6. THOROUGHFARE PLAN

The function of a road system and its ability to move traffic in an efficient and convenient manner have a significant impact on the viability of land uses and overall quality of life in a community. The primary goal of the Thoroughfare Plan is to plan for a road network that will serve the residents and businesses anticipated in the Land Use Plan chapter. This includes the City of Adrian's road network of state, city, and private roadways.

EXISTING TRANSPORTATION CONDITIONS

Like the land use planning process, the process for planning a community's transportation system must begin with a study and analysis of existing conditions. This includes an analysis of recent traffic volumes and vehicle crash data. For more detailed information about existing road conditions, refer to Chapter A5 Existing Transportation Conditions Inventory.

Traffic Volumes

Traffic volumes along the City's streets are displayed on Map 6-1 Selected Traffic Volumes on Major Streets. As the map indicates, the highest volumes are located along Main Street (M-52), Beecher Street (M-34), Winter Street, Division Street, and US 223.

Traffic Crash Data and Trends

Crash data obtained from the Region II Planning Commission were used to develop the Average Annual Crashes Map 6-2. The map illustrates intersections at which 12 or more crashes occurred within a three-year time period from January 2001 through December 2003 (for an average of four or more crashes per year). The intersections with the highest number of crashes are predominantly 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 shown on Map 6-2 vary primarily with the amount of traffic passing through the 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

Table 6-1
Roadway Functional Classification, City of Adrian

Road
Major Arterials
Minor Arterials
Collectors
Local

Figure 6-1
Functional Classification of Streets

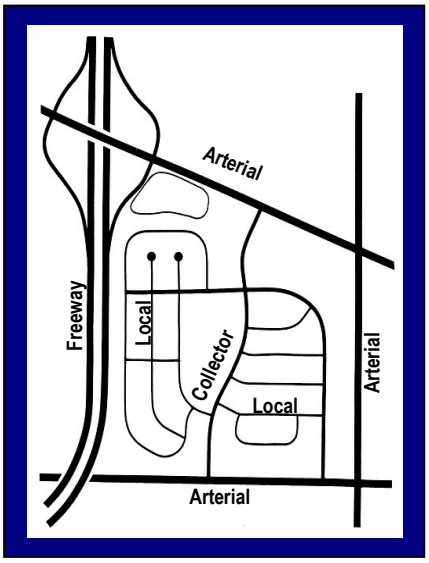
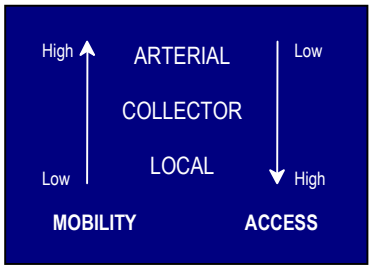


Figure 6-2
Mobility vs. Access



engineering evaluation of these intersections is warranted to determine the prevailing accident characteristics and appropriate crash countermeasures.

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 20 percent of the roads carry approximately 80 percent of vehicle miles traveled.[1] In order to set funding priorities for the roads that carry the highest volumes, transportation planners established a street classification system. Table 6-1 to the left illustrates the street classification system concept used in the City of Adrian. This functional classification system is the foundation upon which the road network is designed.

Although there is some variation in classification, roadways are typically divided into those that carry through traffic and those that carry local traffic, as illustrated in Figure 6-1. It is desirable to physically separate these two road types as much as possible to eliminate conflicting traffic movements, traffic congestion, delays, and crashes.

The role of each road classification in providing access and mobility is illustrated in Figure 6-2. Generally, as access increases, mobility decreases – and vice versa.

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 major arterials, minor arterials, collector streets, and local streets. The definitions for these roadways are provided below.

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, the number of intersections increases and speeds decrease. Arterial roads

[1] Coghlan, Gerald. "Opportunities for Low Volume Roads," Transportation in the New Millenium, Transportation Research Board, 1999.

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. Examples of Adrian roads currently functioning as major arterials include Main Street (M-52), US 223, and Beecher Street (M-34).

Minor Arterials

Minor arterials serve a similar function as major arterials; however, these roads typically carry less traffic over shorter distances than arterials. Examples of existing minor arterials within the City of Adrian include Maple Avenue, Maumee Street, Oakwood Avenue, and Treat Street.

Collector Streets

The collector streets primarily permit direct access to abutting properties and provide connections to higher order roadways including minor and major arterials. Through traffic movement from one part of the City to another is deliberately discouraged on these streets. The collector street, in most cases, is a public roadway serving moderate traffic movement from local streets to arterial streets. Although collectors permit access to abutting property, it is preferable that they do not serve an access function for residential lots. The collectors may accommodate pedestrians and public utility facilities within the right-of-way. Collectors feed the arterials, thus reducing the number of curb cuts onto arterials and ensuring fewer interruptions for arterial traffic. Some collectors are residential collectors and others are nonresidential collectors. The nonresidential collectors accommodate traffic generated by industrial and commercial developments. The residential collectors connect local streets serving residential areas to the arterial system. Examples of existing collector roads within the City include Elm Street, McKenzie Street, College Avenue, Church Street, and Broad Street.

Local Streets

Local streets serve the purpose of providing access to abutting land and consist of all facilities that do not belong to one of the higher systems. 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. They offer the lowest level of mobility and may carry no through traffic. Examples of this class of roadway are residential subdivision streets and cul-de-sacs.

PROPOSED ROADWAY FUNCTIONAL CLASSIFICATIONS AND CROSS SECTIONS

Planned Roadway Functional Classifications

The Thoroughfare Plan Map 6-3 indicates how the roadways in the City of Adrian are classified for future road function. Relative to the existing functional classification of the City's roadways, the following changes in designation are proposed: Locust Street is proposed to be upgraded from a local to a collector street; Greenly Street and College Avenue are proposed to be downgraded from collectors to local streets; Church Street between Winter Street and Main Street is proposed to be downgraded from a major arterial to a collector; Winter Street between Front Street and Main Street is proposed to be downgraded from a major arterial to a collector; and Front Street between Winter Street and Main Street is proposed to be downgraded from a major arterial to a

collector. In the case of roadways for which no change in designation is proposed, the existing classification is thought to be adequate to handle future circulation requirements.

