

DEVELOPMENT RANGES FOR THE INTERSTATE
ROUTE 495 AREA AND IMPLICATIONS
TO GENERAL PHYSICAL PLANNING

by

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Acknowledgements are never very adequate. They are only partially sufficient. Often-times prosy.

Nevertheless.

To my Parents, to Nancy for general but very special support. To Professor Howard for his valuable help and criticisms. To Professor Fleisher for his ideas, his long-hours, his long-suffering.

Gratitude

Abstract

Highway impact studies continue to multiply. It has been observed that the wide variations in purpose, scope, and method have made difficult any generalizations from conclusions of specific studies. This thesis is an attempt to identify the physical planner as a prospective user of a particular highway impact study. Specifically, the thesis asks the questions what possible impacts may occur for the Area near Route 495, and Outer Circumferential in the Boston Region; these based upon observations of development around Route 128, and older Inner circumferential in the same Region. Then, the possible implications of the impact ranges are considered relative, on a gross level, to community physical planning.

Findings:

- (1) A remotely plausible limit of 630,000 persons and 80,000 manufacturing jobs added can be reasoned from the Route 128 experience to the Outer, Route 495, area; a more reasonable upper limit may be more nearly half of this.
- (2) Based on case studies of eight "growth" communities in the Greater Boston Area the Outer Band towns were arranged in three categories. All towns in all three categories at the limit of 630,000 added population would experience particular physical planning difficulties from this impact level. The smaller towns may be particularly troubled but this would depend upon the real distribution of population. On an average

increase of 8600 persons per town, however, all the small towns (below 10,000 population) and about half of the medium size ones would be experiencing growth additions that may be considered more than moderate.

- (3) At half of the remote "upper limit" (an addition of 315,000 persons), planning problems would be generally experienced only by the smaller communities but there would be sufficient flexibility for additions (and good reason to believe this would happen) to larger communities, (at little or no particular difficulty to them) that growth could be accommodated by all communities.

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1. Introduction

Foreword

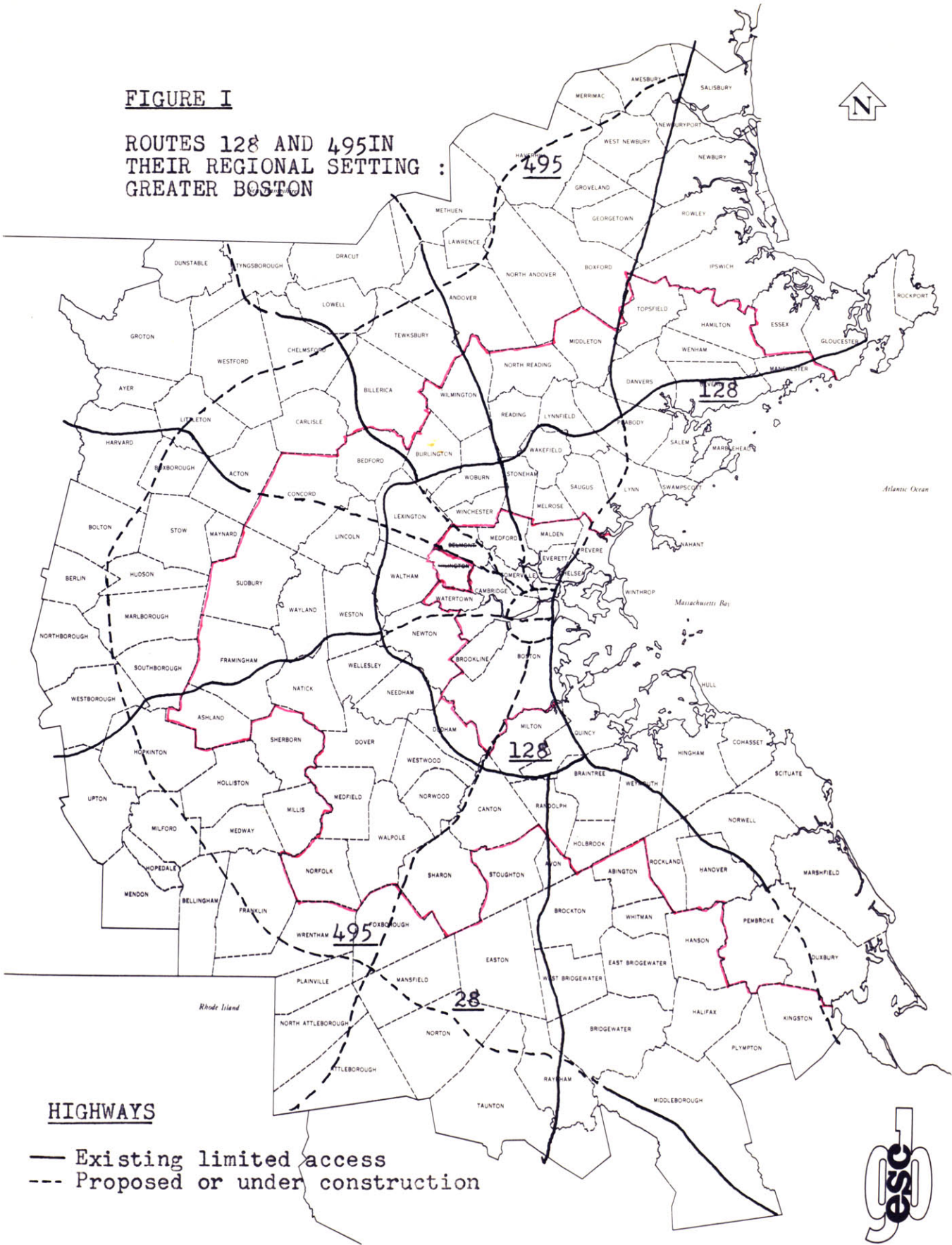
The many facets of highway impact have been a popular subject for much research and study in recent years. We are told that the wide variations in purpose, scope and method have made it very difficult to generalize from conclusions drawn from specific studies.¹ Much effort may be saved and confusion averted if we knew better who it is that uses the results of a highway impact study and what particular things investigated can best serve that user. If we know the user of these studies and the questions that would particularly require resolution for that user, then perhaps we can fix upon methods and fasten upon the more important problems that need be given close attention: to better advance, thus, the general fund of knowledge from each specific study.

The thesis attempts to assess the possible concern to physical planning at each level of a range of highway projects. The possible physical planning problems and the communities concerned at each level of impact are considered for a second proposed limited-access circumferential highway in the same metropolitan area as another for which a highway impact study is available. The thesis looks upon the highway as producing planning problems of general concern or not of general concern, to all communities, or to class of communities, in the Outer Band, at various assumptions of growth levels.

1. Commonwealth of Massachusetts, Department of Public Works, Social and Economic Impact of Highways, Review of Important Studies and Selected Bibliography (April, 1961), p.1

FIGURE I

**ROUTES 128 AND 495 IN
THEIR REGIONAL SETTING :
GREATER BOSTON**



HIGHWAYS

- Existing limited access
- Proposed or under construction



SCALE IN MILES

It is hoped that the results of this investigation may help clear, however slightly and incidentally, the possible confusion that might have arisen in the diversity of purposes, methods and scopes of highway impact studies. The investigation proceeds in a concrete case but in a fairly hypothetical and general way and proceeds, also, as only a very minor step in a succession of hopefully many.

Notes for Figure I

The red borderlines indicate:

1. the inner red line: the western border of the twelve city and town core. cf. p 15
2. The next, outer, red line indicates the western boarder of the Standard Metropolitan Statistical Area. cf. p 15
3. The whole area includes the 153 city and town are known as Greater Boston (includes the new additions of Amesbury, Merrimac, Newburyport and Salisbury). cf. p 15

In 1951 Boston's Metropolitan highway network was beginning to take form. A 22.5 mile segment of circumferential highway, Route 128, was opened to traffic. From Wakefield, a town roughly twelve miles northwest of Boston, to Wellesley, roughly twelve miles west, the new section of highway brought about forty miles of sixty-seven total miles of the planned circumferential into service.² The southern portion was completed in stages from Wellesley to Braintree in 1956 and 1960.

When the central 22.5 mile section was dedicated, it was generally felt that the limited access feature would discourage commercial or industrial development along its path.³ Some people, when the central section opened could only comment: "But it doesn't go anywhere." Notwithstanding, the highway soon became more than merely "Route 128". It was now the "Golden Ring"⁵, "The Golden Industrial Semicircle", "Miracle Highway", The Nation's Golden Industrial Incubator.⁶ Such epithets may be slightly puffy but the fact of the new highway's capacity to attract new industrial locations is readily apparent.

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2. Northern sections were completed at intervals between 1936 and 1941 and, following the War, reconstruction here was begun.
 3. A.J. Bone and Martin Wohl: Route 128 Study, Transportation Engineering Division, Department of Civil and Sanitary Engineering, Massachusetts Institute of Technology (Cambridge, Mass.: December, 1958), p7.
 4. "Boston's Golden Industrial Semicircle", Greater Boston Business, Special Supplement of 1959 (Boston: Greater Boston Chamber of Commerce), p.6
 5. Commonwealth of Massachusetts, Department of Public Works, The Massachusetts Highway Story 1949-1956. p.4
 6. "Boston's Golden Industrial Semicircle", p.1 and inside back cover.

By the end of 1960, 169 establishments (manufacturing, research and development, distribution, and service) employing some 24,000 persons and representing about \$110,000,000 were counted as visible from the highway.⁷

The highway also has been observed as accelerating a process of "filling-in between-the-radials": as a powerful force in influencing population distribution in the Metropolitan area. Before the highway was built population increases were greater in towns along high traffic radials; after the opening of Route 128, however, populations increases of substantial sizes were observed, also, in towns in-between the high traffic radials.⁸

The "filling-in" process is expected to continue and actually accelerate, further, to a distance of fifteen miles from downtown Boston, at least to 1970, in a path thus with the circumferential Route 128.⁹

While the new highway is observed as a strong factor in the location of population and industry in the Boston metropolitan suburbs, the prime function of the highway had been

7. Roger Johnson, "Route 128 Study Assesses Social and Economic Impact", Industry (Boston: Associated Industries of Massachusetts, December, 1960), p.11

8. Bone and Wohl, pp181-185.

9. The Route is located about 10 miles from the downtown. The observation of Route 128's continued influence upon circumferential population distribution is noted in: Greater Boston Economic Study Committee, Economic Base Report No.4, The Population of the Cities and Towns of Greater Boston Projected to 1970 (Boston, December, 1959), p.4

anticipated as its serving as a by-pass for north-south through traffic around the congested core areas. This new circumferential was to remove the through route from conflict with local traffic - the situation which had made the old Route 128, passing through the center's ^{of} core communities, intolerably congested.¹⁰

For the new Route 128, however, little evidence, in 1957, was found that the highway had been much used as a complete by-pass for the intown areas.¹¹ The evidence did indicate that as its older predecessor the Route was being largely used by persons living, working, or shopping in the nearby towns.¹²

The character of the Route traffic-wise appears to be no different from the old one. Route 128 remains a local suburban traffic circulator.

The special significance of this highway, that which really characterizes it, was and is its ability to influence the distribution of industry and population along its route. Route 128 is a metropolitan physical phenomenon (but, with, apparently, its area of influence somewhat smaller than the total metropolis) - for we observe industry located along its edges; population "filling-in" to 1970 from the edge of the built up area to

10. Bone and Wohl, p.1

11. *ibid*; p. 78

12. *ibid*; pp77-78. About 76% of all weekday trips were found to have origins or destinations in the towns lying close to the highway.

fifteen miles from the downtown, belt fashion; and traffic, also, generated belt-fashion mostly from persons living, working, and shopping in the towns along its path.

A new circumferential highway, Interstate Route 495, in various stages of design, construction and completion, ten to thirty miles west of Route 128, will run an arc 88 miles from near the New Hampshire border in the north and Interstate Route 95 to within horn-tooting distance of Rhode Island at, again, Route 95, south, in Mansfield, Massachusetts.

Originally, in 1956, a Route 110 expressway was proposed to alleviate severe congestion on an older Route (110) that passed through the central areas of Haverhill, Lawrence, Lowell, the intervening small towns, and into Worcester. Special emphasis was placed upon the ability of a new freeway to accommodate economic revival in the distressed textile and leather cities of the Merrimack Valley.¹³ And the Department of Public Works, at the time, suggested that the new partially circumferential highway could mean that "the State would then have a 'Golden Ring' - Route 128 - capped by a 'Platinum Band' - New Route 110." ¹⁴

In 1956 Congress gave the Go sign to the Federally aided Interstate Highway System.

13. Edwards, Kelcey and Beck, A Master Plan of Highways for the Lowell, Lawrence and Haverhill Metropolitan Areas, prepared for Massachusetts Department of Public Works and the United States Bureau of Public Roads (May 1956) p.3

14. The Massachusetts Highway Story 1949-1956, p.4

Proposed Route 110 now became proposed Interstate Route 495. Instead of terminating at Worcester, the highway is scheduled to meet - twelve miles east of that city - with Route 90 (the toll Massachusetts Turnpike) and Interstate 290, the Worcester Expressway, twenty-seven miles, here, west of downtown Boston.

The State Department of Public Works feels that the new highway "holds great promise for the 30 communities which it touches along its path." And:

Because of the need for relieving the heavy intercity traffic which was clogging outmoded Routes 110 and 125 and the desire to alleviate the chronic economic distress which has plagued the area, it was decided to give priority to work on the Outer Belt in the Merrimack Valley.¹⁵

The experience of Route 128 as attracting substantial industrial development seems to occupy, now, a good portion of people's thinking on what might happen at Route 495.¹⁶ When Route 128 was being built little thought was given its industrial development potential, but now, when we hear discussion of Route 495, just such development possibility seems uppermost.

15. Commonwealth of Massachusetts, Department of Public Works, A Report of Progress to Governor John A. Volpe, On the Massachusetts Highway Program (Fall, 1961), pp 26-27.

16. One observer notes that "In the minds of many is the thought that circumferential highway Route 495 will be THE road of the future - perhaps even surpassing Route 128 in its eventual economic impact." But on the other hand it is observed, also, that, "Some of the industrial developers who played such an important part in the growth of Route 128 have a 'wait and see' attitude toward 495." Dr. J. Laurence Phalan, "Economic Impact of Highways with Particular Reference to Merrimack Valley", Boston University Business Review (Spring, 1961). pp 28-29.

The Route 495 impact, generally, is quite naturally of interest to many persons: politicians, economists, bankers, real estate brokers, developers, unemployed textile workers.

