2030 Population and Employment Forecast Methodology

I. Overview

MORPC prepares a Regional Transportation Plan on a three year cycle. Future land use data sets are prepared as part of that plan. The land use prepared in 2002 for the 2004 Regional Transportation Plan is being updated to reflect new development information for the 2007 Regional Transportation Plan, and we have introduced the land use model developed during the Regional Connections project into our forecasting.

This data is a primary data set for the travel demand model that is used as a tool in determining future transportation projects. Your input and comments are very important. This data will be presented to the MORPC Policy Committee on March 9, 2006 and adopted as the official data set for regional transportation planning for the 2007 Transportation Plan in the spring of 2007.

The horizon year is 2030. Base year data were updated from year 2000 data to 2005 from residential building permit data that MORPC collects and employer files available through the Job and Family Service office. Maps and tables included in this packet include data from 2000, 2005 and 2030.

The final data set is prepared for MORPC's Traffic Analysis Zone geography. This is a special geography used for travel demand modeling. The edges of the TAZ's are hard, physical things such as railroads, rivers or roads. Political boundaries do not make TAZ boundaries. We have compiled the TAZ data into areas that approximate political boundaries to provide you with information at a local level. These are approximation of your community boundaries only. The values will not match specific information you may have exactly. Based on our analysis, we feel it is close.

The forecasts were developed using the land use model that was developed as part of Regional Connections, a region wide planning exercise that MORPC is engaged in. Many local planners and GIS staff people were involved in the development of this model. The model uses a ¼ mile square geography. We have taken the results of the model and transferred them into TAZ geography for our final products.

Following is discussion of how the model works and assumptions that were used to develop the 2030 forecasts.

II. Land Use Model

The land use model is a Microsoft Excel based application that calculates the projected 2030 population and employment to the grid level based on a set of data inputs. The model requires data to be developed using a GIS. This model assists MORPC staff in projecting population and employment at the TAZ level for the entire MORPC Data Collection Area (DCA).

Land Use Model Components

The Land Use Model considers multiple variables to allocate the employment and population across the region. These variables are provided by the State, local jurisdictions, and MORPC.

The five main variables are as follows:

- **Grids -** The seven county region has been divided into 40 acre square grids, each grid is approximately 1/4 mile squared. The existing and future land uses have been projected onto these grids using existing zoning and future land use plans. A list of land use plans referenced is attached. Because there is no standard set of land use or zoning used by all of the jurisdictions in the DCA, MORPC, with help from a technical committee consisting of local planners and GIS staff, created a general set of land use types that enable standardization of the dozens of unique zoning codes and land use plans in the region. The following are the land use types used by MORPC:
    - Residential High Urban
    - Residential Low Urban
    - Residential High Suburban
    - Residential Mod Suburban
    - Residential Suburban
    - Residential Low
    - Residential Rural
    - Residential Rural Estate
    - Agriculture
    - CBD
    - Corporate
    - Regional Commercial
    - Community Commercial
    - Neighborhood Commercial
    - Neighborhood Mix
    - Industrial
    - Light Industrial
    - Warehouse/Distribution
    - Quarry
    - Open Space
    - Park
    - Public Service

- **Raw Data** – The raw data consists of base population (2005), households (2005), and employment data (2005) at the grid level. The 2005 data were developed from local residential building permits that MORPC collects from local jurisdictions, and from employer files provided from the Ohio Jobs and Family Services office. New residential housing units were located on a GIS map to the TAZ, and then to the model grid. The list of employers was compared to a previous list from 2000 to identify changes in employment due to closures, new business openings, or changes in employment to existing employers. The employment data were coded into employment sectors of industrial, retail, office and other. Data were tabulated to the TAZ geography and then to the model grid geography.

