CORRADINO

FINAL REPORT

Northeast Ann Arbor Transportation Plan

Prepared for:

City of Ann Arbor Planning Department

Prepared by:

The Corradino Group, Inc.

In association with:

The Greenway Collaborative, Inc.

May 2005

City of Ann Arbor
Northeast Area Transportation Plan

Prepared by the
Ann Arbor Planning & Development Services Unit and
The Corradino Group, Inc. and
The Greenway Collaborative, Inc.

Adopted, with amendments,
as an element of the Master Plan
by the Ann Arbor City Planning Commission
on August 1, 2006

Adopted, with amendments,
as an element of the Master Plan
by the Ann Arbor City Council
on September 18, 2006

This planning process would not have been possible without the hard work and dedication provided by many. The City Planning Commission and Planning & Development Services Unit would like to acknowledge the commitment and contributions made by the Citizens and Technical Advisory Committees, the members of which are listed on Pages 6-8 of the plan. Special thanks go to Susan Kornfield, who volunteered her expertise to facilitate the many advisory committee meetings.

September 2006

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1. Introduction

Ann Arbor has achieved recognition for its exceptional quality of life. Its planning for sustainable, comfortable, and cost-effective mobility and accessibility for its residents, visitors, and workers has contributed to that condition. Transportation plans which help achieve those mobility/accessibility objectives address more than eliminating congestion and reducing travel delay. They address the community's vision for a future which stresses multimodal travel options.

Looking southwest at intersection of Plymouth and Nixon.

November 2003

The Ann Arbor City Planning Commission is updating the plan for the Northeast Area of Ann Arbor (Figure 1-1). Once adopted, this plan will serve as a blueprint for the development of land in a manner that meets the vision of the entire community. The northeast area not only contains most of the undeveloped land in Ann Arbor, but also is adjacent to rapidly developing townships of Washtenaw County outside of the City. So, alterations in density, placement of open space, and design of employment and retail centers must be reviewed for their implications for traffic, non-motorized mobility, and transit suitability.

The Northeast Area Transportation Plan was initiated in July 2001 to evaluate the combined traffic impact of the planned, unplanned, proposed, and yet-to-be-proposed development and compare it with existing and potential infrastructure in the Northeast Area. Adding lanes of traffic is the least desirable solution in the eyes of residents.

Particular attention was paid to evaluating traffic movement and safety between M-14/U.S. 23 and the northside neighborhoods currently served by the Barton Drive/M-14 interchange. To do so, an array of alternatives have been evaluated with the public. Interaction with the community in a definition of its unique values was essential to addressing the interchange's issue and the entire Northeast transportation planning process. It enabled the various publics to express their own views of the relative importance of the critical issues against which alternatives were measured. It applies their values to measuring the impacts of each alternative against a "do-nothing" option. It provided an opportunity for the community to establish the basis of the choice of a preferred alternative.

In the end, both the Northeast Area Land Use Plan and this study, the Northeast Ann Arbor Transportation Plan (NEATP), encourage the use of non-auto trips. This means placing additional emphasis on public mass transit and ride sharing, non-motorized transportation and additional Travel Demand Management (TDM) techniques. For the plan to be effective, it must meet community goals and have widespread community support. This Final Report of the Northeast Ann Arbor Transportation Plan Study demonstrates the steps taken to accomplish those objectives.

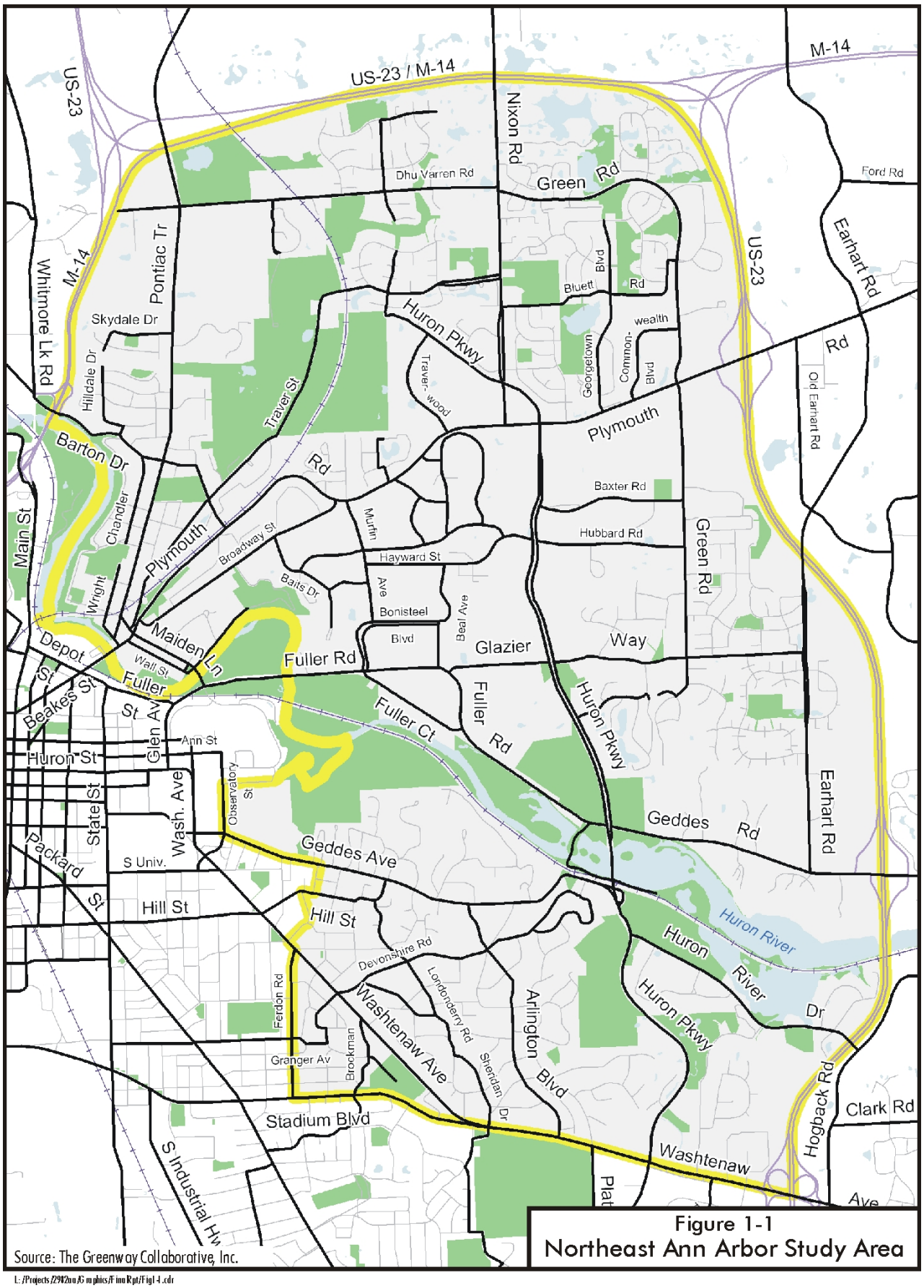

Figure 1-1
Northeast Ann Arbor Study Area

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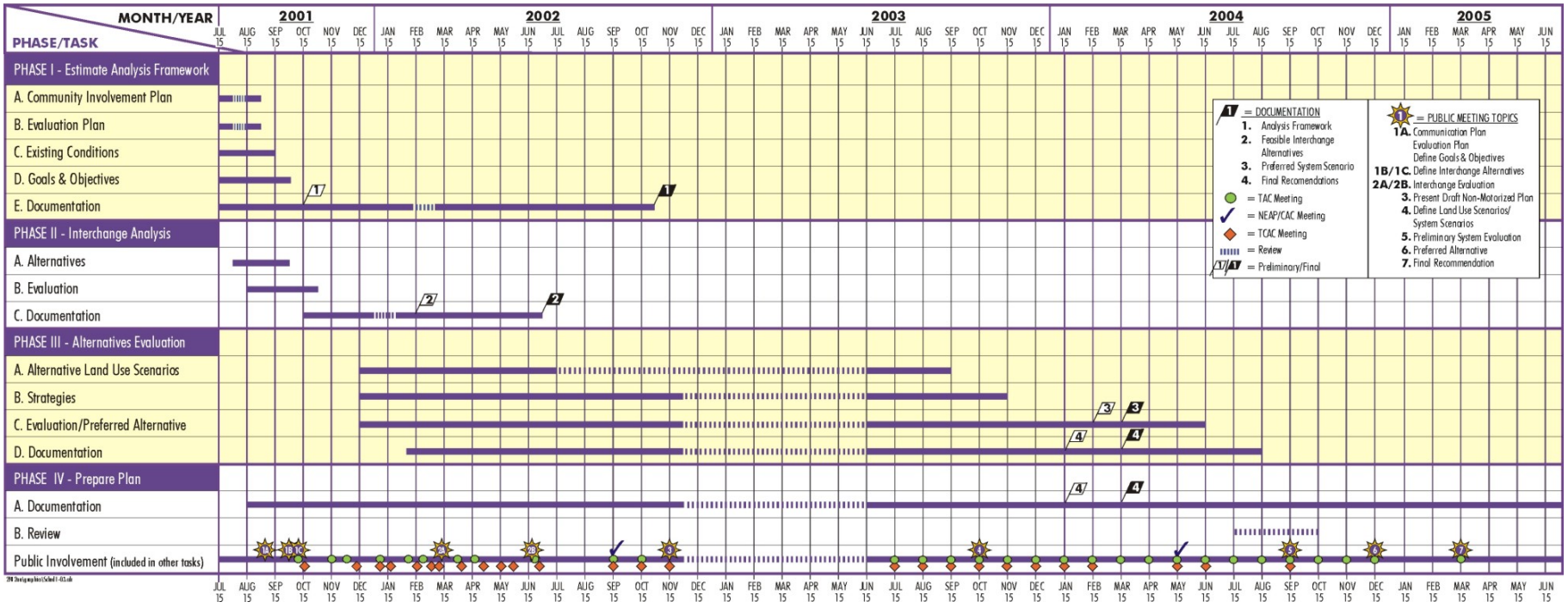
1.1 Planning Process

This project, comprised of four phases, began in the summer of 2001 (Figure 1-2). (The Phase/Tasks in the Scope of Work are listed in the leftmost column of Figure 1-2. The Scope of Work is available upon request at the City of Ann Arbor Planning Department.) It addressed the framework for community involvement (Phase I) and the evaluation of how to address changes to the M-14/Barton Drive interchange (Phase II). Because of the time required to establish the new TransCAD transportation modeling system, the project schedule was extended. Awaiting the new modeling platform allowed an extensive amount of time to be dedicated to establishing goals, objectives, and evaluation factors. Also, regional socioeconomic data were reviewed and updated by the City of Ann Arbor to focus on the city, particularly the northeast area.

To maintain the momentum of the project while waiting on the new model, a decision was made to develop in "layers" the future transportation system for northeast Ann Arbor. The first layer was that of the non-motorized component. This was especially important to ensure that this component of the plan was not overshadowed by the highway and transit components which often dominate an urban area transportation plan. When the new model was available, it included the first interactive modal split model to address transit's dynamic role in the overall transportation system. With the modal split model and new socioeconomic data in place, the transit and roadway "layers" were then established. All components of this future transportation system were developed with significant public input.

This document presents the content and results of each of the analysis phases of the project. The NEATP Final Report is the product of Phase IV. The first part of Sections 3 through 6 summarizes the results of the work presented there. They are the "yellow" sheets. A standalone summary is also available.

Figure 1-2
Northeast Ann Arbor Transportation Plan
Schedule
(revised November 2004)



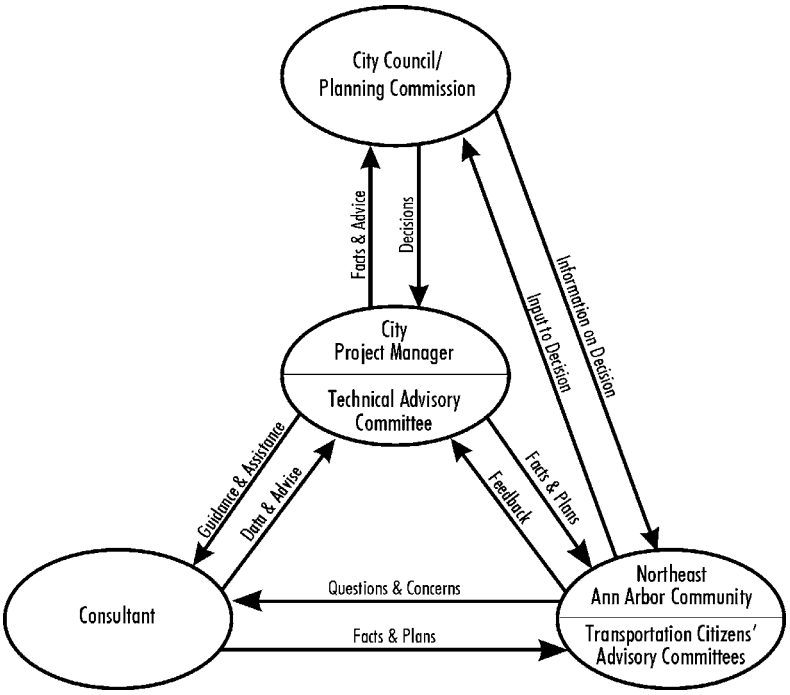
2. Community Involvement Process (CIP)

The Community Involvement Process (CIP) of the Northeast Ann Arbor Transportation Plan involved communicating with the City; with project-related Technical and Citizens' Advisory Committees; with key stakeholders affected by the project; and, just as important, communicating with the public at large. A Web site on which all project documentation was available, as well as a telephone hotline, allowed continued public input to the project.

2.1 CIP Structure

Perhaps the single, most significant step toward successful completion of this study is the decision-making process. Figure 2-1 identifies the structure used on the NEATP. Four key "players" are depicted: the City, the Technical Advisory Committee (TAC); the community, including the Transportation Citizens' Advisory Committee (TCAC); and, the consultant. The makeup of each group is presented first, followed by the role of each.

Figure 2-1
Organization for Decision Making



The Technical Advisory Committee (TAC) is a standing group of representatives of various agencies with specific technical expertise in areas like university planning, roadway engineering, traffic engineering, non-motorized use/ planning, environmental analysis, and the like. In addition, representatives of adjoining jurisdictions and the Citizens Advisory Committee participated in the TAC. The TAC membership is shown in Table 2-1.

Table 2-1
Northeast Ann Arbor Transportation Plan
Membership of the Technical Advisory Committee (TAC)

Organization	Name	Category of Representation
Ann Arbor Charter Township	Mike Moran	Committee Member
Ann Arbor Transportation Authority	Chris White	Committee Member
City of Ann Arbor – Environmental Services	Matt Naud	Resource Person
City of Ann Arbor – Parks	Amy Kuras	Resource Person
City of Ann Arbor – Planning	Jeff Kahan	Resource Person
City of Ann Arbor – Planning	Wendy Rampson	Project Manager
City of Ann Arbor – Planning	Matt Kowalski	Resource Person
City of Ann Arbor – Project Management	Les Sipowski	Committee Member
City of Ann Arbor – Project Management	Homayoon Pirooz	Resource Person
City of Ann Arbor – Safety Services	Brad Hill	Committee Member
City Planning Commission	James D'Amour	Committee Member
Environmental Protection Agency	Mark Coryell	Committee Member
Federal Highway Administration	Ron Krauss[1]	Committee Member
Michigan Department of Transportation – TSC	Kelby Wallace[2]	Committee Member
Michigan Department of Transportation – University	Kari Andrewes	Committee Member
MDOT Planning	Todd Kaufman	Committee Member
NEAP Citizens Advisory Committee	Kate Pepin	Committee Member
NEAP Citizens Advisory Committee	Lynne Wolff	Committee Member
Southeast Michigan Council of Governments	Sharon Rose	Committee Member
University of Michigan	Sue Gott[3]	Committee Member
University of Michigan	Joe Grengs[4]	Committee Member
Village of Barton Hills	Cheryl Mackrell	Committee Member
Washtenaw Area Transportation Study	Terri Blackmore	Committee Member
Washtenaw County Road Commission	Roy Townsend	Committee Member
Washtenaw County Road Commission	Ken Reiter	Resource Person
Washtenaw County Road Commission	Steve Puuri	Resource Person

[1]Replaced Ron Hatcher
[2]Replaced Brenda O'Brien
[3]Replaced Fred Mayer
[4]Replaced Jonathon Levine

The Transportation Citizens' Advisory Committee (TCAC) was formed specifically for the Northeast Ann Arbor Area Transportation Plan. Membership was open to anyone who chose to be involved. More than 100 people eventually enlisted in the TCAC (Table 2-2). And the group determined a facilitator was needed to ensure a balanced discussion. Susan Kornfield, an attorney specializing in mediation, was chosen as the facilitator following interviews by the TCAC. She served the TCAC at every one of its meetings for the next three years.

Table 2-2
Northeast Ann Arbor Transportation Plan
Membership of the Transportation Citizens' Advisory Committee (TCAC)

Name	Notes
Jean Carlberg	City Council
Tobi Hanna-Davies	City Council
Bob Johnson	City Council
Joan Lowenstein	City Council
Mike Reid	City Council
Joe Upton	City Council
Sandy Arlinghaus	City Planning Commission
Braxton Blake	City Planning Commission
James D'Amour	City Planning Commission
Bill Hanson	City Planning Commission
Kevin McDonald	City Planning Commission
Ethel Potts	City Planning Commission
Evan Pratt	City Planning Commission
Steve Thorp	City Planning Commission
Donna Tope	City Planning Commission
Barry Johnson	Northeast Area Plan CAC
Kate Pepin	Northeast Area Plan CAC
Phares Whinney	Northeast Area Plan CAC
Lynne Wolff	Northeast Area Plan CAC
Parma Yarkin	Northeast Area Plan CAC
Jan Adams-Watson	Citizen
David Ballard	Citizen
Brad Bates	Citizen
Astrid Beck	Citizen
Bruce Benz	Citizen
Tina Bowen	Citizen
Rachelle Bradfield	Citizen
Carolyn Brink	Citizen
Ed Bruening	Citizen
Jennifer Burris	Citizen
Susan Butterwick	Citizen
Ray Caleca	Citizen
Sheila Calhoun	Citizen
Linda Carr	Citizen
Clark Charnetski	Citizen
Ken Clark	Citizen
Jeffrey Colton	Citizen
Karen Cooper	Citizen
Laura Crane	Citizen
Connie Cronenwett	Citizen
Jeff Dec	Citizen
Mary DeVries	Citizen
Linda Dintenfass	Citizen
Karen Donahue	Citizen
Helen Dorsey	Citizen
Joyce Dwiggins	Citizen

Name	Notes
Laurel Erickson	Citizen
Brian Etter	Citizen
Linda Etter	Citizen
Marcia Feingold	Citizen
Patricia Fischer	Citizen
Chris Fraleigh	Citizen
Amalia Gobetti	Citizen
Jack Gobetti	Citizen
Paul Greeno	Citizen
Bill Hanson	Citizen
Freda Herseth	Citizen
Dan Hill	Citizen
Phyllis Hill	Citizen
Fred Hoxie	Citizen
George Jacobi	Citizen
Fritz Kaenzig	Citizen
Ralph Katz	Citizen
Donna Kelly	Citizen
Elaine Kerr	Citizen
Paul Kopper	Citizen
Kenneth Koral	Citizen
Sharon Liu	Citizen
Ann Lund	Citizen
Laura MacKay	Citizen
Cheryl Mackrell	Citizen
John MacKrell	Citizen
Jerry Malloy	Citizen
Amy Marcinkowski	Citizen
Ed Miller	Citizen
James Mitchell	Citizen
Tom Nicely	Citizen
Tove Nielsen	Citizen
Kevin Novak	Citizen
Arthur Nusbaum	Citizen
Sheryl Olson	Citizen
Bruce Oshaben	Citizen
Roberta Palmer	Citizen
John Pastula	Citizen
Randolph Perry	Citizen
Betty Peters	Citizen
Cloyd Peters	Citizen
Denise Plaisier	Citizen
Michael Prozinski	Citizen
Gene Ragland	Citizen
Marge Ragland	Citizen

Table 2-2 (continued)
Northeast Ann Arbor Transportation Plan
Membership of the Transportation Citizens' Advisory Committee (TCAC)

Name	Notes
Susan Rezniceck	Citizen
James Rice	Citizen
Sandra Rice	Citizen
Jean Robinson	Citizen
Stephani Schupbach	Citizen
Melanie Shell-Weiss	Citizen
Bryan Skib	Citizen
Michael Spaly	Citizen
David Sponseller	Citizen
Tom Taylor	Citizen
Carolyle Towers	Citizen
Stan Towers	Citizen
Caroline Tustian	Citizen
Helmut Unger	Citizen

Name	Notes
Dan Walters	Citizen
Ross Ward	Citizen
Kate Warner	Citizen
Laura Weingartner	Citizen
Carlos Weiss	Citizen
Kim Whitaker	Citizen
Jim Wilkes	Citizen
James Wines	Citizen
Beverly Wood	Citizen
Fran Wright	Citizen
Barton Yeary	Citizen
Peter Zeman	Citizen
Deborah Zimperle	Citizen

The Ann Arbor City Council, under advisement by the City Planning Commission, has the responsibility to make decisions on transportation alternatives to be implemented in northeast Ann Arbor. In the case of improvements to state and federal roads, the Michigan Department of Transportation has a role once a recommendation is made by the City Council.

The City's project manager and the TAC were responsible for overseeing the actions of the consultant and providing leadership for all activities and the dialogue among the various publics and agencies affected by the project.

The consultant supported the CIP and conducted much of the technical work. It assisted the City and the TCAC in conducting all meetings. The consultant developed and executed the evaluation of all options, and assisted in preparing the draft and final recommendations of elements to be included in "layers" of the plan.

Two citizens' groups were engaged in the study process: the Northeast Area Plan Citizens Advisory Committee and the Northeast Area Transportation Plan Citizens Advisory Committee. Because the CACs are comprised of citizens from throughout the study area, they were in a unique position to have guided the development and evaluation of alternatives and the final selection of the format and content of all public discussions.

The community was engaged in eight rounds of public meetings (Table 2-3).

Table 2-3
Northeast Ann Arbor Transportation Plan
Meetings of Technical Advisory Committee (TAC)
Transportation Citizens Advisory Committee (TCAC)
and Public[1]

Year	Month	TAC Meeting	TCAC Meeting	Public Workshops
2001	July	July 12: Project "Kickoff"		
2001	August	August 8: Study Progress		
2001	September	September 14: Study Progress		September 5: Project "Kickoff"
				September 25: M-14/Barton Drive Issues
2001	October	October 17: Review Public Meeting Input	October 17: Project "Kickoff"	October 10: M-14/Barton Drive Issues
2001	November	November 8: M-14/Barton Drive Workshop		
2001	December	December 12: Preliminary List of M-14/Barton Drive Alternatives	December 12: List of M-14/Barton Drive Alternatives	

Year	Month	TAC Meeting	TCAC Meeting	Public Workshops
2002	January	January 3: Review of Upcoming Public Meeting	Review of TCAC Operating Procedures	
		January 17: Study Progress	January 16: Review of Evaluation of M-14/Barton Drive Preliminary Alternatives	
2002	February	February 7: Review Public Meeting Input	February 13: Review of Public Meeting Input	February 7: M-14/Barton Drive Evaluation of Preliminary Alternatives
		February 21: Review Public Meeting Input	February 21: Develop Goals and Objectives	
2002	March	March 28: Study Progress		
2002	April	April 18: Study Progress	April 24: Develop Goals and Objectives	
2002	May	May 16: M-14/Barton Drive Evaluation of Practical Alternatives	May 15: Develop Goals and Objectives	
			May 29: Develop Goals and Objectives	
2002	June	June 26: Take Action on M-14/Barton Drive Recommendation	June 26: Take Action on M-14/Barton Drive Alternatives	June 19: Evaluation of M-14/Barton Drive Final Alternatives
2002	October	October 1: Study Progress	October 30: Review Non-motorized Plan Concepts	
		October 29: Study Progress		
2002	November			November 20: Transit Planning Workshop

Table 2-3 (continued)
Northeast Ann Arbor Transportation Plan
Meetings of Technical Advisory Committee (TAC)
Transportation Citizens Advisory Committee (TCAC)
and Public[1]

Year	Month	TAC Meeting	TCAC Meeting	Public Workshops
2003	September	September 18: Review Non-motorized Plan Concepts	September 24: Review Upcoming Public Meeting on Non-motorized Plan Concepts	
2003	October			October 30: Preliminary Review of Non-motorized Transportation Recommendations

Year	Month	TAC Meeting	TCAC Meeting	Public Workshops
2004	February	February 18: Review Land Use Implications	February 18: Review of Land Use Implications	
2004	June	June 23: Review of Transit and Roadway Analyses	June 23: Review of Preliminary Transit and Roadway Results	
2004	September			September 30: Preliminary Transit Improvement Concepts and Roadway Modification Proposals
2004	December	December 2: Prepare for Upcoming Public Meeting on All Components of NEATP	December 2: Prepare for Upcoming Public Meeting on All Components of NEATP	December 15: Review of All Components of Transportation Plan

Year	Month	TAC Meeting	TCAC Meeting	Public Workshops
2005	March	March 23: Review and Approval of Draft Final Report	March 23: Review and Approval of Draft Final Report	

[1]Notes are included in Appendices A, B and C, respectively.
Source: The Corradino Group of Michigan, Inc.

2.1.1 Meeting 1: Introduce Project

The City/consultant team introduced the project's work program/schedule and presented an overview of transportation issues (like Level of Service and use of non-motorized transportation) on September 5, 2001. (Notes of each meeting are included in Appendix A.) Goals and objectives were reviewed and a preliminary list of evaluation factors was discussed.

2.1.2 Meeting 2: Define Interchange Alternatives

The public discussed the alternatives for addressing the safety and neighborhood impacts associated with the Barton Drive/M-14 interchange on September 25 and October 10, 2001. The

ideas generated at this meeting is led to the development of illustrative alternatives to be tested for their ability to provide access to the northeast area.

2.1.3 Meeting 3: Evaluate Preliminary Interchange Alternatives

The results of the consultant's data analysis of 16 illustrative alternatives of the Barton Drive/M-14 interchange were discussed with the public on February 7, 2002. This input was used to select the practical alternatives to be evaluated.

2.1.4 Meeting 4: Evaluate Final Interchange Alternatives

The results of the consultant's data analysis of the practical alternatives to change the Barton Drive/M-14 interchange were reviewed with the public on June 19, 2002. The public meeting was followed by meetings on June 26, 2002 of the TAC and the TCAC, at which a recommendation selecting one alternative was approved (Table 2-1).

2.1.5 Meeting 5: Present Northeast Non-motorized Transportation Concepts

The results of the consultant's evaluation and the preliminary recommendations of the non-motorized component of the plan were presented for public comment on October 30, 2003.

2.1.6 Meeting 6: Present Preliminary Transit Improvement Concepts and Roadway Modification Recommendations

The results of the preliminary transit improvement and roadway modification proposals were presented to the public on September 30, 2004.

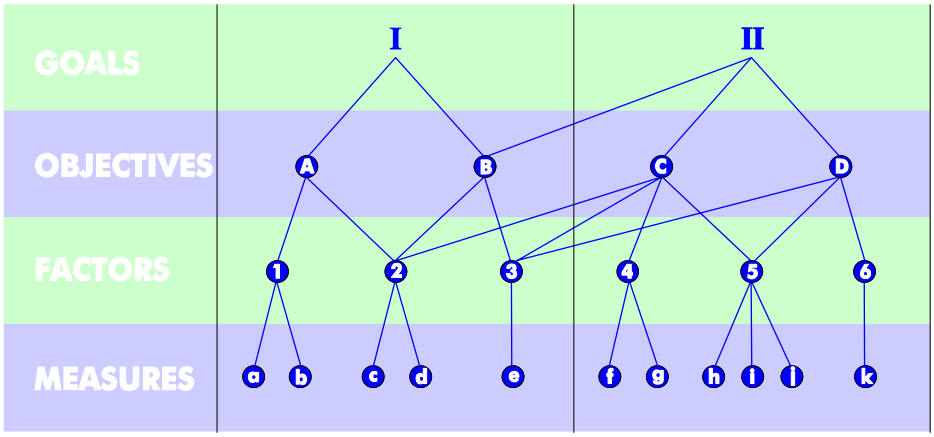
2.1.7 Meeting 7: Present All Components of the Transportation Plan

The public was involved in a review of all components of the proposed NEATP on December 15, 2004.

2.2 Goals, Objectives and Evaluation Factors

A community-based study process typically begins with defining goals and objectives, evaluation factors, and performance measures. The inter-relationship among these elements is shown on Figure 2-2. Defining these items was the primary subject of four meetings of the TCAC (refer to Table 2-3). The result of that work is the set of Goals outlined below. Tables 2-4 through 2-9 show Goals and Objectives and their linkage to evaluation factor(s) related to each goal. The definition of each evaluation factor is included in Appendix D.

Figure 2-2
Conceptual Relationship Among Goals, Objectives, Evaluation Factors, and Performance Measures



2.2.1 Northeast Area Transportation Goals

The project's Citizens Advisory Committee developed a set of goals by which all proposed transportation improvements were measured. The goals are:

First Goal: Provide appropriate access and mobility, with minimal negative impacts, for all people and goods.

Second Goal: Protect and enhance the natural environment and the human, residential and built environment.

Third Goal: Promote a safe and secure transportation system.

Fourth Goal: Invest in transportation infrastructure in a manner consistent with other goals.

Fifth Goal: Promote cooperation among the City of Ann Arbor and other governmental entities, particularly the surrounding townships and municipalities and the University of Michigan, in a manner consistent with the other goals.

Sixth Goal: Meaningful public input and involvement will be required of any transportation project in the northeast area.

Table 2-4
Linkage of First Goal of NEATP to Evaluation Factors

First Goal:	**Provide appropriate access and mobility, with minimal negative impacts, for all people and goods.**	
	Objective A:	Minimize vehicle miles and vehicle hours spent traveling.
	Objective B:	Increase the occupancy rate for motorized modes.
	Objective C:	Reduce barriers to the use of the transportation system, especially its non-motorized components by facilitating pedestrian and bicycle access on public rights-of-way.
	Objective D:	Improve bicycle access on public roads.
	Objective E:	Increase the number of bus centers and commuter lots and improve their distribution and efficiency throughout the SEMCOG region.
	Objective F:	Increase the contiguity among public transportation services and non-motorized transportation modes.
	Objective G:	Implement travel demand management plans to reduce commuter traffic and congestion.
	Objective H:	Increase mode choices and their coordination for the movement of goods and people.
	Objective I:	Encourage the development of commuter rail services, particularly the Detroit/Ann Arbor/Lansing proposal, on the Norfolk Southern and Ann Arbor Railroads.
	Objective J:	Provide direct and safe connections for pedestrians, bicyclists and motorists between adjoining neighborhoods and between neighborhoods and the primary road system to reinforce a sense of "connectedness" and better distribute traffic.
Applicable Evaluation Factors:		
• Community Cohesion		
• Connectivity/Time of Travel		
• Mode Choice		
• Level of Service		

Source: The Corradino Group of Michigan, Inc.

Table 2-5
Linkage of Second Goal of NEATP to Evaluation Factors

Second Goal: **Protect and enhance the natural environment and the human, residential and built environment.**

Objective A: Produce short-term and long-term reductions in air, water and noise pollution.

Objective B: Produce long-term reductions in energy consumption and greenhouse gas emissions.

Objective C: Reduce transportation support for urban sprawl, and reduce negative effects of the transportation system on Ann Arbor, including the impacts on:

- Agricultural, open space and recreational resources
- Historic sites and districts
- Wetlands and natural habitats
- Households and neighborhoods
- Commercial and industrial facilities

Objective D: Preserve and enhance the aesthetic, natural and cultural qualities of the region, especially parks and open spaces.

Objective E: Increase the use of public transportation and ridesharing.

Objective F: Reduce the risks associated with the transportation of hazardous materials.

Objective G: Encourage the development and use of non-motorized as well as less-polluting motorized facilities and programs.

Objective H: Preserve and enhance the integrity of local neighborhoods, including greenspace, pedestrian walkways and playgrounds.

Applicable Evaluation Factors:

- Air Quality
- Community Cohesion
- Connectivity/Time of Travel
- Land Acquisition/Displacements
- Noise
- Mode Choice
- Water Quality
- Wetlands
- Noise
- Open Space
- Environmental Justice

Source: The Corradino Group of Michigan, Inc.

Table 2-6
Linkage of Third Goal of NEATP to Evaluation Factors

Third Goal:	**Promote a safe and secure transportation system.**	
	Objective A:	Reduce the number and severity of traffic crashes.
	Objective B:	Increase the safety and security of the transportation system, both motorized and non-motorized and its users.
	Objective C:	Reduce conflicts between rail, auto, transit and non-motorized modes.
	Objective D:	Ensure traffic arteries are friendly to non-motorized transportation.
	Objective E:	Improve pedestrian and bicycle connections between commercial centers and surrounding neighborhoods, between local neighborhoods, and within business/commercial centers.
	Objective F:	Improve accurate collecting and reporting of all transportation system conflicts.
Applicable Evaluation Factors:		
• Level of Service by Mode		

Table 2-7
Linkage of Fourth Goal of NEATP to Evaluation Factors

Fourth Goal:	**Invest in transportation infrastructure in a manner consistent with other goals.**	
	Objective A:	Give priority to preservation and maintenance of the existing road system, as opposed to constructing new roads and widening existing roads.
	Objective B:	Develop a financially responsible plan that allocates available resources.
	Objective C:	Encourage creative public and private partnerships in the transportation system.
	Objective D:	Develop a cost-effective transportation system that improves the city's quality of life economically, socially and environmentally.
	Objective E:	Ensure that our transportation system does not prioritize non-residents over residents.
	Objective F:	Improve public transportation and non-motorized facilities, including pedestrian access to public transportation.
Applicable Evaluation Factors:		
• This goal will be met once the draft plan has been refined. At that point in the planning process, the plan's cost and financing plan will be developed for review and refinement.		

Source: The Corradino Group of Michigan, Inc.

Table 2-8
Linkage of Fifth Goal of NEATP to Evaluation Factors

Fifth Goal:	**Promote cooperation among the City of Ann Arbor and other governmental entities, particularly the surrounding townships and municipalities and the University of Michigan, in a manner consistent with the other goals.**
	Objective A: Encourage increased cooperation between the City of Ann Arbor and major employers to reduce commuter traffic and congestion.
Applicable Evaluation Factors:	
• This goal will be met in the plan's implementation process.	

Table 2-9
Linkage of Sixth Goal of NEATP to Evaluation Factors

Sixth Goal:	**Meaningful public input and involvement will be required of any transportation project in the Northeast Area.**
	Objective A: Open-membership citizen advisory committee will be required of any transportation project within the Northeast Area having a budget cost of $500,000 or more in 2002 dollars.
Applicable Evaluation Factors:	
• This goal will be met in the plan's development and later in the implementation process.	

Source: The Corradino Group of Michigan, Inc.

3. M-14/Barton Drive Interchange Analysis

Summary

The M-14/Barton Drive interchange, when constructed more than 40 years ago, was to be "temporary" until it could be relocated north to connect with Huron Parkway. Huron Parkway was never completed to M-14, and the Barton/M-14 interchange still exists today in its original form. Over the years, concerns have been raised about the interchange, its traffic effects on surrounding areas, and ways to change it.

M-14/Barton Drive is recognized as being an interchange which does not meet current design standards, particularly the east side ramps (2000 Average Daily Traffic = 4,757). With the interchange in the "sag" at the bottom of a steep vertical curve, crashes are frequent when vehicles from the south exit the very tight curve of the off-ramp to Barton Drive. Likewise, traffic going north on M-14 from the east side on-ramp must first come to a stop before going uphill and, at the same time, merge with existing fast-moving traffic. The combination of these conditions, plus a grant application to relocate the interchange, caused the City of Ann Arbor Council to pass a resolution in 1997 calling for a special study of the interchange. Soon thereafter, the U.S. Congress approved the federal transportation funding bill known as TEA-21, which included a special study of the freeway access alternatives to the M-14/Barton Drive interchange.

In response, the City authorized an analysis of alternatives to address the needs of the M-14/Barton Drive interchange which was conducted at two levels of detail. The first-level screening involved almost two dozen Illustrative Alternatives, plus No Action (Figure 3S-1). Key considerations upon which the analysis focused were possible impacts to historic properties, public parkland, or wetlands. Another key consideration is whether a proposed improvement can meet the design standards applied by the Michigan Department of Transportation (MDOT).

The first review of the Illustrative Alternatives Evaluation was conducted by the Technical Advisory Committee on January 3, 2002 (see Appendix A). After reviewing the effects of each on parkland and wetlands and compliance with MDOT standards, the TAC reached these conclusions (Table 3S-1):

1. Eight alternatives do not appear to be feasible due to flaws in at least two areas of primary concern:

    - Alternative 3: Remove the East Portion of the Barton Drive Interchange/Add Partial Nixon Road Interchange. Flaws in wetlands and MDOT standards.
    - Alternative 4: Remove Entire Barton Interchange/Add Full "Flopped Diamond" Nixon Interchange. Flaws in wetlands and MDOT standards.

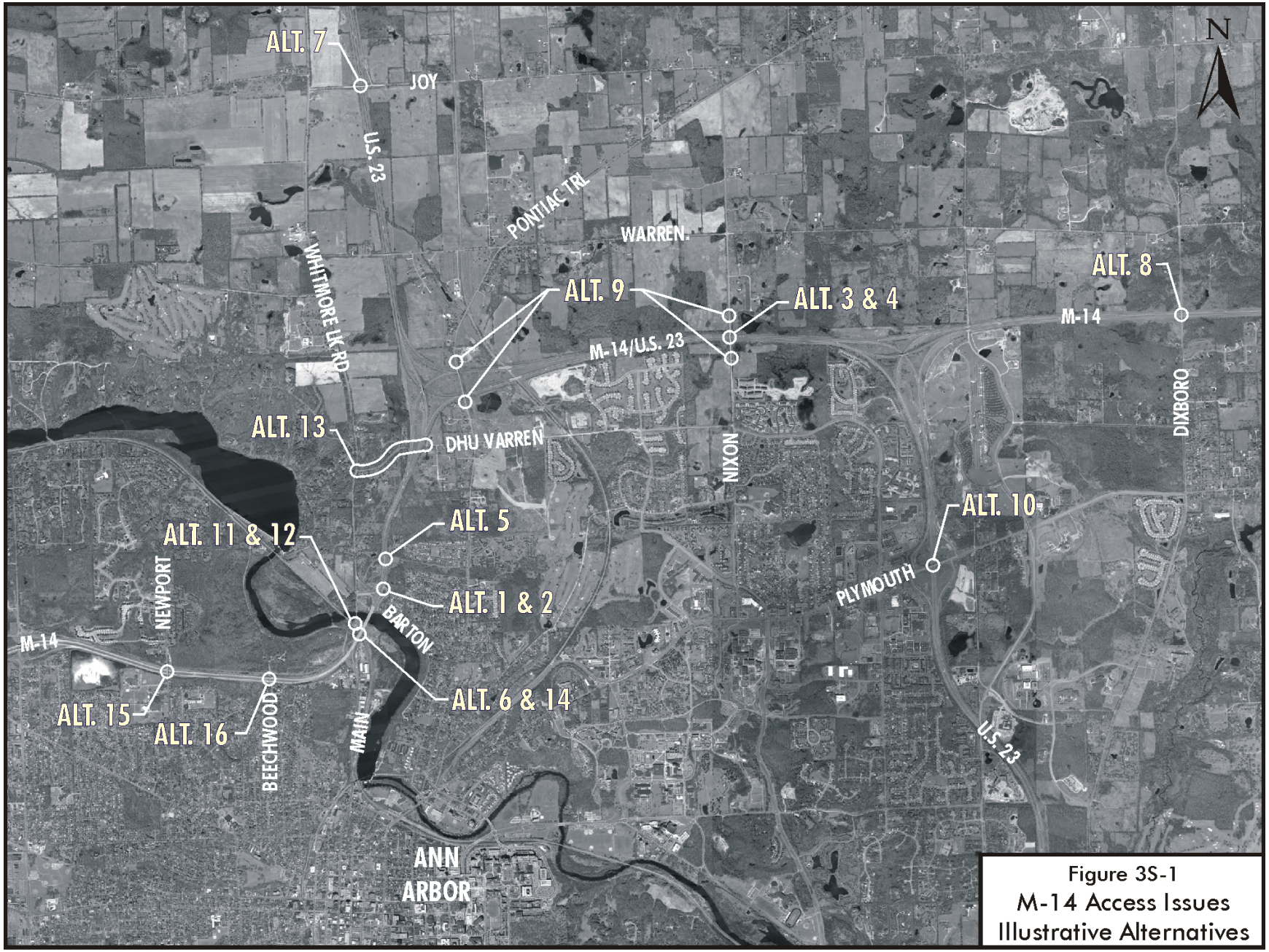


Figure 3S-1
M-14 Access Issues
Illustrative Alternatives

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Table 3S-1
Northeast Ann Arbor Transportation Plan
M-14 Access Issues
Key Considerations

Key	Illustrative Alternative															
	Fix Barton	Remove Barton	Partial Nixon	A Full Nixon	Greenway	Full Main w/o Barton	Joy	Dixboro	Front Rds.	Fix Plymouth	Whit/Main w/Barton	Whit/Main w/o Barton	Dhu Varren	Full Main w/Barton	Newport	Beechwood
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8	Alt. 9	Alt. 10	Alt. 11	Alt. 12	Alt. 13	Alt. 14	Alt. 15	Alt. 16
Avoids Direct Parklands Effects	●	●	●	●	●	●[1]	●	●	●	●	●[2]	●[2]	●	●[1]	●	●
Avoids Direct Wetlands Effects	●[3]	●	●	●	●[3]	●	●	●[3]	●	●[3]	●	●	●	●	●	●
Meets MDOT Standards	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

[1]Option A = 0.5 acres; Option B = 4 acres.
[2]Option A = 1 acre; Option B = 3.5 acres.
[3]One option is 2 acres or less.

Legend:

● Yes

● No

○ May meet "urban" standards; does not meet "rural" standards.

- Alternative 5: Remove the Entire Barton Interchange/Add Greenway Interchange. Flaws in wetlands and MDOT standards.
- Alternative 8: Remove Entire Barton Interchange/Add Dixboro Interchange. Flaws in wetlands and MDOT standards.
- Alternative 9: Remove Entire Barton Drive Interchange/Add Frontage Roads Between Pontiac and Nixon. Flaws in parklands and wetlands.
- Alternative 14: Develop a full interchange at Main Street while retaining the Barton Drive interchange. Flaws in parklands and MDOT standards.
- Alternative 15: Develop a new Newport Road interchange while retaining the Barton Drive interchange. Flaws in parklands, wetlands and MDOT standards.
- Alternative 16: Develop a new Beechwood Road interchange with M-14 while removing the Barton Drive interchange. Flaws in parklands, wetlands and MDOT standards.

2. Fixing Plymouth Road (Alternative 10) is an improvement which was already committed to by MDOT. It was included in the transportation network, but removed from the next level of alternatives evaluation.

3. The Joy interchange proposal (Alternative 7) and the Dhu Varren bridge (Alternative 13) should be dropped from further consideration because they are not cost-effective, i.e., that their transportation service effects for the City of Ann Arbor are very much the same as taking no action but require an investment of between $8.0 and $13.0 million.

4. Keeping open only the west side of the Barton Drive interchange should be included for further analysis.

5. If the option listed in Item 4 is not possible and the entire Barton interchange is closed, then connecting Whitmore Lake Road to Main Street should be considered further while minimizing the parkland effects through refinements to that proposal's layout. The parkland impacts are likely to be examined differently at the local level if this proposal for Whitmore Lake Road becomes a non-federal investment.

6. If the Barton Drive/M-14 interchange remains open, the proposal to connect Whitmore Lake Road to Main Street is not cost-effective (Alternative 11).

7. If the entire Barton Drive/M-14 interchange were closed, the full Main Street interchange is an option requiring further study (Alternatives 6A and 6B). And, adding the Whitmore Lake connection to Main Street should be part of this alternative.

8. Short-term fixes for the Barton Drive interchange area, by the use of traffic control devices or by improving the design/layout of the east side ramps, should be advanced, as soon as possible, through more detailed discussion with MDOT. This is particularly important in light of the opinion by MDOT articulated at the January 3, 2002, meeting that even the application of design standards reflecting urban conditions may not allow the ramps to be changed (Appendix A).

These proposals were reviewed by the TCAC on January 9, 2002. A discussion of issues took place with no formal action taken, although suggestions were made to identify short-term improvements to the Barton interchange, particularly the east ramps (Appendix B).

The public meeting on the evaluation of the alternatives was held on February 7, 2002 (Appendix C). Input from that meeting was presented to the TAC and TCAC. The final list of alternatives to be tested was then developed.

- Alternative No. 1 – Improve the Barton Drive Interchange. Two options are to be considered to correct the substandard ramp condition on the freeway's east side[1]. Proposals that affect the east and west sides of M-14 in varying ways are to be examined.

- Alternative No. 2 – Close the Barton Interchange. In addition to examining the removal of the entire interchange (Alternative 2-A), removing only the east side of the M-14/Barton Drive interchange (Alternative 2-B) is to be evaluated.

- Alternative No. 6 – Develop a Full Main Street Interchange while Removing the Barton Drive Interchange. Two conceptual designs are to be examined from an engineering standpoint at the outset. They vary in the expected impacts on parks, business acquisitions and the like. It is noted if Alternative No. 1 or No Action were chosen, it would preclude making a full interchange at Main Street.

- Alternative No. 12 – Connect Whitmore Lake Road to Main Street while Removing the Barton Drive Interchange. Two options were to be examined originally to avoid another at-grade crossing of the Norfolk Southern rail line. The viability of this connection is also a function of whether either Alternative No. 1 or No Action is chosen. If so, Alternative No. 12 will likely not be needed nor cost-effective.

- New Alternative 17 – A combination of Alternatives 6 and 12. This proposal was developed through public input. It adds the Whitmore Lake Road-to-Main Street Connector to the proposed full interchange at Main Street/M-14 with the deletion of the Barton Drive interchange.

These options, called Practical Alternatives, are in addition to taking No Action, which is also the baseline against which the performance of the alternatives is measured.

A more detailed analysis of the Practical Alternatives was undertaken producing information like that shown on Table 3S-2 for each option. As a result, all options to Alternatives 1 (Improve the Barton Drive Interchange), 6 (Develop a Full Main Street Interchange), 12 (Connect Whitmore Lake Road to Main Street), and 17 (Combination of Alternatives 6 and 12) were not considered achievable. The potential displacements associated with Alternatives 1, 6 and 17 encouraged a search for another solution. The possible parks issues (and, to some degree, the wetlands) of Options 6 and 17 required a search for another solution. And, when the cost of each option is

[1] Separate and apart from those options, changes have been made by MDOT to make the interchange work better without major construction (i.e., without changing a ramp's design/configuration which is considered major construction).

Table 3S-2
Example of Second-Level Screening
Overall Measurement Data

Issue \ Alternative	No Action	Fix Barton		Remove Barton	
		1-A1	1-A2	1-B	1-B1
Areawide Traffic					
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall
Noise					
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall
Air Quality					
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall
Safety					
Change (crashes/yr.)	Baseline	-61	-61	-61	-61
Possible Acquisitions					
Private Residents (no.)	0	23	8	2	3[5]
Businesses (no.)	0	0	0	0	0
Vacant Land (acres)	0	2	3.4	1	0.1
Total (acreage)	0	9.5	7.0	3.2	3.8
Schools					
Direct Impact (no.)	0	0	0	0	0
Indirect Impact (no.)	0	0	0	0	0
Parks					
Direct Impact (acres)	0	0[2]	0[3]	0[4]	0[6]
Wetlands					
Direct Impact (acres)	0	2.1	3.7	3.7	3.5
Community Cohesion					
Positive Change	NA	None	None	None	None
Negative Change	NA	None	None	None	None
Cost (2002 dollars)[1]	NA	$11.5 to $18.0 million	$6.5 to $9.0 million	$8.0 to $11.0 million	$9.0 to $13.0 million

[1]Includes cost to construct road improvements, plus remove Barton ramps, plus property acquisition/relocation.
[2]Involves possible use of about 2 acres of ROW that is considered by some as a greenway.
[3]Involves possible use of about 5 acres of ROW that is considered by some as a greenway.
[4]Involves possible use of about 6.5 acres of ROW that is considered by some as a greenway.
[5]Owner of one house applying for *National Register of Historic Places* status.
[6]Involves possible use of about 8.5 acres of ROW that is considered by some as a greenway.

added to the evaluation, the consultant reached the conclusion that these alternatives are not achievable.

A key to the evaluation of alternatives is the forecast of 2020 traffic. Some may say the forecast is too low; others, that it is too high. Regardless, the forecast will be realized sooner or later. And, as that condition develops, the east side of the "temporary" Barton Drive interchange, built more than 40 years ago, is going to fail to perform its designed function, as its configuration is inadequate. As traffic builds on M-14 (a freeway-to-freeway connector serving a growing area) it will be difficult to depend on a crash-free experience at the Barton Drive on-/off-ramps. The "reputation" of the interchange will cause people to avoid it. Eventually, the density of traffic on M-14 will significantly restrict its use as intended—drivers just won't be able to freely get on/off M-14 at Barton Drive.

The consultant's findings indicated the most reasonable and prudent option to addressing the overall community needs as affected by the Barton Drive/M-14 interchange is to close the east side ramps, except the use of the on-ramp by emergency vehicles in emergency conditions.

The consultant's findings were presented to the TAC and TCAC on May 28 and 29, 2002, respectively. The public reviewed the findings on June 19, 2002. Then the TAC and TCAC each met on June 26, 2002, to take action on the findings based on public input. Each, by majority vote, recommended closing the east side of the interchange. Notes of each meeting are include in Appendix A (TAC) and Appendix B (TCAC).

Recommendation

The Ann Arbor City Planning Commission recommends the "no change option" for the M-14/Barton Drive interchange, with the exception of incremental changes to improve safety.

3.1 M-14/Barton Drive Interchange Background

The current configuration of the M-14/Barton Drive interchange is out of date in terms of modern design standards. It has east side ramps that are so tight they are the site of frequent crashes. The interchange is at the bottom of a "sag" in a vertical curve with traffic approaching at very high downhill speeds. The east side on-ramp comes to a stop even though traffic must move uphill to merge into oncoming traffic. These factors, in addition to a grant application to relocate the interchange, led the City Council to pass a resolution on May 19, 1997, that includes the following statement:

> "Because of newly raised concerns by citizens of Ann Arbor, regarding the stated location of the replacement interchange, we wish to amend our application to study the problem in its entirety, to investigate all solution options, to determine which option or combination of options is preferred with input from all stakeholders, and to construct the option(s) chosen, approved by Council. The options to be investigated include all alternative interchange locations on M-14/U.S. 23 from Maple Road to Plymouth Road, plus mass transit options, and other means of reducing commuter traffic and improving highway safety. Specific options include:
>
> 1. Constructing an interchange at Huron Parkway easement, as originally proposed; or alternatively;
> 2. Preserving the Huron Parkway easement as a "greenway" connecting Bandemer Park to Leslie Park;
> 3. Making safety improvements to the hazardous Barton/M-14 ramp; or alternatively;
> 4. Closing the Barton/M-14 ramp, with or without replacing it;
> 5. Upgrading the North Main St./M-14 interchange to a full four-way interchange;
> 6. Constructing either a full or partial interchange at Nixon Road/M-14/U.S. 23;
> 7. Establishing rail transit on the existing railroad tracks combined with park and ride lots;
> 8. Creating incentives for businesses to increase the number of employees carpooling, using public transit, and otherwise reducing commuter traffic;
> 9. Other possible interchange locations and other options suggested during the public process. The study would cost $1 million and would be completed with 18 months of approval of funds. The remaining funds would be used for construction of the solution(s) chosen. The desire is that a comprehensive transportation planning process be undertaken which could be a model for projects which engender significant public interest."

Then, at the City's urging, the U.S. Congress placed into the federal transportation funding bill known as the Transportation Equity Act of the 21st Century funding and the following language:

> "Conduct a study of all possible alternatives to the current M-14/Barton Drive interchange in Ann Arbor, including relocation of M-14/U.S. 23, from Maple Road to Plymouth Road, mass transit options and other means of reducing commuter traffic and improvement to highway safety."

These positions were addressed by Phase II of the Northeast Ann Arbor Transportation Plan to assess the traffic, community and environmental issues of possible changes to the M-14/Barton Drive interchange. A two-step analysis process was employed.

3.2 Evaluation of Illustrative Alternatives

A two-level analysis of alternatives was used in examining changes to the M-14/Barton Drive interchange. It is consistent with MDOT's process affecting changes to state and federal roads. The first-level evaluation focused on Illustrative Alternatives; the second-level, on Practical Alternatives.

To begin the analysis, public input was solicited at two workshops on September 25 and October 10, 2001. From this work, the following alternatives were established:

- No action – The Existing Plus Committed (E+C) Transportation Plan for Washtenaw County, established in 1995. In effect, this is close to current roadway conditions.
- Alternative 1 – Improve Barton Drive/M-14 interchange
- Alternative 2 – Remove the entire Barton Drive/M-14 interchange
- Alternative 3 – Remove the east portion of the Barton Drive/M-14 interchange and replace it with a partial interchange on the south side of M-14 at Nixon.
- Alternative 4 – Remove the entire Barton Drive/M-14 interchange and add a "flopped" diamond interchange at Nixon.
- Alternative 5 – Remove the entire Barton Drive/M-14 interchange and add a full interchange with M-14 at the "greenway"
- Alternative 6 – Remove the entire Barton Drive/M-14 interchange and add a full interchange at Main Street
- Alternative 7 – Remove the entire Barton Drive/M-14 interchange and add a full interchange at Joy Road
- Alternative 8 – Remove the entire Barton Drive/M-14 interchange and add a full interchange at Dixboro Road
- Alternative 9 – Remove the entire Barton Drive/M-14 interchange and add one-way frontage roads between Pontiac and Nixon, with slip ramps to and from the freeway
- Alternative 10 – Improve the Plymouth Road interchange with U.S. 23
- Alternative 11 – Connect Whitmore Lake Road to Main Street with a river crossing while retaining the Barton Drive interchange
- Alternative 12 – Connect Whitmore Lake Road to Main Street with a river crossing while removing the entire Barton Drive interchange
- Alternative 13 – Extend Dhu Varren over M-14 to connect with Whitmore Lake Road while removing the entire Barton Drive interchange
- Alternative 14 – Develop a new full interchange at Main Street while retaining the Barton Drive/M-14 interchange

- Alternative 15 – Develop a new full interchange at Newport Road with M-14 while retaining the Barton Drive interchange
- Alternative 16 – Develop a new Beechwood Road interchange with M-14 while removing the entire Barton Drive interchange

These proposals are graphically depicted in Section 3.1.2 of the report.

3.2.1 Process

To measure the ability of each of these options to serve future traffic, simulations of 2020 travel were developed using the TranPlan model made available by UATS. The model's data were updated for growth forecasts of the University of Michigan's Life Science Center in the core of Ann Arbor, as well as a recently-announced expansion of Pfizer in northeast Ann Arbor. Key roadway segments were selected to focus the analysis (Figure 3-1 and Table 3-1). Then, measurements were made in the following areas:

- Traffic
- Noise
- Air Quality
- Safety
- Acquisitions
- Historic Properties
- Parks/Schools
- Wetlands
- Community Cohesion
- Engineering Issues/Construction Cost

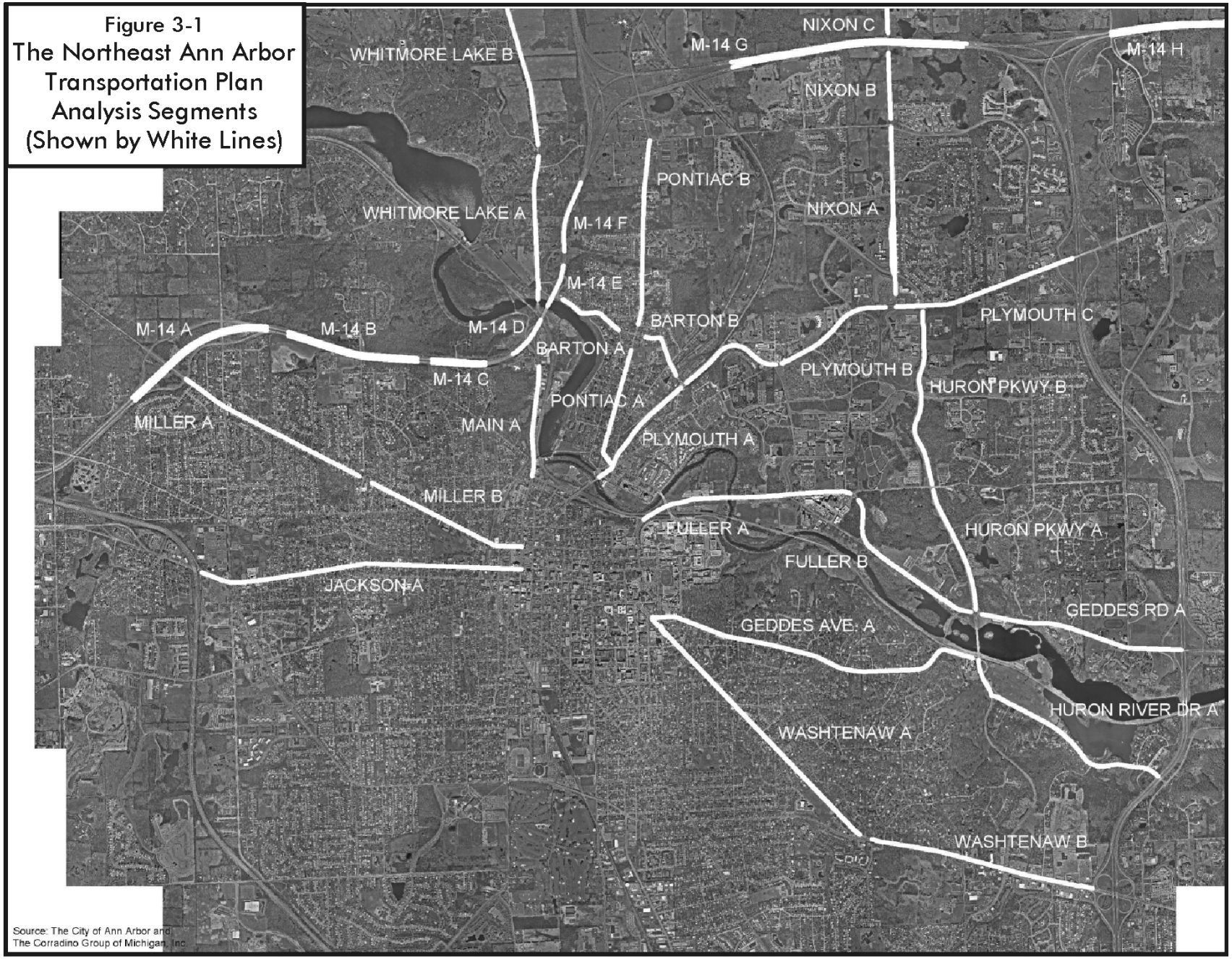
The approach used in each of these areas is summarized below. It is noted that, even though the goals and objectives for the overall NEATP were still under development at the time of the M-14/Barton Drive analysis, the evaluation factors eventually developed to link with them are covered by measurements in the above-listed areas.

Traffic

The UATS TranPlan simulation model was used to make assignments of 2020 average daily traffic for the entire study area. The model has a pre-processing function which extracts transit trips from the overall trip table. The remaining activity is converted to auto trips which are then assigned to the roadway network in a capacity-restrained approach, the results of which are shown on Figure 3-2. It is noteworthy that UATS' E+C ("Existing Plus Committed") highway network was only changed to address M-14 access issues, i.e., adding and/or deleting one at a time each proposal listed in Section 3.1. No other roadway change was made.

To place the data in perspective for each alternative, ratios of 2020 traffic volumes and volume-to-capacity ratios for the No Action and new alternative conditions were developed. These data allowed an assessment of the performance of each alternative.

Figure 3-1
The Northeast Ann Arbor Transportation Plan Analysis Segments (Shown by White Lines)



Source: The City of Ann Arbor and The Corradino Group of Michigan, Inc.

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Table 3-1
Northeast Ann Arbor Transportation Plan
Analysis Segments

Roadway	Segment	From	To
M-14	A	W. Miller/Maple	E. of Miller/Maple
	B	E. of Miller/Maple	E. of Beechwood
	C	E. of Beechwood	E. of Main St.
	D	E. of Main St.	S. of Barton Dr.
	E	S. of Barton Dr.	N. of Barton Dr.
	F	N. of Barton Dr.	S. of U.S. 23
	G	W. of U.S. 23	E. of Nixon
	H	E. of U.S. 23	E. of Dixboro
Whitmore Lake Rd.	A	Huron River Dr.	Stein Rd.
	B	Stein Rd.	N. Territorial Rd.
Main St.	A	M-14	Depot St.
Barton Drive	A	M-14	Pontiac Trail
	B	Pontiac Trail	Plymouth Rd.
Pontiac Trail	A	Plymouth Rd.	Barton Dr.
	B	Barton Dr.	Dhu Varren Rd.
Plymouth Rd.	A	Huron River Dr.	Barton Dr.
	B	Barton Dr.	Nixon Dr.
	C	Nixon Rd.	U.S. 23
Nixon Rd.	A	Plymouth Road	Dhu Varren Rd.
	B	Dhu Varren Rd.	M-14
	C	M-14	Pontiac Trail
Huron Pkwy.	A	Plymouth Rd.	Fuller Rd.
	B	Fuller Rd.	Geddes Rd.
Fuller Rd.	A	Glen Ave.	Glazier Way
	B	Glazier Way	Huron Pkwy.
Geddes Rd.	A	Huron Pkwy.	U.S. 23
Huron River Dr.	A	U.S. 23	Huron Pkwy.
Geddes Ave.	A	Huron Pkwy.	Washtenaw Ave.
Washtenaw Ave.	A	U.S. 23	Stadium
	B	Stadium	Geddes Ave.
Miller Rd.	A	M-14	Newport Rd.
	B	Newport Rd.	Main St.
Jackson Rd.	A	1-94	Main St.

Source: The Corradino Group of Michigan, Inc.

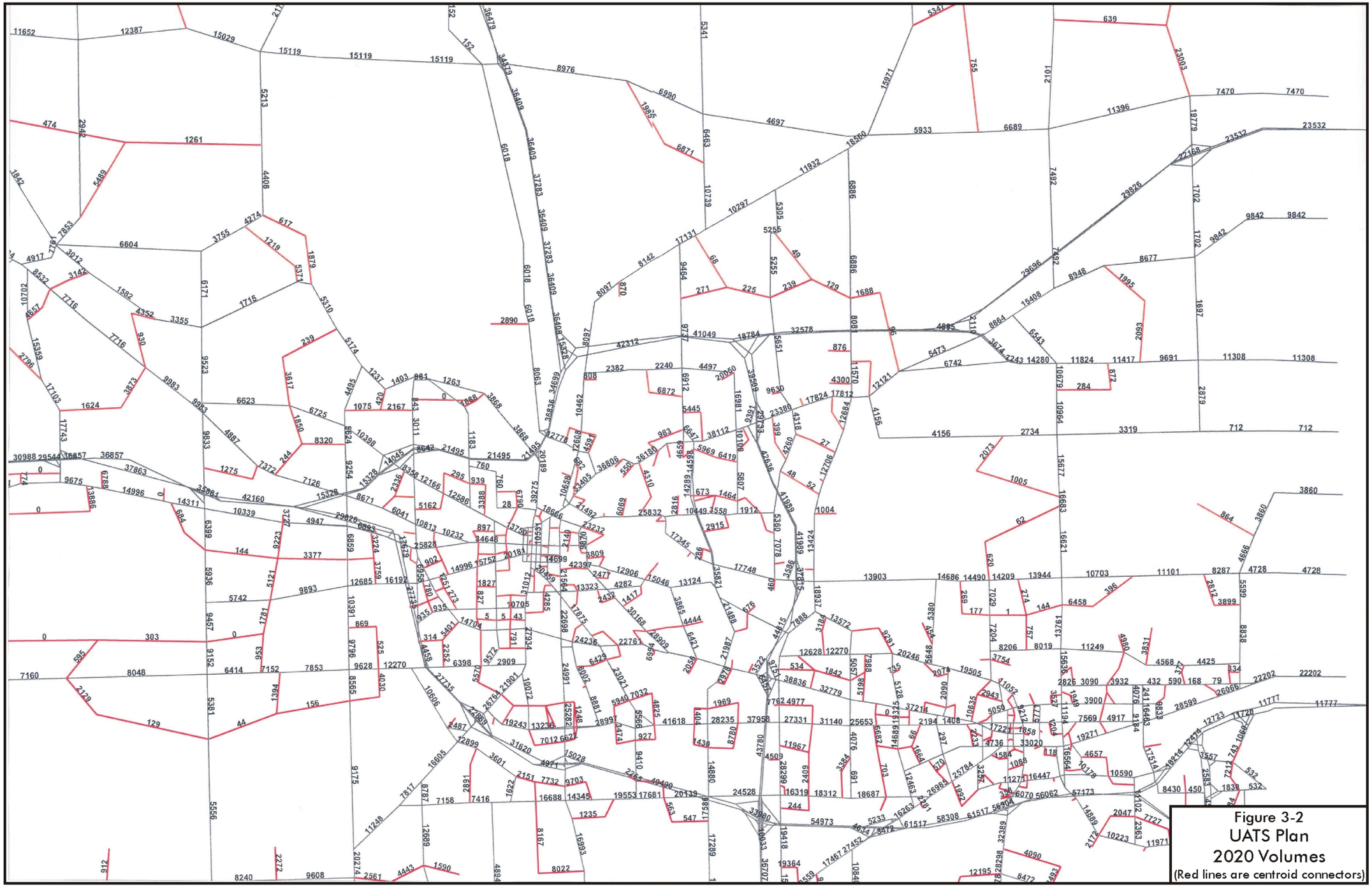

Figure 3-2
UATS Plan
2020 Volumes
(Red lines are centroid connectors)

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Noise

An assessment was made of the average noise conditions along each roadway segment based upon an understanding of its adjacent land uses. The principles of the Federal Highway Administration's Transportation Noise Model were relied upon in this analysis. Using traffic flow data for the No Action and "new alternative" conditions, the expected change in noise at sensitive (i.e., residential) places along each roadway segment was determined. It is important to note that 3 dBA is a level below which the change in noise is not considered perceptible in normal urban conditions.

Air Quality

A matrix was created to assess the expected carbon monoxide (CO) concentrations for an array of roadway conditions. FHWA's CalQH3C model was employed in this analysis. It uses traffic flow and speed as basic input data along with pollutant emissions characteristics of various vehicle types. Based on the UATS model output, each alternative's CO forecast by roadway segment was derived. It is noteworthy that EPA's standard at the time of the analysis (2001-2002) was that carbon monoxide concentrations remain below 35 parts per million (ppm) at sensitive receptors in peak (one-hour) conditions. The data reported later, while defining the change in CO from the No Action condition, is well below the EPA standard for all roadway segments in the analysis (Table 3-2).

Safety

Crash data for 1997, 1998 and 1999 were collected from UATS and SEMCOG for each roadway segment listed in Table 3-1 (Table 3-3). After adjustments for location coding issues which assign some crashes to the nearest mile marker rather than the exact location, these data were converted to rates (i.e., crashes per million vehicle miles of travel). Then, for the combination of all segments used in this analysis, a total number of yearly crashes was calculated based upon 2020 traffic volumes. The change in possible crashes from the No Action alternative (forecast to be about 925 per year in 2020) to the new condition was then determined. It is noteworthy that this change is as low as one percent to about 8.5 percent with closing the Barton Drive/M-14 interchange alone accounting for about a six to seven percent crash reduction from the No Action condition.

Acquisitions

The GIS database for Ann Arbor was used to define the number of possible relocations associated with each alternative. Washtenaw County mapping was used for the Joy and Dixboro alternatives. Acquisitions were classified as the number of residential or business structures and acres of vacant land not now in public right-of-way that could possibly be taken for construction of the proposed alternative.

Table 3-2
Air Quality Analysis Chart
Carbon Monoxide (CO) Concentrations under Different Conditions

CO Concentrations on Two-Lane Roads (ppm)[1]

Receptor Distance from Roadway Centerline	Peak-Hour Volumes (2020/two-way)									
	500	600	700	800	900	1000	1200	1400	1600	2000
20 feet	2.8	2.9	3.1	3.2	3.4	3.5	3.8	4.1	4.4	5.1
30 feet	2.5	2.6	2.8	2.9	3.0	3.1	3.3	3.5	3.7	4.2
40 feet	2.4	2.5	2.6	2.7	2.7	2.8	3.0	3.1	3.3	3.6
50 feet	2.3	2.4	2.5	2.7	2.7	2.7	2.8	3.0	3.1	3.4
60 feet	2.3	2.4	2.4	2.5	2.5	2.6	2.7	2.8	3.0	3.2
70 feet	2.3	2.3	2.4	2.4	2.5	2.5	2.6	2.7	2.9	3.1

CO Concentrations on Four-Lane Roads (ppm)[1]

Receptor Distance from Roadway Centerline	Peak-Hour Volumes (2020/two-way)											
	900	1000	1200	1400	1600	2000	2400	2800	3200	3600	4000	5000
20 feet	3.3	3.5	3.8	4.1	4.4	5.0	5.6	6.2	6.8	7.4	8.0	8.6
30 feet	3.2	3.3	3.6	3.8	4.1	4.6	5.2	5.7	6.2	6.7	7.3	7.8
40 feet	2.9	3.0	3.2	3.4	3.6	4.0	4.5	4.9	5.3	5.9	6.1	6.5
50 feet	2.7	2.8	3.0	3.1	3.3	3.6	3.9	4.3	4.6	4.9	5.2	5.5
60 feet	2.6	2.7	2.8	3.0	3.1	3.4	3.6	3.9	4.2	4.5	4.7	4.9
70 feet	2.5	2.6	2.7	2.8	3.0	3.2	3.4	3.7	3.9	4.1	4.4	4.6

[1]Assumes background of 2 ppm.

Table 3-3
M-14 Crash Data

M-14 Road Segment		Ex. ADT No-Action	Length of Segment Miles	Total Crashes 1997-1999	Crash Frequency Annual Average	Crash Rate per MVM
Segment[1]	Mile Post[2]					
A	1.0 to 2.0	35,000	1.00	26	8.7	0.68
B	2.0 to 2.7	35,000	0.70	11	3.7	0.41
C	2.7 to 3.1	35,000	0.40	9	3.0	0.59
D	3.1 to 3.4	35,000	0.30	24	8.0	2.09
E	3.4 to 3.9	50,000	0.50	118	39.3	4.31
F	3.9 to 4.6	50,000	0.70	31	10.3	0.81
G	1.0 to 3.0	60,000	2.00	142	47.3	1.08
H	3.0 to 4.5	50,000	1.50	70	23.3	0.85

[1]Refer to Table 3-1 and Figure 3-1.
[2]Mile Post.
Source: The Corradino Group of Michigan, Inc.

Historic Properties

Properties of historic significance, as defined in the GIS database, were examined (Figure 3-3). The results indicate no property will be directly affected by any proposed M-14 access proposal. So, the data were not included in the information reported later.

Parks/Schools

Any park or school (Figure 3-4) directly affected by a potential taking was cited and the number of acres likely to be acquired/used was measured. The Ann Arbor GIS database, plus Washtenaw County mapping, were employed in this process. It is noteworthy that public park impacts are guided by Section 4(f) of the U.S. Department of Transportation Act of 1966. The law provides that no federally-funded transportation project or program will use public parkland unless there is no feasible and prudent alternative.

Wetlands

Any wetland (Figure 3-5) directly affected by a potential taking is cited and the number of acres likely to be acquired/used was measured. The Ann Arbor GIS database, plus Washtenaw County mapping, were employed in this process. Federal and state laws and regulations (Federal Executive Order 11990 and Part 303 of Michigan Public Act 451 of 1994) protect wetlands and require that they be avoided to the extend feasible and prudent.

Community Cohesion

The direct effect of the proposed interchange, plus the indirect impact of a significant change (increase or decrease) in traffic, were used in making a judgment of the possible effect on a community's/neighborhood's cohesion. Cohesion is related to the social interaction of a community/neighborhood through non-motorized movements and the area's accessibility to special services such as police, fire, EMS.

Engineering Issues/Construction Cost

A conceptual layout was defined for each alternative. Based on these concepts, key engineering issues were cited, including whether MDOT's urban design standards are expected to be met. Roadway and related design standards are defined by federal policy (Part 625 of CFR 23) and incorporated into design procedures of the Michigan Department of Transportation. Roadway design standards are also consistent with those promulgated by the American Association of State Highway and Transportation Officials. They provide criteria to ensure the safety and service of the transportation facility to be built, at a minimum. Design standards affect horizontal alignment in terms of curve lengths, radii, superelevations, clear zones etc. They affect vertical alignment issues like grades, stopping sight distances and clearances. Application of design criteria also considers items like travel speed and volumes of traffic, including weaving movements. They determine whether an interchange can be placed in a specific location and how the ramps, signing, markings etc., will be laid out.

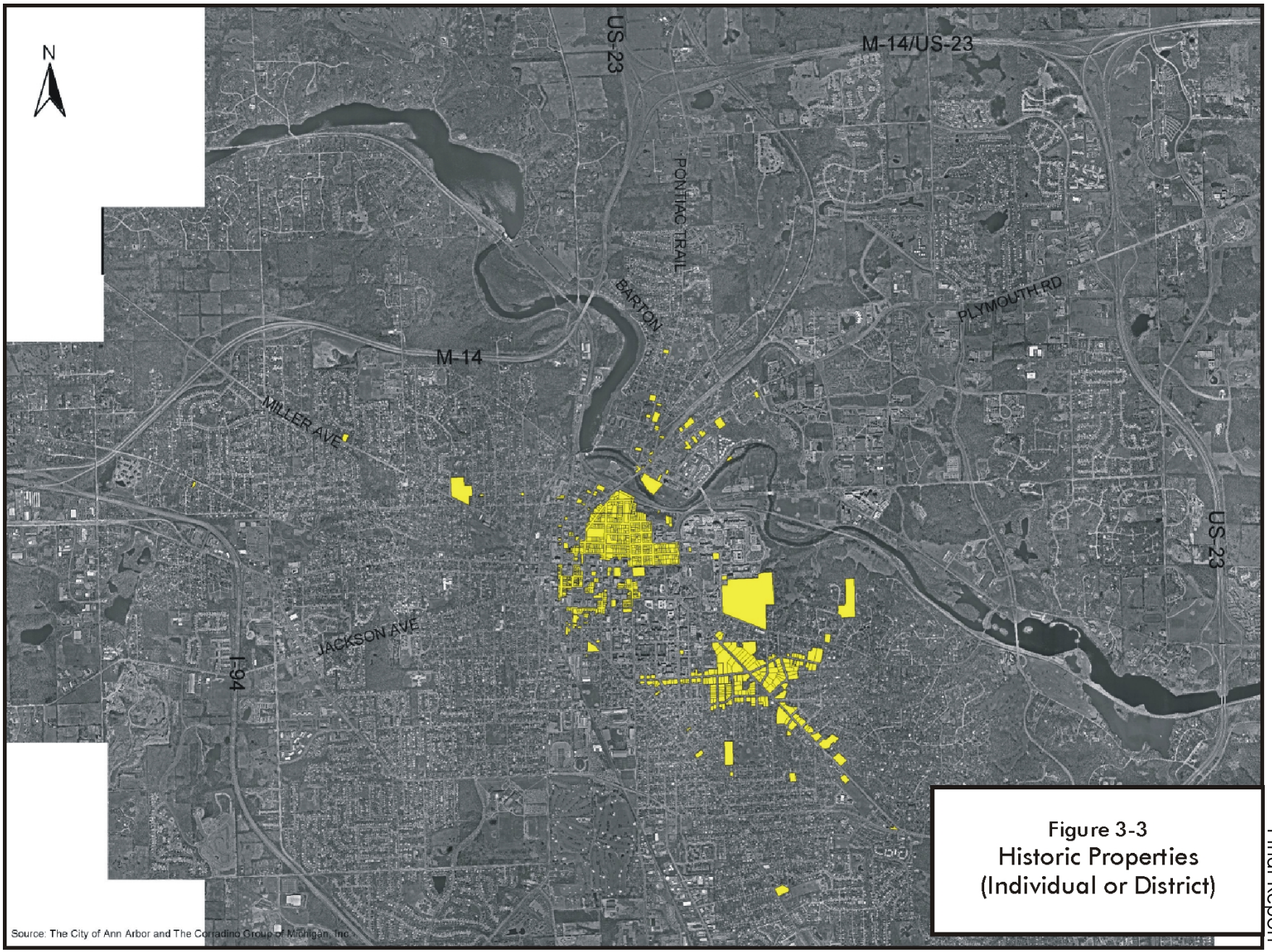

Figure 3-3
Historic Properties
(Individual or District)

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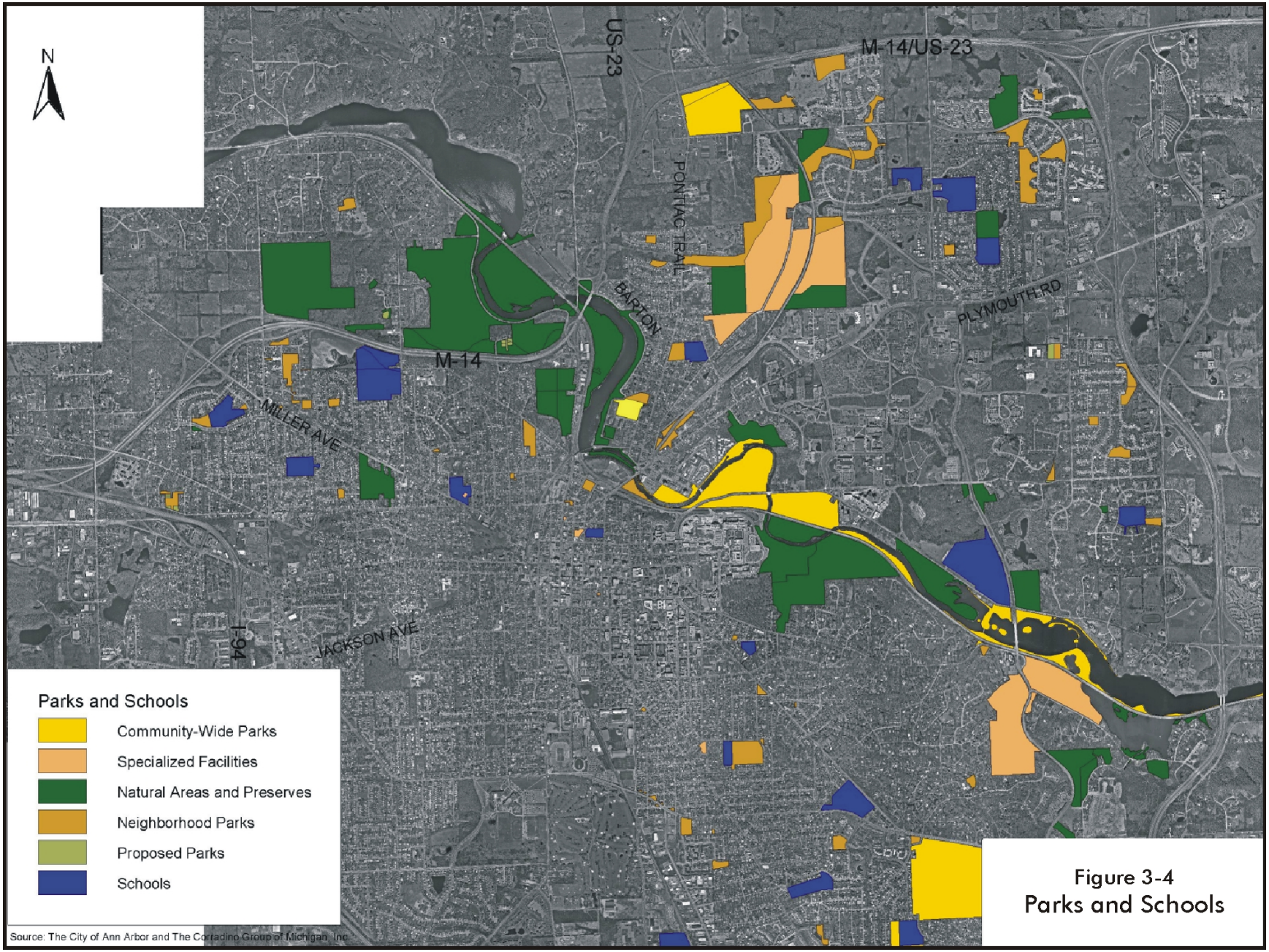

Figure 3-4
Parks and Schools

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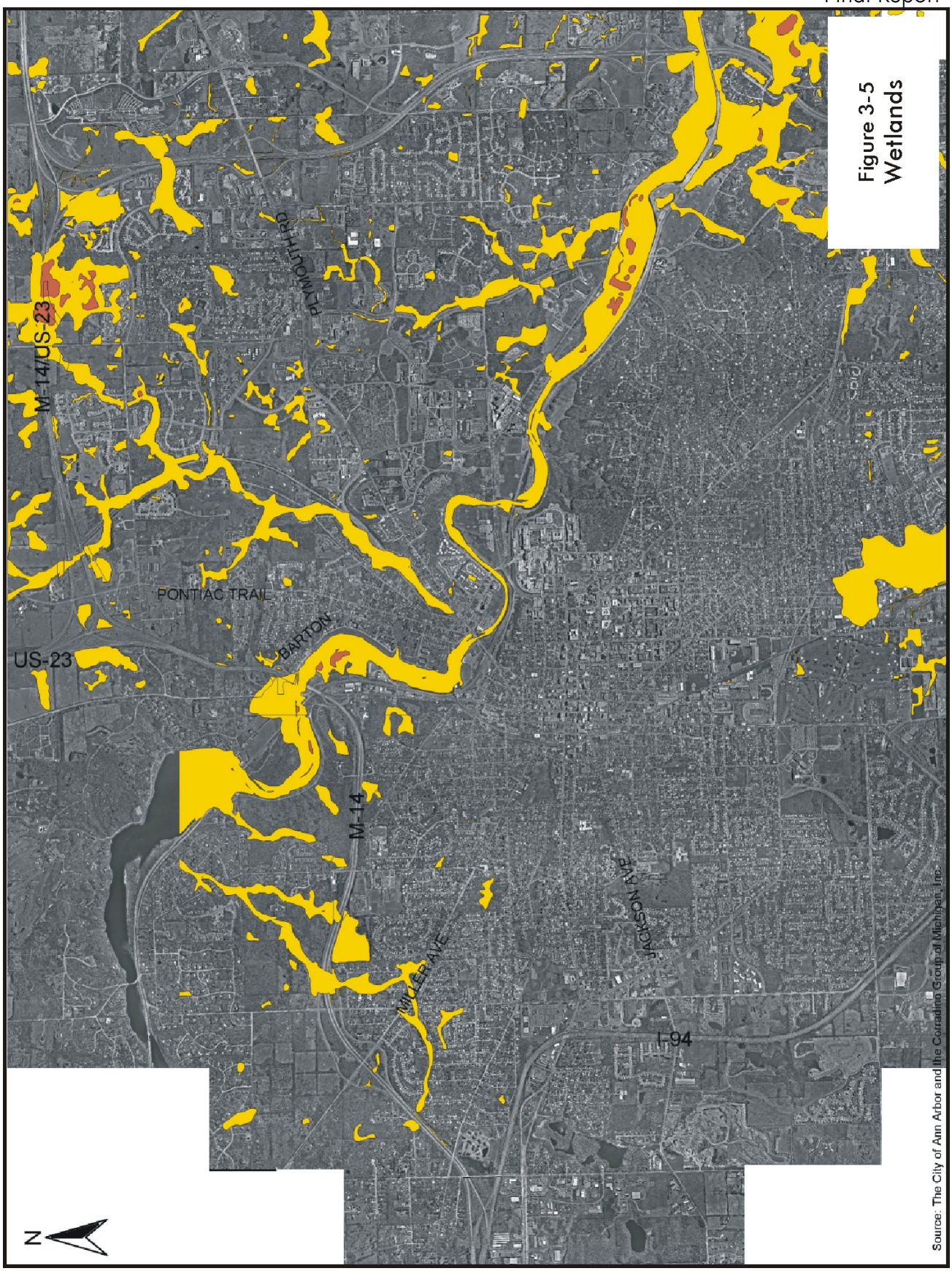


Figure 3-5
Wetlands
M-14/US-23
PLYMOUTH RD
PONTIAC TRAIL
US-23
BARTON
M-14
MILLER AVE
JACKSON AVE
I-94
N
Source: The City of Ann Arbor and the Corradino Group of Michigan, Inc.
L:/Projects/Z9872AA/Graphics/FinalRpt/Fig3-5.dir

Design standards vary for rural and urban conditions largely because of differences in speeds and traffic volumes. Usually, rural conditions require greater stopping sight distances, longer acceleration and deceleration lanes, and greater distances between interchanges than are required under urban conditions.

Application of design standards is very complicated. Exceptions to them may be granted, but only after consideration is given to all project conditions such as maximum service and safety benefits for the investment to be incurred and the compatibility with adjacent sections of roadway.

This evaluation category also includes construction cost defined in a range of current dollars. The cost to acquire right-of-way is not included nor is the cost to remove an existing structure or road where that is part of an alternative. And, while changes to M-14 access are generally thought of as federal/state projects, MDOT's Project Development Practices require costs to be borne by local governments for improvements outside the ramp area.

