



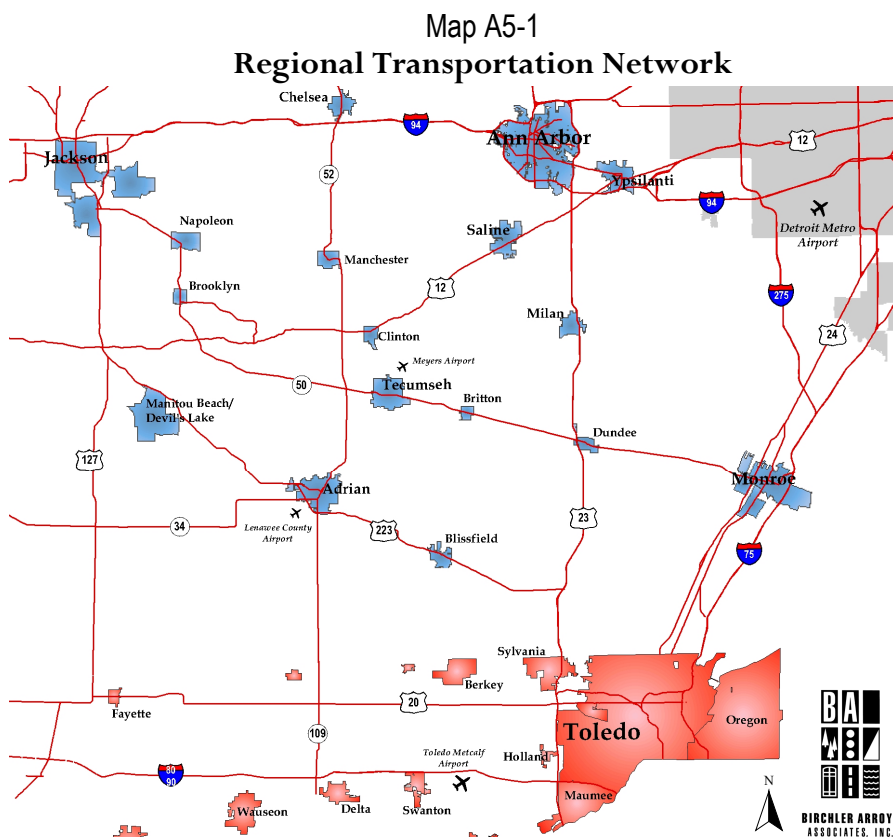
## A5. EXISTING TRANSPORTATION CONDITIONS INVENTORY

**T**

he function of the road system and its ability to move traffic in an efficient and convenient manner can affect the viability of land uses and the overall quality of life in a community. A properly designed and maintained road network is necessary to provide access to development; yet the pattern of land uses and number and type of access points onto roads impact the function of the road system.

### REGIONAL LOCATION

The City of Adrian is located near the center of Lenawee County. US Highway 223 runs southeast/northwest through the City, connecting it with Toledo via US 23 to the southeast and Jackson via US 127 to the northwest. State Route 52 provides access to Tecumseh, Clinton, Manchester, Chelsea, and I-94 to the north. M-52 also connects with US 12, which provides access to Ann Arbor, Ypsilanti, and US 23 northbound. This regional transportation network is illustrated below.



## FUNCTIONAL CLASSIFICATION

Traffic is concentrated on certain roadways due to the roads' physical condition, level of use, and direction of travel, as well as the overall land-use pattern. About twenty percent of the roads carry approximately eighty percent of vehicle miles traveled<sup>1</sup>. In order to set funding priorities for the roads that carry the highest volumes, transportation planners established a street classification system.

Although there is some variation in classification, roadways are typically divided into those that carry through traffic and those that carry local traffic (Figure A5-1). It is desirable to physically separate these two road types as much as possible to eliminate conflicting traffic movements, traffic congestion, delays, and crashes.

In order to function successfully, the overall traffic circulation system must be carefully integrated. In the City of Adrian, the four basic types of roads are arterials, minor arterials, collectors, and local streets. The role of each road classification in providing access and mobility is illustrated in Figure A5-2. Generally, as access increases, mobility decreases – and vice versa. The Existing Functional Classification System Map A5-2 indicates how the roads in the City of Adrian are classified by the function they serve as part of the overall road network.

