

Michigan Department of Transportation

# US-23 FEASIBILITY STUDY

M-14 to I-96



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## Section One Executive Summary

The study will identify both short- and long-range improvements that will enhance the US-23 corridor from south of I-96 to north of the west junction of US-23/M-14. The study findings contained in this planning level document will be used as a guide for investment decisions and a tool to prioritize need and projects within the corridor for the next 20 years.

The US-23 Corridor between M-14 and I-96 is a four-lane limited access route built in the 1960s and does not meet current highway design standards. The US-23 bridges were constructed between 1957 and 1962 with a typical design life of forty years. Nineteen of the corridor's twenty-one bridges have underclearance that would not meet current standards. The design loads of most of the bridges on the corridor do not meet today's standards. According to MDOT's Bridge Safety Inspection Report, most bridges are in fair or better condition.

A pattern of strong commuter travel exists along the corridor with a majority of the US-23 morning peak hour traffic heading southbound towards Ann Arbor while the evening peak hour traffic is heaviest on the northbound return trip. Options for the traveling public are minimal since there are no adjacent north/south routes that serve as a viable alternative to the US-23 corridor nor any existing transit options. Any unexpected disruptions or other lane-blocking incidents such as crashes or construction have a high impact on the operational flow on the corridor. Increases in projected traffic volumes along the corridor will exacerbate the current congestion issues. Although the patterns of travel and land use along the corridor are not supportive of extensive local transit service today, the directional commuter travel pattern presents an opportunity for commuter-oriented transit service as a mobility option along US-23, particularly during peak congestion periods.

The study analyzed both traditional and nontraditional improvements. (It was assumed the proposed Washtenaw and Livingston Commuter Rail Project (WALLY) would be studied and as such, was not an alternative analyzed):

- **No-Build/Baseline**
- **Local System/Operational Improvements**
- **Transit Service Options**
- **Bus Bypass Shoulders**
- **Additional General Purpose Lanes**
- **Additional High Occupancy Vehicle (HOV)**
- **Additional High Occupancy Toll (HOT)**

Corridor opportunities such as a commuter-oriented transit service, tolling, and transit-oriented development were identified for implementation and/or further consideration in future phases of study. It is recommended that Intelligent Transportation System technology be deployed along US-23 as a means to better monitor congestion and respond to incidents in the area. In addition, expanding the MDOT Freeway Courtesy Patrol Program could help mitigate non-recurring congestion by enabling faster clearance of disabled vehicles from the roadside.

### MID-TERM OPPORTUNITIES INCLUDE:

- **Replace Critical Bridges** at 6 Mile Road and 8 Mile Road that are rated in "Poor" condition and are in need of replacement and would provide the horizontal clearance required for future widening of US-23.
- **Replace Bridges over US-23** at Warren Road, Joy Road, North Territorial Road, Barker Road, the CSX railroad and 9 Mile Road (M-36). These bridges are designed to carry two lanes of traffic in each direction only and will require lengthening to accommodate future widening of US-23.

- **Operational Improvements** to all the interchanges in the study area including the lengthening of all ramp acceleration and deceleration lanes and evaluating ramp terminal operations. This would include adjusting terminal turn lanes, signal optimization and investigating the opportunity for roundabouts. Modifications to the US-23/M-14 west tri-level would improve safety and weaving deficiencies.

### LONG-TERM OPPORTUNITIES INCLUDE:

- **Mainline US-23 Reconstruction and Widening** is the best long-term solution to improve the current infrastructure conditions and resolve traffic congestion issues. The widening of mainline US-23 would commence with the south segment of US-23 where traffic congestion is the greatest. Consideration should be given to the elimination of the Barker Road interchange to improve traffic flow. It is recommended that all three scenarios for capacity enhancement – Three Lane General Purpose, HOV, HOT – be carried forward for further evaluation in the environmental process, as each was found to present a viable option for improving traffic operations throughout the corridor.

The findings of this study are considered conceptual and not final. Advancing specific alternative recommendations will require an environmental study and the appropriate environmental clearance approval. To implement the proposed improvements identified in this plan, some combination of available federal, state, and local public and private funding sources will need to be leveraged when funding becomes available and construction schedules are determined.

## Section Two Study Purpose and Goals

### PROJECT AREA FOR THE US-23 FEASIBILITY STUDY

The US-23 freeway is a major Michigan north-south arterial that begins in Michigan at the Ohio State Line near Toledo, traverses through the cities of Ann Arbor and Flint, runs adjacent to the Lake Huron shoreline and terminates at Mackinaw City. The project area for this feasibility study is northeast of Ann Arbor and includes that portion of US-23 from north of the south western US-23/M-14 interchange to south of I-96. **Figure 2-1: Project Limits**

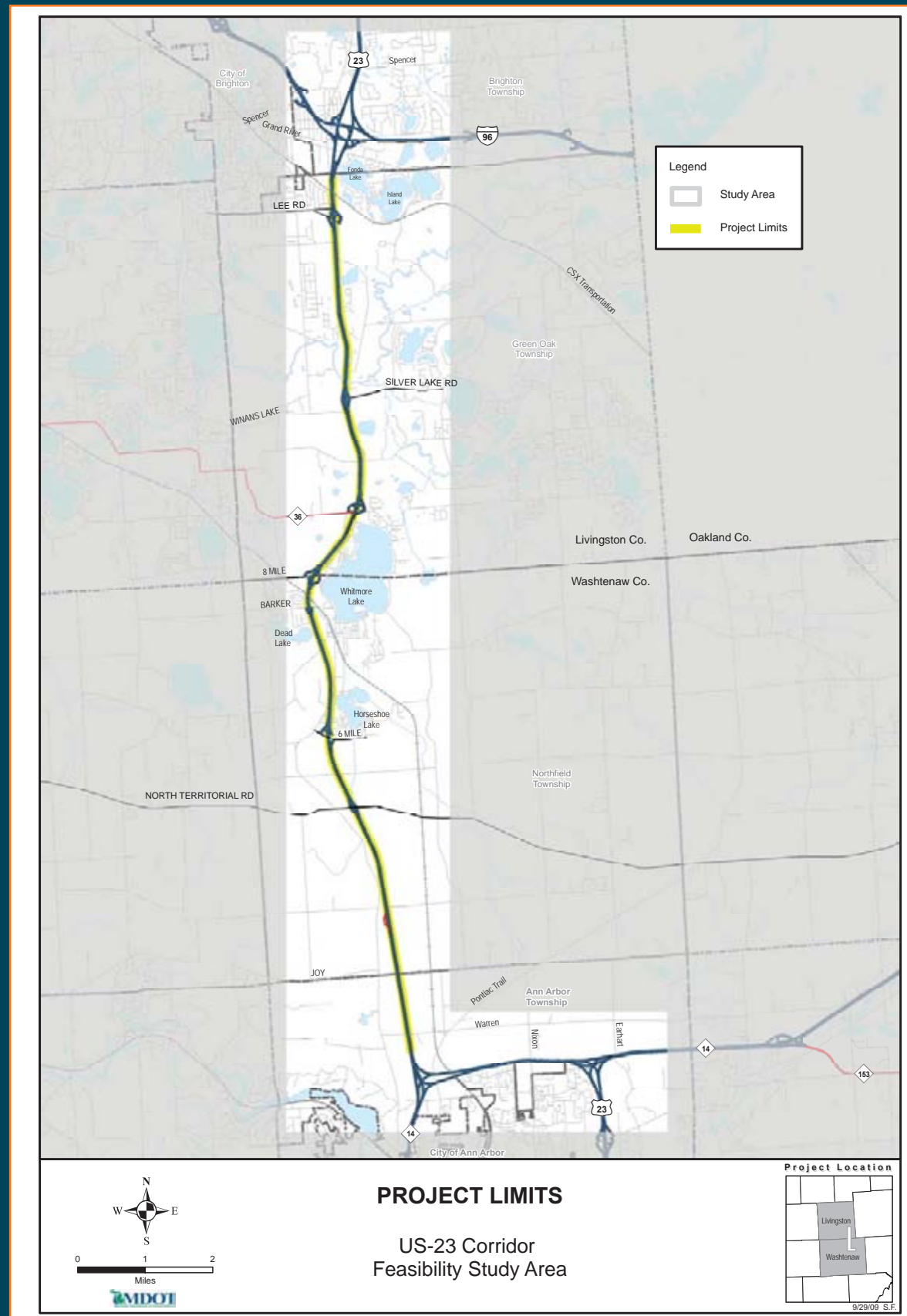
### STUDY OBJECTIVES

The study identified both short- and long-range improvements that will enhance the US-23 corridor and provide safe and efficient movement of people and goods between Livingston and Washtenaw Counties that can be implemented by the Michigan Department of Transportation (MDOT), other regional stakeholders, adjacent local communities and private partners.