- **Weighting** – The weighting is the aggregation of twenty separate variables that are used to measure the likelihood that an individual grid will be developed. These variables are scored at the grid level on a scale of 0 to 2, with 0 being equivalent to undevelopable, 1 equivalent to neutral, and 2 equivalent to certain development. These twenty scores are then multiplied together to calculate the total weight for each grid. The higher the total score, the more likely the grid will be developed. Any variable scored as a 0, which is true only when a grid is protected, is recognized as undevelopable by the model. The weighting variables can be divided into four categories: Land Use, Infrastructure, Economic Development, and Environmental.

A general description of the weighting variables follows:

Weight	Description	Score
Land Use		
Protected	The grid is a body of water, park, cemetery, conservation easement, or other designation that protects it from being developed for the foreseeable future.	0 (Grid is automatically weighted 0 and therefore undevelopable)
Incorporated	If the grid is wholly or partially incorporated	1.5
Existing Development	If the grid is less than 1 mile to existing development	1.5
Infrastructure		
Interchange	If the grid is within 3 miles of an existing or proposed freeway interchange. This includes future interchanges from the 2004 MORPC Transportation Plan.	1.5
Arterial Road	If the grid is within 1 mile of the existing or proposed arterial road network. This includes future major new roads from the 2004 MORPC Transportation Plan.	1.25
Sanitary Sewer	If the grid is within an existing or proposed sanitary sewer service area	1.5
Transit	If the grid contains a proposed trunk line transit improvement	1.25
Economic Development		
TIF	If the grid is wholly or partially within a Tax Incremental Financing (TIF) District (as of July 2005)	2
CRA	If the grid is wholly or partially within a Community Reinvestment Area (CRA) (as of July 2005)	1.5
CEDA	If the grid is wholly or partially within a Cooperative Economic Development Area (CRA) (as of July 2005)	
Environmental		
Floodplain	The percentage of the grid that is not in a 100 year flood plain	%
Slope	The percentage of the grid that has a slope of less than 12%	%
Wetlands	The percentage of the that is not in a ODNR designated wetland	%
Powerplant	If the grid is within 2 miles of an electric generation station	0.5
SW Transfer Station	If the grid is within 2 miles of a solid waste transfer station	0.5
WWTP	If the grid is within 1 mile of a waste water treatment plant	0.5
Noise Contours	If the grid is wholly or partly within the noise contours of an airport	0.5
Wellfield Protection Area	If the grid is wholly or partly within a wellfield protection area	0.5
Electrical Substation	If the grid contains an electric substation	0.75
Landfill	If the grid is within 2 miles of an active sanitary landfill	0.5
Big Darby Watershed	If the grid is wholly or partly within the Big Darby Watershed	0.5

Maps including existing land use, future land use, environmentally sensitive areas, areas with economic incentives, and the infrastructure assumptions are included with this information packet.

- **Build-out Rates** – The build-out rates are the households and jobs per acre that the model will use in calculating the 2030 allocation. The household rate is based on the future land use type and the typical housing density that is generally proposed for that type of land use. The employment build-out rates are calculated using current employment levels for each different land use category.

- **County Control Totals** – The county control totals are county level projected population and employment levels for 2030. The Ohio Department of Transportation (ODOT) mandates that we use population 2030 population projections provided by the Ohio Department of Development (ODOD). The projected employment control totals are derived from the assumed labor availability of the population, thus making it a function of the ODOD 2030 population estimates. The county population and employment control totals are as follows:

	Population			Employment			Employment control totals were developed from the population. A 5% unemployment rate and 70% labor force participation rate were assumed (67% for 1995) .
County	**2005**	**2030**	**Pct Change**	**2005**	**2030**	**Pct Change**	
Delaware	145,291	266,200	45%	92,466	177,023	91%	
Fairfield	121,850	201,010	39%	77,657	133,672	72%	
Franklin	1,144,546	1,326,180	14%	728,546	881,910	21%	
Licking	148,055	198,760	26%	94,218	132,175	40%	
Madison	38,275	46,520	18%	24,479	30,936	26%	
Pickaway	48,173	59,980	20%	30,588	39,887	30%	
Union	46,634	85,190	45%	29,661	56,651	91%	
Total	1,692,824	2,183,840	22%	1,077,616	1,452,254	35%	

- **Other Land Use Assumptions** – Other anecdotal information is factored into the model as well in order to account for situations or issues that may not be considered by the weighting variables. This includes information gathered from the Community Visits we periodically have with your community, land use information gathered from other transportation studies MORPC has been involved in, or other known development activity that we are aware of.