### Major Arterials

Major arterials are the “highest order” of surface streets, and they typically carry high volumes of traffic. Major arterials provide travel routes from one city to another, and can traverse one or more states. They are most often used for longer trips, as higher speeds are allowed. When an arterial passes through a more populated area, however, the number of intersections increases and speeds decrease. Arterial roads have a dual function: to provide routes for through traffic while providing access to abutting properties and minor intersecting streets. This can lead to congestion and traffic crashes because of turning vehicles conflicting with through traffic.

### Minor Arterials

Minor arterials can have similar characteristics as major arterials, however, these roads typically carry less traffic and the length of trip is generally shorter than on major arterials.

Figure A5-1  
Functional Classification  
of Streets

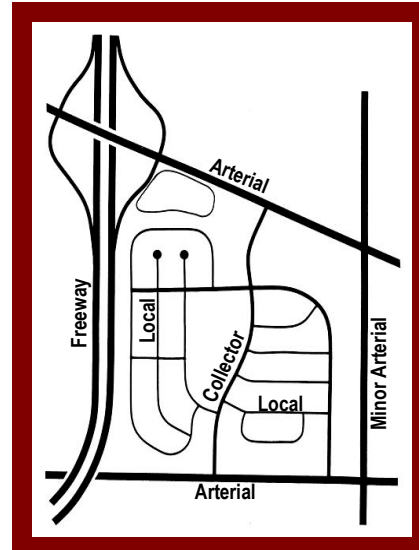
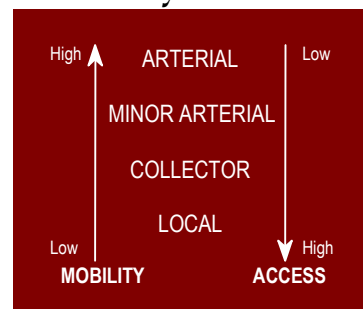


Figure A5-2  
Mobility Vs. Access



<sup>1</sup> Coghlan, Gerald. “Opportunities for Low Volume Roads”, Transportation in the New Millenium, Transportation Research Board, 1999.

### **Collector Streets**

The intent of a collector street is to collect vehicles from the local streets or rural areas and distribute them to either local destinations or to an arterial. The collector street system serves both land access and through traffic

### **Local Streets**

Providing access to adjacent land is the sole function of local streets. These streets make up a large percentage of total street mileage in urban areas, but they almost always carry a small portion of vehicle miles traveled. The aim of local streets is to provide access to collector streets and through routes, but in such a manner that through traffic is not encouraged to use the local streets as a shortcut route.

## **TRAFFIC VOLUMES**

There are a variety of factors that determine the volume of traffic that travels along a given roadway. The location and length of the roadway, the roadway condition and surface (paved vs. unpaved), and the quantity and type of adjacent land uses are all factors that contribute to the overall traffic on a roadway.

The Traffic Volumes Maps A5-3 and A5-4 display the traffic volumes along the City's streets. As the maps indicate, the highest volumes are located along Main (M-52), Beecher (M-34), Winter, Division, and US 223.

## **EXISTING ROAD NETWORK**

The Existing Road Conditions Map A5-5 identifies the number of lanes on the roadways, traffic signal and three-way / four-way stop locations, and locations on the road system that may have a safety concern. The areas on the roadway system that have the greatest safety concerns are the following:

- ❖ Offset intersections
- ❖ Skewed intersections (angles less than ninety degrees or other unusual configurations)

Offset and skewed intersections increase the probability of conflicting traffic movements that can occur, thereby increasing the probability of a crash.

## **TRAFFIC CRASHES**

This section includes a general examination of traffic crash causes, factors that influence traffic safety, and traffic crash data and trends within the City.

### **Traffic Crash Causes**

Roadway design and surface conditions, driver behavior, and weather conditions may all be contributing factors to the cause of a crash. The most frequent cause of traffic crashes is attributed to improper driving. Excessive speed, failure to yield the right-of-way, and following too closely are the principal types of improper driving behavior that lead to crashes. Alcohol and other drugs were reported to be a factor in over one-half of the fatal traffic crashes in the United States.