The traffic analysis developed for this study was based in large part on the SEMCOG regional travel forecasting model available at the time this study began (2007). The socioeconomic forecasts used in the SEMCOG model may need revisions in view of recent economic changes in the state of Michigan, particularly related to auto industry.

The data sets available for the current study may not contain an accurate reflection of the more recent economic downturn.

FIGURE 2-1



### US-23 CORRIDOR/WALLY COALITION AND ITS ROLE IN THIS FEASIBILITY STUDY

In order to achieve the objectives of the study, MDOT sought the assistance of interested stakeholder groups. The US-23 Coalition is comprised of representatives from:

- MDOT
- Federal Highway Administration (FHWA)
- SEMCOG
- Livingston and Washtenaw County Road Commissions
- The Cities of Ann Arbor, Brighton and Howell
- Washtenaw Area Transportation Study (WATS)
- Northfield, Green Oak and Ann Arbor Townships
- Ann Arbor Transit Authority (AATA)
- Great Lakes Central Railroad
- Chambers of Commerce – Ann Arbor, Brighton and Howell
- Ann Arbor Downtown Development Authority
- Parsons Brinckerhoff Michigan, Inc.

The Coalition met on a regular basis to discuss issues, strategies for addressing the congestion and safety improvement of the US-23 Corridor Area, pursuit of a commuter rail option (WALLY) and progress on the feasibility study.



## GOALS OF THIS FEASIBILITY STUDY

The US-23 Corridor Coalition identified seven overarching goal areas that, when implemented, will support the economies of Southeast Michigan and the U.S. for at least 30 years. If these goal areas are successfully implemented, the US-23 Corridor Coalition believes this corridor can serve as an innovative model for other corridors studies in Michigan. These seven overarching goal areas are discussed in further detail below.

**Mobility in the Corridor:**

- Increase reliability of travel time for all modes and users
- Reduce congestion to the minimum given the affordable capacity
- Seek to provide reliable transit service within the corridor and continually evaluate its benefits against private vehicle travel
- Investigate nontraditional approaches to managing freeway traffic, such as managed lanes and dynamic congestion pricing
- Investigate transit services not now provided in the corridor: commuter bus, local bus, commuter trains
- Utilize technology to monitor the flow of traffic, maximize the operational efficiency of the corridor, and more effectively communicate existing traffic conditions to corridor users
- Expand the Regional Freeway Courtesy Patrol Program to include the US-23 corridor
- Develop a plan to maintain traffic and minimize delays during short-term, mid-term, and long-term construction projects
- Develop a plan to accommodate emergency road closures along the corridor
- Integrate planning activities and proposed improvements with community land use planning, county level emergency operation and hazard mitigation plans

**Access and Connectivity:**

- Develop corridor improvements to increase access to adjacent communities, facilitate tourism traffic and provide key regional connections along the corridor
- Provide new, productive alternatives to all users in the corridor for automobile users, non-auto users, and commercial traffic.

**Corridor Facilities:**

- Enhance corridor facilities to support all modes of travel
- Design facilities for efficient transfer between modes and networks (interchanges, carpool lots, transit stops and commuter parking)
- Design the corridor for safe, efficient use by multiple modes on the same facility (sidewalks, non-motorized paths, bicycle lanes) both along and across US-23
- Enhance linear non-motorized paths and/or networks along the corridor

**Economic Development:**

- Reduce transportation cost in the corridor and improve predictability of travel time to make the region attractive to employees and employer investment
- Build upon existing regional assets and provide key linkages between existing regional activity centers
- Reduce congestion, delay and unpredictability to preserve quality of life in the region and keep it a desirable place to locate homes and jobs
- Provide a high degree of reliability, safety and inter-modal connectivity for existing and future movements of freight and goods along the corridor

**Infrastructure Condition:**

- Assure bridges and pavement conditions are maintained in at least a 90 percent “Good” condition along the corridor while meeting current standards
- When possible, coordinate needed infrastructure improvements with local development projects to both maximize the benefits of both expenditures and minimize travel delays for corridor users

**Public Private Partnerships:**

- Enhance and/or develop new partnerships with public/private transportation providers along the corridor that will expand opportunities to implement future improvements
- Enhance partnerships with corridor emergency service and enforcement agencies to improve operational conditions along the corridor
- Enhance and/or develop new partnerships with adjacent developers to leverage and coordinate future development improvements with proposed corridor improvements
- Develop new policies and operational procedures that allow for expanded future public private partnerships across the region
- Seek to attract private capital ventures for proposed improvements within and adjacent to the corridor
- Provide opportunities throughout the planning phases for interaction and collaboration with various stakeholders, including the public

**Safety:**

- Implement improvements along the corridor to eliminate fatalities and injuries along the corridor where feasible
- Ensure that crash rates in the corridor are minimized by eliminating detected causes
- Modernize the US-23 corridor to upgrade existing facilities to meet current geometric standards where feasible

MDOT AND OTHER STAKEHOLDERS'  
FUTURE USE OF THIS MASTER PLAN

The Master Plan is a planning level document used as a guide for investment decisions along the US-23 Corridor. It is a tool to prioritize needs and projects within the corridor for the next 20 years. The findings of this study should be considered conceptual and not final. Advancing specific alternative recommendations will require an environmental study and the appropriate environmental clearance approval.

## Section Three Project Description

The 17-mile section of US-23, which has been analyzed, is a limited access four-lane divided freeway located in Washtenaw and Livingston County and is influenced by its freeway-to-freeway connections with I-96 and M-14. There are seven local access interchanges. All interchanges provide total travel movements with the exception of the Seven Mile (Barker Road) interchange where only northbound off and southbound on movements are accommodated. With few viable north-south alternative routes located nearby, the corridor provides service around the western suburbs of Detroit for tourists and primary access to Ann Arbor, the University of Michigan and Eastern Michigan campuses. In addition, it serves as a connector for motorists traveling between the I-94 and I-96 interstates. Whitmore Lake and Fieldcrest Roads are two local adjacent roads running parallel to US-23 that present unique constraints for the project.

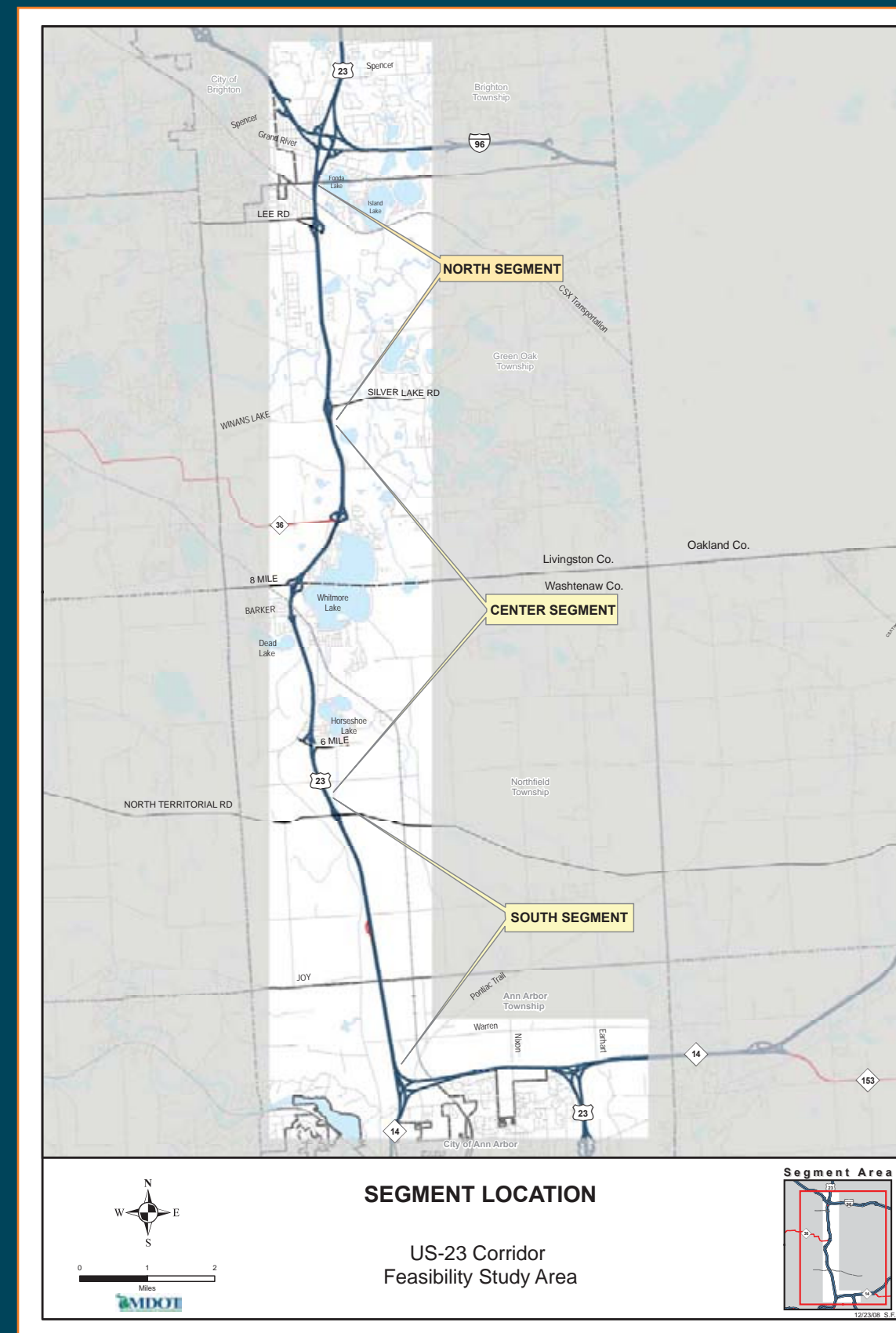
### OVERVIEW OF SEGMENT ANALYSIS AREAS:

To evaluate the different travel patterns and infrastructure along the US-23 Corridor, the study area divided the corridor analysis into three segments (**Figure 3-1: Section Location**):

- The South Segment – from North of the West junction to north of North Territorial Road
- The Center Segment – from north of North Territorial Road to south of Silver Lake Road
- The North Segment – from south of Silver Lake Road to south of I-96.

To properly examine the area of influence, analysis was expanded to include the I-96/US-23 interchange, and both the east and west junction of US-23/M14. Sections 4 through 6 will provide detailed analyses of existing conditions and future No-Build conditions. Sections 7 through 9 will describe opportunities and recommendations for the corridor and near-term, mid-term and long-term improvements by project segment.

FIGURE 3-1



### CONDITION OF THE CORRIDOR INFRASTRUCTURE

This section includes descriptions of the overall infrastructure conditions of the corridor. Detailed analyses by segments are included in the respective segment sections.

The US-23 Corridor between M-14 and I-96 was built in the 1960s and does not meet current highway design standards. Any proposed improvements to the corridor should include an evaluation of the following geometric elements to meet today's design standards and desired 75 mph design speed. These elements include:

#### Cross Section

The cross section of a road includes travel lane width, inside and outside shoulder width, median width, cross-slope of the travel lanes, shoulder slope, cut/fill slopes, and the ditch slopes. The travel lane width of 12 feet for both US-23 and I-96 meet current design standards.

Outside shoulder width occurs on US-23 south of M-36 that would not meet today's standards. The inside shoulder widths, although narrow, generally met current standards for a four-lane freeway facility. No substandard shoulder widths were found on US-23.

Median widths in Livingston County were adequate; however, the median narrows considerably approaching M-14 in Washtenaw County requiring a center median guardrail to separate traffic.

The cut/fill slopes of the outside shoulders of the US-23 corridor utilizes 2:1 slopes and guardrail to keep grading within the right-of-way and minimize the impacts to adjacent frontage roads, wetlands and private property. **Figures 3-2 through 3-4: Typical Cross-Section of Existing US-23; 1500 Feet North and 2640 Feet south of M-36 and North Territorial to Eight Mile Road** shows a cross-section representation of the corridor. **Figure 3-5: Typical Cross-Section of Existing Bridges** provides a representative cross-section of existing bridges over US-23.

