

# Transportation Analysis



## **Green Bay Smart Growth 2022**

# Transportation Analysis

- Introduction.....5-1**
- Land Use and Transportation.....5-1**
  - Historical Trends .....5-1
  - Land Use .....5-1
  - Population .....5-2
  - Housing Units .....5-2
- Existing Transportation System.....5-3**
  - Travel Behavior .....5-3
  - Roadway Network .....5-3
  - Road Design Elements.....5-7
  - Public Transit Network.....5-19
  - Pedestrian Network .....5-23
  - Bicycle Network .....5-24
  - Passenger Rail .....5-27
  - Passenger Air .....5-27
  - Freight Transport .....5-27
- Assessment of Existing Transportation Policies .....5-31**
  - Zoning.....5-31
  - Streets .....5-31
  - City Ordinances.....5-32
- Summary of Findings and .....5-33**
- Conclusions .....5-33**
- Major Transportation Planning Issues .....5-34**
  - Primary Transportation Issues.....5-34

- Roadways ..... 5-35
- Pedestrians ..... 5-35
- Public Transit ..... 5-36
- Bicycle ..... 5-36
- Parking ..... 5-36
- Rail ..... 5-37
- Airport ..... 5-37
- Waterways ..... 5-37
- Conclusion.....5-38**

## List of Figures

- Figure 5-1: 1990 Green Bay Urbanized Area Commuter Mode Choice ..... 5-3
- Figure 5-2: Functional Class and National Highway System ..... 5-5
- Figure 5-3: Roadway Geometry ..... 5-10
- Figure 5-4: Hourly Vehicle Capacity Per Lane by Speed..... 5-12
- Figure 5-5: Selected Roadway Site for Historical Traffic Count Data ..... 5-13
- Figure 5-6: Levels of Service Descriptions ..... 5-14
- Figure 5-7: 2020 Level of Service (LOS) Forecast ..... 5-16
- Figure 5-8: Sources of METRO Operating Funds ..... 5-20
- Figure 5-9: Green Bay METRO Transit Service ..... 5-22
- Figure 5-10: Proposed Bicycle Network ..... 5-26
- Figure 5-11: Airport Zoning and Freight Routes ..... 5-30

## 5. Transportation

---

### List of Tables

Table 5-1: Green Bay Urbanized Area Functional Classification Mileage.....	5-4
Table 5-2: Historical Traffic Count Data for Selected Roadways, 1989-1998 .....	5-13

# Transportation Analysis

## Introduction

This chapter summarizes the condition of the City's transportation system and identifies the issues to be addressed through the comprehensive planning process. Many of today's transportation issues and problems are rooted in past development decisions and City policies. Transportation is not an isolated City component, but directly related to land use decisions and other public policies. Thus, transportation should be considered with respect to all aspects of the planning process.

## Land Use and Transportation

### Historical Trends

In the earliest cities, walking was the primary transportation mode. Early cities were densely populated and people lived close to where they worked. Many commercial buildings prior to 1900 were designed to accommodate businesses on the first floor with upper floors serving as residences for the owner or workers. With the introduction of the streetcar, residential areas were located farther away from the fumes and noise of factories and commercial areas. Downtowns evolved into more concentrated business centers with easy worker access via the transit system. Even though land uses became more separated, people still needed to be within walking distance of the streetcar line and neighborhood commercial areas.

The popularity of the automobile and the economic prosperity following World War II dramatically changed the form of cities. To accommodate the growing use of cars, more and more public resources were funneled into road construction. The car became the accepted and expected mode of transportation. As a result, land farther from the city core was now available for development.

In an effort to avoid the negative impacts associated with different land uses, new residential, commercial, and industrial land uses were segregated. Because land was cheaper on the city fringe, developments could afford to provide plenty of space for "free" parking. Little effort was made to accommodate walkers and transit users in new developments. As auto-oriented development continued, vehicle trips and traffic increased, and more roads were built and widened to serve demand. New and wider roads provided easier access to these areas, encouraging more development. Thus, a cycle of ever-increasing road demand developed.

The connection between land use and transportation has become increasingly clear. Population and employment densities and mixed land uses are particularly critical for transit, biking, and walking to be viable transportation modes. Furthermore, clustered housing and commercial sites near each other result in lower Vehicle Miles Traveled (VMT).

### Land Use

In 1990, about 59 percent of Brown County's lands were for agricultural use, 11 percent less than in 1970. These lands had been

## 5. Transportation

---

converted to urban land uses (i.e., residential, commercial, industrial, governmental, institutional and transportation land combined). In 1970, urban land uses accounted for 10 percent of total land uses in Brown County. By 1990, urban land uses had increases to 18 percent of total land uses. Between 1970 and 1990, the Brown County population grew by 23 percent, whereas total urban land uses increased by 78 percent. During this time, Residential and Commercial land uses increased by 120 and 157 percent, respectively. As a result, residential land use densities decreased from an average of 13 persons per acre in 1970 to seven persons per acre in 1990; a 44 percent decrease.

Population densities were likely significantly higher prior to World War II. The decades following the Second World War saw most cities changing to more auto-oriented, low-density, suburban development patterns. The community impact of this type of development pattern has led to longer travel distances, and greater road, sewer, and other utility costs.

### Population

According to the US Census Bureau, the 2000 population of the City of Green Bay was 102,313, an increase of six-percent since 1990. Over the same period, Brown County grew 16.5 percent from 194,594 to around 226,778. Even though the City of Green Bay is growing in population, the areas outside the city limits have grown at a faster rate. In 1990, 50 percent of the Brown County population lived in the City of Green Bay; in 2000, 45 percent lived in Green Bay. The Brown County Planning Commission projects the 2022 population of Green Bay to increase to 108,700.

### Housing Units

Housing units in Brown County increased to an estimated 91,800 in 2000 from 74,740 in 1990, a 23 percent increase. Occupied housing units were estimated to be about 97 percent of total

housing units in Brown County for both 1990 and 2000. Population per occupied housing unit in 1990 was 2.6 and in 2000 is estimated to be about 2.4, suggesting a continued trend in declining household size. It is important to take into account that these figures are state-generated estimates. The more accurate 2000 census data was not available at the time of this report.

Because land use and development patterns effect transportation decisions, most of the transportation issues will relate to existing and potential land uses and their relationship to the various transportation modes, infrastructure, and services.

## Existing Transportation System

The “conditions” component of this report is a summary of the existing transportation system. The transportation system includes the obvious elements such as the road and transit system, but also includes pedestrians, bicycles, ports, railroads, and airports. How these modes connect with each other and the land uses they serve, and how the transportation system impacts travel behaviors are also considered.

## Travel Behavior

**Mode Choice:** According to the 1990 Census Data, about 82 percent of commuters in the Green Bay urbanized area drove alone to work, which is above the national average of 73 percent (see Figure 5-1). The percentage of Carpooling and transit use was lower than the national average. Biking, walking, and working at home were near the national average.

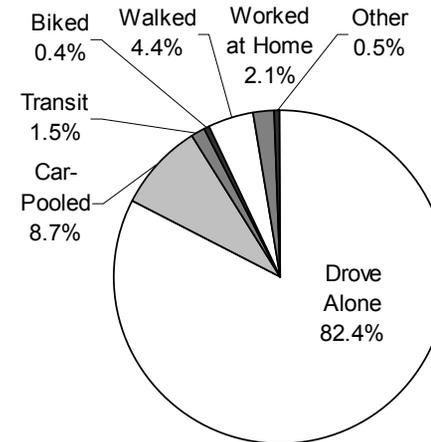
**Median Commute Times:** In 1990, the median travel time for residents in the Green Bay urbanized area who drove alone to work was about 15 minutes. For those using transit, the median travel time was almost 27 minutes and about 16 and 9 minutes for those who biked or walked to work, respectively.

## Roadway Network

### Functional Classification

Federal regulations require that each state classify roadways in accordance with the Federal Highway Administration’s *Highway Functional Classification: Concepts, Criteria and Procedures*. Functional classification defines the role each road plays in serving travel movements within the transportation network. The functional classification hierarchy is described below and consists of

**Figure 5-1: 1990 Green Bay Urbanized Area Commuter Mode Choice**



Source: US Census Bureau, 1990.

Freeways, Expressways, Principal Arterials, Minor Arterials, Collectors and Local Streets.

- **Freeway:** A limited-access highway with no traffic stops and with grade-separated interchanges at major thoroughfares. Intended for high volume, high speed traffic movement between cities and across the metropolitan area. Freeways are not intended to provide direct access to adjacent land.
- **Expressway:** A limited access highway with some grade crossings and signals at major intersections. Intended for high-volume, moderate to high speed traffic across the metropolitan area with minimal access to adjacent land.
- **Primary Arterial:** A street primarily intended to provide for high volume, moderate speed traffic between major activity centers. Access to abutting property is subordinate to major

## 5. Transportation

traffic movement and is subject to necessary control of entrances and exits.

- **Minor Arterial:** A street which augments and feeds the Principal Arterial system and is intended for moderate volume, moderate speed traffic. Access to abutting property is partially controlled.
- **Collector:** A street, which collects and distributes traffic to and from local and arterial streets. Collectors are intended for low to moderate volume, low speed, and short length trips while also providing access to abutting properties. At the time a collector street is platted, it may be designated as a residential or commercial/industrial collector, depending upon the predominant land use it will serve. A commercial/industrial collector must be constructed to higher standards in order to serve truck traffic.
- **Local:** A street for low volume, low speed, and short length trips to and from abutting properties. During the platting process a local street may be designated as an industrial, commercial, high-density residential, normal residential, or low volume residential street, depending upon the predominant land use it will serve.

For Federal and State funding purposes, the Wisconsin Department of Transportation (WisDOT) determines the percentages of entire roadway system that can be allocated to any functional classification. WisDOT has accepted Green Bay Urbanized Area's functional classification system as being within these guidelines. Table 5-1 shows the WisDOT functional class guidelines for urbanized areas. Figure 5-2 shows Green Bay's Functionally

Classified roadways. Interstate 43, US Highway 41, and State Highway 172 create a beltway of Freeways encircling most of Green Bay's population. North/South and East/West Principal Arterials primarily follow the City's grid pattern street system to downtown Green Bay. Minor Arterials and Collector Streets are reasonably spaced throughout the city. A Minor Arterial is planned east of the interstate about halfway between I-43 and S. Northview Road along Huron Road and Woodside Road.

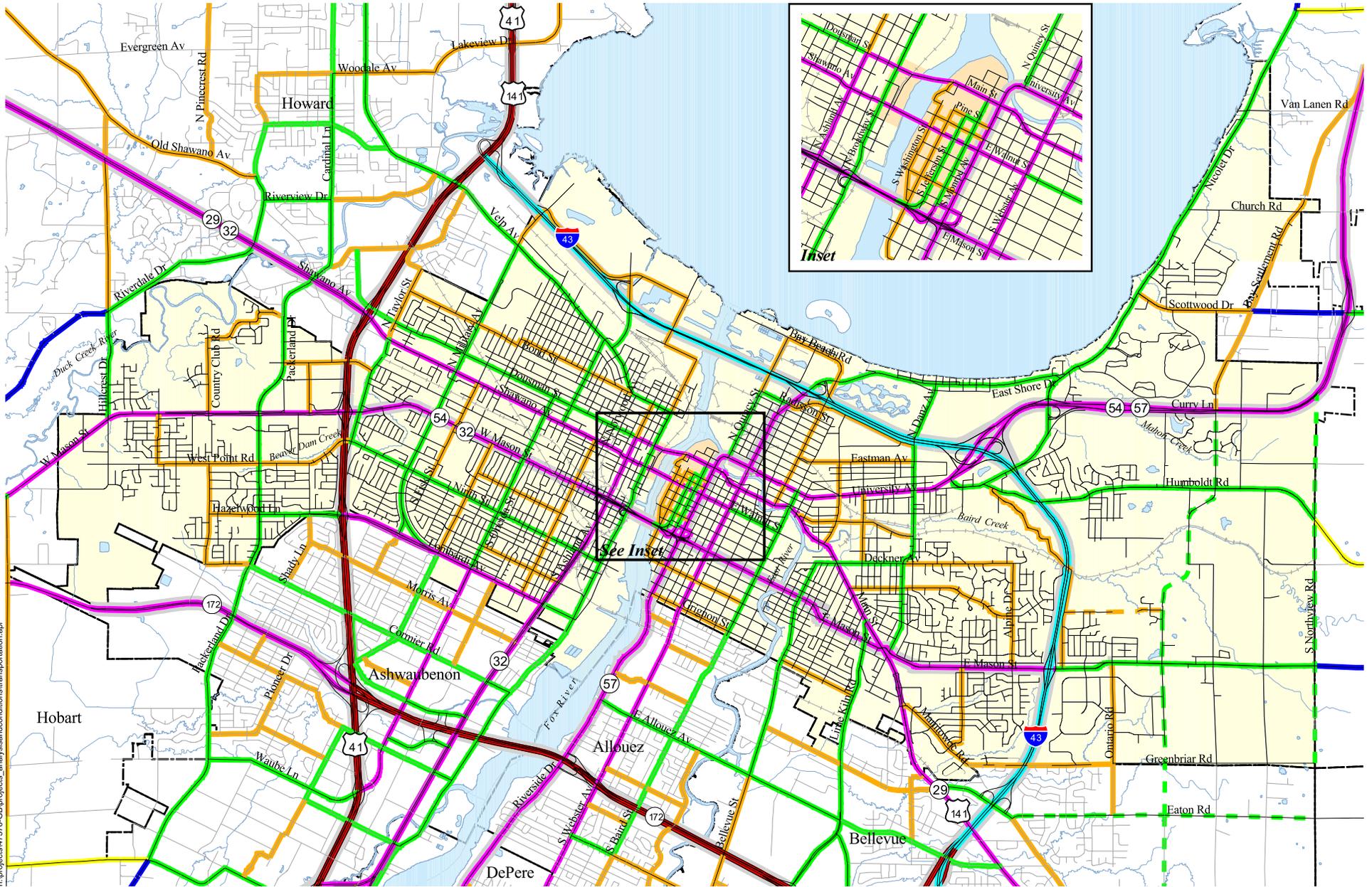
Three Principal Arterials run east and west through Downtown Green Bay including Main Street, East Walnut Street, and East Mason Street. Mason Street between 12th Avenue and South Webster Avenue is designed as an expressway connecting east and west Green Bay. Principal Arterials running north and south through downtown include South Webster Avenue, and Riverside Drive.