What about the physical planner? Is he concerned? ¹⁷ How much and what spatial industrial and population distribution does it appear that Route 128 might have influenced? Does this suggest which particular towns, which areas, with physical planning problems, may thus require the professional scrutiny of the physical planner?

If Route 495 were to similarly influence population and industrial distribution what can we say of the towns that might experience physical planning difficulties. First of all: which towns? Secondly: what difficulties? At what levels of population and industrial additions do physical planning problems become more pressing; perhaps more demanding of solution? Is there some upper limit, some level between plausibility and unlikelyhood, that is about the maximum that can be expected as highway impact? If such a limit can be found perhaps the very most difficult physical planning problems

17. The planner, in general, is apparently felt to be concerned where it is suggested that "...If a sound program of land, population, and economic planning is to be formulated it will be necessary to consider... (Among other things)... the probable impact on the distribution of populations and economic activity of all proposed highway facilities with special attention paid to the impact of the planned circumferential Route 495, the proposed southeast and northeast expressways and the extensions of Routes 2 and 3 into downtown Boston." Economic Base Report No. 4, The Population of the Cities and Towns of Greater Boston Projected to 1970, p.8

can be brought to light. Planning problems also can be assessed at various levels within this upper limit and perhaps within the more likely range of population and industrial distribution impacts.

We are looking for an indication of the Towns that might be affected by Route 495 development and the physical problems that could be thereby encountered at various hypothetical levels of impacts. At what levels, if any, do planning problems cease to be of general concern? And what problems usually are of this general concern?

We are concerned with particular problems that might be encountered, at various levels of growth, by towns abutting the highway and towns not-abutting. We are seeking, in a general way, the problems that might be encountered by rural Nashoba Valley apple producer towns, by emerging suburban communities, by the older, larger, Merrimack Valley Cities - but not as individual towns, perhaps not even as identifiable towns, but as towns within a class that looks to be generally characteristic.

We are looking for typical problems for typical towns, with growth. What, for example, does the particular growth level mean in terms of existing community facilities: will the old schools, the old streets, the old fire station need replacement, rebuilding, expansion? Will the town center become intolerably congested? Need more parking? What about town character: is the old lost? Will the old land use patterns mesh with the new?

These are questions we would like to answer at least generally in the thesis. We would like to know what may be

the most concern physical planning should give the highway. How important the industrial location impact is to physical planning. How important may be the impact on population distribution. The area where the planner may be concerned only little, if at all. Where he may possibly become more concerned.

To answer these questions we shall look at the possibilities for the Route 495 area development - from the most unlikely, but still wildly possible, on down - and attempt, then, to relate planning problems in communities for various growth levels. We consider the most wildly possible not because it is expected but because it may serve as a base for comparison with lesser, more likely, levels of development and because we feel that it is often well to know especially in planning, rather exactly what is the most that one might be called upon to deal with in a particular period of time.

In an investigation of this sort it cannot be stated strongly enough that a so called upper limit, or some hypothetical growth level within that limit, is anything but a device to consider, rather arbitrarily but analytically, problems that would be associated with growth of certain amounts. It is hoped, therefore, that the various limits analyzed are not taken as predictions or projections, forecasts, estimates, recommendations of policy. Also, at times, the analysis requires some attempts at educated guesswork: it is important that the guesswork be understood as such.

Accordingly, the thesis accepts Route 128 as having strong influence upon population and industrial locations

in the Boston region. We are looking for an indication of what that impact might have been. To do this we have divided the Boston Region into a core and two bands. We shall attempt to compare Boston with other metropolitan areas for Route 128's possible role in the Boston region's growth.

Then we seek, from our experience with Route 128, an indication of what might occur at Route 495 and in the towns possibly concerned - in population and industrial growth. Finally, the thesis attempts to consider the growth possibilities and their relation, thus, to community physical planning.

The thesis, therefore, is divided into two Parts: the first develops the possible range of impacts and the more probable areas within the range that development may occur; Part II discusses in detail, eight specific cases of community growth from which generalizations were made to apply to growth levels in the range of Route 495 development possibilities.

CHAPTER I An analysis of population and industrial distribution in a Route 128 Band of communities

A. In the introduction we were careful to ask how much does it appear that Route 128 might have influenced population and industrial distribution.¹⁸

We are reminded that Route 128 was located just outside existing developed areas.¹⁹ We also note that the highway was built while strong pressures for postwar suburbanization of population and industry were present and working in the Boston area.²⁰ The highway was immediately in the path of an outward pattern of physical development.²¹ And Route 128 was there to satisfy a strong outward movement which would have occurred in Metropolitan Boston even if the new highway had never been built.²²

A serious analysis of the impact of Route 128 would require a painstaking detailed separation of metropolitan suburbanization influences, and the effects, then, upon population and industrial distribution, which these would have had notwithstanding Route 128.

18. p 11, supra

19. Bone and Wohl, p3

20. *ibid*

21. And in this connection we may note that the historical pattern of movement, mostly, ran in a radial fashion west, northwest, and southeast from the central City: Economic Base Report No. 4, The Population of the Cities and Towns of Greater Boston Projected to 1970, p4. cf also Figures I and II in the Report.

Such is not our intent in this section. For our purposes a total impact which includes highway influences and metropolitan growth pressures would be adequate.²³ Thus if we can observe certain consequences in the Route 128 Band of communities - consequences of unmeasured inputs - and if, from our observations, we can rationally define a range of possibilities for the Route 495 area impact, we may have what we need to consider the highway, then, as presenting planning problems of general or not of general concern.

In a sense, the thesis investigation may be thought of as asking what might be the most development that the Route 495 area might expect; what this may mean to physical planning; and the answers, thus, may give indication of whether it would be worthwhile to attempt a separation of direct influences and metropolitan growth influences.²⁴

The analysis in this section, therefore, is more one of a total impact observable in the Route 128 area: of consequences, a posteriori, without reference, generally, to causes.

The area must be defined along with areas with which it will be compared. Then, in the Route 128 area, 1950-1960, corresponding roughly with the first decade of the highway's life, growth may be assessed with growth in other areas.

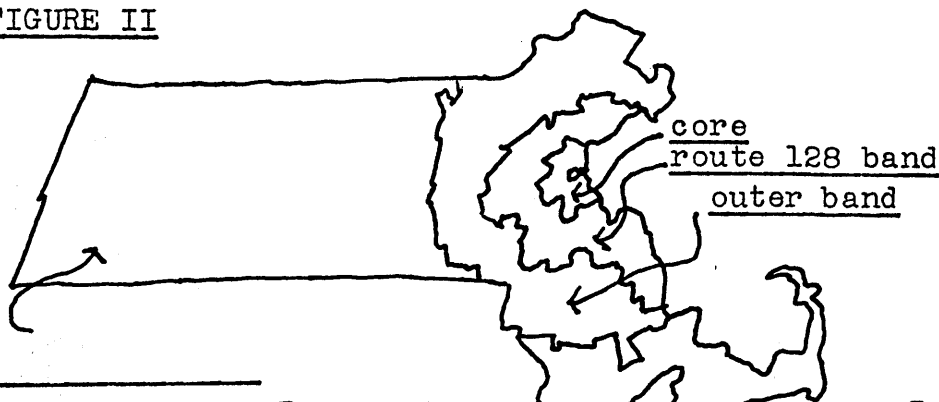
23. And perhaps, really, they are inseparable.

24. The indication may become apparent at the conclusion of the investigation but we are not conducting it with this purpose; rather, we are more interested in the Route 495 area's possible problems.

Areal definitions which incorporate Routes 128 and proposed 495, and for which summary statistics are collected, are available and convenient for our purposes. Data collected for the State, for Greater Boston, Metropolitan Boston, and the Boston Core will be used, thus, in the analysis.²⁵ See Figure II.

The areas are seen to divide Eastern Massachusetts into a core and two bands. Beyond the core, in the inner band - and we name the area thus, the Route 128 Band - we find the first Circumferential, roughly ten to twelve miles from downtown Boston. The next band embraces the Outer Belt, Route 495, and this area we call the Outer Band - the highway running through it twenty-two to twenty-seven miles from the downtown. Beyond the two Bands and the Core we also may use the rest of Massachusetts for aid in the analysis. The areas are shown in Figure II:

FIGURE II



25. Greater Boston is defined by the Greater Boston Economic Study Committee (GBESC) as including those 149 cities and towns within approximately 30 miles of the State House in Central Boston. Metropolitan Boston is formally known as the Boston Standard Metropolitan Statistical Area (SMSA). The Boston Core, finally, also defined by GBESC, includes those 12 central cities within roughly 8 miles of the State House.

We include also the State of Massachusetts for comparison purposes and for convenience. It would also be proper, if resources permitted, to analyze the possible effects of the Route upon areas in Rhode Island and New Hampshire - we concentrate here, however, upon the possible consequences in Eastern Massachusetts, notably Greater Boston.

If we compare population and industrial growth in the areas, presumably the Route 128 area should show, if there was a highway impact, a significant departure in measurement from any other area: if there is no significant departure either there was no impact or the areas defined do not show it and may need to be re-defined so as not to cloud the impact.

B. We choose first to look at population distribution. The period to be observed is 1950 through 1960 - the Route 128 impact mostly occurred since 1951.²⁶

TABLE I POPULATION IN MASSACHUSETTS AND SUB AREAS (1950-1960)

<u>Area</u>	<u>1950</u>	<u>1960</u>	<u>change</u> <u>increment</u>	<u>percent</u>
Core	1,430,876	1,303,022	-127,854	-8.0
Metropolitan Boston	2,410,572	2,589,301	178,729	7.4
Greater Boston	3,131,318	3,436,337	305,019	9.7
Massachusetts	4,690,514	5,148,578	458,064	9.8

The above, Table I, gives an indication of the relative population concentrations in Massachusetts. Greater Boston, for example, in 1960, with about 31% of the land area in the State counted 65% of Massachusetts' population. And, in 1960, the Metropolitan area, about 42% of Greater Boston's land area housed about 67% of that Greater Boston population.²⁷

26. cf Introduction pp.3, 4-6

27. We have estimated the land area in Greater Boston, from an incomplete land use survey, to be about 1,541,000 acres. The same survey does have complete data for the towns in the Metropolitan area which we have totalled at 615,417 acres. cf Greater Boston Economic Study Committee, Greater Boston Land Use, Draft II (unpublished, Dec. 15, 1961). The Massachusetts acreage totals about 3,476,000 acres.

The distribution of population and population increases in the core, the two bands, and the rest of Massachusetts follows:

TABLE II POPULATION DISTRIBUTION IN MASSACHUSETTS (1950-1960)
population change

<u>Area</u>	<u>1950</u>	<u>1960</u>	<u>increment</u>	<u>percent</u>
Core	1,430,876	1,303,022	-127,854	-8.0
Rte.128 Band	979,696	1,286,279	306,783	32.0
Outer Band	720,746	847,036	127,090	17.6
Rest of Massachu- setts	1,559,196	1,712,241	153,045	9.8

Table II demonstrates the rapid gain of population, relative to other areas, in the inner Route 128 Band. Nearly two and one half times the population increase of the Outer Band and double the increase in the rest of the State is observed in the population increase in the Route 128 Band. And, if we compare the total areal dimensions over which the increases are seen, we find that the population increase per square mile in the Route 128 Band is fifteen times as great as that observed in the rest of Massachusetts and four times as great as that in the Outer Band. The comparative figures follow in Table III:

TABLE III THE DISTRIBUTION OF A POPULATION INCREASES PER SQUARE MILE IN MASSACHUSETTS (1950-1960)

<u>Area</u>	<u>square miles</u>	<u>increase</u>	<u>increase per sq. mi.</u>
Core	99.7	(a)	
Route 128 Band	861.9	306,783	355
Outer Band	1446.2	127,090	88
Rest of Massachusetts	6392.5	153.045	24

(a) Loss

The Route 128 Band has received a lion's share of population increases in the State and in Greater Boston. We note, again, that this is a measured total impact: the result of metropolitan urbanization and suburbanization forces and, to an unknown extent, perhaps some result of the highway.

Noting the population increases in the Route 128 Band, we recall in the Introduction, a statement that we should like to consider problems encountered by abutting and by non-abutting towns.

Not all Band towns will be touched by Route 495. Might these towns' problems be lesser?

A distinction of abutting, non-abutting does not appear to be valid for the Route 128 Band. Towns not abutting the highway experienced about as much population growth (and actually their rate of population increase was faster) as the towns abutting. Of the 306,783 net population added in the Band, 166,870 is accounted for by the 26 abutting towns (a 30% rate of increase) and 139,913 is accounted for by 38 non-abutting towns (36% increase). In assessing planning problems for certain levels of population growth it would be well, at Route 495, to expect similar problems of growth in abutting and non-abutting towns; there is little need, therefore, to maintain any distinction in towns on this measure.

C. The more apparent feature of Route 128 is its performance as a location for industrial activity.²⁸ Industry also can introduce planning problems, as, among other things, industry is a land user, an origin and a destination of employee and

28. Introduction pp 4-5, supra

truck traffic; and a generator, sometimes, of the noise, dirt and smoke that can limit the spectrum of land uses considered as likely neighbors.

Industrial activity will be measured in employment - employment data being generally more available.²⁹ And, in this regard also our only estimates of future industrial development are written in the language of employment data.³⁰

In order to avoid confusion we choose to look at manufacturing employment in our gross analysis of industrial distribution: the data thus would cover Standard Industrial Classification Categories 19 through 39. We recognize that the activities such as retail and wholesale trade and services (which accounted for about 15% of employment "along" Route 128 in 1957 and 50% of the number of plants³¹) are highly important considerations for potential highway development but, also however, a great deal of this employment is non-highway - locating in central areas, local shopping districts etc. For our purposes, concentration on manufacturing distribution

29. GBESC has tabulated employment data furnished it by the Massachusetts Division of Employment Security. The data includes "covered" employment: those employees covered by the Employment Security Provisions. Such workers include all but the self-employed, government workers, agricultural workers, those in domestic service, railroading, and non-profit institutions. The GBESC tabulations cover the years 1947-1957, 1950, 1954, and 1960 for the 149 cities and towns in the study area (lately increased to 153).

30. Namely, Melvin R. Levin and David Grossman, Industrial Land Needs in the Greater Boston Area Through 1980 (Boston: GBESC and the Federal Reserve Bank of Boston, prepared by Planning Services Group, October, 1961)

31. This is the amount included in the Route 128 Study's two functional categories: Distribution and Service. Bone and Wohl, Table II-4, p18 and Appendix II-2, p206.

ought to give a clearer picture of the impact of Route 128 and its industrial attractiveness. Retail, service, and wholesale jobs can be added into the limits by a factor of say, 15 or 20%, if need be, when the time comes to estimate a potential ceiling of jobs in the Outer Band.

