NEW HAMPSHIRE
HOUSING NEEDS ASSESSMENT

APPENDIX 3:

DETAILED HOUSING NEEDS MODEL - STATE, COUNTY, AND METRO AREAS

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NEW HAMPSHIRE HOUSING NEEDS STUDY

Appendix 3:
Detailed Housing Needs Model – State, County, and Metro Areas

The housing needs model used to estimate housing needs by County and PMSA for the NHHFA study is described below with respect to two components: (1) a needs model (primarily, Census-based information on households by tenure, age income, cost burden and other need measures); and (2) a production model (used to estimate numbers of households by tenure and income) which may be used to develop updates of the number of households between Census years, or to develop alternative projections of demand for additional housing supply, using employment or population growth projections. The intent of the model is to provide a basic structure that uses information available at the municipal level, so that the model can be used in housing needs studies of larger geographic areas such as regional planning commission service areas or labor market areas.

A. Housing Needs Baseline with 1990-2000 Cost Burden Data

The following describes the elements of the basic needs assessment model for NHHFA analysis of needs at the State/County/Metro level. This model provides basic needs analysis data for the Counties and major metro areas (the portions within NH). The same structure can be applied at the Regional Planning Commission level, labor market area level, or for any other geographic area to develop regional housing need assessments. The following is a verbal description of the needs analysis framework. This model includes only selected variables related to general growth in population, households, and the housing stock, along with year 2000 Census data on household income by tenure, and housing cost burden ratios for renters and single family homeowners.

1. Baseline Housing Needs Data

- Collect 1990 and 2000 data for: total population, group quarters population, households, owners, renters, households by age (65+ vs. under 65) and tenure, and vacant units. 1980 Census data may be added as desired or as available.

- Using the 2000 Census data, illustrate the distribution of household income by selected income bands (interpolated as a percent of median area income) by housing tenure for all owner and renter households. This will provide a basis comparing and analyzing the distribution of incomes among all owners and renters. (Tenure by income for all owner and renter households is included in SF3 Table HCT11.)

- Determine the number of year 2000 households with high housing cost burdens using 30%+ and 35%+ ratios of monthly housing costs to income for renters and owners of single family detached homes. [Important: while general income tables are available for all households by owner/renter tenure, the Census tables

for homeowners that depict cost burden ratios by age or income are limited to a sample of "specified owner occupied units". This sample excludes owners of attached, multifamily, and manufactured housing, and therefore reflects only the cost burden of selected single family homeowners, which represents only about 75% of all homeowners. See Census SF3, tables H73 (renters) and H97 (specified owner occupied units) for these tables.

- For 1990 and 2000 (and for prior years as included in the study), illustrate total population, group quarters population, and the population in households. Subtracting the group quarters population from total population yields the non-institutional population (equivalent to population in households). Dividing the non-institutional population by the total number of households yields average household size.

- Compute the tenure split (owner/renter % of total households) for 1990 and 2000 Census data (or for years utilized in study).

- For 2000, within each tenure group, interpolate local income data using County or PMSA income thresholds as appropriate to the community to estimate homeowners and renter households falling within the various thresholds (under 30% of MAI, under 50% etc.). Sum the results for the selected County, PMSA, or other region. (Income interpolations have already been completed at the local level for owners and renters by bands of income relative to the AMFI. Municipal-level interpolations of household income by tenure have also been prepared for the housing cost ratio tables. However, the data for homeowners in these cost ratio tables pertains only to selected owners of single family detached homes.

- The homeowner cost to income ratios calculated by the Census are based only on "specified owner occupied units" (single family detached homes, lots of less than 10 acres, etc.), representing only this subset of homeowners. Statewide, this will reflect the housing cost to income relationship of about 75% of NH homeowners (based on the 2000 Census). Wherever single family detached housing is more prevalent, the data will be more representative of total homeowners in that area.

- Estimate the number and percent of SAMPLE households with high cost burdens by tenure group. Because homeowner cost burden data is available only for a sub-set of total owner-occupants, the sample total should be used for any percentage comparisons.

- For 1990 and 2000, compute the elderly/non-elderly split in housing need based on the percent of households with high cost burden, by tenure, who are under 65 vs. 65 and older. While this overpayment data is available by age and tenure, it is not available for specific income groupings by age and tenure within SF3. However, since most overpayment occurs in the lower income ranges, it

provides a general estimate of the proportion of need found in the elderly vs. non-elderly groups. (See Census 2000 Census SF3, tables H71 and H96.) More detailed age breakouts are possible.

- Using Census data for 2000 as a basis, illustrate the proportion of households in each tenure and income band who with housing cost ratios of either 30% or 35%+ of gross income (or both). Note: Some rent subsidy programs allow tenant payments for gross rent that exceeds these ratios, so there will be some overlap between the number identified as having a housing need and those who have various forms of housing assistance. The number of renters spending 35% or more on gross rent may be closer to a "net need" figure than the number indicated using the 30%+ threshold.

- More detailed housing cost ratio data for renters is included in the 2000 Census SF3 Table H69, which includes payment ratios of up to 50% or more of income. However, this table reflects all renters, and does not differentiate by income.

- Using the above model, housing needs estimates by income range, tenure and cost burden may be estimated with respect to income level, tenure, and age to the extent allowed by the limitations of the Census cost and income tabulations of the SF3 data of the 2000 Census. Homeowner cost burden data is less useful for updates and projections because it would require an estimate of the number of "specified owner occupied units" per the Census definition, which represents only a subset of owner-occupied housing.

- The above method may be used as a basis for developing estimates or projections of need in broad income ranges for general planning purposes. This will also help address statutory requirements for the evaluation of housing needs of all income levels and ages in regional and local need assessments.

