THE COSTS AND REVENUES GENERATED BY LOW AND MODERATE INCOME HOUSING IN THE SUBURBS: A STUDY OF NEWTON, MASSACHUSETTS

by

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ABSTRACT

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The purpose of this thesis was to determine, through a case study approach, how low and moderate income housing (LMIH) would affect the fiscal resources of a suburban community. The community considered was Newton, Massachusetts and the housing, not yet built, 361 scatter site units that would house approximately 1329 people during the first year of occupancy.

Three primary questions were asked: (1) What are the amounts of the costs and revenues that LMIH would generate? (2) How do these costs and revenues compare? (3) What would be the effect of the housing on the municipal budget?

The costs that were considered are among those classified as "general expenditures" by the U.S. Bureau of Census: costs for streets, sewerage, sanitation other than sewerage, and education. The revenues that were considered were the real property tax, motor vehicle excise tax, intergovernmental revenues, and "current charges".

In determining the costs that the LMIH would generate, an effort was made to calculate marginal costs, thus requiring the evaluation of fixed costs and variable costs, and how these would respond to an increase in population.

In answer to the first two questions above, the results of the study were that average costs generated by the LMIH would be lower than the average costs generated by the community as a whole; the same held true for revenues. The shortage on the revenue side would result in a deficit of approximately $18,500 during the first year of occupancy. To this extent the housing would not be able to pay for itself. In answer to the third question, the effects of the housing on the municipal budget were

as follows: (1) per capita expenditures and revenues would both be reduced, (2) total expenditures would increase by less than 1% as would total revenues, and (3) a per capita cost of 20¢ would have to be carried by the entire city if the housing were to break even. It was therefore concluded that the housing would impose a minimal fiscal burden on the City of Newton.

Thesis Advisor: John T. Howard
Title: Professor of City Planning

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Final responsibility for all facts, estimates, and conclusions is, of course, my own.

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CHAPTER I

INTRODUCTION

Statement of Problem

A primary argument against low and moderate income housing in the suburbs is that such housing will impose a financial strain upon municipal services; such housing, the argument goes, will not pay its own way. This thesis, through examination of a particular suburb[1], will attempt to determine whether the above argument is valid, and if so, at what points. The questions that will be asked are (1) what are the costs and revenues that low and moderate income housing[2] will generate for the muncipality? (2) how do the costs and revenues compare? and (3) how will these costs and revenues affect the municipal budget? Primary emphasis will be given to the first question, and indeed, only after the first question is answered can we proceed to the second and third. In order to provide a useful comparison, one that might well be made when choosing among alternative land use policies, these same questions will be asked of other development that could realistically occur on the low and moderate income sites. Since the 1970 census made available such a wide range of data relevant to these questions, we shall rely upon 1970 figures rather than figures of the current year.

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[1] Newton, Massachusetts, a suburb out side of Boston. Details will be given in chapter ii.

[2] The low and moderate income housing that will be considered is not yet constructed although the sites and specifications are known.

Costs [1]

A number of problems arise when analyzing costs. On the simplest level, perhaps, is the problem of whose costs to analyze. Should we only consider the costs that are incurred by the municipality, or are private and other governmental costs important as well? Since we are concerned here with the fiscal effect that low and moderate income housing would have on municipal services, it seems reasonable to consider only those costs for which the municipality is responsible.

On the other hand, costs of municipal services, typically those of capital items, are often partially paid for by other levels of government and in some cases by private citizens. The portion that each of these contributors pays may change over time; currently, education costs are almost exclusively carried by the municipality, but in several years the state may assume a greater role. This suggests that to focus solely on municipal costs is to ignore the potential for shifts in fiscal responsibility for municipal services.

In analyzing costs, therefore, it seems appropriate to have a service-oriented approach. That is, we should first select the municipal serivces that are relevant to the study, determine the total cost of those services as they relate to the needs of the

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[1] The costs considered in this thesis are those classified by the Census Bureau as general expenditures. These are all city expenditures but utility, and employee-retirement amounts.

new population, and then determine who pays what share. It should be recognized, however, that although it is highly desirable to establish such a breakdown of revenue sources, there are certain difficulties in doing so. First of all, there is the problem of obtaining accurate data; that is, unless one can determine how much money from which sources are to be applied to which services the funding breakdown may not be very meaningful. Secondly, some of the money that is given to the municipality from other levels of government may have come from the municipality in the first place. Thus, the ostensible cost that is indicated for the municipality may really be an understatement of its actual burden. While this does not negate the value of the breakdown, it is an item the reader should be aware of.

With these problems in mind, we will present, when possible, a breakdown of the various contributors to the cost of municipal services. This not only isolates the municipal burden, but indicates how the total burden is distributed. Because we will attempt to present such a breakdown, it should not be inferred that we consider the municipal burden simply one among many. The municipal costs are of primary importance within the context of this study, but it is nevertheless important to present how the total costs are shared.

Turning to other cost issues, we should ask about the types of costs that are relevant to consider. The distinction between operating and capital costs is clearly a useful one, and we shall use that distinction here. The standard definitions of operating and capital costs should be assumed; that is, operating costs meaning those expenses for the daily operation and maintenance of the service, including expenses for wages, materials, and supplies; and capital costs meaning those expenses for capital items such as buildings, major equipment, and frontage facilities. One rule of thumb for defining a capital item is to determine whether its cost "may legally be financed by borrowing and bonded debt."[1] If it can, it is a capital item.

The costs of capital items may be looked at in two ways. One way is to view the expenditures as one lump-sum item, that is, as a single capital outlay; the other is to view them as an annual expense, that is, as the annual cost of the capital outlay. One must, of course, determine the capital outlay before determining its annual cost.

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[1]John T. Howard, Capital Improvements Programming. Paper prepared for the Boston Regional Development Strategy Project sponsored by the Department of Urban Studies and Planning, MIT, 1972, p. 5.

Annual costs are incurred as a result of the community assuming a debt. The debt may cover only part of the cost, and the rest may be paid for through existing revenues, but for the sake of simplicity, we shall assume that the entire cost of major capital items will be financed through borrowing. There are a number of ways to determine annual costs of capital facilities. One is to calculate constant annual payments, and another, which is characteristic of serial bonds, is to calculate declining payments over time. Although repayment of loans by serial bond is required by statute in Massachusetts, again for the purpose of simplicity, the first method will be used here.

In order to calculate constant level payments, we must know the rate of interest and the length of time over which the debt must be repaid. Different capital facilities have different amortization periods fixed by statute. Local roads, for example, may be amortized over a 10 year period, and schools may be amortized over a 20 year period. Furthermore, depending upon the age distribution of the new population of children, school costs,

particularly costs for secondary schools, may not be incurred until several years after the new residents move in. These points suggest that the capital costs that are generated by the new population may not all be carried at the same time; that there are periods when capital expenses will coincide in time, and periods when they will not. It is therefore appropriate to present a dynamic cost picture, one that reflects the changes over time, rather than presenting that period when all capital costs coincide.

It was noted above that the calculation of annual payments for capital facilities would be made by determir ng constant level payments according to the interest rate and period of amortization. Isard and Coughlin, in Municipal Costs and Revenues Resulting from Community Growth[1], note that this method of calculation does not reflect real costs; that in fact the actual life of an improvement is normally longer than the amortization period for which it is financed. Because of this fact, they maintain that costs calculated on the basis of debt service financing ignore the value of the improvement after the debt is retired, and therefore overstate annual costs. This view regards the improvement as an asset whose value lasts throughout its useful life.

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[1]Walter Isard and Robert Coughlin, Municipal Costs and Revenues Resulting From Community Growth, (Wellesley, Mass.: Chandler-Davis Publishing Co.), 1957, p 18.

In translating this view into annual costs, Isard and Coughlin suggest that determination of costs be based upon the actual useful life of the improvement rather than its statutory amortization term.

It appears that both methods - statutory amortization term and useful life - have merit. The former reveals the actual out-of-pocket expense that the community must pay; and the latter recognizes the value of a facility after the debt has been retired. If this type of study is to be meaningful for local decision-makers, the first method, that which indicates actual expense to the community, seems more appropriate.

Thus far we have concentrated primarily on capital costs. But new residential growth also may generate additional operating costs, and, in fact, if the capital facilities are underutilized the operating costs may be the only costs to be generated. There are no special points to be made here about operating costs, except to mention that they may be more difficult to determine. At what point, for example, will the streets department need to hire extra street cleaners? Or at what point will extra school janitors need to be hired? Some will maintain that these are simple questions to answer; that one need only know the standard of service in terms of a particular unit - e.g., area to be cleaned, population to be served - and how fully that standard is met. Theoretically this is true, but as this writer has discovered, city departments have often not set forth explicit operating standards.

In discussing the types of costs that are relevant to consider, we not only should ask about operating and capital costs, but other types as well. Should we consider marginal costs or average costs? Variable costs or fixed costs? Answers to these questions will be attempted in the following paragraphs.

A common way to determine the cost impact of a new population is to use the average cost approach. If, for example, a city annually spends $70,000,000 for education and there are 70,000 students in the school system, it costs the city $1000 to educate each student. Using the average cost approach, an entry of 200 new students into the system would add $200,000 of extra expenditure to the school budget, and the average cost of educating a student would be maintained at $1000. While this is a widely used method of calculating additional expenditures, there are some serious drawbacks to it. The most serious is that each new student will not necessarily generate $1000 of extra expenditures simply because it was determined that it cost, on the average, $1000 to educate each student. The initial determination of $1000-per-student includes such expenses as heat and electricity for the school building, clerical support, debt service, perhaps, and other fixed costs. If the new students can be absorbed without increasing fixed expenses - that is, if there is enough excess capacity - then each one may actually generate a much lower expense than $1000. And if this is the case, then the average cost of educating a student will be lowered.

A number of points are raised by the above example. First of all, it is important to distinguish between the extra, or marginal, costs that are generated by the new population, and the average costs of serving the existing population; the average costs cannot be assumed to be identical to the marginal costs, although in some cases they will be. Secondly, in order to determine the marginal costs it is necessary to distinguish between those costs that are variable and those costs that are fixed. Fixed costs, within certain limits, remain the same regardless of the number of users, and variable costs change with the number of users.[1] In the context of schools, for example, a fixed cost item might be wages for a teacher; the teacher's salary remains the same whether there are 14 students in the classroom or 24. A variable cost item, on the other hand, would be expenses for textbooks; the addition of new students requires more textbooks. At a certain point, however, a fixed cost item may become a variable cost item: if another classroom is needed because of overcrowding, then another teacher will be needed as well. A fixed cost item, then, is fixed only when excess capacity exists. It is important, therefore, when determining marginal costs to know (1) the "maximum efficient" capacity of the services, and (2) the existing use of those services (degree to which they are under - or over -

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[1]Strictly speaking, fixed and variable costs should be considered in relation to the number of units produced rather than the number of users. However, in the case of urban services, and particularly for the school example, it seemed more appropriate to speak of users.

utilized). It should be clear that when excess capacity exists, the marginal costs will be lower than the average costs, and that when no excess capacity exists, the marginal costs will be higher than the average costs. The new average, based upon the amount of the marginal cost, will thus change accordingly.

Having discussed the types of costs that are relevant to this thesis, we shall now turn briefly to other cost issues. One of the problems is to determine what share of the costs should be assigned to particular users within a municipality. If the total expenditures for a particular year are, say, $50,000,000, is it appropriate to simply find the per dwelling unit or per capita expense? In both cases only the residential population is considered, but to be more accurate, costs should be shared among industrial and commercial users as well. But on what basis? By proportion of land occupied? By percentage of revenues generated for municipal services? To determine what percentage particular users are to be charged for municipal expenditures, one would want to link the user with the intensity with which he uses- and therefore benefits from - certain services[1]. School costs, for example, are normally only assigned to residential users - on a per pupil, per dwelling unit, or per capita basis - because it is considered that they are the only beneficiaries of school services. Yet, commercial and industrial establishments may also be beneficiaries; they benefit from the existence of an educated populace.

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[1]It should be clear that we are not discussing out-of-pocket expense to the user. If that were the case,the benefit principle might not apply.

Other examples of direct and indirect benefits within the municipality may be thought of; and when one considers inter-muncipal spillover effects, the allocation of costs becomes even more complex.

There are other cost issues that should be recognized when doing a study of this sort, but because of limited time and objectives they will not be applied here. One of these issues concerns opportunity costs; that is, the cost of sacrificing alternative "spending"[1] by choosing to spend on the new population. The opportunity cost of spending on the new population may, for example, be thought of as a sacrifice of improving the school system. In determining the proper opportunity cost, one should determine what the best alternative use of resources would be. Since "best alternative use" is based upon efficiency criteria, and efficiency criteria are not necessarily the most appropriate criteria in the public sector, the opportunity cost concept may not be as important for a muncipality as it is, say, for industry.

Another cost issue that should be recognized, but that will not be discussed in the thesis, is that of social costs. The social costs to the city of absorbing a low and moderate income population, and indeed, the social costs to that population, are extremely difficult to measure; they may, however, be no less important than fiscal costs, and in fact may be the costs that are most threatening to the suburban resident.

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[1]Spending not only in terms of cash, but time, energy, talent, etc. Use of resources.

Having reviewed some basic problems relating to costs, we are ready to discuss the other side of the question, namely, revenues.

Revenues

As with expenditures, this thesis will only consider general revenues, that is, all revenues but water, other utility, and employee retirement amounts.

The general revenues of a municipality come from a variety of sources: other levels of government, the local property tax, licenses and fees. The most important source of local revenue is the property tax. In Newton, for fiscal 1969-70, the property tax accounted for 80% of its total revenues; other levels of government contributed 15%; and a combination of other taxes and miscellaneous charges contributed 5%[1]. If we examine revenue trends over the years we see that, although still predominant, the property tax is diminishing as a source of local revenues.[2]

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[1] U.S. Bureau of the Census, City Government Finances in 1969-70, Table 5. These figures differ slightly from those reported in Newton's 1970 Annual Report of the Assessing Department. The difference arises because the Census Bureau's figures cover the period from July 1, 1969 to June 30, 1970, whereas Newton's figures cover the calendar year.

[2] See James A. Maxwell, Financing State and Local Governments (Revised Edition, Washington D.C.: The Brookings Institution, 1969), pp. 18 and 128.

It is therefore appropriate to consider not only revenues generated by the property tax,[1] but other sources as well. Further, the costs that we are considering are paid for from several public sources, so when comparing costs with revenues it is necessary that we consider all revenues that go toward meeting those costs.

Determining the direct property tax yield for the hypothetical properties should be relatively simple. The tax yield from rental housing in Newton is ordinarily between 25 and 30 per cent of gross rentals, and new single family dwellings are ordinarily assessed at 40 to 50 per cent of their fair market value. While assessment and appraisal of property is actually a complex process, these rule-of-thumb measures may be applied to the housing in question with a reasonable amount of confidence.

Besides considering the property tax that the new housing would directly generate, it is appropriate to consider the property tax that such housing would indirectly generate. We should ask, therefore, whether the new residents would contribute to increased property tax yields in other sectors of the community besides the residential sector. If, for example, we assume that the new residents would spend a certain portion of their income

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[1] Included in the Census Bureau's property tax category are monies received from the assessment of real property, motor vehicles, and personal property. We shall only consider the first two items as they are the most important source of property revenues for Massachusetts municipalities. Further, they are much simpler to estimate, and, as Maxwell indicates in above reference, the personal property component of the property tax is shrinking. See pp. 133-137 of Maxwell.

in local commercial establishments, and, that the property tax yield of these commercial establishments is based upon a certain percentage of their sales, we may then estimate an increase in tax yield for the commercial sector based upon the increased sales stimulated by the new residents.[1]

Similarly, if the new residential population becomes a part of the local work force, and, if the increase in employees is related to increased productivity, an increase in property tax revenues may also be estimated for the sectors in which they work.

In Newton, the first example is relevant and the second is not. Since Newton, as most well-to-do suburbs, is sufficiently stocked to satisfy a wide range of commercial needs, one can predict that of the income that is spent for commercial or retail goods, much of it would be spent locally. However, in the case of the second example - linking increased tax revenues to increased employment - an analysis that would likely be difficult would not be justified by the low proportion of new residents that could be expected to work locally.[2]

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[1] In order to assert that there is an increase in sales as a result of the new population, there is the underlying assumption that the new population is in fact "new" - that it has not simply moved from one part of town to another. Or, if it has, people with similar consumption patterns are occupying the housing from which the "new" population moved.

[2] See Newton Planning Department, Economic Base Study, 1967, for assertion that those who live in Newton do not necessarily work there, and that those who work there do not necessarily live there.

Finally, besides the real property component of the property tax, there is that component that is unique to Massachusetts and a number of other states, namely, the motor vehicle excise tax. This is a tax that is levied on automobiles that are garaged in particular communities and whose revenues are used by those communities.[1] This tax will be more fully discussed in a later chapter.

Determining the amounts of non-property revenue that the new growth would generate is considerably more difficult than determining the anticipated property tax yield. The Census Bureau enumerates the municipal non-property sources of revenue. These sources are: intergovernmental revenue; general sales and gross receipts; selective sales and gross receipts; other; current charges; and, miscellaneous. In Massachusetts, a municipality cannot legally tax sales, therefore the sales categories are irrelevant in the case of Newton. Very relevant, however, are intergovernmental revenues. Since, as noted earlier, intergovernmental revenue accounted for 15% of Newton's total general revenue, while other non-property categories accounted for only 5%, it is reasonable to emphasize the revenues from intergovernmental sources.

According to the census figures for fiscal 1969-70, 14% of

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[1]In Massachusetts the state receives the revenues from those cars that cannot be said to "reside" in a particular city or town.

Newton's intergovernmental revenue came from state sources, and 1% from federal and local sources combined. It should be recognized that the 14% from state sources included funds that originated at the federal level but that passed through the state apparatus to the locality, but that the 1% from federal and local sources represented funds that passed directly to Newton.

How can we determine the amount of intergovernmental revenues that is associated with new residential growth? To begin to answer this question we must answer two others: (1) For the costs of which services do the intergovernmental funds go? and (2) What is the basis for determining such aid? These questions are directed primarily at the state level, since it is primarily state funds (from the disbursement standpoint) that are involved. Once these questions are answered, they can be related to both the characteristics of the residents of the new housing (e.g., income level, age distribution), and to the additional services and facilities that these new residents generate. If, for example, much of state aid goes toward street construction, and the new housing requires very little street construction, then the state revenue generated by residents for such purposes would be insubstantial; or, if some state aid is distributed to schools on the basis of percentage of families with personal incomes below a certain level, then the presence of low and moderate income families may increase the amount of state aid for education. And so on.

Once the intergovernmental revenues are determined, we may look at the other 5%: current charges; miscellaneous; and "other".

Current charges may be loosely defined as user charges. As the Census Bureau says, current charges include "fees, assessments, and other reimbursements for current services...incident to the performance of particular functions..." Current charges do not, however, include (1) charges for utilities, and (2) charges for licenses "which relate to privileges granted by the government or regulatory measures for the protection of the public."[1] Examples of "current charges" are fees for the use of recreational facilities, fees for school lunch, and assessments on betterments. What the new population would contribute to this category of revenue may be determined with varying degrees of precision: The money that would derive from betterment assessments or school lunch may be more accurately estimated than the money that would be derived from the use of recreational facilities. We will therefore only examine those elements of "current charges" that we are fairly certain will yield reasonable results. In any case, since these revenues only contribute a small portion to the total pot, a rough approximation is adequate.

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[1] U.S. Bureau of Census, City Government Fincances, p. 101.

As for the last two categories of revenue - "other" and "miscellaneous" - since they would include incidental charges whose amounts would be difficult to predict, and since they together constitute only 1.7% of total revenues - we would do well not to consider them at all. The revenues we will consider, then, are those from the motor vehicle and real property components of the property tax; intergovernmental revenue, particularly state aid; and those aspects of current charges that we can reasonably determine.

Before we launch into the case itself, it is worth repeating that the revenues that are needed to meet municipal costs come from a variety of sources, and that the proportion that these sources contribute may change over time. Currently, the heaviest burden falls upon the municipality in the form of the local property tax. Changes, however, may occur so that other sources and forms of financing will emerge to alleviate the local burden. This thesis, therefore, by assuming that the largest proportion of general revenues will come from the local property tax, is presenting a case in which the community is under substantial fiscal pressure, more pressure, perhaps, than the community might be subjected to in a decade. In short, from the community's standpoint the current case might well be the toughest case.

CHAPTER II

THE CASE

Description of Newton

Newton, Massachusetts is a residential suburb located seven miles from downtown Boston. Like many of the communities that surround the central city, Newton is old and fairly well built-up. Town government was established there in 1688, and incorporation as a city occurred in 1873. It is a wealthy community, from the standpoint both of personal income and assessed valuation. 1970 figures indicate that the median income of Newton families is $15,381, and that the per capita assessed valuation is $3813.[1] Newton's population of over 91,000 occupies roughly 18 square miles of territory. Residential property accounts for 53.5% of this area, commercial and industrial property account for 5%, institutional and public, 23.5%, and the balance is occupied by streets and privately owned vacant land.[2] Of these properties in 1964, residential land contributed 85% of the total taxable valua-

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[1] U. S. Bureau of Census, General Social and Economic Characteristics 1970, Table 89 and Newton's 1970 Annual Report of Assessing Department.

[2] Newton Planning Department, Economic Base Study, 1967, p. 4.

tion, commercial and industrial uses contributed 14%, and vacant land, 1%.[1] Institutional and public land is, of course, exempt.

Much of the tax money goes to support the school system. 43% of all revenues are applied to education, and of these revenues the property tax represents 80%.[2] Newton prides itself on its school system, reputed to be one of the best in the state, and indeed, the City prides itself on the high quality of all its public services.

One evidence of the level of service provided, is that most of the City's elementary school children are within ½ mile walking distance of school. Twenty-three elementary schools serve 9098 students, eight junior high schools serve 4241 students, and two high schools serve 4230 students.[3] In 1970, six of the elementary schools were considered overcrowded, but three of those schools are currently the subject of proposals to relieve congestion, and two already have reduced enrollments that expect to be maintained for at least five years. A new

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[1]Newton Planning Department, Economic Base Study, 1967, Table 3.

[2]Newton's 1970 Annual Report of Assessing Department, p. 3.