We analyze the distribution of manufacturing employment increases in the Greater Boston Area during the decade of the 1950's.

It should be noted that the area designated as the Core, for the analysis, includes only the two central cities, Boston and Cambridge. These two cities have been strong industrial centers but recently they have lost industrial jobs to other locales.³² These are the cities from which most relocated companies on Route 128 had moved.³³ Relocated industries and relocated branch plants, also, we note, in 1957 accounted for 76.8 percent of total investment and 78.3 percent of total employment in 77 of 96 plants located within roughly a mile of Route 128.³⁴

Where relocations to the Inner Circumferential have played such an important role in that highway's industrial development - a factor not to be overlooked at Route 495 - and, where most of the relocated plants have moved from Boston and Cambridge, we choose, for purposes of investigating industrial distributions

32. Levin and Grossman, p11.

33. Bone and Wohl, p21. In terms of total investment in Route 128 plants, 96% of total investment in relocated plants has come from those plants which had been located within $4\frac{1}{2}$ miles of the State House - the areas, thus, of Boston and Cambridge.

34. *ibid*, Table II-4, p18; Figure II-7 p20; and p.21.

during the years 1950 through 1960, to define the Core as including the two central cities only. The other areas used in the population distribution analysis we leave intact.³⁵

TABLE IV MANUFACTURING EMPLOYMENT IN MASSACHUSETTS AND SUB AREAS, 1950 - 1960.

Area	September Employment		Change	
	1950	1960	increment	percent
Core	140,200	112,800	-27,400	-19.5
Metropolitan Boston	285,600 ^a	295,700 ^b	10,100	3.7
Greater Boston	426,200	442,900	16,700	3.9
Massachusetts	687,200	691,300	4,100	0.6

a. 1950 Boston Standard Metropolitan Area of 65 cities & towns

b. 1960 Boston Standard Metropolitan Statistical Area of 76 cities and towns

The concentration of industry in Massachusetts, as measured by manufacturing employment, is demonstrated in Table IV. In 1960, 64% of Massachusetts' manufacturing jobs are located in Greater Boston and, within that latter area, 67% of those jobs are located in the Metropolitan Area. The ratios compare quite closely with the ratios of population concentration - the shares of population and manufacturing jobs being almost exactly the same.³⁶ The distribution of manufacturing employment in the core, the Bands, and the rest of Massachusetts is now considered.

TABLE V THE DISTRIBUTION OF MANUFACTURING EMPLOYMENT IN MASSACHUSETTS, 1950-1960.

AREA	September Employment		Change	
	1950	1960	increment	percent
Core	140,200	112,800	-27,400	-19.5
Route 128 Band	145,400	182,900	37,500	25.7

³⁶. cf pl6, supra.

<u>Area</u>	<u>September Employment</u>		<u>Change</u>	
	<u>1950</u>	<u>1960</u>	<u>Increment</u>	<u>Percent</u>
Outer Band	140,600	147,200	6,600	4.7
Rest of Massachu- setts	261,000	248,400	-12,600	-4.8

Table V indicates how strongly the Route 128 Band has attracted net manufacturing jobs over and above any other area in the State. A small increase in the Outer Band is seen but this is only about one sixth the increase in the Route 128 Band. Enough jobs have been added to nearly offset losses in all the rest of the state including the core (and also to offset manufacturing jobs lost in the Route 128 Band itself in such industries as textiles, leather, rubber etc). Whereas the manufacturing jobs added in the Route 128 Band represent an addition of about 435 jobs in ten square miles, the increase in the Outer Band represents one of little over 45 jobs in ten square miles.

The distribution of manufacturing jobs within the Route 128 Band can also be considered. What particular towns got the new industrial locations? Did the non-abutting towns receive, as they did population distributions, a nearly equal share? In planning for industry at the Outer Belt is it worth knowing which towns may receive the new industries in an abutting non-abutting distinction?

The Bone & Wohl Route 128 Study, in 1957, counted the number of manufacturing employees³⁷ at 14,563 - about 85% of total employment "along" the Route. We can compare this

37. That is, workers in their two functional categories, Production, and Research and Development, cf Bone and Wohl, Table II-A, p 18.

with total manufacturing employment in the towns that the Bone Study covers, and for the period that Study extended, roughly, September 1950 through 1957. This comparison will give an indication of the employment "along" the highway vis-a-vis employment slightly beyond a one mile reach.

Of the jobs added in the towns in manufacturing, approximately 46 to 93% are found to be added within one mile of the highway, (depending on the industrial location groups).³⁸ Over all the industrial location groups, the jobs added along the highway account for about 61 percent of all manufacturing jobs added in the Towns. ³⁹

For the decade 1950 through 1960, meanwhile, we find a net increase of 30,330 manufacturing jobs in "developed" Route 128 towns - and a net loss of 6548 in certain SIC categories.⁴⁰ Of the 37,500 job increase found in the Route 128 Band, then, only 7200 or so are located either in the non-abutting towns in the Band or in abutting but non-⁴¹ "developed" Route 128 towns.

38. cf. Appendix I p 88.

39. *ibid.*

40. Totalled from GBESC employment data for the towns.

41. "Developed" Route 128 refers to the portion of the Route that is observed to display a fairly continuous arrangement of new plants as shown in the latest Massachusetts Department of Commerce Map of Industrial Development Along Massachusetts Route 128 (July, 1961). Towns excluded, thus, are: at the northern extremity, Gloucester -(with but two food-processor-warehouses not actually located along the Route), Manchester and Wenham; add, at the southern extremity, with no observable industrial development along the Route, Braintree, Milton Quincy, Randolph and Weymouth (much of the land being preempted by the Blue Hills Reservation in Randolph, Quincy and Milton especially). "Abutting" towns number 26 and "developed" towns, 18.

D. In summary, the distribution of industrial locations measured by employment in manufacturing finds nearly all Greater Boston increases in the Route 128 Band and, within the Band, most increases are found in the "developed" towns, finally, within the Towns, especially towns which had little industry previously (in the Burlington and South of Needham locational areas), nearly all, ninety percent of new jobs added, are added within a mile, approximately of the highway. In the towns more familiar with industrial locations in the past (Waltham, Needham, Newton) only about 46% of jobs added appear to be added within one mile of the highway.⁴²

The attractiveness of Route 128 to industry is rather more closely aligned with the highway than the distribution of population. For planners this may mean that unless abutting the highway, not much industry will locate in the Town. For abutting towns, industrial sites may not necessarily need be located immediately adjacent to the highway where the town has a developed industrial base. For towns newly acquiring industry, sites adjacent to the highway would be demanded.

Population increases, on the other hand, may be equally experienced in abutting and non-abutting towns.

The increases in population and industry in the Route 128 Band are significantly greater than any increases in any such wide area of the State.

Route 128 and Route 495 should be of physical planning concern - not only to the Town planner immediately adjacent to the highway but to the metropolitan, the regional, planner (should he arrive). Of how much concern is Route 495, however

must await the setting of the most that can be reasonably expected at the Outer Belt in population and industrial distribution.

E. The preceding analysis of population and manufacturing employment distribution has indicated the strength of Greater Boston in relation to the rest of the State, and the State as a whole. Massachusetts increased its population by 1,560,196 persons yet only 153,000, about ten percent, of the increase occurred outside Greater Boston in the 1950-1960 decade.

Further, for manufacturing employment, the "pull" of Greater Boston appears even stronger. In the years 1950-1960, Massachusetts increased its employment in manufacturing by 4100. All of this net increase is accounted for by the jobs added in Greater Boston which offset core losses and losses in the Rest of Massachusetts, thus, to the amount of 4100.⁴³

Do these two observations, above, indicate an abnormality, a rate of growth, for Greater Boston, above its norm, which we may account to Route 128?

We do not have areas that we are very sure are comparable to Greater Boston's Areal definition; however, the Bureau of the Budget's definitions of SMSA's have been sufficiently defined objectively to allow comparability.⁴⁴

43. cf Table V. p 21,22.

44. Definitions have changed for some areas, however, as Boston's current 76 city and town Standard Metropolitan Statistical Area (SMSA) differs from the Standard Metropolitan Area of earlier years (SMA) of 65 cities and towns. We must assume, within our limited resources, that the differences are not critical. And, if the criteria for changing Metropolitan area definitions are objective, then comparing one Metropolitan Area with another (even though their own areal definitions may have changed) may not be so critical as comparing a Metropolitan area with itself when, in time, its area's definition has changed.

Where the "pull" of Greater Boston appears to be best and most clearly indicated by manufacturing employment we use that employment as our parameter, our more sensitive measure.

We are using, here for the moment, Greater Boston and Metropolitan Boston interchangeably, as the latter's, 1950 through 1960, increase in manufacturing employment accounts for about 85% of Greater Boston increases.⁴⁵

What is sought is a norm by which to judge the rate of growth in Metropolitan (and Greater) Boston.

We have chosen, for this purpose - Boston's historical data being rather useless here - Metropolitan Areas which have demonstrated an increase in manufacturing employment through the years 1947, 1954 and 1958.⁴⁶ Only Metropolitan Areas with over 100,000 manufacturing employees in 1947 were chosen - the assumption being that they would more nearly represent Metropolitan Boston's manufacturing character.

The Metropolitan Areas comparable to Boston for the period, therefore:

45. from Table V, p 21.

46. Census of Manufacturer's Years. They do not correspond with the opening of Route 128, however, but there is sufficient overlap to allow the 1947-1958 period as useable.

TABLE VI ⁴⁷ LARGE MANUFACTURING METROPOLITAN AREAS WITH
EMPLOYMENT GAINS 1947, 1954, and 1958

Metropolitan Area	Manufacturing Employment 1947	Manufacturing Employment 1958	1947-1958 percent increase
Baltimore	170,062	198,000	16.0
Boston	271,273	301,000	10.0
Cincinnati	135,774	151,000	10.1
Cleveland	262,750	285,000	8.0
Los Angeles	358,772	725,000	100.0
Milwaukee	177,202	185,000	4.0
Minneapolis-St. Paul	118,824	144,000	20.1
Philadelphia	532,492	536,000	1.0
St. Louis	244,516	255,000	4.0
San Francisco-Oakland	163,641	191,600	16.0

If we remove the extremes, Los Angeles and Philadelphia, the average of the increases indicates a norm of about 11.0%.

Boston's metropolitan rate of growth measured by manufacturing employment increases, does not appear to be anything but in-line with the estimated growth norm for a large metropolitan area. The Metropolitan and Greater Boston Areas would appear to exhibit growth rates over this period that are very normal. This last is a significant point, for, if the rate of growth in the region is demonstrated as being normal, then

47. Other manufacturing areas were excluded - Buffalo, Chicago, Dayton, Detroit, Indianapolis, Kansas City, Youngstown - either for "losses" 1947-1954, 1947-1958, or 1954-1958. The "losses" may have resulted from changed areal definitions. New York is excluded as too large for comparisons here.

Route 128 which is observed as an "influencer" during the period cannot be regarded as stimulating Greater Boston (or Metropolitan Boston's) development. Rather, and the hypothesis is advanced, Route 128 acted not as a "stimulator" but a "gatherer" of normal growth of population and industry in the Greater Boston Region. Route 128's influence, then, is regarded as exerted not upon regional growth, but upon regional distribution (or redistribution) of persons and industries.

If we assume that this same thing would hold true for Route 495: that it be a gatherer not a stimulator, then it becomes eminently reasonable to say that the very most that could be remotely plausible in development in the Outer Band - in the first decade of the highway's life - would amount to a gathering of all Greater Boston's population and employment increases for the period. Of course we do not expect this to happen - it is highly unlikely. Tables II and V indicate that Route 128 never did this even as it was located at the edge of the built up area, close to the downtown, and immediately in the path of suburban movement. We cannot expect that growth will halt in the areas outside the Outer Band because the new circumferential is opened. There are good reasons to believe that the Route 495 area would not "gather" all regional growth to it, but nonetheless, we can consider this possibility, if only to indicate the most that the highway impact could demand physical planning attention.⁴⁸

48. We shall discuss the more probable ranges of Outer Belt development later. cf 32-39

If, therefore, we have at our disposal projections of population and employment that appear fairly reasonable, even high, for Greater Boston, then we can establish, from them, the most that could plausibly occur at the Outer Band.

The time period for which we seek projections will be the decade of the 1970's. We have no official schedule for completion of the Outer Belt. In the northern portion of the highway, some 62 miles are currently under design, construction or have been completed: 40, 14 and 8 miles respectively.⁴⁹ The southern portions, from Route 9 in Westborough to proposed Route 95 in Mansfield, about 26 miles, were, (as of the Fall of 1961), then in the survey and mapping stages.

The study of Industrial Land Needs for 1980 in Greater Boston suggests that, at the present rate of construction, Route 495 would be completed around 1970. If this true, and where our study of apparent Route 128 impact covers the decade, 1950 through 1960, we similarly use a decade: the ten years after expected completion of the highway, 1970-1980. The interim period, 1960-1970, we expect will grow somewhat in line with present conditions and we use for this decade the Greater Boston Economic Study Committee estimates to 1970.⁵¹

49. Commonwealth of Massachusetts, Department of Public Works, A report of Progress to Gov. John A. Volpe on the Massachusetts Highway Program (Fall, 1961), pp26-31 and 10-14.

50. *ibid.*

51. Especially, Economic Base Report No. 4, The Population of the Cities and Towns of Greater Boston Projected to 1970; and Greater Boston Economic Study Committee, Revised 1970 Populations Projections For the 149 Cities and Towns In The Greater Boston Economic Study Area (Boston: Feb. 21, 1961).

CHAPTER II The Outer Band Range of Development.

A. The previous chapter demonstrates that whatever impact had occurred because of Route 128, that impact can be found within Greater Boston. The area defined by GBESC had become the locus of most population increases and all net manufacturing job additions in Massachusetts.⁵² And, we proposed, the most population and employment that the Outer Band might plausibly receive would be no more than the normal Greater Boston increase- and most probably something a good deal less.

This chapter attempts to discover what the ceiling upon expectations would be and what possibly narrow^{ed} range within that ceiling may be more reasonably expected in the Outer Band, 1970-1980.

