working to create an efficient land use and transportation pattern within respective communities. This view maintains land use planning authority as a local prerogative, while emphasizing that the tools of land use planning are not being used effectively. There are two reasons why the local government may not be using its planning authority effectively. First, there may be gaps in the authority that allow the private market to circumvent the land use planning process. Second, decision makers may not properly exercise their land use planning authority in ways that alleviate suburban congestion because the land use decisions have multiple objectives--economic development, community development--transportation efficiency being only one objective.

If you view suburban congestion resulting from the local government's failure to use its land use planning authority to create an efficient land use and transportation pattern within its own borders, policy options to improve the land use planning process are:

1. Improve the land use and regulation process to tighten loopholes in zoning variances, zoning changes, and grandfather clauses. The zoning ordinance identifies the specific use and building footprint requirements for each parcel of land. Through an appeals process, land owners can be granted a right to vary from the zoning requirements, called a zoning variance. If zoning variances are granted too liberally, they can make the zoning ordinance ineffective in controlling land use.

Another larger action is the granting of a zoning change. Instead of the local officials granting a variance from the existing zone, they actually change the zone so that the proposed land use is legal by right. Numerous zoning changes triggered by land developers can make the government's adopted land use plan ineffective in controlling land use.



A majority of land owners who seek protection under grandfather clauses so that they can avoid meeting the stricter requirements of new zoning ordinances can effectively tie the hands of government officials to implement rezonings. When a zoning change is made affecting a particular land owner, the grandfather clause allows the land owner to develop his or her land according to the old zone requirement so long as the owner has shown some intent to develop. That intent to develop may be the submittal of a preliminary plan or it may be a requirement that footings for the structure are in the ground. The requirement for just a preliminary plan is the most liberal type of grandfather clause, because it allows the owner to seek grandfather protection when only the first steps of development have been taken and it may be years before any building is ever built.

Tightening the loopholes in the granting of zoning variances and zoning changes may be a matter of appointing new planning officials or electing new council members, which occur at regular intervals. There are legal procedures that these officials must follow in order to grant a variance or change, which includes a public hearing on the matter, but there is a great deal of discretionary authority that determines what the outcome will be. Grandfather clauses, on the other hand, are generally a part of the state land use code, and, therefore, legislative change is required to tighten the loopholes allowing many land owners to get grandfather clause protection. The new legislation should require land owners to have made significant financial steps in the development process before receiving grandfather protection.

2. Downzone land to reduce the trip generation on congested corridors. In the past, suburban municipalities with very little commercial development could get away with having very liberal zoning for commercial development. They were pleased to get whatever commercial development they could and so they zoned much more land for commercial use than they expected would actually be developed, with the intent that developers would have many parcels to choose from. After all, residential uses were also

permitted in these commercial zones. As commercial development shifts to the suburbs, municipalities' liberal commercial zoning leaves them open to extensive development.

The commercial zoning was generally implemented on state highways. Many communities are now considering downzoning--reducing the allowable development--along these highways in order to reduce the potential for future trip generation on corridors that are now congested. The downzoning may take the form of a zone change, a decrease in the coverage ratio for the footprint of the building, a decrease in the floor-area-ratio, or an increase in the green space required on the developed lot.

A municipality faces two difficulties in downzoning on a highway. The first is that it is limiting the potential for commercial development to enhance its financial position. The second is that neighboring municipalities might not downzone to the same degree, and the traffic from the neighboring developments may use up transportation capacity of the municipality that downzones.

Downzoning is an effective way of reducing the future demand for transportation capacity in a particular area, although it will not affect through traffic. There are also drawbacks to downzoning areas that are close to the central city core or areas that have extensive transportation infrastructure. It may be that the best solution for the metropolitan area is for these areas to develop at higher densities, with the possibility that mass transit or other ridesharing activities might be feasible at some date. Too much downzoning can preclude the clustering of development, which would make mass transit viable.

3. Require zoning to be tied to a master plan which stages development. Many suburban municipalities have a zoning ordinance which guides current development decisions and functions as the long range land use plan. This double-duty zoning ordinance is not able to stage development, e.g., allow development in certain areas for ten years and then open more areas to development in the next ten years. Communities that have a master plan--showing the general long range land use plan--combined with a zoning ordinance--regulating the specific short range land uses--can have more control over the

timing of development in particular areas. This timing capability allows the community to coordinate land use development with transportation infrastructure development.

Some states have recognized the need for local master plans to help communities use the state's infrastructure dollars more effectively. A common component of many state land use acts is to require municipalities to create master plans, also called general plans and comprehensive plans.

The effectiveness of master plans which stage development in alleviating suburban congestion is to reduce future congestion through better coordination between land use development and transportation infrastructure development.

4. Adopt adequate public facilities ordinances. An adequate public facilities ordinance stages land development based on the availability of public infrastructure. Development approval is conditioned on the availability of necessary infrastructure for the project; transportation is one of the key public facilities tested. The ordinance is implemented in various ways, but is something like this: each year the jurisdiction determines how much road capacity will be available over the next four years, including new projects in the capital improvements program. Traffic counts and the trips generated by facilities that are already approved is subtracted from the total capacity. What remains is the transportation capacity available for new development. Before a new development is approved, it is evaluated for how many trips it will generate. If there is enough remaining transportation capacity for those new trips, the development is approved. Otherwise, the development must wait until additional capacity is added to the transportation network.

Adequate public facilities ordinances seek to keep new development from congesting existing roadways. It is a promising planning tool because it links land development with transportation infrastructure development. Since the ordinance can stall developments, increasing the developers' costs, they must be carefully administered using reliable data on both development activity and traffic counts.

5. Rezone land, with a pattern of higher densities where transportation infrastructure is most developed and lower densities where it is not. A zoning pattern that concentrates development at transportation nodes and allows only sparse development where transportation infrastructure is not well developed creates the most efficient pattern of transportation uses. Market forces are unreliable in making this happen, sometimes clustering is advantageous to developers and other times sprawled development is advantageous. Most suburban office densities are in the 0.5 to 2.0 floor-area-ratio (FAR) range, with 0.5 FARs creating congestion and 2.0 being too low to support intensive transit.<sup>1</sup>

A zoning ordinance can attempt to create a high-density/low-density pattern. To achieve a high density at transportation nodes, there must be many amenities in the area and a strong demand for growth. A transportation node, if it is as significant as a rail transit station and is in an area that is growing, can induce significant clustering of new development.<sup>2</sup>

A strong political will is necessary to implement a major rezoning. Land owners of parcels that are downzoned will be losers because the value of their land will drop. They will strongly oppose the rezoning. Land owners of parcels that are upzoned (density is increased) will be winners because the value of their land will rise. They will support the rezoning. But their support may be drowned out by owners of residences in or near the high density area. They often oppose density increases because of the increased traffic congestion and alteration of the landscape, even when the value of their own property is likely to increase as a result of the change.

Because of the opposition of the first category of land owners, those who lose money on the value of their property when it is downzoned, many jurisdictions have

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<sup>1</sup> Cervero, "Suburban Centers," p.156.

<sup>2</sup> Alan Altshuler, The Urban Transportation System: Politics and Policy Innovation, (Cambridge, Mass.: The MIT Press, 1979), p. 404.

considered using transfer development rights in place of rezoning. Transfer development rights programs would allow the property owners in the low density area to sell development rights to property owners in the high density area. The high density development could only occur with the purchase of development rights. The ability to sell development rights on the part of the low density land owners, allows them to make some economic profit on their land while still keeping it at a low density use.

Transfer development rights programs sound reasonable, but they are extraordinarily difficult to administer. Extensive record keeping is required and the legality of the entire process is questionable. The transferring of intangible rights to develop land also leaves a confusing array of development rights for future land owners who buy land in the area. It may also tie the hands of future local decision makers who may want a different development pattern. For this reason, it is unclear how long into the future the land that sells its development rights must remain low density.

6. Increase the availability of mixed use zones, which combine office, retail, and residential uses, to reduce travel needs. Traditional zoning separates different land uses, such as residences from office parks. Current planning thought is that combining some land uses, particularly in densely developed environments, is preferable. From a transportation standpoint, the benefit of mixing land uses--allowing office, retail, and residential uses together--is to reduce travel needs. One of the problems of low density suburban worksites is that workers need to use a car to make midday errands and to go to lunch. In urban areas these activities usually take place on foot. The need to use a car at midday also makes workers more reluctant to rideshare since they give up midday mobility.<sup>1</sup>

Mixed use zones allow mixed development to occur and are not an incentive for it to occur. Some planning officials are go beyond zoning and get developers to add

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<sup>1</sup> Cervero, "Suburban Centers," p. 153.

restaurants, banks, etc. to their commercial developments as part of a negotiated agreement. Market forces are the biggest incentive for mixed use development, as developments are considered more valuable over the long term if they are in a setting of lively and complementary mixed uses.<sup>1</sup>

The effectiveness of mixed use zoning in alleviating suburban congestion is not yet known. It definitely reduces midday congestion in the vicinity of the mixed use area. It alone, however, will not be enough of a factor to get employees to actually change their commute; it will just eliminate the midday trips as an excuse for not ridesharing.

#### 7. Performance zoning with points awarded for transportation.

Performance zoning is system of two phases: zones have minimal requirements and final approval is based on the amenities the project offers. As projects meeting the minimal requirements come up for review, a system of points are assigned to it based on the amenities the project has in different categories. Many congestion alleviation techniques could be counted as high point amenities to encourage developers to use them in their development. Examples are mixed-use developments, increased densities at transit nodes, and ridesharing programs.

Performance zoning has a great potential to manage travel demand of proposed developments. Because of its discretionary nature, the outcome will largely depend on the priorities of the planning officials who approve development.

#### Summary of a Government Failure in Land Use

Metropolitan areas where land use planning occurs at the level of small municipalities will likely need some alternative arrangements for approving developments with regional transportation impacts. The alternative arrangements could involve neighboring municipalities or higher levels of government in the decision, on an ad hoc or

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<sup>1</sup> Cervero, "Suburban Centers," p. 160.

permanent basis, informally or formally. The multijurisdictional, multilevel coordination would require municipalities to give up some of their independent planning authority, but

Even if no changes are made in the level of land use planning, municipal planning can be made more sensitive to the transportation issues of development. The development approvals process could include objectives to reduce travel demand and channel development to areas where the transportation facilities are best suited to serve it.

However, the efforts of the municipality with regard to controlling traffic within its own borders is still subject to through traffic.

## CHAPTER 2

### MASSACHUSETTS' EXPERIENCE WITH POLICIES TO ALLEVIATE SUBURBAN CONGESTION

In this chapter I document the policies and policy initiatives that are occurring in the Commonwealth of Massachusetts to alleviate suburban congestion. I have gathered the information from published documents, public meetings, interviews, and surveys. I have sorted the policies into the framework I presented in Chapter one, i.e., policies to correct: a market system failure in transportation, a market system failure in land use, a government planning failure in transportation, and a government planning failure in land use.

Two information sources provide opinions on which policies people think will be most effective. One source is a survey that I helped to conduct at an Metropolitan Area Planning Council (MAPC) seminar, "The Commute: A Forum for Local Officials" held February 1, 1989 in Boston, Massachusetts. Approximately 175 people attended the forum; 50 percent of whom were local officials. Of the 175 attendees, 63 completed the survey during the seminar. I have divided the respondents into subgroups to identify the preferences of particular types of respondents. The first set of subgroups is level of concern where: 24 percent responded at the municipal level, 62 percent at the metropolitan level, and 10 percent at the state level. The second way I divided all of the respondents was by their role: 10 percent are elected officials; 52 percent are public service workers; and 37 percent are private sector workers. I used these two exclusive sets of subgroups because of the low number of respondents in some subgroups when the data is cross-tabbed. The Appendix includes a copy of the survey questionnaire and results.

The second source is a public hearing that was held by the State Legislature's Special Commission on Growth and Change. The Commission held ten hearings around the State and will report on growth in all of the different areas and will provide



recommendations to the Legislature. I attended the hearing for the western metropolitan area which was held in Sudbury, Massachusetts on February 28, 1989.

### **A Review of Suburban Congestion in Metropolitan Boston**

In the Introduction, I pointed out four factors that have led to an increase in suburban congestion nationally. These four factors are evident in Metropolitan Boston. The first is an increase in the labor force. In 1986, Metropolitan Boston had 1.7 million employed workers, up 12 percent from 1980. The sources of this new labor were: 44 percent new women laborers; 8 percent population growth; and 49 percent interregion commuters.<sup>1</sup>

The second factor is the growth in private vehicle usage. Between 1970 and 1980 the number of drive alone commuters increased from 67 percent to 73 percent. During that time period there was also a dramatic increase in the number of households with two or more automobiles and, by 1980, 40 percent of households had more than one automobile.<sup>2</sup> Even with increases in automobile usage, transit ridership is increasing. Ridership on the Massachusetts Bay Transportation Authority's (MBTA) four rapid transit lines has grown steadily since 1983, representing a 19 percent increase from 1983 to 1987. Commuter rail daily ridership increased 62 percent during the same period. A commuter ferry between Hingham and Boston is experiencing the most rapid increase in ridership, up 340 percent from 1983 to 1987.<sup>3</sup>

The third factor is population. The population in Metropolitan Boston actually declined by five percent between 1970 and 1980.<sup>4</sup> The population is projected to continue

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<sup>1</sup> Douglas C. Carnahan, The Population and Employment Outlook for the Metropolitan Boston Area: A Preliminary Report and Methodology, (Boston, MA: MAPC, March 1988).

<sup>2</sup> Metropolitan Area Planning Council (MAPC), State of the Region: A Statistical Portrait, (Boston, MA: MAPC, 1985), p. 62, 65.

<sup>3</sup> MAPC, Facts and Figures for the Commute Forum, (Boston, MA: MAPC, February 1989), pp. 15-17.

<sup>4</sup> MAPC, State of the Region, p. 11.

to decline between 1985 and 1990 in the City of Boston (down three percent) and the inner core cities, but to increase in the outlying suburbs (some increases as high as 24 percent).<sup>1</sup>

The fourth factor is work sites are growing faster in suburbs than in the central city. In 1980, 58 percent of the work trips were a suburban resident commuting to a suburban work destination. This trend should continue as the MAPC estimates that 335,00 new jobs will be created between 1987 and 2010, 55 to 80 percent of the new jobs being created outside the City of Boston. The labor sources for the 335,000 new jobs will be: women from the region filling 35 percent, new population growth filling five percent, and interregion commuters (e.g., New Hampshire, Rhode Island, Central Massachusetts) filling 60 percent.<sup>2</sup>

#### **Policies to Correct a Market System Failure in Transportation**

1. Toll gates. Tolls gates on the Massachusetts Turnpike collect user fees from drivers . The Turnpike was built to provide access between Western Massachusetts (Pittsfield) and Eastern Massachusetts (Boston.) A non-profit Turnpike Authority was set up to administer services on the road. To build the road, the Authority issued bonds that were secured by the toll revenue. When the original bonds were paid off, the tolls were to be removed, and the maintenance for the road was to divert to the Massachusetts Department of Public Works (MDPW). But the tolls have not been taken off. The Turnpike Authority issued some new bonds to widen the Turnpike near its intersection with Route 128. The widening has been stalled and the money remains in a trust fund. Current speculation is that a new tunnel across the Boston Harbor will be placed under the responsibility of the Turnpike Authority. Then the funds and tolls collected on the Turnpike could be used to finance that capital project which improves access to Logan International Airport in Boston.

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<sup>1</sup> Carnahan, Population and Employment Outlook.

<sup>2</sup> MAPC, Facts and Figures, p. 6.

There is strong sentiment in Western Massachusetts that the tolls should be removed. Citizens in Worcester, a city in this region, passed a nonbinding resolution to remove the tolls.

The Massachusetts Turnpike, as of now, is not a case of congestion pricing. The tolls were instituted with the purpose of paying for the facility and have not been used to price congestion. This is born out by the fact that fares have not been increased on the portion of the Turnpike that is the most congested, Brighton to Boston, but they have been increased for longer distance commuting, Pittsfield to Boston, where there is less congestion.<sup>1</sup>

The Turnpike Authority also oversees toll charging on the inbound lanes of the Summer tunnel, connecting Logan Airport with Boston. The last bonds on the tunnel retired in February 1989 and, under the terms of the bonds, the tunnel was to be transferred to MDPW. However, there is now a proposal to increase the tolls from 60 cents to one dollar to finance a four to ten year rehabilitation program. East Boston residents, who use tunnel for access to their neighborhood will continue to pay a lower toll, 40 cents.<sup>2</sup>

In the Commute Forum survey, participants were asked whether or not they supported the imposition of tolls on selected roads. Forty-eight percent responded "yes" and 38 percent responded "no."

2. Increase in the gasoline tax. The Massachusetts gasoline tax is eleven cents per gallon and was set in 1981. The revenue is used for three main programs: 7.7 cents for the Highway Fund (which represents 56% of the revenue of the Fund); 1.65 cents for transit; and 1.65 cents for municipalities. Each penny of the gasoline tax generates \$27.7 million in annual revenue.<sup>3</sup>

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<sup>1</sup> Interview with Dan Fortier, Principal Transportation Planner, MAPC, Boston, Mass., 24 March 1989.

<sup>2</sup> "\$1 Toll Proposed for Sumner Tunnel," Boston Globe, 15 April 1989, Metro section, p. 27.

<sup>3</sup> The Road Information Program, "Massachusetts' Aging, Crowded Highways: The Effect of Stagnant Highway Spending," Report prepared for the Construction Industries of Massachusetts, (Wash., D.C.: TRIP, 1989), p. 4.

The FY 90 budget proposal submitted by Governor Dukakis sought to raise the tax six cents the first year, two cents the second year, and two cents the third year, for a total gasoline tax increase of ten cents per gallon. This proposal is intended to generate revenue and is not directly tied to efforts to discourage automobile use.

The MAPC Executive Committee is insisting that if an increase in the gasoline tax is approved, that it continue to be reserved for transportation improvements. In particular, a portion of the increase should go to fund local roads.

In the Commute Forum survey, participants were asked whether or not they supported an automobile use penalty fee through a significant increase in the gasoline tax. Fifty-four percent responded "yes" and 30 percent responded "no." Participants concerned at the municipal level, as a subgroup, responded more favorably for a gas tax, with 73 percent responding "yes."

3. Electronic pricing of road use. Electronic pricing of road use has neither been tried nor proposed in Massachusetts.

In the Commute Forum survey, participants were asked whether or not they supported congestion pricing on selected roads. Forty-nine percent responded "yes" and 27 percent responded "no." Elected officials, as a subgroup, responded more negatively toward congestion pricing, with only 33 percent responding "yes."

4. Area license schemes. No municipalities in Metropolitan Boston have implemented area license schemes.

5. High parking fees. Formal policies to increase the cost of parking have not been used in Metropolitan Boston. The Cities of Boston and Cambridge have high parking fees due to market forces.

6. Increase automobile ownership charges. In Massachusetts, any time you buy a new or used vehicle you pay a five percent sales tax to the State General Fund. This tax is paid at the time you register your vehicle. Vehicle registry is an additional charge, \$40 for two years for a passenger vehicle. A passenger vehicle operating license is \$35 for four

years. Prior to January 1989 the charge for vehicle registration was \$24 and for operator licensing was \$25. The increases took place because both of these fees had not been increased in over five years. The vehicle registration and operator license fees are earmarked for the Highway Fund, and, in 1988, 30 percent of the highway fund came from registry fees. This fund supports a variety of highway programs, including the Metropolitan District Commission Police which supervise the highways in the metropolitan area. There are no annual taxes of vehicle ownership in Massachusetts.

