

# Land Use Assumptions and the Plan Development Process

Travel demand is dependent upon the location and densities of land use development, since the need for transportation stems from our need to access goods, services, and other people within and beyond the region. Therefore, the formation of a regional transportation system plan must start with projections of future growth and the allocation of that growth within the region. This determines the potential demand for transportation between various points within and outside the region. At the same time, transportation investments can also affect land use development by improving mobility within and between certain areas of the region and increasing the accessibility of areas (e.g., through addition of an interchange). This transportation/land use connection must also be considered.

## ***Formulation of Goals and Policy Objectives***

The first step in any planning process is the formulation of goals and objectives, which then guide the design and preparation of the plan. Goals generally state the desired outcome, while policies and objectives outline strategies and specific actions identified to achieve the goals. Because the distinction between more general policies and more specific objectives is sometimes difficult to make, they have been combined as “policy objectives.” Goals and policy objectives were developed for the overall transportation system, land use and transportation system coordination, and the different elements of the transportation system. They are outlined in the following section of the plan.

One of the key objectives in terms of the plan development process relates to how roadway traffic congestion will be managed. All mobility options (transit, ridesharing, bicycling, walking) and operational strategies (Intelligent Transportation Systems, Travel Demand Management, Transportation Systems Management) will be considered before undertaking major capacity expansion (i.e., addition of general purpose travel lanes) projects. In addition, a higher level of congestion (generally Level of Service D) during peak travel periods will be accepted as a means of both encouraging use of alternative transportation modes and stretching limited funding for improvements. This approach is integrated into the MPO’s Congestion Management System (CMS) discussed beginning on page 49 of the plan.

## ***Inventory of Land Use, Socio-Economic, and Travel Characteristics and Trends and the Transportation System***

Preparation of forecasts of future growth and travel must begin with inventorying current land use development and socioeconomic and travel characteristics and trends as well as the current state of the transportation system, including motor vehicle traffic volumes and congestion on the roadway system and transit ridership.

A comprehensive countywide 2000 land use inventory was conducted by Dane County Regional Planning Commission (DCRPC) and Madison Area MPO staff. The land use inventory is always conducted at the beginning of each decade to coincide with the decennial Census, which provides data on population, households, employment by type, school enrollment, household income, vehicle ownership, and other socioeconomic characteristics of the population that are key factors in determining both overall travel demand and propensity to use public transit. Other data sources included a comprehensive 1999 countywide database of employers developed by MPO staff and information on recent and planned future developments obtained from City of Madison and other local planning departments.

Madison Area MPO staff uses small traffic analysis zones (TAZs) covering the entire county for the collection and analysis of the land use and socioeconomic data. There are over 1,000 TAZs countywide. The size and shape of the TAZs are based on factors such as existing and planned land use characteristics, natural boundaries and travel barriers (e.g., rivers, major roadways, rail corridors), U.S. Census Block boundaries, and travel production and attraction potential.

Transportation inventories completed for the regional transportation plan update included a comprehensive household travel survey of over 2,000 Dane County households conducted in 2001 as part of the National Household Transportation Survey (NHTS) and an origin-destination (O/D) survey conducted in 2000 on all arterial roadways leading into Dane County. Wisconsin Department of Transportation (WisDOT) staff conducted these two surveys. MPO staff also collected journey-to-work data from the Census Transportation Planning Package (CTPP). These three data sources provided important information on regional travel patterns both for intra- and inter-county trips. 1999/2000 traffic count data and 1990-2000 traffic growth data was prepared for all arterial and collector roadways using data collected by WisDOT and the City

of Madison Traffic Engineering Division. Existing traffic congestion levels on the arterial and collector roadway system were then calculated based upon the observed traffic volumes and roadway capacities, using the regional TRANPLAN (TP+) travel simulation model. Transit ridership data at a system, route, and bus stop level was also obtained.

All of this data on land use, socioeconomic, and travel characteristics and the transportation system was summarized in Part I of the plan.