The impact of weather on traffic crashes may seem significant because a high number of traffic crashes can occur during a short period of time; however, over one-half of total traffic crashes take place when pavement is dry.

The general characteristics of traffic crashes vary significantly in urban and rural areas. Approximately one-quarter of all rural crashes take place at intersections versus about one-half for urban areas. Although more crashes take place in urban areas, crashes in rural areas are more severe; the severity is primarily due to higher rural speeds.

The impact of congestion becomes apparent when examining the relationship between increased traffic volumes and crash frequency. Studies have shown that crash rates increase with increasing volume to a certain point, and then the crash rate drops as congestion and volumes increase. The peak traffic volume in one study was found to be 650 vehicles per hour on California highways; another study of two-lane rural roads showed similar results with a peak traffic volume at about 8,000 vehicles per day.

### **Factors That Influence Traffic Safety**

Roadway design and safety features also impact crash rates. Several roadway design and safety features are discussed below.

#### **Lane Width**

A narrow lane width generally has a greater impact on safety as vehicle speeds increase. One study showed that widening 240 miles of highway from nine-foot wide lanes to eleven-foot wide lanes reduced crashes by twenty-one percent on low-volume roads and forty-seven percent on high volume roads.

#### **Highway Shoulders**

Studies have shown that crash rates decrease with increasing shoulder width. This is primarily due to the fact that motorists traveling on roads with wide shoulders have a stable area to use if they cross the outer pavement edge.

#### **Horizontal Curves**

Curves in roadway pavement increase the possibility of traffic crashes. The most frequent crash type is skidding.

#### **Vertical Alignment**

A change in pavement elevation can also have an impact on crash rates. Long, steep grades and steep grade/horizontal curve combinations can greatly increase the frequency of crashes.

#### **Intersections**

The design, location, number of approaches, traffic controls and vehicular volume of an intersection influence the number and type of crashes that will occur at a given intersection. For example, an intersection with three approaches is generally safer than one with four approaches because of the reduced number of conflicting movements. The sight distance for the motorists approaching the intersection is also a critical variable.

### Speed

The speed at which vehicles travel must reflect an appropriate response to existing road and traffic conditions in order to minimize the frequency and severity of crashes. Consequently, high speeds are often safer than slow speeds on roads designed for high speed travel, provided road and weather conditions are good. However, high speeds can both increase the severity of crashes and decrease the frequency of crashes.

### Other Factors

Other factors that influence speed and safety include night lighting, railroad crossings, pedestrian crossing, interchanges, and median designs. A comprehensive discussion of all these factors is beyond the scope of this report. However, the general discussion above has been included to provide the reader with some background on the cause of traffic crashes and factors influencing safety before examining crash data within the City.

### **Traffic Crash Data and Trends**

Table A5-1 on the following page lists all intersections in the City of Adrian at which 12 or more crashes occurred within the three-year time period of January 2001 through December 2003 (for an average of four or more crashes per year). These intersections are illustrated on Map A5-6. As both the table and map illustrate, the intersections with the highest number of crashes are primarily located along the City's most heavily traveled roads, including Main Street (M-52), US 223, and Beecher Street (M-34).

The intersection crash frequencies listed in Table A5-1 vary primarily with the amount of traffic passing through those intersections. To better assess the actual hazard levels, crash rates – in terms of crashes per million entering vehicles (MEV) – were determined for the 28 intersections having both an average of four or more crashes annually over three years and a means of estimating daily traffic volumes. Relative to a large sample of comparable intersections throughout southeast Michigan, it was found that 15 Adrian intersections have above-average crash rates. According to procedures outlined in the *SEMCOG Traffic Safety Manual* (developed for statewide use), five of the 15 intersections have crash rates sufficiently over the sample average to confidently declare them “high-crash” locations. As such, further engineering evaluation of these intersections is warranted to determine the prevailing accident characteristics and appropriate crash countermeasures.