[3]Vincent Silluzio, Director of Research and Evaluation, Newton Public Schools, Enrollment Analysis, October 1, 1971, p. 2 and 4 - 8.

high school is under construction, and a recommendation to modernize one of the junior highs is expected to be implemented. In addition, Newton supports a technical high school and a junior college.

As far as other services are concerned, the levels of service are equally high: The Police Department is fully staffed 24 hours a day and its officers are able to be anywhere in the City within two minutes of a call; there are seven fire stations throughout the City, and although it is considered that the southern section could be better covered, a mutual call system with the Town of Brookline somewhat compensates for the inadequacy; Newton is almost completely sewered, with sanitary sewers totalling 283 miles, and storm sewers, 242 miles; the streets, 88% of which are accepted, run 301 miles; there are 203 acres of municipal parks in the City, 370 acres of playgrounds, and 304 acres of metropolitan district parks.[1] In addition to its parks falling within the metropolitan district, the district covers Newton's sewage treatment plant, transit facilities, and water supply system.

This information is presented to indicate the extent of services provided by Newton, and to describe the setting within

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[1]Newton's 1970 Annual Report of the Engineering Department, p. 18. This report is included in the Annual Report of the Public Works Department.

which the hypothetical new development would find itself.

Some comments are in order concerning the nature of the low and moderate income housing (LMIH) we are considering. It has been mentioned throughout that the housing is, at this point, hypothetical. Currently there exists a non-profit sponsor for the housing, the Newton Community Development Foundation (NCDF); six sites on which options are being held; site plans; architectural plans; and plans for financing, which include income criteria for tenant eligibility. The physical specifications for the housing are thus known, and the demographic characteristics of its occupants may be estimated from these. It should be noted that the housing specifications and financing plans that are being used as a data source here are under review at this writing, and will possibly be subject to modification; therefore, if and when the housing is built,[2] the actual costs and revenues generated may differ somewhat from those estimated here.

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[1]For a full description of the housing to date, see NCDF, "The Newton Community Development Foundation Program", May 1971, unpublished, hereinafter referred to as NCDF Program.

[2]Construction has been delayed for political reasons. For excellent analyses of the political controversy in Newton, see Christa Carnegie, Subsidized Housing: Running the Suburban Gauntlet and Robert Engler, Subsidized Housing in the Suburbs: Legislation or Litigation? Both are unpublished masters theses prepared for the Department of Urban Studies and Planning, MIT, 1971.

The following two sections will discuss in detail the nature of the housing as it is currently known, and the types of tenants that are projected to live in it.

Site Descriptions

The Newton Community Development Foundation (NCDF) has proposed six sites for its low and moderate income housing (LMIH) development. These sites are scattered throughout Newton, but more of them are located in the southern section of the city than elsewhere. The housing is a mixture of garden apartments and row houses, is two-storey, and has more than 55% of the land preserved as open space.[1] Table 1 presents a site-by-site description.

Currently, four of the sites are in areas that are zoned for single-family housing, and two are in areas zoned for two-family housing; as Table 2 indicates, the single-family sites are subject to zoning restrictions that range from minimum lot areas of 10,000 square feet to areas of 25,000 square feet, and lot widths of 80 feet to widths of 140 feet; the two-family sites, like single-family Residence C, have minimum lot sizes of 10,000 square feet and lot widths of 80 feet.[2]

As was mentioned in the introduction, the impact of the LMIH

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[1] 70% of the total acreage is to remain open; over 55% of it landscaped and planted, with the balance used for roadways and parking.

[2] City of Newton, Zoning Ordinances, Revised 1968.

TABLE 1

DESCRIPTION OF LMIH BY SITE

Site	1BR	2BR	3BR	4BR	Non-Master BR*	Total Units per Site	Parking Spaces	Sq. Ft. per Unit	Total Site Area (Sq. Ft.)
Hunnewell Ave.	4	14	3	3	29	24	30	3544	85,059
Stanton Ave.	6	38	10	10	88	64	67	2386	152,707
Hamlet St.	24	44	17	17	129	102	102	3514	358,428
Thurston Rd.	6	30	8	7	67	51	54	2479	126,473
Goddard St.	4	18	13	12	80	47	48	2983	140,233
Esty Farm Rd.	6	40	14	13	107	73	75	2465	180,000
TOTAL	50	184	65	62	500	361	376	2889 (avg)	1,042,898

*Number of bedrooms per unit less 1, multiplied by the number of units of that type. This figure is useful because it reveals the possible number of bedrooms that could accommodate children.

will be compared to that of housing that could conceivably be developed on those sites if the LMIH were not to be built. One should ask, therefore, about the nature of the housing that might occur there. One approach is to use the current zoning regulations, as specified above, as a basis for determining likely development. How reasonable is this approach?

Considering that the construction of single-family housing in Newton has declined substantially since 1960,[1] one might question whether much more of such construction is likely to occur. Most of Newton's land is developed, and for that which is vacant costs are quite high; new single family dwellings are thus discouraged. On the other hand, apartment building is discouraged, too. Of the land that is currently zoned for apartment use, approximately 73% has been developed for other purposes.[2] And, even though the land for apartments has been thus diminished, zoning changes have not been made to allow apartments in other zones: Of the apartments that were built between 1961 and 1969, all but one was built within areas where apartments were either allowed by right or by special permit.[3]

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[1]Newton Planning Department, Apartment Study, April 1971, p.3.

[2]Newton Planning Department, Apartment Study, April, 1971, p. 9.

[3]Ibid., p. 7.

One can conclude, therefore, that although single-family construction is following a downward trend, it is more likely that such housing would be built in single-family zones, rather than zoning changes granted in the same zones for the construction of apartments. One might apply the same conclusion to those sites zoned for two-family use. Since only one of the apartments built during the 1960's was built in a two-family zone, we might assume that apartment construction is unlikely to occur there either, and that if any building occurs it will be of the two-family type.

In sum, assuming residential construction would occur on the six sites, it is reasonable to anticipate it will be of the type that is specified by the current zoning regulations. Therefore, given the minimum specifications for the lot areas as presented in Table 2, we could expect, at most, the distribution that Table 3 indicates for the number of dwelling units for the sites as currently zoned.[1] These tables are presented on the following pages.

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[1] Topographical features and road space for the currently zoned housing were not taken into account because to do so would have required making subdivision plans; the number of dwelling units indicated in column 1 of Table 3, therefore, should be seen as maximum estimates. In any case, one should emphasize that it is not the number of units that is important but the balance of costs against revenues.

TABLE 2

CURRENTLY ZONED STATUS OF LMIH SITES[1]

Sites	Currently Zoned As	Minimum Lot Area	Minimum Lot Width
Hunnewell	Residence C (1-Family)	10,000 s.f.	80 ft.
Stanton	Residence A (1-Family)	25,000 s.f.	140 ft.
Hamlet	Private Residence (2-Family)	10,000 s.f.	80 ft.
Thurston	Private Residence (2-Family)	10,000 s.f.	80 ft.
Goddard	Residence C (1-Family)	10,000 s.f.	80 ft.
Esty	Residence C (1-Family)	10,000 s.f.	80 ft.

[1]NCDF is requesting that each site be changed to Residence D zoning. Residence D areas will allow garden apartments at 3,000 s.f./d.u. by special permit.

TABLE 3

NUMBER OF DWELLING UNITS PER SITE:

CURRENTLY ZONED AND LMIH

Site	Currently Zoned	LMIH
Hunnewell	8	24
Stanton	6	64
Hamlet	70	102
Thurston	25	51
Goddard	14	17
Esty Farm	18	73
TOTAL	141	361

Population Characteristics

Before one can analyze the impact of residential growth on the city's fiscal structure, one must know the characteristics of the residential population. Among these characteristics are the number of children per dwelling unit, the age distribution of the children, and the number of people per dwelling unit. The specifications for the housing provide a basis for determining this information.

Number of Children

As indicated in Table 1, NCDF's plans specify 50 1-bedroom units; 184 2-bedroom units; 65 3-bedroom units; and 62 4-bedroom units - a total of 361 apartments. Of the 361, 25% will be available for middle-income families through MHFA (Massachusetts Housing Finance Agency) funds; another 25% will be available to low-income families through either a rent supplement or leased housing program; and the balance of 181 units will be financed by 236 funds, and thus will be available to moderate income families.[1] Federal regulations - which would apply to

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[1] Middle-income families have incomes of $9,000-$16,000 as specified in the NCDF Program. A later discussion with the executive director of NCDF suggested that incomes may actually be higher. Low-income families are those who meet income eligibility requirements for public housing as set forth by the Newton Housing Authority. Moderate-income families have incomes between the upper limits of low-income families and 135% of those limits.

the 271 units for low and moderate income families - stipulate that each bedroom must be occupied by at least one person and no more than two persons; and that non-master bedrooms may have two people if they are of the same sex.[1] Those units financed by MHFA, on the other hand, are not subject to federal requirements, therefore a small family may occupy a large unit.

If we assume that the low and moderate income units will be occupied by a nuclear family of parent(s) and children, then we may estimate an average of 1.5 children[2] per non-master bedroom. This assumes that if two children are of the same sex they will share a bedroom, and that there is a 50% chance that the second child will be of the same sex as the first; or, looking at the 1.5 figure another way, it represents the mid-point between the minimum and maximum number of children that may occupy a bedroom.

Based upon the nuclear family assumption, the 1.5 figure makes statistical sense. However, if we anticipate that low and moderate income families may have as part of the household a non-parent adult, perhaps a relative who may occupy non-master

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[1]The experience of 236 housing in Stoughton and Framingham, Massachusetts reveals that if two children are of the same sex they must occupy the same bedroom. We shall make this assumption here as well.

[2]Children are defined here as under 18 years old, i.e., pre-school and student age.

bedrooms, the 1.5 figure may be lowered somewhat. And, considering that the 90 units that are financed by the MHFA funds do not have minimum occupancy requirements, and that they will be occupied by families in a middle income range, the figure may be lowered even further. Looking again at the Stoughton and Framingham experience, we see that their initial occupancy figures indicate 1.4 children per non-master bedroom.[1] We shall assume this figure for the low and moderate income families of the NCDF housing. For those units that will be occupied by middle income families, we might be highly conservative and estimate one child per non-master bedroom. Bringing this figure together with 1.4, we arrive at an average of 1.3 children per non-master bedroom.[2]

Of the 361 units proposed, 311 could potentially have children in them.[3] The number of non-master bedrooms is 500, therefore a total of 650 children can be estimated for the six sites. The site-by-site breakdown is as follows: Hunnewell, 38 children; Stanton, 114 children; Hamlet, 168 children; Thurston, 87 children; Goddard, 104 children; and Esty Farm, 134 children.

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[1]Compiled from data on applications of initial tenants of the housing in Stoughton and Framingham.

[2]Weighted average based on proportion of middle income to LMI families: 1.4 (.75) + 1.0 (.25)/1 = 1.3.

[3]Assumption that one-bedroom units will not have children.

Thus far we have only calculated the number of children for the NCDF housing. What about the housing with which the LMIH is to be compared? We said earlier that this housing is to be the type specified by current zoning regulations; that is, it will be similar to housing in the surrounding area. That being so, we might examine data concerning the number of children per household in the neighborhoods surrounding the sites. Since we are concerned with the characteristics of the hypothetical families at the time they move in, the data that would be most useful is that which reports on the neighboring residents at the point of their initial occupancy. The underlying assumption is that there are certain demographic characteristics (age and number of children, for example) that are common to families when they first move into suburban housing.

If we assume that those families that now occupy the housing within the six relevant neighborhoods moved in, on the average, 10 years ago,[1] 1960 data would be pertinent.[2] Looking at census

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[1]This judgement is based on the following: Census data indicates that of those who lived in owner-occupied housing in Newton in 1970, roughly half moved in between 1950 and 1964, and 77% moved in between earlier than 1949 and 1964; it is therefore highly likely that most of those who are currently living in the neighborhoods were living there 10 years ago. Whether they moved in 10 years ago is admittedly speculative, but, since there were more children under 18 in these census tracts in 1960 than in 1970, we may assume that these families in 1960 were roughly at the stage at which families move to the suburbs, i.e., when most of the children are of school age. It therefore seems reasonable to use the 1960 figures as a guide for the number of children in the hypothetical families. These figures are drawn from U. S. Bureau of Census, Census Tracts, 1960, Table P-2.

[2]Except for the Esty Farm site. The streets surrounding the site did not exist at the time of the 1960 census, therefore we shall use the figures from the 1970 census in this case.

tract data, we find the following number of children under 18 per household in each of the tracts within which the sites are located: Hunnewell, .84; Hamlet, 1.08; Esty, 1.4; Goddard, Thurston, and Stanton, 1.1. These figures seem surprisingly low for the suburbs. Yet these areas are not the most affluent parts of the city; houses are generally smaller, and they may contain at most three bedrooms thereby restricting the number of children who may possibly live there. But if we accept these figures as appropriate, and apply them to the number of dwelling units shown in Table 3, we arrive at the following number of children in the currently zoned sites. Comparing these figures to those for the LMIH we see that the difference, as expected, is substantial.

TABLE 4

PROJECTED NUMBER OF CHILDREN AT EACH SITE: YEAR 1

Site	Currently Zoned	LMIH
Hunnewell	7	38
Stanton	7	114
Hamlet	76	168
Thurston	28	87
Goddard	15	104
Esty	25	139
TOTAL	158	650

Age Distribution of Children

What is a reasonable estimate of the age distribution of these children? First we shall deal with the children of the LMIH.

There are a number of ways that one can guess the age distribution of the children who would occupy the LMIH in Newton. One way, and the approach that the NCDF used when it was projecting the housing's impact on schools, is to assume a random distribution of children from kindergarten through high school.[1] NCDF assumed that the age range of the children ran from 1 year to 18 years, and that, therefore, 7/18 of all children would be of elementary school age, 3/18 would be of junior high age, 3/18 of senior high age, and 5/18 would be too young to attend school. Another way is to choose a housing development that one believes would have tenants similar to those who would occupy NCDF housing, examine the age distribution of children there, and apply those figures to the Newton development. And finally, one can examine the tenant selection plan that NCDF hopes to implement, determine what characteristics the anticipated tenants might have, and attempt to associate those characteristics with a likely age distribution of children.

The three approaches are of varying validity. The first approach, that of random distribution, assumes that there is no

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[1]Assuming a K-6, 7-9, 10-12 distribution, as currently exists in the Newton public schools.

relationship between age distribution of children within a given population and other particular characteristics of that population. It is this writer's view that there may be a very strong relationship. Housing with a large number of 4-bedroom apartments, for example, will attract large families; the median age of children in large families is likely to be higher than that for small families,[1] and in that case there would be a higher proportion of children in the upper grades than a random distribution would specify. The size of families, then, would have a decided influence on the age distribution of children. Or families in particular income brackets may have certain preferences about the timing of children, and in that case, level of tenants' income may influence how the ages of children are distributed. In short, one must account for several variables that could possible be associated with the age distribution of children.

The second approach may be more appropriate. This approach suggests that one choose a housing development that one believes would attract similar tenants to those in NCDF housing, examine the age distribution of children there, and apply those figures to the NCDF housing. This approach has the advantage of using figures from an actual rather than theoretical population, and, if one assumes that the actual distribution is more likely to

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[1]If a small family, for example, is in the process of becoming a larger family, the children's average age will be lower than it will be at a later point in time.

approximate the reality of NCDF, then using a similar housing development as a guide is clearly an advantage.

The third approach may be the best - given ideal conditions of time and energy. The tenant selection plan proposed by NCDF provides that at least 75% of the tenants should have what NCDF calls "Newton ties". Newton ties can range from being a widow(er) of a Newton employee to being a current resident. Within the group of those who have Newton ties, first priority for tenancy would go to those who live in substandard housing. The rest of the tenants, 25%, would not have to have Newton ties but would have to meet income eligibility requirements (as would every tenant) and other conditions stipulated by the tenant selection committee.[2] The difficulty arises in predicting in what proportions people with particular characteristics would be selected, and then relating probable age distributions to those characteristics. Clearly, this would be a complex and tedious job, one that does not leave much margin for error.

The second approach, then, is the one we shall use. The housing whose age distribution we shall apply to Newton is located in Stoughton, Massachusetts, namely, Presidential Courts. There are several reasons for speculating that the occupants of Presidential Courts would bear a resemblance to

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[1]See the tenant selection section of the NCDF Program.

those who would occupy the housing proposed for Newton. First of all, the tenants of the Stoughton development are primarily of moderate income, as would be the tenants of the Newton development.[1] Secondly, the Stoughton housing is predominantly white - approximately 85% - and if the NCDF tenant selection plan is implemented, the tenants of the Newton housing will be predominantly white as well. And thirdly, the NCDF housing would be located in the suburbs, as is the housing in Stoughton. Thus, insofar as race, income, and residential location can be associated with the age distribution of children, and assuming these characteristics are similar in both developments, we can assume that the age distribution will also be similar.

The Stoughton figures reveal that most of the children in two-bedroom apartments are of pre-school age; most of those in three-bedroom apartments are of elementary school age; and most of those in four-bedroom apartments are also of elementary school age, but in addition, the four-bedroom units have the highest proportion of children in junior high and high school. Although the proportion of older children increases with the

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[1]Those in Presidential Courts are of moderate income because the housing is subsidized through the 236 program - a program for housing moderate income families. Even though only 50% of the units in the NCDF housing will be rented to moderate income families, 25% will be rented to low-income families, and 25% will be rented to middle income families. The low income families and middle income families will average themselves out to moderate income; we can therefore say that in Newton, as in Stoughton, the average income will be within the moderate range.

size of the unit, in no case is the proportion of secondary-school-age children higher than that of elementary age.

Looking specifically at the figures, we find the following distribution:

TABLE 5

AGE OF CHILDREN BY UNIT SIZE:

PRESIDENTIAL COURTS[1]

Age	School Level	Size of Unit 2BR	3BR	4BR	All Sizes
1-4	Pre-school	28(76%)	22(30%)	3(9%)	53(37%)
5-11	Elementary	8(21%)	37(50%)	17(52%)	62(43%)
12-14	Junior High	1(3%)	9(12%)	9(27%)	19(13%)
15-17	Senior High	- -	6(8%)	4(12%)	10(7%)
	TOTAL	37(100%)	74(100%)	33(100%)	144(100%)

Since it is clear that there is a relationship between the number of bedrooms and the grade level of the children, these percentages must be applied to each of the six sites according to the size of the unit. When these results are combined

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[1]Data were compiled from applications of all initial tenants. Since we are concerned with initial tenants for the Newton developments, the data are particularly appropriate.

according to school level, we find the following distribution of children for each site.

TABLE 6

NUMBER OF CHILDREN AT EACH SITE BY SCHOOL LEVEL: YEAR 1 OF LMIH

	School Level				
Site	Pre-school	Elem.	Junior	Senior	Total
Hunnewell	17	14	5	2	38
Stanton	49	43	14	8	114
Hamlet	62	69	25	12	168
Thurston	38	32	12	5	87
Goddard	32	46	18	8	104
Esty	55	55	20	9	139
TOTAL	253	259	94	44	650

These are the figures that will be used as a base for projecting the impact of the housing on Newton schools. If one is interested in the impact over time, however, one must also determine the length of the tenants' occupancy and the characteristics of those who will replace the initial tenants. As a study by George Sternlieb reports, garden apartments - some of which are the LMIH in Newton - primarily attract families with young

children who move out after a few years, and who are subsequently replaced by families who also have young children.[1] According to this reasoning, families in garden apartments do not stay throughout their children's schooling and therefore place little or no burden upon the secondary schools. If we consider the student age children of the initial tenants of the LMIH in Newton, we see that they also would place little burden upon secondary schools; 67.7% of these children are projected for elementary school, and only 32.2% are projected for secondary school; as significant, perhaps, is the split between junior and senior high school: 23.7% in junior high, and 8.5% in senior high. Since per pupil costs are normally highest for senior high school students, the smaller proportion of senior high students suggests lower secondary school impact than is ostensibly apparent.

Will the above distribution change over time, or will it, as Sternlieb suggests, remain constant? Sternlieb's assertion - that families in garden apartments move in with young children and move out before their children's education is complete - assumes an upwardly mobile population. Since those who will occupy LMIH in Newton necessarily have limited incomes, the assumption of upward mobility may not apply. Added to the lack of upward mobility, the quality of the Newton school system may provide an additional incentive for the LMI families to stay for

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[1]George Sternlieb, The Garden Apartment Development: A Municipal Cost-Revenue Analysis (New Brunswick, New Jersey: Rutgers, the State University, 1964), pp. 7-8.

the duration of their children's education. We may assume, therefore, that a family that moves in to subsidized housing in Newton will stay until its children's education is complete, and, that these tenants will be replaced by tenants with similar characteristics.

Now we shall turn to the age distribution of children in the currently zoned sites. We said earlier that we are concerned with the characteristics of the hypothetical population at the time they move into Newton. That being so, we looked at 1960 census data, speculating that would describe the families at their point of initial occupancy, particularly in terms of the number of children per family. In determining the age distribution of children, we may again assume that 1960 data will provide us with reasonable estimates. These data indicate that of children under 18, 27% were under 5, 40% were between 5 and 11, 17% were between 12 and 14, and 16% were between 15 and 17.[1] Applying these percentages to the number of children per site, as shown in Table 4, we find the following distribution:[2]

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[1]Compiled from U. S. Bureau of the Census, General Population Characteristics for Massachusetts, 1960, Table 20.

[2]Since some of the sites had a small number of units, it seemed appropriate not to use rounded numbers.

TABLE 7

NUMBER OF CHILDREN AT EACH SITE BY SCHOOL LEVEL:

YEAR 1 OF CURRENTLY ZONED SITES

Site	Pre-School	Elem.	Junior	Senior	Total
Hunnewell	1.9	2.8	1.2	1.1	7.0
Stanton	1.9	2.8	1.2	1.1	7.0
Hamlet	20.5	30.4	12.9	12.2	76.0
Thurston	7.6	11.2	4.8	4.5	28.1
Goddard	4.1	6.0	2.5	2.4	15.0
Esty	6.8	10.0	4.2	4.0	25.0
TOTAL	42.8	63.2	26.8	25.3	158.1

As with the residents of the LMIH, we shall assume that these families will stay in Newton until their children's education is complete, and that the families who replace them will have similar characteristics.

