



# **MADISON MEASURES**

## **2008**

**Mayor Dave Cieslewicz**  
**October 2, 2007**





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### An Introduction to the 2008 Edition of *Madison Measures* Mayor Dave Cieslewicz

*Madison Measures* is a compilation of key benchmarks that provide City of Madison residents, laypersons and decision-makers with a framework and context for policy discussions and budget deliberations. Benchmarks relate to a department or program's fundamental mission and activities. They are numeric values that can be used to illustrate trends.

We often get caught up in making decisions based on input measures like additional funding or staff, and we forget to ask what we are trying to accomplish. *Madison Measures* is about goals and the experiences and expectations of City residents. High-level benchmarks like these can prompt us to ask more detailed questions about changes in service levels, investigate their causes and explore solutions.

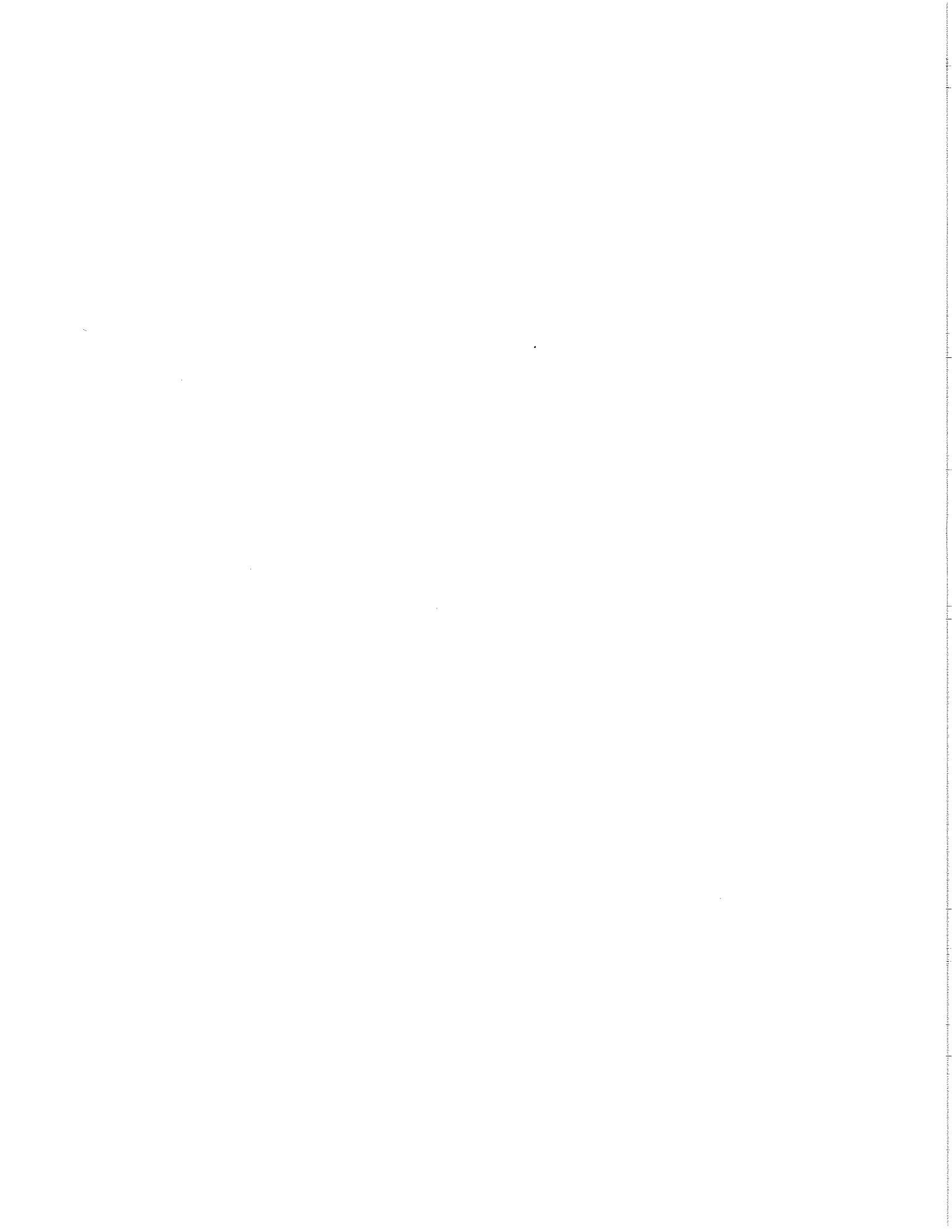
This marks the second year that benchmarks have been incorporated into my executive operating and capital budgets. These key indicators illustrate the challenges, needs and success of City programs. Having been through two budget cycles using *Madison Measures*, I have learned the true benefit of focusing on results.

This year's edition includes several budget highlights where benchmarks played a key role in prioritizing City spending. Specific examples include:

- Additional resources to address graffiti and various housing code violations;
- Avoiding fare increases and restoring Sunday hours of service at Metro Transit;
- Expanding the Sequoya Branch library to promote usership;
- Improving fire and emergency medical response times with the construction of Fire Station 12; and
- Capital investments to maintain high volume arterial streets.

My 2008 budget provides significant increases to enhance public safety. These investments include hiring 30 new police officers, funding for an accelerated academy to get many of these officers on the street faster, additional capacity to analyze crime trends to aid deployment, and continued civilianization of Police Department administrative positions. The budget also directs the Police Department to provide timely annual reports that outline several new performance measures and summary statistics. These reports are due July 1 every year and their results will be incorporated into future editions of *Madison Measures*.

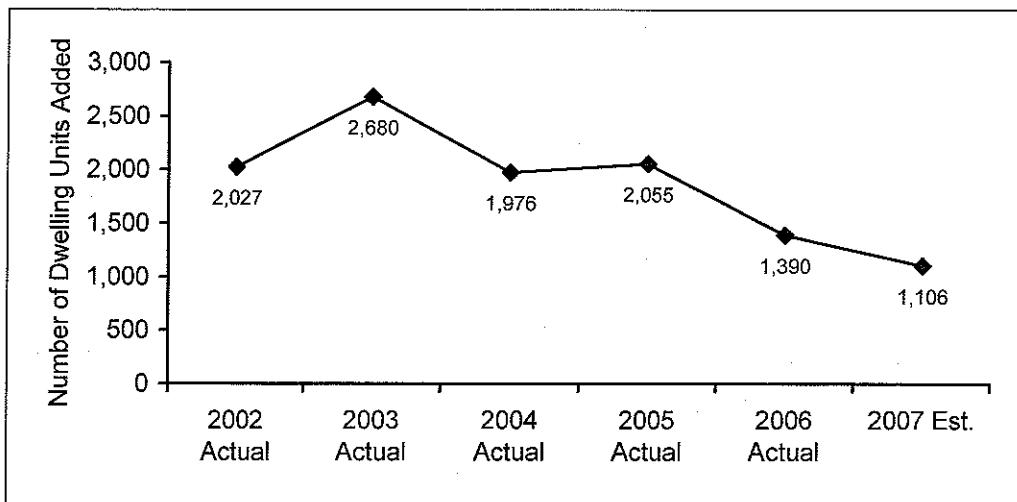
*Madison Measures* will be updated every year and will be continually improved based on feedback provided by contributors to and users of these benchmarks.



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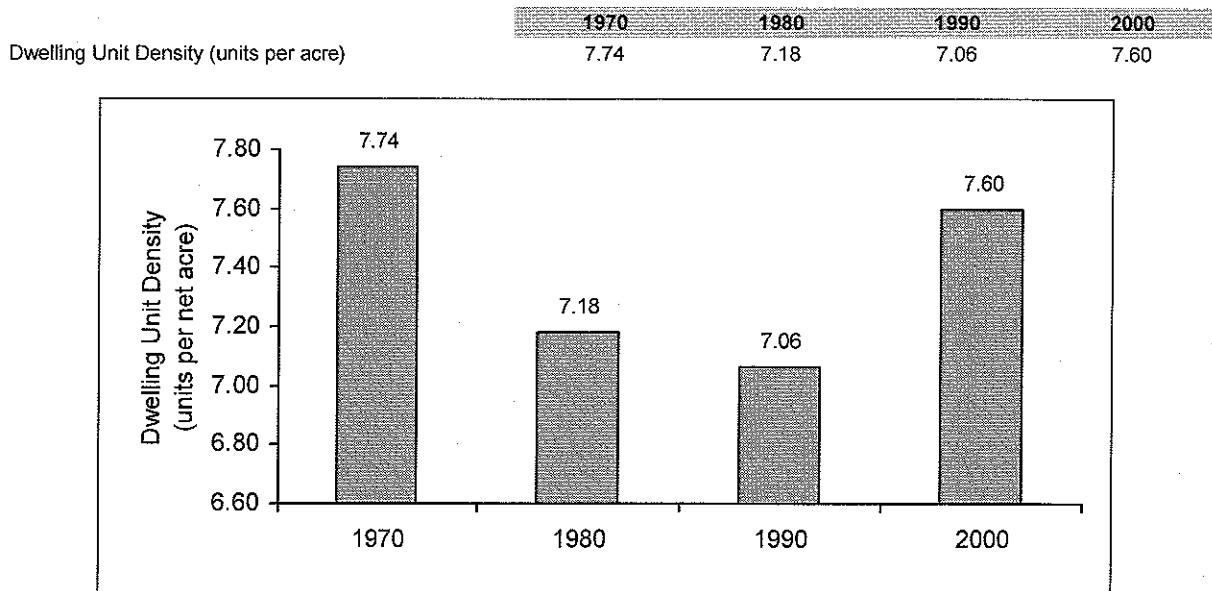


Source: City of Madison Neighborhood Preservation and Inspection Division

The 2007 estimate is based on year-to-date actuals and assumes the same number of units will be added in the second half of the year.

Timing issues and dramatic changes in the number of housing units added each year make the number of units added hard to predict, particularly for multifamily. Interest rates, national housing market trends and the availability of platted land can all have an impact on the number of dwelling units added in any given year.

### Dwelling Unit Density



Sources: U.S. Bureau of the Census (City of Madison dwelling units)  
Dane County Regional Planning Commission (City of Madison developed residential acreage)

Measuring the density of new residential development relates to the City's goal to utilize land resources efficiently and to develop at densities which are in conformance with the City's adopted plans. Historic data on the existing density of residential development throughout the City of Madison reflects the overall

residential densities in all Madison neighborhoods developed over the last 150 years. Data are currently available for 1970, 1980, 1990 and 2000, and the average net density of the City over this period has ranged between seven and eight dwelling units per acre.

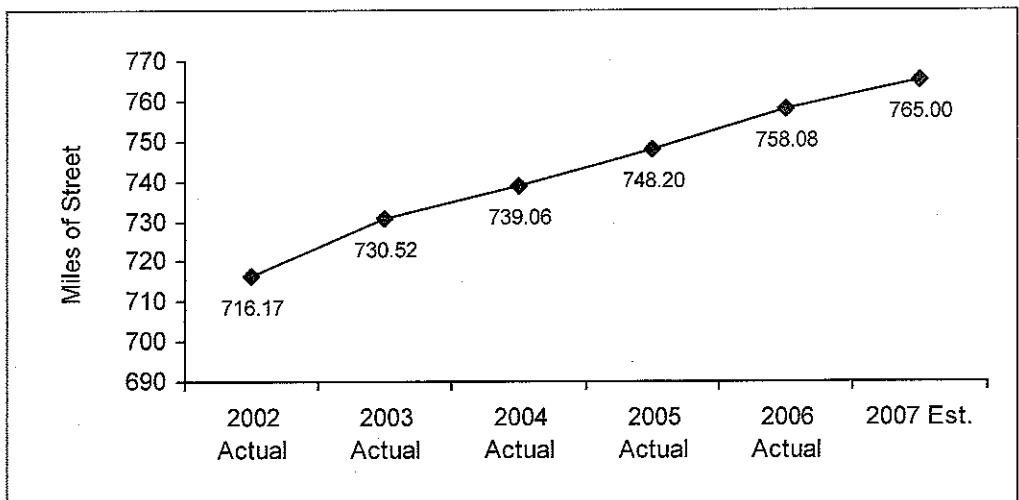
It should be recognized that the density of residential development varies significantly from neighborhood to neighborhood. For example, downtown residential neighborhoods close to the Capitol Square and campus have very high residential densities far in excess of the City-wide average compared to lower-density residential neighborhoods dominated by single-family detached homes on individual lots at the edge of the City. New development in both areas is guided by adopted City plans which recommend development densities within prescribed ranges. While the overall density of residential development occurring throughout the City in any given year is an overall indication of the efficiency of the use of land, these data may vary significantly from year to year depending on the amount of development occurring in peripheral neighborhoods and the downtown/Isthmus neighborhoods and the split between single-family and multi-family construction. In addition, because the city has a very large amount of existing residential development, the average density of the city as a whole will change very little from year-to-year, even if the density of new development is significantly different from the City-wide average. A more useful indicator may be the average density of the new residential developments that are approved each year - although this number may vary widely for the reasons described above.

The department does not currently track the aggregate residential density for all new development projects approved annually. In 2007, the Department of Planning and Community and Economic Development will begin to maintain a tabular listing of residential development densities for all residential projects approved by the Plan Commission and Common Council for new developments occurring within the City. This information will be included in future editions of Madison Measures.

#### **Miles of Street**

This benchmark measures the transportation infrastructure needed to accommodate the City and its growth. It can impact the delivery of certain municipal services.

	2002 Actual	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.
Miles of Street	716.17	730.52	739.06	748.20	758.08	765.00



Source: City of Madison Engineering Division

This number may also be useful as a denominator to analyze incremental costs or service ratios. Examples could include garbage collection costs per mile or time spent plowing streets on a per mile basis.

## Lake Quality

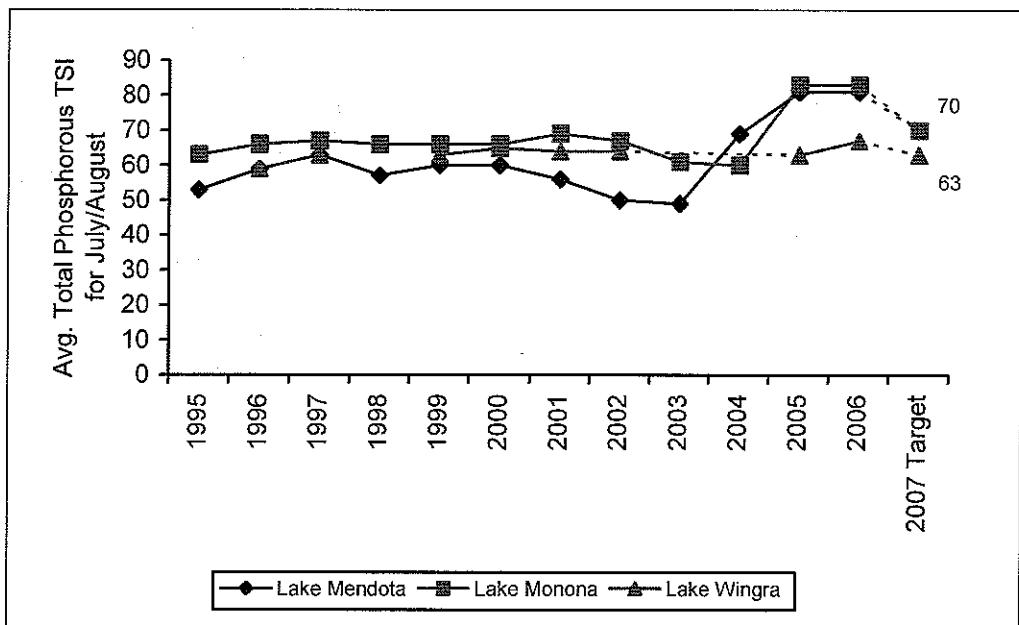
City Engineering, in conjunction with the Commission on the Environment, created a Clean Lakes report April 2006 which provides guidelines for working towards improving lake water quality over the next 15 years. In 2007, the report received its first update and was presented to the commission in August.

Lake quality can be measured in several ways, depending on the lake user's viewpoints. Total Phosphorus was chosen as the parameter for lake quality benchmark, as it can be controlled through erosion control practices and changes in agricultural and stormwater management practices. Phosphorus can directly affect other water quality parameters (clarity, algae, weeds).

The Lake Mendota Priority Watershed Plan outlines goals for reducing Total Phosphorus loading into Lake Mendota, which in turn should reduce the frequency of algal blooms. Goals were established for each land use. The City of Madison is close to meeting the urban runoff goal for phosphorus. Tracking lake water quality through summer (July/August) average Total Phosphorus over several years will be an indicator as to whether or not these reduction goals will affect lake quality over time.

The Clean Lakes report outlines ways the City of Madison can meet the urban runoff goals. The report is to be updated each year.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 Target
Lake Mendota	53	59	63	57	60	60	56	50	49	69	81	81	70
Lake Monona	63	66	67	66	66	66	69	67	61	60	83	83	70
Lake Wingra	n/a	59	63	n/a	63	65	64	64	n/a	n/a	63	67	63



Source: City of Madison Engineering Division

The benchmark chosen for monitoring lake water quality is the average Trophic State Index of Total Phosphorus for July and August each year. Total Phosphorous (TP) was chosen as a significant benchmark for the Lake Mendota Priority Watershed project. It is required for plant growth, and plays a key role in algae growth which in turn can impact water clarity.

Water samples are taken on a bi-weekly basis by University of Wisconsin Limnology staff and are tested in the lab for TP and other parameters. The results are entered into a logarithmic equation to better analyze trends and classify the current trophic status of the lake.

The Trophic State Index (TSI) is a number between 1 and 100, which indicates where a water body falls on a scale of biological activity. Trophic means the level of nutrients and biological activity in a water body. The lowest level (1-39) is called oligotrophic (or very little biological activity), the next is mesotrophic (40-50), eutrophic (51-70), and hypereutrophic (70+; extreme biological activity). Lakes Mendota, Monona and Wingra are considered eutrophic. Stormwater detention ponds can often become hyper-eutrophic.

Many different outside factors also have an effect on the TSI. For example, in years with higher than average rain, the levels of phosphorus may dramatically increase due to more runoff. In contrast, in drought years the Index may be very low. For this reason, it is important that this Index not be used as the only indicator of water quality. It is important to continue to monitor our lakes with this method, but to keep in mind that they can be affected by a variety of parameters.

Tracking the status of water quality parameters over the course of at least 10 years is better than taking one measurement out of a temporal context, due to the natural fluctuations within (e.g., food chain dynamics) and outside (e.g., climate) water bodies. Because there are so many internal variables that affect lake ecosystems, it can be very difficult to accurately predict changes within the lake.

The peaks in Mendota and Monona in 2005 may be explained by heavy late winter rain storms. Water is unable to adequately infiltrate when the ground is frozen. In addition, there was a manure spill in the Mendota watershed which may have contributed a higher than average concentration of nutrients early in the year.

Due to significant spring and early summer rains in 2006, it is likely that last year's average TP will be similar to 2005 when the actual number is determined by the Wisconsin Department of Natural Resources. If the rain fall is more normal in 2007, it is likely that the TP will dip back down. A goal is to keep the July and August TSI to 70 or below, as greater than 70 indicates a hyper-eutrophic status. It is not realistic to aim for a TSI below 50, as the area lakes are naturally eutrophic, and have been for many years. Therefore, the target for Mendota and Monona should be to maintain a TP TSI of 70 or below. Lake Wingra is not influenced by agricultural practices, and so should maintain a lower TSI level -- 63 was chosen as a realistic goal.

## Stormwater Utility

### MISSION

The Engineering Division has been tasked with meeting the requirements of NR-151 of the Wisconsin Administrative Code. NR-151 requires that the City reduce total suspended solids (TSS) from existing urban areas by 20% by 2008 and 40% by 2013.

### OBJECTIVES

TSS reduction can be accomplished in many ways including street sweeping, retention ponds, greenways, proprietary devices and catchbasin cleaning. By mid to late 2007, the Engineering Division must provide an estimate of the current level of TSS reduction to the Wisconsin Department of Natural Resources (WDNR) for their review and a program of how to meet the goals stated above in the mission. The original deadline of March 31, 2007, has been pushed back pending WDNR issuing guidance on the removal efficiency for street sweeping.

### STRATEGIES

Current best estimates are that the City has already achieved a TSS reduction of 23%. This estimate is based on very preliminary numbers and requires additional information be provided by the WDNR. Once that information is provided Engineering Division staff will complete a cost/benefit review of available options described above and propose a best course of action to meet the requirements of NR-151.

It is anticipated that the methods to meet the 40% goal will require expansion of the weekly street sweeping program to other downtown areas. Further, a program to require street sweeping of private parking lots may be proposed dependent on the level of credit the WDNR determines that a program of this may be granted.

### DESCRIPTION OF BENCHMARKS, DATA AND RESULTS

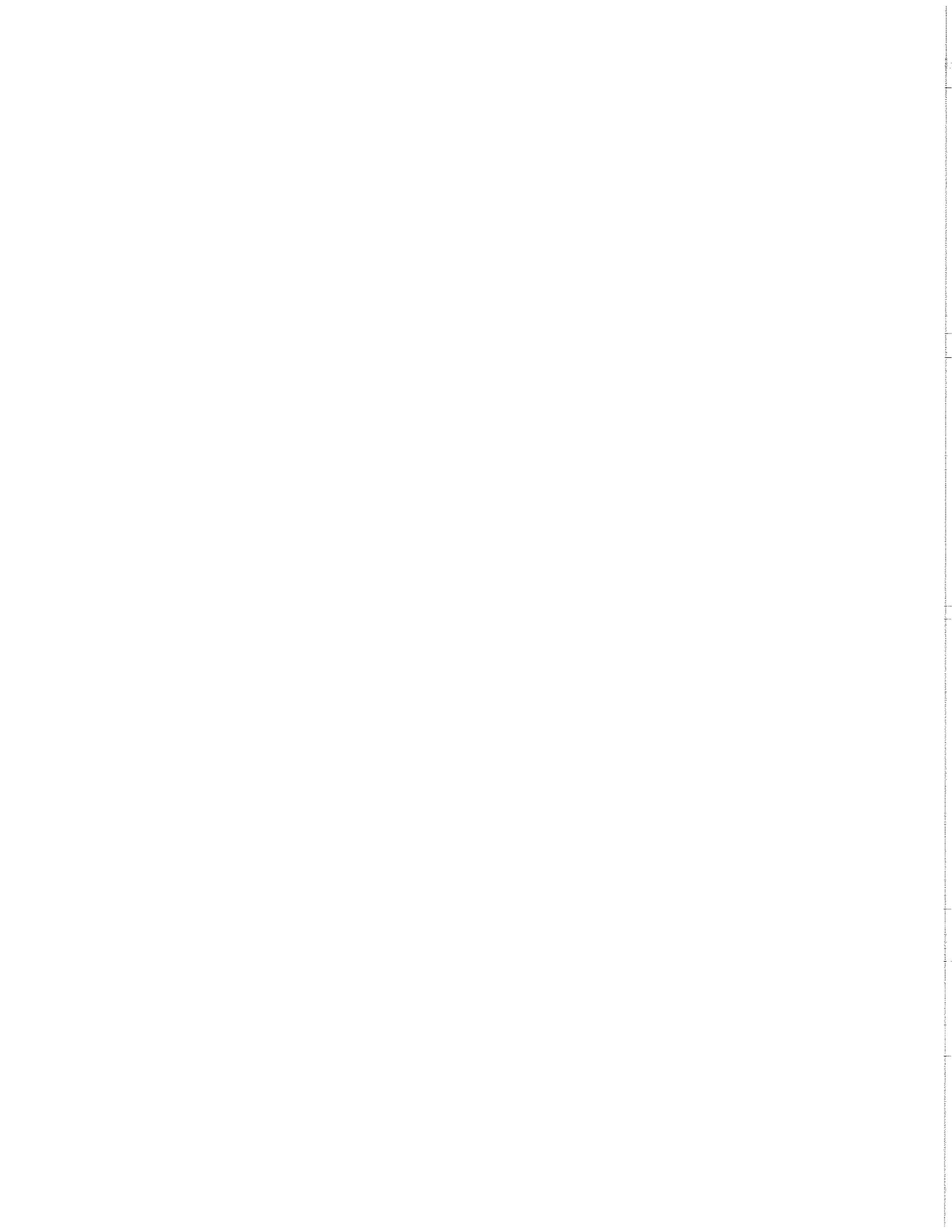
#### Percent Reduction in Total Suspended Solids

As described in the mission statement the 20% and 40% requirement is mandated by NR-151 and to remain in compliance with its Wisconsin Pollutant Discharge Elimination System (WPDES) stormwater discharge permit the City needs to meet this reduction standard. If the goal is met not only will the City meets its statutory requirement but will also provide for a cleaner (less sediment) lake and river environment.

TSS is used as the benchmark as it is required by NR-151. This is a reasonable benchmark for urban areas as TSS and to a greater extent Suspended Solids Concentration (SSC) are the only pollutants that can be reasonably modeled and treated. How the City is progressing toward our TSS goal would be estimated by the Source Loading Area Management Model (SLAMM) computer model as run by Engineering Division staff. This model is currently supported by the WDNR and represents the best available technology to estimate loads of this type in a large geographic area.

The TSS target was chosen by the WDNR as the highest standard that could in any reasonable way be met by existing urban areas with current technology. As discussed above TSS is the best pollutant measure for urban areas. The 40% goal, while mandated by the WDNR and anticipated to be reasonable, is proving to be much more difficult to meet than originally anticipated by the WDNR.

Provided that current management practices (sweeping, ponds, catchbasin cleaning) do not change, TSS loads from existing areas should never increase. Rather as areas are redeveloped and as existing programs are expanded, TSS loads will continue to decrease.



## Streets Division

### MISSION

Promote a clean and safe city by collecting, processing, and disposing of solid wastes and recyclables; cleaning, maintaining, and repairing streets; removing snow and ice from streets; removing noxious weeds; minimizing the environmental impact of these services; and providing customers with accurate and timely information about services offered.

### OBJECTIVES

1. Collect solid waste, organic, and recyclable materials in a manner that maximizes efficiency and customer convenience, while minimizing environmental impact.
2. Minimize noxious weeds on vacant lands.
3. Maintain safe driving surfaces and extend the useful life of city streets.
4. Maintain safe driving conditions during snow and ice events, while minimizing environmental impact of snow and ice control operations.
5. Minimize street debris to ensure attractive and safe driving surfaces, and to minimize environmental impact of storm water run-off.

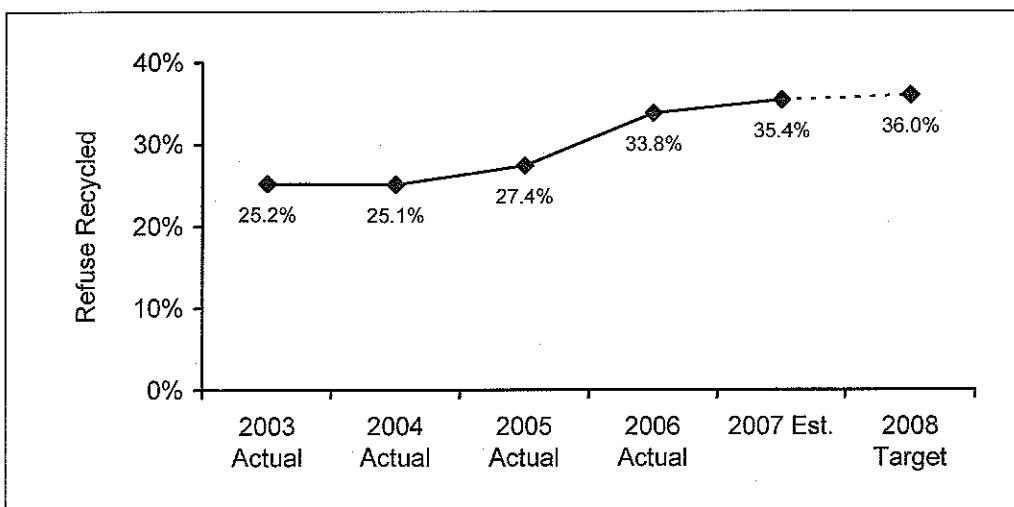
### STRATEGIES

1. Implemented in 2005, a single-stream automated cart collection system for recyclable materials to increase the amount of solid waste materials recycled, decrease the amount of solid waste materials landfilled, and increase customer convenience and participation in recycling.
2. Implement automated cart collection of refuse materials in 2007 to increase collection efficiency and reduce staff injuries.
3. Minimize the waste stream by providing services, products and education, such as compost bins, the Computer Round-Up and sponsorship of environmental action teams in Madison through EnAct.
4. Implement automated road patch trucks to increase the efficiency of pothole repair.
5. Increase the effectiveness of salting and plowing operations through improved equipment and technology such as wing plows, digitally calibrated salt spreaders and GPS tracking.

### DESCRIPTION OF BENCHMARKS, DATA AND RESULTS

#### Percent of Refuse Recycled

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Percent of Refuse Recycled	25.2%	25.1%	27.4%	33.8%	35.4%	36.0%



Source: City of Madison Streets Division

The Streets Division works to minimize environmental impact of refuse disposal by increasing the opportunities for and convenience of recycling, as well as by educating its customers about the refuse reducing principles of "reduce, reuse and recycle." Recycling refuse also costs the city less than landfilling it. Landfilling refuse costs \$28 per ton compared to an estimated average of \$21 net revenue per ton to recycle.

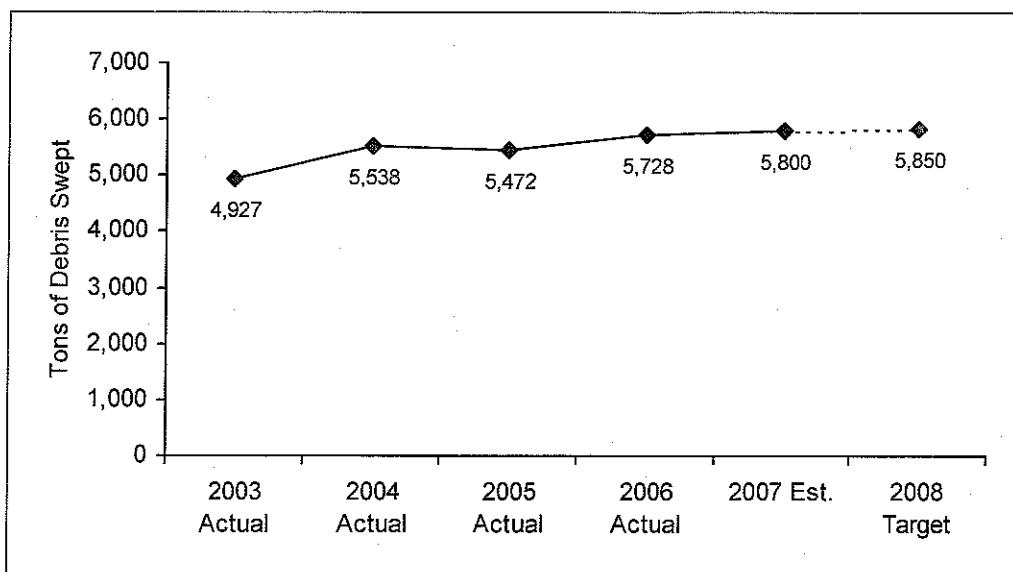
The division's new single-stream automated cart collection system for recyclable materials has increased customer convenience by eliminating the need to separate recyclable materials by bundling newspaper and placing mixed recyclable containers in Madison Pride recycling bags purchased at customer expense. Instead, the new system provides customers, at no additional charge, a wheeled recycling cart in which all recyclable materials can be placed. It also expands the types of recyclable materials that are collected.

The increased convenience combined with the increase in the types of materials recycled has increased recycling tonnage by 35% in 2006 compared to 2004, which is the last full year that utilized the former Madison Pride recycling bag collection system. In 2006, the use of automated carts and going to single stream recycling has proved very popular and the increased recycling options have led to over 6,000 households to upgrade from smaller carts to the largest cart since the program began.

EPA estimates the national average total recycling diversion rate is 32%. This number includes curbside recycling as outlined above, industrial recycling and other sources. The City of Madison recently obtained a total diversion rate of 57%.

#### Tons of Debris Swept

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Tons of Debris Swept	4,927	5,538	5,472	5,728	5,800	5,850



Source: City of Madison Streets Division

The Streets Division performs street sweeping to minimize street debris and to ensure attractive and safe driving surfaces. Street sweeping also reduces the water-borne particulates in storm water run-off which impacts the quality of area lakes and other surface water. Swept materials are used by the Dane County landfill as grading infill and are disposed of at no charge to the City.

The division typically runs nine street sweepers per day with as many as 18 per day in the Spring to remove dirt, gravel, heavy metals and other debris from city streets. All streets get swept at least once per month. Heavily trafficked streets and streets within the Clean Streets/Clean Lakes area are swept weekly.

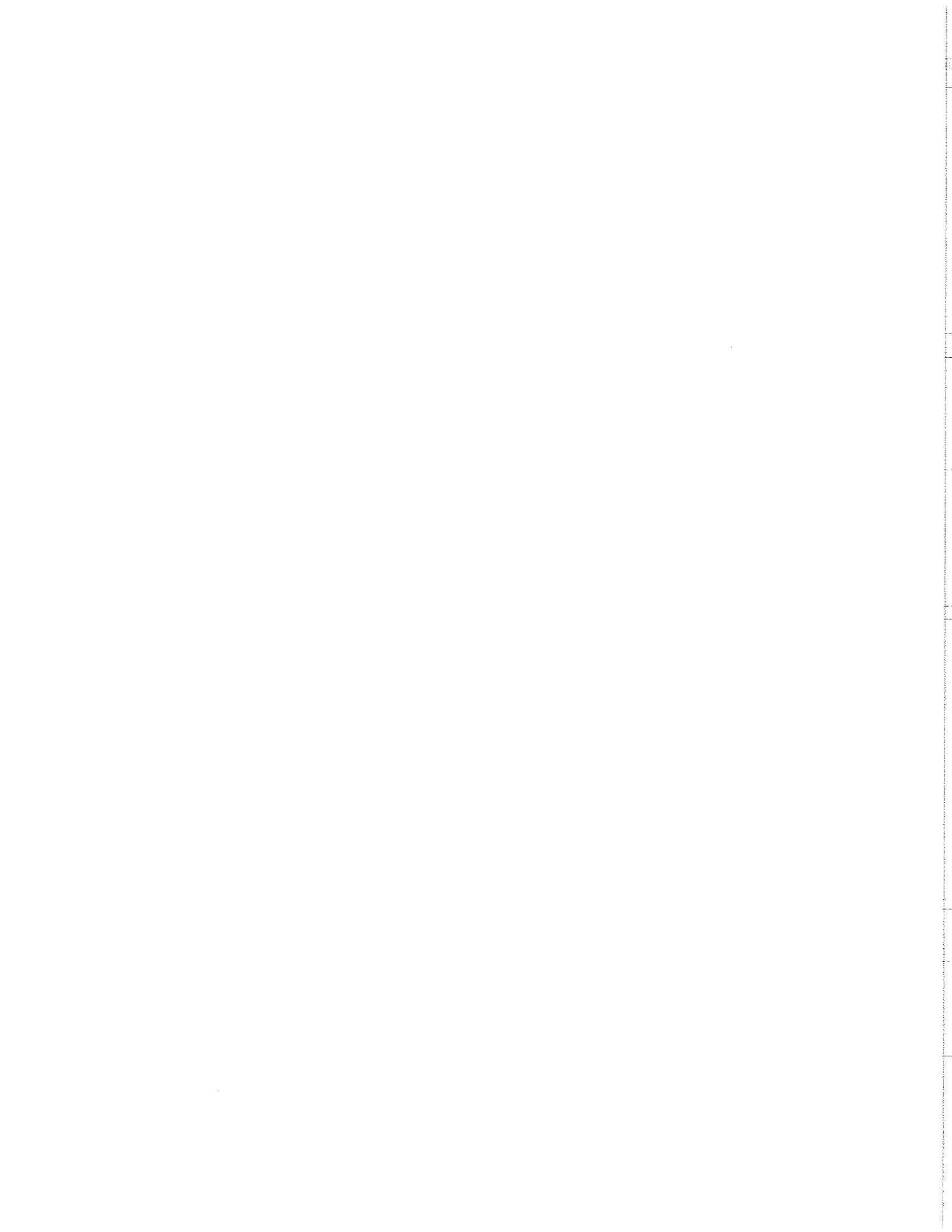
The increase in material swept from 2002 to 2004 can be explained by increases to the miles of streets swept due to City expansion. During 2002 and 2003 alone, the City added over 48 miles of street. Since then, the growth in City streets has slowed to 8.5 miles in 2004, nine in 2005 and five in 2006.