3.2.2 Impact Measurements

Data measurements were calculated for each alternative by each of the 33 roadway segments listed on Table 3-1 and Figure 3-1 for the following items:

- Traffic
  - ✓ Volume
  - ✓ Volume-to-Capacity
  - ✓ Level of Service
- Noise
- Air Quality

Measurements were provided by alternative (i.e., all roadway segments as a system) for the following:

- Safety
- Potential Acquisitions
- Schools
- Parks
- Wetlands
- Community Cohesion
- Engineering Issues/Construction Cost

A review of measurement data is presented next. It is suggested the reader pay particular attention to the three critical issues: possible impacts on parks, expected impacts to wetlands and whether a proposed improvement is expected to meet MDOT design standards. Those issues are highlighted by underlining the following text and circling the effects beyond zero on Table 3-4.

Table 3-4
Northeast Ann Arbor Transportation Plan
M-14 Access Issue
Overall Measurement Data
(shading provided to make table easier to read)

	No Action	Fix Barton		Remove Barton	Partial Nixon	Full Nixon	Greenway Trumpet	Greenway Diamond	Full Main w/o Barton		Add Joy Int.	Add Dixboro Int.	Frontage Roads	Fix Plymouth	Whitmore to Main w/Barton		Whitmore to Main w/o Barton		Add Dhu Varren Int.	Full Main w/Barton		Add Newport Int.	Add Beechwood Int.
		1A	1B	2	3	4	5A	5B	6A	6B	7	8	9	10	11A	11B	12A	12B	13	14A	14B	15	16
Areawide Traffic																							
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall
Noise																							
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	See Table 9A	See Table 9B	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	See Table 13	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	See Table 17	Minimal Overall	Minimal Overall	See Table 19	See Table 20
Air Quality																							
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall
Safety																							
Change (crashes/yr.)	Baseline	-61	-61	-73	-66	-69	-79	-79	-62	-62	-75	-65	-70	No Change	-16	-16	-68	-68	-75	-6	-6	-7	-73
Possible Acquisitions																							
Private Residences (no.)	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3	0	0	19	28
Businesses (no.)	0	0	0	0	0	0	0	0	0	3	0	0	2	0	0	0	0	0	0	0	3	1[12]	1
Vacant Land (acres)	0	0.5	0	0	36	37	0.5	0	1	4	36	34	51	0	1	3.5	1	3.5	0	1	4	11	14
Total (acreage)	0	2	0	0	36	37	1	3.5	1	5.5	36	34	60.5	0	1	3.5	1	3.5	0	1	5.5	65	25
Schools																							
Direct Impact (no.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2[13]	0
Indirect Impact (no.)	0	0	0	1[4]	4[5]	4[5]	1[4]	1[4]	1[4]	1[4]	1[4]	1[4]	1[4]	0	0	0	1[4]	1[4]	1[4]	1[4]	0	1[4]	0
Parks																							
Direct Impact (acres)	0	0[2]	0[3]	0	0	0	0[6]	0[7]	0.5[9]	4[8]	0	0	7.5[9]	0	1[10]	3.5[11]	1[10]	3.5[11]	0	0.5[9]	4[8]	8[14]	12[15]
Wetlands																							
Direct Impact (acres)	0	3	2	0	6.5	5.5	6.5	2	0	0	0	1	7.5	1.5	0	0	0	0	0	0	0	2.5	4
Community Cohesion																							
Positive Change	NA	None	None	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)/@ Whitmore Lake (Huron River to Stein)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	None	None	None	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)	None	@ Barton (M-14 to Plymouth) @ Whitmore Lake (Huron River to N. Territorial)
Negative Change	NA	None	None	@ Pontiac Trail (Plymouth to Barton)	@ Nixon (M-14 to Dhu Varren)/AA Township	@ Nixon (M-14 to Plymouth)/AA Township	@ Greenway/ @ Pontiac Trail (Barton to Dhu Varren)	@ Greenway/ @ Pontiac Trail @ Whitmore Lake (Huron River to Stein)	@ Pontiac Trail (Plymouth to Barton)	@ Pontiac Trail (Plymouth to Barton)	@ AA Township/ @ Pontiac Trail (Barton to Dhu Varren)	AA Township	@ Nixon (M-14 to Plymouth)/ AA Township	None	None	None	@ Whitmore Lake (Huron River to N. Territorial)	@ Whitmore Lake (Huron River to N. Territorial)	@ Whitmore Lake (Stein to N. Territorial)/ @ Dhu Varren	@ Pontiac Trail (Plymouth to Barton)	@ Pontiac Trail (Plymouth to Barton)	@ Newport Road (N/S of M-14)	@ Beechwood (N/S of M-14)
Engineering																							
Issues	NA	Application of urban standards	Application of urban standards	None of significance	Doesn't meet standards	Doesn't meet standards	Doesn't meet standards	Doesn't meet standards	None of significance	None of significance	None of significance	Doesn't meet standards	Weaving of ramps/auxiliary lanes	None of significance	Steep grade (80± feet)/railroad and river crossings	Railroad and river crossings	Steep grade (80± feet)/railroad and river crossings	Railroad and river crossings	None of significance	Doesn't meet standards	Doesn't meet standards	Doesn't meet standards	Doesn't meet standards
Construction Cost (2001 dollars)[1]	NA	$4.5 to $6.8 million	$6.0 to 9.0 million	$0.5 to 0.8 million	$5.5 to $8.3 million	$9.0 to $13.5 million	$10.0 to $15.0 million	$7.0 to $10.5 million	$7.0 to $10.5 million	$11.0 to $16.5 million	$9.0 to $13.5 million	$9.0 to $13.5 million	$17.0 to $25.5 million	$9.0 to $10.0 million	$3.0 to $4.5 million	$4.0 to $6.0 million	$3.0 to $4.5 million	$4.0 to $6.0 million	$8.0 to $12.0 million	$7.0 to $10.5 million	$11.0 to $16.5 million	$9.0 to $13.5 million	$9.0 to $13.5 million

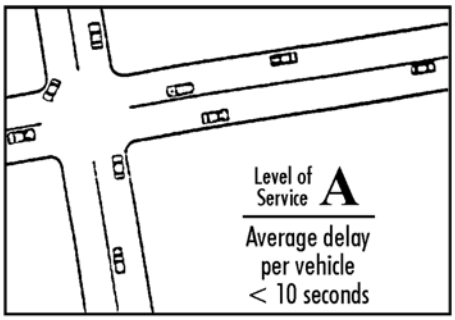
[1]Excludes right-of-way cost and the cost to remove the Barton Drive interchange, where that action is part of the alternative.
[2]Involves possible use of 4 acres of ROW that is considered by some as a greenway.
[3]Involves possible use of 8 acres of ROW that is considered by some as a greenway.
[4]Positive effect on the Northside Elementary School.
[5]Positive effect on the Northside Elementary School; negative effect on the Clague Middle, Logan Elementary, and Thurston Elementary schools.
[6]Involves possible use of 27.5 acres of ROW that is considered by some as a greenway.
[7]Involves possible use of 16.5 acres of ROW that is considered by some as a greenway.
[8]Negative effect on Kuebler Langford Nature Area.
[9]Negative effect on Northeast Area Park.
[10]Negative effect on Barton and Bandemer Parks.
[11]Negative effect on Bandemer Park.
[12]Negative effect on Free Methodist Church.
[13]Negative effect on the Wines Elementary and Forsythe Middle schools.
[14]Negative effect on Bird Hills Nature Area.
[15]Negative effect on Bird Hills Nature and Kuebler Langford Nature Area.

Legend:
○ impact in critical area.

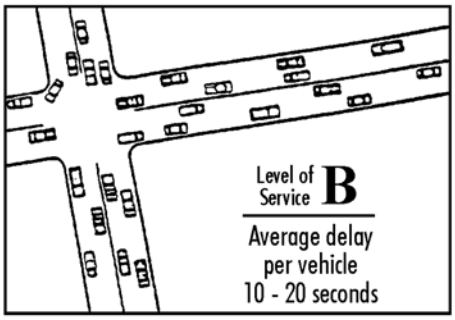
No Action Alternative

The No Action Alternative represents characteristics of the roadway system in its current condition for all practical purposes. The average daily vehicle traffic in 2020 on that network is depicted in Figure 3-2. The measure of congestion known as Level of Service C represents relatively free flow conditions (Figure 3-6). While the City of Ann Arbor's policy is to achieve this level of service, most urban places accept Level of Service D. Figure 3-7 depicts volume-to-capacity ratios in the No Action network in the year 2020. In a general sense, a V/C ratio of 1.00 to 1.20± at Level of Service C would likely reflect a V/C ratio of closer to 1.00± at LOS D. In other words, the congestion indices for 2020 vehicular traffic which look troublesome (i.e., red and orange lines on Figure 3-7) are likely to be considered more normal/less troublesome in typical urban situations.

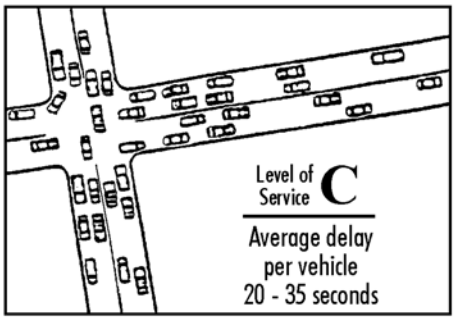
By reviewing Figure 3-7, it can be seen that roadway segments in northeast Ann Arbor with LOS C volume-to-capacity ratios greater than 1.00 (the red and orange lines) include many of the segments listed on Table 3-1 and Figure 3-2. These, plus key segments of M-14, are included in this analysis.



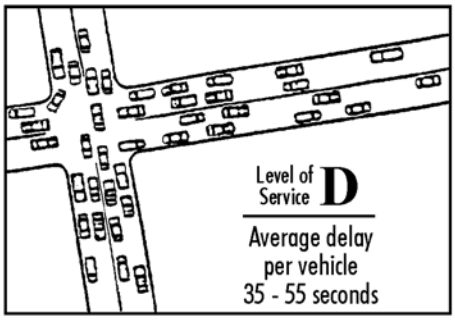
Level of Service A: A condition of free flow with low traffic density and high maneuverability within the traffic stream. No vehicle waits longer than one signal indication.



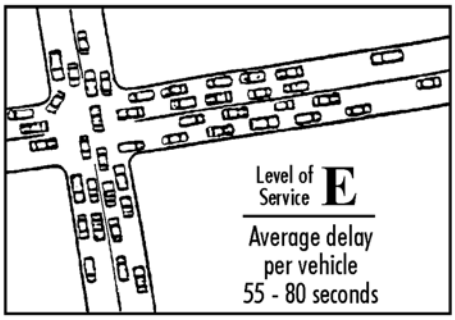
Level of Service B: Stable flow of traffic with negligible impact from other vehicles in the traffic stream. On a rare occasion drivers wait through more than one signal indication.



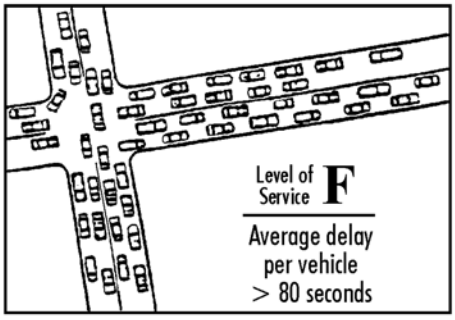
Level of Service C: Still in the zone of stable flow. Drivers are somewhat restricted in selecting operating speed and maneuverability. Drivers wait intermittently through more than one signal indication. Backups may develop behind left-turning vehicles.



Level of Service D: Still in zone of stable flow. Drivers are very restricted in their freedom to change lanes. Delay may be substantial during peak hours.



Level of Service E: Unstable traffic conditions exist. Long queues of vehicles may create lengthy delays, especially for left-turning vehicles.



Level of Service F: Forced traffic flow exists. Travel is slowed to stop-and-go conditions. Very long queues prevent movement of vehicles creating a "storage" effect during part or all of the peak hour.

Figure 3-6
Levels of Service at Signalized Intersections

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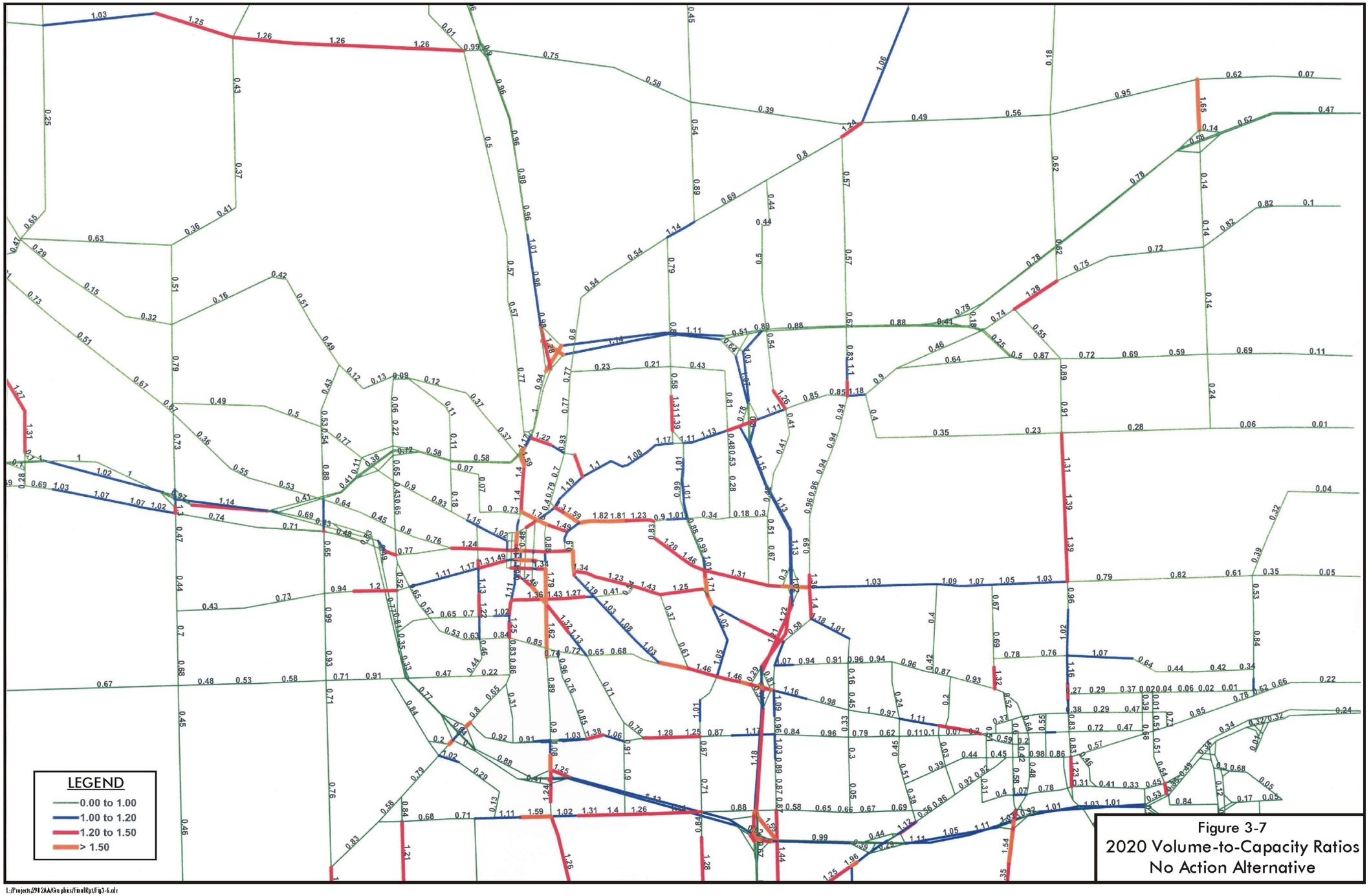

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Figure 3-7
2020 Volume-to-Capacity Ratios
No Action Alternative

Alternative 1 – Improve Barton Drive/M-14 Interchange (Figures 3-8A and 3-8B)

There are several ways to improve the ramps at this interchange on its east side. Figures 3-8A and 3-8B show two conceptual approaches to illustrate alternative effects. As might be expected, the traffic flow, noise and air quality measurements of this alternative (either option) are the same as the No Action conditions (Table 3-5).

Alternative 1A would involve the acquisition of one house on 1.5 acres of land plus another one-half acre of land that is vacant and not in road right-of-way (Table 3-4). No officially-designated parkland or wetlands are expected to be affected. But, four acres of open space, referred to by some as a greenway, would be affected by Alternative 1A. That land is officially considered public right-of-way.

Alternative 1A would likely be associated with a decrease of 61 crashes per year throughout northeast Ann Arbor due to the improvement of the Barton Drive interchange and the reassignment of traffic to other streets. No significant changes in community cohesion are expected.

It is important to note that the concepts described in Figures 3-8A and 3-8B, and many others designed to address the substandard ramps at the Barton Drive/M-14 interchange, will require MDOT to change to the application of design standards that reflect urban rather than rural conditions for this section of M-14. Using standards for urban roadway situations, the scenarios depicted in Figures 3-8A and 3-8B, may be possible. If Alternative 1A were approved for implementation, it would cost between $4.5 and $6.8 million to construct, i.e., exclusive of right-of-way.

The measurements associated with Alternative 1B are mostly the same as for Alternative 1A. Major differences are in the avoidance of a house by Alternative 1B that would be acquired with Alternative 1A; the likely impact of two acres of wetlands with Alternative 1B, while three are expected to be affected by Alternative 1A; plus, the impact of eight acres of right-of-way that is considered by some as parkland, while Alternative 1A would impact four acres of this area. The cost to construct this improvement would range from $6.0 to $9.0, excluding right-of-way.

Figure 3-8A
Alternative 1A – Improve Barton Drive Interchange

Figure 3-8B
Alternative 1B – Improve Barton Drive Interchange

Note: Full-size photos are included in Appendix D.

Table 3-5
Alternative 1 – Improve Barton Drive Interchange
Comparison to No Action Conditions

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	1.00	0.39	1.00	0.0	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.00	0.61	1.00	0.0	0.0
	C: E. of Beechwood	E. of Main St.	1.00	0.61	1.00	0.0	0.0
	D: E. of Main St.	S. of Barton Dr.	1.00	0.61	1.00	0.0	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	1.00	1.13	1.00	0.0	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.00	0.97	1.00	0.0	0.0
	G: W. of U.S. 23	E. of Nixon	1.00	1.13	1.00	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	1.00	0.89	1.00	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	1.00	0.77	1.00	0.0	0.0
	B: Stein Rd.	N. Territorial Rd.	1.00	0.57	1.00	0.0	0.0
Barton Drive							
	A: M-14	Pontiac Trail	1.00	1.17	1.00	0.0	0.0
	B: Pontiac Trail	Plymouth	1.00	1.10	1.00	0.0	0.0
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.00	0.75	1.00	0.0	0.0
	B: Barton Dr.	Dhu Varren Rd.	1.00	0.82	1.00	0.0	0.0
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.00	1.14	1.00	0.0	0.0
	B: Barton Dr.	Nixon Rd.	1.00	1.11	1.00	0.0	0.0
	C: Nixon Rd.	U.S. 23	1.00	1.19	1.00	0.0	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.00	1.09	1.00	0.0	0.0
	B: Dhu Varren Rd.	M-14	1.00	0.81	1.00	0.0	0.0
	C: M-14	Pontiac Trail	1.00	0.79	1.00	0.0	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.00	1.52	1.00	0.0	0.0
	B: Glazier Way	Huron Pkwy.	1.00	1.22	1.00	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	1.00	1.40	1.00	0.0	0.0
Miller Road							
	A: M-14	Newport Rd.	1.00	0.81	1.00	0.0	0.0
	B: Newport Rd.	Main St.	1.00	0.94	1.00	0.0	0.0
Jackson Road							
	A: I-94	Main St.	1.00	1.14	1.00	0.0	0.0
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	1.00	0.95	1.00	0.0	0.0
	B: Fuller Rd.	Geddes Rd.	1.00	0.96	1.00	0.0	0.0
Main Street							
	A: M-14	Depot St.	1.00	1.40	1.00	0.0	0.0
Washtenaw							
	A: U.S. 23	Stadium	1.00	1.09	1.00	0.0	0.0
	B: Stadium	Geddes Ave.	1.00	1.48	1.00	0.0	0.0
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	1.00	1.21	1.00	0.0	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	1.00	1.31	1.00	0.0	0.0

[1] No Action Alternative divided into new alternative.

Alternative 2 – Remove Entire Barton Drive Interchange (Figure 3-9)

Eliminating the Barton Drive interchange in its entirety would cause the 2020 traffic on Barton Drive to drop between 10 and about 40 percent, while increasing traffic on Pontiac Trail, between Plymouth Road and Barton Drive, by about 20 percent (Table 3-6)[2]. At the same time, diverted traffic would use many other roadways in the area; no concentration in one location is expected. So, changes in congestion are expected to be minimal except on Barton Drive where congestion would drop and on the segment of Pontiac Trail between Plymouth Road and Barton where congestion would increase. In the latter case the volume-to-capacity ratio would not exceed 1.0 at LOS C.

Simulation results indicate the average 2020 trip diverted from the closed Barton Drive interchange would take about one minute longer (18 vs. 19 minutes) and be about one-half mile longer (13.2 vs. 13.8 miles) than with the interchange in place. The levels of carbon monoxide are also expected to change little from the No Action situation while still being well below the EPA standard of 35 ppm. Noise on Barton Drive is expected to drop while noise on all other segments is projected to be virtually unchanged. No noise level change is expected to exceed 3 dBA.

Computer analysis of the removal of the Barton Drive interchange, combined with the change of traffic on the segments of the roadway system used in this analysis, indicates crashes through the Northeast Area network would drop by 73 per year compared to the No Action Alternative.

The reductions in traffic and noise are likely to have a positive effect on the community served directly by Barton Drive from M-14 to Plymouth Road. This includes the Northside Elementary School (Table 3-4). The traffic volume change along Pontiac Trail may have a negative effect on the community served by the roadway segment between Plymouth and Barton. Also, access to Ann Arbor Township by emergency equipment is an issue. Computer simulation indicates removing the Barton Drive interchange and forcing use of other roads as alternatives to freeway access causes the average trip between the Township fire/EMS station at Pontiac Trail and the intersection of Stein Road and Whitmore Lake Road to experience no change in travel time. On the other hand, travel time from the station on Goss Road to the Stein/Whitmore Lake Roads area will increase by almost two minutes. It is possible if both Township stations were called into service, others in the city would also respond. If the Barton Drive interchange were closed, the trip from Ann Arbor City Fire Station No. 5 to the Stein/Whitmore Lake Roads area would be one minute longer.

Figure 3-9
Alternative 2 – Remove Entire Barton Drive Interchange

No acquisition of property including wetlands or parkland is expected. The cost to remove the Barton Drive ramps and return the area to a more natural state is expected to be $0.5 to $0.8 million. No problems are expected in terms of MDOT design standards.

[2] Note: Data on Table 3-6, and other like tables, differ in some cases from information on graphics in Appendices B and C because data in the tables are averages of several roadway segment conditions while a fewer key conditions are shown on the graphics. Nevertheless, use of either data set leads to the same conclusions.

Table 3-6
Alternative 2 – Remove Entire Barton Drive Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.89	0.35	0.90	-0.5	0.0
	B: E. of Miller/Maple	E. of Beechwood	0.86	0.52	0.85	-0.6	0.0
	C: E. of Beechwood	E. of Main St.	0.86	0.52	0.85	-0.6	0.0
	D: E. of Main St.	S. of Barton Dr.	0.86	0.52	0.85	-0.6	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.89	1.01	0.89	-0.5	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.01	1.01	1.04	0.0	0.0
	G: W. of U.S. 23	E. of Nixon	1.01	1.14	1.01	0.1	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.91	0.70	0.91	-0.4	-0.2
	B: Stein Rd.	N. Territorial Rd.	0.99	0.57	1.00	0.0	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.59	0.70	0.60	-2.3	-0.3
	B: Pontiac Trail	Plymouth	0.87	0.95	0.86	-0.6	-0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.21	0.90	1.21	0.8	0.2
	B: Barton Dr.	Dhu Varren Rd.	0.89	0.74	0.90	-0.5	-0.1
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.03	1.22	1.07	0.1	0.1
	B: Barton Dr.	Nixon Rd.	0.97	1.09	0.98	-0.1	0.0
	C: Nixon Rd.	U.S. 23	1.04	1.24	1.04	0.2	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.03	1.12	1.03	0.1	-0.1
	B: Dhu Varren Rd.	M-14	1.00	0.81	1.00	0.0	0.0
	C: M-14	Pontiac Trail	1.00	0.79	1.00	0.0	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	0.99	1.51	0.99	0.0	0.1
	B: Glazier Way	Huron Pkwy.	0.99	1.21	0.99	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.98	1.38	0.99	-0.1	0.0
Miller Road							
	A: M-14	Newport Rd.	1.08	0.87	1.09	0.3	0.0
	B: Newport Rd.	Main St.	1.09	1.02	1.09	0.4	0.1
Jackson Road							
	A: I-94	Main St.	1.03	1.18	1.04	0.1	0.1
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.98	0.94	0.99	-0.1	0.0
	B: Fuller Rd.	Geddes Rd.	0.97	0.93	0.97	-0.1	0.0
Main Street							
	A: M-14	Depot St.	0.94	1.32	0.94	-0.2	-0.3
Washtenaw							
	A: U.S. 23	Stadium	1.09	1.18	1.08	0.4	0.2
	B: Stadium	Geddes Ave.	1.07	1.58	1.07	0.3	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.84	1.02	0.83	-0.7	-0.1
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.87	1.15	0.88	-0.6	-0.1

[1] No Action Alternative divided into new alternative.

Alternative 3 – Remove the East Portion of the Barton Drive Interchange/Add Partial Nixon Road Interchange (Figure 3-10)

The elimination of the east-side ramps of the Barton Drive/M-14 interchange will improve the traffic flow and noise situations on Barton Drive. At the same time, development of a partial interchange at Nixon Road on the south side of M-14 will increase traffic and congestion on Nixon between the freeway and Dhu Varren Road (Table 3-7). Traffic volume and congestion indices for all other roadway segments reflect no significant change throughout the remainder of the network. So, no noise nor air quality change from the No Action condition is expected except on Nixon Road and Barton Drive. The resulting adjustment in traffic patterns is expected to cause a decrease in crashes by 66 per year compared to the No Action Alternative.

Acquisitions associated with the partial Nixon interchange would likely involve 36 acres of vacant land that is not public right-of-way. Six to seven acres of wetlands would be directly affected by ramp construction (Table 3-4). This is part of a much larger wetlands area, so the impact is likely to be considered significant. No parkland is expected to be involved.

While no schools would be directly touched by the ramps on the south side of Nixon Road, the Clague Middle School, and Logan and Thurston Elementary Schools would be indirectly affected by the expected increase in traffic and congestion. The Northside Elementary School on Barton Drive would be positively affected by a decrease in traffic. Similarly, the cohesion of the community served by Nixon Road would be negatively impacted; by Barton Drive, positively affected. Also, placing an interchange at Nixon Road is considered inconsistent with Ann Arbor Township's commitment to farmland preservation as the interchange may draw unwanted development to the area. And, the effect of dropping the M-14 interchange at Barton Drive on emergency service access would range from no change in travel time from the Township's Pontiac Trail Fire Station to the area of Stein Road and Whitmore Lake Road, to a two-minute increase in travel time between the latter point and the fire station on Goss Road.

While it could cost $5.5 to $8.3 million to build the partial interchange at Nixon Road (exclusive of right-of-way and the cost to remove the M-14 ramps on Barton Drive's east side), it is noted that MDOT has indicated partial interchanges are not considered acceptable by the Federal Highway Administration, which must approve such projects.

Figure 3-10
Alternative 3 – Add Partial Interchange @ Nixon
Remove East Barton Interchange

Table 3-7
Alternative 3 – Remove East Portion of Barton Drive Interchange/Add Partial Nixon Road Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.96	0.38	0.97	-0.2	0.0
	B: E. of Miller/Maple	E. of Beechwood	0.96	0.59	0.97	-0.2	0.0
	C: E. of Beechwood	E. of Main St.	0.96	0.59	0.97	-0.2	0.0
	D: E. of Main St.	S. of Barton Dr.	0.96	0.59	0.97	-0.2	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.96	1.09	0.96	-0.2	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.02	1.02	1.05	0.1	0.0
	G: W. of U.S. 23	E. of Nixon	1.03	1.16	1.03	0.1	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.84	0.65	0.84	-0.7	-0.2
	B: Stein Rd.	N. Territorial Rd.	0.94	0.54	0.95	-0.3	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.67	0.81	0.69	-1.7	-0.2
	B: Pontiac Trail	Plymouth	0.89	0.98	0.89	-0.5	-0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.01	0.77	1.03	0.1	0.0
	B: Barton Dr.	Dhu Varren Rd.	0.93	0.77	0.94	-0.3	-0.1
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	0.97	1.15	1.01	-0.1	-0.1
	B: Barton Dr.	Nixon Rd.	0.94	1.07	0.96	-0.3	-0.1
	C: Nixon Rd.	U.S. 23	0.98	1.17	0.98	-0.1	0.1
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.07	1.20	1.10	0.3	0.0
	B: Dhu Varren Rd.	M-14	1.47	1.19	1.47	1.7	0.2
	C: M-14	Pontiac Trail	1.06	0.84	1.06	0.2	0.1
Fuller Road							
	A: Glen Ave.	Glazier Way	1.02	1.54	1.01	0.1	0.1
	B: Glazier Way	Huron Pkwy.	1.00	1.43	1.17	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.96	1.36	0.97	-0.2	0.0
Miller Road							
	A: M-14	Newport Rd.	1.02	0.83	1.02	0.1	0.0
	B: Newport Rd.	Main St.	1.02	0.95	1.01	0.1	0.0
Jackson Road							
	A: I-94	Main St.	1.02	1.16	1.02	0.1	0.0
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.99	0.94	0.99	0.0	0.0
	B: Fuller Rd.	Geddes Rd.	1.01	0.96	1.00	0.0	0.0
Main Street							
	A: M-14	Depot St.	0.97	1.37	0.98	-0.1	-0.2
Washtenaw							
	A: U.S. 23	Stadium	0.98	1.07	0.98	-0.1	0.0
	B: Stadium	Geddes Ave.	1.01	1.48	1.00	0.0	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.97	1.17	0.97	-0.1	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	1.06	1.37	1.05	0.3	0.1

[1]No Action Alternative divided into new alternative.

Alternative 4 – Remove Entire Barton Interchange/Add Full "Flopped Diamond" Nixon Interchange (Figure 3-11)

This alternative would lessen further the traffic, congestion, crash, noise and air pollution effects on Barton Drive while likewise increasing those along a longer stretch of Nixon Road. Thirty-seven acres of land not in public right-of-way would likely be acquired to construct this proposal (Table 3-8). Between five and six acres of wetlands would be involved. But, no houses, businesses, nor parklands are expected to be acquired.

The community served by Nixon Road would be negatively affected including three schools (Table 3-4). Ann Arbor Township's objective of farmland preservation will likely be negatively impacted by this proposal. And, the Township fire station at Goss Road would be two minutes farther from the Stein/Whitmore Lake Roads area with the Barton/M-14 interchange removed. No change in travel is expected between the latter point and the Pontiac Trail fire station.

Some negative impact on cohesion of the community served by Pontiac Trail from Plymouth Road to Barton Drive would also be felt. At the same time, a positive effect would be experienced by the community served by Barton Drive from M-14 to Plymouth Road.

A positive effect on safety is expected to occur as it is forecast based on computer analysis that the number of crashes systemwide would drop by 69 compared to the No Action Alternative.

The engineering issues in constructing this proposed interchange at Nixon Road involve wetlands, soil conditions, and drainage. Its cost is estimated to be $9.0 to $13.5 million (exclusive of property purchase and the cost to remove the Barton Drive interchange). But, this interchange would be so close to the M-14/U.S. 23 split, that it is considered unacceptable from a design standards set by FHWA/MDOT.

Figure 3-11
Alternative 4 – Add Full Nixon Interchange
Remove Barton Interchange

Table 3-8
Alternative 4 – Remove Entire Barton Drive Interchange/Add "Flopped Diamond" Nixon Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.94	0.37	0.97	-0.3	0.0
	B: E. of Miller/Maple	E. of Beechwood	0.93	0.57	0.93	-0.3	0.0
	C: E. of Beechwood	E. of Main St.	0.93	0.57	0.93	-0.3	0.0
	D: E. of Main St.	S. of Barton Dr.	0.93	0.57	0.93	-0.3	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.93	1.06	0.94	-0.3	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.06	1.06	1.09	0.3	0.0
	G: W. of U.S. 23	E. of Nixon	1.04	1.17	1.04	0.2	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	-0.1	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.86	0.66	0.86	-0.7	-0.2
	B: Stein Rd.	N. Territorial Rd.	0.91	0.52	0.91	-0.4	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.55	0.65	0.55	-2.6	-0.3
	B: Pontiac Trail	Plymouth	0.82	0.90	0.82	-0.9	-0.2
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.14	0.88	1.17	0.6	0.1
	B: Barton Dr.	Dhu Varren Rd.	0.84	0.70	0.85	-0.7	-0.2
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.00	1.18	1.04	0.0	0.0
	B: Barton Dr.	Nixon Rd.	0.93	1.05	0.95	-0.3	-0.2
	C: Nixon Rd.	U.S. 23	0.99	1.18	0.99	0.0	0.2
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.08	1.21	1.11	0.4	0.0
	B: Dhu Varren Rd.	M-14	1.52	1.24	1.53	1.8	0.2
	C: M-14	Pontiac Trail	1.19	0.94	1.19	0.7	0.1
Fuller Road							
	A: Glen Ave.	Glazier Way	1.03	1.56	1.03	-0.5	0.1
	B: Glazier Way	Huron Pkwy.	1.03	1.26	1.03	0.1	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	1.02	1.43	1.02	0.1	0.0
Miller Road							
	A: M-14	Newport Rd.	1.02	0.83	1.02	0.1	0.0
	B: Newport Rd.	Main St.	1.00	0.94	1.00	0.0	0.0
Jackson Road							
	A: I-94	Main St.	1.03	1.17	1.03	0.1	0.0
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.98	0.94	0.99	0.0	0.0
	B: Fuller Rd.	Geddes Rd.	1.01	0.96	1.00	-0.1	0.0
Main Street							
	A: M-14	Depot St.	0.95	1.34	0.96	-0.2	-0.3
Washtenaw							
	A: U.S. 23	Stadium	1.04	1.07	0.98	0.2	0.2
	B: Stadium	Geddes Ave.	0.99	1.31	0.89	0.0	0.0
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.96	1.16	0.96	-0.2	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	1.00	1.31	1.00	0.0	0.0

[1] No Action Alternative divided into new alternative.

Alternative 5 – Remove the Entire Barton Interchange/Add Greenway Interchange (Figures 3-12A and 3-12B)

Two alternative concepts have been developed for this proposal to illustrate impacts east and west of M-14. Alternative 5A provides traditional loop and slip ramps on and off east M-14 to a divided street connection to Pontiac Trail. Alternative 5B is a diamond interchange. About a 50 percent reduction of traffic and congestion on Barton Drive between M-14 and Pontiac Trail would be provided by Alternative 5A (Table 3-9A). Likewise, Whitmore Lake Road would see a drop of about 20 to 30 percent. The new interchange's access road would carry 17,000 vehicles per day in 2020 east of M-14. And, Pontiac Trail between Barton Drive and Dhu Varren Road would carry more traffic (+18%) and experience more congestion (+24%) compared to any other alternative among the 16 being studied. New congestion is not evident elsewhere in the network when compared to the No Action Alternative.

Figure 3-12A
Alternative 5A – Add Greenway Interchange
Remove Entire Barton Interchange

Significant noise from the traffic on the new connector to M-14 from Pontiac Trail would likely affect about two dozen homes on each of the north and south sides of the new road. There would also be a noise increase along Pontiac Trail north of Barton Drive but it is not expected to exceed a 1 dBA increase. A noise reduction of more than 3 dBA is expected on Barton Drive between M-14 and Pontiac Trail. Air quality impacts are not expected to change from the No Action condition and the EPA standard for carbon monoxide concentrations is not close to being approached on any roadway segment.

The traffic effects of a diamond interchange at the greenway are much different on Whitmore Lake Road and Barton Drive for Alternative 5B compared to Alternative 5A (Table 3-9B). The diamond interchange configuration would allow some of the traffic that used Barton Drive in Alternative 5A to shift to the new two-way street between Whitmore Lake Road and Pontiac Trail. It is expected to serve 19,000 vehicles per day in 2020 east of M-14 and about 5,500 vpd west of the freeway. The result is a major decrease in noise on Barton Drive and an impact of new and significant noise to be experienced by almost 50 homes that surround the new connector from Pontiac Trail to Whitmore Lake Road.

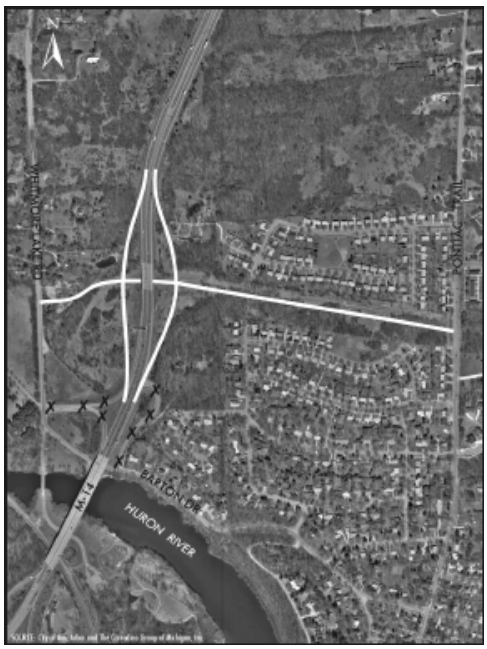


Figure 3-12B
Alternative 5B – Add Greenway Interchange
Remove Entire Barton Interchange

Computer analysis indicates that with either alternative, the number of crashes is expected to show its greatest decline (79 fewer accidents per year) over the No Action condition because of the removal of the interchange at Barton Drive as well the largest reduction in traffic on Barton Drive itself.

The greenway alternative is likely to cause one house to be acquired with Alternative 5A; two houses are likely to be impacted with Alternative 5B (Table 3-4). And, while no officially-designated parks would be affected, the area upon which either interchange would be constructed is currently used by the public as open space ("the greenway"). The possible acquisition in this area includes the following acreages.

- Alternative 5A: east of M-14: 19 acres; west of M-14: 8.5 acres
- Alternative 5B: east of M-14: 12.5 acres; west of M-14: 4 acres

These alternatives would involve between two and seven acres of wetlands.

The cohesion of the communities along the greenway and Pontiac Trail north of Barton Drive is considered to be negatively affected by both Alternatives 5A and 5B. The community directly served by Barton Drive would experience a positive effect including the Northside Elementary School. For Alternative 5A, the impact on the cohesiveness of the community served by Whitmore Lake Road, at least from the Huron River to Stein Road, would likely be balanced by the negative effects of the intrusion of new ramps so close to the houses and the positive effect of the reduction in traffic. With Alternative 5B, a negative impact on community cohesion along at least the southern section of Whitmore Lake Road is anticipated as a result of the acquisition of two houses with no reduction of traffic.

Wetlands/drainage/soils conditions will be key issues in building this interchange, which is expected to cost $10.0 to $15.0 million for Alternative 5A, and $7.0 to $10.5 million for Alternative 5B (exclusive of property acquisition and the cost to remove the Barton Drive interchange). It is noted that MDOT's position would likely require a significant portion of the cost of the roadways leading to the interchange ramps from Whitmore Lake Road and Pontiac Trail to be a local responsibility. However, the overriding engineering issue is that MDOT standards will not allow the interchange to be introduced so close to the M-14/U.S. 23 connector immediately to the north.

Table 3-9A
Alternative 5A – Remove Entire Barton Interchange/Add "Greenway" Trumpet Interchange
Comparison to No Action Condition
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level[2]	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.99	0.39	1.00	0.0	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.00	0.62	1.02	0.0	0.0
	C: E. of Beechwood	E. of Main St.	1.00	0.62	1.02	0.0	0.0
	D: E. of Main St.	S. of Barton Dr.	1.00	0.62	1.02	0.0	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	1.00	1.13	1.00	0.0	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.06	1.05	1.08	0.2	0.0
	G: W. of U.S. 23	E. of Nixon	0.99	1.07	0.95	-0.1	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.73	0.56	0.73	-1.4	-0.3
	B: Stein Rd.	N. Territorial Rd.	0.71	0.41	0.72	-1.5	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.47	0.56	0.48	-3.3	-0.3
	B: Pontiac Trail	Plymouth	0.92	1.01	0.92	-0.4	0.0
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	0.91	0.69	0.92	-0.4	-0.1
	B: Barton Dr.	Dhu Varren Rd.	1.18	1.02	1.24	0.7	0.2
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	0.95	1.13	0.99	-0.2	-0.1
	B: Barton Dr.	Nixon Rd.	0.97	1.09	0.98	-0.2	0.0
	C: Nixon Rd.	U.S. 23	0.98	1.17	0.98	-0.1	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.03	1.11	1.02	0.1	0.0
	B: Dhu Varren Rd.	M-14	0.96	0.78	0.96	-0.2	0.0
	C: M-14	Pontiac Trail	0.96	0.76	0.96	-0.2	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.00	1.52	1.00	0.0	0.0
	B: Glazier Way	Huron Pkwy.	1.00	1.22	1.00	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	1.05	1.48	1.06	0.2	0.0
Miller Road							
	A: M-14	Newport Rd.	1.01	0.82	1.01	0.1	0.0
	B: Newport Rd.	Main St.	0.99	0.92	0.98	-0.1	-0.1
Jackson Road							
	A: I-94	Main St.	1.02	1.15	1.01	0.1	0.0
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	1.01	0.96	1.01	0.0	0.0
	B: Fuller Rd.	Geddes Rd.	1.02	0.98	1.02	0.1	0.0
Main Street							
	A: M-14	Depot St.	1.01	1.41	1.01	0.0	0.0
Washtenaw							
	A: U.S. 23	Stadium	1.02	1.10	1.01	0.1	0.1
	B: Stadium	Geddes Ave.	1.02	1.50	1.01	0.1	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.91	1.11	0.92	-0.4	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.97	1.27	0.97	-0.2	0.0

[1]No Action Alternative divided into new alternative.

[2]Twenty-six houses on the north side of the connector road and 22 houses on the south side would experience new noise.

Table 3-9B
Alternative 5B – Remove Entire Barton Interchange/Add "Greenway" Diamond Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level[2]	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	1.01	0.40	1.03	0.0	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.02	0.62	1.02	0.1	0.0
	C: E. of Beechwood	E. of Main St.	1.02	0.62	1.02	0.1	0.0
	D: E. of Main St.	S. of Barton Dr.	1.02	0.62	1.02	0.1	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	1.01	1.14	1.01	0.1	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.05	1.04	1.07	0.2	0.0
	G: W. of U.S. 23	E. of Nixon	0.98	1.10	0.97	-0.1	0.0
	H: E. of U.S. 23	E. of Dixboro	1.00	0.89	1.00	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	1.02	0.78	1.02	0.1	0.0
	B: Stein Rd.	N. Territorial Rd.	1.02	0.58	1.02	0.1	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.23	0.27	0.23	-6.4	-0.4
	B: Pontiac Trail	Plymouth	0.89	0.98	0.89	-0.5	-0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	0.83	0.62	0.83	-0.8	-0.2
	B: Barton Dr.	Dhu Varren Rd.	1.33	1.17	1.43	1.2	0.2
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	0.96	1.14	1.00	-0.2	-0.1
	B: Barton Dr.	Nixon Rd.	0.95	1.07	0.96	-0.2	-0.1
	C: Nixon Rd.	U.S. 23	1.00	1.20	1.01	0.0	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.03	1.15	1.06	0.1	0.0
	B: Dhu Varren Rd.	M-14	0.93	0.75	0.93	-0.3	0.0
	C: M-14	Pontiac Trail	0.92	0.73	0.92	-0.3	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.07	1.63	1.07	0.3	0.2
	B: Glazier Way	Huron Pkwy.	1.04	1.28	1.05	0.2	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.98	1.37	0.98	-0.1	0.0
Miller Road							
	A: M-14	Newport Rd.	1.01	0.82	1.01	0.0	0.0
	B: Newport Rd.	Main St.	0.98	0.92	0.98	-0.1	-0.1
Jackson Road							
	A: I-94	Main St.	1.02	1.16	1.02	0.1	0.0
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.99	0.93	0.98	0.0	0.0
	B: Fuller Rd.	Geddes Rd.	1.00	0.95	0.99	0.0	0.0
Main Street							
	A: M-14	Depot St.	1.00	1.41	1.01	0.0	0.0
Washtenaw							
	A: U.S. 23	Stadium	1.02	1.11	1.02	0.1	0.1
	B: Stadium	Geddes Ave.	1.02	1.50	1.01	0.1	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.99	1.19	0.98	-0.1	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.90	1.19	0.91	-0.4	-0.1

[1]No Action Alternative divided into new alternative.

[2]Twenty-six houses on the north side of the connector road and 22 houses on the south side would experience new noise.

Alternative 6 – Remove Entire Barton Interchange/Add Full Main Street Interchange (Figures 3-13A and 3-13B)

There are two concepts for this interchange (Figures 3-13A and 3-13B). Alternative 6A is a diamond interchange with ramps placed close to the mainline of M-14. Alternative 6B creates more elaborate ramp overpasses and underpasses to address the flow of traffic. They vary in the amount of new right-of-way that would have to be acquired and how they treat Huron River Drive (Table 3-4). In each case they provide all movements between M-14 and Main Street that are now provided by both the Main Street and Barton Drive interchanges.

With this alternative (either option), Barton Drive would gain traffic relief, while Pontiac Trail between Plymouth Road and Barton Drive would experience an increase in traffic plus an increase in congestion compared to the No Action Alternative (Table 3-10). But, the volume-to-capacity ratio on Pontiac Trail is not expected to exceed 1.00 at LOS C.

Neither noise nor air quality is expected to change significantly anywhere in the system with Alternative 6 as compared to the No Action condition. Computer analysis indicates a decrease in crashes (62 per year) is expected with the closing of the Barton Drive interchange.

Overall, the community served directly by Barton Drive will have its cohesiveness improved by this alternative. This includes the Northside Elementary School. The community served by Pontiac Trail between Plymouth Road and Barton Drive would experience a negative effect on its cohesiveness.

In terms of other measurements, the two options for Alternative 6 differ in terms of potential acquisitions: Option B (Figure 3-13B) would involve three businesses while Option A (Figure 3-13A) would affect none (Table 3-4). Both options would directly affect the Kuebler Langford Nature Area with Option B having the greater potential to take parkland. No wetlands would be involved.

Another difference between the two options is the associated construction cost. Alternative 6A is estimated to cost between $7.0 and $10.5 million while Alternative 6B has a cost estimate of $11.0 to $16.5. Both estimates exclude property acquisition and the cost to remove the Barton Drive interchange. With the Barton interchange removed, developing a full Main Street/M-14 interchange is expected to meet MDOT design standards.

Figure 3-13A
Alternative 6A – Add Full Main Street Interchange
Remove Entire Barton Interchange

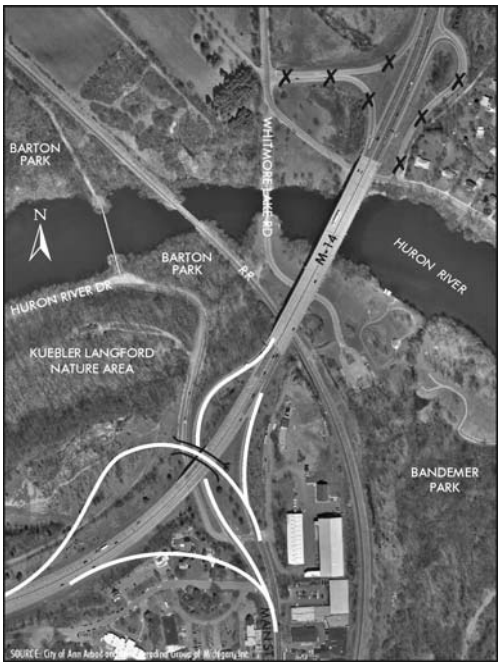


Figure 3-13B
Alternative 6B – Add Full Main Street Interchange
Remove Entire Barton Interchange

Table 3-10
Alternative 6 – Remove Entire Barton Interchange/Add Full Main Street Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	1.06	0.43	1.10	0.3	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.04	0.63	1.03	0.2	0.0
	C: E. of Beechwood	E. of Main St.	1.04	0.63	1.03	0.2	0.0
	D: E. of Main St.	S. of Barton Dr.	1.12	0.63	1.03	0.5	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.85	0.96	0.85	-0.7	0.0
	F: N. of Barton Dr.	S. of U.S. 23	0.97	0.96	0.99	-0.2	0.0
	G: W. of U.S. 23	E. of Nixon	1.00	1.13	1.00	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.91	0.70	0.91	-0.4	-0.2
	B: Stein Rd.	N. Territorial Rd.	0.99	0.57	1.00	-0.1	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.59	0.69	0.59	-2.3	-0.3
	B: Pontiac Trail	Plymouth	0.89	0.98	0.89	-0.5	-0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.18	0.88	1.17	0.7	0.1
	B: Barton Dr.	Dhu Varren Rd.	0.88	0.73	0.89	-0.6	-0.1
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.01	1.20	1.05	0.0	0.0
	B: Barton Dr.	Nixon Rd.	0.95	1.08	0.97	-0.2	-0.1
	C: Nixon Rd.	U.S. 23	1.05	1.26	1.06	0.2	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.00	1.12	1.03	0.0	0.0
	B: Dhu Varren Rd.	M-14	0.99	0.81	1.00	0.0	0.0
	C: M-14	Pontiac Trail	0.99	0.78	0.99	0.0	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.05	1.59	1.05	0.2	0.1
	B: Glazier Way	Huron Pkwy.	1.00	1.23	1.01	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.97	1.36	0.97	-0.1	0.0
Miller Road							
	A: M-14	Newport Rd.	0.97	0.79	0.98	-0.1	0.0
	B: Newport Rd.	Main St.	0.93	0.87	0.93	-0.3	-0.1
Jackson Road							
	A: I-94	Main St.	0.97	1.12	0.98	-0.1	-0.1
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.99	0.94	0.99	-0.1	0.0
	B: Fuller Rd.	Geddes Rd.	1.03	0.99	1.03	0.1	0.0
Main Street							
	A: M-14	Depot St.	1.02	1.43	1.02	0.1	0.0
Washtenaw							
	A: U.S. 23	Stadium	1.09	1.26	1.09	0.4	0.3
	B: Stadium	Geddes Ave.	1.08	1.60	1.08	0.4	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.85	1.03	0.85	-0.7	-0.1
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.88	1.16	0.89	-0.6	-0.1

[1]No Action Alternative divided into new alternative.

Alternative 7 – Remove Entire Barton Interchange/Add Joy Road Interchange (Figure 3-14)

Barton Drive would experience a significant reduction in traffic and noise with Alternative 7 (Figure 3-14 and Table 3-11). So will Whitmore Lake Road from the Huron River north to Stein Road, and Pontiac Trail between Barton Drive and Dhu Varren Road. The introduction of the Joy Road/M-14 interchange produces no other significant change in volumes, congestion, noise nor air quality compared to the No Action Alternative. A reduction in crashes of 75 per year is expected with Alternative 7 based on computer modeling.

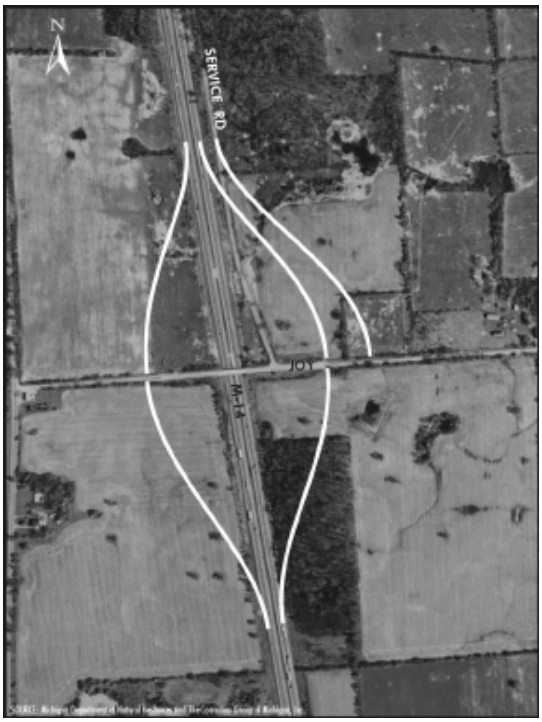


Figure 3-14
Alternative 7 – Add New Interchange @ Joy
Remove Entire Barton Interchange

Acquisition of 36 acres of vacant land that is not public right-of-way will likely be involved with building a new interchange at Joy Road (Table 4). None will be wetlands or parkland. No structures will be acquired. Northside Elementary is the only school expected to be directly or indirectly affected.

The cohesiveness of the communities along Barton Drive, Whitmore Lake Road and Pontiac Trail will be affected positively. Some negative impact on cohesion of the community served by Joy Road would be felt. New, perhaps unwanted, development in an area with a relatively large number of unpaved roads would be a concern.

The effect of removing the M-14 interchange with Barton Drive on Ann Arbor Township emergency service access would range from no change in travel time from the Township's Pontiac Trail fire station to the area of Stein Road and Whitmore Lake Road, to a two-minute increase in travel time between the latter point and the fire station at Goss Road.

There are no significant engineering issues associated with this proposal. Its cost is expected to be in the range of $9.0 to $13.5 million, exclusive of right-of-way and the cost to remove the Barton Drive interchange. This proposal can meet MDOT design standards.

Table 3-11
Alternative 7 – Remove Entire Barton Interchange/Add Joy Road Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.92	0.36	0.92	-0.4	0.0
	B: E. of Miller/Maple	E. of Beechwood	0.90	0.55	0.90	-0.5	0.0
	C: E. of Beechwood	E. of Main St.	0.90	0.55	0.90	-0.5	0.0
	D: E. of Main St.	S. of Barton Dr.	0.90	0.55	0.90	-0.5	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.92	1.05	0.93	-0.3	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.05	1.05	1.08	0.2	0.0
	G: W. of U.S. 23	E. of Nixon	1.00	1.13	1.00	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	-0.1	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.70	0.54	0.70	-1.6	-0.3
	B: Stein Rd.	N. Territorial Rd.	1.02	0.58	1.02	0.1	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.45	0.53	0.45	-3.5	-0.4
	B: Pontiac Trail	Plymouth	0.83	0.92	0.84	-0.8	-0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	0.99	0.74	0.99	0.0	0.0
	B: Barton Dr.	Dhu Varren Rd.	0.79	0.65	0.79	-1.0	-0.2
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.02	1.21	1.06	0.1	0.0
	B: Barton Dr.	Nixon Rd.	0.93	1.05	0.95	-0.3	-0.2
	C: Nixon Rd.	U.S. 23	1.03	1.21	1.02	0.1	0.1
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.06	1.22	1.06	0.2	0.0
	B: Dhu Varren Rd.	M-14	1.05	0.85	1.05	0.0	0.0
	C: M-14	Pontiac Trail	1.05	0.83	1.05	0.2	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.03	1.56	1.03	0.1	0.1
	B: Glazier Way	Huron Pkwy.	1.02	1.25	1.02	0.1	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	1.00	1.41	1.01	0.0	0.0
Miller Road							
	A: M-14	Newport Rd.	1.05	0.85	1.05	0.2	0.0
	B: Newport Rd.	Main St.	1.01	0.94	1.00	0.0	0.0
Jackson Road							
	A: I-94	Main St.	1.03	1.18	1.04	0.1	0.1
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.99	0.95	1.00	0.0	0.0
	B: Fuller Rd.	Geddes Rd.	0.99	0.95	0.99	0.0	0.0
Main Street							
	A: M-14	Depot St.	0.97	1.36	0.97	-0.1	-0.3
Washtenaw							
	A: U.S. 23	Stadium	1.06	1.14	1.05	0.2	0.2
	B: Stadium	Geddes Ave.	1.05	1.55	1.05	0.2	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.83	1.00	0.83	-0.8	-0.1
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.85	1.12	0.85	-0.7	-0.1

[1] No Action Alternative divided into new alternative.

Alternative 8 – Remove Entire Barton Interchange/Add Dixboro Interchange (Figure 3-15)

Except for Barton Drive and Pontiac Trail, the Dixboro Road interchange proposal is associated with few significant changes in the traffic and related measurements throughout the Northeast Area roadway system (Table 3-12). The decrease in traffic on Barton Drive is the result of closing its interchange with M-14 as are the traffic increases on Pontiac Trail from Plymouth to Barton Drive. Alternative 8's noise and air quality impacts do not change significantly from those of the No Action option. A decrease of 65 crashes per year is expected compared to No Action conditions based on computer analysis.

Figure 3-15
Alternative 8 – Add New Interchange @ Dixboro
Remove Entire Barton Interchange

The Dixboro interchange proposal is expected to be involved with acquisition of 34 acres of vacant land that is not public right-of-way (Table 3-4). Much of this land was government-controlled until just recently when it was sold. One acre of this area is officially designated as wetlands. No parkland is expected to be affected directly by this proposal.

The cohesiveness of the community served by Barton Drive is expected to be positively affected, including the Northside Elementary School. No other schools are likely to be impacted. Other community cohesion effects are considered marginal except that access by emergency vehicles without the Barton Drive interchange will be two minutes longer from Ann Arbor Township's Goss Road fire station to the area defined by the intersection of Stein and Whitmore Lake Roads. No change in travel time is expected to that area from the Pontiac Trail fire station.

While it may cost $9.0 to $13.5 million to build this new interchange (exclusive of right-of-way and the cost to remove the Barton Drive/M-14 interchange), the engineering issue that dominates its feasibility is that its insertion between U.S. 23 and the M-14 interchange at Ford Road will not meet current MDOT design standards.

Table 3-12
Alternative 8 – Remove Entire Barton Interchange/Add Dixboro Road Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.91	0.36	0.92	-0.4	0.0
	B: E. of Miller/Maple	E. of Beechwood	0.89	0.54	0.89	-0.5	0.0
	C: E. of Beechwood	E. of Main St.	0.89	0.54	0.89	-0.5	0.0
	D: E. of Main St.	S. of Barton Dr.	0.89	0.54	0.89	-0.5	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.91	1.03	0.91	-0.4	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.03	1.03	1.06	0.1	0.0
	G: W. of U.S. 23	E. of Nixon	1.04	1.17	1.04	0.2	0.0
	H: E. of U.S. 23	E. of Dixboro	1.03	0.91	1.02	0.1	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.88	0.68	0.88	-0.5	-0.2
	B: Stein Rd.	N. Territorial Rd.	0.95	0.54	0.95	-0.2	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.57	0.67	0.57	-2.4	-0.3
	B: Pontiac Trail	Plymouth	0.86	0.94	0.85	-0.7	-0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.15	0.86	1.15	0.6	0.1
	B: Barton Dr.	Dhu Varren Rd.	0.85	0.70	0.85	-0.7	-0.2
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.03	1.22	1.07	0.1	0.1
	B: Barton Dr.	Nixon Rd.	0.97	1.09	0.98	-0.2	-0.1
	C: Nixon Rd.	U.S. 23	1.03	1.23	1.04	0.1	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.03	1.13	1.04	0.1	0.0
	B: Dhu Varren Rd.	M-14	0.98	0.79	0.98	-0.1	0.0
	C: M-14	Pontiac Trail	0.98	0.77	0.97	-0.1	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.01	1.52	1.00	0.0	0.1
	B: Glazier Way	Huron Pkwy.	1.01	1.24	1.02	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.99	1.39	0.99	-0.1	0.0
Miller Road							
	A: M-14	Newport Rd.	1.02	0.83	1.02	0.1	0.0
	B: Newport Rd.	Main St.	0.99	0.92	0.98	-0.1	-0.1
Jackson Road							
	A: I-94	Main St.	1.05	1.20	1.05	0.2	0.2
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	1.02	0.97	1.02	0.1	0.0
	B: Fuller Rd.	Geddes Rd.	0.99	0.94	0.98	0.0	0.0
Main Street							
	A: M-14	Depot St.	0.95	1.34	0.96	-0.2	-0.3
Washtenaw							
	A: U.S. 23	Stadium	1.02	1.11	1.03	0.1	0.1
	B: Stadium	Geddes Ave.	1.02	1.51	1.02	0.1	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.93	1.12	0.93	-0.3	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.97	1.27	0.97	-0.1	

[1] No Action Alternative divided into new alternative.

Alternative 9 – Remove Entire Barton Drive Interchange/Add Frontage Roads Between Pontiac and Nixon (Figure 3-16)

Alternative 9, which adds frontage road connectors between Nixon Road and Pontiac Trail, performs much like Alternatives 3 (partial Nixon interchange) and 4 (full Nixon interchange) except it causes even more traffic and congestion on Nixon Road (Table 3-13). While this will not cause air quality standards to be exceeded, noise will be increased by more than 2 dBA on Nixon Road between M-14 and Dhu Varren Road. And, nine homes south of the frontage road will be exposed to significant new noise. Noise will decrease by almost 3 dBA on Barton Drive.

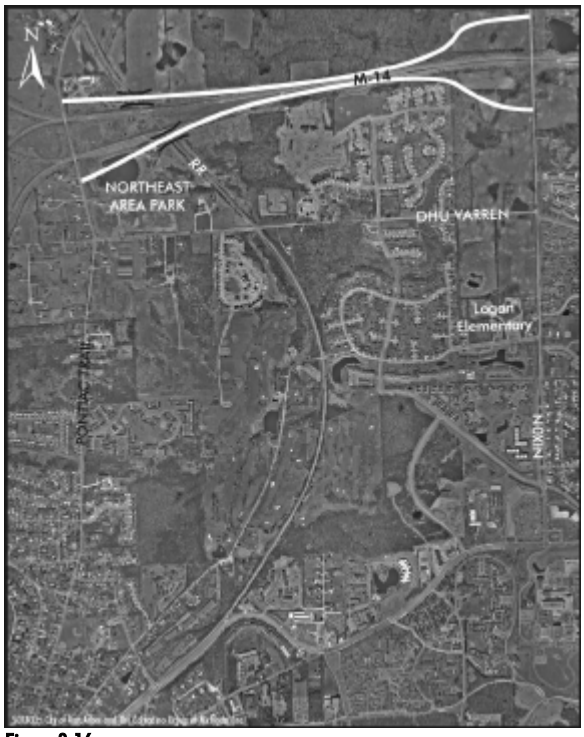


Figure 3-16
Alternative 9 – Add Frontage Roads
Remove Entire Barton Interchange

Computer analysis forecasts a drop in crashes by 70 per year is expected to be associated with the redistribution of traffic compared to the No Action Alternative (Table 3-4).

Alternative 9 will likely cause acquisition of 60+ vacant acres of land that is not now public right-of-way. This includes two business properties, about eight acres of designated wetlands and about eight acres at the proposed Northeast Area Park.

The impacts on community cohesion are expected to be positive on the area served by Barton Drive, including the Northside Elementary School. Negative effects are expected on the community served by Nixon Road. The removal of the Barton interchange will cause the travel time of emergency equipment to be two minutes longer from Ann Arbor Township's Goss Road fire station to the area defined by the intersection of Stein and Whitmore Lake Roads. No change in travel time is expected to that area from the Pontiac Trail fire station.

The cost estimate for this alternative ranges between $17.0 and $25.5 million, exclusive of right-of-way and the cost to remove the Barton Drive interchange. This interchange's engineering challenges are associated with making the weaving operations happen smoothly in the 1.5± distance between the M-14/U.S. 23 split and Nixon Road.

Table 3-13
Alternative 3 – Remove Entire Barton Interchange/Add Frontage Roads Between Pontiac and Nixon Roads
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level[2]	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.95	0.37	0.95	-0.2	0.0
	B: E. of Miller/Maple	E. of Beechwood	0.94	0.57	0.93	-0.3	0.0
	C: E. of Beechwood	E. of Main St.	0.94	0.57	0.93	-0.3	0.0
	D: E. of Main St.	S. of Barton Dr.	0.94	0.57	0.93	-0.3	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.95	1.07	0.95	-0.2	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.08	1.07	1.10	0.3	0.0
	G: W. of U.S. 23	E. of Nixon	1.00	1.17	1.04	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.81	0.63	0.82	-0.9	-0.2
	B: Stein Rd.	N. Territorial Rd.	0.85	0.49	0.86	-0.7	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.53	0.62	0.53	-2.8	-0.4
	B: Pontiac Trail	Plymouth	0.78	0.86	0.78	-1.1	-0.2
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.02	0.76	1.02	0.1	0.0
	B: Barton Dr.	Dhu Varren Rd.	0.86	0.71	0.87	-0.7	-0.1
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.01	1.2	1.05	0.1	0.1
	B: Barton Dr.	Nixon Rd.	0.91	1.02	0.92	-0.4	-0.3
	C: Nixon Rd.	U.S. 23	0.99	1.18	0.99	0.0	0.1
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.20	1.31	1.20	0.8	0.2
	B: Dhu Varren Rd.	M-14	1.61	1.31	1.62	2.1	0.3
	C: M-14	Pontiac Trail	1.10	0.87	1.10	0.4	0.1
Fuller Road							
	A: Glen Ave.	Glazier Way	1.02	1.55	1.02	0.1	0.1
	B: Glazier Way	Huron Pkwy.	1.03	1.26	1.03	0.1	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	1.04	1.47	1.05	0.2	0.1
Miller Road							
	A: M-14	Newport Rd.	1.02	0.83	1.02	0.1	0.0
	B: Newport Rd.	Main St.	1.01	0.94	1.00	0.0	-0.1
Jackson Road							
	A: I-94	Main St.	1.02	1.17	1.03	0.1	0.0
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.97	0.93	0.98	-0.1	0.0
	B: Fuller Rd.	Geddes Rd.	0.98	0.94	0.98	-0.1	0.0
Main Street							
	A: M-14	Depot St.	0.97	1.36	0.97	-0.1	-0.1
Washtenaw							
	A: U.S. 23	Stadium	1.01	1.09	1.00	0.0	0.1
	B: Stadium	Geddes Ave.	1.00	1.47	0.99	0.0	0.0
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.94	1.14	0.94	-0.3	-0.1
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.99	1.29	0.98	-0.1	0.0

[1]No Action Alternative divided into new alternative.

[2]Nine houses along the south side of the frontage road are expected to be impacted by significant new noise.

Alternative 10 – Improve the Plymouth Road/U.S. 23 Interchange (Figure 3-17)

The concept for Alternative 10 is shown on Figure 3-17. At the time of the M-14/Barton Drive interchange analysis, it was being designed by MDOT for construction in 2002. This proposal has the same traffic and related characteristics (noise, air quality, safety) of the No Action Alternative (Tables 3-4 and 3-14).

There are no significant engineering issues associated with improving the Plymouth Road/U.S. 23 interchange. It is consistent with MDOT design standards. The project was completed in 2004 at a cost of about $10.0 million.

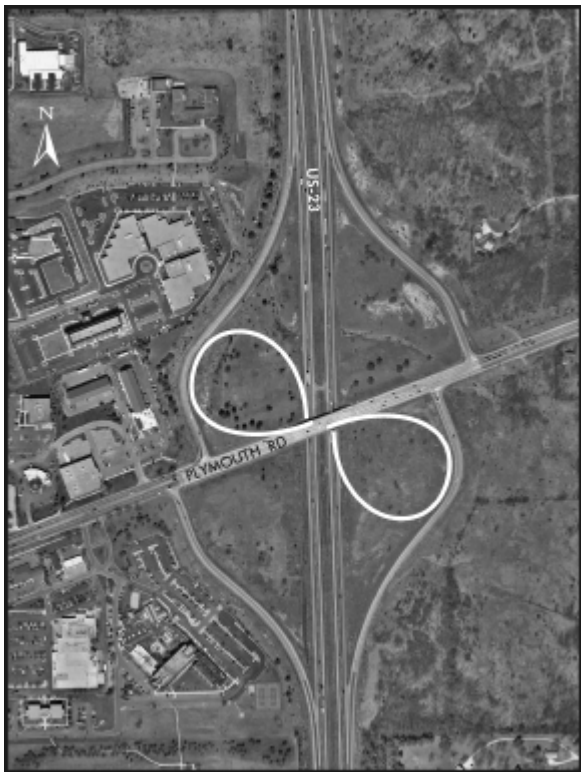


Figure 3-17
Alternative 10 – Improve Plymouth Rd. Interchange @ U.S. 23

Table 3-14
Alternative 10 – Improve the Plymouth Road Interchange @ U.S. 23
Comparison to No Action Conditions

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	1.00	0.39	1.00	0.0	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.00	0.61	1.00	0.0	0.0
	C: E. of Beechwood	E. of Main St.	1.00	0.61	1.00	0.0	0.0
	D: E. of Main St.	S. of Barton Dr.	1.00	0.61	1.00	0.0	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	1.00	1.13	1.00	0.0	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.00	0.97	1.00	0.0	0.0
	G: W. of U.S. 23	E. of Nixon	1.00	1.13	1.00	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	1.00	0.89	1.00	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	1.00	0.77	1.00	0.0	0.0
	B: Stein Rd.	N. Territorial Rd.	1.00	0.57	1.00	0.0	0.0
Barton Drive							
	A: M-14	Pontiac Trail	1.00	1.17	1.00	0.0	0.0
	B: Pontiac Trail	Plymouth	1.00	1.10	1.00	0.0	0.0
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.00	0.75	1.00	0.0	0.0
	B: Barton Dr.	Dhu Varren Rd.	1.00	0.82	1.00	0.0	0.0
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.00	1.14	1.00	0.0	0.0
	B: Barton Dr.	Nixon Rd.	1.00	1.11	1.00	0.0	0.1
	C: Nixon Rd.	U.S. 23	1.00	1.19	1.00	0.0	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.00	1.09	1.00	0.0	0.0
	B: Dhu Varren Rd.	M-14	1.00	0.81	1.00	0.0	0.0
	C: M-14	Pontiac Trail	1.00	0.79	1.00	0.0	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.00	1.52	1.00	0.0	0.0
	B: Glazier Way	Huron Pkwy.	1.00	1.22	1.00	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	1.00	1.40	1.00	0.0	0.0
Miller Road							
	A: M-14	Newport Rd.	1.00	0.81	1.00	0.0	0.0
	B: Newport Rd.	Main St.	1.00	0.94	1.00	0.0	0.0
Jackson Road							
	A: I-94	Main St.	1.00	1.14	1.00	0.0	0.0
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	1.00	0.95	1.00	0.0	0.0
	B: Fuller Rd.	Geddes Rd.	1.00	0.96	1.00	0.0	0.0
Main Street							
	A: M-14	Depot St.	1.00	1.40	1.00	0.0	0.0
Washtenaw							
	A: U.S. 23	Stadium	1.00	1.09	1.00	0.0	0.0
	B: Stadium	Geddes Ave.	1.00	1.48	1.00	0.0	0.0
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	1.00	1.21	1.00	0.0	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	1.00	1.31	1.00	0.0	0.0

[1] No Action Alternative divided into new alternative.

Alternative 11 – Retain Barton Interchange/Connect Whitmore Lake Road to Main Street (Figure 3-18)

Figure 3-18 illustrates two concepts to connect Whitmore Lake Road across the Huron River. And, while these concepts cause traffic to increase by 10 to 15 percent on Whitmore Lake Road compared to the No Action Alternative, there are virtually no changes anywhere else in the road system more significant (Table 3-15). As a result, this option is not different in its systemwide traffic, congestion, noise, air quality and safety measurements compared to the No Action condition.

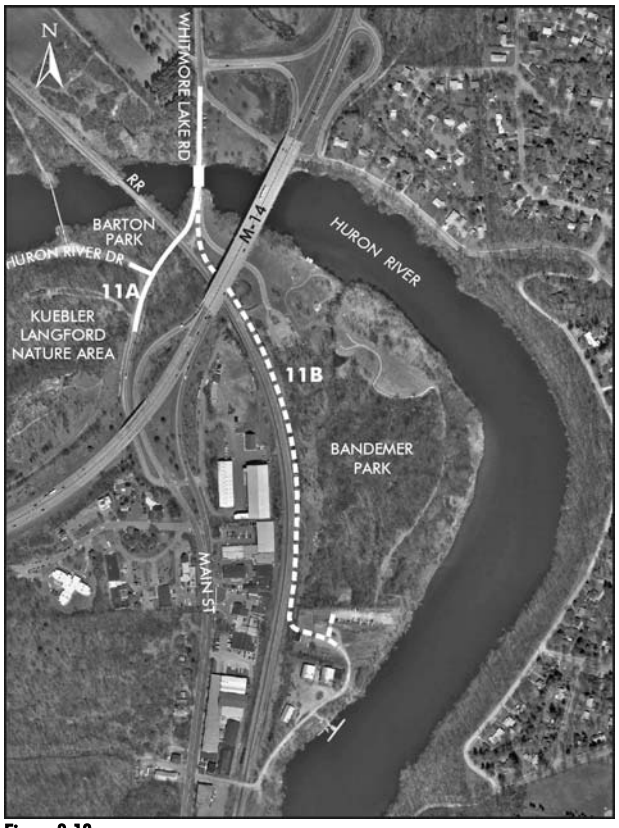


Figure 3-18
Alternative 11A & 11B – Connect Whitmore Lake Road to Main Keep Barton Interchange

The significant issues include: the potential acquisition of land in Bandemer Park with both alternatives, plus an impact to Barton Park with Alternative 11A (Table 3-4). One acre of parkland would likely be acquired with Alternative 11A and 3.5 acres with Alternative 11B. No wetlands impacts are expected. Crossing the Huron River and the railroad south of the river are issues of concern. Alternative 11A would create a new railroad crossing while Alternative 11B would use the existing one at Lakeshore Drive. The cost to construct Alternative 11A is estimated at $3.0 to $4.5 million, exclusive of right-of-way. Alternative 11B is expected to cost $4.0 to $6.0 million, exclusive of right-of-way. This proposed improvement is expected to meet MDOT design standards. Nevertheless, MDOT is likely to expect this improvement would be a local responsibility. And, if no federal funds were used, the prohibition against the use of parkland will not apply.

Table 3-15
Alternative 11 – Retain Barton Interchange/Connect Whitmore Lake Road to Main Street
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	1.03	0.40	1.03	0.1	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.03	0.62	1.02	0.1	0.0
	C: E. of Beechwood	E. of Main St.	1.03	0.62	1.02	0.1	0.0
	D: E. of Main St.	S. of Barton Dr.	1.03	0.62	1.02	0.1	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.94	1.07	0.95	-0.3	0.0
	F: N. of Barton Dr.	S. of U.S. 23	0.98	0.97	1.00	-0.1	0.0
	G: W. of U.S. 23	E. of Nixon	1.00	1.13	1.00	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	1.11	0.85	1.11	0.4	0.0
	B: Stein Rd.	N. Territorial Rd.	1.14	0.65	1.14	0.6	0.1
Barton Drive							
	A: M-14	Pontiac Trail	1.01	1.18	1.01	0.0	0.0
	B: Pontiac Trail	Plymouth	1.01	1.11	1.01	0.0	0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	0.95	0.71	0.95	-0.2	0.0
	B: Barton Dr.	Dhu Varren Rd.	1.03	0.85	1.04	0.1	0.1
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	0.96	1.14	1.00	-0.2	-0.1
	B: Barton Dr.	Nixon Rd.	0.97	1.10	0.99	-0.1	0.0
	C: Nixon Rd.	U.S. 23	0.99	1.19	1.00	0.0	0.1
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.01	1.10	1.01	0.0	0.0
	B: Dhu Varren Rd.	M-14	1.02	0.83	1.02	0.1	0.0
	C: M-14	Pontiac Trail	1.02	0.80	1.01	0.1	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.00	1.53	1.01	0.0	0.1
	B: Glazier Way	Huron Pkwy.	1.01	1.24	1.02	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.99	1.40	1.00	0.0	0.0
Miller Road							
	A: M-14	Newport Rd.	0.96	0.78	0.96	-0.2	-0.1
	B: Newport Rd.	Main St.	0.96	0.90	0.96	-0.2	-0.1
Jackson Road							
	A: I-94	Main St.	0.98	1.11	0.97	-0.1	-0.1
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.99	0.94	0.99	-0.1	0.0
	B: Fuller Rd.	Geddes Rd.	0.99	0.95	0.99	0.0	0.0
Main Street							
	A: M-14	Depot St.	1.06	1.49	1.06	0.3	0.3
Washtenaw							
	A: U.S. 23	Stadium	1.01	1.10	1.01	0.1	0.1
	B: Stadium	Geddes Ave.	1.02	1.50	1.01	0.1	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.92	1.11	0.92	-0.4	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.97	1.28	0.98	-0.1	-0.1

[1] No Action Alternative divided into new alternative.

Alternative 12 – Remove Entire Barton Interchange/Connect Whitmore Lake Road to Main Street (Figure 3-19)

This is the same as Alternative 11 but with the Barton Drive/M-14 interchange removed (Figure 3-19). It is associated with no different effects in engineering challenges. Property acquisition issues are the same as with Alternative 11 including taking of between one and 3.5 acres of parkland (Table 3-4). The cost of Alternative 12 would include the additional expenditure ($0.5 to $1.0 million) to remove the Barton Drive/M-14 interchange compared to Alternative 11.

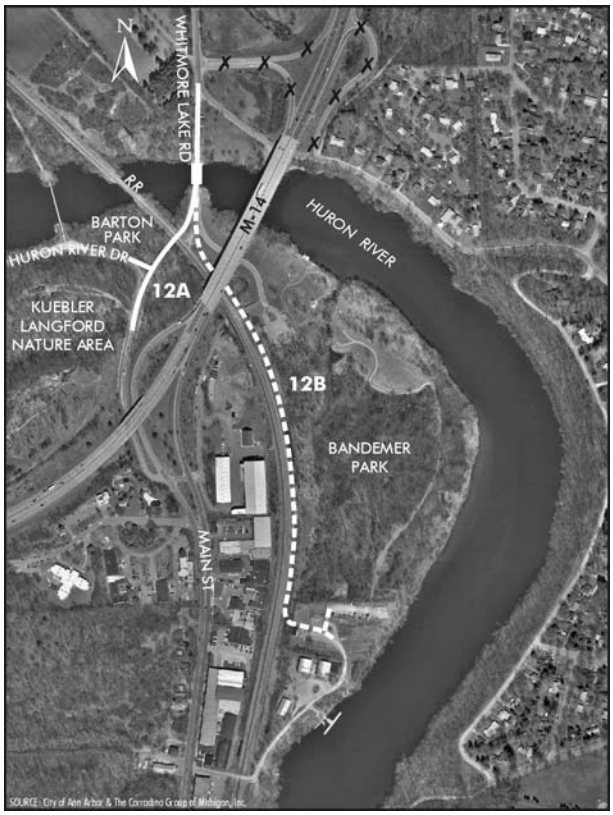


Figure 3-19
Alternative 12A & 12B – Connect Whitmore Lake Road to Main Remove Entire Barton Interchange

The major differences between Alternatives 11 and 12 are the traffic relief on Barton Drive and the large increases in traffic on Whitmore Lake Road (Table 3-16). These changes are largely due to the removal of the Barton Drive interchange, not the connection of Whitmore Lake Road to Main Street. They will affect the cohesiveness of the community served by Whitmore Lake Road (negative) and Barton Drive (positive). And, while noise would increase on Whitmore Lake Road it is not expected to exceed the standard of significance (i.e., a 3 dBA change) because of the distance of the houses from the road. The drop in the noise on Barton Drive will be close to 3 dBA.

No change in air quality is expected. And the EPA standard for CO will not be approached. A systemwide reduction in crashes of 68 per year is expected compared to the No Action conditions.

Table 3-16
Alternative 12 – Remove Entire Barton Interchange/Connect Whitmore Lake Road to Main Street
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.89	0.35	0.90	-0.5	0.0
	B: E. of Miller/Maple	E. of Beechwood	0.87	0.53	0.87	-0.6	0.0
	C: E. of Beechwood	E. of Main St.	0.87	0.53	0.87	-0.6	0.0
	D: E. of Main St.	S. of Barton Dr.	0.87	0.53	0.87	-0.6	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.85	0.96	0.85	-0.7	0.0
	F: N. of Barton Dr.	S. of U.S. 23	0.96	0.96	0.99	-0.2	0.0
	G: W. of U.S. 23	E. of Nixon	1.01	1.14	1.01	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	1.34	1.03	1.34	1.3	0.0
	B: Stein Rd.	N. Territorial Rd.	1.47	0.84	1.47	1.7	0.2
Barton Drive							
	A: M-14	Pontiac Trail	0.53	0.63	0.54	-2.7	-0.3
	B: Pontiac Trail	Plymouth	0.82	0.91	0.83	-0.9	-0.2
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	0.93	0.69	0.92	-0.3	-0.1
	B: Barton Dr.	Dhu Varren Rd.	0.95	0.78	0.95	-0.2	0.0
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.01	1.2	1.05	0.1	0.1
	B: Barton Dr.	Nixon Rd.	0.97	1.09	0.98	-0.2	0.0
	C: Nixon Rd.	U.S. 23	1.08	1.25	1.05	0.3	0.1
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.01	1.10	1.01	0.0	0.0
	B: Dhu Varren Rd.	M-14	1.01	0.82	1.01	0.0	0.0
	C: M-14	Pontiac Trail	1.01	0.80	1.01	0.0	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	0.99	1.49	0.98	-0.1	0.1
	B: Glazier Way	Huron Pkwy.	1.00	1.23	1.01	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.96	1.36	0.97	-0.2	0.0
Miller Road							
	A: M-14	Newport Rd.	1.02	0.83	1.02	0.1	-0.2
	B: Newport Rd.	Main St.	1.02	0.95	1.01	0.1	0.0
Jackson Road							
	A: I-94	Main St.	1.02	1.16	1.02	0.1	0.0
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.97	0.90	0.95	-0.1	0.0
	B: Fuller Rd.	Geddes Rd.	0.97	0.92	0.96	-0.2	0.0
Main Street							
	A: M-14	Depot St.	1.04	1.46	1.04	0.2	0.2
Washtenaw							
	A: U.S. 23	Stadium	1.08	1.17	1.07	0.3	0.3
	B: Stadium	Geddes Ave.	1.08	1.59	1.07	0.3	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.88	1.06	0.86	-0.6	-0.1
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.90	1.18	0.90	-0.5	-0.1

[1] No Action Alternative divided into new alternative.

Alternative 13 – Remove Entire Barton Interchange/Extend Dhu Varren to Whitmore Lake Road (Figure 3-20)

Extending Dhu Varren over M-14 to Whitmore Lake Road, while closing the Barton Drive interchange, would push traffic and congestion to a 25+ percent increase on Whitmore Lake Road north of Stein Road (Table 3-17). But, even then, the Level of Service would be C. Barton Drive would be the major beneficiary with trip volume reductions of 15 to almost 60 percent. This traffic shift will cause a reduction in noise of more than 3 dBA on Barton from M-14 to Pontiac Trail. Noise along Whitmore Lake Road would increase by about 1 dBA. The Barton Drive noise effect is significant while the Whitmore Lake Road change is unlikely to be perceived at sensitive receptors. But, almost two dozen houses along Dhu Varren would likely experience noise considered intrusive in this rural setting.

Air quality changes are expected to be insignificant as they will fall far below the EPA standard for CO pollution (35 ppm). A decrease in crashes of 75 per year is likely to be experienced throughout the roadway system.

Figure 3-20
Alternative 13 – Extend Dhu Varren
Remove Entire Barton Interchange

Three residences are expected to be acquired to accommodate the bridges that are part of Alternative 13. But, no wetlands or parks are likely to be impacted (Table 3-4). Community cohesion would be negatively affected along Dhu Varren and Whitmore Lake Roads, north of Stein Road, while the community served by Barton Drive would benefit from this alternative.

No significant engineering issues are associated with extending Dhu Varren Road over M-14. The cost estimate to construct this proposal is $8.0 to $12.0 million, exclusive of right-of-way. This proposed improvement is expected to meet MDOT design standards. Nevertheless, MDOT's policy would likely require this project be a local responsibility.

Table 3-17
Alternative 13 – Remove Entire Barton Interchange/Extend Dhu Varren to Whitmore Lake Road
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level[2]	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	0.89	0.36	0.90	-0.5	0.0
	B: E. of Miller/Maple	E. of Beechwood	0.86	0.54	0.87	-0.6	0.0
	C: E. of Beechwood	E. of Main St.	0.86	0.54	0.87	-0.6	0.0
	D: E. of Main St.	S. of Barton Dr.	0.86	0.54	0.87	-0.6	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.90	0.95	0.90	-0.5	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.02	0.95	1.05	0.1	0.0
	G: W. of U.S. 23	E. of Nixon	1.01	1.13	1.01	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	1.00	0.89	1.00	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.90	1.16	0.91	-0.4	-0.2
	B: Stein Rd.	N. Territorial Rd.	1.26	0.90	1.26	1.0	0.1
Barton Drive							
	A: M-14	Pontiac Trail	0.42	0.39	0.42	-3.8	-0.4
	B: Pontiac Trail	Plymouth	0.83	0.85	0.83	-0.8	-0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.10	0.61	1.11	0.4	0.1
	B: Barton Dr.	Dhu Varren Rd.	0.89	0.65	0.89	-0.5	-0.1
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.02	1.19	1.06	0.1	0.0
	B: Barton Dr.	Nixon Rd.	0.93	1.06	0.95	-0.3	-0.3
	C: Nixon Rd.	U.S. 23	1.04	1.23	1.04	0.2	0.2
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.09	1.14	1.08	0.4	0.0
	B: Dhu Varren Rd.	M-14	0.89	0.73	0.89	-0.5	0.0
	C: M-14	Pontiac Trail	0.88	0.71	0.89	-0.5	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	0.99	1.49	0.99	-0.1	0.1
	B: Glazier Way	Huron Pkwy.	0.98	1.22	0.98	-0.1	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.92	1.34	0.93	-0.3	0.0
Miller Road							
	A: M-14	Newport Rd.	1.04	0.84	1.05	0.2	0.0
	B: Newport Rd.	Main St.	1.00	0.97	0.99	0.0	0.0
Jackson Road							
	A: I-94	Main St.	1.04	1.18	1.04	0.2	0.2
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.97	0.95	0.97	-0.1	0.0
	B: Fuller Rd.	Geddes Rd.	0.98	0.95	0.97	-0.2	0.0
Main Street							
	A: M-14	Depot St.	0.96	1.52	0.96	-0.2	-0.2
Washtenaw							
	A: U.S. 23	Stadium	1.09	1.11	1.08	0.4	0.3
	B: Stadium	Geddes Ave.	1.09	1.50	1.09	0.4	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.85	1.20	0.84	-0.7	-0.1
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.86	1.24	0.86	-0.6	-0.1

[1]No Action Alternative divided into new alternative.