Table A5-1  
**Intersections with Four or More Average Annual Crashes**  
**City of Adrian, 2001-2003**

Intersection	Crash Frequency (Crashes Per Year)	Crash Rate (Crashes Per MEV <sup>1</sup> )	Rank by Crash Rate
M-52 at M-34	35.3 <sup>*^</sup>	2.92 <sup>*^</sup>	1
M-52 at US 223	25.3 <sup>*^</sup>	2.19 <sup>*^</sup>	3
US 223 at Sand Ck. / Wolf Ck.	15.0 <sup>*</sup>	1.34 <sup>*</sup>	9
US 223 at Division	14.0 <sup>*</sup>	1.64 <sup>*^</sup>	5
M-52 at Siena Heights	12.7 <sup>*</sup>	1.28 <sup>*</sup>	11
Beecher at Division	11.7 <sup>*</sup>	1.50 <sup>*</sup>	8
M-52 at Metcalf	11.3 <sup>*</sup>	1.31 <sup>*</sup>	10
Siena Heights at Bent Oak	10.0 <sup>*</sup>	2.29 <sup>*^</sup>	2
M-52 at Maple	9.3 <sup>*</sup>	0.96 <sup>*</sup>	15
US 223 at W. Maumee St.	9.3 <sup>*</sup>	1.15 <sup>*</sup>	12
M-52 at S. Winter	9.0 <sup>*</sup>	1.06 <sup>*</sup>	13
