Woodward Avenue Rapid Transit Alternatives Analysis Locally Preferred Alternative

Prepared for

Southeast Michigan Council of Governments

SEMCOG

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Acknowledgements

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Woodward Avenue Rapid Transit Alternatives Analysis Steering Committee

Municipal Members
City of Detroit
City of Highland Park
City of Pleasant Ridge
City of Ferndale
City of Huntington Woods
City of Royal Oak
City of Berkley
City of Birmingham
Bloomfield Township
City of Bloomfield Hills
City of Pontiac

Local/State Government Agency Members
Michigan Department of Transportation (MDOT)
Suburban Mobility Authority for Regional Transportation (SMART)
Detroit Department of Transportation (DDOT)
Detroit Transportation Corporation (DTC)

Non-Profit Partners
Woodward Avenue Action Association (WA3)
Michigan Suburbs Alliance (MSA)

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1.0 Introduction

With a history dating back to 1701, Woodward is considered "Detroit's Main Street".

1.1 Overview

In July 2012, the Southeast Michigan Council of Governments (SEMCOG), in collaboration with the Woodward Avenue Rapid Transit Alternatives Analysis (AA) Steering Committee, began a study to identify and evaluate rapid transit alternatives that would improve mobility options and job access, provide better connectivity to major destinations, and increase economic development opportunities along Woodward Avenue, a 27-mile corridor in SE Michigan. The AA study included a multi-tiered screening process that evaluated modal and alignment alternative options resulted in the selection of a locally preferred alternative (LPA). The LPA was recommended to move forward in the next phase of analyses and would lay the foundation for higher level rapid transit service in SE Michigan.

1.2 Purpose of LPA Report

The purpose of the LPA report is to summarize the selection process for the Woodward AA LPA. The document outlines the methods of technical analyses used to evaluate the costs, benefits, and impacts of each alternative, and it describes the qualitative factors considered in the LPA selection such as public input and private and public agency stakeholder feedback.

The LPA is a transit mode and alignment option that results from the AA process. The multi-step evaluation process reviewed multiple options and their abilities to address the transportation needs of the Woodward corridor. The LPA was deemed to be the most appropriate and feasible alternative to meet the purpose and need for the project and represents the best chances for implementation and the most stakeholder support.

1.3 Report Organization

The LPA report is organized as follows:

Chapter 1: Introduction

Chapter 1 provides an overview of the project. It includes background information on the history of transit in SE Michigan, ongoing transit projects in the region, and a summary of local transportation plans. Additionally, this chapter details the study area and the project's Purpose and Need, Goals, and Objectives. A description of the New Starts, Small Starts, and NEPA processes are provided as context for the study regarding necessary future phases of analysis once an LPA is recommended.

Chapter 2: Stakeholder Engagement and Public Outreach

Chapter 2 provides a summary of stakeholder engagement and public outreach throughout the Woodward AA process. Starting with a description of the Woodward AA Steering Committee's involvement, this section also includes one-on-one interaction(s) with project stakeholders as well as public comments with details of how input from these groups was integrated into the process of evaluating alternatives and selecting the LPA.

Chapter 3: Existing Conditions

Chapter 3 offers a snapshot of existing transportation conditions along the Woodward corridor and the I-75 freeway that accommodates the corridor's traffic. The existing conditions described in this section form the basis of the Purpose and Need for the Woodward AA study.

Chapter 4: Evaluation Framework

Chapter 4 details the evaluation framework for the project. The section describes the process undertaken to determine the preferred modal option, and the two-tiered alignment screenings that resulted in the selection of a LPA. A summary of the process for developing the study's evaluation criteria and how public input factored into that decision-making are also included.

Chapter 5: Locally Preferred Alternative Recommendation

Chapter 5 describes the LPA in further detail. The chapter summarizes the alternative's relationship to improving transportation and mobility options and economic opportunities and investment. A snapshot of the LPA's impact on communities and the environment as well as public sentiment concerning the LPA are also offered in this chapter.

Chapter 6: Next Steps

Chapter 6 provides an outline of the next steps following the Woodward AA LPA recommendation through to implementation.

1.4 Proposed Project: Woodward Avenue Rapid Transit Alternatives Analysis (AA)

The Woodward AA explores rapid transit options for the 27-mile long Woodward Avenue corridor from downtown Detroit northwest to the Woodward Loop in Pontiac. The Woodward corridor traverses both Oakland and Wayne Counties, including 11 communities: Detroit, Highland Park, Ferndale, Pleasant Ridge, Huntington Woods, Royal Oak, Berkley, Birmingham, Bloomfield Township, Bloomfield Hills, and Pontiac.

Woodward Avenue is one of the oldest transportation corridors in the country and the main artery of the SE Michigan roadway system. As a cultural and historical asset in the region, it connects two of the state's oldest cities, Detroit and Pontiac. Woodward is one of the five main "spokes" that radiates from Detroit. With a history dating back to 1701, it is considered "Detroit's Main Street." In 1805, Woodward officially connected to the City of Pontiac. Its route followed the route of the Saginaw Trail, a Native American trail that linked Detroit with Pontiac, Flint, Saginaw, and eventually the Straits of Mackinac through the Mackinac Trail. The first automobile was driven on Woodward Avenue on March 3, 1896. In 1909, Woodward became the first concrete paved highway in the world. And in 1913, it became a state trunk-line. Woodward Avenue not only connected two of the largest cities in SE Michigan, but over time, several other cities were established and grew along the corridor. These communities include Highland Park, Ferndale, Pleasant Ridge, Huntington Woods, Royal Oak, Berkley, Birmingham, Bloomfield Hills, and Bloomfield Township. Among Woodward Avenue's many distinctions, the nation's first four-way traffic signal was installed at the intersection of Woodward and Michigan Avenues in Detroit. Woodward Avenue had streetcar operations until 1956.

Woodward is an All-American Road in the National Scenic Byways program and has been designated a Michigan Heritage Route by MDOT.

1701 NATIVE AMERICANS ESTABLISHED THE THE SAGINAW TRAIL, ONE OF THE FIRST TRANSPORTATION ROUTES THROUGH WHAT BECOME THE STATE OF MICHIGAN. THE TRAIL FOLLOWED WHAT IS NOW WOODWARD AVENUE FROM THE DETROIT AREA NORTH TO SAGINAW WHERE IT CONNECTED TO THE MACKINAW TRAIL NORTH TO THE STRAIGHTS OF MACKINAC.

1805 THE TOWN OF DETROIT CREATED THE RIGHTS-OF-WAY FOR THE PRINCIPAL STREETS OF THE CITY WHICH WERE PLANNED BY JUDGE AUGUSTUS WOODWARD. THE PLAN OFFICIALLY CONNECTS WOODWARD TO THE CITY OF PONTIAC.

1815 DETROIT IS INCORPORATED AS A CITY.

1861 PONTIAC IS INCORPORATED.

1863 STREETCAR SERVICE IS ESTABLISHED ALONG WOODWARD.

1864 BIRMINGHAM IS INCORPORATED.

1889 HIGHLAND PARK IS INCORPORATED.

1895 ROYAL OAK IS INCORPORATED.

1896 THE FIRST AUTOMOBILE WAS DRIVEN ON WOODWARD.

1909 WOODWARD BECOMES THE FIRST CONCRETE PAVED HIGHWAY IN THE WORLD. THE FIRST PAVED MILE WAS WOODWARD BETWEEN 6 AND 7 MILE ROADS IN DETROIT.

1913 WOODWARD BECOMES A STATE TRUNKLINE.

1918 FERNDALE IS INCORPORATED.

1920 THE FIRST FOUR-WAY TRAFFIC SIGNAL IN THE WORLD WAS INSTALLED AT THE INTERSECTION OF WOODWARD AND MICHIGAN AVE.

1921 PLEASANT RIDGE IS INCORPORATED.

1923 BERKLEY IS INCORPORATED.

1926 HUNTINGTON WOODS IS INCORPORATED.

1927 BLOOMFIELD HILLS IS INCORPORATED.

1956 WOODWARD'S STREETCAR OPERATIONS CEASE.

2002 WOODWARD IS DESIGNATED AN "ALL-AMERICAN" ROAD IN AMERICA'S NATIONAL BYWAYS PROGRAM - THE ONLY URBAN ROUTE SO DESIGNATED AT THE TIME.