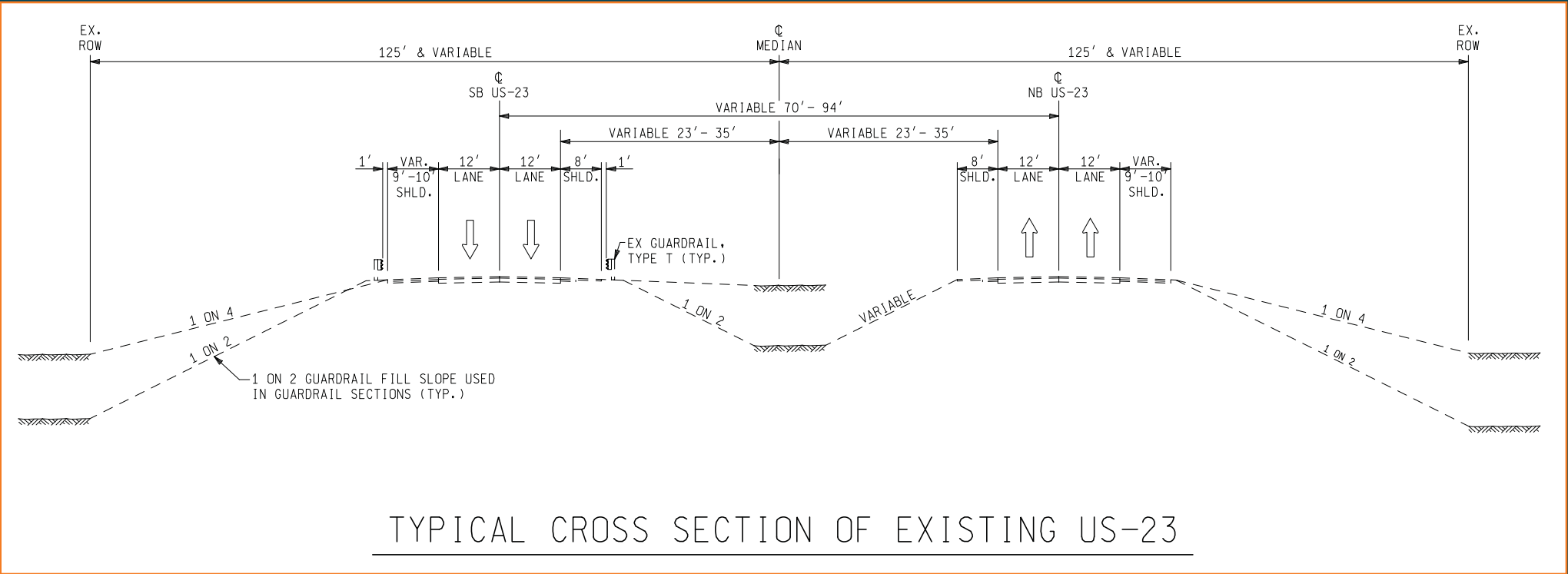


FIGURE 3-2

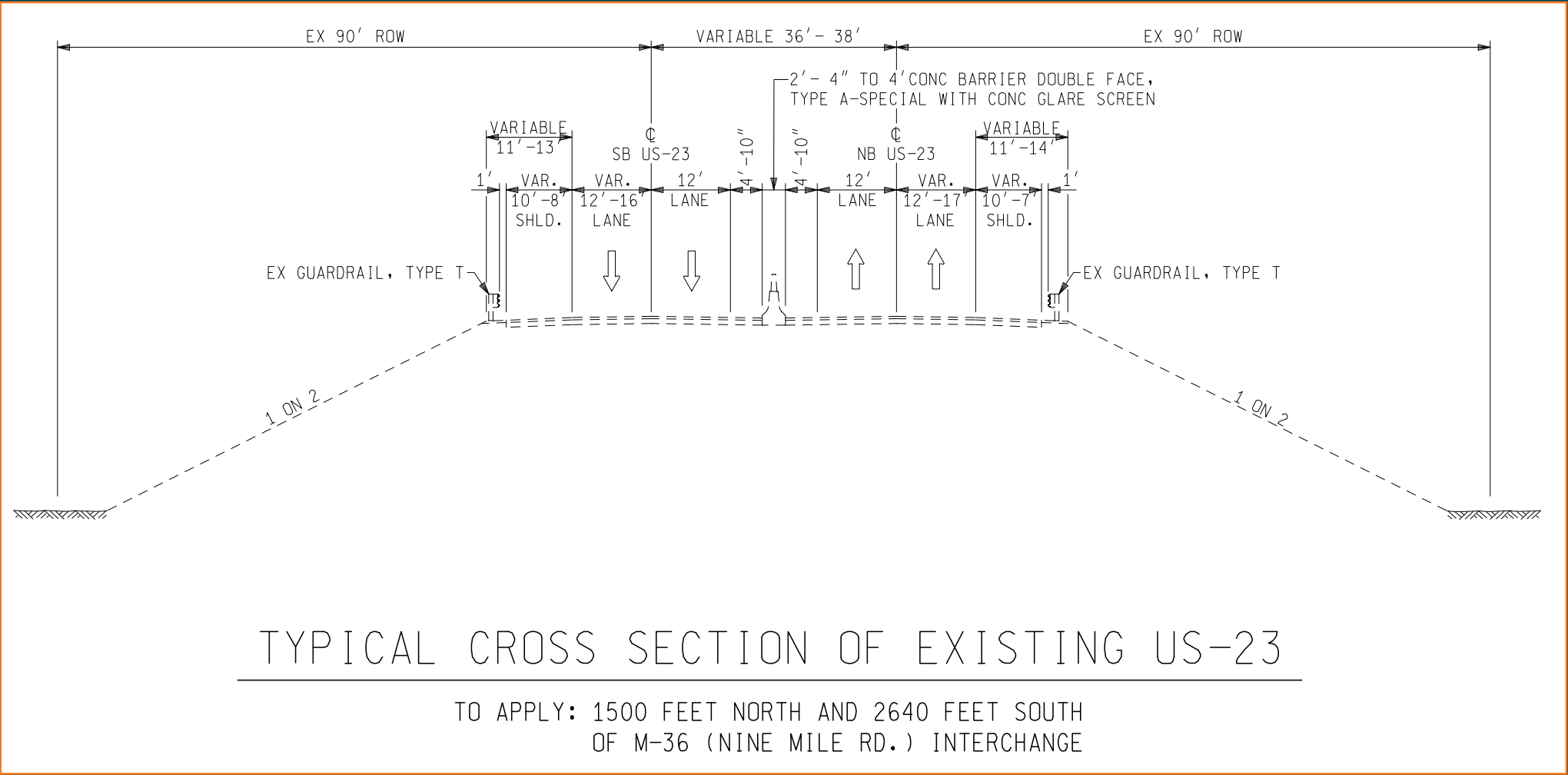
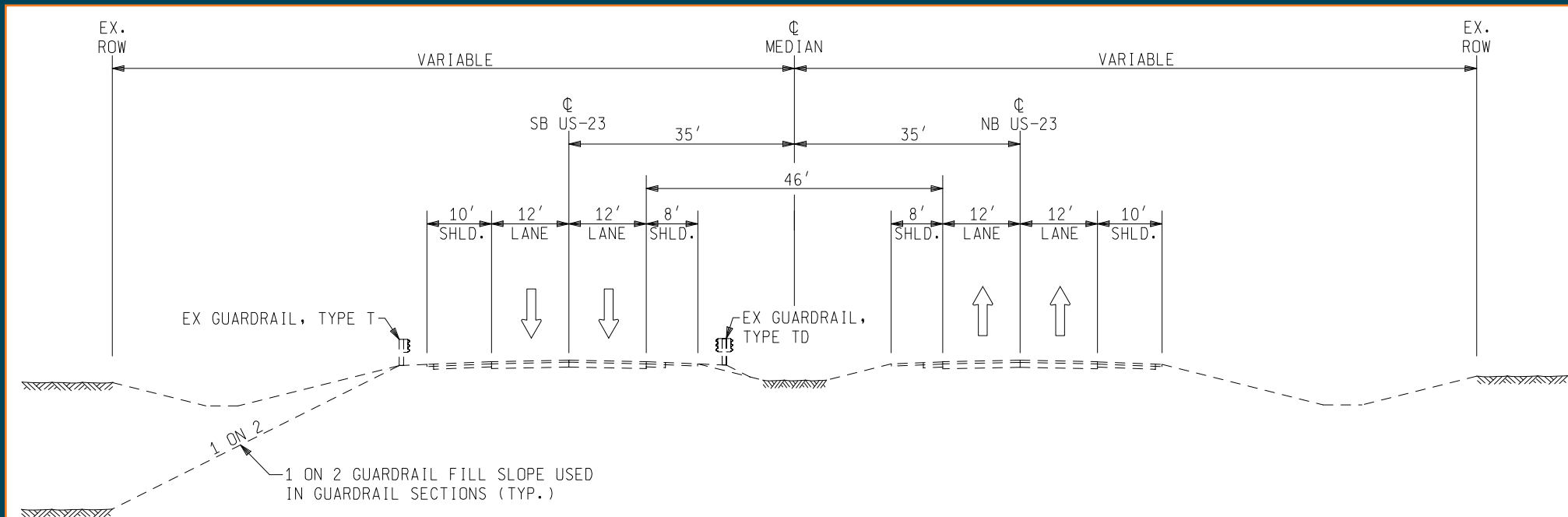


FIGURE 3-3

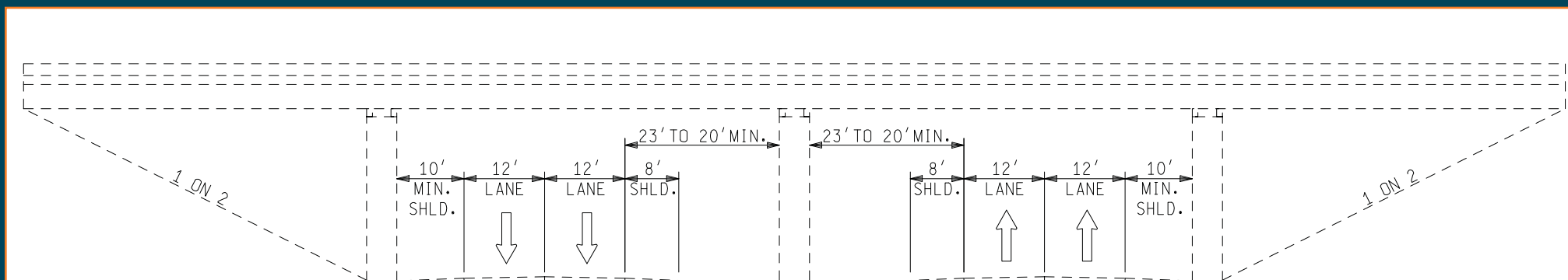
FIGURE 3-4



### TYPICAL CROSS SECTION OF EXISTING US-23

TO APPLY: NORTH TERRITORIAL RD. TO EIGHT MILE RD.

FIGURE 3-5



### TYPICAL CROSS SECTION OF EXISTING BRIDGES OVER US-23



**Horizontal Alignment**

The horizontal alignment of the corridor includes geometric elements such as the radii of the curves and their lengths. The only curve radii that would not meet today's standards (for a 75 mph design speed) within the study area are located at the westbound I-96 curves at the merge/diverge points of the I-96/US-23 interchange.

**Rate of Superelevation**

The rate of superelevation is the rise in the roadway surface elevation as one moves from the inside to the outside edge of the road. A majority of the curves in Livingston County (11 curves) had superelevation rates that would not meet today's standards. All superelevation rates for US-23 in either Washtenaw County or on I-96 were standard.

**Vertical Clearance**

Vertical clearance is the distance between the surface of the roadway and the bottom of the bridge structure. Substandard bridge clearances may result in trucks colliding into bridge beams and require some larger trucks to take alternate routes. The minimum standard for underclearance today is 16'3". Nineteen of the twenty-one bridges within the corridor have underclearance that is less than 16'3" and are considered substandard.

**Vertical Grade**

Vertical alignment also includes the grade of the roadway. Desired freeway grades fall between a minimum of 0.5 percent and maximum of 3 percent grade to provide adequate drainage and allow trucks to operate efficiently. Three problem areas exist along the US-23 Corridor. The area south of M-36 over the abandoned railroad does not meet the minimum grade requirement. Two areas that exceed the desired three percent grade maximum are located approximately one mile north of the Huron River and at the railroad underpass north of Lee Road. There were no problem areas identified on I-96 or M-14 within the study area.

**Ramp Exit and Entrance Design**

With the exception of the North Territorial Road interchange, all interchanges within the study area fail to meet current entrance, exit and/or ramp termini standards. Common problems include inadequate taper lengths to and from the freeways, tight radii for the loop ramps and narrowly spaced ramp termini. These issues contribute to back-ups on the ramp and impede freeway travel flow.

In addition, two existing ramps at the I-96/US-23 interchange provide left off and left on ramp movements. Neither becomes a continuous lane, forcing motorists to merge with existing freeway traffic. Experts across the country have determined that this is an undesirable condition for freeways with high traffic volumes.

**Ramp spacing**

Spacing of interchanges has a significant effect on traffic operations. According to the American Association of State Highway and Transportation Officials (AASHTO) guidelines, minimum spacing on interstates and access-controlled highways should be one mile in urban areas and three miles in rural settings. This spacing provides adequate distance for motorists to merge and exit safely and efficiently at interchanges. Most of the interchanges in the corridor are spaced less than three miles apart.

**Stopping Sight Distance**

Stopping sight distance is the distance a motorist requires to stop to avoid a stationery object or other threat. As speeds increase, stopping sight distance requirements also increase. Obstructed views, such as inadequate stopping sight distance, can contribute to crashes when motorists do not have sufficient time and distance to reduce speeds. There are many locations where stopping sight distance is less than desired for a 75 mph design speed.