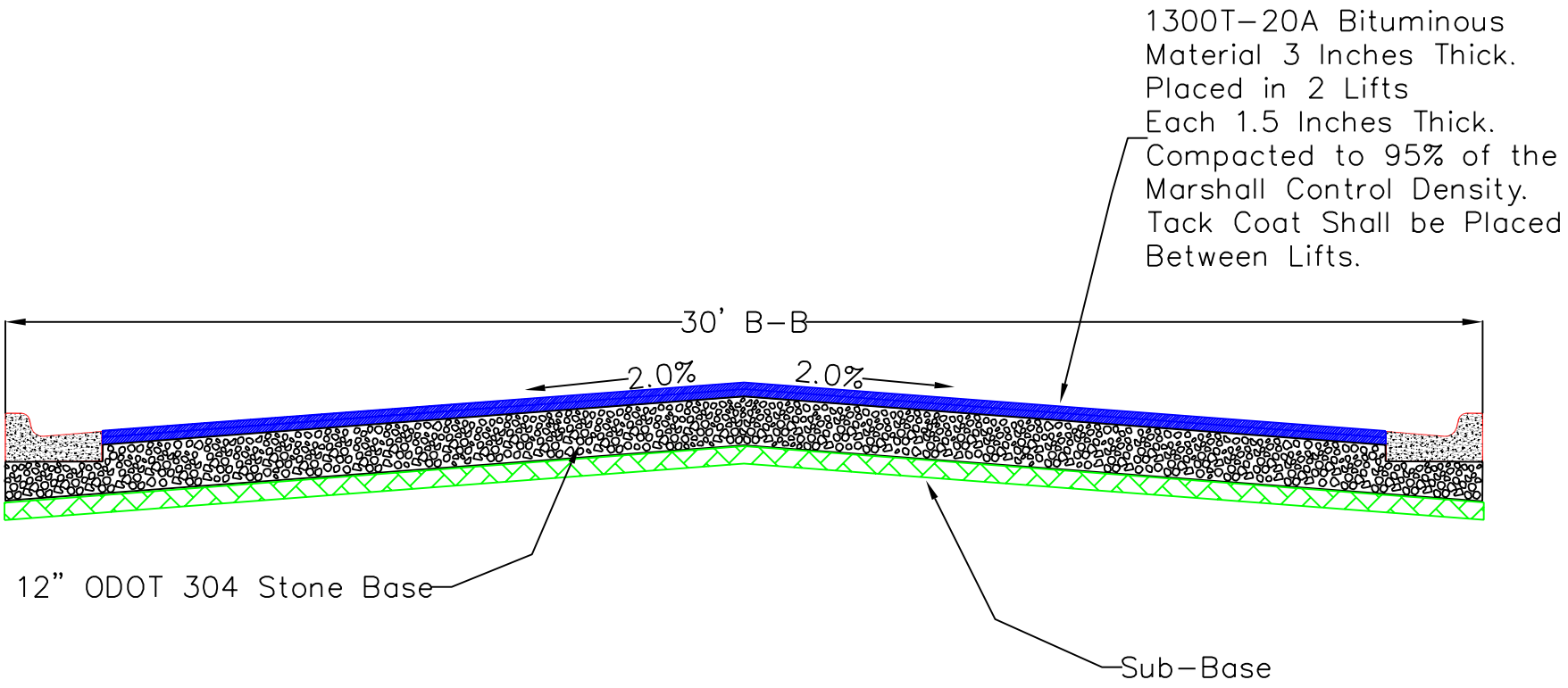
Currently, a number of streets in Downtown Adrian function as one-way streets, including: Main Street between Winter and Front Streets (northbound traffic only); Broad Street between Church and Front Streets (northbound traffic only); Winter Street between Front and Main Streets (southbound traffic only); Front Street between Broad and Winter Streets (westbound traffic only); Church Street between Maumee and Broad Streets (eastbound traffic only); and Maiden Lane (westbound traffic only). The *Adrian Downtown Blueprint 2003* recommends returning streets within the Downtown to two-way traffic. As an implementation measure, a study of traffic circulation in Downtown Adrian is currently underway, with consideration being given to restoring one-way streets to two-way traffic.

State highway M-52 currently functions as a two-way street to the north and south of Downtown Adrian. At Front Street, southbound traffic on M-52 is diverted west on Front Street and south on Winter Street, where it reconnects with Main Street (M-52). Northbound traffic on M-52 is routed east on Church Street, north on Broad Street, and west on Front Street back to Main Street. If one-way streets were converted to two-way streets, southbound traffic on M-52 could potentially be rerouted to follow the route currently taken by northbound traffic. Correspondingly, the functional classifications of segments of Winter, Church, and Front Streets would be downgraded, as shown on the Thoroughfare Plan Map.

Preferred Future Road Cross Sections

On the following pages, Figure 6-3 Local Road Cross Section and Figure 6-4 Major Road Cross Section illustrate the City of Adrian's standards for roadway pavement structures. Figure 6-5 depicts a shared residential driveway, providing access to between two and four dwelling units, in plan view. Figures 6-6 and 6-7 show local residential street alternatives in plan view: a low-volume local residential street, affording access to between five and 20 dwelling units and a maximum of 1,000 vehicles per day, and a local residential street serving more than 20 dwelling units and/or more than 1,000 vehicles per day. Figures 6-8 through 6-12 show urban collector alternatives in plan view. A minimum right-of-way width of 86 feet is anticipated for roads classified as urban collectors. The appropriate cross section should be determined through consultation with the City Engineer as part of the plan or plat review process. The road cross sections for Alternatives II and V may be appropriate to use on certain minor arterials planned for use with bike lanes. It should be noted that every road will not achieve the cross-section illustrated, while others may exceed the cross section width where additional turn lanes are necessary or additional capacity is required and fits within the planning context of the area.

Figure 6-3
Local Road Cross Section



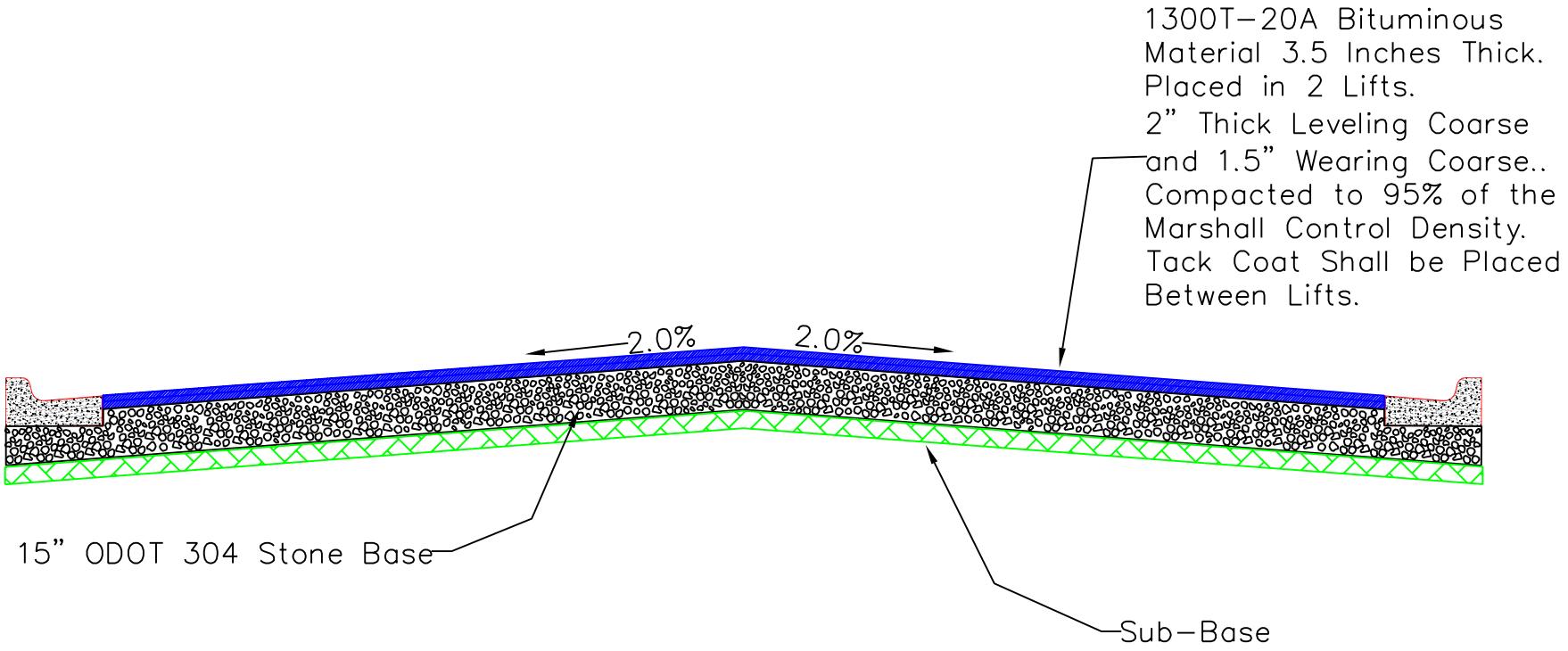
REVISIONS	REV #	BY	DATE
City of Adrian Standard Details			
Drawing # SD-RD-01			
DRAWN BY: TB/MC	CHECKED BY: KD/JH		
SCALE: NONE	DATE: 3/17/98		

SEAL OF THE CITY OF ADRIAN MICHIGAN

Note: Cross-section width may vary depending upon curb option (refer to Figure 6-7). For low-volume local residential streets, refer to Figure 6-6 for appropriate cross-section width.