Main at Front	8.7 <sup>*</sup>	1.72 <sup>*^</sup>	4
Main at Church	8.0	N/A <sup>2</sup>	N/A <sup>2</sup>
Beecher at Winter	7.3	0.85	16
E. Maple at Locust	6.7 <sup>*</sup>	1.57 <sup>*</sup>	7
Main at Maumee	6.7 <sup>*</sup>	1.59 <sup>*</sup>	6
M-52 at Merrick	6.0	0.71	20
M-52 at Albert	5.3	0.71	20
Broad at E. Maumee	5.3	N/A <sup>2</sup>	N/A <sup>2</sup>
M-52 at Michigan Ave.	5.0	0.57	22
Beecher at Treat	4.7	0.99 <sup>*</sup>	14
M-34 at Madison	4.3	0.75	18
N. Winter at Washburn	4.3	N/A <sup>2</sup>	N/A <sup>2</sup>
S. Winter at Church	4.3	N/A <sup>2</sup>	N/A <sup>2</sup>
Beecher at Center	4.0	0.78	17
E. Maple at Broad	4.0	0.72	19
M-52 at Crystal Springs	4.0	0.55	23
M-52 at Butler	4.0	0.49	24

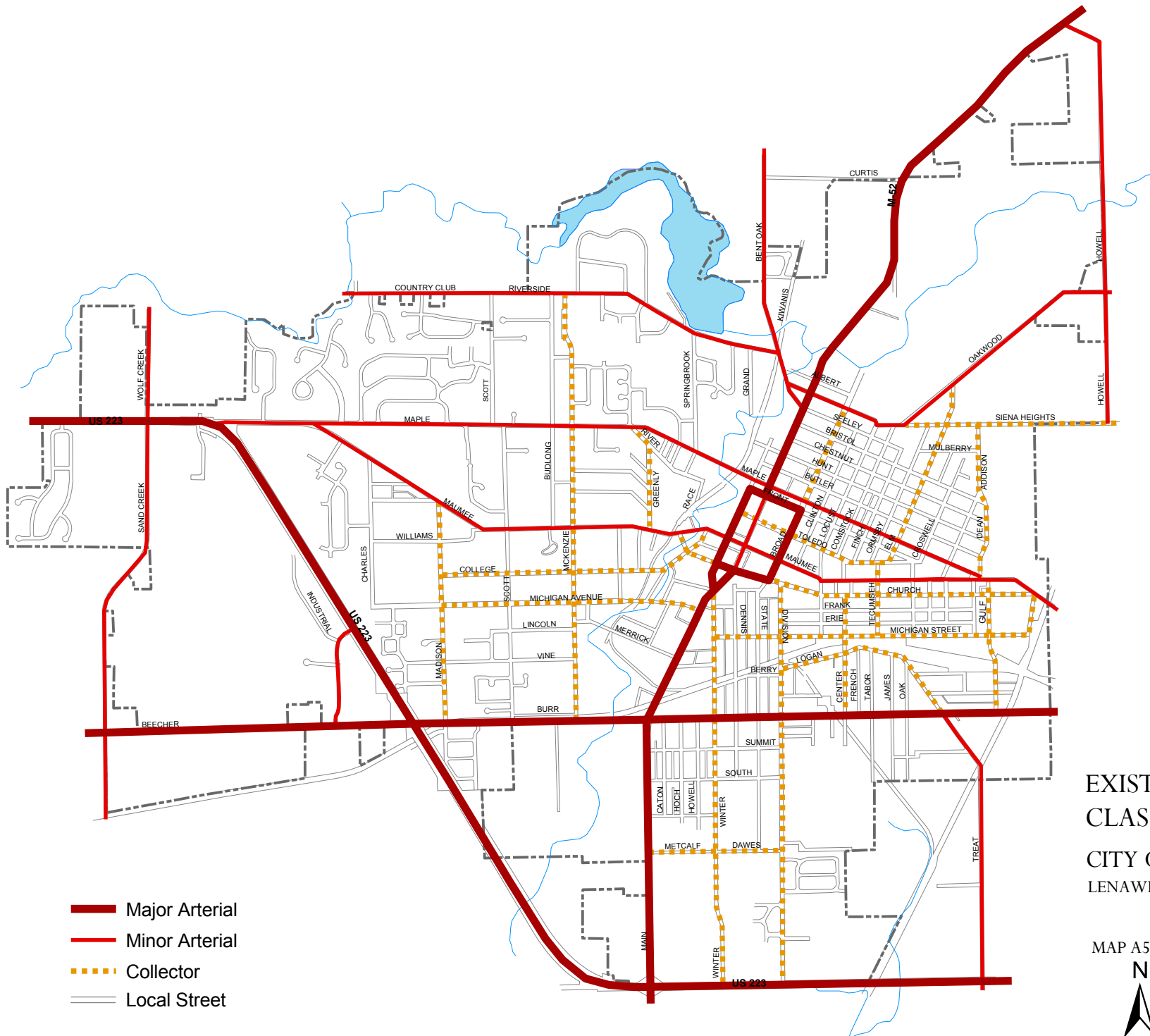
\* Over average crash frequency / rate (Average crash frequency and rate vary depending upon daily traffic volumes.)