[2]Twenty-one houses along Dhu Varren would experience significant new noise.

Alternative 14 – Retain the Barton Interchange/Develop Full Main Street Interchange (Figures 3-21A and 3-21B)

This option allows testing the concept of a full Main Street interchange with the Barton Drive interchange remaining as compared to Alternative 6 which removes the Barton Drive interchange. Two concepts for the Main Street interchange are included in the analysis (Figures 3-21A and 3-21B). And, as the data on Table 3-4 indicate, these concepts have the same impacts on acquisitions, including the likely acquisition of 0.5 to four acres of parkland but no involvement of wetlands. The difference is in the traffic-related issues (Table 3-18). Keeping the Barton interchange and providing a full interchange at Main Street does not divert traffic from Barton Drive, nor does it have a significant effect on other roadways. In the end, the investment of $7.0 to $10.5 million (exclusive of right-of-way) for this improvement causes no significant systemwide changes over the No Action condition. Regardless, this proposal does not meet MDOT design standards because there would be too many movements too close together along M-14 with the Barton Drive interchange remaining in place.

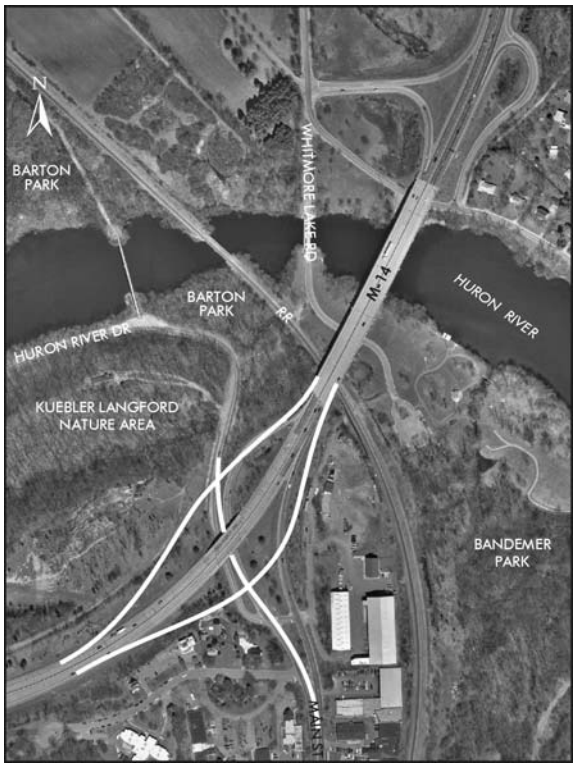


Figure 3-21A
Alternative 14A – Add Full Main St. Interchange/Retain Barton Interchange

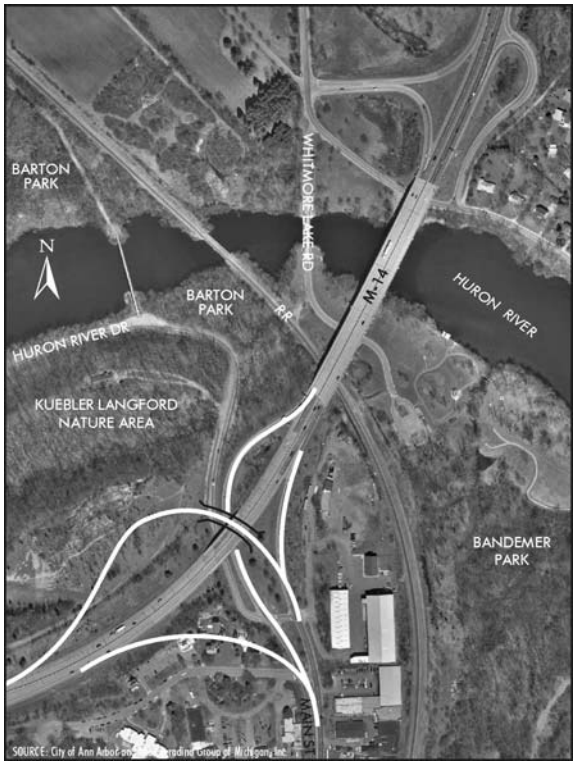


Figure 3-21B
Alternative 14B – Add Full Main St. Interchange/Retain Barton Interchange

Table 3-18
Alternative 14 – Retain Barton Interchange/Develop Full Main Street Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	1.14	0.45	1.15	0.6	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.13	0.69	1.13	0.5	0.0
	C: E. of Beechwood	E. of Main St.	1.13	0.69	1.13	0.5	0.0
	D: E. of Main St.	S. of Barton Dr.	1.25	0.73	1.20	1.0	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.94	1.06	0.94	-0.3	0.0
	F: N. of Barton Dr.	S. of U.S. 23	0.94	0.93	0.96	-0.3	0.0
	G: W. of U.S. 23	E. of Nixon	0.99	1.11	0.98	-0.1	0.0
	H: E. of U.S. 23	E. of Dixboro	0.99	0.88	0.99	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.93	0.79	0.92	-0.3	-0.2
	B: Stein Rd.	N. Territorial Rd.	0.90	0.52	0.91	-0.4	0.0
Barton Drive							
	A: M-14	Pontiac Trail	1.00	1.18	1.01	0.0	0.0
	B: Pontiac Trail	Plymouth	0.97	1.07	0.97	-0.1	0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.09	0.81	1.08	0.4	0.1
	B: Barton Dr.	Dhu Varren Rd.	1.01	0.84	1.02	0.1	0.0
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	0.96	1.13	0.99	-0.2	-0.1
	B: Barton Dr.	Nixon Rd.	0.96	1.09	0.98	-0.2	-0.1
	C: Nixon Rd.	U.S. 23	1.01	1.2	1.01	0.0	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.00	1.12	1.03	0.0	0.0
	B: Dhu Varren Rd.	M-14	1.00	0.81	1.00	0.0	0.0
	C: M-14	Pontiac Trail	1.00	0.78	0.99	0.0	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.10	1.68	1.11	0.4	0.1
	B: Glazier Way	Huron Pkwy.	1.07	1.31	1.07	0.3	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	1.05	1.48	1.06	0.2	0.1
Miller Road							
	A: M-14	Newport Rd.	0.92	0.74	0.91	-0.4	-0.1
	B: Newport Rd.	Main St.	0.93	0.87	0.93	-0.3	-0.2
Jackson Road							
	A: I-94	Main St.	0.98	1.12	0.98	-0.1	-0.1
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.98	0.93	0.98	-0.1	0.0
	B: Fuller Rd.	Geddes Rd.	1.04	0.99	1.03	0.2	0.0
Main Street							
	A: M-14	Depot St.	1.02	1.43	1.02	0.1	0.1
Washtenaw							
	A: U.S. 23	Stadium	1.02	1.10	1.01	0.1	0.1
	B: Stadium	Geddes Ave.	1.01	1.49	1.00	0.0	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.89	1.08	0.89	-0.5	-0.1
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.90	1.18	0.90	-0.5	-0.1

[1] No Action Alternative divided into new alternative.

Alternatives 15 and 16 – "West Side" Interchanges With and Without Barton Interchange (Figures 3-22 and 3-23)

Alternative 15 would add an interchange with M-14 at Newport Road (Figure 3-22) while the Barton Drive interchange remains. Alternative 16 would add an interchange at Beechwood (Figure 3-23) but removes the Barton Drive interchange. These two proposals allow a test to determine the potential of a "west side" interchange to cause change.

These two alternatives are associated with virtually the same traffic conditions (Tables 3-19 and 3-20) on all roads, but Barton Drive, Whitmore Lake Road and Pontiac Trail. Those effects are associated with Barton Drive's inclusion or exclusion from the network not a new west-side interchange.

Each of the proposals would take at least one business, and about two dozen houses, as well as 11 acres or more of vacant land that is not public right-of-way (Table 3-4). Each would impact eight to 12 acres of parkland and two to four acres of wetlands. Plus, the Newport Road interchange would impact with significant noise four houses while the Beechwood interchange would affect six houses with significant noise. The Newport Road interchange would likely take two schools.

Each of the interchanges of Newport Road and Beechwood Road with M-14 is estimated to cost $9.0 to $13.5 million. However, each interchange's placement between the Miller/Maple and Main Street interchanges is believed to be incompatible with MDOT standards.

Figure 3-22
Alternative 15 – New Interchange @ Newport Road/Retain Barton Interchange

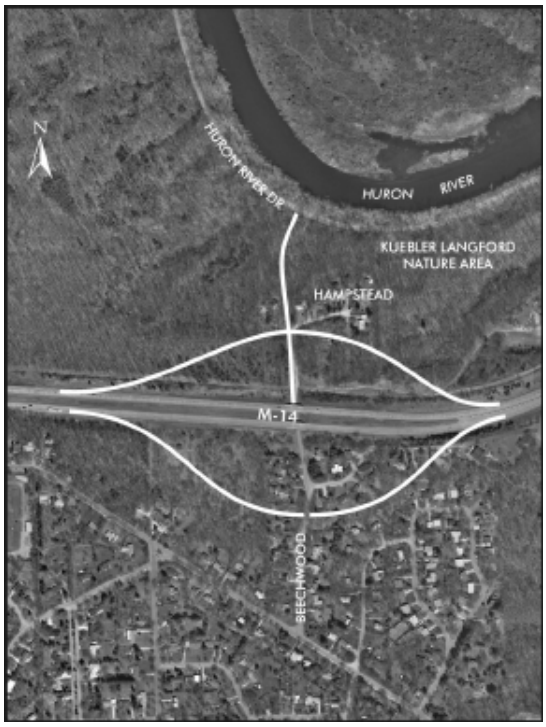


Figure 3-23
Alternative 16 – New Interchange @ Beechwood/Remove Entire Barton Interchange

Table 3-19
Alternative 15 – Retain Barton Interchange/Develop Newport Road Interchange
Comparison to No Action Conditions

Road Segment	From	To	Traffic			Noise Level[2]	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	1.05	0.41	1.05	0.2	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.04	0.63	1.03	0.2	0.0
	C: E. of Beechwood	E. of Main St.	1.06	0.65	1.07	0.3	0.0
	D: E. of Main St.	S. of Barton Dr.	1.06	0.65	1.07	0.3	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	1.01	1.14	1.01	0.0	0.0
	F: N. of Barton Dr.	S. of U.S. 23	0.98	0.98	1.01	-0.1	0.0
	G: W. of U.S. 23	E. of Nixon	1.01	1.14	1.01	0.0	0.0
	H: E. of U.S. 23	E. of Dixboro	1.00	0.89	1.00	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.99	0.89	0.99	0.0	0.0
	B: Stein Rd.	N. Territorial Rd.	0.98	0.56	0.98	-0.1	0.0
Barton Drive							
	A: M-14	Pontiac Trail	1.00	1.17	1.00	0.0	0.0
	B: Pontiac Trail	Plymouth	1.00	1.10	1.00	0.0	0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	0.98	0.73	0.97	-0.1	0.0
	B: Barton Dr.	Dhu Varren Rd.	1.01	0.84	1.02	0.0	0.0
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	0.96	1.13	0.99	-0.2	-0.1
	B: Barton Dr.	Nixon Rd.	0.98	1.10	0.99	-0.1	0.0
	C: Nixon Rd.	U.S. 23	1.00	1.18	0.99	0.0	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.02	1.12	1.03	0.1	0.0
	B: Dhu Varren Rd.	M-14	1.01	0.82	1.01	0.0	0.0
	C: M-14	Pontiac Trail	1.01	0.79	1.00	0.0	1.0
Fuller Road							
	A: Glen Ave.	Glazier Way	0.99	1.5	0.99	-0.1	0.1
	B: Glazier Way	Huron Pkwy.	0.99	1.22	1.00	0.0	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.98	1.38	0.99	-0.1	0.0
Miller Road							
	A: M-14	Newport Rd.	0.89	0.72	0.89	-0.5	-0.2
	B: Newport Rd.	Main St.	0.93	0.87	0.92	-0.3	-0.2
Jackson Road							
	A: I-94	Main St.	0.98	1.11	0.97	-0.1	-0.1
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	0.98	0.94	0.99	-0.1	0.0
	B: Fuller Rd.	Geddes Rd.	0.99	0.94	0.98	0.0	0.0
Main Street							
	A: M-14	Depot St.	0.97	1.36	0.97	-0.1	-0.2
Washtenaw							
	A: U.S. 23	Stadium	1.03	1.11	1.02	0.1	0.1
	B: Stadium	Geddes Ave.	1.03	1.51	1.02	0.1	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.91	1.10	0.91	-0.4	-0.1
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.93	1.22	0.93	-0.3	-0.1

[1]No Action Alternative divided into new alternative.

[2]Four houses near Newport Road are expected to be impacted by ramp noise.

Table 3-20
Alternative 16 – Remove Barton Interchange/Develop Beechwood Road Interchange
Comparison to No Action Conditions
(shading provided to highlight area(s) of discussion in text)

Road Segment	From	To	Traffic			Noise Level[2]	Air Quality
			Volume Ratio[1]	V/C	V/C Ratio[1]	(dBA Change)	(CO Change in ppm)
M-14:							
	A: W. Miller/Maple	E. of Miller/Maple	1.07	0.42	1.08	0.3	0.0
	B: E. of Miller/Maple	E. of Beechwood	1.00	0.61	1.00	0.0	0.0
	C: E. of Beechwood	E. of Main St.	0.96	0.61	1.00	-0.2	0.0
	D: E. of Main St.	S. of Barton Dr.	0.92	0.59	0.97	-0.3	0.0
	E: S. of Barton Dr.	No. of Barton Dr.	0.90	1.03	0.91	-0.5	0.0
	F: N. of Barton Dr.	S. of U.S. 23	1.02	1.01	1.04	0.1	0.0
	G: W. of U.S. 23	E. of Nixon	1.02	1.15	1.02	0.1	0.0
	H: E. of U.S. 23	E. of Dixboro	1.00	0.89	1.00	0.0	0.0
Whitmore Lake Road							
	A: Huron River Dr.	Stein Rd	0.84	0.64	0.84	-0.8	-0.2
	B: Stein Rd.	N. Territorial Rd.	0.89	0.51	0.89	-0.5	0.0
Barton Drive							
	A: M-14	Pontiac Trail	0.54	0.63	0.54	-2.7	-0.3
	B: Pontiac Trail	Plymouth	0.86	0.94	0.85	-0.7	-0.1
Pontiac Trail							
	A: Plymouth Rd.	Barton Dr.	1.17	0.87	1.16	0.7	0.2
	B: Barton Dr.	Dhu Varren Rd.	0.89	0.74	0.90	-0.5	-0.3
Plymouth Road							
	A: Huron River Dr.	Barton Dr.	1.00	1.18	1.04	0.0	0.0
	B: Barton Dr.	Nixon Rd.	0.94	1.06	0.95	-0.3	-0.1
	C: Nixon Rd.	U.S. 23	1.02	1.22	1.03	0.1	0.0
Nixon Road							
	A: Plymouth Rd.	Dhu Varren Rd.	1.02	1.12	1.03	0.1	0.0
	B: Dhu Varren Rd.	M-14	1.00	0.81	1.00	0.0	0.0
	C: M-14	Pontiac Trail	1.00	0.79	1.00	0.0	0.0
Fuller Road							
	A: Glen Ave.	Glazier Way	1.06	1.62	1.07	0.3	0.1
	B: Glazier Way	Huron Pkwy.	1.02	1.25	1.02	0.1	0.0
Geddes Road							
	A: Huron Pkwy.	U.S. 23	0.99	1.40	1.00	0.0	0.0
Miller Road							
	A: M-14	Newport Rd.	0.94	0.77	0.95	-0.3	-0.1
	B: Newport Rd.	Main St.	0.94	0.88	0.94	-0.2	-0.2
Jackson Road							
	A: I-94	Main St.	0.99	1.12	0.98	-0.1	-0.1
Huron Parkway							
	A: Plymouth Rd.	Fuller Rd.	1.01	0.96	1.01	0.0	0.0
	B: Fuller Rd.	Geddes Rd.	1.01	0.96	1.00	0.0	0.0
Main Street							
	A: M-14	Depot St.	0.89	1.25	0.89	-0.5	-0.6
Washtenaw							
	A: U.S. 23	Stadium	1.01	1.09	1.00	0.0	0.1
	B: Stadium	Geddes Ave.	1.02	1.50	1.01	0.1	0.1
Huron River Drive							
	A: U.S. 23	Huron Pkwy.	0.97	1.18	0.98	-0.1	0.0
Geddes Avenue							
	A: Huron Pkwy.	U.S. 23	0.93	1.21	0.92	-0.3	-0.1

[1]No Action Alternative divided into new alternative.

[2]Six houses near Beechwood Road are expected to be impacted by ramp noise.

3.2.3 Consultant Findings

There are three key considerations in developing transportation projects with federal funding that are guided by statutes. They mandate that impacts cannot occur to historic properties, public parkland, or wetlands unless there is no reasonable and prudent alternative to the transportation improvement. Another key consideration is whether a proposed improvement can meet the design standards applied by MDOT and AASHTO.

Historic Properties and Public Parkland

As noted earlier, no proposal affects historic properties directly. Examining the issue of direct parkland impacts indicates Alternative 9/Frontage Roads (7.5 acres); Alternative 15/Newport Interchange (8 acres); and, Alternative 16/Beechwood Interchange (12 acres) have what the consultant believes are significant parkland effects (see Table 3-21 and Table for 3-4 for detail). Alternatives 6 and 14/Full Main Interchange and Alternatives 11 and 12/Whitmore Lake Road connection to Main Street might be limited to the taking of about one acre of parkland. So, these latter options may be viable by refining them. And, if only local funding were involved in the Whitmore Lake Road connection, the federal restrictions on the use of parkland would not apply.

Wetlands

Alternative 3/Partial Nixon Interchange (6.5 acres); Alternative 4/Full Nixon Interchange (5.5 acres); Alternative 9/Frontage Roads (7.5 acres) and, Alternative 16/Beechwood Interchange (4 acres) would impact significant amounts of wetlands, in the consultant's view. Fixing the east side ramps at the Barton Drive interchange (Alternative 1A), and the Greenway (Alternative 5B) and Dixboro (Alternative 8) interchange proposals would likely affect fewer than two wetland acres just like the Plymouth interchange improvement. Because the Plymouth Road improvement was approved for construction with fewer than two acres of wetlands impacted, these last three alternatives are not considered to be "fatally" flawed by wetlands issues.

Design Standards

Table 3-21 indicates that the following alternatives do not meet MDOT's and AASHTO's design standards for urban conditions.

- Alternative 3: Remove the East Portion of the Barton Drive Interchange/Add Partial Nixon Road Interchange
- Alternative 4: Remove Entire Barton Interchange/Add Full "Flopped Diamond" Nixon Interchange
- Alternative 5: Remove the Entire Barton Interchange/Add Greenway Interchange
- Alternative 8: Remove Entire Barton Interchange/Add Dixboro Interchange
- Alternative 14: Develop a full interchange at Main Street while retaining the Barton Drive interchange
- Alternative 15: Develop a new Newport Road interchange while retaining the Barton Drive interchange.
- Alternative 16: Develop a new Beechwood Road interchange with M-14 while removing the Barton Drive interchange.

Table 3-21
Northeast Ann Arbor Transportation Plan
M-14 Access Issues
Key Considerations

Key	Illustrative Alternative															
	Fix Barton	Remove Barton	Partial Nixon	A Full Nixon	Greenway	Full Main w/o Barton	Joy	Dixboro	Front Rds.	Fix Plymouth	Whit/Main w/Barton	Whit/Main w/o Barton	Dhu Varren	Full Main w/Barton	Newport	Beechwood
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8	Alt. 9	Alt. 10	Alt. 11	Alt. 12	Alt. 13	Alt. 14	Alt. 15	Alt. 16
Avoids Direct Parklands Effects	●	●	●	●	●	●[1]	●	●	●	●	●[2]	●[2]	●	●[1]	●	●
Avoids Direct Wetlands Effects	●[3]	●	●	●	●[3]	●	●	●[3]	●	●[3]	●	●	●	●	●	●
Meets MDOT Standards	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

[1]Option A = 0.5 acres; Option B = 4 acres.
[2]Option A = 1 acre; Option B = 3.5 acres.
[3]One option is 2 acres or less.

Legend:

● Yes

● No

○ May meet "urban" standards; does not meet "rural" standards.

It is noteworthy that Alternative 1 (improve the Barton Drive interchange) may meet standards applied in urban conditions but will not meet standards for rural conditions that MDOT has applied. Additionally, the communication of Department representatives indicates that, while the application of urban standards is open to discussion, Alternative 1 may not be possible to achieve.

Infeasible Alternatives

In summary, the following proposals appeared to have flaws of such significance in at least one of the key areas as to be infeasible.

- Alternative 3: Remove the East Portion of the Barton Drive Interchange/Add Partial Nixon Road Interchange. Flaws in wetlands and MDOT standards.
- Alternative 4: Remove Entire Barton Interchange/Add Full "Flopped Diamond" Nixon Interchange. Flaws in wetlands and MDOT standards.
- Alternative 5: Remove the Entire Barton Interchange/Add Greenway Interchange. Flaws in wetlands and MDOT standards.
- Alternative 8: Remove Entire Barton Interchange/Add Dixboro Interchange. Flaws in wetlands and MDOT standards.
- Alternative 9: Remove Entire Barton Drive Interchange/Add Frontage Roads Between Pontiac and Nixon. Flaws in parklands and wetlands.
- Alternative 14: Develop a full interchange at Main Street while retaining the Barton Drive interchange. Flaws in parklands and MDOT standards.
- Alternative 15: Develop a new Newport Road interchange while retaining the Barton Drive interchange. Flaws in parklands, wetlands and MDOT standards.
- Alternative 16: Develop a new Beechwood Road interchange with M-14 while removing the Barton Drive interchange. Flaws in parklands, wetlands and MDOT standards.

Further Review

Of those remaining options, each needed further examination by the community to determine if they should move forward for additional analysis. With Alternatives 7/Joy Road Interchange and 13/Dhu Varren Road Extension a key question was: Is the expenditure of between $8.0 and $13.0 million considered cost-effective when virtually the same systemwide effects can be achieved by the No Action option?

In the case of Alternative 6 /Full Main Interchange and Alternatives 11 and 12/Whitmore Lake Road Connection to Main Street, a key question was: Does the community want road improvements affecting its parks in any way regardless of who pays for the improvement?

For Alternative 1/Fix the Barton Interchange, a key question was: Is it worth pursuing MDOT approval of new ramps in light of three issues: 1) the positive effects on safety; 2) the negative effects of the likely acquisition of private property and some public wetlands; and, 3) the dedication to roadways of land that is used by some as a park although it isn't officially designated as such?

Finally, for Alternative 2/Close the Baron Drive Interchange, a key question was: Will the community be able to give up an interchange which is a convenience for some, at the least, and a

nuisance for others, in the least, when the effects of removing that interchange on the community overall are negligible?

Answering those questions involved discussion with the public, the TAC and TCAC.

3.2.4 Technical Advisory Committee Recommendations

The first review of the information in this report was conducted by the Technical Advisory Committee on January 3, 2002 (see Appendix A). After discussing the report, the TAC reached these conclusions:

1. Eight alternatives do not appear to be feasible due to flaws in at least two areas of primary concern:

   - Alternative 3: Remove the East Portion of the Barton Drive Interchange/Add Partial Nixon Road Interchange. Flaws in wetlands and MDOT standards.
   - Alternative 4: Remove Entire Barton Interchange/Add Full "Flopped Diamond" Nixon Interchange. Flaws in wetlands and MDOT standards.
   - Alternative 5: Remove the Entire Barton Interchange/Add Greenway Interchange. Flaws in wetlands and MDOT standards.
   - Alternative 8: Remove Entire Barton Interchange/Add Dixboro Interchange. Flaws in wetlands and MDOT standards.
   - Alternative 9: Remove Entire Barton Drive Interchange/Add Frontage Roads Between Pontiac and Nixon. Flaws in parklands and wetlands.
   - Alternative 14: Develop a full interchange at Main Street while retaining the Barton Drive interchange. Flaws in parklands and MDOT standards.
   - Alternative 15: Develop a new Newport Road interchange while retaining the Barton Drive interchange. Flaws in parklands, wetlands and MDOT standards.
   - Alternative 16: Develop a new Beechwood Road interchange with M-14 while removing the Barton Drive interchange. Flaws in parklands, wetlands and MDOT standards.

2. Fixing Plymouth Road (Alternative 10) is an improvement which was already committed to by MDOT and should continue to be included in the transportation network, but removed from the next level of alternatives evaluation.

3. The Joy interchange proposal (Alternative 7) and the Dhu Varren bridge (Alternative 13) should be dropped from further consideration because they are not cost-effective, i.e., that their transportation service effects are very much the same as taking no action but require an investment of between $8.0 and $13.0 million.

4. Keeping open only the west side of the Barton Drive interchange should be included for further analysis.

5. If the option listed in Item 4 is not possible and the entire Barton interchange is closed, then connecting Whitmore Lake Road to Main Street should be considered further while minimizing the parkland effects through refinements to that proposal's layout. The parkland impacts are

likely to be examined differently at the local level if this proposal for Whitmore Lake Road becomes a non-federal investment.

6. If the Barton Drive/M-14 interchange remains open, the proposal to connect Whitmore Lake Road to Main Street is not cost-effective (Alternative 11).

7. If the entire Barton Drive/M-14 interchange were closed, the full Main Street interchange is an option requiring further study (Alternatives 6A and 6B). And, adding the Whitmore Lake connection to Main Street should be part of this alternative.

8. Short-term fixes for the Barton Drive interchange area, by the use of traffic control devices or by improving the design/layout of the east side ramps, should be advanced, as soon as possible, through more detailed discussion with MDOT. This is particularly important in light of the opinion by MDOT articulated at the January 3 meeting that even the application of design standards reflecting urban conditions may not allow the ramps to be changed (Appendix A).

These proposals were reviewed by the TCAC on January 9, 2002. A discussion of issues took place with no formal action taken, although suggestions were made to identify short-term improvements to the Barton interchange, particularly the east ramps (Appendix B).

The public meeting on the evaluation of the alternatives was held on February 7, 2002 (Appendix C). Input from that meeting was presented to the TAC and TCAC. The final list of alternatives was then developed.

- Alternative No. 1 – Improve the Barton Drive Interchange. Two options are to be considered to correct the substandard ramp condition on the freeway's east side[3]. Proposals that affect the east and west sides of M-14 in varying ways are to be examined.

- Alternative No. 2 – Close the Barton Interchange. In addition to examining the removal of the entire interchange (Alternative 2-A), removing only the east side of the M-14/Barton Drive interchange (Alternative 2-B) is to be evaluated.

- Alternative No. 6 – Develop a Full Main Street Interchange while Removing the Barton Drive Interchange. Two conceptual designs are to be examined from an engineering standpoint at the outset. They vary in the expected impacts on parks, business acquisitions and the like. It is noted if Alternative No. 1 or No Action were chosen, it would preclude making a full interchange at Main Street.

- Alternative No. 12 – Connect Whitmore Lake Road to Main Street while Removing the Barton Drive Interchange. Two options were to be examined originally to avoid another at-grade crossing of the Norfolk Southern rail line. The viability of this connection is also a function of whether either Alternative No. 1 or No Action is chosen. If so, Alternative No. 12 will likely not be needed nor cost-effective.

[3] Separate and apart from those options, changes have been made by MDOT to make the interchange work better without major construction (i.e., without changing a ramp's design/configuration which is considered major construction).

- New Alternative 17 – A combination of Alternatives 6 and 12. This proposal was developed through public input. It adds the Whitmore Lake Road-to-Main Street Connector to the proposed full interchange at Main Street/M-14 with the deletion of the Barton Drive interchange.

These alternatives are in addition to taking No Action, which is also the baseline against which the performance of the alternatives is measured.

3.3 Evaluation of Practical Alternatives

This work began with a detailed examination of each Practical Alternative and, where flaws were evident, the design was incrementally improved, if possible, to a point where its physical and operational performances were acceptable from a design standards viewpoint. Then, the second option was reviewed in the same manner so that a final choice between it and "Option A" could be made, if possible. At the outset, it is important to note a key part of this work was the set of roadway design standards established by the American Association of State Highway and Transportation Officials (AASHTO), which is approved by the Federal Highway Administration and applied by Michigan DOT.

3.3.1 Alternative No. 1 – Improve the Barton Drive Interchange

The purpose of this alternative is to address the substandard ramp configurations (on and off) on the east side of M-14 at Barton Drive by building new ramps. The conceptual approach that resulted from the first-level screening for Option 1-A is illustrated in Figure 3-24. Application of design standards to this configuration indicated that the off-bound loop ramp from northbound M-14 to Barton Drive is too tight (as depicted on Figure 3-24). So, the radius was made larger to meet AASHTO/MDOT design standards (minimum acceptable radius is 230 feet; 250 feet is used here to ensure an adequate measure of impacts). The consultant examined expanding the loop ramp beginning at its existing takeoff point with M-14 (Option 1-A1 shown on Figure 3-25) or moving the ramp farther to the north along M-14 to vary the ramp's impact on residences along and near Barton Drive (Option 1-A2 shown in Figure 3-26).

Next, Option 1-B was examined. Here, the objective is to use the right-of-way owned by MDOT on both the east and west sides of M-14 to handle the traffic exiting M-14 northbound. The first-level concept (Option 1-B shown in Figure 3-27) called for this new ramp to pass over M-14. By applying the MDOT design standards to determine acceptable grades/elevations for traveling vehicles, the off-bound ramp at its terminus would be 14 feet higher than existing Whitmore Lake Road. (The maximum elevation of the proposed exit ramp would be 40+ feet higher than the elevation of Whitmore Lake Road.) So, fill material will be needed to support this ramp and to elevate Whitmore Lake Road for a distance of 750 feet (north plus south) of the point where the new ramp would tie into Whitmore Lake Road.

Figure 3-24
Option 1-A

Source: The Corradino Group of Michigan, Inc.

Figure 3-25
Option 1-A1

Source: The Corradino Group of Michigan, Inc.

Figure 3-26
Option 1-A2

Source: The Corradino Group of Michigan, Inc.

Figure 3-27
Option 1-B

Source: The Corradino Group of Michigan, Inc.

Because of the elevation issues affecting the proposed off-ramp from M-14 northbound to Whitmore Lake Road, a refinement to Option 1-B was made by moving the ramp down rather than up, as it transitions from the freeway to Whitmore Lake Road (Option 1-B1 shown on Figure 3-28). This off-bound ramp would turn to the west under M-14 at a point south of the existing culvert. Rebuilding of the complete Barton Drive/Whitmore Lake Road interchange, including west side ramps, is depicted to illustrate the possible range of impacts and the likely outcome of this concept.

Operations analyses were conducted of the proposed on-ramp of these options, which has been the focus of attention from the project's outset. They indicated neither Option 1-A1, 1-A2, 1-B nor 1-B1 will meet design standards with the current configuration of M-14 because the 2020 traffic on M-14 is expected to increase to the point that on-ramp traffic cannot appropriately merge/diverge in the distance available before the M-14/U.S. 23 split)[4]. The operations analyses also indicated that if M-14 were widened to carry the new on-ramp to U.S. 23 as it splits off M-14 to go south (in other words, add an extra-long on-ramp), the on-ramp for both Options 1-A and 1-B would work.

At this point in the analysis, it appeared possible to fix the Barton Drive/M-14 east side ramps by adding an extra-long on-ramp. The impacts of Option 1-A1, 1-A2, 1-B and 1-B1 were measured (Table 3-22). The results indicated that the potential acquisition of residences would range from as few as two (Option 1-B) to almost two dozen (Option 1-A1). It is noted that the owner of one house associated with Option 1-B1 (2426 Whitmore Lake Road) had applied for an historic designation during the study of M-14/Barton Drive. The property has since been designated a Washtenaw County historic district. Wetlands that could be directly impacted range from about two to four acres. This total could increase with Options 1-B and 1-B1 (maybe triple) as part of the area between M-14 and Whitmore Lake Road could be classified as wetlands with additional investigation. Information provided by the Huron River Watershed Council and Weatherbee's Botanical Surveys, plus a site visit by the consultant, indicate classification of a large part of this area as wetlands is likely. And, finally, while no officially-designated parks would be affected by Options 1-A1, 1-A2, 1-B or 1-B1, from two to almost nine acres of an area that is right-of-way, but considered by some to be a greenway, could be used for the project.

With the potential impacts associated with fixing the Barton Drive/M-14 interchange defined, the consultant performed operations analyses of the off-ramp to handle 2020 northbound M-14 peak hour traffic exiting at Barton Drive. This analysis indicated the off-ramps of Options 1-A1, 1-A2, 1-B, and 1-B1 would not meet standards as there is not adequate distance for vehicles to weave between the Main Street/M-14 on-ramp and the M-14/Barton Drive off-ramp. This issue (as well as the need for an extra-long on-ramp) can be addressed by adding a lane to M-14 from Beechwood Road to the split with U.S. 23 (about a mile). But, this would increase the impacts cited previously by pushing the Barton Drive ramps farther to the east, thereby involving likely acquisition of more houses, greenway, and wetlands east of the Huron River, and five businesses west of the Huron River. Impacts at the Huron River and the Kuebler Langford Nature Area would also be likely. Rebuilding the Main Street-to-M-14 on-ramp (at a minimum) would also likely be required. The cost of this project could exceed $25 million and range to $40+ million.

[4] Analyses is based on a forecast of 2020 peak hour traffic, and design speeds on mainline M-14 of 60 mph and 75 mph.

Figure 3-28
Option 1-B1

Source: The Corradino Group of Michigan, Inc.

Table 3-22
Northeast Area Transportation Plan
M-14 Access Issues
Second-Level Screening
Overall Measurement Data

Issue \ Alternative	No Action	Fix Barton		Remove Barton	
		1-A1	1-A2	1-B	1-B1
Areawide Traffic					
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall
Noise					
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall
Air Quality					
Change	Baseline	Minimal Overall	Minimal Overall	Minimal Overall	Minimal Overall
Safety					
Change (crashes/yr.)	Baseline	-61	-61	-61	-61
Possible Acquisitions					
Private Residences (no.)	0	23	8	2	3[5]
Businesses (no.)	0	0	0	0	0
Vacant Land (acres)	0	2	3.4	1	0.1
Total (acreage)	0	9.5	7.0	3.2	3.8
Schools					
Direct Impact (no.)	0	0	0	0	0
Indirect Impact (no.)	0	0	0	0	0
Parks					
Direct Impact (acres)	0	0[2]	0[3]	0[4]	0[6]
Wetlands					
Direct Impact (acres)	0	2.1	3.7	3.7	3.5
Community Cohesion					
Positive Change	NA	None	None	None	None
Negative Change	NA	None	None	None	None
Cost (2002 dollars)[1]	NA	$11.5 to $18.0 million	$6.5 to $9.0 million	$8.0 to $11.0 million	$9.0 to $13.0 million

[1]Includes cost to construct road improvements, plus remove Barton ramps, plus property acquisition/relocation.
[2]Involves possible use of about 2 acres of ROW that is considered by some as a greenway.
[3]Involves possible use of about 5 acres of ROW that is considered by some as a greenway.
[4]Involves possible use of about 6.5 acres of ROW that is considered by some as a greenway.
[5]Owner of one house applying for *National Register of Historic* Places status.
[6]Involves possible use of about 8.5 acres of ROW that is considered by some as a greenway.

As a result of the considerations presented above, widening M-14, rebuilding part of the Main Street interchange and the east and/or west sides of the Barton Drive/Whitmore Lake interchange to address the needs at Barton Drive (an interchange that now carries about 12,000 vehicles per day) was not viewed by the consultant as achievable.

3.3.2 Alternative No. 2 – Close the Barton Interchange

Options 2-A (close the entire Barton Drive interchange with M-14) and 2-B (close only the east side of the interchange) were intended to address the substandard condition of the M-14 ramps on the east side of Barton Drive by removing all or part of the interchange. The first-level evaluation of alternatives indicated that, on a systemwide basis, closing the entire interchange (Option 2-A) would not place an undue burden on the roadway system in any one spot .

Option 2-B proposed deleting only the ramps on the east side of M-14 at Barton Drive (Figure 3-29). This option had not been tested on a systemwide-travel basis in the first-level evaluation, as it was added at the end of that process based on public comment. Therefore, this evaluation began with testing the systemwide traffic effects of Option 2-B. The analysis data indicated that, compared to Option 2-A, Option 2-B is expected to be associated with more traffic and congestion on Barton Drive from M-14 to Plymouth Road but less congestion on Pontiac Trail between Plymouth Road and Barton Drive and on Plymouth Road between Huron River and Barton Drives. Changes on other roadway segments are about the same between these two options and vary little from the No Action condition.

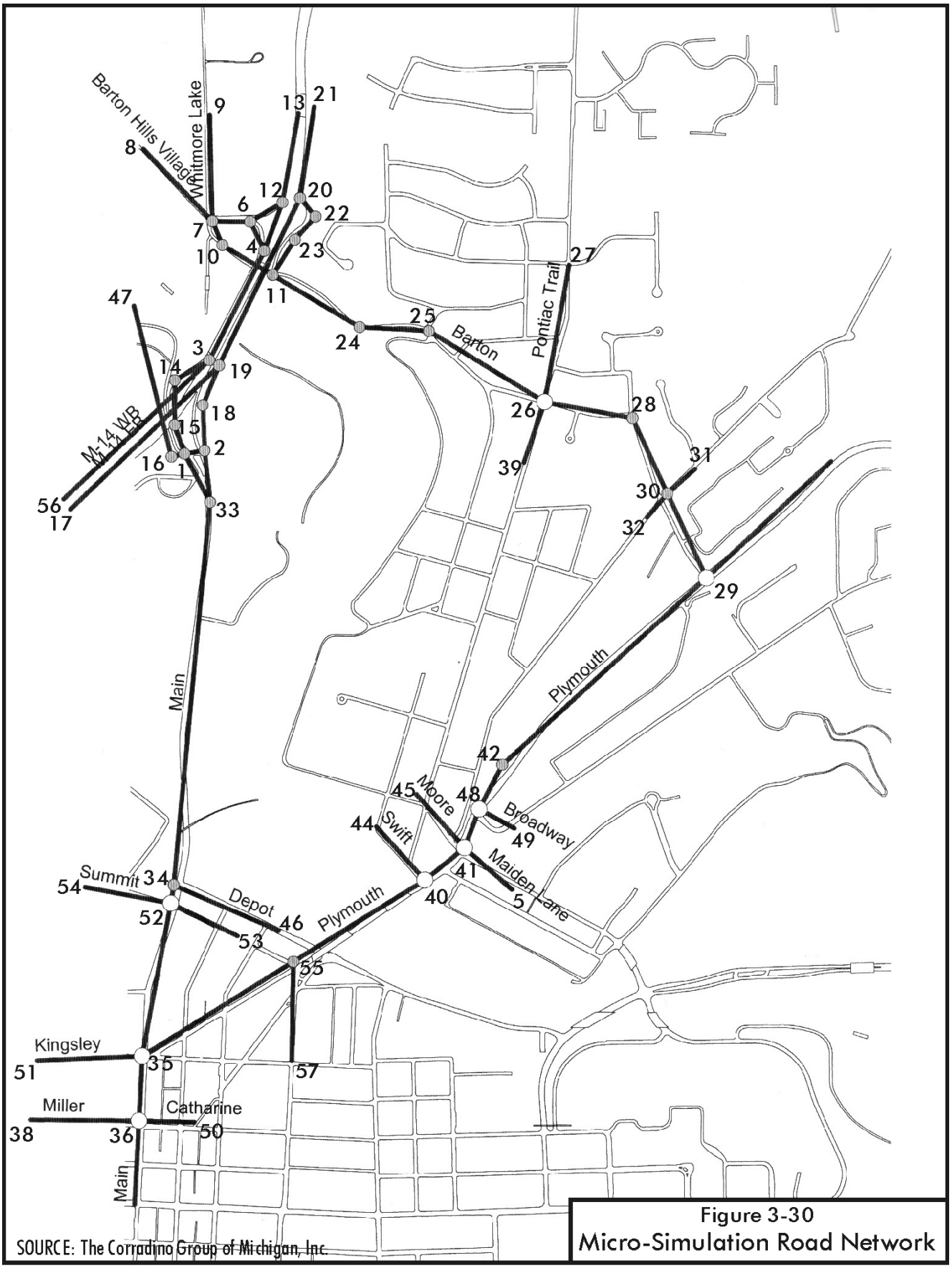
To further evaluate Options 2-A and 2-B, a micro-level traffic analysis was undertaken using simulation models known as SYNCHRO and CORSIM. They focus on peak hour conditions at intersections in the network shown on Figure 3-30. To support this work, traffic counts were conducted during the period March 5 to 8, 2002, at several intersections in the core area of Ann Arbor (Figure 3-31). (Data from relatively recent traffic counts at another three intersections were also used in the analysis.)

To begin this work, the 2020 peak hour conditions of the No Action roadway system were determined so that the approach used in the first-level evaluation of comparing "new" conditions to those of the baseline could be repeated. The No Action road network characteristics indicated congestion during the future afternoon peak hour will be LOS F at the intersections of Main/Kingsley and Plymouth/Maiden (Table 3-23)[5] .

When Option 2-A (close the entire M-14/Barton Drive interchange) was tested, LOS E/F traffic conditions were also evident in the afternoon peak hours at the Main/Kingsley and Plymouth/Maiden intersections. But, the Plymouth/Swift intersection also dropped to Level of Service E during both the AM and PM peaks. It is noteworthy that closing only half the interchange (Option 2-B) is associated with somewhat better traffic performance than Option 2-A, and has virtually the same conditions as with the No Action situation.

[5] No attempts are made to mitigate this effect. But, signal timing, adjustments, lane adjustments/additions for turns and through movements and the like are possible and were tested in Phase III of the NEATP.

Figure 3-29
Close East Side of Interchange



SOURCE: The Corradino Group of Michigan, Inc.

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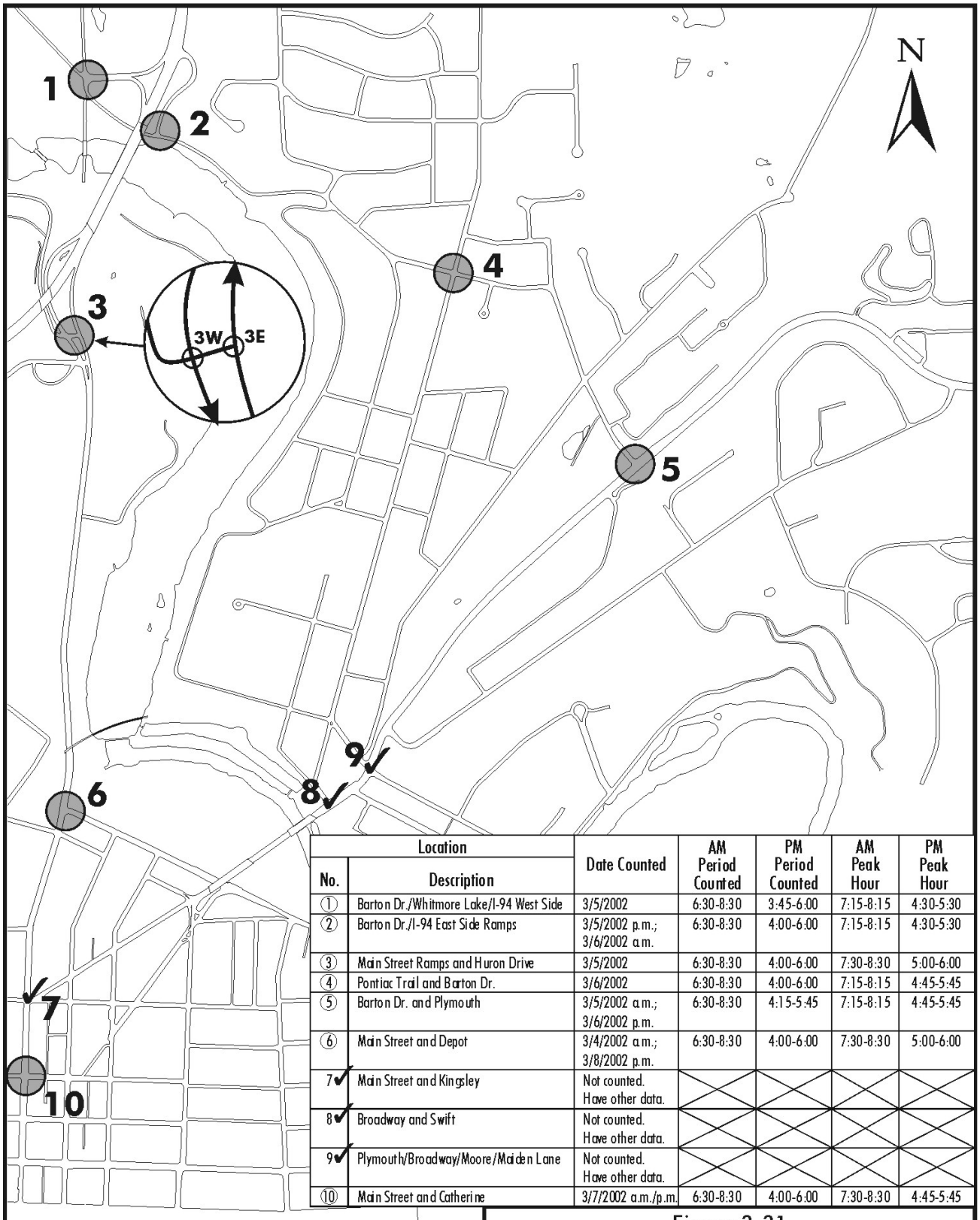
Figure 3-30
Micro-Simulation Road Network



Location		Date Counted	AM Period Counted	PM Period Counted	AM Peak Hour	PM Peak Hour
No.	Description					
①	Barton Dr./Whitmore Lake/I-94 West Side	3/5/2002	6:30-8:30	3:45-6:00	7:15-8:15	4:30-5:30
②	Barton Dr./I-94 East Side Ramps	3/5/2002 p.m.; 3/6/2002 a.m.	6:30-8:30	4:00-6:00	7:15-8:15	4:30-5:30
③	Main Street Ramps and Huron Drive	3/5/2002	6:30-8:30	4:00-6:00	7:30-8:30	5:00-6:00
④	Pontiac Trail and Barton Dr.	3/6/2002	6:30-8:30	4:00-6:00	7:15-8:15	4:45-5:45
⑤	Barton Dr. and Plymouth	3/5/2002 a.m.; 3/6/2002 p.m.	6:30-8:30	4:15-5:45	7:15-8:15	4:45-5:45
⑥	Main Street and Depot	3/4/2002 a.m.; 3/8/2002 p.m.	6:30-8:30	4:00-6:00	7:30-8:30	5:00-6:00
7✓	Main Street and Kingsley	Not counted. Have other data.				
8✓	Broadway and Swift	Not counted. Have other data.				
9✓	Plymouth/Broadway/Moore/Maiden Lane	Not counted. Have other data.				
⑩	Main Street and Catherine	3/7/2002 a.m./p.m.	6:30-8:30	4:00-6:00	7:30-8:30	4:45-5:45

Figure 3-31
Northeast Ann Arbor Transportation Plan
Traffic Count Summary

SOURCE: The Corradino Group of Michigan, Inc.

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Table 3-23
Northeast Area Transportation Plan
Micro Analysis
Options 2-A and 2-B

A.M. Peak

Location	Node #	Future No Action			Alt. 2-A			Alt. 2-B		
		LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Barton and Pontiac Trail	26	D	46.0	1.00	C	32.0	0.87	C	23.7	0.73
Barton and Plymouth	29	C	26.2	0.73	B	14.7	0.56	B	18.1	0.62
Main and Kingsley	35	A	9.0	0.54	A	9.9	0.63	A	8.7	0.44
Miller and Main	36	C	21.7	0.87	C	28.3	0.94	D	40.4	1.01
Plymouth and Swift	40	C	32.0	0.81	E	64.9	1.12	D	49.5	10.3
Plymouth and Maiden Lane	41	C	26.5	0.73	C	22.3	0.87	C	23.0	0.87
Plymouth and Broadway	48	A	8.6	0.41	A	5.8	0.50	A	5.9	0.52
Summit and Main	52	B	16.1	0.61	B	12.0	0.60	B	13.3	0.58
WB On-Ramp and HRD	16	na	na	na	na	na	na	na	na	na
WB Off-Ramp and Main	1	na	na	na	na	na	na	na	na	na
EB Ramps and Main	33	na	na	na	na	na	na	na	na	na
Main and Local Drives	63	na	na	na	na	na	na	na	na	na
Whitmore/Barton Connector	7	na	na	na	na	na	na	na	na	na

P.M. Peak

Location	Node #	LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Barton and Pontiac Trail	26	C	30.8	0.85	C	20.0	0.57	C	31.4	0.76
Barton and Plymouth	29	B	15.1	0.67	B	15.2	0.66	B	19.0	0.65
Main and Kingsley	35	F	113.2	1.32	F	167.3	1.48	F	123.9	1.33
Miller and Main	36	C	27.5	0.88	C	31.9	0.91	D	42.6	0.96
Plymouth and Swift	40	C	27.8	0.97	E	61.6	1.17	C	33.3	0.98
Plymouth and Maiden Lane	41	F	84.2	1.22	F	99.5	1.29	F	115.2	1.32
Plymouth and Broadway	48	A	6.2	0.67	A	6.7	0.72	A	7.0	0.73
Summit and Main	52	B	11.8	0.63	A	8.9	0.64	B	11.0	0.58
WB On-Ramp and HRD	16	na	na	na	na	na	na	na	na	na
WB Off-Ramp and Main	1	na	na	na	na	na	na	na	na	na
EB Ramps and Main	33	na	na	na	na	na	na	na	na	na
Main and Local Drives	63	na	na	na	na	na	na	na	na	na
Whitmore/Barton Connector	7	na	na	na	na	na	na	na	na	na

Source: The Corradino Group of Michigan, Inc.

To further augment the database, the consultant conducted travel time runs from the intersection of Dhu Varren and Whitmore Lake Roads to three alternate destinations (Pfizer, Ann Arbor City Hall, and a point on the east side of the interchange of U.S. 23 at Geddes Road). All runs were conducted between 3:30 p.m. and 6:30 p.m. on March 13, 2002. The results indicate that for the trips to and from Pfizer, the average travel time difference between using M-14 and the local roads (the latter trip via Barton Drive to Plymouth Road to Pfizer) is between one and two minutes, with the use of M-14 taking longer in each direction (Table 3-24).

Table 3-24
Northeast Ann Arbor Transportation Plan
Travel Time Runs on March 13, 2002
3:00 p.m. to 6:30 p.m.

Route	WL Road @ Dhu Varren to Pfizer		Pfizer to WL Road @ Dhu Varren	
	Distance	Time	Distance	Time
1. M-14	6.4 miles	8:42/8:41/8:18 Avg. = 8:34	6.5 miles	8:28/9:16/9:17 Avg. = 8:55
2. Local	3.4 miles	7:27/7:07 Avg. = 7:17	3.4 miles	7:15/6:38 Avg. = 6:56
	WL Road @ Dhu Varren to City Hall		City Hall to WL Road @ Dhu Varren	
1. M-14	2.5 miles	5:33/5:50/5:34 Avg. = 5:39	2.8 miles	5:19/7:55 Avg. = 6:37
2. Local	2.5 miles	8:10/4:48 Avg. = 6:44	2.8 miles	6:08/6:24/7:42/7:08 Avg. = 6:50

Source: The Corradino Group of Michigan, Inc.

The trips between Whitmore Lake Road/Dhu Varren and City Hall using M-14 versus a local trip (Barton Drive to Pontiac Trail to Swift to Broadway to Fifth Avenue and Main Street) were less than one minute's difference with the local trip being longer.

Overall, the average of the 10 travel-time runs made from the intersection of Whitmore Lake Road at Dhu Varren to either the Pfizer or the City Hall destination was a seven-minute trip whether M-14 or the local streets were used. The average for the travel-time runs in the opposite direction indicated that the local streets are about a minute shorter.

A third analysis was done to a destination at Geddes Road east of U.S. 23. The analysis indicated that going from the Whitmore Lake Road area to this destination, based on two to three travel-time runs for each path (local path is Barton Drive to Plymouth Road to U.S. 23 to Geddes Road) is about a one-half minute difference in favor of using M-14 (Table 3-25). In the reverse direction during the peak afternoon hours, the trip is longer on the local streets by about 4½ minutes, on average.

Table 3-25
Northeast Ann Arbor Transportation Plan
Travel Time Runs on March 13, 2002
3:00 p.m. to 6:30 p.m.

	WL Road @ Dhu Varren to Geddes @ U.S. 23		Geddes @ U.S. 23 to WL Road @ Dhu Varren	
1. M-14	8.1 miles	13:13/10:09 Avg. = 11:41	8.1 miles	8:00/7:45 Avg. = 7:52
2. Local	6.5 miles	13:00/11:59/12:23 Avg. = 12:28	7.1 miles	12:19/12:32 Avg. = 12:26

Source: The Corradino Group of Michigan, Inc.

The sum of this information indicated that closing the Barton Drive interchange would cause trips made throughout the day that are diverted to other paths to experience a few minutes increase in travel time. This conclusion is similar to systemwide computer model runs presented in the first-level evaluation.

These data indicated to the consultant that either option to closing the Barton Drive interchange was achievable based on systemwide and micro-simulation travel effects. It is important to note that members of the TCAC and the general public disputed these results.

A key concern with closing the Barton Drive interchange, even partially, is the need for access to M-14 by fire/emergency equipment. A meeting was held on March 28, 2002, with representatives of the City of Ann Arbor and Ann Arbor Township's fire departments to discuss the concept that emergency access would be allowed to use the existing on-ramp on the east side of M-14[6]. The existing off-ramp would be closed to all users because of safety considerations. The City of Ann Arbor Fire Department indicated that, as long as emergency access to M-14 is preserved and a turnaround is provided north of the Barton/M-14 interchange, the public's safety would be best served by closure of the ramps on the east side of the interchange.

The Ann Arbor Township Fire Department eventually expressed opposition to closing the off-ramp.

In conclusion, the consultant indicated that closing the east side of the M-14/Barton Drive interchange (Option 2-B) is achievable (i.e., closing the M-14-to-Barton Drive off-ramp to all traffic, including emergency vehicles, while allowing the on-ramp to be used by emergency equipment only). It is preferred to Option 2-A because it has somewhat better traffic characteristics. Option 2-B is associated with no impacts to parks, wetlands and historic properties, or other elements of the environment protected by law (Table 3-26).

[6] Since reviewed with MDOT and considered a "proposal that deserves additional discussion."

Table 3-26
Northeast Area Transportation Plan
M-14 Access Issues
Second-Level Screening
Overall Measurement Data

Issue \ Alternative	No Action	Remove Barton	
		2-A	2-B
Areawide Traffic			
Change	Baseline	Minimal Overall	Minimal Overall
Noise			
Change	Baseline	Minimal Overall	Minimal Overall
Air Quality			
Change	Baseline	Minimal Overall	Minimal Overall
Safety			
Change (crashes/yr.)	Baseline	-73	-73
Possible Acquisitions			
Private Residences (no.)	0	0	0
Businesses (no.)	0	0	0
Vacant Land (acres)	0	0	0
Total (acreage)	0	0	0
Schools			
Direct Impact (no.)	0	0	0
Indirect Impact (no.)	0	1[2]	1[2]
Parks			
Direct Impact (acres)	0	0	0
Wetlands			
Direct Impact (acres)	0	0	0
Community Cohesion			
Positive Change	NA	@ Barton (M-14 to Plymouth)	@ Barton (M-14 to Plymouth)
Negative Change	NA	@ Pontiac Trail (Plymouth to Barton)	@ Pontiac Trail (Plymouth to Barton)
Cost (2002 dollars)[1]	NA	$0.5 to $0.85 million	$0.2 to $0.4 million

[1]Includes cost to construct improvement, plus remove Barton ramps, plus property acquisition/relocation.
[2]Positive effect on the Northside Elementary School.

3.3.3 Alternative No. 6 – Develop a Full Main Street Interchange While Removing the Barton Drive Interchange

The objective of Alternative 6 is to provide a full interchange at Main Street (i.e., access from and to eastbound and westbound M-14), which would require closing the Barton Drive interchange with M-14 because two interchanges cannot operate when so closely located. Two options were reviewed during the first-level evaluation (Option 6-A shown on Figure 3-32 and Option 6-B shown on Figure 3-33). They vary in the impacts to parklands and potential acquisition of business properties. A more detailed examination of Option 6-A indicated that the topography in the area requires that the ramps to and from M-14 west of Huron River Drive be very long to meet design standards for grades. In turn, the ramps extend from points 1,000 to 2,000 feet west of Beechwood Road. That could cause more potential acquisitions of residences as well as use of parkland compared to the original options. But, it is expected this can be mitigated by using the median of M-14 to shift the needed expansion inward rather than to the outside of the freeway right-of-way (Option 6-A1 shown on Figure 3-34).

Analysis of the Option 6-A1 connection to Main Street of the new interchange ramps and the intersections they encounter with local streets indicated the concept will not work operationally, i.e., M-14 traffic from the east/north going south on Main Street will back up onto the freeway[7]. So, Option 6-A2 was developed (Figure 3-35). It would provide a loop ramp for moving traffic from westbound M-14 to southbound Main Street. This allows the interchange to adequately handle exiting traffic from the east/north. A micro-level operational analysis of the street network affected by this interchange indicated significant congestion in the afternoon peak will develop at Plymouth and Swift (Table 3-27). This condition is in addition to the LOS F expected in the PM peak under No Action at the Main/Kingsley and Plymouth/Maiden intersections due to the normal growth in traffic.

Option 6-B was also refined from its original concept (Figure 3-36). It would also be associated with very long ramps west of Huron River Drive. And, while it meets standards, the new off-ramps from M-14 will cause access to be removed to the Allied Company on the east side of Main Street from the north and to the south. Likewise, access to Huron View Boulevard on the west side of Main Street would be removed from the south and to the north on Main.

Because of the latter impacts associated with Option 6-B, Option 6-A2 was considered the most workable.

The impacts associated with Option 6-A2 were then measured. They include possible acquisition of three houses, five businesses, more than five acres of parkland and less than one acre of wetlands (Table 3-28). The Girl Scout site would lose between two and three acres but no structures. A new road would have to be built to maintain access to the Girl Scout facilities. The cost of the new interchange and related improvements, plus land acquisition/relocation is placed in the range of $29 to $43 million. With these issues, the consultant indicated Option 6-A2 is unachievable.

[7] A Single-Point-Urban Interchange would also be unworkable.

Figure 3-32
Alternative 6A
Add Full Main St Interchange
Remove Entire Barton Interchange

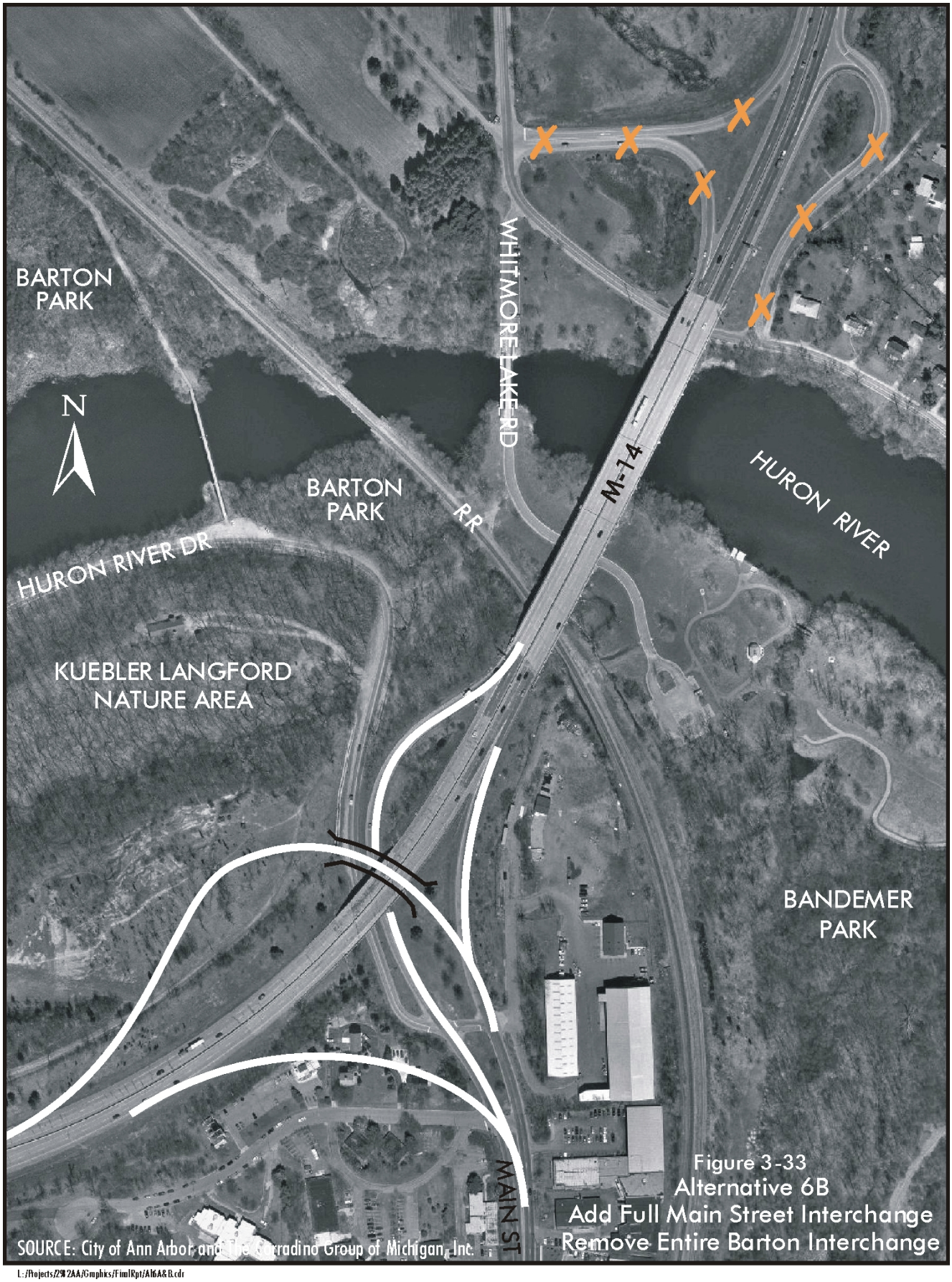

Figure 3-33
Alternative 6B
Add Full Main Street Interchange
Remove Entire Barton Interchange

Figure 3-34
Option 6-A1

Source: The Corradino Group of Michigan, Inc.

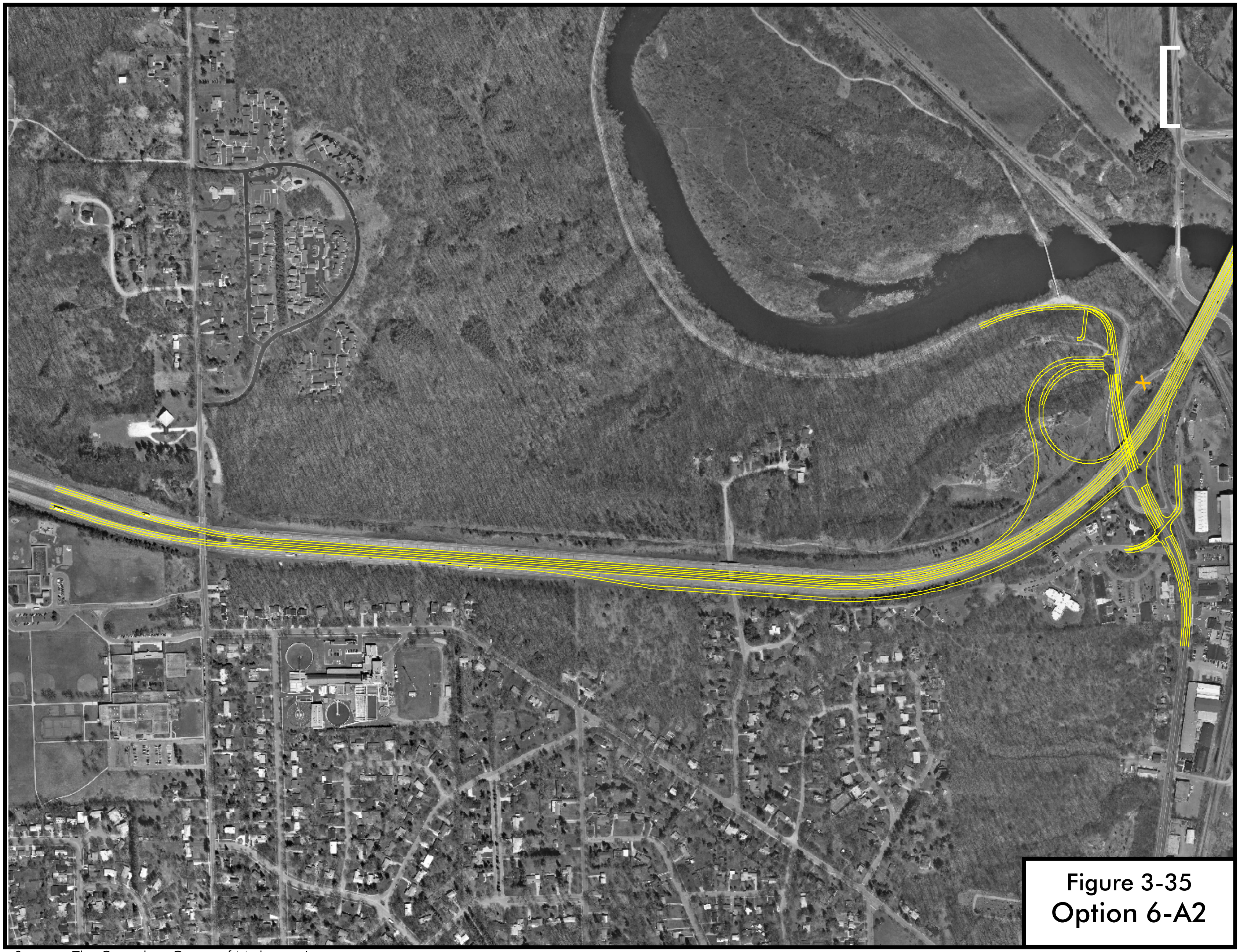

Figure 3-35
Option 6-A2

Source: The Corradino Group of Michigan, Inc.

Table 3-27
Northeast Area Transportation Plan
Micro Analysis
Option 6-A2

A.M. Peak

Location	Node #	Future No Action			Alt. 6-A2		
		LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Barton and Pontiac Trail	26	D	46.0	1.00	C	21.2	0.64
Barton and Plymouth	29	C	26.2	0.73	B	16.0	0.59
Main and Kingsley	35	A	9.0	0.54	A	9.2	0.64
Miller and Main	36	C	21.7	0.87	C	21.5	0.80
Plymouth and Swift	40	C	32.0	0.81	D	48.6	1.01
Plymouth and Maiden Lane	41	C	26.5	0.73	C	25.2	0.94
Plymouth and Broadway	48	A	8.6	0.41	A	6.7	0.55
Summit and Main	52	B	16.1	0.61	A	6.1	0.61
WB On-Ramp and HRD	16	na	na	na	B	11.3	0.16
WB Off-Ramp and Main	1	na	na	na	D	39.0	0.91
EB Ramps and Main	33	na	na	na	D	53.5	1.00
Main and Local Drives	63	na	na	na	B	13.7	0.86
Whitmore/Barton Connector	7	na	na	na	na	na	na

P.M. Peak

Location	Node #	LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Barton and Pontiac Trail	26	C	30.8	0.85	C	29.5	0.67
Barton and Plymouth	29	B	15.1	0.67	C	21.2	0.72
Main and Kingsley	35	F	113.2	1.32	F	136.9	1.36
Miller and Main	36	C	27.5	0.88	D	40.1	0.93
Plymouth and Swift	40	C	27.8	0.97	E	73.9	1.17
Plymouth and Maiden Lane	41	F	84.2	1.22	F	118.3	1.34
Plymouth and Broadway	48	A	6.2	0.67	A	7.0	0.73
Summit and Main	52	B	11.8	0.63	A	7.5	0.69
WB On-Ramp and HRD	16	na	na	na	A	6.8	0.27
WB Off-Ramp and Main	1	na	na	na	C	20.7	0.55
EB Ramps and Main	33	na	na	na	A	8.2	0.87
Main and Local Drives	63	na	na	na	C	31.4	0.95
Whitmore/Barton Connector	7	na	na	na	na	na	na

Source: The Corradino Group of Michigan, Inc.

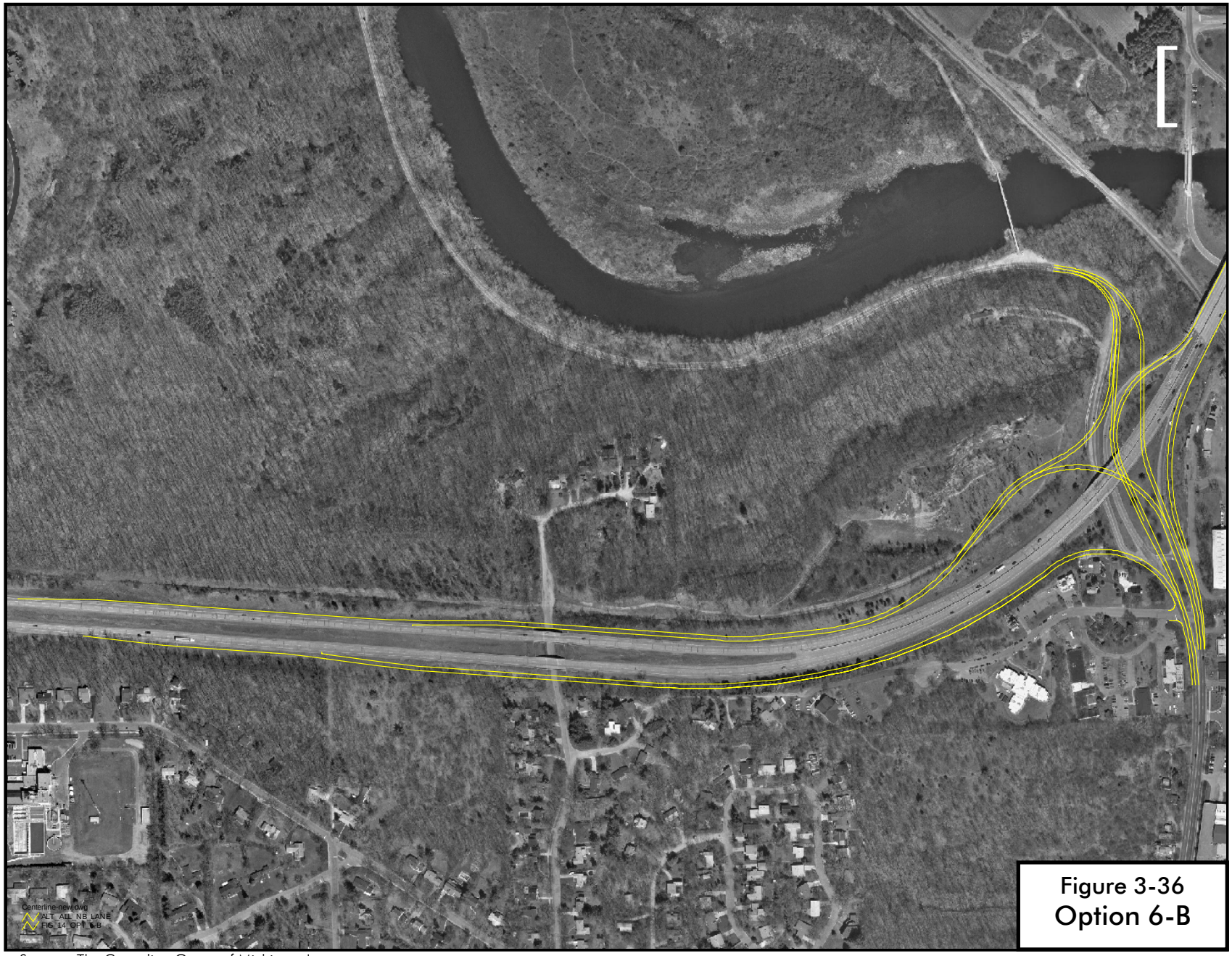

Figure 3-36
Option 6-B

Source: The Corradino Group of Michigan, Inc.

Table 3-28
Northeast Area Transportation Plan
M-14 Access Issues
Second-Level Screening
Overall Measurement Data

Issue \ Alternative	No Action	Full Main w/o Barton
		6-A2
Areawide Traffic		
Change	Baseline	Minimal Overall
Noise		
Change	Baseline	Minimal Overall
Air Quality		
Change	Baseline	Minimal Overall
Safety		
Change (crashes/yr.)	Baseline	-62
Possible Acquisitions		
Private Residences (no.)	0	3
Businesses (no.)	0	5
Vacant Land (acres)	0	3.4[2]
Total (acreage)	0	8.5
Schools		
Direct Impact (no.)	0	0
Indirect Impact (no.)	0	1[3]
Parks		
Direct Impact (acres)	0	5.2[4]
Wetlands		
Direct Impact (acres)	0	0.5
Community Cohesion		
Positive Change	NA	@ Barton (M-14 to Plymouth)
Negative Change	NA	@ Pontiac Trail (Plymouth to Barton)
Cost (2002 dollars)[1]	NA	$29 to $43 million

[1]Includes cost to construct improvement, plus remove Barton ramps, plus property acquisition/relocation.
[2]Includes approximately 2.4 acres of Girl Scout camp land without structures.
[3]Positive effect on the Northside Elementary School.
[4]Involves possible use of Kuebler Langford Nature Area (5.2 acres).

3.3.4 Alternative No. 12 – Connect Whitmore Lake Road to Main Street While Removing the Barton Drive Interchange

This alternative contemplates connecting Whitmore Lake Road to Main Street, if the entire Barton Drive interchange were closed, as conceptually shown on Figure 3-37. Additionally, it was suggested during the first-level evaluation that the Whitmore Lake-to-Main Street alternative accompany the development of a new full Main Street interchange, if possible. This was labeled Alternative 17 (Figure 3-38).

The two original options for Alternative 12 differ in their crossing of the Norfolk-Southern Railroad tracks. Option 12-A was originally associated with a "new" at-grade crossing of the rail line, which could be a "fatal flaw." So, the continued use of an existing rail crossing at Lakeshore Road was the reason that Option 12-B was developed. In either case, it is noted this rail line is considered part of the Detroit-Chicago high speed rail proposal, talked about for years.

Engineering analysis indicated that, if the proposed Whitmore Lake Road/Main Street connection is elevated, beginning immediately south of the existing ramps to the Barton Drive/M-14 interchange, the connection would clear the rail line and connect to Huron River Drive then to Main Street such that all design standards for grades/elevations can be met. This concept is more achievable than adding thousands of vehicles per day to the existing railroad grade crossing at Lakeshore Road, i.e., Option 12-B. Conversations with Norfolk-Southern Railroad indicated major resistance to Option 12-B. So, it was not considered achievable.

Option 12-A for the proposed Whitmore Lake Road-to-Main Street connector was analyzed for the following conditions with the basic assumption that the Barton Drive interchange is closed:

- With the existing M-14/Main Street interchange
- With Option 6-A2

With the existing M-14/Main Street interchange (Option 12-A), the Whitmore Lake Road-to-Main Street connector (via Huron River Drive) would have problems as the additional traffic added to Huron River Drive, which then ties into the westbound M-14 off-ramp to Main Street, would require a traffic signal. With it, 2025 traffic will still stack up on M-14 westbound to the extent that this connection was not considered achievable.

Connecting Whitmore Lake Road to Main Street via Huron River Drive with Option 6-A2 (i.e., Alternative 17) (Figure 3-38) would make this interchange's operation complex but workable (Table 3-29). It would involve building a new access road to the Girl Scout facility served by Huron River Drive.

The impacts associated with Alternative 17 by adding the Whitmore-Lake-to-Main connector (via Huron River Drive) to Option 6-A2 involves an additional acre of parkland and 2.5 acres of wetlands, compared to Option 6-A2 (Table 3-30). The cost estimate for Alternative 17 is in the range of $34 to $49 million. These issues are even more significant than those of Option 6-A2. So, the consultant also concluded Alternative 17 was not achievable.

Figure 3-37
Alternative 12A & 12B
Connect Whitmore Lake Rd to Main
Remove Entire Barton Interchange

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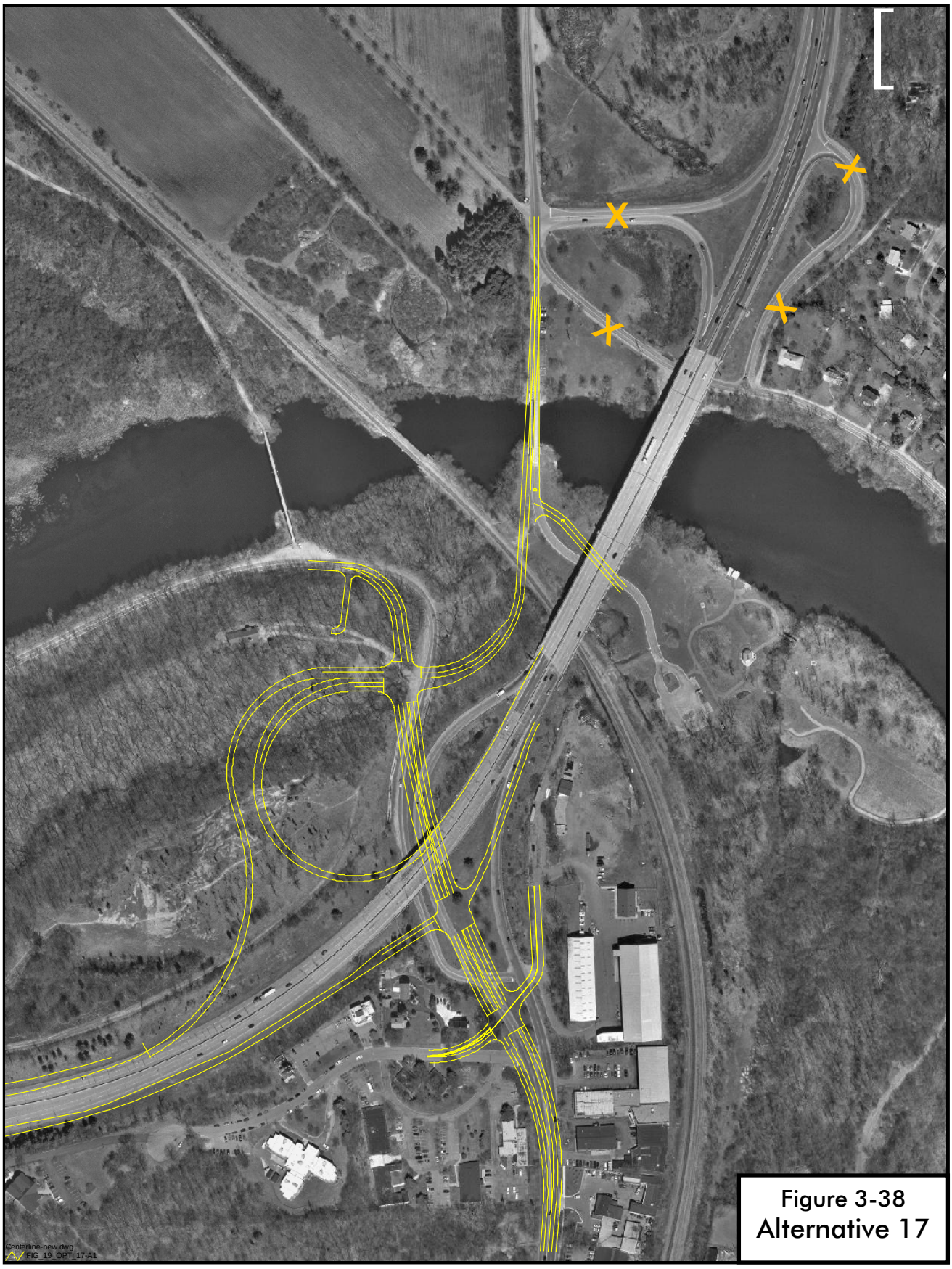


Figure 3-38
Alternative 17

Source: The Corradino Group of Michigan, Inc.

Table 3-29
Northeast Area Transportation Plan
Micro Analysis
Option 17-A

A.M. Peak

Location	Node #	Future No Action			Alt. 17-A		
		LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Barton and Pontiac Trail	26	D	46.0	1.00	C	30.4	0.86
Barton and Plymouth	29	C	26.2	0.73	B	19.5	0.66
Main and Kingsley	35	A	9.0	0.54	A	5.9	0.57
Miller and Main	36	C	21.7	0.87	C	31.1	0.93
Plymouth and Swift	40	C	32.0	0.81	C	31.3	0.80
Plymouth and Maiden Lane	41	C	26.5	0.73	C	24.5	0.80
Plymouth and Broadway	48	A	8.6	0.41	A	6.4	0.45
Summit and Main	52	B	16.1	0.61	A	6.2	0.68
WB On-Ramp and HRD	16	na	na	na	B	16.1	0.39
WB Off-Ramp and Main	1	na	na	na	D	47.9	1.04
EB Ramps and Main	33	na	na	na	D	43.5	0.96
Main and Local Drives	63	na	na	na	B	16.5	0.89
Whitmore/Barton Connector	7	na	na	na	C	29.8	0.85

P.M. Peak

Location	Node #	LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Barton and Pontiac Trail	26	C	30.8	0.85	C	25.8	0.79
Barton and Plymouth	29	B	15.1	0.67	B	14.6	0.68
Main and Kingsley	35	F	113.2	1.32	F	133.7	1.40
Miller and Main	36	C	27.5	0.88	D	39.3	1.08
Plymouth and Swift	40	C	27.8	0.97	D	35.1	0.97
Plymouth and Maiden Lane	41	F	84.2	1.22	F	82.6	1.22
Plymouth and Broadway	48	A	6.2	0.67	A	5.7	0.71
Summit and Main	52	B	11.8	0.63	A	7.3	0.67
WB On-Ramp and HRD	16	na	na	na	B	13.1	0.28
WB Off-Ramp and Main	1	na	na	na	B	16.8	0.45
EB Ramps and Main	33	na	na	na	A	7.6	0.84
Main and Local Drives	63	na	na	na	A	9.3	0.81
Whitmore/Barton Connector	7	na	na	na	D	39.3	0.86

Source: The Corradino Group of Michigan, Inc.

Table 3-30
Northeast Area Transportation Plan
M-14 Access Issues
Second-Level Screening
Overall Measurement Data

Issue \ Alternative	No Action	Whitmore Lake to Main w/Alt. 6-A2 17-A
Areawide Traffic		
Change	Baseline	Minimal Overall
Noise		
Change	Baseline	Minimal Overall
Air Quality		
Change	Baseline	Minimal Overall
Safety		
Change (crashes/yr.)	Baseline	-62
Possible Acquisitions		
Private Residences (no.)	0	3
Businesses (no.)	0	5
Vacant Land (acres)	0	3.4[2]
Total (acreage)	0	8.5
Schools		
Direct Impact (no.)	0	0
Indirect Impact (no.)	0	1[3]
Parks		
Direct Impact (acres)	0	6.3[5]
Wetlands		
Direct Impact (acres)	0	2.8
Community Cohesion		
Positive Change	NA	@ Barton (M-14 to Plymouth)
Negative Change	NA	@ Pontiac Trail (Plymouth to Barton)
Cost (2002 dollars)[1]	NA	$34 to $49 million

[1]Includes cost to construct improvement, plus remove Barton ramps, plus property acquisition/relocation.
[2]Includes approximately 2.4 acres of Girl Scout camp land without structures.
[3]Positive effect on the Northside Elementary School.
[4]Involves possible use of Kuebler Langford Nature Area (about 5.2 acres), Barton Park (0.70 acres) and Bandemer Park (about 0.40 acres).

3.4 Consultant Findings

All options to Alternatives 1 (Improve the Barton Drive Interchange), 6 (Develop a Full Main Street Interchange), 12 (Connect Whitmore Lake Road to Main Street), and 17 (Combination of Alternatives 6 and 12) are not considered achievable. The potential displacements associated with Alternatives 1, 6 and 17 encouraged a search for another solution. The possible parks issues (and, to some degree, the wetlands) of Options 6-A2 and 17 required a search for another solution. And, when the cost of each option to address concerns about an interchange that now serves 12,000 vehicles per day, is added to the evaluation, the consultant reached the conclusion that these alternatives are not achievable.

A key to this position is the forecast of 2020 traffic. Some may say the forecast is too low; others, that it is too high. Regardless, the forecast will be realized sooner or later. And, as that condition develops, the east side of the "temporary" Barton Drive interchange, built more than 40 years ago, is going to fail to perform its designed function, as its configuration is inadequate. As traffic builds on M-14 (a freeway-to-freeway connector serving a dynamic area) it will be difficult to depend on a crash-free experience at the Barton Drive on-/off-ramps. The "reputation" of the interchange will cause people to avoid it. Eventually, the density of traffic on M-14 will significantly restrict its use as intended—drivers just won't be able to freely get on/off M-14 at Barton Drive.