2016 A NEWLY CONSTRUCTED 3.3-MILE STREETCAR SYSTEM IN DETROIT IS EXPECTED TO BEGIN OPERATIONS.

FIGURE 1-1. TIMELINE OF WOODWARD AVENUE
Sources: Michigan.gov, MDOT, M-1 RAIL

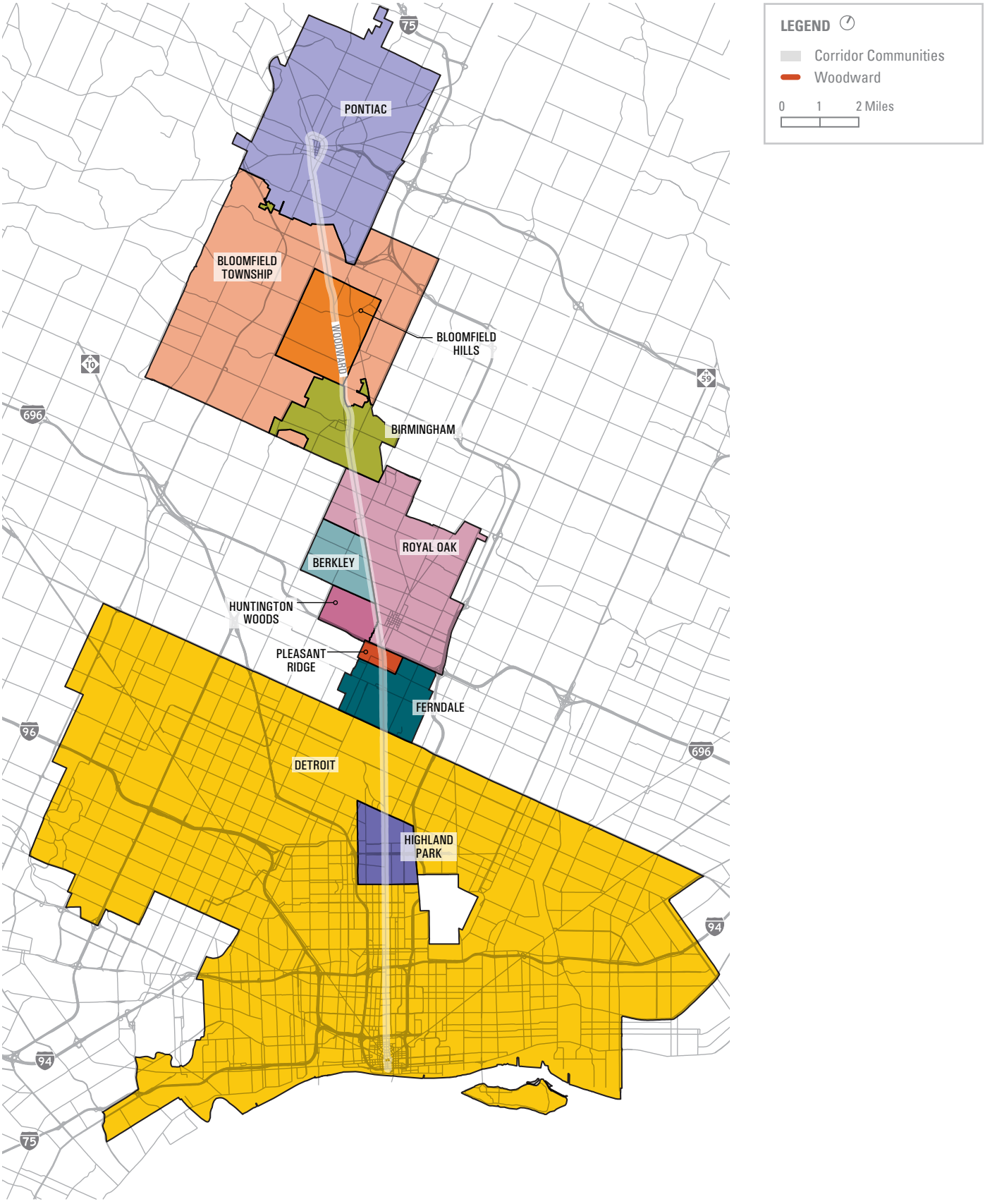


FIGURE 1-2. COMMUNITIES ALONG THE WOODWARD CORRIDOR

1.5 Purpose and Need, Goals, and Objectives

1.5.1 PURPOSE AND NEED STATEMENT

Through regional planning efforts, Woodward Avenue has been identified as the top priority for investment in an effort to improve SE Michigan's regional transit system. Based on review of existing conditions, references to SEMCOG's long-range transportation goals, and consultation with steering committee members and public feedback, the need for transit improvements in the corridor is to:

- Improve mobility options.
- Improve job access.
- Connect people with major destinations along the corridor.
- Encourage economic development opportunities along the corridor.

The Woodward AA examined transit options and recommended the alternative that was determined to best address the following goals and objectives endorsed by the Steering Committee:

- Improve mobility and reliability for the entire corridor.
- Make transit travel times and service reliability competitive with the automobile.
- Provide better connectivity to key origins and destinations.
- Provide better access to major regional employers, including reverse commute services.
- Support increased mode share of trips for transit.
- Support local and regional planning initiatives and land use strategies that aim to strengthen communities, foster economic development, and fulfill long range growth goals.

1.5.2 GOALS AND OBJECTIVES

GOALS	OBJECTIVES
Develop a transit alternative that is competitive with the automobile.	Improve transit travel times and speeds within the study area.
Provide transit capacity needed to meet future travel demand and mobility choices.	Reduce the number of transit trips that require a transfer.
Improve transit service reliability within the study area.	Improve on-time performance.
Develop a transit alternative that enhances mobility for the reverse commute market and transit-dependent populations (specifically in Detroit and Pontiac).	Increase transit accessibility.
Develop a transit system that improves connectivity between origins and key destinations and major regional employers.	Provide convenient and accessible transit service to activity centers.
Develop a transit system that supports local planning initiatives and land use strategies.	Provide transit service that can influence more compact growth patterns. (Corridor communities will vary in this area.)

1.6 Background

1.6.1 HISTORY OF TRANSIT IN SOUTHEAST MICHIGAN

Woodward Avenue has been studied for rapid transit options many times since the 1950's. Some efforts related to overarching goals and policy setting, while others consisted of corridor studies that reviewed transit modes and alignment options. One of these major efforts dates back to 1953 when the Detroit Metropolitan Area Transportation Study was completed, calling for a balanced system of highways and mass transit. In 1956 Metro Detroit streetcar ceased after 93 years of service. The last streetcar ran on the Woodward line in Downtown Detroit. In 1968, the Detroit Rapid Transit Commission published a new plan which called for a regional monorail system. 1987 marked the opening of the People Mover, an automated guide-way transit system circulating in Detroit's Central Business District; however, a comprehensive regional transit system did not materialize, and studies continued to evaluate rapid transit options.

Traditional bus service provided through the Detroit Department of Transportation (DDOT) and the SMART has served Detroit and the surrounding suburban communities in the absence of a regional rapid transit system. DDOT and SMART are the first and second largest transit providers in Michigan, respectively. However, travel times, gaps in service, and reliability make bus service noncompetitive with the automobile.

Recent studies include the Woodward Light Rail Transit (LRT) project in 2011 which did not move forward to implementation, and the M-1 Rail streetcar project, which was awarded federal environmental clearance and funding commitments in 2013 to move forward to implementation.

In December 2012, the SE Michigan Regional Transit Authority (RTA) was established by the Michigan legislature. The RTA identified four corridors for rapid transit improvements: Woodward Avenue, M-59, Michigan Avenue, and Gratiot Avenue. The Woodward Avenue AA, which commenced work prior to RTA enabling legislation, marks the first identified rapid transit project for which the RTA will be responsible for implementation.

1.6.2 ONGOING TRANSIT PROJECTS IN SOUTHEAST MICHIGAN

Ann Arbor to Detroit Commuter Rail

The Ann Arbor to Detroit commuter rail service is a project proposed in the same corridor as the Pontiac-Detroit-Chicago Amtrak line. Using existing infrastructure, the commuter rail connects Downtown Detroit to the City of Ann Arbor. SEMCOG and MDOT are working closely with the Federal Railroad Administration (FRA) and the Federal Transit Administration (FTA) to ensure that the capital improvements for both commuter and Amtrak service are coordinated. Ongoing work includes the identification and agreement with host railroads on key track improvements, refurbishment of passenger cars, acquisition of locomotives, preliminary design of stations and layover facilities, and coordination with Amtrak. The terminal station of this service is the Amtrak station at Woodward Avenue and Grand Boulevard in Detroit. This service will connect to both the proposed M-1 Rail Streetcar and any future rapid transit along Woodward.

Chicago to Detroit High Speed Rail

The Chicago to Detroit/Pontiac High Speed Intercity Passenger Rail project will upgrade 300 miles of track to accommodate trains traveling at a speed of up to 110 mph. The goal is to improve travel times and double the daily round trips between Detroit and Chicago.

M-1 RAIL Woodward Avenue Streetcar Project

The M-1 Rail streetcar is a planned urban, fixed rail circulator system connecting Downtown Detroit to Detroit's New Center area along Woodward Avenue. It would operate in mixed traffic and run from Larned Street in Downtown Detroit north to West Grand Boulevard in New Center. The route is 3.31 miles long and has 20 stations serving 12 locations. The streetcar system is envisioned to follow a side-running alignment through a majority of the corridor with transitions to center-running operations at the north and south ends. M-1 Rail will use modern vehicle technology to link cultural, entertainment, health care, sports, and educational activity centers along the corridor and address unmet higher level transit needs along Woodward.

Link Detroit Project

The Link Detroit project is a Transportation Infrastructure Generating Economic Recovery (TIGER) grant project. It includes infrastructure improvement projects aimed at connecting vibrant destinations, including the Detroit Riverwalk, Eastern Market, Midtown, and Hamtramck.

1.7 Summary of Local Plans

1.7.1 MDOT 2035 LONG-RANGE TRANSPORTATION PLAN

The long-range transportation plan for Michigan is an update to the 2005-2030 MI Transportation Plan: Moving Michigan Forward (2030 MITP.) The plan is a policy document that sets the transportation vision, goals, objectives, and strategies for the state through the 2035 horizon year. Public feedback obtained during the update process in 2012 show that Michiganders' top three transportation priorities are to:

- Maintain and preserve the existing transportation system.
- Improve public transit.
- Recognize the need for intercity rail passenger service.

1.7.2 SEMCOG 2040 LONG-RANGE TRANSPORTATION PLAN & 2008 SEMCOG REGIONAL TRANSPORTATION COORDINATING COUNCIL COMPREHENSIVE REGIONAL TRANSIT SERVICE PLAN

SEMCOG is the Metropolitan Planning Organization for member counties, cities, villages, townships, intermediate school districts, community colleges, and public universities in Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne counties. Woodward Avenue is identified as a regional corridor priority in SEMCOG's *Direction 2040 Long-Range Regional Transportation Plan*, including the pursuit of rapid transit implementation.

In 2013, SEMCOG unveiled the 2040 update to the *Direction 2035 Long-Range Regional Transportation Plan* (RTP). The RTP update has been shaped by looking ahead to 2040 to anticipated 21st century needs and desired outcomes for the region.

SEMCOG's Creating Success initiative lays the groundwork for that broader look, asking how will our transportation investment:

- Lead us to the greatest possible economic prosperity?
- Make our communities more desirable for ourselves and the future workers we will need for that economic prosperity?
- Maintain and enhance fiscally sustainable public services?
- Ensure reliable, quality infrastructure, particularly our transportation infrastructure?
- Preserve and enhance healthy and attractive environmental assets?
- Ensure access to services, jobs, markets, and amenities for all of us individually and the region's businesses?

Achievement of rapid transit service spanning the entire length of Woodward Avenue is viewed as an enhancement to the planned 3.3-mile Woodward Avenue Streetcar project from Downtown to New Center Detroit and aligns with the Regional Transit Coordinating Council (RTCC) 2008 Comprehensive Regional Service Plan recommendation for premium transit service on Woodward. SEMCOG's long-range goals include:

Enhance accessibility and mobility for all people.

Objectives:

- Reduce time spent traveling.
- Increase access to public transportation, consistent with the regional transit plan.
- Increase coordinated development and use of walking/biking facilities.
- Increase connectivity of transportation service across the region, and provide multimodal access to major land uses.

Strategically improve the transportation infrastructure to enhance community and economic vitality.