The Massachusetts automobile ownership charges have been implemented as general revenue raising measures and do not have the intent of discouraging automobile purchases. At the current rates, they are not a substantial disincentive to automobile ownership.

Summary of Massachusetts Policies  
To Correct a Market System Failure  
in Transportation

The following table summarizes policies in Massachusetts that would correct a market failure in transportation. It includes information from the Commute Forum survey.

<u>Policy Action</u>	<u>Massachusetts Experience</u>	<u>Response at Commute Forum</u>
1. Toll gates	-Massachusetts Turnpike	48% in favor of toll gates
2. Increase in gasoline tax	-Governor's budget proposal	54% in favor of increased gas tax
3. Electronic pricing of road use		49% in favor of congestion pricing
4. Area licensing scheme		
5. High parking fees		
6. Increase in automobile ownership charges	-Increases made in Jan. 1989	

There have been state policies to implement toll pricing on a highway, to increase the gasoline tax, and to increase automobile ownership charges. However, none of these has had the explicit intent of correcting a market failure of drivers not paying the social cost

of their trip. Their purpose has been to raise revenue for highway construction and operation and other government programs.

### **Policies to Correct A Market System Failure in Land Use**

1. Negotiated agreements or exactions. Exactions to mitigate traffic are becoming quite common in Massachusetts, occurring both at the municipal and state level. The need for a permit is the trigger for a negotiation between some government agency and the private developer. In the negotiation process, the government can exact traffic mitigations from the developer, including road improvements and trip reduction measures. The two types of permits that trigger negotiated agreements are: special permits required by the zoning or subdivision ordinance (local government) or a curb cut permit required to access the road abutting the site (usually the state government).

At the local level, developers often agree to mitigate the traffic impacts of their development in order to receive permits to proceed with construction. Chapter 40A, Section 9 of the Massachusetts General Laws authorizes municipalities to require special permits for specific land uses in specific zones. In particular, the municipality can grant density and land use intensity increases to a developer whose project provides other amenities, one of which is traffic improvements. Other uses that require special permits are cluster developments or planned unit developments. Chapter 40A requires the zoning ordinance to detail the uses that can be allowed through the special permit process and the extent of the amenities that can be exacted.<sup>1</sup>

In State court cases, rulings have supported the right of municipalities to adopt zoning measures to control orderly growth. Included is an allowance to require site plan review and permitting of all nonresidential development.<sup>2</sup> Site plan review requirements

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<sup>1</sup> Commonwealth of Massachusetts, General Laws, Chapter 40A, Section 9, pp. 890-892.

<sup>2</sup> MAPC, "Impact Fee Primer: A Manual for Local Officials," draft report, MAPC, 1989, pp. 24-25.

provide another opportunity for the local government to exact traffic mitigations from the developer.

Chapter 41, Sections 81K through 81GG of the Massachusetts General Laws comprise the Subdivision Control Law. Subdivision refers to dividing land into two or more lots, which usually requires municipal approval if the subdivision affects how the lots will be accessed. Section 81M authorizes the municipality to consider during the subdivision approval process ways in which congestion at the site and in the adjacent public ways can be lessened. Court rulings on subdivision powers support the concept that subdivision regulations can require a developer to report on how the subdivision affects the street it intersects with and how it affects adjacent streets. If the subdivision regulations refer to specific adverse impacts, the municipality could seek some type of mitigation of those impacts. However, exactions cannot be based on a claim of adverse affect on the community as a whole.<sup>1</sup>

In addition to development permits, access from the site to a road may require a curb cut permit. Massachusetts General Laws, Chapter 81, Section 21 authorize the MDPW to manage the volume of traffic and to insure safety on state highways. Specifically, Section 21 requires a developer to get a permit from the MDPW if the development will create a curb cut on a state highway.<sup>2</sup>

Traditionally, MDPW has granted permits on the basis of safety and water drainage. Increasingly, it is using its curb cut authority to control growth. An MDPW memo issued in December 1988 clarifies current practice of the agency in granting curb cuts: any new development or the expansion of a development which abuts a state highway and would generate a substantial increase in traffic or a substantial impact on traffic, whether or not the development's driveway actually enters the state highway, requires a curb cut permit. A substantial increase in or impact on traffic is:

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<sup>1</sup> MAPC, "Impact Fee," pp. 26-28.

<sup>2</sup> Commonwealth of Massachusetts, General Laws, Chapter 81, Section 21, p. 18.

- (a) Residential developments of 50 or more dwelling units;
- (b) Non-residential developments of 25,000 square feet or more;
- (c) Non-residential developments proposing 200 or more parking spaces; or
- (d) Any development generating 1000 or more vehicle trips per day.

If a development even changes the pattern or timing of traffic, it may be required to go through the permitting process. Examples include: change from automobile to truck traffic, change increasing the number of left turns, or change in traffic flow so that more of it is during the peak hour of the facility.<sup>1</sup>

The MDPW has been using temporary suspensions and delays in its processing of curb cuts in areas where the State has particular development concerns. The MDPW has used temporary suspensions in a few towns and counties in northern, western, and southern Massachusetts, but has not used them in Metropolitan Boston.<sup>2</sup>

Another process is concurrent with the curb cut requirement. The Massachusetts Environmental Protection Act, Chapter 30, section 61, sets up a procedure to review the environmental impacts of new development projects. MEPA is broader reaching than just transportation impacts, but it has substantial requirements for reporting on traffic impacts and mitigation methods when a curb cut permit is required. The criteria given above for a substantial increase in or impact on traffic requires that an environmental notification form be filed. Once the environmental notification form is filed, the Secretary of Environmental Affairs makes the final ruling on whether an environmental impact report (EIR) is needed. If no EIR is needed, the developer would proceed through the curb cut review process with the MDPW district office. If an EIR is required, the developer works closely with state

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<sup>1</sup> Massachusetts Department of Public Works (MDPW), Memo from Robert H. Johnson, Chief Engineer to all Divisions, Bureaus, Districts, and Sections, "Implementation of 1988 Amendments to MDPW Curb Cut Statute," 19 December 1988, pp. 1-2.

<sup>2</sup> Mike Burke, Chief of the Bureau of Transportation Planning, MDPW, Comments at a presentation on results of the Massachusetts Strategic Planning Grants, sponsored by the Executive Office of Communities and Development, Transportation Building, 15 March 1989.



agencies, including a Public Private Development Unit in the MDPW, to clear MEPA requirements before receiving the curb cut permit.

The EIR has specific requirements for doing the traffic impact assessment. The required assessment must include:

- (a) A complete description of the project;
- (b) A report on existing traffic conditions (including traffic volumes, capacity and LOS analysis, and accident history);
- (c) Trip generation analysis of the new development;
- (d) Trip distribution analysis of the new development;
- (e) An analysis of the five-year future traffic volumes with and without the development; and
- (f) Mitigative measures so the fifth-year future performance degradation is fully mitigated to be equivalent to a no build delay and volume-to-capacity ratio. Mitigation measures can include: actively marketing MBTA passes, road improvements, and alternative densities and land uses.

Once the EIR has been approved, the Public Private Development Unit uses the traffic studies and prioritized list of mitigation measures in its curb cut review process. The list of mitigation measures serves as the conditions required to receive the curb cut permit.

In October 1986, the MAPC Transportation Department examined traffic impact mitigation efforts promised by developers who filed EIRs. The Department sampled EIRs for municipalities in the MAPC boundaries, excluding the City of Boston. Of the 47 development proposals sampled, 33 made commitments to some form of off-site improvements. There was no discernible pattern to the required exactions, which included highway widenings, intersection improvements, turning lanes, ramps, shuttle buses, and travel demand management programs.<sup>1</sup>

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<sup>1</sup> MAPC, "Impact Fee," pp. 4-11.

2. Transportation Impact Fees. Currently, the General Laws of Massachusetts do not specifically authorize impact fees, or charging developers a pro rata share of the cost of a transportation improvements program for a particular subarea, however, four impact fee bills have been filed with the State Legislature in early 1989. The laws could authorize impact fees at the state level or could authorize each municipality to choose to implement its own impact fee law. The state impact fee program would cover state highways, while a local program would only cover local roads. If the legislation authorizes only local impact fees, it could leave open the option for multijurisdictional implementation of the fees.

The Executive Office of Transportation Construction, the main transportation office for the State, is opposed to impact fees because it feels that the MEPA process and negotiated exactions are able to gain more substantial contributions from developers than impact fees would. The Executive Office of Communities and Development favors impact fees. The developers at the Public Hearing of the Special Commission on Growth and Change also supported impact fees, as long as the fees supported improvements that were linked to their projects. They even supported a portion of impact fees being used to fund planning efforts.

In the Commute Forum survey, participants were asked whether or not they supported impact fees to finance highway facility expansion. Seventy-three percent responded "yes" and 8 percent responded "no." Participants concerned at the municipal level, as a subgroup, responded more negatively, with only 60 percent responding "yes." Another question asked about support for impact fees to finance transit expansion. Eighty-six percent responded "yes" and 3 percent responded "no."

Even with no State impact fee legislation, two municipalities, Framingham and Waltham, have impact fee ordinances. The municipalities imposed impact fees based on Chapter 40A, Section 9 of the General Laws which allows the municipality to grant density

increases in exchange for certain amenities.<sup>1</sup> (This clause was detailed in the section on negotiated agreements and exactions.)

In Framingham, site plan review procedures require development above a certain threshold to submit a traffic impact study. The threshold density acts as the permitted density, so developments above that density are subject to fees. The traffic study must report on the development's impact on intersections within 1000 feet of the project and that would receive at least five percent of the development's traffic. If any location is found deficient, a fee equal to three percent of the project's value must be paid to cover the cost of improvements in the deficient locations.<sup>2</sup>

In Waltham, various zoning districts have a threshold density, above which an traffic impact review is required. The traffic review must determine if the development is within a one-mile radius of an intersection operating at or below level of service "D." If it is, the developer is required to pay fees based on the particular land use and traffic demands of the project.<sup>3</sup>

3. Areawide Transportation Improvement Fees. In Massachusetts, there are no current or proposed policies for areawide transportation improvement fees, i.e., charging developers on a Metropolitan wide basis for capital improvements.

4. Trip reduction requirements. The City of Cambridge is the only municipality in Metropolitan Boston that has a trip reduction ordinance under consideration. A mandatory trip reduction ordinance for the City has come about in part because of the Massachusetts 1982 State Implementation Plan for Ozone and Carbon Monoxide which identified the need for Metropolitan Boston to reduce auto emissions by 35 percent. The compliance date passed December 1987 without the area meeting its reduction goals. At the same time, development activity has increased traffic substantially in Boston and Cambridge, with Cambridge adding three million square feet of office space since 1979. Cambridge wants

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<sup>1</sup> MAPC, "Impact Fees," p. 4.

<sup>2</sup> MAPC, "Impact Fees," p. 30.

<sup>3</sup> MAPC, "Impact Fees," p. 30.

to both keep its economic boom alive and comply with auto emission reduction goals, thus it is proposing a trip reduction ordinance for new development.<sup>1</sup>

Cambridge requested the technical assistance of MAPC to prepare a trip reduction ordinance. The product is a pamphlet on trip reduction zoning including a model ordinance for Cambridge. The proposed Cambridge ordinance requires any commercial development over 50,000 square feet to meet auto reduction goals based on the district the development is located in. In District 1 (locations near rapid rail stations) a 50 percent auto trip reduction is required, in District 2 (locations in the vicinity of rapid rail stations) a 42.5 percent reduction is required, and in District 3 (locations distant from rapid rail stations) a 35 percent reduction is required. The developers are required to submit a transportation access plan that identifies how they will meet the reduction goals using strategies such as, ridesharing, carpool and vanpool preferred parking, transit pass programs, and flexible work hours. The development must also have a transportation coordinator to implement and monitor effectiveness of the strategies.<sup>2</sup>

In the Commute Forum survey, participants were asked whether or not they supported mandatory trip reduction measures on new and existing development projects. Sixty-five percent responded "yes" and 21 percent responded "no." Participants concerned at the state level, as a subgroup, responded more negatively, with only 50 percent responding "yes." A second question asked about support for a employer tax incentive for trip reduction programs. Seventy-six percent responded "yes" and 11 percent responded "no."

5. Parking reduction requirements. Mandatory parking reduction requirements have not been implemented or proposed in the Metropolitan Boston municipalities. In the City of Boston, however, there has been a citywide freeze since 1974 on off-street public parking places for air quality reasons. While Boston's public parking is frozen at 35,000

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<sup>1</sup> MAPC, Trip Reduction Zoning, (Boston, MA: MAPC, September 1988), pp. 17,18,20.

<sup>2</sup> MAPC, Trip Reduction, pp. 20-27.

spaces, private spaces have increased by approximately 18 percent. So now Boston is considering controls on the number of private parking spaces as well as public spaces.<sup>1</sup>

In the Commute Forum survey, participants were asked whether or not they supported parking limitations (surcharges, reduction of spaces, etc.). Sixty percent responded "yes" and 30 percent responded "no." Elected officials, as a subgroup, all responded "no."

### Summary of Massachusetts Policies That Would Correct a Market System Failure in Land Use

The following table summarizes policies in Massachusetts that would correct a market failure in land use. It includes information from the Commute Forum survey.

<u>Policy Action</u>	<u>Massachusetts Experience</u>	<u>Response at Commute Forum</u>
1. Negotiated agreements	-Special permits -Subdivision approvals -Curb cut permits -MEPA requirements	
2. Transportation Impact Fees	-Framingham -Waltham -Pending state legislation	73% in favor of impact fees to fund highways 86% in favor of impact fees to fund mass transit
3. Areawide Transportation Improvement Fees		
4. Trip reduction requirements	-Waltham TMA -Pending Cambridge Ordinance	65% in favor of mandatory trip reductions 76% in favor of employer trip reduction tax incentives
5. Parking reduction requirements	-Boston response clean air requirements	60% in favor of parking reduction requirements

Both the state and local governments in Massachusetts are requiring developers to pay for the traffic impacts of their developments. Municipal governments are usually the first to negotiate with the developer on exactions required before permits are granted. Then

<sup>1</sup> Commute Forum Seminar, Boston, MA, 1 February 1989.

the developer goes to the State. The State, through the MEPA legislation and companion Curb Cut Ordinance are requiring substantial contributions from developers. At times, the developer is put in a position between the municipality and the State, which both have authority to require exactions and no obligation to coordinate their exactions with each other. There appears to be a growing need to coordinate the state and municipal negotiated agreement processes.

Impact fees are being studied at both the state and local level. If they are implemented, they would replace some of the negotiated agreements that are currently taking place.

Most of what developers pay to mitigate the traffic impact of their development is the cost of road improvements, which marginally increase the capacity of the highway system. While the option exists for them to use demand management as an alternative to paying for road improvements, few developers are selecting that option. The state and most municipal governments in Massachusetts are not requiring developers to reduce trips to their developments.

## **Policies to Correct A Government Planning Failure in Transportation**

### **Correcting For Unrestricted Use of the Highways**

1. Charge for road use, especially on congested highway segments. Methods for charging road users include: toll charges, increases in the gasoline tax, electronic pricing, area license schemes, and high parking fees. These policies overlap directly with policies to correct the market failure in transportation, where road users do not pay the congestion portion of their road trip. Only toll charges, the gasoline tax, and high parking fees in the Boston core area are in use in Massachusetts. See the market failure in transportation section for more thorough descriptions of these policies.

2. Scale back highway building programs. By 1969, community groups in Metropolitan Boston had organized to oppose the social and environmental effects of

highway building in the area. Some of the most controversial projects were: (a) an Inner Belt (a circumferential around Boston proper including the Cities of Somerville and Cambridge); (b) the Southwest Expressway (a southwestern expressway connecting the southwestern suburbs to Boston); and (c) the I-95 expressway (an upgrade of an existing highway connecting the North Shore to Boston). In February 1970, the governor declared a moratorium on highway construction inside Route 128, except for a small section of I-93, and he proposed the establishment of the Boston Transportation Planning Review (BTPR). In December 1971, the BTPR deleted the Inner Belt from consideration. In 1972 and after much debate, the governor chose to convert the eight-lane Southwest Expressway to a four-lane highway and rail transit guideway. The governor also decided to drop the I-95 expressway connecting Boston with the North Shore communities.<sup>1</sup>

With these highway modifications and cancellations, the last interstate highway to be completed in the Boston metropolitan area was I-93 in 1972. The only suburban construction projects now being planned are to add new lanes to existing highways, i.e., Route 128 (between Route 24 and Route 9) and Route 3 South (between Hingham and Duxbury).<sup>2</sup> There is current planning underway to depress the Central Artery, an elevated highway traversing central Boston.

The general policy in State transportation agencies is that the congestion problems in Metropolitan Boston will not be solved with increased highway building, but that traffic demand on the system must be regulated.<sup>3</sup>

In the Commute Forum survey, participants were asked whether or not they supported widening of existing roads. Thirty-two percent responded "yes" and 49 percent

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<sup>1</sup> Ralph Gakenheimer, Transportation Planning as Response to Controversy: The Boston Case, (Cambridge, MA: MIT Press, 1976), pp. 26-27, 52-61.

<sup>2</sup> Thomas F. Humphrey and Marc Warner, The Development of Transportation Strategies in High Growth Corridors in Massachusetts, Report of the MIT Center for Transportation Studies, prepared for the MDPW, Bureau of Transportation Planning and Development, September 1987, p. 31.

<sup>3</sup> Robert Bowyer, "Regional Commercial Growth Management," Papers Prepared for the National Conference on Suburban Expressways and Beltways, (Boston, MA: Commonwealth of Mass., EOTC, June 1986), pp. 3-4.

responded "no." Elected officials, as a subgroup, responded more negatively, with only 17 percent responding "yes." Participants concerned at the state level, as a subgroup, responded more positively, with 50 percent responding "yes." This was the only policy to alleviate congestion that received more "no" responses than "yes" responses.