2. Updated or Projected Needs Data

- For the update or projection year, obtain or prepare independent estimates of population using either an employment-based or population-based projection model. Subtract from these estimates of the total updated or future population an allowance for the number or percent living in group quarters (institutional population) to project the population living in households. Divide the total updated or future non-institutional population by an updated or projected average household size to estimate the number of households in the update or projection year. In the model we assumed a 2010 average household size that is about 98% of the 2000 base year, reflecting U. S. Census nationwide projections.

- An updated housing needs estimate (between Census years) can be initiated using an independent projection of area population, less an allowance for the group quarters population.

- Estimate or project average persons (not residing in group quarters) per household to derive an estimated or projected number of households. Apply a tenure split (owner/renter ratios) based on the 2000 Census or observable trend from the Census history.

- Apply the 2000 Census income distributions for each tenure group to the updated number of owner and renter households to estimate total households by income band (expressed as percent of median area incomes).

- To update need estimates based on housing cost burden by income, apply the percentages with high cost burdens for each income group (by percent of MAI) for each tenure category to estimate needs beyond the Census year. For updates or projections, it is recommended that the cost burden data for homeowners either be adjusted or omitted, as the baseline Census cost ratio data for owners reflects *only those in single family detached units.*

- Comparison of the update or projection year to the base year will indicate the increase in the number of households by income band, and the percent of specified households expected to have a high cost burden. The low income portion of renter household demand may be compared with actual or expected production of low income units for the given period.

- The approximate proportion of households with high cost burdens within elderly vs. non-elderly households can be approximated by tenure category using the 2000 census proportions. Renter cost burden data may be updated directly, since the sample data from the 2000 Census represents all renters. Updates are not recommended for the ownership cost burden data, since these data are based on a sample that reflects only about 75% of homeowners, limited to Census-defined "specified owner occupied units" which excludes owners of manufactured housing, multifamily or attached (condo) units.

- Elements of the housing production model can be applied to estimate the total housing supply growth by tenure and income needed to meet demand during the update or projection period.

- If needed for comparison to current price and rent distributions, the income ranges expressed as a percentage of area median family income may be converted to dollar amounts using current HUD income schedules. The percentage of homes sold or on the market by price range, or the distribution of market rents, can then be compared to the proportion of renters or homeowners with an adequate income to afford those price or rent ranges.

All of the above elements may also be incorporated into a regional housing element, since all of the above data are available by municipality. In the model prepared for the NH Housing Finance Authority (State, County, and PMSA levels), all income and housing cost ratio data was

interpolated relative to the median family income (2000 Census SF3 Table P77) of the county (or metro area, if in a PMSA) in which the city or town was located. This enables income-based data, interpolated relative to area median family income, to reflect the income standards applicable to each community, and allows data to be summed for any geographic area using a consistent income standard. All metro area data displayed in the model example was adjusted to reflect the PMSA definition as of the most recent Census year (2000) so that geographies of the analysis areas remained consistent.

B. Production Component

1. Basis for Production Estimates

The initial function of the housing needs model was to illustrate changes in basic need measures (household change, overpayment by tenure, by income, and by age) for each county and major metropolitan area for 1990 and 2000. A secondary purpose was to provide a basis to anticipate future housing supply needs commensurate with employment growth. The production element of the model presents three projections of housing supply needs for the counties and metro areas of the state. Two of the projections are employment-driven and the third is based on independent population projections issued by the NH Office of State Planning.

In February 2003, NH Employment Security published data on projected employment growth for the state for the period 2000-2010, indicating an average growth rate in total employment of about 1.6% per year. (See New Hampshire Employment Projections by Industry and Occupation, February 2003). The employment-based projections of the housing model begin with that estimate as the assumed annual growth rate in wage and salary employment at the state level. The model then allocates the resulting statewide employment growth to each county and metro area. Within each area, ratios are used to estimate the required housing supply to support projected growth, and the results for each county are summed back to produce the state totals. The population-based projections work in the same manner, but are not associated in the model with any particular employment expectation.

The housing production model uses an annual growth rate in employment for its initial estimates, but allows that growth rate to be modified to produce alternative employment-based projections of housing demand. The first employment-based projection assumes that each county and metro area maintains its year 2000 share of the state's wage and salary employment through 2010. The second employment-based projection allocates wage and salary employment growth (including government) to each county and metro based on its share of private sector covered employment growth during the prior decade (1990-2000). It would also be possible to substitute other assumptions about each region's share of employment growth to provide alternative estimates based on changing shares of statewide employment and other factors.

The third projection in the model is not employment-driven, but is based on the municipal-level population projections for 2010 issued by the New Hampshire Office of State Planning in March 2003. The employment-driven projections essentially represent two scenarios that indicate the number of housing units needed (owner and renter) based on the rate of projected employment growth. The employment-based projections also indicate the quantity of housing that would be required to meet the demands associated with residents working within the county or the metro area as a portion of total projected housing demand (based on historic commuting patterns). This approach does not represent a sophisticated econometric model; it employs simple ratios that are consistent with year 2000 relationships between selected demographic and employment variables.

2. Employment and Relationship to Population and Households

The model contains historical data for 1980, 1990 and 2000 on the relationship between number of working residents by area, and number working within vs. outside the area in relation to area resident population and households. The most stable relationship over time for most areas appears to be the ratio of resident households to the number of working residents age 16+ as reported in the Census. For projection year 2010, the model assumes that the 2000 ratio of households to total working residents remains constant.

