

# Assumptions and Methodology for Forecasts of Population, Employment and Housing: Gorham East-West Corridor Study

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## **Overview**

The allocation process used for this study assures consistency with county level forecasted levels. The approach taken emphasizes the continued outward movement of population away from the urban core, continued decline in the share of Cumberland County population held by the urban core, and the concentration of employment growth in existing centers of employment.

## **County Population and Employment**

The forecasts of population, housing and employment began with county-wide forecasts of Cumberland and York counties out to 2035 using the REMI model maintained by the Maine Center for Business and Economic Research at USM. The most recent version of the REMI model was purchased for the project. This version had the last year of history as 2007; employment data were updated to 2008 levels based on Quarterly Census of Employment and Wages data from Maine DOL.

The baseline forecasts were then adjusted to incorporate the effects of the current recession and the closing of Naval Air Station Brunswick. The recession adjustments made the baseline forecast approximately the same as the current New England Economic Partnership short term forecast (differences are due to different measures and underlying structures in the models). The forecasts were further adjusted to account for the REMI model's tendency to over-forecast economic migration and also to adjust what were considered to be too pessimistic a result for retail employment. Such adjustments are a normal part of the forecasting process.

Once county-wide estimates of population and employment growth were completed, the next steps took the county-wide figures and distributed them first to the towns and then to the TAZ's (Transportation Analysis Zone). within each town as described below. This process assures consistency with the overall county forecast.

## **Population and Households**

To estimate the traffic impacts generated by a given level of population, it is necessary to estimate the dwelling units (both year round and seasonal) that will be located in each TAZ in the target year. The number of dwelling units is a function of the number of households, which is in turn a function of total population, average household size, and occupancy rates.

To get to total population in a town, a two-stage process was used in which population is first allocated to zones in each county and then to each town. Cumberland County was divided into three zones:

- Zone 1: the core cities comprising Portland, South Portland, Westbrook, and Brunswick (which is a core city within its own sub-region).
- Zone 2: The inner suburbs of Cape Elizabeth, Scarborough, Gorham, Windham, Falmouth, Yarmouth, Cumberland, and Freeport.
- Zone 3: The outer suburbs, comprising all other communities in Cumberland County.

York County was also divided into three zones based on proximity to the study area:

- Zone 1: the nearest towns to the study area comprising Buxton and Hollis.
- Zone 2: the middle zone comprising Biddeford, Dayton, Limington, Old Orchard Beach, and Saco.
- Zone 3: All other York County towns

Each zone's share of the county was determined based on the zone's projected share of county population in 2035. The projected share was estimated by taking the change in the zone's share between 1990 and 2008 and projecting that rate of change forward as a compound interest rate to 2035. The projected shares were then normalized to equal 100%. See Note 1.

Within a zone, each town's population was estimated by projecting that town's share of the zone based on 1990-2008 in the same manner as the zone's share of the county was projected.

Once a total population for 2035 for each town was estimated, total households were estimated by first subtracting the group quarters (this is group or transient housing such as military barracks or college dormitories) population for each town (assumed to be the same as in 2000, the last time this measurement was taken) and thus deriving "population in households". This population in households was then divided by a projection of average household size for Cumberland County and larger municipalities, from the Census's American Community Survey.<sup>1</sup> This yielded a projection of households by municipality. Households were then adjusted for occupancy rates, again from the 2000 Census, to get total dwelling units, both year-round and seasonal. See Note 2.

Dwelling units were allocated to each TAZ based on that TAZ's estimated 2009 share of total dwelling units in the town. See Note 3. These 2009 estimates of dwelling units by TAZ were provided by Kevin Hooper. Again judgment was applied to keep certain TAZ's, particularly in shoreline areas, from developing beyond reasonable limits.

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<sup>1</sup> It was assumed that average household size in Portland is leveling off at 2.10 and for other more urban communities at 2.15. For other communities, the data implied that average household size has continued to fall since 2000, and while it was assumed that this decline would level off through the projection period, the total decline was pegged at 10% below each municipality's 2000 Census level.