### ***Growth Forecasts and Allocation***

The next step in the planning process following the development and analysis of land use, socioeconomic, and transportation inventories is the preparation of forecasts of future population, households, and employment for the planning horizon year and the spatial allocation of this future growth around the planning area. The planning horizon year for this regional transportation plan update is 2030 and the planning area is the entire county. The MPO for the Madison area has traditionally always prepared countywide plans even though the MPO planning area does not cover the entire county. Regional travel patterns show the interdependence of the central and outer Dane County areas as well as Dane County and adjacent counties.

The 2030 Dane County population and household forecasts prepared by the Wisconsin Department of Administration's (WisDOA) Demographic Services Center were used as control totals. This total county population and household growth was then sub-allocated down to the urban service areas (USAs) and rural areas of the county based primarily on the forecasts prepared by DCRPC staff (See Figure 4 on page 21, which shows the USAs). Some minor adjustments were made to USA forecasts prepared by the DCRPC based upon municipal population forecasts prepared by WisDOA.

MPO staff worked with DCRPC staff to prepare a Dane County employment forecast. The employment forecast was based upon a labor supply forecast, using WisDOA's 2030 population forecast by age group.<sup>12</sup> The forecast assumes an increase in the labor force participation rate and a continuing increase in commuting into the county from workers residing in adjacent counties. MPO staff then allocated the forecast county employment to the urban service areas (USAs) based primarily on the USA population forecasts. In other words, the same countywide percentage change in the ratio of population to employment from 2000 to 2030 was assumed for each USA. Adjustments were made in some cases (i.e., allocating more or less employment in relation to population) based upon local land use plans, the location of planned employment centers, the change in the population/employment ratio for each USA from 1990 to 2000, and professional judgment.<sup>13</sup> A small amount of employment was also allocated to the rural areas.

Table 23, on the next page, shows the 2000 and forecast 2030 population and employment for the central urban service area (CUSA), urban service areas (USAs) for cities and villages in central Dane County, USAs for outer county villages, and the very small or limited USAs and rural unsewered areas.

### Countywide Composite of Local Land Use Plans

The next step in the process was to allocate the 2030 forecast population, households, and employment by USA and the rural areas down to the traffic analysis zone (TAZ) level. In order to do this, MPO staff obtained the most recent comprehensive plans and neighborhood development plans from communities in the county and prepared a composite land use map of planned future growth (See Figure 38, on page 120). Adjustments from local plans were made in a few cases to maintain consistency with regional land use plan goals and objectives, in particular that urban development occur within urban service areas where the full range of urban services can be provided.

The comprehensive land use plans for many cities and villages provide for more than 25-30 years of growth. The allocation of forecast 2030 growth constituted far less than a build out scenario of the planned growth shown in Figure 38. For example, the allocation of growth to City of Madison peripheral neighborhoods constituted around 60% of the planned population and households and 70% of the planned employment based upon the recommended densities in the neighborhood development plans. For many suburban communities, allocated 2030 growth constituted 50% or less of planned population and households and less than 40% of planned employment. Where plans included information on the phasing of development, that information was used in the growth allocations.

<sup>12</sup>A trend forecast was initially prepared, but dismissed as not realistic due to the large percentage of the population ("baby boomers") that will reach retirement age during the planning period. Realization of the trend forecast would have required an unlikely massive in-migration of workers.

<sup>13</sup> Reliable employment data at the municipal or USA level was not available prior to 1990.