Objectives:

- Preserve the existing transportation system, prioritizing highway maintenance before highway expansion.
- Focus transportation investment in areas with high concentrations of people and jobs.
- Improve the efficiency and effectiveness of the transportation system.
- Increase public involvement and ensure equal access to participation in transportation decision making.
- Preserve transportation rights-of-way.

Other Regional Goals:

- Attracting and retaining a workforce for the future by linking people to education and jobs;
- Developing transportation assets (such as higher-level transit and walking/biking facilities) perceived by the knowledge-based workforce as fundamental to quality of life;
- Providing a transportation system conducive to aging in place for older adults (the region's fastest growing segment of the population);
- Stabilizing communities and neighborhoods by promoting livability and sensible development/ redevelopment;
- Encouraging land use and housing decisions that foster meaningful transportation choices by providing access to multiple modes of travel for work, school, shopping, recreational, and entertainment;
- Preserving green resources and air and water quality;
- Ensuring the region is safe and secure; and
- Making the region a place where people want to live and visit and where businesses want to invest.

1.7.3 WOODWARD AVENUE COMPLETE STREETS MASTER PLAN

The Woodward Avenue Complete Streets Master Plan initiative was started in August 2011 and has been managed by the Woodward Avenue Action Association (WA3) after receiving a grant from the Federal Highway Administration (FHWA). The Complete Streets Master Plan will ultimately align with the proposed rapid transit on Woodward Avenue by recommending a new, "complete" street design for the entire 27-mile corridor. This design recommendation will complement the existing character of Woodward Avenue while providing an environment that is safer, more livable, and welcoming for pedestrians, bicyclists, and transit users.

1.7.4 OAKLAND COUNTY TRANSPORTATION COMMITTEE

Oakland County believes that the enhancement of multi-modal public transit is an important and essential element of economic development and contributes to the improvement of the quality of life in Oakland County and the surrounding region. Living and working in Oakland County both now and in the future will be greatly enhanced with the development of a multi-modal transit system that meets the needs of all people. In December 2012, the Oakland County Transportation Committee released its Business Roundtable Annual Report which lists transportation issues and identified actions Oakland County can take to mitigate them. The commission made four transit-related recommendations.

Recommendation #1: Support the creation of the Southeast Michigan RTA.

The Southeast Michigan Regional Transit Authority (SMRTA) was established in December 2012. The transit region includes Wayne, Oakland, Macomb, and Washtenaw counties.

Recommendation #2: Create a vision for Regional Transit.

The Oakland County Executive should direct the Oakland County Planning and Economic Development Services Division to work with the Regional Transit Authority (RTA) to determine how Oakland County can best be served by public transportation with the goal to maximize economic development, attract high growth companies and draw a young, talented, and educated workforce in its borders. Short- and long-term strategies to achieve that goal will act as a blueprint for the Oakland County members of the RTA. The plan that emerges should:

- Identify activity centers to be connected by public transit.
- Establish strategies to ensure access to employment and educational opportunities for all county residents.
- Provide special transportation service support to those who need transit. The effort should create a vision that clarifies what kind of transit system Oakland County wants, establish achievable and realistic strategies to achieve this vision, and ensure that the vision supplements and complements the plans developed by the RTA.

Recommendation #3: Support the Woodward AA project.

Oakland County is supportive of the Woodward AA as explicitly listed in December 2012 Oakland County transportation Committee recommendations. Oakland County communities have also expressed support through city council resolutions.

Recommendation #4: Support a full" All-In" (no opt-out) funding model for SMART.

With all Oakland County communities participating in the millage, SMART would see an 80% increase in funding of approximately $13.2 million and have the opportunity to build a truly comprehensive multi-modal regional service program for the residents of Oakland County.

1.7.5 THE GREATER DOWNTOWN TRANSIT-ORIENTED DEVELOPMENT (TOD) STRATEGY

The Greater Downtown TOD Strategy was created in support of the M-1 Rail streetcar project on Woodward Avenue between Jefferson Avenue and Grand Boulevard. The M-1 Rail streetcar provides the opportunity to connect major destinations, employment, educational and medical centers in the Greater Downtown to neighborhoods, improving access to jobs and services for residents along the corridor, and offering a new opportunity to live in a walkable environment. The Greater Downtown TOD Strategy seeks to leverage the transit investment to create a framework to guide future development in support of the creation of more dense, vibrant, and walkable districts and neighborhoods.

The success of the Greater Downtown TOD Strategy is predicated on the collaboration of a diverse range of participants that share the responsibility for shaping the vision for the corridor and in creating a positive community impact in response to transit investment. The process was guided by the Greater Downtown TOD Planning Group, made up of members from the public, private and philanthropic sectors, and led by the Detroit Economic Growth Corporation and Downtown Detroit Partnership/M-1 Rail. Through interviews, workshops, critiques of the work, residents and stakeholders participated in the authorship of the vision, principles, and action plans that will guide investment and development throughout their communities.

1.7.6 SOUTH OAKLAND COUNTY TRANSIT-ORIENTED DEVELOPMENT (TOD) STUDY AND CODE

In anticipation of enhanced bus rapid transit (BRT) service that is planned along Woodward Avenue in Detroit, WA3 developed a land use and redevelopment plan to complement anticipated transit service in southern Oakland County. This "pre-planning" document includes an audit of the comprehensive plans and zoning ordinances of five cities along the corridor in southern Oakland County. These included the cities of Ferndale, Huntington Woods, Berkley, Royal Oak, and Birmingham. The study helped to identify changes needed to achieve a unified vision for transit along the corridor, help improve planning along the Woodward corridor utilizing Complete Streets methodology, and to maximize development associated with potential future transit. The study includes the following key elements:

1. Identification of potential transit nodes and stations that are generally consistent with the LPA recommendations (see Transit Framework Map). Key stop locations were suggested at Maple Road, 13 Mile Road, I-696, and 8 Mile Road.
2. TOD principles to guide participating cities as they update their master plans and zoning ordinances.
3. Complete Streets recommendations to improve walking and biking along the corridor, including suggested pedestrian crossings and design options for the Woodward Avenue right-of-way.
4. An initial framework for transit that will coordinate with the Woodward Complete Streets project and transform the right-of-way to be more supportive of transit, walking, and biking.
5. A model TOD overlay code to provide the participating cities with transit-friendly zoning language to help attract the type of redevelopment desired.

1.7.7 CORRIDOR COMMUNITIES

Detroit

The City of Detroit released the Detroit Future City (DFC) Strategic Framework Plan in 2013 following a multi-year planning effort. The DFC Strategic Framework Plan articulates a shared vision for Detroit's future, recommending specific actions related to economic growth, land/building resources, city systems, land use, neighborhoods, and civic engagement. In 2014, through private, public, and foundation support, the DFC Implementation Office was created to ensure the successful execution of the vision created in the DFC Strategic Framework Plan. Several initiatives under the "city systems" umbrella of the DFC Implementation Office specifically address the critical role of transit within the city and region. The DFC Implementation Office is working toward the development of a transit hierarchy that offers fast, efficient and convenient transportation between neighborhoods and job centers, which align with the other elements of the DFC Strategic Framework Plan.

Highland Park

The City of Highland Park updated its Master Plan in 2010, which places an emphasis on fostering TOD along Woodward Avenue within a quarter-mile of transit stations as planned for during the Woodward Light Rail study. While the recommendations of that study have not been implemented, the LPA aligns with Highland Park's goals for TOD and should provide a similar impact toward the development of those properties. The Master Plan also recommends formal Complete Streets policies and guidelines along Woodward Avenue and other street typologies within the city.

Ferndale

The Ferndale Master Plan calls for enhancement of the existing transportation system to develop a safe and diverse multi-modal system, specifically supporting mass transit, non-motorized transportation, and TOD along Woodward Avenue and 9 Mile Road. Ferndale was very involved in the Woodward Avenue Complete Streets Master Plan. The City endorsed the Master Plan's recommendations to remove one traffic lane in each direction with the space being repurposed for wider sidewalks and a two-way cycle track along both sides of Woodward. Well-defined and more frequent mid-block pedestrian crossings are also recommended. Ferndale has adopted a Complete Streets and Non-Motorized Network Plan. The Plan's guiding principle is for equitable design for all types of transportation users and improved connectivity for all modes of transportation. The Plan promotes a Complete Streets philosophy for the entire Woodward corridor in the city with a series of recommendations to improve pedestrian and bicycle connections to, along and across Woodward Avenue and future transit stations.

Pleasant Ridge

The Pleasant Ridge Master Plan includes planned land uses along Woodward Avenue that are conducive to future transit. The future land use map indicates a blending of residential uses into commercial uses at the northernmost section of the city. This area is identified as having a relatively high redevelopment potential for multi-level storefronts with upper level residential.

Royal Oak

Royal Oak's 2012 Master Plan promotes a pedestrian-friendly environment and encourages TOD principles. The city's plans call for a streetcar or rail system that extends from Woodward to Main Street in Downtown Royal Oak. The Plan promotes public transit and notes its importance to the city's future, especially the downtown. The City of Royal Oak had long planned for transit on Main Street, but understands that an alignment along Washington could be valuable, particularly with a more direct and rapid route off of Woodward Avenue.

Huntington Woods

The Huntington Woods Master Plan endorses TOD along Woodward Avenue. The city envisions Woodward serving as a "front door" to the community, with redevelopment mixing townhomes and condominiums, green space, offices, and small-scale retail uses. One particular deficiency stated in the plan is the lack of senior living, which the city hopes to solve with second and third story residential units above storefronts along Woodward.

Berkley

In its Master Plan, Berkley strongly endorses TOD strategies and transit along Woodward. Although Berkley's downtown area is planned on 12 Mile Road west of Woodward, the Plan also includes strategies to strengthen Berkley's commercial presence near Catalpa Drive, the half-mile road between 11 Mile and 12 Mile Roads.

Birmingham

Although the City of Birmingham does not have a comprehensive land use plan, its Triangle District Plan and Downtown Plan provide a solid foundation for TOD and mixed-use development along Woodward Avenue and in the blocks to the east and west. Both plans, along with a new Multi-Modal Plan, call for improvements to the pedestrian and bicycle infrastructure along Woodward. The city is completing a corridor plan for the city's South Gateway, along Woodward from 14 Mile Road north to Lincoln Street. This plan recommends TOD nodes at 14 Mile and Lincoln to support future transit stations. Redevelopment of the rest of the corridor into denser, walkable places is also proposed.