Running the Land Use Model

The computer model, using these five inputs, runs a complex series of macros which allocate the control totals of population and employment over the grids based on the future land-use, build-out rates, and weighting. The output consists of a table of grids which contain the 2030 projections for households and employment. The employment is then allocated to the different employment categories, manufacturing, retail, and office based on the land use categorization of the grid.

III. Transferal of Land Use Model Data to the Traffic Analysis Zone

The results of the model were then analyzed to ensure that they were reasonable compared to local projections and comprehensive plans. The gridded results were then translated to the Traffic Analysis Zone (TAZ) geography that is recognized by another computer model, the MORPC Travel Demand Model.

The TAZ level data is a primary set of input data for the MORPC Travel Demand Model. The results of the Travel Demand Model include estimated future traffic volumes that are used to help prioritize future transportation projects. Data input include population, housing units and employment by various employment sectors. In addition, MORPC uses the housing and employment data to calculate floor areas and acreages of these land use types.

Distribution of Employment by Sector

The grid level employment was allocated into industrial, retail, office, and other employment sectors based on the land use assigned to the grid. Employment forecasts developed by the Ohio Labor Market were consulted to assure that the resulting breakdown was consistent with other forecasts.

Floor Area Calculations – Transect

Floor areas were calculated from employment density factors that were developed based on employment type and the characteristic development intensity, or transect, in which the TAZ is located. The TAZ's were assigned to transect types that included CBD, Urban, Suburban and Rural. The CBD includes downtown Columbus. The Urban area was selected based on housing age. Census block groups which had a high amount of housing built before 1955 were identified as "Urban". Rural areas were identified as those areas still in agriculture or very low density residential uses. Suburban transects were the areas that fell between Rural and Urban. TAZ's were assigned to the transect types and employment densities were used to generate square feet. The employment densities for the various transects were calculated from historic land use data that MORPC maintains. *A map of the Transects is included in this information packet*.

Transect	Manufacturing Square Feet per Employee	Warehouse Square Feet per Employee	Retail Goods Square Feet per Employee	Retail Service Square Feet per Employee	Office Square Feet per Employee
Rural	778	1596	611	225	216
Exurban	737	1135	958	247	232
Suburban	648	602	705	551	197
Urban	711	552	946	253	183
CBD	878	1537	392	373	170

The results are displayed on several thematic maps included in this information packet. These maps include changes in population, housing units, employment, industrial square feet, retail square feet for two time periods including 2000-2005; and 2005-2030 at the TAZ level. Residential densities and percent of the TAZ that is developed were also mapped.

Residential Densities

Housing density assumptions were based on the land use type assigned to the grid from local planning documents. The residential densities used include:

Grid Land Use Type	Residential Density
Agriculture	20 acres per unit
Residential Rural Estate	5 acres per unit
Residential Rural	2 acres per unit
Residential Low	1 acre per unit
Residential Suburban	2 units per acre
Residential Moderate Suburban	4 units per acre
Residential High Suburban	6.5 units per acre
Residential Low Urban	12 units per acre
Residential High Urban	20 units per acre

Population Estimates

Population was estimated at the TAZ level based on the number of housing units and the Transect. Household sizes were developed for the transects based on 2000 census data. It was assumed that household sizes will decrease by 10 percent between 2000 and 2030.

Transect	Household Size 2000	Household Size 2005	Household Size 2030
Rural	2.47	2.44	2.23
Exurban	2.66	2.62	2.39
Suburban	2.46	2.43	2.21
Urban	2.34	2.31	2.11
CBD	1.77	1.75	1.75