Number of People Per Dwelling Unit

As with the number of children per dwelling unit - or per bedroom - the determination of number of people per dwelling unit will be an approximation. Again, we shall look at the LMIH first.

The primary area of uncertainty here is the number of households that will be headed by one parent, typically female.[1] For Newton as a whole, the percentage of female-headed households is approximately 10%.[2] There are a number of variables that are associated with female-headed households, among them race, income, ethnicity, age, and religion, and these may act upon the dependent variable in any number of ways. Since it is difficult to predict just what the mix of the above variables[3] will be in the proposed housing, the best that can be done is to make an educated guess as to the percent of female-headed families. Since most of the families will be those with Newton ties as previously defined, we might assume that the proportion of those families headed by a single parent will hover around the above figure for Newton. And, since the families will be of a lower income than most of the families in Newton, perhaps a slightly higher figure should be assumed, say, 12%.[4] The higher figure, besides suggesting an association between low

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[1]Female-headed household and single parent household are considered synonomous here.

[2]Derived from U. S. Bureau of Census, General Population Characteristics for Massachusetts, 1970, Table 25.

[3]One can predict with some certainty, however, that incomes will be "moderate" and race will be predominantly white.

[4]This figure is deliberately low since we should allow for the possibility of non-parent adults, as mentioned in the section on "Number of Children".

income and single parent households, also reflects an anticipated higher proportion of widows and widowers than are found in the general population. In each development, then, 88% of the families will be headed by two adults, and 12% by single adults. The number of master bedrooms for each site shall be the basis for determining the number of adults. The number of master bedrooms, of course, is equal to the number of units. Applying the above percentages to the number of units, we arrive at the following number of adults at each site: Hunnewell, 45; Stanton, 120; Hamlet, 192, Thurston, 97; Goddard, 88, and Esty, 137. Adding these figures to the number of children, we find the following site-by-site breakdown:

TABLE 8

NUMBER OF PERSONS AND PERCENTAGE OF CHILDREN AT EACH SITE: YEAR 1 of LMIH

	Number of Persons[1]	Percent Children
Hunnewell	83	46
Stanton	234	49
Hamlet	260	47
Thurston	184	47
Goddard	192	54
Esty	276	50
TOTAL	1329	

[1]These estimates are somewhat lower than those made by NCDF. NCDF uses 1.5 children per non-master bedroom rather than the the figure of 1.3 here.

The low and moderate income housing, then, would increase the 1970 population by approximately 1% if its residents were not living in Newton to begin with. The 1% figure, therefore, is maximally high.

For the currently zoned sites, the figures will obviously be much lower. Here again, the proportion of families headed by single parents is an uncertainty. However, rather than speculate on what proportion of families are headed by single parents, we shall use figures that will probably be more precise: the number of persons per dwelling unit within the neighborhood when the currently zoned housing would be built. Considering the zoning ordinances, the assumption is that the same type of housing would be built that is in the immediate vicinity, and, given that the housing is similar, families of approximately the same size would occupy it.

We mentioned earlier that we are concerned with the characteristics of the hypothetical families at the point of their initial occupancy. In determining the number of children per household, therefore, we looked at 1960 census data, speculating that that would describe characteristics that would be found in families who would move in today. Assuming that reasoning is valid, we may again look at 1960 census data for determining the number of persons per household. Examining census tract information, we find that there were 3.06 persons per household in the tract surrounding the Hunnewell site; 3.45 at Hamlet;

3.78 at Esty Farm; 3.40 at Goddard and Thurston; and 3.54 at Stanton.[1] The figure for Esty Farm describes the area at a time when the blocks surrounding the relevant site were not yet developed; we shall therefore use for Esty, as before, the figure for 1970 - 3.64.[2] Applying these figures to the number of units on the sites as currently zoned, we arrive at the following number of persons per site.

TABLE 9

NUMBER OF PERSONS AND PERCENTAGE OF CHILDREN AT EACH SITE: YEAR 1 OF CURRENTLY ZONED SITES

	Number of Persons	Percent Children
Hunnewell	25	28
Stanton	21	33
Hamlet	243	31
Thurston	85	33
Goddard	48	31
Esty	66	37
TOTAL	488	

[1] U. S. Bureau of Census, Census Tracts, 1960, Table P-1.

[2] U. S. Bureau of Census, Census Tracts, 1970, Table P-1.

Having thus presented the basic characteristics of the new residents, we are now ready to examine the extra costs they would be generated for Newton.

CHAPTER III

COSTS

Selection of services

It was noted earlier that the costs that will be considered are among those classified as "general expenditures" by the Census Bureau. Specifically, these expenditures are for the following municipal services: education; highways (streets); public welfare; health and hospitals; police protection; fire protection; sewerage; sanitation other than sewerage; parks and recreation; financial administration; general control; general public buildings; and libraries.

Those items that are not included under general expenditures are water supply expenditures, utility expenditures, and city contributions to their own retirement systems. It is arguable whether the above three items should be included in a cost-revenue analysis such as this. In the particular case of Newton, this writer thinks they should not since these items either pay for themselves, or are not provided by the municipality: In Newton, because of a system of user charges, the water supply revenues consistently meet expenditures; utilities are provided by publicly regulated private companies; and the city contributions to the employee retirement system come from the employees' salaries. In other regions of the country the method of financing these "non-general" expenditures may differ, and in those cases they may be appropriately considered in a study of this sort.

Of the items that are classified under general expenditures, some will be given more attention than others. One of the criteria for determining how much attention an item should be given is the significance of the item in the municipal budget. What proportion of total general expenditures is applied to this service? If very little (say, 3% or less) we will not very thoroughly examine the cost impact on the service, if we examine it at all. Another criterion for determining importance is the likelihood that the costs for the service will be affected by an increase in population; as should be clear from the earlier discussion on costs, this criterion addresses itself to the issues of fixed costs and variable costs. One might reasonably conclude that expenditures for general public buildings,[1] for example, a function heavily weighted with fixed costs, would not be affected by a small population increase; or that education, on the other hand, would be affected by such an increase. Using these criteria, one may determine which services are worth considering and to what degree.

Looking at Table 10, which presents general expenditures for Newton, we find that besides for the category "all other",[2]

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[1]Examples are museums or historical buildings supported by the municipality.

[2]"All Other" is not defined in the text from which the table was taken, but from examination of Newton's 1970 Annual Report of the Assessing Department, it appears to include state and county assessments. Although it is a significant item in the municipal budget, since it should not increase with the additional residence projected, we will not consider it here.

the heaviest expenditures
/ are for education, streets, police protection, and fire protection. After that, other significant expenditures go toward sanitation other than sewerage,[1] and parks and recreation. Other services do not account for much in the municipal budget, and one might guess that most of those would not be affected by an increase in population. An exception may be expenditures for sewerage. However, functions such as financial administration, general control, libraries, and general public buildings are highly labor-intensive, and it may be reasonable to assume that the amount of labor required to operate these services would not be sensitive to small population fluctuations.

In addition, although expenditures for parks and recreation constitute slightly more than 3% of the municipal budget (3.1% to be precise), since the services here are also highly labor-intensive, consisting primarily of personnel for organized recreational activity, we may assume that this service too would not vary in expenditure with a 1% increase in population. In examining the costs of services generated by the new population, then, we shall consider education, streets, police protection, fire protection, sewerage, and sanitation other than sewerage.

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[1]Street cleaning, and collection and disposal of garbage and other waste. For definitions of all services see U.S. Bureau of Census, City Government Finances in 1969-70, pages 101-104.

TABLE 10

1969-70 SELECTED GENERAL EXPENDITURES FOR NEWTON, MASSACHUSETTS[1]
(amount in thousands of dollars)

Item	Operating Cost		Capital Cost		Total Cost	
	Amount	Percent	Amount	Percent	Amount	Percent
Education	20,010	49.7	1,426	64.0	21,436	50.5
Streets	3,999	9.9	750	33.7	4,749	11.2
Public Welfare	269	0.6	—	—	269	0.6
Health & Hospitals	489	1.2	—	—	489	1.2
Police	2,450	6.1	—	—	2,450	5.8
Fire	2,635	6.5	—	—	2,635	6.2
Sewerage	548	1.3	52	2.3	600	1.4
Other Sanitation	1,522	3.7	—	—	1,522	3.6
Parks & Recreation	1,334	3.3	—	—	1,334	3.1
Financial Administration	344	0.8	—	—	344	0.8
General Control	437	1.1	—	—	437	1.0
Interest on General Debt	473	1.2	—	—	473	1.1
Libraries	605	1.5	—	—	605	1.4
Gen'l Public Buildings	244	0.6	—	—	244	0.5
All Other	4,853	12.1	—	—	4,853	11.4
Total	40,212	100.0	2,228	100.0	42,440	100.0

[1]Source: U.S. Bureau of the Census, City Government Finances in 1969-70, Table 5. Percentage totals may not add exactly because of rounding.

[2]Public welfare expenditures for the categorical programs such as Aid to Families with Dependent Children, Old Age Assistance, Aid to the Blind, etc., have been assumed by the state in Massachusetts. The amount in the above table refers to services and payments to veterans.

TABLE 11

1969-70 PER CAPITA AMOUNTS FOR SELECTED GENERAL EXPENDITURES

NEWTON, MASSACHUSETTS[1]

(in dollar amounts)

Item	Amount
Education	235.39
Streets	52.15
Public Welfare	2.95
Health & Hospitals	5.37
Police	26.90
Fire	28.94
Sewerage	6.59
Other Sanitation	16.71
Parks & Recreation	14.65
Other[2]	23.11

[1]Source: Ibid., Table 6.

[2]Combination of financial administration; general control; interest on general debt; libraries; general public buildings.

School Costs[1]

The process of determining the school costs that the new population would generate provides a general model for determining the extra costs of other services. Information on school costs, however, was more accessible and more detailed than that for other services, and operating standards were more explicitly set forth. As a result, the process of determining school costs will better conform to appropriate procedures, and the findings themselves might be more accurate estimates of what would actually occur.

What are the abovementioned "appropriate procedures"? First of all, as the earlier discussion on costs indicates, it is necessary to determine the "maximum efficient capacity" of the facilities or services in question. Maximum efficient capacity refers to not only what a facility can hold, but also to the upper limits of what it should hold; therefore the concept of standards and service levels is implicit in the term. For convenience, we shall simply refer to capacity. In the case of schools, capacity can be measured in a number of ways. The most frequently used measures are number of square feet per student, number of students per classroom, and number of students per teacher, none of which is entirely satisfactory. The first and

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[1]Although Newton supports a Technical High School and Junior College, this analysis will only concern itself with the regular schools. The Technical High School and Junior College together constitute only 6% of the total school budget.

second measures assume a conventionalized school design, and the third does not address differences in students' abilities. These measures, in short, speak to the "average" student under "average" conditions. Until better measures are devised, however, we are left with these, and we shall see later how Newton applies them to its own schools.

After current capacity is determined, one must find the degree to which that capacity is utilized. If a school is under-utilized, how many more students can the school absorb? And, if it is over-utilized - if no excess capacity exists - how much more material, equipment, or classroom space would be required to bring the operating level back to desirable standards? In either case - under-utilization or over-utilization - one should ask whether the municipality has any plans to increase the capacity of the school, and in addition, to what extent future capacity will be utilized.

At this point one should be ready to ask what the impact of the new population would be on the school, in terms of both immediate impact and impact over time. Issues of fixed costs and variable costs are now important. If we find that the school is currently under-utilized, that existing classrooms can absorb the new population, then those items whose costs we normally regard as fixed - clerical help, operation and maintenance of physical plant - will not increase. Those items that are sensitive to even slight population fluctuations, however, such as textbooks, would have to be supplied in greater quantities to accommo-

date the new population, and the total costs of providing those items would subsequently rise. If, on the other hand, the school is already filled to capacity and new classrooms are needed, then some of those items that we had formerly considered fixed - heat and electricity, for example - must increase to support the larger physical plant. And, of course, unless current operating standards are lowered, teachers, textbooks, and other variable cost items will be needed as well.

These are admittedly simple examples that illustrate some of the ways in which costs and population growth interact. It should be recognized, however, that although the issues may seem simple, and the process of determining extra costs straightforward, the empirical work may be difficult. As was noted earlier, municipal departments may not have set forth explicit standards of operation, and may not have quantitatively determined at what particular points new employees should be hired, or new equipment purchased.[1] Since these items need to be known when estimating extra costs, the researcher may be hindered by the lack of them. With this caveat, we may proceed to the specific case of school costs in Newton. We shall look at capital costs first.

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[1]This statement should be qualified somewhat. After many years of experience, the municipal department head has acquired a "feel" for when capacity must be increased, even if he has no *a priori* quantitative basis for determining such an increase. While this is frustrating to the naive researcher, i.e., this writer, it does not mean that the department head's estimates are inaccurate.

Capital Costs

A. Elementary Schools

Following the steps outlined above, we will present the current[1] capacity of the schools and the degree to which that capacity is utilized; we will then consider the effects of the new population on the given capacity and utilization patterns. Only those schools that would be used by the new population will be examined. Since Tables 6 and 7 indicate that at the time of initial occupancy the heaviest age concentration would be on the elementary level, we shall first consider the schools that would serve the elementary population.

Looking at Table 12, we see which elementary school serves each site, the current capacity of each school, and the current enrollment figures.[2] These figures represent enrollments as of October 1, 1970 and do not include children of the hypothetical population growth. We can see that without the new growth, four schools are over-utilized, and three have room for more students. Although accepted standards are being violated in four schools,

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[1]"Current" throughout will refer to 1970 figures, and 1970 will be considered Year 1 of the development. 1970 is the baseline year because the most complete set of data was available for it.

[2]Capacity was determined by the principals of the relevant schools and refers to capacity in terms of space and equipment - not teachers. Both capacity figures and enrollment figures are reported in Silluzio, Enrollment Analysis, Tables 2 and 5, and are the basis of all tables in this section on enrollment and capacity.

TABLE 12

CURRENT CAPACITY AND USE OF SELECTED ELEMENTARY SCHOOLS BY SITE

Site	School	Current Capacity	Current Enrollment
Hunnewell	Underwood	538	582
Stanton	Angier/ Williams	482/ 335	519/ 360
Hamlet	Bowen	375	369
Thurston	Emerson	339	290
Goddard	Countryside	346	363
Esty	Memorial	280	261

is there enough justification for constructing more classrooms? There are no hard and fast rules for answering this question; it is dependent upon several factors.

First of all, given a surplus of students, one must ask how the number of students in each grade is distributed and what the alternatives are for fitting this distribution into a reasonable classroom utilization pattern; because grade levels are not ordinarily mixed within a classroom, one school with a substantially uneven grade distribution may force certain grades to under-utilize their classrooms, while it forces other grades to over-utilize them. Another school may find the number of students fairly evenly distributed across grades so that most classrooms are equally utilized. In each case, a different decision may be made about whether more classrooms are required.

Secondly, one must ask how much violation of desirable standards is tolerable. In the case of certain facilities, sewerage for example, the question may be easily answered: beyond a certain point, the lines will not carry sewage. But in the case of school facilities, the point beyond which student will not learn is more difficult to identify. If we resort to a quantitative measure, perhaps we might say that having one more student per classroom over the stated standard is tolerable, while having more than that would justify adding space.

But even this conclusion is contingent upon another factor, namely, how long any over-crowding is expected to continue. If the school population is expected to decrease within the next few years, thus bringing utilization back to or under capacity, an outlay to relieve one or two years of over-crowding may not be justified.

And finally, of course, there is the subjective consideration: Does the municipality, in terms of its fiscal abilities and priorities, feel that constructing more classrooms is necessary?

In the case of Newton, we will assume that education is a top priority item, and that if the community feels it needs another classroom it can afford to pay for it. As for the first point above, it suggests that need may partially be determined not only by the number of surplus students, but also by how these students are distributed across grades and thereby by classrooms. Unfortunately, information of that detail was not

available,[1] so for simplicity we must assume that students are evenly distributed across classrooms in each school. Assuming that, we can present Table 12's capacity and enrollment figures in terms of average number of students per classroom:

TABLE 13

CURRENT CAPACITY AND USE OF SELECTED ELEMENTARY SCHOOLS
(students per classroom)

School	Current Capacity	Current Enrollment
Underwood	24	26
Angier/Williams	24/26	25/28
Bowen	27	26
Emerson	24	21
Countryside	25	26
Memorial	25	24

Although what over-crowding there is does not appear serious - there are at most two extra students per classroom - if it is expected to continue, justification may be provided for relieving it through construction of additional space. To determine whether over-crowding will continue, we must find out (1) what the projected enrollments are for the elementary schools,

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[1]Although enrollment figures were available, these were not related to the available figures on classrooms. Enrollment figures were broken down on a grade-by-grade basis by school whereas classroom figures were only broken down by school. Number of classrooms is presented ibid., Table 5.

and (2) what, if any, Newton's plans are for increasing the capacity of the schools.

The following table indicates that of the elementary schools that would be used by the new population, two of them - Underwood and Williams - will remain above maximum capacity through Year 5; Countryside, except for Year 2, will operate at capacity; and Angier, Memorial, Bowen, and Emerson are projected

TABLE 14[1]

ENROLLMENTS FOR SELECTED ELEMENTARY SCHOOLS: YEARS 2 THROUGH 5
(students per classroom)

School	Enrollment			
	Year 2	Year 3	Year 4	Year 5
Underwood	26	26	25	25
Angier/Williams	22/27	22/27	20/27	20/27
Bowen	25	23	22	21
Emerson	20	21	21	21
Countryside	26	25	24	25
Memorial	20	19	19	20

to operate below capacity. Again, these figures refer to enrollments before the new population growth.

Does Newton have plans to increase the size of these schools, particularly to increase the size of Underwood and Williams? Information from the school superintendent's office

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[1]Figures for Years 3-5 are projections computed from total school projections and number of classrooms per school which are presented ibid., Table 5.

indicates that an addition to the Underwood School is currently being considered, although no action has yet been taken, and, that there are no current plans to expand the capacity of the Williams School. Since the Underwood School is considered the most seriously over-crowded of the elementary schools,[1] it is reasonable to assume that the proposed addition will be realized. The School Department has requested 20,000 additional square feet for Underwood to be used for eight classrooms, a library, a gymnasium, lunchroom, and resource area. Assuming the extra space is ready for use in 1974, or Year 5, the eight extra classrooms would have the effect of reducing the number of students per classroom to twenty-two.[2]

Having determined the degree to which elementary school capacity is to be utilized, we are ready to examine that impact of the new population on these schools. In order to do so, we should look at the effects of the new population over a period of years. For the LMI population, Table 6 indicates the age distribution of children for Year 1, and Table 28, at the end of this section, indicates the age distribution for Years 2 through 5; the same information is presented for the population from the

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[1]Figures for Underwood include 6 classrooms that have been converted from other space. The overcrowding at Underwood, therefore, is more serious than the figures suggest.

[2]The number of students is not reduced drastically from the figure shown in Table 12 because the classrooms that had been converted from other space were put back to their original use.

currently zoned sites in Tables 7 and 29 respectively.[1] Transposing these data into students-per-classroom figures, we may use them as a base for determining how many students the new population would add to the rolls. Adding these students to the pre-growth figures in Tables 13 and 14, we find that with the LMI students enrollments would increase as indicated by the table on the following page.[2]

Using the criteria discussed on pages 65 and 66, the Williams and Countryside Schools would need additional classrooms, and the other schools could be maintained as they are. Bowen School is admittedly a borderline case, but it was decided that (1) because in Years 3 through 5 the average surplus of students per classroom would only be 1.1, and (2) because the number of LMI students would be expected to decline in the elementary schools in the immediately following years,[3]

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[1]In making the projections that are reported in Tables 28 and 29, the survival-cohort method was originally intended. It was discovered, however, that the age specific mortality rates as applied to the relevant age categories resulted in miniscule reductions over the years. It was therefore decided to simply apply an appropriate birth rate (the Massachusetts rate of 17 births per 1000 population to the LMI families, and the 1960 Newton rate of 16 births per 1000 population to the currently zoned families) and to discard a mortality rate altogether. The assumptions that were made were (1) that the children were distributed evenly across grades within each school level, (2) each child was promoted after each year, (3) all of the children would attend the Newton Public Schools, and (4) there was no in-migration or out-migration of families during the projection years.

[2]Table 15, unlike Table 14, takes into account the capacity changes expected for the Underwood School in Year 5.

[3]The addition of students through births would be less than the loss of students through promotion from elementary school.

TABLE 15

ELEMENTARY SCHOOL ENROLLMENTS WITH LMI STUDENTS:

YEARS 1 THROUGH 5

(students per classroom)

School	Capacity	Enrollment				
		Year 1	Year 2	Year 3	Year 4	Year 5
Underwood	24	26.2	26.7	26.8	25.9	23.0
Angier/ Williams	24/ 26	27.1/ 29.6	23.2/ 28.8	23.3/ 29.1	21.5/ 29.3	21.6/ 29.5
Bowen	27	30.9	30.3	28.7	28.1	27.5
Emerson	24	22.3	22.6	23.9	24.3	23.6
Countryside	25	28.3	29.3	28.4	27.5	28.7
Memorial	25	29.0	25.5	25.0	25.5	27.1

additional classrooms would not be needed. In the case of the Memorial School, similar reasoning applies. And in the case of the Underwood School, even though there would be an average surplus of 2.4 students through Year 4, the additions that are expected in Year 5 should compensate for the over-crowding suffered in the early years.

The capital cost of constructing a single classroom in Year 1 is approximately $112,500, the cost of equipment and furnishings approximately $1,300, making the total cost of one classroom $113,800.[1] Assuming that the Williams School and Countryside School would need two classrooms apiece,[2] the total capital outlay required would be $455,200. And, if this amount were to be paid over a 20 year period at an interest rate of 4%,[3] then

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[1]Construction cost figures were based upon $45 gross square foot estimate given by the School Department. The assumption was that there are 2500 gross square feet per classroom (25 students at 100 g.s.f. per student). Equipment and furniture costs were estimated by consulting personnel in charge of purchasing such items, and by consulting relevant catalogs.

[2]With the LMI students, there would be an average annual surplus of 42 students at the Williams School and an average annual surplus of 48 students at the Countryside School. Given the maximum acceptable standards of 26 and 25 students per classroom respectively, two additional classrooms for each school would leave the schools operating with little excess capacity. Recommendation of so few classrooms seemed reasonable, however, since the birth rate in Newton has declined, fewer young families are moving in, and, in general, smaller classes of entering students are expected.