Bloomfield Hills

The 2009 Bloomfield Hills Master Plan identifies future BRT as a valuable asset. The Master Plan calls for "arterial BRT along Woodward by 2015 with the development of streetcar or light rail transit over the next 25 years." It also voices the City's support of regional transit efforts as the demand is evaluated over time. The Plan notes that if Bloomfield Hills adds SMART service and rapid transit stops, "the need for safety paths or sidewalks in the vicinity should be evaluated to improve convenience and safety for users."

Bloomfield Township

Bloomfield Township considers transit as an important asset to its transportation system. The municipality promotes TOD in their Master Plan to help foster a more livable and walkable community. The Plan states that future land use decisions should consider enhancing the transit-friendly environment through the adoption of TOD standards around business centers and transit locations.

Pontiac

The Pontiac Master Plan identifies the need to enhance walkability in the city through pedestrian-friendly street profiles and standards. The Pontiac Livability Study shows the possibility to convert a one-way loop in downtown into a two-way loop with a vastly improved system for pedestrians and bicyclists, fostering better walkability downtown and connectivity to the BRT system.

1.8 Federal New Starts, Small Starts, and NEPA Processes

1.8.1 NEW STARTS VERSUS SMALL STARTS

The United States Department of Transportation FTA Capital Program (Section 5309) provides funding for new railway or busway projects, the improvement and maintenance of existing rail and other fixed guideway systems that are more than seven years old, and the upgrading of bus systems.

The resulting Woodward LPA will compete with projects from cities across the United States for Section 5309 funding. The LPA will be evaluated to determine the appropriate funding source for which an application should be submitted. There are three sources of funding for transit systems under the FTA Capital Program: News Starts, Small Starts, and Very Small Starts. These funding sources are delineated by the degree of new capital infrastructure and improvements needed to make the system operational. New Starts projects generally require the largest capital investment, Small Starts requires a lesser degree of investment, and Very Small Starts require the least amount of new capital infrastructure and improvements.

1.8.2 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

The National Environmental Policy Act requires federal agencies to consider the impacts of federal actions on both the human and natural environments. Once an LPA is recommended to FTA on behalf of the SE Michigan Transit Authority, further analysis under FTA guidelines will determine the degree of environmental analysis that will be needed to satisfy NEPA requirements.

Typical areas of analysis explored in the NEPA process include air quality, hazardous materials, historic and archaeological resources, environmental justice, and noise and vibration.

2.0 Stakeholder Engagement and Public Outreach

SEMCOG recognizes the importance of optimizing existing community relationships to encourage meaningful public engagement. This section summarizes interactions with key stakeholders and the general public throughout the AA process from July 2012 to December 2013.

2.1 Stakeholder Engagement

Stakeholder engagement included a series of public workshops throughout the AA process. In addition, meetings were held with key stakeholders, such as institutions, major employers, city boards and commissions, transit and road agency staff, and the M-1 Rail team. Monthly Steering Committee meetings were held, including a bus tour of the Cleveland Health Line and a separate tour of the Woodward corridor to better understand the different alignment options. This section describes the stakeholder engagement process, a summary of the input received, and a segment-by-segment review of the input on the LPA by community leaders.

WOODWARD AVENUE RAPID TRANSIT ALTERNATIVES ANALYSIS (AA) STEERING COMMITTEE

The Woodward AA Steering Committee is an advisory body that has guided the AA process towards the development of the LPA that meets the transit needs of the Woodward corridor and improves transit in the SE Michigan region. The Woodward LPA is comprised of a preferred mode and alignment, and preliminary cross sections and station locations that the Steering Committee will recommend to the RTA.

The Committee is comprised of representatives from 11 study area communities, two non-profit organizations, and local, regional, and state transportation agencies. Study area communities include: Detroit, Highland Park, Ferndale, Pleasant Ridge, Huntington Woods, Royal Oak, Berkley, Birmingham, Bloomfield Township, Bloomfield Hills, and Pontiac. SEMCOG (the project sponsor), MDOT, DDOT, SMART and DTC represent the transportation agency representation on the Steering Committee. WA3 and the Michigan Suburbs Alliance are (MSA) are non-profit partners participating on the committee. Throughout the AA process, the Steering Committee convened monthly to review project updates from SEMCOG and provide feedback on technical presentations.

In addition to its role as an advisory body to SEMCOG, a key mission of the Steering Committee was to arm decision makers within corridor communities with information that supports educated decision making on behalf of their constituents. Part of the Committee's educational process centered on the group understanding the benefits of rapid transit. A field trip to the Cleveland, Ohio Health Line BRT system in December 2012 offered committee members a real world rapid transit system experience. The committee attended a presentation by the Greater Cleveland RTA CEO/General Manager, Joseph Calabrese, and the Deputy Manager of Engineering and Project Management, Michael Schipper, and had the experience of riding a BRT vehicle on the 6.8 mile Euclid corridor from downtown to East Cleveland. As a result, the committee developed a keen understanding of rapid transit's benefits and were more equipped to inform their constituents and decision makers about the project.

Given the Committee's enthusiasm for the project, coupled with the group's knowledge of the corridor and community networks, it was determined that the Committee's input into station location development would bring great benefit to the study. As such, the Committee was regularly engaged in exercises that broadened their knowledge of station location development considerations. Exercises included a bus tour of the Woodward corridor, a station location prioritization exercise, and a transit rider profile identification exercise.

MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT)

MDOT is the owner and operator of Woodward Avenue roadway and median from I-75 in downtown Detroit to the Woodward Loop in Pontiac, MI. Collaboration with MDOT was ongoing throughout the AA process and it will continue as the project moves forward into future phases. The median on Woodward was identified by many corridor municipalities as a symbol of community identity. Though MDOT owns the median, local communities typically maintain it, including investments in landscaping improvements. Per MDOT's recommendation local communities were consulted extensively in an effort to reconcile communities' transportation and cultural needs with the design and operational needs of the rapid transit system proposed along Woodward.

TRANSPORTATION RIDERS UNITED (TRU)

TRU is a non-profit organization committed to promoting transit in the Detroit metropolitan area. TRU recognizes the need for high-quality transit as a critical component to that system. While a formal TRU campaign was not launched for the Woodward AA, the organization's assistance was critical to reaching transit dependent riders in the Detroit metropolitan area with information about the project. TRU included public meeting announcements in their monthly electronic and standard mail newsletters. TRU also activated its network of volunteers to distribute flyers and engage the public regarding the project at targeted locations within the community.

IMAGE 2-1. CLEVELAND BUS TOUR
Source: Parsons Brinckerhoff

IMAGE 2-2. CLEVELAND BUS TOUR
Source: Parsons Brinckerhoff

IMAGE 2-3. CLEVELAND BUS TOUR
Source: Parsons Brinckerhoff

HENRY FORD HOSPITAL

Throughout the AA process, an effort was made to consider the consistency of the project's development with planned land development in the study area, including Henry Ford Hospital's recent $35-million expansion in Detroit. The Henry Ford Hospital Level I Trauma Center in Detroit is the hospital's flagship facility. The hospital is located at the northwest intersection of the M-10 Service Drive and Grand Boulevard. In 2013, meetings with Henry Ford Hospital were conducted to better understand their development visions and to coordinate future rapid transit facilities that support their efforts.

BEAUMONT HOSPITAL

Discussions with stakeholders at Royal Oak Beaumont Hospital, which is located at Woodward and 13 Mile Road, focused on the location of possible transit stations in proximity to the Hospital. The main concern was how transit stops could provide service to both hospital staff and visitors. Beaumont Hospital also owns the Northwood Shopping Center at the southwest corner of Woodward Avenue and 13 Mile Road, which is planned for major redevelopment in the next two to five years. Discussions revolved around the possibility of designing the redevelopment to take advantage of a transit station along Woodward. One particular concern raised was the possibility of private parking structures located on the hospital grounds being used as an informal park-and-ride (P&R) for transit users looking for free parking.

ST. JOSEPH MERCY OAKLAND

St. Joseph Mercy Oakland in Pontiac is completing a major expansion and renovation of its campus. Major projects included a reconstructed entrance, new buildings, new parking structures on Woodward and Martin Luther King Boulevard, a pedestrian bridge over Woodward, and major landscaping enhancements along the Woodward median. Those involved in the discussion noted many of the patients and visitors of St. Joseph Mercy Oakland are transit dependent. A station as close to the entrance of the hospital as possible was preferred to benefit these visitors and the institution's many employees.

BIRMINGHAM AND BLOOMFIELD CHAMBER OF COMMERCE AND PRINCIPAL SHOPPING DISTRICT

Presentations to the Birmingham Chamber of Commerce took place relatively early in the Woodward AA process. The goal of the presentation was to familiarize them with rapid transit and the AA process. Additionally, the presentation provided information about the potential economic benefits rapid transit can provide to businesses near Woodward in the Birmingham and Bloomfield areas. These discussions led to a general consensus of support, with most comments aimed at the process of determining station locations and how businesses along Woodward would be impacted during the construction phase. There were also several comments on the importance of security at the stations and in the vehicles.

ROAD COMMISSION OF OAKLAND COUNTY

A presentation of the LPA was made to staff of the Road Commission of Oakland County. Although the Road Commission showed overwhelming support for the project, a few concerns arose, such as the impact of traffic operations on cross streets in their jurisdiction, changes to Michigan left turns and crossovers, and how the signal system would adapt to reduce conflicts between the rapid transit system and the signals along Woodward.

COMMUNITY BODIES

In November 2013 and May 2014, SEMCOG, in coordination with Woodward AA Steering Committee members, met with planning staff, local legislative bodies, and elected officials to provide project development updates to present and receive feedback on alignments, station locations, and cross sections under consideration. Community input was integrated into presentation materials that were shared with the public at the December 2013 series of public meetings, and was ultimately considered as part of the LPA.

Based on the meetings with community leaders, key issues by segment are listed below. These issues ranged from comments on alignment, station locations, cross sections, and topics to be addressed in the upcoming Environmental Assessment (EA) and engineering phase.