3. Encourage higher vehicle occupancy rates.

a. High occupancy vehicle lanes. In 1977, a reversible high occupancy vehicle lane was implemented on the Southeast Expressway while it was being reconstructed. The Southeast Expressway is a major urban highway in the city of Boston, running along the eastern coastline connecting southeastern suburbs with Boston's central business district. A lane of the existing facility was used as the high occupancy vehicle lane, so HOV traffic flowed unseparated from other traffic. Initially, there was no enforcement of the HOV restriction, and 80 percent of the vehicles using the HOV lane were not HOVs. With enforcement, this violation rate was reduced to 35 percent, which is still high. Auto occupancy did increase from 1.31 to 1.38, but vehicle volume decreased 21 percent and person volume decreased eight percent. Because of the congestion on the non-HOV lanes and the high violation rate, the public didn't support the HOV lane. When a highway worker was killed removing cones on the reversible lane, the State terminated the HOV project. The whole experience has left a stigma against HOV facilities in the Boston area.<sup>1</sup>

In the Commute Forum survey, participants were asked whether or not they supported the creation of high occupancy vehicle lanes on expressways. Seventy-nine percent responded "yes" and 11 percent responded "no." Elected officials, as a subgroup, responded more negatively, with only 17 percent responding "yes."

b. Ridesharing promotion. Efforts to promote ridesharing have a mature history in Metropolitan Boston. In 1973, Masspool was organized by the State to promote

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<sup>1</sup> Gakenheimer, National Survey, pp. 5,17,19.



ridesharing in order to meet federal clean air standards. All companies with more than fifty employees were asked to develop ridesharing programs. Corporations actively participated in the program, but only 1-2 percent of drivers changed their drive-alone commute to a rideshare commute. In 1979, the State decided to retrench the ridesharing program and created Caravan. Some of the more traditional services offered by Caravan are: training for employee transportation programs; a database called "Ridesource" which matches commuters to carpools, vanpools, and mass transportation options; an information services program which distributes schedule and fare information and newsletters; and marketing support services for employee transportation programs.<sup>1</sup>

The most innovative program of Caravan is its vanpool administration services. Caravan brokers services of three large vanpool leasing organizations for employers. Each van leased carries insurance and maintenance as part of its monthly fee. In Boston's Route 128 corridor, a main circumferential route in the Boston suburbs which attracted extensive high-tech industrial development, Caravan has been administering a subsidy program for ridesharing. The initial program is to spend \$250,000 over a three year period. Each vanpool receives a \$300 per month subsidy for vanpool expenses. The subsidy has induced the creation of new vanpools to increase from 3.7 per month to seven or eight.<sup>2</sup>

#### Correcting for Insufficient Road Capacity

##### 1. Increase capacity of existing roads through Transportation Systems

###### Management.

a. Meter entrance ramps. No entrance ramps are metered on Massachusetts highways.

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<sup>1</sup> Gakenheimer, National Survey, pp. 53,54,58; and Caravan for Commuter, Inc., advertisement brochure.

<sup>2</sup> Gakenheimer, National Survey, pp. 53,54,58; and Caravan for Commuter, Inc., advertisement brochure.

In the Commute Forum survey, participants were asked whether or not they supported metering ramp entrances on the expressways. Fifty-four percent responded "yes" and 24 percent responded "no."

b. Traffic engineering improvements. The Boston metropolitan area has a Transportation Improvements Program, a five year program prioritizing the transportation projects that should take place in Boston area. The Metropolitan Planning Organization (MPO) determines prioritization of the projects. The MPO includes: Executive Office for Transportation and Construction, MDPW, Massachusetts Bay Transit Authority (MBTA), Massachusetts Port Authority (oversees seaports and airports), MBTA Advisory Board (comprised of municipal representatives), and MAPC. Only the latter two groups represent the interests of the municipalities.

The state highway system has almost 12,000 lane miles and the local highway system has just over 29,000. Of those 41,000 lane miles, 7 percent are in poor condition and 67 percent are in fair condition. Therefore, more than 30,000 lane miles are deficient.<sup>1</sup> MAPC claims that if the current rate of spending for highway improvements remains at \$26 million annually--which is threatened by the State budget crisis--at the end of 30 years, 79 percent of the roads would be in poor condition and 13 percent would be in excellent condition. In order to maintain all the roads in excellent condition, it would require \$143 million for ten years and then the cost would drop to \$10 million annually.<sup>2</sup>

Corridor studies have been another method, apart from the Transportation Improvements Program, to identify needed transportation improvements. A study occurs because of a strong "squeaky wheel" in a particular transportation corridor. The studies are usually headed by the Central Transportation Planning Staff, a state technical assistance agency for Metropolitan Boston, and include participation of MDPW, MAPC, and the affected municipalities. The short range element of the plans detail current roadways

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<sup>1</sup> Construction Industries of Massachusetts.

<sup>2</sup> MAPC, "Three Long-Range Funding Scenarios," Facts and Figures, p. 9.

improvements that could be made that are not capital intensive. Routes that have been studied are Routes 128, 9, and 20.<sup>1</sup>

From 1985 to 1988, there was a Traffic Operations Problem Solving Unit (TOPS) in MDPW. It was a team of six traffic specialists who travelled the State to find quick low-cost solutions to irritating traffic problems. During its existence, the TOPS Unit made reports on 130 incidents, often involving new signal designs.<sup>2</sup> The TOPS Unit was discontinued because of state budget constraints, but may be reinstated when the fiscal constraints diminish.

In the Commute Forum survey, participants were asked whether or not they supported improving intersections. Eighty-three percent responded "yes" and 6 percent responded "no." Both participants concerned at the municipal and state levels, as subgroups, selected improving intersections as the strategy they most supported to relieve congestion.

c. Traffic control systems. For some time the traffic signals on the state highway system have been neglected because of lack of funds. Now, MDPW has begun a statewide program to update all its traffic signals, starting first with the high volume corridors, such as Routes 9, 20, and 3A.

d. Limit access points to highway. Sites that require direct access onto a state highway require a curb cut permit. Massachusetts General Laws, Chapter 81, Section 21 authorize the MDPW to manage the volume of traffic and to insure safety on state highways. Specifically, Section 21 requires a developer to seek a permit from the MDPW if the development will create a curb cut on a state highway.<sup>3</sup>

Traditionally, MDPW has granted permits on the basis of safety and water drainage. Increasingly, it is using its curb cut authority to control growth. An MDPW

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<sup>1</sup> Humphrey and Warner, Suburban Corridors, p. 30.

<sup>2</sup> Matthew A. Currie, TOPS Team Manager, presentation at the Commute Forum, 1 February 1989.

<sup>3</sup> Commonwealth of Massachusetts, General Laws, Chapter 81, Section 21, p. 18.

memo issued in December 1988 clarifies current practice of the agency in granting curb cuts: any new development or the expansion of a development which abuts a state highway and would generate a substantial increase in traffic or a substantial impact on traffic, whether or not the development's driveway actually enters the state highway, requires a curb cut permit. Even if a development changes the pattern or timing traffic, it may be required to go through the permitting process. Examples include: change from automobile to truck traffic, change increasing the number of left turns, or change in traffic flow so that more of it is during the peak hour of the facility.<sup>1</sup>

The MDPW has been using temporary suspensions and delays in the processing of curb cuts in areas where the State has particular development concerns. The MDPW used temporary suspensions in a few towns and counties in northern, western, and southern Massachusetts, but none in Metropolitan Boston.<sup>2</sup>

In January 1989, MAPC surveyed city planners and MAPC representative on state zoning and subdivision legislation. Of the respondents, 85 percent supported explicit legislation on curb cuts. Curb cut legislation was ranked as the second highest area of concern.<sup>3</sup>

e. Expedite clearing of traffic accidents. The Metropolitan District Commission Police (MDC) and the State Police share the responsibility for clearing traffic accidents in Metropolitan Boston, each covering different geographic areas. The State Police had a comprehensive incident management program at one time that fell into disuse. Now the State Police are trying to coordinate with MDC and MDPW on a new incident management program that would include an automated geographic data base loaded with

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<sup>1</sup> MDPW, Memo from Robert H. Johnson, Chief Engineer to all Divisions, Bureaus, Districts, and Sections, "Implementation of 1988 Amendments to MDPW Curb Cut Statute," 19 December 1988, pp. 1-2.

<sup>2</sup> Mike Burke, Chief of the Bureau of Transportation Planning, MDPW, Comments at a presentation on results of the Massachusetts Strategic Planning Grants, sponsored by the Executive Office of Communities and Development, Transportation Building, 15 March 1989.

<sup>3</sup> MAPC, MetroPlan 2000: Growth Plan Preview (Procedures, Issues, and Actions, (Boston, MA: MAPC, February 1989), p. 48.

plans on how to clear incidents at various locations. The project is being funded through a federal energy grant.

2. Increase revenue available to finance road building. Building new roads is not a major policy direction in Massachusetts. Revenue gained from negotiated exactions and impact fees have been used to make major and minor modifications to existing roads. Other taxes are being used to finance maintenance and improvements of existing roads. But there are not initiatives to find new sources of revenue to build new roads.

For the new construction that has taken place, the revenue has been a combination of federal funds and debt financing. The Massachusetts Turnpike, for example, was financed by a debt secured with user fees, and current proposals are to repeat the process to rehabilitate the Sumner Tunnel and to construct a new harbor tunnel. Current plans to depress the Central Artery, an elevated expressway through central Boston, will use federal and state funds.

In the Commute Forum survey, participants were asked what they considered the greatest threat to mobility. Only eight percent responded that it was the inability to fund and build new roadway capacity. A second question asked whether or not they supported private financing of new roads. Forty-eight percent responded "yes" and 33 percent responded "no." Both participants concerned at the municipal level and elected officials, as subgroups, responded more negatively, with only 33 percent responding "yes."

3. Allow and arrange for private construction and ownership of some roads. The Massachusetts Turnpike is in some sense a private road. It was discussed in detail under a market failure in transportation. The Turnpike was built to provide access between western Massachusetts (Pittsfield) and eastern Massachusetts (Boston). The Turnpike Authority issued bonds to build the road; the bonds were secured by toll revenue. When the original bonds were paid off, the tolls were to be removed, and the maintenance of the road was to divert to the MDPW. Even though the original bonds have been retired, the State is not

taking over the Turnpike over to MDPW and is, in fact, proposing new facilities for the Turnpike Authority to finance.

In the Commute Forum survey, participants were asked whether or not they supported privatization of new or existing facilities. Thirty-eight percent responded "yes"

4. Organize the planning and construction of road building in ways that mitigate public opposition. The strong public opposition to new highway building in the 1960s in Metropolitan Boston did stop the implementation of several planned highways. Since the early 1970s, there have not been any major new highways built. The major construction project coming up is in central Boston and involves depression of the Central Artery, an elevated expressway. While there is concern over the cost and the disruption during the approximately ten years of construction, the depression project is considered an improvement to the affected neighborhoods because there will no longer be an elevated highway in their skyline.

5. Increase planning coordination amongst the localities and between the localities and the State, to more expeditiously implement road improvements and construction. The Public Hearing of the Special Commission on Growth and Change included testimony on negative relations between the state and the municipalities over road improvements. One town planner said that when they dealt with the state for a traffic light, the process took five years. He said the turnover in the MDPW frustrates the implementation of projects. All in all, he feels the MDPW has too much discretionary authority. A Board of Selectman member from a different town expressed similar concerns about the staff of the MDPW.

A member of the Board of Selectman of a different town said that the State was a bad neighbor when it had a major facility in your town. For example, the Turnpike Authority wanted to add more lanes without any concern for the town it would affect.

A representative of the Builders Association of Greater Boston said that too many people are relying on the state to solve problems and it shouldn't be that way. He also said the state lacks planning and regional planning has come too late.

6. Give more power to the municipalities to design highways. In Massachusetts, the State plays a large role in developing highways because municipalities are small in land area and population. It does not appear feasible for the municipalities to have a major role in designing highways unless they form a multijurisdictional organization to implement regional development review or tax base sharing.

7. Provide public transportation. The MBTA requires that the farebox for a particular bus route provide 30 percent of the operating costs of providing service in order to be a legitimate service need. Most of the MBTA service is radial service feeding the city of Boston. If either your origin or destination is not the city of Boston, it is likely that you will have to travel via the city of Boston in order to make your trip.

The MBTA, aware that some communities who contribute to the MBTA were not seeing much service in exchange for their payments, created a Suburban Mobility Program. Some examples of suburban based transit are: Lexington provides service to downtown shopping with routes that mainly serve the elderly; Burlington provides jitney bus service connecting industrial areas; Beverly operates a shoppers shuttle. Other municipalities, like Peabody, decided to completely discontinue its contract with the MBTA because of the feeling it wasn't getting service equal to its contributions. For a while, Peabody contracted for bus service with a private company.

The Cape Ann Transit Authority, a separate authority from the MBTA, runs a bus service that follows a loop between Rockport and Gloucester. The route connects industrial parks with the downtown. Both Rockport and Gloucester have commuter rail stations with rail service to Boston.

Commuter rail and a water ferry are other transportation modes that extend to the suburbs. However, both of these modes are designed to serve Boston-bound commuters.

In the Commute Forum survey, participants were asked several question on transit. In fact, it emerged as the policy most supported to alleviate congestion in Metropolitan

Boston: the top three policy choices were to upgrade the rail system, provide tax incentives to transit users, and extend the rail system. The "yes/no" transit questions were:

(a) Upgrade rail system	90% yes	3% no
(b) Extend rail system	83% yes	3% no
(c) Increase frequency of bus service	70% yes	16% no
(d) Expand bus route coverage	70% yes	not available
(e) Provide employee tax incentive for use of transit	76% yes	11% no
(f) Use of impact fees to finance transit expansion	73% yes	8% no
(g) Develop new transit services where there may be private support	54% yes	8% no

The elected officials and public service subgroups were much less supportive of increased and expanded bus service than the private sector subgroup. Seventy-three percent responded "yes" and 8 percent responded "no." Participants concerned at the municipal level, as a subgroup, responded more negatively, with only 60 percent responding "yes." Another question asked about support for impact fees to finance transit expansion. Eighty-six percent responded "yes" and 3 percent responded "no."

#### Summary of Massachusetts Policies To Correct a Government Planning Failure in Transportation

The following table summarizes policies in Massachusetts that would correct a government failure in transportation. It includes information from the Commute Forum survey.



<u>Policy Action</u>	<u>Massachusetts Experience</u>	<u>Response at Commute Forum</u>
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**The government is providing too much unrestricted access on highways which is encouraging overuse of the highways.**

- |   |  |   |
|---|--|---|
| 1. Charge road users                        | -Massachusetts Turnpike  | 48% in favor of new tolls on selected roads<br>49% in favor of congestion pricing |
| 2. Scale back road building                 | -Cancellation of programmed highways in the 1970s              |   |
| 2. Encourage higher vehicle occupancy rates |  | 79% in favor of HOV lanes   |
| -HOV lanes                                  | -SE Expressway   |   |
| -Carpool/vanpool promotion                  | -Caravan vanpool leasing program<br>-Route 128 vanpool subsidy |   |

**The government is not providing enough road capacity to meet all of the demand for travel.**

- |   |  |   |
|---|--|---|
| 1. Increase capacity of existing roads                                    |  |   |
| -Meter entrance ramps   |  | 54% in favor of metering ramps  |
| -Traffic engineering improvements to increase capacity of existing roads  | -Transportation Improvement Program<br>-Corridor Studies<br>-TOPS                          | 32% in favor of widening existing roads<br>83% in favor of improving intersections  |
| -Traffic signals  | -Signal Update Study   |   |
| -Limit access points  | -Curb Cut Ordinance  |   |
| -Expedite accident clearing   |  |   |
| 2. Increase revenue for new road building                                 |  | 48% in favor of private financing<br>57% in favor of tax increase   |
| 3. Allow and arrange for private construction and ownership of some roads |  | 38% in favor of privatization of facilities   |
| 4. Organize road building to mitigate public opposition                   |  |   |
| 5. Increase planning coordination with municipalities                     | -State corridor studies  |   |
| 6. Give municipalities more authority to design highways                  |  |   |
| 7. Provide public transportation  | -MBTA lower requirements for bus service in the suburbs<br>-MBTA Suburban Mobility Program | 90% in favor of upgrading rail system<br>83% in favor of extending rail system<br>70% in favor of increasing frequency of bus service<br>70% in favor of expanding bus route coverage |

Massachusetts policies are intended more to control the demand for travel than to provide major new capacity. The policies to control demand are not aimed at the drivers themselves, rather they are aimed at land developers. The capacity increases that are made are of the existing system and are often funded by developers through negotiated exactions. Other capacity increase have been made in public transportation.

### **Policies to Correct a Government Planning Failure in Land Use**

Correcting For Land Use Planning Authority Delegated to Too Small a Governmental Unit

1. Convene a task force with representation from each municipality sharing a transportation corridor. The Central Transportation Planning Staff, MAPC, and the municipalities have formed ad hoc committees to conduct transportation corridor studies. The purpose of the corridor committees is to encourage local officials and private developers to consider access and traffic issues in relation to new development. They also encourage greater coordination with the metropolitan and state agencies to develop short and long term solutions to traffic problems.<sup>1</sup>

The first study was of Route 128, which is Boston's suburban high-technology corridor. Corridor "councils" were formed to deal with specific sections of the highway: Route 3 to Route 9; Route 9 to I-93; and I-93 to Gloucester. Corridor coordinators have now been assigned to specific high growth corridors, such as Routes 9, 53, and 20.

During the Public Hearing of the Special Commission on Growth and Change, the MetroWest director said that ad hoc committees had provided a solution to the problem of the traffic from new development spilling over jurisdictional boundaries. She pointed out how the corridor studies and the aid programs of the state have made ad hoc committees operable. She said the committees have been successful at building subregional consensus

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<sup>1</sup> Humphrey and Warner, Suburban Corridors, p. 29.

and trust. Others at the hearing pointed out how important the aid programs of the state were in funding these ad hoc committees.

The MEPA legislation includes a provision for the Secretary of Environmental Affairs to establish an ad hoc committee to review projects that are designated "major and complicated." The "citizens' advisory committee" would consist of at least ten members and would assist the Secretary in evaluating the EIR.<sup>1</sup>

An area called the Golden Triangle has formed a voluntary planning commission to review zoning changes and includes six members from Natick and six from Framingham. The members were chosen by the Board of Selectman of the two municipalities, and some members represent the private sector. A state grant has funded this voluntary commission.

The following two chapters on Route 20 and Route 114 highlight the activities of ad hoc corridor committees.

2. Formal negotiations among the municipalities sharing a transportation corridor.

Formal negotiations have not been used to coordinate the planning efforts of municipalities sharing a corridor. However, during the Public Hearing of the Special Commission on Growth and Change, negotiations between municipalities was discussed. A Board of Selectman member from Lincoln pointed out that his town must go to court to resolve problems whenever another town allows development on their shared border. He presented a proposal whereby a development affecting neighboring jurisdictions would be reviewed by an ad hoc (temporary) planning board comprised of the representatives of the municipalities affected. When any town wanted to claim a development would have a regional impact, the State would create this special planning board.

A land use attorney who is a member of the Special Commission pointed out that municipalities underutilize their rights to negotiate with other towns. He directed attention to the intergovernmental agreement power in Chapter 40 of the General Laws.

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<sup>1</sup> Commonwealth of Massachusetts, "Massachusetts Environmental Policy Act Regulations," 301 CMR 11.12, 9 January 1987, pp. 85,86.

In the Commute Forum survey, participants were asked whether or not they supported negotiated settlements on traffic and land use strategies among jurisdictions sharing the same transportation corridor. Eighty-seven percent responded "yes" and 3 percent responded "no."

3. Allow tax base sharing of nonresidential property tax among neighboring municipalities. The 1977 Massachusetts Growth Policy Report includes a policy recommendation that communities share property taxes generated by new nonresidential development. The policy recommendation points out why such a policy should be implemented:

Inequities among communities are in part due to tax base differences attributable to non-residential development. The property tax revenue generated by major commercial and industrial development cannot reasonably be attributed solely to the community in which such development occurs. The service demands created by such development often extend far beyond municipal boundaries. Moreover, it is frequently a regional attraction (e.g., a major highway or regional economic forces) which created the opportunity for such development in the first place. Furthermore, the present system fosters unnecessary and counterproductive competition among communities for new commercial and industrial development. Therefore, a *tax-sharing* system should be enacted by the Legislature, whereby some portion of the increase in tax revenue of major commercial and industrial development is shared among communities within a statutorily defined region.<sup>1</sup>

No action was taken on this recommendation.