3.4.1 Recommendation

The consultant believes the reasonable and prudent option to addressing the overall community needs as affected by the Barton Drive/M-14 interchange is to close the east side ramps, except the use of the on-ramp by emergency vehicles in emergency conditions.

The consultant's findings were presented to the TAC and TCAC on May 28 and 29, 2002, respectively. The public reviewed the findings on June 19, 2002. Then the TAC and TCAC each met on June 26, 2002, to take action on the findings based on public input. Each, by majority vote, recommended closing the east side of the interchange. Notes of each meeting are include in Appendix A (TAC) and Appendix B (TCAC).

Recommendation

The Ann Arbor City Planning Commission recommends the "no change option" for the M-14/Barton Drive interchange, with the exception of incremental changes to improve safety.

3.5 Goals and Evaluation Factors

The consultant reviewed the M-14/Barton Drive recommendation in light of the NEATP goals and judged that five of six goals are met (Table 3-31). Achieving Goal 6, i.e., "Promote cooperation among the City of Ann Arbor and other governmental entities…" will be determined as a result of reviewing/acting upon this plan.

The consultant believes there will be no negative effects of closing the east side of the M-14/Barton Drive interchange. On the other hand, it will have a positive effect on community cohesion in a section of northeast Ann Arbor served by Barton Drive (Table 3-32). And, if the excess land available after the closure is dedicated to the city's park system so a trail easement can connect the City's Greenway to Whitmore Lake Road, the effects of the recommendation would be even more positive.

Table 3-31
Northeast Ann Arbor Transportation Plan
M-14/Barton Drive Interchange – Consultant Recommendation

Goal	Recommendation: Close east side of interchange except on-ramp to emergency equipment
Provide appropriate access and mobility with minimal negative impacts for all people and goods.	Meets goal as the diversion of east side ramp trips will not cause congestion to worsen on other roadways compared to No Action condition. Some trips will take a few minutes longer due to increased travel distances.
Protect and enhance the natural environment and the human and built environment.	Meets goal as no wetland, parks, historic sites will be adversely affected nor will air quality carbon monoxide standards be violated.
Promote a safe and secure transportation system.	Meets goal as recommendation will be associated with overall reduction of 60 crashes per year in 2020 in northeast Ann Arbor.
Invest in transportation infrastructure in a manner consistent with other goals.	Meets goal as no new road ramps will be built.
Promote cooperation among the city of Ann Arbor and other governmental entities, particularly the surrounding townships and municipalities and the University of Michigan in a manner consistent with other goals	To Be Determined
Meaningful public input and involvement will be required of any transportation project in the northeast area	Meets goal as a result of TCAC and public involvement in each step of analysis/recommendation.

Table 3-32
Northeast Ann Arbor Transportation Plan
M-14/Barton Drive Interchange - Consultant Recommendation

Evaluation Factor	Consultant Recommendation: Close east side of interchange except on-ramp to emergency equipment
Air Quality	No Violation of Standards
Community Cohesion	Positive Effect
Land Acquisition	No Acquisition
Noise	No Significant Effect
Mode Choice	No Effect
Level of Service	No Effect Overall
Water Quality	No Effect
Wetlands	No Effect
Open Space	No Effect
Environmental Justice	No Disproportionate Negative Effect

4. Non-motorized Component of Plan

Summary

Thirty years ago, Ann Arbor was considered a national leader in establishing an environment that supported and encouraged walking and bicycling. In the intervening years, the non-motorized program failed to keep pace with research and innovations in non-motorized transportation. Recently, there has been a renewed interest in and support of non-motorized transportation in the City. Many non-motorized facilities have been constructed in the past few years and the new Alternative Transportation Program Management Team and Alternative Transportation Coordinator have been working diligently to improve the non-motorized conditions in the City. The material presented here is intended to help Ann Arbor once again become a national model for quality non-motorized transportation. The goals of the Transportation Citizens Advisory Committee, presented in Section 2.2, clearly point to that objective.

The non-motorized "layer" of the Northeast Area Transportation Plan (NEATP) has been incorporated into the recently developed citywide non-motorized plan. Reference is made to that document for a review of Planning and Design Guidelines and Proposed Policies and Programs to support a successful pedestrian and bicycle network. This report covers two topics specific to the Northeast Area:

- The Existing Environment – assesses the state of the existing condition of pedestrian and bicycle facilities; and,
- Proposed Facilities – covers the specific long and near term improvement recommendations to the transportation system to establish a non-motorized transportation network.

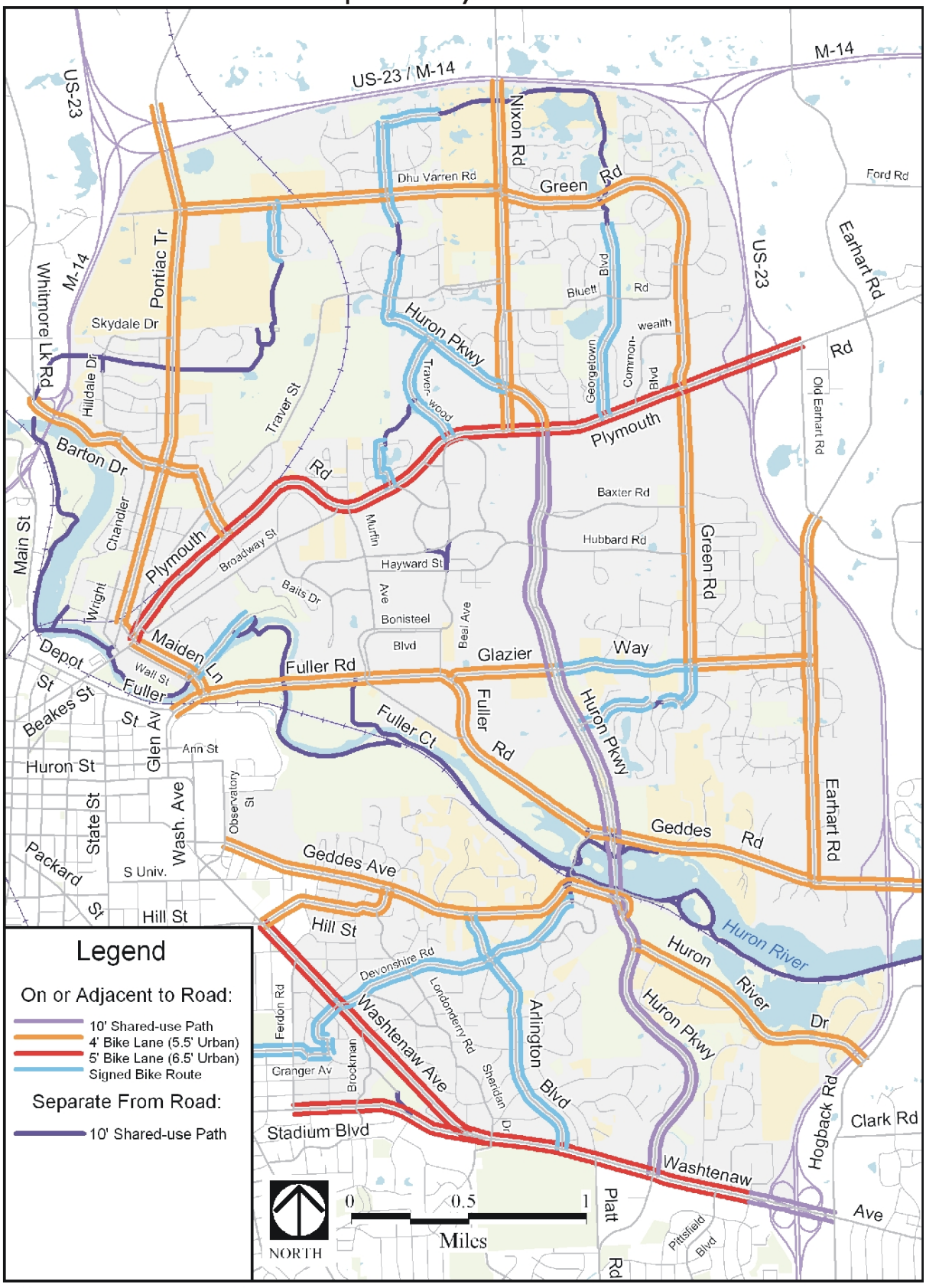
Long-term Solutions

The NEATP long-term pedestrian facility proposals for northeast Ann Arbor are illustrated on Figure 4S-1. The bicycle facility proposals are shown on Figure 4S-2. Crosswalk and median proposals are depicted on Figure 4S-3. These are to be considered for implementation when the roadways to which they relate are reconstructed or widened.

To guide future private development, the following recommendations have been developed:

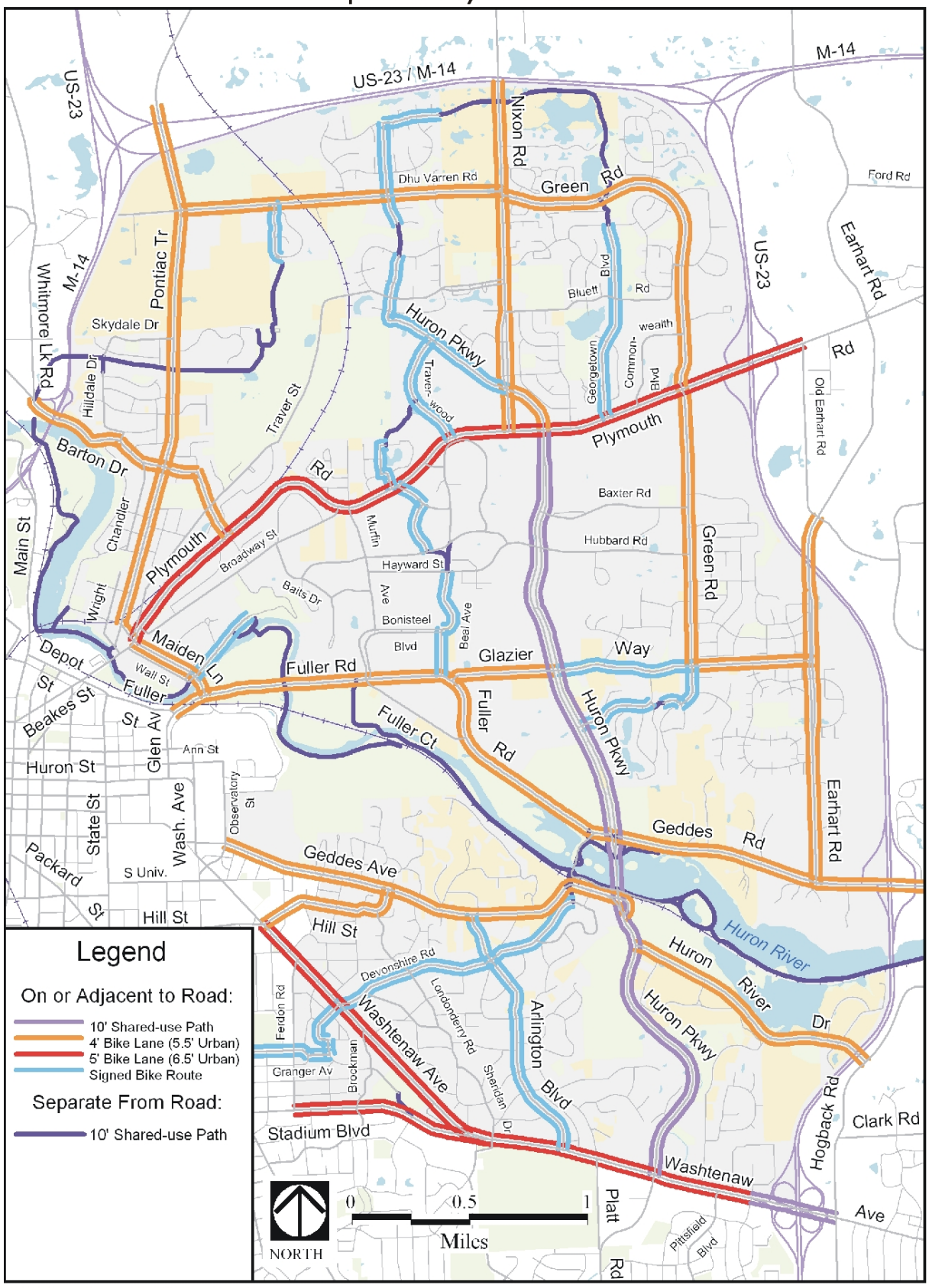
- Existing subdivision ordinances should be modified to include specific requirements for accommodating pedestrians and bicycles.
- The site plan review process should include criteria that evaluates whether walking is encouraged through the site design and review and modify plans as necessary.

Figure 4S-2
Proposed Bicycle Facilities



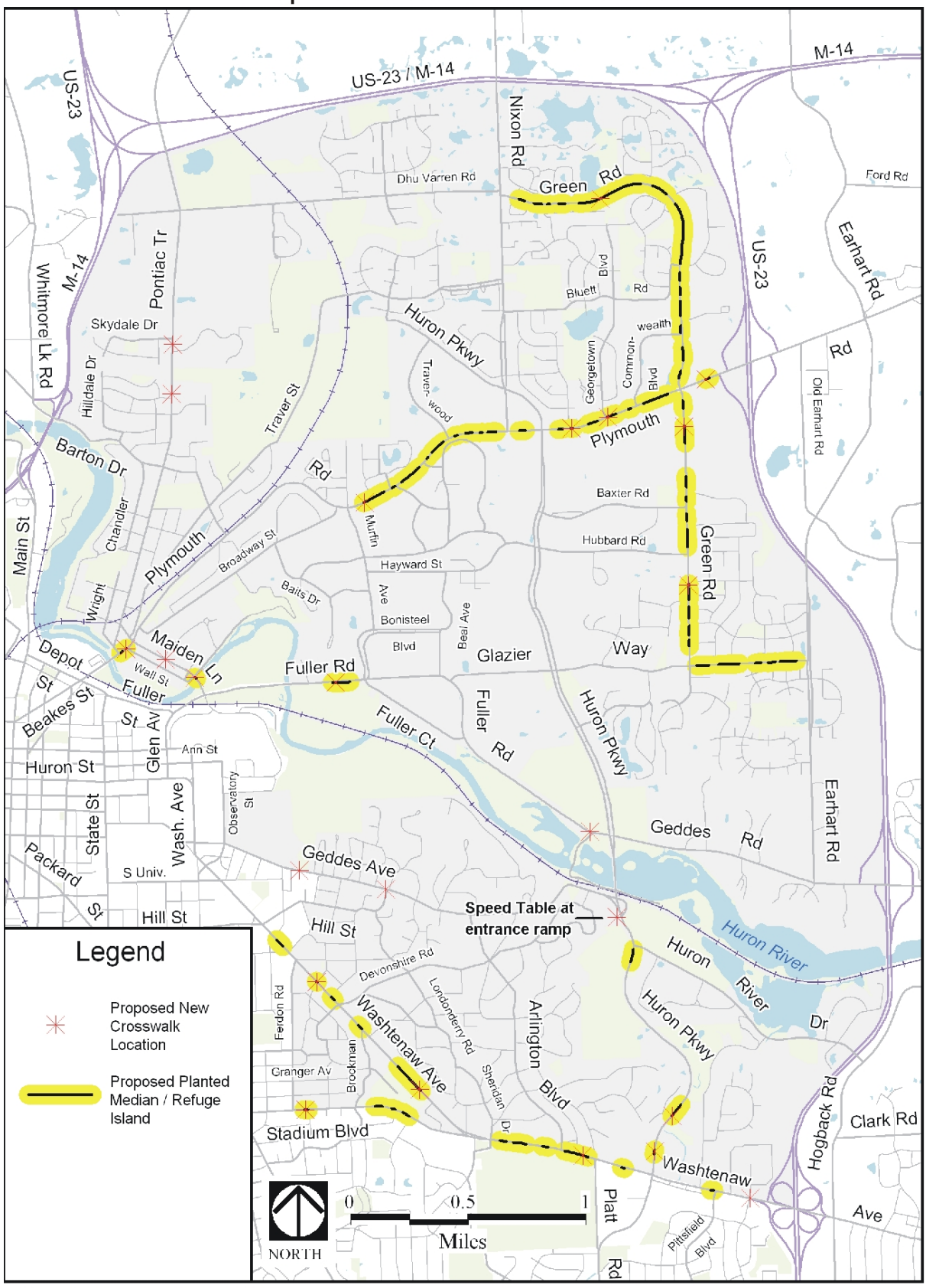
SOURCE: The Greenway Collaborative, Inc.

Figure 4S-2
Proposed Bicycle Facilities



SOURCE: The Greenway Collaborative, Inc.

Figure 4S-3
Proposed Crosswalks and Medians



SOURCE: The Greenway Collaborative, Inc.

- Developments with small blocks and grid streets should be encouraged through design guidelines.
- New residential developments must include pedestrian and bicycle networks that connect to surrounding areas.
- Private road standards for sidewalks and buffer zones should be the same as public street standards.

Atypical Long-term Solutions

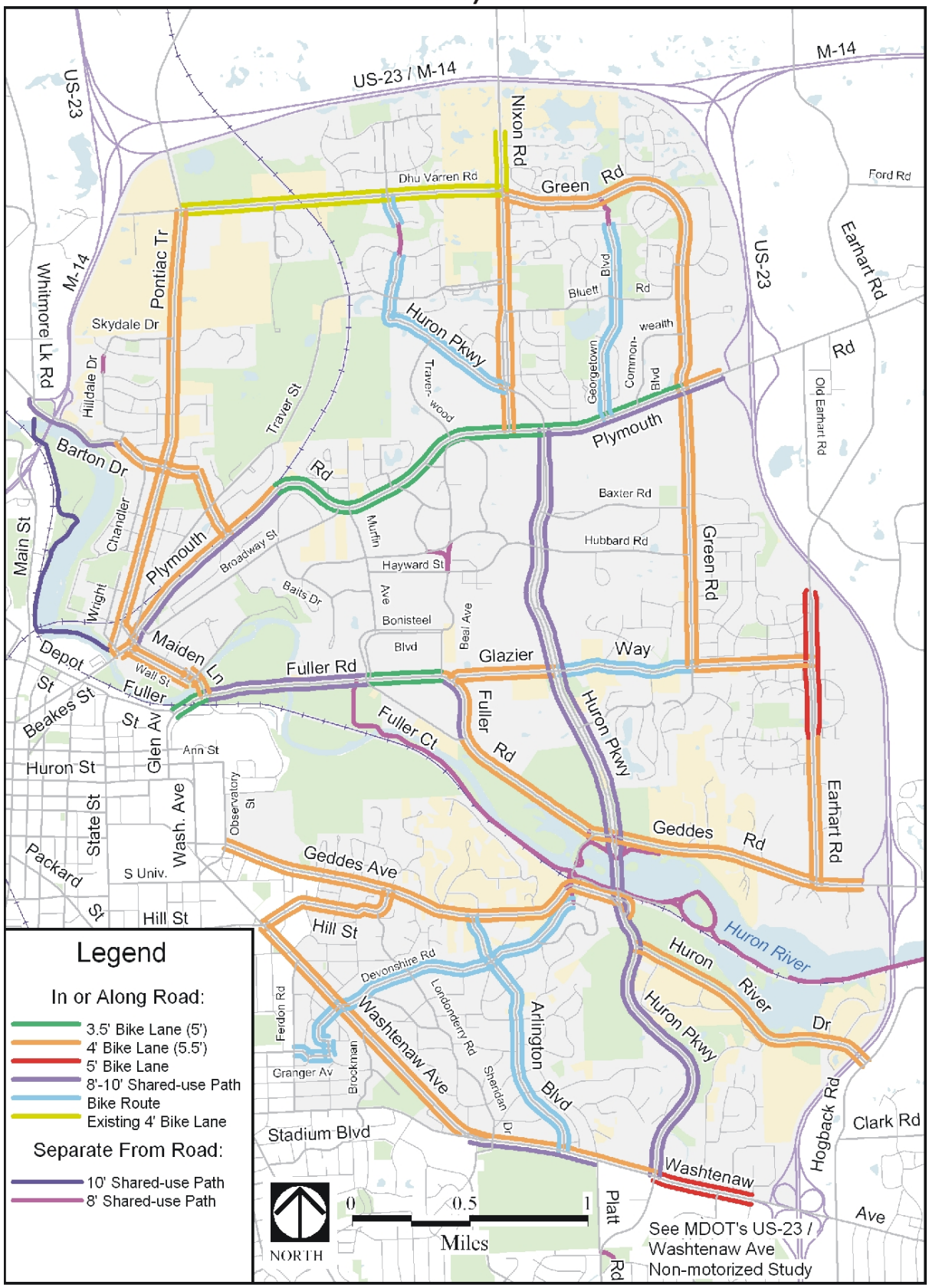
Not every possibility for each roadway can be adequately addressed at a master plan level. Ultimately, a corridor specific design will determine how to best apply the design guidelines to specific situations. But, even at this level of analysis, several locations can be identified where circumstances make the typical guidelines for accommodating pedestrians and bicycles infeasible or impractical. They include:

- **Washtenaw Avenue**, from Stadium to Geddes Avenue, goes through historic districts where the road and sidewalk width are unlikely to change. The sidewalks are five feet wide and the road is narrow (40 feet wide in some places). Because the road is a Principal Arterial, draft AASHTO Pedestrian Guidelines call for an eight-foot-wide sidewalk. This is unlikely to occur and underscores the need to accommodate bicycles within the roadway as the existing five-foot-wide sidewalks clearly cannot accommodate both adult bicyclists and pedestrians in this high demand corridor.
- **Huron River Drive**, from Huron Parkway to Hogback Road, has adjacent mature woods and steep slopes primarily on the south side of the road. This, in combination with the limited development along the road, makes a sidewalk only on the north side of the road an appropriate solution. There may be areas where the buffer between the sidewalk and the roadway may have to be eliminated to minimize the impact to the natural features.
- **Geddes Road**, from Huron Parkway to Sumac Lane, has steep slopes and woodlots on both sides of the road. Because this road serves as a key linkage connecting Concordia University, three neighborhoods, and the Huron River Pathway system, there is demand for a non-motorized linkage. The most appropriate non-motorized linkage may not be directly adjacent to the roadway but rather away from the roadway utilizing city property and, potentially, easements on private property. By utilizing this approach, the road character may be preserved while still providing the non-motorized link.
- **Geddes Avenue**, from Hill Street to Huron Parkway, goes through patches of woodlots with some mature trees adjacent to the roadway. There is an existing narrow path along portions of the north side of the trail. This path experiences considerable activity. It should be improved and widened, where possible, without significantly impacting the natural features.

Near-term Solutions

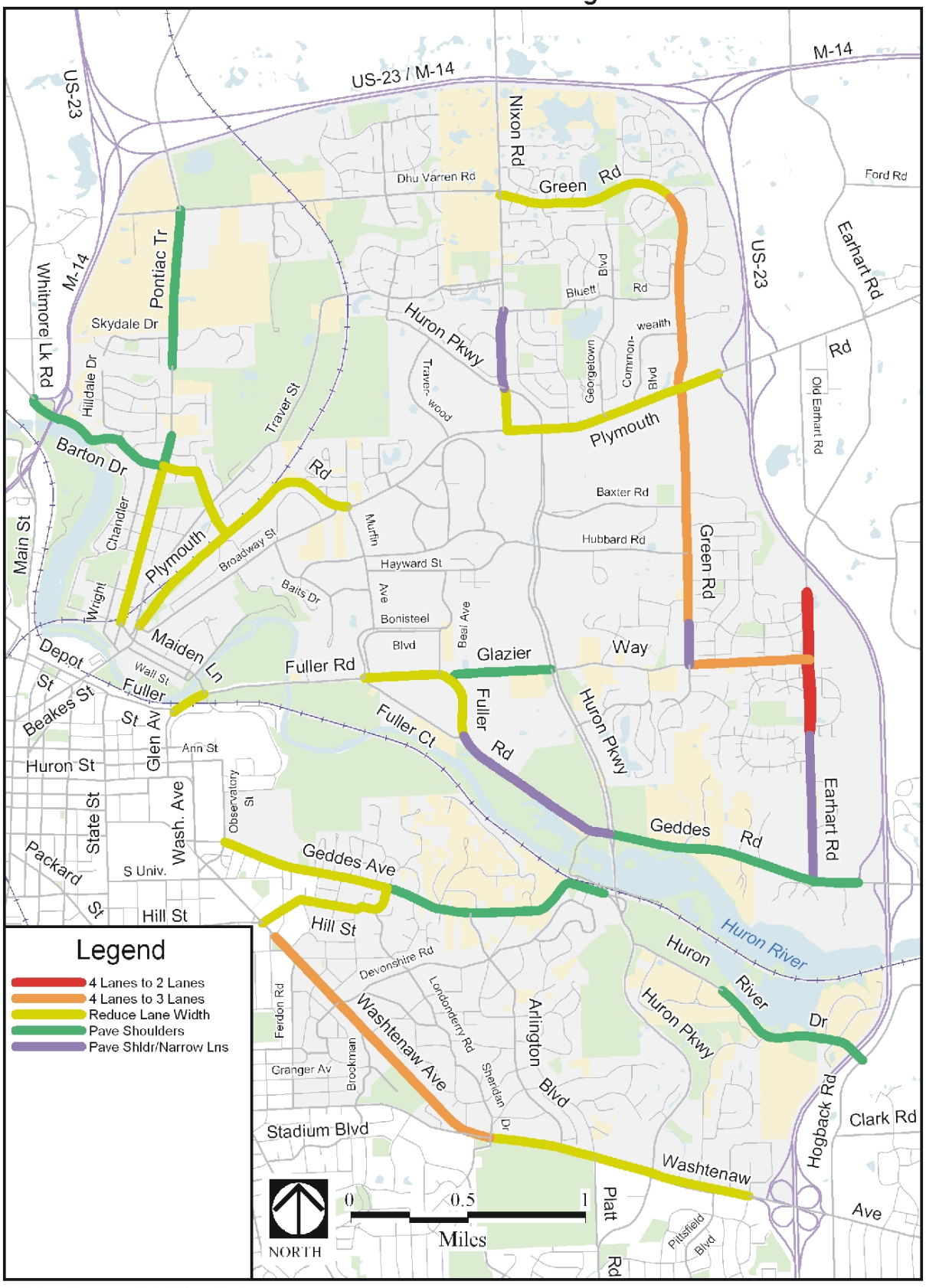
Near-term solutions were designed to be implemented with minor changes such as re-striping the existing road surface (Figures 4S-4 and 4S-5). These cost-effective solutions will enhance bicycle

Figure 4S-4
Near-term Bicycle Facilities



SOURCE: The Greenway Collaborative, Inc.

Figure 4S-5
Near-term Road Changes



SOURCE: The Greenway Collaborative, Inc.

and pedestrian conditions, quickly and easily, until the road is expanded or major reconstruction is undertaken.

Four road corridors in the project area present distinct challenges that are the result of limited space and high volumes of traffic, and/or higher speed limits.

- Plymouth Road
- Washtenaw Avenue
- Fuller Road from Glazier Way to Fuller Court
- Stadium Boulevard from Ferdon Road to Washtenaw Avenue

AASHTO standards provide for flexibility in cases such as these, and certain modifications are described below. Ann Arbor city engineering staff has determined that vehicular lanes on roads with a posted speed limit of 40 mph or greater should not be reduced to less than 11 feet wide.

Plymouth Road

Providing minimum-width bicycle lanes on both sides would require that the outside motor vehicle lanes be narrowed to 10.5 feet in some places, the inside motor vehicle lane to 11 feet and the center-turn lane reduced to 10 feet. There is, however, room to provide one designated bicycle lane and maintain the 11-foot desired minimum width of the vehicular lanes.

The cross-section illustrations shown later in this report on Figures 4-24A through 4-24D are based on the number of intersecting driveways and the corresponding need for bike lanes. In several cases, bicyclists would be given the option of bicycling in the roadways or using the sidepath at their discretion. In those situations, and situations where no bike lane is feasible, the visibility of the sidepath needs to be improved at the driveways, and transitions must be provided between the road and sidepath.

Washtenaw Avenue

Washtenaw Avenue, a state trunkline, is a high-demand corridor for both automobiles as well as non-motorized traffic. The width of the roadway varies greatly along its length, from 40 feet in the historic neighborhoods closer to campus, to 70 feet nearer U.S. 23.

The bike quality/level of service of the corridor is an E from the intersection of Stadium Boulevard to Huron Parkway due to the large volumes of traffic moving at high speeds and the lack of sidewalks along the north side. Currently, there is a “desire path” worn into the narrow strip of grass along the road at that point, which is virtually impassible during the winter months.

For a near-term solution on this segment, the City should seek MDOT approval to provide a bicycle lane on the north (westbound) and finalize Transportation Enhancement grant approval for a shared use path on the north side.

For the segment from Huron Parkway to U.S. 23, there is sufficient width to provide two bicycle lanes. If improvements recommended in the U.S. 23/Washtenaw Non-motorized Crossing Study are implemented, transitions to sidepaths must be developed.

The near-term proposals along Washtenaw Avenue are shown later in this report on Figures 4-25A through 4-25F.

Fuller Road

Fuller Road also varies in width along its length. Portions of the roadway are heavily used by pedestrians and bicyclists moving between North Campus and Central Campus, waiting for buses, or walking from the commuter lots by Mitchell Field. In some portions, the existing sidepaths along both sides of the road can accommodate bicycle use safely due to few intersecting driveways. However, due to heavy pedestrian use, a shared use is problematic for bicycle use. The near-term solution is to accommodate bicyclists in the roadway, where possible, with a narrowing of lanes are shown later in this report on Figures 4-26A through 4-26D.

Stadium Boulevard

Nearly a mile of Stadium Boulevard is included in northeast Ann Arbor. The road in this area is 60 feet wide. Unlike the section of Washtenaw Avenue between Stadium and Huron Parkway, a sidepath is not a viable alternative due to the numerous intersecting driveways and intersections on both sides and the existing conditions of a five-foot sidewalk up against commercial development properties. The near-term proposals for Stadium Boulevard are illustrated later in this report on Figure 4-27.

Specific Area Recommendations

The following recommendations for near-term solutions deal with a variety of specific problem areas within the study area:

- Conduct an analysis of pedestrian and bicycle crash data annually to identify problem areas and potential corrective actions.
- Provide crosswalks and pedestrian signals at main entrance to the Arborland Mall.
- Improve the crosswalk where the Huron River Path crosses Wall Street and Maiden Lane.
- Improve the crosswalk at the entrance to Gallup Park from Fuller Road restricting overflow parking as necessary.
- Eliminate all pedestrian activated crosswalk signals in the Lower Town area and integrate the walk phase into standard signal phasing.

Other Considerations

Analysis of the "before" and "after" conditions of the traffic effects of the non-motorized proposals on Plymouth Road, between Nixon and Murfin Roads, was performed using the SYNCHRO model. Bike lanes and two new refuge islands were recently constructed on Plymouth Road in this segment.

The SYNCHRO model examined reductions in lane width (12 feet to 11 feet) and average speeds (lower by five mph) on this segment of Plymouth. The results (Table 4S-1) show an increase in delay and travel time. But, with the reduced average vehicular speed on Plymouth, these are considered productive tradeoffs, particularly when understanding these increases in time represent a few seconds per vehicle on Plymouth Road.

Table 4S-1
Travel Time Effects of Non-motorized Proposal on Plymouth Road between Nixon and Murfin Roads

Performance Measure / Segment	Vehicle Minutes		Average Speed MPH
	Delay Time	Total time	
Before Condition			
Murfin to Traverwood	53.0	342.6	34.0
Traverwood to Nixon	204.0	328.2	15.2
Nixon to Traverwood	18.6	124.4	34.2
Traverwood to Murfin	87.8	311.7	28.9
After Condition (.5 mph)			
Murfin to Traverwood	62.3	398.1	29.3
Traverwood to Nixon	254.8	398.1	12.5
Nixon to Traverwood	19.1	141.1	30.1
Traverwood to Murfin	119.6	374.1	23.7

Source: The Corradino Group of Michigan, Inc.

The Highway Capacity Software was also applied to determine if the narrower lane width on Plymouth Road, accompanying the non-motorized changes and the increased presence of bicyclists and pedestrians, makes a difference. The results show that the Plymouth Road intersection with Nixon Road will experience no significant reduction in its ability to handle traffic in the peak hour when the lanes on Plymouth are 11 feet rather than 12 feet wide and 10 pedestrian and bicycle interactions affect the flow of eastbound and westbound traffic on Plymouth Road. The reduction in capacity is less than four percent when the bicycle/pedestrian interactions with traffic grow to 25 in the peak hour. So, while, this test is only for one road, the consultant concluded there will be no significant negative effect in vehicle Level of Service due to implementing the non-motorized component of the NEATP. Such changes will have a calming effect on vehicular speeds and improve overall safety of the pedestrians and bicyclists.

4.1 The Existing Environment

Thirty years ago, Ann Arbor was considered a national leader in establishing an environment that supported and encouraged walking and bicycling. In the intervening years, the non-motorized program failed to keep pace with research and innovations in non-motorized transportation. Recently, there has been a renewed interest in and support of non-motorized transportation in the City. Many non-motorized facilities have been constructed in the past few years and the new Alternative Transportation Program Management Team and Alternative Transportation Coordinator have been working diligently to improve the non-motorized conditions in the City. The material presented here is intended to help Ann Arbor once again become a national model for quality non-motorized transportation. The goals of the Transportation Citizens Advisory Committee, presented in Section 2.2, clearly point to that objective.

The non-motorized "layer" of the Northeast Area Transportation Plan (NEATP) has been incorporated into the recently developed citywide non-motorized plan. Reference is made to that document for a review of Planning and Design Guidelines and Proposed Policies and Programs to support a successful pedestrian and bicycle network. This report covers two topics specific to the northeast area:

- The Existing Environment – assesses the state of the existing condition of pedestrian and bicycle facilities; and,
- Proposed Facilities – covers the specific long and near term improvement recommendations to the transportation system to establish a non-motorized transportation network.

4.1.1 General Conditions

The major influences on non-motorized travel are the physical environment and the social environment. The influence of the physical environment includes the existence of specific facilities, such as bike lanes and sidewalks, and the underlying land uses and buildings. The majority of bicycle and pedestrian trips are for short distances. Even with first-rate facilities, large blocks of homogeneous land uses and spread-out development will inhibit many non-motorized trips.

The social environment affects why people walk and bicycle, including environmental ethics, economics, disabilities, exercise and enjoyment. A community's acceptance and endorsement of walking and bicycling can promote increased non-motorized travel. Society typically utilizes the automobile for all trips almost without thought. Few people stop to consider the social and economic consequences of their transportation choices. Adult professionals who bicycle or walk to work are still considered "unusual."

The majority of northeast Ann Arbor is typical of the development patterns that were created post-World War II. The area's road system and dispersed land uses are largely scaled towards automobile use. Few alternatives exist to the arterial and collector streets for bicyclists and pedestrians. Bicyclists and pedestrians are directed into corridors with the highest concentration of vehicular traffic. The result is a non-motorized environment that is not favorable to walking and bicycling for everyday transportation.

One of the defining characteristics of northeast Ann Arbor is the amount of park and open space. Two golf courses, the parkland along the Huron River and the open space along Huron Parkway are typical of northeast Ann Arbor. While this provides outstanding recreational resources, it also compartmentalizes the existing development. This, in combination with the natural barrier of the Huron River, and the artificial barriers of railroads and four-lane arterials, divides northeast Ann Arbor into distinct subareas.

Land Use and Future Development

There are about a dozen locations within the study area with mixed land uses in close proximity to each other. Some have high-density residential areas in close proximity to office, commercial, research, or institutional uses. Others include hotels near restaurants and shopping. In these areas there currently is high potential for a greater percentage of trips to be accomplished by walking or bicycling than would be typical for the northeast area as a whole. The difficulty is that, in many cases, a busy multi-lane primary road separates the trip origin and destination.

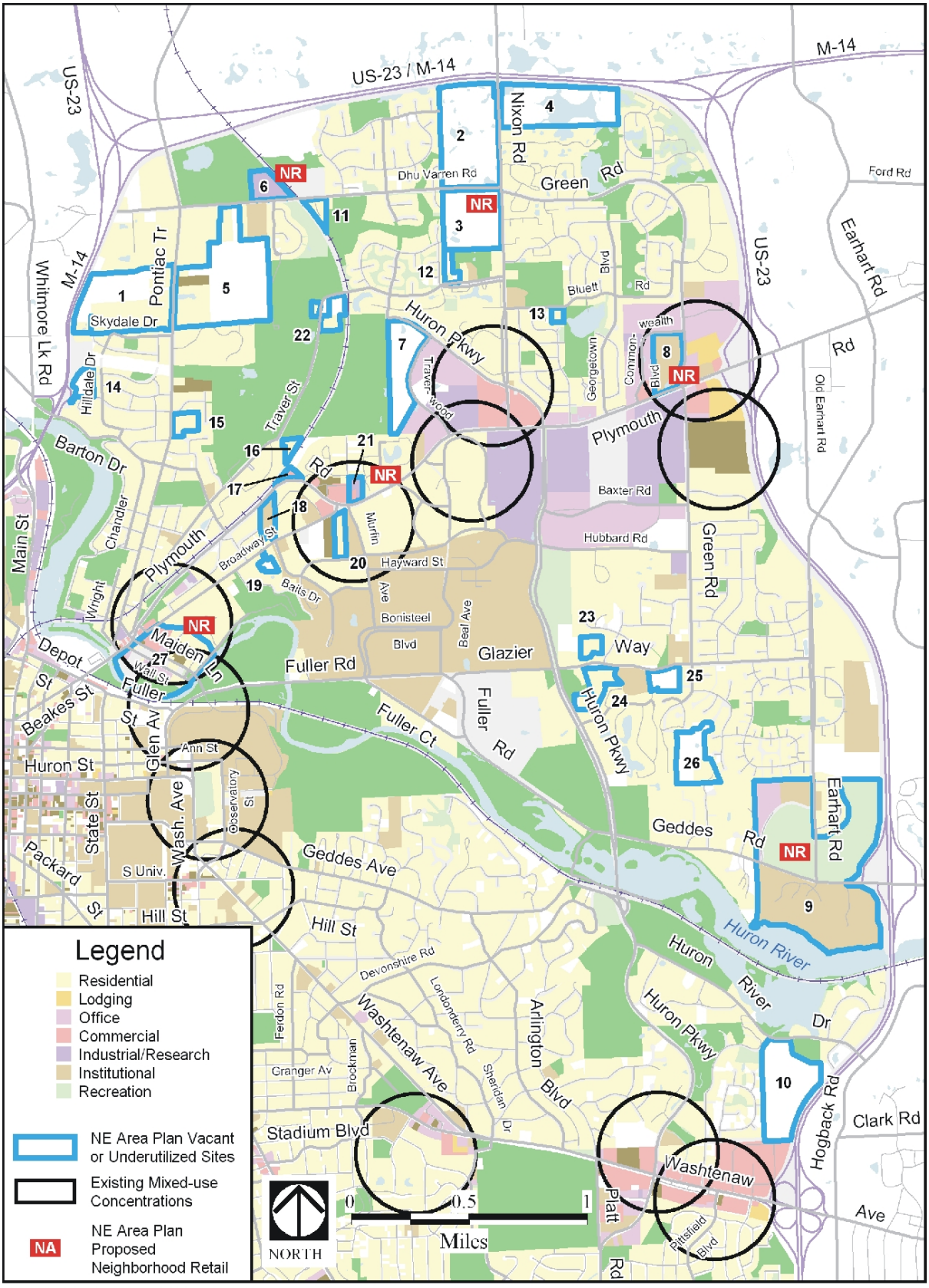
The Northeast Area Plan identified 26 areas that are either undeveloped or underutilized (Figure 4-1 and Table 4-1). Many of these areas are located in places of minimal land use diversity. Neighborhood commercial development has been identified for six sites.

Natural and Cultural Features

Some roadways in northeast Ann Arbor have significant natural and/or cultural features that are regulated through natural feature or historic district ordinances. The following are some situations where the natural and/or cultural features may influence the proposed design of the roadway and associated non-motorized facilities.

- **Washtenaw Avenue** from Stadium to Geddes Avenue is in an historic district where the road and sidewalk width are unlikely to change. The sidewalks are five feet wide and the road is a narrow (40 feet wide in some places), four-lane facility. Because the road is a Principal Arterial, draft AASHTO Pedestrian Guidelines call for an eight-foot-wide wide sidewalk. This is unlikely to occur and underscores the need to accommodate bicycles within the roadway as the existing five-foot sidewalks clearly cannot accommodate both adult bicyclists and pedestrians.
- **Huron River Drive**, from Huron Parkway to Hogback Road, has adjacent mature woods and steep slopes primarily on the south side of the road. A sidewalk, separated from the roadway, would be difficult to construct without significant impact to the natural features.
- **Geddes Road**, from Huron Parkway to Sumac Lane, has steep slopes and woodlots on both sides of the road. Because this road serves as a key linkage between Concordia University, three neighborhoods, and the Huron River Pathway system, there is demand for a non-motorized linkage. The most appropriate non-motorized linkage may not be directly adjacent to the roadway but rather away from the roadway utilizing city property and potentially easements on private property. By utilizing this approach, the road character may be preserved while still providing the non-motorized link.

Figure 4-1
Land Use and Future Development Areas



SOURCE: The Greenway Collaborative, Inc.

Table 4-1
Northeast Area Plan Summary of Draft Site Specific Land Use Recommendations

Site	Acres	Proposed Residential	Proposed Retail	Notes
1	63	7-10 DU/Ac	None	Provide pedestrian connection to stub street on Skydale Drive.
2	67	7-10 DU/Ac	None	Provide pedestrian connection to Foxfire. Provide a pathway along the creek between Foxfire East Park to Nixon Road.
3	40	7-10 DU/Ac	<=3 AC neighborhood retail	Provided a paved path to Logan School and the Placid Way stub street. Provided sidewalks along Dhu Varren and Nixon Roads
4	54	4-10 DU/Ac	None	Provide path linking Nixon Road to Oakwood Nature area and around the large wetland. Provide sidewalk along Nixon Road.
5	90	7-10 DU/Ac	None	Provide access from Pontiac Trail to Leslie Park. Provide a path to link Northeast Area Park and Leslie Park. Provide sidewalk along Pontiac Trail and Dhu Varren Roads.
6	10	10-15 DU/Ac	<2,000 SF neighborhood retail	Provide a sidewalk along Dhu Varren Road. Provide a path to connect Northeast Area Park to Leslie Park.
7	30	7-25 DU/Ac	None	Provide pedestrian linkage along Traverwood Boulevard to Leslie Woods.
8	18	Mixed Use	Restaurant	Mixed use with research, office, education and residential.
9	160	7-10 DU/Ac	Potential	Provide pedestrian access along the Huron River and sidewalks along both sides of Geddes and Earhart Roads.
10	47	7-10 DU/Ac	None	Provide pedestrian access to natural features on north side of site, and paved pathways to rear of Arborland Mall.
11	5.4	4-6 DU/Ac	None	Maximum of two access points from Dhu Varren Rd.
12	3.8	4-6 DU/Ac	None	Access from Traver Road.
13	2.1	4-6 DU/Ac	None	
14	5.9	4-6 DU/Ac	None	Provide pedestrian access to Hilldale Road via Cloverdale Road right-of-way.
15	6.0	6-8 DU/Ac	None	Provide pedestrian access to private stub street off of Tibbits Court.
16	2.7	7-10 DU/Ac	None	Single access point from Traver Road.
17	1.7	None	Potential	Office or neighborhood commercial use.
18	6.3	4-6 DU/Ac	None	Access from Broadway.
19	3	4-6 DU/Ac	None	Provide pedestrian access to Baits Drive.
20	5.7	High Density	None	Existing private dormitory proposal.
21	3.8	Mixed Use	Yes	Mix of office, retail, and residential. Locate retail adjacent to Plymouth Road sidewalk.
22	8.3	Single Family	None	Limited development potential due to natural features.
23	4.6	4-6 DU/Ac	None	Access from Wolverhampton Lane.
24	11.7	4-6 DU/Ac	None	Access from Glazier Way.
25	8.8	3-4 DU/Ac	None	Access from Lakehave Drive and Shagbark Court.
26	20.8	2 DU/Ac	None	Access from Sumac Lane to the south and existing private stub street to the west. Extremely sensitive natural area.
27	--	150 Units	Mixed Use	Current development proposal calls for a significant increase in population density.

Source: Northeast Area Plan, 2006

- **Geddes Avenue**, from Hill Street to Huron Parkway, goes through patches of woodlots with some mature trees adjacent to the roadway. There is an existing narrow path along portions of the north side of the trail. This path experiences considerable activity, but is constrained by a narrow right-of-way.

4.1.2 Neighborhood Accessibility

The key issues determining neighborhood accessibility are population density, diversity of land uses, and the design of the physical environment. Kevin J. Krizek of the University of Minnesota has published a series of papers documenting a measurement system for neighborhood accessibility. Using Portland, Ore., as a test case, Krizek developed a "neighborhood accessibility index" based on generally available data. Key inputs to the model are measurements of population density, urban form, and land use diversity. The model also uses smaller analysis zones than traditional transportation models. An independent panel verified the model by ranking the accessibility of 70 neighborhoods using numerous criteria. A high correlation was found between the panel's results and the results of the model.

Krizek's model was adapted and refined for this project. All of Washtenaw County was modeled to provide a context for the results in northeast Ann Arbor. While Krizek validated his model with comparative research conducted by a separate panel, a similar detailed validation has not been completed for this model. However, there is also a strong correlation between the areas of high neighborhood accessibility and the number of bicycle and pedestrian crashes. While this may seem counterintuitive, in general, the number of crashes does reflect the degree of activity in an area. There is also a strong correlation with bus stop location reflecting AATA's assessment of the years of potential pedestrian activity.

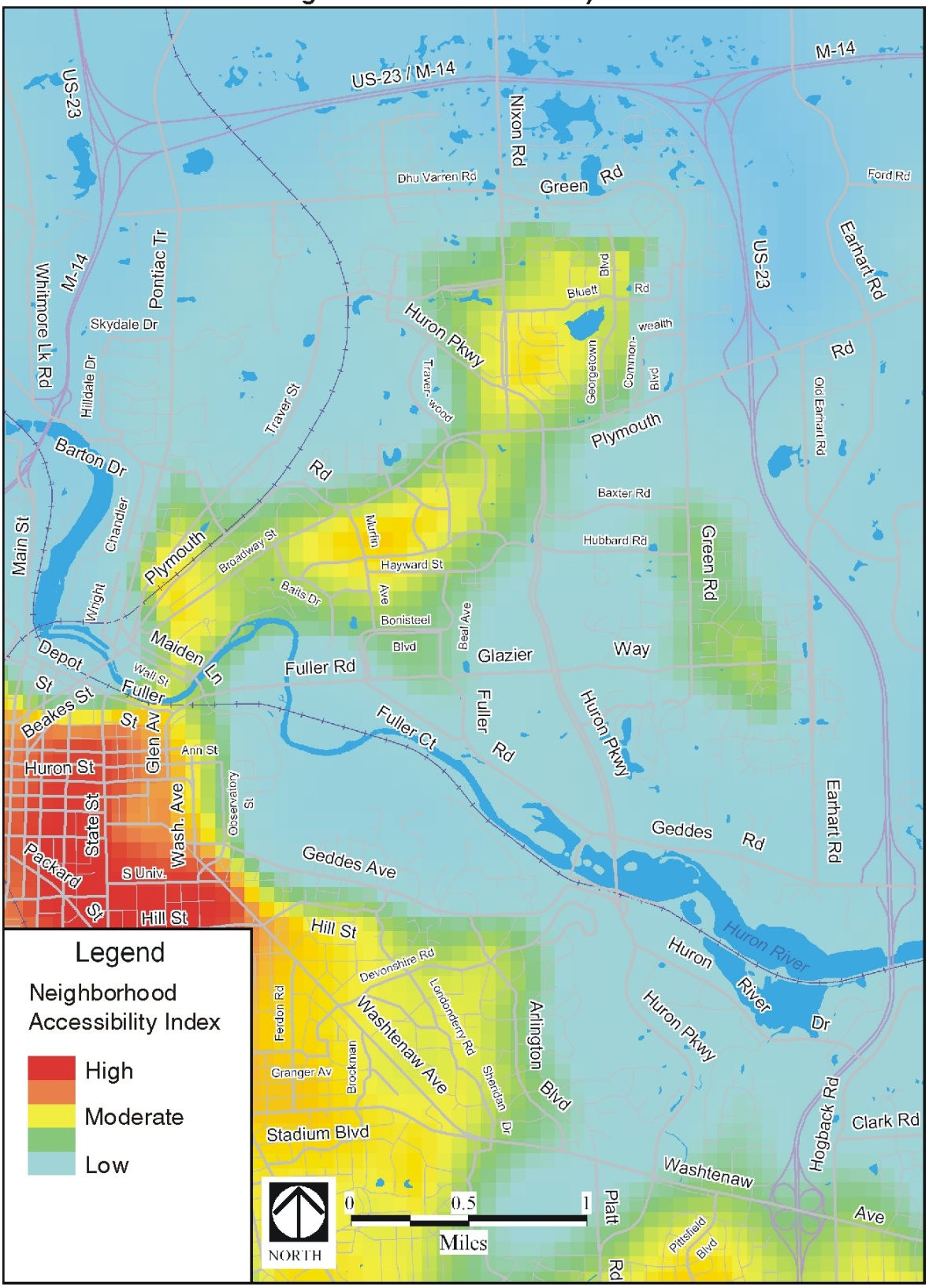
Regional Neighborhood Accessibility Context

In comparison with the rest of Ann Arbor, the northeast area has a great percentage of the project area that is at a low level of neighborhood accessibility (Figure 4-2). This can be attributed to the two golf courses in the area, the open space along the Huron River, and the sparse development along Huron Parkway. The majority of northeast Ann Arbor has a neighborhood accessibility rating similar to many of the surrounding rural areas.

Northeast Ann Arbor Neighborhood Accessibility

Based on the neighborhood accessibility index for the northeast area, four corridors have a significant potential for daily bicycle and pedestrian trips. Washtenaw Avenue, Plymouth Road, Nixon Road and Stadium Boulevard. Another pattern that is apparent is the exceptionally low ratings of the Huron River corridor and the Huron Parkway corridor. While the pathway that runs along the Huron River receives considerable recreational activity in the evenings and weekends, it does not act as a primary transportation corridor for work, school, or personal business trips. The limited residential development and large block size along Huron Parkway contribute to its low index.

Figure 4-2
Neighborhood Accessibility Index



SOURCE: The Greenway Collaborative, Inc.

Other Key Pedestrian Activity Centers

While the neighborhood accessibility index provides a view of the underlying potential for daily non-motorized activity, there are a number of trip types that are not directly captured by this model:

- Work trips
- Hotel-to-Commercial trips
- Recreational trips
- School trips

Non-motorized home-to-work trips are exceptionally difficult to model given the relatively short commuting distances. Other than for the downtown area, there are no data indicating that Ann Arbor residents live within a distance short enough to walk or bicycle to their workplace.

Trips between hotels and restaurants are other types of movements that are challenging to capture in a model. However, analysis of northeast Ann Arbor shows there is one location near the junction of Plymouth Road and Green Road where the potential to increase walking trips from hotels to restaurants and businesses exists with the addition of crosswalks and other pedestrian facilities.

The Huron River Corridor, while currently of little significance to work and personal business trips, is a major destination in the city for recreational bicycling, walking, running and inline skating. While some people access the park via their automobile, many people bicycle or walk from their home to the river pathway system via the connecting city streets. As the Huron River path system is expanded towards Ypsilanti and northwest, through the Border-to-Border Trail Initiative, the draw and use of this recreational corridor will increase. The Huron River corridor has been identified as regionally significant and is part of the key "Greenway Framework" in *A Vision for Southeast Michigan Greenways*.

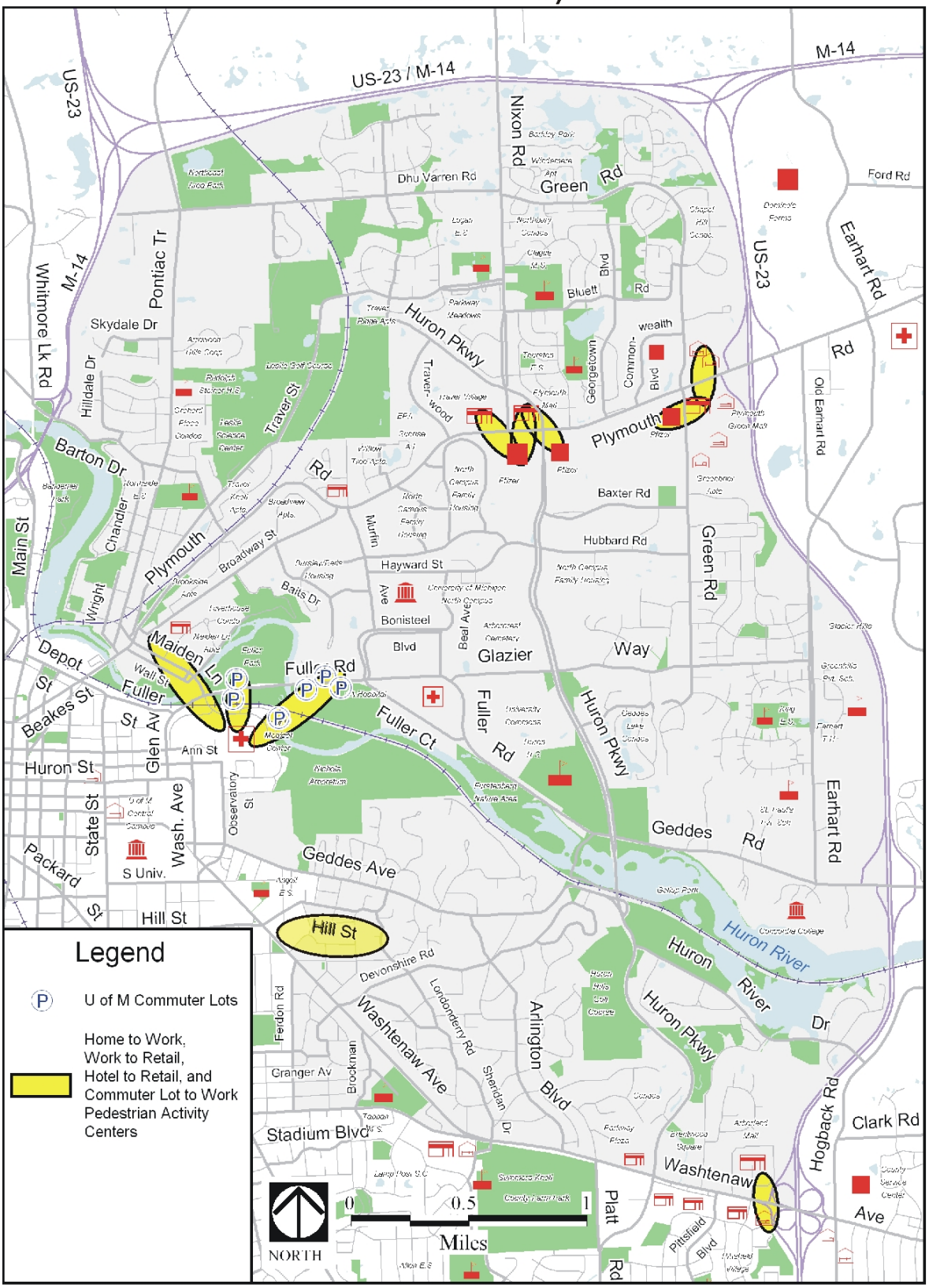
Another type of movement not captured in this model is the home-to-school trip. The number of students walking or bicycling to school has dropped dramatically over recent years. Through a combination of educational efforts, events such as Walk-to-School Day and minor facility improvements, like crosswalks or streetlights, many more home-to-school trips could be encouraged.

Centers of existing and potential pedestrian activity are shown in Figure 4-3.

4.1.3 The Pedestrian Environment

A nearly complete sidewalk system exists along the roadways throughout northeast Ann Arbor with a few notable exceptions. These include key transportation corridors such as portions of Washtenaw Avenue, Geddes Avenue, Geddes Road, Pontiac Trail, and the area at the intersection of Nixon Road and Dhu Varren Road where new neighborhoods continue to grow. Many of the sidewalks in the study area have little, if any, buffer, such as a row of trees or parked cars, between the sidewalk and the roadway. The lack of a barrier has been shown to have a significant impact on the quality of the walking experience.

Figure 4-3
Other Pedestrian Activity Centers



SOURCE: The Greenway Collaborative, Inc.

Another major issue lies with cross-roadway accommodation. There are significant stretches of the major thoroughfares in northeast Ann Arbor that provide no means to safely cross the vehicular traffic. There are also places where logical crossings are not accommodated. Even where there are marked crosswalks, a general disregard by motorists of a pedestrian's right-of-way in a crosswalk has been observed. This may be attributed to a lack of understanding of the applicable laws and/or lack of enforcement.

Existing Pedestrian Facilities

Figure 4-4 shows both adjacent-to-road facilities (i.e., sidewalks) along major streets and pedestrian facilities away from the road corridor (i.e., trails and paths). In addition, most neighborhoods, with the exception of those in the Geddes/Arlington/Washtenaw area, are served by internal sidewalk networks. While the city has an extensive network of existing facilities, the areas mentioned above, where gaps remain, are indicated by a dashed line.

AATA Bus Stops and Service Area

A ¼ mile buffer around each bus stop is considered the primary service area; this corresponds to a five-minute walk. Figure 4-5 indicates the areas within a five-minute walk to a bus stop.

Distance Between Crosswalks

This factor measures the distance between official crosswalks across arterial and collector roadways. One-eighth of a mile (660 feet) is considered the maximum spacing between crosswalks in high demand areas. While city code allows a pedestrian to cross at any point along a road, as long as they do not interfere with motor vehicle traffic, widely-spaced or non-existent crosswalks provide a clear physical message that discourages cross-corridor travel by pedestrians. Most of the road corridors in northeast Ann Arbor do not meet the 1/8-mile standard (Figure 4-6).

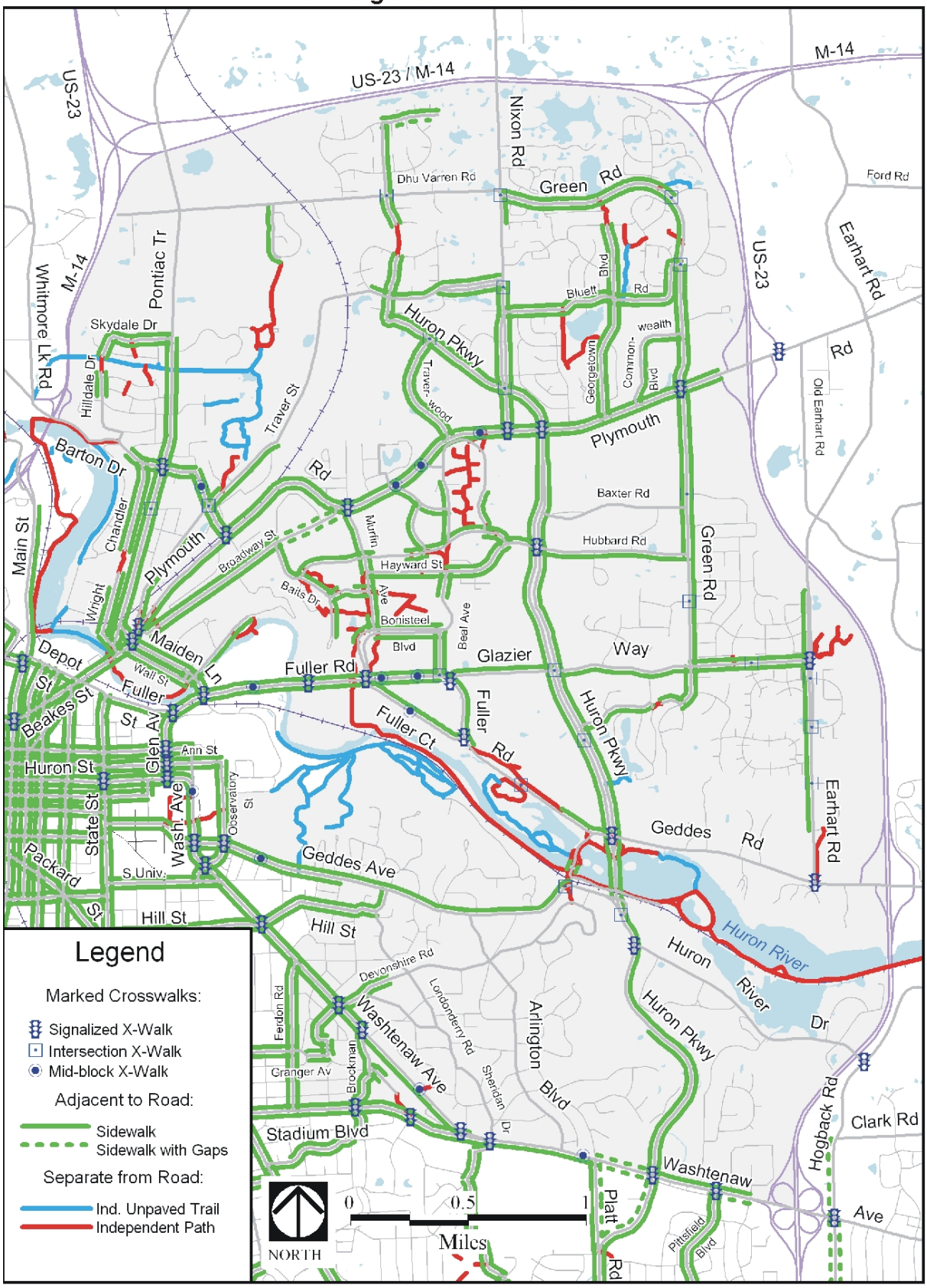
Pedestrian/Car Crash Locations

Crashes involving pedestrians/bicycles and autos are underreported. Nevertheless, clear patterns and problem intersections emerge in looking at the crashes reported from 1997-1999 in the northeast Ann Arbor area (Figure 4-7). While most of the crashes are centered in and around the downtown area, the Plymouth Road corridor stands out as a site of relatively large numbers of pedestrian crashes. This is a very high-density, mixed-use area with minimal crosswalks.

The intersection of Washtenaw and Huron Parkway is another area with a high level of pedestrian crashes. The intersection has multiple turning movements and high volumes of cars moving through the intersection at any given time in this high-density area. At the time this analysis was conducted, there was a gap in the sidewalk facilities along that stretch of road which may have contributed to the dangerous nature of the intersection for pedestrians.

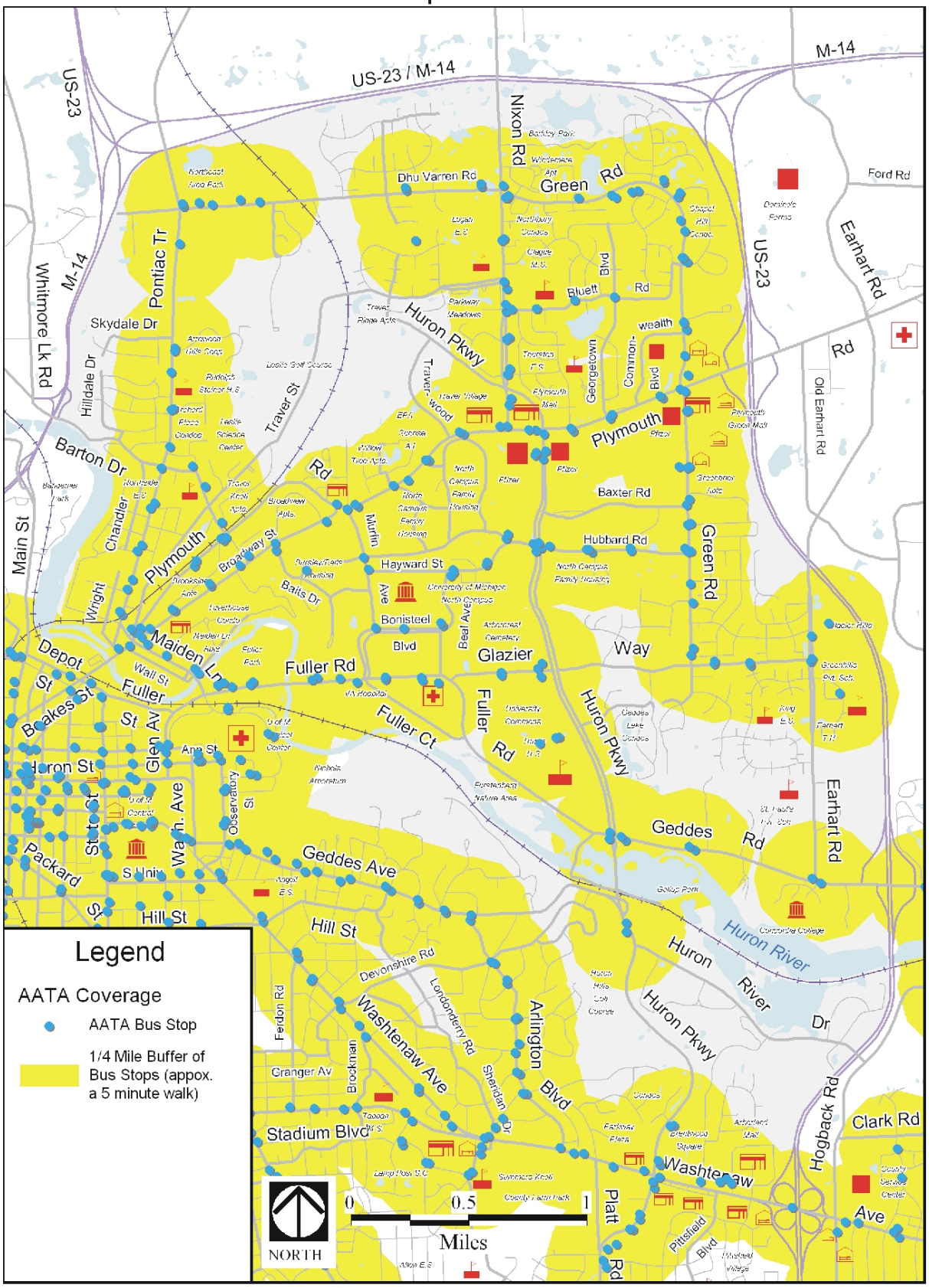
These preliminary findings are instructive but require further study of contributing factors before final conclusions are reached.

Figure 4-4
Existing Pedestrian Facilities



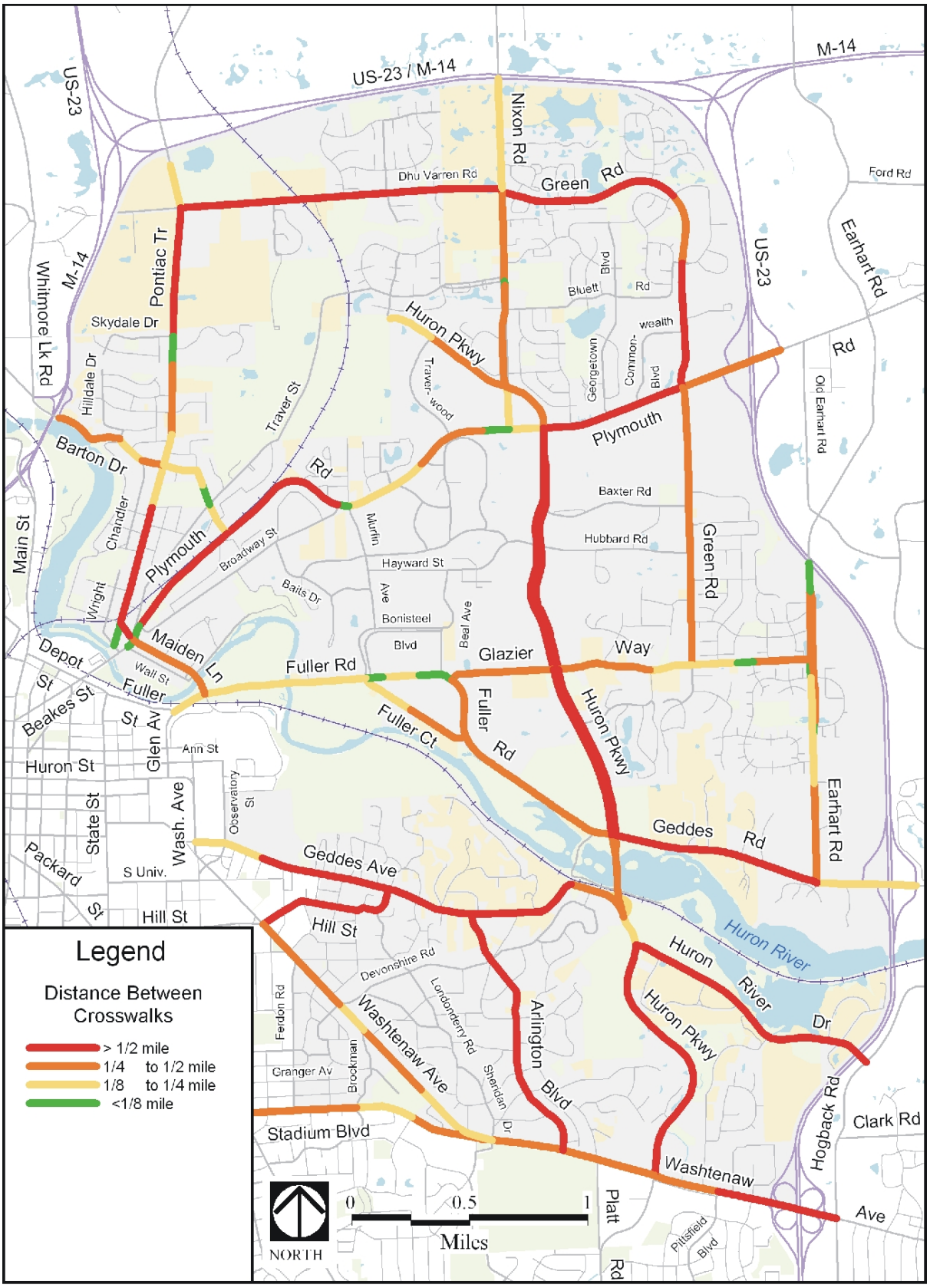
SOURCE: The Greenway Collaborative, Inc.

Figure 4-5
AATA Bus Stops and Service Area



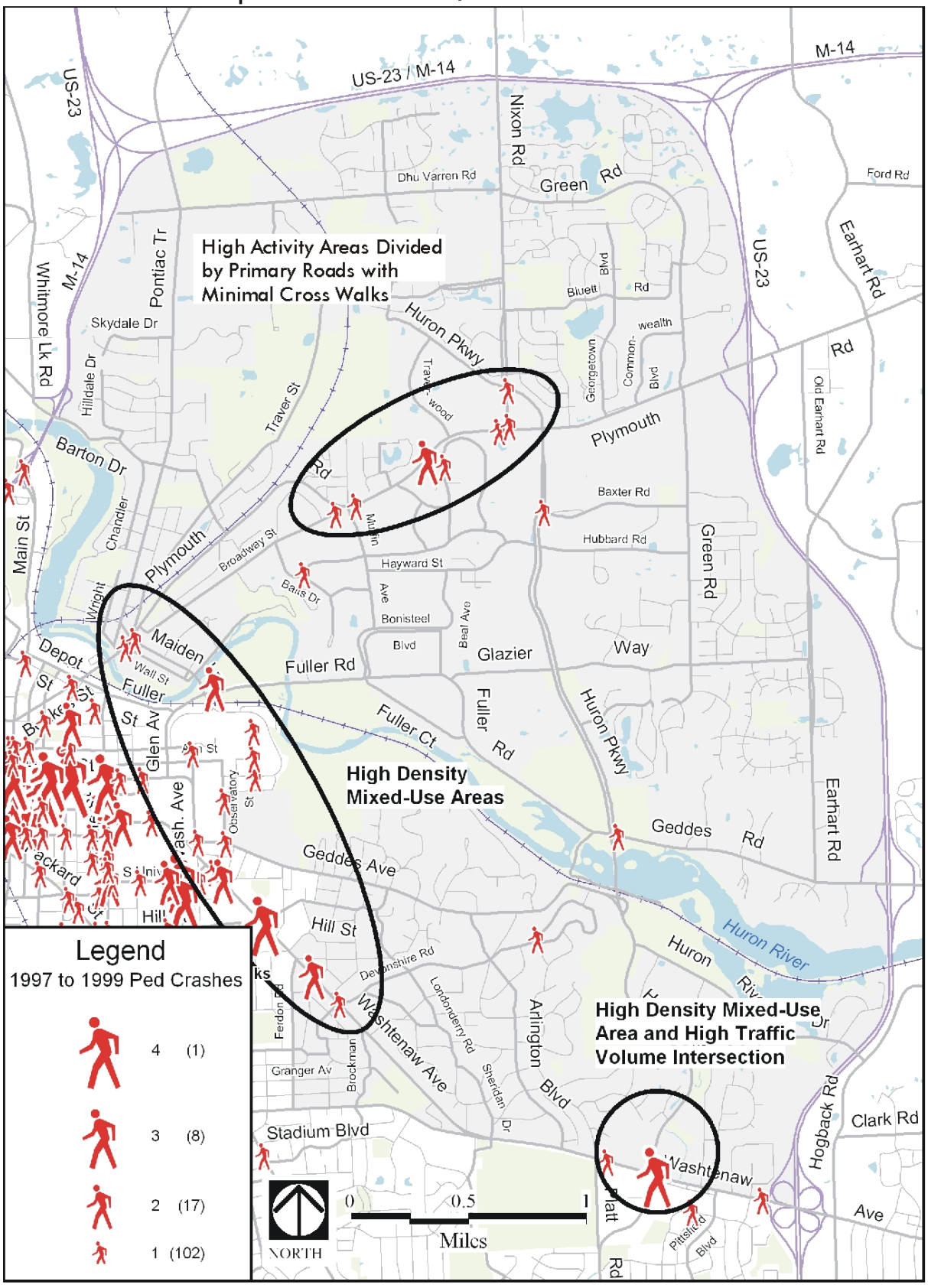
SOURCE: The Greenway Collaborative, Inc.

Figure 4-6
Distance Between Crosswalks



SOURCE: The Greenway Collaborative, Inc.

Figure 4-7
Reported Pedestrian/Car Crash Locations



SOURCE: The Greenway Collaborative, Inc.

Existing Quality/Level of Service Analysis

The quality/level of service rating is a measurement of the perceived safety and comfort of pedestrians. The technique used in this analysis is Sprinkle Engineering's Pedestrian and Bicycle Level of Service. Key factors affecting the rating include presence of a sidewalk, separation between pedestrians and motorists, presence of buffers, automotive vehicle volume and speed.

Parts of Washtenaw, Fuller, Geddes and Huron River Dr. receive a rating of E, the lowest possible grade, because of their absence of sidewalks, lack of separation between the road and sidewalk, high volumes and speed, or a combination of factors (Figure 4-8). Adding a sidewalk in critical portions of these corridors would mean a substantial increase in the level of service. For corridors with a rating of D or C, increasing the amount of lateral separation between the road and the sidewalk with the addition of a bike lane will improve the perceived safety/comfort of pedestrians. Likewise, adding amenities like buffer strips and tree plantings will help make the experience for pedestrians a more pleasant one.

4.1.4 The Bicycling Environment

The existing bicycle facilities in northeast Ann Arbor tend to be primarily off-road side-path facilities. Very few accommodations, whether formally demarcated or not, exist in the roadway. Transfers between on-road and off-road facilities are not logical or convenient. In short, a functioning non-motorized transportation system does not exist on-road, off-road, or a combination thereof. Of special concern are key transportation corridors such as portions of Washtenaw Avenue, Geddes Avenue, Geddes Road, Pontiac Trail, and Nixon Road that are inhospitable to bicycle travel.

Existing Off-Road Facilities

The existing off-road facilities have numerous gaps and do not constitute a system (Figure 4-9). Without exception, these facilities are all constructed to older design guidelines.

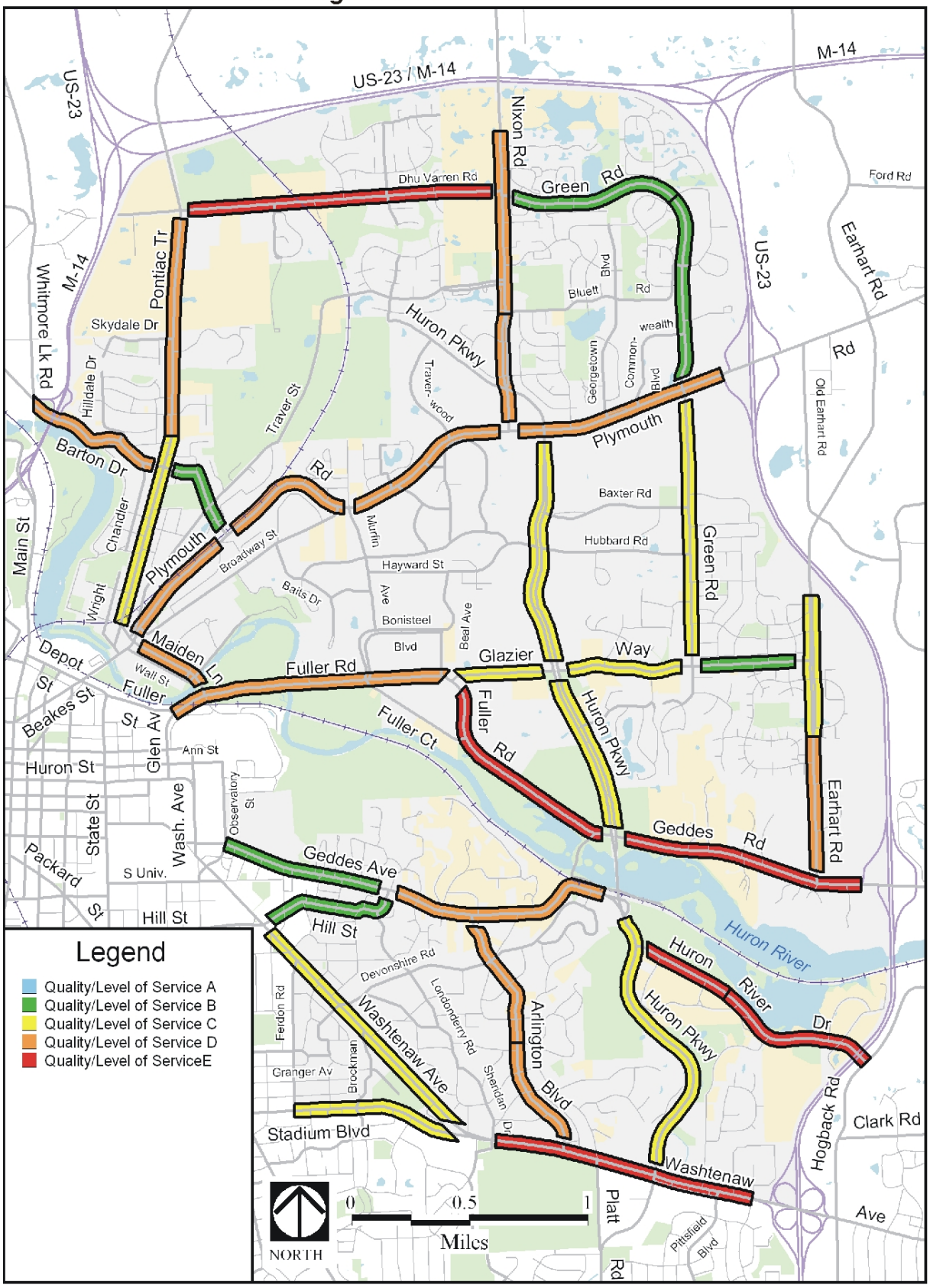
Existing On-Road Facilities

The limited on-road facilities consist mainly of low-volume roadways and roads with wide curb lanes (Figure 4-10). Even though the on-road bike system is very limited right now, progress continues to be made to improve biking conditions in northeast Ann Arbor. Portions of Dhu Varren, Pontiac Trail, Huron River Drive, and Nixon Road all received bike lanes or paved shoulders in the summer of 2003. In 2004, bicycle lanes were added on Plymouth between Murfin and Traverwood in coordination with pedestrian refuge islands throughout this segment.

Reported Bike/Car Crashes

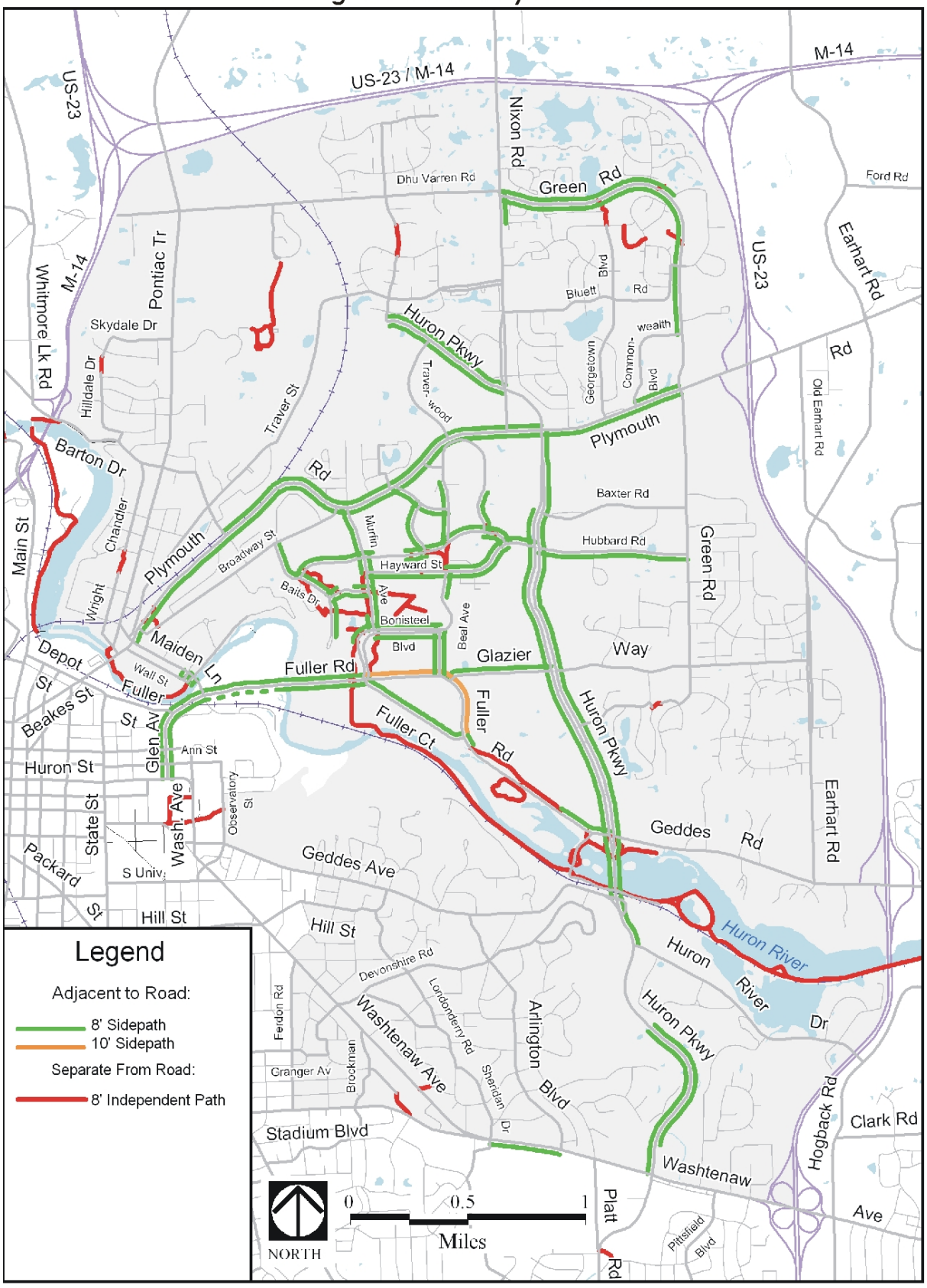
Similar to pedestrians, the reporting of crashes involving bicyclists is often incomplete or not recorded. Examination of the available data does, however, call attention to several intersections, in particular the intersection of Plymouth Road, Pontiac Trail and Maiden Lane (Figure 4-11). The lack of on-road facilities in this area makes bicyclists riding on the sidewalk particularly vulnerable to turning movements in this complicated intersection. This area has the highest number of reported bicycle/car crashes in the city for the three-year analysis period (1997-1999). This information on crash experience needs to be supplemented and further study undertaken of contributing factors before final conclusions are reached.