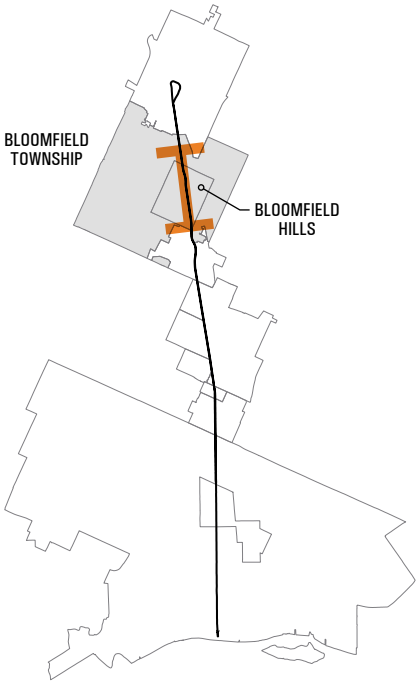
NORTH OF SQUARE LAKE TO DOWNTOWN PONTIAC

ALIGNMENT	The LPA alignment runs up Woodward Avenue to the downtown and then loops through the downtown. Two options are shown. The first alignment option goes north along Woodward Avenue, heading west a Water Street and then north on Saginaw Street to Lawrence Street. The route then heads west on Lawrence Street until connecting with southbound Woodward Avenue. The second alignment option goes north along northbound Woodward Avenue before heading west on Pike Street connecting directly with southbound Woodward Avenue after stopping at the downtown Pontiac station.
STATIONS	Three potential stations are shown for this segment • St. Joseph Mercy Oakland Hospital: Representatives noted many of the patients and visitors of Pontiac St. Joseph Mercy are transit dependent. A station as close to the entrance of the hospital as possible would be a huge benefit to those visitors dependent upon transit. • Downtown Pontiac: A downtown station is integral to the revitalization of downtown Pontiac. • Pontiac Amtrak Station: This station is within walking distance of the downtown, but a separate station may be desirable. In addition, there is a considerable amount of land on the west side of Woodward Avenue just north of the station that could be used for a P&R.
CROSS SECTION	The cross section for Pontiac includes a shared BRT lane on both sides of the median from Square Lake Road to South Boulevard. North of South Boulevard to the Pontiac Loop, the BRT has a dedicated lane on each side of the median. The Loop portion of the route has a dedicated BRT lane to the left of one way traffic. As previously mentioned, the one way traffic along the Pontiac Loop may change to incorporate pedestrian and bicycle friendly infrastructure.
KEY TOPICS TO BE ADDRESSED IN THE EA	• Strong desire that rapid transit extends to downtown Pontiac and does not stop to the south • Consideration that the rapid transit in downtown Pontiac will take into account the redesign of the loop around downtown Pontiac.

Pontiac representatives view the BRT as an important catalyst for downtown revitalization, and one of the main ingredients to their revitalization plan. There was strong preference that BRT must extend into Pontiac and not end south of the city.

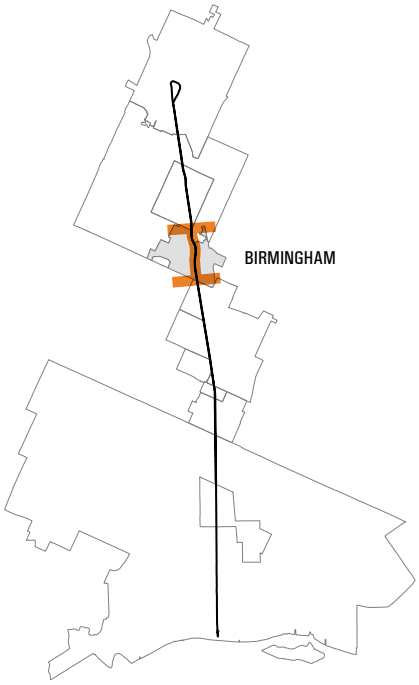
QUARTON ROAD TO SQUARE LAKE ROAD (BLOOMFIELD HILLS AND BLOOMFIELD TOWNSHIP)

ALIGNMENT	The only alignment considered was the "mainline" (all Woodward) option.
STATIONS	Two stations are shown in the LPA for this segment, Long Lake Road and Square Lake Road. Other potential locations were also mentioned by residents and the city's many institutions along Woodward. For example, some church leaders were curious about the possibility of a small Sunday morning only stop near the churches at the corner of Woodward and Cranbrook Road. There was some interest by the Cranbrook Academy (see **Section 4.3.3** for a description of the potential station) either for a future stop or a shuttle to the most convenient stop for students, visitors, and staff. • Long Lake Road: Representatives of the City of Bloomfield Hills were open to discussing a station near Long Lake Road, with the understanding that some pedestrian improvements immediately around the station area may be necessary to improve access. Additionally, this station would serve as the connecting station to a potential Cranbrook Academy shuttle. • Square Lake Road: A station is shown at the north side of Square Lake Road. This area lacks much TOD density, but there are some opportunities to develop some vacant sites and underutilized parking lots and older one-story shopping centers with new, denser TOD scale development. Square Lake also directly connects with heavy traveled I-75. Ridership forecasts showed a strong demand for a P&R at this location. A combination of more TOD development and P&R facilities could significantly increase transit ridership. The established low density single family neighborhoods can be expected to scrutinize the design aspects to ensure the township benefits.
CROSS SECTION	Both communities and the Road Commission for Oakland County understood that one reason to show the BRT would not have an exclusive lane is because reduction on Woodward would lead to major backups on cross streets.
KEY TOPICS TO BE ADDRESSED IN THE EA	• Impact of rapid transit on the traffic operations along Woodward Avenue at major crossing streets • Potential P&R size and locations along Woodward Avenue • Preservation of median, green space, and landscaping • Impacts of any sidewalks to serve transit • Design of transit stops and locations along Woodward Avenue



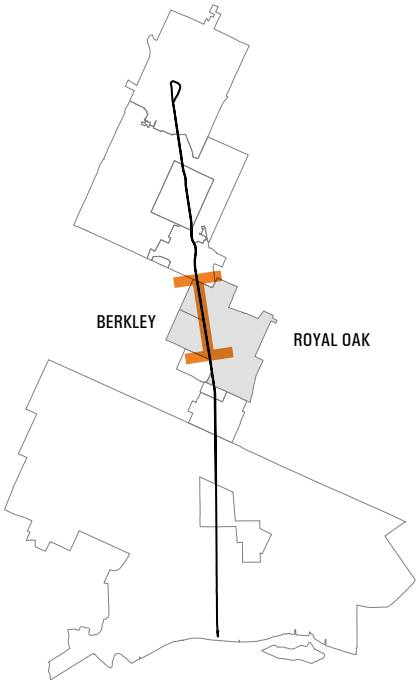
Both communities generally supported rapid transit along Woodward Avenue. A main comment was the accessibility to stations and crossing Woodward for pedestrians and bicyclists. Bloomfield Township representatives were particularly interested in discussing potential pedestrian crossings. Bloomfield Township representatives also discussed the potential of a P&R and TOD on several unused parcels at the northwest corner of Square Lake and Woodward.

14 MILE ROAD TO QUARTON ROAD (BIRMINGHAM)



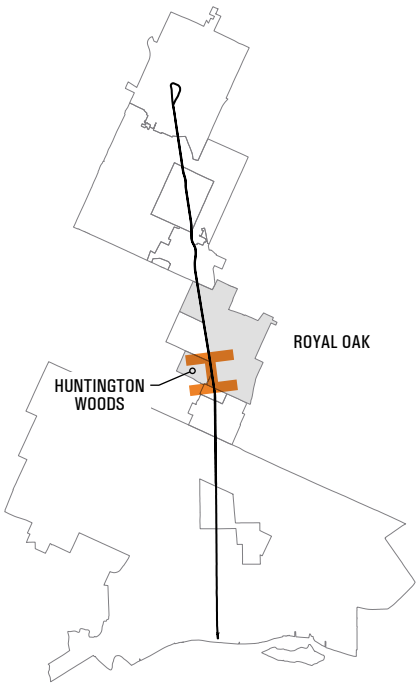
ALIGNMENT	In Birmingham, the only alignment studied was the "mainline" (all Woodward) option. The public inquired about serving the Troy/ Birmingham Transit center either directly (too far away) or with shuttles, and some suggested routing through downtown but that was not moved forward.
STATIONS	The drawings show a station at Maple (within a few blocks and likely south of Maple but north of Bowers), with potential stations at Oak (or Oak to Quarton) and near 14 Mile Road. The Oak and 14 Mile Road stations are somewhat dependent upon additional ridership forecasts during the next phase of the project (EA). Similarly, there may be some potential for that 14 Mile station to be shifted north to Lincoln Street (14.5 Mile), or a separate station added there in the future if there is significant new TOD. (Please see **Section 4.3.3**)
CROSS SECTION	Sentiment from the public, business representatives, and city officials was mixed on the cross section. Many preferred that the rapid transit run down the center of the existing median to minimize conflicts with traffic using the Michigan U-turns (**see illustration on page 24**). That cross section also would retain the number of traffic lanes that many felt are needed to accommodate the traffic volumes along Woodward and the major cross streets. Others felt the green space and landscaping provided by the median is very important and preferred a conversion of the current vehicle lane adjacent to the median be converted to an exclusive transit lane (no change in the median width but one less traffic lane). There were also opinions similar to those in Ferndale, Berkley and Royal Oak that a median center running cross section would be preferred if some of the lost green space was "restored' by converting the traffic lane adjacent to the median into a wider median along the rapid transit lanes (as shown in the sketch). Others in the city also endorsed the median center option but preferred that the outer vehicle lane in each direction be absorbed into more space for sidewalks and a bikeway along the outer edge of the Woodward right-of-way (as also shown for Ferndale). Either cross section is likely to require some consolidation and redesign of the median crossovers and signal system. The preferred cross section south of Birmingham is median center running. The preferred design north of Birmingham in Bloomfield Township/Bloomfield Hills shows the rapid transit running in the existing lane next to the median, mixed with traffic. Therefore, somewhere in Birmingham there would likely be a transition from center median to median edge. This design will be evaluated in more detail during the more refined traffic engineering during the EA process. So at this point, it might be best if Birmingham supports both cross section options moving forward, with the issues on green space and traffic noted, and that the point of transition can be studied further.
KEY TOPICS TO BE ADDRESSED IN THE EA	• Need for more consistent overhead lighting including pedestrian crossings • Access across Woodward for pedestrians to the stations and at other points • Restoration of green space and landscaping if the median width is reduced • Accommodation of bikes in the right-of-way per the city's multi-modal plan and the Woodward Complete Streets • When and how a center running rapid transit would transition to a median edge running rapid transit north of the city