**Table 5-1: Green Bay Urbanized Area Functional Classification Mileage**

Functional Classification	Miles	Percent	WisDOT Guidelines
Principal Arterials - Interstate	12	1%	
Principal Arterials - Others	88	9%	
Principal Arterials - Total	101	10%	5-10%
Minor Arterials	109	11%	10-15%
Collectors	103	11%	5-10%
Subtotal	313	32%	20-35%
Locals	663	68%	65-80%
<b>Total</b>	<b>976</b>		

Source: Wisconsin Department of Transportation.

Note: may not sum to total due to rounding.



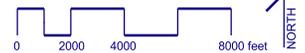
n:\projects\47376-GB\projects\_analysis\conditions\transportation.apr



- |  |                    |  |                       |  |                        |
|--|--------------------|--|-----------------------|--|------------------------|
|  | INTERSTATE         |  | FUTURE MINOR ARTERIAL |  | FUTURE MAJOR COLLECTOR |
|  | FREEWAY            |  | COLLECTOR             |  | MINOR COLLECTOR        |
|  | PRINCIPAL ARTERIAL |  | FUTURE COLLECTOR      |  | LOCAL                  |
|  | MINOR ARTERIAL     |  | MAJOR COLLECTOR       |  | NHS                    |

Figure 5-2

**Functional Class and National Highway System (NHS)**



## 5. Transportation

---

### National Highway System

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) redefined federal aid roadways by authorizing the National Highway System (NHS). The NHS includes all interstate routes, a portion of Principal Arterials and the Defense Strategic Highway Network and its connectors. In the Green Bay urbanized area, NHS routes includes Interstate-43, US Highway 41, State Highway 172, State Highway 57, State Highway 54, and State Highway 32 (see Figure 5-2).

### Roadway Jurisdiction

Roadway Jurisdiction refers to governmental ownership and not necessarily responsibility. For example, State highway authorities maintain some roads owned by the Federal government. Furthermore, the designation of a public road as a Federal Aid Highway does not alter its ownership or jurisdiction as a state or local road, only that its service value and importance have made that road eligible for federal construction and rehabilitation funds.<sup>1</sup>

The State of Wisconsin delegates and provides financing to cities and counties for conducting routine maintenance and minor repairs on state and federal highways. However, major repairs and reconstruction are the responsibility of the State Department of Transportation.

The Brown County Planning Commission conducted and published the *Jurisdictional Transfer Study* in 1997. The study's purpose was to logically assign highways for maintenance and improvement to the units of government having the greatest interest in the routes. One objective of the study was to maximize roadway system management efficiency and intergovernmental cooperation to avoid

---

<sup>1</sup> US Department of Transportation, Federal Highway Administration Conditions and Performance Report.

duplication of design, construction, maintenance, and operation of individual facilities. The study tried to promote the adoption of existing and planned roadways by appropriate jurisdictions based on location, physical characteristics and traffic carrying significance. Furthermore, an attempt at creating an equitable distribution of highway system development costs and revenues was made among various levels of government and to ensure that those with jurisdictional responsibility had the existing staff expertise and financial capabilities required of the system. The final objective was to promote the implementation of the Brown County 2020 *Land Use and Transportation Plan*.

The Jurisdictional Study made several recommendations within the City of Green Bay. Recommendations were generally planned to go into effect following the next major reconstruction of the roadway or construction of an alternative route.

### Roadway Safety

In February 2001, the Brown County Planning Commission adopted the Green Bay Metropolitan Area Intersection Crash Study. The findings were based on crash data between 1997-1999. The study identified 30 intersections with the highest crash rates (crashes per million vehicles entering the intersection). Total crashes, estimated property damage, injuries, estimated injury costs, crash type, and driver factor information was provided for each of the 30 intersections.

The crash study offered comments and recommendations for each of the 30 intersections. There were several recurring themes of most crashes. First, every intersection had several crashes caused by a failure of turning vehicles to see oncoming motorists. Second, all of the intersections had a least a few crashes attributable to drivers disregarding traffic signals or stop signs. Third, rear end crashes were common, likely caused by inattentive drivers or driving too fast or too close given weather conditions.

Several improvements were recommended for multiple intersections. Roundabouts, similar to one located at the Lineville Road/Cardinal Lane Intersection in the Village of Howard, were recommended at several intersections. Roundabouts, although still relatively new to the United States, have been used extensively in European Countries. Roundabouts have been shown to reduce the number and severity of the types of crashes common at many of high-crash intersections (e.g. right angle crashes and crashes by disregarding traffic controls). Roundabouts can also enhance intersection capacity, improve safety and accessibility for pedestrians and bicyclists, provide aesthetic improvements, and tend to compare favorably with the cost of signalized intersections.

Even though multiple-lane roundabouts have not been tested locally, they have been shown to reduce crash frequency and crash severity where they have replaced large signalized intersections. However, the safety benefits have not been to the extent as single lane roundabouts. The crash study recommended multiple lane roundabouts at several Green Bay area locations.

The Crash Study recommended offset left turn lanes as a means of improving the ability of left turning motorists to see oncoming traffic. Narrowing and converting Jefferson Street and Madison Street from one-way streets to two-way streets was also recommended in the crash study. Frontage roads located in close proximity to the main road were shown to create safety problems. Locating frontage roads away from the main intersection was recommended, when this is not feasible, the study recommended multi-leg roundabouts.

### Road Design Elements

Not surprisingly, roadway design (i.e. number of lanes, road width, intersection configurations, etc.) is largely driven by traffic use. Conversely, roadway design affects how desirable a roadway is to use compared to alternative routes.

According to Anthony Downs in the book *Stuck in Traffic*, “nearly every vehicle driver normally searches for the quickest route, one that is shorter or less encumbered by obstacles (such as traffic signals or cross-streets) than most other routes. These direct routes are usually limited-access roads (freeways, expressways, or beltways) that are faster than local streets if they are not congested. Since most drivers know this, they converge on such 'best' routes from many points of origin.”<sup>2</sup>

As the “best” routes become congested during peak times, the road’s “quickest route” status diminishes and drivers will begin to shift to alternative routes that become quicker than the congestion freeway. Other motorists will shift their trips before or after the congested times, and still others may shift to alternative modes. Once the roadway’s capacity is expanded and the route once again becomes the quickest route, “drivers who formerly used alternative routes during peak hours switch to the improved expressway (spatial convergence); drivers who formerly traveled just before or after the peak hours return to traveling during the peak hours (time convergence); and some commuters who were taking public transportation or other modes now switch to driving (modal convergence).” These behaviors are what Anthony Downs refers to as “Triple Convergence.” Others have used the term “induced trips” for this phenomenon.

Studies have shown that these trips account for ten to 50 percent of new road capacity in the short-term and 50 to 100 percent in the long-term (i.e. more than three years).

### Road Network Characteristics

**Number of Lanes:** Lane configuration and traffic control devices are illustrated in Figure 5-3. Many of the Principal Arterials are four lane roadways. The more through-lanes of traffic, the wider

<sup>2</sup> Downs, Anthony, *Stuck in Traffic*, 1992.

## 5. Transportation

---

the road and the faster vehicles are likely to travel. One of the main premises of traffic calming is the narrowing of road sight lines. Narrowing four-lane roads to two-lane roads may be desirable in residential areas with shallow housing setbacks and/or if existing and forecasted traffic can adequately be served with two lanes.

Within the City of Green Bay, there are two roadways that are designed with six through-traffic lanes. South Military Avenue is a six-lane roadway between Biemeret Street and Shawano Avenue. The Annual Average Daily Traffic (AADT) for this road ranges from 14,800 north of 9<sup>th</sup> Street and 14,700 south of 9<sup>th</sup> Street. Main Street currently has six through-lanes between Washington Way and North Webster Avenue. This section of roadway ranges between 10,500 and 17,200 AADT, and is programmed to be changed to four-lanes in order to better accommodate pedestrians between the convention center and other parts of downtown.

**Signalized Intersections:** As traffic increases, signalized intersections are used to assign intersection right of way to improve safety, reduce delays and enhance traffic flow. Traffic signal technologies offer features that improve intersection capacity by altering signal coordination and timing sequences to accommodate peak hour directional traffic, give priority to the major roadway, and accommodate high percentage turning movements. However, traffic signals are quite expensive and therefore generally have to be replaced over time. Figure 5-3 shows the locations of all signalized intersections in Green Bay.

**Roundabouts:** As previously discussed in the section on Roadway Safety, roundabouts have several benefits as an intersection traffic control measure. Although roundabouts have not been used in the City of Green Bay, the technique has been used at the Lineville Road/Cardinal Lane Intersection in the Village of Howard, and is planned at other intersections as well.

Roundabouts can efficiently handle particular intersections with decreased delay and greater efficiency than traffic signals. This is particularly true where traffic volumes entering the roundabout are roughly similar and where there are a high number of left-turning vehicles.

**One-way Streets:** One-way streets can increase capacity and greatly enhance traffic flow. However, one-way streets tend to create environments conducive to speeding. Jefferson Street and Madison Street between Mason Street and Pine Street are the only significant one-way street pair used in Green Bay (see Figure 5-3).

Generally, one-way streets have been shown to reduce trip travel times while increasing trip length. The shorter travel times are due to the traffic flow efficiency created; increased trip lengths are due to decreased access to adjacent land uses. In other words, some motorists will likely have to drive around the block in order to access their destination.