[3]Newton did not issue any bonds in 1970, but the City Treasurer indicated that the cost of borrowing would have been approximately 4%. This should be seen as a rough estimate.

an annual cost of $33,685 would be incurred.

Massachusetts law provides that school construction costs - including costs for new equipment - are eligible for state aid.[1] The abovementioned amount of $33,685, therefore, would not exclusively be carried by the City. The law provides that a municipality may receive no less than 40% and no more than 50% of the total approved cost of construction and equipment. Assuming Newton would receive 40%, it would pay $20,211 annually, and the state would pay $13,474.[2]

It should be recognized that in certain cases the over-crowding, and the subsequent need for new classrooms, would be caused both by the additional students that the LMIH would generate and the pre-growth students who would already be enrolled when the LMI students move to Newton. Therefore, since we are interested in the extra costs for which the LMIH would be responsible, we should distinguish between the over-crowding that would be caused by the LMI students, and the over-crowding that would be caused by the pre-growth students. For the Williams School there would be an average annual surplus of 42.3 students; of these, the LMIH would be responsible for 26.7 students, and the pre-growth housing would be responsible for 15.6 students.

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[1] General Laws, c.70, ss. 1-1 to 1-10.

[2] According to the construction aid formula, which is defined in the above chapter and sections, Newton would be entitled to an amount of aid that is 17% of the total approved cost. But since a municipality cannot receive less than 40%, the 40% minimum would apply.

And for the Countryside School, the annual average surplus would be 48.1, of which the LMIH would be responsible for 45.3, and the pre-growth housing for 2.8. The LMIH, therefore, would generate 63% of the over-crowding at the Williams School and 94% of the over-crowding at the Countryside School. Thus, although the city's annual cost of paying for classroom space would be $20,211, the share that should appropriately be charged to the LMIH is $15,866.[1]

Before we turn to the capital costs that may be generated by the sutdents from the currently zoned sites, it should be noted that $15,866 is the highest capital cost for elementary schools that the LMI students could possible generate. In reality, if the LMIH were to be built, and NCDF's tenant selection plan implemented, families that applied to one site might be routed to another site if there were room, and if it were felt that the other elementary school could better absorb the additional students. Moreover, although contrary to Newton's policy, there is the possibility that students from one site could be bussed to a school serving another site, or to a school in a section of the City that could absorb them. In that case, the financial cost of bussing children, and the social costs to the children, would have to be weighed against the capital out-

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[1]The percentage of the surplus generated by the LMIH is an average of 78.5%. 78.5% x $20,211 = $15,866.

lay that would be required to construct additional space.[1] The financial cost will be discussed in a later section.

Looking now at the impact of the students from the sites as currently zoned, we see from the table on the following page that only the Williams School is consistently over-crowded. The Williams School, however, is only over-crowded by an annual average of 1.3 students per classroom, thus negligibly exceeding the accepted standard. Furthermore, according to the Director of Research and Evaluation of the Newton schools, elementary school enrollments are not expected to increase significantly. To incur extra cost, therefore, by constructing an additional classroom does not in this case seem justified.

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[1]Elementary school children in Newton are rarely bussed. Therefore, social costs might be incurred by the LMI children because in addition to their possibly being seen as "different" because they come from the LMIH, their differences may be compounded if they are the only class of children that is bussed.

TABLE 16[1]

ELEMENTARY SCHOOL ENROLLMENTS WITH STUDENTS FROM SITES AS CURRENTLY ZONED: YEARS 1 THROUGH 5

(students per classroom)

School	Capacity	Enrollment				
		Year 1	Year 2	Year 3	Year 4	Year 5
Underwood	24	26.1	26.1	26.1	25.1	22.1
Angier/ Williams	24/ 26	26.1/ 28.1	22.1/ 27.1	22.1/ 27.1	20.1/ 27.1	20.1/ 27.1
Bowen	27	28.1	27.2	25.3	24.3	23.3
Emerson	24	20.8	20.8	21.8	21.9	21.9
Countryside	25	25.4	26.4	25.4	24.4	25.5
Memorial	25	24.9	20.9	19.9	20.0	21.0

[1]This table was derived in the same way as Table 15, and, as with Table 15 the Year 5 column for the Underwood School includes the change made by the increased capacity.

B. Secondary Schools

Having discussed the capital costs that would be generated for elementary schools, we will now turn to the capital costs that may be generated for secondary schools. Examining first the current and projected enrollments for junior high schools - independent of new population growth - we see that their capacity and utilization patterns are as follows:

TABLE 17[1]

CAPACITY AND ENROLLMENTS OF SELECTED JUNIOR HIGH SCHOOLS BY SITE: YEARS 1 THROUGH 5

Site	School	Capacity	Enrollment Y1	Y2	Y3	Y4	Y5
Hunnewell	Bigelow	600	525	559	583	632	647
Stanton[2]	Warren	1050	1243	1194	1145	1092	1117
Hamlet	Weeks	800	869	871	813	777	760
Thurston	Meadow-brook	1000	841	882	897	909	844
Goddard	"	"	"	"	"	"	"
Esty	"	"	"	"	"	"	"

The above table indicates that the Bigelow School would be operating under capacity through Year 3, but over capacity in

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[1]Capacity is not expressed in terms of numbers of students per classroom because the figure would be deceptively low; the classroom figures that would have been used to calculate students per classroom included special rooms for art, home economics, shop, etc., not only rooms for general classroom use.

[2]Actually, only half of the children from the Stanton site would attend the Warren School; the other half would attend Meadowbrook.

Years 4 and 5; that the Warren School would be operating over capacity throughout; that the Weeks School would be operating over capacity through Year 3, but under capacity in Years 4 and 5; and that the Meadowbrook School would be operating under capacity through Year 5.

Are there any plans to increase the size of the above schools? Newton's most recent Capital Improvement Program proposes that both the Warren School and the Weeks School add more space. If the recommendation for the Weeks School were implemented, approximately 150 more students could be accommodated; the nature of the recommended addition to the Warren School is undefined, although its estimated cost - $2,200,000 - suggests that if constructed it could accommodate approximately 325 more students.[1] Assuming, then, that both of these recommendations are implemented, the following table indicates that the students from the LMI population could be easily absorbed. The table further indicates that the LMI population could be absorbed by the Meadowbrook School, and by the Bigelow School for the first three years. After that, the Bigelow School would be operating above capacity. Since Bigelow would be considered over-crowded during Years 4 and 5, is there justification for adding more space?

Even without the addition of the LMI students, Bigelow

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[1]Assuming $45 per gross square foot, and in the secondary schools, 150 gross square feet per student.

TABLE 18

JUNIOR HIGH CAPACITY AND ENROLLMENTS WITH LMI STUDENTS: YEARS 1 THROUGH 5

School	Capacity Before Addition	Capacity After Addition	Enrollment Y1	Y2	Y3	Y4	Y5
Bigelow	600	-	530	564	589	638	653
Warren	1050	1375	1250	1202	1154	1101	1126
Weeks	800	950	894	898	841	806	789
Meadow-brook	1000	-	898	942	960	975	910

would be considered over-crowded by an average of 39.5 students for Years 4 and 5 (with the LMI students the figure would rise to 45.5 - a negligible increase); yet despite the projected surplus of 39, the School Department did not recommend that extra space be added. Reasons might be that the projected over-crowding was not considered numerically serious; that, coupled with anticipated lower enrollments for the next ten years on the secondary level[1] perhaps did not justify recommendation of additional space. If the future secondary school enrollments of non-LMI students will indeed be lower that they are now, the anticipated increase of LMI students - based upon the large Year

[1]The incoming kindergarten class in 1970 had 301 students fewer than the outgoing senior class, and the number of births in that year, for the first time since 1941, dropped below 1000 (Silluzio, Enrollment Analysis). Also, if few young families move to Newton - as we may expect given housing costs there - secondary school enrollments in the next 10 years will be lower than they are now.

1 pre-school and elementary populations - may be able to be absorbed. This should be particularly so in the case of the LMI students who would attend the Bigelow School since, as Tables 6 and 28 indicate, their numbers would be relatively few. In view of these points, we may assume that extra space need not be added to the Bigelow School.

Even though new construction may not be justified, if it were felt necessary to relieve any over-crowding that might occur, a possible solution would be sending the LMI students to another school.[1] After the Bigelow School, the closest junior high to the Hunnewell site is the Day School, approximately 2.4 miles away. Capacity and enrollment figures in Newton's Enrollment Analysis indicate that the LMI students could be easily absorbed there. Unlike the other junior high schools, students are not bussed to the Day School since all who attend are within walking distance. The LMI students, however, would not be within walking distance and would therefore take public transportation - an expense that the City would initially pay for. Assuming, then, that the City decided to pay for students who take public transportation to the Day School rather than pay for an addition to the Bigelow School, we can estimate the cost as follows: If it costs 20¢ a day to transport a student (students

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[1]This option may also be open to the pre-growth students who contributed to over-crowding, but we are only interested here in the costs that are generated by the LMI students.

may travel at half fare), and the student travels to school 185 days per year (the required number of school days), the annual cost for one student is $37.00. Multiplying this by the number of LMI students who would attend the Bigelow School in Years 4 and 5, we find that it would cost $222 for each of the two years. While this amount is small, particularly when compared to what could be spent on adding space to the Bigelow School, it should be stressed that even this small amount would not necessarily need to be spent. It is likely, in fact, that the six LMI students who are supposed to attend Bigelow in Years 4 and 5 would not be considered burdensome enough to justify an annual cost of $222.

Considering the students from the sites as currently zoned, it is clear - since they are so few - that they would not generate any capital costs for the junior high schools. And, if a public transportation solution to the problem of Bigelow's overcrowding is unlikely for the LMI students, it is even more unlikely for the students from the currently zoned sites: they would add only 1.2 students to Bigelow in Years 4 and 5.

In sum, the new population of students from the LMIH would not generate any capital costs for junior high schools; at most, they would generate $222 in Years 4 and 5 for public transportation. And, as mentioned directly above, no capital or transportation costs would be generated by the students from the sites as currently zoned.

We shall now consider the capital costs that may be generated for the high schools. Unfortunately, the Enrollment Analysis that gave us maximum efficient capacity figures for the elementary and junior high schools did not provide us with the same information for the high schools. We must therefore devise our own standards on the basis of the information we have. Since the number of classrooms and enrollments is information we have for each of the high schools,[1] we may use as a measure the number of students per classroom. Assuming that a range of 20 to 25 students per classroom is acceptable, we can see from the following table how Newton's current and projected enrollment pattern conforms to or violates this standard. These figures represent enrollments before any capacity changes and before the hypothetical growth occurs.

TABLE 19

ENROLLMENTS OF HIGH SCHOOLS: YEARS 1 THROUGH 5
(students per classroom)

	Enrollment				
School	Y1	Y2	Y3	Y4	Y5
Newton High	21	20	20	20	20
Newton South	25	25	24	24	24

[1]Enrollment figures found in Enrollment Analysis, p. 17. Number of classrooms found in 131st Annual Report of Newton Public Schools. In order to only consider general classrooms, the classroom figures in the Annual Report were reduced slightly since they included rooms for art, home economics, shop, etc.

It appears from the above that Newton High can absorb more students and that Newton South is operating at nearly full capacity. But although Newton High is able to accommodate more students, its physical plant is old, and the City is constructing a new high school to replace it. The new school is expected to have a capacity of 2750 students and should be ready for use in 1973, or Year 4.

Considering the impact of the LMIH on the high schools, we may look at the following table. Newton High, which would serve students from the Hunnewell and Stanton sites, would still be operating well below capacity in Years 1 and 2; during Years 3 to 5, when the new high school would be in use, there would be room for approximately 200 more students annually[1] - and the

TABLE 20

SENIOR HIGH SCHOOL ENROLLMENTS WITH LMI STUDENTS: YEARS 1 - 5
(students per classroom)[2]

School	Enrollment				
	Y1	Y2	Y3	Y4	Y5
Newton High	21.1	20.1	(see footnote 2 below)		
Newton South	25.5	25.7	24.9	25.2	25.2

[1]Capacity of new high school is 2750 students. Projected enrollments, presented in Table 5 of Silluzio, Enrollment Analysis, show that capacity would be under-utilized by approximately 200 students.

[2]Year 3 marks the first year of use of the new high school. Student per classroom figures were not available, but we know, as was said above, that there would be room for approximately 200 more students annually, thus leaving considerable room for the LMI students.

LMIH would only be generating an annual average of 18.4. As for Newton South, which would take students from Hamlet, Thurston, Goddard, and Esty, the LMIH enrollment strains the capacity negligibly - by an annual average of .275 students per classroom during the four years of over-crowding - so we may assume that capital outlays for additional space are not justified at the South School either. And, since there would be considerably fewer students from the sites as currently zoned, it is clear that they, like the LMI students, would not generate any capital costs for the senior high schools.

At this point it would be useful to summarize the preceding section. We have seen that the only capital costs for schools that would be generated by the new population is $15,866 annually. This is the amount that the LMIH would generate for the City for new construction and equipment for elementary schools. The other cost that the LMIH might possibly generate is $222 in Years 4 and 5 for public transportation; this is not a capital cost, however, and will more appropriately be discussed in the following section on operating costs. The students from the sites as currently zoned would not generate any capital costs.

Operating Costs

Having considered the capital costs that would be generated by the new population, we are now ready to consider the operating costs. It might be useful to begin with the operating costs that are directly tied to the capital improvements.

A. Heat and Electricity

The only capital improvements required are the four classrooms on the elementary level that would be generated by the students from the LMIH. The primary operating costs that would be connected with additional classrooms are heat and electricity.[1] Electricity might be estimated at approximately 6¢ per square foot annually, and heat at approximately 7¢ per square foot annually.[2] Since 10,000 square feet of space would be constructed, the annual operating cost related to the improvements would be $1300. But since, as noted earlier, the LMI families would be responsible for only 78.5% of the over-crowding that generated the additional classrooms, the cost that should properly be attributed to them is $1020.

This, then, is the operating cost that would be associated with the capital improvements. We shall now turn to the operating costs that are independent of any improvements. It is at this point that we become involved with the issues of fixed

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[1]It can be argued that each additional classroom would also generate a need for an additional teacher. While it is undoubtedly so that there is normally at least one teacher per classroom, it seemed more appropriate to relate additional teachers to the increase in number of students rather than to the increase in number of classrooms. Additional teachers, then, may be required regardless of additional space, and will be discussed later in this section.

[2]The unit cost of utilities was determined by dividing their total cost, as reported in the 1971 School Budget, by the total area of the school buildings, as reported in the 131st Annual School Report.

costs and variable costs. Looking through the school budget we find that, given certain population limits, most items would not increase in cost as a result of the student growth.[1] There are exceptions, of course, and two of the most notable are teachers' salaries and books and supplies, both of which are subsets of the budgetary category "Instruction". Besides these, other costs that could - but that would not necessarily - vary with the number of students are costs for pupil transportation and school lunch. We shall examine each of these separately. First we shall look at expenditures for teachers.

B. Teachers

It might be assumed that when the capacity of a school is spatially adequate to accommodate more students, no more teachers are required; that if students can be absorbed by existing classrooms, they can also be absorbed by existing teachers. While this assumption may sometimes have validity on the elementary level, it rarely does in the secondary grades. The reason is that, simply, there are usually more teachers connected to a school than classrooms.[2] On the elementary level, this phenome-

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[1]The categories of the primary account of the Newton school budget are: administration; instruction; attendance services; pupil transportation; operation of plant; maintenance of plant; fixed charges; civic activities; acquisition of equipment; out-of-state travel; data processing. In the secondary account are such items as cafeteria; elementary lunch program; athletic account. 1971 School Budget, pp. 1 and 4.

[2]This is the case in Newton.

non is often a result of multiple sessions, particularly for kindergarten students. On the secondary level, it is primarily a result of teachers being tied to subjects - not to classrooms - and since a teacher's subject load occupies only part of a school day, a single classroom is often utilized by a number of teachers during that day.

That being the case, we cannot assume that since the additional students could be absorbed by the existing number of classrooms, they could also be absorbed by the existing number of teachers. For the sake of simplicity, we shall assume that a population addition of the size of the LMIH would require the hiring of extra classroom teachers only.[1] Since the Newton school system has not articulated standards for student-teacher ratios, we shall further assume that the current student-teacher ratios are desirable, and that these should be maintained after the addition of the new population. The student-teacher ratios we will use as our standard are those of the school levels to which the individual schools belong.[2]

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[1]In 1971 classroom teachers made up 75.6% of the total staff; supportive personnel (e.g., librarians, guidance counsellors), 18.9%; and administrative personnel, 5.5%. Thus, even if more administrative and supportive staff would have to be hired, not calculating their costs is not a serious omission since they comprise such a small percentage of the total staff. Source of data: Vincent Silluzio, Professional Staff 1971-72, (Newton: Newton Public Schools) p. 4.

[2]The student-teacher ratios within each school level were not different enough from each other to justify separate calculations.

On the elementary level in Year 1, there was a total enrollment of 9089 students for 364 teachers; on the junior high level for the same year, there was a total enrollment of 4241 students for 277 teachers; and, on the senior high level, 4491 students for 261 teachers. If, as Table 6 indicates, the LMIH would send a total of 269 students to elementary school, 94 students to junior high school, and 34 to high school, in order for the Year 1 standard to be maintained, the LMI students would generate a need for 10 more teachers at the elementary level, 6 more teachers at the junior high level, and 2 more teachers at the senior high level. What about Years 2 through 5? Would even more teachers be needed?

Examination of enrollment projections for Years 2 through 5 of the pre-growth population reveals a decline of enrollments on all school levels;[1] this decline would be substantial enough to absorb the anticipated LMI students without requiring any more teachers than would be needed in Year 1. In fact, because of an overall decline - even with the LMI students - fewer teachers would be needed. However, despite this fact, more teachers would be needed with the LMI students than without them; it is therefore reasonable to consider the LMI students responsible for generating a need for a certain number of the teachers.

To determine just how many teachers the LMI students would

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[1]Silluzio, Enrollment Analysis, Table 4.

be responsible for, we shall again use as a standard the 1970 student-teacher ratios, and apply these ratios to the expected enrollments (both with and without the LMIH) to find how many teachers would be required to support the given number of students. It was found that on the elementary level, the LMI students would be responsible for 11 teachers in Year 2, 12 teachers in Year 3, and 14 teachers in Years 4 and 5; on the junior high level, they would be responsible for 6 teachers in Year 2, and 7 in Years 3, 4, and 5; and, on the senior high level, they would be responsible for 4 teachers in Year 2, 5 teachers in Year 3, and 6 teachers in Years 4 and 5. In general, then, the number of teachers for which the LMIH could be held responsible increases each year. This does not reflect an increasing number of total students, but rather an increasing proportion of the LMI students in the student body as a whole.

We shall now consider the additional teachers that would be generated by the students from the sites as currently zoned. In Year 1, they would add a total of 115 students to the school system: 63 to the elementary schools, 27 to the junior high schools, and 25 to the high schools. On the basis of 1970 standards, then, these students would generate a need for 2 more elementary school teachers, 2 more junior high school teachers, and one more high school teacher. And, like the students from the LMIH, the students from the currently zoned sites would also be responsible for generating a certain number of teachers in

Years 2, 3, 4, and 5. On the elementary level, these students would be responsible for 3 teachers in each of those years; on the junior high level, they would be responsible for 2; and, on the senior high level, they would be responsible for 2 teachers in Years 2 through 4, and 1 in Year 5. Because of the consistency of these figures, we may infer that the students from the currently zoned sites, unlike those from the LMIH, form approximately the same percentage of the student body throughout the projection years.

Having determined the need for teachers, we should now determine the cost. The median salary for a Newton elementary school teacher in Year 1 is $9,930; the median salary for a junior high school teacher in the same year is, surprisingly, lower: $9,820; and, that for a senior high school teacher is the highest of the three: $11,480.[1] Multiplying these costs by the number of teachers needed, we find the distribution indicated on the following page.

Table 21 shows us that in the case of the LMI students, the cost of teachers rises during the five-year period; and, in the case of the students from the currently zoned sites, the cost initially rises, maintains its stability, and then drops in the last year. These differences reflect the different population compositions of the two groups over the projection period. With

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[1]City of Newton, 1971 School Budget, Appendix.

TABLE 21*

COSTS FOR TEACHERS GENERATED BY NEW STUDENTS DURING YEARS 1 THROUGH 5:

LMIH AND CURRENTLY ZONED

(in dollar amounts)

l	LMIH COSTS					CURRENTLY ZONED COSTS				
	Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	
ı-	99,300	109,230	119,160	139,020	139,020	19,860	29,790	29,790	29,790	
r	58,920	58,920	68,740	68,740	68,740	19,640	19,640	19,640	19,640	
r	22,960	45,920	57,400	68,880	68,880	11,480	22,960	22,960	22,960	
l	181,180	214,070	245,300	276,640	276,640	50,980	72,390	72,390	72,390	

*Neither this table nor any of the others that present operating costs take int
ıt any unit cost increases that might occur over the years.

the LMI population, there is a steady increase in the number of students in each school level; these increases are not only steady but substantial, as a glance at Table 28 will show. With the currently zoned population, however, only the number of elementary students rises, but even here the increases are so imperceptible that they do not express themselves in increasing teacher costs.

Despite these differences there are some similarities. With both groups the highest costs are on the elementary level and the lowest costs are on the senior high level. Again this is reflective of population composition: both groups have more children of elementary age than of senior high age. But there is also another element: there is, very simply, a higher probability that there would be more elementary age students because the elementary grades constitute the highest proportion of total grades.

C. Books and Supplies

The cost of books and supplies shows a pattern similar to the cost of teachers. Unlike the unit cost for teachers, however, the unit cost for books and supplies consistently rises with the school level. On the elementary level, there is a $24 allotment per student; on the junior high level, a $32 allotment; and, on the senior high level, a $35 allotment.[1] Looking at

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[1]Memorandum from Office of Superintendent to author, July 5, 1972.