## **Employment**

The REMI estimates of employment were grouped into the four sectors used in the transportation model (retail, services, manufacturing, all other). Employment in each sector was then allocated to each zone, town, and TAZ based on each geography's 2008 share of employment in these sectors as estimated by Kevin Hooper from the 2008 Quarterly Census of Employment establishment level data. However, no change in share for the towns was estimated because historic data on the distribution of employment were not available. Thus each TAZ's share of employment in 2035 is the same as in 2008 (though employment levels are obviously higher). See Note 4.

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**Note 1:**

Estimate the share of population in a zone within a county in 2035 and the population in a town in 2035:

$$S_z^{35} = \frac{P_z^{35}}{P_c^{35}} \quad (\text{Eq 1})$$

Where:

$S_z^{35}$  = The share of population in county c in zone z in 2035

$P_z^{35}$  = Population of zone z in 2035

$P_c^{35}$  = Population of county c in 2035

$$S_z^{08} = \frac{P_z^{08}}{P_c^{08}} \quad (\text{Eq 2})$$

Where:

$S_z^{08}$  = The share of population in county c in zone z at in 2008

$P_z^{08}$  = Population of zone z in 2008

$P_c^{08}$  = Population of county c at time t

$$S_z^{90} = \frac{P_z^{90}}{P_c^{90}} \quad (\text{Eq 3})$$

Where:

$S_z^{90}$  = The share of population in county c in zone z in 1990

$P_z^{90}$  = Population of zone z in 1990

$P_c^{90}$  = Population of county c in 1990

Estimate Zone Share of County:

$$P_z^{35} = \left( S_z^{08} * \left( 1 + \left( \frac{S_z^{08} * (t-1)}{S_z^{90}} \right) \right) \right) * P_c^{35} \quad (\text{Eq 4})$$

Estimate Town Share of Zone

$$P_t^{35} = \left( S_t^{08} * \left( 1 + \left( \frac{S_t^{08}}{S_t^{00}} \right)^{\left( \frac{t}{n} - 1 \right)} \right) \right) * P_z^{35} \quad (\text{Eq 5})$$

Where: n= number of years 1990-2008

**Note 2:**

Estimate dwelling units in a town and in a TZ

$$D_t^{35} = \frac{(P_t^{35} - G_t^{00}) * H_t}{R_t^{00}} \quad (\text{Eq 6})$$

Where:

$D_t^{35}$  = Dwelling units in town t in 2035

$G_t^{00}$  = Group quarters in town t in 2000

$H_t$  = Estimate of average household size in 2035 in town t

$R_t^{00}$  = Average occupancy rate in 2000

**Note 3:**

Estimate the dwelling units in a TAZ in 2035

$$D_z^{35} = D_t^{35} \left( \frac{D_z^{08}}{D_t^{08}} \right) \quad (\text{Eq 7})$$

Where:

$D_z^t$  = Dwelling units in TAZ z at time t

**Note 4:**

Estimate employment in a county zone, town, and TAZ

$$SE_{cz}^{08} = \frac{E_{cz}^{08}}{E_t^{08}} \quad (\text{Eq 8})$$

Where:

$SE_{c,z}^{08}$  = Share of employment in county zone in 2008

$E_{c,z}^{08}$  = Employment in county zone in 2008

$E_c^{08}$  = Employment in county in 2008

$$SE_c^{08} = \frac{E_c^{08}}{E_c^{08}} \text{ (Eq 9)}$$

Where:

$SE_t^{08}$  = Share of employment in town in 2008

$$SE_z^{08} = \frac{E_z^{08}}{E_t^{08}} \text{ (Eq 10)}$$

Where:

$SE_z^{08}$  = Share of employment in TAZ i in 2008

$$E_z^{35} = E_c^{35}(SE_{c,z}^{08})(SE_t^{08})(SE_z^{08}) \text{ (Eq 10)}$$

Where:

$E_z^{35}$  = Employment in 2035 in TAZ z

$E_c^{35}$  = Employment in 2035 in County