This activity contributes to the reduction of total suspended solids as required by state administrative code. For details, see the Stormwater Utility's benchmark for the reduction of total suspended solids on page 57.

#### Time to Clear Streets After Snow and Ice Events

This benchmark reflects the division's efforts to clear City streets in a timely manner after winter storms. This newly collected measure is based on the start and stop times of general plowing events. While Streets Division begins salting and plowing arterial streets and side street intersections as soon as snow accumulates, general plowing operations are conducted on the remaining side streets after three inches of snow has accumulated. This allows the Streets Division to focus its resources on arterial streets to ensure that snow and ice does not become compacted on streets with higher traffic volumes. It ensures that traffic has the ability to travel throughout the city at all times during a snow and ice event. It also reduces the number of times side streets must be reploowed during general plowing operations.

A general plowing operation takes approximately 10 to 12 hours, depending on conditions. Review of timesheets from prior years supports this average. However, it is difficult to determine the length of general plowing operations using driver timesheets, since drivers start and stop at different times throughout an operation in addition to being reassigned to other daily operations. During the 2006-2007 winter season, the Streets Division began recording the start and stop times for general plowing operations to allow for more accurate benchmarking data. There were seven general plowing operations



## Water Utility

### MISSION

The mission of the City of Madison Water Utility is to provide and maintain an adequate supply of safe water for consumption and fire protection, with quality service and at a reasonable price, for present and future generations.

### OBJECTIVES

The prime objective of Madison Water Utility is to keep its customers satisfied by working to the best of our ability, taking pride in our work and striving to make Madison Water Utility a first class organization.

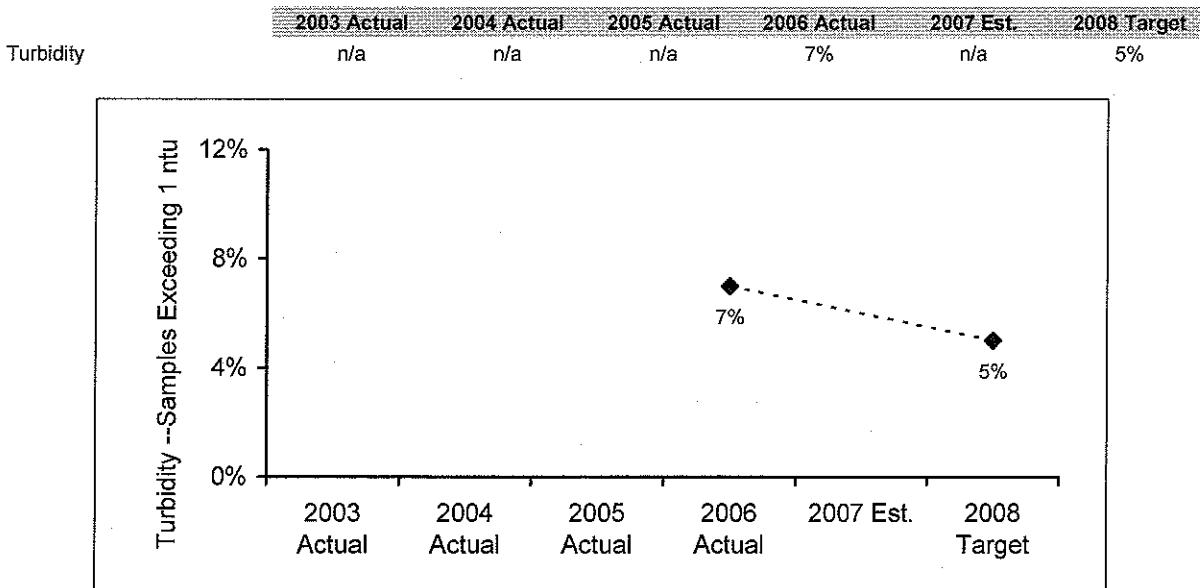
### STRATEGIES

Strategies used by the Utility to achieve its mission and objectives include:

1. Long-term planning for capital improvements.
2. Infrastructure management and business strategies.
3. Preventative maintenance and repair.
4. Continual monitoring, sampling and reporting of water quality.
5. Compliance with state and federal regulations.
6. Water conservation and source water protection.
7. Attention to financial matters, business practices and customer service.

### DESCRIPTION OF BENCHMARKS, DATA AND RESULTS

#### Water Quality



Source: City of Madison Water Utility

Turbidity. This benchmark is the percent of water quality samples taken at customers' taps with turbidity levels above 1 ntu. Turbidity is a direct measure of the cloudiness or discoloration of water measured in nephelometric turbidity units (ntu). The Water Utility collects data as part of ongoing scientifically

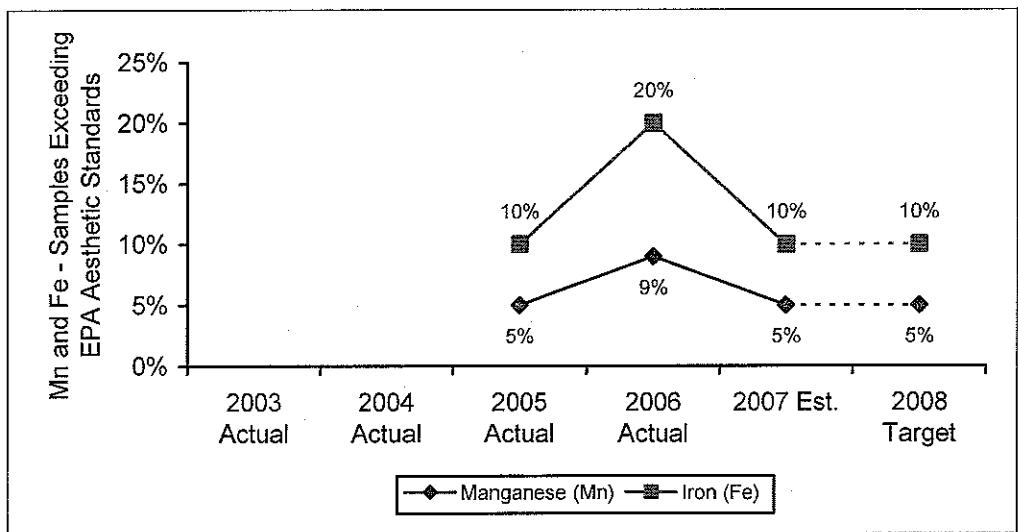
designed sampling programs. This benchmark is directly related to the Utility's strategies for preventative maintenance and for continual monitoring, sampling and reporting of water quality. It ties into the objective of keeping its customers satisfied and its mission to maintain an adequate supply of safe water for consumption.

Manganese and iron in drinking water cause discoloration of the water and result in the majority of complaints the Utility receives from customers about water quality. In 2005, the Utility began a comprehensive sampling program and other projects designed to reduce iron and manganese levels and incidents of discolored water at customers' taps. The benchmark and sampling programs do not represent levels and targets in the water system as a whole, but rather in areas where iron and manganese levels are highest and areas where the Utility receives the most discolored water reports. Current year data is not available. The Utility plans to conduct sampling during October and November of 2007 that may include turbidity.

The Utility's goal is to reduce, to the extent possible, the occurrences of turbidity above 1 ntu at customers' taps. There is no established standard for turbidity in a groundwater system, but providing water at 1 ntu would minimize aesthetic problems such as discolored water and staining of laundry.

Prior to 2006, the Utility did not have a program to test tap water for turbidity. Consequently, there is no benchmark data prior to 2006. The sampling program is being and will be conducted in the water service areas of wells producing the highest levels of iron and manganese in the system and in areas where discolored water incidents are reported. A reduction in percentage of samples exceeding 1 ntu would indicate success in a number of efforts designed to reduce iron and manganese and discolored water events, including (1) reducing pumpage at wells producing elevated iron and manganese levels; (2) replacement of old water mains; (3) more effective flushing procedures; and (4) other well and facility improvements that may be taken.

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Manganese (Mn)	n/a	n/a	5%	9%	5%	5%
Iron (Fe)	n/a	n/a	10%	20%	20%	10%



Source: City of Madison Water Utility

Manganese. This benchmark is the percent of water quality samples taken at customers' taps with manganese (Mn) levels above 50 parts per billion (ppb). The Water Utility collects data as part of ongoing scientifically designed sampling programs. This benchmark is directly related to the Utility's strategies for preventative maintenance and for continual monitoring, sampling and reporting of water quality. It ties into

the objective of keeping its customers satisfied and its mission to maintain an adequate supply of safe water for consumption.

Manganese and iron in drinking water cause discoloration of the water and result in the majority of complaints the Utility receives from customers about water quality. Extremely high levels of manganese consumed over long periods of time can also have adverse health effects. In 2005, the Utility began a comprehensive sampling program and other projects designed to reduce manganese levels and incidents of discolored water at customers' taps. The benchmark and sampling programs do not represent levels and targets in the water system as a whole, but rather in areas where manganese levels are highest and areas where the Utility receives the most discolored water reports. Current year estimates are based on 30 year-to-date samples, none of which exceeded the aesthetic limit for manganese. The Utility plans to conduct additional testing during October and November of 2007. Because these samples will target areas that have historically been served by wells with higher levels of manganese, the actual value for 2007 may exceed 5%.

The Utility's goal is to reduce to the extent possible, the occurrences of manganese levels above 50 ppb at customers' taps, which is the secondary standard established by U.S. EPA designed to minimize aesthetic problems such as discolored water and staining of laundry.

Prior to 2005, the Utility did not have a program to take tap water manganese samples. Consequently, there is no benchmark data prior to 2005. The sampling program is being and will be conducted in the water service areas of wells producing the highest levels of manganese in the system and in areas where discolored water incidents are reported. The percentage of samples with elevated manganese spiked in 2006 due to an extensive sampling program being conducted in areas served by wells producing high levels of manganese. A reduction in percentage of samples exceeding 50 ppb would indicate success in a number of efforts designed to reduce manganese and discolored water events, including (1) reducing pumpage at wells producing elevated manganese levels; (2) replacement of old water mains; (3) more effective flushing procedures; and (4) other well and facility improvements that may be taken.

Iron. This benchmark is the percent of water quality samples taken at customers' taps with iron (Fe) levels above 300 parts per billion (ppb). The Water Utility collects data as part of ongoing scientifically designed sampling programs. This benchmark is directly related to the Utility's strategies for preventative maintenance and for continual monitoring, sampling and reporting of water quality. It ties into the objective of keeping its customers satisfied and its mission to maintain an adequate supply of safe water for consumption.

Iron and manganese in drinking water cause discoloration of the water and result in the majority of complaints the Utility receives from customers about water quality. In 2005, the Utility began a comprehensive sampling program and other projects designed to reduce iron and manganese levels and incidents of discolored water at customers' taps. The benchmark and sampling programs do not represent levels and targets in the water system as a whole, but rather in areas where iron and manganese levels are highest and areas where the Utility receives the most discolored water reports. Current year estimates are based on 30 year-to-date samples, one of which exceeded the aesthetic limit for iron. The Utility plans to conduct additional testing during October and November of 2007. Due to system dynamics and because these samples will target areas that have historically been served by wells with higher levels of iron, the actual value for 2007 may be closer to 20%.

The Utility's goal is to reduce, to the extent possible, the occurrences of iron levels above 300 ppb at customers' taps, which is the secondary standard established by U.S. EPA designed to minimize aesthetic problems such as discolored water and staining of laundry.

Prior to 2005, the Utility did not have a program to take tap water iron and manganese samples. Consequently, there is no benchmark data prior to 2005. The sampling program is being and will be conducted in the water service areas of wells producing the highest levels of iron and manganese in the system and in areas where discolored water incidents are reported. The percentage of samples with elevated iron spiked in 2006 due to an extensive sampling program being conducted in areas served by

wells producing high levels of iron. A reduction in percentage of samples exceeding 300 ppb would indicate success in a number of efforts designed to reduce iron and manganese and discolored water events, including (1) reducing pumpage at wells producing elevated iron and manganese levels; (2) replacement of old water mains; (3) more effective flushing procedures; and (4) other well and facility improvements that may be taken.

Lead. Lead in Madison's drinking water comes from the corrosion of plumbing systems, primarily lead service lines (or laterals) running from water mains in the street to customers' water meters. Madison exceeded regulatory levels of lead in drinking water in 1991, leading to the Utility's Lead Service Replacement Program. Under this program, all lead service lines in the City will be replaced with copper lines by 2011. Using lead in drinking water as a benchmark is directly related to strategies for continual monitoring, sampling and reporting of water quality and compliance with state and federal regulations. It ties to the Utility's mission for providing safe water for consumption for present and future generations.

The last sampling of lead levels for regulatory purposes occurred in 1997, showing the Utility still slightly above regulatory levels. The Utility is not required to conduct regulatory sampling for lead again until after completion of the Lead Service Replacement Program. Substantial reduction in lead levels following the replacement program will indicate success of the program. Assuming regulatory levels are achieved, sampling for lead in drinking water will be conducted thereafter on a three-year cycle.

Copper. Like lead, copper in Madison's drinking water comes from the corrosion of plumbing systems, including water service lines and internal plumbing. Madison has always tested well below regulatory levels for copper in drinking water. As a benchmark, copper levels are directly related to strategies for continual monitoring, sampling and reporting of water quality and compliance with state and federal regulations. This benchmark ties to the Utility's mission for providing safe water for consumption for present and future generations.

The last sampling of copper levels for regulatory purposes occurred in 1997, showing the Utility well below regulatory levels. The Utility is not required to conduct regulatory sampling for copper again until after completion of the Lead Service Replacement Program. Maintenance of low copper levels will be an indicator that the Utility is maintaining high-quality drinking water. Following the Lead Service Replacement Program, sampling for copper in drinking water will be conducted on a three-year cycle.

Coliform Bacteria. The presence of coliform bacteria in drinking water is considered to be an indicator that the water may have been contaminated with microbiological organisms. The Utility maintains chlorine levels throughout the system to prevent contamination by bacteria and viruses. The Utility tests more than 200 samples every month from representative sites throughout the water system for coliform bacteria. This is far more testing than required by state and federal regulation. As a benchmark, presence or absence of coliform bacteria directly relates to strategies for continual monitoring, sampling and reporting of water quality and compliance with state and federal regulations. This benchmark ties to the Utility's mission for providing safe water for consumption for present and future generations.

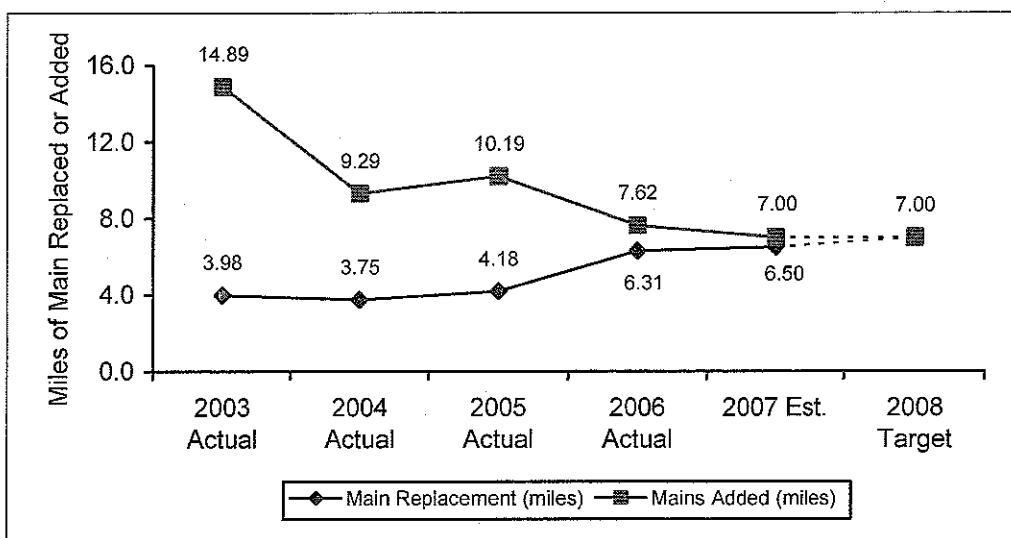
If a water sample is positive for coliform bacteria, the site is resampled to confirm the finding. Regulatory requirements mandate that less than 5% of monthly samples test positive for coliform bacteria. The Utility has never had a positive sample confirmed upon resampling. Maintenance of no coliform bacteria in the drinking water indicates appropriate levels of chlorine in the system and that the Utility is maintaining high-quality drinking water for consumption.

Volatile Organic Compounds. VOCs are derived from petroleum products or from solvents or cleaners. Leaking storage tanks or spills can allow VOCs to contaminate groundwater. The Utility samples all wells on a regular basis for the presence of VOCs. As a benchmark, presence or absence of VOCs directly relates to strategies for continual monitoring, sampling and reporting of water quality and compliance with state and federal regulations. This benchmark ties to the Utility's mission for providing safe water for consumption for present and future generations.

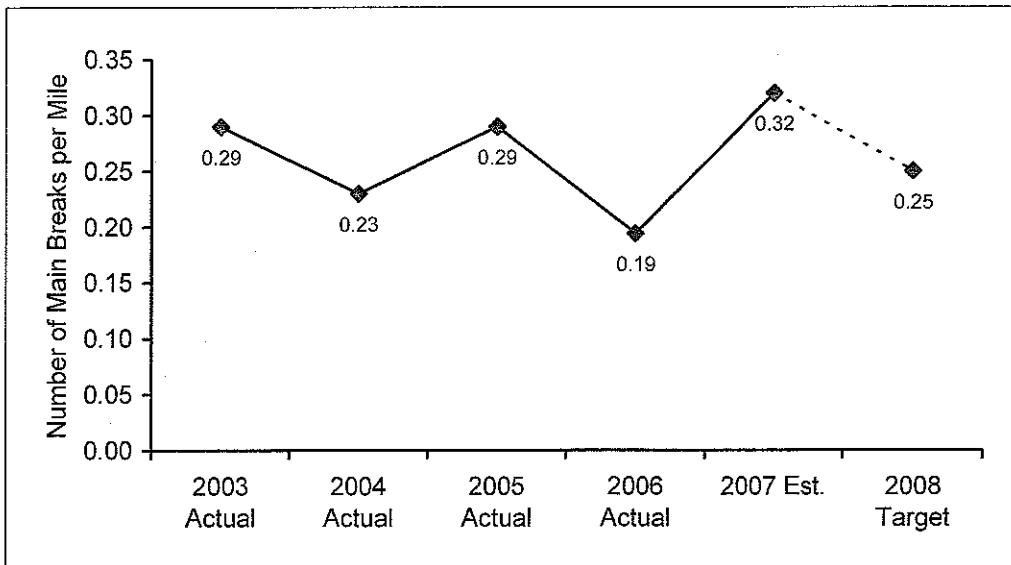
State and federal regulations establish maximum amounts of specific VOCs allowable in drinking water based on health and safety standards. A Utility is in violation of the regulation if the maximum level is exceeded as an average over three consecutive sampling occurrences. While the Utility has never violated the regulatory standard for any VOC, it did exceed the maximum amount allowable for carbon tetrachloride during single sampling events on two occasions in one well. Maintaining VOC levels below maximum allowable amounts at all times indicates that the Utility is maintaining high-quality drinking water for consumption.

### Main Replacement, Additions and Breaks

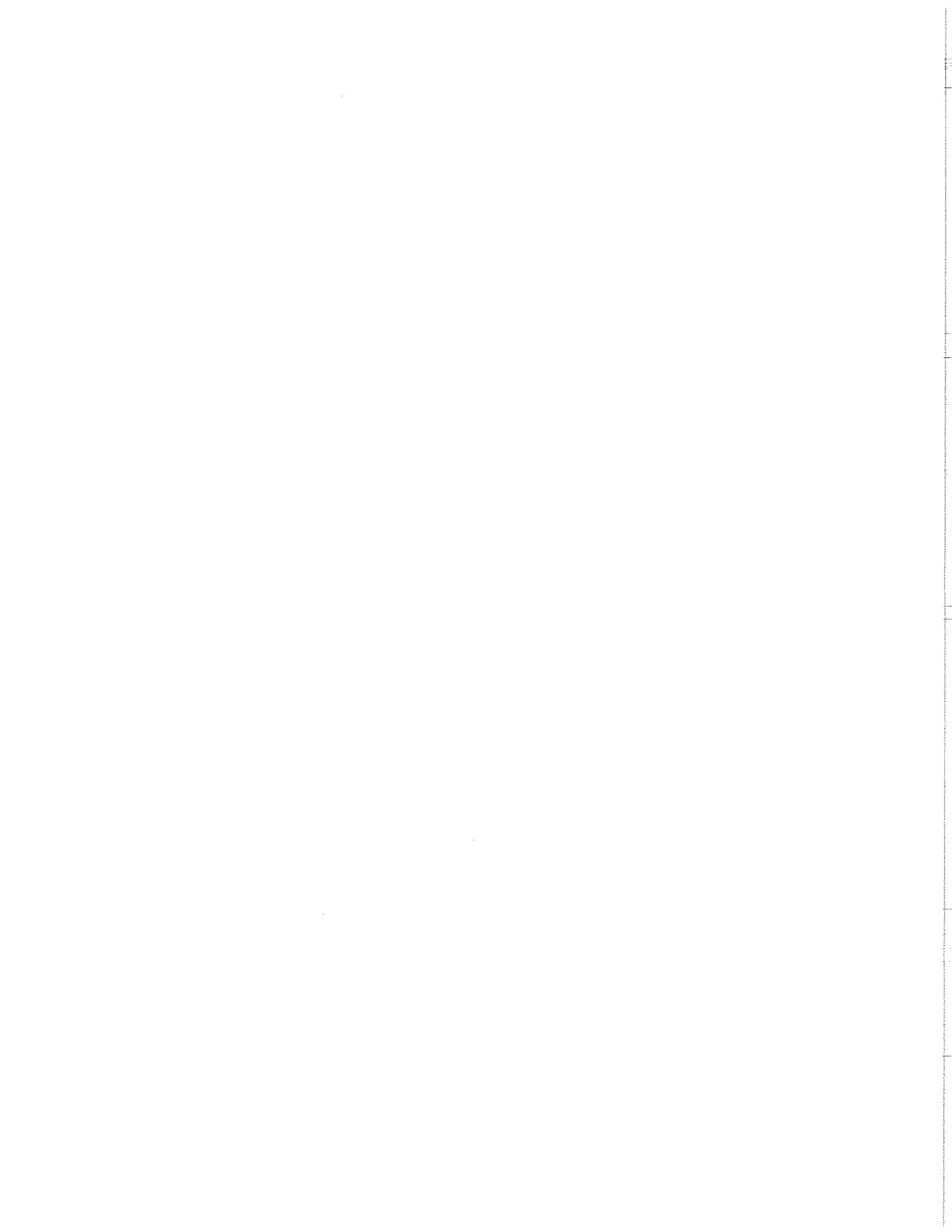
	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Main Replacement (miles)	3.98	3.75	4.18	6.31	6.50	7.00
Mains Added (miles)	14.89	9.29	10.19	7.62	7.00	7.00
Main Breaks per mile	0.29	0.23	0.29	0.19	0.32	0.25



Source: City of Madison Water Utility



Source: City of Madison Water Utility



Main Replacement. This benchmark is the number of miles of water main replaced annually. Data are compiled by the Water Utility as part of its ongoing water main replacement program. This benchmark represents the Utility's increased emphasis on and efforts toward replacement of aging infrastructure. The benchmark is related to the Utility's strategies for infrastructure management and ties into the Utility's mission to provide and maintain an adequate supply of safe water for consumption and fire protection for present and future generations.

Replacement of water mains is a good measure of the Utility's progress toward goals and objectives outlined in its Infrastructure Management Plan. While there is other aging infrastructure in the water system (pump stations, reservoirs, etc.) water mains are ubiquitous to the system and represent a continuum of infrastructure age from over 100 years old to present. The data are collected and compiled by the Utility annually.

The target value is a numeric goal based on industry standards and on projected needs set forth in the Utility's Infrastructure Management Plan.

Steady increase in the number of water mains replaced annually represents continual achievement toward its goal of replacing aging infrastructure.

Mains Added. This benchmark is the number of miles of main added to the system annually. It represents the net increase in miles of main after mains taken out of service are subtracted from new mains placed into service and reflects overall growth of the water system. This benchmark is related to the Utility's strategy for long-term planning for capital improvements and ties into the mission to provide an adequate supply of safe water for consumption and fire protection for present and future generations.

Mains added is a good benchmark for growth of the water system. The data are collected and compiled by the Utility annually. The target value is a numeric goal based on past experience, future projections of growth and budget recommendations.

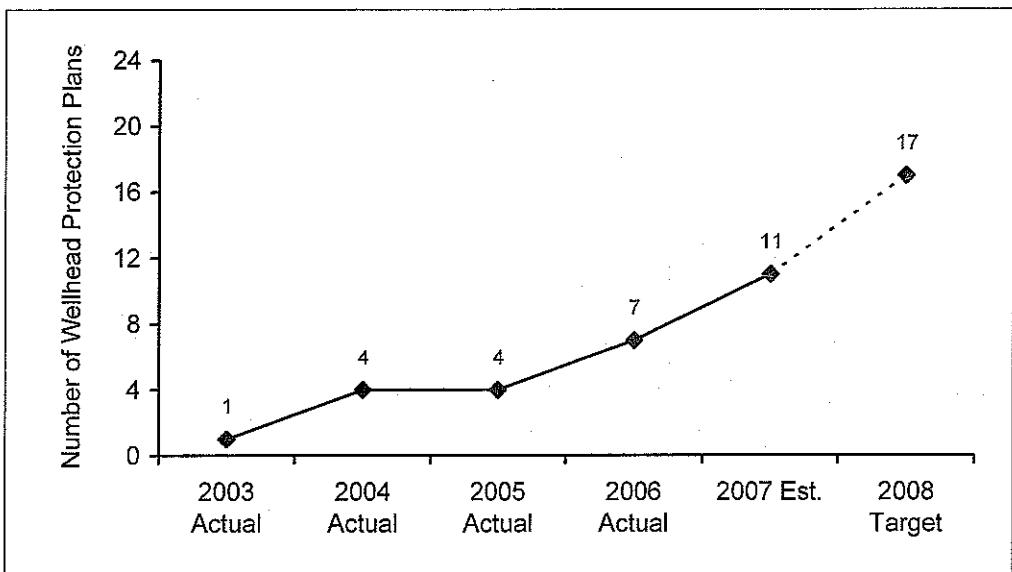
Main Breaks per Mile. This benchmark is the number of main breaks per mile of water mains in service. It is an indicator of the overall condition of the water system. This benchmark is related to the Utility's strategies for infrastructure management and preventative maintenance and repair. It ties into the mission to provide an adequate supply of safe water for consumption and fire protection for present and future generations.

Main breaks per mile provides an indicator of water system condition and repair. However, many other factors affect numbers of main breaks in any given year, most notably, temperature and weather conditions. If, however, there were a steady increase in breaks per mile over a number of years with various weather conditions, it may be a sign of an aging and deteriorating water system. The data are collected and compiled by the Utility annually. The current year estimate is based on experience and year-to-date data. The target value is a numeric goal based on an average of prior year data.

These data compare favorably to industry standards for this benchmark. They indicate that Utility water mains are in good condition and numbers of main breaks per mile are very reasonable.

### **Wellhead Protection Plans**

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Number of Wellhead Protection Plans in Place	1	4	4	7	11	17



Source: City of Madison Water Utility

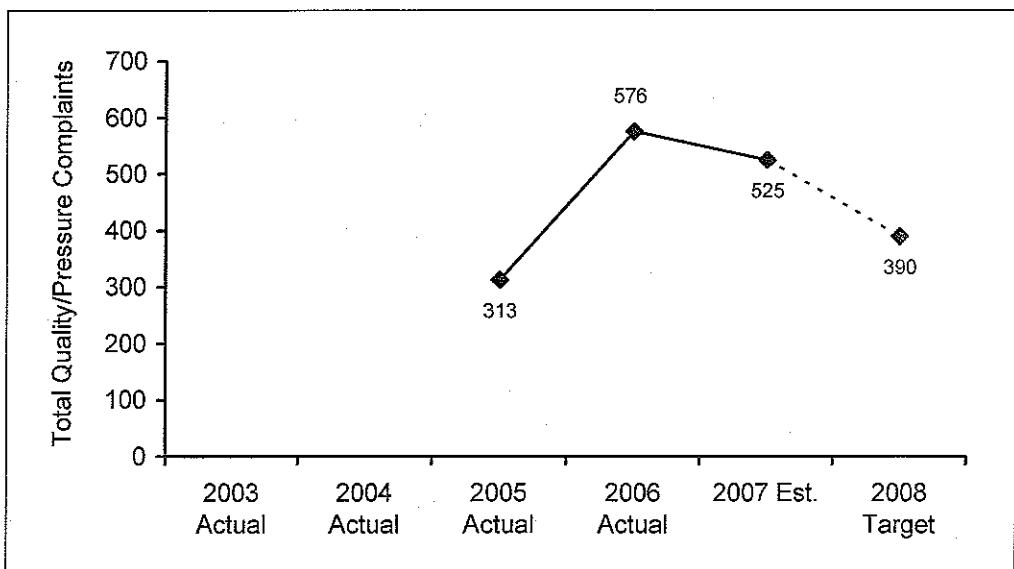
This benchmark is the number of wellhead protection plans adopted into City ordinance. The Utility is required by state and federal law to adopt a wellhead protection plan for any new well placed on-line. However, the City has committed to adopting wellhead protection plans for every new and existing well in the system. This benchmark is related to the Utility's strategies for compliance with state and federal regulations and for sourcewater protection. It is tied to the mission of providing safe water for consumption for present and future generations.

The City and Utility have committed to completing four wellhead protection plans per year until all wells in the system (23 wells are currently active) have an adopted plan. This benchmark is a direct measure of the accomplishment of that objective. The current year estimate is based on wellhead protection plans currently completed or underway.

The target value is based on the Utility's annual goal and its budget request for 2007. An increase in the number of adopted plans by five in 2007 and beyond indicates achievement of the stated goal.

#### Water Quality/Pressure Complaints

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Color/Manganese	n/a	n/a	247	456	320	250
Taste	n/a	n/a	24	33	55	50
Odor	n/a	n/a	34	43	90	50
Pressure	n/a	n/a	8	44	60	40
Total Water Quality/Pressure Complaints	n/a	n/a	313	576	525	390



Source: City of Madison Water Utility

Water quality complaints consist generally of reports of drinking water taste, odor and/or discoloration. Pressure complaints are usually reports of low pressure at the tap. Such events are a normal expectation of operating a public water system, but the Utility tries to minimize them to the extent possible. Receiving such complaints and reports is an important tool for identifying and resolving problems as they occur throughout the system. While the Utility has always responded to such complaints and reports, in 2005 it established a system for documenting the reports and response. As a benchmark, this data directly relates to the Utility's strategies for continual monitoring and reporting of water quality and attention to customer service. It ties to the Utility's objective of keeping its customers satisfied and its mission of providing an adequate supply of safe water for consumption and fire protection, with quality service, for present and future generations.

This benchmark provides a direct indication of customer perception of water quality and pressure. The current year estimate is based on data in the system and projections through the end of the year.

Color/manganese complaints peaked in 2006 and have been gradually decreasing. Typically, color complaints are related to flushing or specific disturbances in the distribution system including water main breaks. Taste and odor complaints increased in 2007 due to the Water Utility Board's decision to increase chlorine levels and media attention. Acclimation to higher chlorine levels is expected to result in fewer taste/odor calls. Finally, pressure complaints often coincide with flushing in which a valve is found in the closed position when it was thought to be open. As the unidirectional flushing program continues and more valves are routinely exercised, the number of water pressure calls is expected to decrease.

The target values are numeric goals that the Utility hopes to achieve for 2008, representing about 5 color/manganese, one taste, and one odor complaint per week and a 50% reduction in pressure complaints.

Data on customer complaints for the 2008 edition of *Madison Measures* is more inclusive than the previous edition.



## Metro Transit

### MISSION

The mission of Metro Transit is to provide safe, reliable, convenient and efficient public transportation to the citizens and visitors of the Metro Transit service area.

### OBJECTIVES

Metro Transit has two major objectives:

1. To increase ridership; and
2. To increase operational efficiency and effectiveness.

Both are the key elements of Strategic Annual Plans approved by the Transit and Parking Commission (TPC) for the past five years. Metro's Strategic Annual Plan outlines a wide range of initiatives to achieve these objectives.

### STRATEGIES

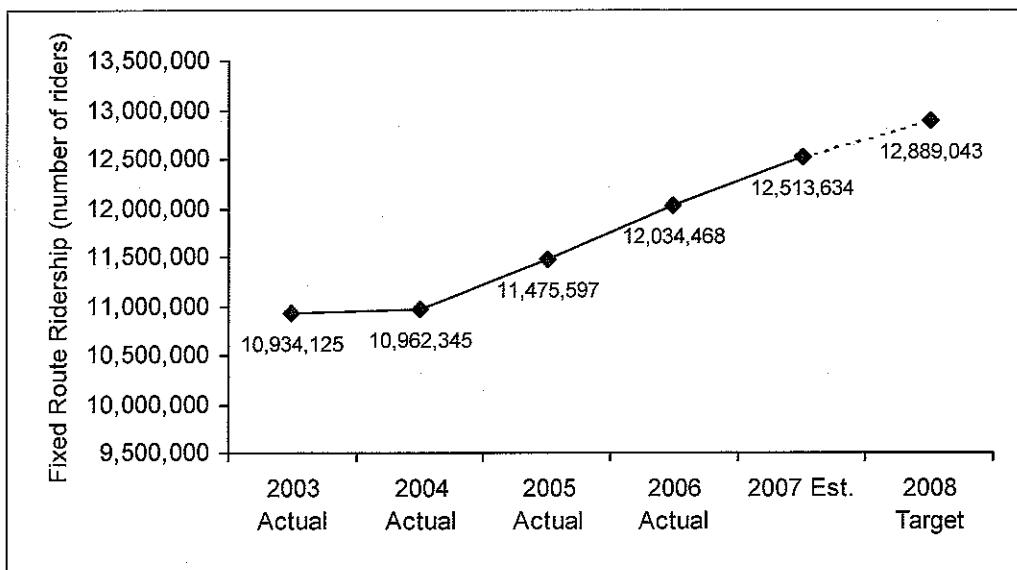
As it relates specifically to increased ridership:

1. Strategic redistribution of service hours through route restructures.
2. Expanded use of Unlimited Ride Pass and other ridership incentives.
3. Improved passenger amenities, including further Park & Ride development.
4. Target Marketing in connection with service improvements.

### DESCRIPTION OF BENCHMARKS, DATA AND RESULTS

#### Annual Fixed Route Ridership

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Annual Fixed Route Ridership	10,934,125	10,962,345	11,475,597	12,034,468	12,513,634	12,889,043



Source: Metro Transit

Increasing ridership is the first of five goals in Metro's Strategic Plan, adopted by the TPC in each of the past five years. Ridership measures the effectiveness of a transit system in its service design and delivery of service. It is the end result of all of the efforts of each work function within the transit system including planning, marketing, operations, maintenance and administration to produce a productive and effective service.