**TABLE 23  
2030 FORECAST POPULATION AND PLACE OF WORK EMPLOYMENT BY URBAN SERVICE AREA**

Urban Service Area	2000		2030		2000-2030 Change			
	Population	Employment	Population	Employment	Population Change Number	Percent	Employment Change Number	Percent
<b>Central Urban Service Area (CUSA)</b> (includes Cities of Madison, Fitchburg, and Middleton, Village of Shorewood, Maple Bluff, and McFarland, and Town of Madison)	268,854	228,317	341,250	296,800	72,396	27%	68,483	30%
<b>Other Central Dane County USAs</b> (includes Cities of Sun Prairie, Stoughton, and Verona, and Villages of Waunakee, Cottage Grove, and Oregon, and the Northern USA (DeForest/Windsor))	70,244	32,009	127,100	56,450	56,856	81%	24,441	76%
<b>Outer Dane County USAs</b>	22,194	9,725	34,495	14,238	12,301	55%	4,513	46%
<b>Other Small, Limited USAs and Rural Areas</b>	65,234	14,965	77,155	15,112	11,921	18%	147	1%
<b>Dane County Total</b>	<b>426,526</b>	<b>285,016</b>	<b>580,000</b>	<b>382,600</b>	<b>153,474</b>	<b>36%</b>	<b>97,584</b>	<b>34%</b>

In terms of redevelopment in the City of Madison, the assumed land use scenario allocates over 5,200 new households with a population of over 9,100 and over 3,100 new jobs to the downtown and greater Isthmus areas. These numbers are generally consistent with assumptions in the City of Madison’s comprehensive plan. The growth was allocated based on building permits issued since 2000, planned and approved development projects, and planned redevelopment areas identified in the City’s comprehensive plan. Most of the employment was allocated to the East Isthmus rail corridor area. As part of the Transport 2020 (East-West Transit Corridor) Study, MPO staff will work with the study consultants and City of Madison staff to develop a “transit-oriented development” scenario that assumes an even greater amount of development and redevelopment around the planned rail transit stations.

Major Employment/Activity Centers

A concept carried forward from the previous 1997 *Dane County Land Use & Transportation Plan (Vision 2020)* is that of Major Employment/Activity Centers. This concept recognizes major concentrations of existing and projected employment and commercial activity. These concentrations of relatively intensive or large-scale mixed land uses result in the generation of large numbers of trips, requiring significant investments in transportation and other public facilities and services. At the same time, these centers can be effectively served by public transit, particularly if they are developed or redeveloped with higher densities, mixed land uses, and pedestrian-friendly designs.

Many of the existing centers have not been designed in this fashion, but plans call for new centers such as the new UW Research Park in the City of Madison’s Pioneer Neighborhood and Green Tech Village in Fitchburg to be more transit-supportive. There is also potential in the future for redeveloping some of the existing centers such as the West Towne and East Towne areas to be more transit-supportive as well. Development of higher density, mixed-use centers makes more efficient use of the transportation system and also provides persons with more choices to live and/or work in places where they have convenient transportation alternatives to the automobile.

The regional land use plan seeks to encourage development in these major activity centers, particularly for large-scale and region-serving activities as a means to maximize utilization of public facilities already in place. This also reduces the need to extend and improve transportation and other public facilities to serve new centers at unanticipated locations. The more numerous and dispersed these centers are, the more difficult they are to serve with public transit.

The major regional employment/activity centers are the downtown Madison and UW-Madison campus areas, which have the highest concentration of employment as well as major cultural, entertainment, and special event destinations. These centers are expected to remain the region’s primary activity hubs despite the fact that most employment and commercial growth over the last 25+ years has been in emerging centers on the urban periphery and these centers are expected to account for most future growth. Other major activity/employment centers on the West side include the greater UW Hospital & Clinics, Hilldale Shopping Center area, UW Research Park, greater West Towne area, Old Sauk Trails Office

Park/Greenway Center area, and Middleton Business Park. Two future centers, including a new UW Research Park, are planned in the Pioneer Neighborhood in the Mineral Point Road corridor. Other major activity/employment centers on the East/Northeast side include Oscar Mayer, MATC Truax campus and business park area, greater East Towne area, and the American Center/High Crossing area.

Figure 39, on the next page, shows all of the existing and future major regional employment/activity centers along with their project 2030 employment. The map illustrates the natural east-west transit corridor that exists connecting many of the existing and planned employment/activity centers. This general corridor includes around 80% of 2000 employment in all of Dane County as well as around 63% of the county population.