Property taxation is complicated in Massachusetts by the State law Proposition 2 1/2. The first component of Proposition 2 1/2 is that a municipality cannot levy more than 2.5 percent of the total full and fair cash value of all taxable real and personal property in the municipality. This is called the levy ceiling. A municipality is required to revalue its property every three years, and with this revaluation, the levy ceilings of Massachusetts' municipalities have been rising because of the rapid appreciation of property in Massachusetts. The second component of Proposition 2 1/2 is that the levy can only increase a certain amount from year to year. This is called the levy limit. A levy limit

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<sup>1</sup> Massachusetts Office of State Planning, "City and Town Centers: A Program for Growth, The Massachusetts Growth Policy Report, (Boston, MA: Office of State Planning, September 1977), p. 85.

increases in three ways: (a) there is an automatic 2.5 percent increase each year, (b) new construction increases the tax base and, thus, the levy limit, and (c) the majority of the residents of a municipality can vote to override the levy limit. In no case, however, can the levy limit be higher than the levy ceiling. The actual levy of the community may or may not be as high as the levy limit; the levy limit increases independently of what the municipalities actual levy is. So a municipality is permitted to tax up to its levy limit, even if it must raise its levy by a large percentage over the previous year's levy to do so.<sup>1</sup>

The structure of Proposition 2 1/2 makes new growth an important opportunity to increase a municipality's fiscal budget. The new growth allows the community the opportunity to increase its levy limit, which can provide added budget flexibility in the future.<sup>2</sup> It will also increase the levy ceiling as the total value of property in the municipality increases with new growth.

The Massachusetts Department of Revenue, Division of Local Services is just completing a report on the effects of Proposition 2 1/2 on the 39 cities and 312 towns in Massachusetts. In general, only one of the 39 cities has passed an override. This isn't necessarily because the cities do not need more revenue, rather because the overrides have little chance of passing in a city with a diverse population that is hard to educate on why the override is needed. The 312 towns have been more successful at passing overrides. In general, the overrides have a higher chance of succeeding in a smaller community where you can run an education campaign on why the override is needed. Weston is cited as an example of a town with the right composition to pass an override.

4. Empower a metropolitan or regional authority to plan land use. The 1977 Massachusetts Growth Policy Report offers good insight into the issue of empowering regional authorities in Metropolitan Boston:

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<sup>1</sup> Massachusetts Department of Revenue, Division of Local Services, Everything You Always Wanted to Know About Levy Limits...But Were Afraid to Ask: A Primer on Proposition 2 1/2, (Boston, MA: Commonwealth of Massachusetts, no date), pp. 1,5,14, 16.

<sup>2</sup> Massachusetts Department of Revenue, Proposition 2 1/2, p. 8-9.

The home rule concept is a long standing tradition in Massachusetts, and it has a large and legitimate following. The strength of this sentiment transcends simple parochialism; its foundation lies in a belief that government is best when it is kept close to the people it represents. The weaknesses inherent in our form of local government--loose organization, dispersed power, part-time officials--are also its greatest strengths, for they provide a style of government to which people can easily relate, and a practice of government which is both highly participatory and unusually responsive to local problems.

Nevertheless, local government does sometimes see advantages in regional solutions. Most communities seem to agree that voluntary regional associations are helpful in addressing certain common problems (such as water supply, transportation, vocational education, or health care). But many do not see the extension of these associations into powerful regional institutions as either necessary or desirable.<sup>1</sup>

Chapter 40B of the General Laws establishes the structure for regional planning commissions, and Section 5 identifies one of its duties as the making of a district comprehensive development plans. Section 5 concludes by saying that such plans and recommendations are advisory only.<sup>2</sup>

Section 24 establishes the Metropolitan Area Planning Council as a special regional planning commission. The Council includes one representative from each of the 101 municipalities, and the chairmen or a designee from the following agencies: Massachusetts Bay Transportation Authority, Massachusetts Port Authority, Massachusetts Turnpike Authority, Massachusetts Water Resources Authority, public safety, metropolitan district commission, public works, commerce and development, communities and development, environmental management, environmental quality engineering, Boston Redevelopment Authority, Boston public works, and Boston Water and Sewer Commission.<sup>3</sup>

MAPC is in a difficult position in implementing a regional plan, such as the plan current MetroPlan 2000. The plan is a three-year comprehensive planning effort begun in July 1987. The major thrust of the plan so far is to present three major development alternatives for the metropolitan area. The first is "Trends Extended," which means

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<sup>1</sup> Massachusetts Office of State Planning, Growth Policy, p. 54.

<sup>2</sup> Commonwealth of Massachusetts, General Laws, Chapter 40B, Section 5, pp. 905-906.

<sup>3</sup> Commonwealth of Massachusetts, General Laws, Chapter 40B, Section 24, pp. 921-922.

development occurring as it is now--patches of commercial development in every municipality. The second alternative is "Existing Centers," which channels development to areas where current densities are the highest--Boston and the inner core municipalities. This is where the transportation system is most developed. The third alternative is "New Centers" and identifies seven new centers of commercial development, each one in an outlying suburb of Metropolitan Boston. These centers would be densely developed, and while located near major highways, would not have extensive transportation alternatives.<sup>1</sup>

MetroPlan 2000 alternatives propose some interesting growth patterns for the metropolitan area, but there is no political structure to make the "Existing Centers" or "New Center" alternatives happen. It is most likely that the "Trends Extended" will occur because it follows existing political structures and market forces for dispersed development.

There are two examples in Massachusetts where County governments have been able to gain more control over planning powers. In 1974, Martha's Vineyard or Dukes County, an island off of Cape Cod, was designated as a district of critical planning concern. With this designation, a regional commission was organized to review developments of regional impact. The municipalities on Martha's Vineyard were required to make their development regulations compatible with the regional development review process. Specified in the criteria for approval of developments is a consideration for the amount of pedestrian and vehicular traffic likely to be generated.<sup>2</sup>

Another example is Barnstable County, or the towns comprising Cape Cod. Several conferences were beginning three years ago in which the communities expressed concern over how fast development was happening on Cape Cod and how new services would be provided for that development. A proposal came out of the conferences to propose new legislation that would empower the Cape Cod Planning and Economic Development Commission (Barnstable County) to have more authority in approving

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<sup>1</sup> MAPC, Commute Forum, pp. 45-47.

<sup>2</sup> Commonwealth of Massachusetts, Acts, 1974, Chapter 637, pp. 618-620,628.

development. The legislation is fashioned after the Martha's Vineyard legislation. The legislation is currently being reviewed by the State Legislature and should be voted on in the fall of 1989. If approved, the Cape Cod Commission would have authority to: (a) designate areas of critical planning concern and (b) review developments of regional impact. Where traffic is an issue, which is most places on Cape Cod, developers would need to submit traffic studies and mitigation plans. The Commission would have the ultimate authority to decide on development approval, but the feedback from the municipality involved would be a critical element of the decision. The Commission would be comprised of one member from each municipality of the County selected by the board of selectman, a representative of the governor, and a representative of a minority racial group.

The State Legislature's Special Commission on Growth and Change is also considering a state requirement that each regional planning commission develop a comprehensive plan, and that the regional planning commission review and approve municipalities' comprehensive plans for compatibility with the regional plan.

In the Commute Forum survey, participants were asked which of five choices was the greatest obstacle to implementing policies to alleviate congestion. The greatest obstacle identified was the lack of a regional political power base to implement the strategies.

5. Withdraw land use planning powers from the municipalities and reactivate them at the state level. In 1975, Massachusetts adopted a Growth Policy Development Act. The law called for growth policy statements from each of the 351 municipalities in the state. Local Growth Policy Committees were established in 330 communities, and these growth policies were used by the thirteen regional planning commissions to complete Regional Growth Policy Reports. In 1977, the Office of State Planning published the Massachusetts Growth Policy Report as the culmination of the effort.<sup>1</sup>

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<sup>1</sup> Massachusetts, Growth Policy, p. i.



The growth policy efforts of the state at that time were considered a failure: nothing happened after the Growth Policy Report was issued.<sup>1</sup>

In 1988, a resurgence of state and regional planning began. The State Legislature set up a Special Commission on Growth and Change with both a Senate and a House Chair. Committee members include representatives of communities and development, economic affairs, environmental affairs, governor's office on economic development, transportation and construction; private and nonprofit representatives; and other state legislators. The Commission has held ten hearings around the State and will report on growth in all of the different areas and will provide recommendations to the Legislature. The Commission is currently considering recommendations to: (a) establish a new state entity to develop a state comprehensive plan of goals and objectives and to review regional comprehensive plans, (b) empower regional planning authorities to make regional comprehensive plans and to review local comprehensive plans, and (c) establish a set of mechanisms (carrots and sticks) to encourage municipalities to make comprehensive plans.

In the mean time, the Executive Branch is informally playing a large role in the development approvals through the MEPA requirement for environmental impact reports and through the Curb Cut Ordinance requirements for traffic mitigation. These two policies are detailed in the section on negotiated agreements and exactions.

In the Commute Forum survey, participants were asked whether or not they supported State action to coordinate municipal policies on land use and traffic demand management. Seventy-one percent responded "yes" and 11 percent responded "no."

Correcting for Zoning Powers and Development Approval Authority That Are Not Creating an Efficient Land Use and Transportation Pattern

1. Improve the land use regulation process to tighten loopholes in zoning variances, zoning changes, and grandfather clauses. Chapter 40A, Section 6 of the

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<sup>1</sup> Humphrey and Warner, Suburban Corridors, p. 47.

General Laws gives property owners generous protection when the municipality is going to change zoning. All the developer has to do if he or she knows about a zoning change proposal is to submit a preliminary plan to the municipal planning board. The zoning at the date of submission of the plan becomes the effective zoning governing the plan even if a zoning change is being considered. If the plan is approved, the developer maintains that approval for eight years and is unaffected by any zoning changes during those eight years. This landowner protection is called a grandfather clause.<sup>1</sup>

What frequently happens in Massachusetts' municipalities is developers submit plans and vest their development rights whenever a municipality considers a downzoning. Since the municipality must announce zoning changes and hold public hearings before enacting them, the developers have a chance to vest their development rights before the zoning change. The frequency of this happening makes it very difficult for the municipality to make effective zoning changes.

At the Public Hearing of the Special Commission on Growth and Change, one town planning board member commented that his town announced a zoning change and four plans appeared before the planning board that same day. Many planners felt the eight year grandfather clause protection in Massachusetts is too generous and needs modification. Bringing up the counterargument, a representative of the National Association of Industrial Parks said the grandfather clause provides the certainty that developers need. He commented that if changes were made to the clause and some certainty was taken away from developers, then some certainty should be returned in its place.

In January 1989, MAPC surveyed city planners and MAPC representative on state zoning and subdivision legislation. Of the respondents, 82 percent supported explicit

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<sup>1</sup> Commonwealth of Massachusetts, General Laws, Chapter 40A, Section 6, p. 888.

legislation on grandfathering preliminary plans. Grandfather clauses was ranked as the fourth highest area of concern.<sup>1</sup>

The State Legislature is considering seven bills on vested rights this year. Five bills seek to reduce grandfather protection, i.e., to reduce it to five years or to require the plan be submitted before the first notice of public hearing of the zoning change. Two bills seek to slightly expand grandfather protection.

2. Downzone land to reduce the trip generation on congested corridors. The municipalities in Massachusetts have the authority to create their own zoning ordinances. Most of them have comprehensive plans but they date back to the 1960s or 1970s, so the zoning by-laws function alone to guide current and future land development. The pattern of land uses was set up at a time when the municipalities were bedroom communities and not employment growth centers. Therefore, almost every municipality has a zoning pattern that allows much more development, even four to ten times as much, as the municipality would be able accommodate with its current transportation network. As the State Secretary of Transportation said, "The whole state is overzoned."<sup>2</sup>

MAPC has been working with the municipalities to review the buildout implications of their existing zoning by-laws. The computer model used assigns the maximum allowable density for each parcel, redeveloping any parcel that is not currently at its maximum use, and reports the total square footage that would be built. Even though this model greatly overestimates what is likely to occur given market conditions and property owner choices, the buildout numbers have made many municipalities reconsider their zoning pattern. However, any downzoning actions will be somewhat frustrated by the grandfather clause referred to above.

More on downzoning will be discussed in the next two chapters on Routes 20 and 114.

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<sup>1</sup> MAPC, MetroPlan 2000, p. 48.

<sup>2</sup> State Legislature Special Commission on Growth and Change, Public Hearing, 28 February 1989.

3. Require zoning to be linked to a master plan which stages development. Most of the municipalities in Metropolitan Boston have either no master plan or a very outdated master plan. In an MAPC survey, 71 percent of the municipalities had master plans and, of that group, 32 percent of plans were dated 1960-1969; 26 percent dated 1970-1979; and 28 percent dated 1980-1988. Updates are underway in 35 percent of the municipalities.<sup>1</sup>

Without using a master plan and a zoning ordinance together, the municipalities are unable to stage development. Since every parcel is zoned today the way it is expected to develop in the future, a developer can choose any location in the town to develop. This makes some sense for jurisdictions as small in land area as the municipalities in Metropolitan Boston, but it is possible that the municipalities could exert greater control over the timing of development if they used a master plan together with a zoning ordinance.

One of the questions the Special Commission on Growth and Change is considering is whether or not there should be a requirement for zoning to be based on a comprehensive land use plan. During the Public Hearing, planners took opposing positions on comprehensive plans. Those in favor of comprehensive plans saw them as a necessary process where consensus on land use could be built. A representative of the National Association of Industrial parks commented that a linkage between comprehensive plans and zoning provided some of the certainty that developers need. The town planner opposed to requiring the comprehensive plan-zoning linkage pointed out that comprehensive plans are enormous undertakings that require large data collections and a long period of time in order to form consensus. She said that strategic plans were a more practical way for the municipalities to make zoning changes.

The Executive Office of Communities and Development (EOCD) has been funding planning efforts through strategic planning grants and incentive aid as many municipalities do not have full time town planners or a enough planners to be able to complete long range

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<sup>1</sup> MAPC, MetroPlan 2000, p. 45.

planning efforts. In Fiscal Year 1990, EOCD anticipates using \$1 million for the Strategic Planning Programs grants. Four types of grants are available:

(a) Municipal grants of up to \$30,000 to fund projects up to ten months duration that produce land use initiatives for local action;

(b) Regional grants of up to \$50,000 to support interlocal planning projects centering on a specific issue of importance to member communities;

(c) Special project grants of up to \$20,000 allowing communities to address unexpected, critical land use planning needs that arise during the course of the year and need immediate action; and

(d) Mini grants of up to \$7,500 to support community efforts to identify growth management issues and clarify local land use objectives and to conduct growth management training programs.<sup>1</sup>

Speakers at the Special Commission Public Hearing stressed the important of plans being funded by these strategic planning grants.

4. Adopt adequate public facilities ordinances. There are no existing or proposed adequate public facilities ordinances in Metropolitan Boston.

5. Rezone land, with a pattern of higher densities where transportation infrastructure is most developed and lower densities where it is not. One of the alternatives of the proposed regional plan MetroPlan 2000 is "Existing Centers" which would channel new developing in the metropolitan area to the City of Boston and the inner core cities where the transportation infrastructure is most developed. This concentration of development is just one of three alternatives, and, even if this alternative is promoted in the final Plan, the Plan is advisory only.

Within each of the municipalities there is also the opportunity of rezoning land to create a pattern of higher densities where transportation infrastructure is most developed in

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<sup>1</sup> Commonwealth of Massachusetts, Executive Office of Communities and Development, Strategic Planning Program: Guidelines and Application, (Boston, MA: EOCD, March 1989), p. 1.

exchange for lowering densities where infrastructure is least developed. There are no major initiatives in the municipalities to create this type of zoning pattern. Sorting out the windfalls and losses to the various property owners makes this a difficult policy to implement. In the Special Commission Public Hearing, the Secretary of Transportation suggested this occur through a transfer development rights program. Using Route 9 as an example, he suggested putting all the development in the Golden Triangle and downzoning the rest of Route 9. Property owners in the downzoned area would sell development rights to property owners in the upzoned area. The representative of the National Association of Industrial Parks commented that his organization was interested in transfer development rights.

In the Commute Forum survey, respondents were asked whether or not they supported increased development densities in locations of concentrated transportation infrastructure. Seventy-one percent responded "yes" and 11 percent responded "no."

Cluster zoning is another option the municipalities want to explore,<sup>1</sup> so that the same amount of development occurs on a parcel, but one piece of it is developed at a higher density to allow more open space on the parcel. Cluster zoning was also promoted by the development community at the Special Commission Public Hearing. A developer, builder, and real estate agent, all from different communities, said that current zoning restricts cluster development and they would all like to be able to develop in clusters.

In the Commute Forum survey, participants were asked what they considered the greatest threat to mobility. Fourteen percent responded that it was zoning ordinances and site plan review requirements that allow developments to spread out over large land areas at low densities.

6. Increase the availability of mixed use zones, which combine office, retail, and residential uses, to reduce travel needs. Mixed use zones are not used widely in the

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<sup>1</sup> MAPC, MetroPlan 2000, p. 48.

Metropolitan Boston municipalities. There are some municipalities that are trying out different mixed uses--e.g., day care or restaurants in industrial zones--and are slowly learning what works.

In the Commute Forum survey, respondents were asked whether or not they supported the creation of mixed use zones. Sixty-five percent responded "yes" and 11 percent responded "no." Participants concerned at the state level, as a subgroup, responded more negatively, with only 33 percent responding "yes." Another question asked what participants considered the greatest threat to mobility. Only 5 percent responded that it was zoning that segregates land use and thereby requires people to make many trips to meet all their needs.

7. Performance zoning with points awarded for transportation amenities.

Performance zoning is used by few municipalities in Metropolitan Boston. It is not being proposed as a new planning initiative.

Summary of Massachusetts Policies  
To Correct a Government  
Failure in Land Use

The following table summarizes policies in Massachusetts that would correct a government failure in land use. It includes information from the Commute Forum survey.

<u>Policy Action</u>	<u>Massachusetts Experience</u>	<u>Response at Commute Forum</u>
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**The powers to plan land use are delegated to too small a spatial and fiscal governmental unit.**

- |  |  |  |
|--|--|--|
| 1. Ad Hoc committees                   | -MAPC Subregional groups<br>-Corridor committees                                   |  |
| 2. Formal negotiations                 |  | 87% in favor of formal negotiations  |
| 3. Tax base sharing                    |  |  |
| 4. Empower regional planning authority | -Dukes County<br>-Barnstable County  | (Cited as the greatest obstacle to implementing traffic alleviation strategies.) |
| 5. State land planning                 | -Special Commission on Growth & Change<br>-MEPA legislation<br>-Curb cut ordinance | 71% in favor of state action to coordinate planning                              |

**Zoning powers and the development approval process are not working to channel development where transportation infrastructure exists.**

- |   |   |   |
|---|---|---|
| 1. Tighten loopholes in approval process  | -Proposals to remove grandfather clause                       |   |
| 2. Downzone land in congested corridors   |   |   |
| 3. Require zoning linkage to comprehensive plan                                 | -Mass Growth Policy Act of 1977<br>-Strategic Planning Grants |   |
| 4. Adopt an adequate facilities ordinance                                       |   |   |
| 5. Rezone land to allow higher densities where infrastructure is most developed |   | 71% in favor of increasing density in areas of concentrated transportation infrastructure |
| 6. Increase mixed use zones   |   | 65% in favor of mixed use zones   |
| 7. Performance zoning   |   |   |

Massachusetts policies work more to correct a government failure of using land use planning authority inefficiently than to restructure the level at which planning decisions are made. There are efforts to empower regional planning commissions, with a pilot example on Martha's Vineyard, but the effects of the endeavors statewide remain to be seen. It is



the multijurisdictional ad hoc committees in Metropolitan Boston that show the most promise of providing regional land use planning.