A study of land needs for industry has estimated a possible 475,000 manufacturing jobs by 1970 and 555,000 by 1980.⁵³ The projections are admittedly optimistic.⁵⁴ Where Greater Boston's manufacturing employment grew at a rate of 4% in the decade of the 1950's,⁵⁵ the projections would see the rate double in the 60's and double again in the 70's. The consultants believe

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52. This is observed also, in: Everett J. Burt, Economic Base Report No. 3, Recent Changes in the Employment Structure of Greater Boston (Boston: Greater Boston Economic Study Committee, November 1959), pl.; and in Frank L. Sweetser, Economic Base Report No. 2, the Population of Greater Boston Projected to 1970 (Boston: Greater Boston Economic Study Committee, June 1959), p.4.
53. Levin and Grossman, p 54, Table V Ratio projections based upon Federal Reserve Bank of Boston
54. They are felt to indicate a "considerable improvement in Greater Boston's employment level as compared to the 1957 (and 1959) levels." Levin and Grossman p 42; also p 77.
55. Table IV; p 21, supra.

the projections to be generally reliable, not definitive, but adequate for their purposes⁵⁶ - and also adequate, we think, for ours.

For population in the Greater Boston Area beyond 1970 we do not have any formal projections. We can use an economic base approach and estimate the 1980 population relying upon a presumed relationship between basic (manufacturing) employment and population.

The observable ratio of basic employment to population in 1950 in Greater Boston was .136; and, in 1960 .128. GBESC has projected a total population of 3,738,999 in the study area by 1970⁵⁷ : comparing this with the estimated 475,000 basic employment for 1970 we find a ratio of .127. If the ratio, .127, were to hold through 1980, population in the Area may be estimated at something like 4,370,000 - an increase over expected 1970 of about 630,000 persons.⁵⁸

The most remotely plausible (but highly unlikely) extent of Route 495 area development would include all of the Greater

56. Levin and Grossman, pp41-42.

57. Frank L. Sweetser, Economic Base Report No.2.

58. Again, this is probably optimistic: the job projections are optimistic; the ratio itself has decreased since 1950; and we have a 1980 guess of about 4,000,000 persons (somewhere between 1975 and 1985) in the area. If this latter were reached in 1980, the increase in Greater Boston's Population would not be 630,000 but a good deal less - about 260,000. The 1980 "guess" is found in Greater Boston Economic Study Committee, People and Money (Interim Report) p.1. The 630,000 increase would be an increase of 16.8% over an estimated 1970 (GBESC) population of 3,738,000 persons - this where, 1950-1960 the increase was around 9.6% and the 1960-1970 increase is expected to be around 8.8%.

Boston population and industrial increases, 1970-1980 in the Outer Band. This ceiling would be estimated rather optimistically at 80,000 jobs and 630,000 persons added. Can we narrow the range to a more likely coverage? To do this we need to take a slightly more sober look at Route 128 and its similarity or dissimilarity, possibly, to the Route 495 circumstance.

B. As far as industrial development at Route 128 is concerned, the comments of Mr. Robert H. Ryan, Vice President of Cabot, Cabot and Forbes - the company which played so great a role in the highway's industrial development - are worth noting.⁵⁹ His comments are summarized:

1. Greater Boston was and is an old community but with pressures of growth.
2. Old industrial facilities had depreciated many times over, in the accounting sense, and had become expensive to operate in multi-story buildings, with no parking, and bad materials handling facilities.
3. There was in existence no available inventory of land ready to build on industrially so new sites had to be made - there was plenty of raw land everywhere but none ready to build upon.
4. A new limited access highway (Route 128) was built.

59. Robert H. Ryan, "Planned Industrial Districts", 42nd Annual Conference of the Massachusetts Federation of Planning Boards (October 19 and 20, 1956) pp 3-4

5. A good guess would have been that land along the limited access highway was going to appreciate in value.
6. Time was becoming more important in transportation than distance.

Mr. Ryan's comments can be applied to expectations of industrial development along any future limited access highway this is precisely why Route 495 may not be, in its initial decade of life at least, another Route 128.

Without the relocated growing industries that left the core areas Route 128 probably would never be called "Golden", nor "Industrial", and about all that might be left of its appellation would be "Semicircle". Without the relocated industries Route 128 in 1957 may have attracted perhaps \$20,000,000 (instead of \$85,000,000) in investment, in 19 plants (instead of 96), hiring 3,700 employees (instead of 17,000).⁶⁰ Instead of seeing about twenty plants per ten miles, we might be seeing six per ten miles.⁶¹

At the present time, there is little indication of the prospects of future growth industries located now either in Boston or other centers which may be relocated to a Route 495. Nor do we know how much new employment projected may actually be added in new plants.

60. cf Bone and Wohl, p 18 Table II-d; and p 21.

61. This estimate from a survey for the Associated Industries of Massachusetts: Roger Johnson, "Route 128 Study Assesses Social and Economic Impact", Industry (Boston: AIM, December 1960) pp 11-12. The study found 169 plants visible from the highway (over an 80 mile length, including the extension to Route 3 in the south) and of these 121 were relocated plants.

We do know, however, that industry that has decentra-
lized, has done so at low densities and can thus expand on
their present sites without relocation.⁶² - with a good deal
of growth industries observed along Route 128, projected
economic expansion, projected employment increases, may,
possibly be satisfied by additions to physical plant at
existing locations.

We do know that while Route 128 may have been the only
truly limited access highway in 1951, since then, we have
the Massachusetts Turnpike, Route 3, Route 24, Interstate
93 and 95 and the Southeast Expressway completed or sub-
stantially complete. In addition to proposed Route 495
another Radial proposed Route 95 South will be added; also
six of seven radials are proposed to extend from Route 128
into the core and the proposed Inner Belt.

We note that in the Core and a Band of surrounding com-
munities there remains about 9700 acres of suitable⁶³ (for
development) land vacant and zoned for industry⁶⁴ - this
within roughly 15 miles of the State House.

In Greater Boston, with Mr. Ryan's comments in mind, we

62. cf. Levin and Grossman, p 51.

63. "Suitable" as defined by GBESC: i.e. having less than
15 per cent slope and not adjudged to be swampy. Greater
Boston Economic Study Committee, Greater Boston Land Use
(Boston, December 1961, draft II), p.5

64. The GBESC land use and zoning studies are summarized in
Levin and Grossman, for their areal definitions, g.v.,
p.9 (insert). And, the data is presented in Table III
p. 36, for these areas.

find now a great deal of land at least zoned for industry. There were, as of 1960, over 55,000 acres of vacant land zoned for industry and, of this, about 39,000 acres was adjudged "suitable".

When Route 128 first opened it was noted that sites for industry had to be made as none were available ready to build upon.⁶⁵ The industrial park - a planned industrial district usually with utilities, central management, package deals and the like - is a relative newcomer on the scene. Of 7223 acres so developed by 1961, only 109 acres were developed prior to 1950.⁶⁶ And, in these parks and in others currently under development, an additional 5000 acres is available or will be available for industrial development. Half of the acreage is available, also, within these communities roughly 15 miles from central Boston - in 2400 acres or so.

There are plenty of industrial sites alternative to Route 495 locations. The situation for the Outer Belt would appear to be rather different from what faced Route 128 in the early 1950's. To expect a Route 128 kind of industrial impact for the Outer Belt, at least in its initial decade of life would seem to be highly optimistic. The highway may well be neutral as an industrial locator consideration. If this is so, then perhaps what may occur is about a continuation of the Greater Boston share of jobs that is observed in 1950 and 1960 in the Outer Band, thus through 1970 and 1980.

65. p 32 supra.

66. Levin and Grossman, Table IV, p 38.

From Table V we can calculate the employment distribution in the sub-areas of Greater Boston.

TABLE VII THE DISTRIBUTION OF MANUFACTURING EMPLOYMENT
IN GREATER BOSTON 1950 and 1960

<u>Area</u>	<u>percent 1950</u>	<u>distribution 1960</u>
Core	33.0	25.5
Route 128 Band	34.0	41.5
Outer Band	33.0	33.0

In Table VII we note that the Outer Band Area maintained about a one third share of Greater Boston jobs in 1950 and 1960. If this were to continue, and if we accept the 475,000 and 555,000 projections for 1970 and 1980, then the Outer Band may have perhaps 158,000 manufacturing jobs by 1970 and 184,000 by 1980 - the increase, then, 10,800 in the 1960's and 26,000 in the 1970's. If the Outer Band increase were to parallel, however, the Route 128 increase, and we feel this to be unlikely, the increase over a presumed 1970 share of 158,000 may be more nearly 41,000.⁶⁷ Whether all of any one of these increases in employment would be reflected in new plant construction is rather debatable.

C. An estimate of the more likely range of population increases in the Outer Band requires a number of guesses and assumptions. The "filling-in" within the Metropolitan Area can be expected to continue. We can look historically at the share of Greater Boston's population in 1950 and 1960;

67. Based on a 26% rate of increase. cf Table V, p 29, supra.

and at projections and estimates for 1970 and 1980, and set a reasonable range of expectations for the Outer Band.

The growth of population in Greater Boston is observed as being slow and is expected to remain that way.⁶⁸ From 1950 through 1960 the area increased its population by 9.8%.⁶⁹ A projection of 3,738,00⁷⁰ for the area for 1970 represents a growth rate of about 8.8%. A rate of about 10 percent population growth does not seem out of line with these observations - this would suggest an increase over projected 1970 of perhaps 375,000 persons and a total population of about 4,100,000.

An estimate, thus, of 4,370,000 appears rather above the Greater Boston indicated slow rate of growth; and, more in line with that slow rate is a population estimate of about 4,100,000. None of the above is to be taken as definitive but it does clarify, somewhat, the meaning of any individual projections.

The Outer Band Area may not receive much additional population as a result of the new circumferential. After

68. cf. Frank L. Sweetser, Economic Base Report No. 2, The Population of Greater Boston Projected to 1970, pp 3-4, and People and Money, p.1.

69. p 17, Table II, supra.

70. Frank L. Sweerser, Economic Bas Report No. 2.

expected development in the Inner Route 128 Band to 1970,⁷¹ there would probably remain something like 275,000 acres of vacant land in that Band.⁷²

Thus if we expect the highway to have little or no influence upon population increases in the Outer Band, perhaps that area's share of Greater Boston population would differ little from its share in the past.

71. Based on GBESC projections for the 149 cities and towns for the study area, 1970 development would amount to:

	Population		increase over 1960	
	1960	1970	increment	percent
Core	1,303,022	1,209,000	-94,000	-7.0
Route 128 Band	1,286,279	1,492,400	206,100	16.0
Outer Band	847,036	1,036,600	189,500	22.0
Total	3,436,337	3,738,000	301,600	8.8

The estimates would expect a Metropolitan Area population of about 2,701,400 (core plus Route 128 Band, 76 cities and towns SMSA). This can be compared with estimates for the 65 city and town Standard Metropolitan Area. One estimate by the Boston College Seminar Research Bureau indicates a population of 2,907,173 for the 65 cities and towns for 1970. Another, by the Massachusetts Department of Commerce would indicate a population of 2,825,000 by 1970. All these estimates are questionable. cf.

Revised 1970 Population Projections for the 149 Cities and Towns in the Greater Boston Economic Study Area;

Boston College, Seminar Research Bureau, Population Forecasts by Age Groups, 1955 - 1975 (Staff Paper #3)

Commonwealth of Massachusetts, Department of Commerce, Population Estimates, Massachusetts Metropolitan Center December, 1958).

72. A ratio of 5.0 persons per developed land area is used. The Land Use Study figures for our Route 128 Band, in 1960, totalled at 230,860 acres of land in urban use for a population of 1,158,425. At 5.0 persons per developed land acre, the 1970 increase of 206,000 persons may indicate land consumption of about 42,000 acres; this to be used from a 1960 supply of 320,731 acres.

The relative distribution of population in the area for 1950 and 1960 and the distribution that is suggested by GBESC 1970 projections,⁷³ is given as follows:

TABLE VIII RELATIVE DISTRIBUTION OF POPULATION IN GREATER BOSTON

Area	percent distribution		
	1950	1960	1970
Core	45.8	38.0	32.5
Route 128 Band	31.2	37.5	40.0
Outer Band	23.0	24.5	27.5

A percent chart of Greater Boston's population of around 39% may not be unreasonable for 1980 as a guess: this would find perhaps a high of 1,411,000 persons, or more moderately a figure of 1,230,000 on the Outer Band.

If we accept the GBESC 1970 estimate for the Outer Band's population, the 1970-1980 increase, instead of 630,000, may more likely be somewhere between 193,400 and 374,400. The larger figure would represent a rate of population increase from 1970 greater than observed at the Route 128 Band⁷⁵ 1950 - 1960: an increase of 36%.

All of this is hypothetical; it is guesswork. This is not done to predict, but rather, it is done to see, slightly more clearly, what has happened in the past, and what some future estimate could mean in terms of this past.

73. cf. note 71, p 38, supra.

74. Depending on the total population of either 4,370,000 or 4,100,000.

75. And, if we take the lower total estimate 4,100,000, a 375,000 increase in the Outer Band would amount to about all the increase going to the Band - again, a remote upper limit, this time for the lesser total Greater Boston figure.

cf. Table II, p 17, supra.

Thus, at the upper, most remotely plausible limit, we would be expecting the highway and metropolitan growth forces here to exclude development elsewhere in the Greater Boston Area: this never happened at Route 128.

At a level of about 375,000 persons added the Route 128 experience would be, whatever it was, rather repeated. In that Band, close to the downtown, in the direction of growth etc., 306,000 persons were added - an average of about 4800 per town. An addition of 375,00 persons would represent about 5100 persons per town and a rate of population increase of about 36%. Whether we can expect such a repeat⁷⁶ where, after 1970 development, plenty of vacant land will be available closer in: this is questionable. We would guess that the more reasonable upper limit for population growth in the Outer Band would be the 375,000 persons - with actual increases probably less.

We can check the relative development at the Outer Band and at the Route 128 Band with some gross density ratios.

TABLE IX DENSITY COMPARISON: ROUTE 128 BAND AND OUTER BAND

	Route 128 Band			Outer Band		
	1950	1960	1970	1970	1980	
land area sq. mi.	861.9	-----	-----	1446.2	-----	
population	979,696	1,286,279	1,492,400	1,036,600 ^b	(1)	1,230,000
					(2)	1,411,000
					(3)	1,666,000
employment	145,400	182,900	^a 204,200	158,000 ^c	(1)	168,800
					(2)	199,000
					(3)	238,000
persons/ sq. mi.	1,140	1,500	1,660	700	(1)	850
					(2)	980
					(3)	1,140
mfg. employees sq. mi.	169	201	204	100	(1)	116
					(2)	136
					(3)	164

ranges of development for the Outer Band based upon our experience in the inner, Route 128 Band - the ranges and their possible meanings in terms of the past. What we attempt to do now is investigate the ranges, even the least plausible for the 1970 - 1980 decade, in terms of the future. What might such ranges mean to physical planning?