Total non-agricultural employment data is not generally available for sub-state areas. Therefore, a flexible model that relies on employment data must make use of regularly published (annual) covered employment information. This is generally available for all but the smallest communities. In the model, covered private sector wage and salary employment as reported by NH Employment Security, is shown for 1980, 1990, and 2000. Employment Security did not begin including government employment in their locally reported data until 1993; therefore it is shown only in the 2000 column, along with the total for private sector and government employment.

The relationship between covered employment (private) and the number of working residents is shown in the model for 1980-2000. The ratio of combined private sector and government employment to the number of working residents of the area is available only for 2000. There is a presumed relationship between total wage and salary employment in an area, and the number of residents working (in and outside that area). The premise of the model is that, if employment grows within a given area, demand for working residents living in that area will increase proportionately as a result of increased job availability both within and outside that area. In areas where very high proportions of residents also work within it, this relationship will be more constant over time than in areas in which higher proportions of residents commute out. For the projection year 2010, the model assumes that the year 2000 ratio between a region's covered employment (total including government) and the number of working residents within remains constant.

3. Elements of the Housing Supply Projections 2000-2010

In order to project 2010 population and households, the following steps are reflected in the model:

1. The annual percentage growth rate assumption for employment from 2000-2010 in the “State Total” tab is the initial “driver” for this model. The initial estimate based on Employment Security projections is about 1.6% per year. This rate is then compounded in the model to estimate year 2010 wage and salary employment including government. Higher or lower rates can be input to produce alternative estimates of statewide wage and salary employment. That employment is then distributed to the various counties and metro areas based on (1) their 2000 share of the state total and (2) their share of private sector employment growth during the prior decade (1990-2000).

2. Within each county and metro area, 2010 projected employment is multiplied by the 2000 ratio of [working residents/area employment] to generate an estimate of working residents in 2010.

3. The projected number of working residents in 2010 is then multiplied by 2000 ratio of [households/working residents] to estimate the number of households in 2010.

4. The number of households is multiplied by an estimate of average persons per household in 2010 (estimated at 98% of the 2000 average for the area, based on U.S. Census national projections). This yields total persons living in housing units. The group quarters population is estimated as a function of persons in living units, using the 2000 ratio of [2000 group quarters population/population in households]. The resulting group quarters population estimate, plus population in households, equals total population for the area. (This is shown for information and comparison only, as the primary focus of the model is on household growth).

5. In the population-driven projection column, there are no independent employment assumptions. Rather, total population projected by NH Office of State Planning is the beginning point. For this projection, the 2010 GQ population is assumed to be the same share of the total as in the 2000 Census, with the remainder allocated to population living in dwelling units.

6. The number of households for each set of projections is split between owner and rental tenure using the 2000 Census ratios. In alternative projections, it would also be possible to use a "trended" ratio that reflects anticipated changes in tenure.

7. The vacancy rates assigned to 2010 are pre-set at 1.5% for ownership units and 5% for rental units. For each tenure category, the required number of vacant units in 2010 is estimated as ([households/(1-vacancy rate)]-households). This yields the total ownership or rental housing supply needed to provide reasonably adequate housing choice. Note that the vacancy rate established by the U. S. Census does not include vacant units that are "rented or sold, awaiting occupancy". This portion of the housing inventory is ignored for the purposes of modeling, as the split between owner and rental shares is not available in the Census data.

8. The final step in estimating the housing supply requirement for 2010 is to add a replacement factor for housing units lost as the result of demolition or disaster. The model assumes that about 0.17% of the base year (2000) housing stock would need to be replaced each year due to these factors (or 1.7% of the base year supply over the 10-year projection period). The same rate was applied to ownership and rental housing. This loss rate is based on an interpretation of estimates of the components of housing inventory change compiled by the U. S.

Census and U. S. Department of Housing and Urban development using data from the Annual Housing Survey. The most recent cumulative report on long-term components of change available from this source was based on the 1980-1993. The indicated replacement need figure is based on data for the Northeastern portion of the U.S.

9. The total 2010 supply need for the resident population of each area is then computed as the sum of households, vacancy reserve, and replacement. The results for each county are then summed to the state level for an estimate of total production needs. These demand estimates do not include other housing unit production that may be generated by seasonal, occasional use, or second home use. The year 2010 projection, less the comparable units present in 2000, yields the housing growth estimates. Implicitly, the projections include production that is needed to rectify base year (2000) supply deficits indicated by vacancy rates.

4. Statewide Results of Model

Using the initial estimate of 1.6% annual employment growth, the model indicates that an annual state total of about 9,600 units would be needed to sustain the projected number of working residents, based on employment-driven demand plus an allowance for adequate vacancies and to replace units that are expected to be lost from the inventory. The production need for residents working within New Hampshire is indicated at about 8,100 per year. The difference, or about 1,500 units per year, represents the additional housing production demand from those who could be expected to reside within the State, but who work elsewhere. Statewide results of the model, based on alternative employment growth expectations are shown in the table below.

Table 1

New Hampshire
Estimated Housing Production Needs By Level of Employment Growth

Employment Growth Assumptions		**Total Annual Production Need**			**Production Need For Residents Working In-State**		
Annual Growth Rate	Annual Employment Growth	Owner	Renter	Total	Owner	Renter	Total
1.6%	10,435	6,600	3,000	9,600	5,500	2,600	8,100
1.3%	8,364	5,400	2,500	7,900	4,500	2,200	6,700
1.0%	6,346	4,300	2,000	6,300	3,600	1,700	5,300
0.7%	4,383	3,200	1,600	4,800	2,700	1,300	4,000

The housing need estimate projected using NH OSP population projections as a baseline yields a production demand that averages 8,400 per year. At the state and regional levels, the several estimates of housing demand are best used to test alternative scenarios relating to different rates of employment growth and to compare these estimates of demand to the level indicated by population growth projections. Because the county and metro area projections are based on

alternative shares of employment growth, there is a wider variation in some areas between the two employment-based projections. These differences reflect the "constant share" vs. "changing share" assumptions used to allocate statewide employment growth to the areas.