TABLE 22

COSTS FOR BOOKS AND SUPPLIES GENERATED BY NEW STUDENTS:

LMIH AND CURRENTLY ZONED DURING YEARS 1 THROUGH 5

(in dollar amounts)

ol l	LMIH COSTS					CURRENTLY ZONED COSTS			
	Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4
en- y	6,216	6,825	7,447	8,088	8,729	1,512	1,538	1,582	1,652
or n	3,008	3,180	3,354	3,523	3,523	858	867	861	854
or n	1,540	2,313	2,716	3,297	3,483	886	928	942	956
al	10,764	12,318	13,517	14,908	15,735	3,256	3,333	3,385	3,444

Table 22, we see that for students from both types of developments the costs of books and supplies increase over the five year period. In both cases, also, the highest costs are consistently at the elementary level. As with costs for teachers, the high elementary costs reflect the fact that there were initially many more elementary students than those in the other categories, and that these students increased their numbers during Years 1 through 5. For both groups it can be generalized that higher secondary costs are yet to come. Both the LMIH families and those from the currently zoned sites have large pre-school and elementary populations, and these would be entering the secondary schools - whose unit costs are highest - after Year 5.

D. School Lunch

As for school lunch costs,[1] certain items, such as labor, are usually regarded as fixed while other items, such as food, are usually regarded as variable. With the LMI population entering the schools, however, both items may be seen as variable. The only school lunch program in Newton is on the secondary level, and since there would be an annual average of 181 students from the LMIH entering the secondary schools during Years 1 through 5, we may assume that with their advent the supply, and therefore the cost, of labor would have to be increased. It is

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[1]Information in this paragraph was supplied by the Nutrition and Food Services Bureau of the Massachusetts Department of Education.

estimated that without labor, the cost of a single lunch is approximately 35¢, and that with labor its cost is 60¢. Since labor costs would be incurred on account of the additional LMI students, it would cost Newton 60¢ per pupil per lunch. This cost, however, would be partially offset by a 12¢ federal-state subsidy per lunch, and a sales price of 35¢. The net cost to the City, therefore, would be 13¢ per lunch.[1]

The cost to the City for the students from the sites as currently zoned would not be as high. These students, as can be calculated from Table 29, would add an annual average of 54 students to the secondary schools in Years 1 through 5. We may assume that this number of students - roughly two classrooms - would not generate a need for extra cafeteria labor, or if it did, such need would be insignificant. The only cost that they would generate, therefore, would be that for food. As noted above, the cost of a lunch that does not cover labor is 35¢. With a subsidy of 12¢ and a sales price of 35¢, it would not cost Newton anything to supply food to the students from the sites as currently zoned.

The total cost of lunch for both groups are presented in Tables 23 and 24. Since these costs are not wholly carried by

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[1]This estimate may be somewhat conservative. The amount of extra labor generated by the LMI students may not be significant enough to justify 25¢ worth of labor per lunch. Precisely how much labor the LMI students would generate was too tedious to determine; therefore the full cost of 25¢ was assumed.

TABLE 23

COSTS GENERATED BY LMI STUDENTS FOR SCHOOL LUNCH IN YEARS 1 THROUGH 5 BY PAYER

(in dollar amounts)

Payer	Cost Y1	Y2	Y3	Y4	Y5	%
Fed/State...	2,284	2,665	2,926	3,267	3,367	20
City.....	2,513	2,932	3,218	3,593	3,703	22
Student.....	6,625	7,730	8,485	9,473	9,764	58
Total	11,422	13,327	14,629	16,333	16,834	100

TABLE 24

COSTS GENERATED BY STUDENTS FROM CURRENTLY ZONED SITES FOR SCHOOL LUNCH IN YEARS 1 THROUGH 5 BY PAYER

(in dollar amounts)

Payer[1]	Cost Y1	Y2	Y3	Y4	Y5	%
City.....	-	-	-	-	-	-
Student.....	2,455	2,513	2,513	2,513	2,513	100
Total	2,455	2,513	2,513	2,513	2,513	100

[1]The share that the federal and state governments pay was thought to be more appropriately included in the section on revenues. Including it here would have suggested that the total lunch cost was more than it actually is; i.e., the figures in Table 20 are based on a 35¢ cost per lunch; by saying that the students pay 35¢ of this cost and the federal and state government 12¢ would have indicated a total lunch cost of 47¢ - 12¢ more than the actual cost.

Since these costs are not wholly carried by the City, the tables present the breakdown of the total costs according to who pays what share. These costs were estimated by assuming that Newton would supply food for 80% of the students for 90% of the school year.[1] It should be noted from both tables that the students carry the largest burden in paying for school lunches; in the case of the LMI students, the share they pay is 58%, and in the case of the students from the sites as currently zoned, 100% (100% because the sales price, 35¢, fully covers the 35¢ cost. The cost of lunch for these students is only 35¢ because they would not generate any extra labor, as mentioned on page).

E. Transportation

It was noted in the section on capital costs that an alternative to adding new elementary classrooms might be to bus the elementary school children to a school or schools that could accommodate them. We might now consider how the cost of bussing compares to the capital and capital related expense of adding new classrooms. Let us assume for the sake of simplicity that the busses that currently transport students to the junior highs and high schools cannot, for reasons of routing, timing, and capacity, transport the surplus of elementary students to the elementary schools with excess capacity. The extra students, there-

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[1] To avoid a surplus, when planning for school food services these rule-of-thumb measures are used. Nutrition and Food Services Bureau, Massachusetts Department of Education.

fore, could not be absorbed by existing busses, but would need new busses. How many more busses would be needed? We recall that to the schools for which additional space would be required - Countryside and Williams - the LMIH contributed 45.3 and 15.6 students respectively. Since an elementary school bus accommodates 65 children, only one new bus would be needed;[1] the annual cost of a single contract bus is approximately $10,550.[2] Assuming, then, that bussing is chosen as a means to alleviate overcrowding, both the capital cost of adding more classrooms, and the operating cost of supplying more heat and electricity, would be eliminated.

The savings to the City would be even greater than it ostensibly appears, for school transportation costs are in part paid for by the state if the students are transported to schools at least 1-1/2 miles from their homes.[3] According to the most current projections, students from the Goddard and Stanton sites - the source of the over-crowding - could be accommodated at the Beethoven and Horace Mann Schools respectively, both of which are more than 1-1/2 miles from the sites. The law provides that the state will pay the cost in excess of $5 per student per year.

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[1]Assuming that one bus can transport the children even if there is more than one point of origin and destination, as likely there would be.

[2]Ellen Goodman, "No-Standing Rule to Increase School Bus Costs," Boston Evening Globe, August 29, 1972, p. 22.

[3]General Laws, c. 71, s. 7A.

Since 60.9 students would be transported, Newton would pay $305, and the state $10,245. The financial savings may be considered compelling enough so that the City would make exception to the policy of not bussing elementary students.

The other operating cost in the transportation category was mentioned earlier - the $222 that would possibly be spent on students who would take public transportation to the Day Junior High School. This cost, it was noted, would initially be paid for by the City. But in this case too, Massachusetts law prescribes state aid.[1] The law provides that the cost incurred by a school department in paying student fares on public transportation may be reimbursed by the state by no more than 20¢ per pupil per day. At that rate, since students may travel at half fare, the entire $222 would be carried by the state.

These, then, are the transportation costs that could be incurred under special conditions. What about the transportation costs that would be incurred normally, without any policy change? Students are ordinarily bussed to the junior high and high schools. Would the new population of students be able to use these busses without an increase in costs? In answering this, we may assume that transportation costs would increase if the busses that currently transport students could not absorb additional students, if the bus routes were such that existing

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[1]General Laws, c. 71, s. 7B.

busses could not easily pick up and return students from additional locations, or some combination of the two. Examination of information from the school department's Office of Business Services indicates that with current routing and utilization, the students from both the LMIH sites and the sites as currently zoned could be absorbed without additional costs being incurred: The existing school busses are on routes that could easily handle the relevant sites, and these busses have room for the new students.[1]

Summary

Having considered both the capital and operating costs, we are now ready to put them together in summary tables. There are four tables presented for the LMIH population, and one for the population from the sites as currently zoned.

The four LMIH tables are divided into two general categories, each having two tables apiece. In the first category are tables that present the total school cost that the LMIH would generate; these tables indicate which level of government - or private source - would pay a particular share of that cost. The second category of table presents only the municipal costs that

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[1]Information on routing and utilization was presented in memorandum to author from the Administrative Assistant for Business Services, June 29, 1972. It should be noted that the busses used are elementary school busses that have a capacity for 65 elementary school students; when these busses are used on the secondary level their capacity decreases to approximately 45 to 55 students per bus.

the LMIH would generate, and this is the more important of the two types: the municipal costs are of primary importance because it is the municipalities that argue against absorbing low and moderate income housing. Each of these categories has two tables apiece that represent alternative methods of relieving the over-crowding that is expected to occur on the elementary level; one method is to build additional classroom, and the other is to bus students to schools that could accommodate them better. These tables indicate the costs that are associated with both alternatives.

The one table for the students from the sites as currently zoned presents only municipal costs, since these students generated no federal or state costs.[1]

We shall first consider Table 25A.[2] This table presents the total costs generated by the LMIH if the additional classrooms were to be built. Several points are noteworthy. First of all, we see that despite the various sources of financing,

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[1]One might argue that the students do generate a federal and state cost because of the subsidy for school lunch. But as noted earlier, the federal and state role will be discussed in the section on revenues.

[2]The costs presented in this table are actually somewhat higher than those directly generated by the LMIH. Technically, the costs for which the LMIH is responsible are 78.5% of the capital improvement costs and 78.5% of the operating costs that are related to these improvements, as well as 100% of other costs discussed. This table, however, includes all, not just 78.5%, of the capital and capital related costs. Tables 23 and 24 will present the share for which the LMIH is directly responsible.

TABLE 25A

COSTS GENERATED BY LMI STUDENTS FOR SCHOOLS DURING YEARS 1 - 5

(alternative A: building additional classrooms)

(in dollar amounts)

	Year 1	Year 2	Year 3	Year 4	Year 5
Capital	33,685	33,685	33,685	33,685	33,685
State	13,474	13,474	13,474	13,474	13,474
City	20,211	20,211	20,211	20,211	20,211
Operating	204,666	241,015	274,746	309,181	310,509
Fed/State[1]	2,284	2,665	2,926	3,267	3,367
City	195,757	230,620	263,335	296,441	297,378
Private[2]	6,625	7,730	8,485	9,473	9,764
Total	238,351	274,700	308,431	342,866	344,194

the City still bears the most substantial share of the total cost - approximately 92%. Moreover, operating costs constitute the most significant portion of this total. Salaries for teachers, at an average of 89% of operating costs, are the most substantial item. Expenditures for books and supplies come next, at 5%, and lunch and utilities form the balance of 6%. This distribution is not unlike that for the Newton school system as a whole. There, teachers salaries also constitute the most sub-

[1]Share that federal and state governments pay for lunch.

[2]Share that students pay for lunch.

stantial part of the operating budget - 95% - with other items composing the balance. Another point worth noting is that the total costs increase over the five year period. The capital costs remain the same, so the increase is clearly a result of rising school population, particularly on the elementary and senior high levels.

If we now look at Table 25B, we see that a small savings is realized by choosing to bus the students rather than to build additional classrooms. On the average, the annual savings is

TABLE 25B

COSTS GENERATED BY LMI STUDENTS FOR SCHOOLS DURING YEARS 1 - 5

(alternative B: bussing students)

(in dollar amounts)

	Year 1	Year 2	Year 3	Year 4	Year 5
Capital	----	----	----	----	----
Operating	213,916	250,262	283,996	318,431	319,759
Fed/State[1]	2,284	2,665	2,926	3,267	3,367
State	10,245	10,242	10,245	10,245	10,245
City	194,762	229,625	262,340	295,446	296,383
Private[2]	6,625	7,730	8,485	9,473	9,764
Total	213,916	250,262	283,996	318,431	319,759

[1]Share that federal and state governments pay for lunch.

[2]Share that students pay for lunch.

$24,436. With bussing, not only is the capital cost of adding more classrooms eliminated, but also the operating costs with which these classrooms would be associated. It is noteworthy, however, that the operating costs would be higher if students were bussed than if the additional classrooms were built. This is because the elimination of the utilities expense would be more than offset by the addition of a contract bus. Nevertheless, the total cost would still be lower; from the City's standpoint it would be even lower than it appears in Table 25B since the state would pay the significant share of the bussing cost.

It would be appropriate to turn now to the tables that present only the municipal costs. The first of these tables, number 26A, presents what the net municipal costs would be if the additional classrooms were built. Unlike 25A, this table recognizes only that part of the municipal capital and capital-related costs for which the LMIH would be directly responsible. Looking at the figures and comparing them with those in Table 25A, we see that they are approximately 90% of the total expenditures.[1] The operating costs are still most significant, because of the heavy costs for teachers; and the total costs still increase, because of the increased school enrollments that influence the costs for teachers.

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[1]The City's share here is somewhat lower than the 92% cited as the City's share in Table 25A. The reason is that the total figure in 26A does not include the small amount for which the LMIH is not responsible.

TABLE 26A

MUNICIPAL COSTS GENERATED FOR SCHOOLS BY LMIH IN YEARS 1 THROUGH 5

(alternative A: building additional classrooms)

(in dollar amounts)

	Year 1		Year 2		Year 3		Year 4		Year 5	
	Total	Per Capita‡	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita
Capital*	15,866	11.94	15,866	11.71	15,866	11.64	15,866	11.57	15,866	11.65
Operating*	195,477	147.09	230,340	169.99	263,055	192.99	296,161	216.01	297,098	218.13
Total	211,343	159.03	246,206	181.70	278,921	204.63	312,027	227.58	312,964	229.78

‡The population base used to derive the per capita figures were as follows: Year 1, 1329; Year 2, 1355; Year 3, 1363; Year 4, 1371; Year 5, 1362. These were calculated by adding to the adult LMIH population in Year 1 - which we assume is stable through the projection period - the number of children in Years 1 through 5. Number of children for these years is presented in Table 28.

*The operating and capital costs are somewhat lower here than they are for the city's share of Table 25A because here they only include that portion for which the LMIH is responsible.

The municipal costs that would be incurred without building the additional classrooms are even lower, as the figures on the following page indicate. Newton would have to pay only a small share of the bussing cost - approximately 3% - as well as all of the costs for teachers, books and supplies, and some of the costs for lunch. The most expensive component here, as in Table 25B, is teachers. And, as before, the total cost increase over the years as the secondary population increases, and as the school population on all levels increases.[1]

Having considered the costs generated by the students from the LMI population, we should briefly consider the costs generated by the population from the sites as currently zoned. As noted earlier, these students do not generate any capital costs, nor do they generate any costs on the state or federal level.[1] We shall therefore only look at the net cost to the municipality.[2]

The costs that the City would incur are those for teachers and books and supplies - the most expensive variable cost items.

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[1]But the total number of children (not students) decreases in Year 5; in Year 5 the number of children added by births is lower than those lost through graduation. See Table 28.

[2]Except for school lunch which we will consider in the section on revenues.

[3]Since in this case the students pay the full cost of lunch, there is no net cost to Newton; the lunch cost to the City is therefore not included.

TABLE 26B

MUNICIPAL COSTS GENERATED BY LMI STUDENTS FOR SCHOOLS DURING YEARS 1 THROUGH 5

(alternative B: bussing students)

(in dollar amounts)

	Year 1		Year 2		Year 3		Year 4		Year 5	
	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita
Capital	----	----	----	----	----	----	----	----	----	----
Operating	194,762	146.54	224,625	169.46	262,340	192.47	295,446	215.50	296,383	217.61
Total	194,762	146.54	224,625	169.46	262,340	192.47	295,446	215.50	296,383	217.61

Unlike the students from the LMIH, the costs for these students rise during the first four years and then fall in the last year;

TABLE 27

MUNICIPAL COSTS GENERATED FOR SCHOOLS BY STUDENTS FROM CURRENTLY ZONED SITES: YEARS 1 THROUGH 5

(in dollar amounts)

	Year 1	Year 2	Year 3	Year 4	Year 5
Total	54,236.00.	75,723.00	75,725.00	75,834.00	64,382.00
Per Capita[1]	111.14	155.49	155.92	156.36	133.57

the costs for the LMI students rise consistently. While the above costs are considerably lower than the municipal costs for the LMI population, it should be noted that on a per capita basis the gap narrows significantly.

It would be useful at this point to make a few comments in summary. We shall focus solely on the costs generated by the LMIH population. One of the most significant expenses generated by this group would be for capital and capital-related items. The expense for capital items would be partially carried by the

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[1]The population base used to derive the per capita figures was calculated in the same way as that for Table 26A.

City, and that for capital-related items would be wholly carried by the City. Capital expenses, however, need not necessarily be incurred; an alternative to building additional classrooms would be bussing the students to schools that could accommodate them. The expense incurred by this strategy would primarily be carried by the state, and the savings to the City would be approximately $16,581 per year.[1] Thus, given the number of students projected for the elementary schools, two strategies would be available for relieving over-crowding, one somewhat less costly than the other.

Even without over-crowding, however, expenses would be incurred; these are for the variable cost items that must be supplied regardless of the increase in the number of students. The variable cost items discussed were transportation, lunch, books and supplies, and teachers. From the City's standpoint, the costs of lunch and transportation would be negligible; transportation costs would primarily be carried by the students and state and federal governments. The costs of teachers and books and supplies, however, would be substantial, and would be completely carried by the City. In fact, the cost to the City of books and supplies and teachers is greater than that of any other items. That being so, one might ask if a community can

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[1]Average of totals in Table 26A less average of totals in Table 26B. It should be noted that this figure is lower than the total savings realized which was derived by subtracting the average of totals in 25B from average of totals in 25A.

exercise any control over expenditures for them.

The total cost of teachers and books and supplies is related to two variables: (1) the unit cost of the item for different school levels (elementary, junior, senior), and (2) the distribution of students over different school levels. Given that the first variable is determined by what a community wants to and can spend, how can the second variable be controlled? If we assume as we did in the second chapter that the type of dwelling unit is related to the number and age distribution of children who occupy that unit, a community may influence the number and distribution of school children by influencing what types of units will be built in its community. Looking specifically at multiple-unit dwellings, since that is the most common type of housing constructed for low and moderate income families, the community can influence its type through zoning controls. It is often agreed that high rise apartments will attract fewer families with children than garden apartments, so when zoning controls allow one type of apartment over another, they simultaneously influence the number of children who might become part of the school system.

As for influencing the age distribution of the children, the number of bedrooms per unit seems to be a crucial determinant; smaller bedroom units attract smaller families and the median age of children in these families is likely to be lower than that for larger families. Thus, if a community wants to

influence which school level might be the object of student enrollment, it might do so by controlling the size of the dwelling units that are constructed. In the case of the LMIH we are considering, the high percentage of smaller units accounted for the high percentage of smaller families whose children were primarily of pre-school and elementary age. Admittedly, it was the developer of the housing that determined the sizes of the units, but a community may exercise indirect control over the number of bedrooms per unit by imposing floor area restrictions. Whether or not it chooses to do so, however, a community should recognize the relationship between the size of the unit and the number and age level of children who occupy that unit. By so doing, a community may be able to make more informed planning decisions for school facilities.

Returning now to the specific question of school costs in Newton, we may compare the costs of what is now spent on the existing population with what would have to be spent on the LMI population. Looking at Table 10, which indicates the City's total expenditures[1] for selected public services, we see that approximately $21.5 million is spent on education. On a per capita basis, as Table 11 reports, the cost is $235.39. These education costs, however, include expenditures for the Technical High School and Junior College, neither of which is the subject

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[1]These are the City's expenditures before state aid or other sources of aid are deducted.

of this analysis. Subtracting, then, what Newton spends on these schools,[1] we arrive at a total education cost of $20,124,765, which on a per capita basis is $220.99. For Year 1, the same year for which these data are presented, the LMI population would generate a total cost of, at most, $238,351, and on a per capita basis that cost would become $179.35. The difference between the per student costs are even more striking. On a per student basis, the LMI population would generate a cost of $535 for Year 1 while the pre-growth population would generate a cost of $1105. There is a difference, then, between what Newton spends on the existing population, and what it would have to spend on the new population.[2]

The above comparison highlights the difference between the marginal costs per unit and the pre-growth costs per unit. In this particular case, the marginal costs are below the pre-growth costs; the difference is primarily a result of the excess capacity of the Newton public schools. Only at the elementary level, and there with only two of the seven schools that the LMI students would attend, would additional classrooms need to be

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[1]$732,227 for the Junior College; $579,008 for the Technical High School; 131st Annual Report of Newton Public Schools.

[2]The difference might be even more striking than it appears because the education costs cited by the Census Bureau do not include "Interest on General Debt", a category of its own. A portion of interest on general debt undoubtedly goes toward schools.

built. The physical plants of the junior and senior high schools would be able to accommodate the new students without problem, so it is primarily operating costs of a variable nature - most significantly teachers - that would need to be increased. And although the sums that would be spent are not small, compared to what is spent on the existing population they are insubstantial.

Insubstantial as they are, how would they affect Newton's per capita expenditures? The per capita costs would be lowered - albeit by a negligible amount. If the alternative of building new classrooms were chosen, the per capita cost of educating a student in the regular schools would be lowered from $220.99 to $220.39; and if bussing were chosen instead, the per capita cost would be further lowered to $220.08. In either case, then, there would be a per capita reduction of less than $1.00.

Considering all of the above, it should be clear that to educate more students need not mean a significant increase in total costs, and, as in this case, it may even mean a slight reduction in average costs. The critical question is whether the system can absorb more students without increasing its fixed costs. If it can, it is likely that the system's average costs will be lowered. And if that is the case, some of the fuel is lost from the fiscal argument against LMIH.

Having considered the costs that would be generated for schools, we are now ready to consider the costs that would be generated for other services. The following analyses, as noted earlier, will not be as thorough as the one for schools if only because less information was available. First we shall examine those items that are normally regarded as public works - streets, sewerage, and sanitation; then we shall look at police and fire protection costs.