### ***The Madison Area MPO Travel Simulation Model***

The Madison Area MPO uses a TRANPLAN (TP+) regional travel simulation model for analysis of existing transportation conditions and forecasting future transportation conditions. As part of the regional transportation plan development process, this model was updated to use the TP+ software package and expanded countywide. Consultants were hired by WisDOT to assist MPO staff in updating the model and validating it using 2000 base year land use, socioeconomic, and travel data that was described above. A validated model is one that can accurately replicate existing traffic patterns and trip-making characteristics. Validation ensures that the model provides a firm foundation for forecasting future traffic conditions.

The regional travel simulation model is actually a set of different models for each of the four steps of the traditional modeling process (trip generation, trip distribution, mode choice, trip assignment) with computerized procedures used to systematically forecast travel patterns in response to changing land use development patterns, roadway and transit systems, and demographics. The model estimates shared and single occupancy motor vehicle trips, transit trips, and non-motorized trips, and assigns the motor vehicle and transit trips to roadway and transit networks in the model. Various statistics can then be calculated on the performance of the transportation system, including motor vehicle miles and hours of travel, traffic congestion levels (volume to capacity ratio) by roadway segment, and peak and non-peak period transit ridership by mode (rail, express bus, local bus) and route.

### ***Travel Demand Modeling Scenarios***

Following preparation of the 2030 growth forecasts and allocation of this growth down to the traffic zone analysis level, this data was coded into the regional travel simulation model. A series of future roadway and transit scenarios were then prepared to develop future year 2030 travel forecasts and evaluate the performance of the transportation system under these scenarios.

#### Existing plus Committed Projects

The first transportation scenario tested was the existing system plus roadway and transit capacity expansion projects with committed funding in the current 2006-2010 Transportation Improvement Program for the Dane County Area. The programmed roadway projects are listed in Table 24 on page 135 of the plan report. The transit projects included commuter bus service from the West Transfer Point to the City of Verona and Epic Systems' new campus and commuter service from the City of Sun Prairie to the North Transfer Point.

#### Transit Scenarios

Two major transit service expansion scenarios were then tested to determine how much future forecast motor vehicle traffic could be reduced prior to consideration of any roadway capacity improvements. The first transit scenario included: (1) Local bus service improvements recommended in the 2004-2008 Transit Development Program for the Madison Urban Area, including a new route connecting the South and East Transfer Points around the Southeast side, and new peripheral routes to serve developing neighborhoods; and (2) New express bus service from outlying cities and villages and peripheral urban area neighborhoods to the downtown/UW campus area with most routes providing through service that connects the transfer points. The second transit scenario modeled was a hybrid rail system in the East-West Transit Corridor with complementary express bus service and the local service improvements included in the first scenario. The hybrid rail system, which can run both on-street and on the rail line, includes two segments on both ends connecting Greenway Cen-

ter in Middleton and the new UW Research Park (west of the Beltline off Mineral Point Road) on the West side and the airport and Sun Prairie on the Northeast side. The hybrid rail system is one of the alternatives being considered as part of the Transport 2020 Study. The Transport 2020 Study is evaluating a starter system, however, while the MPO tested a more fully developed system.

While the travel model accounts for non-motorized trips, it does not have the capability to forecast changes in these trips based upon changes in the pedestrian and bicycle systems or pedestrian-friendly development designs. The travel model also cannot account for transportation systems management (TSM) strategies (e.g., ramp meters on the Beltline) or most travel demand management (TDM) strategies. However, the potential impacts of these strategies were also considered.<sup>14</sup>

### Roadway Scenarios

To meet remaining traffic congestion needs after implementation of an aggressive expansion and improvement of the transit system, a series of roadway improvement scenarios were considered.