Figure 6-4

Major Road Cross Section

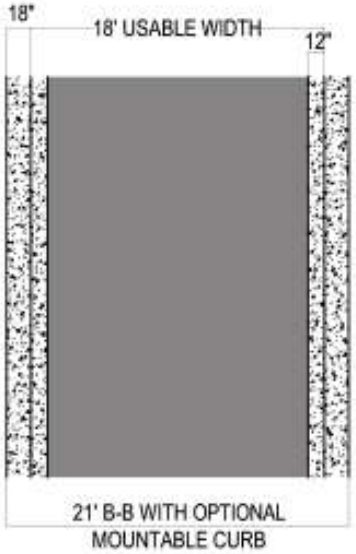


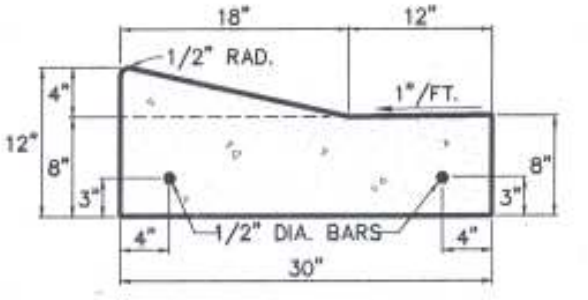
REVISIONS	REV #	BY	DATE
City of Adrian Standard Details			
Drawing # SD-RD-02			
DRAWN BY: TB/MC	CHECKED BY: KD/JH		
SCALE: NONE	DATE: 3/17/98		

SEAL OF THE CITY OF ADRIAN MICHIGAN

Note: For collector streets, refer to Figures 6-8 through 6-12 for appropriate cross-section width; for minor and major arterial streets, contact the Engineering Department for appropriate cross-section width.

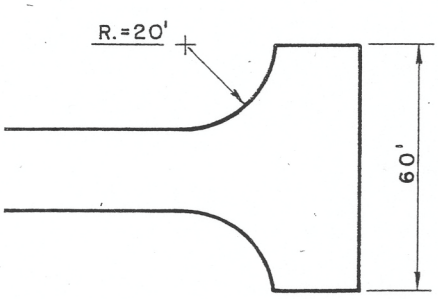
Figure 6-5
Shared Driveway
Maximum of Two to Four Dwelling Units



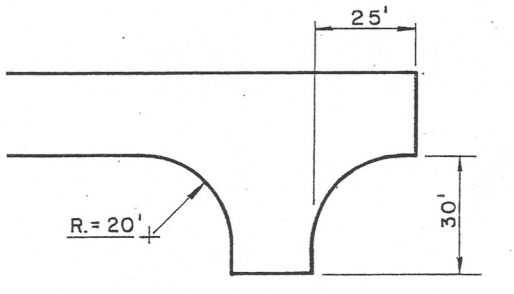


Optional Mountable Curb

Note: If dead-end and longer than 150', must use one of the following turnaround designs (private drive is permissible substitute for one or both stubs if easement is granted and 8" concrete is used):

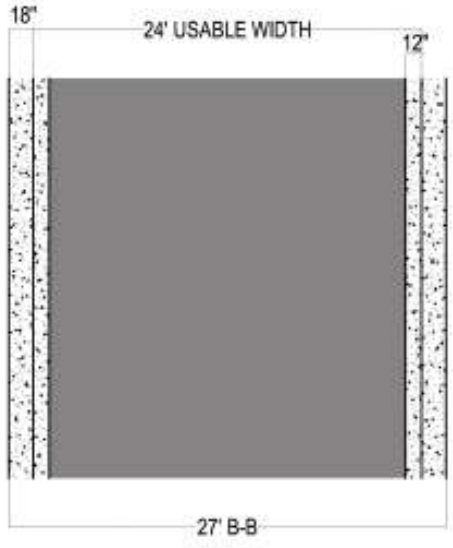


Standard Turning Area

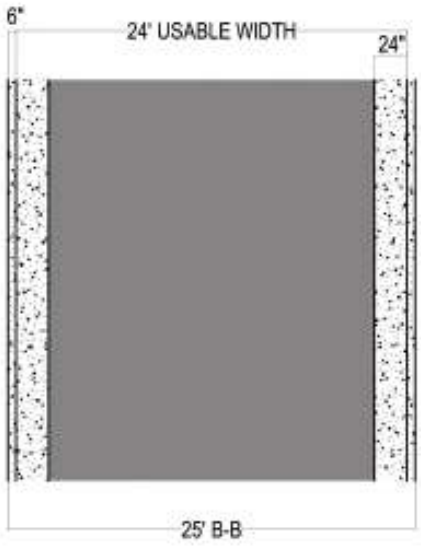


Minimum Turning Area

Figure 6-6
Low-Volume Local Residential Street
Maximum of Five to 20 Dwelling Units, Maximum of 1,000 Vehicles per Day



Mountable Curb Option

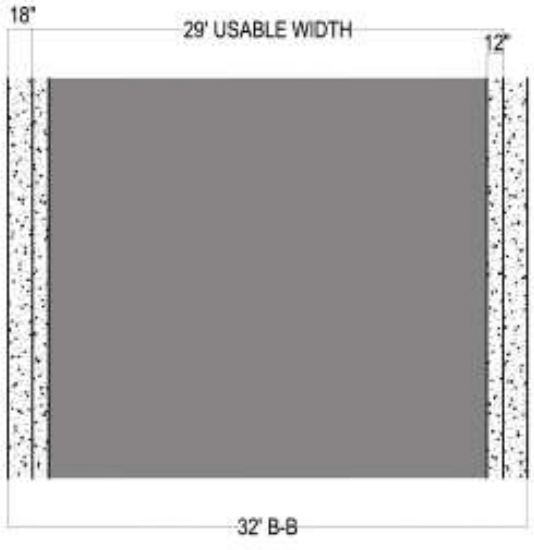


Vertical Curb Option

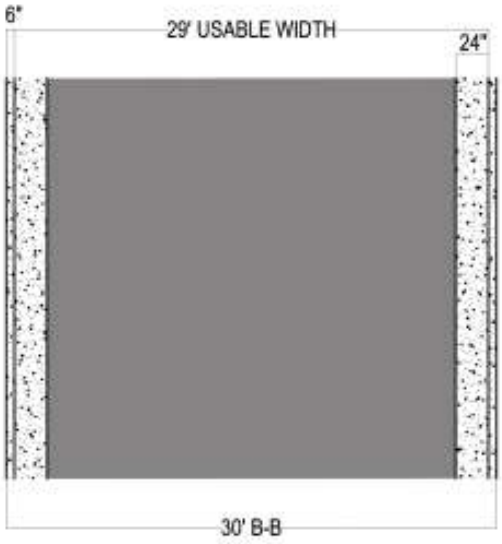
Note 1: If total future daily traffic can be expected to exceed 1,000 vehicles (due to through traffic in addition to traffic related to units abutting street), then use the cross section specified for Local Residential Street (> 20 d.u., > 1,000 vpd).

Note 2: If dead-end and longer than 150', must use a cul-de-sac turnaround with a main back-of-curb radius of at least 50'. If an island is used within the turnaround, it shall be circular and provide a circulating roadway width of at least 30'.