To do this we shall take the 630,00 population and 80,000 job additions as our ceiling, our most imaginable, but reasoned, level of difficulty. While it may be virtually miraculous if such were attained in the 1970 decade, nevertheless, since it is plausible, remotely, we consider this level. Also, while this may not be attained, it is well to look sometimes beyond our most reasonable expectations, in planning, to what appears highly remote. It may be worthwhile to look now, at a level of 630,000 persons and 80,000 manufacturing jobs added even where this may not be expected for decades. Planning for "reasonable" levels of growth, only, may compound future difficulties as future growth is added.⁷⁷

Using then, the remote limit, we arbitrarily look at half, then a quarter of that limit so that we might define the loci in the range where physical planning difficulties from the impacts may become generally pressing upon all communities, some groups of communities, generally no communities. And, within the range we look for the typical kinds of physical planning problems which might, at various levels, be thereby encountered.

⁷⁷. In Town Plans, the "saturation level" is used as a basis for formulating the plan for a specific year, yet the target year and the "saturation level", most assuredly will be passed; we shall see more of this later. cf pp70-73

The analysis requires some knowledge of planning problems associated with growth levels. On a broad scale, the scale that we have been dealing with, we have, to our experience, no available materials for the Boston region. We have a number of Master Plan Reports for communities in the Region, however, which we can check for community growth expectations, planning problems, and planning solutions. We shall attempt to generalize from a handful of these reports to the Outer Band growth levels. This is the task for Part II.

PART II GROWTH PROSPECTS AND PLANNING

Chapter III Case Studies of Eight Greater Boston "Growth" Towns.

A. What does the possibility of adding 630,000 persons and 80,000 industrial jobs in the Outer Band mean to the physical planners in the various communities? What particular problems arise with this kind of growth? How pressing are these problems? What can be done to meet them?

Presumably, the largest and most pressing problems would occur at this remote limit if reached in the decade of the 1970's. We are defining, here, at this limit, the most that we imagine growth will tax the resources of the individual communities. The physical planner must align the demands of growth with his community's capacity and willingness to provide the physical resources that growth demands will place upon community facilities. Typical solutions for this growth situation are large lot zoning, the reservation of land from use through acquisitions or rights in open space or by, for the other side of the coin, the provision of sites for non-residential, mostly industrial, use.

Does this upper limit, therefore, represent a level of growth which is greater than anything that the metropolitan suburban towns have so far experienced? Yes it does. In time of population growth, an Outer Band increase of 630,000 persons, over a total of 1,036,600 or so persons in 1970,⁷⁸ represents a rate of growth of about 61% - this is nearly double the Route 128 Band increase observed for the 1950-1960 period.⁷⁹

⁷⁸. cf. 38, note 71, supra.

⁷⁹. cf. Table II p 17, supra.

We are able, however, to select a number of towns, as growth representatives, which have experienced the rate that this limit suggests.

We do not anticipate that even our highest, most remote expectations will introduce any greater urgency in planning at the community level than has been experienced, previously by some towns in the Greater Boston Area in the decade of the 1950's. Rather, for the Outer Band towns, the problems and the urgency of their solution ought to closely parallel what has been the case in these selected towns.

We do recognize that this conclusion rests on an assumption of similar quantitative population distributions in the towns as has occurred elsewhere - that is, that population increments added roughly correlate with town size. The eight towns, and for that matter, the towns in the Greater Boston Area attest to the fact that smaller towns have received smaller increments; while the more medium size towns have received the larger increments.⁸⁰

The question now to be answered is what particular problems face the particular town planner at a particular level of growth?

We have chosen eight towns in the Greater Boston Area which, 1950 through 1960, experienced relatively high rates of population growth. The towns are representative (1) of the ability of Towns of a certain size class to cope with a doubling or near doubling of populations - and the problems thereof and (2), taken more abstractly, the towns are regarded

80. And the larger, more mature, cities and towns, have received little, often lost, population increments.

as representative of levels of growth - absolute increments - say of a hypothetical town on its way to maturity. Thus, we may observe the growth of a hypothetical town which say, in 1950 had a population of 876, in 1960, a population of 12,771, and in 1970 a population of 62,000.

While we may discuss the problems that a certain town of a certain size may have with our population ranges; we may, also, discuss the evolution of planning problems - a continuum really - at various stages of absolute growth. The former ought to give us an indication of the kinds of problems an individual town might face; and the latter, the time, the level of growth increment, at which the problems become particularly pressing. It is important that we remember that not only do we look at the individual eight towns as representative of towns of a certain size, but also, we look at the eight towns as representing increments of growth added in a more abstract context. If we can find some fairly definitive answers to the questions of what particular problems may occur for a particular size town and the absolute level of population added which may introduce particular problems - or make old ones more pressing - then we can, in a general way, relate our most remotely plausible limit, half, and a quarter of it and planning problems which these may introduce to given communities.

A final preparatory note: when discussing growth and its implications to physical planning, the most natural way to look at the eight selected towns is, thus, through the eyes of the physical planner. It is he, who, given the goals of

the community, and given his own professional point of view, in the face of growth recognizes planning problems and proposes physical planning solutions. The point of the thesis is the prospect of growth and its implications to physical planning. What the planner recognizes as a problem may not be so recognized by the community he represents - the same with his recommendations. But what the planner thinks about growth and its problems ought, for our purpose, to receive the greater weight. We grant the expertise and sensitivity for physical planning to the planner. Our sources, thus, for our eight towns analysis become the Master Plan Reports of the professional physical planner for the individual town concerned - these being the most readily available and digested summaries of planning problems and recommendations for the towns.

The eight towns we have chosen for analysis are listed for their population 1950 and 1960, their rate of population increase, their absolute increase, and their expected "saturation" levels and years that this might occur.⁸¹

TABLE X BASIC DATA FOR THE EIGHT "GROWTH" TOWNS

	Population		Increases		Saturation	
	1950	1960	absolute	%	Amount	possible date
Garlisle	876	1488	612	70%	7000	2000 ⁺ (a)
Dover	1722	2846	1124	62%	4000	1967 ^(b)
Lincoln	2427	5613	3186	130%	6000	1977
Sharon	4847	10,070	5223	108%	22,836	1985
Wilmington	7039	12,475	5436	78%	30,000	1987 ⁺
Canton	7465	12,771	5306	70%	28,800	2000 ⁺
Concord	8623	12,517	3894	45%	30,000	1980 ⁺
Framingham	28,086	44,526	16,440	58%	80,000	1980 ⁺

(a) plus sign indicates the year or reasonably thereafter.

(b) projected 10 years.

B. From the analysis of the eight Towns we can conclude that no town is really free of physical planning problems with growth. Indeed, most planning problems are quite similar - those foreseen, and those actualized - for all Town sizes. We can see, however, with additional increments of population the particular problem becoming more and more demanding of solution. We find certain similarities in planning problems and a progression of urgencies of solutions, in the smaller towns represented by Carlisle, Dover and Lincoln; in the medium size Towns as Sharon, Wilmington, Canton and Concord; and in the larger town, Framingham.⁸²

We shall discuss planning problems, thus, with reference to these groups.

The planners for the smaller towns, Carlisle, Dover and Lincoln anticipate future growth problems of increased traffic, congestion, parking, needed new facilities, loss of

81. "Saturation", generally, refers to the capacity of developable residential land to hold a certain number of persons at a certain density. The figure usually takes into account current zoning and currently available "buildable" land also assumes a certain family size using any given parcel of residential land. Where possible, we have taken the "saturation" level that could be reached, as maximum, under the Master Plan report recommendations or where the level on the Report is deemed "probable". Wilmington's saturation is regarded as maximum without a radical change in zoning and use of low-grade building land. Dover's figure is a mere ten year projection - not a "saturation". Carlisle, Sharon and Framingham's are regarded as "probable" maximums. The remaining, Lincoln, Concord and Canton are maximums if the Master Plan Report is followed.

82. This should all become apparent as the discussion progresses.

rural character. At this level, none of the problems appear to be present in the towns, but good planning anticipates such problems.

The Carlisle planner, for example, recommends that rights-of-way be laid out for a by-pass of the Town Center - the by-pass needed, perhaps, in twenty to twenty-five years, with a doubling of traffic there.⁸³ Congestion in the Center is not anticipated, however, as a severe problem. At capacity, "saturation", a population of about 7000, it is felt that the one village center can provide the necessary residential, civic and other neighborhood facilities without requiring excessively large facilities.⁸⁴ The only acute parking problem in Dover, meanwhile, was in the process of being solved at the time the consultant was writing his Master Plan Study. Further parking needs when and if needed can be provided behind the present business zone on school property.⁸⁵ The five point intersection in Lincoln Center is anticipated as a possible congestion problem, and by-passes with rim roads are proposed.⁸⁶

The prospect of additional facilities demanded by growth is a genuine concern of the Town Planners. Providing such services that satisfy demand and that are within the resources

83. Allen Benjamin, Long Range General Plan for the Town of Carlisle, Massachusetts (January, 1960) p.10.

84. ibid. p4.

85. Charles W. Eliot, Master Plan Study for the Town of Dover, Massachusetts (July 1958), p 19.

86. Charles W. Eliot, Planning for Lincoln, Massachusetts (December, 1958), p 27.

of the community: this is viewed as a future problem that will require careful consideration now.

In Carlisle and Dover, the land use plan itself is formulated with the problem of future services demands in mind. The plans closely limit development to the central area of the Towns and discourage scattered peripheral development. Townwater mains could be shorter, fire station coverage better, schools more accessible, road maintenance easier, more economical.⁸⁷

Growth should be channeled with the provision of facilities in mind: to fill in where there are presently partially developed districts, to concentrate development in a few drainage areas and to develop up stream so as to minimize sewerage costs.⁸⁸ If development is so channeled in Dover, the total ten year projected population increase to 1967 can be easily accommodated and added population of 3138.⁸⁹

In both Towns, however, the possible demand for community facilities is considered to be in the rather remote future. The Carlisle planner, for example, expects a population of 3000 in twenty-five years or so: three six-room elementary schools may be needed by then;⁹⁰ eventually a fire-proof fire station may be needed.⁹¹ In Dover, the planner observes

87. cf. Eliot, Dover, Massachusetts, p 20 and Benjamin, Carlisle Massachusetts, p4

88. Eliot, Dover Massachusetts, p 20

89. *ibid.*, p 21

90. Benjamin, Carlisle, Massachusetts, p 13

91. *ibid.*, p 14.

that there seems to be no demand for the provision of sewer, gas service, Town water - but the possibility of future demand is considered.⁹² The elementary and junior high school needs seem well provided for the foreseeable future. A regional High School is proposed in concert with Sherborn and possibly Medfield.⁹³

In Dover and Carlisle, in addition to channeling growth to the central portions of Town the planners recommend that new development in other areas of the towns be discouraged by Agricultural zoning, Flood plain and Conservation zoning and by programs of acquisition of fees or rights to open space.⁹⁴

It is noted in Carlisle, that subdivisions often produce a demand for road improvements, utilities etc. which abutting farmers and large land owners neither need nor want. Also, the storage of certain objectionables associated with farming often produce unpleasant odors for the sub-division occupants.⁹⁵ In the interests of efficient municipal service and in the interest of keeping possibly disturbing land uses separated, a two-edged policy is recommended of channeling growth to development areas and of excluding it elsewhere.

In the Town of Lincoln, no explicit policy such as this is recommended. Rather, the anticipated additional service

92. Eliot, Dover, Massachusetts, p 37

93. ibid, p 38

94. ibid. pp22-29; and Benjamin, Carlisle, Massachusetts, p4

95. Benjamin, Carlisle, Massachusetts, p4

must be provided, apparently, where demanded. The growing need for water, schools, recreation facilities, the increased use of local roads, the need for increased protective and other services all are problems the Town now faces.⁹⁶ In order that the tax rate be held at \$75 and in order that capital outlays and operating expenses meet these growth demands (an increased annual expenditure of \$30,000 is estimated) the Town should increase assessed valuations by \$400,000 a year. Such an increase, the Planners contend, would require new construction of 50 houses each year with a building permit value of about \$20,000, or 40 houses with a building permit value of \$30,000. Otherwise, the Town must seek non-residential construction to stabilize its tax rate.

Two sites are recommended to the Town for non-residential consideration. No zoning change, however, is recommended, without the prior application of a particular entrant: that the Town can pay close attention to any individual enterprise, its ability to fit with the rural character of the community and its willingness to live up to any zoning controls and performance standards the Town may desire.⁹⁷

Aside from the very important question of providing services for future growth, perhaps the most delicate matter for the Town planners in the three communities is the preservation of rural character in the face of growth. If and when, under Carlisle's two acre zoning, the town reaches

96. Eliot, Lincoln, Massachusetts p 50

97. Eliot, Lincoln, Massachusetts, p 47

"saturation", such scattered development as results could have a substantially different character and appearance than the rural atmosphere which now prevails. Also, such development would exempt probably all of the land from use by such activities as hiking, camping, riding, nature study, organized sports.⁹⁸

In Dover and Lincoln, the Planner defines, partially the character of the Towns in terms of "spaciousness": the distance between homes, the size of holdings, the continuance of open fields and woodlands.⁹⁹ The recommendations for Agricultural zoning, flood plan and conservation zoning, and for acquisition of open space, discussed above relative to municipal services, also are intended to safeguard this feeling of spaciousness and provide large areas for active and passive recreation. Two acre zoning is not considered enough to insure spaciousness.¹⁰⁰

In addition to the pressures of growth filling zoned residential land, and thus altering the rural character of the Towns, these pressures threaten destruction of the things which apparently give the Towns their rural character. In Lincoln, the narrow winding roads, lined with trees and stone-walls, have become "entirely outmoded" by the automobile and the growing traffic is constantly building up demands for widening and straightening. A problem arises, thus, between providing the kind of roads that modern transportation requires

98. Benjamin, Carlisle, Massachusetts, pl .

99. Eliot, Dover Massachusetts, p 23

100. Eliot, Lincoln Massachusetts p 28

and retaining the rural character which these technologically outmoded roads still suggest.¹⁰¹

Interest in preserving the Town centers is also expressed in the Carlisle and Lincoln Plans. In Carlisle, property owners are urged to recognize the value of preserving its "country village" character: to avoid, thus any architectural improvements clearly incongruous.¹⁰² The Lincoln Planner, recognizing that the idea of a "historic district" is a frontier in planning, with difficulties, nevertheless urges that if Lincoln wishes to preserve "the harmonious village character of the Town Center", voluntary restrictions or controls through zoning for architectural review ought to be seriously considered.¹⁰³

The question of providing land for non-residential (mostly industrial and commercial) use is closely tied with the preservation of rural character in the Towns. And, the suitability of the Town from industry's point of view is considered. The three Towns do not have such assets as ample water supplies, sewerage, or access heavily travelled highways.¹⁰⁴ Apparently, the only industries that would choose the Towns, in the Planner's minds, therefore, would be craft operations or research laboratories.

