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- FAIR SHARE ANALYSIS FOR BERNARDS TOWNSHIP

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FAIR SHARE ANALYSIS

FOR

BERNARDS TOWNSHIP

LOW AND MODERATE INCOME HOUSING

Prepared by:

William W. Allen
Township Committee
Planning Board

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Fair Share Analysis for Bernards Township
Low and Moderate Income Housing

1. Introduction

Bernards Township enacted Ordinance 385 on May 18, 1976. This zoning ordinance made provision for 354 dwelling units for households of low and moderate income and 177 units for market income. 354 was the estimate of the Bernards fair share which followed a preliminary analysis in April. This present analysis attempts to refine the computations and to incorporate some additional principles. The result is a new fair share estimate of 350 low and moderate income housing units. Though there has been some collaboration with others, primary responsibility for this analysis and the views expressed rests with the author.

2. Summary of Fair Share Computation

2.1. This analysis deals with the Bernards Township fair share of "low and moderate income housing", or LAMIH. It does not treat the question of housing for middle income or other households.

2.2. Zoning is for new dwelling units. A ratio of 3.16 persons per dwelling unit is used here. This has been derived from 1970 census data presented by C. K. Agle.

2.3. Only a fraction of new dwelling units are for low and moderate income households. 25.8% is used here. It has been derived from 1970 census data for the Bernards region.

2.4. Our region is not defined in purely geographical terms. Rather, it rests on the concept of commutershed.

The principal assumption is that there is a relationship between the place where one works and that where one lives. Some forces tend to decrease commuting distance, while others tend to increase it. There is a predictable pattern of residential sites around an employment site. This pattern is described by a mathematical model called a "job oriented residential distribution", or JORD.

2.5. Present need is derived from a Department of Community Affairs analysis based on 1970 census data. It results in a LAMIH fair share debit or obligation of 90.1 housing units.

2.6. Future need is based on projections of population, and these in turn rest on projections of employment growth. These are derived from New Jersey data on "covered employment". The average annual population growth for the state is 1.16% by this method for the 1976-1982 period.

2.7. The LAMIH fair share debit for this future need is 378.1 housing units.

2.8. Bernards will provide housing for senior citizens via the Ridge Oak project. This will serve as a credit equivalent to 117.7 LAMIH units.

2.9. The resultant net balance for which Bernards should zone is 350 LAMIH units.

3. Mandate

"We conclude that every such (developing) municipality must, by its land use regulations, presumptively

make realistically possible an appropriate variety and choice of housing ... at least to the extent of the municipality's fair share of the present and prospective regional need therefor." (Justice Hall in Mount Laurel, Ref. A)

This is our mandate. It contains several independent requirements.

3.1. Developing municipality. A term used to describe municipalities of "sizeable land area outside the central cities and older built-up suburbs ... which ... have substantially shed rural characteristics ... are not completely developed and remain in the path of inevitable residential, commercial and industrial demand and growth." (Ref. A) The term probably applies to our municipal neighbors. We in Bernards have conceded that it applies to us.

3.2. Zoning. Our municipal responsibility is to establish "land use regulations", principally zoning, which are suitable for the needed housing. It is not to finance land purchase or home construction. Other private or public agencies must do this.

3.3. Variety and choice of housing. Ord. 385 and this analysis deal with low and moderate income housing (LAMIH), that is, housing which is suitable for households near the low end of the income spectrum. "Appropriate variety" suggests that housing must be provided for which meets the requirements over the entire income spectrum. Further work must be done to determine our degree of compliance and any additional obligations for middle and other incomes.

3.4. Regional need. In this study I have defined region in terms of a model based on probable home-to-work travel distances. This is the "job oriented residential distribution", or JORD, described in Ref. B. The commuting distance concept is most reasonable for those households which contain one or more job holders or persons seeking employment. It is also reasonable for households of those who are now retired and wish to remain in communities where they lived during their working years. A small proportion of the population fits none of these categories but these people must be housed somewhere. Since no superior model comes to mind, these needs are also accommodated here via the JORD model.

In summary, housing needs for the entire population are dealt with via the JORD commuting model. This includes the large majority who are linked to the job market and the small minority who are not.

3.5. Present need. The N.J.D.C.A. has estimated 1970 housing needs. (See Ref. F) The analytical method is indirect and somewhat suspect. However, I have seen no better or more current study and have used the DCA study as the basis for the "present need", that is, the 1976 need.

3.6. Prospective need. Future need for the period from 1976 to 1982 has been estimated by projecting county trends of covered employment from the 1970-1974 period.

3.7. Past need. Some dwellings may be in poor condition and some areas too congested, and these conditions may have been aggravated by zoning practices which are now deemed wrong. However, everyone lives somewhere already, and there is no mandate in Mount Laurel to provide for massive population shifts which will somehow redress alleged past sins.
To the degree that past housing needs are still reflected in present needs, then these are accommodated in this analysis. Otherwise, in determining need there is no backward look.

3.8. "Fair" share. My dictionary defines "fair" as "showing no partiality; just; upright; according to rules, principles ..." I believe the computation of the Bernards LAMIH share meets these criteria.
Except for the data which supports the JORD model, the analysis rests on official state and federal data. It proceeds mechanically. Judgemental factors regarding Bernards, which might be considered self-serving, do not play a substantial role. A similar fair share computation could be made for any other municipality in the region.

3.9. Quotas and land use planning. There is no suggestion here that fair shares which are computed from the JORD model and then incorporated into each municipality's land use regulations, represent good land use planning. They do not. These fair shares represent a pure quota system. This is regional sharing, not regional planning. It is necessary at this time because the

mechanism is not now in place which can impose planning principles on the region.

Regional planning with teeth in it, that is, regional zoning, will probably come. In fact, the gradual awakening to the implications of a pure quota system will probably stimulate the political process to make it come. For now a quota system based on a formula approach is appropriate. Later, when planning principles enter the equation, there will be some shifting of shares. Share computed in a simpler manner now, can serve then as the basis for the bookkeeping.

The present simpler approach is also practical. Bernards has the resources to develop a fair share formula and this analysis is an example. It does not have the resources to develop a regional plan. That requires information for every municipality in the region, not just for Bernards.

Regional zoning decisions will require a weighing of planning information in the same scale with other priorities. The political process will influence the final product. Bernards cannot impose its own views on the region. Of course, Bernards should participate in the political process which leads to regional zoning decisions.

Quota systems are used elsewhere. In the schools to establish racial balance, and in employment via affirmative action programs to establish better balance with regard to race and sex. These are not

perfect, but they do constitute some forward movement in areas where there is no general consensus for a more sophisticated treatment.

4. Job Oriented Residential Distribution, JORD

Where a person lives is a function of many factors - housing cost and quality and availability, family ties, his income and life style - but certainly important are the location of his job and the burdens of home-to-work travel. A place of residence is related to a place of work, and, other things being equal, there is a tendency to keep the daily commute short rather than long.

The term "commutershed" has been coined to describe the region in which people live who work at a particular employment site. This is a valuable concept. However, we also need a quantitative method for determining the region. It helps to give names to things, so define the manner in which employee residences are distributed throughout the commutershed as a "job oriented residential distribution", or more simply, JORD. (This concept was first described in Ref. B and the empirical and theoretical foundations were presented there. Only the conclusions and application are included here.)

The following expression is basic in the JORD model.

(1) $$F = \frac{1}{\left(R\right)^{E}_{B}}$$ (R is raised to the exponent E, and this quantity serves as the exponent of B.)

F is the fraction of employee residences which fall outside a circle of radius R.

E is an empirically derived constant equal to 1.4.
B is a constant for a particular employee distribution or commutershed.
Define R50 as the median commute or the radius of the circle which encompasses 50% of the residences. Then

(2) $$0.5 = \frac{1}{B\left(R50^{1.4}\right)}$$

EQ(2) can be solved for B and this value of B used to determine F for other values of R.
In this analysis R50 = 10.0 miles.

Note that R is the commuting distance "as the crow flies", not the distance actually traveled by road.

Since (EQ(1) gives the fraction of job oriented residential sites outside, or inside, a circle of radius R, it can also be used to estimate the fraction of sites in a ring or the fraction of sites per square mile in a ring. A more direct route is to convert EQ(1) to a probability density function and then to differentiate with respect to R.
EQ(3) is the result.

(3) $$D = \left(\frac{0.7}{PI}\right)\left(LOGe(B)\right)\left(\frac{1}{R^{0.6}}\right)\left(\frac{1}{B\left(R^{1.4}\right)}\right)$$

The above seems somewhat intimidating but need not cause concern. I have used a computer to generate tables - analogous to tables of logarithms or square roots - and one need only refer to them to find D as a funtion of R.

CHART (1) presents plots of F and D from EQ(1) and (3) for the case of R50 equal to 10.0 miles. (1000 D is plotted.) D is a probability density or likelihood that a person will live in a particular square mile of territory if he works at a site R miles away. In the real world a person lives at a specific site; he is not spread around. If we multiply D by 1000 then the result is the number of persons from a site employing 1000 persons who can be expected to live in a particular square mile at a distance of R miles.

Consider two examples.

Bridgewater is 7.0 miles from Bernards at the township centers.