The use of zoning powers to control how much development and where is located varies by municipality. Some have actively reviewed their commercial zones to prepare for the increasing suburban development. Other municipalities still use the zoning patterns and regulations of several years.

In the next two chapters, I will highlight the policy initiatives for interjurisdictional coordination in two transportation corridors, Route 20 and Route 114.

### CHAPTER 3

#### CONGESTION ALLEVIATION ON ROUTE 20

In chapters three and four, I use the framework to analyze policy initiatives relating to suburban congestion on particular transportation corridors in Metropolitan Boston. Chapter three focuses on the Route 20 corridor, a two-lane state highway. The Boston metropolitan area has an inner beltway, Route 128, and an outer beltway, Route 495. Route 20 connects the western portion of the inner beltway with the outer beltway, roughly at the nine o'clock position. A map at the end of this chapter shows the location of the corridor. Four municipalities lie along this segment of Route 20: Weston, Wayland, Sudbury, and Marlborough. The table below briefly characterizes the different municipalities:

Figure 6. Socioeconomic characteristics of Route 20 municipalities.

Item	Weston	Wayland	Sudbury	Marlborough
1985 Population <sup>1</sup>	10,800	12,200	14,000	32,100
1985 Employment <sup>1</sup>	3,809	3,066	8,984	12,907
1979 Median <sup>2</sup> Household Income	47,646	34,141	37,666	19,213
1980 Median Age <sup>2</sup>	35.6	34.4	31.8	29.5
Labor Force <sup>2</sup>				
% managers and professionals	57	48	52	24
% technicians, sales, & administrative support	28	28	27	31
% service occupations	8	8	7	12
% other	6	14	11	30

<sup>1</sup> Carnahan, Population and Employment Outlook.

<sup>2</sup> Massachusetts Municipal Profiles.

Traffic congestion is considered a problem all along the corridor. The following chart identifies the worst level of service at different times of day for intersections along the corridor:

Figure 7. Level of service at Route 20 intersections.

Intersections for Through Traffic	Weston	Wayland	Sudbury	Marlborough
Level of Service A or B	2	0	1	3
Level of Service C	0	1	0	2
Level of Service D	0	0	0	0
Level of Service E	0	1	1	0
Level of Service F	0	0	0	2

Almost without exception, the level of service on the approaching streets to Route 20 is level "F."

Source: CTPS, Route 20 Corridor Study: Short Range Element, (Boston, MA: CTPS, 1989).

The following sections detail the Route 20 corridor policy initiatives to alleviate suburban congestion using the framework that was set up in chapter one.

### **Market System Failure in Transportation**

There are no initiatives relating to Route 20 that would correct a market failure of drivers not paying the congestion cost of their trips.

### **Market System Failure in Land Use**

There are policy initiatives at both the state and local levels relating to Route 20 that seek to price the social cost, or the trip generation portion, of development. Both the state and the municipalities are using negotiated exactions. A quick review of MAPC records shows that the state has required six developments, all of them in Marlborough, to submit environmental impact reports (EIR) which included traffic studies.

The City of Marlborough actively negotiates with developers over exactions in addition to the State EIR process. The City has many development proposals and feels it can be selective. Marlborough worked on an agreement with two developers to jointly improve a section of Route 20, including some widening of the road. However, MDPW did not allow the widening, and instead directed the developers to just improve some of the intersections.

Marlborough has proposed a development plan for West Marlborough, which includes Northborough and Southborough. Under the proposal, the municipalities would jointly administer a combined EIR process for all developers in the area.

Weston, Wayland, and Sudbury are not currently negotiating with developers over exactions. If state enabling legislation is passed, Sudbury would consider implementing an impact fee ordinance.

### **Government Planning Failure in Transportation**

The government failure in transportation is viewed differently by the municipalities. Two don't want the State to provide more capacity. One wants the State to provide some additional capacity. And one says the congestion problem would be completely solved if that State would add more capacity. I will highlight the specific policy initiatives to correct a government failure in transportation that are relevant to Route 20.

Scale back highway building programs. Both Weston and Wayland want to discourage excessive through traffic on Route 20. They want the State to leave the road as it is in order not to induce any more traffic on it.

Increase vehicle occupancy rates. There are no major initiatives to increase vehicle occupancy rates, but the State ridesharing program called Caravan is available to assist commuters interested in ridesharing. Groups of commuters with destinations on Route 20 have organized themselves into vanpools with the assistance of Caravan. Two vans travel

from Cape Cod to employment destinations in Wayland. There are several vans with different origins that have employment destinations in Marlborough.

Increase capacity of the existing roads. Sudbury does not want Route 20 widened, but it does support improvements to Route 20. In particular, Sudbury wants Route 20 to be realigned so that it bypasses the town's main commercial area, which the town would like to transform into a pedestrian oriented village center.

Marlborough thinks the State isn't providing enough road capacity on Route 20 to meet all of the demand for travel. Marlborough would like Route 20 to be widened to four lanes from one end of Marlborough to the other.

The state wants Route 20 to remain as a regional transportation route. It does not want the municipalities to use it as a collector and distributor road. The state wants the municipalities to develop their own internal circulation roads and not rely solely on Route 20 for this purpose.

Increase the planning coordination amongst the localities and the state. In order to overcome the different views on Route 20, the State Central Transportation Planning Staff began a Route 20 corridor study in 1985. The first phase of the study, the Short Range Element, is nearing completion. The Short Range Element's purpose is to propose improvements to increase safety and to increase capacity that can be made to the road within a two to five year time frame and are low cost. In the process of preparing the plan, CTPS used MetroWest--a growth management committee that is discussed later--as a convener to set up meetings with each of the municipalities.

CTPS released the Short Term Element in October 1988, spending one year after community meetings to prepare the final plan. CTPS submitted the plan to MDPW and the Metropolitan Planning Organization (MPO), who approved it. Since then, the municipalities have reviewed the plan and asked that an addendum be made to it to reflect some of the changes that have occurred on Route 20 since their initial meetings with CTPS. CTPS thinks that producing an addendum to the plan is worthwhile over the long run to

secure consensus on the plan, but in the process some of the original recommendations are being weakened. One example is in Weston. Two roads intersecting with Route 20, in close proximity to one another, were proposed to be modified to a one-way circulation scheme. Weston has opted to remove the recommended one-way scheme because it might induce new traffic. Weston might be willing to allow the improvement at a later date. A second example is an intersection in Wayland. CTPS recommended widening the existing intersection, but the Wayland traffic committee decided that it wanted to maintain the existing pavement widths and sidewalks so that the intersection could continue serving pedestrians and school children on bicycles.<sup>1</sup> CTPS thinks that changing recommendations like these substantially limits its ability to make capacity increases through traffic engineering improvements.<sup>2</sup>

The next phase of the Route 20 Corridor Study is the Long Range Element. The Long Range Element will propose long term recommendations for improvements to Route 20, which could include capital intensive solutions such as road widening. Initially, CTPS met with all of the towns together on the Long Range Element. Since CTPS found all the municipalities at different stages in planning for development, CTPS is now meeting with each municipality individually, using MetroWest as a convener. For example, CTPS held a meeting in Sudbury in the Spring of 1989 and discussed long term options for Route 20 with the following groups: the Traffic Management Commission, the Planning Board, the Board of Selectman, the Conservation Commission, and the Town Engineer.

The role of MAPC in the corridor study is to provide socio-economic forecasts of the area. For example, MAPC has conducted a buildout analysis of the existing zoning of land abutting Route 20. The buildout analysis will be discussed in the next section.

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<sup>1</sup> Pagitsas, Efi, Central Transportation Planning Staff, "Addendum to the Route 20 Corridor Planning Study-Short Range Report," Memorandum to MDPW, MetroWest, Weston, Wayland, Sudbury, and Marlborough, 18 April 1989.

<sup>2</sup> Interview with Bill Steffens, Transportation Planner, CTPS, Boston, Mass., April 1989.

The Long Range Element was scheduled to be completed in June 1989, but progress has been slow. Efforts to amend the Short Range Element is one reason. The municipalities themselves do not want to finish the project by June. Wayland, for example, is not ready with it's own town plan for Route 20. All in all, CTPS thinks it is better to spend more time on the plan now than to have the whole process shut down by some political actors later in the process.

Weston is very content with the corridor planning study approach to solve multijurisdictional differences on the configuration of Route 20. Weston is delighted that the State is asking it for comments on Route 20 and thinks that CTPS is working to make a plan that gives each community what it wants. The town held a meeting in December 1988 on Route 20, inviting all who had an interest in Route 20. The meeting was well-attended and the participants basic message was that improvements to Route 20 should not encourage additional traffic to the town.

Wayland understands that it has started late in the process to plan for Route 20. The town formed a committee comprised of residential and commercial property owners on Route 20. Wayland views regional participation positively, but doesn't think all of the State's data is reliable.

Sudbury is completing a land use plan for Route 20. The town has a Sudbury Route 20 Study Committee which is very active. The main proposal of Sudbury is to create a Route 20 bypass that would take through traffic around the northern side of a segment of the existing alignment, leaving this segment, which is now a developed with retail uses, as a village center.

Marlborough has undertaken its own traffic and land use plan for Route 20. Marlborough has presented its work to the State and wants the State to commit to the proposals recommended in the study, i.e. the state will widen Route 20 and the city will downzone land abutting Route 20. However, the State will not commit to any actions until it has completed its own study.

Provide public transportation. Providing public transportation as an option for relieving traffic congestion is not promising on Route 20 because it is developed at a low density. Sudbury did attempt a bus service called Sudbus, but it was discontinued because of low ridership.

### **Government Planning Failure in Land Use**

Are the governmental units too small? Weston, Wayland, Sudbury, and Marlborough are all small governmental units. The following table gives population, employment, land area, and fiscal statistics for the four municipalities.



Figure 8. Population, employment, land area, and fiscal statistics of Route 20 municipalities.

Item	Weston	Wayland	Sudbury	Marlborough
1985 Population <sup>1</sup>	10,800	12,200	14,000	32,100
2010 Population Forecast <sup>1</sup>	10,800	12,200	14,000	35,250
Percent Change	0	0	0	9.8
1985 Employment <sup>1</sup>	3,809	3,066	8,984	12,907
2010 Employment Forecast <sup>1</sup>	5,830	3,550	12,000	27,500
Percent Change	53.1	15.8	33.6	113.1
Land Area <sup>2</sup> (in square miles)	17.2	15.3	24.4	21.0
Taxable Property <sup>2</sup> Fiscal Year 1988 (Value in \$1000; Rate per \$1000 assessed value):				
		<b>% of Total</b>	<b>% of Total</b>	<b>% of Total</b>
<b>-Total</b>				
Valuation	1,370,700	<b>100</b>	1,259,700	<b>100</b>
Potential Tax Revenue	15,488,910		13,970,073	
<b>-Residential</b>				
Valuation	1,308,900	<b>95</b>	1,150,600	<b>91</b>
Tax Rate	11.30		11.09	
Potential Tax Revenue	14,790,570		12,760,154	
<b>-Commercial/Industrial</b>				
Valuation	53,000	<b>4</b>	99,900	<b>8</b>
Tax Rate	11.30		11.09	
Potential Tax Revenue	598,900		1,107,891	
Levy Limit Exclusions <sup>3,4</sup> (Value in \$1000)	FYs 83-89 3,700	FYs 85-89 1,900	None	None
Levy Limit Overrides <sup>3,5</sup> (Value in \$1000)	FYs 83-89 Five Overrides 1,400	FY 83 One Override 260	Just defeated an override	None
Excess Capacity <sup>3,6</sup> (Value in \$1000)	253	7	261	1,400
Excess Capacity as a % of <sup>3</sup> Levy Limit	1.5	negligible	1.5	4.6

<sup>1</sup> Carnahan, Population and Employment Outlook.

<sup>2</sup> Municipal Profiles 1988-89, (Palo Alto, CA: Information Publications, 1988.)

<sup>3</sup> Massachusetts State Department of Revenue, Division of Local Services.

<sup>4</sup> An exclusion is a temporary assessment over the levy limit.

<sup>5</sup> An override is a permanent change in the levy limit.

<sup>6</sup> Excess capacity is the difference between the levy limit and the levy ceiling.

The MAPC current population estimates and the 2010 population forecast show municipalities of roughly the same population size: small municipalities ranging from 10,000 to 30,000. While not a large city, Marlborough is more than twice the population of the others and the population is projected to grow a small amount, while the other towns are not expected to grow.

The MAPC forecasts for employment growth to the year 2010 indicate that each municipality will be growing. Weston and Wayland have not been changing very much and do not have current long range planning efforts underway. Sudbury and Marlborough are projected to have the largest employment bases in the year 2010 and both municipalities have current long range planning efforts underway. Marlborough currently has the largest employment base and will be growing at a much faster rate than the other municipalities. Marlborough has many development proposals and is in a position to be selective about which development proposals it approves.

Each of the municipalities have roughly the same amount of land area, so the differences in population and employment do not correlate with differences in land area. Marlborough is likely to develop at a higher density than the other towns.

Weston and Wayland have almost all of their taxable property base in residential property, so residential property represents over 90 percent of their property tax receipts. The tax rate in the two municipalities is the same for residential and commercial/industrial properties. Both Wayland and Weston have passed levy limit exclusions and levy limit overrides to overcome the constraints of Proposition 2 1/2.<sup>1</sup> Both are taxing at their levy ceilings, i.e., the maximum they can tax under Proposition 2 1/2.

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<sup>1</sup> The Massachusetts State Legislature passed Proposition 2 1/2 in 1983. The law restricts any municipality from levying more than 2.5 percent of the value of real and personal property in the municipality (the levy ceiling). In addition, the municipality cannot increase its levy by more than 2.5 percent each year (the levy limit) unless there is growth in the tax base from new construction or the residents vote to override the levy limit. In no case can the levy limit exceed the levy ceiling. See Chapter 1 on tax base sharing for more detail.

Sudbury has 86 percent of its property base in residential property. Residential property represents approximately 80 percent of tax receipts because it is taxed at two-thirds the rate of the tax on commercial/industrial property. Sudbury hasn't passed any levy limit exclusions and just had an override referendum defeated. Sudbury is taxing at its maximum levy ceiling.

Marlborough is in a much different situation than the other three municipalities. Its property tax base is split roughly as two-thirds residential and one-third commercial. Since the commercial tax rate is twice the residential, potential tax receipts for fiscal year 1988 commercial/industrial property should exceed those for residential property. Marlborough hasn't passed any levy limit exclusions or overrides. It is not taxing at its maximum levy limit; it has almost five percent of its levy limit in excess capacity, i.e. the difference between the levy limit and the levy ceiling.

The situation on Route 20 appears to be one where the governmental units to approve development (and secure tax base increases) are too small to also be accountable for the traffic generated by the new traffic, as it is very unlikely that the residents of one municipality actually work in the same municipality. Most of the new commercial development planned for Route 20 will attract workers from the metropolitan area.

Weston and Marlborough are both situated to take advantage of two major circumferential expressways. Weston sits on the west side of Route 128, the suburban Boston beltway which has experienced the most commercial growth in the last decade. Weston has chosen not to allow major developments in its borders. For fiscal purposes, it has opted to request higher taxes from its residents. In fact, Weston is considered to be the municipality that has been most successful in passing overrides of its levy limit. If Weston chose more commercial development to improve its tax base, it would not necessarily affect the other Route 20 municipalities because most traffic would come to Weston via Route 128.

Marlborough sits on both sides of I-495, an outer suburban beltway which is currently under development pressure. Marlborough has taken a position to take advantage of its transportation infrastructure and allow large scale development. The established part of Marlborough where most of its residents live is east of I-495, and Marlborough is allowing less commercial development there. The area where Marlborough is targeting its development is on the west side of I-495, where the land has been mostly undeveloped. This decision of Marlborough eases the impact of congestion on the segment of Route 20, connecting Weston, Wayland, and Sudbury, particularly because the Massachusetts Turnpike would be the preferred route east and west between Route 128 and I-495. So most commuters to Marlborough's major employment center are unlikely to choose Route 20.

Ad hoc committees. With Marlborough's development plan to focus development west of I-495, major conflict among the municipalities has been avoided. However, there is still need for dialogue and cooperation over development. The Route 20 municipalities are organized into an ad hoc committee, that serves a subregion of Metropolitan Boston. The subregional group is called the MetroWest Growth Management Committee and serves five other municipalities in addition to the Route 20 municipalities. It was organized to deal with the effects of the traffic of new development spilling over on local roads. MetroWest is comprised of one selectman and one planning board member from each municipality, and representatives from MAPC. MetroWest has a full-time professional planner organizing its efforts. The planner is affiliated administratively with MAPC, but works out of one of the town halls and is financially supported by the municipalities themselves.

MetroWest is considered a successful organization that is helping the municipalities to cooperate over growth issues. The existence of the Committee is likely to continue indefinitely, and, in fact, MetroWest is being used as a prototype for other subregional committees in Metropolitan Boston, i.e., the South Shore and the North Shore.

Using land regulation powers to make an efficient land use and transportation pattern. The use of an ad hoc committee to deal with development issues on Route 20, indicates that the municipalities will retain almost complete development approval authority. The municipalities are making efforts to improve their use of that authority in order to make land use development more compatible with the existing transportation infrastructure. Some of the major initiatives underway are: downzoning proposals and comprehensive land use plans.

MAPC conducted a buildout analysis for the Route 20 Corridor Study, including only the parcels abutting Route 20. MAPC did field research on existing development and vacant parcels during the summer of 1988 and then loaded the data into a computer model to conduct the buildout analysis. The buildout analysis uses the following methodology:

1. Only nonresidentially zoned parcels abutting Route 20 are used.
2. Each parcel is "built-out" individually; any aggregations which currently exist were broken down.
3. The parcel must conform strictly to the existing zoning regulations.
4. All required parking is surface parking.
5. Existing uses at lower densities than allowed by zoning are converted to the highest density use.
6. All lots are converted to a rectangular shape.

The methodology points out the difficulty of conducting a buildout analysis and what assumptions must be made. The MAPC buildout analysis, then, provides a look at the highest density development that would occur on Route 20 under existing zoning. It does not represent a forecast of what the likely buildout would be because it redevelops every parcel to its highest density without a market analysis. Results of the Route 20 buildout analysis are summarized below:

Figure 9. Route 20 buildout analysis.