Ridership data is collected through the farebox system. Prior to July 2005, drivers manually entered key counts for each boarding passenger based on type of fare paid. In July 2005, a new farebox system was implemented using magnetic swipe card technology that automatically records most passenger counts. The new system enables Metro to obtain and collate this data with a very high degree of accuracy.

Annual ridership is used by Metro, Wisconsin Department of Transportation (WisDOT) and peer transit systems as a means of establishing in-house and peer system trend lines. Figures shown in the above chart are for fixed route service only. For these, Metro has seen a growth of 1.5 million trips over the past five years. The 2007 estimated ridership and the 2008 target assume a 3% growth rate, which may be conservative if fuel prices remain high or increase.

Metro's total annual ridership (combined transit and paratransit) in 2006 was 12.0 million. 2006 was a banner year for Metro with total ridership at a 20 year high. In 2007 YTD (through June), Metro's ridership has been increasing by 4.3%.

Both annual ridership and revenue hour statistics are compiled from the scheduling database for all scheduled trips and from dispatch records for unscheduled trips. Both statistics are considered extremely important in the transit industry and have long been a reporting requirement of the National Transit Database. Ridership and revenue hour data is published monthly in performance reports to the TPC.

WisDOT performs a Transit System Management Performance Audit every five years. In 2004, the state's audit for Metro Transit found it carries almost four times as many passengers per capita as the average for population peer transit systems, and carries over twice as many passengers per capita as the peer average for 11 much larger communities with comparable levels of transit service.

Also, survey data from 2005 shows that 32% of Madison residents ride Metro Transit or have a family member who does in a typical month. Among county-wide residents, the figure is 22%.

Budget highlight: The 2008 operating budget restores funding to avoid fare increases and reduced hours of service on Sundays. Had fares gone up and Sunday hours been reduced, projected annual fixed route ridership would have dropped to 12,649,043 for 2008.

### Ridership per Revenue Hour

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Ridership per Revenue Hour	30.70	29.97	31.48	32.92	34.15	34.89

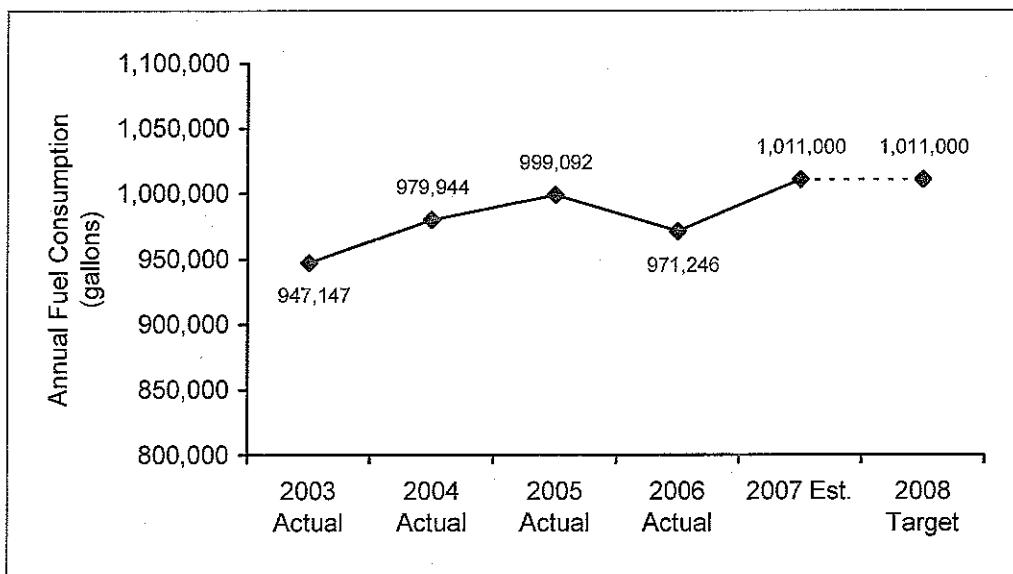
repairs and the reactive deployment of maintenance staff. It has a direct relationship between with the quality of the preventive maintenance work preformed as well as equipment replacement funding.

Breakdowns are tracked through the management information system and updated as the repair orders are created by reason for repair. Further review of the class of vehicles that experienced breakdowns reveal that extending the useful life of refuse equipment created the spike in breakdowns. This was caused by the implementation of the new recycling program funding of automated collection equipment.

During 2007, the division will perform over 3,200 preventative maintenance work orders.

### Fuel Consumption

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Fuel Consumption (gallons)	947,147	979,944	999,092	971,246	1,011,000	1,011,000



Source: City of Madison Fleet Service

This benchmark relates to the City's commitment to reduce its fuel consumption and its environmental impact.

The numbers shown above represent total fuel consumption by the City fleet, which excludes Metro Transit. Increases in total fuel consumption during recent years is likely the result of Madison's growth and consequent demand for City services. In spite of these increases, total fuel consumption remain below the all time high of 1,059,561 gallons during 1974. According to annual Department of Administration estimates, Madison's population has grown over 33% since that time. The City was able to accommodate this increase in demand without similar increases in total fuel consumption by acquiring more fuel efficient fleet vehicles.

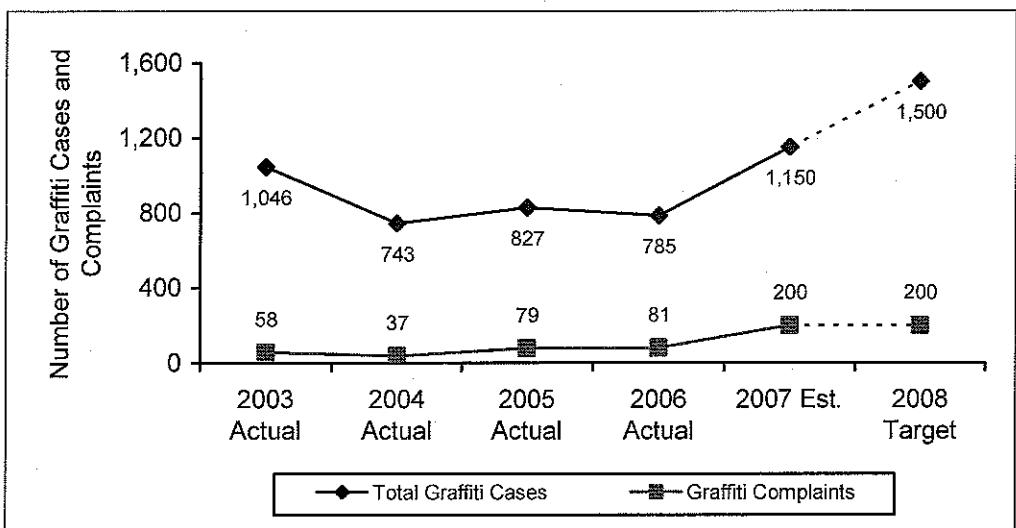
General automobile fuel efficiency in the near future should decrease fuel use 2% by replacing vehicles with more fuel efficient cars in targeted vehicle groups. Additionally, heavy truck fuel use should decrease by 2% in vehicles equipped with AVL/GPS. Fuel efficiency data will be better captured beginning in 2007 with the City's new fuel dispensing system.



## DESCRIPTION OF BENCHMARKS, DATA AND RESULTS

### Number of Graffiti Cases and Complaints

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Total Graffiti Cases	1,046	743	827	785	1,150	1,500
Graffiti Complaints	58	37	79	81	200	200



Source: City of Madison Neighborhood Preservation and Inspection Division.

These benchmarks track the number of citizen-generated complaints citing graffiti and the total number of graffiti cases handled by staff during a calendar year. They can be viewed as quality of life indicators that directly relate to how citizens feel about the appearance of the City and their neighborhoods. The number of cases is a compilation of cases opened as the result of citizen complaints, field observations by unit staff during the course of business or referred to the unit by other City departments like Police and the Streets Division.

Ideally, the incidence of graffiti and the subsequent number of complaints and cases would decrease. Recent data shows that the total number of cases has fallen over time while the number of complaints has increased. This indicates that the citizens are more aware and troubled by graffiti and are taking action. The total number of cases can fall because the amount of time staff can devote to field observation decreases as a result of staff turnover, vacancies and other requests for division services.

Data is directly pulled from case activity entered into the case tracking system. The numbers come from computer data entered on a daily basis by staff to document their activity. The data is reviewed at least annually and at the request of alders and neighborhood representatives for data of unit activities in their areas.

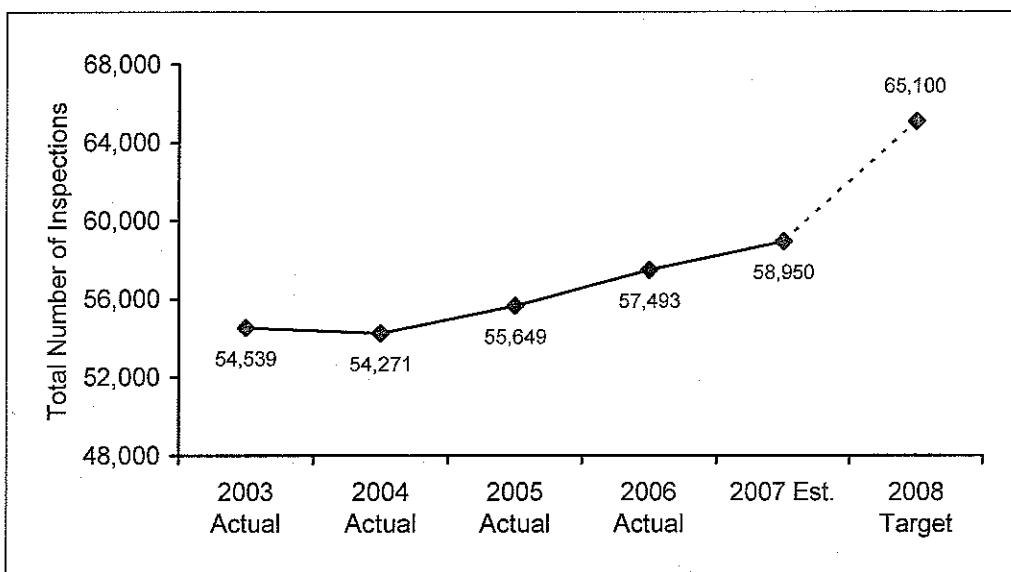
The estimate for 2007 is based on the number of complaints received to date. The 2008 target values is based on the assumption that the citizens tolerance for graffiti vandalism will continue to decline and staffing levels will stay consistent. This should lead to an increased ability to conduct surveys and field observations resulting in an overall increase in the number of graffiti cases.

**Budget highlight:** The 2008 operating budget provides three additional positions for the Neighborhood Preservation and Inspection Division: one property maintenance inspector, one housing inspector and one zoning code officer. It is anticipated that these additional resources will increase the total number of graffiti cases to 1,500 as staff will be able to proactively conduct more surveys and field observations.

This should have a positive effect the number a graffiti complaints as more of the violations are observed by staff before they are observed and reported by the general population.

### Inspection Workload

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
New Construction	37,327	37,544	40,765	39,751	38,000	39,000
Minimum Housing	8,621	7,926	7,524	9,478	7,900	9,500
Property Maintenance	6,303	6,112	5,907	6,493	11,300	14,000
Zoning	2,288	2,689	1,453	1,771	1,750	2,600
Total Inspections	54,539	54,271	55,649	57,493	58,950	65,100



Source: City of Madison Neighborhood Preservation and Inspection Division

The benchmark is roll up of all inspections conducted by the staffs of the New Construction, Minimum Housing, Property Maintenance and Zoning Sections completed to carry out the division's strategy. These inspections include building, plumbing, heating and electrical required for construction projects including additions and alterations. The roll up also includes the number of inspections conducted by the Minimum Housing, Property Maintenance and Zoning Sections to ensure compliance with the codes they enforce. Inspections are key in the objective of assuring the future by safeguarding the present.

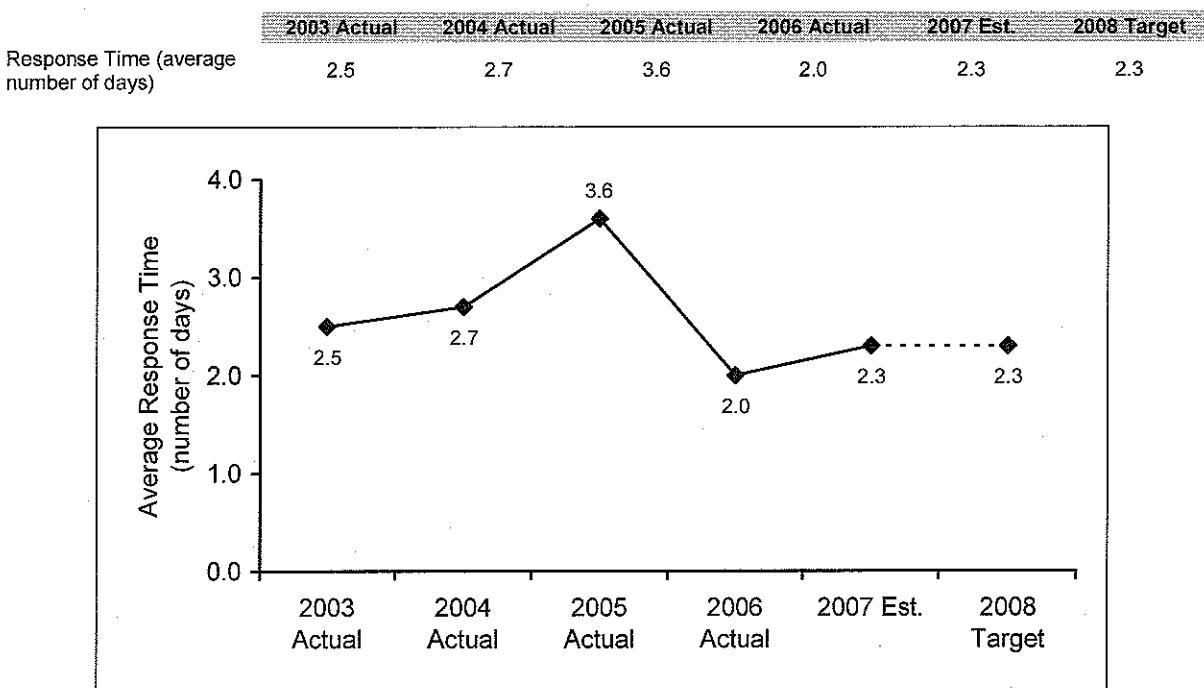
The unit tracks the number of inspections, the type and the time to complete the inspection on a daily basis. The data is collected daily and can be printed out for any time period. This data is reviewed at least annually and frequently more often as request are made by alderpersons and neighborhood representatives for data of activities in their areas.

The chart shows a relatively stable number of inspections from 2002 through 2005. Madison has experienced a single-family building boom in recent years. The historic average of 400 homes per year had grown to 900 homes per year. New single-family permits for 2006 have returned to the historic average of 400 homes per year with the outlook for 2007 to be similar. While single family housing starts have returned to historic averages the demand for new construction inspections will remain high with commercial projects, additions and remodels. Recent hires in the Property Maintenance and Zoning Sections have returned their staffing to normal levels and should result in an increase in productivity.

Current year estimates are based on historical production. The target for 2008 is based on the increased ability of recently hired staff to handle more complicated buildings and cases as part of their daily inspection activities. Their ongoing training will provide them the ability to increase the productivity of the various sections and in turn the number of inspections.

**Budget highlight:** The 2008 operating budget provides three additional positions for the Neighborhood Preservation and Inspection Division: one property maintenance inspector, one housing inspector and one zoning code officer. It is anticipated that these additional resources will increase the number of inspections conducted by Minimum Housing, Property Maintenance and Zoning Inspectors. In particular, the new staff will allow the Minimum Housing and Property Maintenance sections to concentrate on the issues they specialize in and not provide support for the Zoning Section.

### **Response Time to Housing Complaints**



Source: City of Madison Neighborhood Preservation and Inspection Division

This benchmark is a customer service indicator. It tracks the number of days from when a housing complaint is received to the date of the initial inspection.

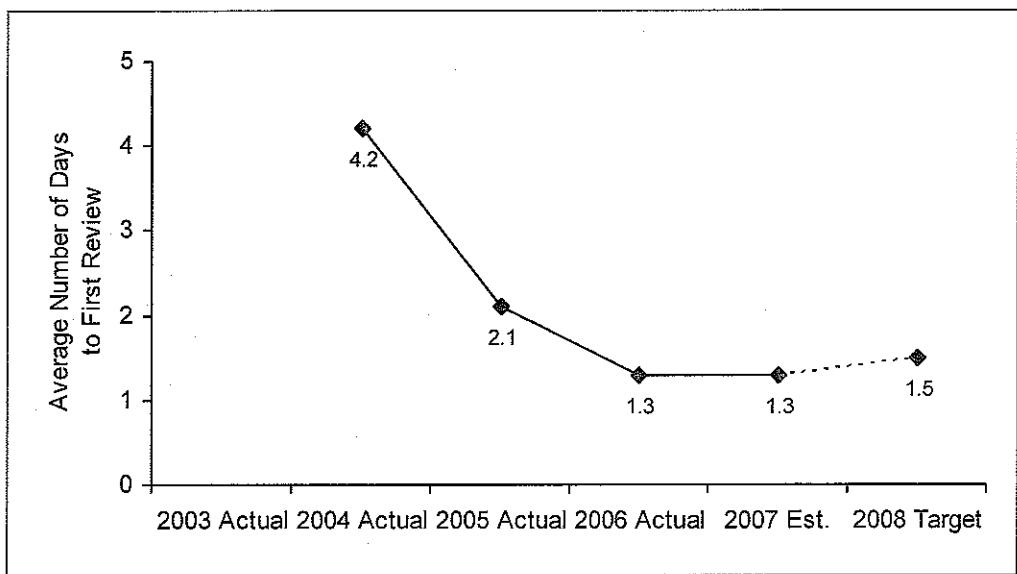
Historically, the division aimed to complete the initial inspection within three days of the complaint. Several factors effect the average time. The first is day of the week a complaint is received. Weekends generally build in a two-day delay for most housing complaints that come in on a Thursday afternoon or on a Friday. Another factor is exterior lighting complaints that are normally inspected on a monthly basis. This is done to group similar night time inspections and limit the mount of overtime. Finally, tenants sometime will want to wait on the inspection to see if the landlord will respond to their call or will want to delay the inspection to meet their scheduling needs.

The data comes from an ad-hoc report listing the case conception date and the initial inspection date. It accurately tracks the average time it takes unit staff to respond to a housing complaint. The data comes from computer data entered on a daily basis by staff to document their activity.

The estimate for 2007 is based on the belief that the two replacement inspectors hired during 2005 will continue to contribute more effectively to the productivity of the section. The newer hires do not require the assistance of another inspector for their inspections which will make the scheduling of the initial inspection easier to accomplish. The target for 2008 is based on a seasoned staff and their ability to function on their own and be totally independent to schedule their appointments.

### Timeliness of Building Permit Application Review

	2003 Actual	2004 Actual	2005 Actual	2006 Actual	2007 Est.	2008 Target
Number of Days to First Review	n/a	4.2	2.1	1.3	1.3	1.5



Source: City of Madison Neighborhood Preservation and Inspection Division

This benchmark tracks the number of days from when a complete set of building plans is received and logged in to the date of the first review. It is a customer service indicator.

It tracks the average time it takes Neighborhood Preservation and Inspection Division staff to review construction plans submitted to the Plan Review Counter. The data comes from computer data entered on a daily basis by staff to document their activity. The data will be reviewed at least quarterly.

The estimate for 2007 is based on the data analyzed for the first half of 2007. The target for 2008 is based on the assumption that the downturn in construction will continue and the number and complexity of projects will continue to be off the hectic pace of 2004.

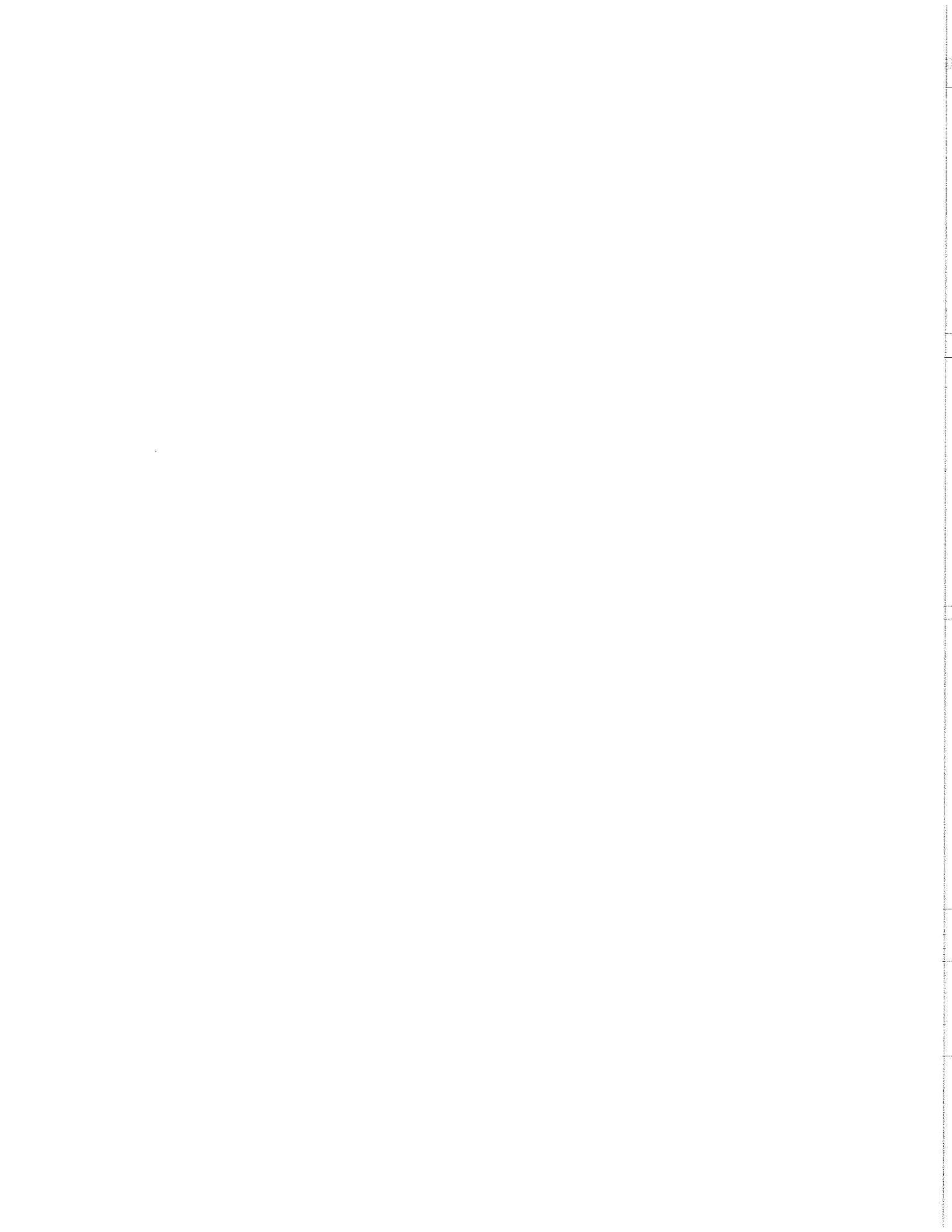
The data for 2003 is not available because of a change in how the numbers are tracked. Before 2004, the data was used mainly as a plan log and to track when the plans were approved. In 2004, a data field was included that tracked the first review as a customer service indicator.

Historically, one of the Division's goals is to complete the initial review within five days of the submittal of a complete set of construction plans. When the five day goal is exceeded during periods of high activity, staff generally will work overtime to complete the review.

**2007 SUMMARY REPORT**

# **DANE COUNTY: HEALTH AT A GLANCE**

**PUBLIC HEALTH -  
MADISON AND DANE COUNTY**



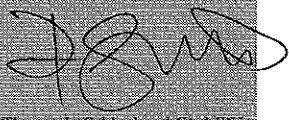
## Message from the Director

On behalf of Public Health-Madison and Dane County (PHMDC), we are pleased to present the 2007 Summary Report "*Dane County: Health at a Glance*." The data presented in this report focus on the health of both our residents and our environment. This information will help guide the Department's plans and actions and provide important information to community leaders, elected officials and the general public.

Dane County is home to beautiful scenery, rich natural resources, vibrant communities, and exciting recreational and cultural opportunities, all of which contribute to health. The role of PHMDC is to help preserve the health of our community by protecting the environment, controlling disease, improving health-promoting behaviors, and striving for equity and access to health care.

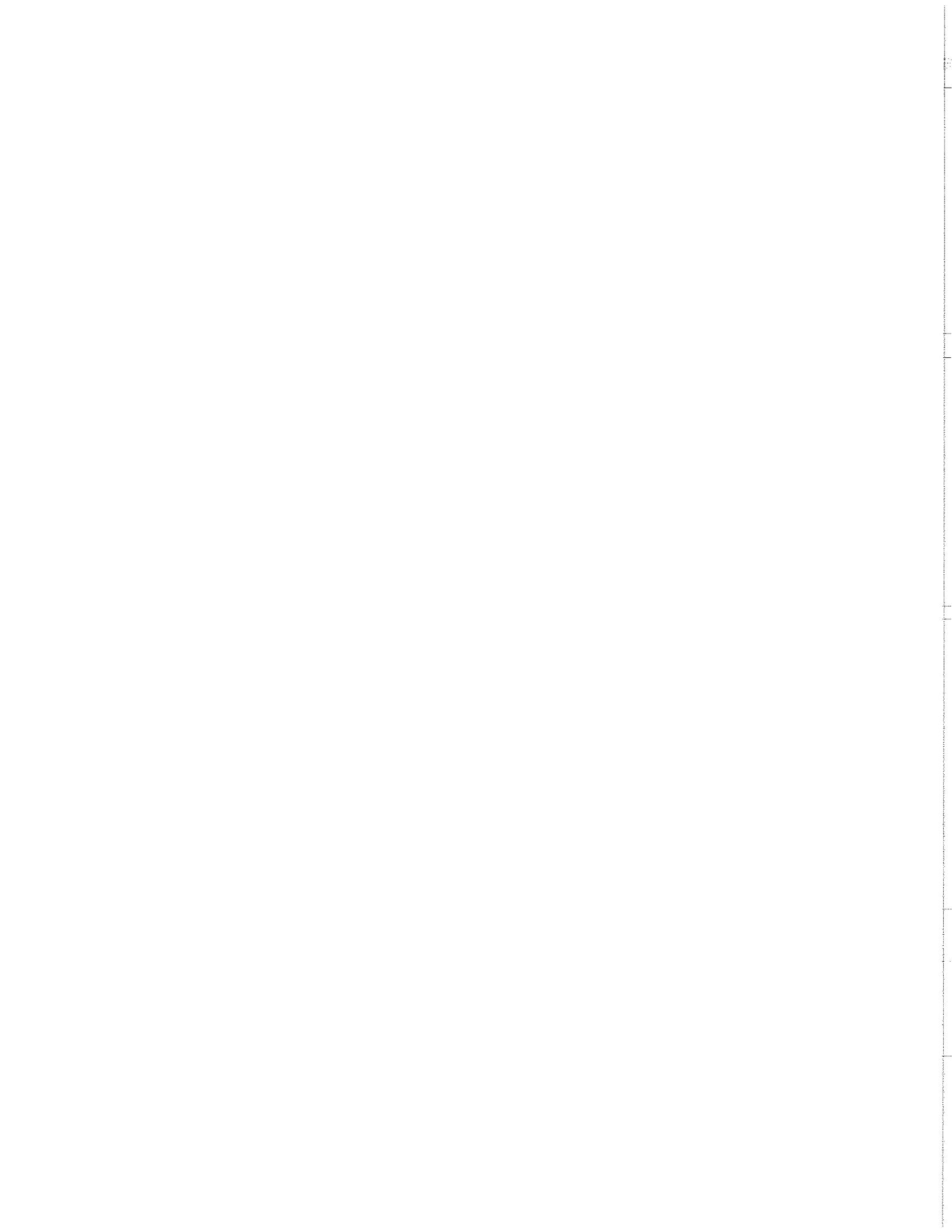
"*Dane County: Health at a Glance*" draws on data from various sources, some of which are limited in availability and scope. Nonetheless, this report provides important information specific to many key health indicators in Dane County. It includes comparison data to the rest of Wisconsin and to the Healthy People 2010 goals (when applicable) and measures our progress, achievements, and shortcomings in reaching certain health benchmarks that define a healthy population. The full report will be available online at [www.PublicHealthMDC.com](http://www.PublicHealthMDC.com).

Public Health-Madison and Dane County is now a unified, county-wide agency. Our goals are to address key issues at the community level in ways that will help individuals to make healthy choices, create healthy environments, promote public health in legislation, and eliminate health disparities between population groups. The information from this report and from discussions with community members and elected officials will be an invaluable resource in achieving these vital goals.



Thomas L. Schlenker, MD, MPH

Director, Public Health-Madison and Dane County



## Environmental Health

A full environmental health report is available from PHMDC for additional reference.

### Air Quality

- While Dane County benefits from a majority of days with good air quality, there is still need for improvement. In 5 of the last 7 years, ozone or fine particulate levels were high enough to have a noticeable health impact, making it more difficult to breathe for people with asthma and other respiratory problems.

### Opportunities

- Reducing the amount of pollution from cars and trucks will have a tremendous positive impact on air quality, as will improving energy efficiency in our homes and businesses.
- Ongoing monitoring of public wells, increasing testing at private wells, and preventing spills and chemical releases into ground and surface water are essential services to protect our water supply.
- In our homes, we can eliminate lead and radon hazards by testing and taking corrective action; we can reduce our "footprint" by reducing waste, reusing materials and recycling.

### Water Quality

- Dane County has a large supply of high quality drinking water and numerous bodies of water for recreation. However, elevated levels of nitrate in private wells and increasing levels of chloride and other pollutants in groundwater and surface water highlight the importance of protecting our water sources.
- Activities such as deicing, overuse of fertilizers and pesticides, and spills have an impact on our water supply.

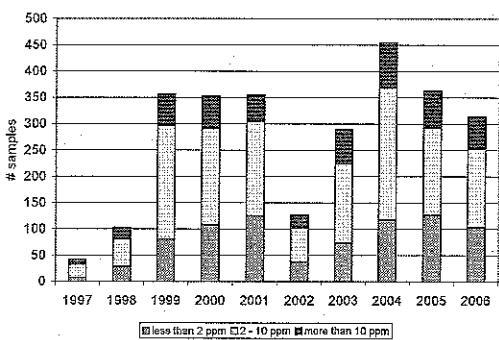
### Food Protection

- Improper food holding temperatures and problems with handwashing were the most common problems identified in Dane County restaurants in 2006.
- Four of the five foodborne outbreaks investigated in 2006 involved ill food workers and resulted in 185 people reporting norovirus infection.

### Healthy Homes and Communities

- Although lead hazards persist in Dane County, the percentage of lead poisoned children continues to decrease.
- Recycling in Madison and Dane County is increasing.

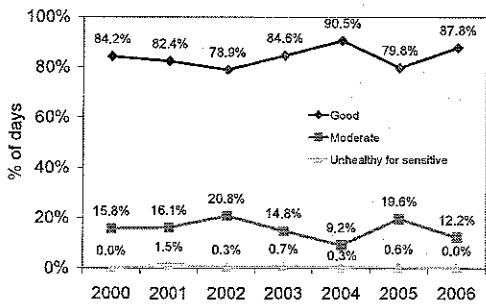
Results of Nitrate Testing in Private Wells, Dane County



ppm = parts per million

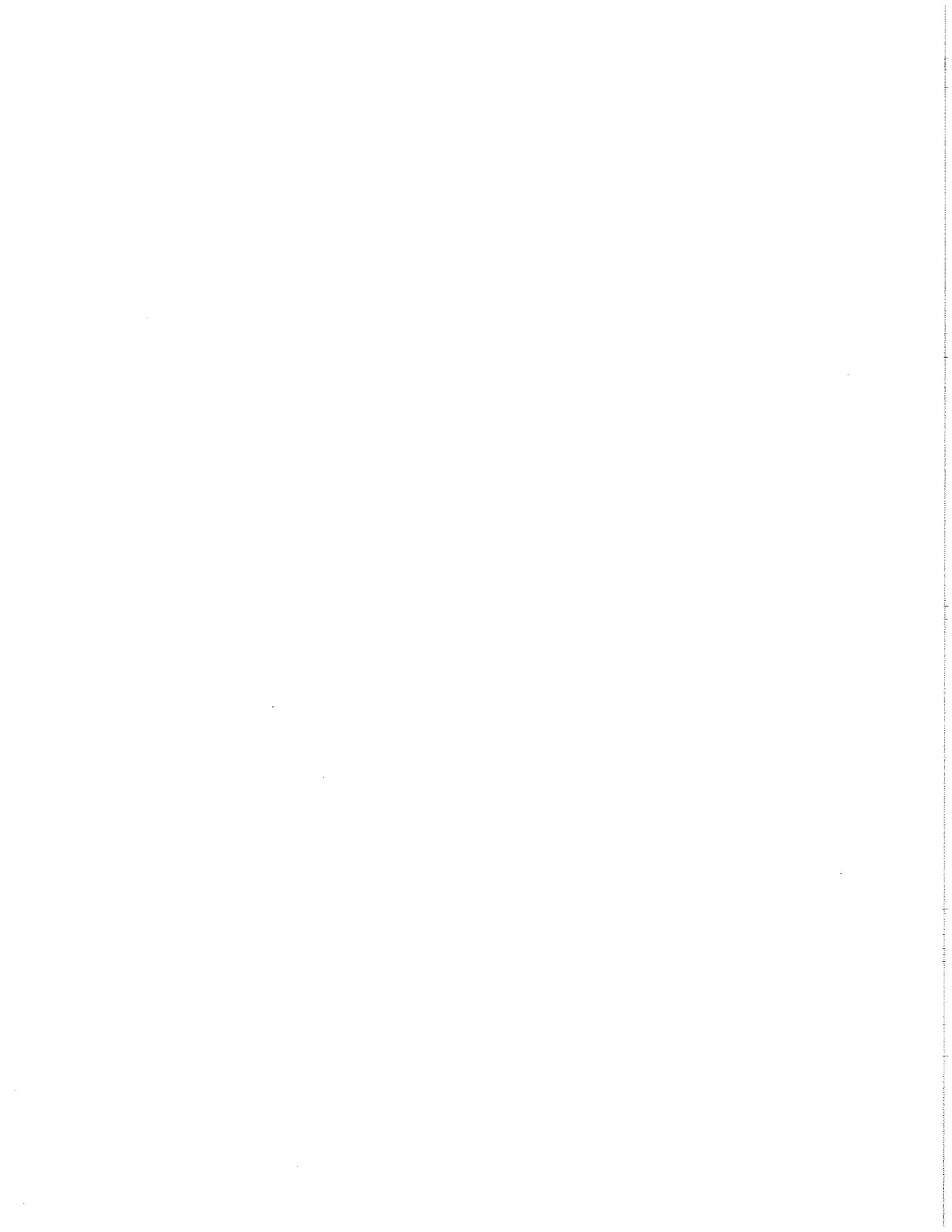
Data provided by WI Department of Natural Resources.

Air Quality in Madison and Dane County according to the Air Quality Index (AQI) for Ozone and Fine Particulate Matter\*



\*Dane County did not have any days with "unhealthy" or "very unhealthy" levels of ozone or fine particulate between 2000 and 2006.

Data provided by WI Department of Natural Resources.