The first roadway scenario included new two-lane collector street connections and extensions that help complete the “grid” street network, thereby distributing traffic as efficiently as possible. These included the following:

- New crossing of Interstate 94 west of Gaston Road
- Milwaukee Street extension to Gaston Road
- Extension of Eastpark Blvd. in the American Center to Portage Road
- Extension of Thompson Road across USH 151 to O’Keefe Avenue in Sun Prairie
- Extension of West Main Street in Sun Prairie from CTH C to Rattman Road
- Extension of Watts Road across the Beltline to Odana Road at Research Park Blvd.
- Extension of S. High Point Road from Mid-Town Rd. to Raymond Rd., connecting to southern segment of street
- Extension of Fitchrona Road from Nesbitt to McKee Road (CTH PD)
- Extension of Post Road from Fish Hatchery Road to existing Post Road
- Mid-Town Road realignment to connect directly to Raymond Road<sup>15</sup>
- Extension of Elderberry Road from existing terminus to Pleasant View Road

The second roadway scenario included local arterial roadway capacity expansion projects recommended in the 1997 Regional Transportation Plan. Almost all addressed areas of high existing or forecast traffic congestion. The exceptions were segments of Reiner/Sprecher Road on the East side and Pleasant View Road on the West side, which are important for connectivity purposes. Reiner/Sprecher Road will be done in phases with the segment from Interstate 94 to Buckeye Road already programmed with local funds. The following is the full list of projects:

- CTH M (West) (Mineral Point Road/CTH S to Cross Country Road)
- Mineral Point Road/CTH S (Beltline to Junction Road/CTH M)<sup>16</sup>
- Mineral Point Road (Junction Road/CTH M to Pioneer Road)
- McKee Road/CTH PD (Maple Grove Road to CTH M)
- Pleasant View Road (Mineral Point Road to USH 14)
- Reiner/Sprecher Road (USH 151 to USH 12/18)
- Cottage Grove Road (S. Thompson Drive to Sprecher Road)
- Lien Road (City View Drive to Reiner Road)

The scenario also included a capacity expansion on STH 19 between Sun Prairie and Waunakee, which was also recommended in the 1997 plan.

The third roadway scenario included all of the above projects and the North Mendota Parkway, which would include expanding to four-lane, 55 mph facilities STH 19 (Interstate 39/90 to STH 113) and STH 113 (STH 19 to CTH M) and expanding CTH M to a four-lane, 45 mph facility from the recently built four-lane segment west of STH 113 over to USH 12 at the Parmenter Street interchange. The segment from CTH K to USH 12/18 would be on new alignment.

<sup>14</sup>The model is sensitive to changes in fuel and parking costs. The impact on transit ridership of an increase in parking costs was tested in the earlier phase of the Transport 2020 Study.

<sup>15</sup>This project was modeled at four lanes.

<sup>16</sup>This would be expanded from four to six lanes. All others would be expanded to four lanes.

The fourth scenario included all of the above-listed projects plus the Verona Road/West Beltline project, expanding to six lanes both Verona Road north of McKee Road (CTH PD) and the Beltline from Verona Road to USH 14.

The fifth scenario analyzed the impact of additional interchanges on USH 14 at relocated Lacy Road in Fitchburg and on USH 12/18 at CTH AB.

Based upon the analysis from these modeling scenarios, the financial capacity analysis, and consultation with WisDOT and local officials, the recommended draft plan was developed and modeled to identify remaining areas of congestion that need to be addressed as part of the Congestion Management System (CMS). The recommended plan carries forward all of the local arterial capacity expansion projects from the 1997 plan.

The plan also includes capacity expansions to Interstate 94 (I-39/90 to CTH N) and Interstate 39/90 (USH 12/18 to County line), which show significant congestion and are important for inter-regional travel. The USH 51 project from north of STH 19 to CTH V is also included and addresses an identified need. While the modeling analysis showed a high level of congestion on Verona Road (CTH PD to Beltline), the Beltline, and USH 51 (Interstate to USH 12/18), no specific capacity expansion projects are included in the plan for these roadways because they are the subject of currently ongoing corridor studies. The specific improvement and funding sources for these projects(s) have not been determined. It is anticipated that the plan will be amended in the future to incorporate project recommendations generated from these corridor studies.

The plan includes a capacity expansion on CTH M (North) from Willow Road to CTH K. This is a part of the North Mendota Parkway project concept. The entire project is not included because an environmental study is needed for the western end of the parkway, which would be on new alignment, and funding has not been identified for the project.