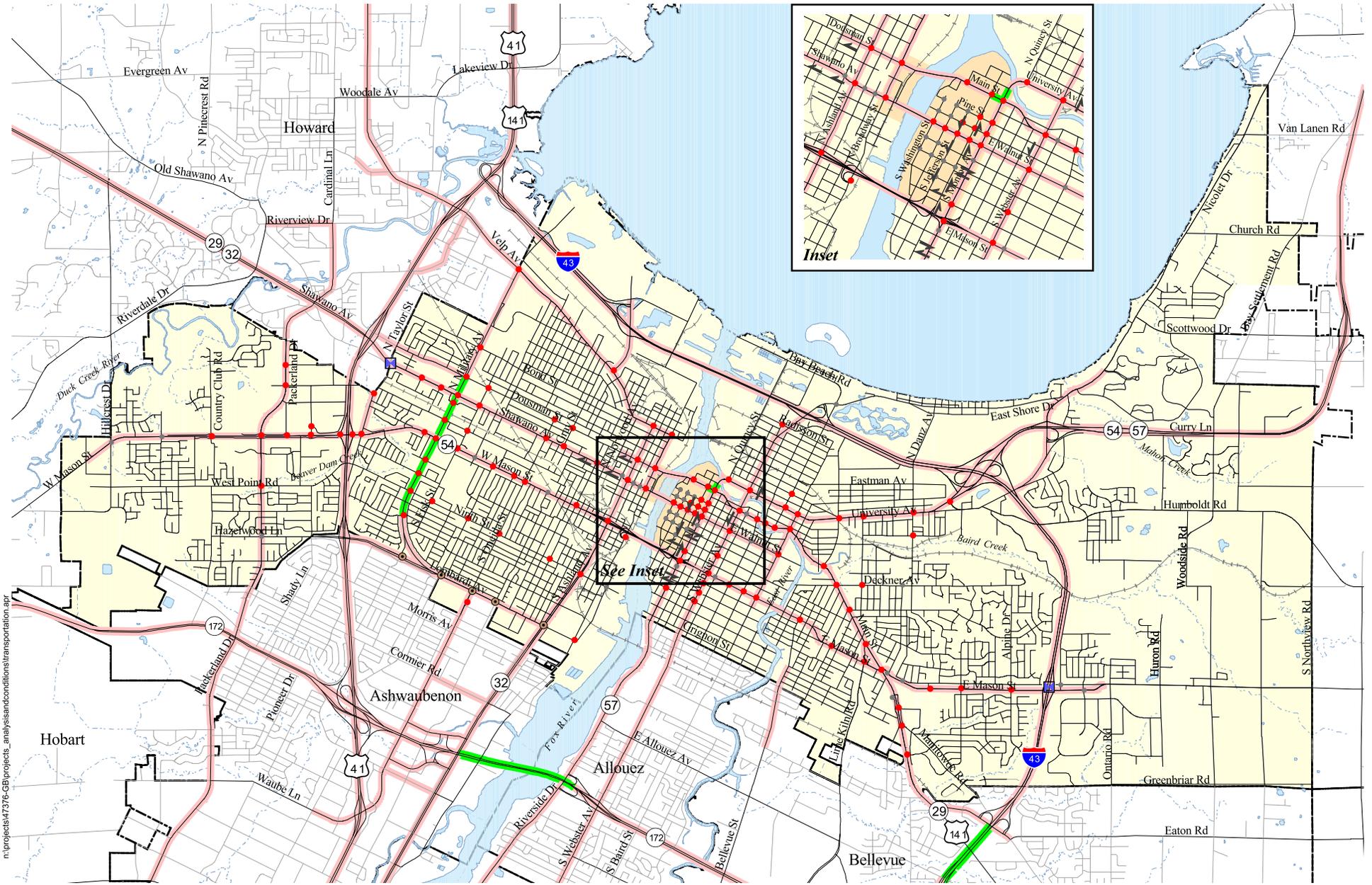
One-way streets can be used to eliminate cut through traffic in a neighborhood or restrict certain turning movements to reduce accidents. Generally, one-way streets with two or more lanes are not desirable in residential areas because they tend to encourage speeding, which diminishes neighborhood livability. One-way streets, particularly in downtown areas, can create confusion, decrease accessibility to businesses, and result in more driving around as people search for on-street parking.

Jefferson Street/Madison Street one-way street pair: The Jefferson Street/Madison Street one-way street pair between Pine Street and Mason Street is designed to enhance traffic flow between Downtown and Mason Street. Given current and forecasted traffic, the one-ways do not appear to be warranted with respect to capacity limitations. According to 1998 AADT counts, these streets together did not exceed 10,000 vehicles per day. The time savings for motorists is minimal given that the Jefferson/Madison Street one-

way pair is only about six blocks long. Furthermore, the one-way streets concentrate significant traffic impacts during their respective a.m. or p.m. peak-hour direction.

If these routes were converted to two-way roads as recommended in the *Downtown Design Plan*, coordinated traffic signals could be used to improve peak-hour directional traffic flow. A reasonable traffic flow would be maintained while allowing both streets to be fully utilized for both morning and afternoon peak hours. Access to adjacent land uses would also be improved with the two-way traffic configuration.

Four of the 30 intersections with the highest crash rates are on Madison Street or Jefferson Street, three on Madison Street, one on Jefferson Street. The Brown County Planning Commission's Green Bay Metropolitan Area Intersection Crash Study suggests that reducing speeds along these routes would increase the safety at these intersections, and converting these streets back to two-way streets would have a desirable traffic calming effect.

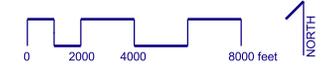


n:\projects\47376-GE\projects\_analysis\conditions\transportation.apr



- One-way Streets
- Local Streets
- 4 Lane Roadway
- 6 Lane Roadway
- Signalized Intersection (City Owned)
- Signalized Intersection (County Owned)
- Conduit Locations
- Signalized Intersection (W.S.D.O.T. Owned)

**Figure 5-3**  
**Road Geometry**



### Access Management

By developing and implementing an access management program, traffic flow can be enhanced, capacity increased, and vehicular and pedestrian safety improved.

**Left Turns:** One of the most efficient means of maximizing roadway capacity and decreasing accidents is minimizing where and how left-turns are allowed. Uncontrolled left turns increase the number of potential conflict points between vehicles. In addition, left-turns disrupt the steady flow of traffic as the turning vehicle waits for an appropriate gap in oncoming traffic. When left turning vehicles are restricted by medians to dedicated left-turn lanes, vehicular conflict points are greatly reduced.

**Right Turns:** Right turning movements can also create problems. The more driveways with direct access along major corridors, the higher the number of vehicle conflict points. In addition, vehicles slowing down to turn right disrupt traffic flow and increase the potential for rear end crashes. Furthermore, more driveways crossing sidewalks increase the potential for crashes with pedestrians.

**Pedestrians and Bikes:** Access Management can also benefit pedestrians and bicyclists by reducing conflicts with turning vehicles. Every driveway that crosses a sidewalk is a potential pedestrian-vehicle conflict point. Furthermore, vehicles turning left to access driveways are likely focussing more attention on oncoming traffic than on pedestrians along the sidewalk where they are turning.

**Green Bay Strategies:** Several corridors in the City of Green Bay could benefit from some form of access management program. Many of the major arterials have center left-turn lanes, multiple driveways to businesses, and driveways too close to intersections.

An access management program may include:

- Eliminating uncontrolled left turning movements by creating medians;
- Combining and sharing driveways;
- Eliminating unnecessary driveways;
- Creating right turn lanes where possible;
- Creating dedicated left turn lanes at intersections;
- Creating right-in, right-out only intersections; and
- Creating frontage or backage roads where appropriate.

Access management programs can be beneficial for traffic, businesses, and residents when combined with appropriate streetscape elements. Some cities have experienced opposition to access management programs from adjacent businesses and residents. Business owners may fear that medians or combined driveways will decrease their customers' ability to get to their business. Similarly, residents may not like the impact of creating a median that would limit some turning movements. However, many communities have worked successfully with business owners and residents to create access management programs that address concerns and create efficient, accessible, and attractive corridors.

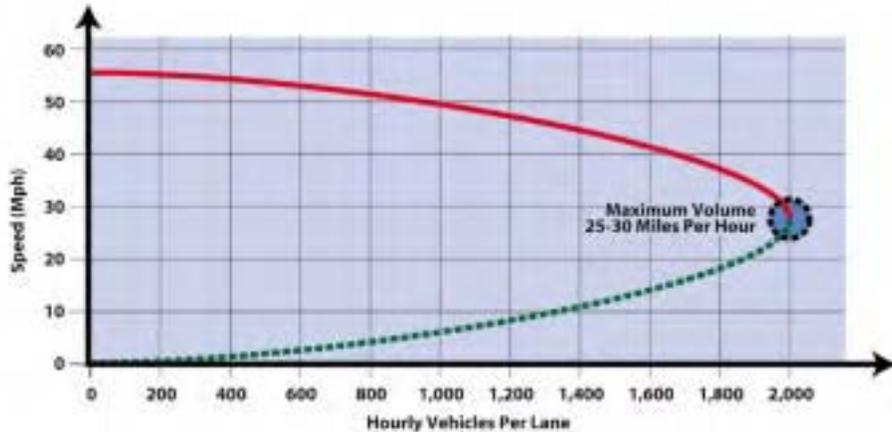
**Gateways:** Many of the major corridors serve as gateways to the community and could benefit from improved streetscape elements in addition to access management strategies. The Downtown Green Bay Design Plan recommended gateways and enhanced intersections, as well as wayfinding signage at gateways.

**Frontage Road Safety:** Frontage roads too close to an intersection can be just as problematic as driveways too close to intersections. According the Brown County Planning Commission's *Green Bay Metropolitan Area Intersection Crash Study*, most crashes at the intersection of West Mason Street and Packerland Drive, occur as the result of vehicles on West Mason Frontage road trying to turn left onto Packerland Drive, or

## 5. Transportation

to cross to the other side. Frontage roads should be used cautiously as part of an access management program.

**Figure 5-4: Hourly Vehicle Capacity Per Lane by Speed**



Source: Institute of Traffic Engineer's Highway Capacity Manual, Special Report 209.

### Posted and Operating Speeds

Posted speeds and operating speeds can vary substantially. The rule of thumb for transportation engineers is to set the speed limit at the 85th percentile operating speed (i.e. the speed at which 85 percent of people drive at or under). Roadway design is likely the most important factor affecting operating speeds. Studies suggest that drivers tend to operate at a speed that is comfortable regardless of the posted speed limit. Therefore, motorists on a four-lane divided roadway with 12-foot lanes, wide paved shoulders, and clear views are likely to drive much faster than a 30-mph posted speed limit. Conversely, drivers with the same posted speed on a two-lane, tree lined road with 11-foot lanes and parked cars along the shoulder will drive much slower. Traffic calming studies have shown that narrowing sight lines on roadways and creating environments that

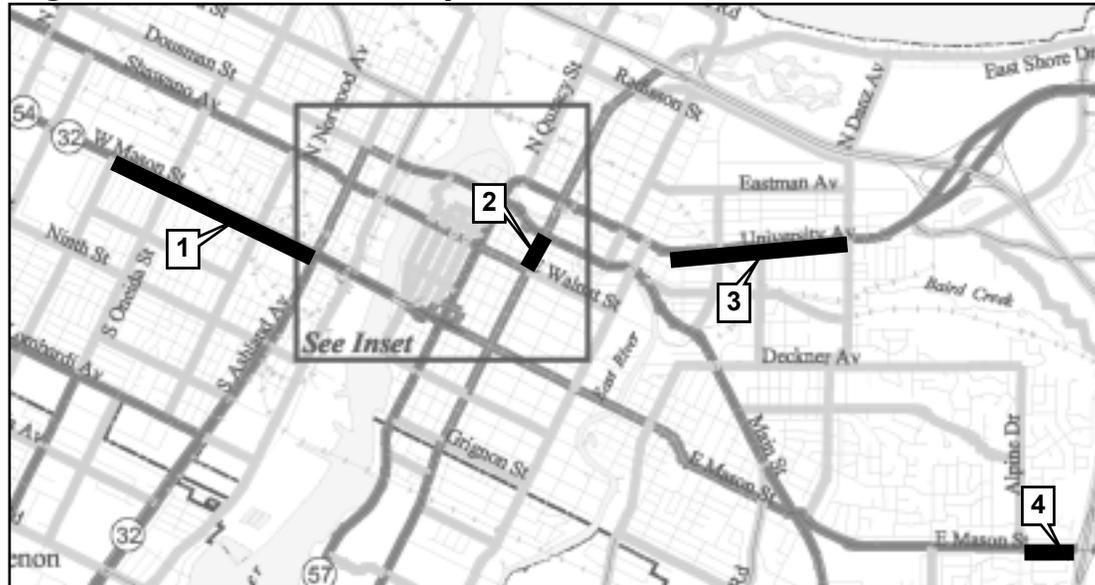
make it uncomfortable to drive at higher speeds are effective in decreasing operating speeds.

It is often assumed that as speeds increase, road capacity increases; however, this is not the case. According to the Institute's of Transportation Engineer's (ITE) *Highway Capacity Manual*, hourly capacity per lane peaks between 25-30 mph. As speed increases above 30 mph more space is required between vehicles to operate safely, thus decreasing capacity (see Figure 5-4).

### Traffic / Level of Service Trends

Nationally, vehicle miles traveled have increased faster than the rate of population growth. Traffic in most urbanized area's, including the Green Bay urbanized area, tend to support this. However, traffic increases are not a ubiquitous phenomenon. Over the past decade, traffic on Green Bay's roadways have increased on some corridors, stayed the same or even decreased. Table 5-2 shows historical Annual Average Daily Traffic for those roadways identified in Figure 5-5. While there are several factors that explain why vehicle miles traveled has out paced population growth, the largest factor is likely the changes in land use over the past 50 years.

**Figure 5-5: Selected Roadway Site for Historical Traffic Count Data**



**Current Traffic:** Current levels of service shows few capacity deficiencies, based on the most recent Annual Average Daily Traffic (AADT) counts. Only Mason Street near downtown and a section of US Highway 41 between Mason Street and Lombardi Avenue has a LOS D or below. Figure 5-6 describes LOS classifications. There may be some isolated Level of Service problems at specific intersections or roadway segments. Generally, however, most functionally classified roadways appear to be operating below capacity.

**Table 5-2: Historical Traffic Count Data for Selected Roadways, 1989-1998**

	1989	1992	1995	1998	% Change '89-'98
1. West Mason Street/STH 54 between Ashland Avenue and Ridge Road (three site count average)	28,413	26,357	25,500	28,100	-1.1%
2. North Monroe Avenue/STH 54 between Main Street and Walnut Street (three site count average)	11,740	11,917	No Counts	11,867	1.1%
3. University Avenue/STH 54 between Forest Street and Danz Avenue (three site count average)	15,403	16,783	15,133	14,933	-3.1%
4. East Mason Street between Interstate 43 and Alpine Drive (one site count)	13,030	15,930	18,400	18,600	29.9%

Source: Wisconsin Department of Transportation, 2000.