# Madison and Dane County Environmental Health Report Card 2006



*Healthy people and places*

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## INTRODUCTION

Public Health - Madison and Dane County is pleased to present this 2006 edition of the Environmental Health Report Card. The Report Card provides the most recent data analysis of Dane County environmental health issues, which involve the interaction between environmental quality and human health. Examples of these issues include nitrates in drinking water, fine particulates in air, lead paint in homes, and bacteria or viruses in food.

The data from this report has been gathered from a wide variety of individuals and agencies. References to these individuals and agencies are made in the text as well as at the end of the report. When possible, the report compares the data for Madison and Dane County to established standards, desired goals and objectives, and average values for other communities or the State of Wisconsin. Environmental health targets in this report come from the Healthy People 2010 Objectives or the Healthiest Wisconsin 2010 Objectives. These documents are health promotion and disease prevention agendas established by the United States Department of Health and Human Services and the Wisconsin Department of Health and Family Services, respectively. Objectives listed in either plan focus on many areas of public health, including environmental issues. Though these objectives are not always measurable at the local level, they provide a solid framework from which to assess environmental health in Dane County.

The Environmental Health Report Card continues to grow and change with each edition. The primary changes in this edition are the expansion to cover environmental health issues across Dane County and new datasets that were identified since the last report was released. This report is the result of many individuals and organizations pulling together a wide variety of data and information and would not be possible without their help.



**Public Health**  
MADISON & DANE COUNTY

*Healthy people and places*

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Cover Art: "digging for buried treasure" by Pauline Viall of Traverse City, MI ([www.paulineviall.com](http://www.paulineviall.com))

# AIR QUALITY

## Environmental Measurements

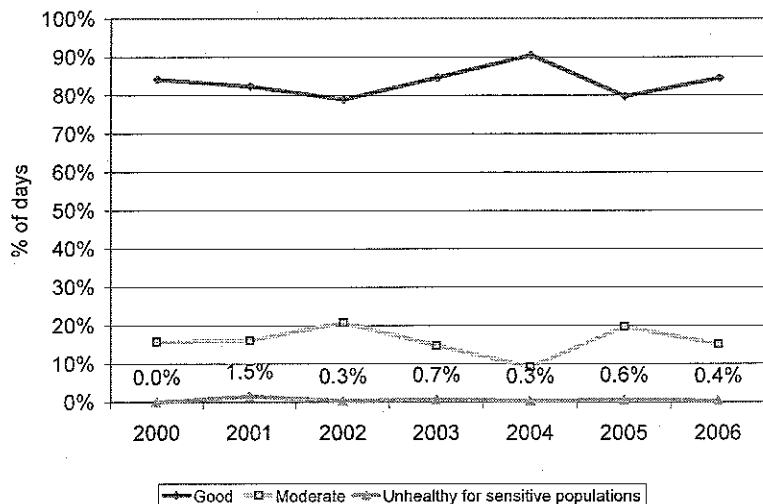
- **The Good News:** Madison and Dane County continue to meet federal air quality standards and benefits from a majority of days with "good" quality air. In 2006, air on one day was determined to be "unhealthy for sensitive populations."
- **The Bad News:** Since 2000, Madison and Dane County has had 11 days where ozone or fine particulates made the air "unhealthy for sensitive populations" (e.g., children, the elderly, and those with respiratory or cardiovascular disease).
  - » This was sufficient to earn Dane County a grade of "D" from the American Lung Association ("State of the Air, 2007" report, <http://lungaction.org/reports/stateoftheair2007.html>).
  - » 15% to 20% of our days each year are considered "moderate," meaning that air quality is no longer "good" and we are getting closer to unhealthy levels.

### HEALTHY PEOPLE 2010 OBJECTIVE

Reduce the number of people exposed to air that violates federal air quality standards.

STATUS: Ongoing

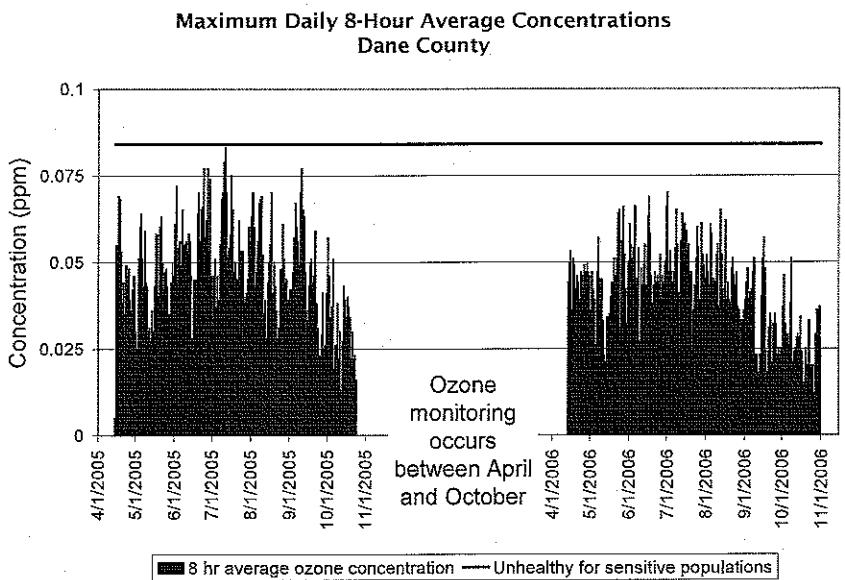
Air Quality in Madison and Dane County According to the Air Quality Index (AQI) for Ozone and Fine Particulate Matter\*



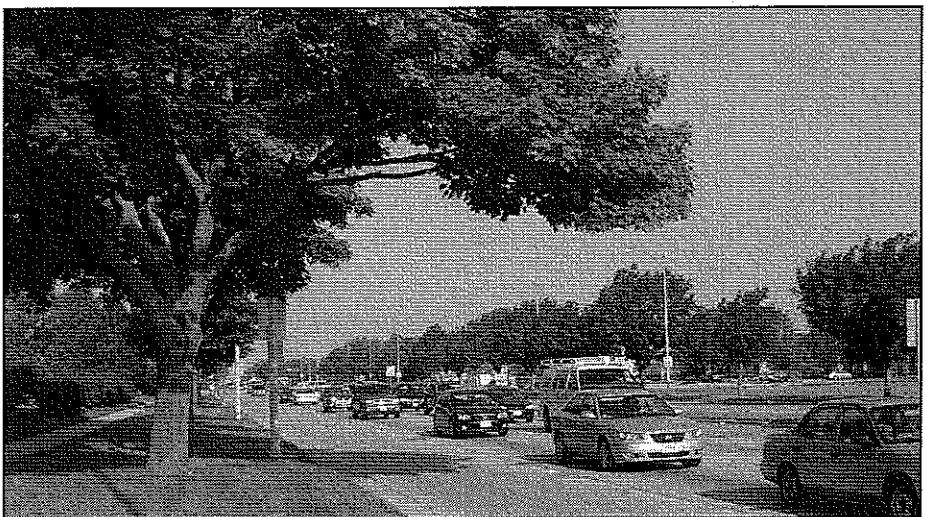
\*Dane County did not have any days with "unhealthy" or "very unhealthy" levels of ozone or fine particulate between 2000 and 2006.

Data provided by WI Department of Natural Resources.

- In Madison and Dane County, unhealthy air quality days have been a result of high levels of ozone or fine particulate matter. The following chart shows the maximum daily 8-hour average for ozone during the 2005 and 2006 seasons.
  - » Ozone levels on July 11, 2005 were likely high enough to impact human health even though the standard for unhealthy air was not reached. In 2007, US EPA is expected to lower ozone levels to be more protective of human health.
  - » These data show lower ozone levels in 2006 as a result of cooler summer temperatures.
  - » These data also show that mid-summer days when temperatures are hottest are the most likely time to have high ozone levels.

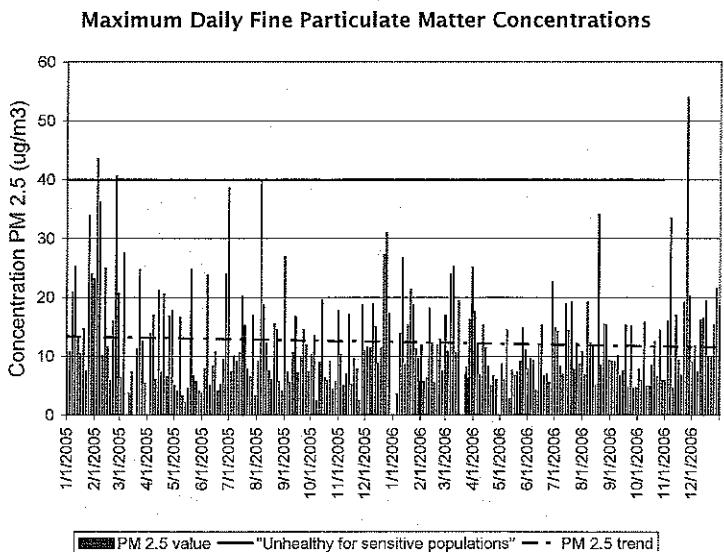


Data provided by WI Department of Natural Resources.



**AIR QUALITY****ENVIRONMENTAL MEASUREMENTS**

- Fine particulate matter (PM 2.5) is less dependant on outdoor temperature. Unhealthy levels of fine particulate matter may occur any time of the year as shown in the chart below.

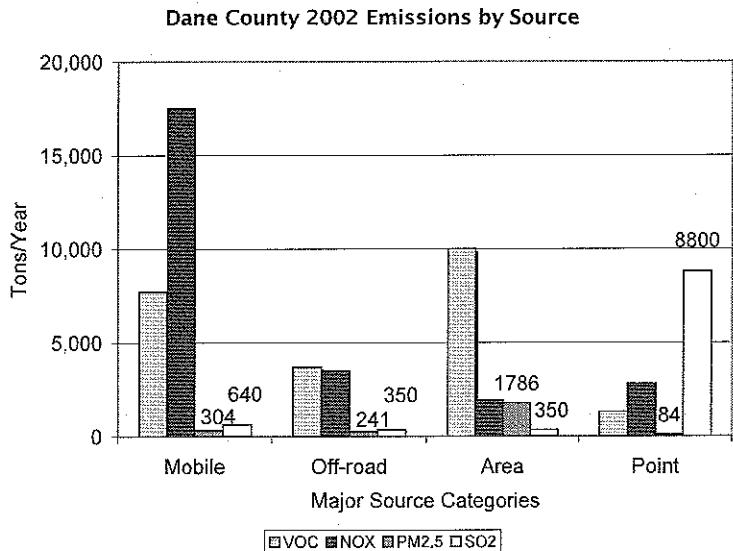


Data provided by WI Department of Natural Resources.

- » Two days in 2005 were reported to have PM 2.5 levels that were unhealthy for sensitive populations. Another three days exceeded the new PM 2.5 standard of 35 ug/m<sup>3</sup> and may have negatively impacted human health.
- » We have seen a general decrease in PM 2.5 levels over the last two years. While this is good, we continue to have days where PM 2.5 reaches unhealthy levels and places Dane County residents at risk of health problems.
- Measurements of carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), and sulfur dioxide (SO<sub>2</sub>) indicate that these air pollutants are much lower than national air quality standards and do not pose a health risk.
  - » Regional monitors for these contaminants are located in Dodge County.
- Hazardous air pollutants, also called air toxics, are chemicals in the air that are known or suspected to cause cancer, reproductive effects, birth defects, or other serious health effects. In Dane County, and most places around the country, these chemicals are not routinely measured in outdoor air but are monitored as emissions from industrial sources. Data on emissions of hazardous air pollutants can be found on page 11.
  - » Examples of air toxics include benzene, formaldehyde, acetaldehyde, 1,3-butadiene, and mercury.

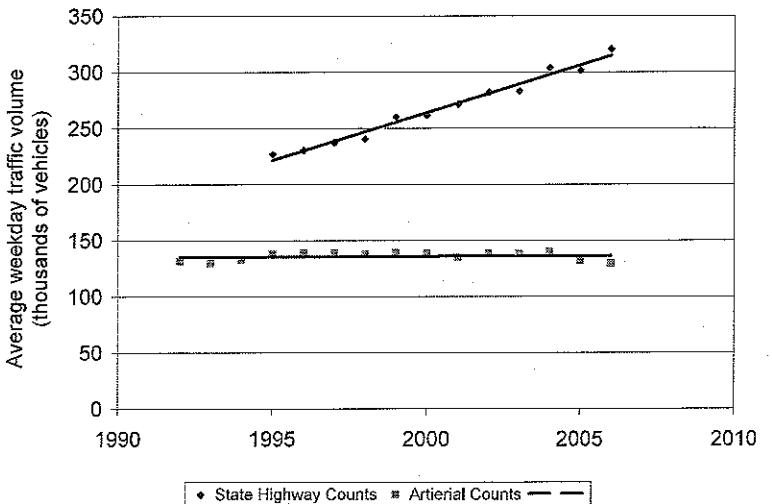
## Sources

- Ozone is formed in air when nitrogen oxides (NOX) and volatile organic chemicals (VOC) combine in hot, sunny weather.
- The following chart shows the estimated amount of volatile organic chemicals (VOC), nitrogen oxides (NOX), fine particulate matter (PM2.5), and sulfur dioxide (SO2) by source category in Dane County.



- Mobile (cars and trucks that operate on roads and highways): this is the primary source of NOX and is the second most important source of VOC, which lead to ozone formation.
- Non-road (farm tractors, construction vehicles, and other off-road vehicles): significant sources of NOX and VOC but much less than on-road cars and trucks.
- Area (general activities like painting, fueling machines and vehicles, and lawn mowing that individually create relatively small amounts of air pollution but create a significant amount when combined): this group emits the highest amount of VOC's and fine particulate in Dane County.
- Point (industries and other distinct sources of emissions): these are the primary source of SO2 and important sources of VOC, NOX, and PM 2.5.
- Cars and trucks operating on our roads are significant sources of NOX and VOC because of the number that are in use on the roads.
  - Measured traffic volumes on highways in and around Madison increased 41% since 1995.
  - Traffic volumes on large streets (arterials) in Madison has been steady over the last 12 years.

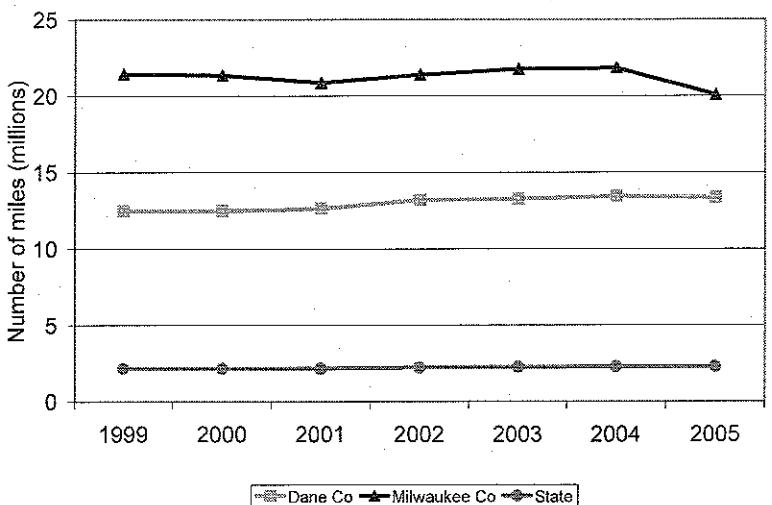
### Traffic Volume Changes at Select Madison Locations



Data provided by Madison Traffic Engineering Division

- » The vehicle miles traveled in Dane County has increased 7% over the past seven years. This is less than the 11% population growth seen over the same period and suggests that driving habits may be starting to change. Between 2004 and 2005, vehicle miles traveled dropped slightly in Dane County, likely a result of consistently high fuel prices.

### Average Daily Vehicle Miles Traveled



Data provided by WI Dept of Transportation

- » The average daily vehicle miles traveled in Dane County was lower than Milwaukee County. However, if you divide the vehicle miles traveled by the population, Dane County had more vehicle miles traveled per person (29 vehicle miles traveled per day) than Milwaukee County (21 vehicle miles traveled per day).

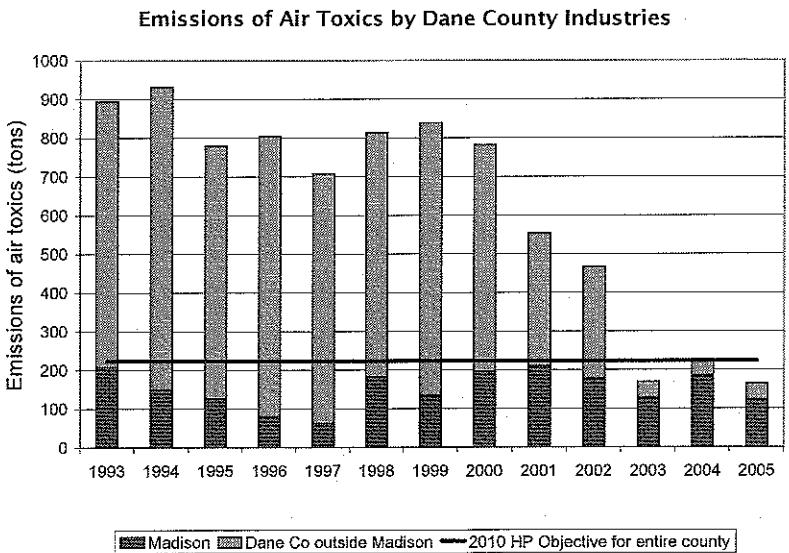
## AIR QUALITY

- Industries in Dane County are an important source of toxic air pollutants. In the last five years, the amount of toxic air pollutants emitted by Dane County industries has decreased dramatically. Most of this change has been observed in communities outside Madison.
  - » A total of 47 facilities in Dane County reported emissions of toxic air pollutants between 1993 and 2005.
  - » 29 of the 47 facilities reported emissions in 2005.
  - » 18 of the 47 facilities stopped reporting emissions by 2005.
  - » A facility will stop reporting if they stop operations or change their process so that emissions are less than US EPA reporting limits.
- According to EPA's 1999 National Emissions Inventory ([www.epa.gov/ttn/chief/net/1999inventory.html](http://www.epa.gov/ttn/chief/net/1999inventory.html)), coal-fired power plants are the largest source of human-caused mercury air emissions in the U.S (40%). Other large sources are industrial boilers (about 10% of U.S. mercury emissions), burning hazardous waste (about 5%), and chlorine production (also about 5%). At one time, burning municipal and medical waste was a large source of mercury emissions. Today, in response to EPA and state regulations and reductions in mercury use, emissions from these sources have declined 85 to 90 percent.

## SOURCES

**HEALTHY PEOPLE 2010 OBJECTIVE:**  
Reduce toxic air emissions to 25% of 1993 levels.

**STATUS:** Achieved



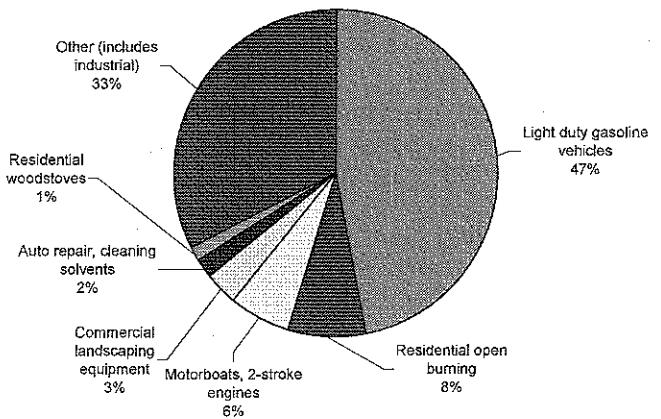
Data provided by U.S. Environmental Protection Agency

## AIR QUALITY

## SOURCES

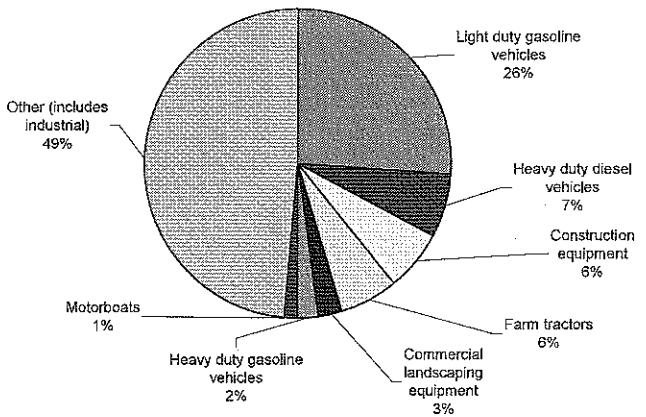
- Dane County industries are not the only source of toxic air pollutants in Dane County. Four toxic air pollutants that are important predictors of human health risk are benzene, formaldehyde, acetaldehyde, and 1,3-butadiene. Estimated emissions of these toxic air pollutants in 2002 for Dane County found light duty gasoline vehicles (cars and small trucks) were important sources of all of these chemicals. Heavy duty gasoline vehicles (such as full size pick-up trucks and delivery trucks) as well as heavy duty diesel vehicles (such as buses, semi-tractors, and dump trucks) on the road also produce these toxic air pollutants.

Largest Sources of Benzene in Dane County, 2002

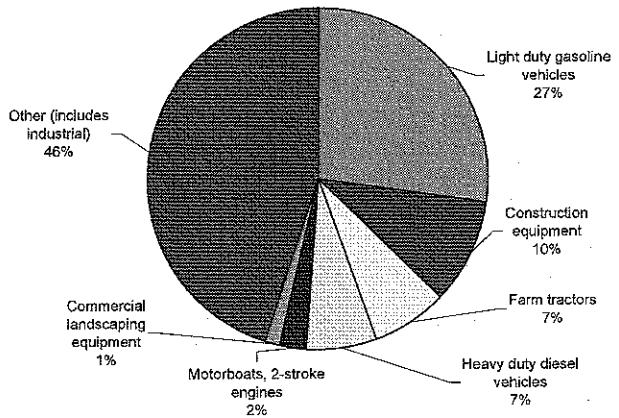


Data provided by WI Dept of Natural Resources

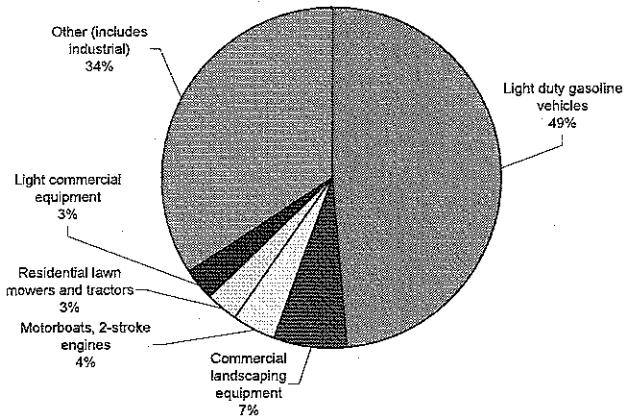
Largest Sources of Formaldehyde in Dane County, 2002



Data provided by WI Dept of Natural Resources

**Largest Sources of Acetaldehyde in Dane County, 2002**

Data provided by WI Dept of Natural Resources

**Largest Sources of 1,3-Butadiene in Dane County, 2002**

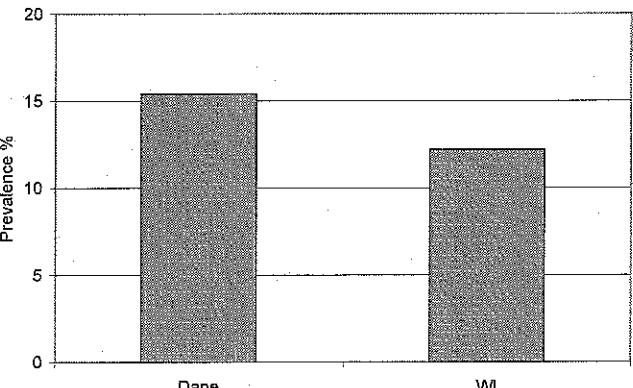
Data provided by WI Dept of Natural Resources

- Air pollutants emitted from sources outside Dane County also affect our air quality. Many air pollutants can travel long distances and cause ozone or fine particulate problems in areas with limited local sources of air pollution.

## Human Health Impacts

- Asthma continues to be a problem for Dane County residents.
  - » 15% of Dane County adults that were reported have been diagnosed with asthma by a health care provider between 2003-2005.
  - » School Districts in Dane County have reported that in the 2006-07 school year 7% to 15% of their students enrolled have asthma.
  - » The rate of asthma hospitalizations in Dane County is lower than the state average and achieves the Healthiest Wisconsin 2010 Objective.

Lifetime Asthma Prevalence in Dane County, 2003-2005

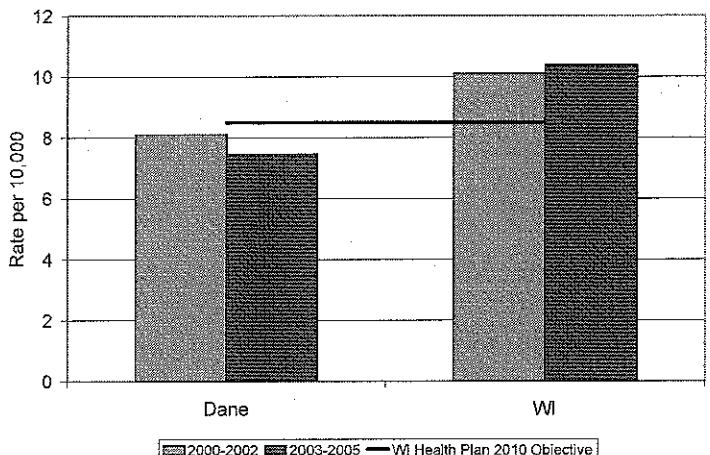


Data provided by WI Dept. of Health and Family Services

HEALTHIEST WISCONSIN 2010  
OBJECTIVE: Reduce asthma hospitalizations to 8.5 per 10,000 people.

STATUS: Achieved

Asthma Hospitalizations in Dane County, 2000-2005



Data provided by WI Dept. of Health and Family Services

- The Scorecard ([www.scorecard.org](http://www.scorecard.org)) used 1996 data to estimate that the cancer risk for the average Dane County resident was 550 cases per million people.
  - » The goal of the Clean Air Act is to reduce cancer risk from these pollutants to one case per million people.

**AIR QUALITY****LOCAL RESPONSE**

## Local Response

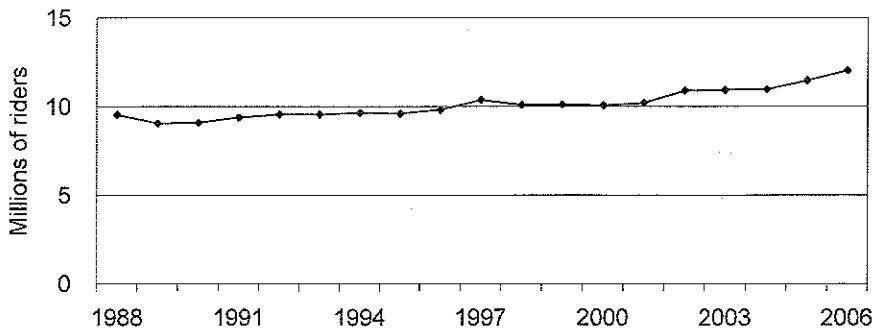
- Individual Actions - What You Can Do
  - » Whenever possible, walk, bike, skate, bus or carpool instead of driving your vehicle.
  - » EnAct Teams\* in Madison and Dane County communities were able to reduce the number of single occupancy vehicle miles driven by 1,194 miles per household, which amounts to a total of 352,312 fewer vehicle miles.
  - » EnAct Teams also increased the amount they ride the bus by 30 trips per household or 8,829 trips ([www.enactwi.org/results.htm](http://www.enactwi.org/results.htm)).
  - » Live in an area near work, shopping, and entertainment so there is less need to use a car.
  - » Purchase fuel-efficient vehicles.
  - » Practice energy conservation at home and work ([www.mge.com/powertomorrow](http://www.mge.com/powertomorrow) and [www.conserve.wisc.edu](http://www.conserve.wisc.edu)).
  - » Purchase renewable energy from your utility and use other clean energy alternatives when available.
  - » Use Green Building techniques when building and remodeling your home or business to conserve energy and reduce exposure to toxic chemicals.
  - » Install solar energy on your home or business and make your own electricity and hot water ([www.focusonenergy.com](http://www.focusonenergy.com)).
- Community Actions - What the Community Can Do
  - » Municipal and County governments should increase energy efficiency and use renewable fuels/energy in vehicles and buildings.
    - The City of Madison recently adopted "The Natural Step," a framework for making decisions that will improve the City's energy efficiency and sustainability. More information on these efforts can be found at [www.cityofmadison.com/mayor/pdfs/tns20070413.pdf](http://www.cityofmadison.com/mayor/pdfs/tns20070413.pdf).
  - » Support and improve mass transit and alternative modes of transportation.
    - Madison Metro is continuing to improve its services; and as a result, ridership has increased by 5% in each of the last two years. Increased fuel prices and programs to boost ridership among UW Madison students and City of Madison employees have

**HEALTHY PEOPLE 2010 OBJECTIVE**

Increase the use of alternate modes of transportation and the use of alternative fuels as a means to improve air quality.

**STATUS:** Ongoing

Number of Riders on Madison Metro's Fixed Bus Routes

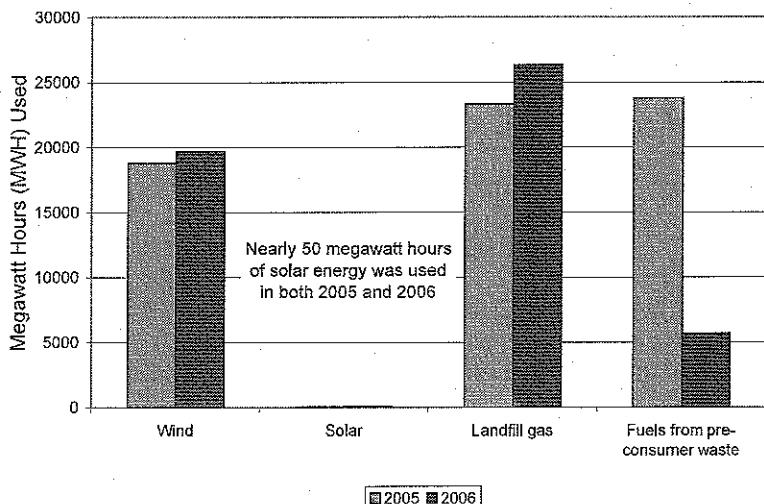


Data provided by City of Madison Metro Transit.

\*"EnAct" is a program that forms Environmental Action Teams in communities, neighborhoods, and workplaces throughout Dane County. To learn about living more sustainably go to [www.enactwi.org](http://www.enactwi.org).

- » Increase availability of energy from renewable sources.
  - The two main power companies in Dane County, Madison Gas and Electric (MGE) ([www.mge.com/environment](http://www.mge.com/environment)) and Alliant Energy ([www.alliantenergy.com](http://www.alliantenergy.com)) continue to develop cleaner sources of energy.
  - In the last two years, the use of energy harvested from wind and landfill gas has increased slightly.
  - Fuel from pre-consumer waste is made up of non-recyclable paper and plastic wrap materials. Burning this fuel instead of coal reduces emissions of SO2.

Alternate Energy Sources\* Use in Dane County by MGE Customers



\*Includes only Madison Gas and Electric installed sources, the amount of energy produced by privately installed systems is not measured.

Data provided by Madison Gas and Electric

- » Work cooperatively to address air quality problems.
  - Dane County Clean Air Coalition ([www.healthyairdane.org](http://www.healthyairdane.org)), a partnership of businesses, schools, government agencies and citizens, has many accomplishments including reducing pollutants from school buses, non-road diesel vehicles, and local businesses. They have also coordinated Clean Air Action Days and gas can exchange programs.

## References and Links

- For more information on ozone, PM2.5 and other pollutants, visit [www.epa.gov/air/urbanair/6poll.html](http://www.epa.gov/air/urbanair/6poll.html).
- National Air Toxics Assessment ([www.epa.gov/ttn/atw/natamain/](http://www.epa.gov/ttn/atw/natamain/))
- Air Pollution and Health Risks ([www.epa.gov/ttn/atw/3\\_90\\_022.html](http://www.epa.gov/ttn/atw/3_90_022.html))
- For more information on transportation, traffic counts, and vehicle miles traveled, visit [www.dot.wisconsin.gov/travel/counts/index.htm](http://www.dot.wisconsin.gov/travel/counts/index.htm) and [www.cityofmadison.com/mpo/transportationtrends.htm](http://www.cityofmadison.com/mpo/transportationtrends.htm).
- For more information on energy conservation and renewable energy and for incentive programs, visit [www.focusonenergy.com](http://www.focusonenergy.com) or call (800) 762-7077.

# WATER QUALITY

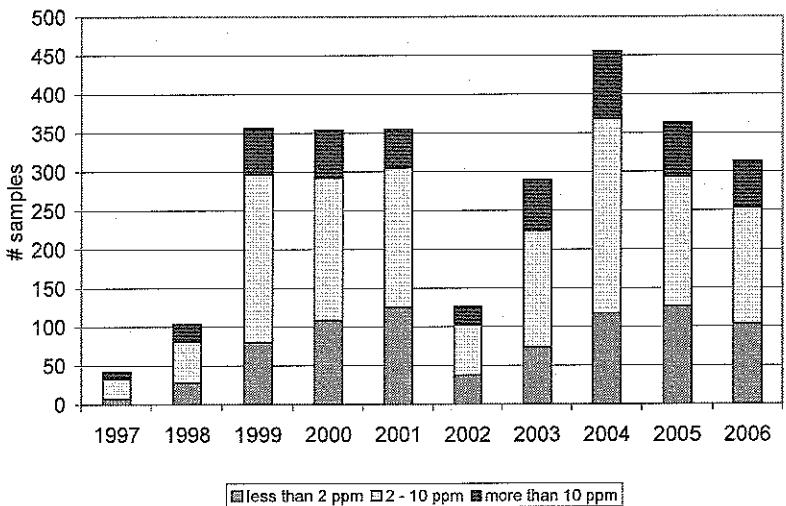
## Environmental Measurements

- Nitrate is a significant problem in Dane County private wells.
  - » Over the last 10 years, more than 2,800 private well samples were tested for nitrates.
    - 18% of the samples exceeded the water quality standard of 10 ppm.
    - 53% of the samples had nitrate levels between 2 and 10 ppm.
    - The number of tests performed varies widely by year. Most nitrate tests in private wells are performed when the well is first constructed.
  - » Almost 99,000 of Dane County's 458,000 residents are served by private water supplies.
  - » Dane County is estimated to have as many as 22,000 private drinking water wells.

**HEALTHY PEOPLE 2010 OBJECTIVE**  
Increase the number of people receiving drinking water that meets the Safe Drinking Water Act requirements.

**STATUS:** Ongoing

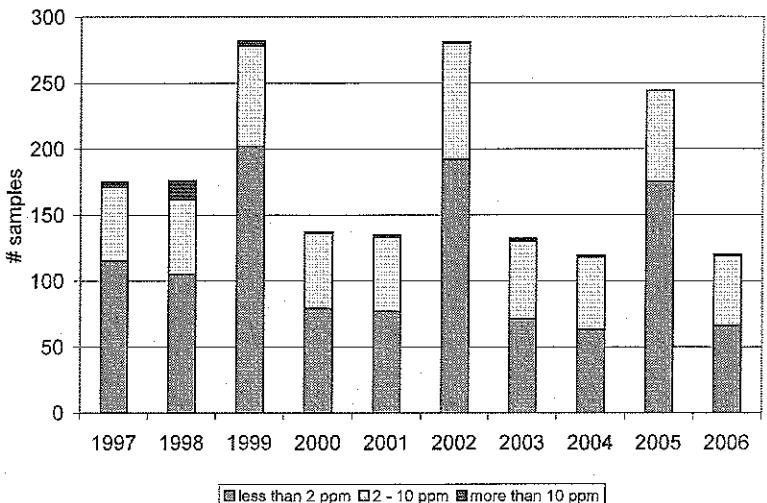
Results of Nitrate Testing in Private Wells, Dane County



Data provided by WI Department of Natural Resources

- » Fewer municipal well tests find elevated levels of nitrate. Over 2000 samples from municipal wells have been tested for nitrates in the last 10 years. Only 2% of these samples were found to exceed the standard of 10 ppm. Another 35% had between 2 and 10 ppm nitrate.