11 MILE ROAD TO 14 MILE ROAD (BERKLEY, ROYAL OAK)



ALIGNMENT	Two routes were considered: • Berkley Route 1. The first option deviated west of Woodward along Coolidge Highway to the northeast corner of Berkley. The route then reconnected with Woodward along 12 mile. • Berkley Route 2. The second option deviated west of Woodward along Coolidge Highway through downtown Berkley, reconnecting with Woodward along 11 mile. Initially, some Berkley representatives requested an analysis of realignment of the proposed BRT line off of Woodward to serve downtown Berkley. Based on the agreed upon alignment evaluation criteria and reaction during a bus tour of the alignment options, the Steering Committee dismissed Berkley Route 2 through part of the downtown, reconnecting with Woodward along 11 Mile. The significant increase in travel time and modest projected ridership gained v lost riders due to the extra travel time proved to be the determining factors. After further evaluation and meetings Route 1 along 12 Mile Road was dismissed due to similar findings.
STATIONS	Once the "all Woodward" alignment in Berkley was agreed upon, discussions focused on potential station locations and cross sections. It was important to local officials to have a station in Berkley. Stations were discussed near 12 Mile Road, which is a regional east-west arterial, close to Catalpa Street (half mile road) or north of 11 Mile Road. The location would probably be south of that intersection where future TOD scale development has more potential. There is also some potential for a small P&R using one of the parking lots of a church or redevelopment of some less intensely used properties. For a more specific description of station locations in this segment, see **Section 4.3.3**.
CROSS SECTION	The preferred cross section alignment places the BRT in the center of the median. Since the median is seen as an important green space, the preference was to convert existing travel lanes adjacent to the median as "restored" green spaces, at least where acceptable traffic operations will not require four travel lanes in each direction. This wider median along the sides of the BRT lanes would also serve as a pedestrian refuge area, allow more room for stations and accommodate temporary snow storage.
KEY TOPICS TO BE ADDRESSED IN THE EA	• Potential transit link to downtown Berkley • Location of the station • Pedestrian crossings • Mitigation of the lost green space • Preservation of median adjacent to rapid transit lanes • Beaumont Hospital concerned with informal P&R at their existing parking structures and impact on current patients and visitors

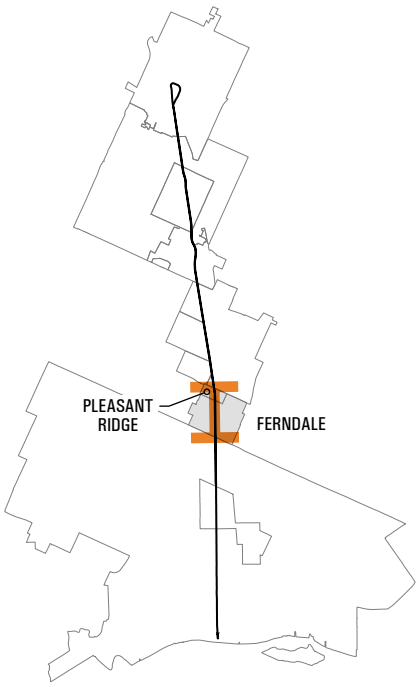
I-696 TO 11 MILE ROAD (ROYAL OAK, HUNTINGTON WOODS)



ALIGNMENT	Alignment options in this segment spurred the most debate aside from the Detroit options. Downtown Royal Oak lies approximately 0.6 miles east of Woodward Avenue. Royal Oak has a vibrant and walkable downtown with countless restaurants, condominiums, a campus of Oakland Community College, theaters, parking structures, and major transit hub for Amtrak, taxis, and buses. Representatives of Royal Oak and other communities preferred that rapid transit directly serve Downtown Royal Oak as the area provides ample transit generators with the exception of Huntington Woods representatives, who preferred an all-Woodward alignment to provide better service to their residents. The LPA includes two potential alignments along this segment. The preference is that the rapid transit would have (1) alternating service with some vehicles staying on Woodward Avenue and (2) and others going into Downtown Royal Oak Several alignments into Downtown Royal Oak were considered. The preferred Downtown Royal Oak alignment runs north along Washington Street to Lincoln, west on Lincoln, north on Lafayette, west on Sherman to 11 Mile Road, and north to return to Woodward. This was preferred to the all-Washington to 11 Mile Road alignment option due to the concerns over traffic congestion along Washington Ave. in certain places, conflicts with angled parking north of Lincoln Street, and the frequent blockage of Washington due to the railroad crossing near the corner of Fourth St. and Washington Ave. Lafayette was also selected due to its low traffic volume and connectivity to publicly owned parking structures, which could serve as a potential P&R location. Potentially two lanes along 11 Mile Road could be dedicated to transit only.
STATIONS	Three different stations are proposed along this segment: one at 11 Mile Road, one near either the Royal Oak Transit Center or the Oakland County Community College campus, and one near the Detroit Zoo. General issues arose about station locations along Woodward between Huntington Woods and Royal Oak. • 11 Mile: A station along 11 Mile Road would allow for connectivity with the current SMART bus system. • Royal Oak Transit Center: This station would serve as the main Downtown Royal Oak station. • Detroit Zoo: The area just north of I–696, to the east of Woodward is public property owned partially by both MDOT and the Royal Oak DDA. This site is prime for redevelopment and a possible P&R station. The issue with this particular location is connectivity problems, created by the underpass near 10 Mile, to the Detroit Zoo and Huntington Woods. A station directly next to the zoo would be difficult to design.
CROSS SECTION	The preferred cross section is the BRT in the center of median.
KEY TOPICS TO BE ADDRESSED IN THE EA	• Difficulty for pedestrians crossing Woodward north of I-696. The road may need a redesign. • The City of Royal Oak strongly prefers a station in downtown Royal Oak to bypass the possibility for visitors to walk through the stable neighborhoods surrounding downtown Royal Oak. • Huntington Woods officials concerned with traffic operations along Woodward if a lane was removed for rapid transit or another purpose. • Use of Royal Oak as terminal for some trips and Pontiac for others, allowing for greater service frequency in southern half of corridor.

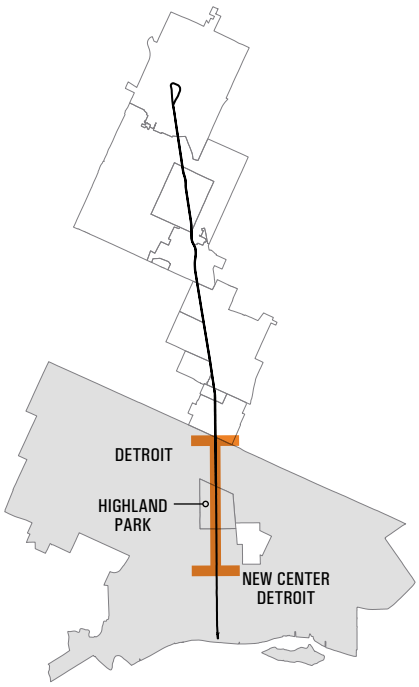
8 MILE TO I-696 (FERNDALE AND PLEASANT RIDGE)

ALIGNMENT	No off-Woodward options were identified. There was some discussion on whether the rapid transit would go under I-696 ("The Ditch"), but there was agreement that it would use the at-grade crossing.
STATIONS	The two communities agreed that one station near 9 Mile Road in this segment was preferred in terms of travel time, but there was also sentiment that another station close to Pleasant Ridge and on the north side of the 8 Mile Road overpass were desired in terms of convenient access for residents. There was a general compromise for a station on the north side of 9 Mile Road. Ferndale representatives accepted a location to the north of 9 Mile Road, but prefer that station placement be as near to 9 Mile Road as possible as it is the economic and cultural center of Ferndale's business district. Additionally, Ferndale's Master Plan identifies this intersection as a prime location for future TOD. Ferndale representatives inquired about the location of a potential station on the north side of 8 Mile Road due to the inability for residents to connect to the station proposed at the south side of 8 Mile Road because of the nature of the 8 Mile Road Bridge.
CROSS SECTION	Representatives of both Ferndale and Pleasant Ridge desire to preserve green space and the hundreds of trees and landscape investment within the Woodward Avenue median. There was a desire that any green space or landscaping lost due to BRT lanes should be mitigated. Additionally, Ferndale representatives stressed that the preservation of on-street parking along Woodward was ideal. Both communities noted that the underpass along Woodward cuts off Pleasant Ridge and Ferndale from communities and stations to the north.
KEY TOPICS TO BE ADDRESSED IN THE EA	• Lack of pedestrian connections across the I-696 interchange • Pedestrian connection issues crossing the 8 Mile Bridge • Ferndale and Pleasant Ridge concerns about any loss of landscaping to median • Replacement of any lost landscaping • Traffic operations on Woodward and the I-696 interchange • Where transition from center median running rapid transit to median edge running rapid transit to cross I-696 efficiently would occur



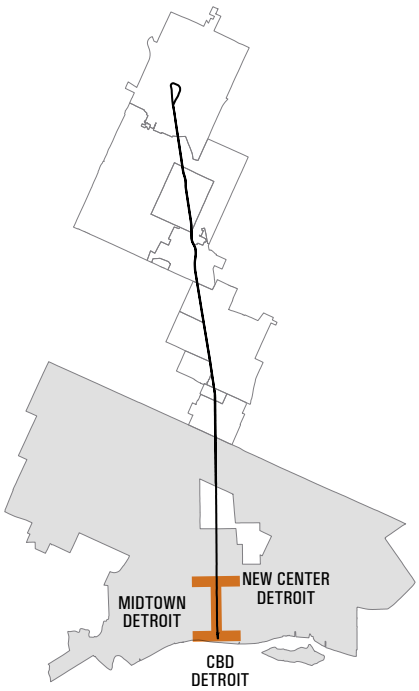
GRAND BOULEVARD TO 8 MILE ROAD (DETROIT AND HIGHLAND PARK)

ALIGNMENT	No off-Woodward alignment alternatives were identified for this segment. There was some discussion on how rapid transit vehicles would traverse the 8 Mile bridge. These discussions and ongoing technical analysis revealed that maintaining exclusive transit lanes at the innermost edge of the bridge would provide the best transition between at-grade operations.
STATIONS	Detroit and Highland Park representatives provided input on station locations based on local knowledge of ridership patterns within their respective communities. It was determined that 1-mile station spacing to maintain rapid service was a key consideration, as long as stations were located strategically at key destinations (e.g. Manchester Street, 8 Mile Road, etc.).
CROSS SECTION	Detroit and Highland Park representatives agreed that center-median operations provide the travel time advantage and a premium level of transit within this segment. The group acknowledged that further analysis of the segment between Grand Boulevard and McNichols would be necessary based on the narrow ROW and the design challenges represented by that condition. Detroit representatives agreed that the expansive median from McNichols to 8 Mile Road would be utilized more appropriately with center-median rapid transit, which would still allow this segment to maintain the existing number of travel lanes and allow ample space for planned non-motorized facilities.
KEY TOPICS TO BE ADDRESSED IN THE EA	• Cross section design through narrow (100') ROW between Grand Boulevard and McNichols Road • Station design and operations within narrow (100') ROW between Grand Boulevard and McNichols Road • Transition between at-grade operations and operations on the 8 Mile bridge