Figure 4-8
Existing Pedestrian Level of Service



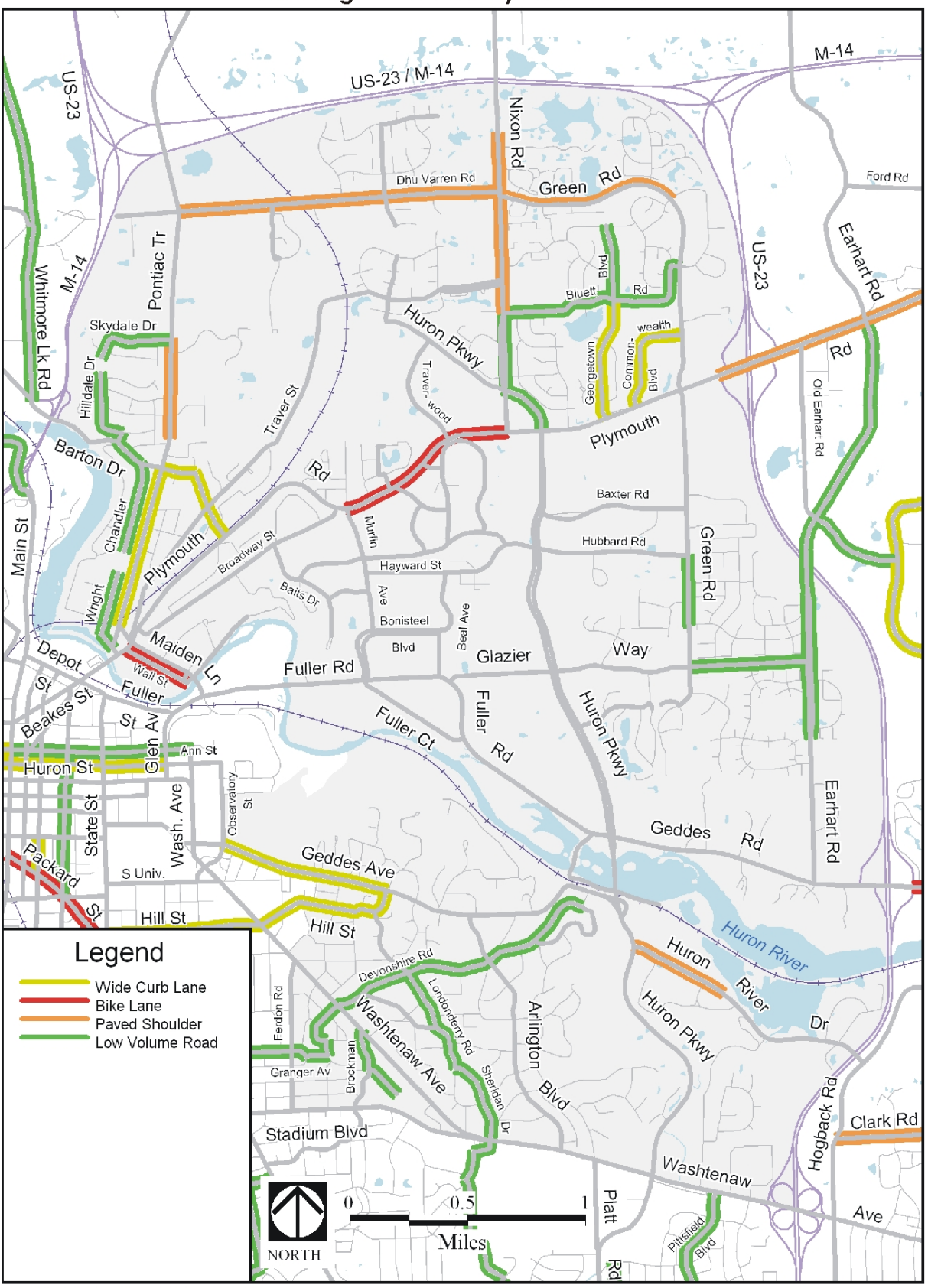
SOURCE: The Greenway Collaborative, Inc.

Figure 4-9
Existing Off-Road Bicycle Facilities



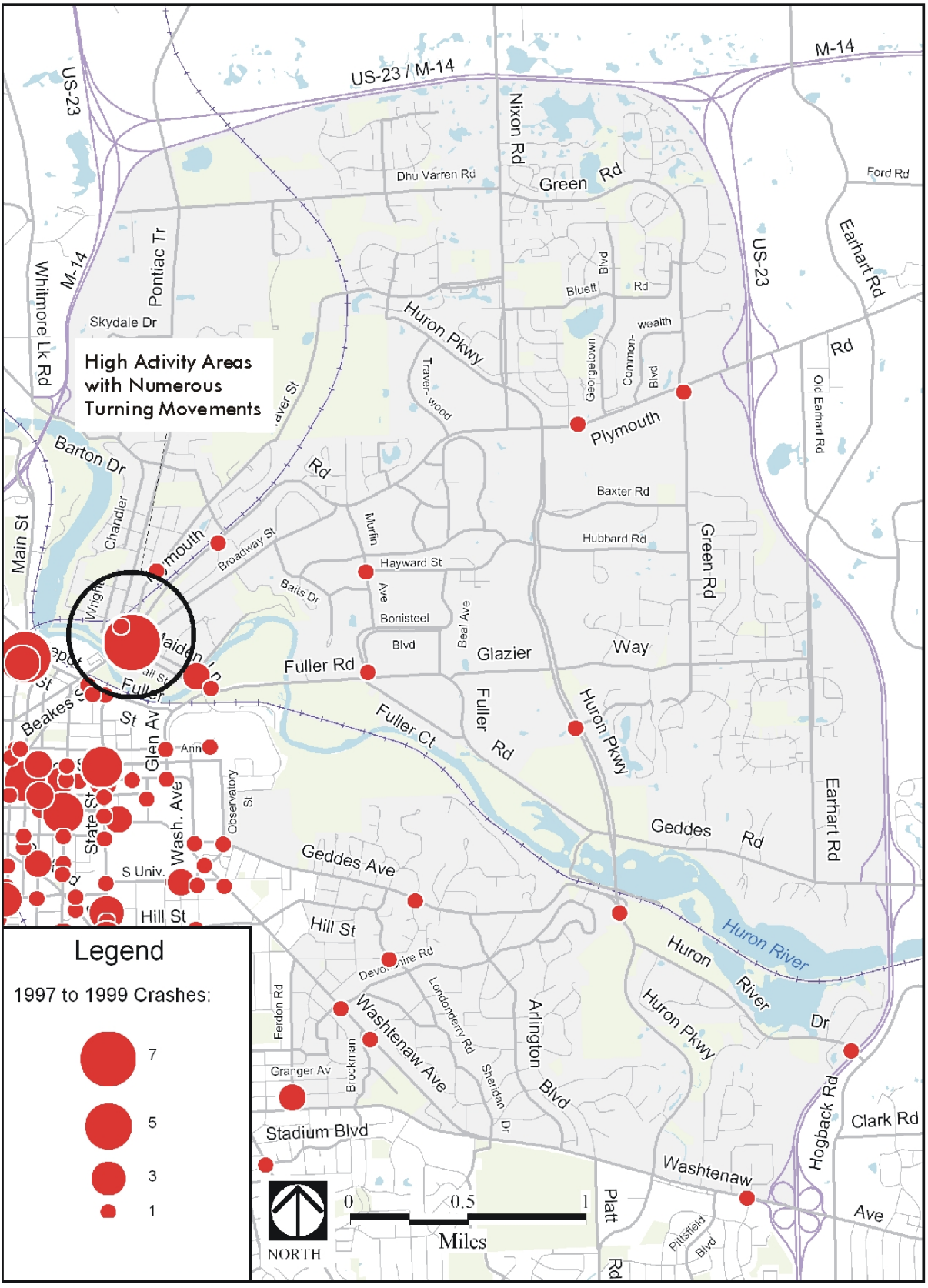
SOURCE: The Greenway Collaborative, Inc.

Figure 4-10
Existing In-Road Bicycle Facilities



SOURCE: The Greenway Collaborative, Inc.

Figure 4-11
Reported Bike/Car Crash Locations



SOURCE: The Greenway Collaborative, Inc.

Bicycle Quality/ Level of Service Analysis (Q/LOS)

Factors affecting the Bike Q/LOS include the presence of a bicycle lane or paved shoulder, proximity of bicyclists to motorized vehicles, motor vehicle volume, speed and type, pavement conditions and presence of on-street parking. The Q/LOS analysis (using Sprinkle Engineering's Pedestrian and Bicycle Level of Service technique) shows that the northeast Ann Arbor area is currently an inhospitable environment for bicycling (Figure 4-12). The majority of roads within the Northeast area received a grade of D or E because of the lack of on-road facilities and the heavy volumes of automotive traffic moving at high speeds.

4.1.5 Existing Plans

Extensive research at the national level has occurred since the Ann Arbor Bicycle Master Plan was developed in 1992. While the Bicycle Master Plan does have some outdated recommendations, mainly having to do with sidepath travel, the majority of the bicycle recommendations and guidelines proposed in the plan still hold true today. The recommendations of the Bicycle Master Plan for increased enforcement, new educational programs, and updated bicycle facilities have not been fully implemented. The recommendations in this plan and the Citywide Non-motorized Plan, now under development, will replace the Bicycle Master Plan with an updated framework based on the wealth of new research in this area.

Recommendations for pedestrian facilities are found in the 1990 Transportation Plan Update and the City's Americans with Disabilities Act Transition Plan.

4.1.6 Existing Non-motorized Trip Characteristics

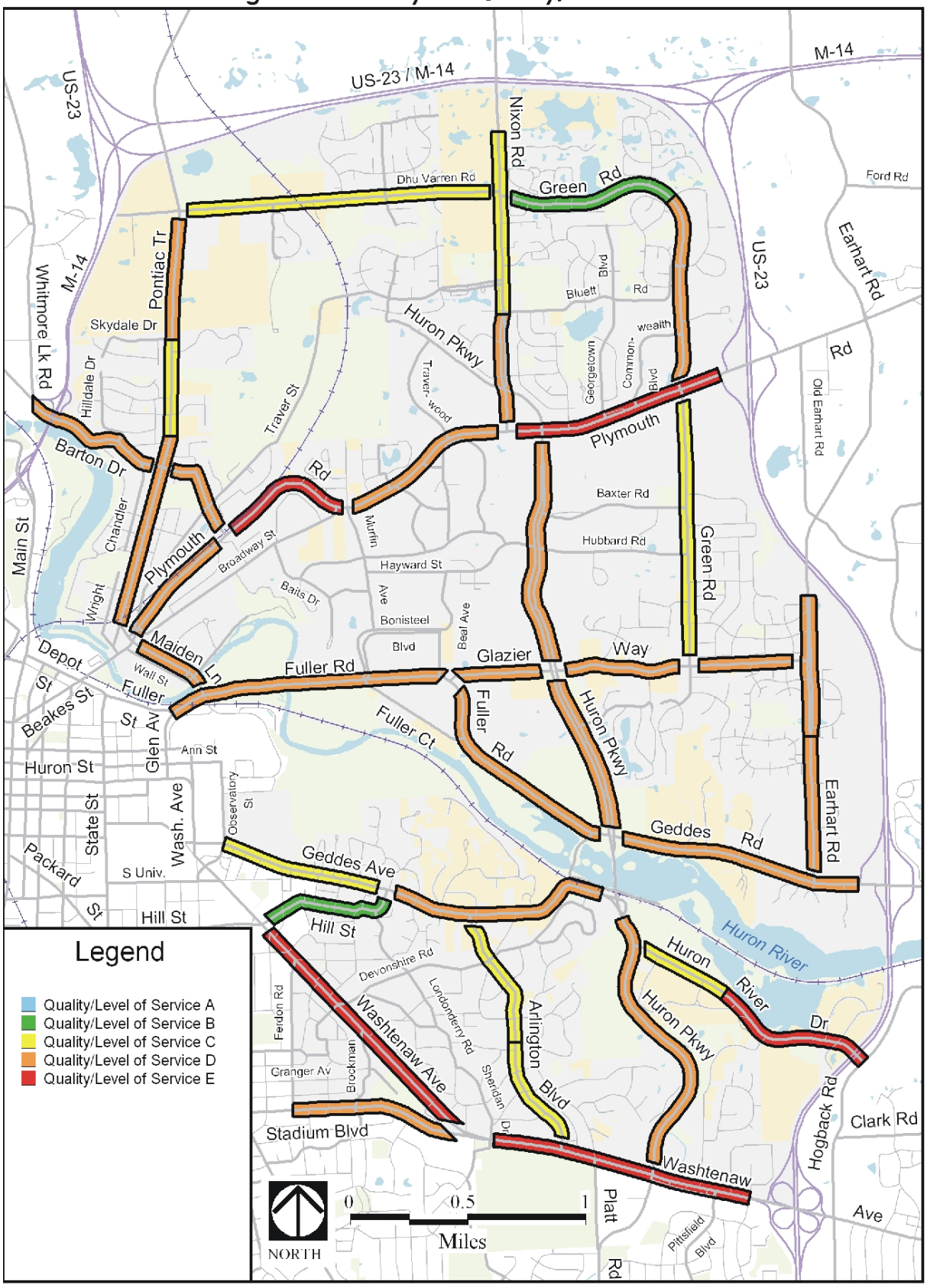
To understand Ann Arbor's potential to increase the number of people walking and bicycling, it is helpful to examine how Ann Arbor's current bicycling and walking compares to other areas. Then it is possible to gauge approximately how many more people may be enticed into walking and bicycling. The issues to address are:

- The number of people who express an interest in bicycling or walking
- Existing non-motorized mode share
- Types of walking and bicycling trips by purpose
- Average distances of those trips

Mode-split is the proportion of trips made by a particular mode of travel. Ann Arbor currently has well over twice the national average of the percentage of trips taking place by walking and bicycling (Table 4-2). Personal/Family Business and Social Recreation Trips are the two most predominant types of non-motorized trips. The Ann Arbor "Get Downtown" Program survey indicated that the average walking trip for downtown workers is 1.25 miles and the average bicycling trip is two miles.

Based on survey data and trip distance/time equivalents, an approximation of the existing trips by purpose is illustrated on Table 4-3. Studies indicate that the trip length varies by the trip purpose with the "Earning-the-Living Trip" being the longest.

Figure 4-12
Existing In-Road Bicycle Quality/Level of Service



SOURCE: The Greenway Collaborative, Inc.

Table 4-2
Walking and Bicycling Trips

Walking		
Area	Share of Total Trips	Information Source
National	7.20%	National Personal Transportation Survey, 1995
Region	6.42%	SEMCOG 1994 Household-based Travel Survey
Washtenaw	10.20%	SEMCOG 1994 Household-based Travel Survey
Ann Arbor	16.52%	Bikes at Work, Inc., Based on 2000 Census
Bicycling		
Area	Share of Total Trips	Information Source
National	0.70%	National Personal Transportation Survey, 1995
Region	0.72%	SEMCOG 1994 Household-based Travel Survey
Washtenaw	0.91%	SEMCOG 1994 Household-based Travel Survey
Ann Arbor	2.39%	Bikes at Work, Inc., Based on 2000 Census

Table 4-3
Trips by Purpose

	Earning-A-Living	School/Church/Civic	Personal/Family Business	Social/Recreational
Walking	10%	15%	45%	30%
4 MPH Avg. Speed				
Average Trip	1 Mile	1 Mile	.5 Mile	1 Mile
	(15 min.)	(15 min.)	(8 min.)	(15 min.)
95% of Trips	2 Miles	2 Miles	NA	2 Miles
Under	(30 min.)	(30 min.)	NA	(30 min.)
Bicycling	10%	15%	50%	25%
8 MPH Avg. Speed				
Average Trip	2 Miles	2 Miles	1 Mile	6 Miles
		(15 min.)	(8 min.)	(45 min.)
95% of Trips	4 Miles	4 Miles	2 Miles	10 Miles
Under	(30 min.)	(30 min.)	(15 min.)	(1.25 hrs.)

Potential Increases in Non-motorized Mode Share

Given that Ann Arbor's non-motorized mode share is relatively high already (Table 4-2), improvements to the physical environment will likely see modest increases in the overall mode share. Nevertheless, such improvements would likely result in lower crash rates and greater integration of all modes of transportation, providing increased opportunities and access for Ann Arbor residents.

The biggest changes are likely to be seen with bicycle mode share. The existing bicycle system is relatively incomplete. Areas with comparable demographic and physical characteristics, but with a more complete bicycle network, have a higher bicycle mode share. Based on a combination of professional judgment, analysis of existing facilities, and data from other similar cities, reasonable targets for non-motorized mode share in the city would be:

- Walking trips to comprise 15 to 20 percent of all trips.
- Bicycling trips to comprise at least one percent of all trips.

4.2 Proposed Facilities

The following facilities are proposed based on the research and analysis presented in the previous sections, and current best practices for accommodating bikes and pedestrians and AASHTO design guidelines. These facilities will enhance the walking and biking conditions in the northeast Ann Arbor area.

4.2.1 Long-term Solutions

The NEATP long-term pedestrian facilities for northeast Ann Arbor are illustrated on Figure 4-13. The bicycle facility proposals are shown on Figure 4-14. Crosswalk and median proposals are depicted on Figure 4-15. These are to be considered for implementation when the roadways to which they relate are reconstructed or widened.

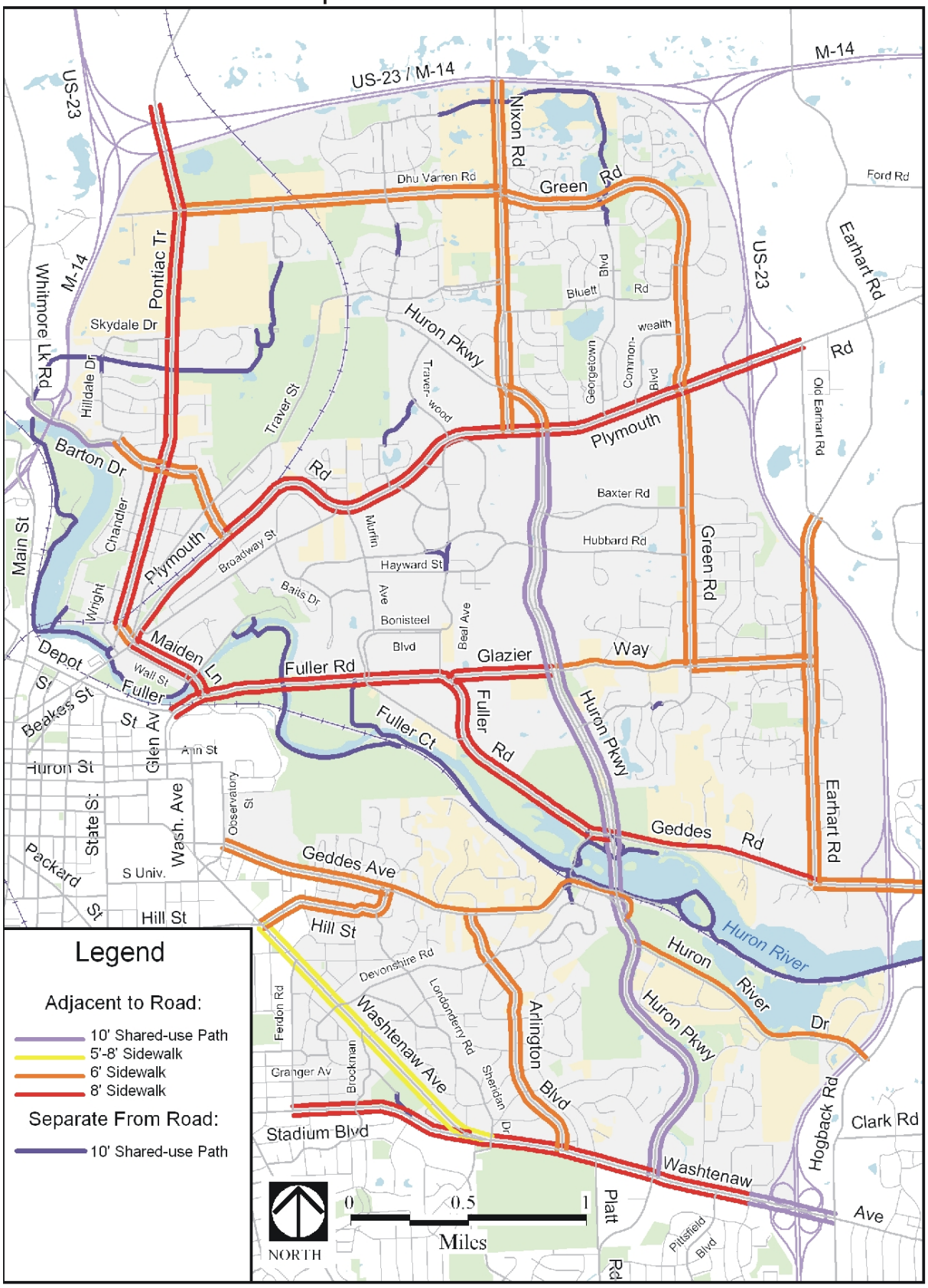
To guide future private development, the following recommendations have been developed:

- Existing subdivision ordinances should be modified to include specific requirements for accommodating pedestrians and bicycles.
- The site plan review process should include criteria that evaluates whether walking is encouraged through the site design and review and modify plans as necessary.
- Developments with small blocks and grid streets should be encouraged through design guidelines.
- New residential developments must include pedestrian, bicycle and street networks that connect to surrounding areas.
- Private road standards for sidewalks and buffer zones should be the same as public street standards.

4.2.2 Other Long-term Solutions

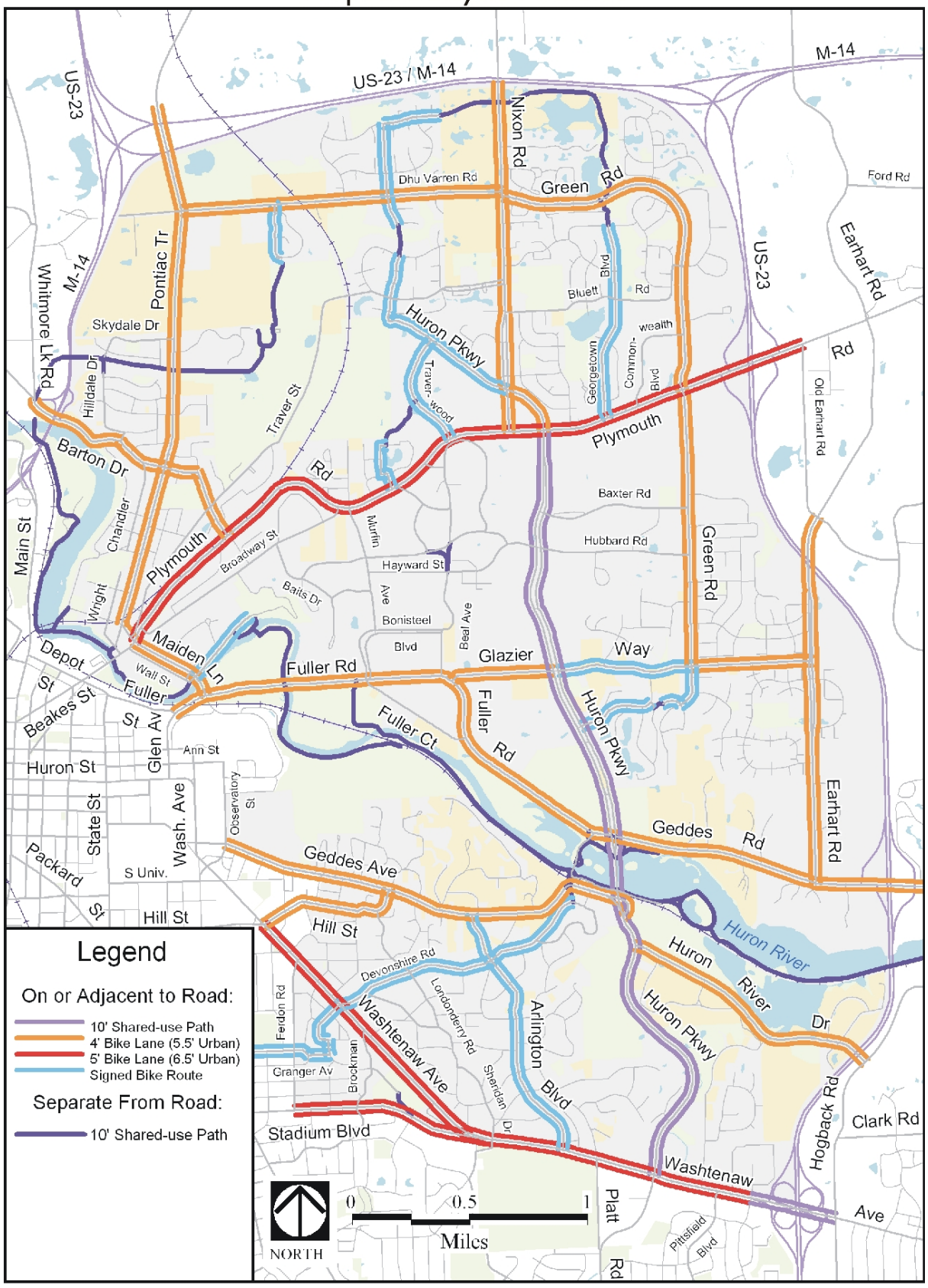
This section includes guidelines for designing typical road sections for collector and arterial streets throughout northeast Ann Arbor, as well as maps where each roadway type occurs in the study area and summary maps that show the entire system. They are to be considered for implementation when the roadways to which they relate are reconstructed or widened. It should be noted that City of Ann Arbor standards set a minimum travel lane width at 11 feet. This minimum is assumed on the roadway cross-sections, but may be reduced in certain situations where speed limits are 35 mph or less.

Figure 4-13
Proposed Pedestrian Facilities



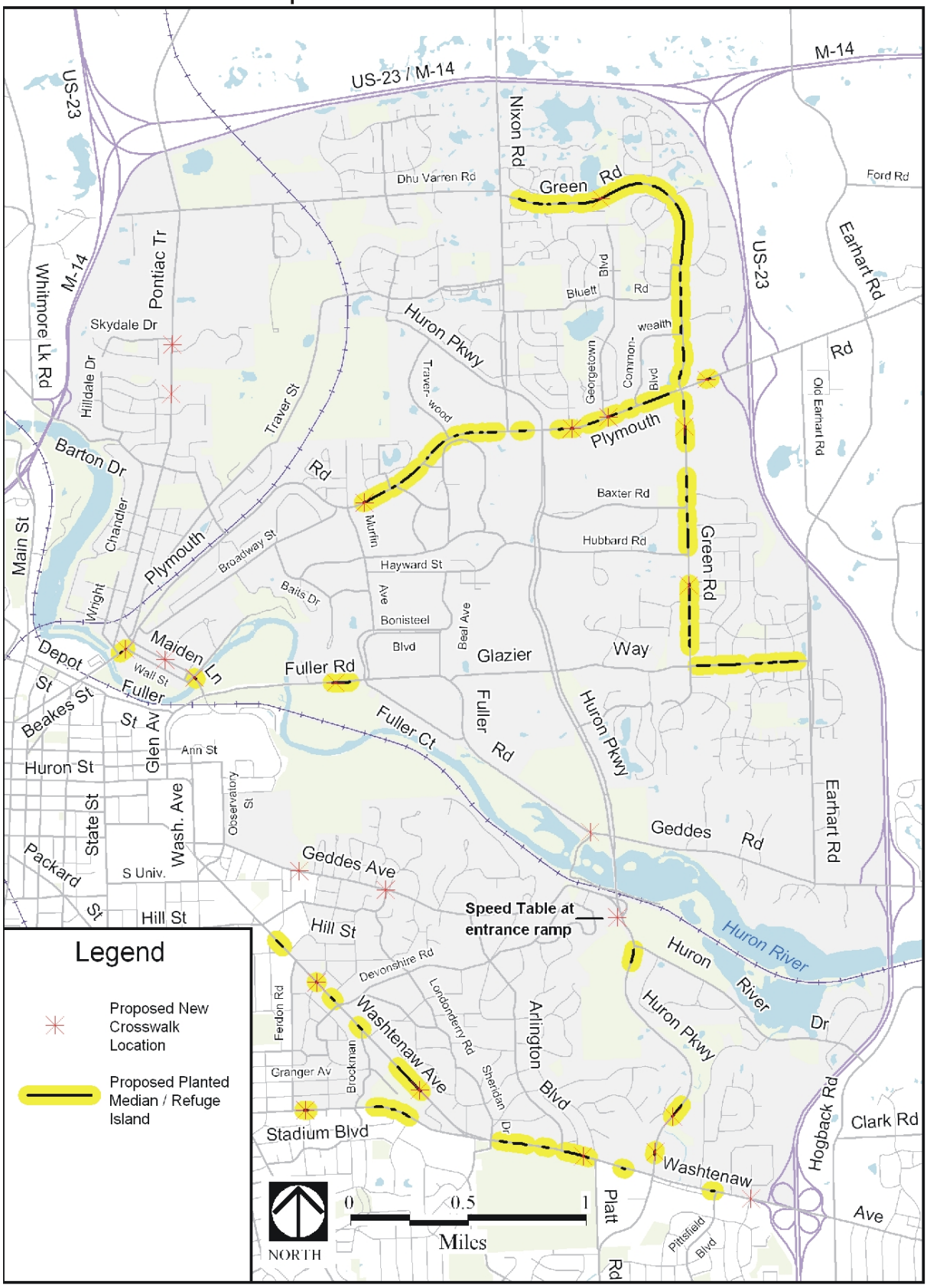
SOURCE: The Greenway Collaborative, Inc.

Figure 4-14
Proposed Bicycle Facilities



SOURCE: The Greenway Collaborative, Inc.

Figure 4-15
Proposed Crosswalks and Medians

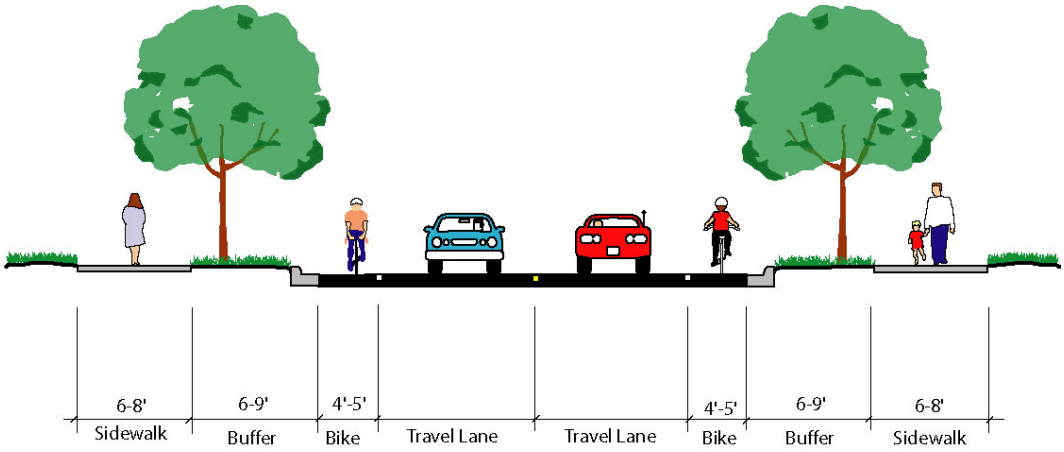


SOURCE: The Greenway Collaborative, Inc.

Two-lane Roads

On two-lane roads with speed limits of 35 mph or less, bicycle lanes may be reduced to the 3.5-foot minimum (five-foot total from face of curb). In rural cross sections the paved shoulder should be a minimum of four feet wide.

Figure 4-16A
Two-lane Roadway Typical Cross Section

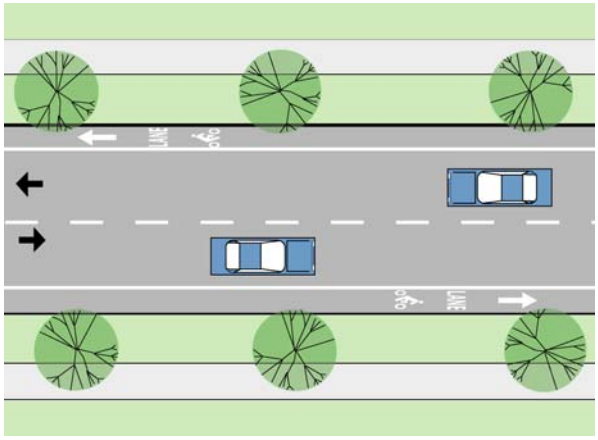


General Two-lane Road Design Guidelines

	Sidewalk Min. Width	Buffer Min. Width	Bike Lane Min. Width
Collectors	6′	6′	4′
Minor Arterials	8′	9′	5′

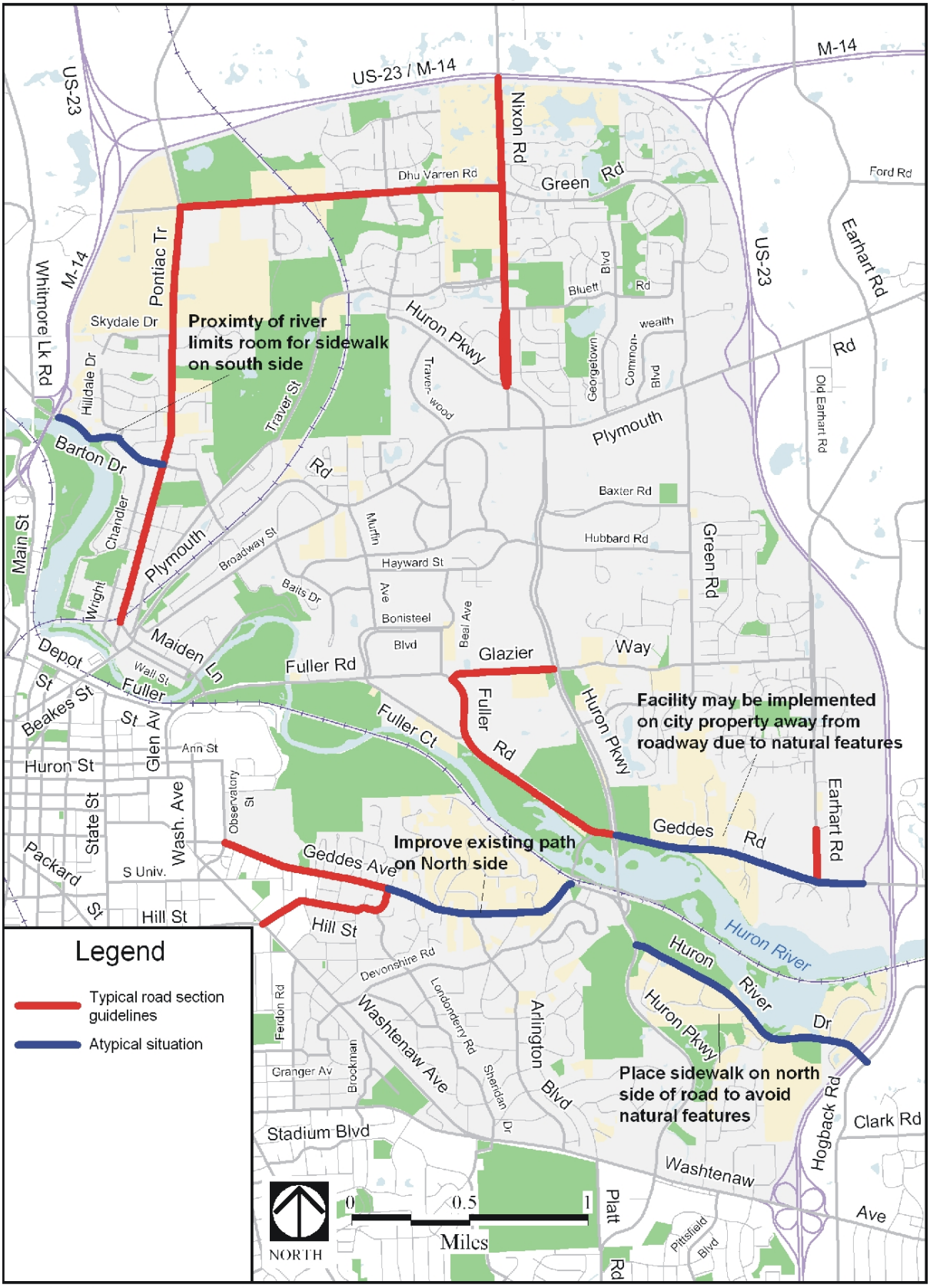
Source: The Greenway Collaborative, Inc.

Figure 4-16B
Two-lane Road Typical Plan View



Source: The Greenway Collaborative, Inc.

Figure 4-16C
Two-lane Roadway Locations

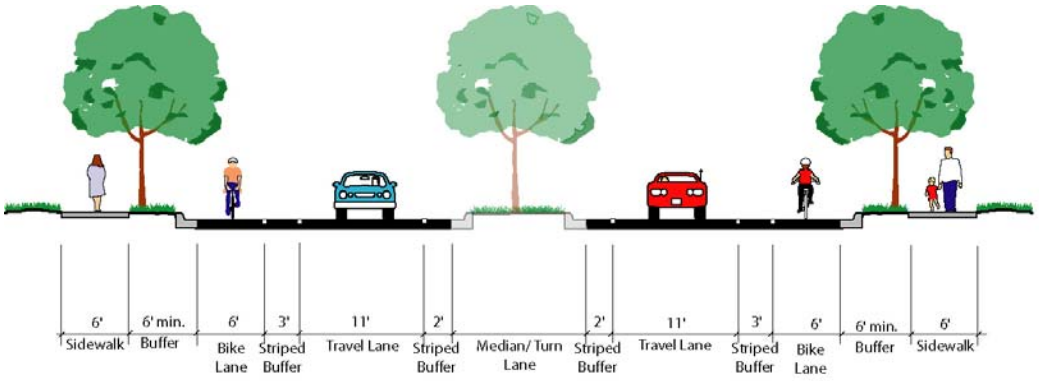


SOURCE: The Greenway Collaborative, Inc.

Two-lane Boulevards

When designing two-lane boulevards, care should be taken to provide adequate room for emergency vehicles to pass vehicles pulled to the side.

Figure 4-17A
Two-lane Boulevard Typical Cross Section

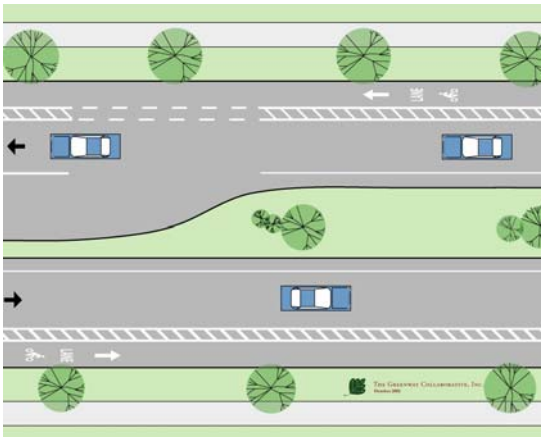


General Two-lane Boulevard Design Guidelines

	Sidewalk Min. Width	Buffer Min. Width	Bike Lane Min. Width
Collectors	6′	6′	4′
Minor Arterials	8′	9′	5′

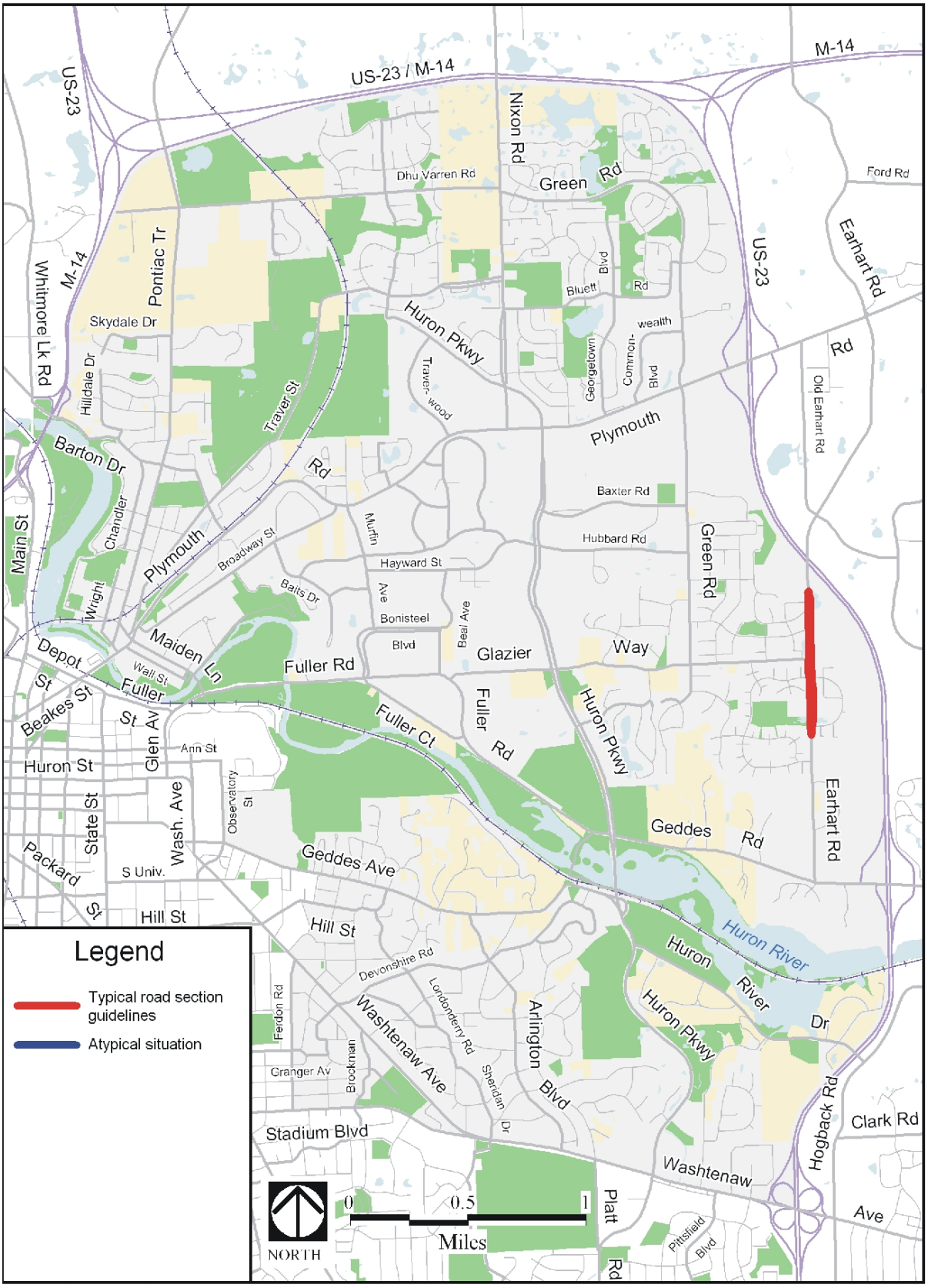
Source: The Greenway Collaborative, Inc.

Figure 4-17B
Two-lane Boulevard Typical Plan View



Source: The Greenway Collaborative, Inc.

Figure 4-17C
Two-lane Boulevard Locations

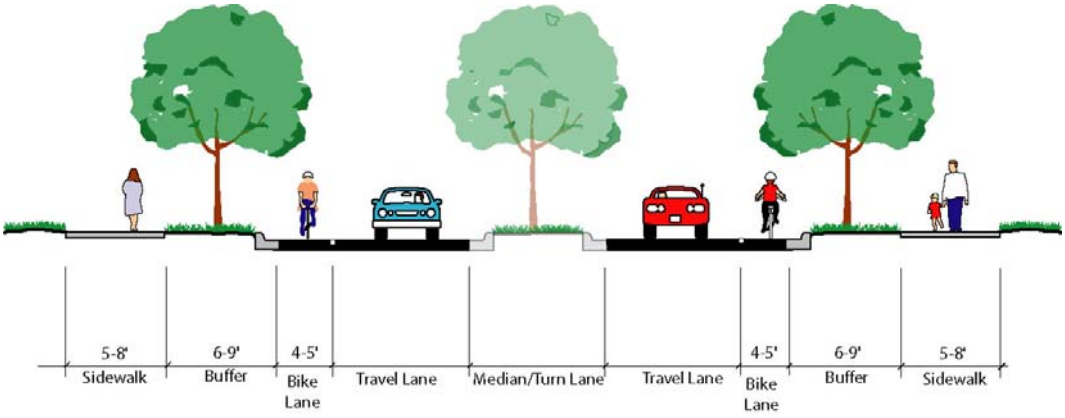


SOURCE: The Greenway Collaborative, Inc.

Three-lane Roads

A planted median should be incorporated into all three-lane roads whenever the there is no need for a turn lane. The planted median improves the aesthetics of the roadway, reduced the impervious surfaces, can act as a refuge island for mid-block crossings, and has been shown to be less expensive in the long run than paving. The refuge island may also be constructed in a manner to mitigate storm water run-off.

Figure 4-18A
Three-lane Roadway Typical Cross Section

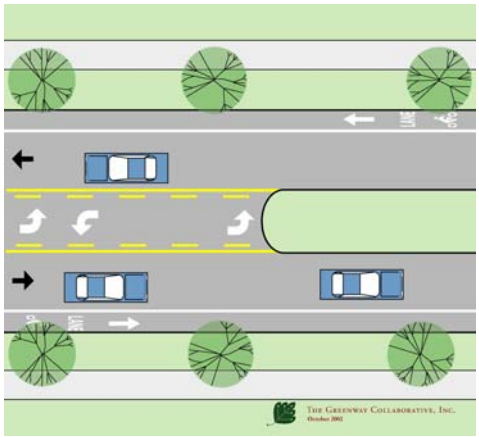


General Three-lane Road Design Guidelines

	Sidewalk Min. Width	Buffer Min. Width	Bike Lane Min. Width
Collectors	6′	6′	4′
Minor Arterials	8′	9′	5′
Principal Arterials	8′	9′	5′

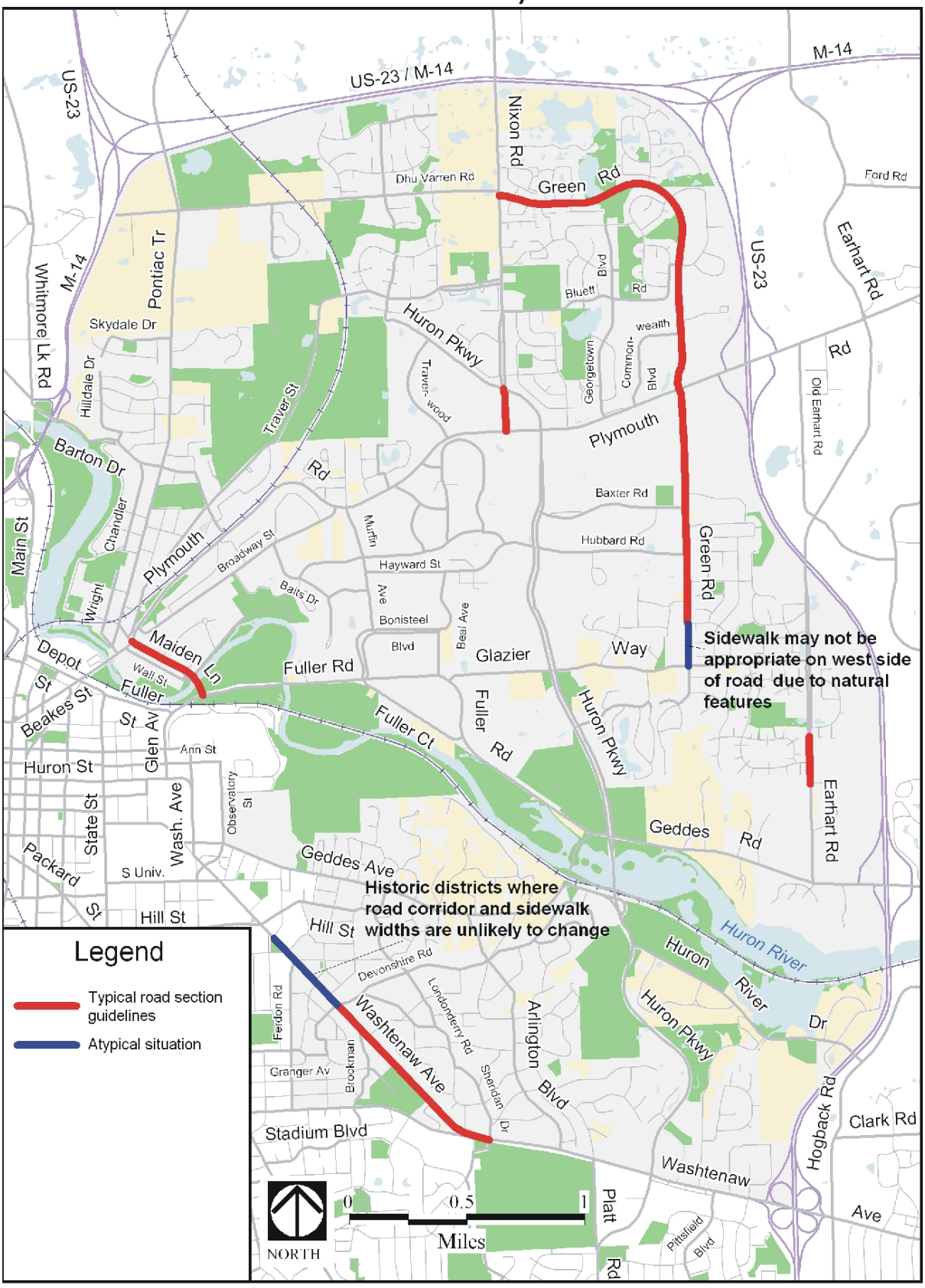
Source: The Greenway Collaborative, Inc.

Figure 4-18B
Three-lane Roadway Typical Plan View



Source: The Greenway Collaborative, Inc.

Figure 4-18C
Three-lane Roadway Locations

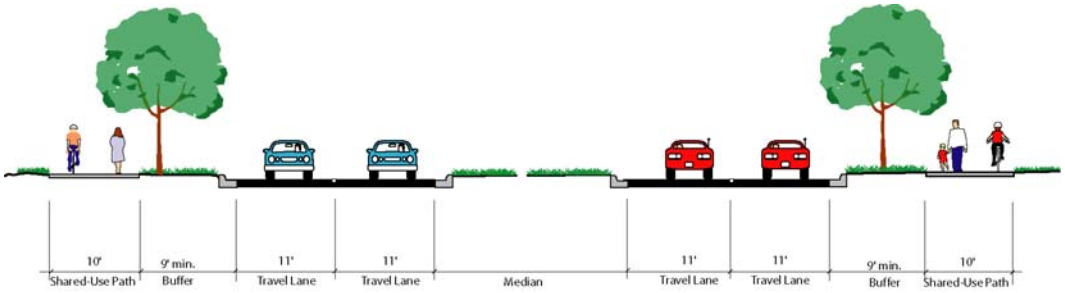


SOURCE: The Greenway Collaborative, Inc.

Four-lane Parkways

The cross-section proposed for parkway-type conditions is where the roadway has few, if any, intersecting roads and/or driveways. The shared-use path is typically set further back from the roadway than in most situations. Care should be taken not to meander the path excessively as even in a parkway situation as few bicyclists will travel far out of their way unless there is a compelling reason.

Figure 4-19A
Four-lane Parkway Typical Cross Section

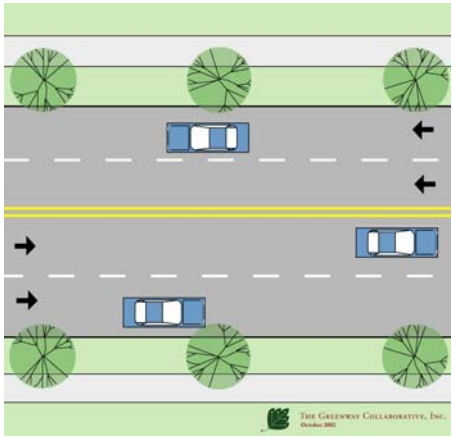


General Four-lane Parkway Design Guidelines

	Shared-use Pathway Min. Width	Buffer Min. Width
Collectors	6′	6′
Minor Arterials	8′	9′
Principal Arterials	8′	9′

Source: The Greenway Collaborative, Inc.

Figure 4-19B
Four-lane Parkway Typical Plan View



Source: The Greenway Collaborative, Inc.

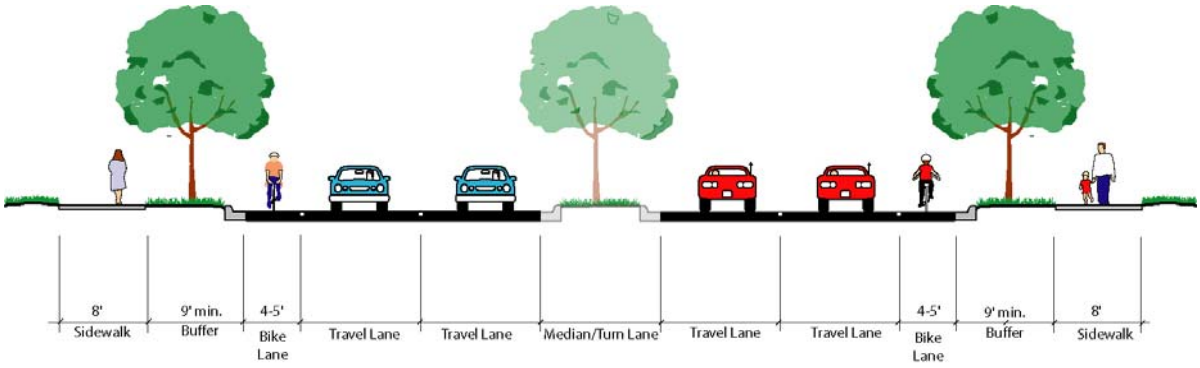
Figure 4-19C
Four-lane Roadway Locations

SOURCE: The Greenway Collaborative, Inc.

Five-lane Roads

A planted median should be incorporated into a five-lane road design wherever the there is no need for a turn lane. The planted median improves the aesthetics of the roadway, reduces the impervious surface, can act as a refuge island for mid-block crossings, and has been shown to be less expensive in the long run than paving. The refuge island may also be constructed in a manner to mitigate storm water run-off.

Figure 4-20A
Five-lane Roadway Typical Cross Section

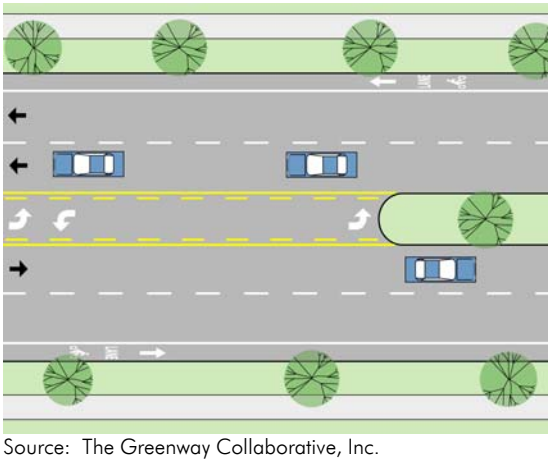


General Five-lane Road Design Guidelines

	Shared-use Pathway Min. Width	Buffer Min. Width	Bike Lane Min. Width
Collectors	6′	6′	4′
Minor Arterials	8′	9′	5′
Principal Arterials	8′	9′	5′

Source: The Greenway Collaborative, Inc.

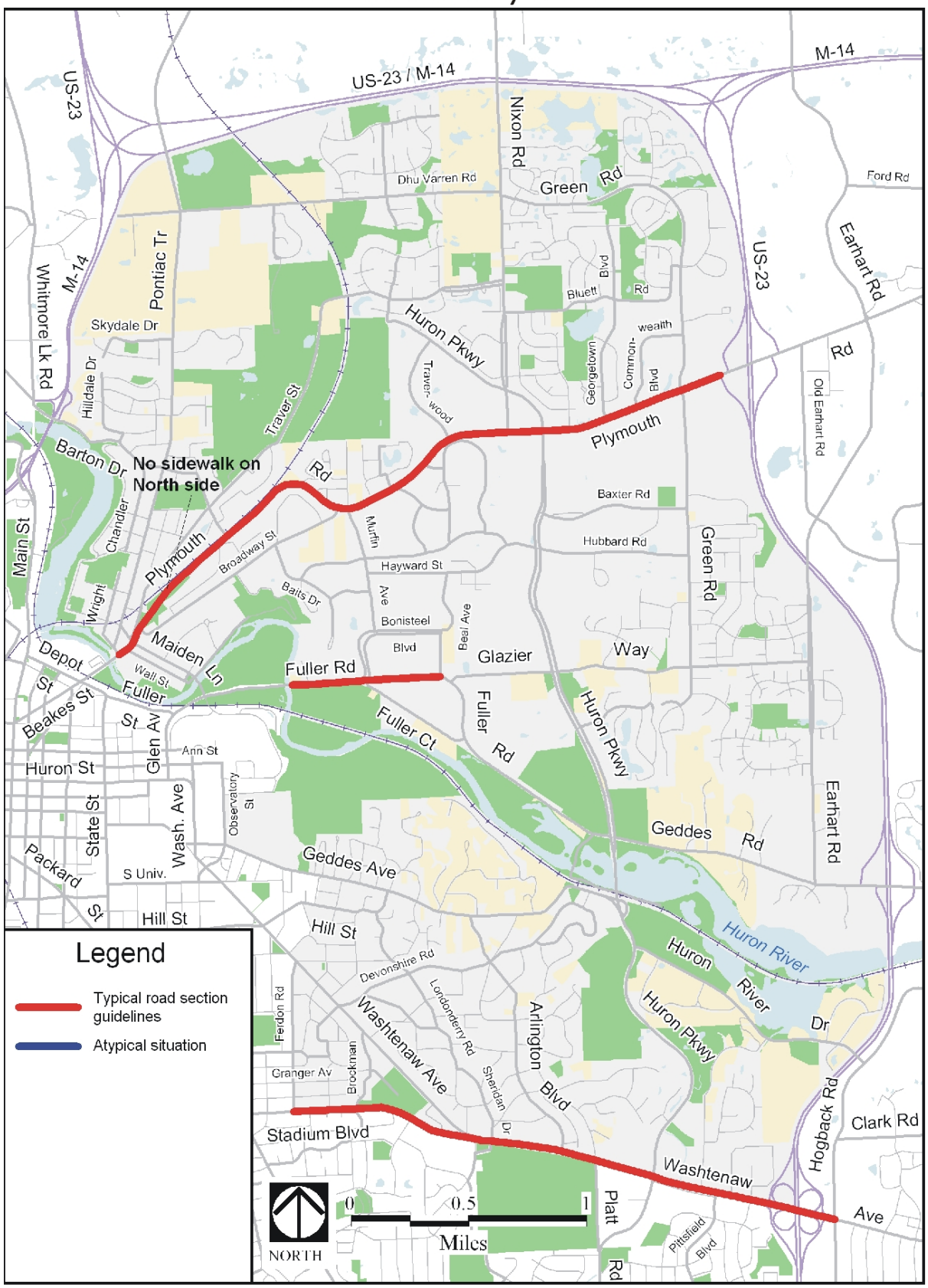
Figure 4-20B
Five-lane Roadway Typical Plan View



Source: The Greenway Collaborative, Inc.

State Street, south of Eisenhower Boulevard, is similar to the proposed five-lane configuration except the sidewalk should be slightly wider and medians should be included.

Figure 4-20C
Five-lane Roadway Locations



SOURCE: The Greenway Collaborative, Inc.

4.2.3 Atypical Long-term Solutions

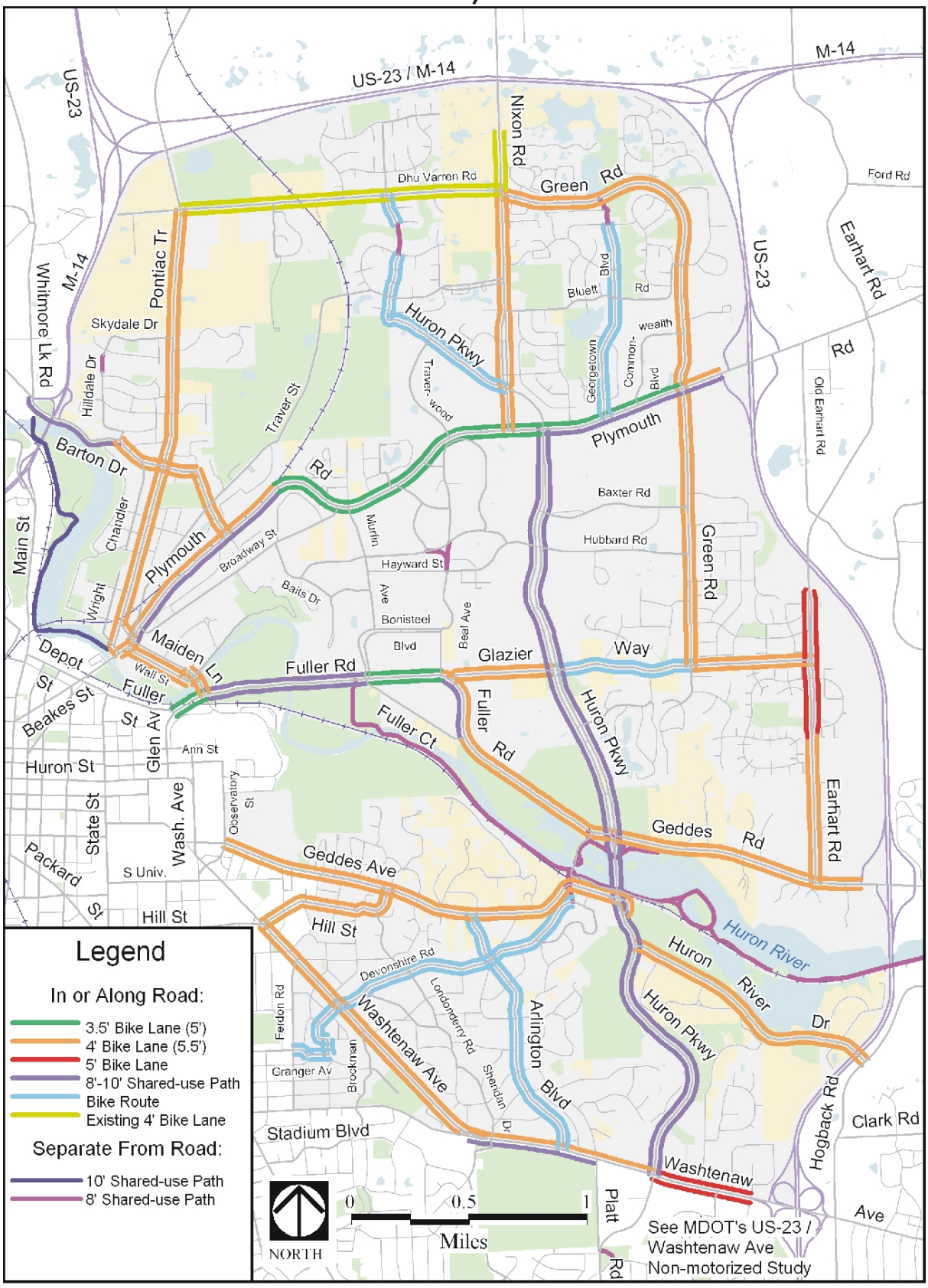
Not every possibility for each roadway can be adequately addressed at a master plan level. Ultimately, a corridor specific design will determine how to best apply the design guidelines to specific situations. But, even at this level of analysis, several locations can be identified where circumstances make the typical guidelines for accommodating pedestrians and bicycles infeasible or impractical. These are shown in blue on Figures 4-22 and 4-23. They include:

- **Washtenaw Avenue**, from Stadium to Geddes Avenue, goes through historic districts where the road and sidewalk width are unlikely to change. The sidewalks are five feet wide and the road is narrow (40 feet wide in some places). Because the road is a Principal Arterial, draft AASHTO Pedestrian Guidelines call for an eight-foot-wide sidewalk. This is unlikely to occur and underscores the need to accommodate bicycles within the roadway as the existing five-foot-wide sidewalks clearly cannot accommodate both adult bicyclists and pedestrians in this high demand corridor.
- **Huron River Drive**, from Huron Parkway to Hogback Road, has adjacent mature woods and steep slopes primarily on the south side of the road. This, in combination with the limited development along the road, makes a sidewalk only on the north side of the road an appropriate solution. There may be areas where the buffer between the sidewalk and the roadway may have to be eliminated to minimize the impact to the natural features.
- **Geddes Road**, from Huron Parkway to Sumac Lane, has steep slopes and woodlots on both sides of the road. Because this road serves as a key linkage connecting Concordia University, three neighborhoods, and the Huron River Pathway system, there is demand for a non-motorized linkage. The most appropriate non-motorized linkage may not be directly adjacent to the roadway but rather away from the roadway utilizing city property and, potentially, easements on private property. By utilizing this approach, the road character may be preserved while still providing the non-motorized link.
- **Geddes Avenue**, from Hill Street to Huron Parkway, goes through patches of woodlots with some mature trees adjacent to the roadway. There is an existing narrow path along portions of the north side of the trail. This path experiences considerable activity. It should be improved and widened, where possible, without significantly impacting the natural features.

4.2.4 Near-term Solutions

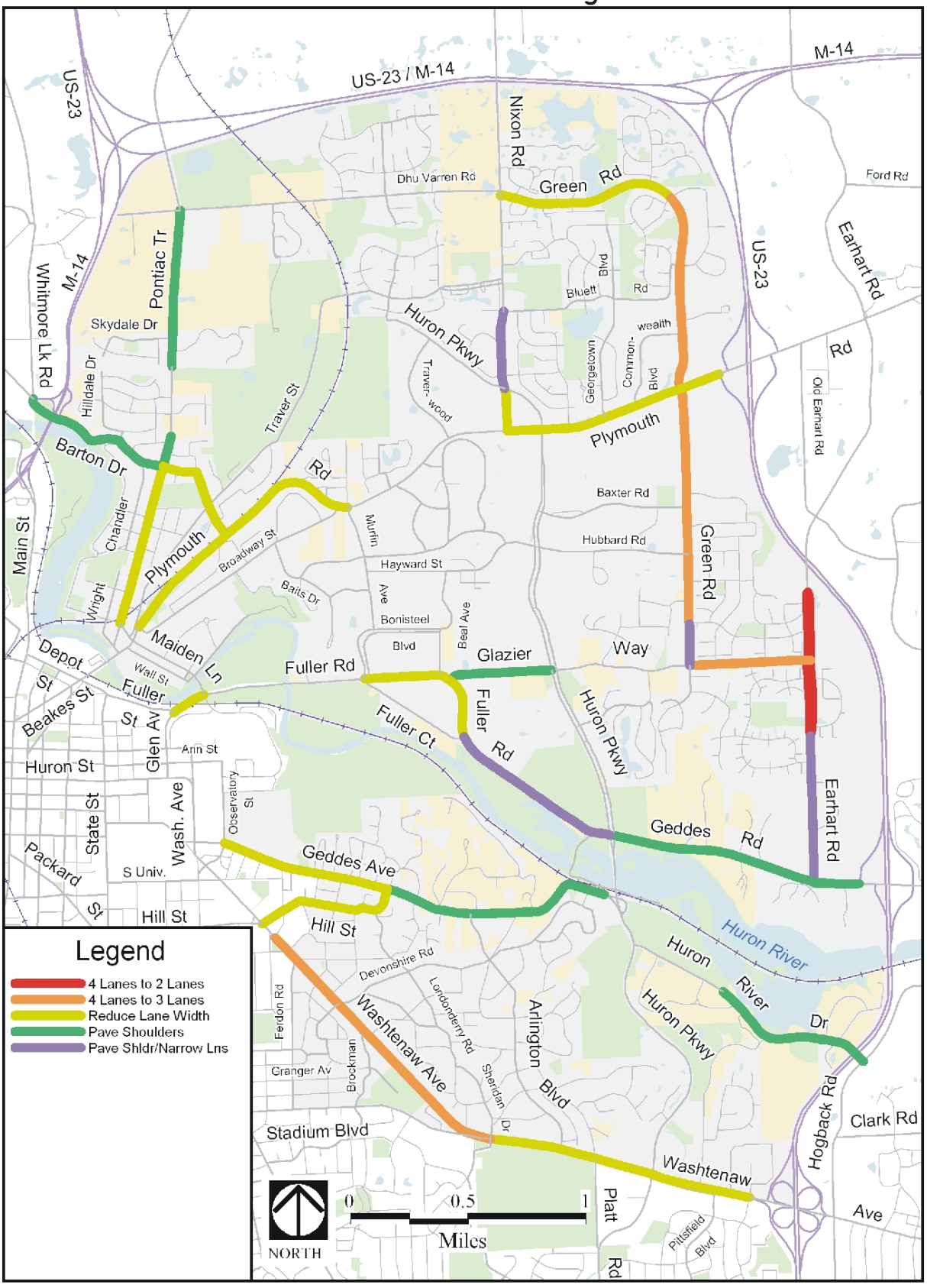
Near-term solutions were designed to be implemented with minor changes such as re-striping the existing road surface (Figures 4-21 and 4-22). These cost-effective solutions will enhance bicycle and pedestrian conditions, quickly and easily, until the road is expanded or major reconstruction is undertaken. In doing so, coordination is essential with the implementation of changes in the transit and roadway components of the Northeast Area's transportation system.

Figure 4-21
Near-term Bicycle Facilities



SOURCE: The Greenway Collaborative, Inc.

Figure 4-22
Near-term Road Changes



SOURCE: The Greenway Collaborative, Inc.

Four road corridors in the project area present distinct challenges that are the result of limited space and high volumes of traffic and/or higher speed limits.

- Plymouth Road
- Washtenaw Avenue
- Fuller Road from Glazier Way to Fuller Court
- Stadium Boulevard from Ferdon Road to Washtenaw Avenue

AASHTO standards provide for flexibility in cases such as these, and certain modifications are described below. Ann Arbor city engineering staff has determined that vehicular lanes on roads with a posted speed limit of 40 mph or greater should not be reduced to less than 11 feet wide.

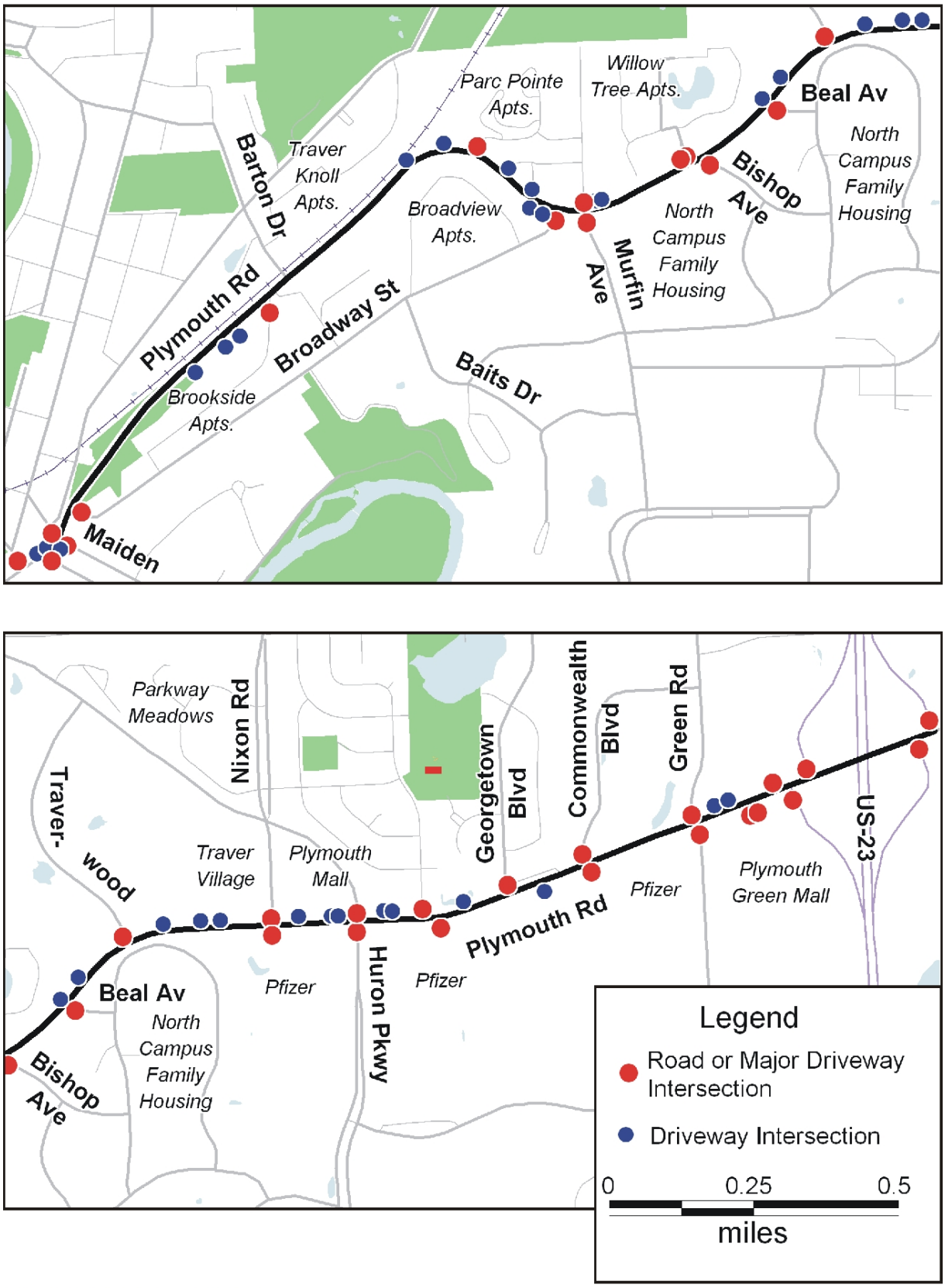
Plymouth Road

Providing minimum-width bicycle lanes on both sides would require that the outside motor vehicle lanes be narrowed to 10.5 feet in some places, the inside motor vehicle lane to 11 feet and the center-turn lane reduced to 10 feet. There is, however, room to provide one designated bicycle lane and maintain the 11-foot desired minimum width of the vehicular lanes.

Figure 4-23 illustrates the numerous road crossings and driveway intersections along the length of Plymouth Road. Between Parc Pointe Apartments and Beal Avenue there are numerous intersecting roads and driveways on both sides of Plymouth Road. For safety reasons, bicycle lanes are highly recommended on both sides of the road even though this would require that the outside travel lane adjacent to the bicycle lane to be 10.5' in some places.

The cross-section illustrations of Figures 4-24A through 4-24D are based on the number of intersecting driveways and the corresponding need for bike lanes. In several cases, bicyclists would be given the option of bicycling in the roadways or using the sidepath at their discretion. In those situations, and situations where no bike lane is feasible, the visibility of the sidepath needs to be improved at the driveways, and transitions must be provided between the road and sidepath.

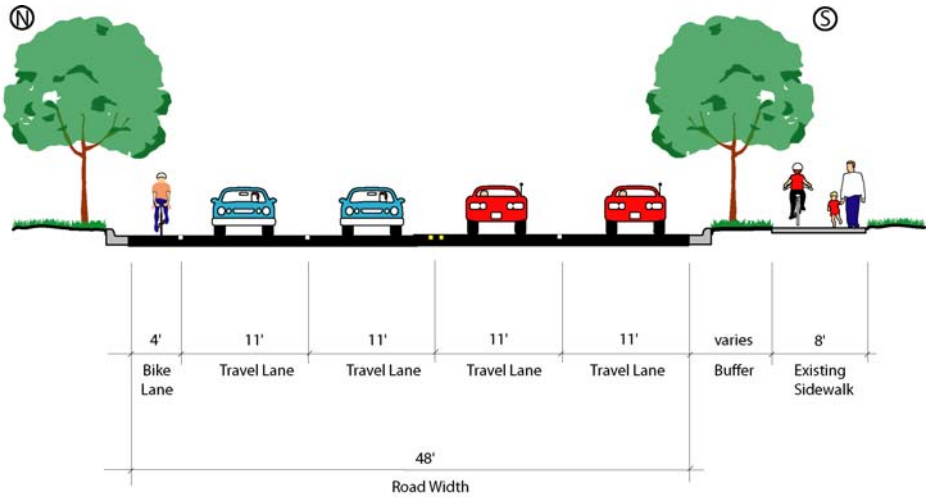
Figure 4-23
Intersections and Driveways Along Plymouth Road



SOURCE: The Greenway Collaborative, Inc.

Figure 4-24A
Plymouth Road – Lowertown to Barton Drive (Near-term)

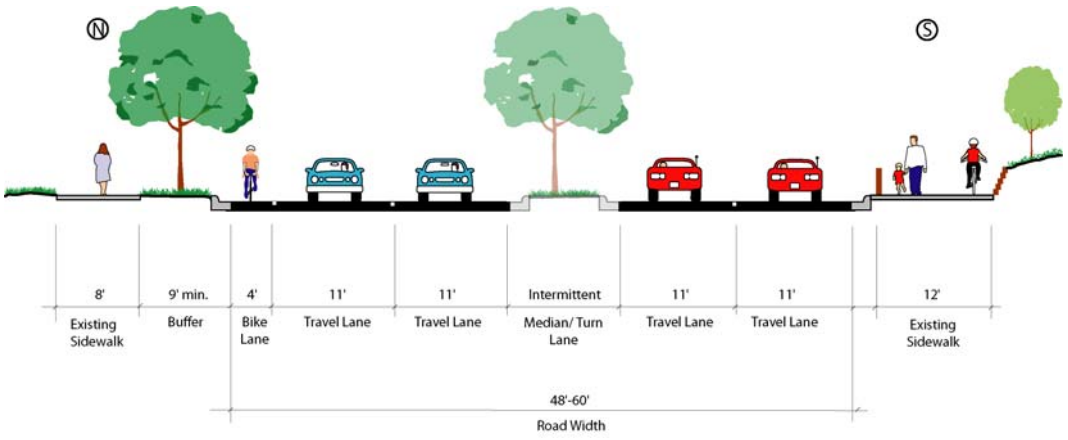
In this section, the roadway is only 48' in width, which does not allow for bike lanes on both sides. The north side of the roadway does not have an existing sidewalk. The south side has an existing 8' sidepath with several entering driveways and intersections.



Source: The Greenway Collaborative, Inc.

Figure 4-24B
Plymouth Road – Barton Drive to Parc Pointe Apartments (Near-term)

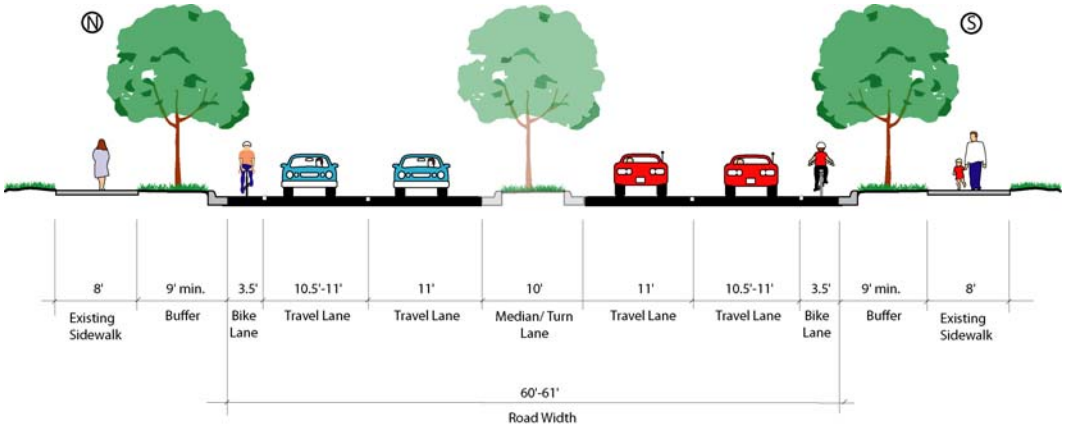
This section varies from 48'-60' and has no entering driveways or intersections until Parc Pointe apartments.



Source: The Greenway Collaborative, Inc.

Figure 4-24C
Plymouth Road – Parc Pointe Apartments to Huron Parkway (Near-term)

Installing bike lanes in this stretch by going to a sub-11' lane for brief sections is a safe and reasonable option to address the large number of intersections and entering driveways in this area. The roadway varies from 60'-61' so in some places bike lanes could be installed while maintaining an outer lane of 11'.

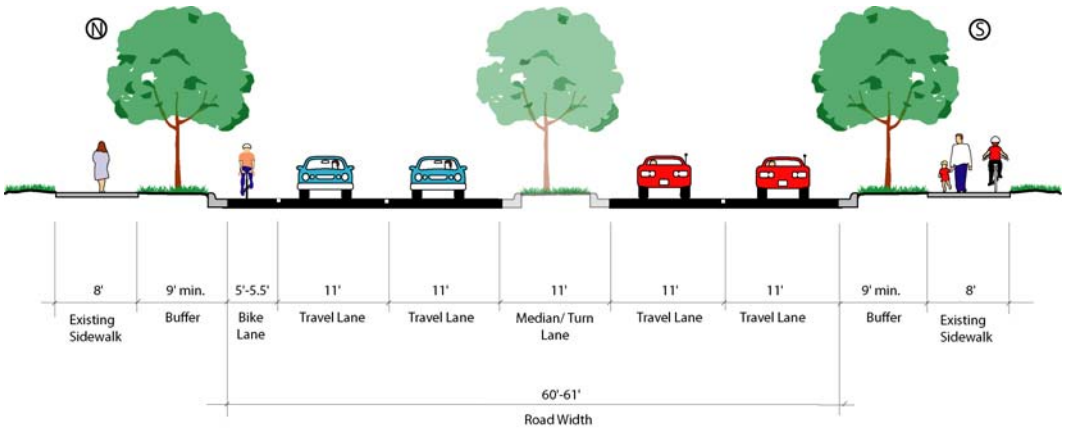


Source: The Greenway Collaborative, Inc.

Figure 4-24D
Plymouth Road – Huron Parkway to U.S. 23 (Near-term)

Due to higher posted speeds in this segment (40-45 mph), narrowing of the outer travel lane is not desired for the near term. Adequate room exits to provide a wide bicycle lane on the north (westbound), which is characterized by more driveways. Modifications to the sidepaths on both sides should be made to improve visibility at driveways and intersections.

Bike lane on north side, shared-use path on south side



Source: The Greenway Collaborative, Inc.

Washtenaw Avenue

Washtenaw Avenue, a state trunkline, is a high-demand corridor for both automobiles as well as non-motorized traffic. The width of the roadway varies greatly along its length, from 40 feet in the historic neighborhoods closer to campus, to 70 feet nearer U.S. 23.

The bike quality/level of service of the corridor is an E from the intersection of Stadium Boulevard to Huron Parkway due to the large volumes of traffic moving at high speeds and the lack of sidewalks along the north side. Currently, there is a "desire path" worn into the narrow strip of grass along the road at that point, which is virtually impassible during the winter months.

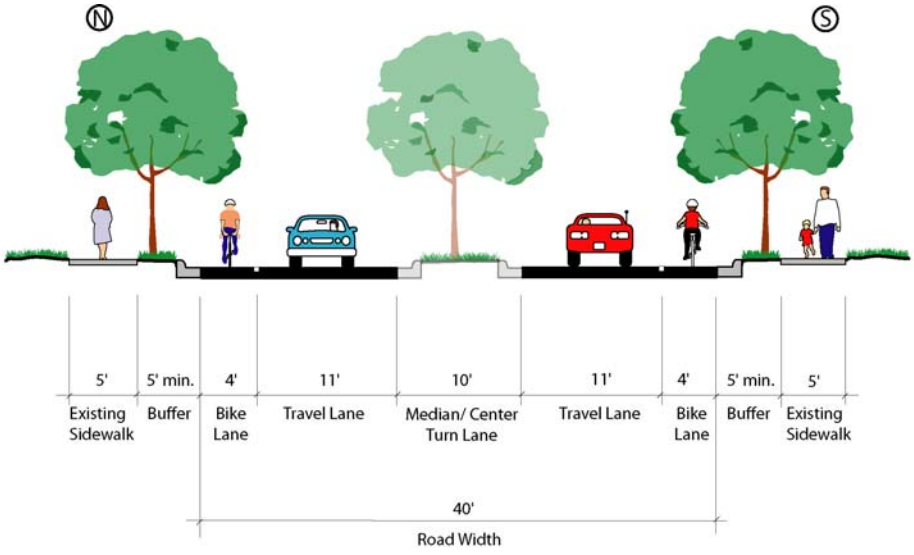
For a near-term solution on this segment, the City should seek MDOT approval to provide a bicycle lane on the north (westbound) and finalize Transportation Enhancement grant approval for a shared use path on the north side.

For the segment from Huron Parkway to U.S. 23, there is sufficient width to provide two bicycle lanes. If improvements recommended in the U.S. 23/Washtenaw Non-motorized Crossing Study are implemented, transitions to the sidepaths must be developed.

The near-term proposals along Washtenaw Avenue are shown in Figures 4-25A through 4-25F.

Figure 4-25A
Washtenaw Avenue from Hill Street to 1/8th Mile East of Toumy Road (Near-term)

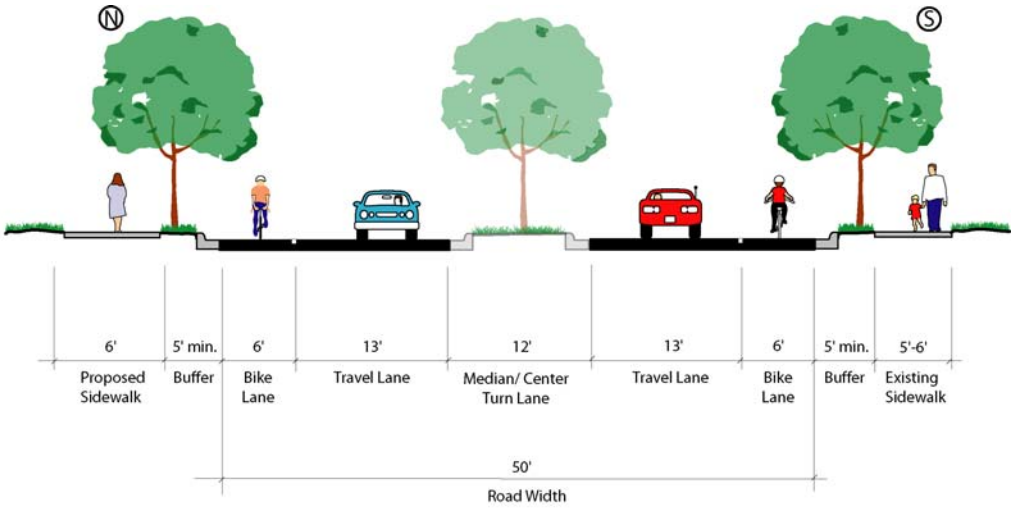
This portion of the road runs through a historic district. Sidewalk widths are unlikely to change. With a 40' roadway width, there is room for two 4' bike lanes by converting the four-lane road to a three-lane road.



Source: The Greenway Collaborative, Inc.