For the purposes of projections, the housing production model includes housing units occupied or vacant and available for sale or for rent. It excludes vacant units classified in the Census as rented or sold, awaiting occupancy; seasonal units; and other vacant units that are not available for occupancy. Therefore, the model's projection of total housing supply needs will not include these units. Since the purpose of the model is to estimate change in units, or production needs, these exclusions should not affect the results significantly.

The model also contains projections of households by tenure and income (as a percent of median area family income) for 2010. Note that the number of households projected in the model is less than the number of housing units needed due to the production requirements for rectifying base year (2000) and future year (2010) vacancy needs, as well as replacement units for housing lost to demolition or disaster within the 10-year projection period.

The year 2000 ratios of the available housing supply (occupied, or available for sale or for rent) to the wage and salary employment within each county or metro area are compared below to the 2010 ratios resulting from application of the model assumptions.

Table 2

Ratio of Housing Units Occupied or Available (1) To
Private and Government Wage and Salary Employment in Area

Area	2000	2010 Projected
Belknap County	0.89	0.90
Carroll County	0.99	0.99
Cheshire County	0.90	0.92
Coos County	1.05	1.04
Grafton County	0.66	0.67
Hillsborough County	0.75	0.78
Merrimack County	0.75	0.77
Rockingham County	0.82	0.84
Strafford County	1.00	1.03
Sullivan County	1.18	1.20
New Hampshire	0.80	0.82
Lawrence, MA--NH PMSA (2)	1.02	1.05
Manchester, NH PMSA	0.73	0.76
Nashua, NH PMSA	0.74	0.76
Portsmouth-Rochester, NH--ME PMSA (2)	0.76	0.79

(1) Excludes vacant units rented or sold, awaiting occupancy

(2) New Hampshire portions of PMSA only

5. Uses of Demand Projections

The employment-based estimates are not intended to be predictive of where new housing units will actually be developed. The projections are a measure of potential demand on the housing supply if employment grows as projected, and if year 2000 relationships between employment and place of residence remain constant on a proportionate basis.

Household income data by tenure based on the 2000 Census (reporting 1999 income distributions) is also incorporated into the model, depicted for each tenure category as the cumulative percent of households falling at or below selected income thresholds (as a percent of median area family income, unadjusted by household size). Applied to the 2010 projected owner and renter stock, these ratios provide an estimate of the number of households by tenure and income for the projection year. As part of this study, an analysis of 1990 vs. 2000 Census data on household incomes indicated relatively little change in the percentage of households falling below selected income bands when indexed to the area median family for each Census year. This suggests that, while dollar incomes will grow during the projection period, the distribution of household income within each tenure group relative to area median family income should be relatively stable over time.

The primary use of the production portion of the model is to estimate the housing development requirements based on growth in employment or population. The projected need for rental housing development, or the portion rental housing needs serving households at or below certain income thresholds, could be used as a baseline need figure for distribution across a region for those areas electing to use "fair share" allocation models. A baseline needs estimate that reflects future housing development needs that support anticipated employment growth might be a more acceptable subject for "need distribution" than the traditional approach.

The model can be taken a step further (this element not presently incorporated) to estimate the number of renter households by income range that could be expected to have a high rental cost burden (30% or more, 35% or more, etc). The year 2000 Census ratios of overpayment by income range could simply be applied to the projected number of renters in 2010 by income range. Such a result would probably be best interpreted as the projected number of renters that could be expected to have high housing cost burdens in the absence of the creation of more affordable rental housing during the projection period. In this study, the comparison of 1990 and 2000 data showed relatively little change in the total *number* of households with a high housing cost burden. However, the comparison indicated that the number of cost-burdened households did increase within the lowest income groups.

Tables 3-4 illustrate the basic structure of the employment-based and population-based housing production needs estimates of the model. Tables 5-7 are examples of the application of the model for Merrimack County to project households by tenure and income and housing production needs by tenure to a future year using data derived from the 2000 Census. Table 6 illustrates household projections cumulative by income level. Table 7 illustrates how the model data might be used to project renter households with high cost burdens by income level. This scenario assumes cost burden ratios remain constant for the same income thresholds.