With R50 = 10.0

R = 7.0

then D = 0.001256

and 1000 D = 1.256

This means that on the average we can expect 1.256 residents per square mile in Bernards for every 1000 persons who work in Bridgewater. Since the Bernards area is 23.5 square miles then the Bernards residents who work in Bridgewater can be expected to be

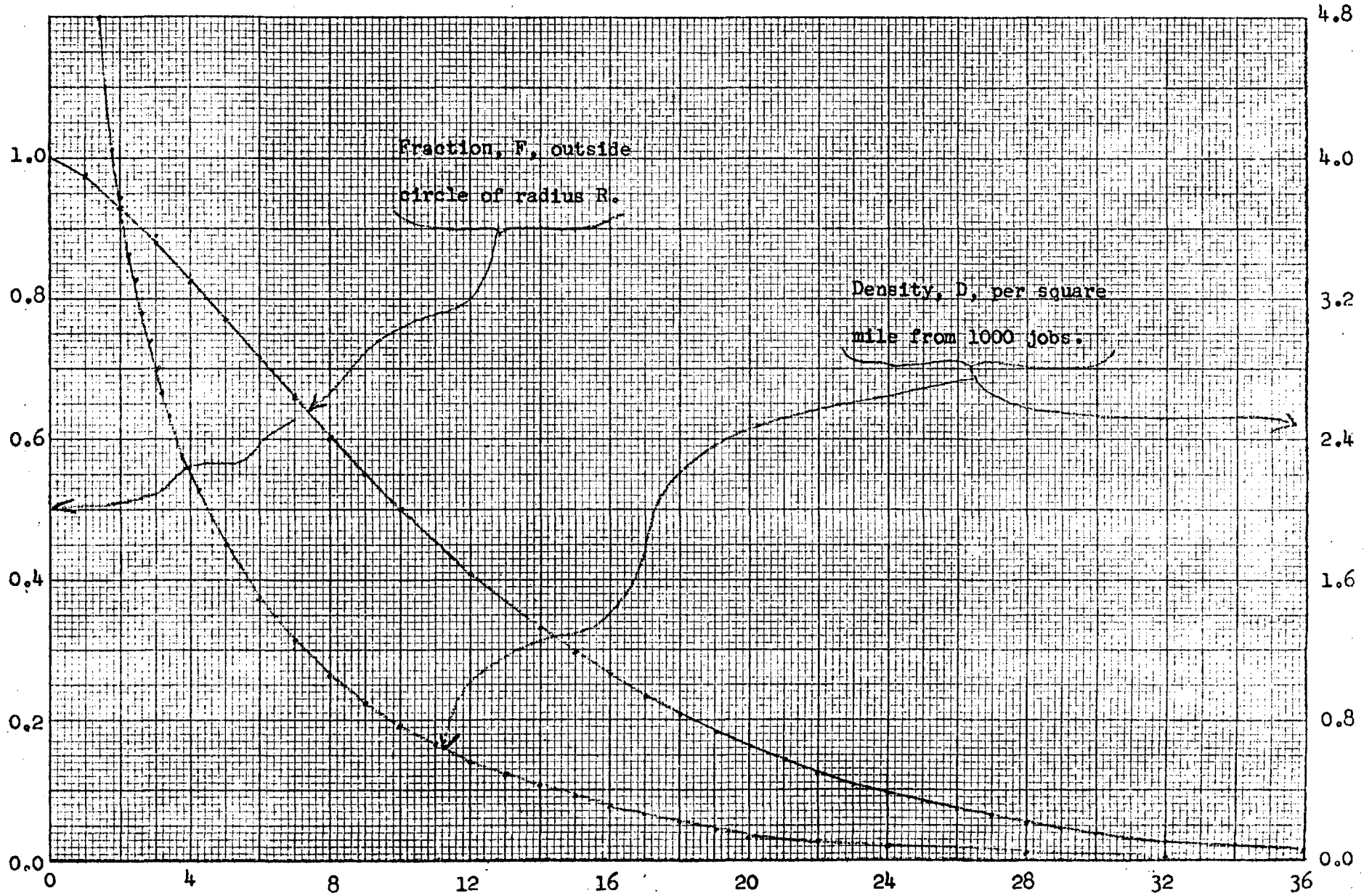
29.5 = 23.5 X 1.256

for every 1000 Bridgewater jobs.

On the other hand Linden in Union County is 16.4 miles from Bernards. The corresponding value of D is 0.000287. We can expect only 6.7 persons to live in Bernards from each 1000 Linden jobs. The distance is more than double (234%) and the residential impact is less than one quarter (23%) that of Bridgewater.

JORD, Job Oriented Residential Distribution for R50 = 10 Miles

CHART 1



The concept of diminished impact with increased distance is intuitively obvious. The value of the specific JORD model for fair share computations is that it provides the ability to assign population densities to various parts of a commutershed. We can estimate how many holders of Bridgewater jobs can be expected to live in Bernards. Similarly for Linden or anywhere else. By summing over all communities around Bernards we can develop a total expectation for Bernards. If our zoning accommodates this number then we have provided for our fair share.

In this analysis I sum over six counties - Essex, Hunterdon, Middlesex, Morris, Somerset, and Union - for a total of 154 municipalities. Given more time I would include Mercer, Sussex, and Warren as well because each has a portion within reasonable commuting range of Bernards. Since these western counties have relatively less employment than those to the east, their absence from the computation tends to increase the influence of the eastern counties which are included and which have greater employment.

5. JORD Mathematics

Certain approximations and simplifications are necessary in applying the JORD model. These are described in this section.

Consider Bernards as a job site and the region around it as a commutershed. Since D is a probability density then an integration over the entire region should give unity as the result, or

(4) $\int_A DdA = 1$

where A is the area of the region. If there are N municipalities in the region with areas of Ai, then

(5) $\sum_{i=1}^{N} \int_{Ai} DdA = 1$

For any municipality there is some central point such that

(6) $\int_{Ai} DdA = DDi \times Ai$

where DDi is a function of RRi and RRi is the distance from Bernards to the central point.

The EQ(5) becomes

(7) $\sum_{i=1}^{N} DDi \times Ai = 1$

This is much easier to deal with if we can first locate the municipal centers or some good approximations to them.

Similar simplifications are made in other branches of science. In mechanics one may consider all mass to be concentrated at a point rather than distributed throughout a body. In optics one may consider that light originates from a point rather than from an area. The validity of any such approximation rests on the usefulness of the results.

One appealing choice for the center of a municipality is the geographic center. This is analogous to a center of gravity. Consider a jigsaw puzzle with

one piece for each municipality. If one places a pin under the geographic center of one piece then the piece will balance. Geographic centers are objective and do not change with time. Unfortunately, data for these was not found.

The Tri-State Regional Planning Commission has established coordinates for population centroids, that is, centers of gravity for population, for each municipality based on the 1970 census. I use these centers in this analysis.

By using these approximations EQ(7) may not hold, and in its place we have

(8) $$\sum_{i=1}^{N} Di \times Ai = QP = 1-ERROR$$

where QP is the cumulative probability, and ERROR is the deviation between QP and unity. We want ERROR to be small.

ERROR exists because of the imperfect choices for municipal centers, and because the region chosen is not large enough. In any case, we can adjust or "normalize" the final result by dividing any summation over the region by QP. More on this later.

If Bernards contains employment equal to E, and we assume QP equal to one, then

(9) $$E \times \sum_{i=1}^{N} Di \times Ai = E = \sum_{i=1}^{N} E \times Di \times Ai$$

E x Di x Ai is the expected number of persons who reside in i and work in Bernards.

In the example above consider Bernards, the employment location, as the "donor", and municipality i, the residence location, as the "acceptor". (The terms donor and acceptor are borrowed from solid state technology.) Each municipality may be a donor as well as an acceptor. Let j be the suffix for donors and i that for acceptors.

Then throughout the region

$$\sum_{j=1}^{N} Ej = \sum_{j=1}^{N} Ej \sum_{i=1}^{N} Dij \times Ai = \sum_{j=1}^{N} \sum_{i=1}^{N} Ej \times Dij \times Ai$$

$$= \sum_{i=1}^{N} \sum_{j=1}^{N} Ej \times Dij \times Ai = \sum_{i=1}^{N} Ai \sum_{j=1}^{N} Ej \times Dij$$

where Dij is the density value for Rij, which is the distance between municipalities i and j. Restating the above

$$(10) \quad \sum_{j=1}^{N} Ej \sum_{i=1}^{N} Dij \times Ai = \sum_{i=1}^{N} Ai \sum_{j=1}^{N} Ej \times Dij$$

This proves that one may first sum over all acceptors from one donor and then sum over all donors (left side of EQ(10)), or may first sum over all donors to one acceptor and then sum over all acceptors (right side of EQ(10)). Either way all employment is accounted for.

The JORD model describes the impact on acceptors from a single donor. EQ(10) demonstrates that it

can be turned inside out to determine the impact on one acceptor from many donors. This is the version we need to determine the impact on Bernards of regional employment.

Now that EQ(10) has been "proved" we must concede that it is only true in the ideal case. Define the "edge" of the Bernards region as the ring beyond which the donors have negligible impact on Bernards, a ring of 20 miles, for example. Then a donor just inside this ring will have its own region extend another 20 miles. For EQ(10) to hold, the summations must extend over a circle of 40 miles.

New Jersey does not extend without limit. The Long Branch region has no acceptors to the east, and those to the west would have to double their quota. Some adjustments might have to be made at the New York and Pennsylvania borders. The main value of EQ(10) is to demonstrate a concept. Since Bernards is centrally located, EQ(10) is probably reasonably true. The final result can always be adjusted by the QP factor of EQ(8).