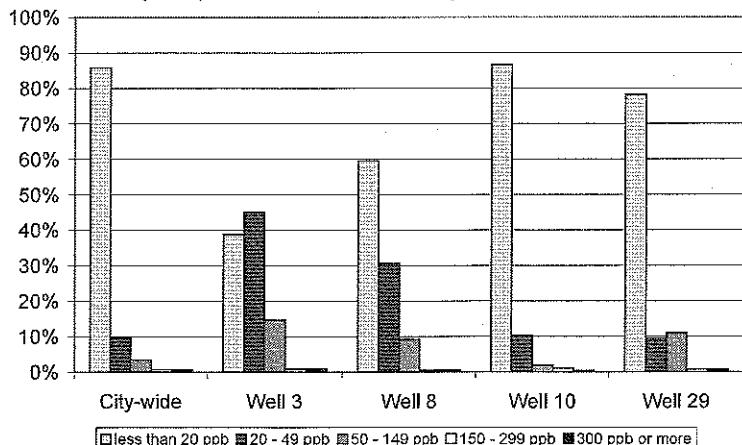
## Results of Nitrate Testing in Municipal Wells, Dane County



Data provided by WI Department of Natural Resources

- Manganese (Mn) became a significant concern among Madison residents in 2005 and 2006 after households reported receiving black-colored water that contained very high levels of manganese.
  - » Enforceable federal or state safe drinking water quality standards for manganese do not exist. EPA has a secondary standard of 50 ppb to protect against discolored water and health advisory level of 300 ppb.
  - » The presence of manganese in drinking water resulted in a decrease in confidence in the quality of Madison's drinking water.
  - » Over 2,000 drinking water samples were collected for manganese analysis in 2006.
    - 92% of households in Madison were found to be receiving drinking water with low levels of manganese (less than EPA's aesthetic standard of 50 ppb).
    - Manganese levels exceeding 300 ppb were found at 11 homes or businesses. Additional sampling at these locations found that manganese levels dropped below 300 ppb and often varied between 20 and 60 ppb after flushing.

## Frequency of Mn Concentration by Well Service Area

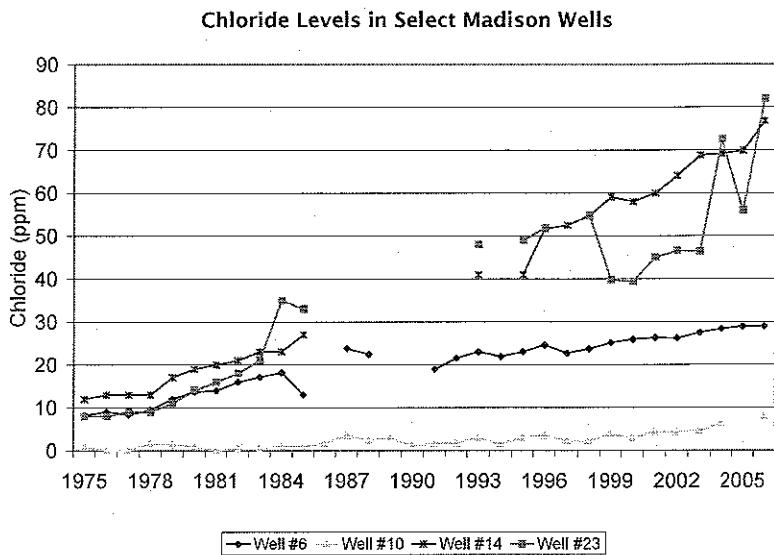


Data provided by Public Health - Madison and Dane County

## WATER QUALITY

## ENVIRONMENTAL MEASUREMENTS

- Chloride is another contaminant of concern in Madison and Dane County groundwater and surface water.
  - » Current water quality regulations do not require well owners to test for chloride in groundwater.
  - » Enforceable federal or state safe drinking water quality standards do not exist for chloride. EPA has a secondary standard of 250 ppm and Wisconsin has set the Protective Action Level (PAL) at 125 ppm.
  - » However, monitoring in the City of Madison has shown that chloride levels have been increasing in some wells over the last 30 years.

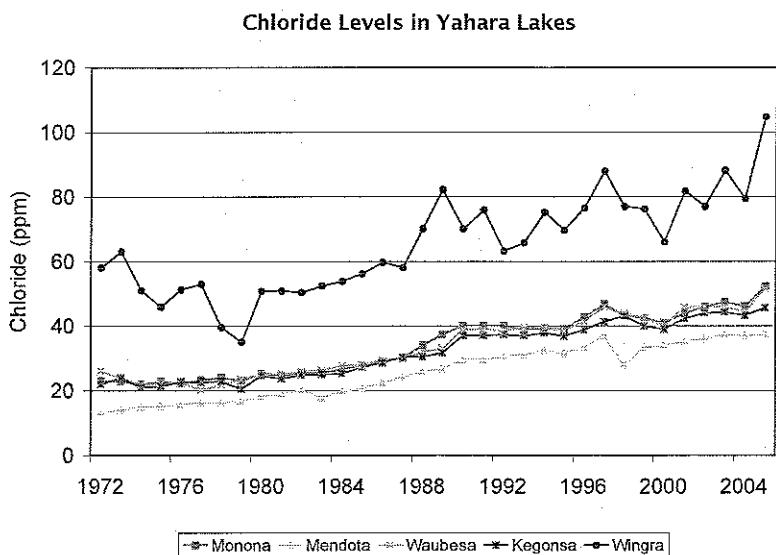


Data provided by Public Health - Madison and Dane County  
Breaks in lines show missing data.

## WATER QUALITY

## ENVIRONMENTAL MEASUREMENTS

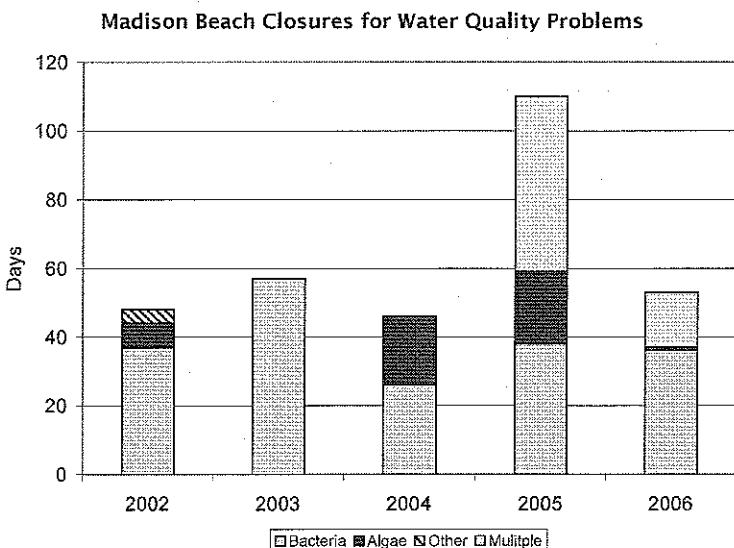
- Chloride levels in surface water have also shown consistent increases. Average levels do not yet pose an immediate risk; however, they may have the potential for changing the ecology of our lakes. Also, peak chloride levels during winter thaws are high enough to harm aquatic plants and animals.



Data provided by Public Health - Madison and Dane County

### ➤ Beach Closures

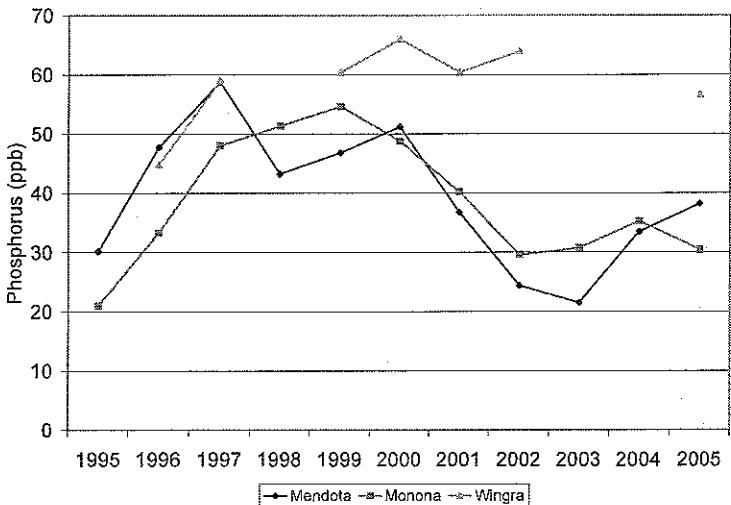
- » There are approximately 1,500 beach days (15 beaches times approximately 100 days between Memorial Day and Labor Day) in Madison each year. In four of the five years from 2002 through 2006, approximately 3% of beach days were lost due to closures. In 2005, twice as many beach days were lost due to closures as a result of elevated algae and bacteria.



➤ **Phosphorus**

- » In 2005 and 2006, 87 beach days in Madison were lost due to high levels of algae at the beach. Algae blooms and weeds on the lakes continue to be a nuisance; and in some cases, may lead to illness in animals and possibly humans.
- » Algae blooms may occur at phosphorus levels above 30 ppb and are common at levels higher than 50 ppb.
- » Phosphorus levels shown in the chart below were measured in the center of the lake. Conditions at the lake shoreline, where blooms affect beaches, may be very different. Breaks in the line for Lake Wingra show years with missing data.

Average Summer Phosphorus Levels in Madison Lakes



Data provided by UW Center for Limnology, LTER Study

➤ In addition to nutrients, storm water washes other pollutants into Madison's lakes, rivers, and streams.

- » Heavy metals are also washed into our lakes by storm water. Levels of these pollutants are still very low compared with Wisconsin's surface water quality standards.

Average Pollutant Levels* in Yahara Lakes, 2005 (ppb)						
Site	Arsenic	Cadmium	Chromium	Copper	Lead	Zinc
Lake Kegonsa	1.34	0.10	0.17	1.39	0.85	2.03
Lake Mendota	1.07	0.12	0.18	1.45	1.00	3.65
Lake Monona	1.23	0.11	0.26	2.31	1.04	3.08
Lake Waubesa	1.16	0.11	0.19	1.33	0.72	3.40
Lake Wingra	1.42	0.11	0.18	1.61	0.77	1.92
Surface Water Quality Standard	148	3.82	152.1	21.57	54.7	220.7

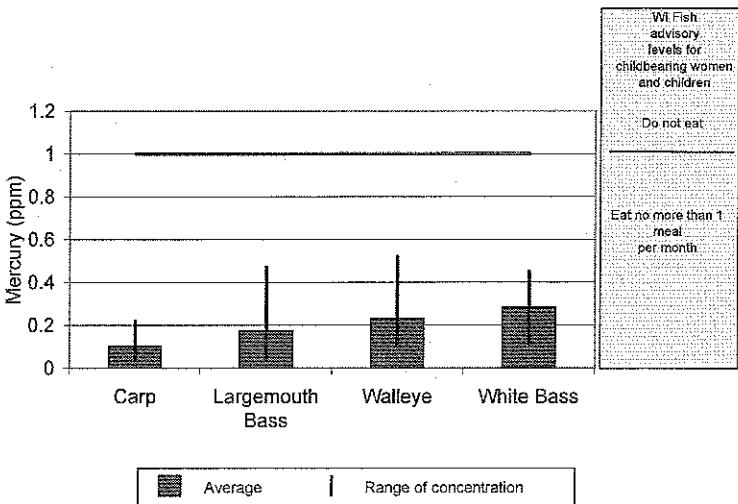
\*Averages calculated after estimating non-detectable results to be 50% of the limit of detection.

## WATER QUALITY

## ENVIRONMENTAL MEASUREMENTS

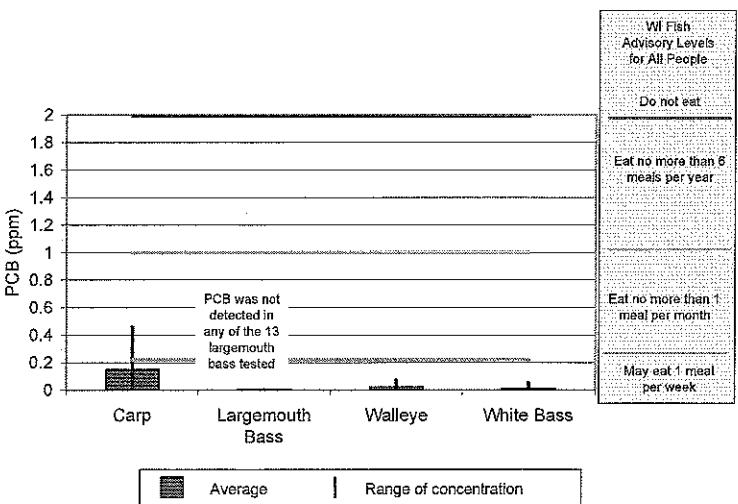
- Fish caught in Dane County waterways may contain unhealthy levels of mercury and polychlorinated biphenyls (PCB).
  - » Wisconsin's Safe Eating Guidelines ([www.dnr.state.wi.us/fish/pages/consumption](http://www.dnr.state.wi.us/fish/pages/consumption)) exist to limit exposure to mercury and PCB.
  - » The following charts show the average amounts and range of mercury and PCB found in the fish most commonly collected for testing in Dane County.

Mercury Levels in Fish from Dane County Lakes and Rivers, 1997-2006



Data provided by WI Department of Natural Resources

PCB Levels in Fish from Dane County Lakes and Rivers, 1997-2006

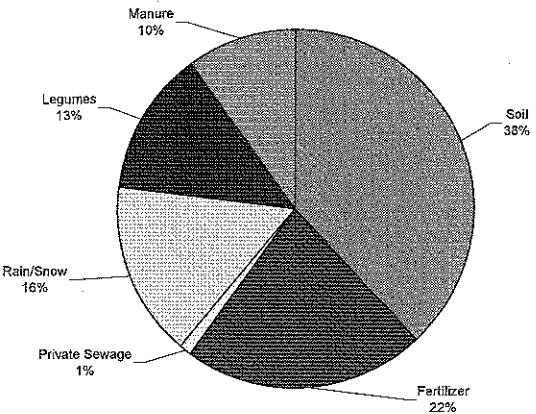


Data provided by WI Department of Natural Resources

## Sources

- Nitrate in groundwater occurs as a result of both natural and human activity. The following chart identifies the sources of nitrate to groundwater and their relative importance.

Sources of Nitrogen Pollution in Groundwater



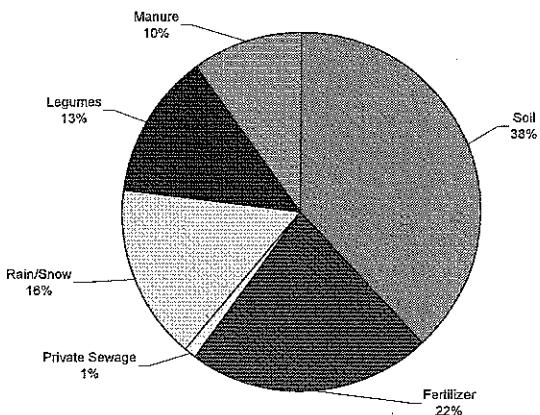
Data provided by the report "Nitrate in Groundwater," 1999

- Manganese in Madison and Dane County drinking water comes from the rock that makes up the groundwater aquifer. Studies in Madison are continuing to determine why some wells produce higher amounts of manganese than others.
- Phosphate is carried from lawns, streets, driveways, sidewalks, and agricultural fields to our lakes, rivers, and streams by storm water. Overuse or misuse of fertilizer is an important source of this phosphate, but so is erosion and poor handling of leaves and grass clippings.
- Bacteria and algae are the two most common reasons for closing public beaches. Algae blooms result when levels of phosphorus are high. High bacteria levels at beaches often result from urban water fowl and other wildlife activity at the beach. On occasion, a dirty diaper or unknown sources of bacteria in the storm sewer can cause a beach to be closed.

## Sources

- Nitrate in groundwater occurs as a result of both natural and human activity. The following chart identifies the sources of nitrate to groundwater and their relative importance.

Sources of Nitrogen Pollution in Groundwater



Data provided by the report "Nitrate in Groundwater," 1999

- Manganese in Madison and Dane County drinking water comes from the rock that makes up the groundwater aquifer. Studies in Madison are continuing to determine why some wells produce higher amounts of manganese than others.
- Phosphate is carried from lawns, streets, driveways, sidewalks, and agricultural fields to our lakes, rivers, and streams by storm water. Overuse or misuse of fertilizer is an important source of this phosphate, but so is erosion and poor handling of leaves and grass clippings.
- Bacteria and algae are the two most common reasons for closing public beaches. Algae blooms result when levels of phosphorus are high. High bacteria levels at beaches often result from urban water fowl and other wildlife activity at the beach. On occasion, a dirty diaper or unknown sources of bacteria in the storm sewer can cause a beach to be closed.

## WATER QUALITY

### Human Health Impacts

- Neither Madison nor Dane County has had a disease outbreak from drinking water in recent history.
  - » Illness outbreaks from recreational water use happen occasionally, but none were reported in 2005 or 2006. Since 1989, five potential waterborne illness events were reported to Public Health, three in swimming pools or whirlpools and two at Madison beaches.
  - » No cases of illness in humans or dogs related to swimming during an algae bloom were reported in 2005 or 2006.
  - » Manganese observed in Madison drinking water raised considerable concern about the potential human health risk.
    - As a precaution, health advisories for infants fed formula and for persons with liver disease were issued for the areas served by wells 3 and 10. These advisories covered the weeks when Madison Water Utility crews were flushing the water pipes and the potential of elevated manganese levels was highest. These advisories were lifted in July 2006 after tap water samples showed that manganese levels in areas served by wells 3 and 10 were acceptable.
    - No cases of manganese poisoning related to water have been identified through Public Health's surveillance.
- Nitrate at levels above 10 ppm places infants at risk for a serious illness called methemoglobinemia (Blue Baby Syndrome). Nitrate levels of 2 ppm or more exceed Wisconsin's Preventive Action Limit and suggest that action is needed to prevent exposure to higher levels.
  - » Infant methemoglobinemia is a relatively rare condition with 2 infants hospitalized in Wisconsin between 1995 and 2005. Neither of these infants lived in Dane County.

### Local Response

- Individual Actions - What You Can Do
  - » People receiving water from a public water system should receive and review an annual Consumer Confidence Report describing the result of water quality monitoring done by the local water utility. To see your most recent report, go to [www.dnr.state.wi.us/org/water/dwg/CCR\\_instructions.htm](http://www.dnr.state.wi.us/org/water/dwg/CCR_instructions.htm).
  - » People receiving their drinking water from private wells should test their water annually for nitrate and bacteria.
    - Annual nitrate testing is especially important for families with infants or pregnant women.
    - A test for arsenic in water from a private well is also appropriate due to rising concerns about this metal.
  - » Conserve water to reduce the amount that needs to be pumped from the ground.
    - Through 2006, EnAct Teams\* in Dane County have conserved 11,026 gallons per household. This adds up to a total of 3,252,665 gallons ([www.enactwi.org/results.htm](http://www.enactwi.org/results.htm)).
  - » Report incidents of spills or discharges to the storm sewer to Public Health.

\*"EnAct" is a program that forms Environmental Action Teams in communities, neighborhoods and workplaces throughout Dane County. To learn about living more sustainably go to [www.enactwi.org](http://www.enactwi.org).

## HUMAN HEALTH IMPACTS / LOCAL RESPONSE

**HEALTHY PEOPLE 2010 OBJECTIVE:**  
Reduce waterborne illness outbreaks from drinking water to two outbreaks per year.

**STATUS:** Achieved

## WATER QUALITY

## LOCAL RESPONSE

- » People receiving water from a public water system should report water problems (poor odor, taste, discoloration, etc.) to their local water utility or Public Health.
- » Increase the amount of water you soak into the ground (infiltrate) by diverting storm water to rain gardens, installing rain barrels or other infiltration devices.
  - The storm water that runs off your property to ditches, streams, and lakes carries with it nutrients and other pollutants.
  - Sustain Dane has had success providing rain barrels throughout Dane County. Since 2005, 420 rain barrels have been distributed and another 425 people are on the waiting list for rain barrels in 2007.
  - Remember to make sure water is not available for mosquitoes. Rain gardens should drain in two days or less and rain barrels should be closed to prevent mosquito access.
- » Reduce or eliminate the use of chemicals and lawn care products on your property.
  - Salt for melting ice, fertilizers, and pesticides should only be used when necessary.
  - As per City of Madison and Dane County ordinances, do not use phosphorus fertilizers on your lawn unless you are starting a new lawn or a soil test shows that your lawn needs phosphorus.
  - Oils, fuels, solvents, and cleaning chemicals should be disposed of properly at Madison/Dane County Clean Sweep ([www.danecountycleansweep.com](http://www.danecountycleansweep.com)).
- » If you have a septic system, make sure the system is operating properly.
- » Keep yard waste and leaves out of the street gutters.

➤ Based on mercury and PCB levels in fish, the following guidance applies to fish caught in Dane County.

- » Women of childbearing age, nursing mothers and children under 15:
  - 1 meal per week - bluegill, sunfish, crappie, yellow perch, bullheads
  - 1 meal per month - walleye, pike, bass, catfish, and other species
  - Do not eat - muskies
- » Women beyond childbearing age and men:
  - Unlimited - bluegill, sunfish, crappie, yellow perch, bullheads
  - 1 meal per week - walleye, pike, bass, catfish, and all other species
  - 1 meal per month - carp from Badfish Creek (all sizes), Lakes Monona (all sizes) and Lake Mendota (fish > 23" long)

➤ Community Actions - What the Community Can Do

- » Monitor public water supplies to ensure safe drinking water.
  - Drinking water from public drinking water systems is tested at least annually to ensure safety.
  - Public Health and landfill staff monitor groundwater near closed landfills to monitor movement of contaminants in groundwater.
- » Take action to address water quality problems that are identified.
  - Madison Water Utility is on track to achieving its goal to remove all lead service pipes by the end of 2010. After 2006, 5,107 (85%) City-owned and 4,106 (82%) privately owned lead services have been replaced or eliminated. More information on lead service replacement in Madison is available at [www.cityofmadison.com/water/plansLead.cfm](http://www.cityofmadison.com/water/plansLead.cfm).
  - Lead water pipes exist in water systems throughout Dane County. The utilities managing these systems need to take action that will ensure that water pipes are not releasing lead into the drinking water.

HEALTHY PEOPLE 2010 OBJECTIVE  
Increase the proportion of lakes and rivers checked for safety.

STATUS: Ongoing

## WATER QUALITY

## LOCAL RESPONSE / REFERENCES AND LINKS

- Madison Water Utility is continuing to take action to address the manganese problem ([www.cityofmadison.com/Water/qualityManganese.cfm](http://www.cityofmadison.com/Water/qualityManganese.cfm)).
- Public water utilities that consistently find nitrate levels above 2 ppm should identify the potential sources and look for ways to maintain or reduce nitrate levels.
- » Prevent pollution in our lakes, rivers, and streams by developing and implementing comprehensive watershed management plans.
- The Dane County Lakes and Watershed Commission ([www.danewaters.com](http://www.danewaters.com)) and the Dane County Land and Water Resources Department have worked for many years on developing and implementing watershed management plans in Dane County. Through a variety of county, state and federal programs they continue to develop and implement nutrient management plans with farmers, monitor water quality, and permit manure storage facilities to prevent groundwater pollution. Important recent accomplishments of this effort include the countywide ordinances banning unnecessary phosphate in lawn fertilizers and coal tar sealants, strengthening stormwater infiltration requirements, and controlling the application of liquid manure during winter.
- » Monitor surface water to provide safe recreational water.
  - Chemical and bacteriological tests on water from lakes, beaches, and storm sewers continue to be a priority for the Public Health.
  - Swimming areas at Madison beaches are also sampled frequently during the summer season from May to September. If elevated bacteria counts are found, the beach is closed for swimming until the levels drop to acceptable levels. Swimming may also be restricted if an algae bloom is present.
  - Water testing in Dane County is performed by Public Health, Dane Co UW Extension, UW-Madison, Edgewood College, US Geological Survey, WDNR, and volunteer citizen monitoring efforts.
- » Update fish consumption advisory based on measured levels of polychlorinated biphenyls (PCB) and mercury in fish.
  - WDNR tests fish from water throughout the state for mercury and PCB. In most cases, advisories have become more restrictive. However, in 2005, advice for brown trout from Bad Fish Creek was relaxed slightly due to lower levels of PCB in the fish.
- » Ensure public pools and whirlpools are properly managed and safe.
  - Public Health inspects and samples all open public pools and whirlpools. If we find high bacteria levels or improper disinfectant levels, we close the pool until the problem is corrected.
- » Reduce salt use on roads, highways, parking lots, and sidewalks.
  - In 2005 and 2005, 199 pools in the City of Madison were closed for health violations.

**HEALTHY PEOPLE 2010 OBJECTIVE:**  
Decrease contaminant levels in fish to reduce human exposure to persistent chemicals.

**STATUS:** Ongoing

## References and Links

- WI DNR Safe Water on Tap Report (<http://www.dnr.state.wi.us/org/water/dwg/news.htm>)
- Groundwater: Protecting Wisconsin's Buried Treasure (<http://www.wnrmag.com/supps/2006/apr06/intro.htm>)
- NSF International, the Public Health and Safety Company ([http://www.nsf.org/consumer/drinking\\_water/index.asp?program=WaterTre](http://www.nsf.org/consumer/drinking_water/index.asp?program=WaterTre))
- Madison Area EnAct Program (<http://www.enactwi.org/WConservation.pdf>)

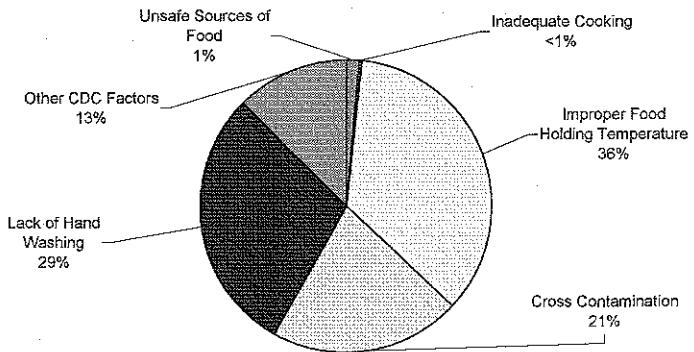
# FOOD PROTECTION

## Environmental Measurements

- Pathogenic organisms and toxins can occur in food at levels that make people sick when food is transported, stored, or handled unsafely. Improper food temperature, inadequate hand washing, and contamination are among problems that must be avoided in order to keep food safe. To help avoid these problems, the Centers for Disease Control and Prevention (CDC) has identified the most important risk factors (see table below) to be controlled to prevent foodborne illness.
- Public Health inspectors focus their inspections to ensure CDC risk factors are controlled. The following table lists the CDC risk factor violations by category and the number observed in Madison and Dane County food establishments. The table and pie chart identify improper food holding temperature and lack of hand washing as the most frequent CDC risk factors observed.

CDC Risk Factor Violations Recorded During Inspection of Madison and Dane County Food Establishments, 2006									
Restaurant Type	Unsafe Sources of Food	Inadequate Cooking	Improper Food Holding Temp.	Cross Contamination	Lack of Hand Washing	Other CDC Factors	Total CDC Risk Factor Violations	Number of Inspections	# Risk Factor Violations /Inspection
Simple	4	2	75	57	128	62	328	420	0.8
Moderate	47	1	967	604	909	388	2916	1032	2.8
Complex	23	10	704	387	410	174	1708	288	5.9
Total	74	13	1746	1048	1447	624	4952	1740	

Percent of CDC Risk Factor Violations in Madison and Dane County Food Establishments, 2006



Data provided by Public Health - Madison and Dane County.

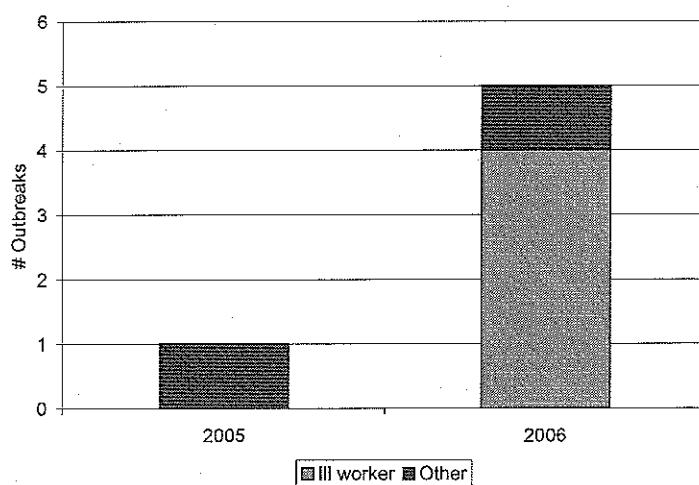
In the above table, restaurants are grouped into categories representing the amount of food handling activity that occurs.

- Simple (minimal preparation and processing) – Food is prepared when ordered and is limited to mixing together prepackaged products. An example of a simple establishment is a concession stand.

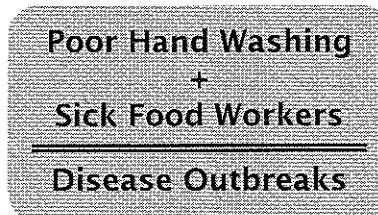
- » Moderate (increased amount of preparation and processing) – This category includes establishments that have self-service salad bars and/or handle raw poultry meat or seafood, have a seating capacity over 50, and a drive up window or delivery service. An example of a moderate establishment is a fast food restaurant.
- » Complex (the most extensive amount of preparation and processing) – This category includes establishments that cool, reheat, and may prepare foods in one location and then transport it to another location. These establishments may also have banquet facilities. An example of a complex establishment is a large hotel kitchen.

➤ Individuals who work while ill provide an opportunity for bacteria, viruses, and parasites to be passed to others by eating contaminated food. The chart below shows the number of foodborne outbreaks observed in the last two years. At least four of the six outbreaks involved ill food workers.

**Number of Foodborne Outbreaks in Madison and Dane County Establishments**



➤ Recently, we have seen a number of foodborne illness outbreaks at the national level. This is possible because the current global food supply system allows contaminated food to be transported to consumers all over the world.

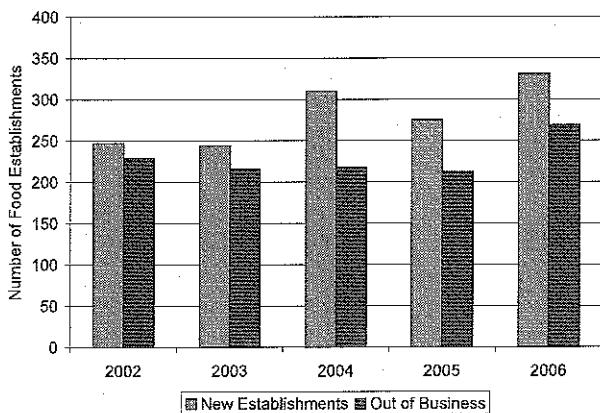


## Sources

- Unsafe food can be found both in the home and commercial food establishments. Unsafe food at home can result in a small number of people becoming ill, but unsafe food from food establishments or temporary event vendors can cause illness in many people.
  - » 2,148 permanent restaurants and retail food establishments were licensed in Dane County in 2006.
  - » 1,040 temporary food vendors were licensed in Dane County in 2006.

- Unsafe food handling practices may be the result of inexperience or a lack of knowledge. These conditions are most likely to exist when a food establishment first opens or new employees are hired. The frequency of new establishments opening for business has grown over the last five years and creates an ongoing demand for food operator training (see chart below).

Changes in Restaurants and Retail Food Establishments in Madison and Dane County



- Nationwide, the hospitality industry employs a considerable number of non-English speaking food workers, which can result in communication difficulties and specialized training needs. This is also true in Dane County.
- A growing trend in the area is the serving of raw or uncooked foods in restaurants and retail food stores. Although uncooked foods may have increased nutritional benefits over cooked foods, the lack of cooking may increase the risk of contamination from bacteria and other microbes.
- Employee turnover in food establishments remains high, requiring constant training.

## Human Health Impacts

- Foodborne illness can have a dramatic impact on human health. CDC scientists estimate that foodborne illness results in 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths each year in the U.S. View more on this research at: [www.cdc.gov/ncidod/eid/vol5no5/mead.htm](http://www.cdc.gov/ncidod/eid/vol5no5/mead.htm).
- Infection from exposure to *Campylobacter* and *Salmonella* in contaminated food may cause diarrhea, fever, and possibly more serious illness.
  - » In 2005, over 19 cases of *Campylobacter* infection and 15 cases of *Salmonella* infection per 100,000 people were reported.
- Other pathogens and toxins are responsible for causing foodborne illness.
  - » 8 people were ill with an unknown agent from an outbreak in 2005.
  - » 185 cases of norovirus were linked to five outbreaks in Dane County in 2006.
  - » 9 cases of *E. coli* illness reported in Dane County were related to the national *E. coli* outbreak in 2006 that was caused by contaminated spinach.

### HEALTHY PEOPLE 2010 OBJECTIVE

Reduce infections caused by *Campylobacter* and *Salmonella* to 12 and 7 cases per 100,000 people, respectively.

STATUS: Ongoing

## Local Response

- Individual Actions - What You Can Do
  - » Maintain proper food temperatures at home and wash your hands after handling raw meats and before eating (see references).
  - » Report concerns in food establishments to Public Health.
  - » Keep your refrigerator at or below 40 degrees Fahrenheit.
  - » Report illnesses that are suspected to have come from eating food to Public Health.
  - » Buy and consume locally grown and produced foods whenever possible. This reduces the risk of exposure to national foodborne outbreaks, as well as the amount of energy spent to produce the food.
- Community Actions - What the Community Can Do
  - » Food establishment inspections to ensure safe handling and storage of food.
    - In 2006, 3,169 regular and follow up inspections were performed in Madison and Dane County restaurants, retail food stores, and temporary events.
  - » Follow-up of suspected foodborne illness outbreaks.
    - Public Health staff investigated 6 foodborne illness outbreaks in 2005 and 2006.
  - » Educate food service operators.
    - Staff educated 720 food service operators and workers about safe food handling in 2005 and 2006.
  - » Correct repeated food safety problems through citations, temporary license suspensions, and permanent license revocations.
    - In 2006, 104 enforcement actions were taken against problem food establishments, including four license suspensions.
  - » Test soft-serve and ready-to-eat foods to identify problems that may lead to human illness.
    - In 2005 and 2006, Public Health staff tested over 300 food samples for bacteria and inspectors worked with establishment owners to correct problems.
    - Results have shown that routine, thorough cleaning of soft-serve ice cream equipment is essential for limiting the presence of bacteria in this food.

Food Testing Activity for 2005 and 2006, Madison

Sample	Total Samples	Unsatisfactory Samples	% Unsatisfactory Samples
Deli Foods	407	53	13%
Soft-Serve Ice Cream	947	265	28%
Frozen Yogurt	74	21	28%

Data provided by Public Health - Madison and Dane County.