Table 3

EMPLOYMENT-BASED PROJECTION MODEL

1		2010 PROJECTED COVERED EMPLOYMENT FOR STATE	
2	**X**	REGIONAL % SHARE OF FUTURE YEAR EMPLOYMENT	
3		(BASED ON 2000 SHARE OF STATE OR REGION'S SHARE OF STATE GROWTH 1990-2000)	
4	**=**	PROJECTED COVERED EMPLOYMENT IN REGION	
5	**X**	RATIO OF WORKING RESIDENTS (CENSUS) PER COVERED EMPLOYMENT JOBS IN REGION	
6	**=**	ESTIMATED NUMBER OF WORKING RESIDENTS OF REGION IN 2010	
7	**X**	RATIO OF HOUSEHOLDS TO WORKING RESIDENTS AGE 16+ IN REGION (CENSUS)	
8	**=**	PROJECTED HOUSEHOLDS	
9	**X**	OWNER/RENTER TENURE PERCENTAGES (2000 CENSUS, OR EXPECTED RATIO)	
10	**=**	**HOMEOWNERS**	**= RENTERS**
11	**/**	0.985 (Achieve 1.5% vacancy)	/ 0.95 (Achieve 5% vacancy)
12	**=**	UNITS AVAILABLE TO OWNERS	= UNITS AVAILABLE TO RENTERS
13	**+**	REPLACEMENT NEEDS DEFINED AS	+ REPLACEMENT NEEDS DEFINED AS
14		(0.017 X 2000 OWNERSHIP STOCK) - (1)	(0.017 X 2000 OWNERSHIP STOCK) - (1)
15	**=**	2010 OWNER SUPPLY - (2)	= 2010 RENTER SUPPLY - (2)
16		**NET PRODUCTION NEEDS IN PERIOD**	
17		OWNERS	RENTERS
18	**=**	2010 OWNER SUPPLY (from above)	2010 RENTER SUPPLY (from above)
19	**(-)**	(2000 OWNER OCCUPIED + VACANT FOR SALE)	(-) (2000 RENTER OCCUPIED + VACANT FOR RENT)
20	**=**	PRODUCTION NEED - OWNERSHIP	= PRODUCTION NEED - RENTAL
21		**FUTURE NEEDS BY INCOME RANGE**	
22		2010 OWNER SUPPLY	2010 RENTER SUPPLY
23	**X**	% INCOME DISTRIBUTION FOR OWNERS (CENSUS) - (3)	X % INCOME DISTRIBUTION FOR RENTERS (CENSUS) - (3)
24	**=**	2010 OWNER SUPPLY NEED BY INCOME RANGE	= RENTER SUPPLY NEED BY INCOME RANGE
25			X % OF RENTERS OVERPAY BY INCOME (2000)
26			= COST-BURDENED RENTERS BY INCOME - (4)
27		SUBTRACT 2000 BASELINE DATA FROM 2010 PROJECTION FOR NET CHANGE DURING PERIOD	

(1) Assumes that 1.7% of base year (2000) stock would be lost by demolition or deterioration over a 10-year period
(2) The subtotal of the supply needed for residents employed within the region can be estimated by multiplying the total times using commuting data and Census-derived % of working residents that are employed within the region.
(3) Income distributions established in bands of income as percent of area median family income per U. S. Census
(4) Split between elderly/non-elderly low income rental needs may be estimated by the percent of renters age 65+ vs. those under 65 that had a high rental cost burden based on the 2000 Census. Further detail on renter cost burden is not available by both income and age.

NOTE: The vacant housing stock that is categorized as seasonal, vacant but not available for sale or rent, or sold/rented but awaiting occupancy is excluded from the base year and the projection. These units are not part of the Census-defined vacancy rate.

Table 4

POPULATION-BASED PROJECTION MODEL

1		2010 PROJECTED POPULATION FOR REGION (NH OSP)	
2	(-)	GROUP QUARTERS POPULATION (ESTIMATED USING 2000 GQ RATIO TO TOTAL POPULATION)	
3	=	POPULATION IN HOUSEHOLDS	
4	/	AVERAGE HOUSEHOLD SIZE (FOR 2010 PROJECTED @ 0.98 X AVERAGE IN 2000 FOR REGION)	
5	=	PROJECTED HOUSEHOLDS	
6	X	OWNER/RENTER TENURE PERCENTAGES (2000 OR EXPECTED RATIO)	
7	=	**HOMEOWNERS**	= **RENTERS**
8	/	0.985 (Achieve 1.5% vacancy)	/ 0.95 (Achieve 5% vacancy)
9	=	UNITS AVAILABLE TO OWNERS	= UNITS AVAILABLE TO RENTERS
10	+	REPLACEMENT NEEDS DEFINED AS	+ REPLACEMENT NEEDS DEFINED AS
11		(0.017 X 2000 OWNERSHIP STOCK) - (1)	(0.017 X 2000 OWNERSHIP STOCK) - (1)
12	=	2010 OWNER SUPPLY	= 2010 RENTER SUPPLY
13		**NET PRODUCTION NEEDS IN PERIOD**	
14		OWNERS	RENTERS
15		2010 OWNER SUPPLY	2010 RENTER SUPPLY
16	(-)	(2000 OWNER OCCUPIED + VACANT FOR SALE)	(-) (2000 RENTER OCCUPIED + VACANT FOR RENT)
17	=	PRODUCTION NEED - OWNERSHIP	= PRODUCTION NEED - RENTAL
18		FUTURE NEEDS BY INCOME RANGE	
19		2010 OWNER SUPPLY	2010 RENTER SUPPLY
20	X	% INCOME DISTRIBUTION FOR OWNERS (2000) - (2)	X % INCOME DISTRIBUTION FOR RENTERS (2000) - (2)
21	=	2010 OWNERS BY INCOME RANGE	= RENTERS BY INCOME RANGE
22			X % OF RENTERS OVERPAY BY INCOME (2000)
23			= COST-BURDENED RENTERS BY INCOME - (3)
24			
25		SUBTRACT 2000 BASELINE FROM 2010 PROJECTION FOR NET CHANGE DURING PERIOD	

(1) Assumes that 1.7% of base year (2000) stock would be lost by demolition or deterioration over a 10-year period
(2) Income distributions established in bands of income as percent of area median family income per U. S. Census
(3) Split between elderly/non-elderly low income rental needs may be estimated by the percent of renters age 65+ vs. those under 65 that had a high rental cost burden based on the 2000 Census. Further detail on renter cost burden is not available by both income and age.

NOTE: The vacant housing stock that is categorized as seasonal, vacant but not available for sale or rent, or sold/rented but awaiting occupancy is excluded from the base year and the projection. These units are not part of the Census-defined vacancy rate.