Figure 4-25B
Washtenaw Avenue from 1/8th Mile East of Toumy Road to Tappan Crosswalk (Near-term)

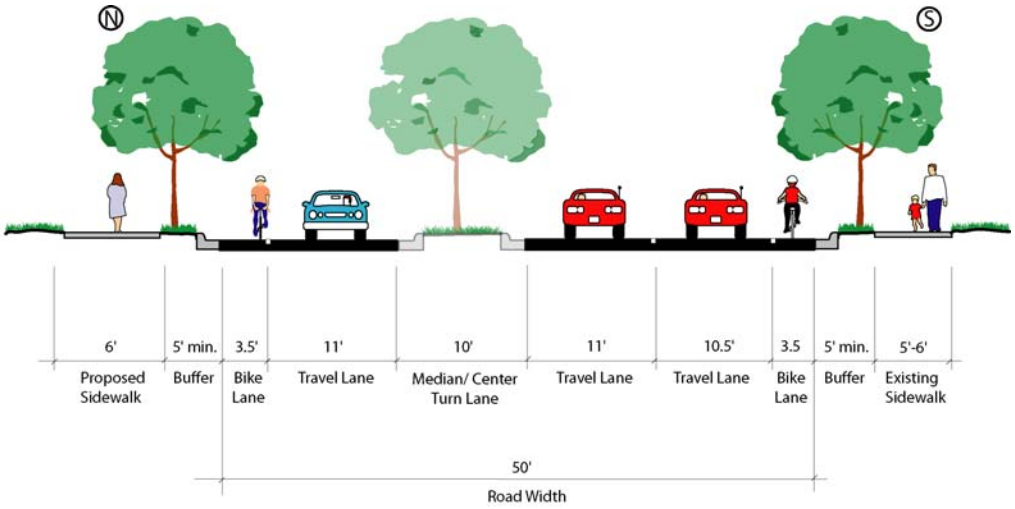
Here the roadway widens to 50' allowing for two 6' bike lanes when the road is converted from four-lane to three-lane. Although this is somewhat wide for a three-lane, the advantage is that people using the crosswalk at Tappan School will only have to cross one lane of fast-moving traffic in each direction.



Source: The Greenway Collaborative, Inc.

Figure 4-25C
Washtenaw Avenue from Tappan Crosswalk to Stadium Boulevard (Near-term)

Because a 50' road width is large for a three lane with bike lanes, the road east of the Tappan crosswalk should be converted to a four lane with bike lanes. Numerous commercial driveways are on the south side of the road. Two eastbound lanes allow cars to use the outside lane as a turning lane into the businesses.

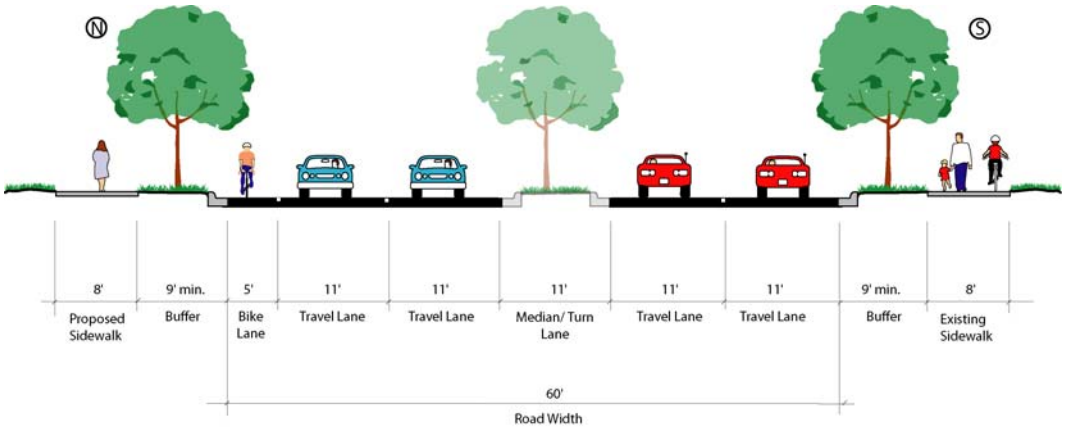


Source: The Greenway Collaborative, Inc.

Figure 4-25D
Washtenaw Avenue from Stadium Road to Platt Road (Near-term)

The roadway in this section is 60' wide. In the near term, provide a bike lane on the North side of the road and utilize the existing shared-use path on the south.

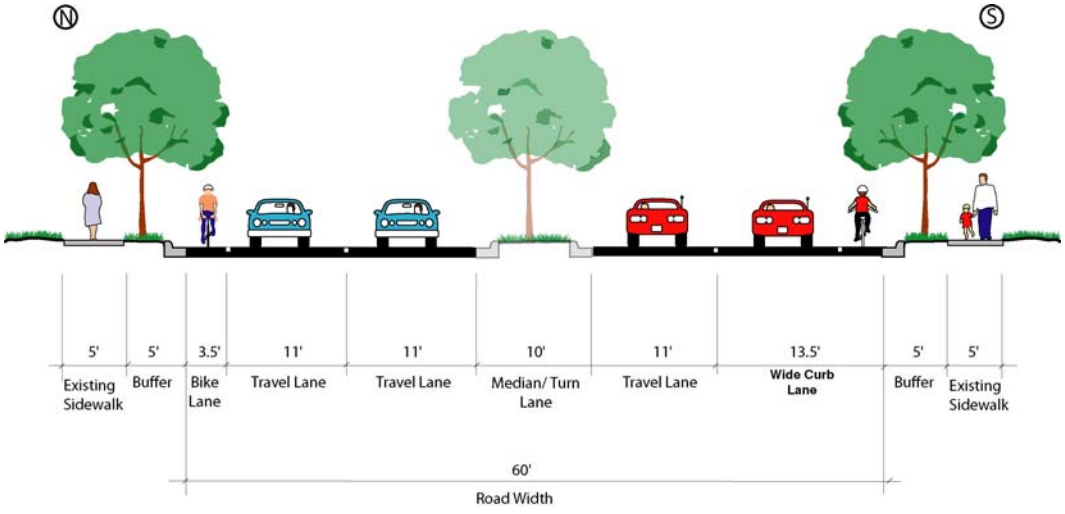
Bike lane on north side, shared-use path on south side



Source: The Greenway Collaborative, Inc.

Figure 4-25E
Washtenaw Avenue from Platt Road to Huron Parkway (Near-term)

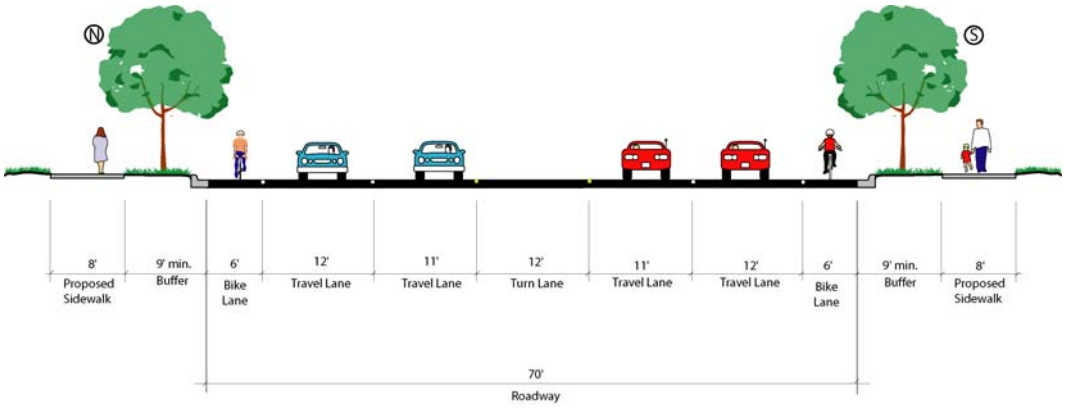
This area has numerous driveway crossings on both sides, however, there is a high volume of traffic. In the near term, a bike lane is recommended on the north side, with a wide outer curb lane on the south. New development on the north should provide for the additional street width to accommodate a full bike lane.



Source: The Greenway Collaborative, Inc.

Figure 4-25F
Washtenaw Avenue from Huron Parkway to U.S. 23 (Near-term)

The roadway in this section is 70' wide. This allows room for two 6' bike lanes by simply narrowing the current travel lanes. 8' sidewalks are proposed on either side of the roadway. Transitions will be necessary at the east end to connect to the facilities recommended in the U.S. 23/Washtenaw Non-motorized Crossing Study.



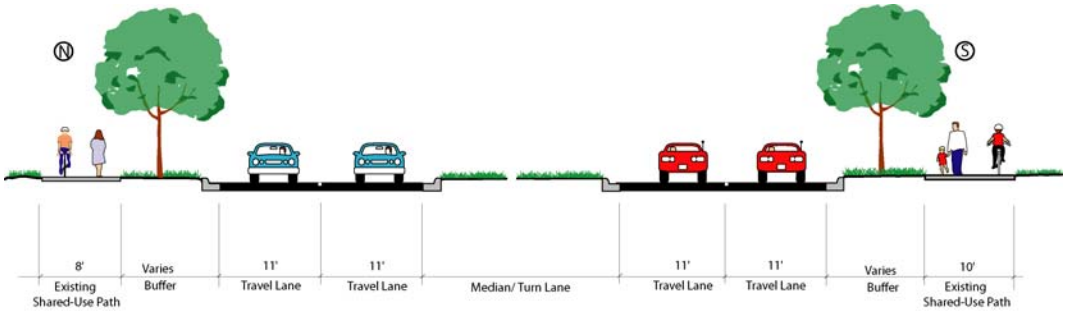
Source: The Greenway Collaborative, Inc.

Fuller Road

Fuller Road also varies in width along its length. Portions of the roadway are heavily used by pedestrians and bicyclists moving between North Campus and Central Campus, waiting for buses, or walking from the commuter lots by Mitchell Field. In some portions, the existing sidepaths along both sides of the road can accommodate bicycle use safely due to few intersecting driveways. However, due to heavy pedestrian use, a shared use is problematic for bicycle use. The near-term solution is to accommodate bicyclists in the roadway, where possible, with a narrowing of lanes as shown on Figures 4-26A through 4-26D.

Figure 4-26A
Fuller Road from Maiden Lane to Bonisteel (Near-term)

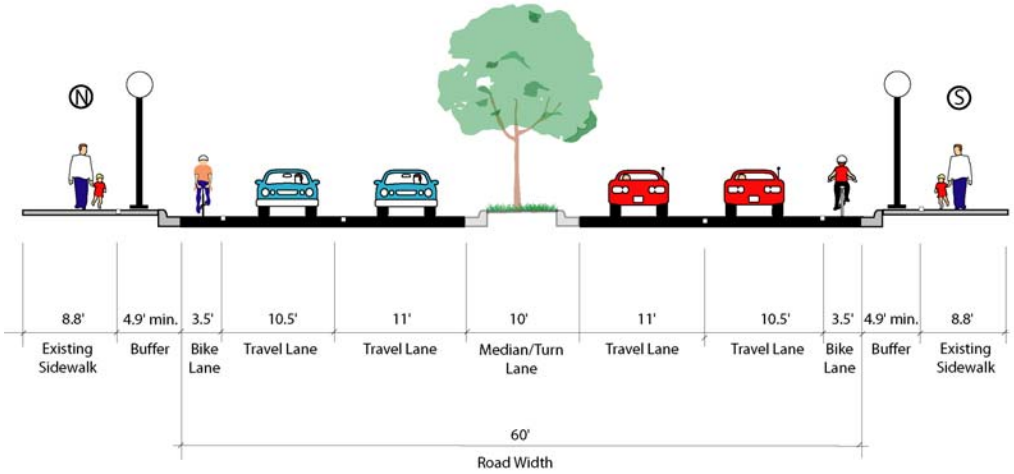
The road width here is too narrow to accommodate bike lanes in the roadway. They are accommodated on the existing shared-use paths on either side.



Source: The Greenway Collaborative, Inc.

Figure 4-26B
Fuller Road from Bonisteel to Glazier Way (Near-term)

The shared use pathways in this section are very crowded with pedestrians. There are numerous heavily used driveways and many intersections. Accommodating bike lanes in the roadway by narrowing the outer lanes to sub-11' is the most appropriate solution for the safety and convenience of both bicyclists and pedestrians.

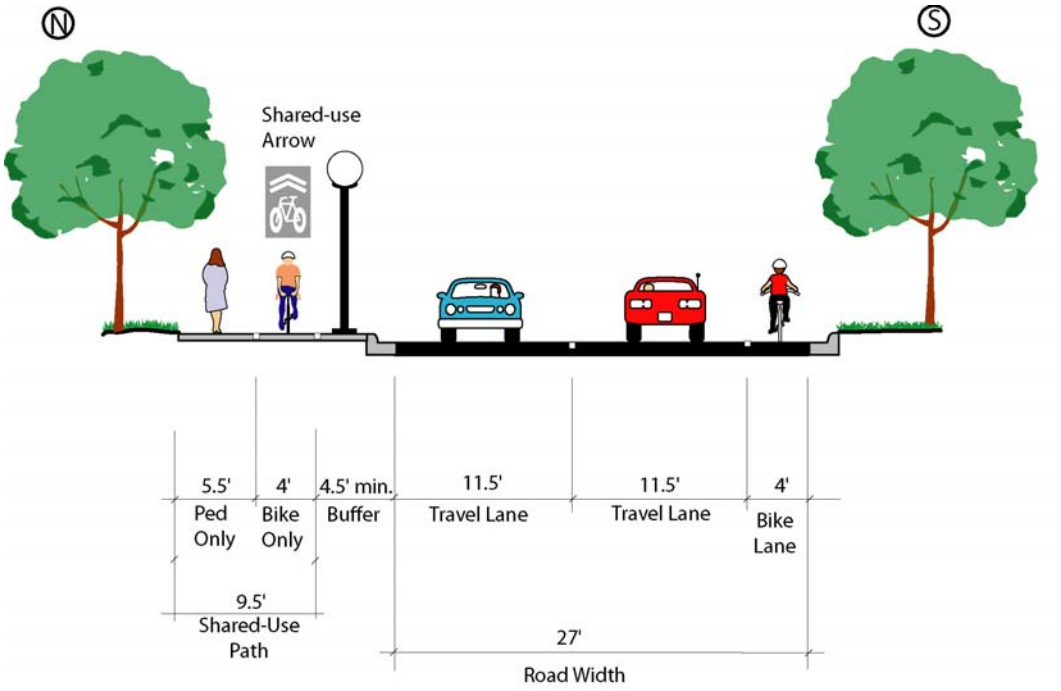


Source: The Greenway Collaborative, Inc.

Figure 4-26C
Fuller Road from Glazier Way East to Fuller Court (Near-term)

With the current road width of 27', there is room for a 4' bike lane on the south side of the road. The presence of the bike lane will narrow the lanes from 13.5' to 11.5' which may reduce the incident of speeding on this road.

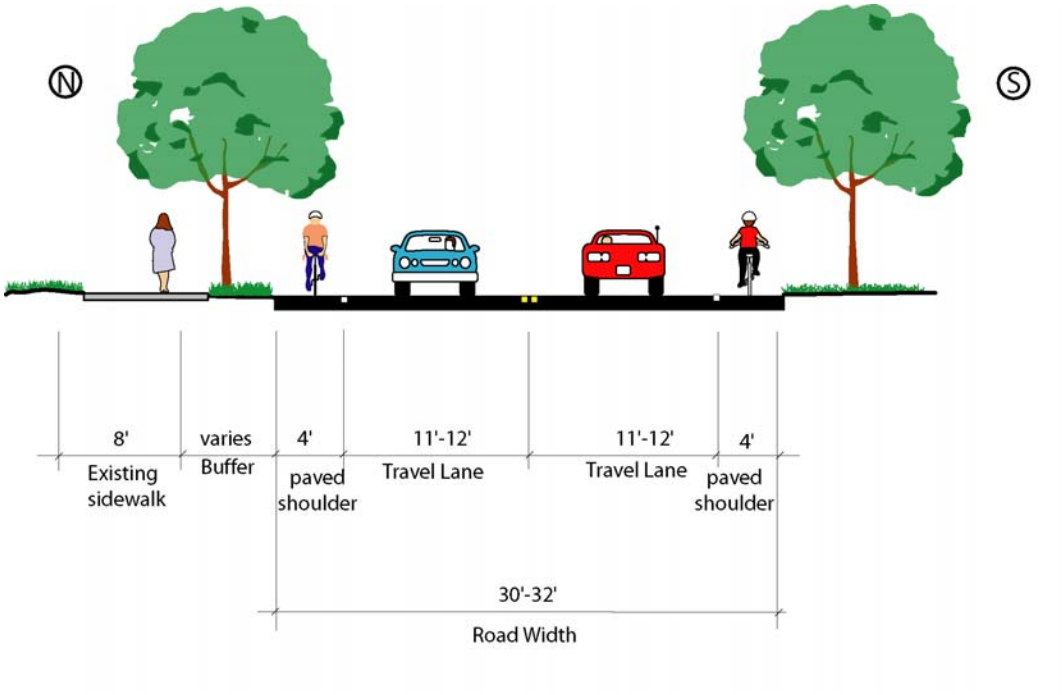
The current sidewalk, directly adjacent to the roadway, is 14' wide. Because there are no intersecting driveways between Glazier Way to Fuller Court on the north side of the road, a "raised bikeway" may be added on the outside edge of the shared-use path, leaving a 4.5' minimum buffer for utility posts and signs. The bikeway portion of the path should be marked with a shared-use arrow to indicate position of the bikes.



Source: The Greenway Collaborative, Inc.

Figure 4-26D
Fuller Road from Fuller Court to Huron Parkway (Near-term)

Paving the shoulders and narrowing travel lanes will facilitate bikes in the roadway along this portion.



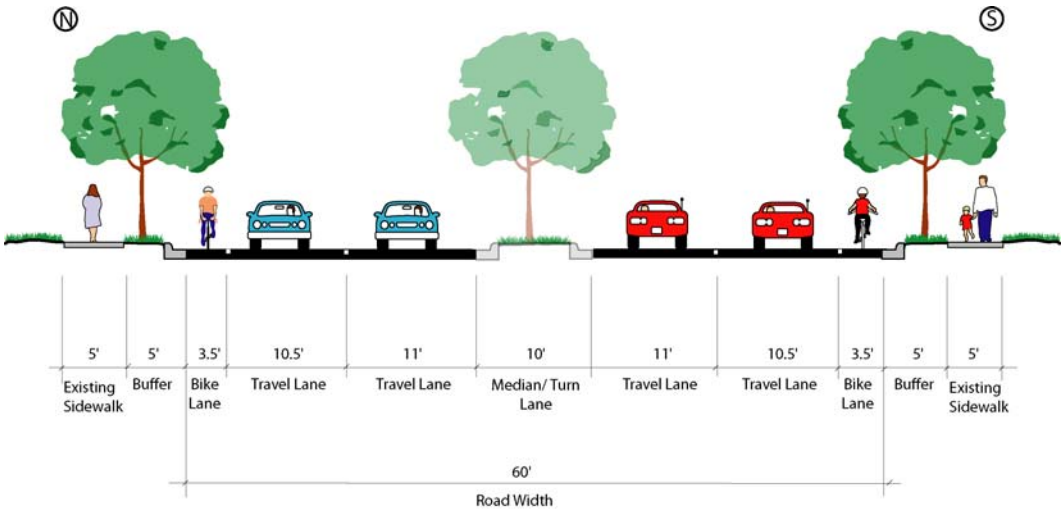
Source: The Greenway Collaborative, Inc.

Stadium Boulevard

Nearly a mile of Stadium Boulevard is included in northeast Ann Arbor. The road in this area is 60 feet wide. Unlike the section of Washtenaw Avenue between Stadium and Huron Parkway, a sidepath is not a viable alternative due to the numerous intersecting driveways and intersections on both sides and the existing conditions of a five-foot sidewalk up against commercial development properties. The proposals for Stadium Boulevard are illustrated on Figure 4-27.

Figure 4-27
Stadium Boulevard from Ferdon Road to Washtenaw Avenue (Near-term)

The 60' wide roadway allows for two bike lanes by narrowing the outside travel lane to sub-11'.



Source: The Greenway Collaborative, Inc.

4.2.5 Specific Area Recommendations

The following recommendations deal with a variety of specific problem areas within the study area:

- Conduct an analysis of pedestrian and bicycle crash data annually to identify problem areas and potential corrective actions.
- Provide crosswalks and pedestrian signals at main entrance to the Arborland Mall.
- Improve the crosswalk where the Huron River Path crosses Wall Street and Maiden Lane.
- Improve the crosswalk at the entrance to Gallup Park from Fuller Road restricting overflow parking as necessary.
- Eliminate all pedestrian activated crosswalk signals in the Lower Town area and integrate the walk phase into standard signal phasing.
- Cooperate with MDOT to implement the improvements recommended by the U.S. 23/Washtenaw Interchange Crossing Study.

4.3 Goals and Evaluation Factors

The non-motorized component meets the goals of the Northeast Ann Arbor Transportation Plan by providing appropriate access and mobility for all people, with minimal impacts (Tables 4-4 and 4-5). The increased emphasis on the non-motorized mode will protect and enhance the natural and human/built environment by providing people an alternative to auto use thereby lessening air pollution. The ability to connect communities by avoiding, to an increased extent, modifying roads by pouring more concrete, is also enhanced by balancing the investment in infrastructure while promoting a safe and secure transportation system. And, an increased emphasis on non-motorized transportation by the City of Ann Arbor and its surrounding communities, as well as the University of Michigan, will allow the focus on this mode to promote cooperation among all these jurisdictions.

Table 4-4
Northeast Ann Arbor Transportation Plan
Proposed Non-motorized Recommendations

Goal	Recommendations
Provide appropriate access and mobility with minimal negative impacts for all people and goods	Meet Goal
Protect and enhance the natural environment and the human and built environment	Meet Goal
Promote a safe and secure transportation system	Meet Goal
Invest in transportation infrastructure in a manner consistent with other goals	Meet Goal
Promote cooperation among the city of Ann Arbor and other governmental entities, particularly the surrounding townships and municipalities and the University of Michigan in a manner consistent with other goals	Meet Goal
Meaningful public input and involvement will be required of any transportation project in the Northeast Area	Meet Goal

Table 4-5
Northeast Ann Arbor Transportation Plan
Proposed Non-motorized Recommendations

Evaluation Factor	Recommendations
Air Quality	Positive Effect
Community Cohesion	Positive Effect
Land Acquisition	No Effect
Noise	No Effect
Mode Choice	Positive Effect
Level of Service	No Effect
Water Quality	No Effect
Wetlands	No Effect
Open Space	No Effect
Environmental Justice	No Disproportionate Negative Effect

Development of the non-motorized transportation component of the NEATP will have little or no effect on land acquisition or noise. Likewise, it will not affect the area's water quality, wetlands or open space. And, there will be no disproportionate negative effects on low-income or minority populations.

Analysis of the "before" and "after" conditions of the traffic effects of the non-motorized proposals on Plymouth Road, between Nixon and Murfin Roads, was performed using the SYNCHRO model. Bike lanes and two new refuge islands were recently constructed on Plymouth Road in this segment. The SYNCHRO model examined reductions in lane width (12 feet to 11 feet) and average speeds (lower by five mph) on this segment of Plymouth. The results (Table 4-6) show an increase in delay and travel time. But, with the reduced average vehicular speed on Plymouth, these are considered productive tradeoffs, particularly when understanding these increases in time represent a few seconds per vehicle on Plymouth Road.

Table 4-6
Travel Time Effects of Non-motorized Proposal on Plymouth Road between Nixon and Murfin Roads

Performance Measure / Segment	Vehicle Minutes		Average Speed MPH
	Delay Time	Total time	
Before Condition			
Murfin to Traverwood	53.0	342.6	34.0
Traverwood to Nixon	204.0	328.2	15.2
Nixon to Traverwood	18.6	124.4	34.2
Traverwood to Murfin	87.8	311.7	28.9
After Condition (.5 mph)			
Murfin to Traverwood	62.3	398.1	29.3
Traverwood to Nixon	254.8	398.1	12.5
Nixon to Traverwood	19.1	141.1	30.1
Traverwood to Murfin	119.6	374.1	23.7

Source: The Corradino Group of Michigan, Inc.

The Highway Capacity Software was also applied to determine if the narrower lane width on Plymouth Road, accompanying the non-motorized changes and the increased presence of bicyclists and pedestrians, makes a difference in vehicle throughput. The results (Table 4-7) show that the Plymouth Road intersection with Nixon Road will experience no significant reduction in its ability to handle traffic in the peak hour when the lanes on Plymouth are 11 feet rather than 12 feet wide and 10 pedestrian and bicycle interactions affect the flow of eastbound and westbound traffic on Plymouth Road. The reduction in capacity is less than four percent when the bicycle/pedestrian interactions with traffic grow to 25 in the peak hour. So, while, this test is only for one road, the consultant concluded there will be no significant negative effect in vehicle Level of Service due to implementing the non-motorized component of the NEATP. Such changes will have a calming effect on vehicular speeds and improve overall safety of the pedestrians and bicyclists.

Table 4-7
Vehicle Thruput Effects of Non-motorized Proposal at Plymouth/Nixon Roads Intersection

	Existing Conditions			New Conditions		
	12′ Lanes	12′ Lanes	12′ Lanes	11′ Lanes	11′ Lanes	11′ Lanes
Performance Measure	0 conflicting pedestrians and bikes per hour each approach	10 conflicting pedestrians and bikes per hour each approach	25 conflicting pedestrians and bikes per hour each approach	0 conflicting pedestrians and bikes per hour each approach	10 conflicting pedestrians and bikes per hour each approach	25 conflicting pedestrians and bikes per hour each approach
All Values Saturated Flow Rates (vph)						
Eastbound Left	1770	1770	1770	1711	1711	1711
Eastbound Thru and Right	3533	3531	3530	3415	3414	3413
Westbound Left	1770	1770	1770	1711	1711	1711
Westbound Thru and Right	3456	3448	3422	3348	3333	3325
Difference with 12′ Lanes and 0 Conflicts						
Eastbound Left	0	0	0	-59	-59	-59
Eastbound Thru and Right	0	-2	-3	-118	-119	-120
Westbound Left	0	0	0	-59	-59	-59
Westbound Thru and Right	0	-8	-34	-108	-123	-131
Percent Difference	0.00%	0.00%	0.00%	-3.33%	-3.33%	-3.33%
	0.00%	-0.06%	-0.08%	-3.34%	-3.37%	-3.40%
	0.00%	0.00%	0.00%	-3.33%	-3.33%	-3.33%
	0.00%	-0.23%	-0.98%	-3.13%	-3.56%	-3.79%

Source: The Corradino Group of Michigan, Inc.

5. Transit Component of Plan

Summary

Following development of the non-motorized component of the plan, the TransCAD model became available. A five-step process was then applied to continue development of the transportation plan.

Step 1: Ensure Reliability of New and Old Models

A. Compare the TranPlan 2020 assignment with the TransCAD 2025 assignment with the M-14/Barton Drive interchange unchanged.

B. Compare the TranPlan 2020 assignment to the 2025 TransCAD assignment with the M-14/Barton Drive interchange changed per Phase II of the NEATP.

Step 2: Determine Impact of the NEAP Land Use Proposals

- Adjust NEAP land use recommendations to determine travel effects.

Step 3: Apply non-motorized trip diversion to the Step 2B model results.

- Adjust trip table.
- Adjust roadway link capacities.

A key factor in using this approach was the availability of a modal split model that accounts for non-motorized and transit modes.

Step 4: Generate and test alternative transit concepts/policies using Step 3 model results.

- Adjust Headways (i.e. time between buses)
- Adjust routes
- Add Express Bus/Park-n-Ride Services
- Add Fixed Guideway Service
  - ✓ LRT/Busway
  - ✓ Commuter Rail

Step 5: Adjust trip table and examine highway improvement needs based on transit improvements accepted in Step 4 with M-14/Barton Drive interchange per Phase II of the NEATP.

- Plymouth Road between U.S. 23 and Huron River Drive
- Fuller Road between Huron Parkway and Glen Avenue
- Geddes Road between U.S. 23 and Huron Parkway
- Jackson Road between I-94 and Main Street
- Washtenaw Avenue between Geddes Avenue and U.S. 23
- Geddes Avenue between U.S. 23 and Huron Parkway

In initializing the process, specifically Step 4, the TAC, TCAC, and the public were asked to examine how the basic bus transit system serving Ann Arbor should be adjusted.

In testing service concepts, the TransCAD modal split model allowed variations in speed of service, frequency, and pricing, including the price of auto parking. Therefore, as concepts were agreed upon for testing, sensitivity analysis of their characteristics helped define/refine the transit concepts. The effect on roadway volumes was also examined after these transit concepts were analyzed.

Through public involvement and coordination with the TAC and TCAC, three concepts for testing transit services were developed (Table 5S-1 and Figures 5S-1, 5S-2 and 5S-3).

This testing process led to the following conclusions. Transit improvements in the form of the BASIC-PLUS concept are expected to produce an eight percent increase in ridership over the BASIC system in 2025 (Table 5S-2). Cutting the time between buses on a route (i.e., headways) by 50 percent will have the most positive, single impact in creating a transit ridership increase. When a change in headways (-50%) is combined with a reduction in fares (-20%) and a parking cost increase (+20%) 5,000 fewer daily auto trips are expected in northeast Ann Arbor in 2025. This is the equivalent to one-half lane of highway dedicated to peak hour travel.

Testing of a busway in the old Conrail right-of-way (now owned by Norfolk Southern Railroad) and light rail in the Ann Arbor Railroad corridor, does not produce significant results over making improvements in transit coverage by adding neighborhood services and express/subscription bus services thereby forming the BASIC-PLUS-PLUS system. Both busway and light rail developments would have major capital costs in facilities, equipment and right-of-way use, that they are considered inappropriate solutions for Ann Arbor to pursue in the near future. Likewise, while commuter rail is expected to serve 500 Ann Arbor trips per day in 2025, this proposal is part of a much larger plan that connects Ann Arbor to Detroit, so it may be affordable for Ann Arbor.

Based on these tests, the consultant believes the future transit system in Ann Arbor should pursue the following four elements: 1) improved neighborhood circulators; 2) subscription bus services; 3) peak hour express bus/park-and-ride operations; and, 4) reducing the time between buses. Actions on these concepts are the prerogative of AATA which will conduct further work on each. The cost of these changes is defined in Table 5S-3.

Paying for these type changes will not be accomplished through increased fare box revenues alone (Table 5S-3). So, other avenues of funding should be explored, if transit service is to expand as suggested here. Increasing parking costs by 20 percent would generate a twofold benefit: an increase in parking revenues of $2.32 million per year (in 2004 dollars), and an increase in transit fare revenues ($230,000) (Table 5S-3). Implementing a higher parking fee represents a significant challenge. And, linking the increased parking revenue to transit further increases that challenge.

Another concept for financing transportation improvements, called "Concurrency," should also be considered. It, too, will be a challenge to implement. It creates a direct link between land use changes – particularly to a higher density than normal – and the investment of developer resources in transportation improvements, including those in transit and to benefit walking and bicycling. This concept may be particularly relevant in the area around Nixon Road, Barton Drive and Plymouth Road. If high development densities in this area are to be approved by the City of Ann Arbor, then the developer should be asked to participate in transit system improvements (i.e., additional routings, shorter headways, subsidized fares) and fine-tune his/her project to encourage more non-

Table 5S-1
Northeast Ann Arbor Transportation Plan
Transit Elements for Testing

Basic Bus Service

- Current AATA System extended to 2025

Basic-Plus

- Current AATA Service plus …
  - ✓ Extended route to Zeeb Road/Meijers
  - ✓ U.S. 23/Territorial Road through Barton Hills Village route to downtown Ann Arbor
  - ✓ I-94/U.S. 23 to Pfizer route with stops only at Washtenaw and Geddes Road with Park-n-Ride facility at I-94/U.S. 23
  - ✓ Neighborhood circulators in some areas
- Signal pre-emption along
  - ✓ Washtenaw
  - ✓ Plymouth
  - ✓ Huron Parkway

Basic-Plus-Plus

- The Basic-Plus Service plus …
  - ✓ Express bus service between downtown Ann Arbor and
    - Washtenaw/I-94 with Park-n-Ride facility
    - State/I-94 with Park-n-Ride facility
    - Miller/M-14 with Park-n-Ride facility
    - Plymouth/U.S. 23 with Park-n-Ride facility
    - U.S. 23/Territorial Road with Park-n-Ride facility
    - I-94/U.S. 23 S with Park-n-Ride facility
    - Nixon Road/Dhu Varren with Park-n-Ride facility
    - Ypsilanti at downtown terminal
  - ✓ Express bus service between
    - Pfizer and Saline with Park-n-Ride lots at Saline and I-94/U.S. 23 via Michigan Avenue
      - One transfer point on Pfizer-Saline route possible at Geddes Road
  - ✓ Subscription bus service between downtown Ann Arbor and
    - Chelsea
    - Canton
    - Brighton

Busway

- One lane busway with bus circulators in surrounding areas accessing busways by ramps at key locations

Rail

- Commuter rail between Chelsea and Detroit with stops in Ann Arbor, Ypsilanti, Dearborn, and other locations in CATA Plan.
- Light rail service from Whitmore Lake Road north of Ann Arbor through downtown Ann Arbor to Milan (Willis Road):
  - ✓ Stops space one to two miles apart, on average

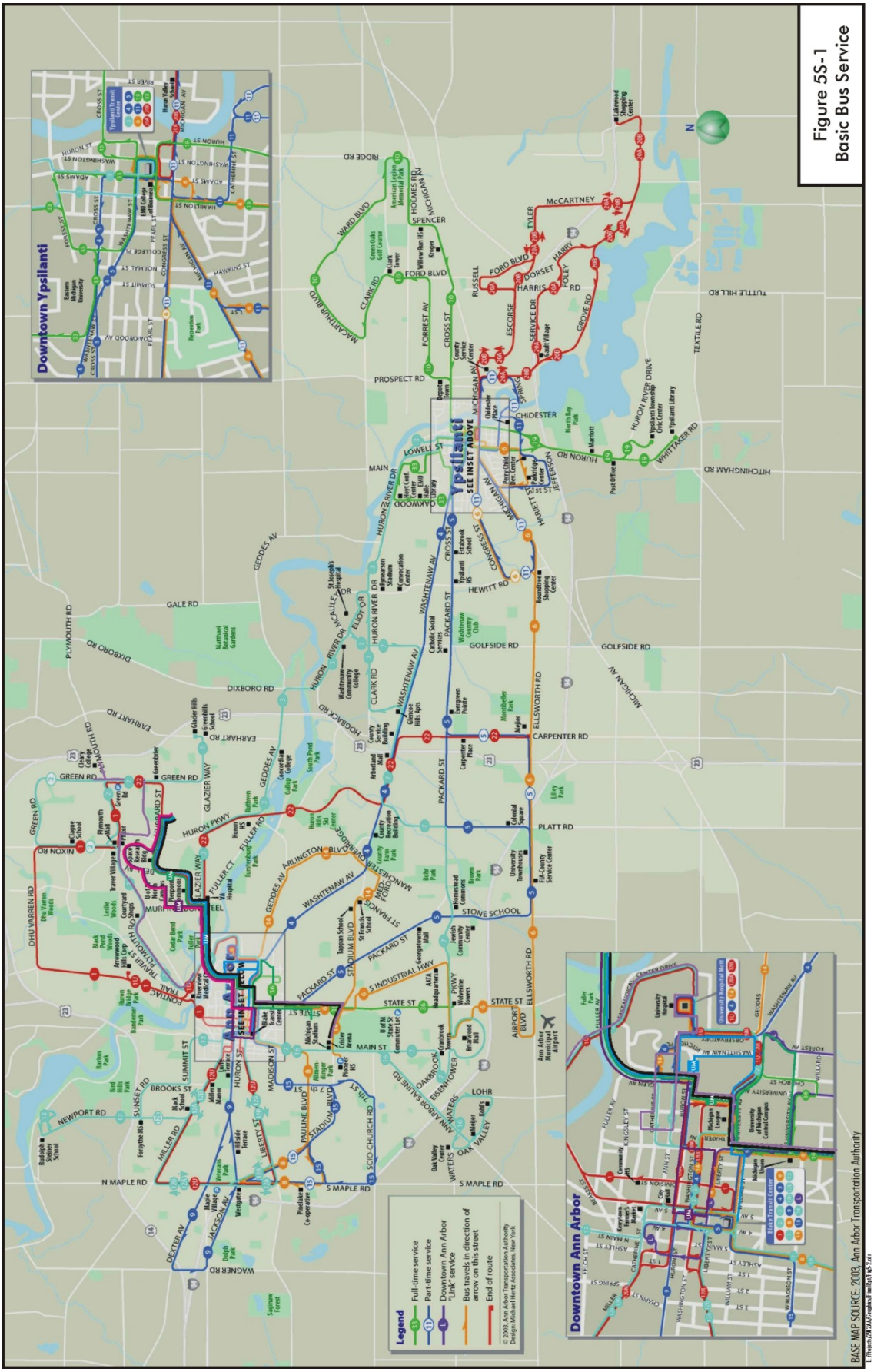


Figure 5S-1
Basic Bus Service

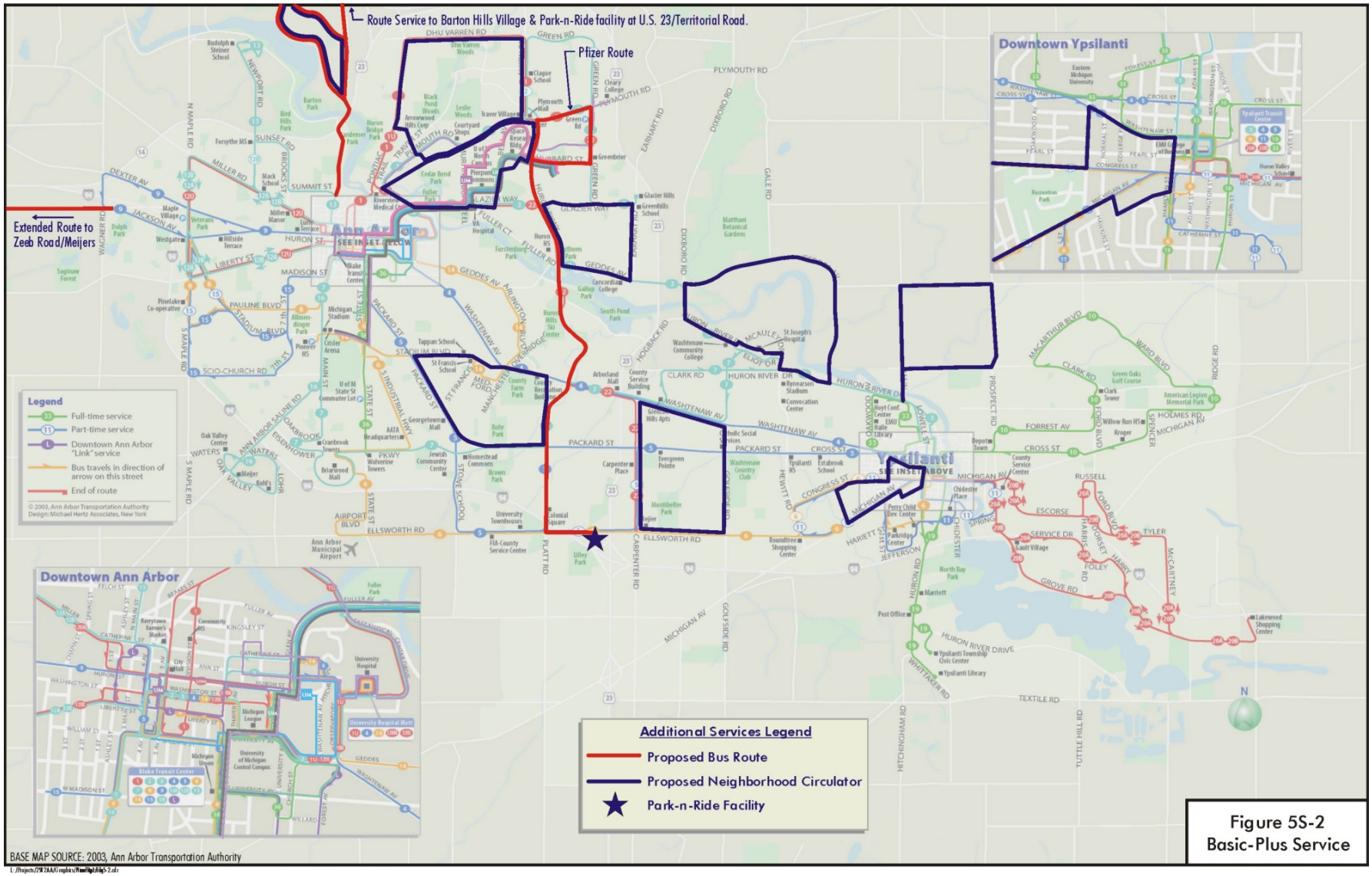


Figure 5S-2
Basic-Plus Service

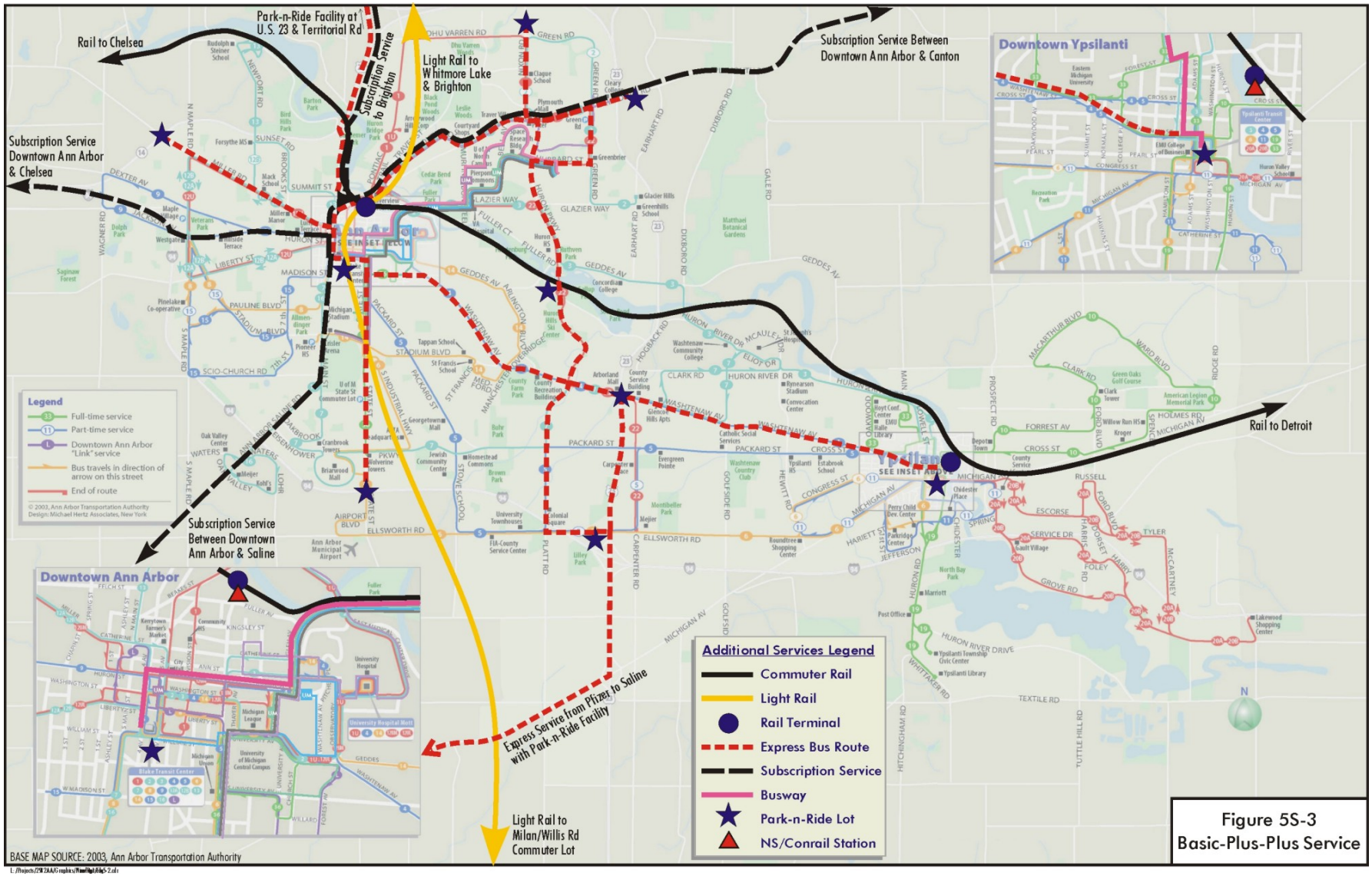


Figure 5S-3
Basic-Plus-Plus Service

Table 5S-2
Northeast Ann Arbor Transportation Plan
Transit Analysis Results

- BASIC-PLUS concept produces eight percent increase in ridership over BASIC system in 2025
- Cutting time between buses is largest determinant of increased ridership – almost a 1 to 1 ratio
- Cutting fares is not productive when comparing ridership increases to revenue decreases
- Increasing parking costs produces a six percent increase in ridership over BASIC system in 2025
- Peak hour express/subscription services can increase ridership by nine percent over BASIC system
- A busway concept is not cost efficient by 2025
- An LRT concept is not cost efficient by 2025
- Commuter rail is expected to accommodate 500 trips per day at the Ann Arbor Station

Table 5S-3
Northeast Ann Arbor Transportation Plan
Preliminary Cost Estimate (2004 Dollars)
Most Viable Transit Concepts

	2025 Daily Trips		Incremental		Annual	Additional Vehicles[2]			
Component	Areawide	NE Ann Arbor	Annual Revenue	Annual Cost	Revenue Needed	Number	Cost	Park-N-Ride Lots	Notes
Basic Service	30,254	7,201	$6,403,244	$20,817,280	$14,414,035	0	--	NA	AATA 56 peak vehicles, University 32 peak vehicles
Circulators/Park-N-Ride	1,801	540	$381,196	$5,537,124	$5,155,927	22	$2,972,000	NA	8 medium heavy duty buses (approx. 30 pass.) for P&R and 14 Cutaways (18 pass.) for Circulators
Express Bus (AM/PM Peak)[1]	975	101	$881,443	$2,908,380	$2,026,937	25	$8,250,000	6	25 heavy duty buses (approx. 40 pass.) plus 6 park-and-ride lots at average cost of $1.5 million per facility
Headway Reduction (50%)	11,340	2,801	$615,066	$26,473,620	$25,858,554	110	$28,592,000	NA	Double AATA and University fleet. Assume 25 medium duty buses and 31 heavy duty buses for AATA and 32 medium duty uses for University. Double Circulator and P&R buses.
Parking Cost Increase	2,903	710	$2,550,344	--	--	0	--	NA	

[1]Subcontracted service will pay for itself and is not included in estimate.
[2]Estimated Vehicle Prices form FY 2005 Application Instructions for Public Transit Programs Administered by the Passenger Transportation Division, MDOT

Cutaway Bus	$58,000
Medium Heavy Duty Bus	$270,000
Heavy Duty Bus	$330,000

Source: The Corradino Group of Michigan, Inc.

motorized use and less driving. An example of this concurrency approach can be found in the university community of Gainesville, Florida.

Additional Proposals

Based on these tests, the consultant believes the future transit system in Ann Arbor should pursue the following four elements in the following order based on the cost to implement: 1) improved neighborhood circulators; 2) subscription bus services; 3) peak hour express bus/park-and-ride operations; and, 4) reducing the time between buses. Actions on these concepts are the prerogative of AATA which will conduct further work on each.

Other Considerations

One measure of the effects of each of these scenarios on the northeast Ann Arbor roadway system is the total hours of delay encountered by all vehicles using northeast Ann Arbor roadways in the afternoon peak hour) (refer to Tables 5-16, 5-18, 5-20 and 5-21 presented later). Overall, the least delay is associated with the BASIC-PLUS system (without the Busway) in combination with the headway reduction of 50 percent, a fare reduction of 20 percent and an increase in parking cost of 20 percent (see Table 5-18, Scenario 2F presented later). Nevertheless, the delay reduction is not more than six hours, which amounts to an average of fewer than 10 seconds per vehicle using northeast Ann Arbor roads in 2025 in the afternoon peak hour.

Another consideration is the need for a bus-only lane(s). A review of the number of buses expected to be using northeast Ann Arbor city streets in the 2025 peak hour was undertaken to determine if that is an appropriate concept to pursue. The largest volume of bus traffic (31 per hour) is expected on Fuller Road between the University of Michigan North and Central Campuses (Figure 5-9). Research[1] indicates that, from the standpoint of enforceability, volumes of 40 to 60 buses per hour per direction (i.e., about one bus per minute) is the desirable threshold at which a bus lane should operate. This is not expected to be evident anywhere in Ann Arbor by 2025. Nevertheless, the recent implementation of a "no fare" policy for UM students using AATA buses may cause that situation to change. That policy has caused an increase of about 1,500 riders per day (11 to 12%) on the AATA system. While that does not immediately lead to an increase in fleet size, continued growth in ridership can, and that should be accompanied by monitoring and further planning of a bus lane on Fuller Road to connect the two University campuses.

[1] Transportation Research Board Report 143, Bus Use of Highways, 1979.

5.1 Step 1: Ensure Reliability of New (TransCAD) and Old (TranPlan) Models

Following development of the non-motorized component of the plan, the TransCAD model became available. A five-step process was then applied to continue development of the transportation plan.

Step 1: Ensure Reliability of New and Old Models

A. Compare the TranPlan 2020 assignment with the TransCAD 2025 assignment with the M-14/Barton Drive interchange unchanged.

B. Compare the TranPlan 2020 assignment to the 2025 TransCAD assignment with the M-14/Barton Drive interchange changed per Phase II of the NEATP.

Step 2: Determine Impact of the NEAP Land Use Proposals

- Adjust NEAP land use recommendations to determine travel effects.

Step 3: Apply non-motorized trip diversion to the Step 2B model results.

- Adjust trip table.
- Adjust roadway link capacities.

A key factor in using this approach was the availability of a modal split model that accounts for non-motorized and transit modes.

Step 4: Generate and test alternative transit concepts/policies using Step 3 model results.

- Adjust Headways (i.e. time between buses)
- Adjust routes
- Add Express Bus/Park-n-Ride Services
- Add Fixed Guideway Service
  - ✓ LRT/Busway
  - ✓ Commuter Rail

Step 5: Adjust trip table and examine highway improvement needs based on transit improvements accepted in Step 4 with M-14/Barton Drive interchange per Phase II of the NEATP.

- Plymouth Road between U.S. 23 and Huron River Drive
- Fuller Road between Huron Parkway and Glen Avenue
- Geddes Road between U.S. 23 and Huron Parkway
- Jackson Road between I-94 and Main Street
- Washtenaw Avenue between Geddes Avenue and U.S. 23
- Geddes Avenue between U.S. 23 and Huron Parkway

In initializing the process, specifically Step 4, the TAC, TCAC, and the public were asked to examine how the basic bus transit system serving Ann Arbor should be adjusted.

To determine the reliability of the new TransCAD model, its results were compared to the data produced by the model it replaces, i.e., TranPlan, with and without changes to the Barton Drive interchange with M-14. A basic test to determine the degree of reliability of both modeling approaches is to calculate the Root Mean Square Error (RMSE) between the TransCAD and TranPlan 2020 assignments of highway trips using TranPlan as the "base" (and without any

changes to the Barton Drive/M-14 interchange). The results overall, i.e., for all links in the networks, is poor with an RMSE of nearly 60 percent (Table 5-1). A good RMSE is in the range of 35 percent or less. By type of roadway, the RMSE's are much better for freeway links (RMSE = 30%) and Principal Arterial (RMSE = 39 percent) and Minor Arterial Roads (RMSE = 41%). These are the facilities of most concern in the NEATP analysis.

Table 5-1
Comparison of TransCAD and TranPlan Model Assignments
(Using TranPlan Data as the Base)

	Links							
	All	Freeway	Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local	Ramp
No. of Links	2,512	248	453	569	742	141	178	181
RMSE[1]	58.7%	29.5%	38.6%	41.2%	81.5%	167.1%	127.4%	103.8%

[1]RMSE = Route Mean Square Error.
Source: The Corradino Group of Michigan, Inc.

It is noteworthy that TransCAD was calibrated against 1998 traffic count data. Its overall (all links) RMSE is 33 percent (Table 5-2). The RMSE statistic for freeway links is 14 percent and for principal arterials, 27 percent. In light of the above-reported 60 percent RMSE and the TransCAD comparison to 1998 counts with an RMSE of 33 percent, it is concluded the TransCAD model is performing at an acceptable level for this type analysis. No data were available on the TranPlan network calibration.

Table 5-2
Comparison of TransCAD Model Assignment with 1998 Traffic Counts
(Using Counts as the Base)

	Links							
	All	Freeway	Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local	Ramp
No. of Links	1,247	104	225	351	412	59	35	61
RMSE[1]	33.4%	14.1%	27.4%	36.1%	50.3%	97.8%	70.9%	55.9%

[1]RMSE = Route Mean Square Error.
Source: The Corradino Group of Michigan, Inc.

The next step in this "reliability" analysis was to examine the 2020 assignments by both models for the segments in northeast Ann Arbor as defined in the study of the Barton Drive/M-14 interchange alternatives (Table 5-3). Here, the RMSE for the 33 segments is 18 percent.

Overall, the TransCAD results confirm that removing the east side of the Barton/M-14 interchange does not produce congestion throughout the system any different than that under the No Action Condition (i.e., leaving the Barton/M-14 interchange as it now exists) (Table 5-4). This is illustrated by examining separately the column labeled "V/C Ratio" for the TransCAD model (Red column on Table 5-4). In no instance are these ratios greater than 1.10, meaning congestion associated with deleting the east side of the Barton/M-14 interchange is never 10 percent greater than if the interchange remained as it now exists.

One important difference between the TransCAD and earlier TranPlan systems is that the capacity assumptions are not the same. This created differences in both the model assignment and the V/C calculations. It is important to note that capacities are input values; they are not governed by the choice of modeling software. And, the consultant who developed the TransCAD model software noted the following:

> "An analysis of the link capacities provided by WATS staff uncovered some discrepancies in the coding by functional class and area type. In some cases, these discrepancies were intentional; in other cases they were unintentional. An updated capacity table to set hourly capacities by functional class and area type was developed and is presented in Table 2-7. This table was applied in the WATS Travel Model during trip assignment. Capacities were derived from an analysis of the minimum, maximum, and average capacities in each category. These are primarily consistent with SEMCOG capacities, as shown in Table 2-7, but there were some minor differences. This capacity table was not revised during model calibration.

Table 2-7
Final Capacity Table (Vehicles Per Through-Lane Per Hour)

	Washtenaw County Model Capacities				SEMCOG Model Capacities			
Functional Class	CBD	Urban	Suburban	Rural	CBD	Urban	Suburban	Rural
Freeway	N/A	1,900	1,900	1,900	1,850	1,850	1,900	1,900
Principal Arterial	850	950	950	950	850	900	950	950
Minor Arterial	725	750	750	750	650	700	750	850
Major Collector	550	650	700	700	550	600	650	700
Minor Collector	N/A	N/A	600	650	550	600	650	700
Local	550	550	550	550	500	550	550	575
Ramps	1,300	1,300	1,300	1,300	1,200	1,250	1,250	1,300

Source: Cambridge Systematics, Inc.

> Capacities are estimated separately for peak and daily assignments. The daily capacity (vehicles per day) is equal to the peak capacity (vehicles per hour) times the peak-hour factor (assumed to be 10). The peak capacity is equal to the hourly capacity times the number of lanes."[2]

[2] Cambridge Systematics, Inc., 2003.

Table 5-3
Comparison of No Action Condition (2020 Traffic)
Base or Roadway Segments used in NEATP Tech Memo C

Road Segment	From	To	Estimated 2020 Traffic Tranplan	TransCAD	TC/TP
M-14:					
	A: W. Miller/Maple	E. of Miller/Maple	28090	18580	0.66
	B: E. of Miller/Maple	E. of Beechwood	44882	40766	0.91
	C: E. of Beechwood	E. of Main St.	47056	40768	0.87
	D: E. of Main St.	S. of Barton Dr.	84028	84692	1.02
	E: S. of Barton Dr.	No. of Barton Dr.	69640	71990	1.02
	F: N. of Barton Dr.	S. of U.S. 23	71788	82146	1.14
	G: W. of U.S. 23	E. of Nixon	76668	67676	0.88
	H: E. of U.S. 23	E. of Dixboro	65580	74836	1.14
Whitmore Lake Road					
	A: Huron River Dr.	Stein Rd	8080	8294	1.03
	B: Stein Rd.	N. Territorial Rd.	6018	4705	0.78
Barton Drive					
	A: M-14	Pontiac Trail	12358	23892	1.93
	B: Pontiac Trail	Plymouth	12409	14352	1.16
Pontiac Trail					
	A: Plymouth Rd.	Barton Dr.	9425	14057	1.49
	B: Barton Dr.	Dhu Varren Rd.	11010	12020	1.09
Plymouth Road					
	A: Huron River Dr.	Barton Dr.	32805	30681	0.94
	B: Barton Dr.	Nixon Rd.	37187	37713	1.01
	C: Nixon Rd.	U.S. 23	38409	42659	1.11
Nixon Road					
	A: Plymouth Rd.	Dhu Varren Rd.	10208	15564	1.52
	B: Dhu Varren Rd.	M-14	9737	8191	0.84
	C: M-14	Pontiac Trail	9464	8191	0.87
Fuller Road					
	A: Glen Ave.	Glazier Way	27213	24158	0.89
	B: Glazier Way	Huron Pkwy.	17958	13124	0.73
Geddes Road					
	A: Huron Pkwy.	U.S. 23	18173	15720	0.87
Miller Road					
	A: M-14	Newport Rd.	11674	12250	1.05
	B: Newport Rd.	Main St.	13192	14099	1.07
Jackson Road					
	A: I-94	Main St.	30834	34586	1.12
Huron Parkway					
	A: Plymouth Rd.	Fuller Rd.	14983	10964	0.73
	B: Fuller Rd.	Geddes Rd.	29114	21751	0.75
Main Street					
	A: M-14	Depot St.	39275	44266	0.94
Washtenaw					
	A: U.S. 23	Stadium	47419	44411	1.08
	B: Stadium	Geddes Ave.	30585	24814	1.07
Huron River Drive					
	A: U.S. 23	Huron Pkwy.	12732	9931	0.83
Geddes Avenue					
	A: Huron Pkwy.	U.S. 23	13586	8915	0.88

TC/TP = Estimated TransCAD/Tranplan daily assigned volume.
Source: The Corradino Group of Michigan, Inc.

Table 5-4
Comparison of TransCAD 2025 Assignment with TranPlan 2020 Assignment

Road Segment	From	To	Option 2-B Traffic (2020 Tranplan) Volume Ratio	V/C	V/C[1] Ratio	Option 2-B Traffic (2025 TransCAD) Volume Ratio	V/C	V/C[1] Ratio
M-14:								
	A: W. Miller/Maple	E. of Miller/Maple	0.94	0.37	0.94	0.83	0.21	0.83
	B: E. of Miller/Maple	E. of Beechwood	0.92	0.56	0.92	0.88	0.51	0.88
	C: E. of Beechwood	E. of Main St.	0.92	0.56	0.92	0.87	0.50	0.88
	D: E. of Main St.	S. of Barton Dr.	0.93	1.05	0.93	0.95	1.14	0.95
	E: S. of Barton Dr.	N. of Barton Dr.	1.05	1.04	1.05	1.02	0.98	1.03
	F: N. of Barton Dr.	S. of U.S. 23	1.01	0.96	1.01	1.00	1.11	0.99
	G: W. of U.S. 23	E. of Nixon	1.01	1.12	1.01	1.01	0.96	1.00
	H: E. of U.S. 23	E. of Dixboro	1.00	0.88	1.00	1.00	1.01	1.00
Whitmore Lake Road								
	A: Huron River Dr.	Stein Rd.	0.90	0.69	0.90	1.02	0.87	0.99
	B: Stein Rd.	N. Territorial Rd.	0.94	0.49	0.94	1.06	0.72	1.03
Barton Drive								
	A: M-14	Pontiac Trail	0.71	0.83	0.71	0.70	1.42	0.73
	B: Pontiac Trail	Plymouth	0.93	1.10	0.93	0.87	1.18	0.94
Pontiac Trail								
	A: Plymouth Rd.	Barton Dr.	1.05	0.73	1.05	1.05	1.07	1.10
	B: Barton Dr.	Dhu Varren Rd.	0.92	0.75	0.92	0.90	0.88	0.95
Plymouth Road								
	A: Huron River Dr.	Barton Dr.	1.00	1.17	1.00	1.02	0.85	1.06
	B: Barton Dr.	Nixon Rd.	0.94	1.04	0.94	0.97	0.81	0.99
	C: Nixon Rd.	U.S. 23	1.02	1.17	1.02	1.02	0.94	1.01
Nixon Road								
	A: Plymouth Rd.	Dhu Varren Rd.	1.00	0.91	1.00	1.00	1.32	1.04
	B: Dhu Varren Rd.	M-14	1.00	0.81	1.00	1.04	0.74	1.01
	C: M-14	Pontiac Trail	1.00	0.79	1.00	1.04	0.74	1.01
Fuller Road								
	A: Glen Ave.	Glazier Way	1.08	1.56	1.08	0.99	1.17	0.99
	B: Glazier Way	Huron Pkwy.	1.06	1.25	1.06	1.01	0.75	1.04
Geddes Road								
	A: Huron Pkwy.	U.S. 23	1.01	1.37	1.01	1.01	1.11	1.04
Miller Road								
	A: M-14	Newport Rd.	1.03	0.89	1.03	1.07	0.95	1.06
	B: Newport Rd.	Main St.	1.02	1.00	1.02	1.08	1.08	1.06
Jackson Road								
	A: I-94	Main St.	1.02	1.02	1.02	1.08	0.91	1.07
Huron Parkway								
	A: Plymouth Rd.	Fuller Rd.	1.00	0.97	1.00	1.00	0.74	1.04
	B: Fuller Rd.	Geddes Rd.	1.00	1.56	1.00	1.00	0.98	1.04
Main Street								
	A: M-14	Depot St.	0.95	1.33	0.95	1.02	1.41	1.02
Washtenaw								
	A: U.S. 23	Stadium	1.04	1.54	1.04	1.01	1.04	1.00
	B: Stadium	Geddes Ave.	1.04	1.13	1.04	1.02	0.66	1.03
Huron River Drive								
	A: U.S. 23	Huron Pkwy.	0.91	1.11	0.91	1.03	0.70	1.19
Geddes Avenue								
	A: Huron Pkwy.	U.S. 23	0.88	1.05	0.88	0.99	0.66	1.06

[1] No Action Alternative divided into new alternative.

Source: The Corradino Group of Michigan, Inc.

The NEATP's analysis of the new TransCAD capacities indicated a number of situations that needed further examination. For example, the capacity of Washtenaw Avenue between U.S. 23 and Stadium (Table 5-5) is 40 percent higher than the TranPlan number. So, a study of capacities was conducted for the key roadway segments in the northeast Ann Arbor area. This analysis considered roadway type, area type, number of lanes and traffic signals. Field observation was also involved. The result of this work produced a decision that TranPlan capacities were more practical and were to be applied in the northeast Ann Arbor area in all cases but for M-14, Fuller Road and Huron Parkway for which the TransCAD capacities would be used (Table 5-6). It is noted this almost always reduces the capacity thereby making the roadway system "more conservative" in deciding the need for improvements.

With the revised capacities for northeast Ann Arbor roadways inserted in the TransCAD model, the expected congestion in 2025 (i.e., the "V/C", or Blue, column of Table 5-7 data), appears problematic for the following segments:

Barton Drive/Segment A:	V/C = 1.70
Barton Drive/Segment B:	V/C = 1.39
Plymouth Road/Segment C:	V/C = 1.30
Nixon Road/Segment A:	V/C = 1.61
Geddes Road/Segment A:	V/C = 1.27
Jackson Road/Segment A:	V/C = 1.25
Main Street/Segment A:	V/C = 1.72
Washtenaw/Segment A:	V/C = 1.40

For Barton Drive between M-14 and Pontiac Trail (Segment A) the congestion associated with closing the east side of its M-14 interchange is defined by a "V/C" of 1.70 and a "V/C Ratio" of 0.73. That means the congestion for Barton Drive under the No Change condition would be over 2 (i.e., 1.70 ÷ 0.73). That, in turn, means the road would be clogged with bumper-to-bumper traffic for more than the peak hour each day, if the Barton Drive/M-14 interchange remains as it is. So, closing the east half of the interchange is a positive action for those on Barton Drive and not a negative action for those who use/live near other roadway segments. This new level of congestion is associated with the updated NEAP land use information for 2025.

For each of the above segments but Barton Drive, it is noteworthy that: 1) the congestion associated with closing the east side of the Barton/M-14 interchange is no different than when the interchange is left as it is. In other words, the TransCAD "V/C Ratio" or "Red" column on Table 5-7, which compares congestion with the interchange partially closed, to congestion with the interchange as it now exists, is always very close to 1.00. But, the results indicate that some change (diversion of auto traffic to another mode, acceptance of higher level of congestion, or road widening) may be necessary on a number of segments as implementation of the NEATP proceeds. This conclusion is consistent with the earlier M-14/Barton Drive analysis based on TranPlan.

Table 5-5
Comparison of TranPlan and TransCAD Capacities

			Average Capacity			
Road Segment	From	To	TranPlan	TransCAD	Difference	Percent Difference
M-14:						
	A: W. Miller/Maple	E. of Miller/Maple	75,000	76,000	2,000	+2.70%
	B: E. of Miller/Maple	E. of Beechwood	74,000	76,000	2,000	+2.70%
	C: E. of Beechwood	E. of Main St.	74,000	76,000	2,000	+2.70%
	D: E. of Main St.	S. of Barton Dr.	74,000	76,000	2,000	+2.70%
	E: S. of Barton Dr.	N. of Barton Dr.	74,000	76,000	2,000	+2.70%
	F: N. of Barton Dr.	S. of U.S. 23	74,000	76,000	2,000	+2.70%
	G: W. of U.S. 23	E. of Nixon	70,000	75,000	3,000	+4.30%
	H: E. of U.S. 23	E. of Dixboro	74,000	76,000	2,000	+2.70%
Whitmore Lake Road						
	A: Huron River Dr.	Stein Rd.	10,500	13,984	3,484	+33.18%
	B: Stein Rd.	N. Territorial Rd.	11,534	11,903	370	+3.21%
Barton Drive						
	A: M-14	Pontiac Trail	10,500	14,000	3,500	+33.33%
	B: Pontiac Trail	Plymouth	10,500	12,600	2,100	+20.00%
Pontiac Trail						
	A: Plymouth Rd.	Barton Dr.	13,537	14,755	1,218	+9.00%
	B: Barton Dr.	Dhu Varren Rd.	13,500	14,617	1,117	+8.27%
Plymouth Road						
	A: Huron River Dr.	Barton Dr.	28,000	38,000	10,000	+35.71%
	B: Barton Dr.	Nixon Rd.	33,600	47,500	13,900	+41.37%
	C: Nixon Rd.	U.S. 23	33,600	47,500	13,900	+41.37%
Nixon Road						
	A: Plymouth Rd.	Dhu Varren Rd.	11,071	13,827	2,755	+24.89%
	B: Dhu Varren Rd.	M-14	12,000	14,000	2,000	+16.67%
	C: M-14	Pontiac Trail	12,000	14,000	2,000	+16.67%
Fuller Road						
	A: Glen Ave.	Glazier Way	18,873	20,632	1,759	+9.32%
	B: Glazier Way	Huron Pkwy.	15,175	18,391	3,217	+21.20%
Geddes Road						
	A: Huron Pkwy.	U.S. 23	13,500	15,000	1,500	+11.11%
Miller Road						
	A: M-14	Newport Rd.	13,500	15,000	1,500	+11.11%
	B: Newport Rd.	Main St.	13,500	15,000	1,500	+11.11%
Jackson Road						
	A: I-94	Main St.	30,816	42,434	11,618	+37.70%
Huron Parkway						
	A: Plymouth Rd.	Fuller Rd.	15,625	16,404	779	+4.98%
	B: Fuller Rd.	Geddes Rd.	18,563	24,386	5,824	+31.37%
Main Street						
	A: M-14	Depot St.	28,000	34,200	6,200	+22.14%
Washtenaw						
	A: U.S. 23	Stadium	31,822	44,551	12,729	+40.00%
	B: Stadium	Geddes Ave.	28,000	37,868	9,868	+35.24%
Huron River Drive						
	A: U.S. 23	Huron Pkwy.	10,500	14,000	3,500	+33.33%
Geddes Avenue						
	A: Huron Pkwy.	U.S. 23	10,589	13,713	3,124	+29.50%

Source: The Corradino Group of Michigan, Inc.

Table 5-6
Capacity Selected for Further NEATP Analysis

Road Segment		From	To	Average Capacity	
				Tranplan	TransCAD
M-14					
	A:	W. Miller/Maple	E. of Miller/Maple	NU[1]	38,000
	B:	E. of Miller/Maple	E. of Beechwood	NU	38,000
	C:	E. of Beechwood	E. of Main St.	NU	38,000
	D:	E. of Main St.	S. of Barton Dr.	NU	38,000
	E:	S. of Barton Dr.	No. of Barton Dr.	NU	38,000
	F:	N. of Barton Dr.	S. of U.S. 23	NU	38,000
	G:	W. of U.S. 23	E. of Nixon	NU	36,506
	H:	E. of U.S. 23	E. of Dixboro	NU	38,000
Whitmore Lake Road					
	A:	Huron River Dr.	Stein Rd	10,500	NU
	B:	Stein Rd.	N. Territorial Rd.	11,534	NU
Barton Drive					
	A:	M-14	Pontiac Trail	10,500	NU
	B:	Pontiac Trail	Plymouth	10,500	NU
Pontiac Trail					
	A:	Plymouth Rd.	Barton Dr.	13,537	NU
	B:	Barton Dr.	Dhu Varren Rd.	13,500	NU
Plymouth Road					
	A:	Huron River Dr.	Barton Dr.	28,000	NU
	B:	Barton Dr.	Nixon Rd.	33,600	NU
	C:	Nixon Rd.	U.S. 23	33,600	NU
Nixon Road					
	A:	Plymouth Rd.	Dhu Varren Rd.	11,071	NU
	B:	Dhu Varren Rd.	M-14	12,000	NU
	C:	M-14	Pontiac Trail	12,000	NU
Fuller Road					
	A:	Glen Ave.	Glazier Way	NU	20,632
	B:	Glazier Way	Huron Pkwy.	NU	18,391
Geddes Road					
	A:	Huron Pkwy.	U.S. 23	13,500	NU
Miller Road					
	A:	M-14	Newport Rd.	13,500	NU
	B:	Newport Rd.	Main St.	13,500	NU
Jackson Road					
	A:	I-94	Main St.	30,816	NU
Huron Parkway					
	A:	Plymouth Rd.	Fuller Rd.	NU	16,404
	B:	Fuller Rd.	Geddes Rd.	NU	24,386
Main Street					
	A:	M-14	Depot St.	28,000	NU
Washtenaw					
	A:	U.S. 23	Stadium	31,822	NU
	B:	Stadium	Geddes Ave.	28,000	NU
Huron River Drive					
	A:	U.S. 23	Huron Pkwy.	10,500	NU
Geddes Avenue					
	A:	Huron Pkwy.	U.S. 23	10,589	NU

[1]Not used.

Source: The Corradino Group of Michigan, Inc.

Table 5-7
Comparison of TransCAD 2025 Assignment with TranPlan 2020 Assignment

Road Segment	From	To	Option 2-B Traffic (2020 Tranplan) Volume Ratio[1]	V/C	V/C Ratio[1]	Option 2-B Traffic (2025 TransCAD) Volume Ratio[1]	V/C	V/C Ratio[1]
M-14:								
	A: W. Miller/Maple	E. of Miller/Maple	0.94	0.37	0.94	0.83	0.21	0.83
	B: E. of Miller/Maple	E. of Beechwood	0.92	0.56	0.92	0.88	0.49	0.88
	C: E. of Beechwood	E. of Main St.	0.92	0.56	0.92	0.88	0.49	0.88
	D: E. of Main St.	S. of Barton Dr.	0.93	1.05	0.93	0.95	1.13	0.95
	E: S. of Barton Dr.	No. of Barton Dr.	1.05	1.04	1.05	1.03	1.01	1.03
	F: N. of Barton Dr.	S. of U.S. 23	1.01	0.96	1.01	0.99	1.11	0.99
	G: W. of U.S. 23	E. of Nixon	1.01	1.12	1.01	1.00	0.96	1.00
	H: E. of U.S. 23	E. of Dixboro	1.00	0.88	1.00	1.00	1.00	1.00
Whitmore Lake Road								
	A: Huron River Dr.	Stein Rd	0.90	0.69	0.90	0.99	0.92	0.99
	B: Stein Rd.	N. Territorial Rd.	0.94	0.49	0.94	1.03	0.54	1.03
Barton Drive								
	A: M-14	Pontiac Trail	0.71	0.83	0.71	0.73	1.70	0.73
	B: Pontiac Trail	Plymouth	0.93	1.10	0.93	0.94	1.39	0.94
Pontiac Trail								
	A: Plymouth Rd.	Barton Dr.	1.05	0.73	1.05	1.10	1.14	1.10
	B: Barton Dr.	Dhu Varren Rd.	0.92	0.75	0.92	0.95	1.00	0.95
Plymouth Road								
	A: Huron River Dr.	Barton Dr.	1.00	1.17	1.00	1.06	1.21	1.06
	B: Barton Dr.	Nixon Rd.	0.94	1.04	0.94	0.99	1.16	0.99
	C: Nixon Rd.	U.S. 23	1.02	1.17	1.02	1.01	1.30	1.01
Nixon Road								
	A: Plymouth Rd.	Dhu Varren Rd.	1.00	0.91	1.00	1.04	1.61	1.04
	B: Dhu Varren Rd.	M-14	1.00	0.81	1.00	1.01	0.80	1.01
	C: M-14	Pontiac Trail	1.00	0.79	1.00	1.01	0.80	1.01
Fuller Road								
	A: Glen Ave.	Glazier Way	1.08	1.56	1.08	0.99	1.22	0.99
	B: Glazier Way	Huron Pkwy.	1.06	1.25	1.06	1.04	0.77	1.04
Geddes Road								
	A: Huron Pkwy.	U.S. 23	1.01	1.37	1.01	1.04	1.27	1.04
Miller Road								
	A: M-14	Newport Rd.	1.03	0.89	1.03	1.06	1.03	1.06
	B: Newport Rd.	Main St.	1.02	1.00	1.02	1.06	1.18	1.06
Jackson Road								
	A: I-94	Main St.	1.02	1.02	1.02	1.07	1.25	1.07
Huron Parkway								
	A: Plymouth Rd.	Fuller Rd.	1.00	0.97	1.00	1.04	0.76	1.04
	B: Fuller Rd.	Geddes Rd.	1.00	1.56	1.00	1.04	1.01	1.04
Main Street								
	A: M-14	Depot St.	0.95	1.33	0.95	1.02	1.72	1.02
Washtenaw								
	A: U.S. 23	Stadium	1.04	1.54	1.04	1.00	1.40	1.00
	B: Stadium	Geddes Ave.	1.04	1.13	1.04	1.03	0.89	1.03
Huron River Drive								
	A: U.S. 23	Huron Pkwy.	0.91	1.11	0.91	1.19	1.10	1.19
Geddes Avenue								
	A: Huron Pkwy.	U.S. 23	0.88	1.05	0.88	1.06	0.93	1.06

[1]No Action Alternative divided into new alternative.

Source: The Corradino Group of Michigan, Inc.

5.2 Step 2: Determine Impact of Northeast Area Plan Land Use Proposal

The next step in the NEATP analysis involved examining the proposed Northeast Ann Arbor Plan (NEAP) land use proposals to determine their effects on transit and automobile travel. Table 5-8 displays person trips by all modes for 1998 based on the calibrated TransCAD model and for 2025 under three scenarios: 1) the 2025 land use data developed by Ann Arbor Planning Department staff for the Northeast Ann Arbor Plan (AAPD); 2) an increase of 40 percent of the residential densities in the largest, primarily-vacant, sites associated with the NEAP data, provided in 1 (AAPD +40%); and, 3) a decrease of 40 percent of the residential densities in the largest, primarily-vacant, sites associated with the NEAP data, provided in 1 (AAPD -40%).

Table 5-8 illustrates the northeast section of the city will produce a greater share of all its trips using transit and non-motorized modes compared to the county as a whole and by factors of over 1.5:1 (bike and walk, i.e., blue circles) and over 2:1 for transit (i.e., red circles), regardless of land use scenario. But, while the data reflect an increase from 1998 to 2025 in the number of bicycle, walk and transit trips in northeast Ann Arbor, greater growth is expected in auto use, both the drive alone and carpool modes. As a result, the share of total travel by the transit and non-motorized modes in 2025 in northeast Ann Arbor is forecast to decline from 1998 conditions.

Increasing the density of residential land uses beyond those now proposed for 2025 in the NEAP (i.e., AAPD +40%) would produce more transit and non-motorized trips. However, the mode share of non-auto travel in northeast Ann Arbor would be virtually unchanged. This was expected as the number of sites focused on in the NEAP are relatively small compared to all of northeast Ann Arbor and, therefore, changes there are not able to create much overall change/shift in travel patterns (refer to Figure 4-1 and Table 4-1).

Decreasing the density of the proposed NEAP residential land uses for 2025 (i.e., AAPD -40%) would cause virtually no statistical difference in northeast area trip making by mode.

Another analysis of the effects of varying residential land use density involved placing a band of one-quarter mile on each side of the transit routes in the 2025 TransCAD network and overlaying the band on the traffic analysis zones in which the households are considered uniformly distributed. Interestingly, reducing the residential density by 40 percent (i.e., AAPD -40%) for the largest, primarily-vacant, sites, compared to the proposed land uses in the NEAP, would create a greater percentage of the households within a quarter mile of a transit route because non-transit households are deleted with the density reduction (bottom of Table 5-8).

The next analysis undertaken dealt with the effect on highway travel due to varying residential densities in northeast Ann Arbor. Table 5-9 presents information on peak-hour roadway delay in 2025 by changing the density of residential land uses of selected sites focused on in the NEAP. Increasing density by 40 percent will likely lead to increases in delay of about 30 percent on minor arterials (like Pontiac Trail) and by about 40 percent on major collectors (like Dhu Varren). Likewise, reducing densities by 40 percent produces a reduction in delay of about 6 percent on minor arterials and about 25 percent on major collectors.

Table 5-8
Comparison of Trip Data for Various Lane Use Conditions

Trip Ends By Mode

	1998		AAPD 2025[1]		AAPD + 40%[2]		AAPD - 40%[3]	
Variable	County	NE Area	County	NE Area	County	NE Area	County	NE Area
Bike	22,270	4,358	27,284	5,202	27,499	5,387	27,095	5,041
Walk	309,122	54,704	340,406	63,995	343,601	67,264	338,085	61,588
Transit	53,324	12,903	60,466	14,369	60,821	14,744	60,172	14,047
Carpool	711,456	78,439	1,132,790	114,203	1,139,650	119,873	1,126,693	109,134
Drive Alone	1,146,583	116,738	1,814,837	171,857	1,827,161	180,699	1,803,852	163,987
Total Trip Ends	2,242,755	267,142	3,375,783	369,626	3,398,732	387,967	3,355,897	353,797

Note: Every trip has 2 Trip Ends

Shares By Mode

	1998		AAPD 2025[1]		AAPD + 40%[2]		AAPD - 40%[3]	
Variable	County	NE Area	County	NE Area	County	NE Area	County	NE Area
Bike	0.99%	1.63%	0.81%	1.41%	0.81%	1.39%	0.81%	1.42%
Walk	13.78%	20.48%	10.08%	17.31%	10.11%	17.34%	10.07%	17.41%
Transit	2.38%	4.83%	1.79%	3.89%	1.79%	3.80%	1.79%	3.97%
Carpool	31.72%	29.36%	33.56%	30.90%	33.53%	30.90%	33.57%	30.85%
Drive Alone	51.13%	43.70%	53.76%	46.49%	53.76%	46.57%	53.76%	46.35%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Households within Walking Distance of a Transit Route

Variable	County	NE Area	County	NE Area	County	NE Area	County	NE Area
Households within 0.25 mi	63,854	10,560	76,916	13,577	77,890	14,552	76,109	12,771
Total HH	116,218	13,056	177,674	17,520	179,028	18,874	176,513	16,359
Percent of Total	54.94%	80.88%	43.29%	77.50%	43.51%	77.10%	43.12%	78.07%

Source: The Corradino Group of Michigan, Inc.

[1] AAPD = Ann Arbor Planning Department.
[2] Residential density increased by 40%.
[3] Residential density decreased by 40%.

Table 5-9
PM Peak Hour Vehicle Hours of Delay

Variable	AAPD 2025[1]		AAPD + 40%[2]		AAPD - 40%[3]	
	Countywide	NE Area	Countywide	NE Area	Countywide	NE Area
Freeway	514	-	517	-	512	-
Principal Arterial	451	6	447	6	450	6
Minor Arterial	248	17	252	22	247	16
Major Collector	207	13	211	18	204	10
Minor Collector	10	-	10	-	10	-
Local Roads	4	1	4	2	4	1
Freeway Ramps	101	6	99	6	101	5
Total	1,535	43	1,540	54	1,528	38

Source: The Corradino Group of Michigan, Inc.

Table 5-10 displays these delays in terms of the average each vehicle operating during the afternoon peak hour. In the northeast area, expected delays would be less than a tenth of a minute, while for the region as a whole, the delays would be on the order of a half-minute. These are very small delays, and changes like 25 percent to 40 percent represent seconds per vehicle on average. So, changes in density reflect little impact on congestion and, therefore, delay in northeast Ann Arbor.

Table 5-10
Minutes of Delay Per Vehicle During the PM Peak Hour

Variable	AAPD 2025[1]		AAPD + 40%[2]		AAPD - 40%[3]	
	Countywide	NE Area	Countywide	NE Area	Countywide	NE Area
Freeway	0.182	-	0.183	-	0.182	-
Principal Arterial	0.160	0.009	0.158	0.008	0.160	0.008
Minor Arterial	0.088	0.023	0.089	0.029	0.087	0.021
Major Collector	0.073	0.017	0.075	0.024	0.072	0.013
Minor Collector	0.004	-	0.004	-	0.004	-
Local Roads	0.001	0.002	0.001	0.002	0.001	0.002
Freeway Ramps	0.036	0.008	0.035	0.007	0.036	0.007
Total	0.544	0.059	0.545	0.070	0.542	0.051

Source: The Corradino Group of Michigan, Inc.

[1] AAPD = Ann Arbor Planning Department.
[2] Residential density in selected areas increased by 40%.
[3] Residential density in selected areas decreased by 40%.

Finally, the analysis focused on the traffic conditions on the 33 roadway segments examined in the Barton Drive/M-14 interchange analysis (Table 5-11). Overall, in northeast Ann Arbor, decreasing the residential density creates only very slight relief in expected congestion, compared to the proposed NEAP land use recommendations. Increasing the density has only a very slight effect in the opposite direction. The exception is Pontiac Trail, which is expected to experience more than a 20 percent reduction in congestion (V/C ratio) on the segment between Barton Drive and Dhu Varren when residential land use densities contemplated by the NEAP are reduced by 40 percent.

Another significant observation is associated with closing the east side of the Barton/M-14 interchange in association with the residential densities now contemplated by the NEAP (i.e., the columns of data bordered in red in Table 5-11). This condition has the greatest effect on controlling congestion on Barton Drive with no meaningful negative impact on other major roads in northeast Ann Arbor. If the east side of the interchange isn't closed, the traffic expected on Barton Drive, between M-14 and Pontiac Trail, will exceed its capacity by more than 125 percent (or a V/C ratio of 2.25 or higher).

Overall, these results indicate changing the residential land use densities from those now proposed in the NEAP will have relatively little effect on northeast Ann Arbor's travel characteristics and no effect on Washtenaw County travel, as a whole.

5.2.1 Pfizer and Nixon Road Trips

The traffic analysis zone that includes the Pfizer headquarters is forecast (using AAPD 2025 data for northeast Ann Arbor) to generate about 14,000 daily vehicle trips (Table 5-12). Almost 75 percent of those trips would be to/from areas outside northeast Ann Arbor. This is expected of a major employer with a regional effect.

An analysis of trips on Nixon Road, between Plymouth and Dhu Varren, indicates that 2025 daily traffic volume would increase from about 16,000 to 19,400 moving from the WATS zonal data to the AAPD zonal data, due to increased housing density. A selected-link assignment, which isolates the origins and destinations of trips using this Nixon Road segment, was made for both of these conditions. This analysis shows that the traffic increase is primarily due to increases in the number of households in TAZs 32, 33 and 35 (Figure 5-1). TAZ 32 is projected to increase from 67 to 1,249 households, TAZ 33 is projected to increase from 1,369 to 2,116 households, and TAZ 35 is projected to increase from 863 to 1,046 households between WATS and AAPD forecasts. (The employment data for these zones were the same for both sets of data.)