In Lincoln, as we have earlier discussed, consideration was given two sites for non-residential use - one 85 acres,

101. The problem is noted in Eliot, Lincoln Massachusetts, p 30; in Eliot, Dover Massachusetts, p 32

102. Benjamin, Carlisle Massachusetts p 26.

103. Eliot, Lincoln Massachusetts, p27

104. cf. Eliot, Dover Massachusetts, p 18; and Eliot, Lincoln Massachusetts, p44; and Benjamin, Carlisle Massachusetts pp 6-7.

the other 65 acres.¹⁰⁵ Caution was recommended, however, and taken by the Planning Board,¹⁰⁶ that, the parcels not be zoned for industrial use prior to the application of a specific developer. Any industrial inroads will be carefully watched.

We have said enough to recapitulate. We were looking at small towns for two reasons: first, to see if these could accommodate the kind of growth that the upper limit earlier arrived at implies; and second, to attempt to define a level where additions of population are somewhat beyond the current resources of the given community to cope with this growth.

The particular planning problems cited in the three Reports are all anticipated with growth. Carlisle's by-pass may be needed in twenty-five years with a doubling of traffic.¹⁰⁷ "Saturation" may occur at 7000 population but a population of 3000 is not anticipated before about twenty-five years.¹⁰⁸ Future parking for Dover, "when and if" needed can be accommodated¹⁰⁹ the if is important.

Lincoln is on the verge of having to increase its capital outlay. Non-residential uses for tax aid are considered. The greatest need is for schools - other needed outlays are considered quite modest.¹¹⁰ The center is not yet congested; nor is its character destroyed.¹¹¹ At the current rate of building, a "saturation" level of 6000 population may be reached in twenty years.¹¹² Lincoln appears to be drawing closer to the time when growth will demand additional seats in the Town Hall - currently, however, seating capacity is sufficient.

105. supra, p 52

106. cf introduction, "liot, Lincoln
p11

107. supra, p 49.

108. supra, p 50.

109. supra p 50.

110. Eliot, Lincoln, Massachusetts, p 52

111. ibid, p 27.

112. ibid. p 50.

The three Towns, apparently have been able to accommodate growth rates comparable to the upper limit of growth for the Outer Belt. This is a significant point; and, if it can be applied to the Outer Belt communities, and we think it can, then the smaller towns could take up to a doubling of their population without incurring immediate consequences of center congestion, parking needs, loss or rural character and so forth. And a doubling of population would actually be greater than a pro rata share would require.¹¹³

The three Towns do not appear to have reached a point in their growth where the problems discussed in the Planning Reports have actually become pressing. Can we define a level where growth would exert strong pressures on the Towns and the problems anticipated actually were realized? To answer this, we turn to the next group of Towns: Canton, Concord, Sharon and Wilmington. We are seeking, here, indications that growth has materialized problems which were anticipated by the Town Planners in the smaller Towns, but, which, with the smaller increments of population increases, apparently were not yet experienced.

C. The nature of Sharon as a rural or semi-rural town is lost; for better or for worse, Sharon is a part of the Metropolitan Area. The Town cannot properly withdraw from its responsibilities to accommodate its share of the area's growth up to the point of saturation.¹¹⁴

Somewhere between 1950 and 1960 Sharon has apparently reached the point we seek. In 1950, Sharon had a population

113. An assumption of equal distribution would require a per town increase of 61%. Supra, p. 44.

114. Joseph C. Gray, A Comprehensive Plan for the Town of Sharon, Massachusetts, (January 1960), p 34.

of 4,847; in 1960, 10,070. Before 1950 Sharon had grown much more slowly than its neighbors, Stoughton and Taunton - both of whom are cut by heavily travelled highways.¹¹⁵ But since then, Sharon has doubled its population.

The particular problems foreseen with growth in the smaller towns appear to be experienced here in Sharon and, as we shall see, in the other Towns in this size class.

The old central area of Sharon has its current problems: impossible traffic congestion, inadequate parking, a serious problem of sanitary drainage, inadequate commercial facilities in largely converted residential dwellings.¹¹⁶

Sharon has its sewer problem. Current deposit is done in cess-pools, leaching fields and septic tanks. An off-street parking survey by the Planning Board found a critical problem in the deposit of waste from the central Post Office Square's business establishments. A similar disposal problem was noted in another part of Town.¹¹⁷

The need for new or for replacement of old community facilities is evident in the four Towns.

In Canton, quick acquisition of school sites and other public use sites is recommended. The scattered pattern of

115. Gray, Sharon Massachusetts, p 1

116. *ibid*, ppl-2. Similar lack of parking, space for business expansion, and traffic congestion are noted in the other towns: In General Plan Report, Wilmington Massachusetts (Planning and Renewal Associates, July 1957), p 24; in Adams, Howard and Greeley, Summary Report Long Range General Plan for Concord, Massachusetts (January 1959), p 17; and in Allen Benjamin, Master Plan Summary Report, Town of Canton Massachusetts (1959) pp 79-80.

117. Gray, Sharon Massachusetts, p.29

residential subdividing has exempted many good sites. Swampy land also has contributed to the problem.¹¹⁸ Not only does the scattered development of residential areas present school siting problems but the pattern is now determining future land use arrangements. The scattered residential areas in open land have earmarked the land around these developments, also, to residential use.¹¹⁹ Planning now must become adaptive. Canton cannot apparently, corral physical development as a Carlisle or a Dover.

At this level of growth, the older Town facilities seem somewhat inadequate but do not necessarily demand immediate replacement. Relief to traffic problems for Sharon is considered, by the Planners, to not require major construction but, for the most part, until funds are available, inexpensive temporary relief would be adequate.¹²⁰

Canton's town offices are located in Memorial Hall. The amount of administrative space is certain to need expansion. The planner, thus, proposes that the second floor of the building be remodeled for additional town offices but probably not before

118. Allen Benjamin, Canton Massachusetts, pp 24-25

119. *ibid*, p 15.

120. Gray, Sharon Massachusetts, p 17. And the Canton planner feels that even where the present day streets were laid out before the days of the automobile, "nevertheless, the present street system, with some noticeable exceptions, is generally able to handle the thousands of vehicles moving over it every day, and occasionally parking along the roadways." Allen Benjamin, Canton Massachusetts, p 3

the end of the current six year budget period. This would, however, only be a temporary expedient and the planner recommends eventual replacement in about twenty years.¹²¹

With maturity, community services certainly need either replacement or rebuilding. Concord, for example, had a sewer system in 1899 - one of the first Towns in the State to provide this service. Since 1950 or so the need for major reconstruction has become apparent. Excessive infiltration has placed a serious overload on the system. The main trunk lines between two pumping stations in the center had been found to be seriously infiltrated and, the disposal plant could not at times handle its job. Sewage thus backed up and leaked out to the river. Restrictions on new connections were in effect for some time and numerous demands for added service were being heard. A major appropriation was needed, thus, to replace the main trunk and connecting trunk, to rehabilitate the filter beds, to reconstruct the disposal plant, and to perform other minor repairs to the system.¹²²

Concord's particular difficulties would have occurred regardless of growth probably, but the pressure by new families for new connections no doubt influenced the Town to study the situation and plan the necessary appropriations.

It is hardly necessary to say, finally, in connection with community facilities, that major appropriations are foreseen in the not so distant future for expansion of school

121. Allen Benjamin, Canton Massachusetts, p 71.

122. The account is given in Town of Concord, Massachusetts, Annual Report 1960, pp 108-109.

facilities. This has been perhaps the first and foremost consequence of growth in all of our observed suburbanization of people in the post-war years.

The question of preserving rural character is not explicitly raised in Canton or Wilmington. In Sharon, as we have noted,¹²³ rural or semi-rural character in the face of metropolitan growth is lost - but a sense of space, of trees and fields, and openness can be retained by public acquisition or acquisition for the public to integrate open green areas into the future land use pattern of the Town.¹²⁴

In Concord, meanwhile, where in 1959 only fifteen percent of the land was developed and where the development was of a fairly compact nature, rural atmosphere could be preserved by clustering new residential development and by retaining large tracts in open land.¹²⁵ An overall rural character, here, probably is lost but skillful design can do much to insure the placement of developed areas in rural settings.

Planning problems from industrial development do not appear to be particularly difficult in the four Towns. The Canton planner notes that recent improvements in zoning techniques can enable the town on the one hand to offer better protection to the home owner and on the other to encourage incoming business and industry.¹²⁶ The town needs, in the planner's mind, "as much good industry as it can obtain" - but

123. supra, p 56.

124. Gray, Sharon Massachusetts, p 33

125. Adams, Howard and Greeley, Concord Massachusetts, p 6.

126. Allen Benjamin, Canton Massachusetts, p 9.

with that industry not interfering with the dominant land use, residence and residence oriented schools, recreation areas etc. Industrial sites therefore, are chosen for their impact on other land uses as well as their suitability for use by industry. The planner sees fit to zone some 741 readily buildable acres for industry.¹²⁷ Using the density of employment generally found along Route 128, then, it does not appear that the Canton planner feels any particular difficulty in the Town's hosting industrial development measured to 15,000 or so employees.¹²⁸

The Wilmington planners had found the new AVCO manufacturing plant's pull of job holders to be so far (in 1957) only slight; the more immediate effects would be felt in increased truck and employee traffic to the industrial sites.¹²⁹

Over 1200 acres were zoned for industry in Wilmington and apparently the Town feels that it is able yet to maintain for all practical purposes a completely residential atmosphere.¹³⁰

In Concord, meanwhile, with a prevailing sentiment among townspeople that the community not become identified as "industrial"

127. *ibid.* p 12. The total industrial zone would be about 1706 acres - 965 being classed, though, as low or wet land.

128. The employment density figure of about 20 workers per industrially developed acre along a Route 128 band is found in Levin and Grossman, Industrial Land Needs in the Greater Boston Area through 1980 (Boston: Greater Boston Economic Study Committee and the Federal Reserve Bank of Boston, October 1961), p 36 Table III.

129. Planning and Renewal Associates, Wilmington Mass., p 9.

130. Joseph L. Courtney, Town Manager, Wilmington Mass. "The Place of Planning in Local Government, Proceedings, Massachusetts Federation of Planning Boards, 42nd Annual Conference (Oct. 29 and 30, 1956) p.5

a majority of citizens, at the same time, indicated some support for a few new industries. The planners felt, however, in this regard, that four of five new Route 128 type plants would not significantly lower the tax rate - perhaps lower it \$2.00 or \$3.00. The planners note that there is little observed correlation between new industry and an influx of worker residents in this area. But, even where a problem of accelerated in-migration may be dismissed, there is danger in another respect, that if obnoxious in location or operation, such industry could cause long range loss in residential assessments which may more than offset any industrial valuation gains. ¹³¹

There are no particular problems with industry cited in the Sharon Master Plan Report. All of the land west of proposed Interstate Route 95 is recommended in the Report, for industrial zoning. ¹³²

The four Towns, Canton, Concord, Sharon and Wilmington, then, have begun to experience the kinds of problems which were noted in the Planning Reports of the first three small communities. In the smaller Towns, we recall, we saw that the problems were not present but anticipated. Sharon provides a good link in our continuum. During the period when Sharon has doubled its population the Town finds difficulties with center congestion, lack of parking, traffic, school needs

131. Adams, Howard and Greeley, Concord Massachusetts, p 19.

132. Gray, Sharon Massachusetts, p 37.

utility needs. These problems, also, we observe in Canton, Concord and Wilmington. The four Towns represent 1960 populations of 10 to 13,000 - and they represent a doubling or near doubling of population in a decade.¹³³

If we can generalize from the cases of the first seen Towns, we may say that from the time that the planner first defines the particular problem for a small town - under, say, 4000 population - until the time that the physical problem thus appears, a tripling of population can have occurred.

Some things need be solved rather rapidly. Sharon's and Concord's sewerage problems are given high priority.¹³⁴ Acquisition of sites for public use - street rights of way, for schools, playgrounds, and other Town properties - are recommended with all due speed. In Canton, for example, in addition to early acquisition of school sites, a number of wholly new non-school recreation areas also being needed: during the "next few years" most available funds are recommended spent for land acquisition rather than for construction of further playground facilities.¹³⁵

Eventually, substantial rebuilding or replacement of Town facilities would be needed to serve the "saturation" populations of 23,000 to 30,000.¹³⁶

133. cf p 43 supra.

134. cf. Gray, Sharon Massachusetts, p 32. In Sharon, a water-sewerage system should be initiated "at the earliest opportunity". In Concord, sewer reconstruction ought to commence by 1963: Adams, Howard and Greeley, Concord Massachusetts, p22.

135. Allen Benjamin, Canton Massachusetts, p 42

136. p 48, supra, for "saturation" populations

Eventually, substantial rebuilding or replacement of Town facilities would be needed to serve the "saturation" populations of 23,000 to 30,000. 136

The Canton planner envisions a \$5,250,000 outlay for new streets and reconstruction of existing ones during the next twenty to twenty-five years. Canton also would need, to serve a contemplated population of around 30,000: new Town office facilities, a new police station, a new fire headquarters, an expanded central business district - not to mention two seven room and one fourteen room elementary schools and a 600 pupil capacity addition to the secondary school building, these by 1965. 137

By and large, then, our typical small towns can grow to perhaps a population of 10,000 and survive with existing community facilities, maintain, somewhat, their rural character and retain a degree of flexibility that will be necessary to guide any future growth.

When, however, we take the moderate sized town of 10,000 persons and double its population a new stock of Town facilities will be needed to serve the additional population. Also, much of the existing facilities will need rebuilding or replacement. the town will have, depending upon its total available vacant land of course, generally though, time enough to direct development into serviceable areas and maintain, between built-up areas, large amounts of open space.

136. p 48 supra, for "saturation" populations

137. Allen Benjamin, Canton Massachusetts, pp71,74,76,80-81, and p 28.

How much growth may be desirable for a particular town of 10,000 will vary with the quality of its present services and its prior planning for anticipated growth.

Wilmington feels that a stabilization of growth to about 150 families per year is a reasonable rate and one at which the land can be used efficiently and at which the people who come in can be adequately served.¹³⁸

The Concord planners feel that moderate growth in population that is consistent with the Town's ability to provide needed service is more desirable than rapid spurts of growth¹³⁹ - the Town Plan, thus, proceeds upon an assumption of 150 new dwelling units per year, a population of 15,000 by 1965 and 25,000 for 1980.