Figure 6-7
Local Residential Street
Greater than 20 Dwelling Units and/or Greater than 1,000 Vehicles per Day



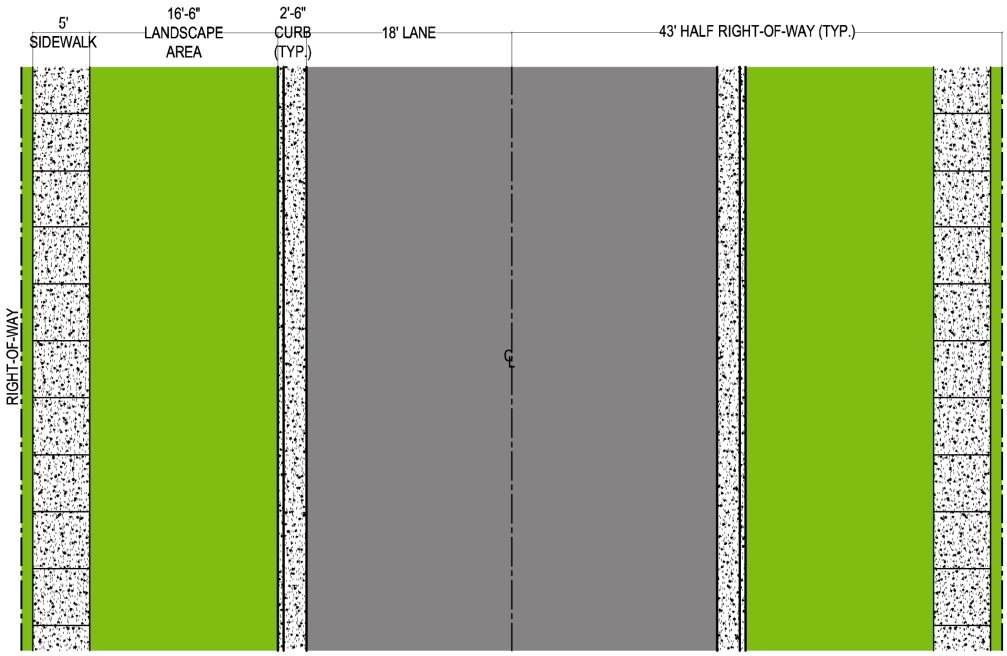
Mountable Curb Option



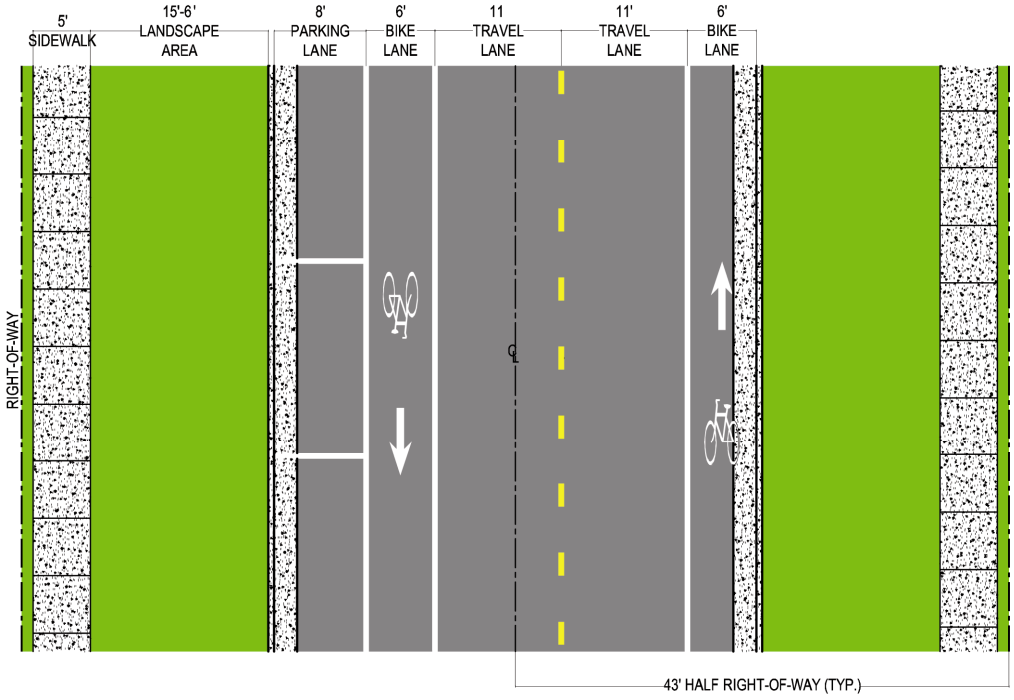
Vertical Curb Option

Note: Requires minimum of two connections to existing public streets; that is, no cul-de-sacs permitted with more than 20 abutting dwelling units.

Figures 6-8 (*top*) and 6-9 (*bottom*)
Urban Collector Alternatives I & II

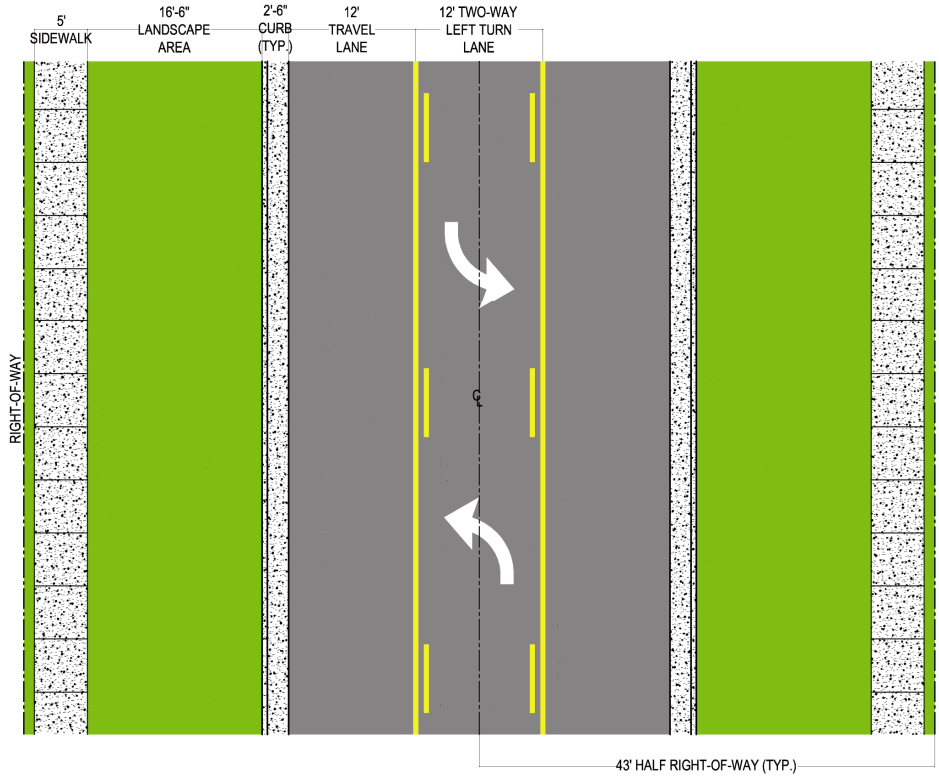


41' LENAWEE COUNTY ROAD COMMISSION STANDARD (PERMITS PARKING ON BOTH SIDES)