## References and Links

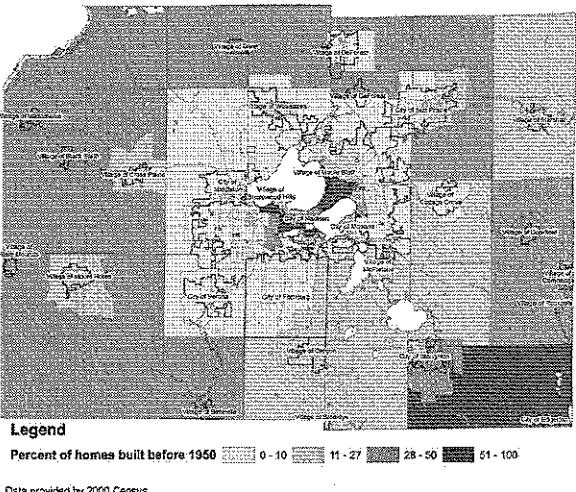
- Fight Bac ([www.fightbac.org](http://www.fightbac.org)): Resource for individuals to learn details about safe food handling and storage.
- CDC Clean Hands Save Lives ([www.cdc.gov/cleanhands](http://www.cdc.gov/cleanhands)): Details on the techniques and benefits of good hand washing.
- Safe Food Crew ([www.safefoodcrew.org](http://www.safefoodcrew.org)): Resource for food operators to obtain training for their staff on food safety.

# HEALTHY HOMES AND COMMUNITIES

## Environmental Measurements

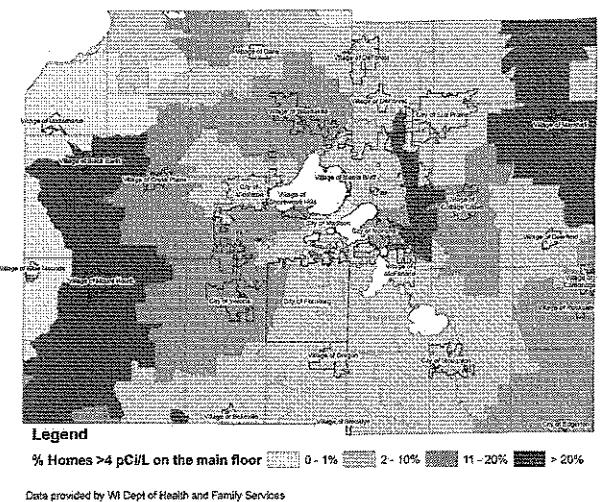
- Children continue to be at risk of lead poisoning due to the presence of lead-based paint in Dane County homes. The highest concentrations of homes built before 1950, which are most likely to contain lead hazards, are located in the central parts of Madison and rural portions of Dane County.
  - » Throughout Dane County, there are over 37,000 homes built before 1950. This accounts for approximately 21% of the total housing stock.

Percent of Homes Built Before 1950



- Radon has been found at elevated levels in nearly 2,000 Dane County homes. Radon is a radioactive gas naturally found in the soil, which can seep into homes under certain conditions. People living in homes with 4 picocuries of radon per liter of air (pCi/L) or more have a greater risk of developing lung cancer. More information about radon is available at US EPA's website [www.epa.gov/radon](http://www.epa.gov/radon).

Estimated Percent of Homes with Elevated Radon Levels (>4 pCi/L) on the Main Floor



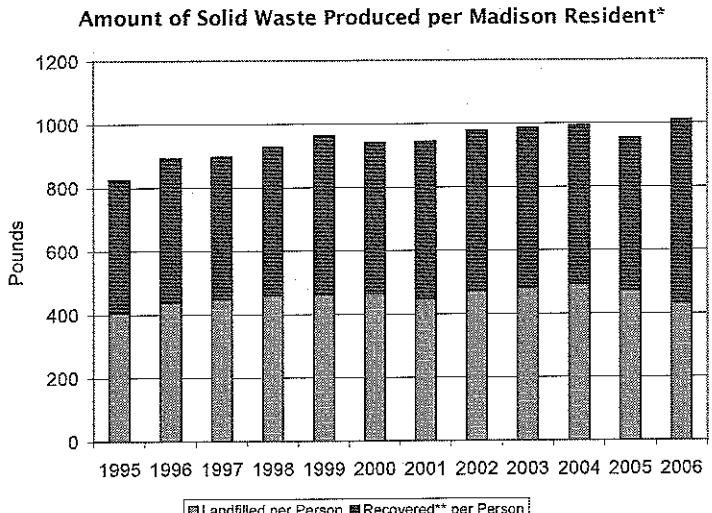
#### HEALTHY HOMES AND COMMUNITIES

- Exposure of children to environmental tobacco smoke is known to increase the risk of respiratory diseases, including asthma.
  - » The Dane County Youth Assessment found in 2005 that 25% of 7th and 8th grade students and 27% of high school students were exposed to tobacco smoke in their home.
- Mold in homes and workplaces continues to be a significant concern to Dane County residents based on calls received by both Public Health and Building Inspection staff.
- Production of solid waste in Madison and Dane County impacts environmental health.
  - » In Madison, total solid waste production has increased 23% since 1995; however, the amount of this waste that is either recycled or composted has also increased.

#### ENVIRONMENTAL MEASUREMENTS / SOURCES

**HEALTHY PEOPLE 2010 OBJECTIVE:**  
Reduce the proportion of children who are regularly exposed to tobacco smoke at home to 10% or less.

**STATUS:** Not Achieved



\*Includes solid waste collected by the City of Madison. Waste collected from businesses and large apartment complexes by private haulers is not included.

\*\*Accounts for waste that is recycled, composted, reused, or otherwise diverted from the landfill.

Data provided by Madison Streets Division

- » The amount of solid waste produced throughout Dane County is unknown because much of the waste is collected by private waste haulers that do not make the data available.

#### Sources

- Lead-based paint is the primary source of lead poisoning in Dane County children. Other sources such as drinking water from lead pipes and consumer products can poison children but are less common.
  - » Lead poisoning occurs when painting and remodeling in older homes create lead dust such as by sanding old paint and varnish.

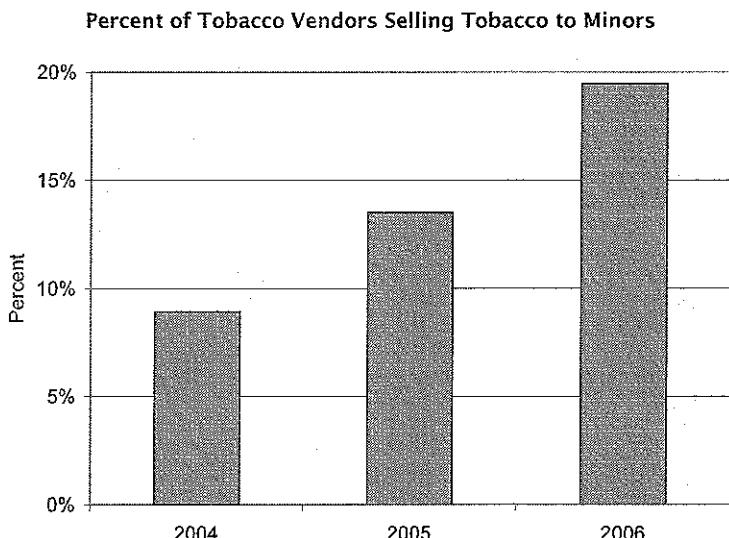
## HEALTHY HOMES AND COMMUNITIES

## SOURCES

- » Lead-based paint was banned on residential property in 1978 so any home built before then may have lead-based paint hazards.
- » Small amounts of lead can dissolve into water from pipes, fixtures, and solder. Lead pipes were more commonly used to carry drinking water prior to 1930; however, lead pipe and solder was not banned in drinking water supply systems until 1986. More recently, faucets, valves, and fittings made of brass (a metal alloy that contains lead) have been recognized as a potential source of lead exposure.
- » Radon gas results from the radioactive decay of naturally occurring uranium in the soil.
  - » Exposure to radon is preventable if you know levels are high in your home.
  - » Most people still have not tested their homes for radon because they misunderstand the risks of radon exposure.
  - » Studies have shown that understanding the health risks associated with radon leads to greater testing in the home.
- » Research continues to show that smokers start the habit as teenagers. By decreasing the number of vendors that sell tobacco to minors, we restrict an important source of tobacco for youth.
  - » The percentage of vendors selling to minors has more than doubled in the last three years from 8.9% to 19.5%.

**HEALTHY PEOPLE 2010 OBJECTIVE:**  
Reduce the percentage of vendors  
that sell tobacco to minors to 5%.

**STATUS:** Not Achieved



Data provided by Public Health - Madison and Dane County.

- » Mold problems in buildings occur when excess moisture persists for 48 hours or more. Excess moisture may come from leaks in plumbing, roofs, or the foundation, as well as high levels of humidity if indoor spaces are not properly ventilated. More information on mold and its causes is available at [www.epa.gov/mold](http://www.epa.gov/mold).

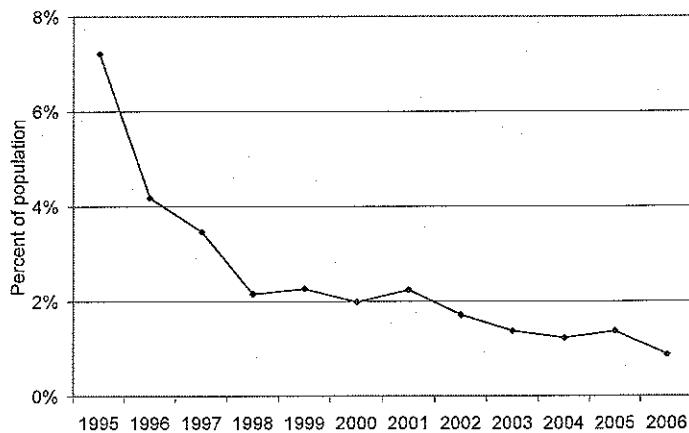
## Human Health Impacts

- In 2006, lead poisoning in Dane County children dropped to 0.8% of children tested.
  - » However, the number of children tested continues to be less than the number of children at risk. In 2006, only 17% of Dane County children less than 3 years of age were tested for lead poisoning. This is less than half of children that should be screened, since 35 to 50% of Dane County children are at risk of lead poisoning.
  - » Childhood lead poisoning usually has few immediate symptoms but can result in long-term problems such as lower intelligence and behavioral problems.

**HEALTHY PEOPLE 2010 OBJECTIVE:**  
Eliminate childhood lead poisoning.

**STATUS:** Not Achieved

**Lead Poisoning in Dane County  
Among Children 0-6 Years Old Tested For Lead Poisoning**



Data provided by Public Health - Madison and Dane County

- Radon is still considered the second leading cause of lung cancer after tobacco smoke. (BIER VI Report, National Academy of Sciences)
- Environmental (secondhand) tobacco smoke is a known carcinogen according to the National Toxicology Program.
- Mold problems in homes, offices and other buildings can result in allergic or asthmatic reactions in sensitive individuals. On rare occasions, more serious illness may also result. More details can be found at [www.cdc.gov/mold/basics.htm](http://www.cdc.gov/mold/basics.htm).
- Solid waste affects human health by degrading land that could otherwise be used for other purposes such as recreation, agriculture, or other needed developments. Hazardous wastes and other household materials can escape landfills and pollute soil and water, resulting in human health effects.

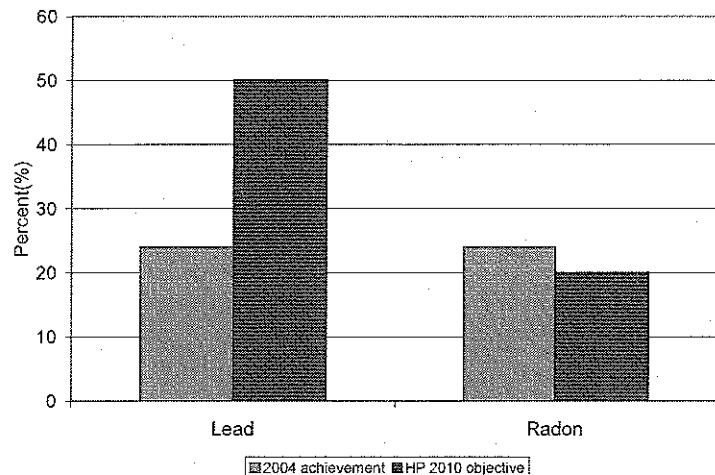
## Local Response

- Individual Actions - What You Can Do
  - » Test your home for lead if it was built before 1978.
    - In 2004, a DaneTrak survey found that 24% of Dane County homes built before 1978 have been tested for lead-based paint, which is only half of the target.

**HEALTHY PEOPLE 2010 OBJECTIVE:**  
Increase the percent of homes built before 1950 tested for lead hazards to 50%.

**STATUS:** Not Achieved

**Lead and Radon Testing in Dane County Homes  
2004**



Data provided by DaneTrak Survey Oct. 2004

- » Test your home for radon
  - This modest objective was achieved in 2004 when a DaneTrak survey found that 24% of Dane County homeowners had tested their homes for radon.
- » Decrease the amount of solid waste produced.
  - EnAct Teams\* in Madison and Dane County communities were able to eliminate an average of 205 pounds of solid waste per year, which amounts to a total of 30.2 tons less garbage between 2003 and 2006.

**HEALTHY PEOPLE 2010 OBJECTIVE:**  
Increase the percent of homes tested for radon to 20%.

**STATUS:** Achieved

\*"EnAct" is a program that forms Environmental Action Teams in communities, neighborhoods and workplaces throughout Dane County. To learn about living more sustainably go to [www.enactwi.org](http://www.enactwi.org).

## HEALTHY HOMES AND COMMUNITIES

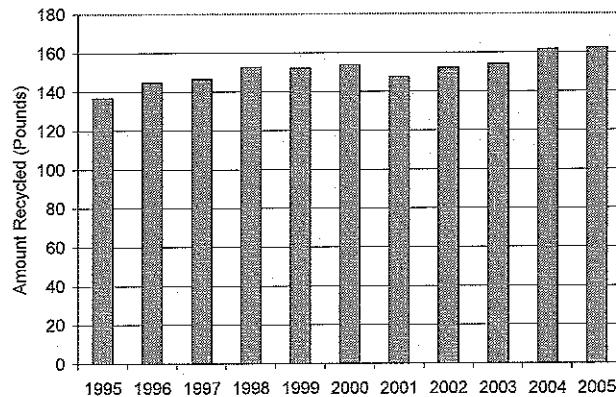
- » Increase the percentage of waste that you recycle.
  - Recycling is commonplace throughout Dane County and the amount that residents recycle has grown by 18.7% since 1995.

## LOCAL RESPONSE

**HEALTHY PEOPLE 2010 OBJECTIVE**  
Increase recycling of municipal solid waste by 40% from 1996 levels.

**STATUS:** Not Achieved

Amount of Solid Waste Recycled per Dane County Resident



Data provided by WI Dept. of Natural Resources

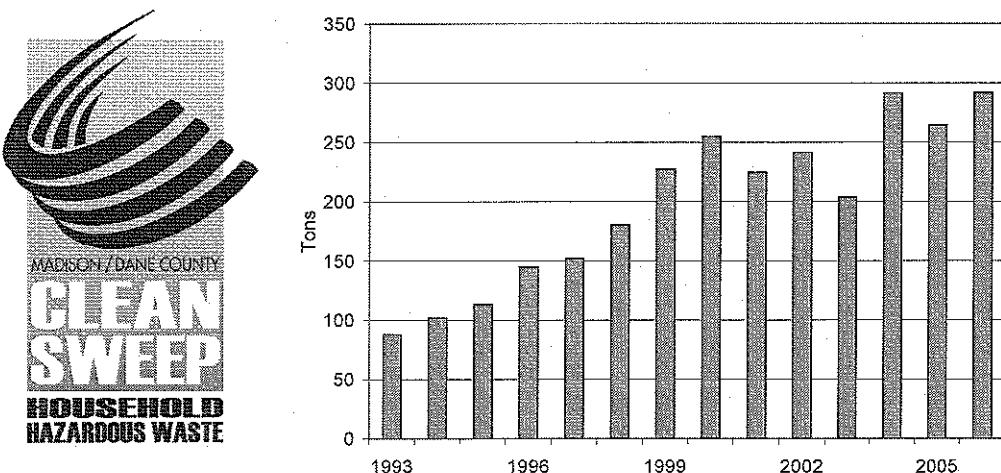
- » Reuse, sell, or donate usable items instead of throwing them away.
  - In 2006, the City of Madison Stuff Exchange ([www.madisonstuffexchange.com](http://www.madisonstuffexchange.com)) diverted 218.7 tons of usable materials by helping people connect.
  - Other options also exist for donating or selling useful items such as Goodwill ([www.goodwill.org](http://www.goodwill.org)), St. Vincent DePaul ([www.svdpmadison.org](http://www.svdpmadison.org)), Freecycle ([groups.yahoo.com/group/madisonfreecycle/](http://groups.yahoo.com/group/madisonfreecycle/)) and Craig's List ([www.madison.craigslist.org](http://www.madison.craigslist.org)).
- » Dispose of hazardous wastes properly through Madison/Dane County Clean Sweep, municipal oil drop off sites, and retailers selling fluorescent light bulbs.
- » Get involved with sustainable lifestyle activities.

## HEALTHY HOMES AND COMMUNITIES

## LOCAL RESPONSE

- **Community Actions - What the Community Can Do**
  - » Provide alternatives to landfilling waste such as recycling, composting, and exchange opportunities.
    - In 2005, the City of Madison changed to an automated recycling process, which has increased recycling by 35%.
    - In 2006, Madison residents recycled or composted a total of 64,569 tons of solid waste according to City of Madison collection data.
  - » Madison/Dane County Clean Sweep continues to collect hazardous wastes from residents throughout Dane County.
    - The annual amount of waste collected has more than tripled between 1993 and 2006.
    - The Product Exchange Program at Clean Sweep allows customers to obtain free usable products such as paint, sealers, caulk, pesticides, and many others. This allows products to be used as they were intended instead of being wasted.

Amount of Hazardous Waste Collection by Madison/Dane County Clean Sweep



Data provided by Public Health - Madison and Dane County

- » **Restrict smoking in public places.**
  - A study in New York City showed that smoking rates dropped dramatically after prohibiting smoking in public places ([www.nyc.gov/html/doh/html/pr/pr062-05.shtml](http://www.nyc.gov/html/doh/html/pr/pr062-05.shtml)).
  - In 2006, the City of Madison passed an ordinance prohibiting smoking in all workplaces, including bars and taverns.
  - In 2006, the City of Fitchburg began discussing a similar ordinance.
  - The 2005, Dane County Youth Assessment found that youth continue to be exposed to tobacco smoke on the job where 5% of 7th and 8th graders and 17% of 9th to 12th graders reported working in a place that allowed smoking in the last year.

**HEALTHY PEOPLE 2010 OBJECTIVE**  
Increase the proportion of smoke-free workplaces to 100%.

**STATUS:** Achieved in Madison

## REFERENCES AND ACKNOWLEDGEMENTS

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### Air Quality

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### Water Quality

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([http://prodoasext.dnr.wi.gov/inter1/grn\\$.startup](http://prodoasext.dnr.wi.gov/inter1/grn$.startup))  
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George Dreckmann, City of Madison Streets Division  
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Madison and Dane County Environmental Health Report Card  
Changes and Corrections  
28 September 2007

The Madison and Dane County Environmental Health Report Card was officially released Wednesday 19 September 2007. Since that time, the report has been revised to make corrections or changes that had a significant impact on the report. The following is a listing of these changes to assist the reader. If you have questions or concerns, please contact John Hausbeck, Environmental Epidemiologist, at 243-0331 or [jhausbeck@publichealthmdc.com](mailto:jhausbeck@publichealthmdc.com).

Additional fine particulate data:

When preparing this report, fine particulate (PM2.5) data for 2006 was available for the months January through October. The remaining two months of data were added since the report was officially released. This new set of data includes one day in November where fine particulate levels were high enough to make the air "unhealthy for sensitive populations". As a result, the text on page 2 (second sentence) and the Air Quality Index chart (page 2) and the Fine Particulate chart (page 4) were updated.

More private drinking water wells:

Data on the number of private drinking water wells in Dane County, page 13, was obtained from the Wisconsin Department of Natural Resources web-based database, Groundwater Retrieval Network (GRN which can be found at [http://protoasext.dnr.wi.gov/inter1/grn\\$.startup](http://protoasext.dnr.wi.gov/inter1/grn$.startup)). Mark Putra, from the WI DNR Drinking Water and Groundwater Section, informed staff that the GRN database did not include all wells. He estimated the true number of wells to be closer to 22,000 private drinking water wells in Dane County. Based on this information, the text on page 13 was changed to reflect this higher estimate.



# Regional Transportation Plan 2030

## Madison Metropolitan Area and Dane County

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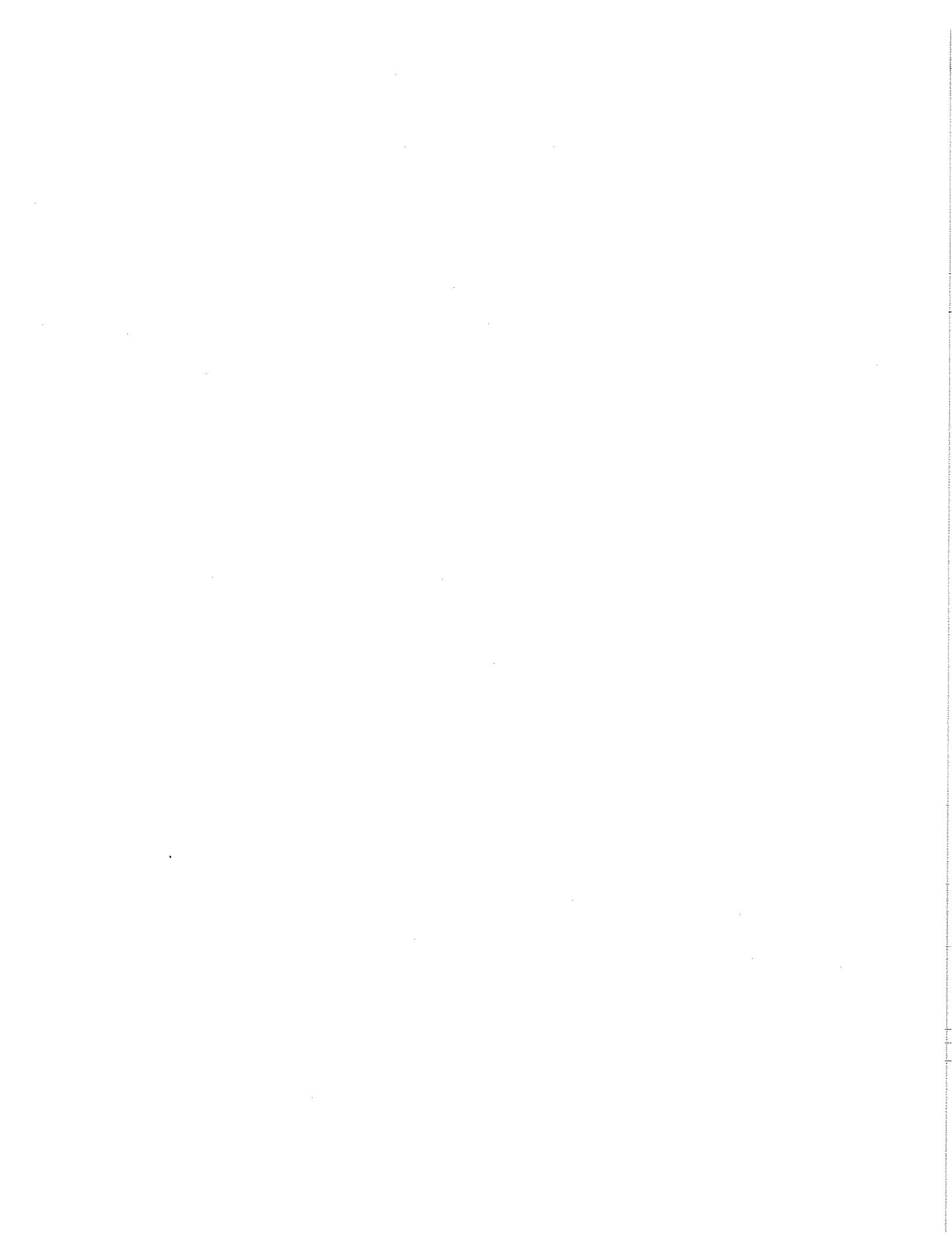
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# SUMMARY

# Regional Transportation Plan 2030

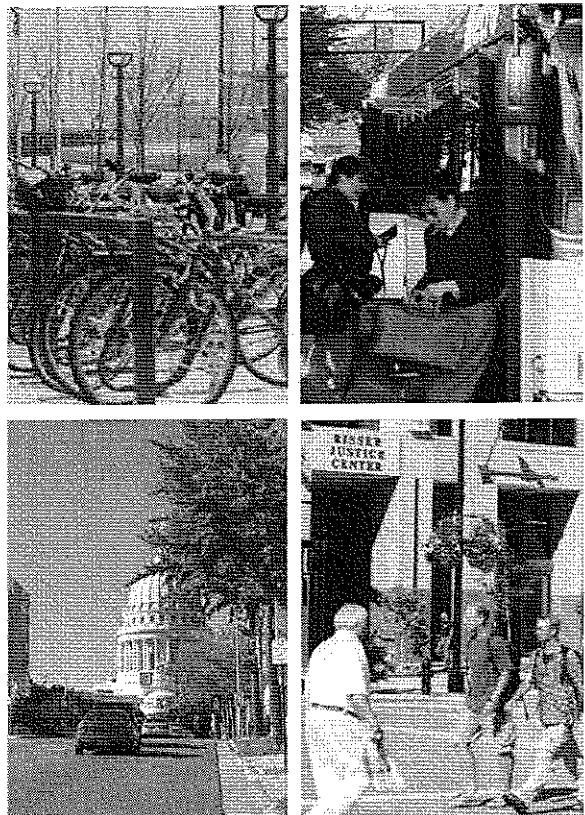
## Madison Metropolitan Area & Dane County

### **Introduction**

Behind the idea of planning is the belief that we have the ability to choose the kind of future we will have. While no one can precisely predict the future, it is possible to use our best knowledge and our most effective tools to lay out a plan to produce the kind of region we desire.

Transportation planning has been underway in the Madison Metropolitan Area and Dane County since 1961. The first transportation plan, called the *Madison Area Transportation Study*, was adopted in 1970 and focused on the Madison Urban Area. Subsequent updates to the plan were completed in 1978, 1988, and 1997 to address emerging issues and trends affecting the transportation system. The last full update of the plan, called the *Dane County Land Use and Transportation Plan (Vision 2020)*, represents an overall system-level plan that serves as a guide for needed improvements to all modes of transportation which includes auto, truck, transit, rail, air, bicycle, and pedestrian. This plan was reaffirmed in 2000 with no changes.

While the plan is reviewed on a continuing basis, it is important that a re-evaluation occur to determine if the underlying assumptions, objectives, and policies are valid today as an adequate plan for the future. In addition, the current update of this plan is also in response to the requirements of existing federal rules that mandate that regional transportation plans for air quality attainment areas like Dane County be updated every five years.



### **Purpose**

The purpose of this document is to summarize the major goals, key features and concepts, and major recommendations contained in the *Regional Transportation Plan 2030 for the Madison Metropolitan Area and Dane County*. A discussion of existing transportation trends, conditions, and issues affecting the region is contained in the full plan.

### **Overall Goal**

The development of the year 2030 regional transportation plan for the Madison Metropolitan Area and Dane County was guided by the plan's following overall goal:

*Develop an integrated and balanced land use and transportation system which provides for the efficient, effective, and safe movement of people and goods, promotes the regional economy, supports transportation-efficient development patterns and the regional land use plan, and provides mode choice wherever possible while enhancing and, where relevant, preserving the character and livability of the neighborhoods and residential areas where transportation facilities are located.*

This goal recognizes that the basic role of a transportation system is the safe movement of people and products necessary to keep a community functioning. These demands influence not only the internal structure of the transportation system but also how the Madison Metropolitan Area and Dane County are linked to the rest of Wisconsin and the rest of the nation. It is important, therefore, to maintain mobility on key routes like the Interstate system for through-traffic to places throughout Wisconsin and beyond.

The goal also recognizes that mode choice options need to be provided to meet existing and future mobility needs. In addition, the goal recognizes the inter-relationship between land use development and the transportation system. The region's land use development pattern plays a critical role in determining the viability of mode choice options and the safety and efficiency of the transportation system. At the same time, transportation strategies and investments can support the regional land use plan, the preservation of neighborhoods, and minimize undesirable impacts from the transportation system on the environment.

## Key Features/Recommendations

The key features of the regional transportation plan are:

- Provide mode choice options (transit, bicycle, pedestrian, and arterial street and roadway facilities) in meeting existing and future travel needs, and in modifying plans to meet changing conditions.
- Continue to make the most efficient use of the existing transportation system by utilizing:
  - *Travel Demand Management (TDM) Strategies* such as carpools; vanpools; transit; alternate work hours; telecommuting; bicycling support; financial incentives; and parking management.
  - *Transportation System Management (TSM) Strategies* such as access management; intersection improvements; peak period curb-lane parking restrictions; operational improvements (traffic signal coordination, freeway ramp meters, high-occupancy-vehicle (HOV) lanes) and incident management (crashes, construction, special events).
  - *Intelligent Transportation Systems (ITS)* such as traveler information systems; emergency vehicle signal pre-emption; incident detection and response; and public transportation system technology (automatic vehicle location, automatic passenger counters, real time passenger information, electronic fare collection, transit security, and on-board vehicle condition sensors).
- Continue a Madison Metropolitan Area transit expansion emphasis, with ridership expected to increase 30-40% by 2030 by establishing high capacity, fixed-guideway transit service with complementary express bus and connecting local service in an East-West Transit Corridor (e.g. Transport 2020 Study Area). The expansion also assumes commuter transit service (bus or rail) to selected villages and cities outside of the Madison Urban Area and the improvement of downtown/UW campus area circulator service (bus or street-running rail (e.g. streetcar)) for residents, students, employees, and visitors. The plan envisions the eventual expansion of the fixed-guideway transit system to other corridors (e.g., south) with sufficient ridership potential and opportunities to help shape community development and redevelopment patterns.
- Continue to improve and expand upon the regional system of park-and-ride facilities to support ride sharing and transit.
- Continue to plan and provide for a continuous, interconnected roadway system that efficiently collects and distributes traffic within and through the region. (See Future Planned Roadway Functional Classification map.)
- Continue to accept somewhat higher congestion levels (Level of Service D) during the peak hours on streets and roadways before giving consideration to building new or expanded facilities. (See the Appendices volume of the plan for Level of Service examples.) Congestion growth is monitored and traffic management solutions (TDM, TSM, and ITS) will be tried prior to any consideration of expansion. If, following these efforts, congestion continues to grow and have negative impacts on surrounding neighborhoods, capacity enhancement options will be studied. Capacity enhancements may not be always possible or desirable due to negative impacts. (See map of Recommended Major Transportation Improvements and Studies.)
- Continue to seek preservation of future travel corridors for pedestrian and bicycle use, transit, and roadways. In some corridors, simultaneous uses may be possible.
- Continue to provide high quality paratransit service that meets or exceeds Americans with Disabilities Act standards for persons unable to utilize accessible fixed-route bus service.



<sup>1</sup>It is recognized that different standards of deficiency are used on certain arterial roadways like the Interstate and WisDOT's backbone system.

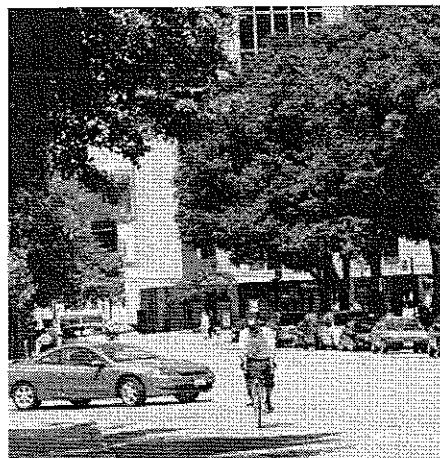
- Continue to provide and improve specialized transportation services (particularly outside the Metro service area) that provide basic mobility and allow persons to access essential services, and strive for increased funding and improved coordination of such services with Metro paratransit service.
- Maintain and reconstruct existing roadways and bridges in a manner that promotes safety, increases efficiency, and minimizes lifetime costs.
- Develop a continuous, interconnected bicycle way network providing reasonably direct, enjoyable, and safe routes between neighborhoods and communities throughout the region. (See map of Bicycle Way System Plan.)
- Develop a continuous, interconnected pedestrian facility network providing reasonable direct and safe routes within and between neighborhoods to destination points in all directions.
- Provide pedestrian and bicycle accommodations along and across all streets as part of new construction and reconstruction where feasible and appropriate in accordance with the U.S. DOT Policy on Integrating Bicycling and Walking into Transportation Infrastructure.
- Recognize limited financial resources available for use on the transportation system and continue to investigate alternative means to finance local, county, and regional transportation improvements and maintenance.
- Provide for the safe, efficient, and reliable movement of goods within and through the region by developing and expanding transportation facilities to accommodate freight movement and to meet the changing needs of the regional economy.
- Provide for the maintenance and construction of structured parking facilities as part of an integrated and balanced land use and transportation system. This includes promoting parking management strategies that encourage the use of alternative modes of transportation, while at the same time meeting user needs.

These features, which represent major policy areas in the transportation system, can be combined in ways to produce certain effects within the region that can also be described in a conceptual context.

## Key Concepts

### *Growth Area and Activity Center Linkage*

The plan seeks to maintain mobility and accessibility options throughout the region. Figure 1 illustrates how the major employment/activity centers and cities/villages in the Madison Metro Area are interconnected by the present system of arterial and collector roadways, and how these centers and communities can be served with a potential rail and express bus system with park-and-ride lots. As the outlying cities and villages grow, rail service could be extended in the future.



### *Balanced Transportation Concept*

The plan strives to increase use of travel alternatives to driving alone and minimize demand on the transportation system during peak travel periods. This is especially the case for work trips to central Madison and for school trips. This makes more efficient use of roadway capacity and provides mobility choices for those who wish to use other modes rather than an automobile or who do not have access to an automobile. This plan also recognizes that the majority of trips made within the region will still be made by automobile for shopping and business, and that modifications to the roadway system will be needed.