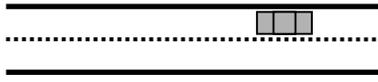
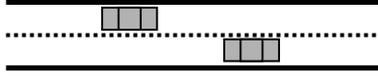
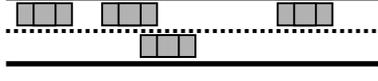
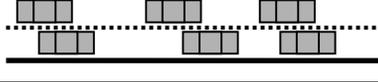
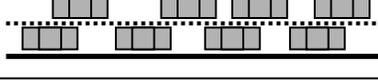
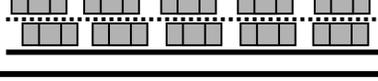
## 5. Transportation

**Travel Forecasts:** It is important to understand how traffic demand models and forecasts are developed in order to evaluate their results. First, the urbanized area is divided into Transportation Analysis Zones (TAZ), which are compact, contiguous, and homogenous areas. The Green Bay metropolitan area is divided into 220 TAZ's. Based on trip generation rates, housing and employment data for each TAZ is used to estimate trips that originate or are destined for each TAZ. These trips are then assigned to a computerized roadway network using mathematical algorithms.

When the assigned trips on the simulated road network are similar to real traffic counts, the model is considered "calibrated." Once a calibrated network is completed, the model can be used to forecast transportation demand based on projected population and employment growth. Similarly, roads can be added or changed within the computerized environment to see what the effects will be to traffic and levels of service. Travel demand models can be very useful tools for analyzing transportation and land use decisions. However, there is the potential for model data to be misinterpreted.

Using the Travel Demand Model to project traffic conditions in

**Figure 5-6: Levels of Service Descriptions**

<i>Level of Service</i>	<i>Description</i>	
<b>A</b>		<b>FREE FLOW.</b> Low volumes and no delays.
<b>B</b>		<b>STABLE FLOW.</b> Speeds restricted by travel conditions, minor delays.
<b>C</b>		<b>STABLE FLOW.</b> Speeds and maneuverability closely controlled due to higher volumes.
<b>D</b>		<b>STABLE FLOW.</b> Speeds considerably affected by change in operating conditions. High-density traffic restricts maneuverability, volume near capacity.
<b>E</b>		<b>UNSTABLE FLOW.</b> Low speeds, considerable delay, volume slightly over capacity.
<b>F</b>		<b>FORCED FLOW.</b> Very low speeds, volumes exceed capacity, long delays with stop-and-go traffic.

future years requires planners to make several assumptions. First and foremost, transportation planners need to determine how much the population and employment will grow and where those housing units and jobs will be located. Population and employment projections are a key element in transportation forecasts and are generally based on past experience and where developable land is available. Determining if and where growth will take place is difficult to predict. Furthermore, transportation decisions such as building a new roadway will likely affect future land uses and travel behaviors, which is generally not addressed in the modeling process.

Travel forecasts generated in 1994 for the year 2020 suggest eventual decreases in LOS primarily along the beltway (see Figure 5-7). US Highway 41 and State Trunk Highway 172 are anticipated to experience declines in LOS. Mason Street near downtown and Broadway Avenue between Mason Street and Lombardi Avenue both are projected to deteriorate to a LOS of F by 2020. However, it is important to remember that the model is an educated guess based on many assumptions. Both the location and the amount of development are uncertain, and therefore, projected traffic increases should not be viewed as an inevitable outcome. City policies and land use decisions, have the potential to minimize future transportation impacts.

### Parking

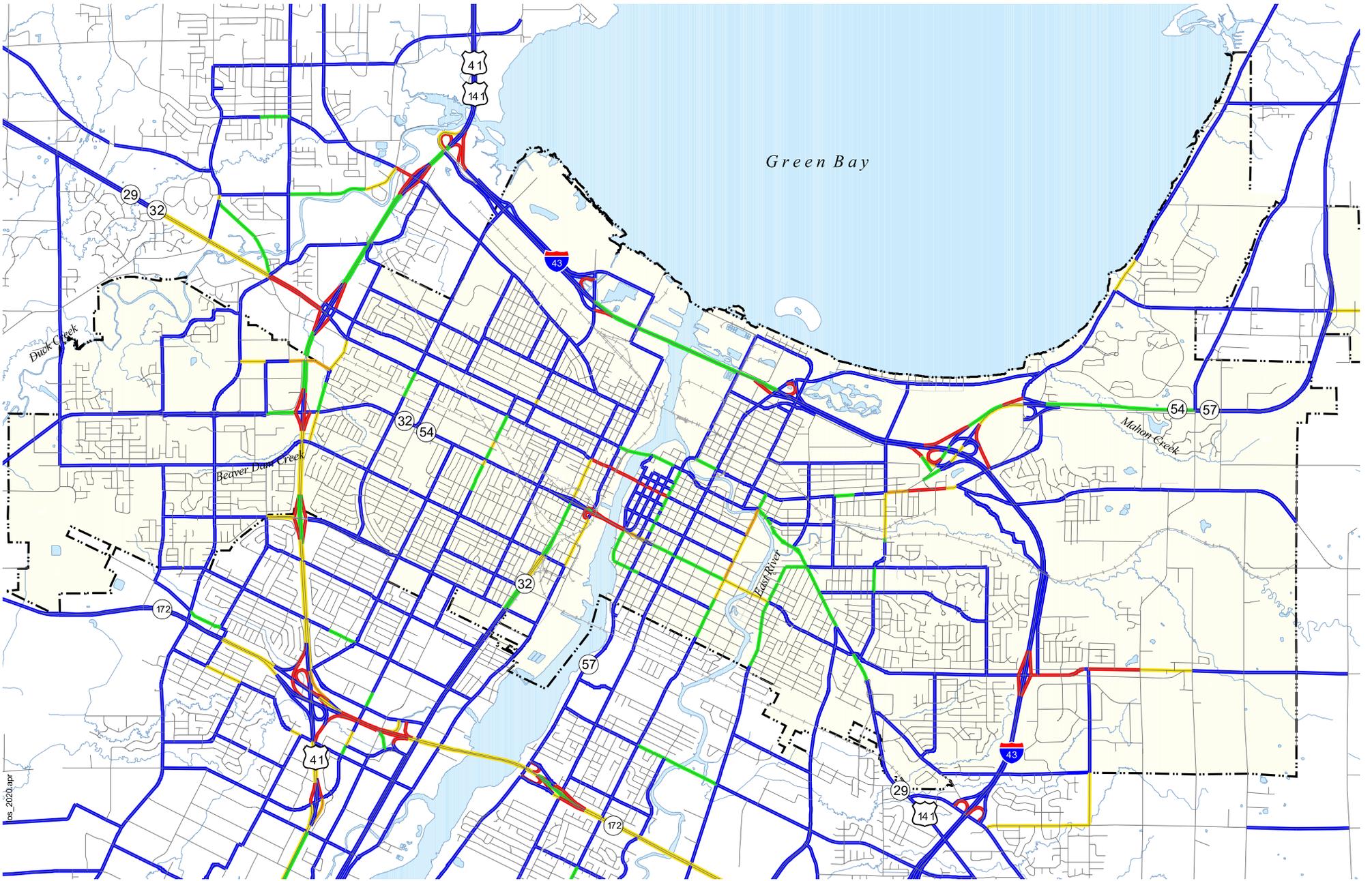
The amount of parking and parking policies greatly impacts travel behavior. Large amounts of free parking tend to encourage driving while discouraging pedestrian, bike, and transit use. City zoning codes often set minimum parking requirements that are typically higher than daily demand. Many cities treat parking differently in downtown since land is generally limited and more expensive. Regardless of how small or how large the city, the lack of or perceived lack of downtown parking tends to be a common complaint and contentious issue in most cities.

**Minimum Parking Requirements:** Minimum parking requirements for new development or redevelopment are not uncommon. However, minimum-parking requirements have many unintentional consequences, which are important to understand.

Most cities set minimum parking guidelines by copying their neighbors or by relying on estimates from national sources such as the Institute of Transportation Engineers' Parking Generation Manual, as well as guides from the American Planning Association and the National Parking Association. These guidelines are typically based on surveys from auto-oriented land uses at suburban locations where parking is free. The guidelines typically call for designing parking for the 20th busiest hour of the year.<sup>3</sup>

---

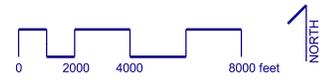
<sup>3</sup> *Don't Even Think of Parking Here: Are we building too many spaces?*, Lisa Wormer, Planning, June 1997.



- 2020 LOS**
- LOS B
  - LOS C
  - LOS D
  - LOS E
  - LOS F
  - Local road
  - Railroad

Based on Green Bay Landuse Plan

**Figure 5-7**  
**2020 Traffic Level of Service Forecasts**



Of course parking is not truly “free,” but paid by the developer who in turn passes the cost of constructing and maintaining parking lots to tenants through higher rents who then pass the costs on to customers through higher prices for goods. As a result, the user still pays for parking, just indirectly. When the users do not pay directly for parking, shoppers and employees are more likely to drive.

Minimum parking requirements encourage what is often referred to as urban sprawl. This occurs because the space needed for the required parking is often greater than the building space. For example, a typical zoning code may require new office buildings to provide one parking space for every 300 square-foot of office space, and require that the parking be located on the same lot as the development. One parking space with aisles and driveways requires about 300-320 square feet of space. Thus creating a building surrounded and separated from other buildings by parking.

The types of development created by following these guidelines tend to discourage pedestrian, bike, and transit use, and encourage auto use. The City may want to consider parking requirements that reflect average daily use and/or more flexible parking options that encourage shared parking between compatible land uses. The City may want consider leaving parking decisions to the developer or business. There may be some concern that by leaving parking decisions to developers that they will construct more parking than the minimum parking requirements. Currently, there is requirement for the maximum amount of parking that can be developed. However, to address this concern, the City may want to replace the minimum parking requirements with a parking review process for proposed developments.

Minimum parking requirements also have been shown to drive up the cost of housing by mandating that apartments provide one to two off-street parking spaces per dwelling unit. The City could lower minimum requirements, encourage shared parking, and/or

allow on-street parking spaces adjacent to the property to be counted toward the parking requirement.

Minimum parking requirements in downtown areas tend to discourage development and redevelopment of property. They also exacerbate auto-oriented developments and discourage pedestrian-oriented developments. Ultimately, increasing auto traffic at expense of alternative transportation modes.

**Parking Pricing:** It is not surprising that people generally do not like paying for things they could get for free. Unfortunately, parking is not free, but paid indirectly through other means. A typical surface parking space requires 300-320 square feet of land, which includes driveways and driving lanes. In addition, there are construction and maintenance costs, and if it is a public parking lot, forgone property taxes. These costs are paid indirectly either through higher taxes or through higher consumer prices.

In addition to paying for the cost of parking, charging for parking serves another function; when other transportation modes are available, it can alter demand. Time limits and/or pricing can also encourage longer-term users to park in underutilized parking spaces. Time limits increase parking turnover, which allows more motorists to use high demand parking spaces.

A market approach to parking would charge the highest amount for the most desirable parking spaces and less for undesirable parking. In downtown, on-street parking generally provides the most convenient and accessible parking, which is why most communities try to ensure that downtown shoppers have access to these spaces. However, if these spaces are always full, it is the same as having no parking. While time limits do increase parking turnover, pricing provides an additional incentive for some to use less utilized parking farther away, thus creating more open spaces for those willing to pay for the convenience.

## 5. Transportation

---

Pricing can be a powerful parking management tool. Using parking meters has an added benefit of increasing time limit compliance. Studies suggest that meters increase “self-enforcement” compared to time limits alone. Another benefit of pricing is that a dedicated fund can be created to pay for additional parking as demand warrants.

**Downtown Parking:** Many feel that charging for parking discourages customers from coming downtown and businesses from locating downtown. The evidence of this is far from clear. The vitality and success of a downtown relates to a variety of components such as the variety of retail, amount of entertainment, concentration of employment, the number of nearby residents, and a balanced transportation system, which includes parking. Cities with the most successful downtowns are the ones that balance these components.

Gould Evans Goodman Associates, L.C. prepared the *Downtown Design Plan* in May of 1997 for the City of Green Bay. The plan was intended to serve as a vision and development framework to guide public and private decisions in Downtown. The elements of the plan included streetscapes, parking, circulation, scale and design of building, gateways, wayfinding, gathering spaces, and other physical elements. Four of these six elements directly relate to transportation, and the remaining two indirectly relate to transportation.