TABLE 5 – EXAMPLE OF PRODUCTION ELEMENT OF MODEL

MERRIMACK COUNTY	1980	1990	2000	Change 1980-90	Change 1990-00	2010 Employment Based Projection 1	2010 Employment Based Projection 2	2010 Population Based Using NHOSP Projection
Covered Private Sector Employment in Area (NHDES)	30,827	42,600	55,265	11,773	12,665			
Percent of State Total	9.5%	10.0%	**10.4%**	11.6%	**12.1%**			
Government Employment in Area (NHDES)	nr	nr	15,221			Constant Share	Growth Share	
Total Private + Government Employment	nr	nr	**70,486**			**82,611**	**83,081**	
Percent of State Total			11.6%					
Ratio Private Covered Employment Per Resident Household	0.89	0.96	1.07					
Ratio - Census Working Residents/NHDES Total Employment	nc	nc	**0.989**			**0.989**	**0.989**	
Number of Working Residents Age 16+ (Census)	45,648	60,446	69,676	14,798	9,230	81,662	82,126	
Work in County	37,450	42,031	48,051	4,581	6,020	56,317	56,637	
Work Outside of County	8,198	18,415	21,625	10,217	3,210	25,345	25,489	
Percent Commute Out of County	18.0%	30.5%	31.0%			31.0%	31.0%	
Ratio Population to Total Working Residents	2.15	1.99	1.96			1.92	1.92	
Ratio Households to Total Working Residents	**0.76**	**0.74**	**0.74**			**0.74**	**0.74**	
Number of Working Residents Per Household	1.32	1.36	1.34			1.34	1.34	
Total Population	98,302	120,005	136,225	21,703	16,220	156,465	157,355	155,280
Institutional & Group Quarters Population	4,369	4,297	6,293	-72	1,996	7,228	7,269	7,173
Population in Households	93,933	115,708	129,932	21,775	14,224	149,237	150,086	148,107
Average Household Size	2.71	2.59	2.51	-0.11	-0.09	2.46	2.46	2.46
Households	34,674	44,595	51,843	9,921	7,248	60,761	61,107	60,301
Owners	24,306	31,088	36,019	6,782	4,931	42,215	42,455	41,895
Renters	10,368	13,507	15,824	3,139	2,317	18,546	18,652	18,406
Ownership Tenure %	70.1%	69.7%	69.5%			69.5%	69.5%	69.5%
Rental Tenure %	29.9%	30.3%	30.5%			30.5%	30.5%	30.5%
Vacant for Sale Units	335	764	332	429	-432	643	647	638
Vacant for Rent Units	652	1,927	460	1,275	-1,467	976	982	969
Vacant-Rented/Sold - Awaiting Occupancy	278	205	230	-73	25	---	not projected	---
Vacant-Occasional Use, Seasonal, Migratory	3,173	2,772	2,892	-401	120	---	not projected	---
Other Vacant Units	524	607	487	83	-120	---	not projected	---
Total Vacant/Seasonal/Occ Use Units	4,962	6,275	4,401	1,313	-1,874	---	not projected	---
Total Housing Units	39,636	50,870	56,244	11,234	5,374	---	not projected	---
Vacancy Rate Ownership	1.4%	2.4%	0.9%	1.04%	-1.49%	**1.5%**	**1.5%**	**1.5%**
Vacancy Rate Rental	5.9%	12.5%	2.8%	6.57%	-9.66%	**5.0%**	**5.0%**	**5.0%**
Vacancy Rate Total	2.8%	5.7%	1.5%	2.92%	-4.19%	**2.6%**	**2.6%**	**2.6%**
Add Replacement for Deterioration, Demolition - Ownership						618	618	618
Add Replacement for Deterioration, Demolition - Rental						277	277	277
Add Replacement for Deterioration, Demolition - Total						895	895	895

Housing Supply Available for Year-Round Occupancy	1980	1990	2000	Change 1980-90	Change 1990-00	2010 Housing Supply 1	2010 Housing Supply 2	2010 Housing Supply 3
Total Ownership Stock Except Sold, Not Occ.	24,641	31,852	36,351	7,211	4,499	43,476	43,720	43,151
Total Rental Units Except Rented, Not Occ.	11,020	15,434	16,284	4,414	850	19,799	19,910	19,651
Total Stock Occupied or Available	**35,661**	**47,286**	**52,635**	11,625	5,349	**63,275**	**63,630**	**62,802**

Net Production Need 2000-2010

Tenure	Housing Supply 1	Housing Supply 2	Housing Supply 3
Owner	7,125	7,369	6,800
Renter	3,515	3,626	3,367
Total	**10,640**	**10,995**	**10,167**

TABLE 6: PROJECTED FUTURE HOUSEHOLDS BY INCOME RANGE
(Merrimack County Example)