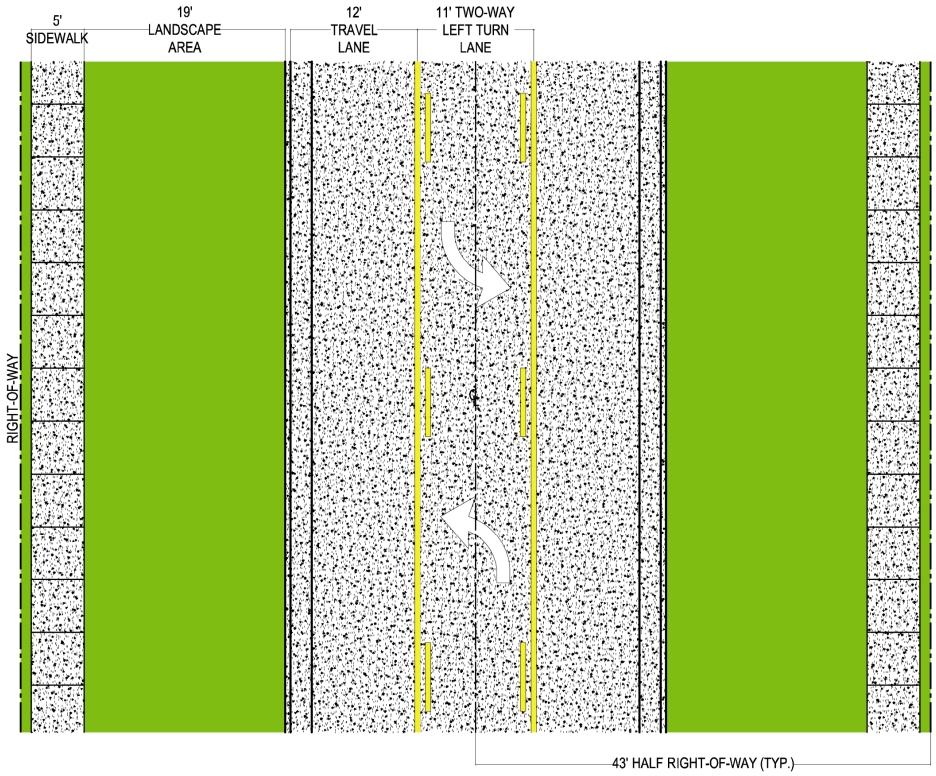


43' SECTION STRIPED TO PROVIDE BIKE LANES PLUS PARKING ON ONE SIDE

Figures 6-10 (*top*) and 6-11 (*bottom*)
Urban Collector Alternatives III & IV

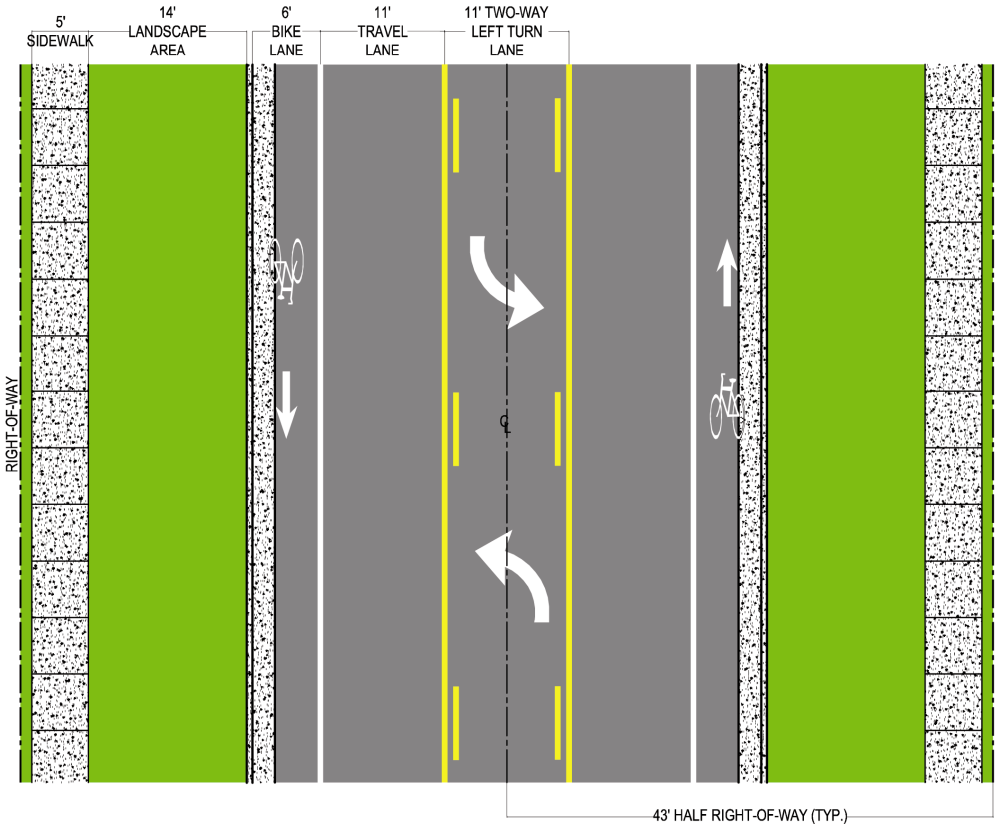


41' SECTION WITH TWO-WAY LEFT TURN LANE BUT NO PARKING OR BIKE LANES



ALTERNATIVE 36' SECTION (REQUIRES MONOLITHIC CONCRETE PAVEMENT AND VERTICAL CURBS)

Figure 6-12
Urban Collector Alternative V



46' RESIDENTIAL COLLECTOR WITH BOTH TWO-WAY LEFT TURN LANE AND BIKE LANES

NON-MOTORIZED PEDESTRIAN FACILITIES

Sidewalks and pedestrian safety paths are pedestrian-oriented facilities that are an integral part of the City's transportation network. They are generally located within the street right-of-way. Sidewalks are most prevalent and justified at points of community development such as schools, local businesses, subdivisions, and industrial developments where pedestrian concentrations are high. Sidewalks are typically five feet in width and are located one foot from the edge of right-of-way. In order to discourage pedestrians from using the traffic lanes, it is preferable for sidewalks to be constructed of concrete.

Due to the increasing use of the bicycle as a mode of transportation, bicycle facilities have become an important element in the road design process. Existing road systems may be supplemented with facilities to provide for such traffic. Bike paths generally carry two-way bicycle traffic with a width of eight to ten feet. Two-way bike paths are common in recreation areas connecting different points of interest. When designing such exclusive bike paths, it is necessary that different design factors such as turning radii, grades and sight distance be considered. When located within the right-of-way, bike paths are typically set one foot from the edge of the right-of-way. Bike paths and bike lanes are typically constructed of asphalt.

At the present time, there are two existing trails in the City of Adrian: a trail extending between McKenzie Street and Springbrook Avenue; and the Kiwanis Trail, which runs along an abandoned rail corridor from the center of the City of Adrian through Adrian and Raisin Townships toward the City of Tecumseh. A bicycle lane is also located on Maumee Street between Maple Avenue and Scott Street. Map 6-4 Pathways Plan depicts generalized routes for planned trailways and bike paths.

As a result of resident input gained during the Community Vision Session, the objective of promoting the use of non-motorized facilities throughout the City was established. Strategies to achieve this objective include: expanding the system of bike paths throughout the City to connect residential areas with Downtown, shopping, entertainment, recreational, cultural, civic, and educational uses; developing an East-West bicycle path through the City, and extending the existing bike path to the South; and converting abandoned railroad rights-of-way to pathways.

Action Items

- ☑ Develop site plan review standards that encourage service drives and combined parking and drives.
- ☑ Adopt and implement good access management practices to reduce the number of driveways for individual sites.
- ☑ Improve problem intersections by means of additional turn lanes, revised traffic controls, and lighting where appropriate.
- ☑ Work cooperatively with MDOT to provide an efficient and safe system of arterial roadways.
- ☑ Actively plan and seek funding for the creation of non-motorized facilities within the community.
- ☑ Prepare a detailed pathway and bike lane implementation plan, documenting pavement widths, right-of-way widths, lane striping, and on-street parking locations in order to prioritize routes.
- ☑ Create South Main Street access management overlay district.

The *River Raisin Greenway Study*, a regional plan that was completed in March 2001, identifies a potential greenway system in the River Raisin watershed. The plan designates the Kiwanis Trail as the main trailway for the River Raisin Greenways Master Plan, making the City of Adrian "the starting point for the Greenways Master Plan." The study indicates that the City is interested in improving the Kiwanis Trail – by paving the trail's north end, establishing a trailhead (also at the north end), and providing a safe crossing at M-52 – and extending it along the abandoned railroad corridor to the south of the existing trail. The construction of connector trailways, linking Adrian's parks to the main trailway, is also included within Adrian's "Trailway Potential." Specifically, a connector trailway loop is proposed to begin at the Kiwanis Trail north of Trestle Park, continuing east and crossing beneath the M-52 bridge connecting to Island Park. The trail would then run northeast beside the River Raisin, crossing under Howell Highway Bridge and extending northeast along the river's edge to Heritage Park. To complete the loop, the trail would be routed west along the river's edge, crossing at M-52 and running west to connect with the existing Kiwanis Trail. As noted in the *Greenway Study*, a connector trailway is also proposed to extend south on Howell Highway, linking to Siena Heights University.