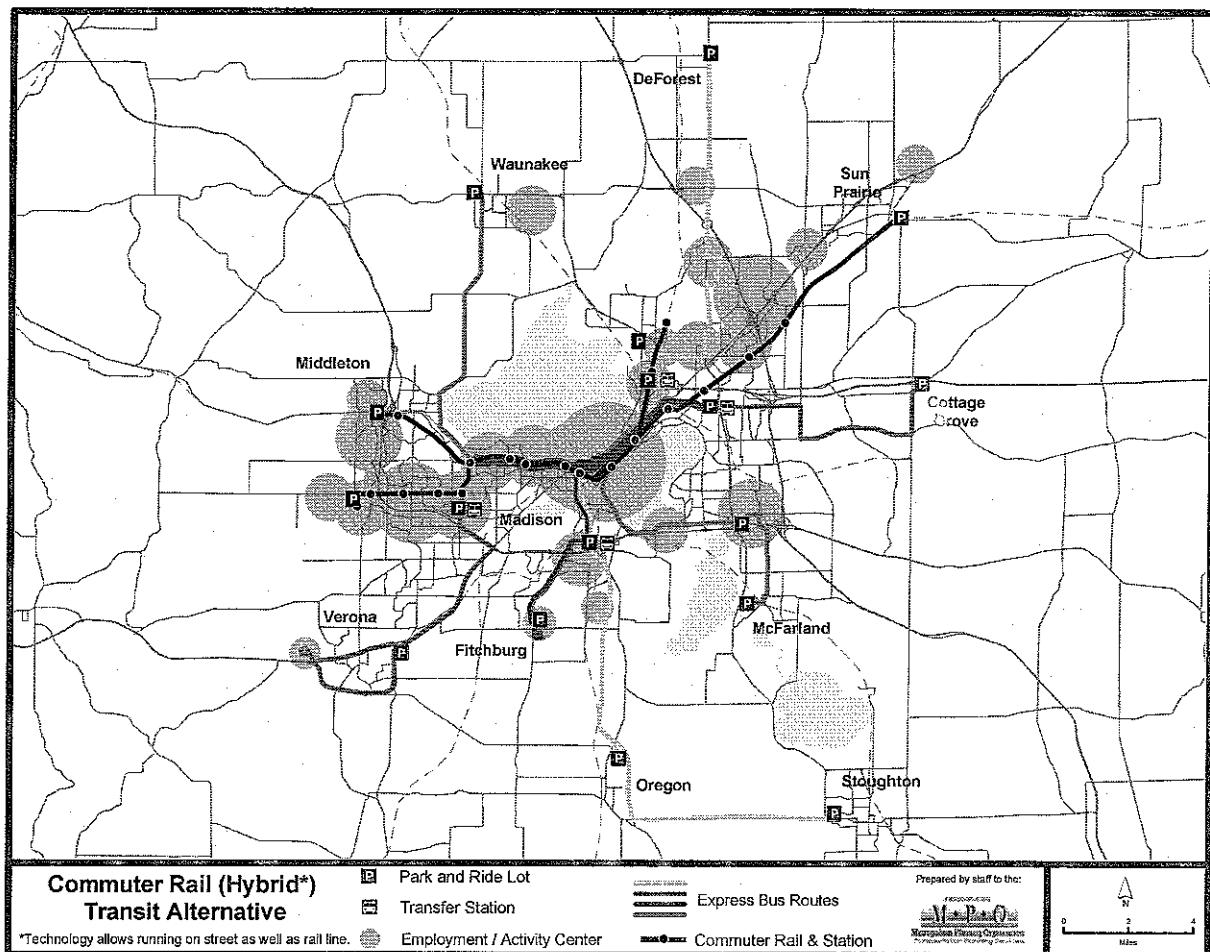
### *Traffic Accommodation Concept*

The plan continues to accept somewhat higher traffic congestion levels (Level of Service D), particularly during peak hours. This is intended as a means of encouraging travel during off-peak periods, greater use of transit and carpooling, and lessening the need for expanding streets and roadways. Travel on circumferential routes (such as the South Beltline) is accommodated as a means to draw travel to these corridors wherever possible. Techniques of traffic engineering and safety improvements are made to make existing streets and roadways more efficient in moving traffic. Higher mobility levels are also maintained on the Interstate system and other key circumferential routes to ensure efficient movement of people and goods throughout the region.

### *Traffic Direction Concept*

The plan seeks to draw local auto through-traffic to local arterial major travel corridors as a way to reduce the amount of through-traffic penetrating central Madison neighborhoods and other neighborhoods in the region. Maintaining mobility on key regional routes like the Interstate System and the Beltline is also important in order to direct inter-regional through-traffic to these corridors to reduce the potential of inter-regional travel on the local arterial system. Traffic calming and other transportation system management techniques are encouraged to reduce and/or redirect traffic from local neighborhood streets and other sensitive areas. Bypasses around outlying villages and cities are also considered, while at the same time making sure that such facilities do not have negative land use impacts.

**FIGURE 1**  
**POTENTIAL COMMUTER RAIL CORRIDOR**  
**AND MAJOR EMPLOYMENT/ACTIVITY CENTERS**



### ***Other Plan Concepts***

The plan seeks to broaden the understanding of the other modes of transportation and to recognize and encourage: pedestrian and bicycle travel, specialized travel needs of elderly and persons with disabilities, taxi and paratransit services, and integration of travel into multi-modal corridors. In addition, the plan seeks to highlight the importance of preserving corridor lands, particularly rail corridors, for possible future travel uses.

### ***Growth Forecasts***

An underlying assumption of the plan is that the population and employment of Dane County and the City of Madison will increase in the future. Dane County's population is expected to grow at a moderate rate. Forecasts indicate a net population increase of 153,450 or an increase of 36% over 30 years. The City of Madison's population forecasts indicate a net population increase of 55,350 or an increase of 26.6% over 30 years. The city's population is expected to grow slower than the county during this entire period and contain 45.4% of the county population in 2030 (see Table 1).

Population forecasts are important because they influence the size of the labor force, which in turn indicate the potential number of work trips which an area could generate. Future projections indicate that from 2000 to 2030, Dane County's labor force is expected to increase 69,374 to a total of 325,125 reflecting an annual growth rate of 0.9%. The City of Madison's labor force is expected to increase 22% but at a slightly slower annual rate (0.7%) compared to the county (see Table 2).

Employment trends and forecasts are important to the transportation system because they indicate the number of work trips that an area will attract. Large shifts in employment concentrations can alter overall travel patterns that can challenge the ability of a transportation system to adjust to the shift.

TABLE 1  
POPULATION PROJECTIONS: 2000-2030

	Total Population				Annual Percent Change		
	2000	2010	2020	2030	2000-2010	2010-2020	2020-2030
Dane County	426,526	480,100	527,500	580,000	1.3	1.0	1.0
City of Madison	208,054	227,600	244,100	263,400*	1.0	0.8	0.8
City as % of County	48.8	47.4	46.3	45.4			

\*Does not include the population of the Town of Madison that will be brought into the City during this time period.

By 2030, the county's employment is forecasted to increase to 382,600 or an average of 1.14% per year. Similarly, the City of Madison's employment is forecasted to increase to 244,600 or an average of 1.04 % per year. Comparing the place of work employment trends and forecasts in Table 2 with the trends and forecasts of the labor force, the amount of growth in employment continues to outpace the growth in the labor force in Dane County and the City of Madison.

To fill these jobs, more people from the communities outside of the City of Madison are commuting to Madison for work. Similarly at a county level, work trip commuting from adjacent counties into Dane County are forecasted to nearly double from approximately 31,000 per day in the year 2000 to around 60,000 per day by the year 2030.<sup>2</sup> This increase in work trip commuting will significantly increase the amount of congestion on the arterial roadway system without future improvements to the transportation system involving all modes (transit, roadway, bicycle, and pedestrian).

TABLE 2  
LABOR FORCE & EMPLOYMENT PROJECTIONS: 2000-2030

	Year			Forecast	Change		
	1980	1990	2000		2000-2030 Amount	2000-2030 Percent	2000-2030 Annual %
<b>Labor Force</b>							
Dane County	178,136	214,857	255,751	325,125	69,374	27	0.9
City of Madison	95,363	112,239	127,932	156,262	28,330	22	0.7
<b>Employment*</b>							
Dane County	170,000	231,000	285,000	382,600	97,600	34.3	1.14
City of Madison	N.A.	166,340	186,550	244,600	58,050	31.1	1.04

\*Place of Work Employment

<sup>2</sup>Increased telecommuting, continued increases in fuel prices, changes in local housing cost and availability, and reductions in home to work travel distances are among factors that could affect the forecast which is based on a continuation of past trends.

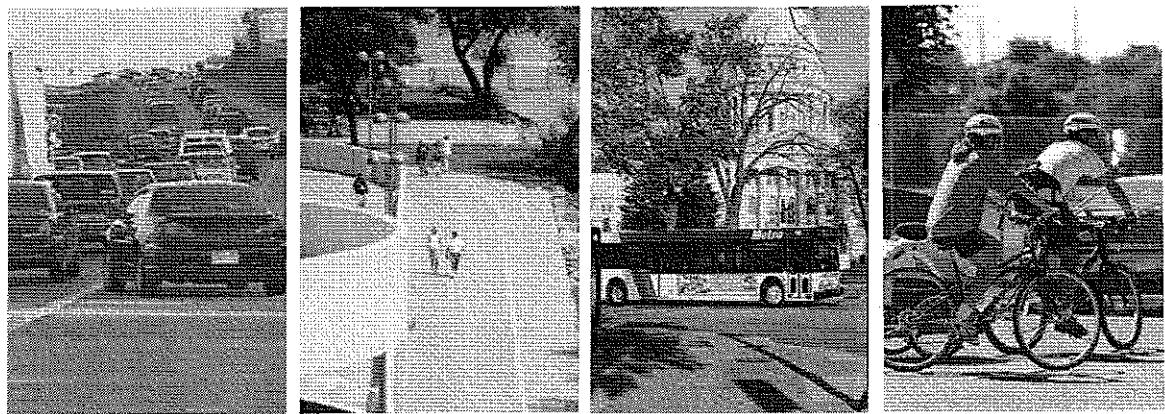
For more information contact:



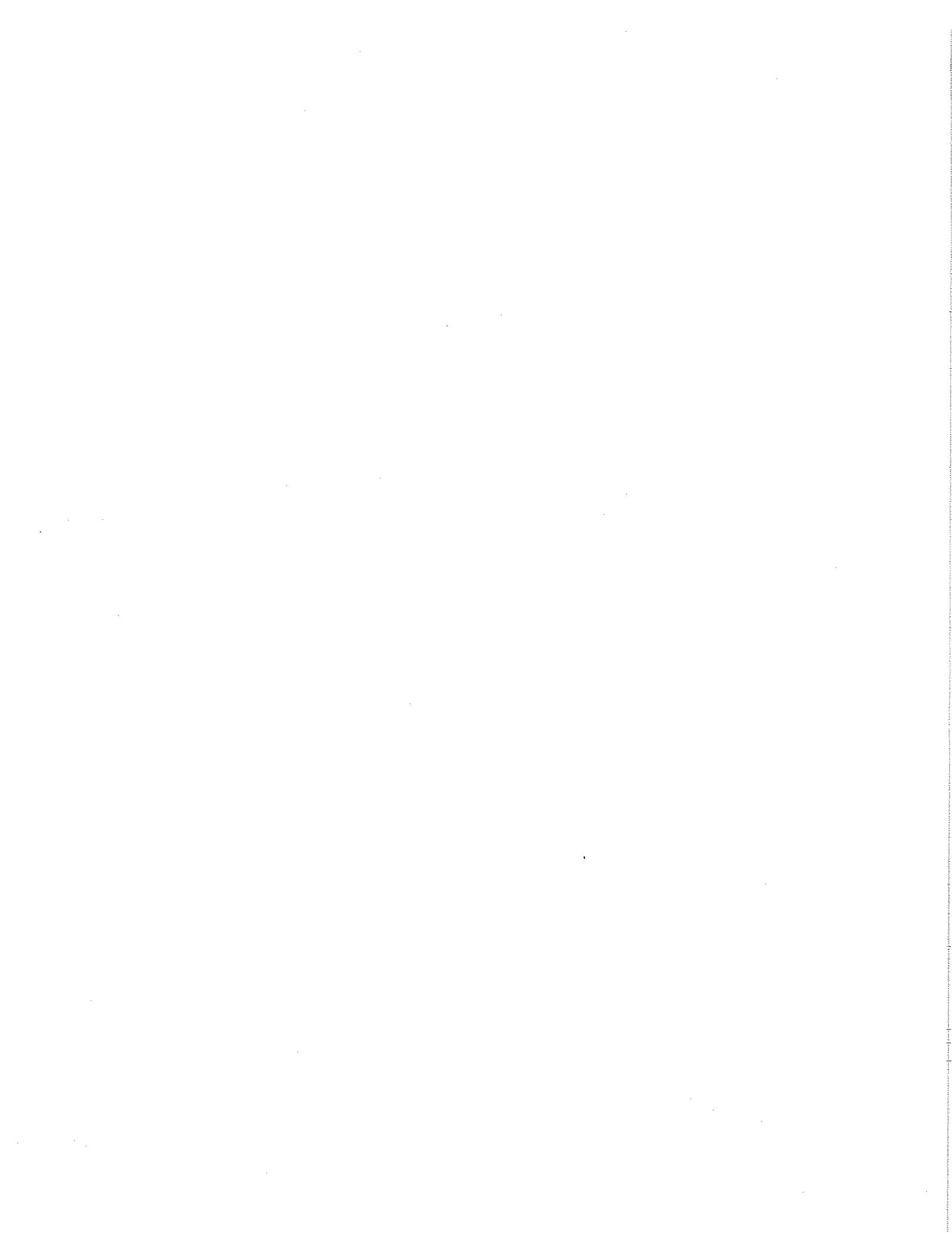
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Preparation of this document has been financially aided by funds from the Wisconsin Department of Transportation, the Federal Highway Administration, and the Federal Transit Administration.





## Transportation Trends, Conditions and Issues

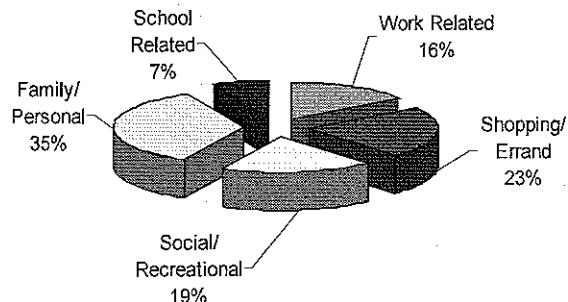


# Travel Characteristics

## Why Do People Travel?

Over one-half of trips taken in Dane County are for family/personal reasons or for shopping and errands, according to a special county add-on sample of the 2001 National Household Transportation Survey (NHTS). Work trips account for just 16% of trips. Nationally, the percentage of trips that are work related has dropped from over 25% in 1969 to 16% in 2001 as a result of increased trip making for other purposes. The work trip is still very important, because it is often the longest trip of the day<sup>1</sup> and many non-work trips are planned around the work trip, such as dropping children at school or shopping. Commuting, whether direct trips to and from work or trip tours (including stops made on the way to/from work), contributes heavily to peak period congestion.

**Trip Purpose Distribution  
All Person Trips in Dane County**

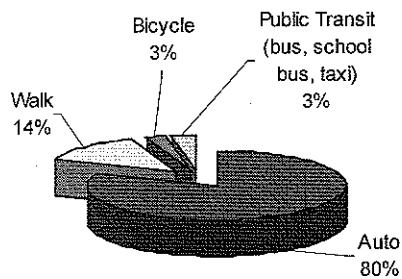


## How Do People Travel?

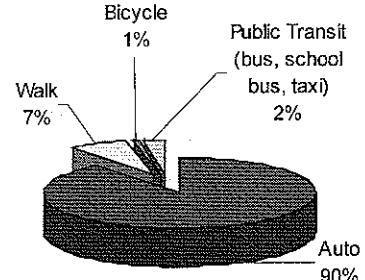
The vast majority of trips are made by personal motor vehicle, accounting for 80% of all trips in the City of Madison and 90% in the rest of Dane County. Walking, bicycling, and transit use is much higher in the City of Madison.

**Mode of Travel for All Person Trips**

**City of Madison**



**Rest of Dane County**



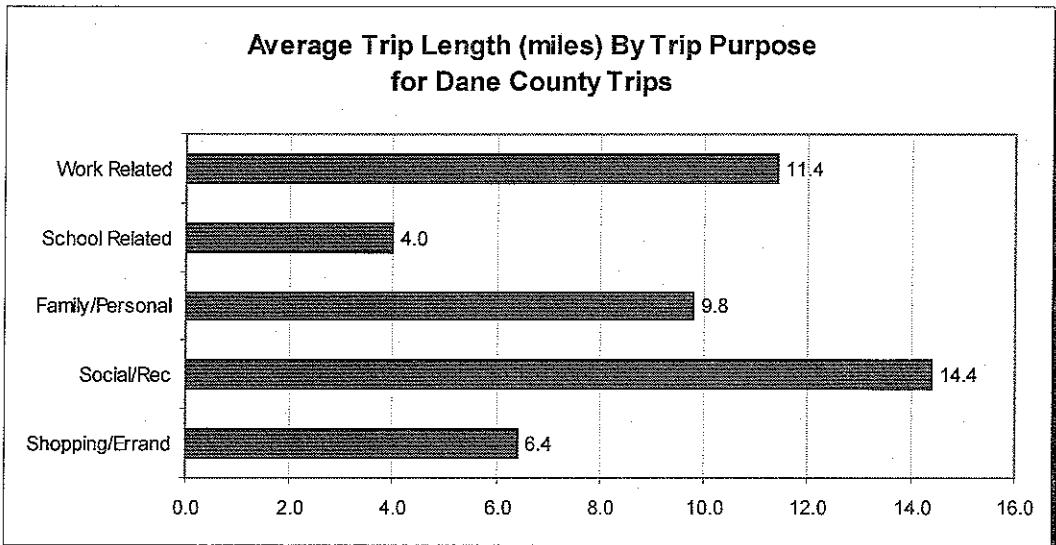
## How Much and How Far Do People Travel?

It is estimated that an average daily total of 1,745,000 one-way person trips were taken in Dane County in 2001. This amounts to a little over four trips per person and 9.5 trips per household based upon the 2001 population and household estimates for the county. National data from the 2001 NHTS indicates that the average number of daily trips peaked among the working population aged 25-54 at 4.6. There was no significant difference in trip frequency based upon gender.

It is estimated that average daily travel in Dane County totaled 13,497,000 miles in 2001. This amounts to a daily average of 31 miles per person and 73 miles per household. Figure 5, on the next page, shows the average trip length varies by trip purpose. Average trip lengths for City of Madison residents were shorter, particularly for work (9.0 mi.), school (2.8 mi.), and family/personal (8.5 mi.) trips.

<sup>1</sup> The average social/recreational trip is longer than the average work trip, but social/recreational trips are not made on a daily basis, particularly on weekdays.

FIGURE 5



#### ***Overall Patterns***

The growth of major employment and commercial retail centers on the periphery of the Madison area—many of them located outside the Beltline and Interstate system—has led to a more dispersed travel pattern with a lower percentage of trips destined for the central area. It is estimated that just 5% of the 1.7 million daily trips in the county in 2001 were destined for the Central Business District. Around 28% of daily trips were destined for central Madison, an area bounded by Whitney Way to the west, Aberg Avenue to the east, and the Beltline and City line to the south. The Near West/UW campus and Far West/Middleton areas (Super Districts 2 and 4) accounted for the largest percentage of trip making, together accounting for 29% of all trip origins and destinations. Figure 6, on the next page, illustrate the dispersed trip making pattern, showing total person trip flows from Madison's Southwest and Southeast sides to other areas in the metropolitan area and countywide.

#### ***Work Trip Commuting Patterns***

Growth in employment in Dane County and the Cities of Madison, Middleton, and Monona continues to outpace growth in the resident labor force. The resident labor force from surrounding counties and communities fills this gap by commuting into the county and these cities on a daily basis. This trend, which is expected to continue into the future for the county as a whole and for Madison and Middleton, has a significant impact on regional travel patterns. The increasing time spent in travel to and from work influences the mode of travel and the propensity to make non-work related trips on the way to or from work. According to data from the 2001 National Household Transportation Survey (NHTS), more than one-half (54%) of weekday commuters stop for a non-work purpose (e.g., dropping off a passenger or shopping) during their commute.

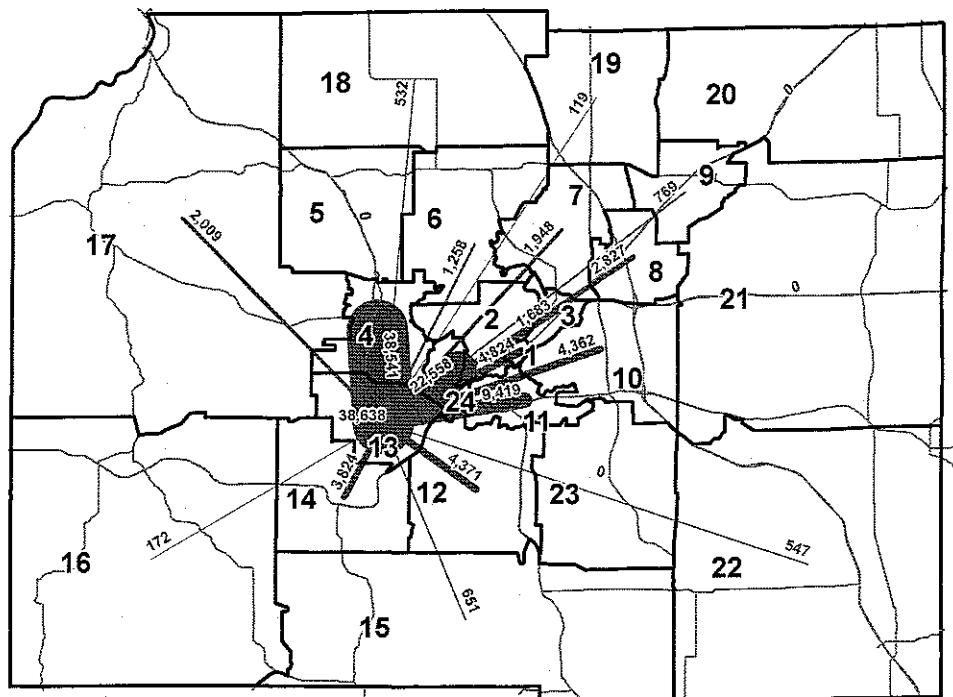
In 2000, there were around 30,000 workers commuting into Dane County from eight adjacent counties, an 83% increase from 1990, according to U.S. Census data. Of those, around 19,500 were commuting to the Madison Area<sup>2</sup> (a 74% increase from 1990) and 16,000 were commuting to the City of Madison (a 63% increase from 1990). “Reverse” commuting from Dane County to adjacent counties has increased as well, but the numbers are much smaller. Approximately 9,000 Dane County workers commuted to adjacent counties, a 50% increase from 1990. Figure 7, on page 28, shows 2000 work trip commuting to and from Dane County.

In 2000, there were almost 60,000 workers commuting to the City of Madison from other Dane County communities in addition to the 16,000 commuting from eight adjacent counties. This represented a 14% increase from 1990, which continued to put increasing travel demands on the arterial roadway system in the Madison area. Figure 8 on page 29 shows the increase in work trip commuting to the City of Madison from cities, villages, and towns in Dane County from 1970 to 2000.

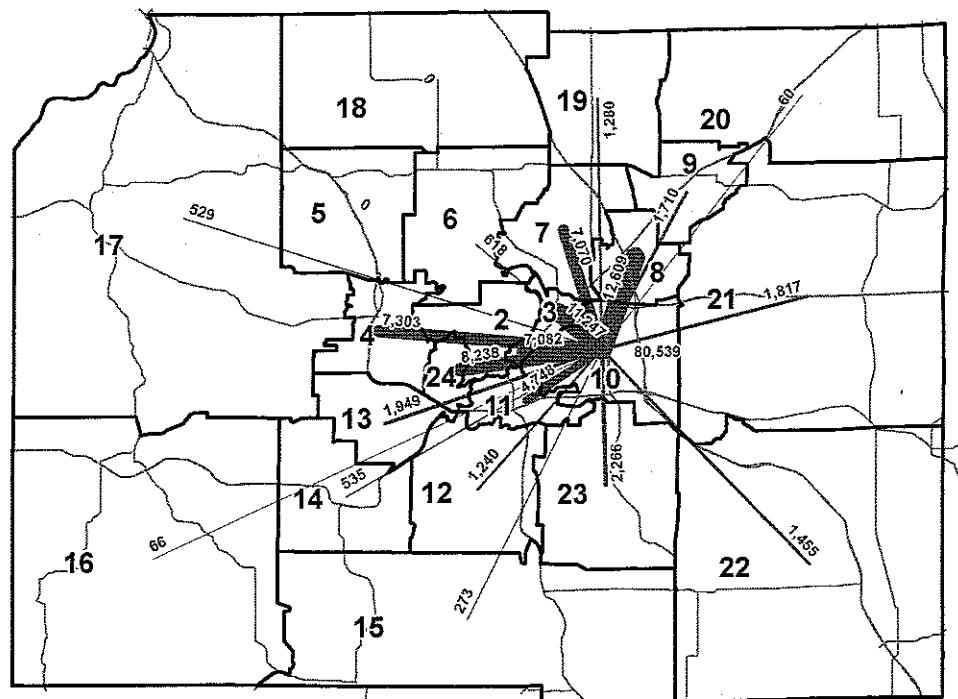
<sup>2</sup>Including the Cities of Madison, Middleton, Fitchburg, and Monona and the Village of McFarland.

FIGURE 6

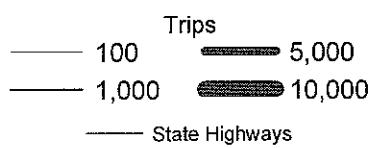
Trips from Super District 13 (Southwest Madison Area)



Trips from Super District 10 (East Madison Area/Monona)



2001 Total Daily Trip Flows  
by Super District  
Dane County, Wisconsin



Prepared by staff to the:



Rev. 9/26/06

SOURCE: 2001 NHTS

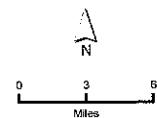


FIGURE 7

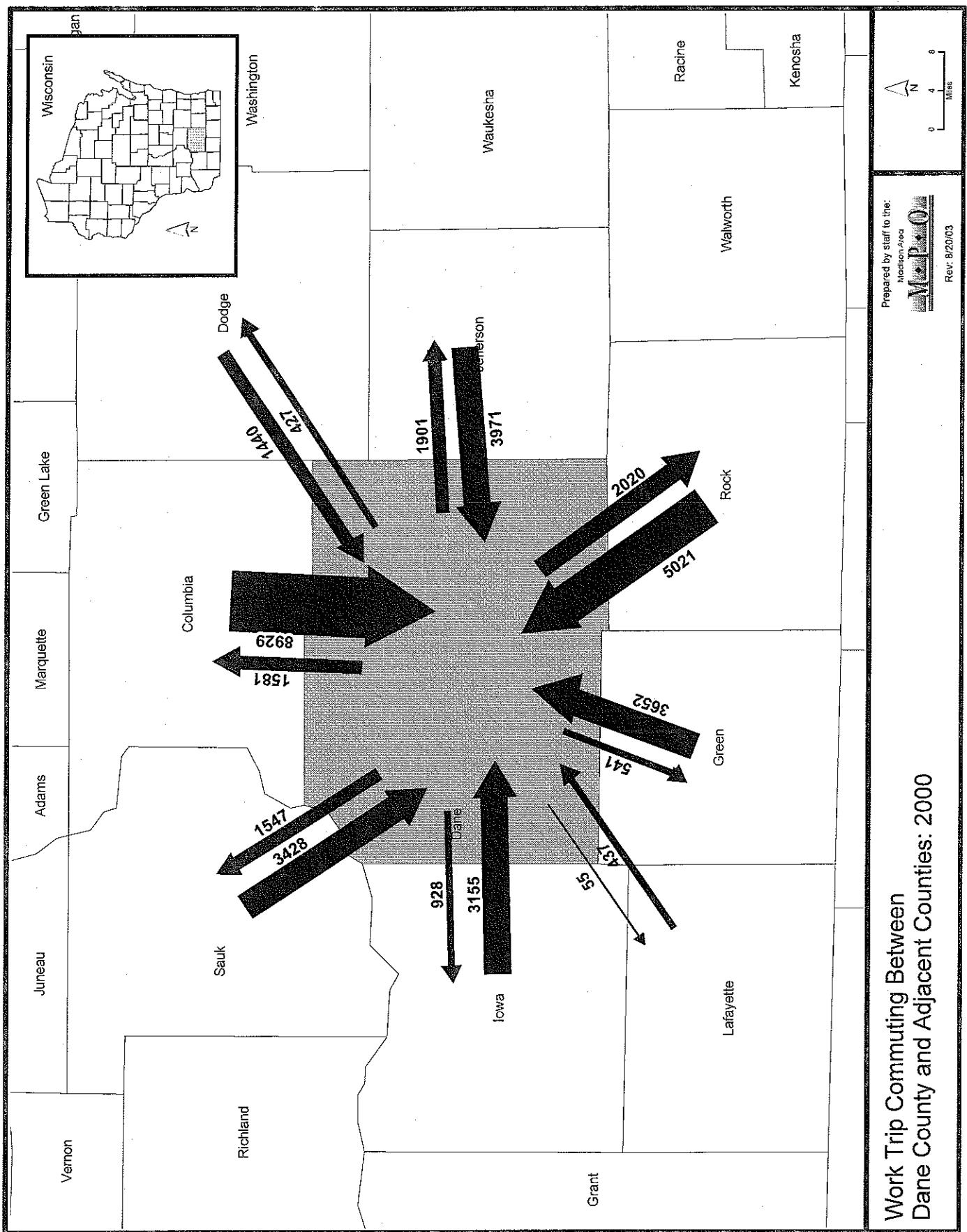
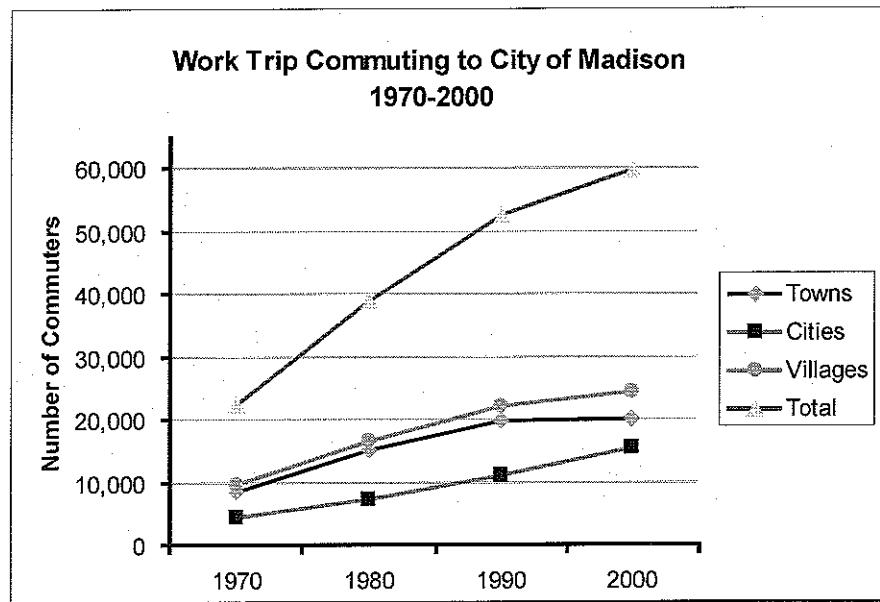


FIGURE 8



Figures 9 and 10, on pages 30 and 31, show the percentage of workers in these communities commuting to the City of Madison in 1970 and 2000.

“Reverse commuting” from the City of Madison has also increased, but again the numbers are much smaller. Around 21,200 City of Madison residents commuted to other Dane County communities for work in 2000, a 62% increase from the 13,100 in 1990. Another 2,600 Madison residents commuted to work in adjacent counties, compared to 1,500 in 1990.

The number of residents of Dane County cities and villages who worked in the place they resided decreased from 62% in 1990 to 56% in 2000. This contributed to an increase in mean travel time to work for Dane County residents from 18.1 minutes in 1990 to 19.9 minutes in 2000.

Well over one-half (57%) of all Dane County commuters depart to work between 6:30 a.m. and 8:30 a.m., greatly contributing to the peak period congestion during this time. Increasing traffic congestion, particularly on the Beltline, is starting to spread out the peak period, but not as significantly as seen in larger metropolitan areas. While this peak spreading has not yet become apparent in the data for all trips countywide, it is expected to occur more in the future, particularly for trips using the Beltline and other congested roadways. Figure 11 shows departure time to work for all Dane County commuters in 1990 and 2000. There was little change over this time period.