\*^ Over critical crash frequency / rate (Critical crash frequency and rate vary depending upon daily traffic volumes.)

<sup>1</sup> Million entering vehicles (MEV)

<sup>2</sup> Crash rates are unavailable for those intersections without a means of estimating daily traffic volumes.

Sources: Region II Planning Commission, MDOT, City of Adrian

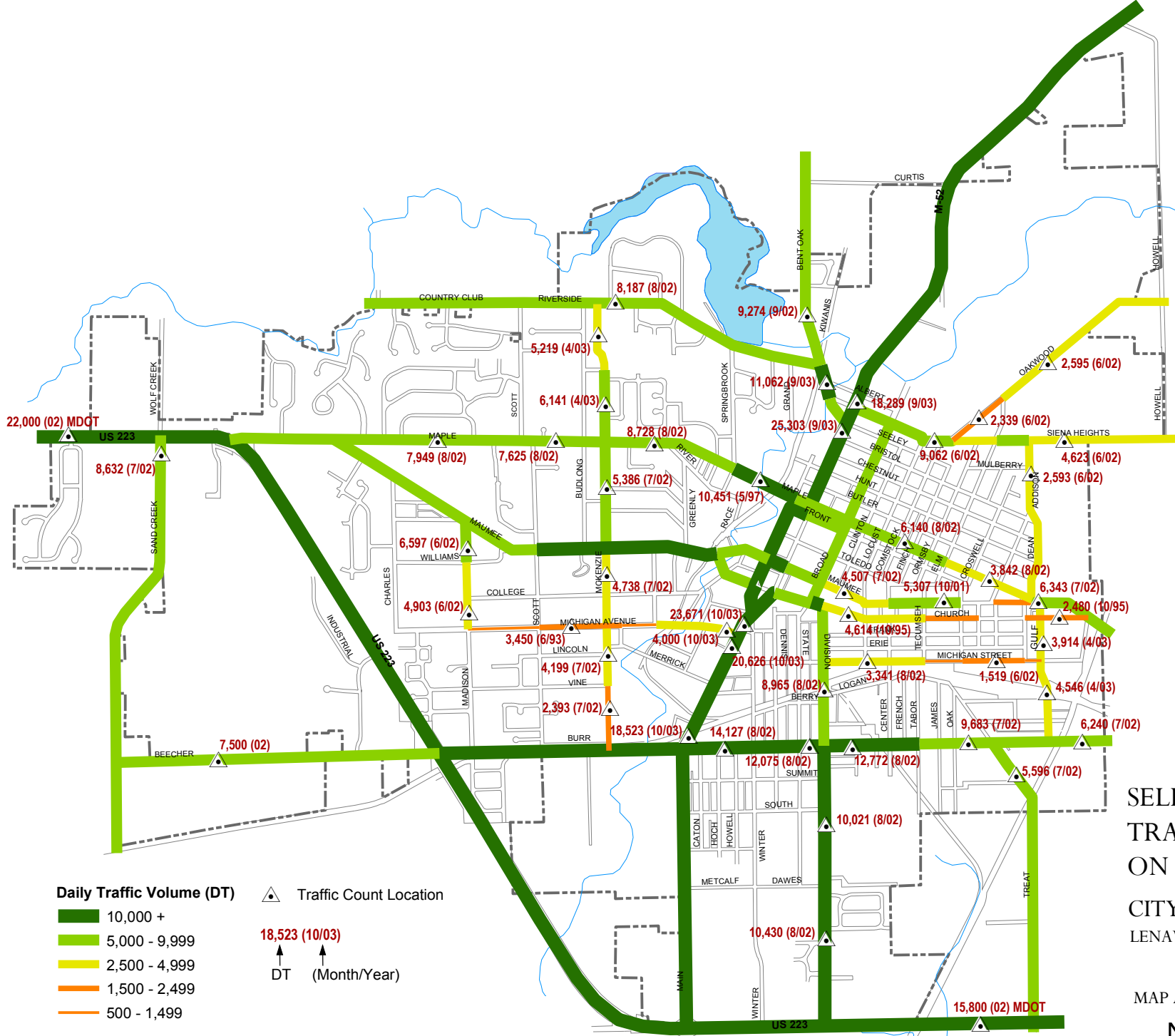


- Major Arterial
- Minor Arterial
- Collector
- Local Street

Base Map Source: Region II GIS

EXISTING FUNCTIONAL CLASSIFICATION SYSTEM  
 CITY OF ADRIAN  
 LENAWEE COUNTY, MICHIGAN





**Daily Traffic Volume (DT)**

- 10,000 +
- 5,000 - 9,999
- 2,500 - 4,999
- 1,500 - 2,499
- 500 - 1,499

▲ Traffic Count Location

DT (Month/Year)

18,523 (10/03)

**SELECTED  
TRAFFIC VOLUMES  
ON MAJOR STREETS**

**CITY OF ADRIAN**  
LENAWEE COUNTY, MICHIGAN

MAP A5-3



Base Map Source: Region II GIS  
 Traffic Volume Sources: City of Adrian Engineering Department;  
 Michigan Department of Transportation (MDOT)