**Surface Parking Lots:** The *Downtown Design Plan* proposed policies that address the treatment of surface parking lots. The plan recommended that surface parking lots be screened with a low wall and/or ornamental fencing in order to delineate the parking lot and create a visual buffer from pedestrians. Planting trees and other vegetation in and around surface parking lots was suggested to soften lots that tend to be large expanses of concrete or asphalt. The plan also called for providing for pedestrian circulation through large surface lots.

**Parking Structures:** The design plan suggested developing mixed-use parking structures. By mixed-use, the authors meant commercial/retail space provided on the street level of the structure and parking areas designated to the upper levels and/or below grade level. It is also possible to provide additional uses above the parking levels such as residential uses, hotel rooms, or office space.

**On-Street Parking:** On-street parking offers the most convenient and thus, the most desirable parking spaces, which is why these spaces tend to be metered with shorter time limits imposed. Historically, many cities removed on-street parking from downtown areas in order to accommodate more through vehicle movements. However, commercial establishments were hurt by the lack of convenient parking and the deteriorated pedestrian environment deteriorated as a caused by closer and faster moving vehicles.

Parallel parking tends to be the most common type of on-street parking. Parallel parking tends to be preferred by traffic engineers since it generally is considered to lead to fewer crashes and creates fewer traffic flow disruptions.

Angle Parking is becoming more popular in recent years for several reasons. First, it provides more on-street parking spaces for downtown customers (assuming available road width). Second, it tends to slow traffic creating a more pedestrian friendly environment. Third, angle parking discourages through-traffic in downtown areas by treating downtown as less of a thoroughfare and more as a destination.

Increased traffic accident rates are a legitimate concern with angle parking. However, crashes tend to be less severe, more characteristic of “fender benders” because of the traffic calming affect created by angle parking. Similarly, streets with angle

parking can be more dangerous for bicyclists and should not be recommended as bike routes.

As long as alternative through-routes are available, providing angle parking along lower AADT roadways can greatly increase the amount of short-term customer parking while at the same time enhancing the pedestrian environment. Angle parking also helps to create a traditional “main street” environment in downtown.

According to 1998 Annual Average Daily Traffic (AADT) counts, only Monroe Avenue, Main Street, and Walnut Street average over 10,000 vehicles per day. Many of the downtown street segments see less than 4,000 vehicles per day. Diagonal parking with two-through lanes of traffic (i.e. one in each direction) has been successfully used on downtown roads with average daily traffic volumes around 10,000.

The following parking recommendations were identified in the *Downtown Design Plan*:

- Landscaping and streetscape improvements to buffer and aesthetically enhance parking lots.
- Encourage shared parking arrangements.
- Incorporate design guidelines provided for surface and mixed-use parking facilities.
- Possible parking management changes for increasing utilization of existing parking ramps associated with Washington Commons and on-street parking along Washington, Adams, and Cherry streets in the vicinity of the proposed Town Center Park.
- Investigate the opportunity to incorporate angle parking in the “villages” within downtown. Angle parking should not be applied to multilane arterials or connecting highways.
- Develop and evaluate parking provisions and management in downtown including:

1. Free parking during certain hours for limited periods of time (three hours) or merchants offering parking validation (with purchases) in underutilized parking ramps.
2. On-street parking meter cost and time limits located closest to Washington Commons and other commercial/retail merchants should allow for two hour parking.

### Public Transit Network

METRO (formerly Green Bay Transit) provides fixed-route bus transportation throughout the Greater Green Bay Metropolitan Area including the Cities of Green Bay and De Pere, the Villages of Allouez and Ashwaubenon, and the Town of Bellevue. METRO also provides Paratransit services for persons with disabilities (see Figure 5-9).

**METRO Transportation Center:** In Spring of 2001, METRO opened a new Transit Center located at 901 University Avenue, which is northeast of downtown. The Transit Center serves as the primary transfer station for the bus service. In conjunction with the new Transit Center, a new route structure was implemented, including a trolley route, which provides frequent service for downtown commuters.

**Ridership:** Annual transit ridership declined in the 1980’s to a low of about 1.4 million passenger trips in 1987. Ridership steadily increased to about two million in 1996, and once again began to decline. Between 1998 and 1999, annual passenger trips decreased by five percent from 1, 774,000 to 1,661,000.<sup>4</sup> METRO provides about 4,000 unlinked trips (not adjusted for transfers) on an average weekday.<sup>5</sup>

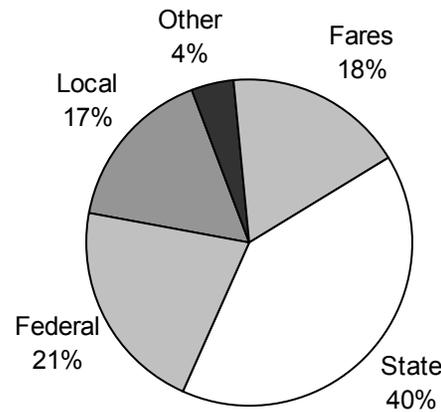
<sup>4</sup> 2000 Green Bay Transit: Annual Route Review and Service Requests and Analysis Report, Brown County Commission, March 2000.

<sup>5</sup> 1999 Federal Transit Administration National Transit Database

## 5. Transportation

**Funding:** In 1999, total expenditures were approximately \$5.2 million. Figure 5-8 shows where those funds come from. Fares cover 18 percent of the total operation costs. The State covers the largest proportion of operating costs. Almost 80 percent of capital expenditures came from federal funds with the remainder coming from local sources.

**Figure 5-8: Sources of METRO Operating Funds**



*Source: 1999 National Transit Database*

**Routes:** METRO offers 15 full service bus routes serving the metropolitan area. Limited routes are provided on school days throughout the school year serving area middle schools and high schools. A limited commuter service route connects BCAR Industries and downtown.

Six of the regular routes operate with ½ hour headways generally between 5:45 AM to 5:45 PM weekdays and one-hour headways in the evenings and Saturday. Three routes (i.e. Routes 5, 6, and 7) provide 30-minute service all day during the weekdays and one-hour headways in the evenings and Saturday. The six remaining routes operate with one-hour headways during the day, offering

various degrees of evening and weekend service, depending on the route.

**Fares:** The fare is \$1.00 for all customers. Adult monthly passes cost \$21.50. Kindergarten through twelfth grade students are charged \$16 for the monthly pass. Persons 65 years of age and older, persons with disabilities, and Medicare recipients are charged half price for both the daily fare and the monthly pass with proper I.D. Post-secondary students are eligible with school I.D. to use the Special Pass, which costs \$19.

### Transit and Land Use

As previously discussed, land use decisions greatly affect transportation. This is particularly apparent with respect to transit. Fixed route transit will only be a viable transportation mode choice if the following land use conditions exist:

Residential population densities are high enough so that transit can serve a large enough population within a relatively short distance.

- Employment and commercial districts are concentrated in a centralized location (i.e. downtown), creating a primary destination for a large segment of the population.
- The Central Business District (CBD) and other business centers serve a variety of activities within walking distance of transit facilities (e.g. government, daycare, retail, entertainment, etc.), which can be accessed by transit users.
- An integrated pedestrian system needs to be in place. The pedestrian system needs to be a comfortable, safe, and attractive environment.
- Auto-related land uses (e.g. parking lots, wide roads) need to be balanced with the needs of pedestrians and transit users.

**Transit Oriented Development:** The elements described above are similar to what is often referred to as Transit Oriented

Development (TOD). From a transportation perspective, TOD is the land use and economic development version of transportation demand management (TDM). The purposes of TOD and TDM are similar, to reduce the use of single occupant vehicles (SOV) by increasing the number of trips by walking, bicycle, car/van pool, bus, or rail. The TOD concept includes mixed use, higher density, buildings at the sidewalk, less private and more public open space, smaller blocks, narrow streets with wider sidewalks, street trees and lights, lower parking ratios, shared parking, parking behind buildings, and on-street parallel parking.

### **Transit Financing and Service**

In the most productive transit systems, fare-box revenues do not cover all operating expenses. Fares generally cover less than a third of operating costs. Transit providers are often in a difficult situation since they can cut operating costs by cutting services, which results in less ridership or they can try to increase ridership by offering more and better services, which increases operating costs.

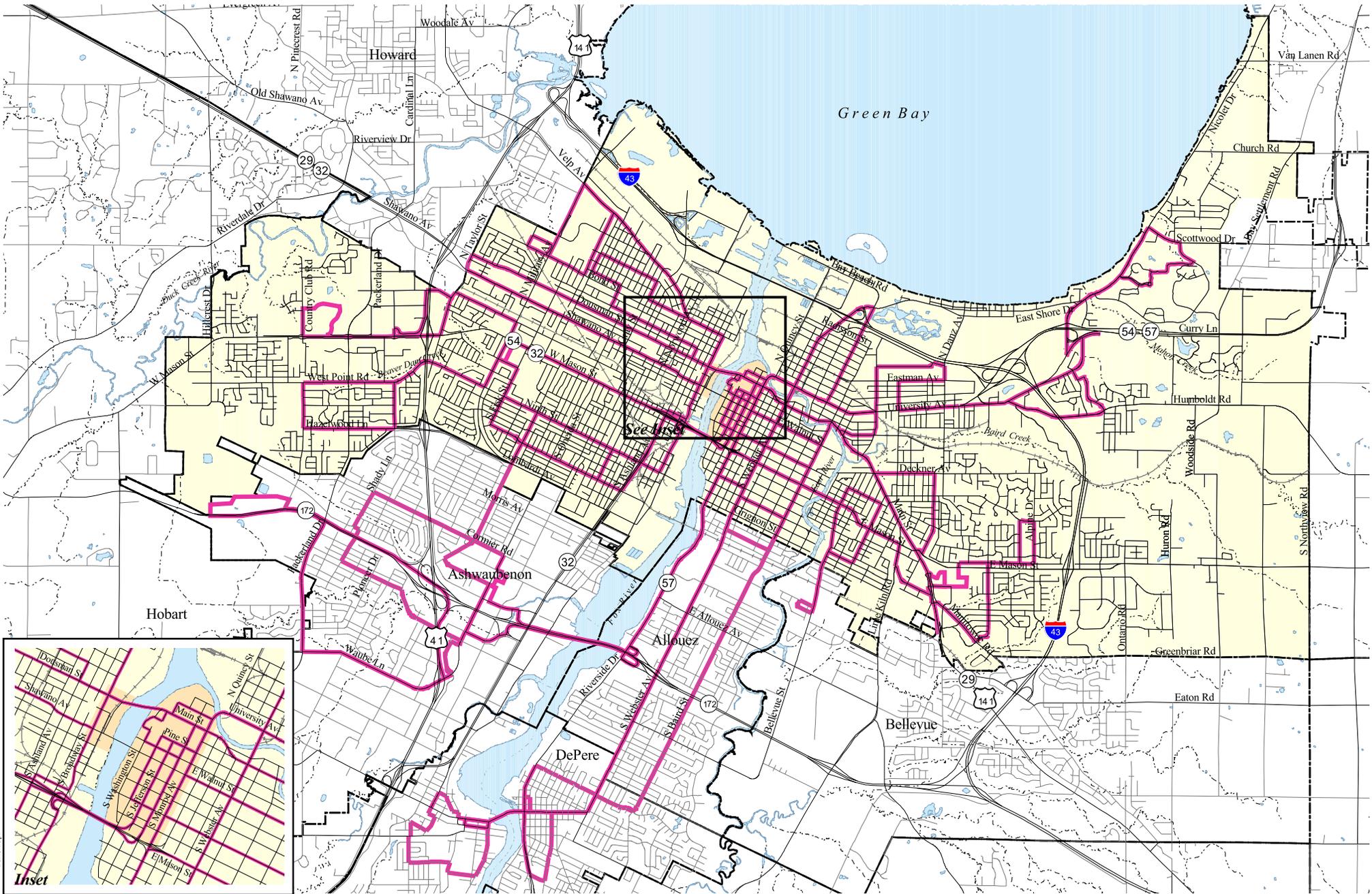
Most cities attempt to find a balance between providing an adequate level of transit service within an acceptable amount of cost being covered by city tax dollars. Based on the city values, the level of transit service, and thus, ridership may vary dramatically. However, as mentioned, if land uses are not compatible with transit use, increases in service will have limited appeal to new riders.

Cost is a factor in transit use. However, the cost of the transit fare is less of an issue than the costs of driving that are directly or indirectly subsidized (e.g. parking, road costs, etc.). Furthermore, most driving costs tend to be fixed costs. For example, only about 16 percent of annual private vehicle expenditures consist of gas and motor oil. As a result, once you own a car, the marginal cost of driving is relatively minimal compared to taking transit.