6. Median Commute, Choice of Ten Miles

The principal data supporting the JORD model was residence data for employees of RCA in Bridgewater. (See Ref. B) The median commute, or R50, was 10.2 miles for the total of 1935 employees. There was also some evidence that this median value would be less if population density increased. Population density near Bernards Township is less than that for

Bridgewater, so an R50 value less than Bridgewater would not seem appropriate.

Our planner, Mr. C. K. Agle, has reported that independent studies of his in the fifties disclosed a median commute of about 10 miles for the Somerville area. Therefore, a value for R50 of 10 miles is used in the present analysis.

For the Bernards region, a larger value for R50 would tend to assign greater weight to the distant municipalities, like Linden. A smaller value would tend to assign greater weight to the nearby ones, like Bridgewater, and to Bernards itself.

7. Basic Data

7.1. Covered employment. The N.J. Department of Labor and Industry keeps data on "covered employment", that is, employment which is covered by the N.J. Unemployment Compensation Law. The report entitled "1974 Covered Employment Trends in New Jersey" and published in October 1975 is the basis for this analysis. (Ref. C) It provides employment data for each municipality and each county in the state. Pertinent data from this source is included in Attachments 1 and 3 of the present report.

All covered jobs which are identified by municipality are included in this analysis. The state report also includes a small number of "undistributed" jobs, that is, jobs which are not assigned to specific municipalities. Since the employment data is used here primarily to define the Bernards region,

the undistributed jobs are of no value, and they are not used here. For this reason state totals included here are slightly less than totals published elsewhere.

The effective date for the data is September 1974. 1975 data by municipality was not available when this analysis was made.

For this analysis the Bernards region is derived from an analysis of six counties - Essex, Hunterdon, Middlesex, Morris, Somerset, and Union. Given more time, Mercer, Sussex, and Warren would also be included.

Covered employment for each municipality in the six-county region, 154 in all, is presented in Attachment 1, Column E, or ATT(1) COL(E). Covered employment by county for the whole state is presented in ATT(3) for 1970 and 1974.

7.2. Physical data. The area of each municipality is presented in ATT(1) COL(A). The distance to the "center" of the municipality (population centroid as determined by Tri-State Regional Planning Commission) from that of Bernards is given in ATT(1) COL(R). The density value per EQ(3) is given in ATT(1) COL(D).

7.3. Dilapidated housing. The N.J. DCA published a report (circa 1974) entitled "An Analysis of Low and Moderate Income Housing Need in New Jersey." (Ref. F)

This report rests on 1970 census and other data and

states "it employs the most accurate Census data and methods available". For each municipality it presents three components of "physical housing need" and two of "financial housing need". The Bernards fair share analysis points towards municipal land use regulations, and more specifically towards zoning for new housing units. Financial need is established in the DCA analysis through an excessive rent burden in terms of household income. The remedy for this is financial - higher earnings or rent subsidies, for example - not zoning. Therefore, units based on financial housing need are not included in the present fair share analysis.

One of the components of physical housing need in the DCA report is "deteriorated" housing. The need here is to repair and renovate, not to tear down and start from scratch. Again zoning is not the remedy, and this component is not included in the present analysis.

One component of physical housing need is "dilapidated" housing. Here the remedy is to tear down and start over and zoning can play a role. This component is included in the present analysis.

The third component of physical need is "lacking plumbing". By a census quirk this class was stripped away before the deteriorated-dilapidated classifications were made. The lacking-plumbing housing units can be deteriorated, dilapidated, or neither of these. Following a verbal discussion between the

Township Administrator, Fred Conley, and a DCA representative the following treatment is used. The lacking-plumbing component is assumed to be either deteriorated or dilapidated, and the proportion of each is the same as that for deteriorated and dilapidated in the given municipality. Consider Bridgewater as an example.

Class	Housing Units
Deteriorated	324
Dilapidated	180
Lacking plumbing	92
Adjusted dilapidated	213

where

$$213 = 180 + 180(92)/(324 + 180)$$

This adjusted dilapidated estimate is given for each municipality in ATT(1) COL(H).

Computed this way, the dilapidated estimate and its fair share impact tend to be inflated.

The DCA report speaks mainly of low and moderate income households and their housing needs. It is not clear whether there are also additional dilapidated housing units which are associated with households of higher income and not included in the report. If this is the case then the dilapidated estimate and its fair share impact are understated.

8. JORD Summations

The computation method involves the assignment of one component of the share to each municipality in the region, computing that component for each, and then

summing over all municipalities to derive the total share.

In Section 5, JORD Mathematics, it is demonstrated that the impact of Bernards employment on some other municipality, say Bridgewater, is given by

$$E \times Di \times Ai$$

where E is the Bernards employment, Di the density value from EQ(3) for a value of Ri equal to the intermunicipal distance, Ai the area of Bridgewater, and i a subscript denoting Bridgewater as one of many in the Bernards region. In this case Bernards is the donor, the giver or generator of the jobs, and Bridgewater is the acceptor, the receiver of the residents.

To account for the entire region it is necessary to sum over all 154 municipalities.

This is represented by

$$(11) \quad \sum_{i=1}^{154} E \times Di \times Ai = E \times \sum_{i=1}^{154} Di \times Ai = E \times QP$$

where $\sum_{i=1}^{154} Di \times Ai$ = D1 x A1 for municipality #1
+ D2 x A2 for municipality #2
+ " " " "
+ D154 x A154 " " #154
= QP

The function QP was introduced in EQ(8). This is the fraction of Bernards employment which the summation accounts for. (QP stands for cumulative probability.) Since we want to account for all of it, then QP should equal unity.

The summation of EQ(11) can be broken down by county and then these subtotals added. These results are presented in ATT(2). Here we see in COL(I) LINE(9) that QP = 0.91729. This indicates that the summation over the six counties only accounts for 92%. Inclusion of Mercer, Sussex, and Warren would probably correct most of this discrepancy, though some error is introduced by the use of the population centroid as the municipal center. (See Section 5)

It is possible to adjust or "normalize" this data by dividing all subsequent summations by 0.91729, and this is what is done here.

Analogous to the Bridgewater share for Bernards employment, where Bernards is the donor and Bridgewater is the acceptor, is the Bernards share for Bridgewater employment, where Bridgewater is the donor and Bernards the acceptor.

The summation element is given by

$$Ei \times Di \times A \qquad (A = 23.5)$$

where Ei is Bridgewater employment, Di is the density function, and A is the area of Bernards. The total from all donors is

$$(12) \quad \sum_{i=1}^{154} Ei \times Di \times A = A \times \sum_{i=1}^{154} Di \times Ei$$

This is the total impact on Bernards of all the 154 municipalities or donors in the six-county Bernards region. These sums are given by county in ATT(2) COL(K), and then normalized (divided by 0.91729) and given in COL(M).

The adjusted total for the six counties, ATT(2) COL(M) LINE(9), is 9623.47 and this can be interpreted as the probable number of persons who would hold jobs in the region and live in Bernards, or the quota of residents which would be assigned to Bernards, if the JORD model were followed exactly. ATT(1) PAGE(10) gives total six-county jobs of 942,904. The Bernards quota works out to

1.02% = (9623.47)/(942,904)

The Bernards land area is 23.5 square miles and this equals 1.34% = (23.5)/(1758.4)
of the six-county land area.

Thus, the proportional Bernards resident quota is of the same order of magnitude as its proportion of land area. The resident quota is actually less, but this is reasonable because maximum job concentration is considerably to the east and the JORD formula takes this into account.

Anticipating a later result, the 9623 Bernards resident quota of employed persons works out to a municipal population of 31,000, about double the present number. Clearly, the great planner in the sky and his assistants down here have used something other than the JORD model to determine where people will live. And we should all be thankful for this. A strict application of the JORD formula would create a nearly homogeneous region. As stressed earlier, the JORD model is a sharing tool, not a planning tool.

The dilapidated housing component is summed and

adjusted in the same manner as for employment. These results appear in ATT(2) COL(J) and COL(L).

9. Employment and Population Growth

Future housing need rests on population growth. There is general agreement that population growth follows job growth. For example, in a 1973 publication of the Rutgers Center for Urban Policy Research entitled Modeling State Growth: New Jersey 1980 (Ref. G), the authors state: "The basic force for change in the model is job growth - the number of jobs directly establishes the characteristics and numbers of both workers and households."

The function of the JORD model is to assign responsibility for the housing for the population increment according to a scheme which takes into account the locations of the new jobs and the probable locations of the new residences. The JORD model is the link between the locations of job growth and the locations of population and housing growth.

Economic analysis can aid in job projection and Ref. G proceeds this way. However, there is no such analysis available for use in this study which encompasses the job growth years of the early seventies. Therefore, a simple projection of the experience from 1970 to 1974 is made and carried through to 1982. The N.J. Dept. of Labor and Industry publishes each year an estimated population for July of that year. (See Ref. D) The 1975 report gives summary data back to 1970. Since we are using covered employment

to project population the Ref. D data can be used to establish the ratio between population and this employment.

ATT(4) presents totals for New Jersey population data per Ref. D. COL(B) entitled "FACTOR" is derived by dividing each total in COL(A) by the total for 1974 in COL(A) LINE(11). Similarly for covered employment, COL(C) is the yearly total (minus the "undistributed") and COL(D) is the factored value based on 1974. By factoring population and employment by their 1974 bases, it is possible to plot them on a common axis, and this is done in CHART(2) which follows.

Examination of CHART(2) discloses that the rate of growth in covered employment prior to 1974 exceeds that for population. The proportion of covered jobs in the population has increased. There are several possible explanations.