ROSA PARKS TRANSIT CENTER TO GRAND BOULEVARD (DETROIT)

ALIGNMENT	The mainline and off-Woodward alignment alternatives for this segment were presented to representatives from the City of Detroit and other area stakeholders. The discussion focused on maintaining rapid service, providing service to major downtown destinations, and limiting operational interactions with M-1 Rail streetcar. Representatives agreed that the mainline alternative would be preferred in absence of the M-1 Rail streetcar, but considering it an "existing condition", Alternative #4 was preferred by Detroit representatives.
STATIONS	Detroit representatives and area stakeholders agreed that the southern terminus of the project should be located at the Rosa Parks Transit Center due to the multi-modal connections provided at the facility. The group also recognized the desire for rapid service throughout the corridor, but agreed that the more frequent station spacing represented in this segment was necessary due to the projected ridership and the importance of providing direct access to major destinations within the Greater Downtown area.
CROSS SECTION	Detroit representatives and area stakeholders agreed that providing rapid transit service is highly dependent on the vehicles operating in exclusive lanes. It was agreed upon that exclusive lanes were possible on John R. Street, but that additional on-street parking impact analysis would be necessary to determine if exclusive lanes would be possible on Cass Avenue. The group also recognized the probability of transit vehicles operating mixed in traffic while diverting to/from Woodward Avenue on Grand Boulevard and the I-75 service drive.
KEY TOPICS TO BE ADDRESSED IN THE EA	• Quantitative on-street parking impacts on Cass Avenue and John R Street • Pedestrian and bicycle safety impacts • Downtown Loop alternatives and potential station locations • Mitigation of operating conflicts with M-1 Rail streetcar



Preliminary analysis of both median-edge and median-center cross sections provides an illustration of how the BRT vehicles would function with indirect left turns on Woodward Avenue. To limit conflicts between automobiles and the BRT vehicles, indirect left turns would be signalized in both median-edge and median-center conditions.

INDIRECT LEFT TURNS WITH MEDIAN-EDGE BRT:

A median-edge cross section would require vehicles to merge across the BRT lane into the turn lane. Vehicles would then wait at a signal - which would be activated using the same transit signal priority as conventional intersections - before crossing the second BRT lane.

INDIRECT LEFT TURNS WITH MEDIAN-CENTER BRT:

A median-center cross section would require vehicles to merge into the turn lane before waiting at a signal. Once both BRT lanes are clear, the signal would change, allowing vehicles to cross both BRT lanes and complete the indirect left turn.

2.2 Public Input

Throughout the AA process, several series of public meetings were held to engage residents of corridor communities. The primary goals of the public meetings were to 1) inform as many members of the public as possible about the project and 2) to obtain targeted public feedback on project elements such as evaluation criteria, modes, alignments, station locations, and cross sections under consideration.

PUBLIC MEETINGS

Three series of public meetings were held in December 2012, April 2013, and December 2013 in support of these goals. A combination open house/presentation format was utilized at meetings to encourage one-on-one engagement between members of the public and the project team. The open house format portion occurred during the first 30 minutes of the meeting with exhibits positioned around the perimeter of each meeting room. Attending project team members were available to answer questions. The presentation portion of the meeting occurred following the 30 minutes of engagement with project team members. Q & A sessions occurred after the formal presentation.

In total, 18 public meetings were hosted at various venues along the corridor, such as community centers, hospitals, libraries, and local churches. Approximately 800 attendees participated in the public meeting series.

OUTREACH

In order to promote the public meetings held in December 2012, April 2013, and December 2013, an intensive public relations effort was undertaken to inform the maximum number of people about the Woodward AA study. Outreach efforts for each of the three series of meetings included:

Flyer Distribution

Flyers were distributed at key locations throughout communities along the corridor in anticipation of public meetings. Churches, coffee shops, community centers, transit centers, libraries, senior housing, and civic buildings are examples of locations used for flyer distribution.

Postcard Mailing

Save-the-date postcards were mailed to approximately 800 members of the public in Detroit and Highland Park who had previously attended meetings for the Woodward Avenue Light Rail Transit project. This effort aimed to reach transit dependent and low income populations in those communities.

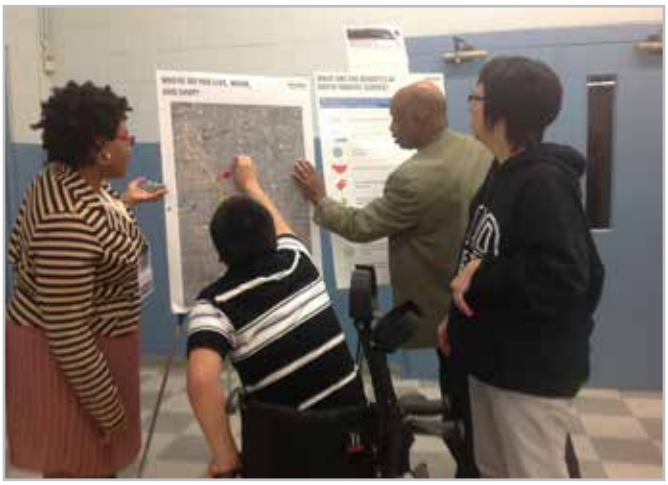


IMAGE 2-4. PUBLIC MEETING IN BERKLEY
Source: Parsons Brinckerhoff

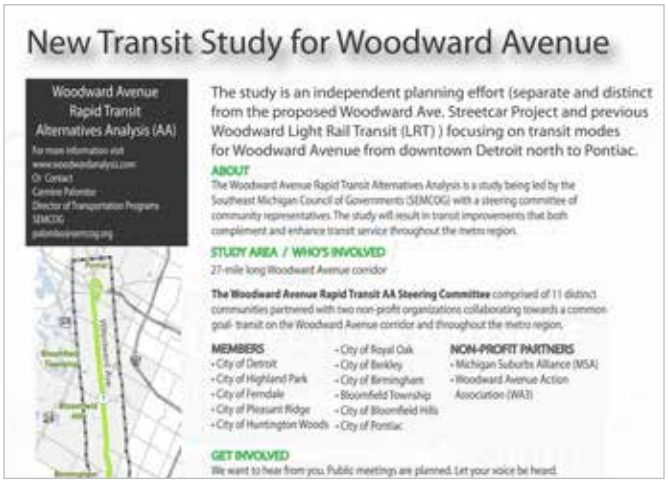


IMAGE 2-5. FLYER FOR PUBLIC MEETING
Source: Parsons Brinckerhoff

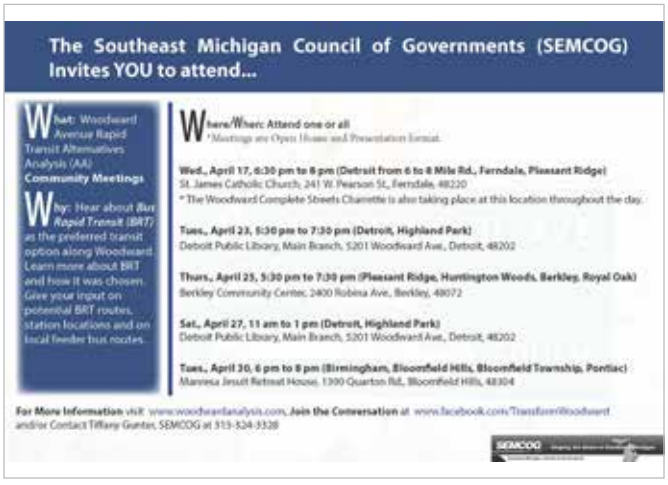


IMAGE 2-6. POSTCARD FOR PUBLIC MEETING
Source: Parsons Brinckerhoff

Public Service Announcement

A public service announcement (PSA) was produced for the December 2013 series of public meetings in a targeted effort to reach low income and transit dependent populations. The PSA detailed upcoming public meetings and offered an introduction to BRT, its characteristics and benefits. Airings of the PSA were confirmed on public access channels in the cities of Detroit and Pontiac, the communities with the largest transit dependent populations along the Woodward corridor. The PSA was distributed to public access channels in all corridor communities.

Press Release

SEMCOG issued formal press releases for all public meetings.

Print Media

Interviews, articles, and calendar listings were used to promote public meetings through the use of 15+ print media outlets.

News Media

SEMCOG participated in interviews with multiple news and radio stations throughout the Detroit metro area in anticipation of public meetings.

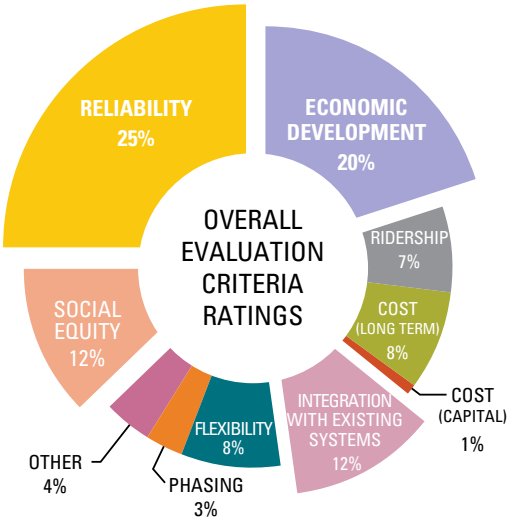
PUBLIC COMMENTS

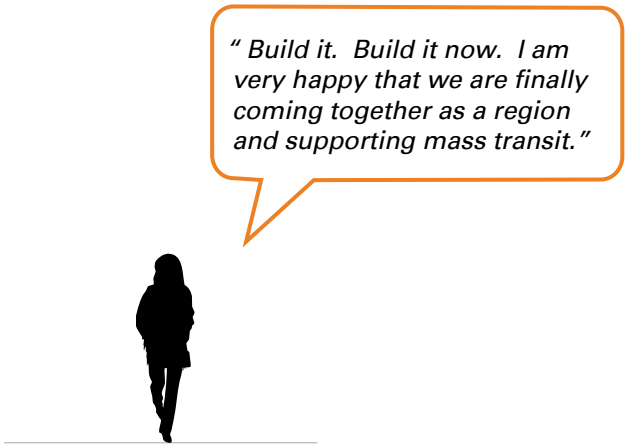
SEMCOG collected project related public comments through various avenues. Comment cards were available at all 18 public meetings for participants to submit their thoughts and concerns. Additionally, public meeting Q & A sessions provided an opportunity for attendees to publicly voice their concerns to SEMCOG as well as other meeting participants.