Table 5-11
Comparison of Traffic on Northeast Ann Arbor Roadways
For Various Lane Uses

Road Segment		From	To	No Action 2025 TransCAD AAPU LU			No Action 2025 TransCAD AAPU +40 LU			No Action 2025 TransCAD AAPU -40 LU			2-B Remove E. Barton Ramps 2025 TransCAD AAPU LU		
				AvgADT	AvgDailyCap	V/C Ratio	AvgADT	AvgDailyCap	V/C Ratio	AvgADT	AvgDailyCap	V/C Ratio	AvgADT	AvgDailyCap	V/C Ratio
M-14:															
	A:	W. Miller/Maple	E. of Miller/Maple	19,204	76,000	0.25	19,588	76,000	0.26	18,922	76,000	0.25	15,610	76,000	0.21
	B:	E. of Miller/Maple	E. of Beechwood	42,590	76,000	0.56	43,108	76,000	0.57	42,048	76,000	0.55	37,544	76,000	0.49
	C:	E. of Beechwood	E. of Main St.	42,602	76,000	0.56	43,102	76,000	0.57	42,054	76,000	0.55	37,338	76,000	0.49
	D:	E. of Main St.	S. of Barton Dr.	90,376	76,000	1.19	91,050	76,000	1.20	90,040	76,000	1.18	85,556	76,000	1.13
	E:	S. of Barton Dr.	No. of Barton Dr.	74,392	76,000	0.98	74,280	76,000	0.98	74,684	76,000	0.98	76,458	76,000	1.01
	F:	N. of Barton Dr.	S. of U.S. 23	84,480	76,000	1.11	84,376	76,000	1.11	84,306	76,000	1.11	84,332	76,000	1.11
	G:	W. of U.S. 23	E. of Nixon	69,362	73,012	0.95	69,488	73,012	0.95	69,334	73,012	0.95	69,814	73,012	0.96
	H:	E. of U.S. 23	E. of Dixboro	75,792	76,000	1.00	75,690	76,000	1.00	75,566	76,000	0.99	76,076	76,000	1.00
Whitmore Lake Road															
	A:	Huron River Dr.	Stein Rd	9,378	10,500	0.89	9,424	10,500	0.90	9,579	10,500	0.91	9,629	10,500	0.92
	B:	Stein Rd.	N. Territorial Rd.	5,626	11,534	0.49	5,658	11,534	0.49	5,868	11,534	0.51	6,172	11,534	0.54
Barton Drive															
	A:	M-14	Pontiac Trail	24,651	10,500	2.35	24,973	10,500	2.38	23,821	10,500	2.27	17,893	10,500	1.70
	B:	Pontiac Trail	Plymouth	15,236	10,500	1.45	15,583	10,500	1.48	15,111	10,500	1.44	14,550	10,500	1.39
Pontiac Trail															
	A:	Plymouth Rd.	Barton Dr.	14,210	13,537	1.05	14,990	13,537	1.11	12,860	13,537	0.95	15,449	13,537	1.14
	B:	Barton Dr.	Dhu Varren Rd.	14,224	13,500	1.05	17,205	13,500	1.27	11,005	13,500	0.82	13,546	13,500	1.00
Plymouth Road															
	A:	Huron River Dr.	Barton Dr.	30,991	28,000	1.11	31,899	28,000	1.14	30,764	28,000	1.10	33,904	28,000	1.21
	B:	Barton Dr.	Nixon Rd.	38,962	33,600	1.16	39,873	33,600	1.19	38,921	33,600	1.16	39,112	33,600	1.16
	C:	Nixon Rd.	U.S. 23	44,052	33,600	1.31	44,549	33,600	1.33	44,051	33,600	1.31	43,747	33,600	1.30
Nixon Road															
	A:	Plymouth Rd.	Dhu Varren Rd.	17,685	11,100	1.59	19,153	11,100	1.73	16,236	11,100	1.46	17,894	11,100	1.61
	B:	Dhu Varren Rd.	M-14	9,672	12,000	0.81	9,757	12,000	0.81	9,679	12,000	0.81	9,617	12,000	0.80
	C:	M-14	Pontiac Trail	9,672	12,000	0.81	9,757	12,000	0.81	9,679	12,000	0.81	9,617	12,000	0.80
Fuller Road															
	A:	Glen Ave.	Glazier Way	24,954	20,632	1.21	25,248	20,632	1.22	24,770	20,632	1.20	25,074	20,632	1.22
	B:	Glazier Way	Huron Pkwy.	13,863	18,391	0.75	13,933	18,391	0.76	13,664	18,391	0.74	14,210	18,391	0.77
Geddes Road															
	A:	Huron Pkwy.	U.S. 23	16,342	13,500	1.21	16,313	13,500	1.21	16,180	13,500	1.20	17,207	13,500	1.27
Miller Road															
	A:	M-14	Newport Rd.	12,945	13,500	0.96	12,982	13,500	0.96	12,980	13,500	0.96	13,866	13,500	1.03
	B:	Newport Rd.	Main St.	14,822	13,500	1.10	14,893	13,500	1.10	14,818	13,500	1.10	15,989	13,500	1.18
Jackson Road															
	A:	I-94	Main St.	35,412	30,800	1.15	35,526	30,800	1.15	35,184	30,800	1.14	38,468	30,800	1.25
Huron Parkway															
	A:	Plymouth Rd.	Fuller Rd.	11,933	16,404	0.73	12,254	16,404	0.75	11,643	16,404	0.71	12,466	16,421	0.76
	B:	Fuller Rd.	Geddes Rd.	23,729	24,386	0.97	24,263	24,386	0.99	23,444	24,386	0.96	24,523	24,386	1.01
Main Street															
	A:	M-14	Depot St.	47,039	28,000	1.68	47,328	28,000	1.69	47,317	28,000	1.69	48,186	28,000	1.72
Washtenaw															
	A:	U.S. 23	Stadium	45,633	31,800	1.43	45,778	31,800	1.44	45,852	31,800	1.44	44,362	31,800	1.40
	B:	Stadium	Geddes Ave.	25,170	28,000	0.90	25,227	28,000	0.90	25,312	28,000	0.90	24,927	28,000	0.89
Huron River Drive															
	A:	U.S. 23	Huron Pkwy.	10,921	10,500	1.04	10,982	10,500	1.05	10,138	10,500	0.97	11,574	10,500	1.10
Geddes Avenue															
	A:	Huron Pkwy.	U.S. 23	9,371	10,600	0.88	9,417	10,600	0.89	9,195	10,600	0.87	9,814	10,600	0.93

Source: The Corradino Group of Michigan, Inc.

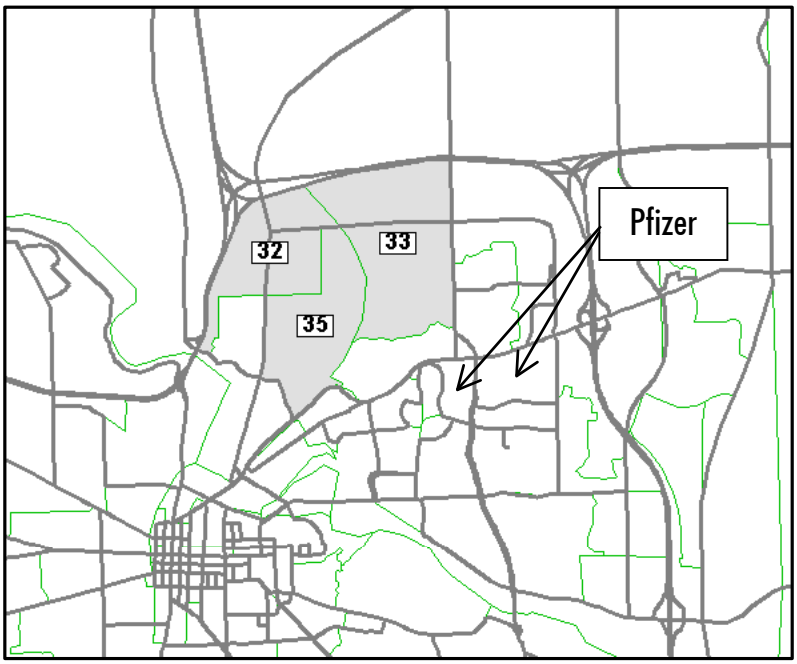
[1] AAPD = Ann Arbor Planning Department.
[2] Residential density in selected areas increased by 40%.
[3] Residential density in selected areas decreased by 40%.

Table 5-12
2025 Daily Vehicle Trips for the Pfizer Zone

Vehicle Trips Between Pfizer and	Number	Percent
Northeast Ann Arbor	3,600	26.5
Other Areas of Washtenaw Co.	7,200	52.9
Areas Outside Washtenaw Co.	2,800	20.6
	13,600	100.0

Source: The Corradino Group of Michigan, Inc.

Figure 5-1
Three Key Traffic Analysis Zones in Northeast Ann Arbor



A question about the effects of NEAP land use proposals in northeast Ann Arbor on Nixon Road required testing a set of land uses developed by reducing the number of households in the AAPD data to that proposed by WATS in Traffic Analysis Zones (TAZs) 32, 33 and 35. This adjustment resulted in a volume of about 16,000 vehicles per day on Nixon Road compared to 19,400 using the AAPD residential densities for these zones.[3] Overall, these changes are similar to those shown on Table 5-11 (and repeated on Table 5-12 as the blue set of numbers) when there is a 40 percent overall reduction in AAPD residential density from the NEAP land use proposals. But, these adjustments in TAZs 32, 33 and 35 bring more significant reductions in congestion (V/C ratios) not only on Nixon Road but also segments of Barton Drive and on Pontiac Trail (Table 5-13, the yellow colored segments). In effect, the NEAP land use changes will have no regional effects but some

[3] This analysis is with the east side of the Barton Drive/M-14 interchange removed from the highway network.

Table 5-13
Comparison of Traffic on Northeast Ann Arbor Roadways with Adjustments in TAZs 32, 33 and 35

Road Segment	From	To	AAPD -40[1] Option 2-B[3] Traffic (2025 TransCAD) V/C	AAPD Revised[2] Option 2-B Rev LU[3] Traffic (2025 TransCAD) V/C
M-14:				
	A: W. Miller/Maple	E. of Miller/Maple	0.25	0.20
	B: E. of Miller/Maple	E. of Beechwood	0.55	0.49
	C: E. of Beechwood	E. of Main St.	0.55	0.48
	D: E. of Main St.	S. of Barton Dr.	1.18	1.12
	E: S. of Barton Dr.	No. of Barton Dr.	0.98	1.01
	F: N. of Barton Dr.	S. of U.S. 23	1.11	1.11
	G: W. of U.S. 23	E. of Nixon	0.95	0.95
	H: E. of U.S. 23	E. of Dixboro	0.99	1.00
Whitmore Lake Road				
	A: Huron River Dr.	Stein Rd	0.91	0.93
	B: Stein Rd.	N. Territorial Rd.	0.51	0.55
Barton Drive				
	A: M-14	Pontiac Trail	2.27	1.59
	B: Pontiac Trail	Plymouth	1.44	1.24
Pontiac Trail				
	A: Plymouth Rd.	Barton Dr.	0.95	0.84
	B: Barton Dr.	Dhu Varren Rd.	0.82	0.37
Plymouth Road				
	A: Huron River Dr.	Barton Dr.	1.10	1.18
	B: Barton Dr.	Nixon Rd.	1.16	1.16
	C: Nixon Rd.	U.S. 23	1.31	1.32
Nixon Road				
	A: Plymouth Rd.	Dhu Varren Rd.	1.46	1.27
	B: Dhu Varren Rd.	M-14	0.81	0.81
	C: M-14	Pontiac Trail	0.81	0.81
Fuller Road				
	A: Glen Ave.	Glazier Way	1.20	1.20
	B: Glazier Way	Huron Pkwy.	0.74	0.78
Geddes Road				
	A: Huron Pkwy.	U.S. 23	1.20	1.27
Miller Road				
	A: M-14	Newport Rd.	0.96	1.02
	B: Newport Rd.	Main St.	1.10	1.16
Jackson Road				
	A: I-94	Main St.	1.14	1.24
Huron Parkway				
	A: Plymouth Rd.	Fuller Rd.	0.71	0.73
	B: Fuller Rd.	Geddes Rd.	0.96	0.99
Main Street				
	A: M-14	Depot St.	1.69	1.72
Washtenaw				
	A: U.S. 23	Stadium	1.44	1.41
	B: Stadium	Geddes Ave.	0.90	0.90
Huron River Drive				
	A: U.S. 23	Huron Pkwy.	0.97	1.09
Geddes Avenue				
	A: Huron Pkwy.	U.S. 23	0.87	0.93

[1]AAPD -40 = Ann Arbor Planning Department per proposed NEAP Land Use Plan for 2025 with residential density in selected areas reduced by 40 percent.
[2]AAPD Revised = AAPD with WATS residential land use in TAZs 32, 33 and 35 for 2025.
[3]Option 2-B = Removal of east side of Barton/M-14 interchange from roadway network.

Source: The Corradino Group of Michigan, Inc.

limited localized impacts. These effects should be the subject of further, detailed study, as noted in the last section of this report.

5.3 Step 3: Determine Non-motorized Travel

The TransCAD model addresses non-motorized travel by examining the length of the trip and a pedestrian environment variable (PEV). Obviously, the longer the trip, the less likely it will be made by non-motorized modes. PEVs for each traffic analysis zone (TAZ) were developed for Ann Arbor by AAPD and AATA staffs to provide a measure of the ease of walking between origins and destinations. (WATS developed PEVs for the remainder of the county.) The PEVs affect the number of walking trips developed in the modeling process. PEVs also impact bike trips in the model because of the strong relationship between areas that are good for walking and areas that are good for bicycling. Lastly, this variable affects transit in that it defines the ease of walking access to bus routes.

The following four factors were considered in the development of each PEV:

1. Sidewalk availability;
2. Ease of street crossing;
3. Street connectivity; and
4. Building setbacks.

A rating system for each of the four factors was applied to each traffic analysis zone. These rating systems are described in Table 5-14.

Table 5-14
Pedestrian Environment Variable (PEV) Rating System

	PEV = 0	PEV = 1	PEV = 2	PEV = 3
Sidewalk availability	No sidewalks	<10% have sidewalks	10-90% have sidewalks	>90% have sidewalks
Ease of street crossing	Crossings Difficult	<10% have easy crossings	10-90% have easy crossings	>90% have easy/ well-defined crossings
Non-motorized connections	No connections	<10% have connections	10-90% have connections	>90% have connections
Building setbacks	All large setbacks	<10% have minimum setbacks	10-90% have minimum setbacks	>90% have minimum setbacks

Source: Pedestrian Environment Variable memorandum provided by WATS developed for the SEMCOG model, March 1999.

5.4 Step 4: Generate and Test Transit Alternatives

To develop transit alternatives for testing, the TAC, TCAC and public were involved in defining a set of changes to the BASIC (i.e., current AATA) system. This allowed two alternatives to the BASIC system to be developed and labeled "BASIC PLUS" and "BASIC-PLUS-PLUS."

The testing process to develop the transit layer of the NEATP is listed on Table 5-15A. Tests were first completed of the Basic Bus Service, then the Basic-Plus Concept and, finally, the Basic-Plus-Plus Concept. It is noted that the road network used in the analysis is that which removes the east side of the M-14/Barton Drive interchange.

Prior to executing the testing process, the computer model that allocates trips to transit and bicycle/pedestrian modes was recalibrated to address inconsistencies in the data provided to the NEATP (Table 5-15B)

To address these inconsistencies, data were assembled from the USDOT Transit Database (2001). It indicates that AATA had average daily boardings of 15,654 and UM buses had average daily boardings of 15,968, for a total of 31,622 daily boardings for both systems. So, while the report provided the NEATP showed 27,664 transit boardings, compared to the operator's numbers of 31,622, the model provided to the NEATP produced 21,327 daily boardings. Furthermore, the survey target of 1.4 percent transit share, which was background to the data provided to the NEATP would produce only 15,783 linked trips (18,782 boardings at the 1.19 transfer ratio). This is far short of what the operators reported (again, 31,622 daily boardings). Therefore, the target transit share was revised to 2.4 percent of total daily person trips. This resulted in about 27,056 daily linked transit trips. The model produces about 1.2 boardings per linked trip, which results in 32,542 daily boardings. The model was recalibrated to this target. It is very much consistent with what the transit operators reported.

Functions were added to the model that allowed recalibrated results to be reported by operator and geographic area. Transit ridership for the Northeast area is 6,559 daily linked trips, and for the remainder of the county it is 20,498 daily linked trips, for a total of 27,056, which is comparable to the target of 26,434 daily linked transit trips at the 2.4 percent transit share. Furthermore, of the 32,543 daily boardings, 13,193 were onto UM buses, compared to the operator's report of 15,968. While this is not an exact match, it is close given the level of accuracy that can be expected from this type of model.

The mode share targets were then adjusted to be greater than the number of transit trips reported in the data provided to the NEATP, and to be much greater than the number actually reported by the model delivered to the NEATP. The changes made to the mode choice model allow it to be used in the analysis of transit concepts.

Even with all these changes, it is important to note that the model still has other deficiencies that will need to be addressed if it is to be used in a focused study of fixed-guideway transit:

- The model is not segmented by corridor or subarea. It should be segmented by corridor or area so it could be validated to match the differing travel behaviors observed in various parts of the region.
- Currently, the choice of walk versus drive access to transit is determined by the minimum path. The model should be used to determine and control the mode of access to transit.
- The model uses only one transit service time period. Service is assumed to be the same throughout the entire day. At the very least, the model should represent peak period and midday service in terms of routes, headways and fares.

Table 5-15A
Northeast Ann Arbor Transportation Plan
Transit Elements for Testing

Basic Bus Service

- Current AATA System extended to 2025

Basic-Plus

- Current AATA Service plus …
  - ✓ Extended route to Zeeb Road/Meijers
  - ✓ U.S. 23/Territorial Road through Barton Hills Village route to downtown Ann Arbor
  - ✓ I-94/U.S. 23 to Pfizer route with stops only at Washtenaw and Geddes Road with Park-n-Ride facility at I-94/U.S. 23
  - ✓ Neighborhood circulators in some areas
- Signal pre-emption along
  - ✓ Washtenaw
  - ✓ Plymouth
  - ✓ Huron Parkway

Basic-Plus-Plus

- The Basic-Plus Service plus …
  - ✓ Express bus service between downtown Ann Arbor and
    - Washtenaw/I-94 with Park-n-Ride facility
    - State/I-94 with Park-n-Ride facility
    - Miller/M-14 with Park-n-Ride facility
    - Plymouth/U.S. 23 with Park-n-Ride facility
    - U.S. 23/Territorial Road with Park-n-Ride facility
    - I-94/U.S. 23 S with Park-n-Ride facility
    - Nixon Road/Dhu Varren with Park-n-Ride facility
    - Ypsilanti at downtown terminal
  - ✓ Express bus service between
    - Pfizer and Saline with Park-n-Ride lots at Saline and I-94/U.S. 23 via Michigan Avenue
      - One transfer point on Pfizer-Saline route possible at Geddes Road
  - ✓ Subscription bus service between downtown Ann Arbor and
    - Chelsea
    - Canton
    - Brighton

Busway

- One lane busway with bus circulators in surrounding areas accessing busways by ramps at key locations

Rail

- Commuter rail between Chelsea and Detroit with stops in Ann Arbor, Ypsilanti, Dearborn, and other locations in CATA Plan.
- Light rail service from Whitmore Lake Road north of Ann Arbor through downtown Ann Arbor to Milan (Willis Road):
  - ✓ Stops space one to two miles apart, on average

Table 5-15B
Revalidation Statistics

Measure \ Source	USDOT from Operators	Data Provided to NEATP	1998 Original Model Sep. 8, 2003	1998 NEATP Revalidation
Linked transit trips	26,434	23,235	17,832	27,056
Survey linked transit trips	--	15,783	--	--
NE boardings	NA	NA	NA	6,559
AATA boardings	15,654	NA	NA	19,350
UM boardings	15,968	NA	NA	13,193
Total boardings	31,622	27,664	21,327	32,542

Source: The Corradino Group, USDOT, Cambridge Systematics

5.4.1 Test of BASIC Transit Service

The tests of improvements to the BASIC transit service, i.e., the current AATA system extended to 2025 (Figure 5-2) indicate that cutting headways in half (i.e., time between buses) on all routes will have the most significant effect on increasing ridership in northeast Ann Arbor (+36%) (Table 5-16). This headway change would cause about 30 percent of the transit increase to come from the non-motorized forms of transportation, while about 30 percent would be diverted from carpooling and approximately 40 percent from the use of single-occupant automobiles (Table 5-17).

Reducing transit fares by 20 percent is expected to cause approximately a six percent increase in northeast Ann Arbor transit use (Table 5-16). About one quarter of this increase would be diverted from the non-motorized modes, with the remainder of the shift to transit coming in about equal amounts from carpooling and single-occupant auto driving (Table 5-17).

The dynamics of increasing parking costs by 20 percent are more complex. Transit ridership is expected to increase by about seven percent in northeast Ann Arbor, all from the drive-alone mode (Table 5-16). And, increasing parking costs also would cause increases in the use of non-motorized forms of transportation as well as carpooling (Table 5-17).

Prioritizing the traffic signals for transit vehicles to reduce transit travel time delay is expected to have the least effect on ridership increases (about 1.6%) (Table 5-16), principally because, as transit vehicle operators adjust the traffic signals, auto users at those locations will get the same benefits as bus riders. But, signal prioritization has the benefit of helping to increase the transit system's on-time reliability.

It was not possible to model a change in the transit service day (i.e., the increase in the number of hours transit is provided). However, AATA already provides bus service until 11:00 p.m., which limits the potential increase in ridership that could be derived by further extension of the service day.

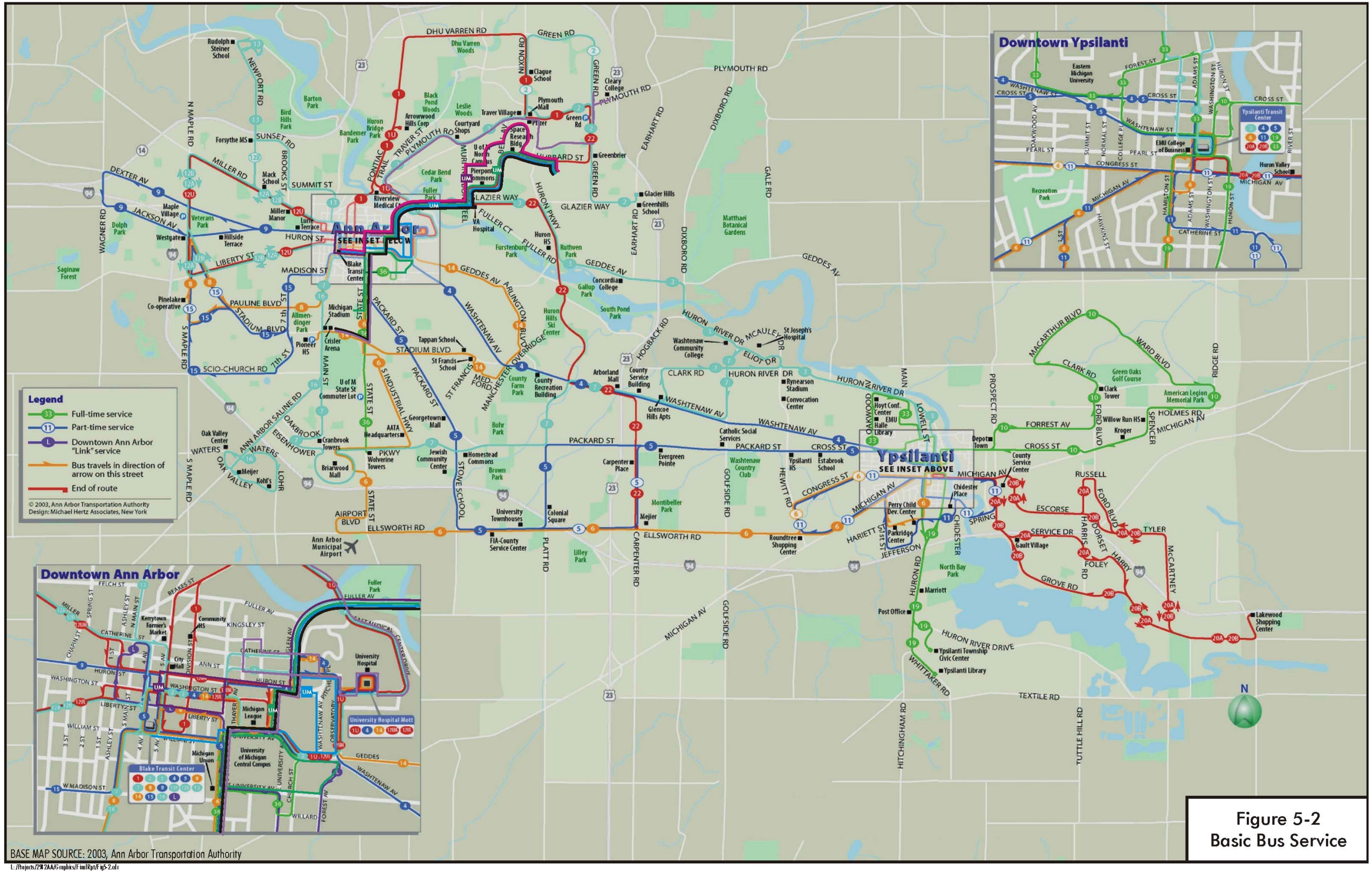


Figure 5-2
Basic Bus Service

Table 5-16
Northeast Ann Arbor Transportation Plan
Test of a Combination of Impacts to BASIC (2025) Transit System

	Scenario												
	1A	1B		1C		1D		1E		1F		1G	
Transit Evaluation Measures	Basic System	• Headway - 50%	% Change from A	• Fare -20%	% Change from A	• Parking +20%	% Change from A	Traffic Signal Priority	% Change from A	• Hdwy. -50% • Fare -20%	% Change from A	• Park +20% • Hdwy. -50% • Fare -20%	% Change from A
Daily Transit Trips (linked)	7,202	9,796	+36.0	7,652	+6.2	7,716	+7.1	7,317	+1.6	10,748	+49.2	11,184	+55.3
Daily Non-motorized Trips	34,738	33,966	-2.2	34,633	-0.3	36,132	+4.8	34,713	0.0	33,811	-2.7	35,100	+1.0
Transit Transfer Ratio	20.9%	34.4%	+64.5	21.2%	+1.4	20.7%	-0.1	21.2%	+1.4	34.7%	-66.0	34.9%	+67.0
Percent Transit	3.9	5.3	+36.8	4.1	+6.2	4.2	+7.1	4.0	+1.6	5.7%	+49.2	6.1%	+55.3
Percent Non-motorized	18.8	18.4	-2.2	18.7	-0.3	19.5	+4.0	18.8	0.0	18.3	-2.7	19.0	+1.0
NE: PM Peak Hour Highway Delay (hrs.)	42	40	-4.8	42	0.0	41	-2.4	42	0.0	39	-7.1	37	-11.9

Source: The Corradino Group of Michigan, Inc.

Table 5-17
Northeast Ann Arbor Transportation Plan
Diversion of Daily Trips Due to Changes in BASIC Transit System

Mode	Scenario											
	1B Headway – 50%		1C Fare – 20%		1D Parking Cost +20%		1E Traffic Signal Pre-empt		1F • Headway – 50% • Fare – 20%		1G • Headway – 50% • Fare – 20% • Parking +20%	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Transit Trips	+2,595	100.0	+450	100.0	+515	100.0	+116	100.0	+3,276	100.0	+3,982	100.0
Daily Non-motorized Trips	- 772	29.7	- 105	23.3	+1,395	NA	- 25	21.6	- 927	28.3	+362	NA
Car Pool Trips	- 755	29.1	- 170	37.8	+268	NA	- 43	37.1	- 1,008	30.8	- 827	NA
Drive Alone Trips	- 1,068	41.2	- 175	38.9	- 2,178	NA	- 48	41.3	- 1,341	40.9	- 3,517	NA

Source: The Corradino Group of Michigan, Inc.

The combination of these possible improvements to the BASIC transit system was also tested (the shaded area in each of Tables 5-16 and 5-17). Combining reductions in headways and fares would produce a 50 percent increase in transit use in 2025, compared to the Basic bus system. And, combining headway and fare reductions with an increase in parking cost would add yet another 400 to 500 daily trips to the overall ridership, compared to the effect of the fare/headway change alone.

The combination of only headway and fare reductions would draw to transit about 30 percent from the non-motorized modes, 30 percent from carpool trip makers and 40 percent from those who drive alone. Once the parking cost increase is combined with headway and fare improvements, the carpoolers who would shift to transit are reduced, but driving alone becomes much less attractive.

5.4.2 Test of BASIC-PLUS Transit System

During Northeast Area Transportation Plan Advisory Committee (TCAC) and Technical Advisory Committee meetings in October 2003, and the public meeting that followed, several improvement concepts to the BASIC (i.e., existing) bus system were suggested for examination. These include (Figure 5-3):

- Neighborhood circulators in several areas
- Extended route to Zeeb Road/Meijers
- U.S. 23/Territorial Route through Barton Hill Village to downtown Ann Arbor
- I-94/U.S. 23 Route to Pfizer with stops only at Washtenaw and Geddes Road with a Park-n-Ride facility at I-94/U.S. 23

These proposals form the BASIC-PLUS transit system. The results of their testing, in combination with changes in headways, fares and parking cost, are presented in Table 5-18.

The BASIC-PLUS system is expected to generate 7.5 percent more transit trips in 2025 than the BASIC system. So, expanding coverage through the concepts listed above would have a greater effect on total ridership than lowering fares by 20 percent or raising parking costs by 20% in association with the BASIC system (refer to Table 5-16). The BASIC-PLUS system's effects on other modes are very much like that of cutting fares of the BASIC system by 20% (Scenario A in Table 5-19 compared to Scenario C in Table 5-17), i.e., about 400 trips per day would be diverted from auto use (191 from carpools and 233 from single-occupant autos). Another 100 trips are expected to be drawn to transit from those who walk or bicycle.

Cutting headways in half on the BASIC-PLUS system is forecast to generate a 47 percent increase in 2025 daily ridership compared to the BASIC system. Three quarters of these new trips would be diverted from carpool and from single-occupant autos (Table 5-19, Scenario B).

Cutting fares by 20 percent in the BASIC-PLUS system does not have as strong an impact, per percentage of change, as reducing headways. Nor is it expected to be cost efficient because the BASIC-PLUS system with a 20 percent fare reduction is expected to carry in 2025 less than 20 percent (about 14 percent) more trip makers than the BASIC system.

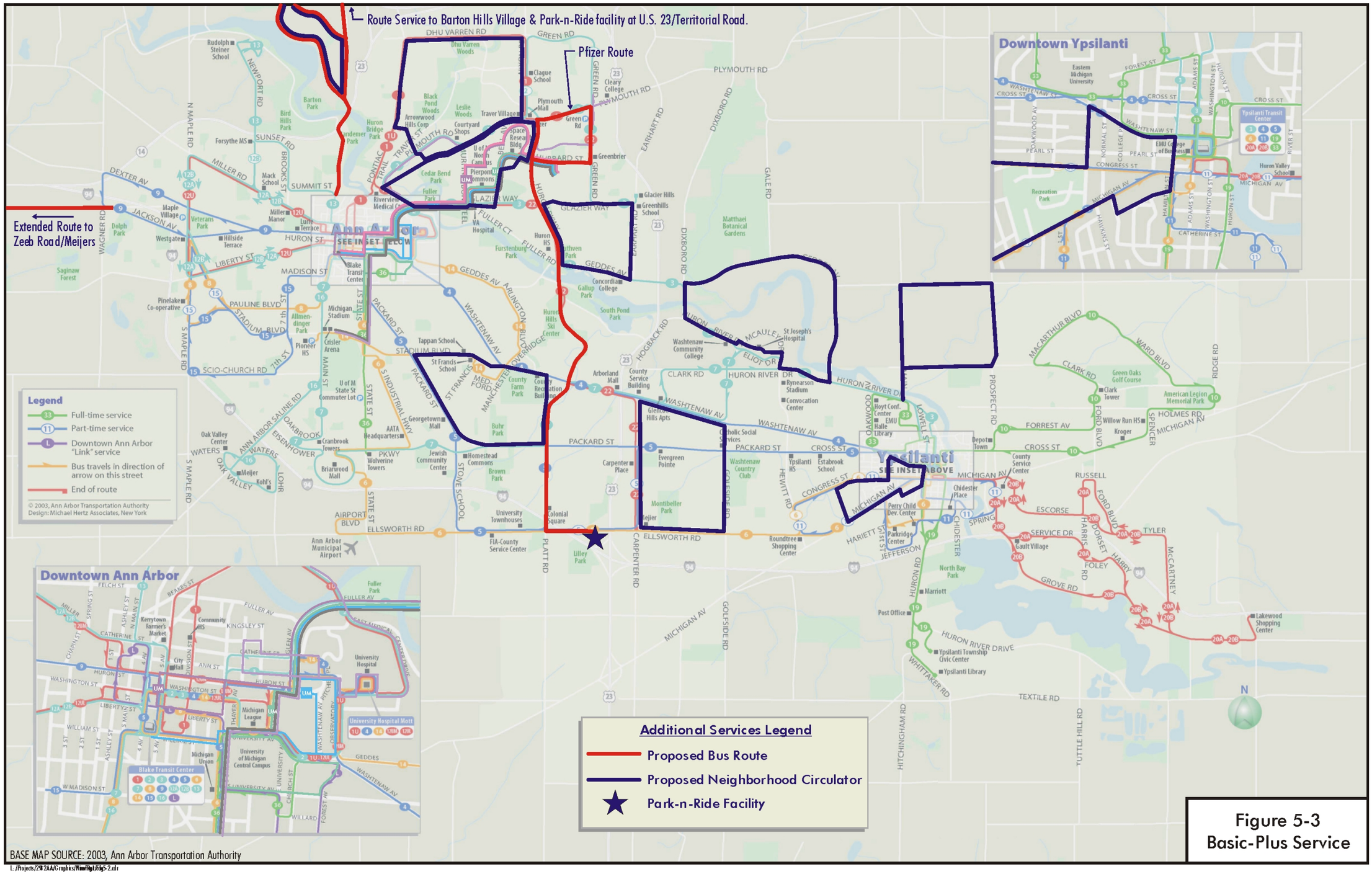


Figure 5-3
Basic-Plus Service

Table 5-18
Northeast Ann Arbor Transportation Plan
Test of BASIC-PLUS (2025) Transit System[1]
and
Improvements to It

	Scenario											
	1A	2A		2B		2C		2D		2E		2F	
Evaluation Measures	Basic System	BASIC-PLUS	% Change from BASIC	Headway –50%	% Change from BASIC A	Fare –20%	% Change from BASIC	Parking +20%	% Change from BASIC	Headway-50% Fares-20%	% Change from BASIC	Headways-50% Fares-20% Parking+20%	% Change from BASIC
Daily Transit Trips (linked)	7,202	7,741	+7.5	10,574	46.8	8,195	+13.8	8,298	+15.2	11,247	+56.5	12,006	+67.1
Daily Non-motorized Trips	34,738	34,622	-0.3	33,838	-2.6	34,512	-0.7	35,998	+3.6	33,680	-2.9	34,950	+0.7
Transit Transfer Ratio	20.9%	24.1%	+16.3	40.4%	93.3	24.4%	+16.7	24.3%	+16.3	40.1%	+91.9	40.0%	+91.4
Percent Transit	3.9	4.2%	+7.5	5.7	+46.8	4.4	+13.8	4.5	+15.2	6.	+56.5	6.5	+67.1
Percent Non-motorized	18.7	18.7%	-0.3	18.3	-2.6	18.7	-0.7	19.5	+3.6	18.2	-2.9	18.9	+0.7
NE: PM Peak Hour Highway Delay (hrs.)	42	41	-2.4	38	-9.5	40	-4.8	39	-7.1	37	-14.2	36	-14.3

[1] Highway network includes only west half of M-14 (Barton Drive interchange).
Source: The Corradino Group of Michigan, Inc.

Table 5-19
Northeast Ann Arbor Transportation Plan
Diversion of Daily Trips Due to Combination of Changes
in
BASIC-PLUS Transit System
vs.
BASIC Transit System

	Scenario											
	2A		2B		2C		2D		2E		2F	
	BASIC-PLUS vs BASIC		• Headways –50%		• Fares – 20%		• Parking – 20%		• Headways – 50% • Fares – 20%		• Headways – 50% • Fares – 20% • Parking +20%	
MODES	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Transit Trips	+540	100.0	+3,372	100.0	+993	100.0	+1,096	100.0	+4,046	100.0	+4,804	100.0
Non-Motorized Trips	-116	21.5	-890	26.4	-225	22.7	+1261	NA	-1,058	26.1	+212	NA
Car Pool Trips	-191	35.4	-1,046	31.0	-362	36.5	+57	NA	-1,298	32.1	-1,146	NA
Drive-Alone Trips	-233	43.1	-1,436	42.0	-406	40.8	-2,414	NA	-1,690	41.8	-3,870	NA

A change in parking cost (20% increase) with the BASIC-PLUS system is forecast to generate over 15 percent more riders then the BASIC system is forecast to carry in 2025. And, increasing the price of parking will cause an increase not only in transit but also non-motorized modes and carpooling. The drive-alone mode is expected to drop by over 2,400 trips per day (Table 5-19, Scenario D). So, increasing parking costs is expected to have a twofold effect: 1) parking and transit revenues would increase; 2) auto use would be discouraged.

Combining reductions in headways and fares, and, later, including an increase in the cost to park, can generate ridership increases of from 55 to almost 70 percent compared to the BASIC transit system (shaded area of Table 5-18). When all three changes are combined, over 5,000 daily auto trips are expected to be diverted to transit and the non-motorized modes in 2025 (shaded area of Table 5-19).

5.4.3 Test of BASIC-PLUS-PLUS System

The potential of express and subscription bus services, busway and light rail concepts was measured by combining these elements alone and in combination with the Basic-Plus system. This combination of elements forms the "Basic-Plus-Plus" concept.

A one-lane busway in the old Conrail (now Norfolk Southern) rail right-of-way, with buses circulating in areas around the busway at 15-minute peak-hour headways, was added to the BASIC-PLUS system (Figure 5-4 and Table 5-20). Adding a busway is expected to increase transit ridership by over 8 percent compared to the BASIC system. The busway itself would serve between 2,600 and 4,400 trips per day in 2025, depending on the scenario tested. This compares with the projection made in a 1994 study that by 2015 about 2,750 to 5,250 daily busway trips could be served. But, the overall transit system ridership with the busway is virtually no different than the BASIC-PLUS system without the busway.

A test of the impact of express and subscription services to various parts of Ann Arbor (not just northeast Ann Arbor) (Figure 5-4) indicates these services will have a slightly greater impact on overall transit ridership than the busway (Table 5-21). Subscription service is defined as a "premium" peak hour operation using high-type intercity coaches at a cost to the user of about $100 per month (in 2004 dollars) (Figure 5-5). Ridership is expected in 2025 to total about 800 to 900 passengers per day (400 to 450 people). Express bus service, while also limited to peak morning and evening hours, would be more geographically extensive than subscription service (Figures 5-4 and 5-6). Express buses are forecast to serve in 2025 about 3,000 passengers per day. This is about 10 percent of the daily transit use in Ann Arbor.

Combining the Basic-Plus system, subscription/express bus services and the busway is likely to produce about 400 more daily transit trips in 2025 than the system without the busway. In this scenario (4C on Table 5-21), express bus service is expected to carry as many passengers as the busway. And, while the busway is more limited in geographical scope than the express bus service, it is more costly. So, the busway is not as cost efficient as more express bus service when also considering the cost of the capital improvements (i.e., buses, busway construction, fee to use railroad right-of-way, etc.).

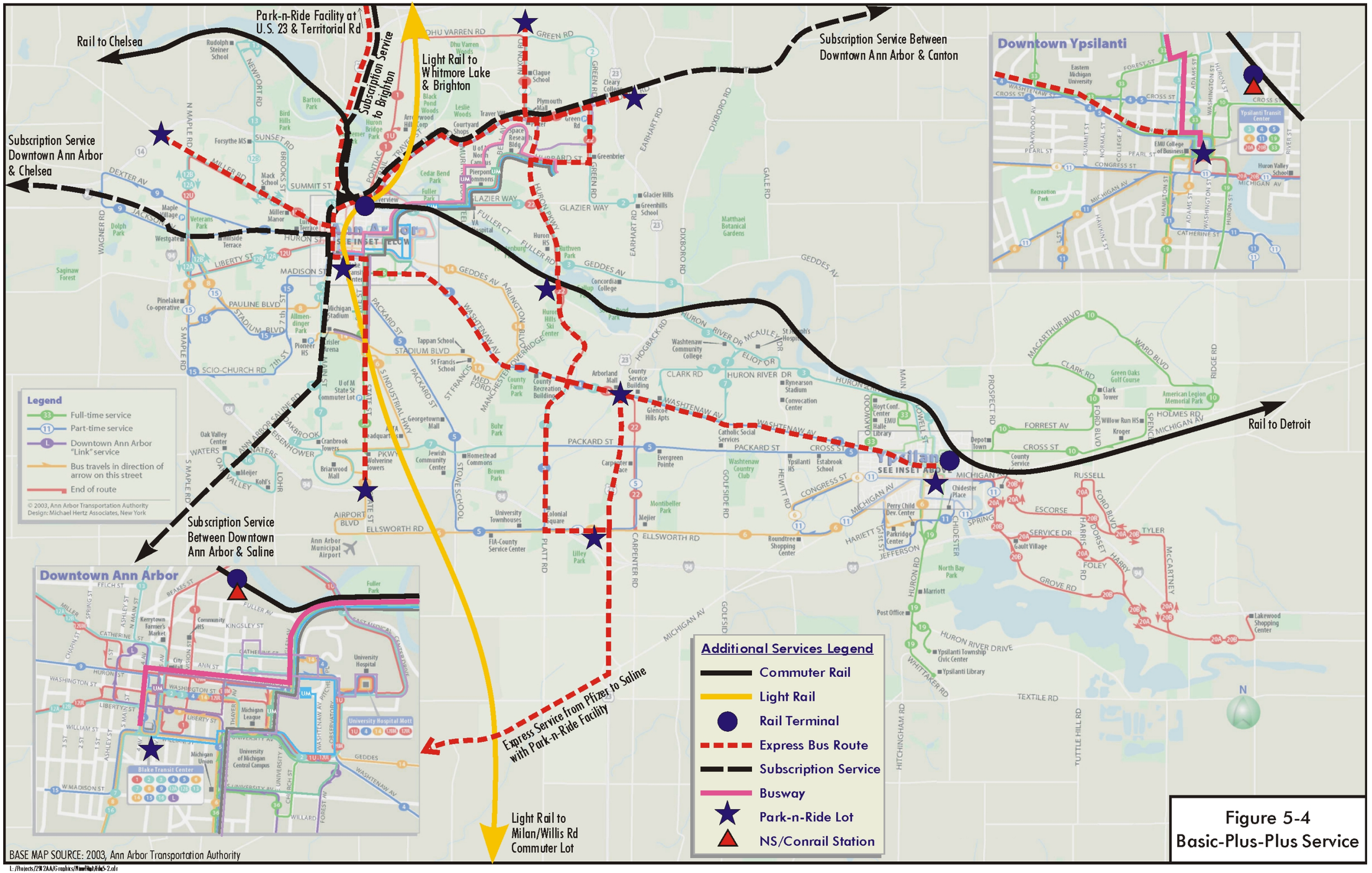


Figure 5-4
Basic-Plus-Plus Service

Table 5-20
Northeast Ann Arbor Transportation Plan
Test of BASIC-PLUS + Busway (2025) Transit System[1]
and Improvements to It

	Scenario														
	1A	2A		3A		3B		3C		3D		3E		3F	
Evaluation Measure	Basic System	BASIC-PLUS	% Change from BASIC	BASIC-PLUS + BUSWAY	% Change from BASIC	BASIC-PLUS + BUSWAY Headway –50%	% Change from BASIC	BASIC-PLUS + BUSWAY Fare –20%	% Change from BASIC	BASIC-PLUS + BUSWAY Parking +20%	% Change from BASIC	BASIC-PLUS + BUSWAY Headway-50% Fares-20%	% Change from BASIC	BASIC-PLUS + BUSWAY Headways-50% Fares-20% Parking+20%	% Change from BASIC
Daily Transit Trips (linked)	7,202	7,741	+7.5	7,792	+8.2	10,620	+47.5	8,244	+24.8	8,354	+16.0	11,292	+56.8	12,056	+67.4
Daily Non-motorized Trips	34,738	34,622	-0.3	34,622	-0.3	33,837	-2.6	34,512	-0.7	35,998	+3.6	33,679	-3.0	34,948	+0.6
Transit Transfer Ratio	20.9%	24.1%	+16.3	27.6%	+32.1	43.2%	+106.7	27.6%	+32.1	27.6%	+32.1	42.9%	+105.3	42.9%	+105.3
Percent Transit	3.9	4.2	+7.5	4.2	+8.2	5.7	+47.5	4.6	+24.8	4.	+16.0	6.1	+56.8	6.5	+67.4
Percent Non-motorized	18.7	18.7	-0.3	18.7	-0.3	18.3	-2.6	18.7	-0.7	19.5	+3.6	18.2	-3.0	18.9	+0.6
NE: PM Peak Hour Highway Delay (hrs.)	42	41	-2.4	42	0.0	41	-2.4	42	0.0	41	-2.4	40	-4.8	38	

[1] Highway network includes only west half of M-14 (Barton Drive interchange).
Source: The Corradino Group of Michigan, Inc.

Table 5-21
Northeast Ann Arbor Transportation Plan
Tests of BASIC-PLUS (2025) Transit System[1]
Plus Additional Services

		Scenario									
	1A	2A		4A		4B		4C		4D	
Evaluation Measure	Basic System	BASIC-PLUS	% change from BASIC	BASIC-PLUS + BUSWAY	% Change from BASIC	BASIC-PLUS + Express and Subscription Services	% Change from BASIC	BASIC-PLUS + BUSWAY + Express and Subscription Services	% Change from BASIC	BASIC-PLUS + LRT + Express and Subscription Services	% Change from BASIC
Daily Transit Trips (linked)	7,202	7,741	+7.5	7,792	+8.2	7,842	+8.9	8,233	+14.3	7,844	+14.3
Daily Non-motorized Trips	34,738	34,622	-0.3	34,622	-0.3	34,620	-0.3	34,581	-0.4	34,616	-0.4
Transit Transfer Ratio	20.9%	24.1%	+16.3	27.6%	+32.1	28.2%	+34.9	31.5%	+50.7	28.9%	+54.1
Percent Transit	3.9	4.2%	+7.5	4.2	+8.2	4.2	+8.2	4.5	+15.4	4.2%	+15.4
Percent Non-motorized	18.7	18.7%	-0.3	18.7	-0.3	18.7	-0.3	18.7	-0.4	18.7	-0.4
NE: PM Peak Hour Highway Delay (hrs.)	42	41	-2.4	42	0	44	+4.8	43	-2.4	44	-2.4

[1] Highway network includes only west half of M-14 (Barton Drive interchange).
Source: The Corradino Group of Michigan, Inc.

Figure 5-5
Subscription Service

Figure 5-6
Express Bus Service

Finally, a light rail component (Figures 5-4 and 5-7) was added to the Basic-Plus system accompanied by subscription/express bus services. The light rail line would run between Whitmore Lake and Milan in the Ann Arbor Railroad corridor. It is expected to carry about 3,000 to 3,200 riders per day in 2025. Again, this concept will require a major capital investment, more than express/subscription bus services, with less return on investment in terms of potential ridership per dollar spent (Scenario 4D on Table 5-21).

Figure 5-7
Light Rail Transit

5.4.4 Transit Effects on Highway Travel

One measure of the effects of each of these scenarios on the northeast Ann Arbor roadway system is the total hours of delay encountered by all vehicles using northeast Ann Arbor roadways in the afternoon peak hour (Tables 5-16, 5-18, 5-20 and 5-21). Overall, the least delay is associated with the BASIC-PLUS system (without the Busway) in combination with the headway reduction of 50 percent, a fare reduction of 20 percent and an increase in parking cost of 20 percent (see Table 5-18, Scenario 2F). Nevertheless, the delay reduction is not more than six hours, which amounts to an average of fewer than 10 seconds per vehicle using northeast Ann Arbor roads in 2025 in the afternoon peak hour.

5.5 Conclusions

Transit improvements in the form of the BASIC-PLUS concept are expected to produce an eight percent increase in ridership over the BASIC system in 2025 (Table 5-22). Cutting the time between buses on a route (i.e., headways) by 50 percent will have the most positive, single impact in creating a transit ridership increase. When a change in headways (-50%) is combined with a reduction in fares (-20%) and a parking cost increase (+20%) 5,000 fewer daily auto trips are expected in northeast Ann Arbor in 2025. This is the equivalent to one-half lane of highway dedicated to peak hour travel.

Table 5-22
Northeast Ann Arbor Transportation Plan
Transit Analysis Results

- BASIC-PLUS concept produces eight percent increase in ridership over BASIC system in 2025
- Cutting time between buses is largest determinant of increased ridership – almost a 1 to 1 ratio
- Cutting fares is not productive when comparing ridership increases to revenue decreases
- Increasing parking costs produces a six percent increase in ridership over BASIC system in 2025
- Peak hour express/subscription services can increase ridership by nine percent over BASIC system
- A busway concept is not cost efficient by 2025
- A Light Rail Transit concept is not cost efficient by 2025
- Commuter rail is expected to accommodate 500 trips per day at the Ann Arbor Station

Testing of a busway in the old Conrail right-of-way (now owned by Norfolk Southern Railroad) and light rail in the Ann Arbor Railroad corridor, does not produce significant results over making improvements in transit coverage by adding neighborhood services and express/subscription bus services thereby forming the BASIC-PLUS-PLUS system. Both busway and light rail developments would have major capital costs in facilities, equipment and right-of-way use, that they are considered infeasible solutions for Ann Arbor to pursue in the near future. Likewise, while commuter rail is expected to serve 500 Ann Arbor trips per day in 2025, this proposal is part of a much larger plan that connects Ann Arbor to Detroit, so it may be affordable for Ann Arbor.

Based on these tests, the consultant believes the future transit system in Ann Arbor should pursue the following four elements in the following order based on the cost to implement: 1) improved neighborhood circulators; 2) subscription bus services; 3) peak hour express bus/park-and-ride operations (Figure 5-8); and, 4) reducing the time between buses. Actions on these concepts are the prerogative of AATA which will conduct further work on each. The cost of these changes is defined in Table 5-23.

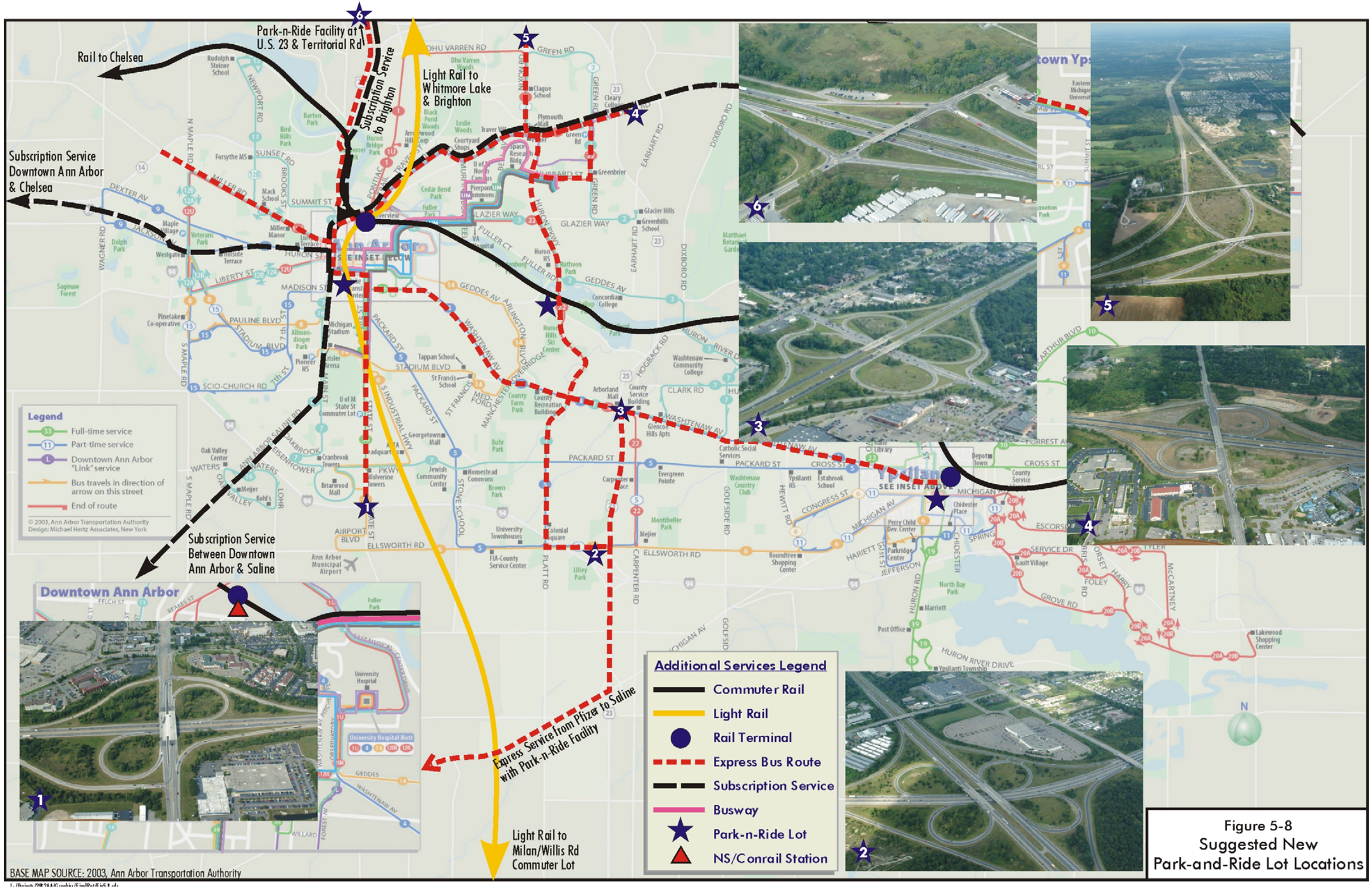


Figure 5-8
Suggested New
Park-and-Ride Lot Locations

Table 5-23
Northeast Ann Arbor Transportation Plan
Preliminary Cost Estimate (2004 Dollars)
Most Viable Transit Concepts

	2025 Daily Trips		Incremental		Annual	Additional Vehicles[2]			
Component	Areawide	NE Ann Arbor	Annual Revenue	Annual Cost	Revenue Needed	Number	Cost	Park-N-Ride Lots	Notes
Basic Service	30,254	7,201	$6,403,244	$20,817,280	$14,414,035	0	--	NA	AATA 56 peak vehicles, University 32 peak vehicles
Circulators/Park-N-Ride	1,801	540	$381,196	$5,537,124	$5,155,927	22	$2,972,000	NA	8 medium heavy duty buses (approx. 30 pass.) for P&R and 14 Cutaways (18 pass.) for Circulators
Express Bus (AM/PM Peak)[1]	975	101	$881,443	$2,908,380	$2,026,937	25	$8,250,000	6	25 heavy duty buses (approx. 40 pass.) plus 6 park-and-ride lots at average cost of $1.5 million per facility
Headway Reduction (50%)	11,340	2,801	$615,066	$26,473,620	$25,858,554	110	$28,592,000	NA	Double AATA and University fleet. Assume 25 medium duty buses and 31 heavy duty buses for AATA and 32 medium duty uses for University. Double Circulator and P&R buses.
Parking Cost Increase	2,903	710	$2,550,344	--	--	0	--	NA	

[1]Subcontracted service will pay for itself and is not included in estimate.
[2]Estimated Vehicle Prices form FY 2005 Application Instructions for Public Transit Programs Administered by the Passenger Transportation Division, MDOT

Cutaway Bus	$58,000
Medium Heavy Duty Bus	$270,000
Heavy Duty Bus	$330,000

Source: The Corradino Group of Michigan, Inc.

Paying for these type changes will not be accomplished through increased fare box revenues alone (Table 5-23). So, other avenues of funding should be explored, if transit service is to expand as suggested here. Increasing parking costs by 20 percent would generate a twofold benefit: an increase in parking revenues of $2.32 million per year (in 2004 dollars), and an increase in transit fare revenues ($230,000) (Table 5-23). Implementing a higher parking fee represents a significant challenge. And, linking the increased parking revenue to transit further increases that challenge. More is presented about parking pricing/management later in this report.

Another concept for financing transportation improvements, called "Concurrency," should also be considered. It, too, will be a challenge to implement. It creates a direct link between land use changes – particularly to a higher density than normal – and the investment of developer resources in transportation improvements, including those in transit and to benefit walking and bicycling. This concept may be particularly relevant in the area around Nixon Road, Barton Drive and Plymouth Road. If high development densities in this area are to be approved by the City of Ann Arbor, then the developer should be asked to participate in transit system improvements (i.e., additional routings, shorter headways, subsidized fares) and fine-tune his/her project to encourage more non-motorized use and less driving. An approach to "concurrency" is application of the already-existing *Traffic Impact Analysis* procedures that are part of the City of Ann Arbor's Land Development Regulations (Appendix E). Section 1:3 states "…(land development) proposals that will contribute traffic to streets or intersections that are or will be as a result of this proposal at a Level of Service D, E, or F…may be denied by the (Ann Arbor City) Commission…until such time as necessary street or traffic improvements are scheduled for construction." Scheduling for construction should be tied to the developer's investment in improvements (non-motorized as well as roadway) that will mitigate the traffic impact.

5.5.1 Other Considerations

Bus Lanes

A review of the number of buses expected to be using northeast Ann Arbor city streets in the 2025 peak hour was undertaken to determine if an exclusive bus lane were an appropriate concept to pursue. The largest volume of bus traffic (31 per hour) is expected on Fuller Road between the University of Michigan North and Central Campuses (Figure 5-9). Research[4] indicates that, from the standpoint of enforceability, volumes of 40 to 60 buses per hour per direction (i.e., about one bus per minute) is the desirable threshold at which a bus lane should operate. This is not expected to be evident anywhere in Ann Arbor by 2025. Nevertheless, the recent implementation of a "no fare" policy for UM students using AATA buses may cause that situation to change. That policy has caused an increase of about 1,500 riders per day (11 to 12%) on the AATA system. While that does not immediately lead to an increase in fleet size, continued growth in ridership can, and that should be accompanied by monitoring and further planning of a bus lane on Fuller Road to connect the two University campuses.

[4] Transportation Research Board Report 143, Bus Use of Highways, 1979.

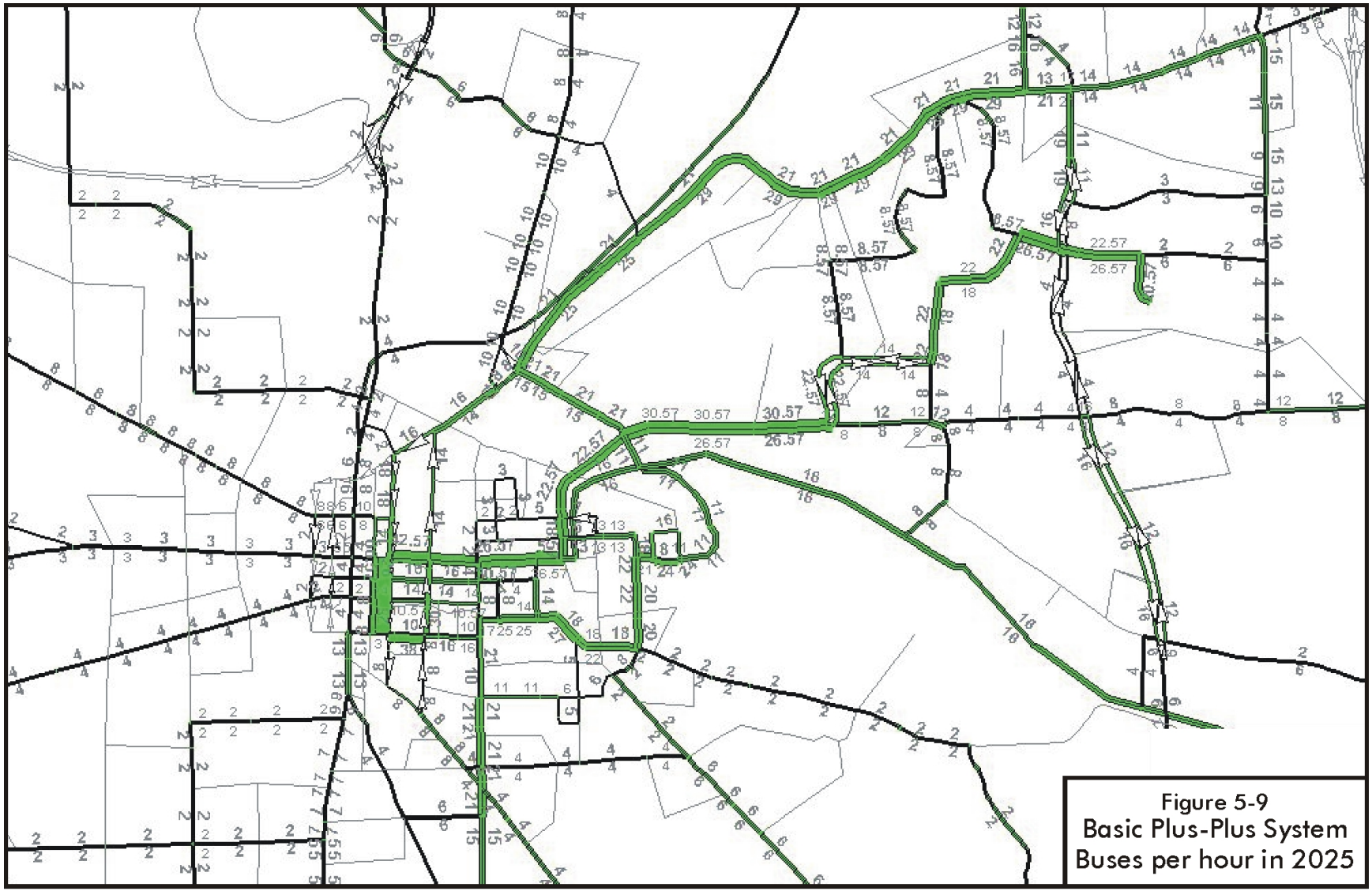


Figure 5-9
Basic Plus-Plus System
Buses per hour in 2025

SOURCE: The Corradino Group of Michigan
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5.5.2 Goals and Evaluation Factors

The consultant reviewed the transit component of the NEATP and judged that five of six goals are met by pursuing the transit concepts listed earlier (Table 5-24). Achieving the sixth goal, i.e., "Promote cooperation among the city of Ann Arbor and other governmental entities, particularly the surrounding townships and municipalities and the University of Michigan in a manner consistent with other goals" will be the subject of review of this plan as well as other efforts by AATA to create "buy in" of a number of proposals, such as increased service to surrounding townships and development of the subscription and express bus/park-and-ride concepts. Again, AATA is pursuing these issues as part of its implementation responsibilities.

Table 5-24
Northeast Ann Arbor Transportation Plan
Proposed Transit Concepts

Goal	Recommendations
Provide appropriate access and mobility with minimal negative impacts for all people and goods	Meet Goal
Protect and enhance the natural environment and the human and built environment	Meet Goal
Promote a safe and secure transportation system	Meet Goal
Invest in transportation infrastructure in a manner consistent with other goals	Meet Goal
Promote cooperation among the city of Ann Arbor and other governmental entities, particularly the surrounding townships and municipalities and the University of Michigan in a manner consistent with other goals	To be Determined
Meaningful public input and involvement will be required of any transportation project in the Northeast Area	Meet Goal

Source: The Corradino Group of Michigan, Inc.

The tests of alternative concepts reported earlier allow the consultant to conclude the areas of air quality, community cohesion, mode choice and environmental justice will all experience positive effects by pursuing the transit concepts proposed for further action (Table 5-25). No effects are expected in the level of highway service because a relatively few vehicles (5,000 in the 2025 peak hour from throughout the entire area) are expected to be eliminated from the area's roads. And, while no effects are expected on water quality, wetlands and open space, the location and development of park-and-ride lots, which will require property acquisition, will have to be monitored.

Table 5-25
Northeast Ann Arbor Transportation Plan
Proposed Transit Concepts

Evaluation Factor	Concepts
Air Quality	Positive Effect
Community Cohesion	Positive Effect
Land Acquisition	Park-n-Ride Lot Acquisition
Noise	No Significant Effect
Mode Choice	Positive Effect
Level of Service	No Effect Overall
Water Quality	No Effect
Wetlands	No Effect
Open Space	No Effect
Environmental Justice	Positive Effect

Source: The Corradino Group of Michigan, Inc.

6. Roadway Component of the Plan

Summary

By applying the TransCAD model, congestion was evident at a number of locations in northeast Ann Arbor when the standard is Level of Service C (Table 6-S1). The model had already removed from the assignment of travel to the area's highways those trips that would be made by the transit and non-motorized modes. Therefore, roadway/intersection widenings at a number of places appeared inevitable. But, the Transportation Citizens Advisory Committee's goals made it clear such solutions are a "last resort." As a result, one principal recommendation of the roadway component of the plan is to have Ann Arbor City Council change its Level of Service standard of acceptable congestion from C to D. This means longer delays at peak travel periods will be experienced by motorists but the tradeoff will be a reduced need to widen roads/intersections. Level of Service D is almost universally accepted as the standard in urban areas.

If LOS D were applied, then many of the congestion issues defined in Table 6S-1 would not lead to roadway widenings. But, because of the idiosyncrasies of long-range/systemwide planning conducted with broad-based, areawide models, such as TransCAD, it was important to take a more detailed view of several of these locations to further refine the levels of congestion forecast. Therefore, a micro-level analysis was undertaken to create a more complete understanding of traffic operations and safety concerns of the following roadway segments in northeast Ann Arbor. It reflects the proposed closure of the east side of the M-14/Barton Drive interchange.

- Barton Drive: Between M-14 and Plymouth Road
- Plymouth Road: Between Huron River Drive and U.S. 23
- Nixon Road: Between Plymouth Road and Dhu Varren Road
- Main Street: Between M-14 and Depot Street
- Washtenaw: Between U.S. 23 and Stadium
- Geddes Road: Between Huron Parkway and U.S. 23

The analysis results for the morning and evening peak periods with 2025 data, using LOS D as the "trigger" (not LOS C), indicated the following locations need additional consideration:

- Main and Depot
- Main and Kingsley
- Plymouth and Maiden
- Plymouth and Huron
- Huron and 7th Street
- Huron and 1st Street
- Washtenaw and Huron Parkway
- Washtenaw and Arborland-Pittsfield
- Geddes and Earhart

At the Main/Depot intersection, adding on Depot a second westbound-to-northbound right-turn lane will bring the LOS to C with an average vehicle delay of about 30 seconds and a volume/capacity ratio (measure of congestion) of 1.00 or lower in each of the morning and afternoon peak periods. This may require private property acquisition.

Table 6S-1
Northeast Ann Arbor Transportation Plan
Impact of Transit on Highways

Road Segment		From	To	1A 2025 Traffic ADT	1A 2025 Traffic V/C	1B 2025 Traffic ADT	1B 2025 Traffic V/C	1C 2025 Traffic ADT	1C 2025 Traffic V/C	1D 2025 Traffic ADT	1D 2025 Traffic V/C	2B 2025 Traffic ADT	2B 2025 Traffic V/C	2C 2025 Traffic ADT	2C 2025 Traffic V/C	3A 2025 Traffic ADT	3A 2025 Traffic V/C	3F 2025 Traffic ADT	3F 2025 Traffic V/C	4A 2025 Traffic ADT	4A 2025 Traffic V/C	4F 2025 Traffic ADT	4F 2025 Traffic V/C
M-14:																							
	A:	W. Miller/Maple	E. of Miller/Maple	15,604	0.21	15,454	0.20	15,628	0.21	15,578	0.20	15,576	0.20	15,684	0.21	15,620	0.21	15,620	0.21	15,444	0.20	15,448	0.20
	B:	E. of Miller/Maple	E. of Beechwood	37,544	0.49	37,428	0.49	37,492	0.49	37,492	0.49	37,500	0.49	37,454	0.49	37,888	0.50	37,752	0.50	37,586	0.49	37,500	0.49
	C:	E. of Beechwood	E. of Main St.	37,338	0.49	37,224	0.49	37,286	0.49	37,282	0.49	37,294	0.49	37,248	0.49	37,666	0.50	37,530	0.49	37,362	0.49	37,276	0.49
	D:	E. of Main St.	S. of Barton Dr.	85,550	1.13	85,446	1.12	85,522	1.13	85,508	1.13	85,490	1.12	85,396	1.12	85,688	1.13	85,492	1.12	85,556	1.13	85,370	1.12
	E:	S. of Barton Dr.	No. of Barton Dr.	76,450	1.01	76,368	1.00	76,414	1.01	76,400	1.01	76,400	1.01	76,332	1.00	75,908	1.00	76,050	1.00	76,582	1.01	76,436	1.01
	F:	N. of Barton Dr.	S. of U.S. 23	84,326	1.11	84,252	1.11	84,290	1.11	84,272	1.11	84,282	1.11	84,208	1.11	83,678	1.10	83,552	1.10	83,996	1.11	83,836	1.10
	G:	W. of U.S. 23	E. of Nixon	69,820	0.96	69,692	0.95	69,800	0.96	69,750	0.96	69,732	0.96	69,274	0.95	69,860	0.96	69,708	0.95	69,216	0.95	69,124	0.95
	H:	E. of U.S. 23	E. of Dixboro	76,076	1.00	76,120	1.00	76,102	1.00	76,130	1.00	76,106	1.00	76,098	1.00	76,102	1.00	76,004	1.00	75,336	0.99	75,294	0.99
Whitmore Lake Road																							
	A:	Huron River Dr.	Stein Rd	19,256	0.92	19,116	0.91	19,250	0.92	19,112	0.91	19,234	0.92	19,156	0.91	14,676	0.70	14,346	0.68	10,318	0.49	10,234	0.49
	B:	Stein Rd.	N. Territorial Rd.	12,342	0.54	12,212	0.53	12,336	0.53	12,260	0.53	12,328	0.53	12,318	0.53	16,350	0.71	16,012	0.69	11,992	0.52	11,906	0.52
Barton Drive																							
	A:	M-14	Pontiac Trail	35,784	**1.70**	35,654	**1.70**	35,796	**1.70**	35,680	**1.70**	35,766	**1.70**	35,722	**1.70**	37,504	**1.79**	37,118	**1.77**	34,660	**1.65**	34,350	**1.64**
	B:	Pontiac Trail	Plymouth	29,098	**1.39**	28,824	**1.37**	29,102	**1.39**	28,778	**1.37**	28,798	**1.37**	28,490	**1.36**	29,300	**1.40**	28,536	**1.36**	29,338	**1.40**	28,728	**1.37**
Pontiac Trail																							
	A:	Plymouth Rd.	Barton Dr.	30,894	1.14	30,336	1.12	30,800	1.14	30,234	1.12	30,368	1.12	30,066	1.11	31,740	1.17	30,850	1.14	30,068	1.11	28,952	1.07
	B:	Barton Dr.	Dhu Varren Rd.	27,090	1.00	26,448	0.98	26,990	1.00	26,382	0.98	26,372	0.98	26,040	0.96	26,336	0.98	25,540	0.95	26,876	1.00	25,964	0.96
Plymouth Road																							
	A:	Huron River Dr.	Barton Dr.	67,768	**1.21**	67,276	**1.20**	67,794	**1.21**	67,026	**1.20**	67,130	**1.20**	65,898	**1.18**	71,158	**1.27**	68,908	**1.23**	69,984	**1.25**	68,358	**1.22**
	B:	Barton Dr.	Nixon Rd.	78,186	**1.16**	77,688	**1.16**	78,234	**1.16**	77,528	**1.15**	77,520	**1.15**	76,426	**1.14**	80,078	**1.19**	78,202	**1.16**	79,420	**1.18**	77,524	**1.15**
	C:	Nixon Rd.	U.S. 23	87,488	**1.30**	86,964	**1.29**	87,472	**1.30**	86,854	**1.29**	86,786	**1.29**	86,432	**1.29**	87,544	**1.30**	86,688	**1.29**	89,628	**1.33**	88,374	**1.32**
Nixon Road																							
	A:	Plymouth Rd.	Dhu Varren Rd.	35,780	**1.61**	35,456	**1.60**	35,658	**1.61**	35,286	**1.59**	35,362	**1.59**	34,948	**1.57**	35,680	**1.61**	34,890	**1.57**	35,508	**1.60**	34,770	**1.57**
	B:	Dhu Varren Rd.	M-14	19,234	0.80	19,424	0.81	19,274	0.80	19,238	0.80	19,352	0.81	19,234	0.80	19,528	0.81	19,286	0.80	19,714	0.82	19,556	0.81
	C:	M-14	Pontiac Trail	19,234	0.80	19,424	0.81	19,274	0.80	19,238	0.80	19,352	0.81	19,234	0.80	19,528	0.81	19,286	0.80	19,714	0.82	19,556	0.81
Fuller Road																							
	A:	Glen Ave.	Glazier Way	50,126	**1.21**	49,450	**1.20**	50,008	**1.21**	48,922	1.19	49,272	1.19	48,232	1.17	50,666	1.23	48,908	1.19	50,288	1.22	48,530	1.18
	B:	Glazier Way	Huron Pkwy.	28,414	0.77	28,116	0.76	28,332	0.77	28,112	0.76	27,976	0.76	27,696	0.75	28,998	0.79	28,228	0.77	28,450	0.77	27,692	0.75
Geddes Road																							
	A:	Huron Pkwy.	U.S. 23	34,404	**1.27**	34,086	**1.26**	34,348	**1.27**	34,144	**1.26**	33,906	**1.26**	33,616	**1.25**	35,498	**1.31**	35,144	**1.30**	34,236	**1.27**	33,742	**1.25**
Miller Road																							
	A:	M-14	Newport Rd.	27,730	1.03	27,408	1.02	27,380	1.01	27,154	1.01	27,276	1.01	26,972	1.00	28,572	1.06	27,976	1.04	28,626	1.06	28,146	1.04
	B:	Newport Rd.	Main St.	31,972	1.18	31,392	1.16	31,606	1.17	31,012	1.15	31,256	1.16	30,668	1.14	33,184	1.23	32,282	1.20	33,102	1.23	32,020	1.19
Jackson Road																							
	A:	I-94	Main St.	76,928	**1.25**	76,834	**1.25**	76,870	**1.25**	76,184	**1.24**	76,348	**1.24**	76,062	**1.23**	77,296	**1.25**	76,060	**1.23**	77,754	**1.26**	76,846	**1.25**
Huron Parkway																							
	A:	Plymouth Rd.	Fuller Rd.	24,924	0.76	24,742	0.75	24,908	0.76	24,776	0.75	24,686	0.75	24,566	0.75	24,508	0.75	24,116	0.73	24,824	0.76	24,620	0.75
	B:	Fuller Rd.	Geddes Rd.	49,024	1.01	48,602	1.00	48,950	1.00	48,654	1.00	48,480	0.99	48,188	0.99	48,144	0.99	47,068	0.97	48,956	1.00	48,016	0.98
Main Street																							
	A:	M-14	Depot St.	96,360	**1.72**	96,338	**1.72**	96,400	**1.72**	96,296	**1.72**	96,278	**1.72**	96,092	**1.72**	95,398	**1.70**	95,024	**1.70**	96,112	**1.72**	95,734	**1.71**
Washtenaw																							
	A:	U.S. 23	Stadium	88,704	**1.39**	87,490	**1.38**	88,368	**1.39**	87,614	**1.38**	87,074	**1.37**	86,010	**1.35**	86,926	**1.37**	84,280	**1.33**	88,382	**1.39**	85,498	**1.34**
	B:	Stadium	Geddes Ave.	49,840	0.89	48,818	0.87	49,564	0.89	48,492	0.87	48,430	0.86	47,054	0.84	47,902	0.86	45,280	0.81	49,150	0.88	46,362	0.83
Huron River Drive																							
	A:	U.S. 23	Huron Pkwy.	23,140	1.10	22,892	1.09	23,102	1.10	23,002	1.10	22,802	1.09	22,526	1.07	22,080	1.05	21,374	1.02	20,330	0.97	19,620	0.93
Geddes Avenue																							
	A:	Huron Pkwy.	U.S. 23	19,622	0.93	19,350	0.91	19,568	0.92	19,218	0.91	19,256	0.91	18,872	0.89	19,826	0.94	19,014	0.90	19,548	0.92	18,846	0.89

Source: The Corradino Group of Michigan, Inc.

At the Main/Kingsley intersection, there is no room to add lanes. But, if the northbound and southbound left-turns on Main are restricted in the afternoon peak period, as at Main and Summit, the level of service could be improved from F to D with a resulting V/C ratio of 1.02 and an average vehicle delay of about one minute. Vehicles which are prohibited from turning left at this intersection would likely use other roads such as Miller Avenue, Ann Street, Huron Street, and Washington Street.

For the Plymouth/Maiden intersection there is no room for roadway widening without property acquisition. Providing a northbound Maiden Road to an eastbound Plymouth right-turn lane and reducing the intersection cycle length will improve capacity and reduce congestion. A second option is to investigate creation of a one-way system to help reduce the congestion in the afternoon peak. This would involve converting the south leg of Maiden from two-way to one-way north, like on Moore. This would require Wall Street to be converted to one-way and installing a signal at Plymouth. There would then be three signals on Plymouth (Swift, Wall, and Maiden/Moore) which would have to operate as a unit. A final option to consider to this one-way concept is a roundabout but it would involve a relatively large amount of acquisition.

Congestion at the Plymouth/Huron Parkway intersection could be improved to LOS D (V/C of 0.96 and average delay of about 44 seconds) if eastbound-to-southbound and westbound-to-northbound right-turn lanes were added and the current "thru/right-turn" lanes were made "thru" only along Plymouth. Also, dual left-turn lanes should be provided at both Huron approaches to the intersection.

At the Huron/7th Street and the Huron/1st Street intersections, there is no right-of-way available to make any changes. While congestion at these locations in the morning peak in 2025 will be at LOS D or better, it will be at LOS F in the afternoon peak. In light of the NEATP goals/objectives dealing with the avoidance of property acquisition, these conditions will only be relieved by diversion of travelers to other modes and/or routes.

The Washtenaw/Huron Parkway intersection is expected to experience LOS F in the afternoon peak period in 2025. Even with the recent addition of double left-turn lanes on Huron Parkway in each direction, and isolating these and the north- and southbound through movements with separate signal phases, the current (2004) Level of Service is E. The average delay in the afternoon peak hour at this intersection in 2025 can be reduced from 100 to 75 seconds, and the Level of Service moved from F to E, if right-turn lanes were added eastbound and westbound on Washtenaw Avenue. But, this will require acquisition of private property. It is noteworthy this would not involve buildings.

Another concept offered for discussion is to extend a boulevard system along Washtenaw Avenue from a point west of Huron Parkway to U.S. 23. This would require property acquisition at Huron Parkway (most likely to include the service station on the southwest corner) and eastward to U.S. 23. Along this latter section of Washtenaw, buildings are set back from the roadway so property acquisition would likely involve only parking area, not buildings. The benefit of this concept would be removal of the dual left-turn lanes for northbound Huron Parkway traffic desiring to travel west on Washtenaw Avenue. That movement would be accommodated by turning right/east onto Washtenaw and then making a “Michigan” left turn (i.e., indirect left).

It is noteworthy that the analysis of Washtenaw Avenue traffic west of Huron Parkway indicates 2025 traffic can be handled by the existing roadway at LOS B or better in the morning and evening peaks. The often-discussed conversion of the section of Washtenaw north of Stadium to a three-lane facility appears achievable based on these conditions.

Washtenaw Avenue at Arborland/Yost is expected to experience LOS F in the 2025 afternoon peak. This can be improved to LOS C if an eastbound right-turn lane were added and the eastbound-to-northbound left-turn movement were protected by a separate traffic signal phase. The addition of a right-turn lane would require some property acquisition.

The Geddes/Earhart intersection is expected to experience LOS E in the afternoon peak in 2025. This can be improved to LOS D by adding a westbound right-turn lane. While property acquisition would be involved, it is expected to be limited/minimal.

Non-motorized Implications

It is important to note that bike lanes have been proposed in the non-motorized component of the NEATP on all of these corridors (some sections are more limited than others) with the exception of Main Street. As reported in Section 4, no significant delay or capacity restrictions were identified. The non-motorized improvements proposed require minimal infrastructure work and no major drainage work to be implemented.

Likewise, refuge islands are proposed to aid in non-motorized crossings and to further the connectivity of neighborhoods on all the corridors with the exception of Geddes Road. To accommodate the roadway and refuge island features, the curbs at the intersections would have to be extended outward another six to 12 feet based on the size of the refuge island as determined by further analysis and detailed engineering study. An intersection roadway widening would ultimately add to the distance that non-motorized users would have to traverse to cross the street, although with adequate refuge islands and non-motorized traffic control devices, the situation for non-motorized users would be significantly improved.

The costs of the roadway widening proposals, presented earlier, total about $2.4 million (Table 6S-2). Spread over a five-year period, with the assistance of Act 51 monies from Michigan DOT, the cost is about $500,000 per year.

Table 6S-2
Preliminary Cost of Roadway Improvements (2005 dollars)
(without right-of-way)

Location	Engineering and Construction Costs
Main and Depot	$220,000
Main and Kingsley	$10,000
Plymouth/Maiden and Moore (right-turn lane)	$290,000
Plymouth and Huron Parking	$660,000
Washtenaw and Huron	$510,000
Washtenaw and Yost	$450,000
Geddes and Earhart	$230,000
Total	**$2,370,000**

Source: The Corradino Group of Michigan, Inc.

Transportation Demand Management

The following Transportation Demand Management (TDM) strategies were examined:

- Parking management
- Ridesharing
- Alternative work hours
- Telecommuting
- Improved transit development/funding

The proposal here is to pursue each of these strategies in a complementary manner to divert travelers from auto use. Particularly important are parking management, especially through pricing, and increased emphasis/funding of transit and ridesharing efforts.

Signalization

The SCOOT (Split Cycle and Offset Optimizer Technique) traffic control system is intended to control the operation of systems of signals rather than isolated intersections. Ann Arbor is changing the master controller of its closed-loop system to the SCOOT system.

The application of SCOOT throughout northeast Ann Arbor's arterials, in combination with the coordination of the City's traffic signal system with the freeway system and surrounding jurisdictions will "squeeze" more out of the existing roadway system, delaying (or eliminating) the need for roadway widening, consistent with the goals established by the Northeast Ann Arbor Transportation Plan Citizens Advisory Committee. Likewise, application of access management, in combination with traffic operations improvements, will extend their roadway traffic service life without major construction.

Other Considerations

The development known as the South Pond Village (Northeast Area Plan Site #10) was considered by the Ann Arbor Planning Commission in 2004 and forwarded to City Council with a denial recommendation. At the writing of this report, action was pending on the zoning for the parcel. A part of the development in that area of northeast Ann Arbor is the proposal to construct an east-west collector street to serve the neighborhood north to Arborland. The roadway/transportation conclusions reached in studying that South Pond Village proposal are as follows.

- Pittsfield Boulevard should be extended north to Wood Creek; most of the extension should operate as a one-way, southbound-only roadway.
- Two-way access to the rear of Arborland would not unduly impact the future east-west collector. This access should be provided either by allowing two-way traffic on the portion of Pittsfield Boulevard directly west of the Mall's detention basin, or by keeping that section one-way south and extending the drive east of the basin one-way north to the future east-west collector.
- To mitigate current traffic delays, the northbound, right-turn movement from Pittsfield Boulevard to Washtenaw Avenue should be provided a protected signal phase during the same time the westbound left-turn arrow is displayed. Also, when funding allows, the Michigan Department of Transportation and/or City of Ann Arbor should add a third eastbound thru-lane on Washtenaw, from about 250 feet west of Pittsfield to the U.S. 23 interchange.
- When the east-west collector is extended to Huron Parkway, the City should periodically evaluate actual traffic volumes with respect to published traffic signal installation warrants.

The South Pond development will work from a traffic standpoint with these roadway improvements.

6.1 Analysis Approach

By applying the TransCAD model, congestion was evident at a number of locations in northeast Ann Arbor when the standard is Level of Service C (Table 6-1). But, the Transportation Citizens Advisory Committee's goals made it clear road/intersection widening is a "last resort" solution.

Because of the idiosyncrasies of long-range/systemwide planning conducted with broad-based, areawide models, such as TransCAD, it was important to take a more detailed view of several of these "congested" locations to further refine the levels of congestion forecast. Therefore, a micro-level analysis was undertaken. It reflects the proposed closure of the east side of the M-14/Barton Drive interchange. The micro-simulation models used in this analysis are SYNCHRO and CORSIM. The major steps necessary to complete the analysis were:

1. Build Existing/Base Model for appropriate links/nodes (Figures 6-1 and 6-2)
2. Obtain existing corridor level data, 2004
   a. Signal timings
   b. Geometrics and lane configurations
   c. New traffic volumes for signalized intersections (Figures 6-3 and 6-4)
3. Compare with Existing TransCAD Demand Model information
4. Obtain TransCAD future projections (2025) and calculate growth rates (i.e., percentages)
5. Build Future/Base Model using existing conditions data and TransCAD growth projections
6. Analyze Future/Base Model with existing and future conditions
7. Identify deficiencies
8. Develop alternatives to address deficiencies using the SYNCHRO micro-simulation model under future conditions
9. Report findings and proposed solutions

In this analysis process, the TransCAD model provided the traffic growth rates and regional effects of any proposed changes in the transportation system. One such change is the proposed closing of the east side of the Barton Drive interchange.

Existing conditions information, such as traffic volumes, traffic control devices, and geometric data, were input to individual micro-simulations for the appropriate links/nodes. By combining the existing conditions data and TransCAD output for 2025, the baseline was established upon which all other micro-simulation networks and alternative solutions were built and compared.

Future conditions (2025) traffic data from TransCAD allowed definition of the expected deficiencies and potential solutions to deal with them. It is noted that the guiding condition is LOS D (refer to Figure 3-8).