(1) The proportion of jobs which are covered by unemployment compensation has increased through legislative action or through a change in job mix.

(2) Participation in the labor force has increased. That is, there are more working mothers, fewer children, etc.

(3) There has been a reduction in net out-commutations.

I make no attempt to assess these factors quantitatively, nor to project them. However, I do use their demonstrated aggregate impact to adjust 1970 employment.

Ref. E states: "...population projections cannot be precise and should not be regarded as predictions. They can, however, be used in short or long-term planning in both the public and private sectors..." With that admonishment, let us proceed to project, not predict.

The population curve from 1970 to 1975 shows a slowing of growth relative to the 1960-1970 period. (Annual figures were not available for this decade). CHART(2) is plotted on "linear paper" rather than "semi-log paper", and with this a constant growth rate would produce an upward bending curve. Here the curve bends toward the horizontal, suggesting a material change from the earlier pattern. Therefore, it is reasonable to base the 1982 projection on the more recent experience rather than the earlier one. Since 1974 is the latest data for employment, the 1970-1974 period is used.

ATT(4) COL(E) gives the ratio of population to employment for 1970 and 1974. By using the ratio of these factors, the 1970 data for covered employment is inflated or "bumped up" to a 1974 equivalent condition, and this is done for each county separately. These results are given in ATT(3). Then the adjusted 1970 employment figure is divided into the 1974 figure to determine the four year growth rate. This rate is then used to project employment for 1976 and 1982.

The 1976 and 1982 projections are given in ATT(3) along with the average projected annual growth

percentage and the total growth percentage from 1976 to 1982.

Consider Somerset County.

46498 = 1970 employment

50290 = 46498(3.5017)/(3.2377)

= 1970 employment adjusted

60490 = 1974 employment

4.72% = $\left[(60490)/(50289)\right]^{\frac{1}{4}} - 1.00$

= average growth from 1970 to 1974

66341 = $(60490)(1.0472)^2$

= projected 1976 employment

87516 = $(60490)(1.0472)^8$

= projected 1982 employment

21175 = (87516) - (66341)

= projected employment increase from 1976 to 1982

35.0% = (21175)/(60490)

= total % increase from 1976 to 1982 in terms of 1974 base

As with the JORD model, this job projection is a mechanical or formula technique, and it is valid to the degree that it gives reasonable and useful results. It leads to a population projection which we can call a "job oriented population projection" or JOPP. We need some means of evaluating it with regard to more sophisticated methods.

The N.J. Dept. of Labor and Industry published in 1975 a document entitled, "New Jersey Population Projections 1980-2020" (Ref. E). Commenting on the study, Ref. E states: "Four series have been developed

in order to give the user some latitude of choice. Each series is considered reasonably possible within the bounds of the assumptions and the data series used. In essence, these series present the highest and lowest levels that could reasonably occur, all things being equal." (Emphasis added.) These official state projections bracket and thus tend to validate the much more simplistic projections developed in the instant analysis (JOPP) which are based on job oriented population growth.

In brief, and quoting from the state study, the rationale for each series follows.

"Series I presents the lowest possible level of growth that could occur, assuming everything equal."

"Series II reflects a continuation of the current trend of population growth in the state for the period 1970 through 1974."

"Series III was developed using the long-term county trends as reported in all U.S. Censuses of Population from 1900 to 1970... The current economic downturn that has gripped the state was not taken into consideration because the last data element used was for July 1, 1970."

"Series IV... used the 1950/1974 and 1960/1974 Census data projected to the year 2020 and averaged."

Several adjustments were made including, "Consideration also was given to the revival of the state's major urban centers as employment generators." Series IV is the highest estimate.

Series I through IV for 1980 and 1985 are given in ATT(4) and plotted in CHART (2).

Total 1982 projected employment for N.J. is given in ATT(3) and again in ATT(4) COL(C) LINE(17). By multiplying this by the population-to-employment ratio in COL(E) we project 1982 population and this appears in COL(A) LINE(17). This is the JOPP projection. It is also plotted in CHART(2).

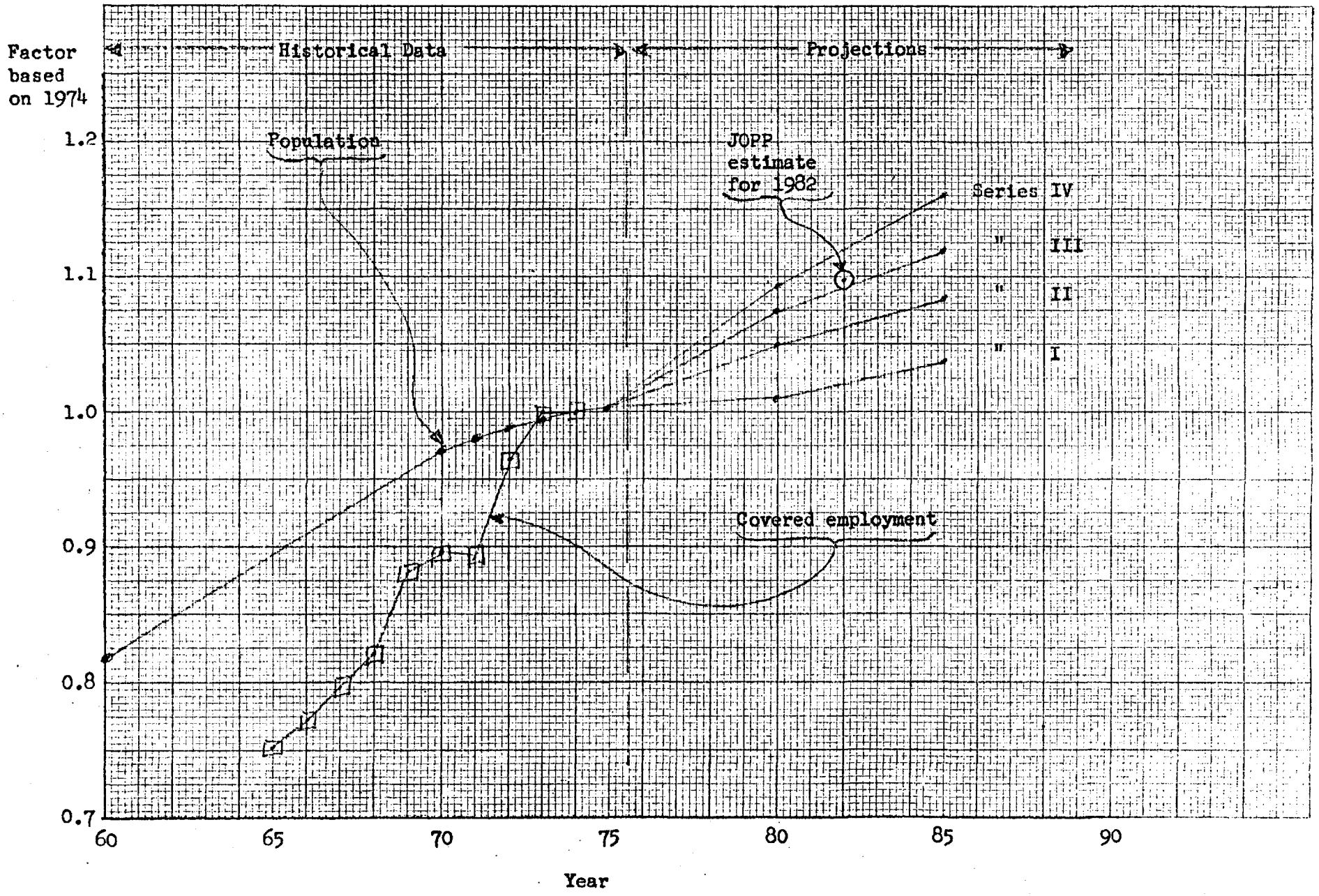
CHART(2) shows that the job oriented population projection of the instant analysis is slightly higher than the state Series III projection, suggesting that the JOPP technique tends to give a high estimate when applied over the entire state. To the degree that housing needs are dependent upon the JOPP result, these housing needs are also inflated.

Ref E contains projections for each county for each series and only the state totals have been presented here. One might argue, since the purpose of the present analysis is to estimate housing needs for people, that a more direct course would be to use the state population projections for the counties in the Bernards region rather than follow the job projection route. There are three major arguments for the JOPP technique.

(1) The JOPP projections are formula estimates and therefore meet the test of "fairness" in that they are "according to rules". On the other hand the narrative in Ref. E states

Total New Jersey Covered Employment and Population

CHART 2



that the state projections "give the user some latitude of choice". Any such "choice" could easily be branded as subjective and self-serving.

(2) Under the JOPP method, County job projections are used to develop numerical population projections. The probable residential locations are determined via the JORD model, and these are not confined to the county which generates the jobs. To the degree that the JORD model is fair then it produces an allocation of zoning responsibility which is also fair. On the other hand the state projections are based on analyses of past trends and other planning factors and not on any concept of fairness.

(3) State employment data is revised and published each year, as is population data. An analysis identical to the one presented here can be performed for any municipality in any year and its fair share brought up to date. In my view this is a major argument for the JOPP approach.

ATT(5) summarizes the job growth for each county in the Bernards region and the Bernards share. COL(M) is the share via the JORD analysis and ATT(2) COL(M) where Bernards is the acceptor. COL(N) is the 1976 to 1982 growth taken from ATT(3). COL (P) is COL(M) times COL(N), and it represents the incremental

Bernards share produced by the six-year growth. Essex and Union show negative growth and the other four counties show positive growth.