TABLE 28

NUMBER OF CHILDREN AT EACH SITE BY SCHOOL LEVEL: YEARS 2 THROUGH 5 OF LMIH

Site	Year 2					Year 3				
	Pre-School	Elementary	Junior High	Senior High	All Levels	Pre-School	Elementary	Junior High	Senior High	All Levels
Hunnewell	14.3	16.3	5.4	3.1	39.1	11.4	18.6	5.7	4.1	39.8
Stanton	41.4	49.2	15.4	10.0	116.0	33.8	55.1	16.9	12.1	117.9
Hamlet	52.6	74.3	26.4	16.3	169.6	43.2	80.0	27.9	20.6	171.7
Thurston	31.6	37.0	12.5	7.4	88.5	25.2	41.5	13.0	9.6	89.3
Goddard	27.5	47.1	18.5	11.4	104.5	22.6	48.7	19.0	14.7	105.0
Esty	45.7	60.5	21.2	12.9	140.3	36.6	66.4	22.3	16.5	141.8
Total	213.1	284.4	99.4	66.1	658.0	172.8	310.3	104.8	77.6	665.5

TABLE 28 - continued

Site	Year 4					Year 5				
	Pre-School	Elementary	Junior High	Senior High	All Levels	Pre-School	Elementary	Junior High	Senior High	All Levels
Hunnewell	8.5	20.9	6.0	5.1	40.5	5.6	23.2	6.0	5.4	40.2
Stanton	26.1	61.3	18.3	14.1	119.8	18.4	67.5	18.3	15.5	119.7
Hamlet	33.8	85.7	29.4	24.9	173.8	24.4	91.4	29.4	26.4	171.6
Thurston	18.8	46.5	13.5	12.0	90.8	12.4	51.5	13.5	12.5	89.9
Goddard	17.7	50.3	19.5	18.0	105.5	12.8	51.9	19.5	18.5	102.7
Esty	27.5	72.3	23.4	20.1	143.3	18.4	78.2	23.4	21.2	141.2
Total	132.4	337.0	110.1	94.2	673.7	92.0	363.7	110.1	99.5	665.3

TABLE 29

NUMBER OF CHILDREN AT EACH SITE BY SCHOOL LEVEL: YEARS 2 THROUGH 5 OF CURRENTLY ZONED SITES

Site	Year 2					Year 3				
	Pre-School	Elementary	Junior High	Senior High	All Levels	Pre-School	Elementary	Junior High	Senior High	All Levels
Hunnewell	1.9	2.9	1.2	1.2	7.2	1.8	3.0	1.2	1.2	7.2
Stanton	1.8	2.9	1.2	1.2	7.1	1.6	3.0	1.2	1.2	7.0
Hamlet	19.1	30.9	13.1	12.6	75.7	17.8	31.7	13.0	12.9	75.4
Thurston	7.0	11.5	4.8	4.6	27.9	6.4	11.8	4.8	4.7	27.7
Goddard	3.8	5.8	2.6	2.7	14.9	3.6	6.0	2.5	2.7	14.8
Esty	6.1	10.1	4.2	4.2	24.6	5.4	10.4	4.2	4.2	24.2
Total	39.7	64.1	27.1	26.5	157.4	6	65.9	26.9	26.9	156.3

TABLE 29 - continued

Site	Year 4					Year 5				
	Pre-School	Elementary	Junior High	Senior High	All Levels	Pre-School	Elementary	Junior High	Senior High	All Levels
Hunnewell	1.7	3.1	1.2	1.2	7.2	1.6	3.2	1.2	1.2	7.2
Stanton	1.4	3.1	1.2	1.2	6.9	1.2	3.2	1.2	1.2	6.8
Hamlet	16.5	32.5	12.9	13.2	75.1	15.2	33.3	12.9	13.1	74.5
Thurston	5.8	12.1	4.8	4.8	27.5	5.2	12.4	4.8	4.8	27.2
Goddard	3.4	6.2	2.4	2.7	14.7	3.2	6.4	2.4	2.6	14.6
Esty	4.7	10.7	4.2	4.2	23.8	4.0	11.0	4.2	4.2	23.4
Total	33.5	67.7	26.7	27.3	155.2	30.4	69.5	26.7	27.1	153.7

Streets and Sewerage

Activities that fall within the two categories of "streets" and "sewerage" shall be considered in one section here. Although the Census Bureau examines these items separately, they are both under the jurisdiction of one department in Newton - Streets, which in turn is part of the Department of Public Works.

Table 10 indicates that services for streets are one of the most costly items in Newton, while services for sewerage are one of the least costly. One of the reasons for the discrepency is that street operations embrace a much wider range of activities than do sewer operations. Specifically, within the category of "streets" are such items as construction and maintenance of streets, curbs, sidewalks, and bridges; installation and maintenance of street and traffic signs and signals; operation and maintenance of street lights; care of trees; and snow removal. Included in the category of "sewerage" are the installation and maintenance of storm and sanitary sewers. Because of the wider range of "street" activities, then, both operating and capital costs are higher for this item.

Within this context, how would the new population contribute to the costs of streets and sewerage? First we shall consider streets. A good place to begin is by determining how much street length, if any, would be added to the City. Because of design and access considerations, the length of street

that would be added by the LMIH would be different from that added by the housing from the currently zoned sites.

For the LMIH, all of the housing is so situated that it would not add any new street length to the City. As the site plans in the Appendix indicate, most of the paved areas are internal to the development, and therefore would not be Newton's responsibility. At the Hamlet Street site, however, the access road is currently unpaved, and therefore is not cleaned by the City. But if the residents of the LMIH were to want the benefits of City street cleaning, Hamlet Street would have to be paved. The cost of paving, which would include two 1" layers of bituminous concrete and a stone seal, is approximately $5 per linear foot.[1] Hamlet Street is approximately 500 feet long, and the total cost of paving, therefore, would be $2500.

Who would carry this cost? The City Engineer suggested that even though existing residents of Hamlet Street would also be beneficiaries of the paving, he did not think they would be assessed for the betterment.[2] He said that the existing residents of Hamlet Street are opposed to the LMIH, and therefore feel that they should not have to pay for paving that results from the LMIH's presence. The opinion of the Engineer was that because it was such a politically controversial issue,

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[1] Calculated on the basis of information presented in the 1970 Annual Report of the Department of Public Works, pp. 20-27.

[2] Telephone interview with City Engineer, June 25, 1972.

the developer would have to pay for the full cost of paving; in fact, this was also the opinion of the personnel of NCDF.

In the case of the residents from the currently zoned sites, the developer, too, would pay the full costs, but his burden would be a result of different circumstances. At three of the currently zoned sites - Thurston, Goddard, and Stanton - housing could be accommodated by existing frontage; but at three others - Esty Farm, Hunnewell, and Hamlet Street - new roads would need to be cut, and these roads would only benefit the new residents. Because pre-growth residents would not be beneficiaries, the developer would pay the full cost of constructing these roads.[1]

Newton, then, has become less generous about paying for frontage facilities. In the late 1940's and early 1950's, when Newton was experiencing considerable growth, it was the City's policy to have the developer pay for streets only up to the rough grade stage, and then assume the cost of the balance.[2] Now, however, in a completely new development, where only the

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[1] The Director of the Department of Public Works indicated that in the case of a new development, where only the new property owners would benefit from frontage improvements, the developer or property owner carries the entire cost. In the case of existing housing, the City sometimes carries a portion and charges the balance to abutting property.

[2] William L.C. Wheaton and Morton J. Schussheim, The Cost of Municipal Services in Residential Areas. (Washington, D.C.: U.S. Department of Commerce, 1955), p. 71

new property owners would benefit, it is the developer's responsibility to assume the full cost.

A similar policy exists for sewerage facilities: if the installation of a sewer main is the result of a new development, and the main will only serve the new residents, then the developer pays the full cost. The cost of frontage facilities is high. The full cost of constructing a street up to Newton's specification - including sewers, catchbasins, manholes, and water lines - is between $65 and $75 per linear foot.[1] This cost would fall particularly heavily on the developer - and thereby purchasers - of the housing on the currently zoned sites. For there, as mentioned above new roads would be needed. The length of street would total 1600 feet - 500 feet at Esty Farm, 500 feet at Hunnewell, and 600 feet at Hamlet Street.[2] Assuming the cost per foot is $70, the total cost would be $112,000. Costs for frontage facilities would not be as high for the LMIH since no new roads would be needed; they would, however, have to pay for the installation of sewerage facilities, both the mains, and of course, house connecters.[3]

Once streets and sewers are installed, however, they become the beneficiaries of City maintenance: sewer maintenance;

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[1]Estimate given by City Engineer of Newton.

[2]The length of street for the Hamlet Street site is not for paving Hamlet Street, as with the LMIH, but for a completely new street that would connect Hamlet with others parallel to it.

[3]Certain of the sites will need mains as well as connecters.

street cleaning, lighting, signing, and signalling; and snow removal. Not all of these items would increase in cost as a result of the new population. Sewer maintenance, for example, which involves periodic inspection of sewers, should not increase in costs with the approximately 2000 more feet of sewer lines that the new population would add.[1] Nor would additional street or traffic signals be needed. Moreover, street cleaning would add negligible costs, as will be seen in the following section. It remains, then, to consider snow removal, street lights, and street signs. First we shall look at snow removal.

There are a number of important variables that are related to the costs of snow removal. Perhaps the most obvious, but nonetheless important, is the amount and frequency of snow fall; other items of importance are the mileage of street to be plowed; the proportion of areas that requires complete and prompt treatment (e.g., business districts, areas around fire stations, hospitals); and the type of equipment used. Of these variables, only length of street might change as a result of the new population; we must therefore ask if the new residents would add any street length to the City.

From the discussion above, we found that the LMIH would not generate any additional streets; at most, an existing street would need to be paved. All streets in Newton, including un-

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[1]Opinion of Director of Department of Public Works.

paved private ways, are plowed. Therefore, since the streets on which the LMIH is located are already the recipients of snow removal services, we may assume that no extra costs would be generated for that purpose. It should be noted, however, that the LMI population would bring with it additional cars; with cars, comes a demand for particularly good service, but we may further assume that the additional cars would not generate a need for new men or equipment, but simply a need for thorough work.

We also saw from the previous discussion that the housing from the sites as currently zoned would add 1600 feet or .30 miles of street to the City. It is difficult to determine how the extra street length would be translated into more men or equipment, if at all, particularly since no figures were available on the frequency of cleaning.

The figures we do have indicate that in 1970, the total cost of snow removal was $790,397. Sixty-two per cent of these expenditures were for labor, twenty-two per cent were for supplies and materials, and sixteen per cent were for contractual services.[1] Since these figures were not available in finer detail, in order to determine extra costs we may have to resort to an average cost approach, recognizing that the resultant figure may be high. If we assume that only the costs of labor and

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[1]1970 Annual Report of the Comptroller of Accounts.

supplies should be considered, we find that their total is $602,120. Since there are 300.72 miles of street in the City, and these are all plowed, the annual cost per mile is $2002. (One of the reasons the cost is so high is that much of the snow removal is performed at night, when workers are eligible for time-and-a-half pay). Since the currently zoned housing would add .30 miles of street to the City, it would generate approximately $600 in extra snow removal costs.

Although this figure appears high, and may in fact be high, it might be well to consider it in concrete terms. Specifically, the extra $600 might be spent on additional time that the workmen might have to spend on the extra street length. In addition, it should be noted that the costs of snow removal vary considerably from year to year as weather conditions change. 1970, the year for which the above figure was taken, had especially heavy snow falls; and 1971, which had less snow, generated a cost for snow removal that was more than $100,000 less than that for 1970. The $600 figure, then, should be viewed with caution, for it seems that there is no "typical" expenditure for snow removal.

We shall now consider the extra costs for street lights. In Newton, the installation of street lights and their attendent utility lines are completely paid for by the electric company. The City, however, spends approximately $50 annually in maintenance and operating expenses on each light. In determin-

ing how many more street lights would be required by the new population, we should know that Newton places street lights at approximately every 200 feet in residential areas. For the currently zoned housing, then, because 600 feet of street would be needed at Hunnewell, 500 at Esty, and 500 at Hamlet, 7 new street lights would be needed as well, thus requiring an annual outlay of $350.

The LMIH, on the other hand, would not require any new street lights because the streets on which the housing would front already have lights placed at the desirable standard. As for lights internal to the development, these are not the responsibility of the City.

And finally, we shall briefly consider whether any street or traffic signs would be required. First for the street signs. We recall that the housing at the currently zoned sites would require streets cut at three of the sites. At two of the sites, Hamlet and Hunnewell, these streets would be separate roadways, and at one of the sites, Esty Farm, the street would simply be an extension of an existing street. The new streets at Hamlet and Hunnewell, then, would need signs designating their names. Street signs are approximately $40 apiece, and there is virtually no maintenance; the total cost for the street signs, then, would be $80.00.

The LMIH would not require any new street signs, since it would not generate any new streets. It would, however, require a stop sign at the Stanton Avenue site. This site, which is off a

main thoroughfare, is projected to have 64 dwelling units; the extra traffic that these units would generate justify a stop sign at the intersection of the street of the site, Stanton Avenue, and the main thoroughfare, Washington Street. The cost of a stop sign is approximately $25.00, and like street signs, there is virtually no maintenance.

It would be useful now to summarize the above costs. From the City's standpoint, negligible costs would be generated. The primary costs, those for streets and sewerage, would in both cases be carried by the developer. Other costs - for snow removal, street lighting, street signs, and traffic signs - would, however, be carried by the City. The housing from the currently zoned sites, surprisingly, generated most of the City costs: $600 for snow removal, $350 for street lights, and $80 for street signs - a total of $1030. The figure for snow removal should be viewed with caution. As was noted earlier, snow removal costs vary from year to year depending upon weather conditions, and the cost reported for 1970 reflected a particularly difficult winter.

As for the LMIH, the only City cost that they would generate would be $25 for a stop sign at Stanton Avenue and Washington Streets. No snow removal costs would be generated because there would be no addition to the City streets, and no street lights would be needed for the same reason. Although this was the only case in which the LMIH generated lower costs than the currently zoned housing, it should be noted that on a per capita basis the

currently zoned housing generated lower costs in this category than for any other. This will be seen in the last chapter.

Sanitation Other Than Sewerage

Now we shall examine the impact of the new population on the costs of sanitation other than sewerage. Specifically, these costs are for the collection and disposal of solid waste and street cleaning, both under the jurisdiction of the Newton Department of Public Works. First we shall consider solid waste disposal.

The costs of collection and disposal of solid waste are related to several factors. Among them are (1) the number of collections made per week, (2) the type of collection (from curb, backyard, or cellar) and (3) the method of disposal. For residential areas in Newton there are 3 collections made per week, 1 for rubbish and 2 for garbage; these collections are made from the curb and backyard respectively and the contents are disposed of either in the municipal dump or incinerator. In 1970 the total cost for collection and disposal of 49,910 tons of rubbish was approximately $1 million, and that for collection and disposal of 4007 tons of garbage was approximately $250,000.[1] On a per ton basis, the amounts were $21.33 and $61.00 respectively. Thus, although the total cost of rubbish handling was far above that for garbage, the unit cost was considerably lower.

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[1]Newton's 1970 Annual Report of Department of Public Works, p. 5. The amount of rubbish indicated represents only what the City collected. More rubbish was collected by private contracters and disposed of in the City's incinerator. The City is reimbursed for incinerating the privately collected rubbish.

How would the advent of the new population affect these costs? In answering this question we must first determine how much waste the new population would produce. Given the volume of waste cited above, and Newton's pre-growth population of 91,066, the existing residents produced a per capita amount of .59 tons of waste annually - .55 tons of rubbish and .04 tons of garbage.[1] Assuming this would also be the amount generated by the new population, in Year 1 the LMI residents would add 731 tons of rubbish to the total volume, and 53 tons of garbage. Since detailed cost breakdowns of waste handling were not available, we shall have to roughly estimate how the added volume would affect costs. We shall do this by considering the opinions of the Director of the Newton Department of Public Works.

Discussion with the Director indicated that since the addition of garbage waste would be minimal, there would be no increased garbage collection costs. To be sure, additional stops would have to be made because of the additional housing, but these could be accommodated on the ordinary route, he noted.[2] Rubbish, however, might pose a problem, not necessarily because the increase in volume is significant, but because apartments in general are considered burdensome. Apartment rubbish was formerly disposed of through apartment incinerators, but since

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[1]The difference exists not only because of a tendency to consume more "rubbish-potential" items, but also because of the widespread use of kitchen disposals.

[2]Interview with Director of DPW, July 11, 1972.

anti-pollution regulations have been in effect, the incinerators are no longer used. As a result, the City now collects rubbish from apartment houses, a service it did not previously perform. The Director indicated that the City is not equipped to handle this new volume and that he would recommend that each apartment dwelling unit pay $1.00 per week to compensate for the City's loss.[1] Although charging assessments to apartment residents is questionable, we might use the Director's estimate as a guide for determining how heavily the City's waste facilities would be burdened by the LMIH, and thereby determine how much would need to be spent in order to lessen this burden.

The LMIH would have 361 units, and, at $1.00 per unit a week, or $52 per unit, the total annual cost would amount to $18,772. To assess the accuracy of this figure as a guide, we might compare it to the total amount that would be generated if the average costing method were used. It was noted above that on a per ton basis the cost of handling rubbish was $21.33; multiplying that by the number of tons the LMIH is expected to produce, the extra cost the LMIH residents would generate is $15,592 - approximately 17% less than the Director's estimate. We noted in a previous section that using the average cost to determine the marginal cost may produce a marginal cost figure

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[1]The loss is not a deficit, but the difference between what the City spends with apartment-generated rubbish and what the City spends without it.

that is too high. In this case, however, considering the Director's estimate, the average cost method might be appropriate. We might, in fact, accept the figure produced by average costs as more appropriate than the figure suggested by the Director. This acceptance is based on the assumption that it would not cost the City any more to service a ton of rubbish from the LMIH than it would from the rest of the City; indeed, from a per dwelling unit standpoint, it may cost the City even less.

As for the residents from the sites as currently zoned, assuming they too would produce .59 tons of annual waste per capita, their total annual volume would be 288 tons. Twenty of these tons would be garbage and 268 would be rubbish. The garbage, as with the LMIH, would not produce any additional costs. And, considering that the volume of waste produced by this population would be approximately 63% less than that produced by the LMIH, we may assume that its costs would also be 63% less, or a total of $5770.

Turning now to street cleaning, and the extra costs that the new population might add to that service, we find that the City covered 1600 cleaning miles[1] in 1970 at a total cost of approximately $298,000. Ninety-three per cent of that cost went toward labor, and the balance was applied toward supplies and con-

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[1] A cleaning mile is the conventional unit used by many DPW's to measure the amount of street cleaning accomplished. It refers to one mile of street cleaned once.

tractual services for sweeping machines, the primary cleaning equipment used by the City. The business areas of the City are cleaned daily, while the residential areas are cleaned twice a year; the above figures, therefore, include both the residential and non-residential districts, although the proportion that each constitutes was not specified.

The costs of street cleaning can be related to the kind of equipment used, the number of miles covered, and the amount of waste collected. Actually, the latter two items are interconnected; the number of cleaning miles is influenced not only by the number of miles of existing streets, but also by the amount of waste collected from those streets. Clearly, an area such as a business district, which generates a considerable amount of street refuse, will require its streets cleaned several times weekly, while a low-density residential district, because of the small amount of street waste that it generates, will only need its streets cleaned several times a year. Although the length of street may be the same in each case, the number of cleaning miles covered would be very different. It should be clear, then, that implicit in the unit "cleaning mile" is not only street length but volume of waste.

In estimating how the new population would affect the costs of street cleaning we must therefore determine how many miles of streets they would add to the City and how much street waste they would generate. For simplicity, however, rather than esti-

mate the amount of street waste they would produce, we might assume that they would add as much waste as the residential population at large, and, therefore, the streets of their neighborhoods would require the same amount of cleaning as other residential areas of the City.[1] We need to consider, then, only the length of street that would be added. First we shall look at the LMIH.

We mentioned in the previous discussion that the LMIH would not add any new street length to the City, but that if the residents of the Hamlet Street site wanted street cleaning services, Hamlet Street would have to be paved. The streets that are already paved are currently the recipient of street cleaning services, so in those cases the LMIH would not generate extra cleaning costs. As for Hamlet Street, if it were to be paved, 500 feet or .09 cleaning miles would be added to the City streets. Assuming Hamlet Street would be cleaned twice a year, as streets are in other residential sections, then it would contribute .18 cleaning miles to the City's current routes, certainly a negligible amount.

We know from the previous discussion that the housing from

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[1]One might argue that since the LMIH is of a higher density than housing in the surrounding neighborhood that it might produce more street waste per mile of street, and therefore require more frequent cleaning. Newton, however, does not distinguish between "high" and "low" density residential areas: all are cleaned twice yearly. Presumably, then, the City does not find that there is an appreciable difference in the amount of street waste produced in neighborhoods of varying densities.

the currently zoned sites presents a somewhat different picture. There, only the Thurston Road, Stanton Avenue, and Goddard Street location would not require new street length, and thereby extra cleaning costs. The other locations, however, would generate an additional 1600 feet to the City's roads, or .60 cleaning miles.

How would the extra length affect costs? The Director of the Department of Public Works indicated that no new supplies or equipment would be needed as a result of the added mileage. He did indicate, however, that more labor costs might be incurred although he was not able to say how much more. In determining the cost of additional labor, we should isolate from the total cost that amount spent on wages. The 1970 Annual Report of the Department of Public Works reports a figure of $278,177; and since the total number of cleaning miles covered for that year is 1600, the cost of labor per cleaning mile is $173.86.[1] With the LMIH population adding only .18 cleaning miles, the extra cost would be $31.29;[2] for the residents from the sites as currently zoned, the extra cost would be $104.32.

In summary, both developments would generate a negligible

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[1]Ideally, we should have isolated the number of cleaning miles covered in residential areas and the amount spent for labor in those areas, but this type of breakdown was not available.

[2]Perhaps this cost should be attributed to others on Hamlet Street because they also would be beneficiaries of street cleaning. Since the cost was so minimal, however, it did not seem worthwhile to pro-rate it.

amount for street cleaning operations, the LMIH less than the currently zoned housing. Furthermore, the LMIH would generate $15,592 for solid waste disposal while the housing from the currently zoned sites would generate $5770. In total, then, the LMIH would generate $15,623 and the currently zoned housing $5874. Adding these extra costs to the amount spent on the pre-growth population as indicated in Table 10, we find that with the LMI residents, the per capita sanitation cost would become $16.64, and with the currently zoned residents it would become $16.69.[1] As we can see from Table 11, in both cases this represents a negligible reduction of the per capita cost that existed for the pre-growth population. The reduction, however, might have been greater had we access to materials that allowed a more detailed analysis. As it was, we had to rely upon an average costing approach, one that might have produced inflated figures. But if we consider that these figures represent, at most, the addition of several more employees, we might also consider that the approach that produced these figures was, in this case, appropriate.