D. A considered moderate ten year addition of population therefore, for towns as Wilmington or Concord would be about 5,000 or 6,000 persons;¹⁴⁰ this figure, in these two cases at least, is deemed to be within the capacities of the towns to adequately serve their additional families.

A good summary for all of this discussion can be had by considering the case of the Town of Framingham. From 1950 to 1960 this particular Town added more persons than any other Town in the State. The U.S. Census counts Framingham's population at 28,086 in 1950 and 44,526 in 1960. The Town

138, Courtney, p 6

139. Adams, Howard and Greeley, Concord Massachusetts, p5

140. At suburban family sizes of about 3.7 to 3.9 persons per family.

planners have anticipated a population of 70,000 in their recommendations - the population being reached around 1977 or 1987. Most of the major proposals, however, should be accomplished within 10 years of the plan in order to provide adequate services for the expected growth.¹⁴¹

Framingham grew from apparently no less than six buckshot scattered villages. By 1830 or so Framingham Centre (the approximate geographical center) had become dominant as a one way stage coach stop from Boston to Worcester. In 1872, the Boston and Albany Railroad was extended through the southern portion of Town. A dramatic shift of land uses to the Railroad then occurred and an industrial town of about 10,000 persons developed there. Most growth has occurred between Framingham Centre and South Framingham, and to a lesser extent between these and the village of Saxonville to the northeast. The remaining area, the northwest quarter of Town expects the major portion of single family dwelling development: and for this area it is proposed that one acre lot area zones be increased to one and one half acres to minimize, thus, the need for uneconomic extension of town services and to maintain the area's rural character.¹⁴²

The more developed portions of Town have all of the problems that were noted earlier in the seven smaller towns.

Congestion in the downtown (in South Framingham) is considered a deterrent to through and to stopping traffic. Saxonville and Framingham Centre are noted as other major congested areas.¹⁴³

141. Samuel M. Ellsworth, and Melvin F. Levine, Summary Report, A General Plan for Framingham, Massachusetts (January 1957) pl.

Current and potential overloading on the Framingham Centre and Saxonville sewerage stations are becoming a problem. Reconstruction of minor pumps and mains for new residential and industrial areas are needed if growth is to be accommodated.¹⁴⁴

Urban renewal procedures are needed in South Framingham and Saxonville.¹⁴⁵

The history of land use distribution in Framingham is a highly interesting one. Dramatic shifts are observable, south, along the railroad, and recently in the central portion of Framingham where large amount of regionally oriented commercial uses have gravitated to the heavily travelled Route 9 and where, now, at the interchange of Route 9 and the Massachusetts Turnpike, a 250 acre industrial park is currently being developed.

The rather rapid unplanned shifts of land uses to the Railroad and to Route 9 have produced some difficulties in Framingham(s emerging physical pattern. A number of rezonings and adjustments of zoning boundaries are recommended in the South Framingham and Saxonville areas.¹⁴⁶ Compatible use relationships between industry and residence are sought. Route 135 can be relocated as a by-pass of the central business district and

142. Ellsworth and Levine, Framingham Massachusetts, p 29. cf also Arthur Row, Louis Dolbeare and Judith Tannenbaum (editors) Framingham, Your Town, Your Problem (Geb. 1948), p12 and map of "Historical Growth 1699-1947", p 15.

143. *ibid.* p4

144. *ibid.*

145. *ibid.*

146. *ibid.*, pp23-29.

buffer residential and industrial areas.¹⁴⁷ Street patterns should be altered to keep industrial and "through" traffic out of residential areas. ¹⁴⁸

Frequent curbcuts for commercial uses along Route 9, meanwhile, have made a bad safety condition worse and seriously threaten the highway's primary function - circulation.¹⁴⁹

Also, Route 9, being the "front yard", so to speak, of Framingham, the planners feel that "its appearance should present a more accurate impression of the nature of the community as one of homes and schools and churches, not just a collection of neon-lit restaurants and filling stations."¹⁵⁰

Generally, Framingham, with growth, expects to have to add the necessary public services. Eventually its school capacity will need doubling. A new high school, a junior high, four elementary schools (15-20 rooms) will have to be programmed. Existing structures built in the 1920's will need to be modernized. Space for a Junior College is recommended.¹⁵¹

Framingham had, in 1957, about 160 acres of land under the jurisdiction of the Park Department - about 4.2 acres per 1000 population.¹⁵² Modern recreation and open space requirements generally find a ratio of about 20 acres per 1000 population as a desirable minimum. Framingham ought to have for 70,000 persons about 1400 acres, thus, in open space, parks, playgrounds, playfields etc. Needless to say, immediate acquisition or reservation ought to commence early.¹⁵³

147. *ibid*, p 23.

148. *ibid*, p 27-28

149. *ibid*, p 15.

150. *ibid*, p 16.

151. *ibid*. p 33

152. *ibid*. p 40

153. *ibid*. p 42.

Industry as such does not appear to be a planning problem in Framingham. Granted the old industrial locations along the Boston and Albany Railroad and other trackage contribute much traffic to the central business district, and, at some points, are inharmoniously aligned with residential areas. This is an old pattern that should have had close physical planning attention. As such, the problem will have to be alleviated with gradual rezoning, new street alignments, and amortization of some existing industries and their relocation. But with this, the potential exists for about 8000 to 16,000 additional jobs¹⁵⁴ at modern industrial densities if all the vacant land zoned for industry were thus used.¹⁵⁵ The planners recommend no major changes of this supply of 800 acres - indeed they recommend addition of a triangle of land from industry adjacent to the Framingham Industrial Park - and we can properly assume that the planners do not feel that an additional 8,000 to 16,000 industrial workers would present any particularly difficult physical planning problems to Framingham.¹⁵⁶

The Framingham plan was developed. finally, with assumptions of a building rate of 300 to 500 dwelling units per year during the decade 1960-1970 - the former is considered to be a low

154. In 1957 there were about 7500 industrial workers in the Town, *ibid*, p 10.

155. *ibid*.

156. They do point out that these additional jobs could mean that 40,000 to 80,000 persons may be induced to reside either in Framingham or the adjacent towns - figuring that for every 1000 jobs added to the "basic" (manufacturing) labor force, about 4,000 to 5,000 persons would be added to the Framingham area. *ibid*.

building rate and the latter, a high building rate for the Town.¹⁵⁷
 At 3.6 persons per family, a possible low for Framingham,¹⁵⁸
 this would mean an addition of about 1100 to 1800 persons per year.
 Apparently, although not stated explicitly, the planners feel that
 the rate of population increase would not be exceptionally
 difficult for Framingham, a Town of 37,000 in 1957, to accommodate.¹⁵⁹

E. The Framingham case illustrates a point which is observable
 also in the other towns: and that is that aside from the ability
 of any given Town to accommodate a certain level of growth in
 any given time period, the need for planned flexibility is ex-
 tremely important - this is the value in planning for "saturation"
 development. Framingham's developed areas now experience diffi-
 culties with traffic congestion, parking, some incompatible land
 use and circulation arrangements, worn or obsolescing physical
 facilities - schools, sewer pumping stations and mains, low
 water pressure - to name but a few.

The difficulties anticipated in the smaller towns and felt
 in the slightly larger ones continue to be felt in the largest
 observed Town, Framingham. The critical planning stage, then
 is that period prior to the time when growth forces a change
 in the old order. The critical planning stage is that particular
 time when human decisions are made that growth is exerting its
 pressure and that something must be done about this. The

¹⁵⁷. *ibid*, p 12.

¹⁵⁸. *ibid*, p 6

¹⁵⁹. The planners have recommended that most of the major pro-
 posals of the plan could be accomplished in the next ten
 years, to about 1967 or 1970, this indicating, we feel, an
 estimate of the Town's capability to accommodate the growth
 before it actually materializes. cf. Ellsworth and Levine, pl.

question is not whether growth can be accommodated - it always can be. The question is, how can it be accommodated: with minimum difficulty or maximum difficulty? Orderly or disorderly? With or without direction?

The case studies indicate that, with growth, certain difficulties can occur in the physical arrangements of things and these can, make life uncomfortable, expensive, sometimes rather ugly. Planning has got to provide the flexibility for growth and for change. To do this, however, planning needs some goals, objectives, expectations. The community must sit down and actually think through its own goals. Planning must then work to these goals. A "saturation" level may be determined - this is the useful tool. Planning can then be directed to this saturation level. The saturation level, ought to be just this, however; there should be good reason for choosing an ultimate level of growth for a community else another stage of growth may introduce new difficulties on an older, lesser capacity order. This is the lesson to be learned from the experience of the four medium size Towns. Framingham is still wrestling with the past in addition to the future. Problems are observed in the congested areas of old Saxonville and old Framingham Centre. Old industrial patterns in South Framingham will require years to amortize. The grade crossing in the Framingham downtown is cited as being a major public issue for 60 years.¹⁶⁰ The gates at the crossing close an average of 75

160. Ellsworth and Levine, Framingham Massachusetts, p 54. A study committee was appointed in 1899 to assess the problem. The committee, in 1957, was still in existence - so was the public.

times a day, while during that average day, 12,000 to 15,000 automobiles cross the tracks.

Perhaps we shall always build for the present. We expect the things we build to wear out. If we seriously build for the future perhaps by the time the future arrives what we have built will have to be replaced. Planning requires less than this. Planning requires the setting aside of a right-of-way for Carlisle that may be needed in 25 to 30 years.¹⁶¹ Planning requires the advance acquisition or the public rights to school sites and other public use sites in Canton.¹⁶² Planning requires a stated intention and the necessary public controls to direct growth to areas which may, in the present and the future, be adequately serviced.¹⁶³

To do these things, however, planning needs to consider what lies ahead in the immediate future and the remote future. This is where community goals and estimated saturation levels enter. Both of these require, however, either clairvoyance or a continuous process of reassessment. The latter is more within most people's capabilities.

We say these things here not pretending that they are original or profound but because the analysis of planning in the eight selected towns has suggested this and because there is danger of an investigations such as this being misunderstood.

161. Benjamin, Carlisle, Massachusetts p 10.

162. Benjamin, Canton Massachusetts, p 24

163. Eliot, Dover Massachusetts, p 20

If there is any conclusion to be drawn from the foregoing case studies of the towns, it is that planning as a process is continuous and that perhaps its considerations ought to be extended beyond the community's own goals and beyond the presumed "saturation" level. After saturation growth may not really stop. Rezoning may be needed, higher densities permitted, expansions of community shopping areas, more streets, wider ones, added capacities for sewers, new mains, these things may not be planned for if considerations stop at "saturation". If there is rock solid reason for not planning beyond "saturation" - well and good. Most assuredly however, growth will continue chipping away at the community's physical resources after "saturation".

The study of Framingham is probably more valuable as illustrating the process, the staging of growth rather than as a concrete case of a Town's reaction to growth. The various shifts in centers of gravity with changes in the transportation network in Framingham, is, after all exactly what the thesis is considering. The center of gravity of a good portion of population and industry shifted dramatically to Route 128 and its surrounding towns in the 1950's. And we are considering such a shift and its planning implications now, for the Route 495 area.

CHAPTER IV Summary and Conclusions: Growth Levels and Physical Planning

A. The physical planning implications of various levels of population and employment distribution in the Outer Band must rest, here, upon the assumption that the eight towns studied in previous chapter are representative. We must, then, first summarize our findings in the eight case studies.

For the small towns (up to 5,000 population):

1. Typical planning problems anticipated with growth were increased traffic (especially in the Town centers), and congestion, need for off street parking, provision of adequate facilities within the town's resources, and the loss of rural character.
2. The anticipated problems, however, if at all, were not expected to be pressing in the near future.
3. The towns were considered unsuitable for all but special industrial types, and, on the other hand, industry was to be carefully screened for its compatibility with the rural nature of the town.
4. The large Town in the group, Lincoln, was considered to be on the verge of increasing capital outlays - mostly for schools.

The middle group of towns (5000 and planning to 30,000)

1. Problems anticipated in the first group of small towns are actually seen as present, here, at 5,000 to 10,000 population.
2. Major appropriations for schools, immediately, and next, sewers, are current. Other facilities, still somewhat useable are programmed for the future.

3. Rural character can be preserved to some degree by judiciously balancing open space and developed areas.
4. Industrial development is not considered to much influence in-migration. Town and industry considerations were to be balanced: net benefits were to be equated with possible loss of "character" and possible harmful effects upon residences and residential valuations. Towns which expressed desire to accommodate industrial growth could apparently plan for 15,000 or so workers at prevailing industrial densities.
5. The 10,000 population appears to be a critical point where old facilities can no longer suffice.
6. A building rate of 150 dwellings per year (approximately 6000 persons in a decade) was considered "moderate" and within the town's capacities to provide expanded services - at a population level of about 10,000 and expanding.

The largest Town, Framingham (38,000 and planning for 70,000)

1. Special concern, here, is given to meshing past patterns - and the services for these - with future growth patterns and services.
2. A potential for 8,000 to 16,000 industrial jobs does not appear to offer particular planning difficulties.
3. A building rate of 300 to 500 dwelling units per year can apparently be accommodated here.

The specific observations noted above, though far from comprehensive a treatment of growth, planning, and planning problems, are now used as generalizations for an assessment of the meaning of the ranges, discussed in Part I, to physical planning for the future. From the small bit of information in the eight case studies, what can be said of the range, from

remote to reasonable, in terms of physical planning prospects for the Outer Band?

We must relate the analysis of the eight towns to the Outer Band Towns. To do this the latter communities are divided into population classes that roughly correspond with observed critical planning points in the case studies. The points, presumably, are those where planning would have to adjust, with growth, for new physical facilities, new land use arrangements and so forth.

The first point,¹⁶⁴ then, at a population of about 10,000; where small town facilities need gradual replacement, where rural character is lost, where growth is setting the land use arrangements with or without planning.

The next point we fix at about 30,000 population not because this is a critical planning point, per se, but because it was determined to be by planners¹⁶⁵ who set a "saturation" level for the Town in the face of community objectives, professional planning and individual prejudices - and growth. The level of 30,000 thus indicates, for the towns (of about 10,000 population in 1960) that we have considered as a medium size class, the particular problems and recommendations that the planners feel would be present at the 30,000 level if the

164. The points are to be taken broadly.

165. cf. p 48, supra

166. Greater Boston Economic Study Committee, Revised 1970 Population Projections for the 149 Cities and Towns in The Greater Boston Economic Study Area (Boston: GBESC, Release, February 21, 1961), supercedes Economic Base Report No. 4.

problems were not now "planned" for. Our final class we deem as our 30,000 and ending at about 99,999 - to include the largest city in the Outer Band (Lowell, 92,107 in 1960).