<u>Buildout Analysis</u>	<u>Weston</u>	<u>Wayland</u>	<u>Sudbury</u>	<u>Marlborough</u>
Existing Sq. Ft.	6,000	520,000	1,341,000	3,195,000
Buildout Sq. Ft.	760,000	2,213,000	4,484,000	7,170,000
Job Equivalents	1,564	2,474	9,676	19,028

The buildout numbers have shocked the municipalities, which MAPC intended in order to encourage the municipalities to review their existing zoning patterns. The major initiative being proposed on Route 20 is that all the municipalities downzone. Weston and Wayland, with their current no growth stances don't see the need to downzone. Sudbury is supportive of downzoning on Route 20, but feels that it has already effectively done so in Sudbury through its aquifer protection law. Marlborough is the municipality that is most seriously proposing downzoning. Five years ago Marlborough wanted to preserve open space and so included an open space requirement in many zones. Marlborough claims its open space requirement and industrial development regulations already make its industrial zoning more restrictive than the other municipalities. Even still, Marlborough is willing to downzone its Route 20 land, but only on with the following two conditions: (1) that Weston, Wayland, and Sudbury also downzone land<sup>1</sup> and (2) that the State widen Route 20 in Marlborough.

Comprehensive planning to link zoning to a masterplan is not being actively pursued in Route 20. Most of the masterplans of the area are over ten years old:

	<u>Weston</u>	<u>Wayland</u>	<u>Sudbury</u>	<u>Marlborough</u>
Date of Last Masterplan	over 10 years old	over 10 years old	over 10 years old	within the last ten years

However, smaller plans are being used to help bring land use plans and transportation plans into coordination. Marlborough, for example, hired a consulting firm to produce a

<sup>1</sup> Conary, Chester, Mayor of Marlborough, "Route 20 Downzoning," Letter to Roz DeLori, MetroWest, 15 April 1989.

Route 20 East land use and traffic study plan. This plan, completed in June 1988, included the recommendations to both widen and downzone the Route 20 corridor. The plan was completed as part of the Route 20 Corridor Long Range Element Process, with private developers helping to finance the plan. Sudbury is also developing a plan for Route 20. So far their major proposal is to use a segment of Route 20 as a village center, and to move through traffic to a bypass road. Sudbury would like to cluster its commercial development and is considering a transfer development rights program to do it.

### **Summary of Route 20 Initiatives**

The first figure below repeats the framework and is followed by a summary of Route 20 initiatives, using the framework format.

Figure 10. Route 20 summary.

	Transport	Land Use
Market Failure	Congestion effects are not priced.	Trip generation is underpriced.
Government Planning Failure	Gov't permits unlimited use of roads, encouraging excessive demand.  Gov't is not providing enough roads to meet all of the travel demand.	Powers to plan land use are delegated to too small a spatial and fiscal unit.  Zoning powers & approvals are not creating efficient land & trans. patterns.

	Transport	Land Use
Market Failure	No initiatives.	State: MEPA review & curb cut review. All municipalities: permit review. Marlborough: joint developer EIR proposal.
Government Planning Failure	Weston & Wayland: Route 20 should remain unchanged. <b>Route 20 Study</b> Sudbury: some improvements. Marlborough: widen Route 20 to 4 lanes.	All municipalities participating in MetroWest Committee.  Sudbury and Marlborough are proposing down-zoning.

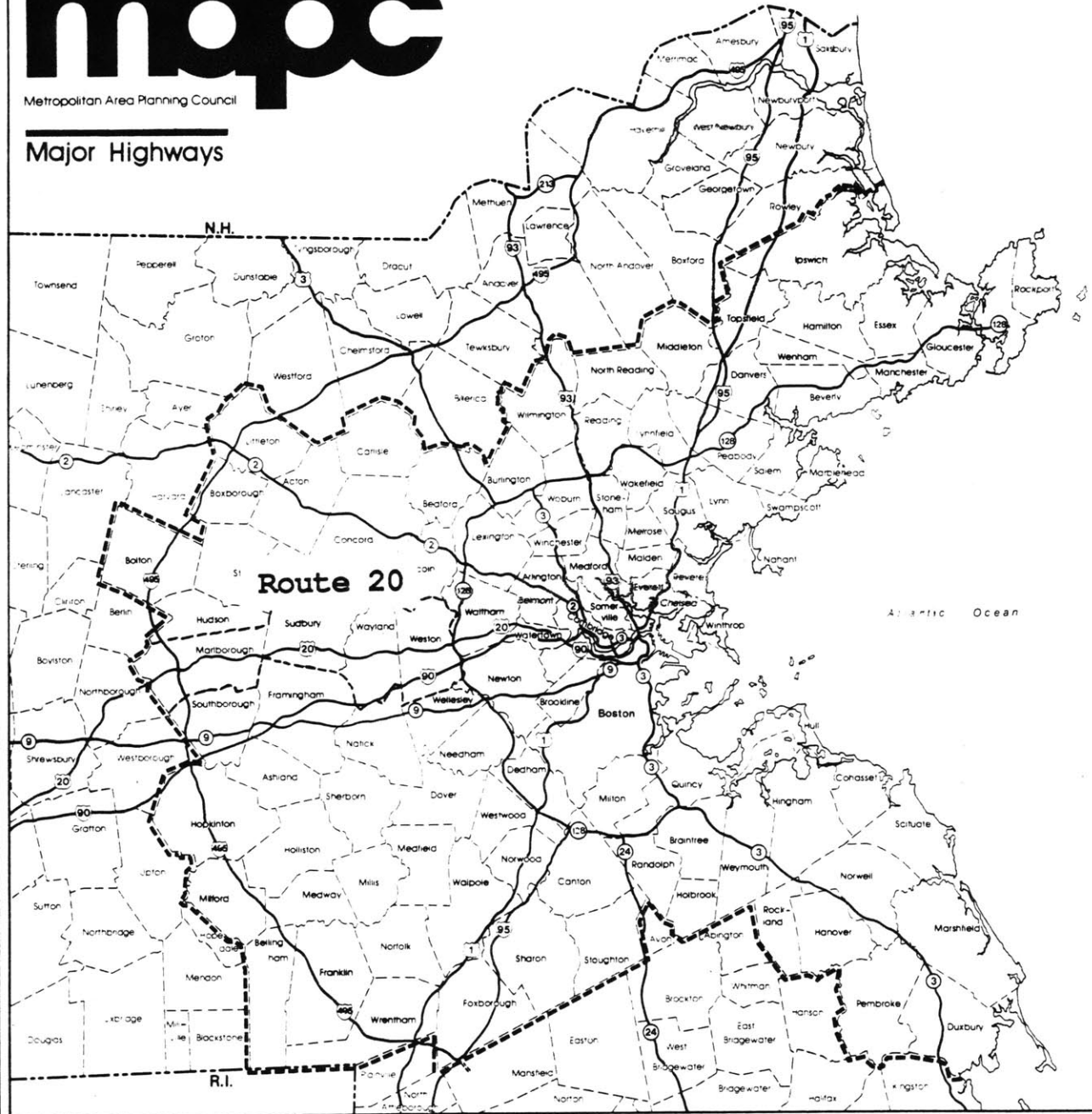


In the Route 20 corridor, the state and the municipalities do not want to solve the congestion problem by adding major new capacity, rather they want to control the demand for travel by managing land development on the corridor. The state and the municipalities are working toward a consensus on both marginal improvement to Route 20 and land development along Route 20 through an ad hoc committee. A corridor-wide initiative to downzone could achieve a reduction in future travel demand, but leaves open the problem of through traffic. The current developers in the corridor are providing the improvements to the existing road and intersections through the MEPA process and local development review.

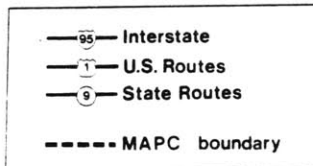
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Metropolitan Area Planning Council

## Major Highways



Scale in Miles



Source: Massachusetts Dept. of Public Works

Drawn: September, 1978

## CHAPTER 4

### CONGESTION ALLEVIATION ON ROUTE 114

In chapter four, I use the framework to analyze policy initiatives relating to suburban congestion on the Route 114 corridor. Route 114 runs from the seacoast northwest, intersects with Route 128 (the inner beltway) and terminates at I-495 (the outer beltway). While Route 114 connects to North Andover, (where Route 114 intersects with I-495), only the municipalities of Marblehead, Salem, Peabody, Danvers, and Middleton are in the MAPC region and are part of this analysis. A map at the end of this chapter shows the location of the corridor.

The following table identifies basic information about the five municipalities:

Figure 11. Socioeconomic characteristics of Route 114 municipalities.

Item	Marblehead	Salem	Peabody	Danvers	Middleton
1985 Population <sup>1</sup>	20,199	38,163	44,400	24,100	4,500
1985 Employment <sup>1</sup>	4,765	19,636	17,594	19,018	2,674
1979 Median <sup>2</sup> Household Income	23,982	15,150	20,687	21,903	21,349
1980 Median Age <sup>2</sup>	36.1	32.1	33.0	33.4	31.9
Labor Force <sup>2</sup>					
% managers & professionals	40	20	21	27	21
% technicians, sales, & administrative support	33	29	34	31	29
% service occupations	10	15	12	13	15
% other	13	31	28	25	31

Route 114 is a two lane facility except in Peabody where it is four lanes and in Danvers where it has just been improved to five lanes. Route 114 has an interchange with Route 128 in Peabody and with Route 1 and I-95 in Danvers. Traffic from Marblehead and

<sup>1</sup> Carnahan, Population and Employment Outlook.

<sup>2</sup> Massachusetts Municipal Profiles.

Salem access Route 128 via east Route 114 and Peabody accesses Route 128 via west Route 114. Route 114 is heavily congested throughout Marblehead, Salem, Peabody and Middleton. The most serious problems are in Salem where traffic volumes easily justify four lanes but there are only two. Traffic volumes are:

Salem	42,400 vehicles per day
Peabody	35,600 vehicles per day
Danvers	30,300 vehicles per day
Middleton	22,400 vehicles per day

In Peabody, traffic has increased 5.8% annually between 1981 and 1986 on the western section of Route 114 and 2.9% annually between 1984 and 1986 on the eastern section of Route 114.<sup>1</sup>

Figure 12. Level of service on Route 114.

Congested Points	Marblehead	Salem	Peabody	Danvers	Middleton
Level of Service D	0	0	0	0	1
Level of Service E	0	0	1	1	2
Level of Service F	0	1	4	1	1

Source: MAPC, "Draft Report of the North Shore Transportation Task Force," November 1988, pp. 13,14.

The following sections detail the Route 114 corridor policy initiatives to alleviate suburban congestion using the framework that was set up in chapter one.

### Market System Failure in Transportation

There are no initiatives relating to Route 114 that would correct a market failure, where drivers do not pay the congestion cost of their trips.

<sup>1</sup> MAPC, "Draft Report of the North Shore Transportation Task Force," November 1988, pp. 13,14.

## **Market System Failure in Land Use**

There are policy initiatives at both the state and local levels relating to Route 114 that seek to price the social cost, or the trip generation portion, of development. Both the state and the municipalities are using negotiated exactions. A quick review of MAPC records shows that the state has required fourteen developments to submit environmental impact reports which included traffic studies: four in Salem, three in Peabody, five in Danvers, and two in Middleton.

The municipalities require traffic studies and mitigations in addition to the state environmental impact reports. Marblehead can require traffic reports and mitigation efforts as part of the approval process, but since there have been no large proposals for Route 114, few mitigations have been made. Salem requires site plan review for all residential projects over six units and all nonresidential projects over 10,000 square feet. The city sometimes requires mitigation measures that are more extensive than what the state requires after MEPA review. Peabody estimates it has exacted \$100,000 worth of improvements from developers even though it does not have site plan requirements--except for a new zone which will be discussed later. Peabody finds that developers are voluntarily contributing for improvements. The residential projects are offering improvements upfront, and the commercial projects are being caught by the MEPA process. Peabody thinks the MEPA process is working well. Danvers requires site plan review for any project over two lots and the zones along Route 114 require traffic mitigation plans for all large retail and industrial projects. Projects at the intersection of Routes 114 and 1 are having a hard time getting MEPA approval. So at either the local or state level, developers are being required to mitigate traffic impacts. Middleton uses site plan review and special permitting to look at the general impact of the development and may identify traffic problems. Recently, a developer wanted to convert a drive-in to a shopping plaza and the approval was conditioned on \$750,00 worth of improvements to Route 114.

Peabody has a current initiative involving impact fees. The city designated a large area around the Route 1 and Route 128 interchange as a Designated Development District. (This area is southern Peabody and Route 114 is in northern Peabody.) The area is not currently served by all the utilities and roads necessary to support development, but the city has developed a capital improvements program to do the work. A detailed impact fee ordinance has been prepared for the area with the assistance of MAPC and is now being reviewed by the city's legal and financial departments. If approved, all developments in this area would pay a pro rata share of the costs of the utility and road improvements.

### **Government Planning Failure in Transportation**

Increase the capacity of Route 114. Marblehead, Salem, Peabody, Danvers, and Middleton would tend to see the government failure similarly, the state needs to provide more capacity on the road to meet the demands for travel. In Marblehead, Salem, and Peabody (east of Route 128), Route 114 is a numbered highway route that travels on local roads. In Peabody (west of Route 128), Danvers, and Middleton, Route 114 is a state highway.

The eastern half of Route 114 is being considered for a redesignation, i.e., changing the local streets that the numbered Route uses. The current designation has a lot of jogs as you move from one local street to another. Salem and Peabody had a consulting firm do a traffic study in 1987 which recommended a redesignation in order to improve the traffic circulation between the two downtowns; the study found that most of the traffic was local. Then the rapid response traffic solving team from MDPW, TOPS, took over the project. TOPS wanted to make Route 114 a less confusing road to use; it felt that the current designation inefficiently used downtown Salem. Peabody favors the redesignation and Salem has yet to give a final position. Since the TOPS Unit is no longer in the MDPW, the redesignation plan is overseen by another unit in MDPW.

While the redesignation would not change the routing in Marblehead, the town is affected by it. Marblehead has only two highway routes out of the town, and in order to access Route 128, drivers must use Route 114. So any improvements to congestion on Route 114 in Salem and Peabody helps Marblehead travellers. Within Marblehead, the right-of-way of Route 114 is too narrow for widening. So Marblehead works to support improvements in Salem and Peabody.

Route 114 to the west is a different story. Route 114 is a state highway with a wider right-of-way and an increasing amount of roadside development. The Peabody section is four lanes, the Danvers section has recently been improved to five lanes (includes a center turning lane), and it narrows to three lanes in Middleton. Middleton is proposing that the five lane configuration continue to its town center.

Increase planning coordination between the state and the municipalities. The North Shore Transportation Task Force is a voluntary committee of representatives of the municipalities on the North Shore. Route 114 is only one of several road projects that the task force works on. The task force came about in 1985 by the initiative of a state senator who was concerned about the development boom on Route 128 in the North Shore. At first, only the towns through which Route 128 passes met together monthly. Then the MAPC executive director saw the need to expand the task force to include all fifteen communities on the North Shore because they were all affected by Route 128. This expanded task force has held monthly meetings for two years. The task force representatives from each municipality are from the board of selectman, planning boards, or planning departments.

One of the major activities of the task force is to make a list of prioritized transportation improvements for the region, considering safety first, capacity second, and level of service third. The Task Force has a list of the top ten regional projects from all funding categories and then lists four subcategories: bridge replacement, federal aid primary (statewide competition for funds), and federal aid urban systems (Metropolitan

Boston competition for funds). Once the municipal representatives have agreed on the priority lists, they must get the municipal councils to endorse the lists. A segment of Route 114 in Peabody and Salem is in fourth place of the regional priorities and the federal aid primary projects. Another intersection of Route 114 in Peabody is in tenth priority for federal aid primary road projects. Riley Plaza, where Route 114 passes through Salem, is the top priority of the federal aid urban system projects. Two other intersections of Route 114 in Middleton are tied in eighth place priority for the federal urban aid systems projects.

So far the task force has tried to have only transportation issues and larger regional issues on its agenda. I will discuss their new development review of projects with regional impacts below that may draw the Task Force into specific projects and mitigation efforts.

Route 114 does not have a formal corridor study underway. The last Route 114 corridor study was done by the Merrimack Valley Planning Council in 1977. The North Shore Task force does provide for increased coordination between the state and the municipalities and amongst the municipalities themselves. For example, at a recent Task Force meeting, the MDPW district traffic engineer, a representative from MDPW, and a representative from the MEPA unit attended.

Organize road building to mitigate public opposition. One of the objectives of the North Shore Task is to act as a cheering section for MDPW to counteract the eleventh hour backlash that typically occurs when a project is about to be constructed. Many projects have gone through all the planning stages, and in the last weeks before construction, groups opposed to the project start an active campaign to stop it. The newspaper coverage in the area eagerly publishes the negative comments. The Task Force is a defined group that the press can contact to find out why the project is being supported by the government.

Provide public transportation. The MBTA provides bus services to Salem, Danvers, and Marblehead. The towns make a contribution to MBTA for this service. All of the routes but one serve commuting trips destined for Boston. The other route connects Salem with Danvers. Salem also has a commuter rail station, connecting it with Boston.



The North Shore Transportation Task Force supports capacity increases to public transit services available in the area.

### **Government Planning Failure in Land Use**

Are the governmental units too small? Marblehead, Salem, Peabody, Danvers, and Middleton are all small governmental units. The following table gives population, employment, land area, and fiscal statistics for the four municipalities.

Figure 13. Population, employment, land area and fiscal statistics of Route 114 municipalities.

Item	Marblehead	Salem	Peabody	Danvers	Middleton
1985 Population <sup>1</sup>	20,199	38,163	44,400	24,100	4,500
2010 Population Forecast <sup>1</sup>	18,680	41,250	43,550	23,690	5,700
Percent Change	-7.5	8.1	-1.9	-1.7	26.7
1985 Employment <sup>1</sup>	4,765	19,636	17,594	19,018	2,674
2010 Employment Forecast <sup>1</sup>	4,820	20,010	24,050	24,660	3,050
Percent Change	1.2	1.9	36.7	29.7	14.1
Land Area <sup>2</sup> (in square miles)	4.40	7.99	16.45	13.64	14.28
Taxable Property <sup>2</sup> Fiscal Year 1988 (Value in \$1000; Rate per \$1000 assessed value):					
-Total		<b>% of Total</b>	<b>% of Total</b>	<b>% of Total</b>	<b>% of Total</b>
Valuation	1,453,100	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Potential Tax Revenue	18,744,990				
-Residential					
Valuation	1,351,600	<b>93</b>	<b>65</b>	<b>71</b>	<b>64</b>
Tax Rate	12.90				
Potential Tax Revenue	17,435,640				
-Commercial/Industrial					
Valuation	95,900	<b>7</b>	<b>20</b>	<b>30</b>	<b>34</b>
Tax Rate	12.9				
Potential Tax Revenue	1,237,110				
Levy Limit Exclusions <sup>3,4</sup> (Value in \$1000)	FY 89 38	None	None	None	None
Levy Limit Overrides <sup>3,5</sup> (Value in \$1000)	Attempted but defeated	None	None	None	None
Excess Capacity <sup>3,6</sup> (Value in \$1000)	35	3	4,100	1,500	145
Excess Capacity as a % of <sup>3</sup> Levy Limit	negligible	negligible	11.7	6.5	3.4

<sup>1</sup> Carnahan, Population and Employment Outlook.

<sup>2</sup> Massachusetts Municipal Profiles.

<sup>3</sup> Massachusetts State Department of Revenue, Division of Local Services.

<sup>4</sup> An exclusion is a temporary assessment over the levy limit.

<sup>5</sup> An override is a permanent change in the levy limit.

<sup>6</sup> Excess capacity is the difference between the levy limit and the levy ceiling.