ACCESS MANAGEMENT RECOMMENDATIONS

Most streets provide two functions: 1) to move traffic and 2) to provide access to land uses that abut them. However, these functions can often conflict because each access point interrupts traffic movement as vehicles turn off and onto the roadway. In order to balance these two road

functions, access management techniques should be used. The access management section describes ways in which the road network's capacity can be maximized, by reducing the impact of development abutting the major road network.

The access management techniques described below primarily apply to more intensive, non-residential land uses. Access management is usually implemented through the site plan review process, and these techniques are suggested as guidelines in that process. Reference should also be made to applicable sections of the City's Zoning Ordinance. Each case will require an individual analysis to determine the appropriate action given the characteristics of the site and use.

Table 6-2
Spacing Standards for Driveways on Same Side of Street

Speed Limit (Mph)	Minimum Driveway Spacing (Feet)*
25	135
30	155
35	180
40	215
45	260
50 or greater	310

* Center-to-center. Note: Greater separation between driveways and street intersections may be required.

Restricting the Number and Spacing of Access Points

Limiting the number of driveways permitted for each land use can help preserve the traffic movement function of a roadway. Proposed and existing land uses should provide the minimum number of driveways needed to provide access to a development site. If additional driveways are proposed, additional street frontage for the subject site and appropriate spacing between existing driveways should be provided.

Even if only one access point is proposed, the most appropriate location should be selected to preserve the function of the roadway and, more importantly, to assure public safety. Driveways located too close together are safety hazards and they can negatively impact road capacity. Recommended spacing standards for non-residential driveways on the same and opposite sides of the roadway are provided in Table 6-2 and Figure 6-13.

Figure 6-13
Spacing Standards for Driveways on Opposite Side of Street

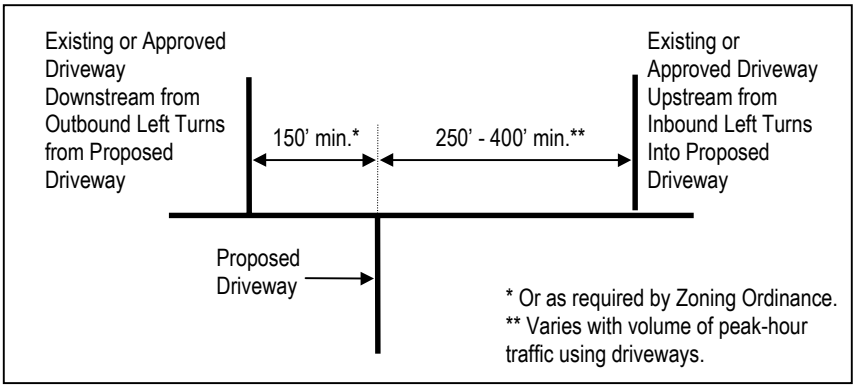
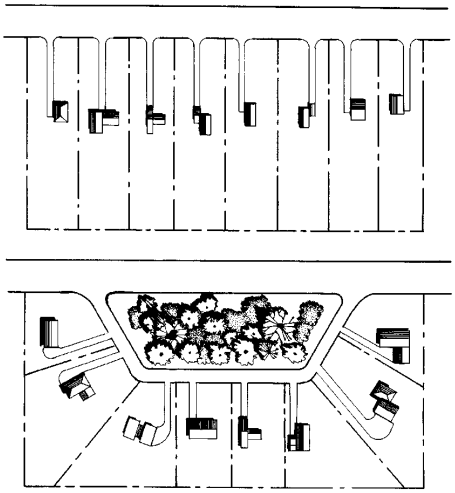
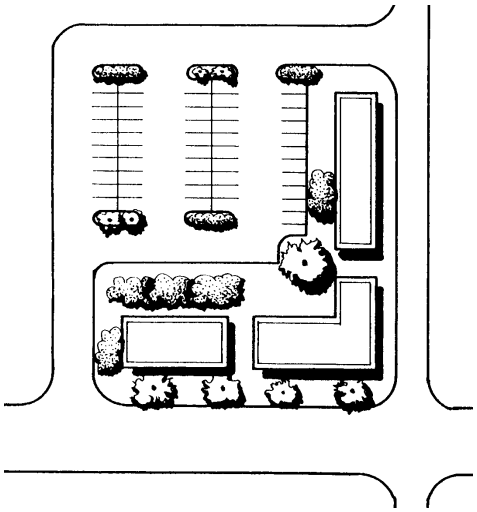


Figure 6-14
Residential Shared Access



Common access problem created by individual driveways serving homes or businesses on a major roadway *(top)*. Shared access driveways and frontage roads preserve capacity of the roadway, views from the road, and can provide a buffer area for houses from traffic noise *(bottom)*.

Figure 6-15
Non-Residential Shared Access



Shared access for a number of non-residential uses preserves the road capacity, which is especially important near intersections. Shared parking at the rear of the buildings also helps preserve the aesthetic appearance and character of the community. If shared access drives are not feasible, internal service roads and/or internal parking lot connections between uses should be provided to preserve roadway capacity.

Encouraging Shared Access

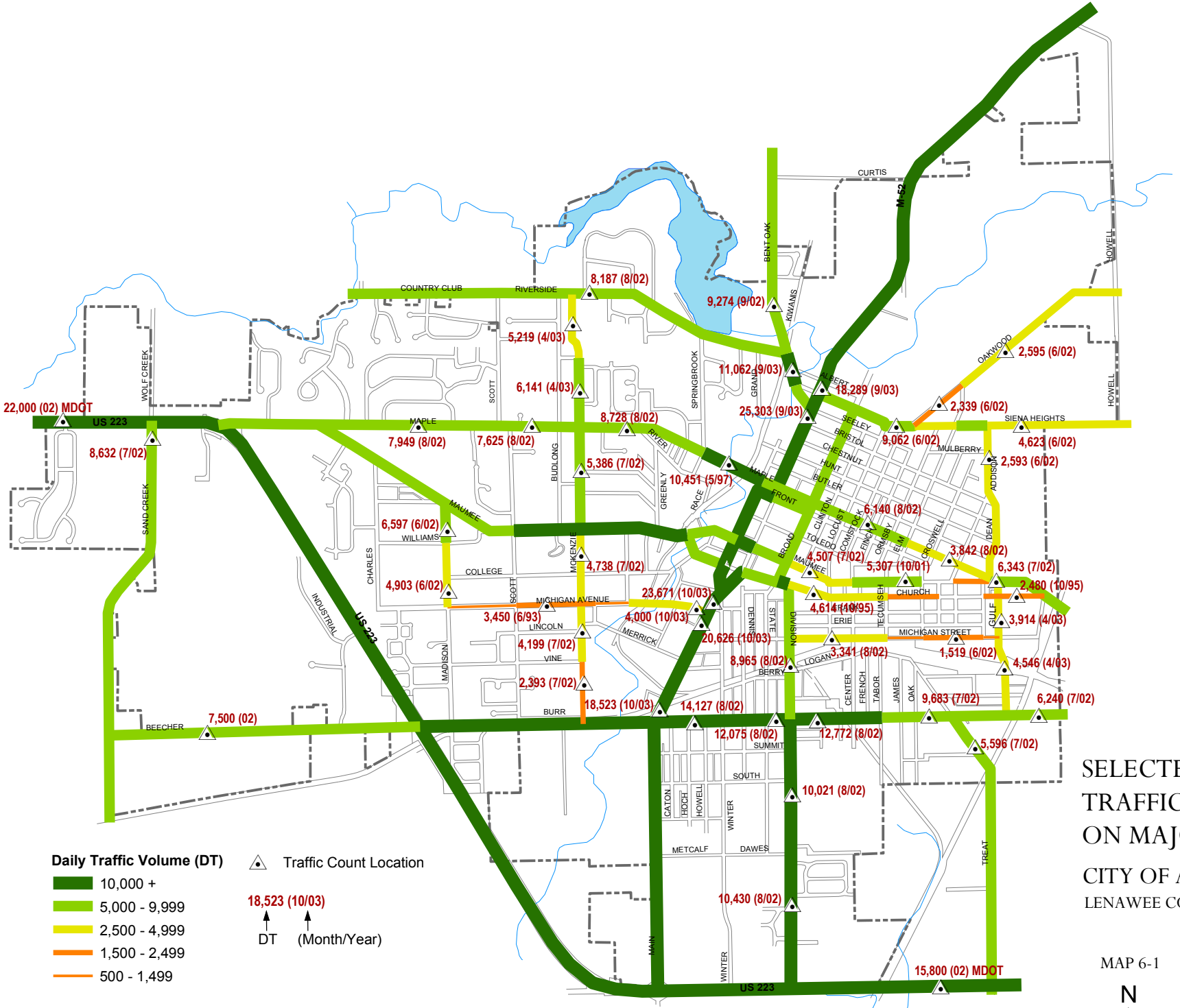
Providing shared access to a site reduces the number of access points, preserves the capacity of the road, and can even help to maintain the character of the community. Shared access can be achieved through a variety of techniques including shared driveways, frontage roads, and internal connections between sites. As discussed above, access management is critical for non-residential land uses because of their intensive nature and tendency to demand a higher number of access points. Figures 6-14 and 6-15 illustrate ways in which residential and non-residential uses can utilize access management techniques.