Special treatment is required for Bernards Township and the balance of Somerset County. AT&T with 3400 jobs and Mount Airy Associates with 941 will complete their projects during the six-year planning period of this analysis, and Bernards has an obligation to accommodate this local job growth in its fair share analysis. By EQ(1) and if one considers Bernards to be a 23.5 square mile circle, then the local share is for 10.674% or 463.36 jobs. This is given in COL(P) LINE(6). It represents a 308.5% increase over 1974.

The Somerset County six-year projected increase is 35.006%. Since a specific local computation has been made, resulting in a much larger increment, it is reasonable to adjust downwards the growth contribution of the remaining 20 municipalities in Somerset and avoid double counting. This adjustment is shown in ATT(5) NOTE(2). It follows from Somerset data presented in ATT(3) and Bernards 1974 data presented in ATT(1) PAGE(8).

Without this adjustment the total Somerset contribution to the Bernards share is 602.19 (ATT(5) COL(P) LINE(5)). With the adjustment the Bernards and other Somerset contributions are 909.82 (LINE(6) plus LINE(7)), an increase of 307.63.

The six-county total is a Bernards share of 1430.26 jobs.

No attempt has been made to project job growth for individual communities outside Bernards. The computational effort would be much greater and the added significance in doubt.

10. Six-Year Planning Period

The period of projected growth is 1976 to 1982, six years beyond the present. The planning horizon should be long enough to give a developer an opportunity to plan and implement a housing proposal and six years should be adequate for this purpose.

Projections become less reliable, as they extend further into the future. For housing purposes, the longer the growth period used to project need the greater that projected need will be, assuming that the growth trend is up. Without some timed-growth provision, zoning, which is enacted to satisfy a longer-term and more uncertain need, could result in excessive housing in the near term.

A municipality's fair share grows with time and is therefore a function of time. Early satisfaction of a long term need would oversubscribe the fair share over the near term.

Finally, regional planning and zoning will probably change the rules. There is no reason to make excessive commitments now.

Therefore, the planning period which is most fair to the municipality is a short one. The specific choice is somewhat arbitrary. Six years is selected here because the new Municipal Land Use Law endorses this planning period. In Section 76 of the act it states: "The governing body shall, at least every 6 years, provide for a general re-examination of its master plan and development regulations..."

11. Population vs. New Jobs

This analysis is directed towards a need for housing. We must first convert the estimate of new jobs to a population increment.

ATT(7) COL(T) gives the population growth in Bernards which is reflected by the Bernards share of job growth for each county. The conversion from jobs to people is made using the 3.2377 ratio for 1974 from ATT(4) COL(E).

By using a factor which relates total population to total covered jobs, all elements of the population are encompassed, including those who have no linkage to the job market, such as persons in institutions or retirement communities. If shares are developed this way throughout the state then the needs of the entire population are accommodated. The surplus of out-commuters (those who leave New Jersey at the start of the work day) over in-commuters is also accommodated. The projection of jobs and conversion to people by a fixed ratio is not invalidated if more jobs become covered, since the statistical increase in jobs would

be counterbalanced by a decrease in the ratio. However, if the labor force participation rate increases then the projection derived here will tend to overestimate real housing need.

The total resident impact on Bernards of regional job growth is 4630.74 people and this is given in ATT(7) COL(T) LINE(7).

12. Population vs. Dilapidated Housing

ATT(2) COL(L) gives the Bernards share for dilapidated housing in the counties. This data is restated in ATT(6) COL(Q). The 1970 census provides data on persons per household. (See Ref. H) This is listed by county in ATT(6) COL(R).

Consider Somerset County.

The Bernards share of dilapidated housing is 53.16 units. The census shows 3.4 persons per housing unit. On the premise that the dilapidated units house the average number of persons, then the dilapidated units reflect

$$180.74 = 53.16 \times 3.4$$

people who are housed in dilapidated units and who must be accommodated in the Bernards fair share for new housing. This computation is made for each county and presented in ATT(6) COL(S).

The total resident impact on Bernards of dilapidated housing in its region is 1103.15 and this is given in ATT(6) COL(S) LINE(7) and ATT(7).

13. New Housing Units vs. People

ATT(6) COL(R) shows that the average of persons per

household varies from 3.0 in Essex to 3.4 in Middlesex, Morris, and Somerset. Rather than try to select one of these or to develop some kind of average for the present analysis, I use another approach.

Our planner, C. K. Agle, has developed a table of dwelling sizes in terms of numbers of bedrooms, as a function of family sizes. These latter are derived from the 1970 census. This table is the basis for the mix of dwelling sizes in Ord. 347 which established the Planned Residential Neighborhood and in Ord. 385 which established the Balanced Residential Complex for low, moderate, and market income housing. It is reproduced in the 1975 adopted Master Plan for Bernards Township.

Since the ultimate goal of the present analysis is zoning for the mix of housing called for in the Agle table, then it is reasonable to assume that the average family size for which the housing mix was established will equal the average family size which will occupy the housing. This average is 3.16 persons per household. It is used to convert the estimate of those people who need housing into an estimate of needed housing units.

14. Percent of Low and Moderate Income Housing

Our mandate calls for an "appropriate variety and choice of housing" and this means housing for households which span the complete spectrum. However, the thrust of this analysis is to determine the Bernards fair share for households of low and moderate income.

The 1970 census provides data by county on household income. Households are grouped in income ranges but it is possible to interpolate and estimate a percentage which falls below any particular income. The median annual household income in the Newark SMSA (Standard Metropolitan Statistical Area) was $11,845 in 1970. (See Ref. H) According to the U.S. Dept. of Housing and Urban Development (HUD), which is the principal source of rent subsidies and, therefore, tends to make the rules, "low income" is defined as income up to 50% of the median and "moderate income" as that up to 80% of the median. (These classes have since been renamed as "very low income" and "lower income" but the definitions remain.) Both low and moderate income fall below 80% of median and this was $9476 for the Newark SMSA in 1970. Interpolating for this value in the 1970 census data leads to the fraction of low and moderate income households listed in ATT(7) COL(V).

Hunterdon lies in a different SMSA and had a slightly lower median income in 1970 of $11,336. Since the Hunterdon impact is very small this small difference is ignored.

The low and moderate proportion varies from 24.0% for Morris to 43.5% for Essex. What value is appropriate for the Bernards fair share computation? One could argue that the Somerset value of 25.0% is appropriate since the housing will be in Somerset and the households would be typical of those in Somerset.

This argument is weakened if it is suggested that the relative affluence of Somerset is the result of exclusionary zoning and true "fair sharing" would shift the distribution of incomes.

A fairer scheme is to develop a weighted average based on the contribution to the Bernards share from each donor county and the fraction of low and moderate income in that donor county.

ATT(7) lists a Bernards Resident Share via Housing in COL(S), the people which could expect to find homes in Bernards and who are now living in dilapidated housing in the Bernards six-county region - this is the present need -, and a Resident Share via Jobs in COL(T), the people which could expect to find homes in Bernards as a result of regional job growth - this is the future need. COL(U) is the sum of COL(S) and COL(T) and represents present and future need in terms of people who need housing.

Two counties have a negative impact, Essex and Union, due to a decline in jobs which has greater impact than dilapidated housing. It does not seem reasonable to include these in the weighting.

Weights are listed in COL(W) which are based on the contributions from the other four counties listed in COL(U). A weighted average of the values in COL(V) is then computed using the weights in COL(W) and the result is shown in COL(V) LINE(8).

The result is 25.8% low and moderate income households. This is the proportion which is used to determine

the Bernards fair share of low and moderate income housing.

Since there are potentially controversial elements in this estimate it is worthwhile to review the process by which the result is reached.

(1) 1970 census data is the basis of the household income estimate and that for dilapidated housing. More recent data would be used if it were available.

(2) This fair share analysis leads to zoning for new housing which is required by those who can be expected to seek housing in Bernards after moving from dilapidated housing in the Bernards region and by the families of those who fill new jobs in the region, and more specifically by the portion of these who are of low and moderate income.

Most new housing is occupied by relatively affluent families who are trading up from lower cost housing. The vacated units may be smaller or structurally simpler, older, in less desirable neighborhoods, etc. This statement is most true for families with children at home and less so with singles and couples who have not begun or who have completed the child rearing cycle. At any rate there is a continuous process of readjustment by which families occupy new or different housing units based on their individual needs and resources.

We can describe this process by the terms "trickling down", "trading up", "musical chairs", etc. However, the fact of the process and the results are clear. Those with higher income tend to occupy the new and more costly housing, and those of lower income tend to occupy the older and less costly.

Some may say this is not fair and one's opinion depends upon his basic social philosophy. But all must agree that this is a realistic assessment of what actually occurs.

(3) Though the assumption in Ref. F is that most occupants of dilapidated units are of low and moderate income, the argument in Section (2) above suggests that the remedy is for these families to move up the housing ladder but not necessarily all the way up to new housing. The remedy for a dilapidated housing unit is a new unit. It is probable that the dilapidated unit is now occupied by a low income family and that the new unit will be occupied by a higher income family. By the readjustment process, the former will find housing which is lower cost and probably less desirable than a new dwelling, but at least it will not be dilapidated.

It is also likely that the lower cost housing will be found in the older urban areas.

(4) Though families are not entirely mobile, and

ignoring for the moment the question of expansion in the number of households, the net addition of one new housing unit to the region will improve the housing opportunity for one low income family, and this will be true regardless of who occupies the new unit. Of course, this is an overly simple illustration which describes a tendency or statistical probability. The principle is most valid when there are large numbers of new units.