The MAPC current population estimate and the 2010 population forecast show municipalities of roughly the same population size; small municipalities ranging from 20,000 to 44,000, with the exception of Middleton which is less than 10,000. Three of the municipalities are expected to decline in population between now and 2010. Middleton has the highest rate of growth, 27 percent between 1985 and 2010.

The MAPC forecasts for employment growth to the year 2010 indicate that each municipality will be growing. Marblehead and Salem have little projected employment growth, while Peabody, Danvers, and Middleton all have substantial projected growth. Peabody is expected to grow the fastest, at a rate of 37 percent between 1985 and 2010. Peabody has 400-500 acres of developable land at the intersections of Route 114 with Routes 95 and 1.

The municipalities have different land areas, and the differences in employment do correlate with differences in land area; the municipalities with larger land areas are those projected to have employment growth. They are also the municipalities that are less densely developed.

Marblehead has almost all of its taxable property base in residential property and so residential property represents over 90 percent of its property tax receipts. The tax rate is the same for residential and commercial/industrial properties. Marblehead is the only town to have passed a levy limit exclusion, but was unsuccessful in passing a levy limit override to overcome the constraints of Proposition 2 1/2.<sup>1</sup> It is taxing at its levy ceilings, i.e., the maximum it can tax under Proposition 2 1/2.

Middleton has three-fourths of its property tax base in residential property and the same portion in tax receipts, as the tax rate is the same for residential and

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<sup>1</sup> The Massachusetts State Legislature passed Proposition 2 1/2 in 1983. The law restricts any municipality from levying more than 2.5 percent of the value of real and personal property in the municipality (the levy ceiling). In addition, the municipality cannot increase its levy by more than 2.5 percent each year (the levy limit) unless there is growth in the tax base from new construction or the residents vote to override the levy limit. In no case can the levy limit exceed the levy ceiling. See Chapter 1 on tax base sharing for more detail.

commercial/industrial properties. Middleton has had one override of Proposition 2 1/2 defeated and is attempting another one. Middleton is taxing very close to its levy ceiling.

Salem has 65 percent of its property base in residential property. It represents approximately 48 percent of tax receipts because it is taxed at one-half the rate of commercial/industrial property. Salem has passed no levy limit exclusions or overrides. Salem is taxing at its maximum levy ceiling.

Peabody and Danvers both have their property tax base split roughly as two-thirds residential and one-third commercial. The commercial tax rates are only 10-15 percent higher than the residential rates, so residential property receipts exceed those of commercial receipts. Peabody and Danvers have passed no levy limit exclusions or overrides, and have significant excess capacity. Peabody's excess capacity is 12 percent of its levy limit.

The situation on Route 114 appears to be one where the governmental units to approve development (and secure tax base increases) are too small to also be accountable for the traffic generated by the new development. It is very unlikely that the residents of one municipality actually work in the same municipality. Most of the new commercial development will attract workers from the metropolitan area.

Peabody and Danvers are both situated to take advantage of major expressways. Peabody has Routes 1, 95, and 128 passing through it (including where Route 128 intersects with Route 114). It feels like a city divided by Route 128. Danvers has Routes 1 and 95 (where both routes intersect with Route 114). Both of these towns would like to make maximum use of these transportation nodes.

Ad hoc committees. The North Shore Transportation Task Force is now proposing to function as a body that reviews developments that will have regional impact. The Task Force approved this voluntary process through a memorandum of understanding. The stated objective is to ensure that traffic growth does not outstrip the capacity of the road network. The regional review is a voluntary process in which the developer of any commercial project over 25,000 square feet could meet with the Task Force to review the

scope of traffic issues related to the development. The developer will be asked to make a voluntary contribution of five dollars per 1000 square feet in order to pay for the staff costs to conduct the regional review. While the Task Force review is advisory only, it is aimed at providing a method to coordinate the MEPA review at the state level with the local review. The mitigation recommendations of the Task Force could become conditions for approval at the state or local levels. To conduct the regional review, meetings will be held with the developer, local officials from the municipality where the development is occurring, Task Force staff, and representatives of MEPA, MDPW, and the district highway office. Even when the development does not require state approval, the local permit requirements can trigger the regional impact review.

Using land regulation powers to make an efficient land use and transportation pattern. The municipalities on Route 114 retain the major development approval authority; the regional impact review serves only to coordinate recommendations on traffic mitigation measures. The municipalities are making some efforts to improve their use of that authority in order to make land use development more compatible with the existing transportation infrastructure. The major initiative underway in Peabody, Danvers, and Middleton is rezoning land on Route 114. Marblehead and Salem do not have any major initiatives on development on Route 114 because the route is already fully developed.

Peabody has zoned the section of Route 114 west of Route 128 business regional, meaning it hopes to attract large scale commercial business that would serve a regional market, such as the existing North Shore Shopping Center development. This segment of Route 114 could be accessed by Routes 1, 95, and Route 128.

Danvers had a one year development moratorium on Route 114 to evaluate the existing zoning. The town replaced what it considered too liberal an industrial zone with two new zones that are more restrictive, with the objective of reducing potential traffic generation in the area. Danvers is hoping to steer Route 114 development away from highway commercial to office and research and development uses.

Middleton has quite a bit of development potential on land abutting Route 114. But without a town planner, there is little long range planning occurring. The current planning initiative in Middleton is to modify the residential cluster development regulations. The next planning initiative should be a rezoning of Route 114.

Comprehensive planning to link zoning to a masterplan is not being actively pursued in Route 114. Most of the masterplans of the area are at least ten years old:

<u>Item</u>	<u>Marblehead</u>	<u>Salem</u>	<u>Peabody</u>	<u>Danvers</u>	<u>Middleton</u>
Date of Last Masterplan	>10 years ago	1979	1981	1960s	1965

Marblehead is the only municipality currently working on a masterplan.

### **Summary of Route 114 Initiatives**

The first figure below repeats the framework; it is followed by a summary of Route 114 congestion alleviation initiatives using the framework.

Figure 14. Route 114 summary.

	Transport	Land Use
Market Failure	Congestion effects are not priced.	Trip generation is underpriced.
Government Planning Failure	Gov't permits unlimited use of roads, encouraging excessive demand.  Gov't is not providing enough roads to meet all of the travel demand.	Powers to plan land use are delegated to too small a spatial and fiscal unit. Zoning powers & approvals are not creating efficient land & trans. patterns.

	Transport	Land Use
Market Failure	No initiatives.	State: MEPA review & curb cut review. All municipalities: permit review. Peabody: impact fee proposals.
Government Planning Failure	No major initiatives.  North Shore Task Force prioritization of improvements.	North Shore Task Force will review developments of regional impact.  Peabody & Danvers: rezoning. Middleton: plans rezoning.

In the Route 114 corridor, the municipalities want to solve congestion problems by widening the corridor, where it is possible. The municipalities work together in an ad hoc committee to compile a list for the State of their preferences for transportation improvements. The State is willing to make the improvements to existing rights-of-way insofar as it can manage and fund road improvements.

The municipalities are just beginning the process of managing land development based on its impact on the transportation system--which the State encourages in order to reduce the demand for new facilities. Since all of the municipalities want to encourage commercial development, they will likely work more at getting developers to pay for improvements than to require them to reduce the trips coming to their site. The potential of rezonings to change development patterns remains to be seen.

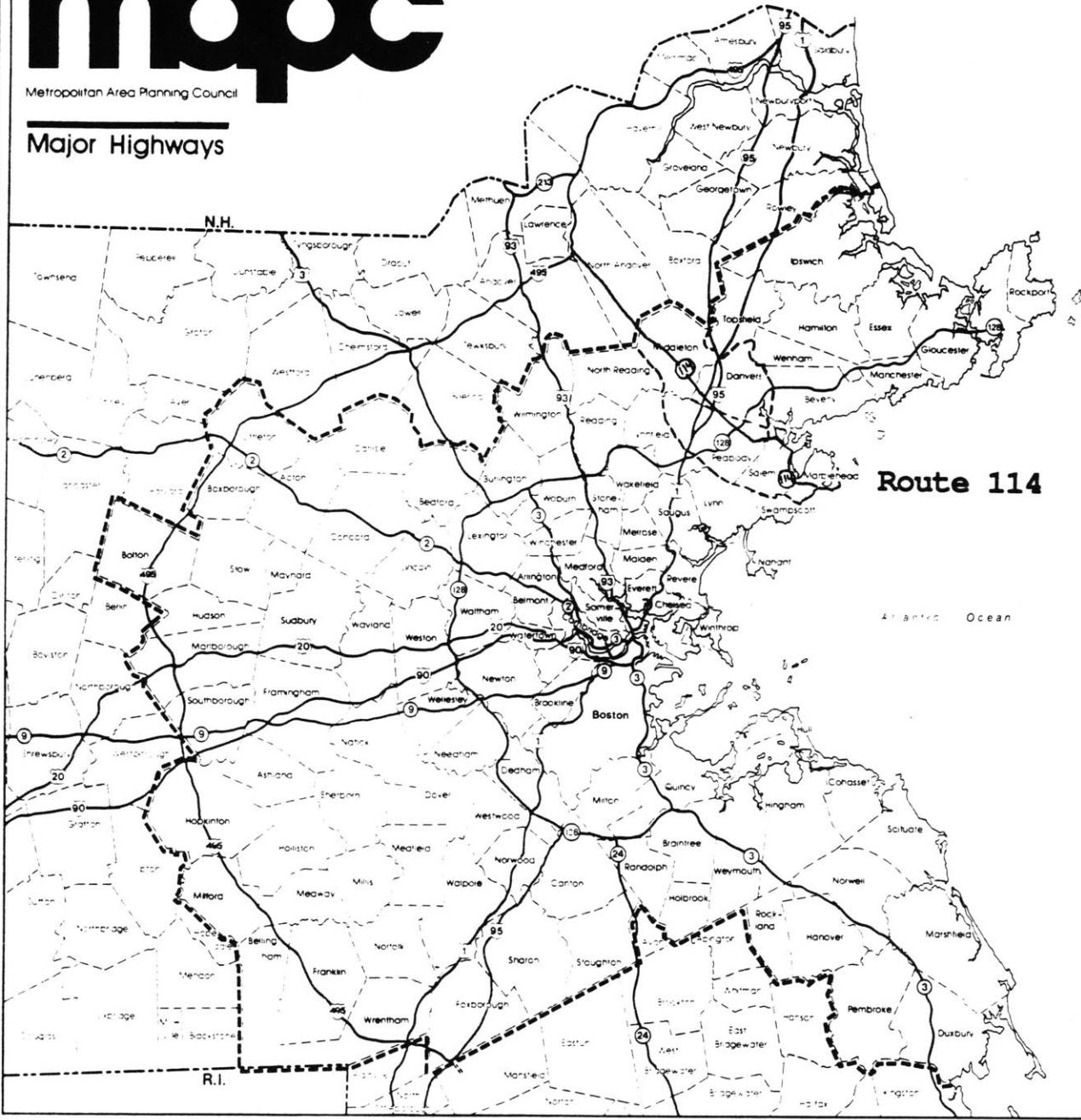
Since Peabody and Danvers have major expressway traversing their borders, commercial development concerns are more focused on these expressways than on Route 114. For Marblehead, Salem, and Middleton, Route 114 is the major transportation route.



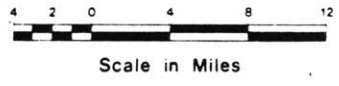


Metropolitan Area Planning Council

### Major Highways



Route 114



- Interstate
- U.S. Routes
- State Routes
- MAPC boundary



Source: Massachusetts Dept of Public Works

Drawn: September, 1978.

## CHAPTER 5

### THE FRAMEWORK AS A MODE OF ANALYSIS

#### **A Framework for Viewing Suburban Congestion**

Both the market system and the government are involved in transportation and land use activities that affect the level of traffic congestion in a metropolitan area. The market activities are as transportation user and land developer: private automobile owners choose when they will drive their cars and land developers choose sites to develop new commercial buildings on. The related government activities are transportation provider and land use regulator: the government builds and operates most highway and mass transit systems and it adopts zoning ordinances which set the pattern for land uses. In carrying out these four activities, the market system or government planning may fail, creating conditions for traffic congestion. A description of possible failures is:

1. A market system failure in transportation. Road users are not paying the congestion cost of their road use.

Road users do pay for the majority of their transportation costs--the car, insurance, maintenance, gasoline, gasoline tax--but they do not pay for the congestion cost of their trips. The congestion cost is that one driver's use of the road detracts from the use of other drivers.

2. A market system failure in land use. Developers are not paying for the traffic impacts of their development projects.

Developers pay for the land, construction, utility connections, and site related road improvements when they develop land. They typically do not pay for the congestion impact that the trips generated by their development will have on traffic upstream and downstream from their development.

3. A government planning failure in transportation. (a) The government is permitting unlimited use of roads and thereby is encouraging excessive demand or (b) the government is under supplying the road capacity necessary to meet the demand for travel.

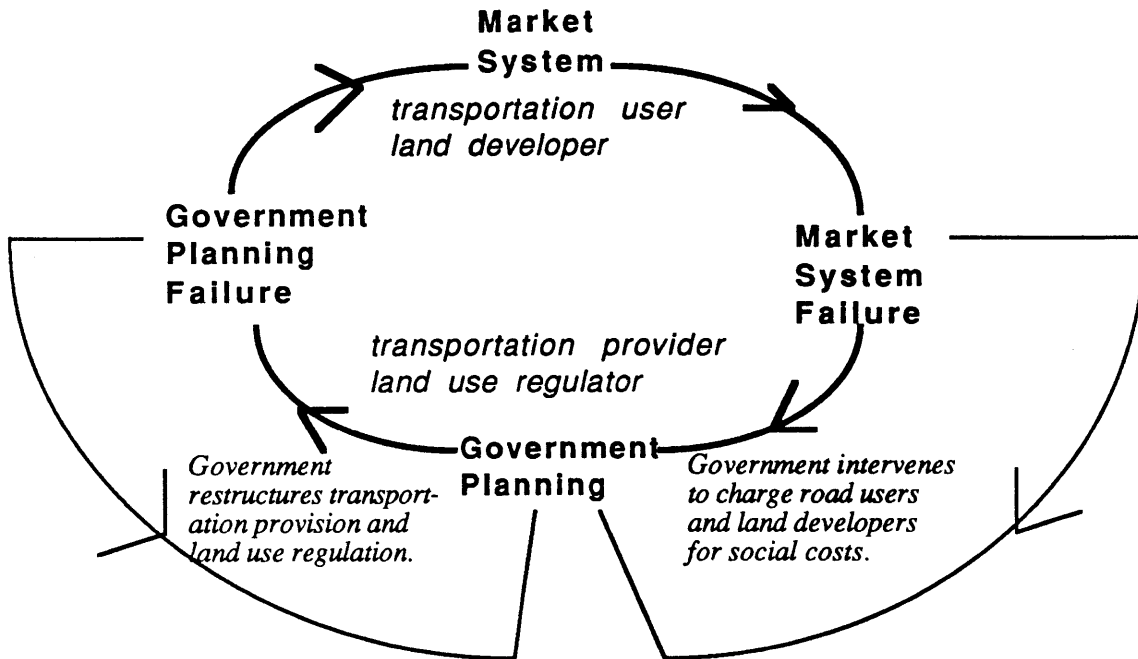
The government provides roads as a public good, yet it has the option of restricting use of the roads through road user charges or requirements for high levels of vehicle occupancy. The government also has the option of determining how much road building will take place: as much as it determines feasible or as much as travel demand requires.

4. A government planning failure in land use. The government is not creating a land use pattern that is well coordinated with transportation infrastructure because: (a) The powers for land use planning are delegated to too small a spatial (land area) and fiscal (taxing authority) unit, or (b) zoning powers and the development approval process are not working to create an efficient land use and transportation pattern within a community.

Land use regulation is usually delegated to the smallest local governmental unit, typically a city or county. The smaller the land area of the governmental unit the greater is the likelihood that the benefits of development (tax base increases) are imbalanced with the cost of development (traffic congestion increases). That is to say, one jurisdiction benefits from the development, but several others share the burden of the traffic the development generates. So the government has the option of re delegating land use planning authority to a governmental unit covering a larger land area. Or the government can maintain land regulation at the local level, but improve the process so that it creates an efficient land use and transportation pattern within respective localities.

The figure below illustrates the failures and what actions the government could undertake to solve both the market system failures and the government planning failures: (a) the government intervenes to charge road users and land developers for the congestion costs of their activities or (b) the government restructures its activities as transportation provider or land use regulator in order to adjust transportation supply and land use patterns.

Figure 15. Cycle of failures in suburban congestion.



The figure shows that the nature of the market system and of government planning has led to the market having the roles of transportation user and land developer and the government having the roles of transportation provider and land use regulator. Suburban congestion suggests there is a secondary round of failures: the market isn't paying for the congestion costs of road use or land development and the government isn't effectively providing transportation or regulating land use. To deal with the second round of failures, several policies can be implemented. In general, the policies require the government to intervene to overcome the market failures and the government to improve its operations to overcome the government planning failures.

The chart below associates policies commonly proposed to alleviate suburban congestion with the failure they would help to correct. The title in bold letters is the general description of the correction; policies that work toward that correction are listed underneath. For example, a market system failure in transportation is corrected by policies to charge road users for congestion costs, such as a policy to install toll gates on highways. Some policies are associated with more than one failure category because the policy has multiple effects. (For complete descriptions of the policies, see Chapter 2.)

Figure 16. Summary of policies to alleviate suburban congestion.

	Transport	Land Use
Market System	<p><b>Charge road users for congestion costs</b>            Toll gates            Increase in gasoline tax            Electronic pricing of road use            Area licensing scheme            High parking fees            Increased automobile ownership charges</p>	<p><b>Charge land developers for traffic impact of development</b>            Negotiated agreements and exactions            Transportation impact fees            Areawide transportation fees            Trip reduction requirements            Parking reduction requirements</p>
Government Planning	<p><b>Restrict road usage</b>            Charge road users            Scale back road building            Encourage higher vehicle occupancy rates</p> <p><b>Increase road capacity</b>            Increase revenue to build new roads            Allow and arrange private construction and ownership of some roads            Organize road building to mitigate opposition            Give municipalities more authority to design highways            Provide public transportation</p>	<p><b>Change the governmental unit making land use decisions</b>            Subregional committees            Formal negotiations            Tax base sharing            Empower a regional planning authority            Increase capacity of existing roads            State land planning</p> <p><b>Improve the zoning and approvals process at the local level</b>            Tighten loopholes in the approvals process            Downzone land in congested corridors            Increase planning coordination with municipalities            Adopt an adequate public facilities ordinance            Rezone land to allow higher densities where infrastructure is most developed            Increase mixed use zones            Performance zoning</p>

Next, I will explain how the policies in any one category to alleviate congestion can work to make the market or government activities of that category more efficient. In order to simplify the discussion about the policies, I abbreviate the policies into the following form.

Figure 17. Suburban congestion alleviation categories.

	Transport	Land Use
Market	<p><b>1</b> Efficient Road Users' Travel Choice</p>	<p><b>2</b> Efficient Developers' Location Choice</p>
Government	<p><b>3</b> Efficient Transportation Supply</p>	<p><b>4</b> Efficient Land Use Regulation</p>

Let me summarize each of these in turn.