We have 1960 populations and 1970¹⁶⁶ estimates on a town basis for the seventy-three Outer Band cities and towns. Grouped according to class, therefore:

TABLE XI OUTER BAND TOWN SIZE CLASSIFICATIONS

<u>Population Class</u>	<u>Number of towns according to population class 1960 populations</u>	<u>1970 estimated</u>
under 10,000	47	42
10,000 to 29,999	19	24
30,000 to 99,999	7	7

The GBESC projections anticipate that five towns will have increased population enough to move into the 10,000 to 30,000 dize by 1970. We can discuss growth problems with relation to the 1970 classes.

We consider first, the community problems with respect to industrial development.

B. If our inference is correct, the planners of Canton, Wilmington and Framingham, familiar with possible employment densities of 10 to 20 workers per acre in modern industrial development in Greater Boston, would feel, with industrial measured by up to 15,000 workers, no particular planning difficulty that could not be solved. Perhaps the only planning problem that we might be able to pin point at our level of analysis would be a problem of there being not enough towns receptive to industrial entrants in the Outer Band. If so, either the industrial upper limit would not be accommodated here

or too much industry would enter the "receptive" towns and present planning problems that could not easily be resolved. Neither would seem to be the case. An additional 80,000 or 90,000 jobs added would need about 4000 to 8000 acres of land at current densities.¹⁶⁷

The 8000 acres would be about .85% of the Outer Band estimated land area of about 925,500 acres (1446 square miles

Industrial development at the most remotely plausible upper level would need, in the Outer Band, thus, at least five or six towns - feeling as Canton or Wilmington or Framingham - that plants possibly hiring 15,000 or so workers would not present planning problems that could not be adequately dealt with.

We can easily find five such towns abutting proposed Route 495, that, seen from their zoning, apparently have a receptive attitude to industrial development suggested by the remotely plausible industrial limit: they have zoned over 9200 acres of land, which, by GBESC, has been deemed vacant and suitable for development.¹⁶⁸

167. The Land Needs study has estimated that industrial additions in 1970 and 1980 might require 3,300 and 4,300 more industrial acres, respectively - the 4,300 for an estimated additional 85,000 jobs in manufacturing and wholesale activity. Levin and Grossman, p 51.

168. The zoning was taken from a recent compilation of zoning data for the Greater Boston Cities and Towns by the Greater Boston Economic Study Committee. The five towns were: Andover, Billerica, Chelmsford, Tewksbury, and Westford.

Planning problems even for the most remote limit then, appear to be rather specific: to be dealt with as individual cases as they arise in any community. We do not therefore, discuss lower levels in the range.

C. Slightly more success is anticipated in considering planning problems with population growth, as of general concern, in the range from the remote to the reasonable.

A remotely plausible increase of 630,000 persons in the Outer Band could be fairly well spread over the 73 cities and towns. The distribution could be rather uneven - some towns getting much, some little. We recall that in the Route 128 Band, abutting and non-abutting towns received about the same population increases.¹⁶⁹ Also, in the eight study towns, population increases tended to increase with town size.¹⁷⁰ Thus, while we do not maintain a distinction of abutting, non-abutting, we do analyze growth in the Outer Band in terms of town population sizes and growth additions to those particular selected classes.

The remote limit represents an average increase of about 8600 persons per town.

As a small town reaches the level of 10,000 population its physical facilities are badly overtaxed. About the most that an average small town can take (hypothetically, the midpoint, 5,000, of the 0 - 10,000 class) is, therefore, an increase of

¹⁶⁹. pp 16-17, supra

¹⁷⁰. Table X, p 48, supra

of 5,000 persons. Over this, the town must plan for some new "saturation" level or attempt to serve the growth it has got and restrict further growth from entrance. On this basis, all of our forty-two small towns would be enduring particular difficulties with inadequate facilities, congested town centers, parking problems, vanishing rural character.

Towns above 10,000, at one remote level addition, would be growing on the average, more rapidly than they choose but probably could handle the population increases - this is based on the "moderate" rate of 150 dwellings per year, 5 or 6,000 persons added in a decade. Depending upon the particular size of the town in this class, the 8600 average increase would be more or less difficult - more say for the under 15,000, less for the over.

Here, the towns may be planning for public utilities, sewers, town-office space, street additions, expansions, widenings-advance acquisition of sites and rights-of-way become extremely important. What the towns does here beyond the small town rural stage and into the next may be crucial for the future. Twenty-four towns thus may experience this critical stage.

For the above 30,000 town, the remote limit average addition may be easily handled on the basis of the Framingham experience. The additions, however, may require higher densities in these cities which are rather largely developed. Three of the cities we note, Haverhill, Lawrence and Lowell have been steadily losing population and they have fairly sizeable amounts of deteriorating and dilapidated housing. In the absence of adequate land for development, and in the face of the deteriorated housing, urban renewal measures may be programmed for the remote limit average increase.

TABLE XII POPULATION AND LAND AVAILABLE FOR DEVELOPMENT
IN THE LARGER OUTER BAND CITIES AND TOWNS

	population ^a			b (acres) vacant and developable		percent vacant
	1950	1960	1970	Total		
Framingham	28,086 ^c	44,526	62,000	14,051	5530	38.
Attleborough	23,809	27,118	34,000	n/a	n/a	--
Brockton	62,860	72,813	80,000	13,485	4677	34.5
Haverhill	47,280	46,346	45,000	21,190	11,819	55.9
Lawrence	80,536	70,933	63,000	4,309	350	8.1
Lowell	97,249	92,107	89,000	8,426	2708	32.1
Methuen	24,477	28,114	32,500	14,342	8482	59.1
Taunton	40,109	41,132	42,000	20,237	15,313	52.8

a. Revised 1970 Population Projections for the 149 Cities and Towns In the Greater Boston Economic Study Area

b. Greater Boston Land Use (Draft II)

c. Framingham, not an Outer Band town is included for comparison.

At a low density assumption of 3 persons per gross acre the 8600 average increase may require about 2900 acres. At this density Lawrence and Lowell could not accommodate the increase and Brockton would be close. Perhaps renewal measures could be here used advantageously, Table XIII indicates that, relative to Framingham, the three cities Haverhill, Lawrence, and Lowell have fairly substantial amounts of marginal housing.

TABLE XIII CONDITION OF DWELLING UNITS IN THE LARGER
OUTER BAND CITIES AND TOWNS

	Total units	Deteriorating		Dilapidated	
	1960	number	percent	number	percent
Framingham	12,813	803	6.3	119	0.9
Attleborough	8,643	711	8.2	134	1.6

Brockton	24,090	2644	10.9	452	1.9
Haverhill	15,967	2800	17.6	730	4.6
Lawrence	24,407	4224	17.3	795	3.3
Lowell	29,952	3787	12.6	782	2.6
Methuen	8,714	1124	12.9	180	1.4
Taunton	12,226	1511	12.4	392	3.2

Source: U.S. Bureau of the Census, U.S. Census of Housing: 1960, Advance Reports, Housing Characteristics, Massachusetts, HC (A1)-22 March 1961.

Thus, while an average increase of 8600 may not be difficult to accommodate in terms of Framingham's observed building rate of 300 to 500 dwelling units per year, the large cities in the Outer Band may add this - especially Lawrence and Lowell - at higher densities (but to which they are accustomed).

We should stress here that none of the above is to be taken as any kind of prediction or recommendation. The analysis is only meant to give some indications of the planning implications, in gross terms only, of this very remote limit of growth.

In those gross terms, the remote limit population distribution on the average would rather radically change the small rural communities to suburban or semi-rural status. All would thus be faced with major decisions of community planning goals, of desired population levels, of possible ultimate population levels. The small towns would be faced with preparing for community services for the ultimates and of replacing and expanding physical facilities for the present. The towns would be taking on the problems of the Sharons, the Cantons, the Wilingtons, the Concorde. The physical planning problems and the physical planning solutions for the above

10,000 class would not be so different from those of the smaller towns - probably they are already in the stage of replacing community facilities that are left over from more rural days. Most towns would experience difficulties with the upper limit. All of the small towns more than likely, and probably half of the medium towns would feel rather heavy pressures - roughly 50 or so towns, thus, of the 73 would be so affected.

The argument is gross and largely hypothetical yet it does indicate that at this only remotely plausible limit of 630,000 persons added, the Route, as influencing the population distribution, would be of major physical planning concern but probably nothing very catastrophic.

At half this level, however, about 315,000 population added and an average of 4300 persons added per town, consideration of the Route as a major planning problem disappears for all but the small towns. These, say, below 3000 would be brought to the point where they feel congestion on their streets, feel perhaps problems, see the possibility of a loss of rural character, feel a need for expanding facilities.¹⁷¹ Towns over 3000 to about 5000 population would be brought to the point where planning goals would have to decide not only what to do about growth that now presses for expanded public services and facilities but how much future growth to anticipate¹⁷² - the towns would find perhaps a similar situation as the study town of Sharon.¹⁷³ For those towns, in a class about 5000 to 10,000,

¹⁷¹. This is based on the experience of Carlisle, Dover and Lincoln rather than the expected experience of these Towns; and the actual experience of Canton, Sharon, Concord and Wilmington. pp49-55, 56-65. The small towns in the Outer Band below 3000 population in 1960 were 16 and expected for 1970 there might be 11.

¹⁷². In 1960 there were 15 such towns and in 1970 there might be 9.

¹⁷³. pp 56-65 supra.

expanded facilities would be needed, something would need to be done for parking problems, for traffic congestion in their centers for school site acquisition: the typical situation that we find in the Canton and Wilmington cases. 174

Above the town of 10,000 population the average increase suggested by half the remote limit (4300) would, from the Concord and Wilmington testimony, be considered a moderate addition and within the particular Town's capacity to satisfy.

As presenting general problems of physical planning a population increase of 315,000 may be such only for the small towns - assuming they receive the average increase. However, population distribution may likely be based on town size - or other considerations - and individual towns may experience difficulties with growth while others may very well not. Such a possibility can be discussed but hypothetically by our gross analysis.

At, finally, one quarter of the upper limit, an average of about 2200 persons added in a Town, the highway impact for the Outer Band disappears as a general problem for any group of towns. Specific towns may find they have their planning problems - they always do. Some towns may restrict growth from entrance; there would be sufficient flexibility however, at the level probably that even the restrictions would be largely unnoticed by the others who might have to accept the growth.

D. Our findings then, for the Outer Band Area, and for a gross analysis only indicate:

- (1) At the most remotely imaginable limit we are unable to generally pin-point any particular difficulties that may arise from industrial development measured by 80,000 to 85,000 jobs. As a general problem, industrial development does not so appear from our analysis. Particular problems may occur with planning for industry which would arise and be solved, apparently, as they existed on a town by town basis.
- (2) At the most remote limit of population additions, average increases of 8600 persons in the Towns would spell physical community difficulties to a majority of towns - for probably all the smallest and about half of the medium sized towns. This is on a hypothetical basis but there appears to be a lack of sufficient flexibility in the amount of population expected at this level and the ability or the preference of the towns to so handle it; and we deem this remote limit to thus present planning problems of general and major magnitude.
- (3) At half the upper remote limit (315,000), an average increase, 4300, over the small towns would be deemed a planning problem of general concern to them. But above 10,000 population the physical problems from growth would be within the resources of the towns to handle. There is, here, sufficient flexibility that this level might constitute no heavy growth problem for any town: towns of 30,000 to 99,999

could add 18,000 (Framingham's moderate rate); towns of 10,000 and under 30,000 could add 5,000 (Concord and Wilmington's moderate rate); and towns below 10,000 would only need add 1700 or ~~20~~ persons - again this is not a recommendation. And, we add, the larger towns and cities especially Lawrence, Lowell and Brockton would require a good bit of renewal housing

(4) At one quarter of the upper remote limit (157,000 persons added) such a highway impact over the Outer Band could not be said to create planning problems of general concern to the communities.

The observations suggest that at the most remotely imaginable limit, the highest ceiling, cooperative efforts may be acceptable to the towns. The problems encountered would be sufficiently common and sufficiently pressing on most towns and there would be enough lack of flexibility that problem solving in common may occur voluntarily.

At half of this upper limit, the interests of all towns, collectively, would be best served by coordinative efforts that could distribute population increases in a way that would be least felt by all towns.

At a quarter of the limit, the impact presents little more than local problems with growth. Future growth prospects for the area and the interests of perhaps the smaller towns may support a coordinative approach. We recall Sharon's new role as a member of the metropolis and its shedding, thereby, of its rural mantle.

Between the upper level of 630,000 and about half of it we have some indications that planning difficulties of general concern would prevail. At half, only the very small would be concerned - and it is possible that a distribution of population based upon town size and moderate growth additions would remove this level of population growth from general concern.

We recall from Part I, that a more reasonable population upper limit may be about 375,000.¹⁷⁵ This range would appear to offer little difficulty that we can generally see for the Outer Band. In all of the analyses, particular towns may have particular difficulties with circumstances - such cannot be discussed by our analyses.

175. pp 36-40

APPENDIX I Manufacturing employment "added" in Towns
 corresponding to industrial location groups
 in the Route 128 Study of Professors Bone and Wohl.

<u>Towns</u>	(1) <u>manufacturing jobs added 1950-1957</u>	Bone Study	Route 128
		(2) <u>Employment in production and RCD</u>	<u>employment as percent of Towns</u>
A. Industrial Location Group #1: North of U.S. 1 North			
Beverley	915		
Danvers	2504		
Peabody	191		.33
	<u>3610</u>	2450	.68
B. <u>area #2 Burlington and North to U.S. 1 North</u>			
Burlington	953		
Reading	111		
Stoneham	220		
Woburn	1857		
	<u>3141</u>	2820	.90
C. <u>Areas #3 (Waltham), #4 (New England Industrial Center), #5 (Newton), #6 (Needham)</u>			
Needham	2352		
Newton	2607		
Waltham	9163		
	<u>14122</u>	6498	.46
<u>Area #7 (South of Needham)</u>			
Dedham	1356		
Westwood	8		
Norwood	1657		
	<u>3021</u>	2795	.93
<u>All Areas</u>	23,894	14,563	.61

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OTHER DATA

Greater Boston Economic Study Committee Data: including 1960 land use and zoning studies; a Map, Land Use In Greater Boston, 1960 (March 1962); and employment data for the years 1949, 1957, 1954, 1950 and 1960.