In an economy where the number of families is expanding faster than the number of new housing units, then those with the lowest income will be forced into the least desirable housing and their situation will deteriorate. However, if the supply of new housing more than keeps pace with the formation of new families then the situation for low income families will improve. The point here is that any addition to housing stock, which has the effect of increasing supply relative to demand, will improve the lot of low income families, regardless of the price of the new housing and the incomes of those who occupy it.

(5) Even though the addition of new housing in Bernards will initiate a chain of events which will result in a step upwards for some low income families, the data we now have is insufficient to predict where that low income

family will locate. We must make some rather arbitrary decision. That decision for this analysis is that the proportion of families, which will locate in Bernards and which will have low and moderate income, will be the same as the proportion of those families in the donor counties. These are the counties which currently have the dilapidated housing or will generate the jobs.

This technique probably exaggerates the number of low and moderate income families which will locate in Bernards. Though somewhat arbitrary it is at least according to rules and should be deemed fair by our neighbors in the region.

15. Ridge Oak Senior Citizens Project

Wheels are in motion to provide housing in Bernards for senior citizens via the Ridge Oak project. There will be 248 units with an estimated 1.5 persons per dwelling. (Data from Robert Boye, Pres. of Ridge Oak, Inc.) All rentals will be subsidized according to low and moderate income criteria. This project will be complete and occupied during the six year planning period and therefore can be used as a credit against our fair share obligations in this period.

Since the new zoning will average 3.16 persons per dwelling, the credit must be adjusted downwards for the fewer Ridge Oak persons per dwelling.

The credit in equivalent units is

$$117.7 = 248(1.5)/(3.16)$$

Since the fair share computation is based on a population statistic which encompasses all elements in the population, including senior citizens, it is reasonable to take credit for housing which satisfies needs for this element of the population. A similar argument for a credit can be made on the occasion of new low and moderate income housing provided by any agency or institution such as Bonnie Brae, Deaconry, or Lyons Hospital. I propose that we keep a tally of all LAMIH units provided by any source and use these to reduce the outstanding obligation.

16. LAMIH Balance Sheet

ATT(8) summarizes the fair share result. The housing and job components are taken from ATT(7) and factored by 3.16 persons per dwelling and 25.8% low and moderate income. The result is a net fair share of LAMIH for Bernards of 350 units and this is the number which must be provided for in our zoning at this time.

17. Periodic Review

Until such time as regional zoning is introduced or other agencies take control, Bernards must periodically review its fair share obligation for new housing and adjust its zoning accordingly. I propose that this be done each year using the most recent official job and population statistics, local data on housing units provided through all mechanisms since the enactment of Ord. 385, and any other pertinent data. A new six year obligation should be determined. It should

be adjusted for actual housing debits and credits incurred or realized during the prior year.

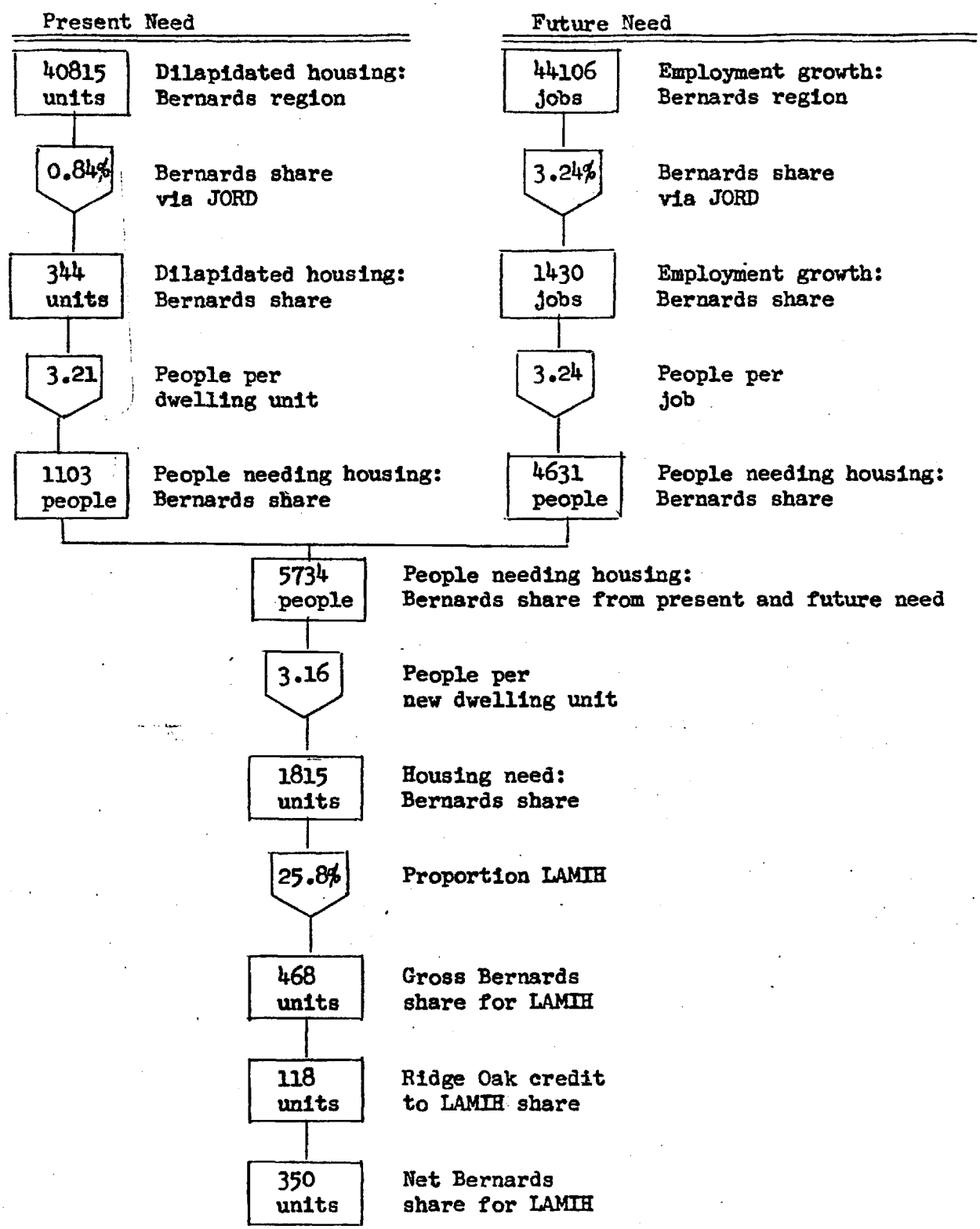
18. Note on Computations

Many digits are carried along in the above computations. This is not intended to suggest that the results are correspondingly precise or "significant" in the scientific sense. There are two reasons for not rounding. It is easier to follow a computational trail when the intermediate results are left unrounded. Rounding during a computation tends to introduce its own errors.

19. Schematic Summary of Analysis

The foregoing analytical steps are presented schematically in CHART(3). The chart does not delineate the precise computational steps, but rather shows the computational flow in conceptual terms.

SCHEMATIC SUMMARY OF BERNARDS FAIR SHARE ANALYSIS CHART 3.



Definitions: JORD - job oriented residential distribution

LAMIH - low and moderate income housing

Revised chart, WWA, 11-19-76

References.

A. Decision of N.J. Supreme Court in Southern Burlington County N.A.A.C.P et al. v. Township of Mount Laurel, March 1975

B. Mount Laurel: A Truly Regional Response, W. W. Allen, memo to Bernards Township Committee and Planning Board, September 1, 1975

C. 1974 Covered Employment Trends in New Jersey, N. J. Dept. of Labor and Industry, October 1975

D. Population Estimates for New Jersey, July 1975, N. J. Dept. of Labor and Industry, December 15, 1975

E. New Jersey Population Projections, 1980-2020, N. J. Dept. of Labor and Industry, 1975

F. An Analysis of Low-and-Moderation-Income Housing Need in New Jersey, N. J. Dept. of Community affairs, circa 1974

G. Modeling State Growth: New Jersey 1980, F. J. James, J. W. Hughes, Center for Urban Policy Research, Rutgers University, 1973

H. City and County Data, 1970 Census, U. S. Dept. of Commerce

ATTACHMENT 1, COUNTY ESSEX, PAGE 1

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
BELLEVILLE	3 30	22 09	0 117	0 432	11 278
BLOOMFIELD	5 40	21 04	0 140	0 630	16 503
CALDWELL	1 20	18 10	0 220	0 083	1 592
FAIRFIELD	10 40	20 47	0 151	0 063	12 210
CEDAR GROVE	4 50	20 57	0 149	0 079	3 314
E. ORANGE	4 00	18 87	0 194	2 492	20 027
ESSEX FELLS	1 30	17 54	0 242	0 000	0 196
GLENN RIDGE	1 30	20 17	0 158	0 058	0 699
IRVINGTON	2 80	17 44	0 246	1 052	12 230
LIVINGSTON	14 00	14 33	0 397	0 153	13 343
MAPLEWOOD	4 00	15 55	0 325	0 220	6 491
MILBURN	10 00	13 08	0 478	0 122	8 644
MONTCLAIR	6 20	20 45	0 154	1 080	10 050
NEWARK	24 14	19 53	0 177	12 391	160 879
N. CALDWELL	2 90	19 69	0 172	0 022	0 512
NUTLEY	3 40	22 81	0 105	0 317	12 368
ORANGE	2 20	17 85	0 231	1 091	10 705
ROSELAND	3 50	16 27	0 292	0 029	3 121
S. ORANGE	2 70	16 23	0 296	0 158	4 990
VERONA	2 80	19 32	0 183	0 124	2 313
W. CALDWELL	5 30	17 96	0 224	0 066	5 308
W. ORANGE	12 10	17 30	0 250	0 417	9 577