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[1]The amount spent for "other sanitation" as reported in Table 10 is less than 2% below the amount indicated for that item in Newton's own reports. It was thought that this discrepancy was minor enough to disregard in computing altered per capita costs.

Police Costs[1]

Before we examine the impact of the new population on police costs, it would be appropriate to briefly describe the Newton Police Department. The Department, as of 1970 - Year 1 of development - was composed of 291 employees. Of these, slightly more than 60% were patrolmen; 12% were officers of higher rank, and the balance were clerical and custodial staff, parking control officers, school traffic supervisors, technicians, and interns. The Department spends approximately $2.5 million annually, and in 1970 this constituted 5.8% of the municipal budget. Most of these expenditures, 93%, were applied toward salaries; the rest went toward such items as contractual services, supplies, new equipment, and out-of-state travel. Police services in Newton, then, as elsewhere, are highly labor-intensive; but as technological applications to police work become more widely used, the purchase of expensive equipment may make more demands on a department's capital budget than currently. One suspects, however, that despite a possible increase in capital expenditures, the primary budgetary focus will continue to be on labor.

Labor is not only the most expensive item of the police budget, it is also that item that is most likely to increase in cost as a result of population growth. What are those factors in a population that influence the cost of police labor in particular,

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[1]Data in most of this section were obtained from Newton's 1970 Annual Report of the Police Department.

and police services in general? In attempting to answer this, we might look at the evidence that per capita police costs are higher in major cities than elsewhere.[1] This phenomenon may be related to several factors. In large cities, there are higher salaries per policeman and more policemen per 1000 people.[2] The latter is probably related to higher densities and heterogeneity of population, with which more crime is associated, and, in short, more conflict. We know, then, in a general way, that police costs may be related to population size, type, and density. We do not, however, have strict operating standards to work with; there is no "maximum efficient capacity" for the average police force simply because there is no average force: under certain conditions more policemen are needed per 1000 people, and under other conditions fewer.

Because there are no generalized rules, Newton's Chief of Police could not with any precision determine in what ways the demands on the force would be increased as a result of new population growth. In the case of the LMIH, which we shall examine first, the Chief indicated that there would likely be more traffic congestion, perhaps more crime, a need for more workers at elementary school crossings, more ambulance runs, and more police call boxes.[3] He did not indicate, however, how these de-

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[1]See U.S. Bureau of Census, City Government Finances, Table 6.

[2]Isard and Coughlin, op. cit., p. 90.

[3]Telephone interview with Chief of Police, August 3, 1972.

mands on the Department might be expressed in terms of extra personnel or costs.

That being the case, some of our own standards will have to be devised. First we shall look at the needs for manpower. We will assume that aside from school crossing personnel, only more patrolmen would need to be hired. Salaries for such support staff as custodial and clerical workers, then, are regarded as fixed, as are the salaries of higher rank officers such as sergeant, lieutenant, and captain. We will further assume that Newton's current utilization of manpower is acceptable, and we shall extrapolate from that how many new people would need to be hired in order to maintain that standard. As of 1970, Newton had 174 patrolmen for a population of 91,066. With an addition of 1329 people, as the LMIH would generate in Year 1, two more patrolmen would be needed in order to maintain the 1970 standard. But since the LMIH would be of a higher density than the rest of Newton's housing, perhaps the standard should be stricter; we might then add one more patrolman to the figure. The LMIH, then, would generate a need for three more patrolmen in Year 1. What about Years 2 through 5? Would additional patrolmen be needed? Since the additions to the LMI population during Years 2 through 5 would be minor, and since they would be additions of infants, it seems reasonable that no more extra patrolmen would be needed then than in Year 1.

In addition to patrolmen, personnel at elementary school

crossings would be required. Since a substantial number of elementary age children would be coming from the Hamlet, Thurston, Goddard, and Esty sites, we might initially assume that one more school crossing worker would be needed at each school that these children would attend. However, the 1970 ratio indicates 63 school crossing workers to 9089 elementary school children. Assuming that proportion is acceptable, for Year 1 the LMIH would generate a need for two more school crossing personnel. Since the pre-growth elementary school population is expected to decline in Years 2 through 5, we may assume that the additional two workers would be adequate for that period as well.

Besides the cost of hiring more employees, there would be other costs. One of these would be for additional police call boxes. Although patrolmen rely more heavily on radios than call boxes, the boxes are still considered an essential part of the police communications system. Personal investigation revealed that police boxes were within ½ to ¼ mile of all sites but one - Stanton Avenue. Since 234 people are projected for this site in Year 1, and might therefore require a beat patrolman, we might recommend that a police call box be installed near the site.

The other non-employee need would be for additional ambulance runs. Although it is not as easy to estimate the need for ambulance runs as it is for call boxes, we might again extrapolate from current figures. As of 1970, the Police Department made 2145 ambulance runs; if the same proportion of runs is to

be maintained after the addition of the LMI population, then a total of 2177 runs would need to be made. The LMI population, therefore, would generate a need for 32 additional ambulance runs.

To summarize, the LMIH would generate a need for three patrolmen, two school crossing personnel, one police call box, and thirty-two ambulance runs. The costs of these items are as follows: the starting salary of a single patrolman in Year 1 is $8738 and the annual cost of clothing him is $140; the annual salary of a single school crossing worker is $1724; the cost of a single ambulance run is $7.50; and the initial cost of a police call box is $725, of which $500 is for the box itself and $225 is for mounting;[1] approximately $90 must be added for annual operating costs. Multiplying these figures by the above-mentioned need, we find the set of costs that is presented in the table on the following page.

Table 30 indicates that like the police costs for the pre-growth population of Newton, the cost of salaries is the most significant component of the total generated by the LMIH. And, like Newton's per capita police cost, that generated by the LMIH is under $30.00: $26.90 for Newton as a whole, and $23.42 for the LMIH. If the expenditures for the LMI population were to

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[1]The initial cost would be considerably higher if a cable had to be installed. This figure assumes that a cable in available, a point corroborated by the Chief of the Fire Department who has jurisdiction over the Wire Department, the department that handles the police and fire call and alarm systems.

TABLE 30

COSTS FOR POLICE SERVICES GENERATED BY LMIH

Item	Total	Per Capita
Patrolmen	$26,634	$20.04
School Crossing Personnel	3,448	2.59
Call Box	815	.61
Installation	725	.54
Operating	90	.07
Ambulance Runs	240	.18
TOTAL	$31,137	$23.42

be included in the municipal budget, how would Newton's per capita police costs be altered? With both populations included, the new per capita cost would be $26.85 - a reduction of only 5¢. While this is clearly negligible, it is significant that Newton's per capita costs would be maintained despite a population increase of over 1000 people.

We shall now consider the costs generated by the population from the sites as currently zoned. Discussion with Newton's Chief of Police indicated that with a population increase of under 500, the Department would not be subject to additional burdens, or if it were, the burdens would be negligible.[1] If we estimate, as earlier, the number of patrolmen needed, and the increased demand for ambulance runs, we find that only one more patrolman would need to be hired, and that 13 extra ambulance runs would be generated. As for the police call box at Stanton Avenue, the Chief indicated that since only 21 persons would be added to the area, installation of a call box would not be justified. On the basis of 1970 utilization patterns, extra school crossing workers would not be justified either. In total, then, the population from the sites as currently zoned would generate a cost of $8975.50 - $8878 for the patrolman and $97.50 for the ambulance runs. On a per capita basis, this would amount to $18.39, $8.51 less than the per capita cost for the pre-growth population. But when combining the two populations, the altered per capita cost is $26.86, practically identical to the per capita cost for the combined LMIH and pre-growth groups.

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[1]Telephone interview with Chief of Police, August 3, 1972.

Fire Protection Costs

The figures in Table 10 indicate that Newton spends over $2.5 million on fire protection, roughly the same amount that it spends on police protection. And, like the Police Department, the bulk of the Fire Department's expenditures, approximately 92%, are applied toward salaries. The balance supports care of buildings, apparatus and equipment, supplies, and the Wire Department. The level of fire protection is high in the City, and Newton is given a first class rating by the National Board of Fire Underwriters.[1] In order for this level of service to be maintained, however, the Fire Department has recommended certain improvements. Among these are an additional ladder company for the southeast section of the City, a new drill school facility, new diesel pumpers to replace the old ones, and a modern signal desk which would consolidate all fire alarm transmitting and receiving equipment.[2]

Within this setting, how would the addition of a new population affect fire protection costs? The primary costs of a fire department are divided between the costs of maintaining a force for fires that actually occur, and the costs of maintaining a force for fires that might occur under unusual circumstances. The division of costs, in other words, is between fires that re-

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[1]For explanation of rating system see International City Manager's Association, Municipal Fire Administration (Chicago: Institute for Training in Municipal Administration, 1946) pp. 63-68.

[2]City of Newton, City Planning Department, Capital Improvement Program 1971-76, p. 24.

quire routine service and those that require exceptional service. There is usually a large amount of unused capacity, then, that is held in reserve for the possibility of a large fire or several smaller fires occurring simultaneously.[1] How much capacity is held in reserve varies from city to city. One source cites that an average of 50% of a fire department's costs are allocated to standby capacity; but this same source recognizes that there may be a range that runs from a low of 30% to a high of 70%.[2] The allocation of costs may depend, among other things, on the probability of severe fires occurring and the effectiveness of the mutual call system of which the community may be a part.

Precisely how Newton's costs are allocated between standby capacity and expected use was not determined. Discussion with Newton's Fire Chief, however, suggested that standby capacity was considerable. He indicated that no additional equipment or firefighters would be required with the inclusion of the LMI population, nor would any be required for the population from the sites as currently zoned.[3] Each of the sites is no more than 1

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[1]On a certain level this is a very obvious point: fire facilities, like other facilities, are planned so that they can absorb additional activity. But unlike other facilities, at least half of a fire department's costs may support a reserve capacity, and, the lack of such capacity could have very serious consequences for the public.

[2]Isard and Coughlin, Op. cit., p. 88.

[3]Interview with Chief of Fire Department, July 26, 1972. His position on not needing any more firefighters can be contrasted with the Chief of Police's position on patrolmen. The difference may be a result of a greater amount of unused capacity in the Fire Department.

mile from a fire station and some are as close as ¼ mile. The assertion that no new men or equipment would be needed at any of these stations was based on the Chief's assumption that the ladder company that is recommended for the southeast section of the City would indeed be realized. Since most of the hypothetical development would occur in the southern section of the City, we may assume that it would act as an incentive for the realization of the new company. Although it might act as an incentive, however, we could not appropriately attribute the costs of this company to the new population. The company is recommended regardless of the advent of additional residents, and in fact was recommended by the National Board of Fire Underwriters in 1941 and again in 1958.[1]

There are certain items, though, whose costs could be uniquely attributed to the new population. The Chief of the Fire Department indicated that fire alarm boxes would be needed near the sites that would serve the residents from the LMIH, but not near the currently zoned sites. It appears, then, that where there is high density housing, fire alarm boxes are placed with greater frequency than where low density housing exists. The cost of these boxes, like police boxes, is $500 for the box itself, $225 for mounting on a pedestal, and $90 for annual operating costs.

Other than fire alarm boxes, one might ask whether fire hydrants would be needed. Although the specifications for and

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[1]City of Newton, Planning Department, Op. cit., p. 24.

maintenance of hydrants are technically under the jurisdiction of the Water Department, since hydrants are part of the fire protection system, it is appropriate to note their need here. Because the sites accommodate housing of various density and distribution differently, different hydrant requirements are noted for both types of development. For the LMIH, more hydrants would generally be needed because the site plans are such that the housing would be oriented away from the street in arrangements unique to each site. The currently zoned housing, on the other hand, could in most cases be covered by existing hydrants because this housing would conventionally front the street.

In concrete terms, the LMIH at the Stanton Street site would need 2 hydrants; that at Hunnewell, Thurston and Goddard, 1; Hamlet Street, 3; and Esty Farm, 2. The currently zoned housing would be covered by existing hydrants at Stanton Avenue, Thurston and Goddard Streets, and would need 1 additional hydrant at Hunnewell, Hamlet and Esty Farm.[1] The hydrants that would be located at the LMIH sites would be inside the development, not on the street; and those that would serve the currently zoned housing would be installed on the street. The difference exists because of the different ways in which the housing is spatially distributed on a site or group of sites; each distribution places special demands on firefighting equipment, and these demands be-

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[1] A rule-of-thumb standard is that no building should be more than 300 to 400 feet away from a hydrant. International City Managers' Association, Op. cit., p. 250.

come more specialized as the housing departs from the traditional street-oriented pattern.

Because the LMIH hydrants would be within the developments, the developer would pay for the cost of installation and maintenance. The hydrants serving the currently zoned sites, however, would be paid for by the City. The cost of installing a hydrant, including the apparatus that is attached to the main, is, on the average, $450.[1] The total cost for three hydrants, then, is $1350. Costs of maintenance vary, but Newton ordinarily runs two tests on its public hydrants, one in the winter and one in the summer, and this activity is carried out by two inspectors who are hired for that sole purpose. We shall assume that the three hydrants the currently zoned housing would add could be accommodated in that schedule at no extra cost.

In sum, then, the housing from the currently zoned sites would generate a City cost of $1350, while the LMIH would generate a City cost of $4890 - $4350 for installation of the fire boxes and $540 for maintenance. Clearly, the cost to the City would be much higher if the LMIH hydrants were included. As it stands now, however, in Year 1 the per capita cost generated by the LMIH is $3.68, and that generated by the residents from the currently zoned sites is $2.77. In both cases, Years 2 through 5 would be even less costly since the initial outlay for hy-

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[1]Telephone interview with Commissioner of Water Department, October 10, 1972.

drants and alarm box would already be paid. As one might expect, the small amount of expenditures required would not change Newton's per capita costs appreciably. Table 11 indicates that the per capita cost for fire protection in Newton was $28.94; with the inclusion of the expenditures for the LMI population, this cost would go down to $28.57, and with the inclusion of the currently zoned population the cost would go down to $28.80.[1]

We have thus concluded our analysis of costs. Rather than present a summary here, however, we shall first briefly consider revenues. The final chapter will present summaries of both costs and revenues as well as a comparison of the two.

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[1]Although the costs of fire hydrants are paid for by the Newton Water Department, it is valid to compute an altered per capita cost on the basis of the Census Bureau's fire protection category; the Bureau includes expenditures for hydrants as part of the fire protection category.

CHAPTER IV

REVENUES

Before we examine the revenues that the new population would generate, we should recall how revenues are distributed for the City of Newton as a whole. Looking at the table on the following page, we see that revenue from Newton's own sources, chiefly the property tax, is most significant, and revenue in the form of state aid, while much less substantial, takes second place. The property tax being most important, we shall first consider that as a potential source of revenue from the new residents. As we mentioned in the first chapter, there are two segments of the property tax that we shall examine: the real estate tax and the motor vehicle excise tax. We shall look at the real estate tax first.

Property Tax

Let us assume that the LMIH would contribute approximately 25% of its gross income to the real estate tax. In order to determine the tax yield, then, it is necessary to determine what the gross income of the LMIH would be. We recall that 25% of the units would be rented to middle income families at market rents, 50% to moderate income families at below market rents, and 25% to low income families, also at below market rents. Given the distribution of income types, we can say that on the average, the units would be in the rental range of moderate income families.

TABLE 31

GENERAL REVENUES FOR NEWTON, MASSACHUSETTS IN 1969 - 1970[1]
(Dollar amounts in thousands)

	Total	Per Capita	Per Cent
INTERGOVERNMENTAL	6,160	67.69	14.70
From State	5,696	62.59	13.70
From Federal	450	4.95	1.10
From Local	14	.15	.03
OWN SOURCES	35,559	390.74	85.20
Property Tax	33,354	366.53	79.90
Other Taxes	91	1.00	.20
Current Charges	1,381	15.17	3.30
Miscellaneous	732	8.04	1.70
TOTAL	41,719	458.43	100.00

[1]Source: U.S. Bureau of the Census, City Government Finances 1969-70, Table 5. Detail does not add because of rounding.

That being the case, we might assume that the 1-bedroom units would have a monthly rent of $125; the 2-bedroom units, $160; the 3-bedroom units, $170; and the 4-bedroom units $175.[1] Given the number and distribution of bedroom types indicated in Table 1, the annual gross rental income would be $691,000. Since taxes would be 25% of that amount, the annual contribution of the LMIH would be $172,750.[2]

We shall now consider the real property revenues for the housing on the currently zoned sites. We recall that Newton ordinarily assesses new single family housing between 40 and 50 per cent of its fair market value; we must therefore determine the housing's fair market value before we can determine its tax yield. Fair market value shall be defined here as that amount for which the property owner feels he can sell, under informed

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[1]These figures were based upon 1970 rents for a similar type of 236 financed housing in Stoughton. They were adjusted upward by approximately 8% to account for higher land costs in Newton. These rents are close to those that NCDF projected - a range of $120 to $170. The reason that the Stoughton figures were used as a base is that the NCDF had not assigned specific rentals to unit types whereas the Stoughton development had.

[2]Alternatively, the tax yield may be calculated according to the provisions of Chapter 121A, Section 10, of the M.G.L. This statute provides that a non-profit project whose purpose is to eliminate "blight" may receive a tax abatement if the municipality so wishes. Assuming the abatement brings the rate down to 18% of gross rental income, the LMIH would contribute $124,380. In this author's opinion it is unlikely that the LMIH would receive the benefits of Chapter 121A since the housing is so politically controversial, and, even with a liberal interpretation it is difficult to see how the LMIH would be removing blight - at least from Newton.

conditions, when neither he nor the buyer is under compulsion.[1] 1970 census material reports these amounts for the housing surrounding the sites in question.[2] Assuming that the currently zoned housing would be of a type similar to that in the surrounding neighborhood, we may also assume that its fair market value would be similar. Taking, then, the amounts reported for the blocks surrounding the sites, we find that housing near Hamlet Street has an average value of $32,800; housing near Hunnewell, $37,866; Esty, $33,900; Goddard, $25,600; Thurston, $26,700; and Stanton, $34,700.[3] If the new housing were valued similarly, and were assessed at 45%, at the 1970 tax rate of $113 per thousand, the total tax revenue generated would be $225,548, 31% higher than that generated by the LMIH.

This, then, is the real estate tax revenue that the new population would directly generate. What about the revenues that they would indirectly generate? We mentioned in the first chapter that the indirect revenues refer to that portion of retail sales stimulated by the new population's expenditures that would be used as tax revenue. Unlike rental housing property, retail

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[1]For a clear discussion of the various definitions of value, and which definitions may be appropriate from an assessment standpoint, see Keith, "Value for Tax Purposes", Assessors Journal, I (January, 1967), 1.

[2]U.S. Bureau of Census, Block Statistics Boston, 1970, Table 2.

[3]These figures may seem low, but they represent the mean and not the median, and therefore may be affected by extreme values, and, they were recorded in 1970.

establishments yield only 2.5% of their gross income to the real estate tax.[1] If, for the LMI families, we assume that approximately 30% of their net income is spent in retail establishments within the City, and that the average net income of these families is $9939, then 361 families would generate $25,285 in additional tax revenue.[2] And, for the families from the currently zoned sites, if we assume that approximately 25%[3] of their net income would be spent locally, and that their average net income is $12,000, then they, since they comprise 141 families, would generate $19,575.

Having examined the revenues that would be received from the real property tax, we shall now consider the revenues that would be received from the motor vehicle excise tax. This tax, as mentioned in the first chapter, is levied on every automobile that is garaged in the City. The tax rate is $66 per $1000 of valuation and has been so for at least ten years. Rather strict assessment ratios are applied, with valuation based on 90% of the manufac-

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[1]Percentage is based on ratio of retail tax revenue to retail sales in Newton, 1963. Source Tables 3 and 18, City of Newton, Planning Department, Economic Base Study. Also 1970 Annual Report of Assessing Department.

[2]The average net income of the LMI families was based on 1-bedroom units having occupants earning $7500; 2-bedroom units, $8850; 3-bedroom units, $10,200; and 4-bedroom units, $10,850. These figures in turn were derived from those reported in the Appendix as "possible upper net income limits" for families in 236 housing.

[3]The percentage that these families spend locally is lower than that for the LMI families because it is assumed that this population is more mobile.

turer's list price during the first year of a car's manufacture, 60% in the second, 40% in the third, 25% in the fourth, and 10% in the fifth and successive years. First let us look at how the motor vehicle tax applies to the LMIH.

If we assume that the number of cars owned by the LMIH residents is equal to the number of parking spaces provided, 376, and that the average valuation of their cars is $900, then the total revenues produced by the motor vehicle excise tax would be $22,308. Turning now to the families from the currently zoned sites, we may assume that they have 1.5 cars per dwelling unit, or a total of 212 cars. If the average value of their cars is $1020[1], the tax revenue that they would generate is $14,256, 36% lower than that generated by the LMI families.

In sum, the direct property tax revenues that the LMI population would generate is $195,038; the direct property tax revenues that the currently zoned population would generate is $239,804. And, indirectly, through expenditure of income in local retail establishments, each population would generate $25,285 and $14,256 respectively. In total, then, the LMI residents would add $220,323 in property tax revenues and those from the currently zoned sites, $254,060.

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[1]This was the average assessed value of a car in Newton in 1970. Source: 1970 Annual Report of Assessing Department, p. 10.

Intergovernmental Revenues

We shall now consider intergovernmental revenues. These revenues are the amounts that are given to the City from other levels of government. In a sense, we have already considered such revenues, but from a cost standpoint: In the section on school costs, for example, we noted which levels of government would pay for the items that would be required by the new population. For certain items the state carried a portion of the costs, and those portions are properly considered intergovernmental revenue. What follows, then, will essentially be a review of the role of state aid as presented in Chapter III. Since the school system is the recipient of the largest share of such aid, we will begin our discussion with state aid to schools. We will look first at the LMI population.

It will be recalled that on the elementary level, if the LMI students were not bussed to other schools, four additional classrooms would need to be built. The annual cost of these classrooms - including new equipment and furniture - would amount to $33,685. Forty per cent of this cost, however, would be carried by the state, and the state, therefore, would contribute $13,474 annually in intergovernmental revenue.