MERRIMACK CO.	Baseline Census Data		2010 Income by Tenure			Net Change 2000-2010		
	2000 Census Income Distribution (for 1999)	2000 Households by 1999 Income	Households Projection 1	Households Projection 2	Households Projection 3	Household Change 1	Household Change 2	Household Change 3
Homeowners								
Under 30% MAI	6.9%	2,504	2,932	2,949	2,910	428	445	406
Under 50% MAI	16.8%	6,071	7,110	7,150	7,056	1,039	1,079	985
Under 60% MAI	22.7%	8,173	9,571	9,626	9,499	1,398	1,453	1,326
Under 80% MAI	35.5%	12,799	14,989	15,074	14,875	2,190	2,275	2,076
Under 100% MAI	48.3%	17,413	20,392	20,508	20,237	2,979	3,095	2,824
Under 120% MAI	60.8%	21,930	25,682	25,828	25,487	3,752	3,898	3,557
All Homeowners	100.0%	36,048	42,215	42,455	41,895	6,167	6,407	5,847
Renters								
Under 30% MAI	26.8%	4,238	4,976	5,004	4,938	738	766	700
Under 50% MAI	47.3%	7,476	8,778	8,828	8,712	1,302	1,352	1,236
Under 60% MAI	56.9%	8,985	10,550	10,610	10,470	1,565	1,625	1,485
Under 80% MAI	71.8%	11,346	13,322	13,398	13,221	1,976	2,052	1,875
Under 100% MAI	81.5%	12,872	15,114	15,200	14,999	2,242	2,328	2,127
Under 120% MAI	88.1%	13,923	16,348	16,441	16,224	2,425	2,518	2,301
All Renters	100.0%	15,795	18,546	18,652	18,406	2,751	2,857	2,611
Total Households								
Under 30% MAI	13.0%	6,742	7,909	7,954	7,849	1,167	1,212	1,107
Under 50% MAI	26.1%	13,547	15,888	15,978	15,767	2,341	2,431	2,220
Under 60% MAI	33.1%	17,158	20,121	20,236	19,969	2,963	3,078	2,811
Under 80% MAI	46.6%	24,145	28,311	28,472	28,096	4,166	4,327	3,951
Under 100% MAI	58.4%	30,285	35,506	35,708	35,237	5,221	5,423	4,952
Under 120% MAI	69.2%	35,853	42,030	42,269	41,711	6,177	6,416	5,858
All Households	100.0%	51,843	60,761	61,107	60,301	8,918	9,264	8,458

TABLE 7: PROJECTED FUTURE LOWER INCOME RENTER HOUSEHOLDS WITH HIGH COST BURDEN - (Merrimack County Example)

LOWER INCOME RENTERS WITH HIGH RENT BURDEN

MERRIMACK CO.	Baseline Census Data		2010 Income by Tenure			Net Change 2000-2010		
Renter Income and % Overpay	% of Renters With High Cost Burden By Income Group (estimated using 2000 Census)	2000 Renters High Cost Burden	Households Projection 1	Households Projection 2	Households Projection 3	Household Change 1	Household Change 2	Household Change 3
Pay 30% + For Gross Rent								
Under 30% MAI	68.8%	2,915	3,423	3,442	3,397	508	527	482
Under 50% MAI	57.5%	4,298	5,047	5,075	5,008	749	777	710
Under 60% MAI	53.8%	4,833	5,675	5,707	5,632	842	874	799
Under 80% MAI	43.8%	4,973	5,839	5,872	5,795	866	899	822
Pay 35% + For Gross Rent								
Under 30% MAI	61.6%	2,610	3,065	3,082	3,041	455	472	431
Under 50% MAI	47.6%	3,555	4,174	4,198	4,143	619	643	588
Under 60% MAI	42.9%	3,853	4,524	4,550	4,490	671	697	637
Under 80% MAI	34.5%	3,915	4,597	4,623	4,562	682	708	647
Pay 50% + For Gross Rent								
All Renters	15.1%	2,385	2,800	2,816	2,779	415	431	394
Estimated Elderly Share of Low Income Renters with High Cost Burden								
Pay 30% +	23.0%							
Under 30% MAI		671	788	793	782	117	121	111
Under 50% MAI		990	1,162	1,169	1,153	172	179	164
Under 60% MAI		1,113	1,307	1,314	1,297	194	201	184
Under 80% MAI		1,145	1,345	1,352	1,334	199	207	189
Pay 35% +	23.6%							
Under 30% MAI		617	725	729	719	107	112	102
Under 50% MAI		841	987	993	979	146	152	139
Under 60% MAI		911	1,070	1,076	1,062	159	165	151
Under 80% MAI		926	1,087	1,093	1,079	161	167	153

The actual model is contained in a separate printable Excel workbook file. The contents of that workbook, as well as the following pages, describe the basic structure and data sources used in the model, and a description of how the model may be adapted to a region other than a County or NH portion of a PMSA. The scope of the model is limited; the analyst may wish to add additional details from historic Census information to expand the housing profile for the region.

Table 8 – General Content of Model

Worksheet Line Number	General Content
2-19	Employment data (NH Employment Security) and working residents age 16+ (US Census)
21-24	Population data (Census and 2010 projection from NH OSP)
26-30	Households by tenure (Census)
32-42	Vacancy detail (Census)
45-47	Replacement needs (computed for 2000-2010 period only) - @ 1.7% of occupied & available year round stock in 2000
50-63	Total housing stock available for year-round households (col B-F). Year 2010 housing supply needs estimated (Col. H-K). Three projections: (1) based on area retaining 2000 share of NH employment; (2) based on area capturing same share of employment growth as in 1990-2000 period; (3) based on NH OSP population projection to 2010.
64-120	Households by tenure and income - all owners and renters (SF3 data for 2000, interpolated to % of area median family income at local level) - in col. D. This interpolation was computed off-sheet in a separate analysis. 2010 households by tenure and income projected in block G64-K92 (households only, not housing supply). Three estimates produced, based on three projections of households by tenure above.
124-140	Senior population and households by tenure (Census - historic only)
141-143	Sample size for 1990 and 2000 Census SF3 tables for housing cost by income and tenure. Note: homeowners portion is a sub-sample of total owners - reflects only selected single family homeowners.
145-180	Cost burden data at 30%+ of income - for renters and specified owner-occupants - interpolated to % of area median family income
182-217	Cost burden data at 35%+ of income - for renters and specified owner-occupants - interpolated to % of area median family income

Table 9: Application to Other Regional Geography

ADAPTING THE MODEL TO A DIFFERENT REGIONAL ANALYSIS AREA

Off-sheet calculations needed:

Step No.	Procedure
1	Households by tenure by income as percent of area median family income, interpolated from 2000 Census (1999 incomes) at local level, summed to regional total. Use cumulative income ranges of 30% or more, 50% or more, up to 100% of median. Estimate balance of households as "over 100% of median". May also develop 1990 data for comparison.
2	Households by tenure by income by percent of income spent on gross rent or monthly ownership costs. Income interpolations made as in above. Construct tables by tenure at 30%+ payment ratio; 35%+ payment ratio. Show total sample represented by the Census cost-burden tables. Note that the ownership sample for cost-burden is smaller than the sample for all homeowners, as it represents only the Census' "specified owner occupied" units (selected single family detached units only).