ENGINEERING DEPARTMENT  
CITY HALL  
100 E. CHURCH STREET  
ADRIAN, MI 49221  
(517) 263-2161 EXT. 261

ANNUAL  
24-HOUR TRAFFIC  
TRAFFIC VOLUMES

OCTOBER 2002

NO.	ISSUE/REVISION	DATE
1	REV. FOR 2003 COUNTS	1/04

**KEY**

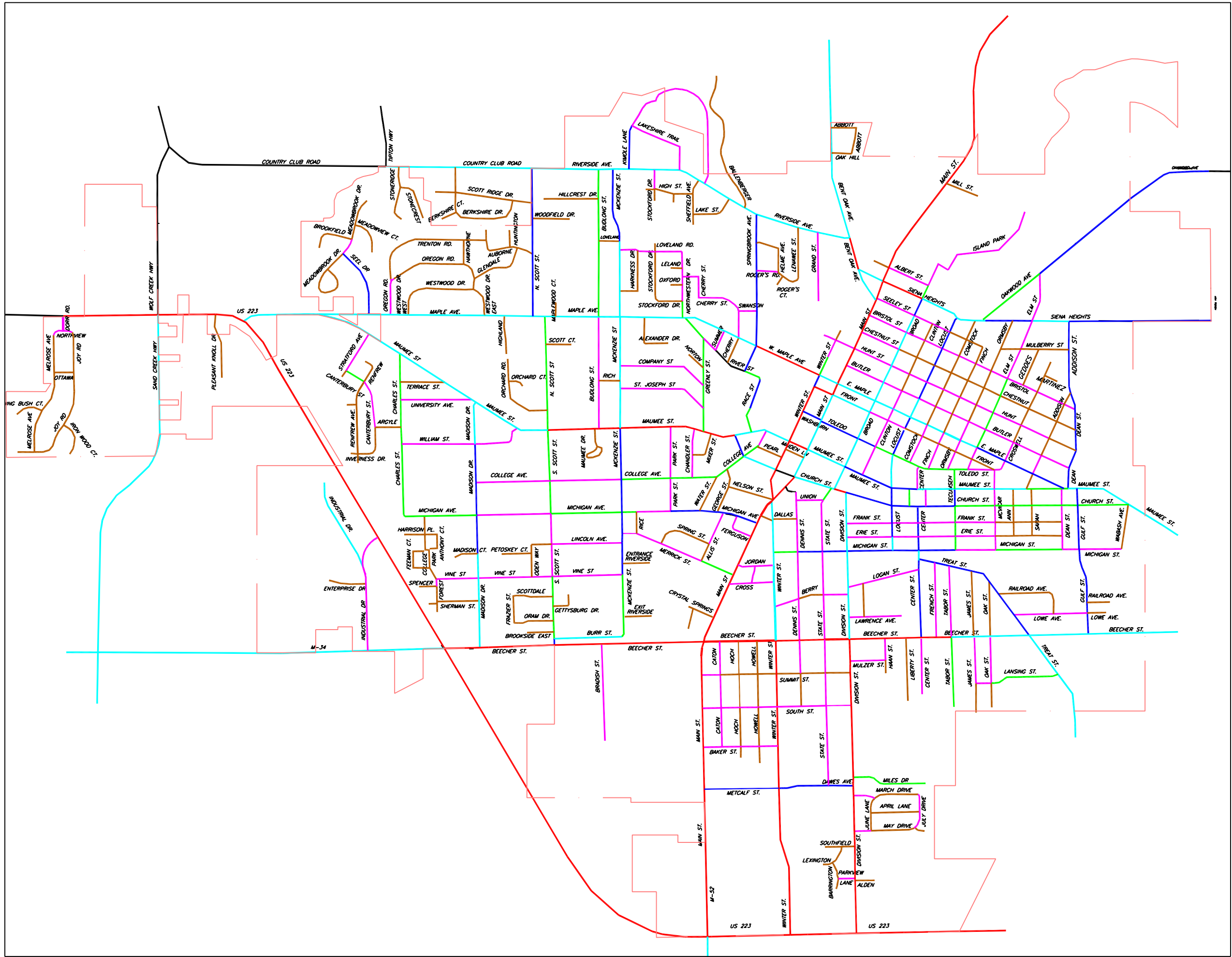
--- CITY LIMITS  
--- TRAFFIC VOLUMES

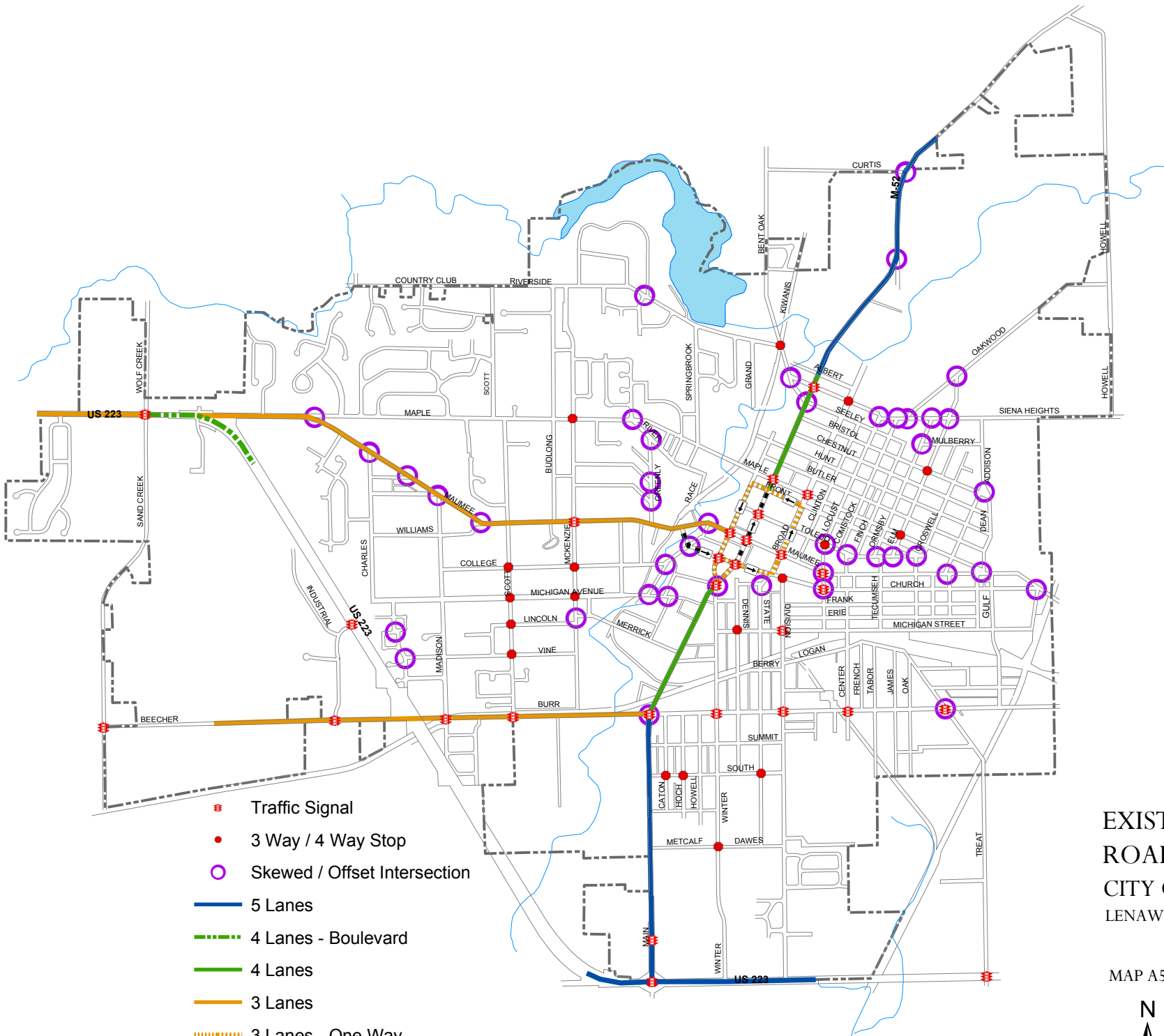
Red	10,000 & ABOVE
Cyan	5,000 - 9,999
Blue	2,500 - 4,999
Green	1,500 - 2,499
Magenta	500 - 1,499
Brown	0 - 499
Black	NO COUNT

**NOTICE.**  
WATER, STORM AND SANITARY SEWER LOCATIONS SHOWN ARE APPROXIMATE AND THE CITY OF ADRIAN ASSUMES NO LIABILITY FOR THE ACTUAL LOCATIONS. ACTUAL FIELD LOCATIONS SHOULD BE MADE PRIOR TO CONSTRUCTION BY CALLING MISS DIG 72 HOURS BEFORE DIGGING AT 1-800-482-7171

3 Working Days  
**BEFORE YOU DIG**  
CALL MISS DIG  
1-800-482-7171  
For Free Location of Public Utility Lines

DATE: November 19, 2002	SHEET NO:
SCALE: Not to Scale	1 of 1
DRAWN/CHECKED BY: KLB/KLB	





- ☒ Traffic Signal
- 3 Way / 4 Way Stop
- Skewed / Offset Intersection
- 5 Lanes
- - - 4 Lanes - Boulevard
- 4 Lanes
- 3 Lanes
- - - 3 Lanes - One Way
- - - 2 Lanes - One Way

Base Map Source: Region II GIS

EXISTING  
ROAD CONDITIONS  
CITY OF ADRIAN  
LENAWEE COUNTY, MICHIGAN

MAP A5-5



BIRCHLER ARROYO  
ASSOCIATES, INC.