Access/Driveway Design

Another access management technique is assuring proper driveway and intersection design. Driveways should be designed with adequate width, turning radius, and depth to allow automobiles and large trucks to enter and exit a site safely and efficiently. A clear-vision area at the corners of all driveways and intersections is also needed for safe driver visibility.

In addition, uses that generate high volumes of traffic may warrant the construction of deceleration and acceleration lanes adjacent to driveways and intersections. Left-turn passing lanes or center left-turn lanes may also be necessary. Such improvements are often identified by the completion of traffic impact studies. In general, traffic impact studies are recommended whenever a proposed land use will generate more than 750 vehicle trips per day and/or more than 100 vehicle trips in one direction during the morning (e.g., 7 a.m. - 9 a.m.) or afternoon (4 p.m. - 6 p.m.) peak hour.

Finally, restricting turning movements at a driveway or intersection is often warranted due to traffic volumes or poor spacing of proposed access points relative to existing driveways and/or intersections. For example, when an existing driveway is too close to an intersection, it is possible to improve the access and safety by restricting turning movements to right turns in and out of a proposed or existing development site.



SELECTED TRAFFIC VOLUMES ON MAJOR STREETS

CITY OF ADRIAN

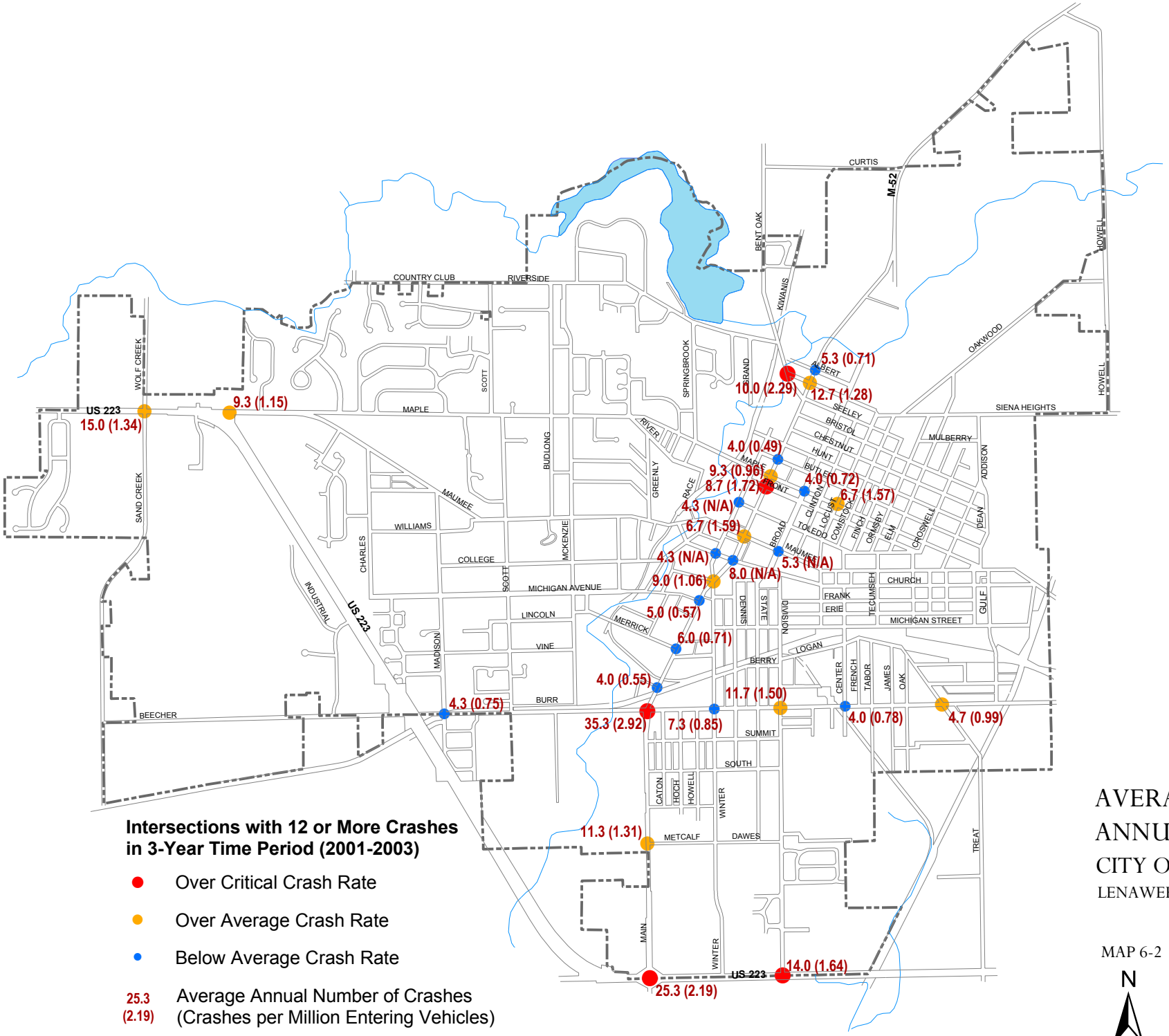
LENAWEE COUNTY, MICHIGAN

MAP 6-1

N

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

BIRCHLER ARROYO ASSOCIATES, INC.



Intersections with 12 or More Crashes in 3-Year Time Period (2001-2003)

- Over Critical Crash Rate
- Over Average Crash Rate
- Below Average Crash Rate

25.3 (2.19) Average Annual Number of Crashes (Crashes per Million Entering Vehicles)

Sources: Region II GIS, City of Adrian, Birchler Arroyo Associates, Inc.