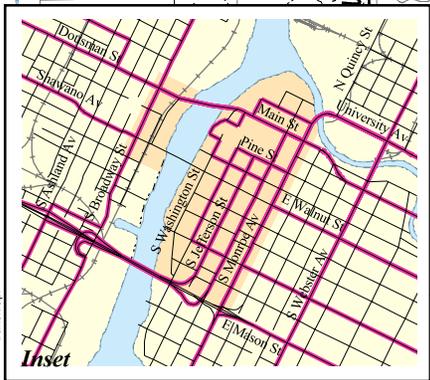
### **Transit Service Assessment**

With the new transit system and route network, it is too soon to assess current transit conditions. Over the next couple years, data will be gathered in order to determine how well the new system is functioning and what, if any, additional steps can be taken to improve the system.

The neighborhood located to the north of the METRO Transit Center is an older neighborhood that has deteriorated over time. Around the neighborhood are mostly industrial land uses. This neighborhood is planned to be supplanted by additional industrial uses. However, given the location of the transit center, there may be an opportunity to create a Transit Oriented Development (TOD) adjacent to the transit center, with less compatible industrial uses located further north.



transit.apr

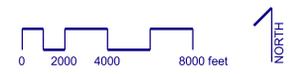


**Inset**



 Bus Routes

**Figure 5-9**  
**Green Bay METRO Transit Service**



## **Pedestrian Network**

The majority of the City of Green Bay was developed prior to World War II when grid pattern streets, streetcars, and compact mixed use developments were the norm. These developments were also likely to have sidewalks. This “traditional neighborhood” development pattern also tended to have planting strips (i.e. boulevards) with trees separating sidewalks from the street providing a buffer between pedestrians and moving traffic. The traditional neighborhood development pattern offers pedestrian-friendly environments.

The conventional development pattern adopted after World War II tended to produce developments that omitted sidewalks, had large lots, and separated land uses. These developments tended to build hierarchical road networks where cul-de-sacs fed collectors, which fed arterials, which fed freeways. This type of road system created long and meandering walking routes, leading to difficult to cross wide arterial roads. Not surprisingly, these types of environments see little pedestrian activity.

## **Sidewalks**

Retrofitting conventional areas with sidewalks has proven a contentious issue in some communities, including Green Bay. Much of the opposition to constructing sidewalks in developed neighborhoods related to financing. Many cities require that all or part of the cost of sidewalk construction be assessed to the adjacent landowner; a practice commonly used for road reconstruction as well. Other objections to constructing new sidewalks in existing development may be due to the feeling that the landowners private property is being turned over to the public domain.

## **Major Pedestrian Trip Generators**

The pedestrian system is not unlike the road system in which the whole is greater than the sum of its parts. A gap in part of the system impacts the entire network, minimizing its usefulness. Likewise, a neighborhood may have a great network of sidewalks, yet not lead to anything worth walking to. Pedestrian connections to schools, employment, retailers, parks, etc., are essential if walking is to be used as a mode of transportation. From the pedestrian perspective, heavy traffic on major arterial roadways can be as difficult to navigate as a river. Even where pedestrian accommodations at intersections are in place, they often feel unsafe and uncomfortable to the pedestrian.

## **Pedestrian Environment**

While the entire community benefits from a well-developed pedestrian network, children are perhaps the most noticeable beneficiaries. Seniors, the disabled, and those without other means or transportation also rely on the pedestrian network.

Even though sidewalks are essential, there are several other factors that make for a pedestrian friendly community, which include the following:

- Sidewalks that are unencumbered by vegetation overgrowth, snow and ice, or uneven surfaces;
- Sidewalks that meet the Americans with Disabilities Act (ADA) by having accessible pedestrian ramps at street curbs;
- Few pedestrian-vehicle conflicts created by driveways;
- Planting strips with large trees and/or parked vehicles providing a buffer between pedestrians and moving vehicles;
- Sufficient lighting to increase security and comfort.
- Lighting fixtures that are at “human-scale;” and
- Land uses that provide attractive and interesting places to walk.

## 5. Transportation

---

### Downtown

Downtown Pedestrian system consists of roadside sidewalks and the Riverwalk along the Fox and East Rivers. Pathways along the river are disjointed and segmented by the built environment. The Fox River Ramp, overhead power lines and ground facilities, industrial activities, and lack of activity destinations hinders the use of the pathway.

Downtown sidewalks located adjacent to busy roadways with fast moving vehicles such as those along the Mason Street Bridge and portions of Main Street offer an uncomfortable pedestrian environment. The rivers, railroad tracks, and busy roads are barriers to pedestrian movements between nearby neighborhoods and downtown destinations.

The *Downtown Design Plan* provided general direction for creating a pedestrian-oriented streetscape and environment for the downtown Green Bay area, and included the following recommendations:

- Through downtown overlay district and landscape ordinance, new development should be required to provide streetscape enhancements based on the direction included in the Design Plan.
- Waterfront improvements, such as gateways and cantilevered boardwalk around the Fox River Ramp, should be developed by the public sector to ensure a coherent design throughout the trail system. The riverwalk system should be accessible to all individuals and be designed to accommodate multiple uses.
- Pedestrian lighting fixtures shall be selected and placed in a manner that reflects the desired character of the village or district in which it is located.

### Bicycle Network

Since 1994, bicycle facilities have been included in several reconstruction projects. Existing bicycle facilities within Green Bay include:

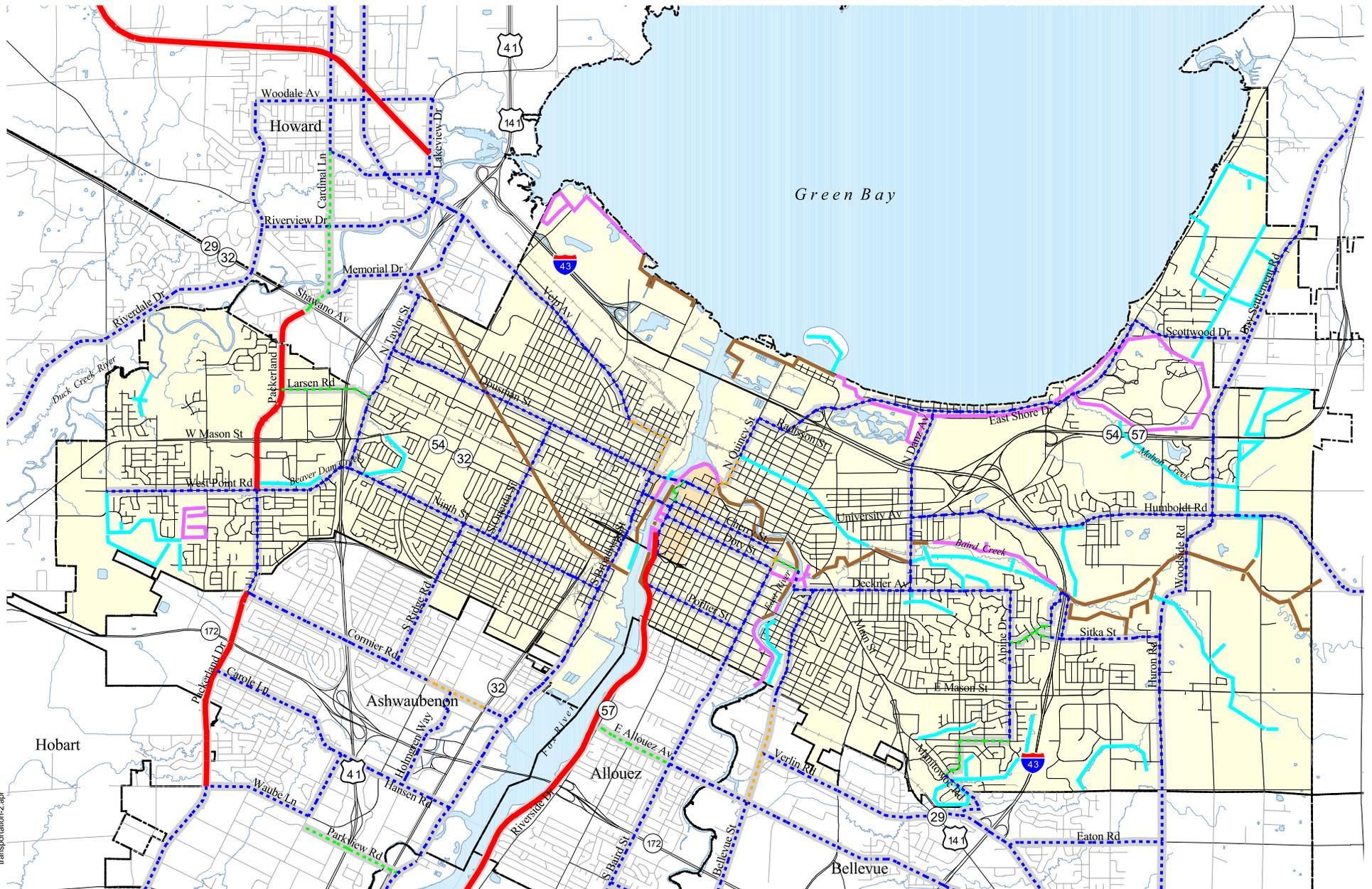
- Paved shoulders on East Shore Drive between Nicolet Drive and East Shore Circle
- Bicycle lanes on Main Street Bridge between Washington Way and the railroad
- Wide curb lanes on Walnut Street Bridge between Washington Street and the railroad

Brown County Planning Commission updated their Bicycle and Pedestrian Plan in 1998. The plan established goals and objectives for creating a seamless bicycle and pedestrian system, increasing bicycling and walking, developing a safe bicycle and pedestrian environment, and promoting bicycling and walking as transportation modes.

The Figure 5-10 shows the existing Green Bay bicycle network. The Brown County Plan proposes a complete and comprehensive network of bike lanes. Bike routes and wide curb lanes serve as connectors where needed. Two multi-use trails are proposed; one along Packerland drive between Shawano Avenue and West Point Road, and one adjacent to the Fox River south of Crooks Street through the urbanized area. The Fox River route multi-use trail would be particularly advantages for commuter transportation. This trail would connect to downtown and the hospitals and require few road crossings minimizing potential bike-car conflicts. Along with the proposed Fox River trail, there may be other multi-use trail opportunities along the East River, Baird Creek and Mahon Creek.

Railroad right-of-ways tend to have few at-grade road crossings. Furthermore, they provide intact corridors that can easily be converted to multi-use trails. The Brown County Bicycle and

Pedestrian Plan identified rail corridors on the east side of the Fox River and along Packerland Drive for potential multi-use trail development. Because of the difficulty of creating new corridors, whether for roads or trails, obtaining intact abandoned rail corridors should be a high priority, even if the use of the corridor is not evident in the foreseeable future. The Brown County Bike and Pedestrian Plan recommends acquiring all railroad rights-of-way for trails prior to rail abandonment.



transportation-2.apr



**Brown County Proposed Bike Network**

-  Multi-Use Trail
-  Bike Lane
-  Bike Route
-  Wide Curb Lane

**City Multi-Use Trails**

-  Existing Multi-Use Trails
-  (City Adopted) Proposed Trails
-  Other Proposed Trails

**Figure 5-10**

**Existing and Proposed Multi-Use Trails and Bike Network**



## Passenger Rail

The Midwest Regional Rail Initiative (or “Midwest Rail”) is an ongoing effort to expand and improve intercity passenger rail in nine Midwest states: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin. Midwest Rail calls for a 3,000-mile system of enhanced and expanded passenger rail service hubbed in Chicago. The initiative would include new service in some corridors, expansion of service in other systems, maximum train speeds of 110 MPH, and acquisition of new trains with high quality amenities. The total capital cost of the system is estimated at \$3.9 billion, covering infrastructure improvements and equipment acquisition over an eight to 12 year buildup period.

Green Bay is identified as a destination within the Midwest Regional Rail System (MWRRS). A fully implemented MWRRS would include five roundtrips between Green Bay and Milwaukee per day, although this route is not designated as a high-speed corridor (i.e. speeds above 110 mph). The study suggested that fares would be competitive with airfares.

The implementation of the MWRRS or other passenger rail improvements would be very beneficial for the City of Green Bay. Not only would a passenger rail service increase access for Green Bay area residents, but it would also increase the attractiveness of Green Bay as a tourist destination, and mitigate interstate congestion related to Packer games. While the MWRRS plan is a long way from becoming a reality, the city should consider how and where such a service could be provided. The city may consider looking into other passenger rail options, such as introducing regular Amtrak service or a specialized service to the city.

## Passenger Air

Over the past ten years, Green Bay’s Austin Straubel International Airport has seen a 37 percent increase in enplanements and

deplanements. In 2000, the airport served 734,000 passenger trips. The summer months generally see more airport activity than other times of the year. However, in Green Bay, many years have seen March with higher air traffic than August. The difference between the busiest month and the slowest month is about 27 percent or 12,000 passenger trips.

The Austin Straubel International Airport has about 30 scheduled arrivals daily. The five airlines currently serving the airport include:

- American Eagle,
- Northwest Airlines/NW Airlin-Messaba-Saab,
- United Express/AIR WI,
- Skyway Airlines, and
- Comair.