**Physical Condition of Bridges**

The US-23 bridges were constructed between 1957 and 1962. Bridges are typically designed for a forty-year life, but can be extended with proper maintenance. The design loads of most of the bridges on the corridor do not meet today's standards. According to the MDOT Bridge Safety Inspection Report, most bridges are in fair or better condition. A detailed summary of the existing bridge physical condition can be located in the respective segment sections.

**Physical Condition of Roadway**

MDOT uses Remaining Service Life (RSL) and Ride Quality Index (RQI) to assess pavement conditions. The corridor is consistent with most segments having a Remaining Service Life of 12 years while the Ride Quality condition varies greatly throughout the corridor. Maps summarizing RSL and RQI are located in the respective segment sections.

**EXISTING CORRIDOR TRAVEL CONDITIONS****Traffic and Capacity**

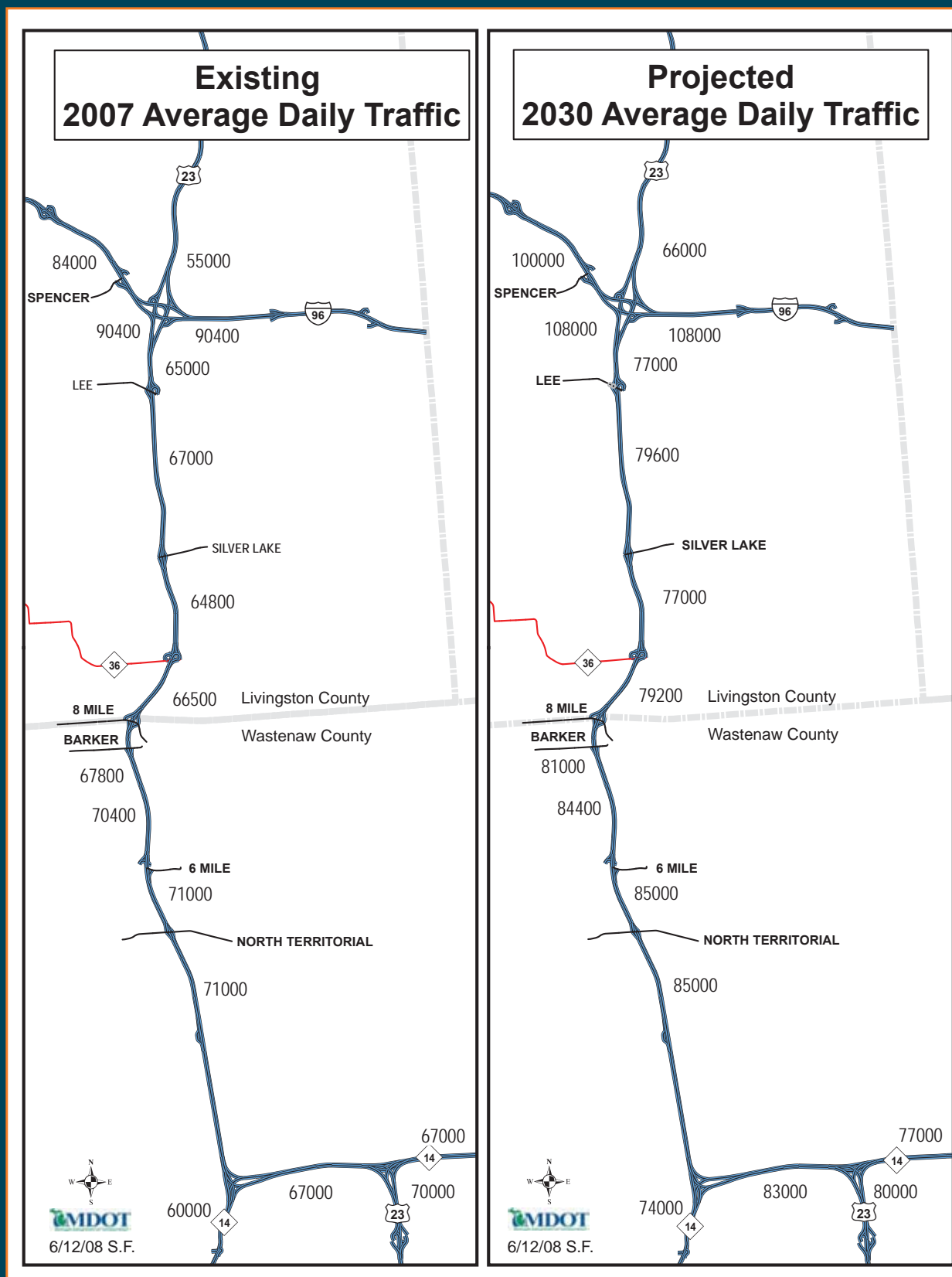
The travel patterns along the US-23 corridor indicate this freeway system provides a dual purpose to the motoring public. The corridor serves as a work-related route for commuters going to and from employment centers within the greater Ann Arbor and surrounding counties. The US-23 Corridor also serves as a recreational route for travelers providing access to northern Michigan resort areas. This project area encounters the majority of its US-23 morning peak hour traffic heading southbound towards Ann Arbor while the evening peak hour traffic is heaviest on the northbound return trip. There are no adjacent north/south routes that serve as a continuous viable alternative to the US-23 corridor.

An analysis of the existing 2007 Average Daily Traffic and Forecasted 2030 Average Daily Traffic map **Figure 3-6: Existing 2007/Projected 2030 Average Daily Traffic** reveals current traffic ranging from 74,000 vehicles north of the M-14/US-23 West Junction interchange to 66,000 vehicles south of the I-96 interchange. Commercial traffic volumes are estimated between 10-12 percent of total traffic throughout the US-23 Corridor. Peak hour traffic and the corresponding Level of Service (LOS) on mainline US-23 and the interchanges are provided in the respective segment sections.

Projected traffic volumes for the No-Build came from the transportation model generated by the Southeast Michigan Council of Government (SEMCOG), local community master plans and historical projections.

A travel time delay study was completed in 2007. Some peak congestion, particularly at the southern end of the corridor occurred during the AM Peak Hour between Silver Lake Road and 6 Mile Road. Much of the existing traffic congestion that is occurring along the US-23 Corridor is of a non-recurring nature. Any unexpected disruptions or other lane-blocking incidents such as crashes or construction have a high impact on the operational flow on the corridor.

FIGURE 3-6



### Safety

Crash data covering the entire US-23 Feasibility Study Area, from just north of I-96 to just south of the US-23/E M-14 interchange was collected between March 2005 and March 2008. Out of the 1,590 total crashes, 39 percent were Rear-End Straight. Two-thirds of the crashes took place during the hours of darkness, and in icy or wet conditions. There were seven fatalities during this three-year period. More detailed crash data is available in the segment sections.

### Mobility

Under existing conditions, there are few alternatives to automobile travel for mobility along the US-23 corridor. While several transit operators, including the Ann Arbor Transportation Authority (AATA), Livingston Essential Transportation Service (LETS) and Northfield Human Service's People's Express (PEX) offer demand-responsive para-transit services in the area, no fixed-route transit services are offered along the corridor.

MDOT operates and maintains five carpool lots located at interchanges within (or in the immediate vicinity of) the study area, including US-23 at Lee Road, Silver Lake, M-36, and North Territorial Road. These lots are located approximately two to five miles apart from one another and are heavily utilized. The Lee Road facility was rebuilt in 2005 in conjunction with a large retail development in the northeast quadrant of the US-23 interchange and has a capacity for 144 vehicles. The Silver Lake Road carpool lot was resurfaced in 2005 and has capacity for 50 vehicles. The Nine Mile and Territorial lots were resurfaced and expanded in 2007 to 71 and 40 spaces, respectively. The following **Table 3-1: Study Area Carpool Lot Characteristics** summarizes characteristics of the existing car pool lots.