6.1.1 Traffic Operations

The analysis results are shown on Tables 6-2 and 6-3 for the morning and evening peak periods with 2025 data. Using LOS D as the "trigger" (not LOS C), the following intersections were given further attention:

Table 6-1
Northeast Ann Arbor Transportation Plan
Impact of Transit on Highways

Road Segment		From	To	1A 2025 Traffic ADT	1A 2025 Traffic V/C	1B 2025 Traffic ADT	1B 2025 Traffic V/C	1C 2025 Traffic ADT	1C 2025 Traffic V/C	1D 2025 Traffic ADT	1D 2025 Traffic V/C	2B 2025 Traffic ADT	2B 2025 Traffic V/C	2C 2025 Traffic ADT	2C 2025 Traffic V/C	3A 2025 Traffic ADT	3A 2025 Traffic V/C	3F 2025 Traffic ADT	3F 2025 Traffic V/C	4A 2025 Traffic ADT	4A 2025 Traffic V/C	4F 2025 Traffic ADT	4F 2025 Traffic V/C
M-14:																							
	A:	W. Miller/Maple	E. of Miller/Maple	15,604	0.21	15,454	0.20	15,628	0.21	15,578	0.20	15,576	0.20	15,684	0.21	15,620	0.21	15,620	0.21	15,444	0.20	15,448	0.20
	B:	E. of Miller/Maple	E. of Beechwood	37,544	0.49	37,428	0.49	37,492	0.49	37,492	0.49	37,500	0.49	37,454	0.49	37,888	0.50	37,752	0.50	37,586	0.49	37,500	0.49
	C:	E. of Beechwood	E. of Main St.	37,338	0.49	37,224	0.49	37,286	0.49	37,282	0.49	37,294	0.49	37,248	0.49	37,666	0.50	37,530	0.49	37,362	0.49	37,276	0.49
	D:	E. of Main St.	S. of Barton Dr.	85,550	1.13	85,446	1.12	85,522	1.13	85,508	1.13	85,490	1.12	85,396	1.12	85,688	1.13	85,492	1.12	85,556	1.13	85,370	1.12
	E:	S. of Barton Dr.	No. of Barton Dr.	76,450	1.01	76,368	1.00	76,414	1.01	76,400	1.01	76,400	1.01	76,332	1.00	75,908	1.00	76,050	1.00	76,582	1.01	76,436	1.01
	F:	N. of Barton Dr.	S. of U.S. 23	84,326	1.11	84,252	1.11	84,290	1.11	84,272	1.11	84,282	1.11	84,208	1.11	83,678	1.10	83,552	1.10	83,996	1.11	83,836	1.10
	G:	W. of U.S. 23	E. of Nixon	69,820	0.96	69,692	0.95	69,800	0.96	69,750	0.96	69,732	0.96	69,274	0.95	69,860	0.96	69,708	0.95	69,216	0.95	69,124	0.95
	H:	E. of U.S. 23	E. of Dixboro	76,076	1.00	76,120	1.00	76,102	1.00	76,130	1.00	76,106	1.00	76,098	1.00	76,102	1.00	76,004	1.00	75,336	0.99	75,294	0.99
Whitmore Lake Road																							
	A:	Huron River Dr.	Stein Rd	19,256	0.92	19,116	0.91	19,250	0.92	19,112	0.91	19,234	0.92	19,156	0.91	14,676	0.70	14,346	0.68	10,318	0.49	10,234	0.49
	B:	Stein Rd.	N. Territorial Rd.	12,342	0.54	12,212	0.53	12,336	0.53	12,260	0.53	12,328	0.53	12,318	0.53	16,350	0.71	16,012	0.69	11,992	0.52	11,906	0.52
Barton Drive																							
	A:	M-14	Pontiac Trail	35,784	**1.70**	35,654	**1.70**	35,796	**1.70**	35,680	**1.70**	35,766	**1.70**	35,722	**1.70**	37,504	**1.79**	37,118	**1.77**	34,660	**1.65**	34,350	**1.64**
	B:	Pontiac Trail	Plymouth	29,098	**1.39**	28,824	**1.37**	29,102	**1.39**	28,778	**1.37**	28,798	**1.37**	28,490	**1.36**	29,300	**1.40**	28,536	**1.36**	29,338	**1.40**	28,728	**1.37**
Pontiac Trail																							
	A:	Plymouth Rd.	Barton Dr.	30,894	1.14	30,336	1.12	30,800	1.14	30,234	1.12	30,368	1.12	30,066	1.11	31,740	1.17	30,850	1.14	30,068	1.11	28,952	1.07
	B:	Barton Dr.	Dhu Varren Rd.	27,090	1.00	26,448	0.98	26,990	1.00	26,382	0.98	26,372	0.98	26,040	0.96	26,336	0.98	25,540	0.95	26,876	1.00	25,964	0.96
Plymouth Road																							
	A:	Huron River Dr.	Barton Dr.	67,768	**1.21**	67,276	**1.20**	67,794	**1.21**	67,026	**1.20**	67,130	**1.20**	65,898	**1.18**	71,158	**1.27**	68,908	**1.23**	69,984	**1.25**	68,358	**1.22**
	B:	Barton Dr.	Nixon Rd.	78,186	**1.16**	77,688	**1.16**	78,234	**1.16**	77,528	**1.15**	77,520	**1.15**	76,426	**1.14**	80,078	**1.19**	78,202	**1.16**	79,420	**1.18**	77,524	**1.15**
	C:	Nixon Rd.	U.S. 23	87,488	**1.30**	86,964	**1.29**	87,472	**1.30**	86,854	**1.29**	86,786	**1.29**	86,432	**1.29**	87,544	**1.30**	86,688	**1.29**	89,628	**1.33**	88,374	**1.32**
Nixon Road																							
	A:	Plymouth Rd.	Dhu Varren Rd.	35,780	**1.61**	35,456	**1.60**	35,658	**1.61**	35,286	**1.59**	35,362	**1.59**	34,948	**1.57**	35,680	**1.61**	34,890	**1.57**	35,508	**1.60**	34,770	**1.57**
	B:	Dhu Varren Rd.	M-14	19,234	0.80	19,424	0.81	19,274	0.80	19,238	0.80	19,352	0.81	19,234	0.80	19,528	0.81	19,286	0.80	19,714	0.82	19,556	0.81
	C:	M-14	Pontiac Trail	19,234	0.80	19,424	0.81	19,274	0.80	19,238	0.80	19,352	0.81	19,234	0.80	19,528	0.81	19,286	0.80	19,714	0.82	19,556	0.81
Fuller Road																							
	A:	Glen Ave.	Glazier Way	50,126	**1.21**	49,450	**1.20**	50,008	**1.21**	48,922	1.19	49,272	1.19	48,232	1.17	50,666	1.23	48,908	1.19	50,288	1.22	48,530	1.18
	B:	Glazier Way	Huron Pkwy.	28,414	0.77	28,116	0.76	28,332	0.77	28,112	0.76	27,976	0.76	27,696	0.75	28,998	0.79	28,228	0.77	28,450	0.77	27,692	0.75
Geddes Road																							
	A:	Huron Pkwy.	U.S. 23	34,404	**1.27**	34,086	**1.26**	34,348	**1.27**	34,144	**1.26**	33,906	**1.26**	33,616	**1.25**	35,498	**1.31**	35,144	**1.30**	34,236	**1.27**	33,742	**1.25**
Miller Road																							
	A:	M-14	Newport Rd.	27,730	1.03	27,408	1.02	27,380	1.01	27,154	1.01	27,276	1.01	26,972	1.00	28,572	1.06	27,976	1.04	28,626	1.06	28,146	1.04
	B:	Newport Rd.	Main St.	31,972	1.18	31,392	1.16	31,606	1.17	31,012	1.15	31,256	1.16	30,668	1.14	33,184	1.23	32,282	1.20	33,102	1.23	32,020	1.19
Jackson Road																							
	A:	I-94	Main St.	76,928	**1.25**	76,834	**1.25**	76,870	**1.25**	76,184	**1.24**	76,348	**1.24**	76,062	**1.23**	77,296	**1.25**	76,060	**1.23**	77,754	**1.26**	76,846	**1.25**
Huron Parkway																							
	A:	Plymouth Rd.	Fuller Rd.	24,924	0.76	24,742	0.75	24,908	0.76	24,776	0.75	24,686	0.75	24,566	0.75	24,508	0.75	24,116	0.73	24,824	0.76	24,620	0.75
	B:	Fuller Rd.	Geddes Rd.	49,024	1.01	48,602	1.00	48,950	1.00	48,654	1.00	48,480	0.99	48,188	0.99	48,144	0.99	47,068	0.97	48,956	1.00	48,016	0.98
Main Street																							
	A:	M-14	Depot St.	96,360	**1.72**	96,338	**1.72**	96,400	**1.72**	96,296	**1.72**	96,278	**1.72**	96,092	**1.72**	95,398	**1.70**	95,024	**1.70**	96,112	**1.72**	95,734	**1.71**
Washtenaw																							
	A:	U.S. 23	Stadium	88,704	**1.39**	87,490	**1.38**	88,368	**1.39**	87,614	**1.38**	87,074	**1.37**	86,010	**1.35**	86,926	**1.37**	84,280	**1.33**	88,382	**1.39**	85,498	**1.34**
	B:	Stadium	Geddes Ave.	49,840	0.89	48,818	0.87	49,564	0.89	48,492	0.87	48,430	0.86	47,054	0.84	47,902	0.86	45,280	0.81	49,150	0.88	46,362	0.83
Huron River Drive																							
	A:	U.S. 23	Huron Pkwy.	23,140	1.10	22,892	1.09	23,102	1.10	23,002	1.10	22,802	1.09	22,526	1.07	22,080	1.05	21,374	1.02	20,330	0.97	19,620	0.93
Geddes Avenue																							
	A:	Huron Pkwy.	U.S. 23	19,622	0.93	19,350	0.91	19,568	0.92	19,218	0.91	19,256	0.91	18,872	0.89	19,826	0.94	19,014	0.90	19,548	0.92	18,846	0.89

Source: The Corradino Group of Michigan, Inc.

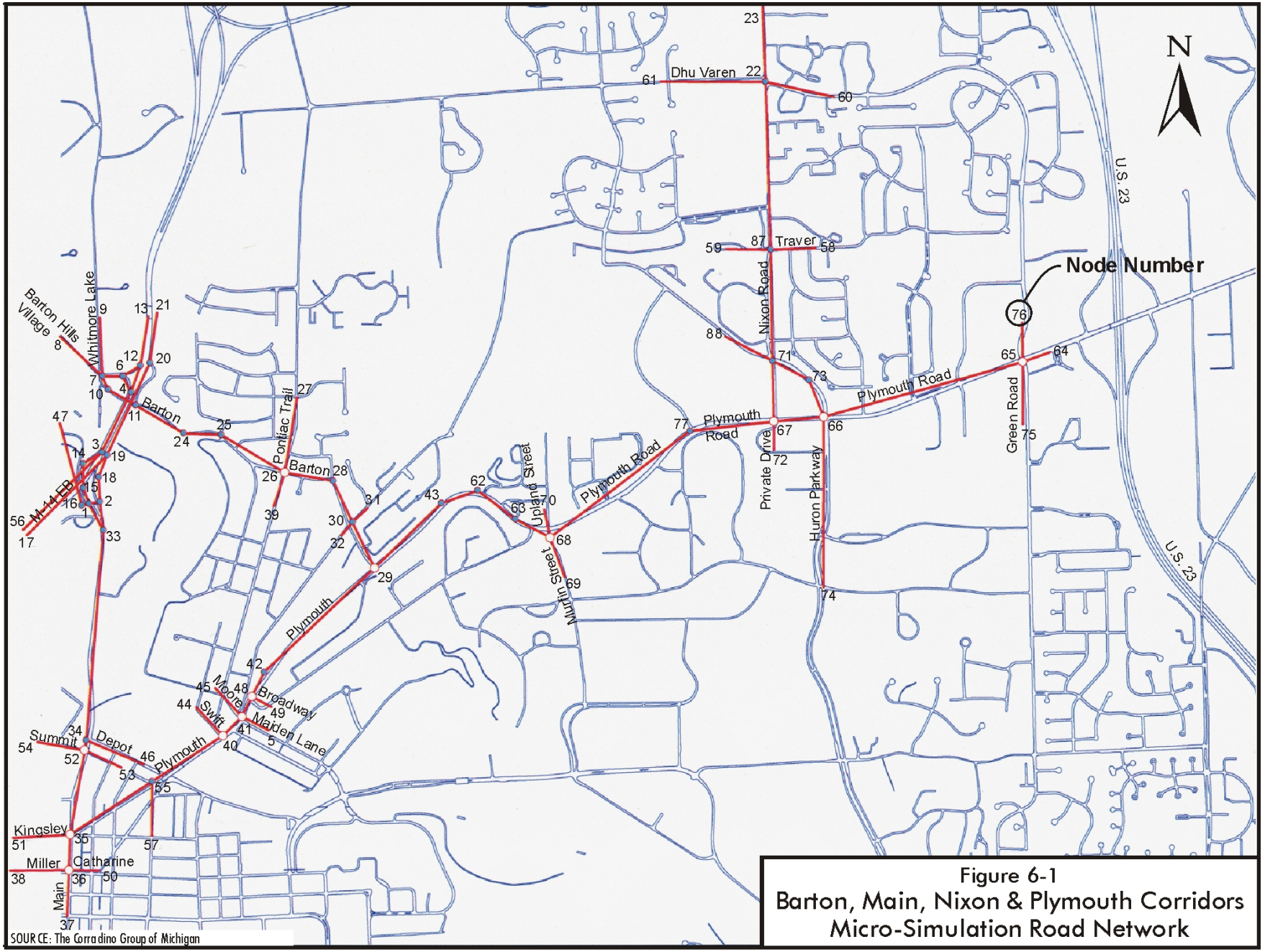


Figure 6-1
Barton, Main, Nixon & Plymouth Corridors
Micro-Simulation Road Network

L:/Projects/29820AA/Graphics/FinalRpt/Fig6-1.cdr

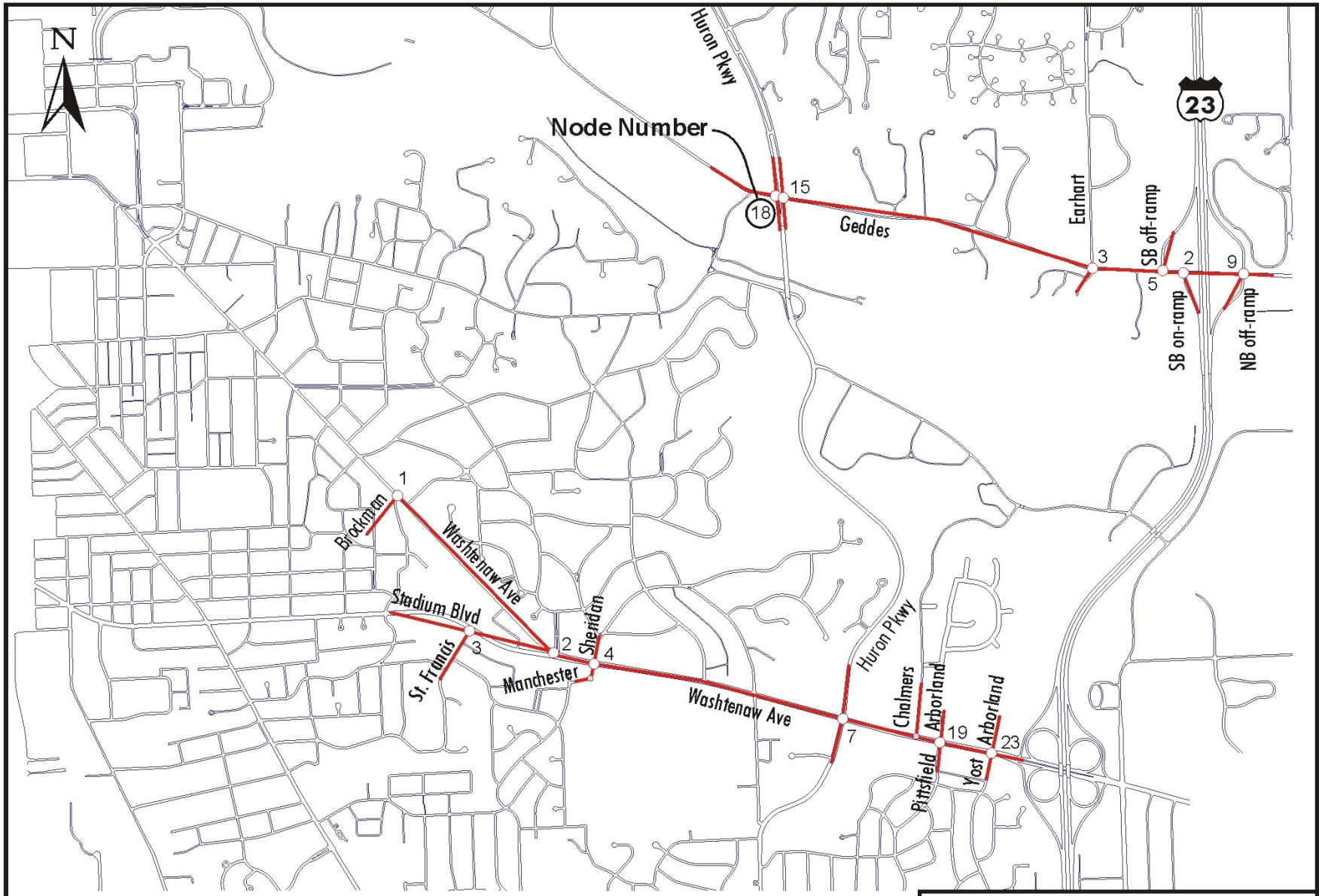
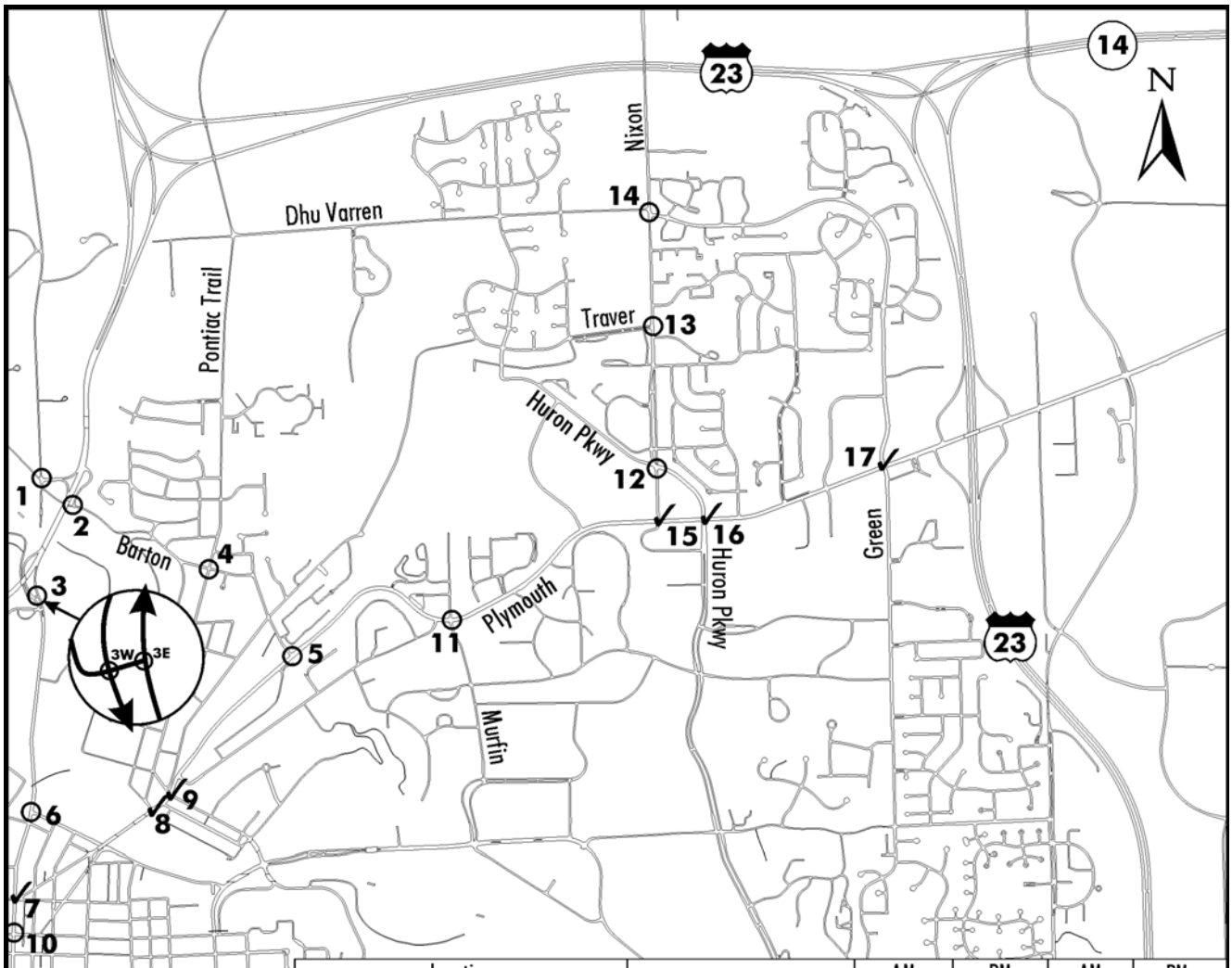


Figure 6-2
Geddes & Washtenaw Corridors
Micro-Simulation Road Network

SOURCE: The Corradino Group of Michigan, Inc.

L:/Projects/2912AA/Graphics/FinalRpt/Fig6-2.cdr



Location No.	Location Description	Date Counted	AM Period Counted	PM Period Counted	AM Peak Hour	PM Peak Hour
1	Barton Dr./Whitmore Lake/I-94 West Side	3/5/2002	6:30-8:30	3:45-6:00	7:15-8:15	4:30-5:30
2	Barton Dr./I-94 East Side Ramps	3/5/2002 pm; 3/6/2002 am	6:30-8:30	4:00-6:00	7:15-8:15	4:30-5:30
3	Main Street Ramps and Huron Drive	3/5/2002	6:30-8:30	4:00-6:00	7:30-8:30	5:00-6:00
4	Pontiac Trail and Barton Dr.	3/6/2002	6:30-8:30	4:00-6:00	7:15-8:15	4:45-5:45
5	Barton Dr. and Plymouth	3/5/2002 am; 3/6/2002 pm	6:30-8:30	4:15-5:45	7:15-8:15	4:45-5:45
6	Main Street and Depot	3/4/2002 am; 3/8/2002 pm	6:30-8:30	4:00-6:00	7:30-8:30	5:00-6:00
7✓	Main Street and Kingsley	Not counted. Have other data.				
8✓	Broadway and Swift	Not counted. Have other data.				
9✓	Plymouth/Broadway/Moore/Maiden Lane	Not counted. Have other data.				
10	Main Street and Catherine	3/7/2002 am/pm	6:30-8:30	4:00-6:00	7:30-8:30	4:45-5:45
11	Plymouth and Murfin	3/25/2004 pm		4:00-5:00		4:00-5:00
12	Nixon and Huron Parkway	3/26/2004 am	7:00-8:00		7:00-8:00	
13	Nixon and Traver	3/26/2004 am/pm	7:00-9:00	4:00-6:00	7:00-8:00	4:30-5:30
14	Nixon and Dhu Varren	3/27/2004 am/pm	7:00-9:00	4:00-6:00	7:00-8:00	4:30-5:30
15✓	Plymouth and Nixon	Not counted. Have other data.				
16✓	Plymouth and Huron Parkway	Not counted. Have other data.				
17✓	Plymouth and Green	Not counted. Have other data.				

SOURCE: The Corradino Group of Michigan, Inc.

Figure 6-3
Barton, Main, Nixon & Plymouth Corridors
Traffic Count Summary

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Location No.	Location Description	Date Counted	AM Peak Hour	PM Peak Hour
1✓	Geddes and Huron Parkway	Not counted. Have other data.		
2✓	Geddes and Huron Parkway	Not counted. Have other data.		
③	Geddes and Earhart	5/18/2004	7:00-9:00	4:00-6:00
④	Geddes and SB U.S.-23 Off-Ramp	5/19/2004	7:00-8:00	4:00-5:00
⑤	Geddes and SB U.S.-23 On-Ramp	5/20/2004	8:00-9:00	5:00-6:00
⑥	Geddes and NB U.S.-23 On/Off-Ramp	5/20/2004	7:00-9:00	4:00-6:00
7✓	Stadium and St. Francis	Not counted. Have other data.		
8✓	Washtenaw and Brockman	Not counted. Have other data.		
9✓	Washtenaw and Stadium	Not counted. Have other data.		
10✓	Washtenaw and Sheridan/Manchester	Not counted. Have other data.		
11✓	Washtenaw and Huron	Not counted. Have other data.		
12✓	Washtenaw and Arborland/Pittsfield	Not counted. Have other data.		
13✓	Washtenaw and Arborland/Yost	Not counted. Have other data.		

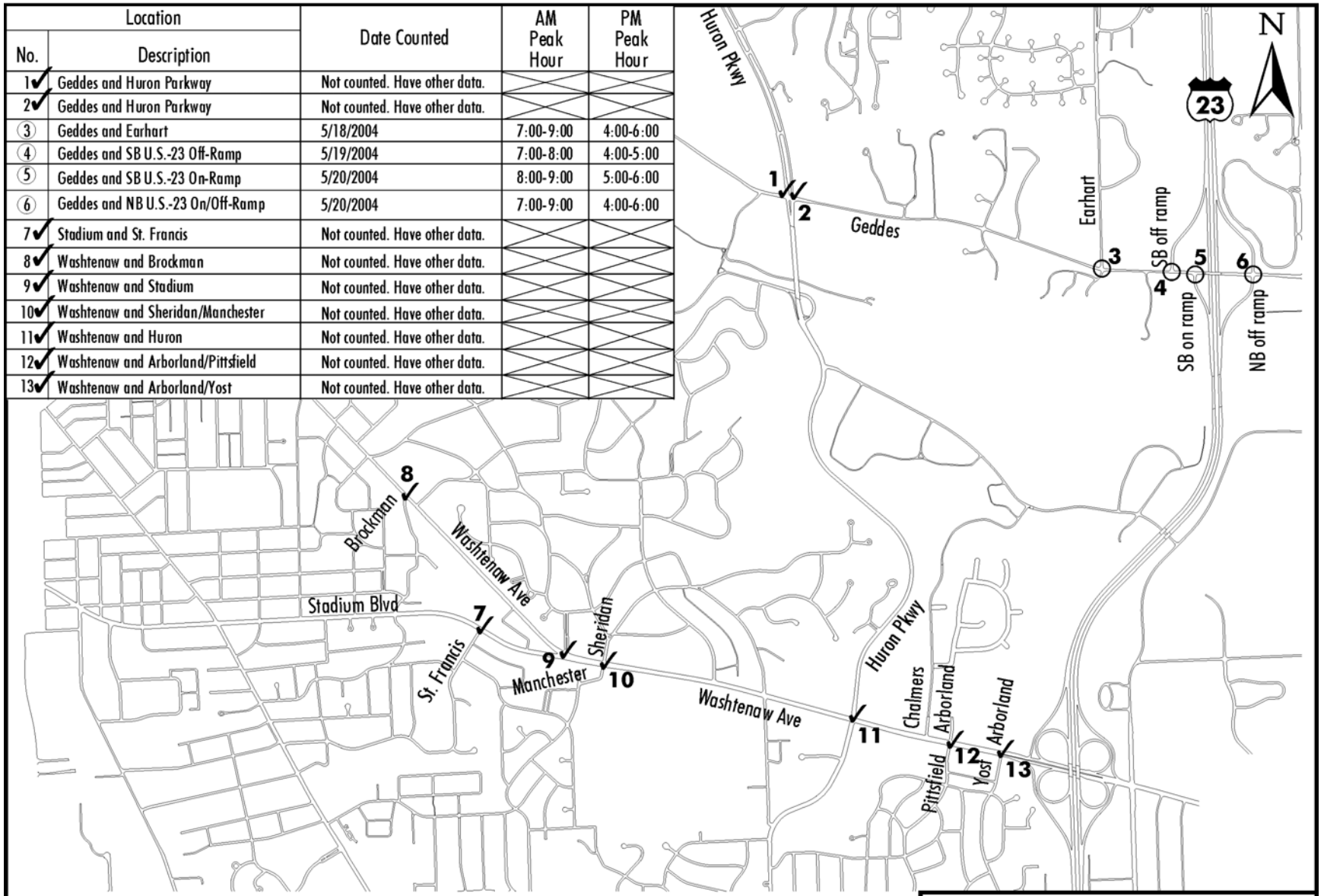

Figure 6-4
Geddes & Washtenaw Corridors
Traffic Count Summary

SOURCE: The Corradino Group of Michigan, Inc.

L:/Projects/2982AA/Graphics/FinalRpt/Fig6-5.cdr

Table 6-2
Northeast Ann Arbor Transportation Plan
Micro Roadway Analysis
Barton, Nixon, Main and Plymouth

Location	Node #	AM Peak					
		Existing			Future (no geometric changes)		
		LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Barton and Pontiac	26	B	19.4	0.73	C	23.7	0.73
Barton and Plymouth	29	B	15.7	0.62	B	18.1	0.62
Nixon and Plymouth	67	C	29.7	0.74	D	43.3	0.74
Main and Summit	52	B	10.8	0.58	B	13.3	0.58
Main and Depot	34	C	31.6	1.10	E	62.9	1.10
Main and Kingsley	35	A	8.6	0.33	A	8.7	0.44
Plymouth and Swift	40	C	26.8	0.79	D	49.5	1.03
Plymouth and Maiden	41	B	18.0	0.67	C	23.0	0.87
Plymouth and Broadway	48	A	5.7	0.52	A	5.9	0.52
Plymouth and Murfin	68	B	16.3	0.64	B	19.1	0.64
Plymouth and Huron	66	D	43.2	1.14	F	88.1	1.14
Plymouth and Green	65	C	32.5	0.92	D	49.9	1.03

Location	Node #	PM Peak					
		Existing			Future (no geometric changes)		
		LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Barton and Pontiac	26	C	25.1	0.56	C	31.4	0.76
Barton and Plymouth	29	B	16.3	0.50	B	19.0	0.65
Nixon and Plymouth	67	D	37.8	1.10	D	42.7	1.15
Main and Summit	52	B	16.5	0.45	B	12.8	0.58
Main and Depot	34	C	28.8	0.75	E	48.5	1.17
Main and Kingsley	35	D	43.4	1.02	F	125.6	1.33
Plymouth and Swift	40	B	18.4	0.75	C	33.4	0.98
Plymouth and Maiden	41	D	46.4	1.02	F	115.1	1.32
Plymouth and Broadway	48	A	6.5	0.56	A	7.2	0.73
Plymouth and Murfin	68	C	25.5	0.60	D	40.9	0.92
Plymouth and Huron	66	D	52.6	0.95	F	101.3	1.24
Plymouth and Green	65	C	27.8	1.07	D	46.4	1.02

Source: The Corradino Group of Michigan, Inc.

Table 6-3
Northeast Ann Arbor Transportation Plan
Micro Roadway Analysis
Jackson/Dexter/Huron, Washtenaw and Geddes
AM Peak

Location	Node #	AM Peak					
		Existing			Future (no geometric changes)		
		LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Huron and 7th Street	8	C	28.1	0.81	D	48.2	1.03
Huron and Ashley	14	B	19.3	0.21	C	23.1	0.27
Huron and 1st Street	15	B	13.5	0.58	C	25.2	0.89
Huron and Main Street	21	C	20.8	0.34	C	23.8	0.43
Washtenaw and Brockman	1	A	9.5	0.30	A	9.9	0.33
Washtenaw and Stadium	2	A	6.6	0.75	A	8.1	0.82
Stadium and St. Francis	3	A	6.7	0.33	B	10.8	0.35
Washtenaw and Sheridan	4	A	7.4	0.53	A	8.0	0.55
Washtenaw and Huron Parkway	7	D	51.0	0.83	D	53.9	0.91
Washtenaw and Arborland/Pittsfield	19	B	14.6	0.70	B	11.5	0.76
Washtenaw and Arborland/Yost	23	C	28.4	0.54	A	8.5	0.58
Geddes and NB U.S. 23 Ramps	9	C	21.6	0.73	D	46.5	0.99
Geddes and SB U.S. 23 On-Ramp	2	A	0.8	0.57	A	1.4	0.85
Geddes and SB U.S. 23 Off-Ramp	5	B	12.2	0.64	B	17.9	0.87
Geddes and Earhart	3	A	9.0	0.69	D	42.9	1.42
Geddes and NB Huron Parkway	15	B	12.4	0.48	B	16.0	0.66
Geddes and SB Huron Parkway	18	B	11.4	0.52	B	15.2	0.70

Table 6-3 (continued)
Northeast Ann Arbor Transportation Plan
Micro Roadway Analysis
Jackson/Dexter/Huron, Washtenaw and Geddes
PM Peak

Location	Node #	PM Peak					
		Existing			Future (no geometric changes)		
		LOS	Avg. Delay	V/C	LOS	Avg. Delay	V/C
Huron and 7th Street	8	B	17.9	0.76	F	282.7	1.18
Huron and Ashley	14	B	15.2	0.67	C	27.3	0.80
Huron and 1st Street	15	C	25.7	0.90	F	70.7	1.31
Huron and Main Street	21	B	11.0	0.49	B	17.0	0.59
Washtenaw and Brockman	1	B	10.7	0.45	B	11.7	0.49
Washtenaw and Stadium	2	C	23.0	0.71	B	14.0	0.80
Stadium and St. Francis	3	B	12.0	0.31	B	14.1	0.35
Washtenaw and Sheridan	4	B	12.6	0.77	B	16.2	0.86
Washtenaw and Huron Parkway	7	E	66.1	1.03	F	99.5	1.13
Washtenaw and Arborland/Pittsfield	19	C	28.6	1.13	C	34.8	1.67
Washtenaw and Arborland/Yost	23	C	30.2	1.47	F	83.2	2.54
Geddes and NB U.S. 23 Ramps	9	B	13.0	0.50	B	19.4	0.72
Geddes and SB U.S. 23 On-Ramp	2	A	1.1	0.55	A	9.6	0.98
Geddes and SB U.S. 23 Off-Ramp	5	B	12.6	0.71	C	20.2	0.95
Geddes and Earhart	3	B	17.3	0.85	E	62.8	1.11
NB Huron Parkway and Geddes	15	B	16.8	0.58	C	22.6	0.77
SB Huron Parkway and Geddes	18	B	19.2	0.62	C	26.1	0.78

Source: The Corradino Group of Michigan, Inc.

- Main and Depot
- Main and Kingsley
- Plymouth and Maiden
- Plymouth and Huron
- Huron and 7th Street
- Huron and 1st Street
- Washtenaw and Huron Parkway
- Washtenaw and Arborland-Pittsfield
- Geddes and Earhart

6.2 Analysis Results

It is important to note that concepts for road widening discussed for these locations are limited, to the extent possible, to existing right-of-way, consistent with the NEATP Citizens Advisory Committee's goals and objectives.

At the Main/Depot intersection, adding on Depot a second westbound-to-northbound right-turn lane will bring the LOS to C with an average vehicle delay of about 30 seconds and a volume/capacity ratio (measure of congestion) of 1.00 or lower in each of the morning and afternoon peak periods (Figure 6-5). This may require private property acquisition.

At the Main/Kingsley intersection, there is no room to add lanes. But, if the northbound and southbound left-turns on Main are restricted in the afternoon peak period, as at Main and Summit, the level of service could be improved from F to D with a resulting V/C ratio of 1.02 and an average vehicle delay of about one minute (Figure 6-6). Vehicles which are prohibited from turning left at this intersection would likely use other roads, such as Miller Avenue, Ann Street, Huron Street, and Washington Street.

For the Plymouth/Maiden intersection there is no room for roadway widening without property acquisition. Providing a northbound Maiden Road to an eastbound Plymouth right-turn lane and reducing the intersection cycle length will improve capacity and reduce congestion (Figure 6-7). A second option is to investigate creation of a one-way system to help reduce the congestion in the afternoon peak. This would involve converting the south leg of Maiden from two-way to one-way north, like on Moore. This would require Wall Street to be converted to one-way and installing a signal at Plymouth. There would then be three signals on Plymouth (Swift, Wall, and Maiden/Moore) which would have to operate as a unit. A final option to consider to this one-way concept is a roundabout but it would involve a relatively large amount of acquisition.

Congestion at the Plymouth/Huron Parkway intersection could be improved to LOS D (V/C of 0.96 and average delay of about 44 seconds) if eastbound-to-southbound and westbound-to-northbound right-turn lanes were added and the current "thru/right-turn" lanes were made "thru" only along Plymouth. Also, dual left-turn lanes should be provided at both Huron approaches to the intersection (Figure 6-8).

At the Huron/7th Street and the Huron/1st Street intersections, there is no right-of-way available to make any changes. While congestion at these locations in the morning peak in 2025 will be at LOS D or better, it will be at LOS F in the afternoon peak. In light of the NEATP goals/objectives dealing with the avoidance of property acquisition, these conditions will only be relieved by diversion of travelers to other modes and/or routes.

Figure 6-5
Proposed Improvements
Main/Depot

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Figure 6-6
Proposed Improvements
Main/Kingsley

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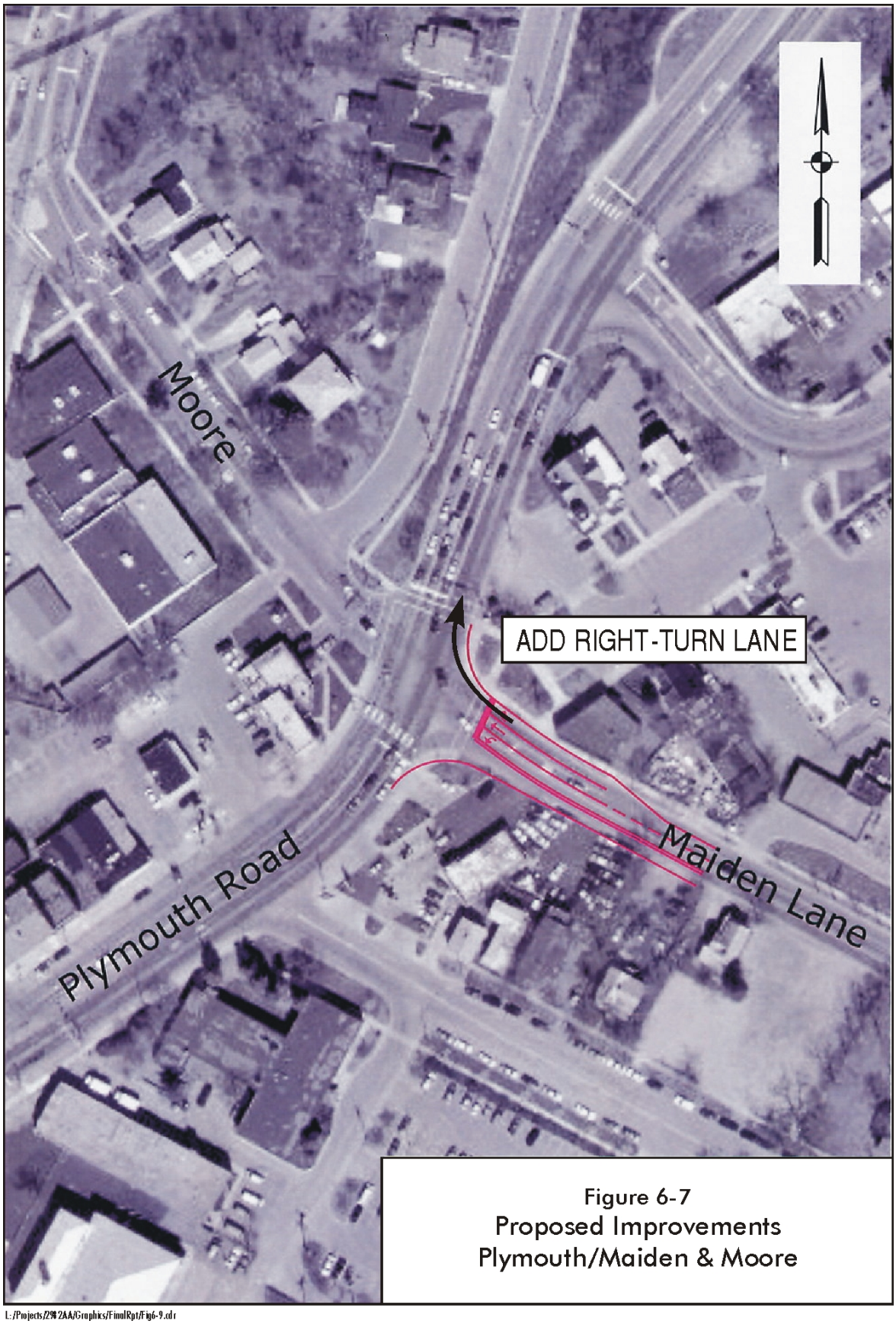

Figure 6-7
Proposed Improvements
Plymouth/Maiden & Moore

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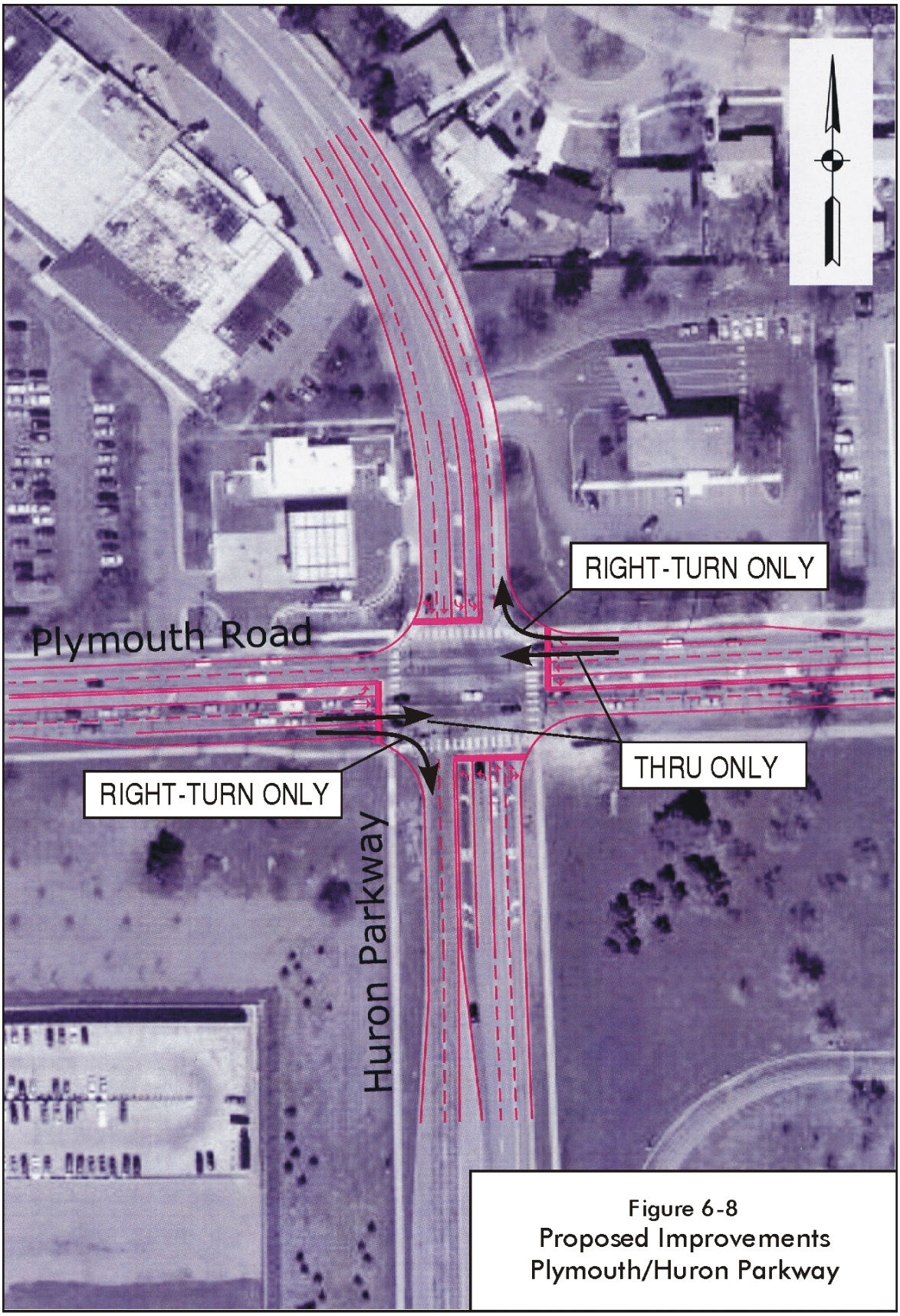

Figure 6-8
Proposed Improvements
Plymouth/Huron Parkway

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The Washtenaw/Huron Parkway intersection is expected to experience LOS F in the afternoon peak period in 2025. Even with the recent addition of double left-turn lanes on Huron Parkway in each direction, and isolating these and the north- and southbound through movements with separate signal phases, the current (2004) Level of Service is E. The average delay in the afternoon peak hour at this intersection in 2025 can be reduced from 100 to 75 seconds, and the Level of Service moved from F to E, if right-turn lanes were added eastbound and westbound on Washtenaw Avenue (Figure 6-9). But, this will require acquisition of private property. It is noteworthy this would not involve buildings.

Another concept offered for discussion is to extend a boulevard system along Washtenaw Avenue from a point west of Huron Parkway to U.S. 23. This would require property acquisition at Huron Parkway (most likely to include the service station on the southwest corner) and eastward to U.S. 23. Along this latter section of Washtenaw, buildings are set back from the roadway so property acquisition would likely involve only parking area, not buildings. The Parkway area is public right-of-way and dedicated to the Interurban line. The benefit of this concept would be removal of the dual left-turn lanes for northbound Huron Parkway traffic desiring to travel west on Washtenaw Avenue. That movement would be accommodated by turning right/east onto Washtenaw and then making a "Michigan" left turn (i.e., indirect left).

It is noteworthy that the analysis of Washtenaw Avenue traffic west of Huron Parkway indicates 2025 traffic can be handled by the existing roadway at LOS B or better in the morning and evening peaks. The conversion of the section of Washtenaw north of Stadium to a three-lane facility, proposed in Chapter 4 as a non-motorized improvement, appears achievable based on these conditions.

Washtenaw Avenue at Arborland/Yost is expected to experience LOS F in the 2025 afternoon peak. This can be improved to LOS C if an eastbound right-turn lane were added and the eastbound-to-northbound left-turn movement were protected by a separate traffic signal phase. The addition of a right-turn lane would require some property acquisition (Figure 6-10).

The Geddes/Earhart intersection is expected to experience LOS E in the afternoon peak in 2025. This can be improved to LOS D by adding a westbound right-turn lane (Figure 6-11). While property acquisition would be involved, it is expected to be limited/minimal.

6.2.1 Non-motorized Implications

It is important to note that bike lanes have been proposed in the non-motorized component of the NEATP on all of these corridors (some sections are more limited than others) with the exception of Main Street. The non-motorized improvements proposed require minimal infrastructure work and no major drainage work to be implemented.

Likewise, refuge islands are proposed to aid in non-motorized crossings and to further the connectivity of neighborhoods on all the corridors with the exception of Geddes Road. To accommodate the roadway and refuge island features, the curbs at the intersections would have to be extended outward another six to 12 feet based on the size of the refuge island as determined by further analysis and detailed engineering study (Figure 6-12). An intersection roadway widening would ultimately add to the distance that non-motorized users would have to traverse to cross the street, although with adequate refuge islands and non-motorized traffic control devices, the situation for non-motorized users would be significantly improved.

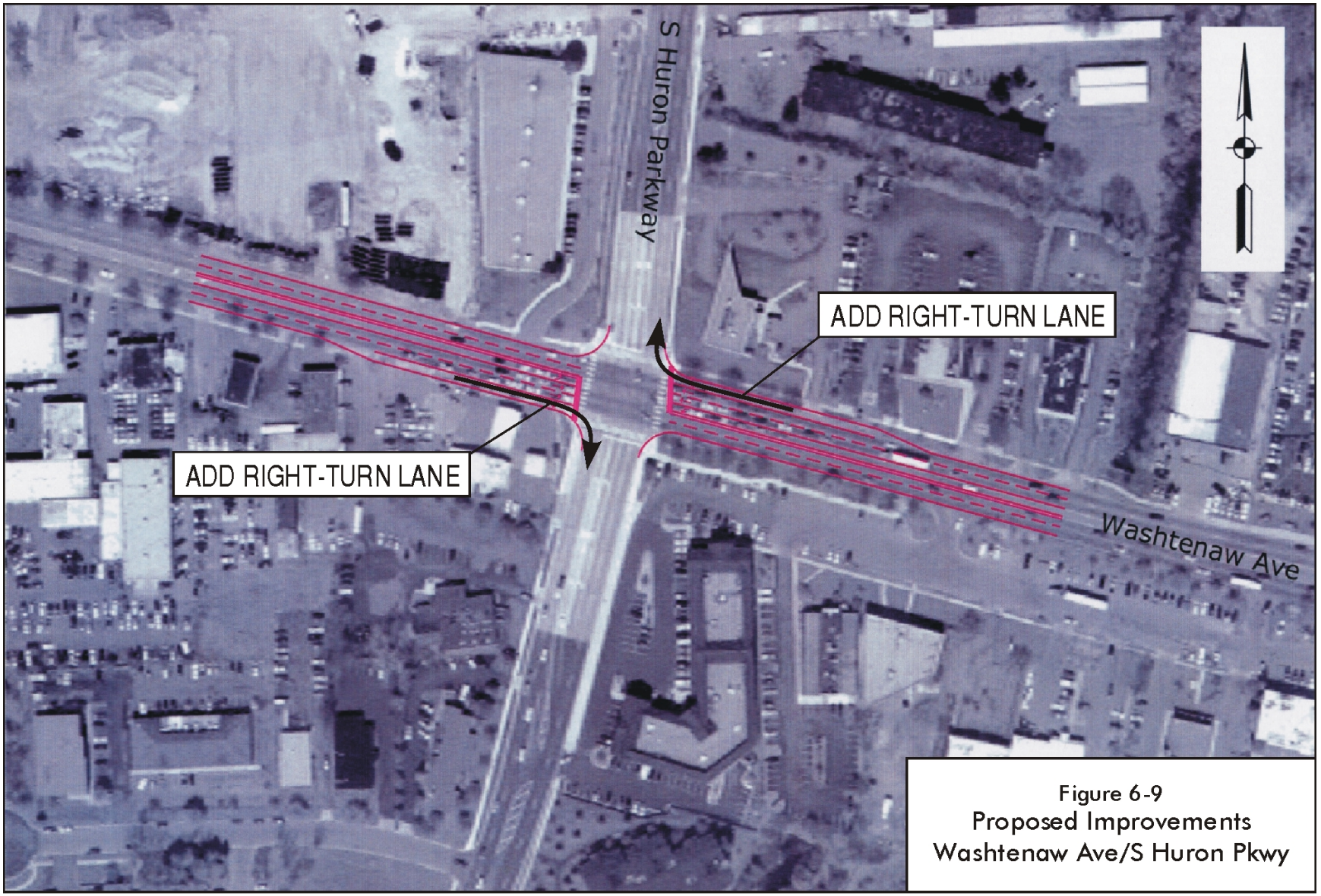

Figure 6-9
Proposed Improvements
Washtenaw Ave/S Huron Pkwy

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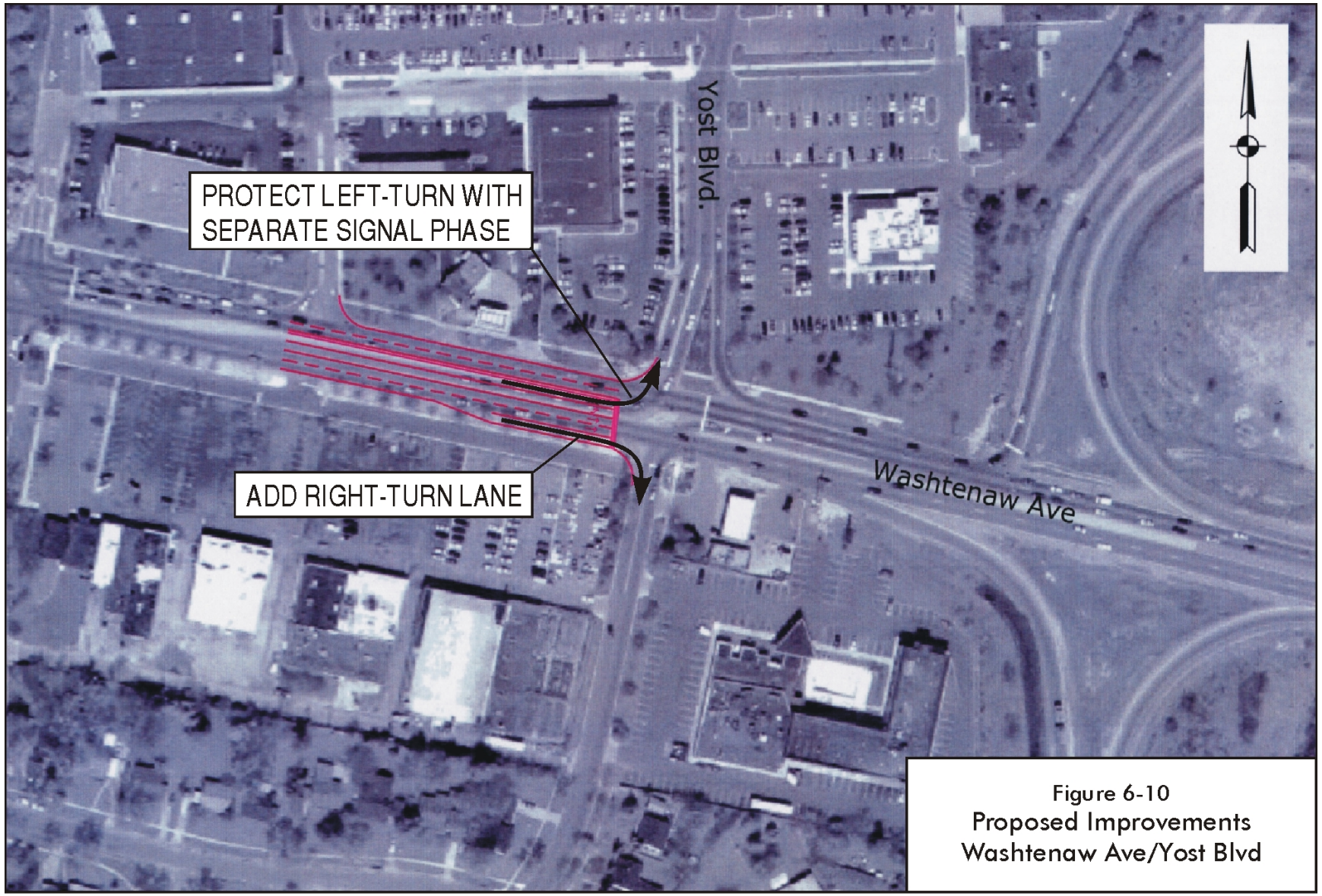

Figure 6-10
Proposed Improvements
Washtenaw Ave/Yost Blvd

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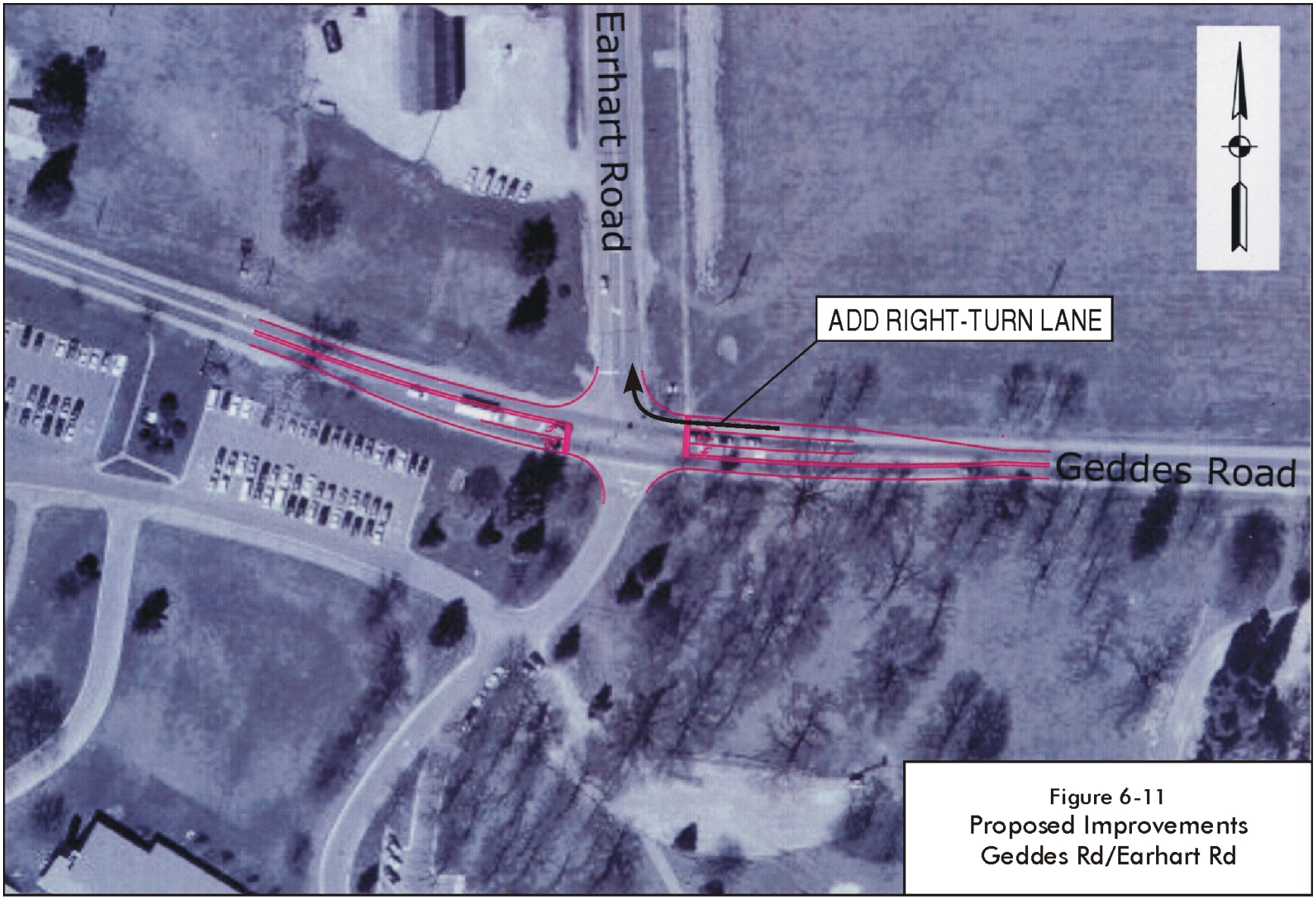

Figure 6-11
Proposed Improvements
Geddes Rd/Earhart Rd

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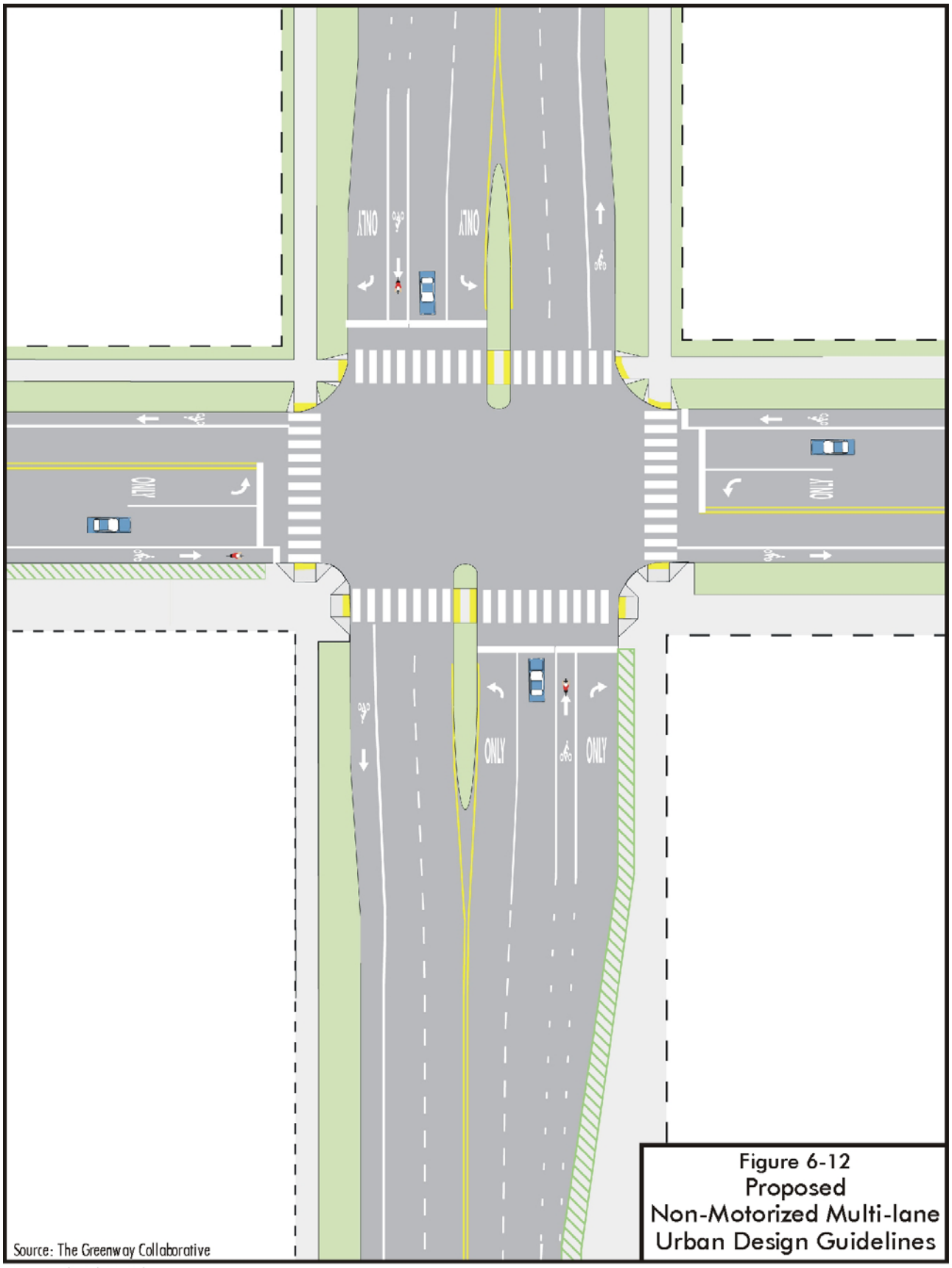

Source: The Greenway Collaborative

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Figure 6-12
Proposed
Non-Motorized Multi-lane
Urban Design Guidelines

6.2.2 Cost

The cost of the roadway widening presented earlier totals about $2.4 million (Table 6-4). Spread over a five-year period, with the assistance of Act 51 monies from Michigan DOT, the cost is about $500,000 per year.

Table 6-4
Preliminary Cost of Roadway Improvements (2005 dollars)
(without right-of-way)

Location	Engineering and Construction Costs
Main and Depot	$220,000
Main and Kingsley	$10,000
Plymouth/Maiden and Moore (right-turn lane)	$290,000
Plymouth and Huron	$660,000
Washtenaw and Huron Parking	$510,000
Washtenaw and Yost	$450,000
Geddes and Earhart	$230,000
Total	**$2,370,000**

Source: The Corradino Group of Michigan, Inc.

6.3 Transportation Demand Management

Because most communities cannot build their way out of congestion, a number of strategies have been developed to manage transportation demand.

Key Transportation Demand Management (TDM) strategies include:

- Parking management
- Ridesharing
- Alternative work hours
- Telecommuting
- Improved transit development/funding

The newly implemented TransCAD modal split model addressed not only transit but walking/bicycling and carpooling/ridesharing. It also provided a quantitative analysis of the impact of managing parking through pricing the supply. More is provided here on parking management, alternative work hours and telecommuting.

6.3.1 Parking Management

It is estimated that there are eight parking spaces for every car in America. The biggest determinant of whether people choose to drive rather than take transit, carpool, walk or bicycle to their

destination is the availability of free or inexpensive parking. Parking management can influence a shift in mode choice. Parking management can be addressed from either the supply side, by limiting the supply of parking, or the demand side, by implementing policies that diminish the demand for parking. With either approach, it is critical to provide adequate and quality alternatives to driving. Thus, transit, parking shuttles, vanpools, and carpools are key elements of any successful parking management strategy. It is also important to promote land use development that is pedestrian and bicycle friendly.

The following parking management strategies that have been successfully implemented in various locations across the United States:

- Reduced minimum requirements
- Cashing-out free parking
- Parking caps
- University parking management

Reduced Minimum Parking Requirements

This strategy reduces the amount of zoning code-specified parking that developers are required to provide. Often this reduction is granted in exchange for developer agreements to support other means of transportation such as transit, carpooling, bicycling or payments to parking or traffic mitigation funds. This strategy works best in areas where there are a mix of land uses that allow for sharing of parking. It also is more effective if the cost of providing parking is high relative to supporting alternative forms of transportation.

Cashing-Out Free Parking

This strategy, used by employers that subsidize or provide free parking, gives the employee the option of giving up their parking space in exchange for pre-tax benefits, such as transit passes or vanpool incentives.

Parking Caps

This strategy is implemented by limiting the amount of parking in an area. In addition to setting maximum parking ratios, as was recently accomplished for office and retail uses, this approach may do any of the following: prohibit the construction of free-standing garages or surface lots; change pricing structures in public facilities; and, allow construction of new buildings without parking, similar to the parking-exempt district that currently overlays the Downtown Development Authority district.

Proposal

A comprehensive parking management plan should be developed that includes the participation of the public and private sectors. To have an effective parking management program, alternative forms of transportation must be available. An ample amount of quality transit service must be provided to make a parking management plan work. The proposals included in this document provide the basis to pursue a parking management program.

6.3.2 Alternative Work Hours

There are three key types of alternative work schedules: staggered work hours, flextime arrangements and compressed workweeks.

Staggered Work Hours consist of start times that are 15 minutes apart throughout the morning. Employees are still required to work an eight-hour day, but they choose when they want to start their day. The goal of this strategy is to spread the amount of traffic during peak periods over a longer period of time, reducing the concentration of ozone precursors.

Under *Flextime* arrangements, employees select their start and end times. As with staggered work hours, it is assumed that flextime arrangements will spread the amount of traffic around the peak period, reducing congestion and air pollution. The greater flexibility in start times may also make ridership possible.

With a *Compressed Work Week* strategy, employees work more hours in fewer days. There are various types of arrangements such as four 10-hour days per week or working eight nine-hour days over a two-week period plus one eight-hour day allowing the employee to take one work day off every two weeks. This strategy works to spread traffic during the peak periods and also to reduce traffic given that employees are traveling to and from work fewer days.

A study by the Arizona Department of Environmental Quality estimated that the carbon monoxide emissions could be reduced by as much as two percent in the Phoenix metropolitan area with a voluntary alternative work schedule program and 20 percent employee participation. But, some studies indicate that having an extra day off might actually increase the number of trips although the non-work trips are generally made off-peak.

A staggered work hour program was implemented in downtown Honolulu. The program included 11,000 employees, comprising 18 percent of the downtown workforce. Commuters experienced up to an 18 percent reduction in peak period travel time, depending on their route. The study also found that those who left work early experienced the greatest reduction in travel time, while those who left later actually experienced increased travel time because they moved into a new peak.

In a San Francisco pilot program, 6,000 employees from 23 companies participated in a staggered work hour program. More than half the participants arrived at work 30 minutes earlier than before the pilot program was implemented. Those traveling by car reduced their daily travel time by nine minutes each way. More than 60 percent indicated they that experienced "much less congestion" on their way to work.

In Denver, 42 federal agencies instituted a compressed workweek program. There were 9,000 participants. Participants arrived one hour earlier and left one hour later than usual. They took the fifth day off. It was estimated that the average carbon monoxide and hydrocarbon emissions for the employees alone was reduced approximately 16 percent.

6.3.3 Telecommuting

Telecommuting is another TDM strategy controlled by employers. Employers determine from what location their employees may work. Those who telecommute may work from home or from a remote satellite center that is run by one or more companies. The employees may or may not have a computer link directly to their employer.

According to the Washington State Energy Office, the national rate of telecommuting is between one and two percent of all workers. The rate of telecommuting is highest in California. It is estimated that 7.6 percent of all workers in the Los Angeles area telecommute while 8.1 percent of all San Francisco area workers telecommute.

There is little documentation of the impacts of telecommuting. In a Massachusetts study of more than 300 workers from 50 different employers, telecommuters drove an average of 31 fewer miles on the days that they telecommuted rather than commuted to a central office. In addition, they averaged 25 fewer daily miles than non-telecommuters.

Participants in the State of California Telecommuting Pilot Project experienced a 27 percent reduction in the number of personal vehicle trips and a 77 percent reduction of vehicle miles traveled.

A FIND/SVP survey found that the number of telecommuters in the U.S. rose from 11.1 million in 1997 to 15.7 million in 1998. A 1999 National Telework Survey found that there were 19.6 million teleworkers who typically worked nine days per month at home. Nevertheless, with the economic downturn since 2000, it is believed the number of telecommuters has dropped.

Proposal

It is suggested that Alternative Work Hours and Telecommuting be explored with both small and large employers in Ann Arbor, perhaps through a central mechanism such as the Chamber of Commerce. This is particularly important if the TDM concept of "parking management through pricing" is not embraced by the private sector. The private sector must play an important role with government if the transportation system's development is to be done in a manner that sustains Ann Arbor's quality of life.

It should also be noted that research by the Victoria Transportation Policy Institute has found "rebound effects" of telecommuting. Specifically, "…teleworkers often make additional vehicle trips to run errands that would otherwise have been made during a commute." Finally, this research indicates, "…Although it tends to reduce peak-period trips, Telework does not necessarily reduce total vehicle travel unless it is implemented in conjunction with other travel reduction strategies."

6.3.4 University of Michigan TDM

Land use priorities, the high cost of building parking structures, and the desire to reduce traffic congestion and fuel emissions are all reasons that The University of Michigan has for years practiced many forms of transportation demand management (TDM). The following is a brief summary of key elements of the U-M TDM model.

Price of Parking

The University employee parking program provides financial incentives for parking off-site, sharing rides, or taking the bus to work. The current employee permit fee structure is as follows:

Gold permit: $1,045 – almost a guaranteed parking space, close to office buildings.
Blue permit: $523 – the most common staff parking permit type; close to office buildings, but no guarantee of finding a space.
Yellow permit: $120 – within reasonable walking distance or a short bus ride to offices.
Orange permit: $60 – requires a bus ride to the worksite.
No charge: No permit is required to park at AATA Park & Ride lots.

University departments contribute $120 per year for each permit their employees purchase. This provides some incentive for them to encourage their employees to utilize AATA bus options.

First and second year students are not allowed to buy parking permits. Third year students and above may purchase parking permits but must park off-site (Orange permits). Graduate students may purchase a Yellow permit.

Parking permit revenues provide financial support for two key transportation programs: Mride and vanpools (see below for a description of those programs).

University Bus Service

The University bus service is free of charge to all riders. The service operates 359 days a year with over 100,000 annual service hours, and carried 4.7 million passenger-trips in fiscal year 2004. It provides commuter service to residence halls and housing units, as well as students and employees who park in Orange permit parking lots. It also provides an extensive inter and intra campus bus service to allow students and staff to travel within and between campuses without the need for an automobile.

AATA Bus Service

The Ann Arbor Transportation Authority (AATA) is a vital element of the U-M TDM model. In August 2004, the AATA and U-M implemented the Mride program, which allows any U-M faculty, staff or student to ride the AATA buses free of charge by showing their U-M ID card. This program is funded through a combination of federal (FTA) funds, parking revenues and general fund appropriations.

Prior to the Mride program, the U-M provided incentives to ride the AATA buses by providing fully subsidized rides from AATA Park & Ride lots, as well as free bus passes to any employee who chose not to purchase a parking permit.

Vanpools

Vanpools have been offered to U-M employees for over 20 years. In 2001, the University decided to fully subsidize the program and saw participation increase by 50 percent. In 2003, we engaged Vanpool Services Incorporated (VPSI) to provide the vehicles and promote the program via Michivan. Participation has increased dramatically and we now have 50 vanpools with over 300 passengers.

Guaranteed Ride Home

In order to relieve the fear of being stranded at work when taking a bus, vanpool or carpool to work, up to six free cab rides home per year are provided to employees and students who utilize these programs.

Bicycles

The University has about 4,000 bike loops on campus. We are working with the city of Ann Arbor on its Non-Motorized Transportation Plan so that we can make improvements to bicycle facilities within and around the campuses. We are also looking into expansion of our limited bike locker program.

Walking

Walking is an important component for getting around campus. Part of our facilities planning efforts include adding new sidewalks where needed and providing safe pedestrian crossings.

Alternative Transportation Coordination

In May 2005, the University created a new position and hired an "Alternative Transportation Coordinator." This person will administer the vanpool and bike locker programs, promote the bus programs, promote carpools, and work with others in the University to improve facilities for biking and walking.

Future Initiatives

As the University continues to grow, TDM programs will become even more important for transportation planning. A few of the new initiatives already identified as being important for the University to work on are:

- Working with AATA on planning expanded Park & Ride and subscription service options
- Creating more incentives for carpools
- Promoting the Mride program to employees
- Expanding the University bus program as needed
- Improving transit facilities; in particular major transit centers on campus
- Improving bicycle facilities

6.4 Signalization

The SCOOT (Split, Cycle and Offset Optimizer Technique) traffic control system is intended to control the operation of systems of signals rather than isolated intersections. Ann Arbor is changing the master controller of its closed-loop system to the SCOOT system.

SCOOT uses data that varies over time, such as the green and red times of the signal and vehicle-presence measurements, together with data that are fixed for the area under control, such as the detector locations and signal stage order. SCOOT collects traffic data from induction loop detectors embedded in the pavement (or through other means at the intersection approaches) to create Cyclic Flow Profiles (CFP) which simulate traffic characteristics (stops, delays, flows and queue length) downstream from the detectors. SCOOT then optimizes signal timing based on these real-time traffic characteristics.

The benefits of SCOOT are highest when traffic flow is heavy, complex, and unpredictable. In those cases, SCOOT can delay the onset of congestion and provide relief from congestion. But, even still, in unsaturated road networks, SCOOT can prevent congestion by its dynamic allocation of signal time on a systemwide approach.

The application of SCOOT throughout northeast Ann Arbor's arterials, in combination with the coordination of the City's traffic signal system with the freeway system and surrounding jurisdictions will "squeeze" more out of the existing roadway system, delaying (or eliminating) the need for roadway widening, consistent with the goals established by the Northeast Ann Arbor Transportation Plan Citizens Advisory Committee. Likewise, application of access management, in combination with traffic operations improvements, will extend their roadway traffic service life without major construction.

6.5 Other Considerations

The development known as the South Pond Village (Northeast Area Plan Site #10) was considered by the Ann Arbor Planning Commission in 2004 and forwarded to City Council with a denial recommendation. At the writing of this report, action was pending on the zoning for the parcel. A part of the development in that area of northeast Ann Arbor is the proposal to construct an east-west collector street to serve the neighborhood north to Arborland. The roadway/transportation conclusions reached in studying that South Pond Village proposal are as follows (Figure 6-13).

- Pittsfield Boulevard should be extended north to Wood Creek; most of the extension should operate as a one-way, southbound-only roadway.
- Two-way access to the rear of Arborland would not unduly impact the future east-west collector. This access should be provided either by allowing two-way traffic on the portion of Pittsfield Boulevard directly west of the Mall's detention basin, or by keeping that section one-way south and extending the drive east of the basin one-way north to the future east-west collector.

Figure 6-13
Future East-West Collector

- To mitigate current traffic delays, the northbound, right-turn movement from Pittsfield Boulevard to Washtenaw Avenue should be provided a protected signal phase during the same time the westbound left-turn arrow is displayed. Also, when funding allows, the Michigan Department of Transportation and/or City of Ann Arbor should add a third eastbound thru-lane on Washtenaw, from about 250 feet west of Pittsfield to the U.S. 23 interchange.
- When the east-west collector is extended to Huron Parkway, the City should periodically evaluate actual traffic volumes with respect to published traffic signal installation warrants.

The South Pond development will work from a traffic standpoint with these roadway improvements.

6.6 Goals and Evaluation Factors

The consultant reviewed the roadway component of the NEATP and judged that five of six goals are met by pursuing the proposals discussed earlier. Achieving the sixth goal, i.e., "Promote cooperation among the City of Ann Arbor and other governmental entities…" will be the subject of review of this plan (Table 6-5).

Table 6-5
Proposed Roadway Recommendations

Goal	Recommendations
Provide appropriate access and mobility with minimal negative impacts for all people and goods	Meet Goal
Protect and enhance the natural environment and the human and built environment	Meet Goal
Promote a safe and secure transportation system	Meet Goal
Invest in transportation infrastructure in a manner consistent with other goals	Meet Goal
Promote cooperation among the City of Ann Arbor and other governmental entities, particularly the surrounding townships and municipalities and the University of Michigan, in a manner consistent with other goals	To Be Determined
Meaningful public input and involvement will be required of any transportation project in the Northeast Area	Meet Goal

Source: The Corradino Group of Michigan, Inc.

The consultant believes there will be no significant negative effects of implementing the roadway widenings (Table 6-6). Further, property acquisition, a key concern of the TCAC, is minimized, although some property acquisition is associated with almost each proposal. And, done consistent with the standards defined in the non-motorized component of the plan, the roadway widening proposals can be compatible with bike and pedestrian activities.

Table 6-6
Proposed Roadway Recommendations

Evaluation Factor	Recommendations
Air Quality	No Violation of Standards
Community Cohesion	No Negative Effect when Combined with Non-motorized Improvements
Land Acquisition	Some Property Acquisition (≈$500,000)
Noise	No Significant Effect
Mode Choice	No Significant Effect
Level of Service	Positive Effect
Water Quality	No Effect
Wetlands	No Effect
Open Space	No Effect
Environmental Justice	No Disproportionate Negative Effect

Source: The Corradino Group of Michigan, Inc.

7. Implementation

A program to implement the proposals, presented earlier, is influenced by the Transportation Citizens Advisory Committee's position that roadway widening be postponed until after all other proposals are acted upon. The extended timeframe to complete the NEATP (two-plus years behind the original schedule) has caused it to merge into additional studies that will affect implementing the NEATP recommendations. For example, the Ann Arbor Transit Authority has commissioned studies to examine possible changes to its basic bus service and the development of park-and-ride services. AATA has already decided to implement subscription service. Also, the City of Ann Arbor has commissioned a study to update its citywide transportation plan, which will include the northeast area.

Nevertheless, a framework for implementing the recommendations of the non-motorized, transit and roadway improvements is provided next.

7.1 Non-motorized Improvements

Immediate attention is being given and must continue to implement the near-term non-motorized component of the NEATP. This includes along:

1) Plymouth Road – Lower Town to Barton Drive: A bike lane on the north side.
2) Plymouth Road – Parc Pointe Apartments to Huron Parkway: Bike lanes on both sides of the road.
3) Washtenaw Avenue from Hill Street to just east of Toumy Road to Tappan Crosswalk: Convert the four-lane road to three lanes and providing two four-foot bike lanes, one on each side of the street.
4) Washtenaw Avenue from Tappan Crosswalk to Stadium Boulevard: Provide bike lane on each side of the road.
5) Washtenaw Avenue from Stadium to Platt Road: Provide a bike lane and sidewalk on the north side of the road and utilize the existing shared-use path on the south.
6) Washtenaw Avenue from Platt Road to Huron Parkway: Provide bike lanes on the north side of the road and widen south outer curb lane.
7) Washtenaw Avenue from Huron Parkway to Arborland: Provide two six-foot bike lanes on Washtenaw from Arborland to Carpenter. Construct facilities recommended in MDOT's U.S. 23/Washtenaw Non-motorized Crossing Study (2004).
8) Fuller Road from Bonisteel to Glazier Way: Provide bike lanes in the roadway by narrowing the outer lanes to sub-11 feet.
9) Fuller Road from Glazier Way to Fuller Court: Provide a "raised" bikeway on the outside edge of the shared-use path, leaving a 4.5-foot minimum buffer for utility posts and signs. The bikeway portion of the path should be marked with a "shared-use" arrow to indicate position of the bikes.

10) Fuller Road from Fuller Court (East End) to Huron Parkway: Pave the shoulders and narrowing the roadway lane to facilitate bikes in the roadway.
11) Stadium Boulevard from Ferndon Road to Washtenaw Avenue: Provide two bike lanes by narrowing the outside travel lane to sub-11 feet.

It is important to recognize projects 3 through 7 require MDOT authorization.

All of these improvements, plus those listed next, are proposed for implementation between 2005 and 2010.

- Conduct an analysis of pedestrian and bicycle crash data annually to identify problem areas and potential corrective actions.
- Provide crosswalks and pedestrian signals at main entrance to the Arborland Mall.
- Improve the crosswalk where the Huron River Path crosses Wall Street and Maiden Lane.
- Improve the crosswalk at the entrance to Gallup Park from Fuller Road restricting overflow parking as necessary.
- Eliminate all pedestrian activated crosswalk signals in the Lower Town area and integrate the walk phase into standard signal phasing.

The long-term non-motorized proposals presented in Section 4 are to be considered for implementation when the roadways to which they relate are reconstructed or widened.

7.2 Transit

The AATA will implement subscription service in 2005. And, studies to possibly modify its basic bus service should be focused in the next five years on: 1) adding between three and ten neighborhood circulator routes; 2) installing up to five park-and-ride lots; 3) providing more direct service between park-and-ride facilities and employment centers like Pfizer, that does not go through downtown; and, 4) reducing the time between buses on the routes shown on Table 7-1 in the priority shown. AATA should also cooperate with the Ann Arbor City Council, Chamber of Commerce and the Downtown Development Authority to examine the increase in parking costs in the core of Ann Arbor or to otherwise manage the downtown parking supply. The NEATP analysis illustrates that a 20 percent increase in parking cost can increase bus use by ten to 25 percent, depending on other transit improvements made. As much as $2.5 million in new revenues could be generated. And, if some or all of this could be dedicated to transit it could generate more federal funding through the traditional federal/local matching programs. Additionally, a coordinated public-private (including U of M) parking management program should be pursued to further encourage alternatives to single-occupant auto use.

Table 7-1
Proposed Routes to Improvements in Time Between Buses

Route	Avg. Weekday Ridership	Potential Headway Improvements
Route 3 Huron River	1,824	Improve Peak Headway to 15 min.
Route 12 U Miller	999	Improve Headway to 15 min.
Route 12A/B Miller-Liberty	958	Improve Peak Headway to 15 min.
Route 7 South Main-East	890	Improve Peak Headway to 15 min.
Route 12U Liberty	854	Improve Headway to 15 min.
Route 20 Ypsilanti Grove-Ecorse	697	Improve Peak Headway to 30 min.
Route 9 Jackson-Dexter	657	Improve Peak Headway to 15 min.
Route 1 Pontiac	584	Improve Peak Headway to 15 min.
Route 6 Ellsworth	516	Improve Peak Headway to 15 min.
Route 16 Ann Arbor-Saline	460	Improve Peak Headway to 15 min.
Route 10 Ypsilanti-Northeast	435	Improve Peak Headway to 30 min.
Route 15 Scio Church-W. Stadium	401	Improve Peak Headway to 15 min.
Route 14 Geddes-E. Stadium	314	Improve Peak Headway to 15 min.
Route 8 Pauline	286	Improve Peak Headway to 15 min.
Route 13 Newport	212	Improve Peak Headway to 15 min.
Route 22 North-South Connector	158	Improve Peak Headway to 15 min.
Route 1U Pontiac	93	Improve Headway to 15 min.
Route 11 Ypsilanti-South	85	Improve Peak Headway to 30 min.

Source: The Corradino Group of Michigan, Inc.

7.3 Roadway Capacity Improvements

While the Transportation Citizens Advisory Committee suggests that roadway capacity improvements be delayed until the non-motorized and transit improvements are complete, an alternative plan for improving the capacity of select intersections is offered here (Table 7-2).

The City of Ann Arbor should immediately change, as a matter of policy, the Level of Service for highway travel from C to D. This will allow the roadway system to "stretch" rather than be expanded with more pavement in the near-term future. And, as funding is available, the roadway capacity improvements should be pursued in the following sequence to address the areas of greatest congestion first.

Table 7-2
Roadway Capacity Improvement Priorities

Priority	Intersection
1	Main and Kingsley/Beakes
2	Main and Depot
3	Plymouth and Maiden
4	Plymouth and Huron
5	Washtenaw and Huron Parkway
6	Washtenaw and Arborland/Yost
7	Geddes and Earhart

Source: The Corradino Group of Michigan, Inc.

As a way of increasing roadway capacity and improving safety, the City should undertake access management plans for Washtenaw Avenue, Plymouth Road, Geddes Road and Nixon Road.

Finally, in the area of roadway improvements, it is suggested that Nixon Road be the subject of a more detailed analysis of land use and transportation impacts to provide guidance on turn lane needs and intersection alignments.

7.4 Funding

Local government funding is expected to be limited for the next several years as the Michigan economy continues to recover from the downturn that began in 2000. Nevertheless, Ann Arbor is and will continue to be an attractive place to work and live. Therefore, it is proposed that as developers seek approval for their projects, the Traffic Impact Analysis provision of the City of Ann Arbor's Land Development Regulations continue to be applied to encourage developers to invest in needed non-motorized, transit, as well as roadway improvements (with emphasis on the non-motorized and transit components of the system, such as bike lane funding, sidewalk development, and funding to increase transit use with more service) so their projects can move forward with benefits to all modes serving their projects.

7.5 Inter-jurisdictional Cooperation

The City should identify ways to increase and improve inter-jurisdictional cooperation with public agencies that impact and are impacted by planning decisions in the Northeast Area. Such agencies include Washtenaw County, surrounding townships, the University of Michigan, the Ann Arbor Transportation Authority, the Washtenaw Area Transportation Study, the Washtenaw Office of the Drain Commissioner, the Washtenaw Metro Alliance, and other entities. Such cooperation can facilitate improved decision making regarding regional land use and transportation planning issues and can help maintain and improve the quality of life for area residents. Periodic meetings should be scheduled between City staff and the planning commission and representatives of surrounding jurisdictions.