Airport traffic is likely to continue to grow. Given the increased air congestion at large metropolitan airports, regional airports may see increases in use.

**Land Use:** The Airport last updated the Airport Master Plan in 1996. It is essential that airport planning and the Comprehensive Plan are coordinated and complimentary. Land use decisions near airport property are particularly important due to the potential for safety and noise impacts. Figure 5-11 identifies the airport height restriction area. The noise impact areas will need to be reviewed to assess existing and future noise impacts on adjacent City lands. The City needs to be proactive to ensure that lands developed within the noise impact areas are compatible with future airport operations.

## Freight Transport

Freight transportation is important to the local economy and the delivery of goods to consumers. Most people do not think about freight transportation until waiting at a train crossing or getting stuck behind a slow moving tractor-trailer. As a result, freight

## 5. Transportation

---

transportation is generally viewed with respect to the negative impacts. However, transporting resources to factories and finished goods to stores and consumers is a critical function of the transportation system.

### Trucking Access

Freight shipments are a major traffic generator. Generally, truck traffic accounts for five to ten percent of traffic volumes on functionally classified roadways. As truck axle weights increase, roadway damage increases exponentially. Studies have suggested that large trucks cause 1,000 times more damage to pavement than cars. Truck traffic through residential areas is especially problematic due to noise and safety concerns. Although trucks cannot be restricted from any state aid roadways, many communities have designated truck routes to encourage trucks to use roads that are better able to accommodate heavy vehicles. Green Bay truck routes are shown on Figure 5-11.

The City should work closely with the Brown County Planning Commission and motor carriers to determine how best to accommodate truck traffic through the area while minimizing the negative impacts to the community.

### Railroad Lines and Terminals

Two railroads operate in Green Bay, the Escanaba and Lake Superior (ELS), and the Canadian National (CN). Most, if not all, of the rail freight traffic in Green Bay originates in the city, or is transferred from ship in the port. There is very little rail “through-traffic” in the city. The City’s rail lines generally do not traverse residential neighborhoods, which minimizes the negative noise impacts often of concern to cities. There are also relatively few multiple at-grade rail crossings throughout the city, minimizing train-vehicle conflicts, which can cause traffic delays and safety concerns. However, there are significant train/vehicle conflicts in

downtown Green Bay, and much of the train traffic occurs during peak hour travel times.

### Water and Port Facilities

The Great Lakes and river system provided the first transportation routes to Green Bay. Subsequent transportation technology such as railroads and cars and trucks have diminished the role and importance of the water routes. Highways tended to take over as the major mode of choice for passenger travel and higher valued finished goods, and water transportation has generally been relegated to transporting lower value bulk commodities, such as coal and grain. However, Great Lakes shipping still plays an important role in Green Bay.

About 185 vessels visit The Brown County Port on an average year carrying approximately 2.0 million metric tons. Coal, limestone, cement, and salt make up the bulk of the shipments. Smaller amounts of pig iron, liquid asphalt, liquid bulk, and tallow make up the remaining shipments.

The I-43 Bridge was constructed high enough to accommodate passing ships below. Main Street, Walnut Street, and Mason Street have drawbridges to allow for passing ships up the Fox River. These bridges are regularly needed given that Fort Howard/Georgia Pacific Paper Company is the destination of a significant proportion of the coal shipments, and is located on the south side of Green Bay.

While efforts to locate a new Bay Port Slip have been discussed, the \$40 million price tag has created some funding challenges. By creating a slip closer to the bay, the Port could expand by 120 acres for new water related businesses, and Riess Coal could relocate, opening up their current site near downtown to other uses.

Unfortunately, creating a new Bay Port Slip would not eliminate the need for continued shipping traffic up stream, and would not eliminate the need to dredge, nor would it completely prevent traffic delays created by drawbridge use.

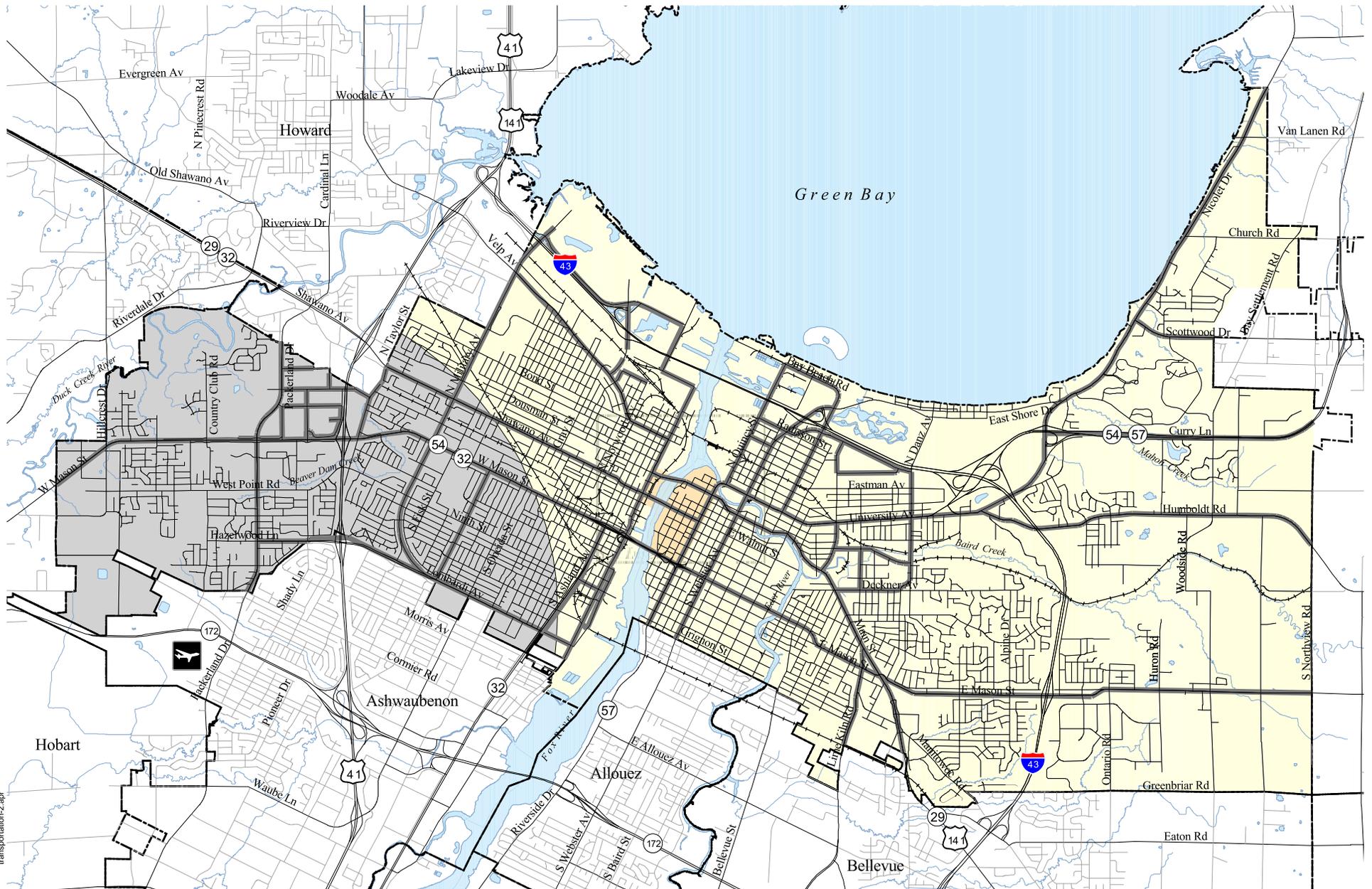
### **Airport Freight Terminals**

Nationally, airfreight has grown at an even faster rate than passenger air. Although only accounting for a small amount of total freight in the transportation industry, airfreight is the fastest growing freight mode. Goods shipped by air tend to be high value goods, such as software, compact discs, etc. that are cost effective to ship by air.

As previously mentioned, airport congestion at large metropolitan airports is increasing, creating potential constraints for airfreight shipments as well. There may be opportunities for regional airports near large metropolitan areas to increase their airfreight role. For example, goods would fly into Green Bay, be put on trucks to make the two-hour trip to Milwaukee, the final destination.

### **Intermodal Terminals and Access to Intermodal Facilities**

The roadway network not only serves vehicular traffic, but is also a link between other passenger and freight transportation modes. Current federal policy emphasizes intermodal connectivity. Encouraging appropriate intermodal connections for freight movements will enhance the City's economic environment.

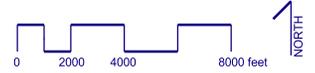


transportation-2.apr



-  Railroad
-  Truck Routes
-  Airport Height Restriction area

**Figure 5-11**  
**Airport Zoning and Freight Routes**



## **Assessment of Existing Transportation Policies**

Whether intentional or not, many City policies directly or indirectly impact transportation. As previously described, land use policies dramatically shape the community's transportation system and choices. The zoning code, as the tool for implementing land use policy, is discussed here as it relates to the city's transportation environment.

### **Zoning**

Approximately 30 pages of the zoning code are devoted to parking and loading zone requirements, including standards for the number and design of parking and loading spaces, design and location of driveways and landscaping of parking areas.

The subdivision and platting ordinance includes approximately five pages of regulations covering design of streets and highways and naming of streets. Other relevant transportation topics such as sidewalks, streetlights, street signs, and street trees do not appear to be covered in either ordinance, but are specified in Public Works Department policies.

### **Parking Requirements**

Green Bay's parking requirements seem high even when compared to other cities or ITE standards. Examples include parking requirements of 2.25 spaces per multiple-family unit (for resident and guest parking) and one space per 150 square feet of floor area in small- to mid-sized retail stores. (A typical widely-used standard is 4 to 5 spaces per 1,000 square feet of retail space).

The requirement for off-street parking to be located on the same lot as the development tends to create buildings that are surrounded

and separated from other buildings by parking. However, the zoning code states that parking may be located off-site if within 250 feet of a main entrance. No reduction in parking is permitted for shared uses with different peak hours of use (i.e., theaters and offices or retail stores).

**Downtown Parking:** Most city downtowns pre-date the automobile and are not easily or inexpensively accommodated with lots of parking. Green Bay has established an overlay district that recognizes this fact and allows for more flexible parking standards.

The Urban Parking Overlay district covers the "greater downtown" and Broadway districts, from Ashland Avenue on the west to Webster Avenue on the east, the East River on the north, and Mason and Porlier Streets on the south. Within this district, parking may be provided with 1,320 feet (1/4 mile) of a site, and the required amount of parking is considerably lower. For example, restaurants must provide one space per four customer seats (compared to one per 3 seats or 50 square feet) and all dwellings must provide only one space per unit (compared to 2 or 2.25 elsewhere in the City). This is the least restrictive parking district in the City.

### **Streets**

The subdivision and platting ordinance states that street layout and design are to be based on applicable official plans and "shall be related to existing and planned streets, topographic conditions, existing natural features, public convenience and safety, and proposed uses of the land to be served by such streets." Street right-of-way width and building setback lines are to be determined by the official map and subdivision ordinance.

Street rights-of-way as prescribed in the subdivision ordinance are as follows:

## 5. Transportation

---

- Arterial streets: 100 feet
- Collector streets: 80 feet
- Minor (local) streets: 70 feet
- Service drives (frontage road): 50 feet

The standard for minor streets (i.e. residential) seem somewhat excessive compared to many street standards in use today. Minimum street pavement width is not specified in the ordinance, but 37 feet is the common standard for local streets. This allows two full parking lanes and two wide travel lanes; a practice that tends to encourage higher travel speeds. However, many communities are returning to more narrow streets in order to calm neighborhood traffic. The City may wish to consider more flexible guidelines for width of local streets. For example, a 55-foot right-of-way is adequate for a 28-foot street, allowing a shared 14-foot through-lane and two 7-foot parking lanes. Examples and guidelines for street width alternatives are discussed in the Institute of Transportation Engineers' Report *Traditional Neighborhood Development Street Design Guidelines: Recommended Practice* (1999).

Service ways (i.e. alleys) are required in commercial and industrial districts, unless other provisions are made for service access. On the other hand, alleys are prohibited in residential area “unless necessary because of topography or other exceptional circumstances.” This standard should be reconsidered. Alleys can play an important role in a street network, especially as an alternative to multiple driveways in areas where lot widths are narrow.

A standard for street naming is identified in the code, which is beneficial for clarifying directions and increasing the ease of finding addresses. Streets are defined by length (short or long) and character (straight, curving or cul-de-sac) and assigned names accordingly. The terms “street” and “avenue” are reserved for long, straight streets; “drive” or “road” for long curving streets, and terms such as “crescent,” “lane” or “terrace” for shorter streets.

### Sidewalks

The subdivision ordinance does not appear to require sidewalks; the general practice is to require sidewalks on collector and arterial streets.