TABLE 3-1

STUDY AREA CARPOOL LOT CHARACTERISTICS				
CROSS ROAD	Lee	Silver Lake	9 Mile	N.Territorial
FACILITY NAME	Brighton - Southeast #1 (SE)	Silver Lake	Hamburg	AA/Whitmore Lake
SPACES AVAILABLE	144	50	71	40
2008 COUNT	65	23	34	45
PRIMARY ROUTE	US-23	US-23	US-23	US-23
LOCAL ROUTE	Lee Road	Silver Lake	M-36	Territorial Rd
EXIT NUMBER	58	55	54	49
QUADRANT LOCATION	Southeast	Northeast	Southwest	Northeast
SURFACE TYPE	Paved	Gravel	Paved	Paved
ENTRANCE SIGN	Yes	Yes	Yes	Yes
LIGHTED	Yes	No	Near	Yes

AATA has one park-and-ride lot located near the study area on Green Road, approximately 1.5 miles from the US-23 and Plymouth Road interchange. The Green Road Park & Ride Lot opened in 1999 and the property owner is the University of Michigan. The lot is located at Green Road and Baxter Road, south of Plymouth Road. This paved and lighted lot is used in conjunction with the University of Michigan. AATA routes #2 Plymouth and #22 North-South Connector currently serve this lot. This lot primarily serves North Campus, the U of M Medical Center, and, indirectly, U of M Central Campus and downtown Ann Arbor. This Green Road lot is being expanded by the University and AATA is building an additional lot in the southwest quadrant of the Plymouth Road interchange. This location was identified in an earlier Park and Ride Service Development Study completed by AATA in 2006.

WALLY, the Washtenaw and Livingston Line, is a 27-mile commuter rail service proposed between Howell and Ann Arbor. According to the *WALLY Validation Study* prepared by RL Banks and Associates in June 2006, the commuter rail service is feasible. Estimated capital costs are \$32.4 million for 60 mph service with operating costs estimated at \$6.3 million per year. The study estimates potential ridership to be approximately 1,300 travelers excluding ridership for special events.

POTENTIAL ENVIRONMENTAL IMPACTS AND ASSOCIATED CONSTRAINTS

Since the US-23 corridor is highly developed, most of the potential impacts relate to the expansion of the existing right-of-way (ROW). Constraints specific to each segment of the project, and a corresponding constraint map, are provided in each segment portion of the document.

There are 50 historical records indicating endangered species along the corridor. Spring, summer and fall surveys will be required to identify what species are currently located within the corridor. Preliminary research has shown that if there were an addition of one lane throughout the corridor, in the existing ROW, archaeological impacts would be minimal. Any expansion beyond the current alignment would require further review and could result in potential impacts. Relocations are possible, primarily associated with businesses located at ramp terminals. Air and noise quality analyses will be required for the entire corridor. Indirect and cumulative impacts are possible with all Build Alternatives.

ECONOMIC DEVELOPMENT POSSIBILITIES

Economic Benefits

A safe, well-maintained and efficient transportation system provides the backbone for all economic activity within the State of Michigan. During the development of the MI Transportation Plan, Moving Michigan Forward, the department more closely evaluated the key linkage between transportation and our state's economy. The following is a short excerpt of the findings of this analysis:

“... [T]ransportation and the economy are linked together closer in Michigan than in many other states since the state’s economy relies heavily on the transportation-intensive manufacturing sector. An efficient, timely, and dependable transportation system can lower cost, enhance competitiveness and support just-in-time inventory control systems for business.

In today’s business environment, cost-effective, time sensitive transportation services are increasingly a strategy for competitive advantage in manufacturing and service-based industries. ‘Globalization’ of the economy has grown at a rapid pace over the past several decades and Michigan has been at the forefront of the industrial globalization trend. The movement of goods by truck, rail, air and water is vital to Michigan’s economy, especially manufacturing and agriculture. To retain current manufacturers and attract new manufacturers, transportation considerations become even more important for Michigan.

Transportation investment can be an engine to drive growth in emerging and developing industries. Tourism and other related service sectors may be expected to increasingly compete for transportation capacity and services.”

Clearly, MDOT’s investments to maintain Michigan’s complex infrastructure network results in benefits both for Michigan’s overall economy, individual industry sectors and provides a more desirable quality of life for both residents and visitors to Michigan.

Economic Profile

The corridor houses the Cities of Brighton and Ann Arbor, and Green Oak, Northfield and Ann Arbor Townships providing access to a diverse economic base. The area around the Lee Road interchange is predominantly commercial retail, and there is a proposed mixed-use community for the west side of the freeway at Silver Lake Road. From Silver Lake to M-36/9 Mile Road is property owned by an area church. At M-36/9 Mile Road, one will find numerous fast food restaurants and gas stations. There is a major proposed development near North Territorial Road, and offices, professional buildings and service businesses near Plymouth Road. Also, Northfield Township has approved the development of a transit-oriented development at Eight Mile and US-23.

Population

Populations for Washtenaw and Livingston Counties are expected to increase 15.7 percent and 10.5 percent respectively between 2006 and 2035. Just over 59 percent of the population in the study area is over the age of 25 with 8.1 percent of the population over 65. The population forecasts for the municipalities surrounding the US-23 Study Area are as shown in **Table 3-2: Brighton / Ann Arbor Area Population**.

TABLE 3-2

BRIGHTON / ANN ARBOR AREA POPULATION					
Municipality	1990	2000	2006	Projected 2035	% Change (2006-2035)
City of Brighton	5,686	6,701	7,263	9,473	30.43%
Brighton Township	14,815	17,673	18,904	19,100	1.04%
Green Oak Township	11,604	15,618	17,911	19,499	8.87%
Northfield Township	6,732	8,252	8,370	9,320	11.35%
Ann Arbor Township	3,473	4,568	4,572	5,951	30.16%
City of Ann Arbor	109,592	114,024	114,062	115,217	1.01%

Sources: The SEMCOG 2005 Regional Development Forecast, and Historical Population And Employment

Ridership Profile

**Table 3-3: Vehicle Occupancy for US-23 Study Area** is a summary of Vehicle Occupancy for the entire US-23 Corridor, including all of the above municipalities. Approximately two-thirds of the population drive to work alone. Mean travel times range from 18.1 minutes in the City of Ann Arbor to 30 minutes in Brighton Township and Green Oak Township.

TABLE 3-3

TRAVEL TO WORK FOR US-23 STUDY AREA		
Travel to Work Mode	Population	% of Population
Drove Alone	58,009	68.3%
Carpool	5,309	6.2%
Public Transportation	4,742	5.6%
Walked	8,837	10.4%
Worked at Home	4,840	5.7%
Other Means	3,232	3.8%

Sources: SEMCOG Community Profiles, [www.semcocog.org/Data/bycommunity.cfm](http://www.semcocog.org/Data/bycommunity.cfm)



The freight tonnage and value data for the US-23 Feasibility Study were drawn from the 2003 Transearch Database from Global Insight. Commodity tonnages based on origin and destination were assigned to highway and rail networks separately in TransCAD. The totals for tons and value for 2013, developed by Global Insight using their industry forecasting expertise, account for employment changes and commodity value trends.

For trucks, the highway network for the corridor from I-96 to Plymouth Rd contained nine links on the network. The shared link between US-23 and M-14 was the highest tonnage area with almost 41 million tons. The link from M-14 to Plymouth Rd was the lowest, at almost 30 million tons. The other seven links between Brighton and Ann Arbor all had the same total, about 31 million tons. When averaging the corridor, the lengths of the links were used to find a weighted average of the tonnage for the whole corridor, which was over 32 million tons.

For rail, only three links on the rail network were used on the rail line between Howell and Ann Arbor.

**Table 3-4: US-23 Study Area Freight Totals** shows this truck and rail data for the US-23 Study Area:

TABLE 3-4

US-23 STUDY AREA FREIGHT TOTALS				
Truck Freight				
Miles (18.306)	2003 Tons	Projected 2013 Tons	2003 Value	Projected 2013 Value
Average	32,576,831	35,921,747	\$78,217,059,607	\$93,451,793,859
Rail Freight				
Track Miles (20.026)	2003 Tons	Projected 2013 Tons	2003 Value	Projected 2013 Value
Average	323,624	301,024	\$23,054,676	\$24,167,657

Sources: Michigan Department of Transportation Statewide and Urban Travel Analysis Section

#### EXISTING LAND USES AND POTENTIAL IMPACTS

The existing land use adjacent to the US-23 corridor project area consists of a broad range of land uses. The uses range from natural open space/agricultural to industrial and commercial retail. Current zoning and future land use plans are in place for the all the local jurisdictions along the route. These local units of government include the City of Brighton, Brighton Township, Green Oak Township, Northfield Township, City of Ann Arbor and Ann Arbor Township. Each of these local plans identifies the US-23 corridor as the main north/south artery essential for the movement of people and goods for the area and any of the proposed solutions would be compatible with each plan.

#### Livingston County

The Livingston County segment of the project study area includes the City of Brighton, Brighton Township and Green Oak Township. The area is almost completely developed land with a mix of commercial, light industrial and residential uses immediately adjacent to the corridor. Island Lake Recreation Area is located in this segment and protected by section 4(f) and 6(f) regulations. It is not anticipated that work associated with the proposed project will change land use patterns in the area and should have no impact on future development patterns. Most new development would likely occur at existing ramp terminals. Any need for right-of-way acquisition or changes in ramp configuration should be identified early to reduce acquisition costs. By identifying these areas early in the process, local jurisdictions and MDOT could notify potential developers and possibly reduce the impacts when these changes are implemented. The future land use and zoning maps for the jurisdictions along the US-23 corridor in Livingston County are located in **Figure 3-7: Livingstone County Future Land Use Map** and **Figure 3-8: Livingstone County Zoning Map**.