AVERAGE ANNUAL CRASHES

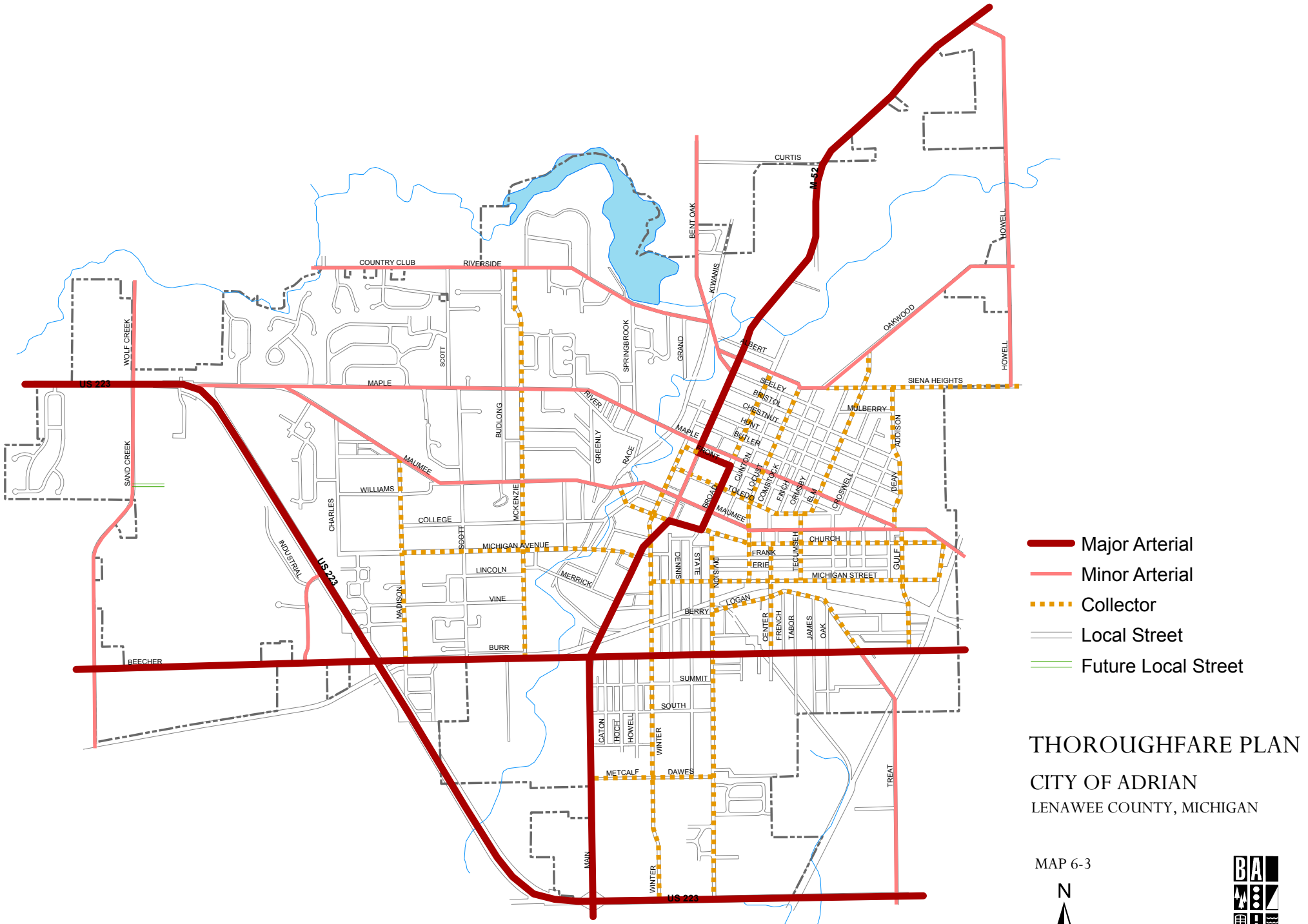
CITY OF ADRIAN

LENAWEE COUNTY, MICHIGAN

MAP 6-2

N

BIRCHLER ARROYO ASSOCIATES, INC.



THOROUGHFARE PLAN

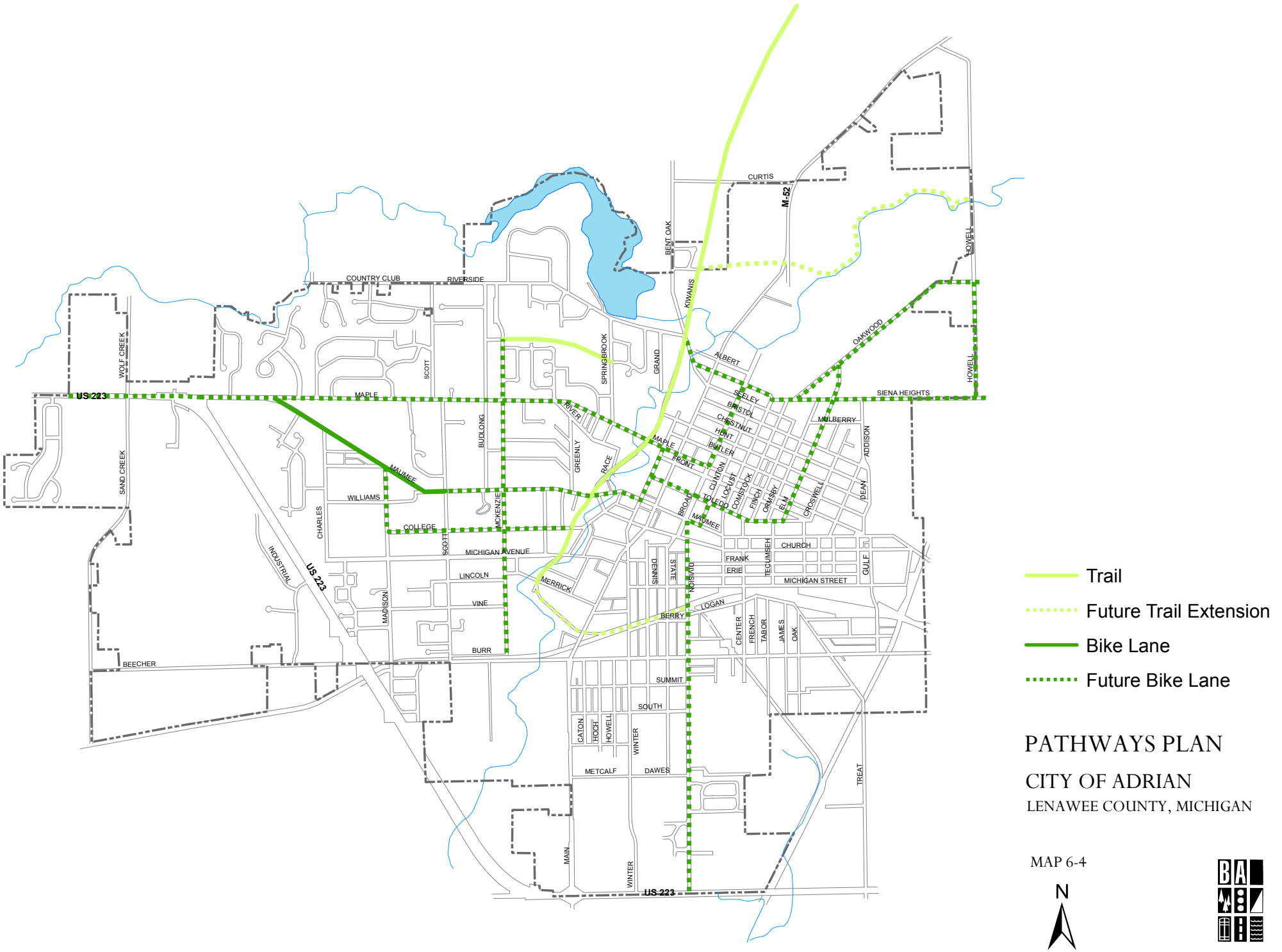
CITY OF ADRIAN

LENAWEE COUNTY, MICHIGAN

MAP 6-3

N

BIRCHLER ARROYO ASSOCIATES, INC.



Trail

Future Trail Extension

Bike Lane

Future Bike Lane

PATHWAYS PLAN

CITY OF ADRIAN

LENAWEE COUNTY, MICHIGAN

MAP 6-4

N

BIRCHLER ARROYO ASSOCIATES, INC.