Requiring sidewalks is an important component to providing a pedestrian system. However, it’s also important that sidewalks don’t simply end at the respective subdivision. Too often the pedestrian facilities do not offer a continuous system.

### Other Street Requirements

The Subdivision Ordinance requires provision of an eight-foot tree-planting easement along each lot that abuts a residential street with a width of less than 70 feet. This allows planting of street trees outside the right-of-way. It is common practice within the City to place these trees in a planting strip within the right-of-way, between curb and sidewalk. This is a commendable feature of the City’s street standards, since it creates a more pleasant pedestrian environment on the sidewalk, and reduces the perceived width of the street.

### City Ordinances

Other City ordinances may also impact various aspects of the transportation system. Examples may include ordinances for snow removable on sidewalks or removing vegetation that impedes sidewalk use. Parking restrictions may positively or negatively impact transportation systems. For example, on-street parking may actually serve to calm traffic and create an additional buffer between pedestrians and moving traffic. On-street parking can also impede traffic flow or create safety problems near intersections.

## Summary of Findings and Conclusions

Listed below are several of the major points to be derived from the preceding sections.

**Land Use:** Land use densities have decreased significantly over the last 30 years. Residences, employers, retail and services have spread farther apart and have become more segregated. More lane-miles have been built to serve these areas and average trip lengths have increased significantly. With the increase in roadway lane miles, more resources are required for maintenance and reconstruction. Spread out land uses have also made walking, biking, and transit use increasingly difficult. The segregation and lack of connectivity between land uses have made these transportation modes unusable in many places.

**Development:** Much of the development over the last 30 years has been designed to accommodate only automobiles. The City's zoning code encourages such development.

**Mode Choice:** Green Bay, even compared with similar cities, is an auto-oriented community. Drive alone commuters accounted for 82 percent of commuting in 1990. Efforts have been made to improve transit service with the construction of the new Transit Center and new route configuration. The completion of the Fox River Trail and implementation of the planned bike lanes recommended in the Brown County Bike and Pedestrian Plan will improve bike travel over the next few years. While transit, bike and pedestrian improvements have been made or have been planned, generally these modes lack a systematic approach. Furthermore, land uses will be a critical element to the viability of these transportation modes.

**Neighborhood Transportation:** Currently, the City requires subdivisions to build 37 foot wide roads. This width, is not only excessive for a neighborhood street, but encourages speeding. Many of these same streets do not have sidewalks, which force pedestrians into the street. Without a good pedestrian system, the transit system becomes more difficult to access. Green Bay's older neighborhoods have grid pattern streets with narrower streets, street trees, sidewalks, and on-street parking, which calm traffic and enhance neighborhood livability. The grid pattern street network also disperses neighborhood traffic and provides more direct access for cars, pedestrians, and bicyclists.

**Arterial Roadways:** Green Bay arterial roadways tend to be wide two or four lane streets. Many have center left turning lanes or no controls on mid-block left turning movements. Several arterials are lined with multiple driveways and driveways located too close to intersections. Traffic flow, safety, and capacity of these corridors could be improved by implementing an access management program to address existing problems and preventing future problems. These arterials also tend to be barriers for pedestrians and bicyclists.

**Downtown Transportation:** Downtown streets are fairly wide and many streets carry very little traffic on average. The Madison Street/Jefferson Street one-way pair is not warranted based on traffic capacity needs and a recent crash study suggests that the road would be safer if converted to a two lane roadway. The mall and parking ramps disrupt the downtown grid-pattern street increasing the access difficulty for both vehicles and pedestrians. The blank exterior of the mall and the large parking structures dominate the streetscape at several locations. Surface parking lots are plentiful, which suggests opportunities for downtown development.

**Intermodal Resources:** The freight transportation options are plentiful given a regional airport with a multitude of daily flights, a

## 5. Transportation

---

Great Lakes port, a well developed rail network, and a highway network with adequate capacity and freeway access. Mode connectivity should be an on-going priority.

### Major Transportation Planning Issues

The following transportation questions relate to the transportation issues that the City should consider addressing through the comprehensive planning process. This is not an all-inclusive list, although the questions do focus on the major issues for all modes of transportation. Many of these questions will not have easy answers since the answers are likely to require significant financial resources, changes in behavior, or the acceptance of certain consequences. Furthermore, there are several possible answers to these questions, which will require a consensus within the community. It is a goal of the planning process that community's values are reflected in the decisions to address these issues.

#### Primary Transportation Issues

- **Priorities:** What are the community's transportation priorities and how many resources can or should be allocated to address them?

The comprehensive plan will need to identify the community's transportation priorities and determine what resources can and should be dedicated to those priorities.

- **Transportation Alternatives:** Should the City implement policies that promote alternatives to driving alone? If so, to what extent?

Even by similar sized Midwestern city standards, Green Bay is an automobile-dominant community. The community needs to

determine what it wants the future transportation system to look like, what options should be made available, and what tradeoffs people are willing to make to achieve this vision. For example, if automobile alternatives are going to be viable, a package of strategies will be needed to address land use decisions, infrastructure investments, and changes to public policy.

- **Mode Connections:** What can or should be done to improve interconnectivity between transportation modes?

Whatever transportation vision the City decides, it should consider how the transportation modes interrelate in order to maximize benefits of past and future transportation investments. Improving connections relate both to freight transportation modes and passenger transportation modes.

- **Land Use:** What will or should the future land use patterns (e.g. densities) be with respect to the existing and future transportation system?

Decreases in land use densities with new development expanding farther from the urban core and increases in land use segregation has led to more and longer trips (i.e. more vehicle miles traveled) and increased per capita funding for new roads and road maintenance.

- **Development Transportation Orientation:** What, if any, changes should the City make to remove existing regulations and guidelines that promote auto-oriented development? What, if anything, should the City do to promote transit use, biking, and walking, through development regulations and guidelines?

The existing zoning code stipulates high minimum parking requirements and on-site parking requirements, which encourage auto-oriented development designs. Existing

Zoning does not require pedestrian, bike or transit access. City street width and intersection curb radii guidelines are high, which tends to encourage higher traffic speeds and increase intersection pedestrian crossing distances, diminishing the pedestrian, bicycling, and transit environment.

## Roadways

- **Tradeoffs:** What sacrifices or tradeoffs, if any, is the community willing to make in terms of land development or neighborhood quality to improve auto movement?

Whenever street improvements are made, the City is making a value decision related to the value of traffic flow or vehicular comfort versus the value of tax revenues that may have been used elsewhere. Similarly, when a street is widened to accommodate existing or projected traffic, the City may be sacrificing slower traffic speeds, incentives to walk or bike, lower traffic volumes, or neighborhood livability for increased traffic flow.

Large traffic increases are not necessarily inevitable in communities with relatively slow population and employment growth. The City may choose to accept a certain amount of congestion in order to avoid the negative impacts associated with road improvements that increase traffic flow. Likewise, the City may wish to sacrifice large lot developments and large surface parking areas for shorter travel distances and to encourage alternatives to driving. All transportation-related decisions require tradeoffs or sacrifices. The Comprehensive Plan will need to address and prioritize transportation decisions with respect to these tradeoffs.

- **Changes in Attitudes:** To what extent is the community willing to change travel behaviors, accept land use changes,

and/or tolerate increases in congestion to reduce the need and cost of more and/or wider roads?

Spread out and separated land uses require more lane miles of roadway. Likewise, road capacity improvements that improve travel speeds may increase vehicular traffic (i.e. induced trips). Changes in land use and transportation decisions can effect transit, bike, and pedestrian activity, as well as vehicle trip lengths. Tolerating some congestion may actually decrease the transportation systems overall vehicle miles traveled, encourage alternative transportation modes, and decrease overall transportation costs.

- **Access Management:** To protect transportation investments, what levels of access management should be implemented and on what portion of the transportation system (e.g. all access, near intersections, by type of land use)?

Several of the principal arterial corridors could be improved by developing and implementing access management strategies. Access Management strategies help to improve traffic flow, maximize capacity of the existing system, and improve vehicular and pedestrian safety.

## Pedestrians

- **Sidewalk Requirements:** Should sidewalks be required for all new development and retrofitted where applicable? How should sidewalk construction and reconstruction be funded?

The current zoning code does not require sidewalks. Sidewalks, like roadways, need to be viewed as a network, which offers pedestrian access throughout the City.

## 5. Transportation

---

- **Policies:** Do current policies encourage pedestrian travel, and should these policies be changed and/or new policies developed?

Several issues determine how walkable a community is, the most obvious of which is providing sidewalks. Other issues include sidewalk condition, land use density and mix, intersection crossings, and aesthetic qualities. The City may want to consider these or other issues to improve the City's pedestrian environment.

### Public Transit

- **Transit Needs:** Is the existing public transit system effectively serving the transportation needs of the community?

METRO has made a major investment with the recent construction of the new Transit Center. A new route system was developed and implemented in conjunction with Transit Center operations. The effectiveness of these changes will be determined over the next couple of years.

- **Policies:** What improvements or policies, if any, should be considered to encourage more transit use?

In 1999, ridership on METRO averaged about 4,100 trips per weekday. Only about 1.5 percent of Green Bay commuters reported using transit in 1990. The City may want to consider additional improvements to the transit system and/or changes in the fare structure to increase transit usage. However, given current land uses, population densities, and employment locations, transit service improvements will likely have minimal impacts. The City should consider how current policies and land use and development decisions effect transit viability. In particular, there may be opportunities for Transit

Oriented Development (TOD) near the METRO Transit Center.

### Bicycles

- **Connectivity:** Does the bicycle network provide proper connectivity within the community and between neighboring communities?

The bicycle network needs to be viewed as a system providing bike access throughout the area, particularly to major destinations such as colleges, employment sites, public services, and retail and commercial centers. The Fox River Trail will offer an excellent opportunity to serve both recreational and transportation uses. An on-street network is critical if bicycling is to be more than just a recreational activity. The comprehensive plan should address how the existing and planned system will be integrated to maximize biking for both recreation and transportation purposes.

- **Infrastructure:** What bicycle infrastructure is necessary to encourage increased bicycle travel?

The City of Green Bay has a number of roadways with pavement widths that could accommodate bike lanes, and provide an inexpensive opportunity to enhance the bicycling environment. The Brown County Bicycle and Pedestrian plan provides a good outline from which to build a City bicycle network.

### Parking

- **Management:** How should parking in the Central Business District (CBD) and in other commercial areas be managed to maximize infrastructure benefits and minimize costs?

Parking management strategies can greatly impact commuter travel behaviors and maximize accessibility opportunities for visitors and shoppers.

- **Minimum Requirements:** Do parking requirements in the zoning code need to be changed to implement community objectives?

The City may want to reconsider existing zoning code minimum parking requirements to reflect community values.

- **On-street Parking:** Can additional and more convenient customer and visitor parking be provided by increasing on-street parking in downtown and other commercial areas?

Many streets in Downtown Green Bay are wide with relatively low traffic counts. Some of these streets may provide an opportunity to increase short-term parking supplies by adding angle parking. Adding angle parking can increase both real and perceived parking, calm traffic, and provide a traditional main street feel to the downtown.

### Rail

- **Passenger Rail:** What should the City do, if anything, in response to the Midwest Rail Initiative?
- The Midwest Rail Initiative's planning efforts to increase passenger rail in the Midwest include possible rail service to Green Bay, which, if implemented, would include five roundtrips daily between Milwaukee and Green Bay. The City may wish to support these efforts.
- **Freight Rail Impacts:** What should the City do, if anything, to minimize rail-vehicle conflicts?

More data is needed to determine if rail activity has increased substantially in the area, and if noise and safety issues are a concern.

### Airport

- **Regional Airport:** What are the benefits and costs associated with airport improvements and its increasing regional significance?

The growth in passengers and airfreight nationally suggests that regional airports are likely to see increased activity. Airport planning activities will need to be coordinated with the City's Comprehensive Plan.

### Waterways

- **Waterfront Uses:** Should the waterfront continue to be used for industries that are not water dependent?

Historically, industrial areas developed along rivers for transportation purposes or other water needs. Many of the subsequent businesses located in these industrial areas, which did not necessarily rely on the river for any aspect of their business. Riverfront property has become very desirable for non-industrial uses. The City should consider if the benefits of moving non-port related businesses to more appropriate locations would outweigh the costs.

- **Waterfront Activity:** What are the opportunities to increase water-related commercial, industrial and recreational activities along the waterfront, and how can a safe balance be maintained between uses?

Shipping still plays an important economic role in Green Bay. The City will need to balance shipping's economic role and

## 5. Transportation

---

the potential for alternative and perhaps, more fiscally beneficial uses along the waterfront.

### **Conclusion**

The aforementioned transportation planning issues should be addressed through the City's comprehensive planning process. Addressing these issues will require the community to set priorities and make tradeoffs. However, the end result should provide the City with a framework for making cost-effective decisions that are achievable and reflect the community's values over the next 20 years.