#### Washtenaw County

Northfield Township, Ann Arbor Township and the City of Ann Arbor are included in the Washtenaw County segment of the project study area. The land uses along this segment of the corridor are more diverse than in Livingston County. The north end of this segment is comprised of dense residential and industrial uses. As you move south down the corridor, the land use transitions to open space and agricultural uses. The corridor transitions back to residential and commercial uses approaching the City of Ann Arbor, located at the south end of the corridor. The project is unlikely to change existing or future land uses due to the area already being developed. If new development is to take place, it is likely to take place adjacent to the ramp termini. Future land use and zoning maps for the jurisdictions along the Washtenaw County portion of the US-23 corridor are in **Figure 3-9: Washtenaw County Future Land Use Map** and **Figure 3-10: Washtenaw County Zoning Map**.

#### FUNDING SOURCES AND FINANCIAL CONSTRAINTS

All proposed improvements will seek to utilize available federal, state and local public and private sectors funding sources. The improvements will be included in the Metropolitan Planning Organization Transportation Improvement Program (MPO TIP) during the NEPA process, as required, and when funding becomes available and construction schedules are determined. The discussion on corridor revenue opportunities afforded by tolling is located in Section 8.

#### Implementation Opportunities

While operational and capacity improvements would likely be part of any long-range improvement strategy for US-23, stakeholders have expressed a strong interest in expanded mobility options along the corridor, including most significantly fixed-route transit service. Although the patterns of travel and land use along the corridor do not support `extensive local transit service today, the strong commuter travel pattern, existing carpool lot infrastructure, parking conditions and employment densities in Ann Arbor, present an opportunity for future commuter-oriented transit service as a mobility option along US-23, particularly during peak congestion periods.