1. A market system failure in transportation resolved through efficient road users' travel choices.

Correcting a market system failure in transportation means pricing the road trip so that it reflects the congestion cost of a trip. If the trip is priced to include congestion costs, road users' travel behavior will change so that drivers make fewer trips, make more shared ride trips, or make more trips using public transportation. The overall effect of increasing the cost of the trip would result in a decreased demand for road facilities.

The short run effect of this policy is to alleviate current congestion through changes in travel behavior. The long run and secondary effect of the policy might be to influence locational decisions of firms and workers as they try to avoid costly trips.

These policies also generate revenue. The road user fees should be set at a level to pay for: (a) at least the cost of implementing and administering the program, (b) an additional amount that appears to increase the intended reduction in tripmaking without being excessively burdensome to drivers, and, possibly, (c) an additional amount to cross-subsidize other congestion alleviation efforts. The cross-subsidization of transportation programs which provide an alternative to the drivers who are trying to avoid the high cost of drive alone commutes, such as ridesharing and mass transit, enhances the congestion alleviation effects of road user charges.

The constraints on this corrective measure are that advances need to be made in technology to find ways to record trips without increasing congestion. In addition, since almost every road user is a voter, approval for road user fees may be difficult to get.

2. A market failure in land use resolved through efficient developers' locational choice efficiency.

Correcting a market system failure in land use involves pricing the land development so that it includes its impact on transportation infrastructure and traffic levels. If the land development is correctly priced to include congestion costs, developers would have a disincentive to develop in areas that are highly congested or have less-developed transportation infrastructure. Developers' locational choices might be moved to areas where the infrastructure can support additional trips, lessening the demand on the overall transportation network.

The short run effect of this policy is to make improvements to existing transportation facilities to support the trips generated by new development, using funds of private developers. The long run effect of this policy is to influence locational decisions of developers as the increased costs of developing land in outlying or congested areas could discourage developers from locating in those areas. Developers choose locations based on the economic advantages of the location reduced by the costs of development at that location. If the economic advantages outweigh the development costs, firms will continue

to locate in the congested or outlying areas. But if the economic advantages do not outweigh the development costs, firms will shift to different locations.

These policies also generate revenue. The revenue could be used for: (a) costs to implement the program, (b) improvements to existing roads that increase capacity and (c) cross-subsidization of other congestion relief efforts with funding shortages, such as ridesharing programs or mass transit.

The constraint on this corrective measure is that it can only be used in a locality with a strong economy. Under reasonably good economic conditions, developers may be willing to pay the congestion costs of their development, but under poor economic conditions they will move their development to another locality. If a locality is seeking new commercial development to increase its tax base, it will not want to give disincentives for development within its borders.

3. A government planning failure in transportation is resolved through an efficient transportation supply.

Correcting a government planning failure in transportation involves getting the right supply of transportation with the right restrictions over transportation usage. Policies can either seek to regulate use of the roadways to reduce the demand for additional capacity or to increase capacity to meet the unregulated demand for travel.

If capacity is not increased in congested areas, there may be severe congestion in the short run until individual travel choices and firm locational choices change over the long run. If capacity is increased, there will be relief from congestion in the short run, however, the new capacity could perpetuate the trend for increased travel and increasingly distant development over the long run, which could mean a return to preexisting congestion levels.

The constraint on a policy to restrict road usage without increasing capacity is political. Many voters will not be willing to endure the short run effects of severe traffic congestion or will not be willing to change their travel behavior. The constraints on



policies to increase capacity are financial (coming up with the necessary revenue) and environmental (public opposition to increased highway building and automobile use).

4. A government planning failure in land use is resolved through efficient land use regulation.

Correcting a government planning failure in land use involves improving the process in which land development is planned and approved, with a strong purpose to coordinate land use better with available transportation capacity. This could occur either by re delegating the land use planning authority to a larger geographic jurisdiction or improving the way local planning is done.

In the short run, not much congestion relief can come from these policies because the planning process mainly affects future development. In the long run, improving execution of land use planning powers can bring development into balance with transportation infrastructure.

The constraints on this corrective measure are mostly political. Land owners are hesitant to give the government authority over how land is developed, which is one reason planning at the local level may already have a hard time rezoning, downzoning, or master planning. An even worse scenario for the land owners is that the land use regulation authority shift to a higher level of government which they feel will have less concern for their individual needs.

### **Using the Framework to Analyze Different Suburban Congestion Contexts**

In the next section, I will use the framework as a mode of analysis to explore which policies might fit a particular congestion context. In total, I describe ten scenarios: action is possible in only one policy area (1, 2, 3, 4--numbers refer to the figure above) and action is possible in two of the four policy areas (1&2, 3&4, 1&3, 2&4, 2&3, 1&4).

a. Congestion Scenario A: policies in box 1 only.

	Transport	Land Use
Market System	<b>1</b>	
Government Planning		

Suppose road users seem willing to pay road users charges, believing that it will keep unnecessary trips off the road. At the same time, new firms need to be recruited to the area to strengthen a weak economy, the state road program is financially strapped, and local governments want to exercise little land use control over developers.

Policies to alleviate congestion would then be concentrated on achieving road users' travel choice efficiency, box one, as the other policies are economically or politically infeasible. The state government is the principal actor to set up a road pricing scheme, like electronic pricing. The short run effect is to modify people's travel behavior--some people switch to carpools, others avoid travelling during the peak hour--and the long run and secondary effect is to encourage people to live closer to the places they travel to--workers live closer to their jobs and students live closer to their schools.

Congestion could be reduced under this scenario, but the urban form resulting from land development decisions would influence the amount of the reduction.

b. Congestion Scenario B: policies in box 2 only.

	Transport	Land Use
Market System		<b>2</b>
Government Planning		

Suppose land developers are willing to pay for road improvements so long as the improvements directly benefit their developments. At the same time, the state is hesitant to implement unpopular road user charges, the state road program is financially strapped, and local governments want to be free of higher level interference as they make their land development approval decisions.

In this scenario, the state or local governments require developers to pay fees to cover the cost of road improvements or to reduce the number of trips coming to the site each day. Over the short run, incremental improvements are made to the road network capacity and development is delayed only by road construction requirements. As soon as the economic climate in some localities weakened, development might shift away from places where the fees are the heaviest, i.e., places where the infrastructure is relatively undeveloped or traffic is now experiencing a low level of service.

Congestion is dealt with in the short run in this scenario, but policies are usually only a stop gap measures to give government agencies time to plan a better alternative for dealing with a congestion crisis.

C. Congestion Scenario C: policies in box 3 only.

	Transport	Land Use
Market System		
Government Planning	<b>3</b>	

Suppose that the state is reevaluating its road program: should it just finish current plans or should it begin an ambitious new road building program? At the same time, metropolitan drivers feel strongly that roads are a public good that should be freely

available, developers are being recruited to strengthen a weak economy, and local governments want to exercise little land use control over developers.

The state must then decide to control travel demand through using programs--ride matching, high occupancy vehicle lanes, etc.--to increase vehicle occupancies or to build more road capacity. In this scenario, the financing of the new roads would need to come from traditional sources, such as the gasoline tax or property taxes.

In this scenario the state would find it difficult to assume all of the responsibility for alleviating congestion. Road users are unlikely to comply with the states efforts to increase vehicle occupancy and new road building could be stopped because of opposition to the social and environmental impacts of the new roads and because of inadequate funds to pay for the roads. Over the long run, the state will grow weary of trying to solve the congestion problem without any strong initiatives to change urban form.

d. Congestion Scenario D: policies in box 4 only.

	Transport	Land Use
Market System		
Government Planning		4

Suppose state and local governments are looking to each other to improve the land development approval process in order to channel development to areas where the transportation infrastructure has the most excess capacity to service new trips. At the same time, road pricing doesn't seem administratively feasible, there is no agreement in the metropolitan area about how to charge developers and so no policies are forthcoming, and the state is financially unable to make any changes to the existing road program.

The state might then support efforts of subregional groups to adopt cooperative agreements among the jurisdictions sharing a transportation corridor so that rezonings result in each jurisdiction benefiting proportionately from new development while bearing a proportionate burden of the traffic generated by new development.

In this scenario, the future of service levels in the metropolitan area could be kept from worsening, but political pressure may mount as planning efforts will have no immediate effect on the existing levels of traffic congestion. Eventually, the political pressure may require policy actions in one of the other boxes.

e. Congestion Scenario E: policies in boxes 1 and 2 only.

	Transport	Land Use
Market System	<b>1</b>	<b>2</b>
Government Planning		

Suppose the government leadership thinks that congestion needs to be solved through corrections in the market system, and road users show a willingness to pay for their road use and land developers are willing to pay for traffic improvements to accommodate the traffic their development generates. At the same time, the state government is not able to establish a plan for new roads and local governments are unwilling to work with the state or other local governments to plan land use at a regional level.

The state government would then select a way of increasing road user charges, such as increasing the number of toll roads and local governments would establish impact fee programs, preferably with coordination at the subregional level. The tolls would likely be used to fund non-road transportation projects (like mass transit) until the state came up with

a new transportation plan, and development transportation impact fees would be used to pay for incremental improvements to the road system.

Drivers would reduce tripmaking somewhat in reaction to the tolls adding to the cost of their trip, and the transportation improvements provided by new development would help to mitigate the traffic impacts of the new development. However, the state would have a difficult political task of charging road users without doing a better job of planning the transportation supply for them. The local governments would be successful at charging transportation impact fees as long as the economic benefits of developing in the area outweighed the development costs.

F. Congestion Scenario F: policies in boxes 3 and 4.

	Transport	Land Use
Market System		
Government Planning	<b>3</b>	<b>4</b>

Suppose the state government is motivated to act to make improvements in the transportation supply and local governments are motivated to act to improve the land use development process in order to coordinate development with transportation infrastructure. At the same time, the political ideology of the metropolitan area is that no additional interferences should be made in how the market system operates: roads are a public good so road users shouldn't be charged and land development should occur without any added charges.

The responsibility is then on the government to improve the way it supplies transportation infrastructure and the way it regulates land development. The state government either scales back transportation supply coordinated with efforts to increase

vehicle occupancy rates or it makes substantial increases to the transportation network. If the state scales back transportation supply, it would be best for land development to be approved at the metropolitan level in order to make the most efficient use of the existent road capacity. If the state increase the transportation supply, land development could remain at the local level, but improvements could be made within a municipality to make better land use decisions in relation to the existing and new transportation capacity that is supplied by the state.

In this scenario, the government takes the full responsibility to alleviate traffic congestion. Alleviation will not be forthcoming in the initial years, but alleviation would come in future years because of the improved planning by state transportation agencies and local planning agencies. Some efforts would need to be made to keep political pressure, arising from current congestion, from stalemating plans that would improve the future situation.

g. Congestion Scenario G: policies in boxes 1 and 3 only.

	Transport	Land Use
Market System	<b>1</b>	
Government Planning	<b>3</b>	

Suppose the majority of people feel that congestion is solely a transportation problem. Road users are willing to pay road user charges, but only if the government uses the funds to build enough road capacity to keep traffic congestion at a reasonable level of service. At the same time, no initiatives to make developers account for the traffic impact of their development or to improve land use regulation seem promising.

The state government could then determine its transportation supply according to the road users' willingness to pay for additional capacity, i.e. the funds received through toll charges or an increased gasoline tax. The government will need to determine some techniques for determining what the balance is between road supply and willingness to pay. The government may also need to overcome political opposition to road building or the lack of road building, i.e., some people won't agree with the level of road building that is decided on and some people will object to road user charges which are uncommon in the United States.

This combination of policies, if successfully administered, should result in a balance between the transportation supply and road usage over the long run, even though there may be congestion during some years in which the roads are still being built to meet the travel demand. If willingness to pay is very high, the government may end up building more roads than it feels is environmentally sound.

h. Congestion Scenario H: policies in boxes 2 and 4 only.

	Transport	Land Use
Market System		<b>2</b>
Government Planning		<b>4</b>

Suppose most people feel that the root of the congestion problem is in urban form, that development has spread at such a low density that the transportation system can never keep up with the demand for travel. Initiatives to charge developers for the traffic impact of their developments and initiatives to plan land use at a regional level seem promising. At the same time, there is no public support for restrictions on road use through charges or requirements for high occupancy of vehicles. In addition, the state transportation



department is unable to make any major changes in the metropolitan area's transportation program.

The policy direction would be to give authority to the metropolitan planning agency to review developments large enough to have a regional impact on the transportation system. These developments would be required to pay fees to make transportation improvements or to reduce the trips travelling to the site during the peak hours of travel. In addition, the metropolitan planning agency would work to coordinate local plans so that they channel development to areas where the transportation infrastructure is well-developed and there is some excess capacity; this would include both road capacity and public transportation capacity. In order to resolve conflicts that might occur as the municipalities are allotted different amounts of development, a form a tax revenue sharing could be implemented so that each municipality benefits somewhat from development, whether or not the development is located in its borders.

This combination of policies could provide a future urban form that would get the maximum utility from the existing transportation infrastructure, however it would not alleviate current congestion problems. It is also likely that over the long run, these strong efforts to change urban form would require that equivalent efforts be made on the part of the state transportation agency to coordinate the transportation system with the land use pattern that is created. There may also be opposition to the type of urban form that is created; it might not meet the desires of the public.

i. Congestion Scenario I: policies in boxes 2 and 3 only.

	Transport	Land Use
Market System		<b>2</b>
Government Planning	<b>3</b>	

Suppose that developers seem willing to pay for transportation improvements that benefit their development and the state transportation agency is willing to make road improvements and build new roads to the level that development is willing to pay for them. At the same time, road users show negative responses to road user charges and local governments show opposition to changes in land use regulation.

The state government could then determine the transportation supply according to the developers' willingness to pay for additional capacity, which would be fairly easy to determine. The government, however, may need to overcome political opposition to road building or the lack of road building, i.e., many people won't agree with the level of road building that is decided on.

In this scenario, congestion would be relieved in the areas immediately surrounding new developments, but congestion on road segments distant from any new developments would not be alleviated.

j. Congestion Scenario J: policies in boxes 1 and 4 only.

	Transport	Land Use
Market System	<b>1</b>	
Government Planning		<b>4</b>

Suppose drivers are willing pay road user charges in hopes of getting unnecessary trips off the road and local governments want to work together at the sub-regional level to determine where and how much new development should take place in order to curtail increases in congestion levels. At the same time, the economic climate of the area is not strong enough to allow the government to exact improvements from developers. And the state transportation agency is not providing any new initiatives on the state transportation program.

Policies implemented in this situation would work in different domains: usually road users and actors in the planning process have little direct involvement. However, if road user charges reduced the demand for travel and land use regulation led development to areas where transportation infrastructure was best developed, then the achievements of the two policies would be mutually enhancing.

In this scenario, current congestion problems would be alleviated by changes in travel behavior brought on by the increased cost of driving. Some future congestion problems could also be curtailed through improvements to land use regulation that channel development to areas where the infrastructure is most developed.

I have presented these scenarios as examples of the utility of the framework in clarifying the analysis of policies that will work in a given political and economic context to alleviate suburban congestion. I hope that the framework is useful to any community that is trying to form a set of policies to alleviate suburban congestion.

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## APPENDIX



COMMUTE FORUM SURVEY

1. Select the title in each of the two columns below that best describes your interest in commuting in Metropolitan Boston.

Level of Concern		Your Role	
a. Municipal	24%	10%	a. Elected Official
b. Regional	62%	52%	b. Public Servant
c. State	10%	37%	c. Private Enterprise

2. Which of the following do you feel is the greatest threat to mobility (circle only one):

- A. Inability to fund and build new roadway capacity. 8%
- B. Lack of availability of commute alternatives (rail lines, buses, carpooling). 11%
- C. Lack or underutilization of mass transit alternatives (rail lines, buses, carpooling). 17%
- D. Lack of strategy in parking development, both restrictions on parking in congested areas and the siting of fringe parking. 17%
- E. Employment and retail activity centers, both new and existing, that generate large amounts of traffic. 2%
- F. Zoning that segregates land use and thereby requires people to make many trips to meet all their needs. 5%
- G. Zoning ordinances and site plan review requirements that allow developments to spread out over large land areas at low densities. 14%
- H. Other \_\_\_\_\_ 16%

3. Which of the following strategies do you support to alleviate congestion?

	YES	NO
A. Widening of existing roads	32%	49%
B. Improving intersections	83%	6%
C. Private financing of new roads	48%	33%
D. Metering ramp entrances on the expressways	54%	24%
E. Upgrading rail system	90%	3%
F. Extending the rail system	83%	3%
G. Increase frequency of bus service	70%	16%
H. Expand bus route coverage	70%	N/A
I. Limit total trip generation of new development	62%	25%
J. Provide employer tax incentives for trip reduction programs	76%	11%
K. Create mixed use zones	65%	11%
L. Increase development densities in locations of concentrated transportation infrastructure	71%	11%
M. Provide employee tax incentives for use of public transit	76%	16%
N. Parking limitations (surcharges, reduction of spaces, etc.)	60%	30%
O. Creation of high occupancy vehicle lanes on expressways	79%	11%
P. Other _____		

4. In the list of strategies in question #3, which three do you support the most (please use the corresponding letter)?

$\frac{E}{1}$        $\frac{M}{2}$        $\frac{F}{3}$

5. Which of the following do you perceive to be the greatest obstacle to the strategies you selected in question 4 (circle only one)?

- A. Cost of strategy exceeds available funds 14%
- B. Political climate 22%
- C. Individual preferences for private automobile travel 22%
- D. Not-in-my-backyard syndrome 8%
- E. Lack of regional political power base to implement strategy 24%

6. Are you willing to support any of the following actions in order to improve the mobility situation?

	<u>YES</u>	<u>NO</u>
A. Tax increase	<u>57%</u>	<u>30%</u>
B. Imposition of new tolls on selected roads	<u>48%</u>	<u>38%</u>
C. Congestion pricing on selected roads	<u>49%</u>	<u>27%</u>
D. Negotiated settlements on traffic and land use strategies among jurisdictions sharing the same transportation corridor	<u>87%</u>	<u>3%</u>
E. State action to coordinate municipal policies on land use and traffic demand management	<u>71%</u>	<u>11%</u>
F. Mandatory trip reduction measures on new and existing development projects	<u>65%</u>	<u>21%</u>
G. Privatization of new or existing facilities	<u>38%</u>	<u>35%</u>
H. Use of impact fees for financing highway facility expansion	<u>73%</u>	<u>8%</u>
I. Use of impact fees for financing transit expansion	<u>86%</u>	<u>3%</u>
J. Automobile use penalty fee through significant increase in gasoline tax	<u>54%</u>	<u>30%</u>
K. Other _____		

7. Are you interested in working with other local officials to:

	YES	NO
A. Develop a regional land use concept?	<u>54%</u>	<u>13%</u>
B. Establish stricter controls for access to arterial roads?	<u>35%</u>	<u>24%</u>
C. Guide site design criteria with respect to access?	<u>49%</u>	<u>13%</u>
D. Assess priorities for transportation improvements?	<u>60%</u>	<u>11%</u>
E. Create a strategy for siting fringe parking in a manner which is fair to host communities?	<u>56%</u>	<u>10%</u>
F. Develop new transit services for an area where there may be private support?	<u>54%</u>	<u>8%</u>

Optional

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

TELEPHONE NUMBER: \_\_\_\_\_

AFFILIATION: \_\_\_\_\_