ATTACHMENT 1, COUNTY HUNTERDON, PAGE 2
1 OF 2

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
ALEXANDRIA	28 20	24 33	0052	0030	0035
BETHLEHEM	21 38	23 62	0092	0028	0085
BLOOMSBURY	100	27 08	0052	0006	0431
CALIFON	090	14 46	0385	0020	0301
CLINTON B.	134	18 41	0210	0018	0705
" T.	33 90	16 08	0301	0044	0683
DELEWARE	36 90	25 80	0064	0035	0072
E. AMWELL	27 80	21 30	0133	0043	0153
FLEMINGTON	130	22 68	0106	0051	6203
FRANKLIN	23 30	20 38	0154	0022	0178
FRENCHTOWN	110	27 75	0046	0024	0537
GLEN GARDNER	146	19 69	0172	0014	0157
HAMPTON	136	20 53	0151	0018	0086
HIGH BRIDGE	240	17 34	0250	0043	0351
HOLLAND	22 70	29 45	0035	0045	0249
KINGWOOD	35 60	27 18	0051	0035	0056
LAMBERTVILLE	110	29 21	0036	0099	1099
LEBANON B.	110	14 63	0379	0023	0671
" T.	32 00	17 19	0254	0056	0289
MILFORD	130	28 63	0040	0018	1238

ATTACHMENT 1, COUNTY HUNTERDON, PAGE 2 OF 2

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
RARITAN	3840	1959	0174	0073	0615
READINGTON	4780	E 1400	0416	0082	0969
STOCKTON	060	2662	0056	0007	0167
TEWSBURY	3180	1166	0593	0025	0085
UNION	2036	2155	0127	0025	0063
W. AMWELL	2190	2179	0096	0030	0061

ATTACHMENT 1, COUNTY MIDDLESEX, PAGE 4
1 OF 2

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
CARTERET	450	1861	0204	0272	8063
CRANBURY	1310	2566	0065	0024	3029
DUNELLEN	100	814	1046	0099	1924
E. BRUNSWICK	2150	1910	0188	0015	11142
EDISON	3020	1424	0403	0597	34203
HELVETTA	080	2244	0112	0019	0174
HIGHLAND PARK	180	1473	0373	0194	2134
JAMESBURGH	090	2410	0085	0068	1171
MADISON T.	3769	2301	0101	0110	1772
METUCHEN	280	1441	0391	0155	5416
MIDDLESEX	360	815	1029	0110	4488
MILLTOWN	160	1745	0246	0059	2758
MONROE	4180	2477	0076	0111	0086
NEW BRUNS. C.	550	1483	0362	0852	26485
" " T.	1130	1629	0292	0150	9615
PERTH AMBOY	460	1691	0194	0741	16293
PISCATAWAY	1690	1016	0746	0377	14315
PLAINSBORO	1170	2397	0086	0017	0785
SOMERVILLE	1630	1950	0177	0276	3482
S. AMBOY	130	2021	0156	0160	2347

ATTACHMENT 1, COUNTY MIDDLESEX, PAGE 5
2 OF 2

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
S. BRUNSWICK	41 40	19 51	0 177	0 127	4 539
S. PLAINFIELD	8 20	10 21	0 748	0 144	10 617
S. RIVER	2 80	18 37	0 210	0 197	2 337
SPOTS WOOD	2 30	21 94	0 121	0 092	1 408
WOODBRIDGE	23 20	15 77	0 315	0 987	30 807

ATTACHMENT 1, COUNTY MORRIS, PAGE 6
1 OF 2

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
BOONTON B.	2.70	16.64	0.278	0.138	3.146
" T.	2.50	17.49	0.242	0.030	1.773
BUTLER	1.80	23.80	0.069	0.101	1.543
CHATHAM B.	2.30	9.59	0.822	0.056	1.968
" T.	9.00	7.44	1.174	0.034	0.532
CHESTER B.	1.62	9.78	0.292	0.016	0.288
" T.	28.68	9.05	0.905	0.028	0.358
DENVILLE	12.90	14.38	0.391	0.152	3.241
DOVER	2.30	13.36	0.456	0.219	8.165
E. HANOVER	8.40	13.85	0.429	0.039	2.669
FLORAM PARK	7.60	10.84	0.682	0.033	5.815
HANOVER	10.80	11.22	0.540	0.077	11.812
HARDING	16.70	4.77	1.672	0.014	0.237
JEFFERSON	44.30	20.61	0.149	0.234	0.786
KINNELON	19.70	22.35	0.112	0.047	0.583
LINCOLN PARK	7.00	21.01	0.140	0.080	1.317
MADISON	4.00	8.80	0.934	0.164	3.186
MENDHAM B.	6.70	6.49	1.369	0.011	0.561
" T.	17.60	7.76	1.099	0.010	0.215
MINE HILL	2.80	13.14	0.428	0.089	0.085

ATTACHMENT 1, COUNTY MORRIS, PAGE 1
2 OF 2

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
MONTVILLE	18 30	16 40	0 210	0 119	2 923
MORRIS T.	15 80	8 72	0 949	0 115	2 895
MORRIS PLANS	250	10 73	0 692	0 038	4 951
MORRISTOWN	200	8 61	0 965	0 375	16 813
MT. LAKES	3 00	14 98	0 356	0 012	0 716
MT. ARLINGTON	2 70	16 36	0 287	0 044	0 094
MT. OLIVE	31 60	14 60	0 379	0 120	0 995
NETCONG	0 80	16 14	0 301	0 043	1 122
PAR. TROY H.	25 30	13 89	0 422	0 112	10 688
PASSAIC	16 50	3 42	2 532	0 056	1 106
PEQUANNOCK	6 30	22 84	0 105	0 099	2 853
RANDOLPH	21 20	10 95	0 661	0 111	1 577
RIVERDALE	1 80	24 50	0 079	0 039	0 982
ROCKAWAY B.	2 02	14 58	0 379	0 104	2 531
" T.	44 80	16 19	0 296	0 217	1 730
ROXBURY	21 00	13 73	0 436	0 179	3 982
VICTORY G.	0 14	12 79	0 500	0 017	0 000
WASHINGTON	45 10	13 90	0 422	0 087	0 626
WHARTON	2 00	14 34	0 397	0 068	2 118

ATTACHMENT 1, COUNTY SOMERSET, PAGE 8

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
BEDMINSTER	26 70	5 92	1 552	0 021	0 680
BERNARDS T.	23 50	—	4 542 C	0 054	1 291
BERNARDSVILLE	13 10	2 61	3 120	0 051	1 486
BOUND BROOK	1 60	8 26	1 012	0 131	5 916
BRANCHBURG	20 20	11 12	0 650	0 056	1 028
BRIDGEWATER	32 84	7 02	1 256	0 213	9 082
FAR HILLS	5 00	3 61	2 415	0 012	0 453
FRANKLIN	46 40	13 51	0 449	0 319	6 419
GREEN BROOK	4 70	7 08	1 235	0 038	1 516
HILLSBOROUGH	54 70	13 55	0 442	0 000	1 023
MANVILLE	2 50	10 35	0 725	0 106	3 703
MILLSTONE	0 60	13 04	0 485	0 020	1 088
MONTGOMERY	32 26	19 00	0 192	0 027	1 966
N. PLAINFIELD	2 90	7 76	1 099	0 262	4 038
PEAPACK-G.	5 90	5 78	1 550	0 019	0 448
RARITAN	2 06	9 09	0 830	0 105	4 316
ROCKY HILL	0 64	20 26	0 156	0 008	0 219
SOMERVILLE	2 70	6 35	0 996	0 205	10 678
S. BOUND BR.	0 90	9 27	0 862	0 072	0 678
WARREN	19 30	4 69	1 910	0 073	2 169
WATCHUNG	6 20	6 56	1 345	0 028	2 593

ATTACHMENT 1, COUNTY UNION, PAGE 9

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
BERKELEY H.	6 30	6 62	1345	0059	2220
CLARK	4 68	13 79	0429	0103	6999
CRANFORD	4 90	13 46	0449	0176	9558
ELIZABETH	11 69	18 27	0214	2364	48617
FANWOOD	1 40	9 57	0822	0043	0736
GARWOOD	0 70	12 52	0524	0066	2510
HILLSIDE	2 70	17 35	0256	0269	10689
KENILWORTH	2 10	13 93	0463	0093	9096
LINDEN	10 67	16 38	0287	0556	29812
MOUNTAINSIDE	4 10	10 51	0714	0037	5122
NEW PROV.	3 70	8 20	1029	0081	9338
PLAINFIELD	6 00	8 84	0934	1147	12893
RAHWAY	4 10	15 47	0330	0408	12151
ROSELLE B.	2 70	15 81	0315	0355	4701
" PARK	1 30	15 35	0335	0144	2022
SCOTCH PLAINS	9 30	9 76	0797	0143	3406
SPRINGFIELD	5 20	12 36	0532	0119	8137
SUMMIT	6 00	10 46	0714	0290	10103
UNION	9 00	15 25	0346	0587	30626
WESTFIELD	6 40	11 57	0602	0298	5958
WINFIELD	0 17	14 53	0385	0049	0018