FIGURE 3-7

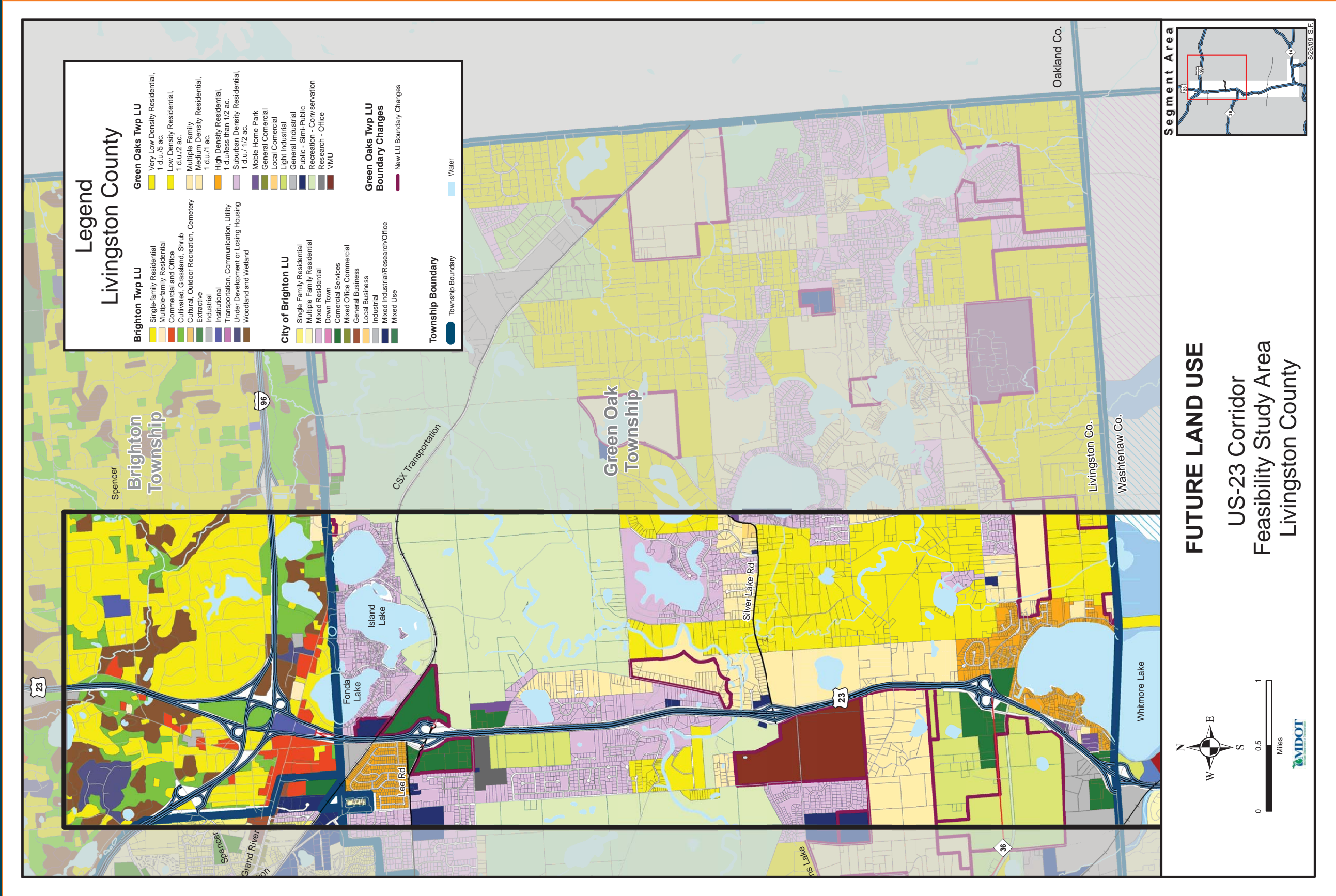




FIGURE 3-8

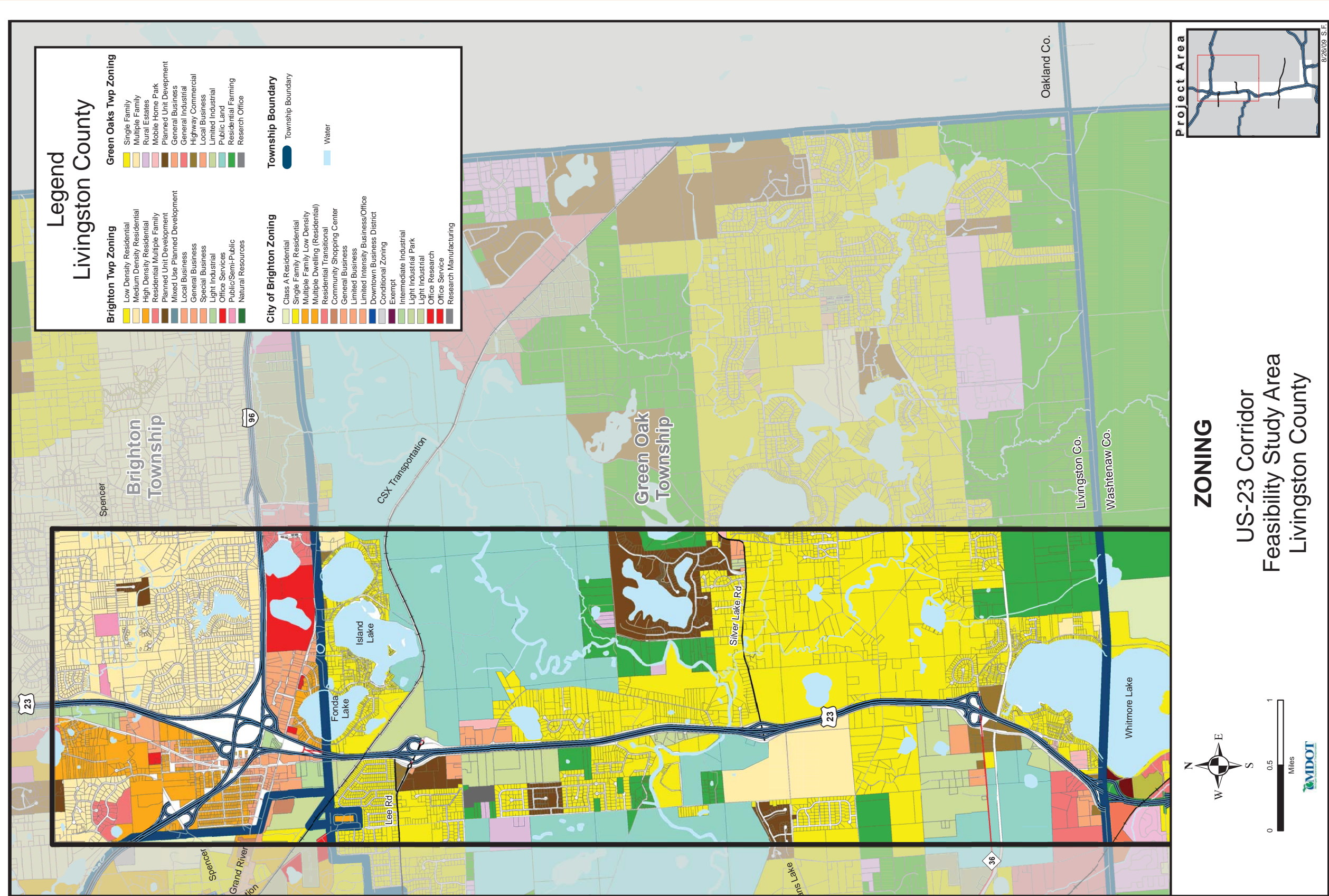




FIGURE 3-9

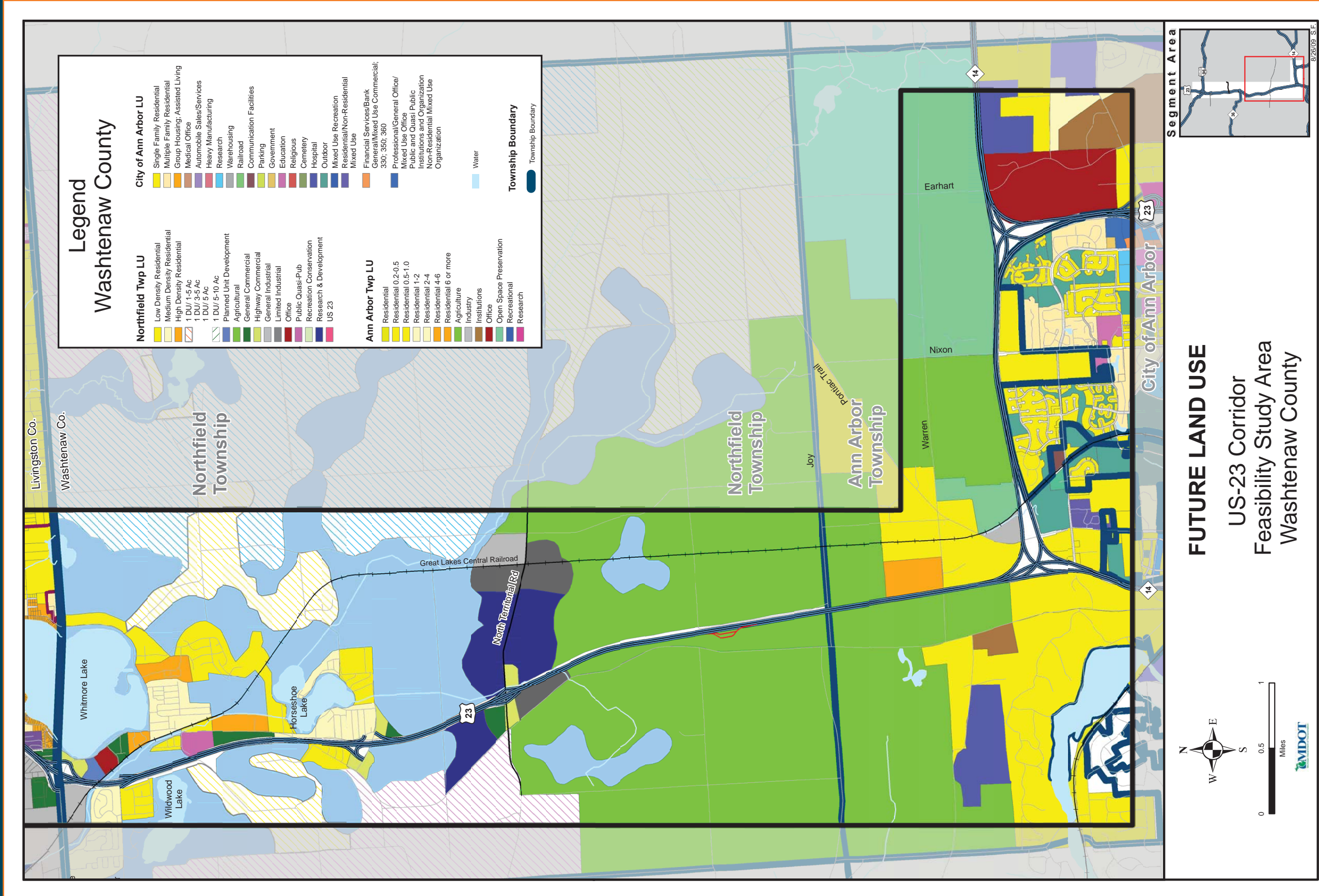
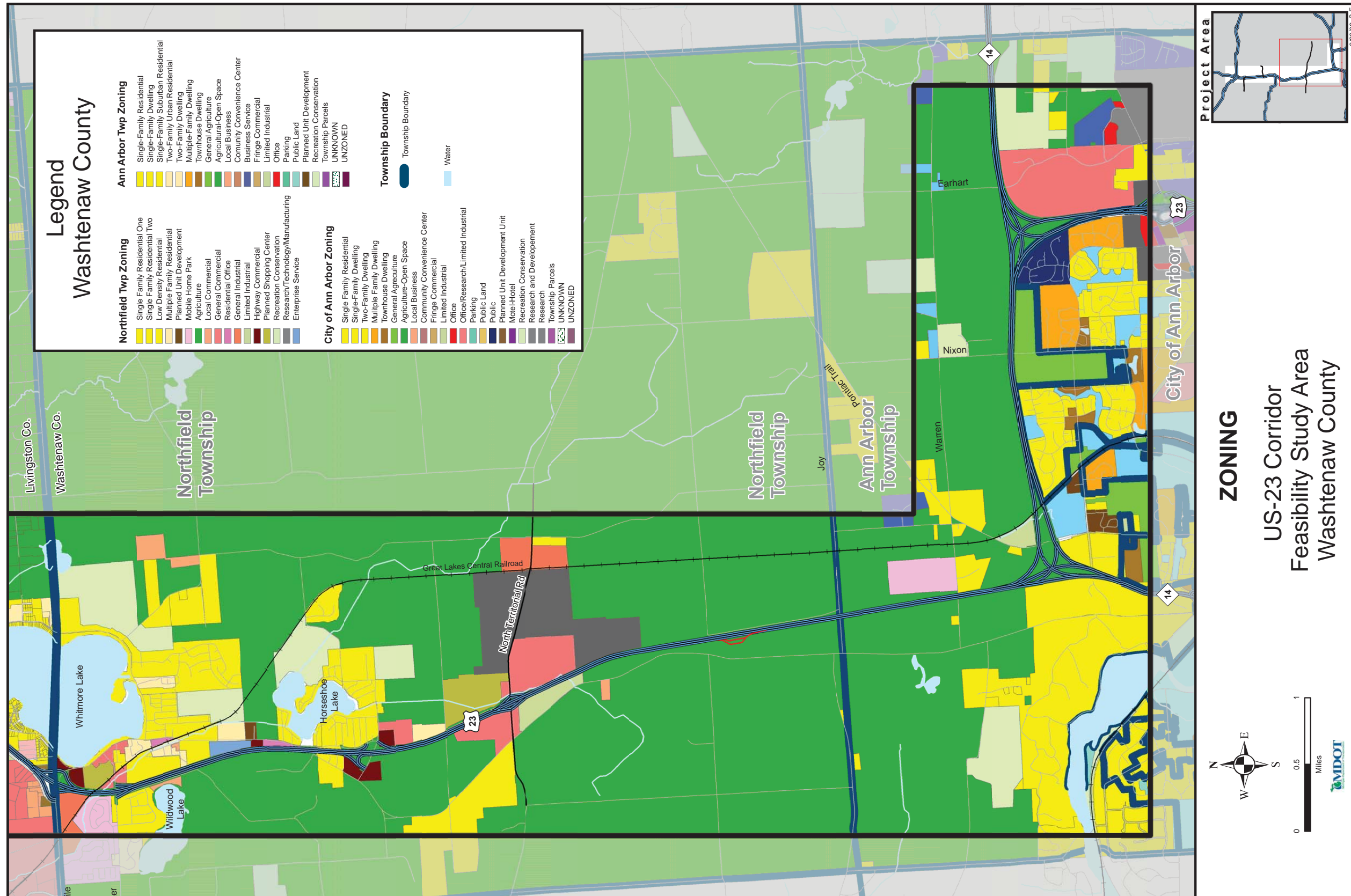




FIGURE 3-10





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