To use model as template:

HOUSEHOLDS AND HOUSING SUPPLY	
3	Copy one County or PMSA sheet to a new sheet or tab for the analysis region
4	Relable tab and line 1 to indentify the geographic area of analysis
5	Enter relevant employment (NH Employment Security) and resident worker data (Census) in lines 2-19. Ratios are computed by the model.
6	Enter relevant population, household by tenure, vacancy and housing stock data lines 21-38. Enter 2010 NH OSP population projection at cell K21.
7	Vacancy rates (lines 40-42) and replacement needs (lines 45-47) will be computed by model.
8	Housing stock available to year-round occupancy computed & households by income and housing supply needs by tenure are projected to 2010 by model (A50: K62).
9	*Alternatives to consider for alternative production need estimates:* Go to top of "STATE TOTALS" sheet and modify state employment growth rate Manually modify 2010 area employment or population projection for region Modify 2010 tenure split or other variables based on alternative expectations
HOUSEHOLD INCOME	
10	Enter interpolated household income data by tenure from step 1 into D67:D92.
	Model computes year 2000 Census distribution by income band and applies to 2010 household projections Yields projected households by income (cumulative, as percent of area median family income) and tenure for 2010
SENIOR HOUSEHOLDS	
11	Enter household data as available from Census (1980-2000) for households age 65+ by tenure in lines 124-139. Percentages computed by model.
	Historic data only, can be compared with general growth. No projections are made by model.
COST BURDEN DATA (from off-sheet calculations in Step 2 above).	
12	Enter total households in sample for SF3 cost burden tables for renters and "specified owner occupied units" at lines 142-143
13	Enter cost burden data @30% or more of income by tenure by income (from Step 2)
14	Enter cost burden data @35% or more of income by tenure by income (from Step 2)
	Model computes relevant percentages; no projections are made by the model, but analyst may elect to apply 2000 proportions to 2010 projections for renters. *NOTE: The ownership cost burden data cannot be applied directly to homeowner projections, however, as the cost burden information reflects single family detached homes only.*

The chart on the following page (Table 10) provides a guide to the key population and housing data available from the 2000 Census. While the Census contains far more information than shown here, the most useful information for regional and local housing needs analysis are likely to be found in the tables listed here.

Table 10

GUIDE TO KEY HOUSING NEEDS DATA FROM THE 2000 CENSUS - SELECTED TABLES

Topic	File	Table No.	Data Content
2000 Census - SF1 Data (100% Count)			
Population	SF1	P1	Total population
Population	SF1	P16	Population in households
Population	SF1	P37	Group quarters population by group quarters type
Housing supply	SF1	H1	Total housing units
Household characteristics	SF1	H4	Households by tenure
Housing supply	SF1	H5	Vacancy status (complete profile)
Household characteristics	SF1	H11	Total population in occupied housing units by tenure
Household characteristics	SF1	H12	Average household size - occupied units by tenure
Household characteristics	SF1	H15	Tenure by number of persons in household
Household characteristics	SF1	H16	Tenure by age of householder
2000 Census - SF3 Data (Based on a Sample)			
Workplace	SF3	P26	Place of work for resident workers age 16+ State/county level
Workplace	SF3	P28	Place of work for resident workers age 16+ MSA/PMSA level
Income	SF3	P52	Household income in 1999
Income	SF3	P53	Median household income in 1999
Income	SF3	P55	Age of householder by income in 1999
Income	SF3	P56	Median household income in 1999 by age of householder
Income	SF3	P77	Median family income in 1999
Income	SF3	P82	Per capita income in 1999
Disability by age	SF3	PCT30	Sex by age by self-care disability for the civilian non-institutional population
Disability by age	SF3	PCT31	Sex by age by go-outside-home disability for the civilian non-institutional population
Housing supply	SF3	H30	Units in structure (Note: 1990 equivalent data was 100% count)
Housing supply	SF3	H31	Units in structure for vacant units (Note: 1990 equivalent data was 100% count)
Household characteristics	SF3	H32	Tenure by units in structure (Note: 1990 equivalent data was 100% count)
Household characteristics	SF3	H33	Population in occupied units by units in structure (Note: 1990 equivalent data was 100% count)
Housing supply	SF3	H36	Tenure by year structure built
Housing supply	SF3	H42	Tenure by number of bedrooms in unit
Rental costs	SF3	H62	Gross rent
Rental costs	SF3	H63	Median gross rent
Rental costs	SF3	H67	Bedrooms by gross rent
Rental costs	SF3	H69	Gross rent as percent of household income in 1999 (payment ratios up to 50%+)
Rental costs	SF3	H71	Age by gross rent as percent of household income in 1999
Rental costs	SF3	H73	Household income in 1999 by gross rent as a percent of household income
Ownership costs - single family	SF3	H74	Value for Census "specified" owner occupied units (see Census definitions for exclusions)
Ownership costs	SF3	H84	Value for all owner-occupied units
Ownership costs - single family	SF3	H96	Age of householder by monthly ownership costs - Census "specified" owner occupied units
Ownership costs - single family	SF3	H97	Household income in 1999 by monthly ownership costs as a percent of household income - Census "specified" owner occupied units
Income by tenure	SF3	HCT11	Tenure by household income in 1999