If Newton decided not to build extra classrooms, the students might be bussed to schools that could accommodate them better. The cost of bussing would be $10,550, but here too the state would contribute a substantial share: $10,245. In either case, then, bussing of students or building additional classrooms, the

state would generate revenues that would offset some of the City's burden. The students from the currently zoned sites would not require extra classrooms or bussing: they would not, therefore, generate state aid for these purposes.

These students would, however, generate state aid for other purposes. It was mentioned in the section on school costs that there is a federal-state subsidy of 12¢ per school lunch. For simplicity, we shall consider this a state subsidy since it is channelled through the state to the municipality. It will be recalled that the families from the currently zoned housing would send, on the average, 54 students to secondary schools annually. Since computations for school lunch costs assumed that lunch would be supplied for 80% of the students for 90% of the school year, 7181 lunches would be made for the students from the currently zoned sites. With a 12¢ subsidy per lunch, then, the students from the currently zoned housing would generate an average of $862 annually in state aid for lunch. The amount would be the same for Year 1.

Because there would be more students from the LMIH, the state subsidy for them would consequently be higher. Looking at Table 23, we see that the share that the federal-state government pays increases over the five year period. On the average, the subsidy is $2901, and for Year 1 it is $2284.

Other than state aid for specific educational purposes, state aid is distributed to municipalities for general educa-

tional purposes.[1] The amount of state aid can vary from 15% of a municipality's "reimbursable expenditures" to 75% of those expenditures. Reimbursable expenditures refer to all amounts spent by a locality for schools - excluding amounts for transportation, food for school food service programs, capital improvements, and other items that are enumerated in the belowmentioned statute. In 1970, Newton received the minimum amount of state aid, 15%, and although the addition of either of the new populations would not increase that percentage, the amount of state aid would increase. Since the amount of state aid would be 15% of reimbursable expenditures, and the LMI population would increase those expenditures by $191,944, the amount of state aid they would generate is $28,791. The population from the currently zoned sites would add a total of $54,236 in reimbursable expenditures, so this group would generate $8,135 in state aid for general educational purposes.

Besides state aid for schools, neither population would generate any additional intergovernmental revenues. In total, the population from the LMIH would generate state aid of $45,166 or $41,937, depending upon whether additional classrooms would be built or students bussed; the first figure refers to the former alternative, and the second to the latter. Both figures incorporate the average amounts for school lunch subsidies. If we only considered revenues for Year 1, however, the figures would drop to

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[1]See General Laws, c. 70, s. 40.

$44,549 and $41,320 respectively. The intergovernmental revenues that the currently zoned residents would generate is $8,997. Having considered intergovernmental revenues, we shall now look at the final category, "current charges."

Current Charges

It will be recalled from Chapter I that current charges loosely refer to user charges. The revenues from current charges include amounts from assessments, and fees for the use of particular services and facilities. One of the examples given was the "fee" for school lunch, and this in fact is the only "current charge" that the new population would generate. Looking at Tables 23 and 24, we see from the row labelled "student" the yield from current charges that each population would generate for school lunch. For Year 1, the LMI students would generate $6625, and those from the currently zoned sites, $2455; on an average basis, these figures become $8415 and $2501.

To be sure, the new resident might generate even more current charges revenue because of the use of recreational facilities, summer school, adult education classes, and the like. It is difficult, however, to determine how much extra revenue in this form the new population would actually generate. Such variables as spending patterns, leisure time available, and recreational preferences are all factors that influence the amount that one would spend on those items that require "current charges". We shall therefore be conservative and claim that the above reve-

nues are the only amounts the new population is likely to generate with any certainty.

In total, for Year 1, the LMIH would generate $271,497 in additional revenues if the extra classrooms were to be built - $220,323 in property tax revenue, $44,549 in intergovernmental revenue, and $6625 in current charges. If the elementary students were to be bussed rather than additional classrooms built, the intergovernmental revenues would go down to $41,320, thus reducing total revenues to $268,258. In Year 1 for the currently zoned population, revenues would be lower. Their total yield would be $262,512 - $254,060 for the property tax, $8997 in intergovernmental revenues, and $2455 in current charges. It appears, then, that because of a higher amount of state aid for education, the residents from the LMIH would be able to produce more substantial revenues. The following section will compare the revenues - from both populations - with the costs that both are projected to generate.

CHAPTER V

FINDINGS

We recall that this thesis set out to accomplish three tasks. The first was to determine the costs and revenues that both types of housing would generate; the second was to compare the costs and revenues; and the third was to determine the effects of the housing on Newton's municipal budget. Most of our time has been spent developing the substance of the first task, and this chapter will be devoted to the final two.

Table 32 summarizes the costs that are generated by both types of housing in Year 1; Table 33 summarizes the revenues; and Table 34 presents a cost-revenue comparison.[1] Before we consider the comparative figures of Table 34, it would be useful to comment on the cost and revenue data individually.

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[1]We will only analyze the costs and revenues for Year 1 in this chapter. Because of this, it should not be inferred that costs and revenues for Years 2 through 5 are unimportant. One should note that for both populations, the costs and revenues rise during those years, thus making average costs and average revenues higher than the costs and revenues for Year 1. For the LMIH, not only are the average costs and revenues higher but so is the average deficit. The primary reason for the deficit increase is that school costs grow each year with the rising LMI student population. However, despite the larger LMIH deficit, Newton's expenditures for Years 2 through 5 should not exceed the total expenditures (pre-growth and LMIH) for Year 1. This is because the pre-growth school population would decline sufficiently in Years 2 through 5 to make room for the increasing LMI students. Therefore, even though the marginal costs generated by the LMIH would grow, because pre-growth needs would decline the <u>total</u> costs of the City would remain relatively stable.

Table 32 tells us what we know already: that the costs generated by the LMIH are substantially greater than those generated by the residents from the currently zoned sites. This is not only a result of more LMI residents, but also of a higher proportion of LMI children to the total LMI population. In both cases, the costs for school are the most significant. For the currently zoned population, school costs are 76% of total costs, and for the LMI residents, school costs are 82% and 81% of the total, depending upon whether elementary students are bussed. In addition, both populations generate per capita costs that are considerably below the per capita costs generated by the Newton population as a whole. We can compute from Table 10 that Newton's per capita expenditures are approximately $466; in comparison, the per capita expenditures of the LMIH and currently zoned residents are approximately $218 and $146 respectively. As one would expect, therefore, the inclusion of either population would lower Newton's per capita costs. If we look at the effects of the new populations from another standpoint, the negligibility of their extra costs is confirmed: Newton's expenditures would increase by only .68% if the LMIH were to be built, and by a trivial .16% if the currently zoned housing were to be built.

On the revenue side, Table 33 indicates that the revenues generated by both populations are practically identical. The LMIH would increase Newton's revenues by .65%, and the currently zoned housing would increase the City's revenues by .63%.

TABLE 32

SUMMARY OF COSTS FOR YEAR 1 FOR LMIH AND CURRENTLY ZONED HOUSING
(in dollar amounts)

		LMIH		Currently Zoned	
		Total	Per Capita	Total	Per Capita
School *	A.	238,351	179.35	54,236	111.14
	B.	213,916	160.96		
Streets and Sewerage		25	.02	1,030	2.11
Other Sanitation		15,623	11.76	5,874	12.04
Police		31,137	23.42	8,976	18.39
Fire		4,890	3.68	1,350	2.77
Total	A.	290,026	218.23	71,466	146.45
	B.	265,591	199.84		

*The costs beside row A indicate costs if classrooms were to be built, those beside row B indicate costs if students were to be bussed.

TABLE 33

SUMMARY OF REVENUES FOR YEAR 1 FOR LMIH
AND CURRENTLY ZONED HOUSING
(in dollar amounts)

		LMIH		Currently Zoned	
		Total	Per Capita	Total	Per Capita
Property Tax		220,323	165.78	254,060	520.61
Intergovernmental Revenues*	A.	44,549	33.52	8,997	18.44
	B.	41,320	31.09		
Current Charges		6,625	4.98	2,455	5.13
Total	A.	271,497	204.28	265,512	544.08
	B.	268,258	201.85		

*The amounts beside row A indicate revenues if classrooms were to be built; those beside row B indicate revenues if students were to be bussed.

Although the total revenues generated by both populations are so similar, when we compare them from an average standpoint it is clear that the currently zoned population is substantially more productive. Moreover, this population generates per capita revenues that are higher than the City-wide average while the LMIH generates per capita revenues that are considerably below the City-wide average.

The above information should lay the groundwork for comparing costs with revenues. Thus far we have seen that both populations generate average costs that are far below the average costs generated by the pre-growth population. We have also seen that both populations would increase Newton's total expenditures by only a negligible amount - less than 1% in each case - although the increase generated by the LMIH would be much higher than that generated by the currently zoned residents. As for revenues, there are both similarities and differences between the two populations. When we consider the total amount of revenue that each would generate, the similarities are clear; but when we look at these revenues on a per capita basis it is equally clear that there is a substantial gap in productivity. Comparing costs and revenues with those of the pre-growth population, we saw that the currently zoned population would generate below-average costs and above-average revenues while the LMIH would generate below-average costs and below-average revenues. And, as we shall see from the following discussion, the

LMIH costs would not be far enough below average to compensate for the lower revenues. We shall now turn to the comparison of costs and revenues.

In comparing costs with revenues, a primary question is whether the housing pays for itself. Does it generate sufficient revenues to cover its costs? If so by how much, and if not, how much is lost? Considering Table 34, we see that the housing on the currently zoned sites would more than pay for itself. This is expected, of course, since the above information indicated that this type of housing would increase Newton's expenditures by only .16% while it would increase its revenues by .63%. The LMIH, on the other hand, would not be able to pay for itself if new elementary classrooms are built, but would be able to do so if the classrooms are not built. Since our primary concern here is the LMIH, let that be the focus of the following discussion. We will assume that the classrooms would be built and thus a deficit created.

As Table 34 indicates, we see that this deficit would be approximately $18,500. How critical is this deficit? If we look at Tables 10 and 31, we see that Newton carries a deficit <u>without</u> the LMIH. These tables indicate that Newton's revenues did not completely cover its expenditures; over $42 million was spent in 1970, and less than $42 million was generated in revenues. Specifically, the deficit for Newton was approximately $721,000. If we add to that the deficit expected from the LMIH, Newton's

TABLE 34

COMPARISON OF COSTS AND REVENUES GENERATED BY THE NEW POPULATION IN YEAR 1: LMIH AND CURRENTLY ZONED HOUSING
(in dollar amounts)

	LMIH		Currently Zoned
	New Classrooms	Bussing	
All Costs	$290,026	$265,591	$71,466
All Revenues	271,497	268,258	265,512
Net Deficit	18,529		
Net Surplus		2,667	194,046
Per Capita Cost to Newton	.20		
Per Capita Benefit to Newton		.03	2.13

1970 deficit would increase by only 2.5%.

Let us consider the effects of the LMIH deficit another way. If the entire City of Newton were to assume the extra costs that the LMIH would incur, the extra expense would be approximately 20¢ per person. This, in essence, would be the per capita cost of supporting or subsidizing the LMI units so that the housing could break even. In this regard it is interesting to mention that more than half of Newton's families are now paying less in revenues than they cost in services; otherwise the 1970 deficit noted above would not exist.

We have seen, then, that according to a number of measures the LMIH would not impose a significant fiscal burden upon the City of Newton. Although the housing would generate below-average revenues, it would also generate below-average costs. To be sure, its revenues would not cover its costs, but this is also the case for the "average" family in Newton, and for the LMIH this could be corrected by assuming a 20¢ cost per capita.

It is important to note that even this negligible cost would only be incurred under certain conditions. One of these conditions is that all of the LMI occupants would be new residents of Newton, and indeed, for the sake of simplicity, that is what we have assumed throughout. However, because much of the impetus for the LMIH was based upon the desire to satisfy

the need of some Newton residents for low-cost housing[1], a number of the LMIH occupants could already be residents of Newton before they move in. In that case, very little new costs for services would be generated[2], particularly for education, since the families would simply have shifted from one part of the City to another. It is possible, of course, that the housing these families would vacate would be re-occupied by non-Newton residents, thus generating new costs to the City, but this is by no means inevitable. In general, to the extent that the LMIH would be occupied by families who were previously residents of the City, fewer new service costs would be incurred.

Another condition we have assumed is that all of the operating costs for schools - with the exception of Chapter 70 state aid - are carried by the municipality. While that is true for the year we have considered, methods of financing these costs may change so that more of the educational load is eventually

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[1]See section on local need in "The Newton Community Development Program."

[2]By the same token, extra revenues would also be reduced if the occupants of the LMIH were previous residents of Newton. State aid to schools would be reduced because of fewer "new" students and lower operating costs; the property tax revenues generated by retail spending would not be increased at all assuming expenditure patterns before and after LMIH occupancy are identical; and the extra property tax revenues would only be "extra" to the extent that they are higher than the revenues produced by the housing previously occupied by the LMIH residents. However, despite the reduction in marginal revenues, the reduction in marginal costs - particularly the costs for school services - would probably compensate for the revenue loss.

carried by the state. If that will be the case, communities that build LMIH will be subject to a lighter burden. Furthermore, there is the possibility that particular incentives will be provided to those municipalities that choose to build LMIH. The state or federal government, for example, may carry that portion of the cost that the housing itself cannot cover. Or a system of property value insurance may be implemented. With the possibility of fiscal reform, then, fiscal barriers that now inhibit LMIH may in the future be removed.

In sum, we found the fiscal impact of the LMIH to be minimal: expenditures would increase by less than 1% and "subsidizing" the housing would cost 20¢ per person. We found the impact to be minimal even though our assumptions were weighted against the LMIH: we assumed the City would build classrooms and thus create a deficit; we assumed the LMI occupants would be new to the City and thus create "new" costs; and we assumed no fiscal incentives would be given to Newton- which indeed was the case in 1970. The fiscal argument against LMIH in the suburbs - at least for the NCDF housing in Newton - was thus undermined. However, the fiscal barrier to LMIH is simply one among many; although solutions should be sought for its removal, it is clear that other barriers remain. And these, since they relate to perceptions of class and race may in fact be the toughest to eliminate.

APPENDIX

FIGURE 1

LOCATION OF SITES WITHIN NEWTON

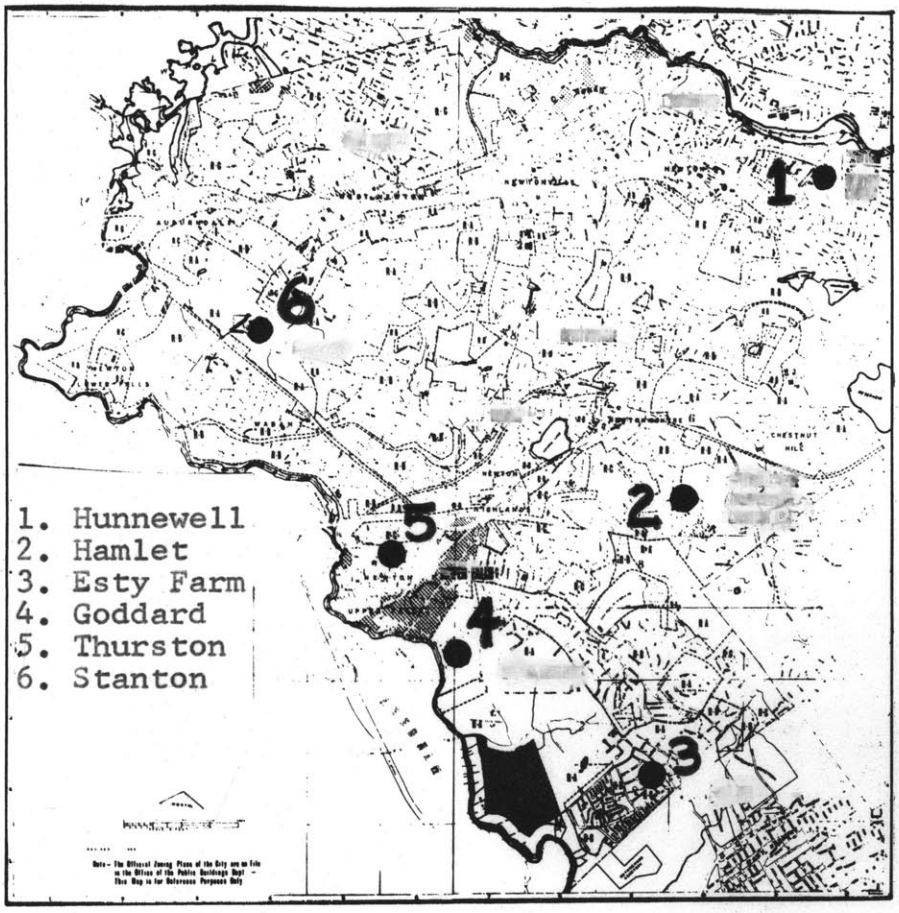
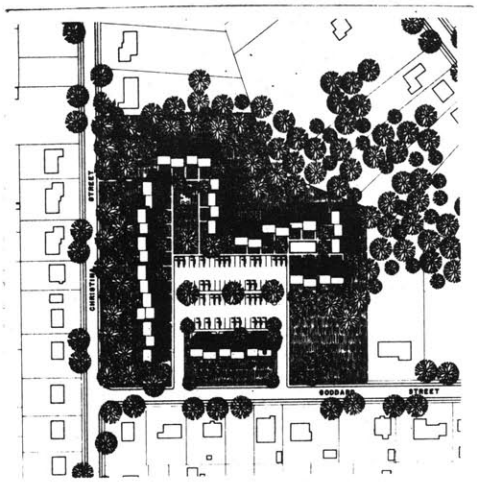


FIGURE 2

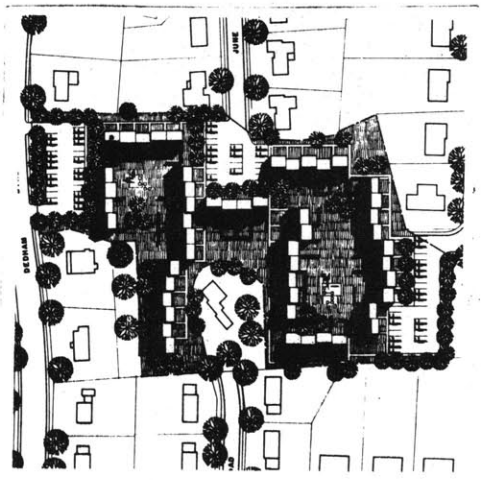
LMIH SITE PLANS

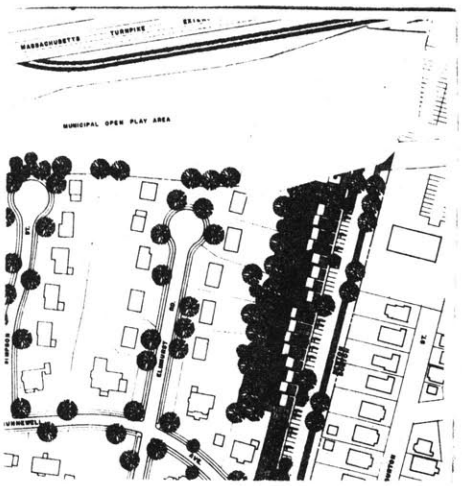
Thurston



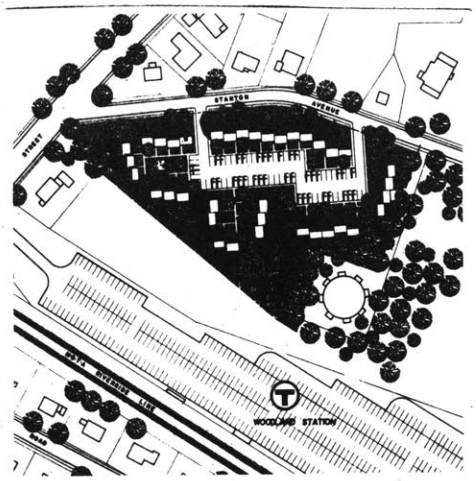
Goddard

Esty Farm





Hunnewell



Stanton

Hamlet

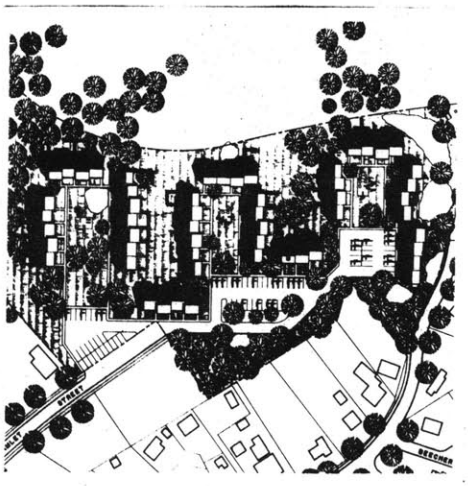


TABLE 35

INCOME LIMITS UNDER SECTION 236 OF THE NATIONAL HOUSING ACT

Family Size	FHA Sec. 236 (Net) Income Limits*	Gross Income Limits**	Possible Higher (Net) Income Limits***	Possible Higher Gross Income Limits****
1	5265	5500	6200	6500
2	5940	6300	7500	7900
3	6480	7100	8850	9600
4	7020	8000	8850	9900
5	7560	8900	10,200	11,700
6	8100	9800	10,200	12,000
7	8640	10,700	11,500	13,700
8	8640	11,000	11,500	14,000

*based on 135% of Newton Housing Authority (net) income limits

Families are eligible for 236 housing if they fall within these limits after the following deductions from gross income:

1. $300 for each minor.
2. 5% for unusual income (social security and withholding).
3. All, or part, of overtime pay which will be discontinued.
4. Departure of a secondary wage earner.
5. Unemployment Compensation which does not occur regularly.

**calculated by adding to FHA 236 limits $300 for each minor and 5% for social security.

***based on 90% of 221 (d) (3) (predecessor of 236) limits also established by FHA.

****calculated by adding to 90% of the 221 (d) (3) limits $300 for each minor and 5% for social security.

Note: NCDF expected the "Possible Higher Income Limits" to be federally approved by the time the project was completed.

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Commissioner of Water Department, Newton Department of Public Works. October 10, 1972.

Director of Department of Public Works, Newton. July 11, 1972.

Director of Research and Evaluation, Newton Public Schools. June 12, 1972.

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Member, Board of Assessors, Newton Assessing Department. August 7, 1972.

Signal Maintenance Foreman, Newton. August 4, 1972.