FIGURE 11

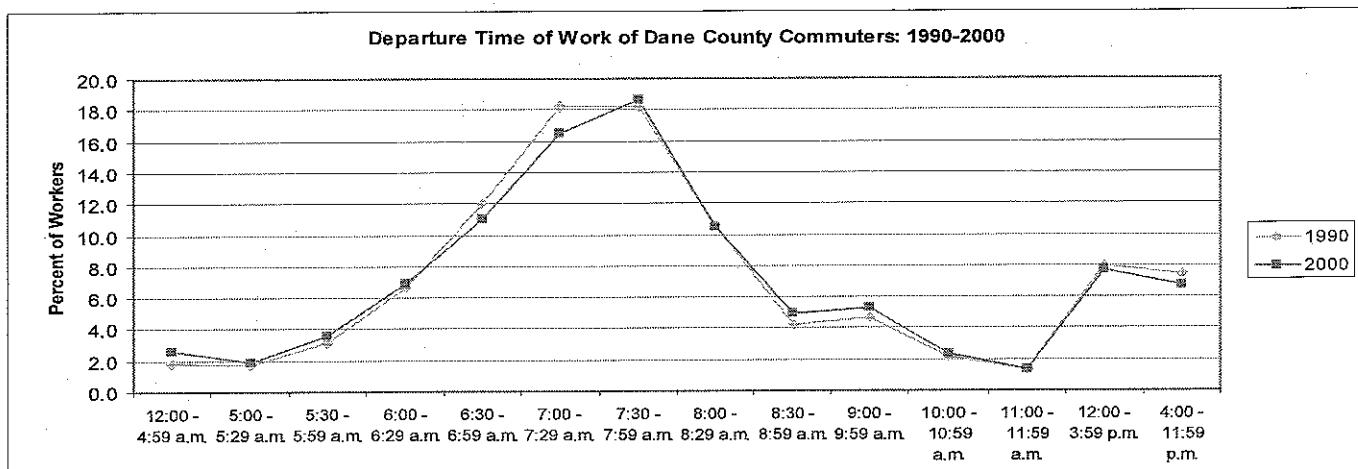
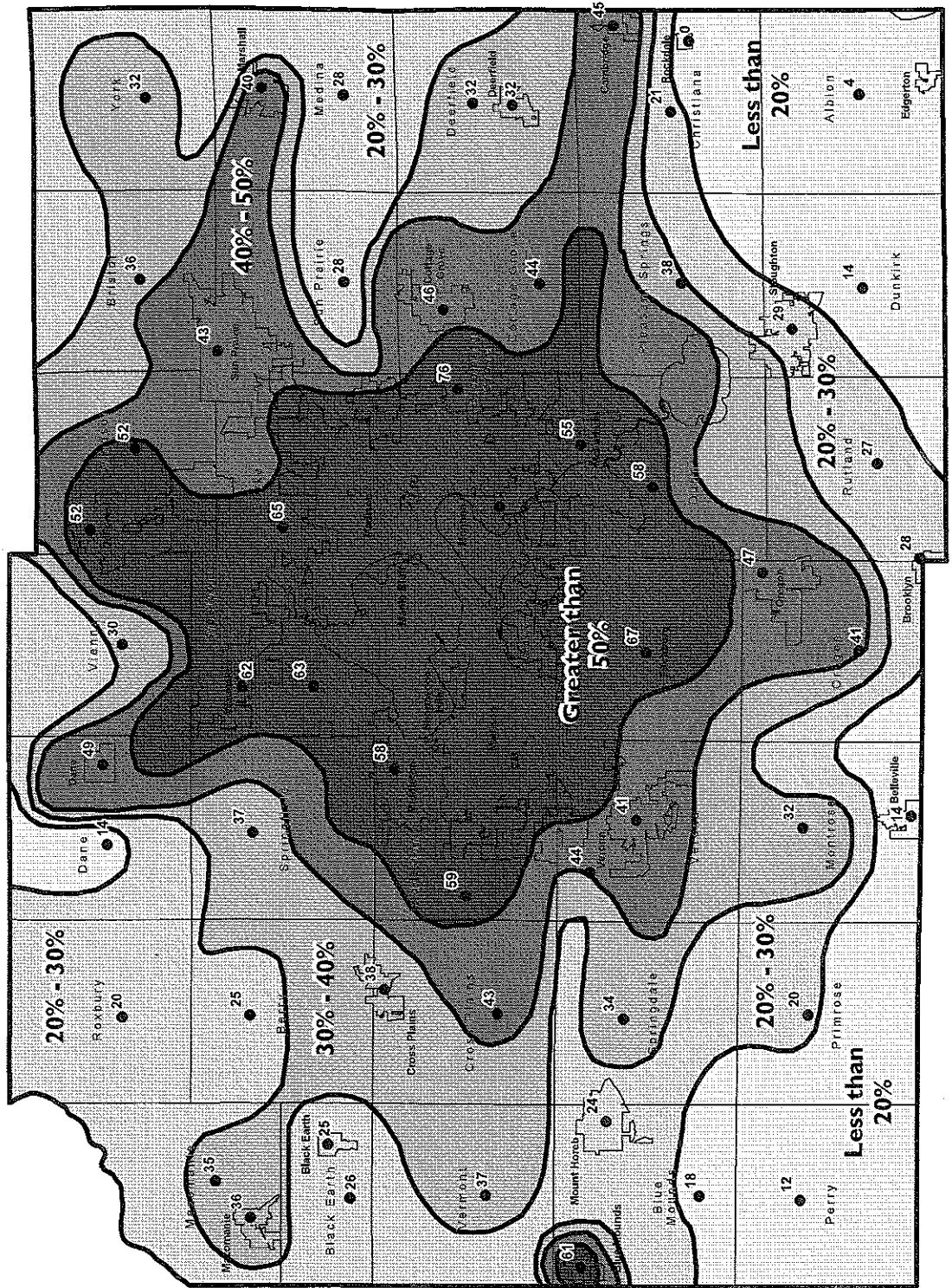


FIGURE 9

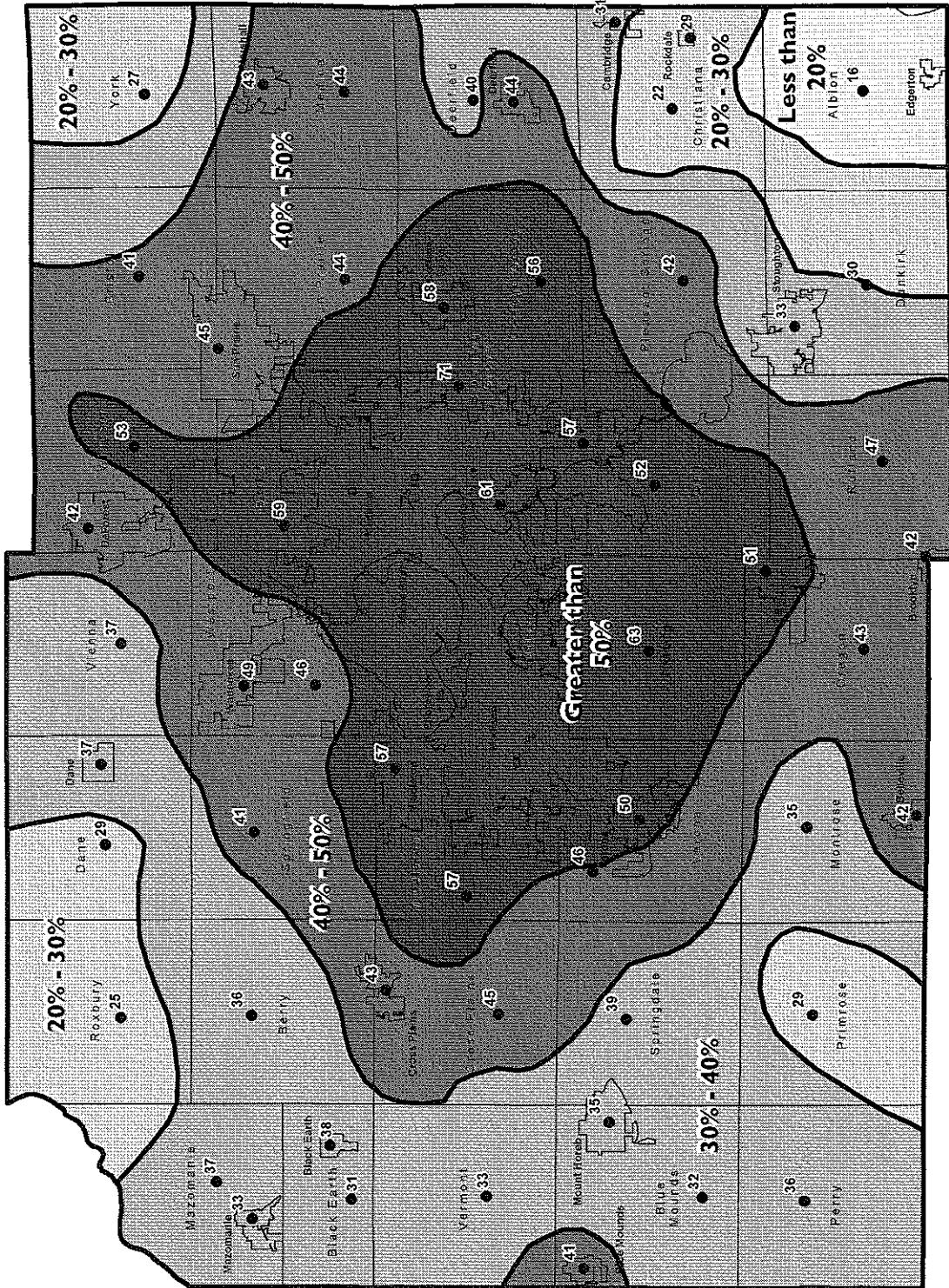


Dane County, Wisconsin

Percent of Workers Commuting from  
Outer Dane County to City of Madison: 1970

Prepared by staff to the:  
Madison Area  
**Vol. 10**  
Rev. 8/20/03

**FIGURE 10**



## Dane County, Wisconsin

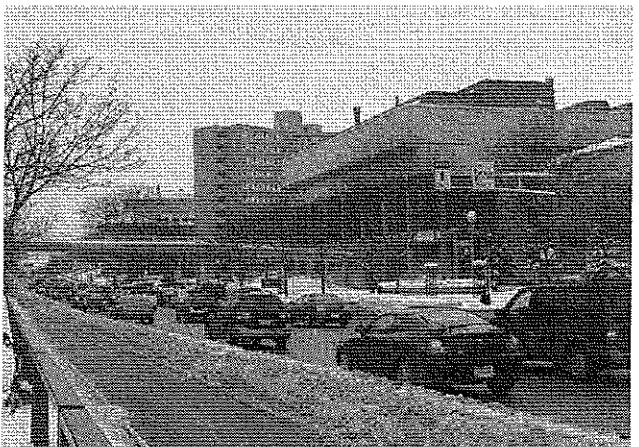
Percent of Workers Commuting from  
Outer Dane County to City of Madison: 2000

Prepared by staff to the:  
McGillivray Area  
Municipal District  
Rev: 8/20/03

A coordinate plane with a line labeled 'z'.

The percentage of workers commuting to work in Dane County who drove alone has continued to increase, while the percentage of workers using alternative means of transportation has decreased. From 1990 to 2000, the percentage share of drive alone work trips countywide increased from 68% to 75%. The percentage share of drive alone trips work trips by City of Madison residents rose from 60% to 65%. The overall number of commuters taking transit and bicycling to work increased, but the percentage share of trips still declined. The same trend of increased single-occupant vehicle commuting was true for those who worked in the downtown and UW-Madison campus areas. However, the percentages of those using alternative means of transportation were much higher due to the concentration of employment centers and UW-Madison campus area, parking cost, and excellent bus service. In addition, the percentage of those using transit and bicycling actually increased to 11.2% and 4.8%, respectively.

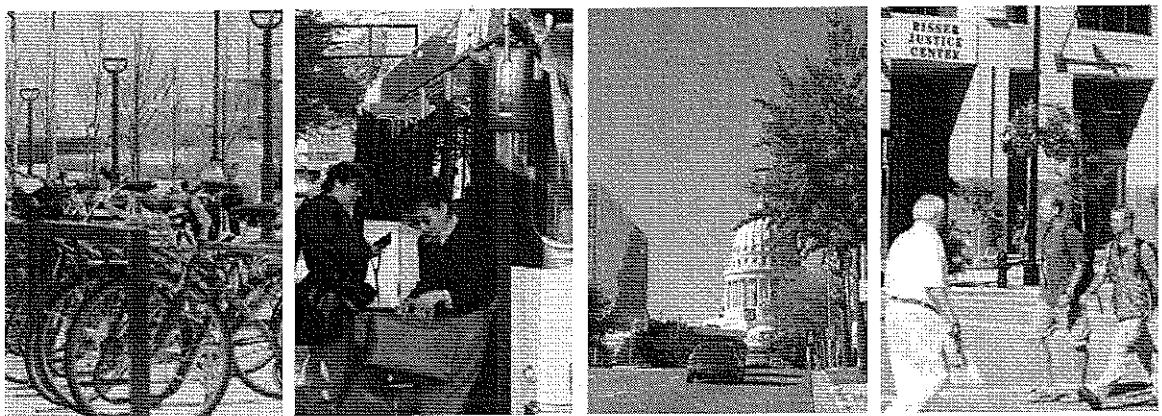
Table 12 below shows the means of transportation to work for all Dane County workers and for those working in the downtown and UW-Madison campus areas in 1990 and 2000.



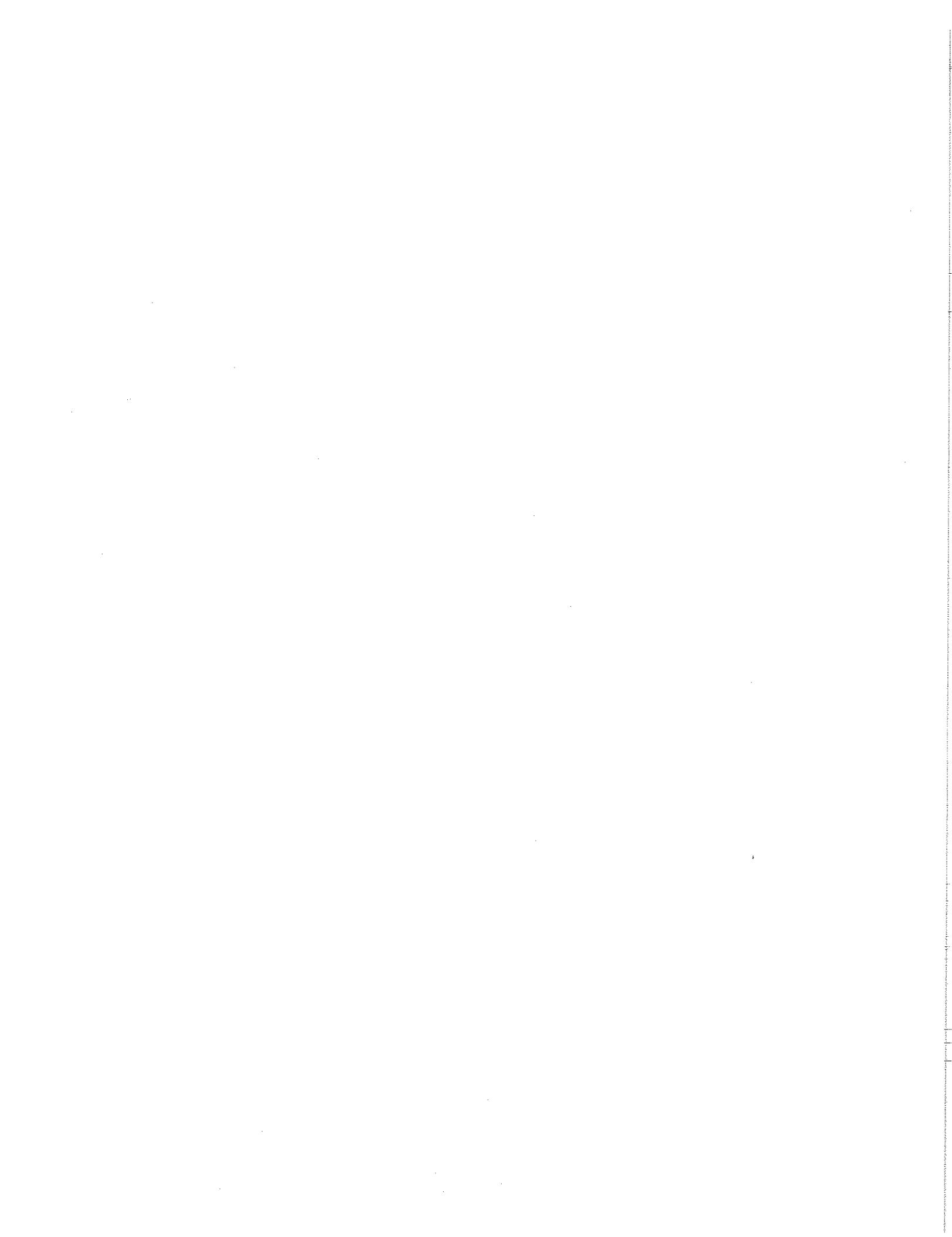
**TABLE 12**  
**MODE OF TRANSPORTATION FOR WORK: 1990 & 2000**

Mode	Trips within/to Dane County			
	1990		2000	
	Number	Percent	Number	Percent
Drive Alone	147,642	68.4	198,841	74.7
Carpool	29,115	13.5	28,062	10.5
Transit	9,445	4.4	10,010	3.8
Bicycle	3,966	1.8	4,148	1.6
Walk	17,190	8.0	15,071	5.7
Other	1,280	0.6	1,120	0.4
Work at Home	7,339	3.4	9,194	3.5
Total	215,977	100.0	266,446	100.0
Trips to the Downtown and UW-Madison Campus Areas				
Mode	1990		2000	
	Number	Percent	Number	Percent
Drive Alone	24,076	47.5	30,625	53.7
Carpool	8,613	17.0	7,552	13.2
Transit	5,265	10.4	6,404	11.2
Bicycle	2,236	4.4	2,767	4.8
Walk	9,725	19.2	9,053	15.9
Other	371	0.7	283	0.5
Work at Home	431	0.8	383	0.7
Total	50,717	100.0	57,067	100.0

Source: Census Transportation Planning Package



## Emerging Socio-Economic and Land Use Trends and the Transportation System



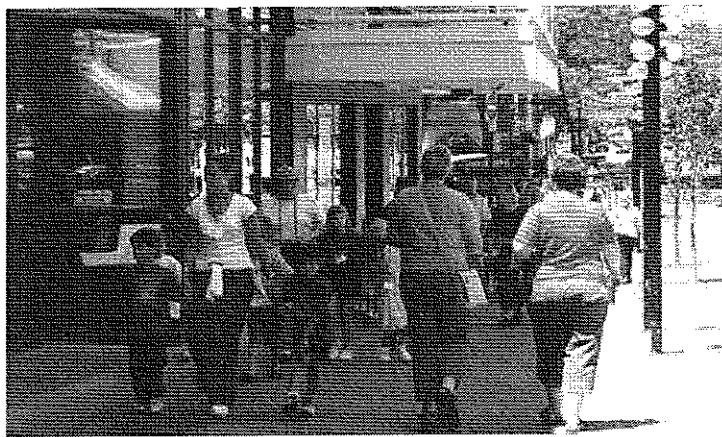
## Introduction

The past three decades have witnessed significant changes in the way in which Americans live, work, shop and play. Although these changes are often difficult to measure quantitatively, they continue to impact our lives. Changes in energy supplies, household composition, age of the population and employment opportunities have all had a major influence on the way the region has grown and developed. The next three decades will surely experience a continuation of many of these trends as well as newly emerging changes that will alter our preferences about where to live, work and play. Since these new or emerging trends will impact where and how the region develops, it is important that they be discussed and considered in preparation of an areawide transportation plan.

The trends to be discussed are divided into four general subject areas:

- Demographic, which addresses changes and shifts in the population, household size, and population composition;
- Housing, which notes the trends in types and location of future housing;
- Economic, which looks at trends in employment and labor force; and
- Land Use, which highlights changes in the location and composition of urban and rural development.

Following the discussion of the emerging trends is a presentation of the future outlook for the Madison Metropolitan Area and Dane County based, in part, on trends, on past experience, and on current adopted policy.



## Demographic

### *Population Growth*

The rate of population growth in Dane County has increased each of the last two decades, while the City of Madison's population grew at a slower rate as shown in Table 1. Although the City of Madison's population has continued to increase since 1970, its overall percentage share of the county's population continues to decline.

TABLE 1  
POPULATION GROWTH: 1970-2000

	Total Population				Annual Percent Change		
	1970	1980	1990	2000	1970-1980	1980-1990	1990-2000
Dane County	290,272	323,545	367,085	426,526	1.1	1.3	1.6
City of Madison	173,258	170,616	190,766	208,054	-0.2	1.2	0.9
City as % of County	59.7	52.7	52.0	48.8			

Source: U.S. Census Bureau and Dane County Regional Planning Commission

The City of Madison's population grew more slowly than the county during this entire period. The city represented 49% of the county population in 2000.

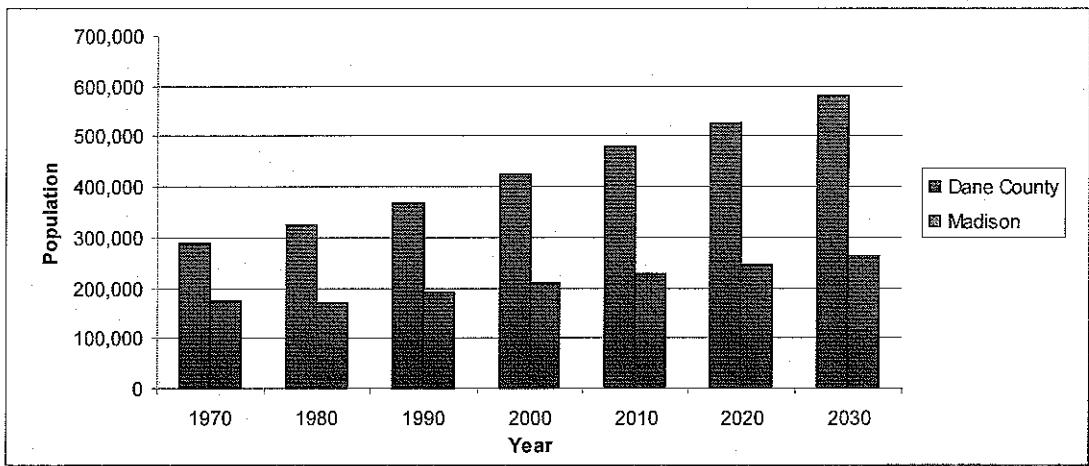
Dane County's population is expected to grow at a moderate rate. Forecasts indicate a net population increase of 153,475 or an increase of 36% over 30 years. The county's population is forecasted to grow the fastest in the 2000-2010 period and then slow a little over the next two decades. The City of Madison's population forecasts indicate a net population increase of 55,350 or an increase of 26.6% over 30 years. The city's population is expected to grow more slowly than the county's during this entire period and contain 45.4% of the county population in 2030 (see Table 2 and Figure 2, on the next page).

TABLE 2  
POPULATION PROJECTIONS: 2000-2030

	Total Population				Annual Percent Change		
	2000	2010	2020	2030	2000-2010	2010-2020	2020-2030
Dane County	426,526	480,100	527,500	580,000	1.3	1.0	1.0
City of Madison	208,054	227,600	244,100	263,400*	1.0	0.8	0.8
City as % of County	48.8	47.4	46.3	45.4			

\*Period from 2025 to 2030 is a prorated estimate.

FIGURE 2  
POPULATION GROWTH AND PROJECTIONS: 1970-2030



#### *Households and Household Size*

A national phenomenon with significant effects on future growth and development patterns is the continuing growth in the number of households and the decline in household size. National trends of smaller families and more single person households will continue to contribute to smaller households.

Since the 1970s, household growth has been increasing faster than population growth. From 1970 to 1980, the number of households in Dane County grew 36.2% (see Table 3, on the next page) compared to a population growth of 11.5% (see Table 1). Similarly, between 1980 and 1990, the household growth rate was 18.4% compared to a population increase of 13.5%, and from 1990 to 2000, the household growth rate was 21.5% compared to a population increase of 16.2%. The City of Madison's household growth also occurred at a faster rate than its population growth over the last three decades.

The number of Dane County's households is expected to grow at a moderate rate. Forecasts indicate a net household increase of 69,600 or an increase of 40.1% over 30 years. The number of City of Madison's households is forecasted to grow 29,100 or increase 32.7% over 30 years. The city's share in the number of the county's households is expected to decrease from 51.3% in 2000 to 48.6% in 2030 (see Table 4, on the next page, and Figure 3).

As the number of smaller households increases, the average household size throughout Dane County continues to decrease. Households are decreasing in size primarily due to the divorce rate, a decrease in the birth rate, the postponement of marriage, and an increase in the proportion of the population age 65 and older. As households decline in size, the need for additional housing increases.

TABLE 3  
HOUSEHOLD GROWTH: 1970-2000

	Number of Households				Percent Change		
	1970	1980	1990	2000	1970-1980	1980-1990	1990-2000
Dane County	88,874	120,601	142,786	173,484	36.2	18.4	21.5
City of Madison	55,019	66,451	77,361	89,019	20.8	16.4	15.1

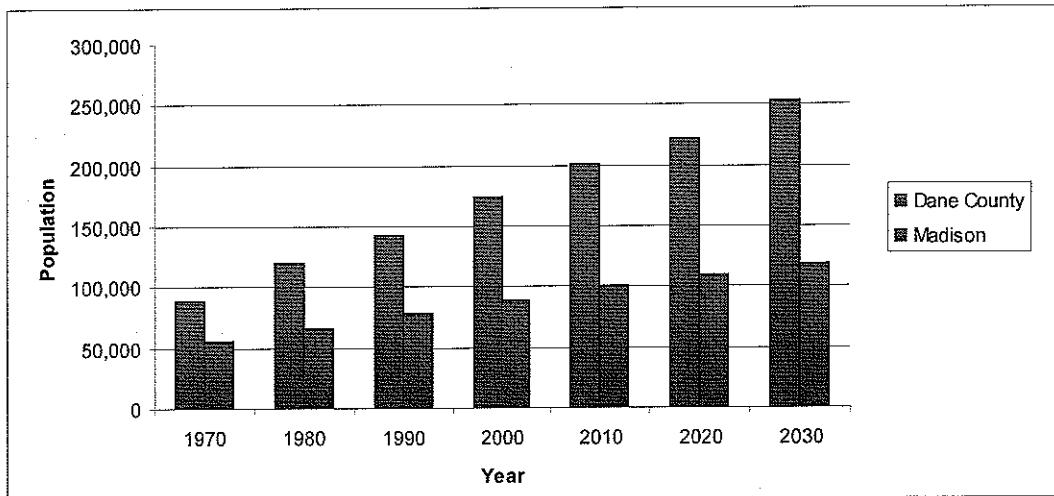
Source: U.S. Census Bureau and Dane County Regional Planning Commission

TABLE 4  
HOUSEHOLD PROJECTIONS: 2000-2030

	Total Households				Percent Change		
	2000	2010	2020	2030	2000-2010	2010-2020	2020-2030
Dane County	173,484	200,300	222,200	243,100	15.5	10.9	9.4
City of Madison	89,019	100,400	109,200	118,100	12.8	8.8	8.2
City as % of County	51.3	50.1	49.2	48.6			

Source: U.S. Census Bureau, Wisconsin Department of Administration, Dane County RPC, and Madison Area MPO

FIGURE 3  
HOUSEHOLD GROWTH AND PROJECTIONS: 1970-2030



In 1980, one- and two-person households accounted for nearly 59% of all households in the county. By 1990, one- and two-person households accounted for 61% of all households, and by 2000, they accounted for 65% of all households (see Table 5, on the next page). About 59% of these one- and two-person households were located in the City of Madison in 1990, and by 2000, 56% were located in the City of Madison.

Since the number of smaller households has been increasing, the average household size has been decreasing. In 1980, Dane County had an average household size of 2.6 persons. By 2000, the average household size had declined to 2.4 persons. For this same time period, the average household size for the City of Madison declined from 2.4 to 2.2 (see Table 6 on the next page).

Table 6 shows that the average size of an owner-occupied household is larger than the average size of a renter-occupied household in Dane County. In 2000, the average size of an owner-occupied household was 2.6 persons, while the average size of a renter-occupied household was 2.0 persons. A continued decrease has occurred since 1980 within the owner-occupied household category, while the renter-occupied household category increased between 1980 and 1990 and then fell between 1990 and 2000.

For the City of Madison, the average size of an owner-occupied household is also larger than the average size of a renter-occupied household. In 2000, the average size of an owner-occupied household was 2.4 persons, while the average size of a renter-occupied household was 2.0 persons. Similar to the county, a continued decrease has occurred since 1980 within the owner-occupied household category, while the renter-occupied household category increased between 1980 and 1990 but remained about the same between 1990 and 2000.

TABLE 5  
DISTRIBUTION OF PERSONS PER HOUSEHOLD: 1990-2000

Household Size	DANE COUNTY				CITY OF MADISON			
	No. of Households		Percent of Total		No. of Households		Percent of Total	
	1990	2000	1990	2000	1990	2000	1990	2000
One	37,640	51,014	26.4	29.4	23,900	31,441	31.2	35.3
Two	49,247	61,168	34.5	35.3	26,512	31,187	34.6	35.0
Three	23,835	26,075	16.7	15.0	11,719	12,260	15.3	13.8
Four	20,933	22,963	14.7	13.2	9,403	9,121	12.3	10.2
Five	7,909	8,578	5.5	5.0	3,464	3,275	4.5	3.7
Six	2,237	2,476	1.6	1.4	1,033	1,067	1.3	1.2
Seven+	985	1,210	0.7	0.7	642	668	0.8	0.8
Total	142,786	173,484	100.0	100.00	76,673	89,019	100.0	100.0

Source: U.S. Census Bureau and Dane County Regional Planning Commission

TABLE 6  
AVERAGE HOUSEHOLD SIZE: 1980-2000

	Persons Per Household								
	Total Occupied			Owner-Occupied			Renter-Occupied		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Dane County	2.6	2.5	2.4	3.0	2.8	2.6	1.9	2.1	2.0
City of Madison	2.4	2.3	2.2	2.8	2.6	2.4	1.9	2.0	2.0

Source: U.S. Census Bureau and Dane County Planning Commission

### Housing

As noted above, the number of households is anticipated to continue to increase faster than population growth during the coming decades increasing the demand for housing. This is due mainly to the maturing of the baby-boom generation who will become "empty nesters" plus the increase in the number of elderly persons.

According to the U.S. Census Bureau, there were 180,398 housing units in Dane County in April 2000 (see Table 7, on the next page). Between 1990 and 2000, the county's year round housing stock increased by 32,547 units, or 22%. In 2000, the City of Madison made up 51% of the county's housing stock, compared with 54% in 1990. Table 7 also shows the percentage share of three-plus family units increasing for both Dane County and the City of Madison from 1970 to 2000. It is also important to note that while the City of Madison has 48.8% of the county's population in 2000, it also has 66% of the three-plus family units.

The total number of housing units in Dane County is forecasted to increase 41.6% from 180,398 in 2000 to 255,500 by 2030. This percentage increase is greater than the population percentage increase of 36.0% for the same period of time (see Table 8). This situation also applies to the City of Madison where the percentage increase in forecasted housing units is greater than the percentage increase in population for the same time period.

The combined trend of smaller household sizes and potential shifts in residential types may ultimately affect the average number of trips made per household throughout the region. The average household living in a single-family detached house averages 9 to 10 vehicle trips per day while smaller households living in multi-family dwelling units average 6 to 7 vehicle trips per day. Although average total trips per household may decrease in the long run, total travel throughout Dane County is expected to increase due to the anticipated increase in the total number of households.

TABLE 7  
GROWTH OF YEAR-ROUND HOUSING STOCK BY  
TYPE: 1970-2000

Type	Housing Units - Dane County							
	April 1970		April 1980		April 1990		April 2000	
	#	%	#	%	#	%	#	%
1-Family	54,855	59.7	72,107	57.4	85,541	57.9	105,903	58.7
2-Family	8,623	9.4	10,101	8.0	9,743	6.6	10,243	5.7
3+-Family	27,050	29.4	41,579	33.1	50,318	34.0	61,886	34.3
Mobile Home	1,398	1.5	1,824	1.5	2,247	1.5	2,366	1.3
	91,926	100.00	125,611	100.00	147,851	100.0	180,398	100.0
Type	Housing Units - City of Madison							
	April 1970		April 1980		April 1990		April 2000	
	#	%	#	%	#	%	#	%
1-Family	28,798	50.7	34,174	49.6	38,769	48.4	44,565	48.2
2-Family	5,485	9.6	5,611	8.1	5,605	7.0	5,739	6.2
3+-Family	21,959	38.7	28,632	41.5	34,882	43.6	41,084	44.5
Mobile Home	542	1.0	532	0.8	791	1.0	965	1.1
	56,784	100.0	68,949	100.0	80,047	100.0	92,353	100.0

Source: U.S. Census Bureau and Dane County Regional Planning Commission

TABLE 8  
HOUSING GROWTH PROJECTIONS: 2000-2030

	Dane County			City of Madison		
	2000	2000-2030	2030	2000	2000-2030	2030
	Number	Percent		Number	Percent	
Population	426,526	153,450	36.0%	580,000	208,054	26.6%
Housing Units	180,398	75,098	41.6%	255,500	92,394	31.7%

Source: U.S. Census Bureau, Wisconsin Department of Administration, Dane County Regional Planning Commission, and Madison Area MPO.

## Economic

Dane County's economy is tied on one hand to state and national economic activity, and on the other to local demographics and governmental policy. Our expectations of the future must keep large-scale trends in mind, though we have a better grasp on local population and employment trends and their effect on the economy.

### Labor Force

Population trends are important because they influence the size of the labor force, which in turn indicate the potential number of work trips which an area could generate. In Dane County, the growth in working age groups means that a larger portion of the population will be in the labor force. From 1980 to 2000, Dane County's labor force increased from 178,136 to 255,838 for a net increase of 77,702 and reflects an annual growth rate of 2.2%. During this same time period, the City of Madison's labor force increased from 95,363 to 127,932 for a net increase of 32,569 and reflects an annual growth rate of 1.7% (see Table 9).

TABLE 9  
CIVILIAN LABOR FORCE GROWTH: 1980-2000

	Dane County			City of Madison		
	1980	1990	2000	1980	1990	2000
Labor Force	178,136	214,857	255,838	95,363	112,239	127,932
Employed	169,658	208,069	246,064	91,175	108,284	121,828
Unemployed	8,478	6,788	9,774	4,188	3,955	6,104
% Unemployed	4.8	4.4	3.2	3.5	3.8	4.8

Source: U.S. Census Bureau and Madison Area MPO

Future projections indicate that from 2000 to 2030, Dane County's labor force is expected to increase 69,350 to a total of 325,100 reflecting an annual growth rate of 0.9%. This annual growth rate is less than what occurred in the last two decades. Also from 2000 to 2030, the City of Madison's labor force is expected to increase 22% but at a slightly slower annual rate (0.7%) compared to the county (see Table 10).

The city's percentage share of the county's labor force is also expected to continue past trends and fall from 50.0% in 2000 to 48.1% in 2030 (see Table 10). This is consistent with the past trends and forecast of the City of Madison's overall population growth in relationship to Dane County's population growth, reflecting a decreasing proportionate share.

TABLE 10  
CIVILIAN LABOR FORCE PROJECTIONS: 2000-2030

	Labor Force			Forecast	Change		
	1980	1990	2000		2000-2030 Amount	2000-2030 Percent	2000-2030 Annual %
Dane County	178,136	214,857	255,838	325,100	69,350	27	0.9
City of Madison	95,363	112,239	127,932	156,300	28,400	22	0.7
City as % of County	53.5	52.2	50.0	48.1			

Source: U.S. Census Bureau, Wisconsin Department of Administration, Dane County Regional Planning Commission, and Madison Area MPO

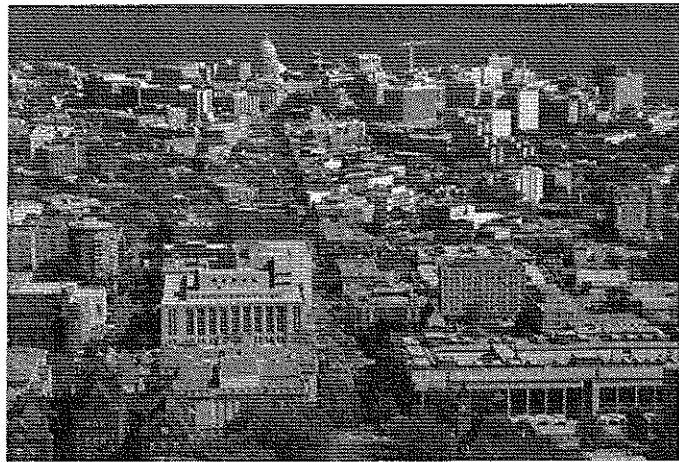
\*Period from 2025 to 2030 is a prorated estimate.

## **Employment**

Employment trends are important to the transportation system because they indicate the number of work trips that an area will attract. Large shifts in employment concentrations can alter overall travel patterns that can challenge the ability of a transportation system to adjust to the shift.

Employment should continue to grow but at a slower pace than in the past. As noted in Table 11, employment in Dane County grew from 231,000 in 1990 to 285,000 in 2000, an increase of 54,000 or an average of 2.2% per year. By 2030, the county's employment is forecasted to increase to 382,600 or an average of 1.14% per year. Similarly, the City of Madison's employment grew from 166,340 to 186,550, an increase of 20,210 or an average of 1.2% per year. By 2030, the city's employment is forecasted in increase to 58,050 or an average of 1.04 % per year.

The city's percentage share of the county's employment is also expected to continue past trends and fall from 65.5% in 2000 to 64.3% in 2030 (see Table 11).



**TABLE 11**  
**EMPLOYMENT PROJECTIONS: 2000-2030**  
(based on place of work)

	Employment			Forecast	Change		
	1980	1990	2000		2000-2030 Amount	2000-2030 Percent	2000-2030 Annual %
Dane County	170,000	231,000	285,000	382,600	97,600	34.3	1.14
City of Madison	N.A.	166,340	186,550	244,600	58,050	31.1	1.04
City as % of County	N.A.	72.0	65.5	64.3			

Source: U.S. Census Bureau, Wisconsin Department of Administration, Dane County Regional Planning Commission, and Madison Area MPO

Comparing the place of work employment forecasts in Table 11 with the growth and forecasts of the labor force shown in Table 10, the amount of growth in employment continues to outpace the growth in the labor force in Dane County and the City of Madison.

Fifty-nine percent of the county's new jobs are expected to be created in the City of Madison. Coupled with a higher growth rate in the labor force in outlying areas, this means that more people are commuting to the city for work. From 1970 to 1980, the number of people commuting into the City of Madison from outlying communities increased 16,450, from 22,450 to 38,900 per day. By 1990, commuting increased another 13,700, and by 2000 increased another 7,200 for a total of 59,800 per day. If current forecasts materialize, commuting into the City of Madison from outlying communities should continue to increase.

## Land Use

An expanding economy and more people are going to require additional land for development. Redevelopment and infill will accommodate some of this development, but for the most part, new land uses will be on land currently vacant or farmed. Nationally there is no agreement on the magnitude of the land that will be needed; however, some trends have been observed that can provide some direction and areawide forecasts based upon trends, assumptions and adopted policy that have been made.

Most new Dane County development is expected to be located in the urban service areas, particularly the Central Urban Service Area (CUSA) (see Figure 4). According to the Dane County RPC, from 2000 to 2030, approximately 42,460 acres will be needed for future development. Of that total, 26,870 acres will be needed for development in the urban areas and 15,590 acres will be needed for development in the rural areas of the County. Further it is expected that of the total acreage needed, 30% (12,870 acres) of the acreage will be needed in the CUSA, 33% (14,000 acres) will be needed in the Outlying Urban Service Areas (OUSA), and 37% (15,590 acres) will be needed in the rural areas of the County.



FIGURE 4