ATTACHMENT 1, COUNTY SUMMARY, PAGE 10

NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
ESSEX	127 44			21 079	326 350
HUNTERDON	437 00			0 904	15 559
MIDDLESEX	308 79			6 013	205 511
MORRIS	477 86			3 539	109 532
SOMERSET	304 20			1 891	60 490
UNION	103 11			7 389	225 462
TOTAL	1758 40			40 815	942 904

ATTACHMENT 1, COUNTY [illegible], PAGE 11

OF TERMS

MUNICIPAL NAME	AREA A	DISTANCE R	DENSITY D	HOUSING H	EMPLOY. E
BRIDGEWATER IN SOMERSET AS EXAMPLE	32.84	7.02	1256	0.213	7.082

AREA IN SQUARE MILES = 32.84

DISTANCE FROM MUNICIPAL CENTER TO BERNARDS = 7.02 MILES

TORO DENSITY PER = 1,256 UNITS PER SQUARE MILE

DILAPIDATED HOUSING = .213 UNITS

JOB GROWTH = 7,082 UNITS

ATTACHMENT 2, JORD Summaries

Column →	Line ↓	ΣD·A (I)	23.5 x ΣD·H (J)	23.5 x ΣD·E (K)	Adjust. COL(J) (L)	Adjust. COL(K) (M)
Essex	(1)	0.03041	93.20	1531.86	101.60	1669.98
Hunterdon	(2)	0.08635	3.77	55.98	4.11	61.03
Middlesex	(3)	0.07813	48.17	1784.98	52.51	1945.93
Morris	(4)	0.28583	43.83	1553.96	47.78	1694.08
Somerset(21)	(5)	0.37867	48.76	1577.98	53.16	1720.26
Bernards T.	(6)			137.80		150.22*
Somerset(20)	(7)			1440.18		1570.04**
Union	(8)	0.05790	77.84	2322.75	84.86	2532.19
Total	(9)	0.91729	315.57	8827.51	344.02	9623.47

* Bernards T. only

** Somerset minus Bernards T.

COL(I) is summation from ATTACHMENT 1 of COL(A) x COL(D) over all municipalities.

COL(J) is summation of COL(D) x COL(H) and multiplied by Bernards area of 23.5.

COL(K) is summation of COL(D) x COL(E) and multiplied by Bernards area.

COL(L) is COL(J) divided by o.91729, the grand total of ΣD·A

COL(M) is COL(K) divided by 0.91729.

ATTACHMENT 3, Employment Growth By County, Covered

County	1970 Actual	1970 Adjusted	1974 Actual	1976 Project.	1982 Project.	1974-82 Growth Av. %	1976-82 Growth Total %
Atlantic	51,581	55,788	55,557		55,099		
Bergen	267,628	289,454	310,982		358,964		
Burlington	53,643	58,018	68,266		94,514		
Camden	115,256	124,655	130,922		144,417		
Cape May	16,223	17,546	20,983		30,009		
Cumberland	39,484	42,704	43,478		45,069		
Essex	326,151	352,750	326,350	313,901	279,332	-1.93	-10.593
Gloucester	28,206	30,506	35,690		48,850		
Hudson	213,169	230,554	200,050		150,617		
Hunterdon	12,991	14,050	15,559	16,373	19,080	2.58	17.398
Mercer	86,851	93,934	105,414		132,756		
Middlesex	171,337	185,310	205,511	216,423	252,761	2.62	17.682
Monmouth	84,313	91,189	105,487		141,161		
Morris	86,378	93,422	109,532	118,601	150,565	4.06	29.182
Ocean	31,792	34,385	46,401		84,499		
Passaic	155,021	167,663	162,285		152,041		
Salem	18,531	20,043	20,267		20,724		
Somerset	46,498	50,290	60,490	66,341	87,516	4.72	35.006
Sussex	11,184	12,096	15,541		25,654		
Union	217,425	235,157	225,462	220,766	207,257	-1.05	- 5.992
Warren	20,404	22,068	24,115		28,796		
Total	2,054,066		2,288,342		2,509,681	1.16	

ATTACHMENT 4, State Population and Employment

Year	Line ↓	Population		Employment		Population Employment Ratio	
		Total	Factor	Total	Factor		
Column ---→		(A)	(B)	(C)	(D)	(E)	
1960	(1)	6,066,893	0.819				
1965	(2)			1,722,255	0.753		
1966	(3)			1,769,863	0.773		
1967	(4)			1,824,858	0.797		
1968	(5)			1,877,685	0.821		
1969	(6)			2,023,244	0.884		
1970	(7)	7,192,805	0.971	2,054,066	0.898	3.5017	
1971	(8)	7,261,440	0.980	2,040,452	0.892		
1972	(9)	7,322,685	0.988	2,207,689	0.965		
1973	(10)	7,371,835	0.995	2,287,477	1.000		
1974	(11)	7,408,955	1.000	2,288,342	1.000	3.2377	
1975	(12)	7,433,920	1.003				
1980	(13)	7,487,725	1.011				Series I
1980	(14)	7,780,025	1.050				Series II
1980	(15)	7,958,555	1.074				Series III
1980	(16)	8,095,020	1.093				Series IV
1982	(17)	8,125,594	1.097	2,509,681		3.2377	
1985	(18)	7,693,360	1.038				Series I
1985	(19)	8,032,070	1.084				Series II
1985	(20)	8,298,210	1.120				Series III
1985	(21)	8,596,500	1.160				Series IV

ATTACHMENT 5, Future Share By County
1976-1982 Employment Growth

County	Line ↓	1974 Share	1976-1982 Change %	1976-1982 Change Absolute	Comment
Column →		(M)	(N)	(P) = (M) x (N)	
Essex	(1)	1669.98	-10.593	-176.90	
Hunterdon	(2)	61.03	17.398	10.62	
Middlesex	(3)	1945.93	17.682	344.08	
Morris	(4)	1694.08	29.182	494.37	
(Somerset(21))	(5)	(1720.26)	35.006	(602.19)	Total does not include this line.
Bernards T.	(6)	150.22	308.447	463.36	Note 1
Somerset(20)	(7)	1570.04	28.436	446.46	Note 2
Union	(8)	2532.19	-5.992	-151.73	
Total	(9)	9263.47		1430.26	Note 3

Note 1 $463.36 = 4341 \times 0.10674$

Note 2 $$446.46 = \left(\frac{87516-66341-4341}{60490-1291}\right)(1570.04)$$

Note 3 1430.26 jobs reflect 4630.75 people since

$4630.75 = (1430.26)(3.2377)$

Note 4 COL(M) from ATT(2).

COL(N) from ATT(3).

ATTACHMENT 6, Present Share By County, Dilapidated Housing

County	Line ↓	Housing Share (Note 1)	Residents Per Household (Note 2)	Resident Share	
Column - →		(Q)	(R)	(S) = (Q) x (R)	
Essex	(1)	101.60	3.0	304.80	
Hunterdon	(2)	4.11	3.3	13.56	
Middlesex	(3)	52.51	3.4	178.53	
Morris	(4)	47.78	3.4	162.45	
Somerset	(5)	53.16	3.4	180.74	
Union	(6)	84.86	3.1	263.07	
Total	(7)	344.02		1103.15	
Weighted Av.	(8)		3.21		Note 3

Note 1 from ATT(2) COL(L)

Note 2 1970 Census data

Note 3 $3.21 = \frac{1103.15}{344.02}$

ATTACHMENT 7, Share By County From Dilapidated Housing & Jobs

County	Line ↓	Resident Share Via Housing	Resident Share Via Jobs	Resident Share Total	% LAMIH	% WGT.
Column →		(S)	(T)	(U) = (S) +(T)	(V)	(W)
Essex	(1)	304.80	-572.75	-267.95	43.5	0.00
Hunterdon	(2)	13.56	34.38	47.94	30.5	0.77
Middlesex	(3)	178.53	1114.03	1292.56	30.0	20.75
Morris	(4)	162.45	1600.62	1763.07	24.0	28.31
Somerset	(5)	180.74	2945.72	3126.46	25.0	50.17
Union	(6)	263.07	-491.26	-228.19	30.0	0.00
Total	(7)	1103.15	4630.74	5733.89		100.00
Weighted Av.	(8)				25.8	

Note 1 COL(S) from ATT(6), COL(S).

COL(T) from ATT(5), COL(P) and multiplied by 3.2377.

COL(V) is % low & moderate income households from 1970 census.

Note 2 COL(W) indicates weights assigned to LINES (2), (3), (4), & (5).

25.8% is weighted average of COL(V) using weights of COL(W).

ATTACHMENT 8, LAMIH Balance Sheet
(Low & Moderate Income Housing)

Item	Note	LAMIH Units Debit	Credit	Balance
Dilapidated Housing, Present Need	2	90.1		
Employment Growth, Future Need	1	378.1		
Ridge Oak	3		117.7	
Total		468.2	117.7	350.5

Note 1 [ATT(7) COLUMN(T) LINE(7)]= 4630.75

378.1 = (4630.75)(0.258)/(3.16)

Note 2 [ATT(7) COL(S) LINE(7)] = 1103.15

90.1 = (1103.15)(0.258)/3.16

Note 3 Per Robert Boye, Pres. of Ridge Oak, Inc.

248 dwelling units and 372 low and moderate income residents, equivalent to LAMIH units above according to

117.7 = (372)/(3.16)