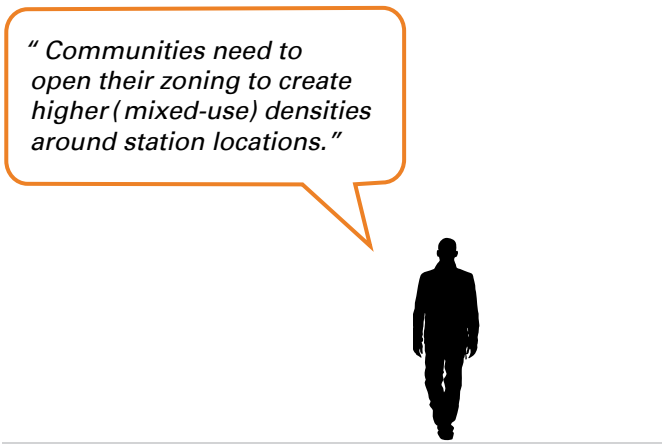
Beyond meeting venues, SEMCOG received public comments through online submissions at the project website (www.woodwardanalysis.com) and the project social media page (www.facebook.transformwoodward.com). The SEMCOG project manager's contact information was advertised on all flyers and press releases distributed for the study. As a result, SEMCOG also received phone calls and emails with comment and question submissions.

Public comments in the Woodward AA were used to balance technical outputs with real world experiences of the public, Woodward's everyday users. Public comments were especially important in considerations for preliminary station location placement, off-Woodward alignment options, and cross sections detailing the physical placement of BRT, automobiles, parking, and bicyclists within Woodward right-of-way.

FIGURE 2-1. EVALUATION CRITERIA RATINGS BY PUBLIC INPUT IN DECEMBER 2012 MEETINGS







PARTICIPANT COMMENTS FROM PUBLIC MEETINGS

3.0 Existing Conditions

Detroit is the only major city in the United States without a rapid transit system in its metropolitan area.

3.1 Demographics

3.1.1 POPULATION

The study area corridor is generally bound by a one-mile buffer on either side of Woodward Avenue. According to the 2010 Census, the combined population for study area corridor is 266,793. **Figure 3-1** shows residential population in the corridor per community.

FIGURE 3-1. POPULATION IN THE CORRIDOR BY COMMUNITY, 2010

Source: 2010 Census

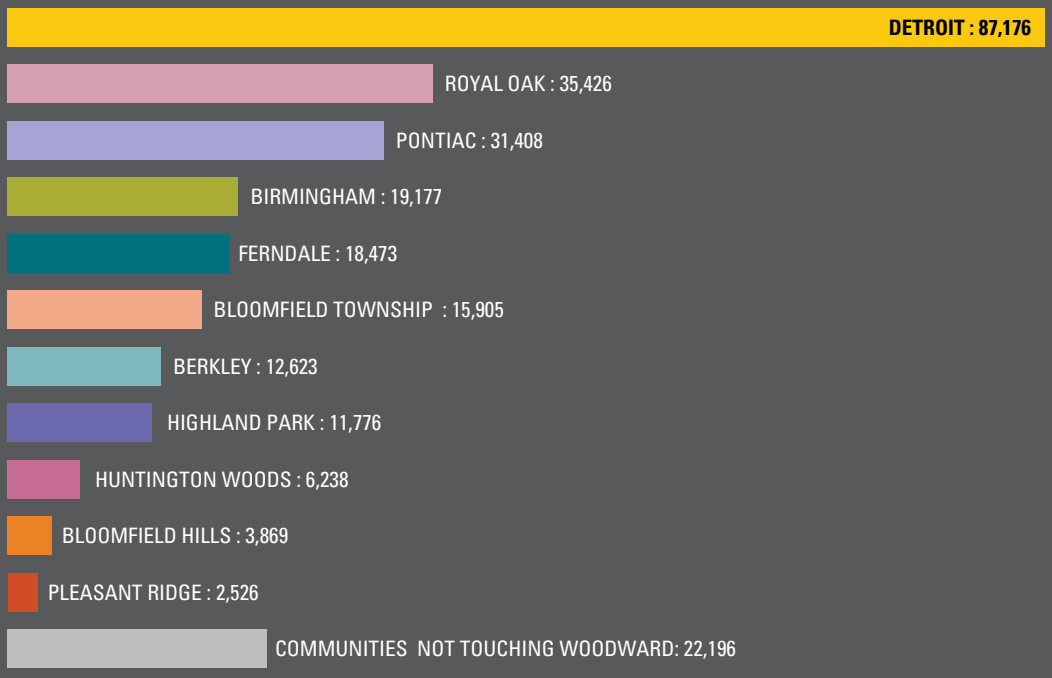


Figure 3-2 shows residential population density per square mile. The highest concentrations of residents along the corridor are in Detroit's three core districts – the Central Business District (CBD) (19,690 people/sq. mi.), Midtown (16,452 people/sq. mi.), and New Center (14,796 people/sq. mi.) – which are considered part of the Greater Downtown area. The population density in the Greater Downtown can be greatly attributed to the presence of major anchor institutions, cultural attractions, and a fast rate of recent development. While the City of Detroit experienced a 25 percent population loss between 2000 and 2010, the Greater Downtown population declined at only half that rate, with some areas experiencing population gain.

A high population density also exists in Downtown Royal Oak (9,961 people/sq. mi.) as well as moderate density levels near Downtown Ferndale, Downtown Birmingham, and Downtown Pontiac.

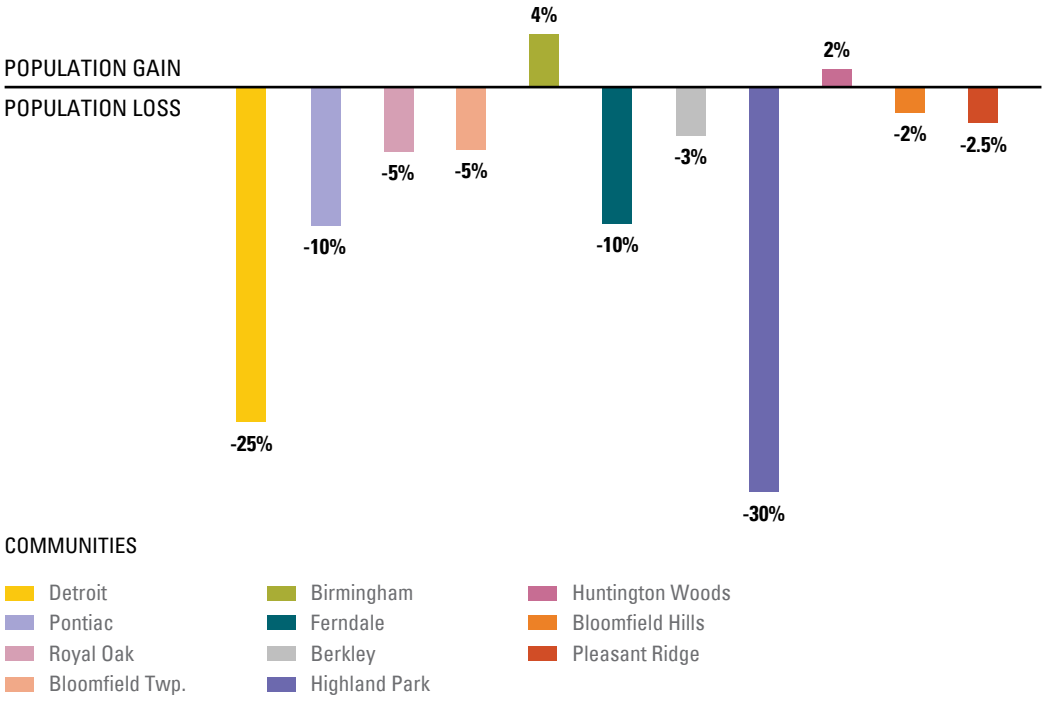
FIGURE 3-2. RESIDENTIAL POPULATION DENSITY

Source: 2010 Census

A comparison of Census 2000 and 2010 data offers insight into the population loss experienced by corridor communities over the ten year period. Detroit and Highland Park encountered the most acute population loss at 25 and 30 percent, respectively. Both Ferndale and Pontiac lost 10 percent of their populations, while Huntington Woods and Birmingham gained population. As a community that experienced population loss, the City of Detroit has responded positively to this challenge by refocusing resources in ways that support a brighter future for the city. For example, the city initiated the *Detroit Future City Strategic Framework Plan*[X] effort in 2010 through the Detroit Works Project. Detroit Future City is a living long-range planning document intended to guide decision-making for Detroit's future. It offers innovative strategies to achieve an efficient and sustainable city and improve the quality of both life and business in Detroit. Local businesses and philanthropic institutions have come together in providing support for the revitalization of Detroit and its surrounding areas. As of January 2013, the Kresge Foundation has committed $150 million to assist in the implementation of the *Detroit Future City Strategic Framework Plan*.

[3] The Detroit Future City framework plan, implementation projects, and priorities can be viewed at www.detroitfuturecity.com.

FIGURE 3-3. POPULATION CHANGE 2000-2010 BY COMMUNITY



Source: 2000 & 2010 Census, Parsons Brinckerhoff 2012

3.1.2 SERVICE TO TRANSIT-DEPENDENT AND TRANSIT-SENSITIVE POPULATIONS

An analysis of the corridor's transit dependent populations was conducted using census information, which is available from the 2010 Census and the 2012 American Community Survey 5-Year Estimates. Transit-dependent populations include those without private transportation (i.e., zero-car households), youth (17 years of age and under) and elderly (65 years and older), and persons below the poverty level. The transit-sensitive population includes those with limited transportation (i.e., one-car households). Figures 3-4 through 3-9 on the following pages show the distribution of transit-dependent and transit-sensitive populations along the corridor.

Zero-Car Households

There are 23,361 zero-car households in the Woodward corridor, 75 percent of which are located in Detroit and Highland Park. In these two communities along the corridor, almost 40 percent of households do not have access to private automobile transportation.

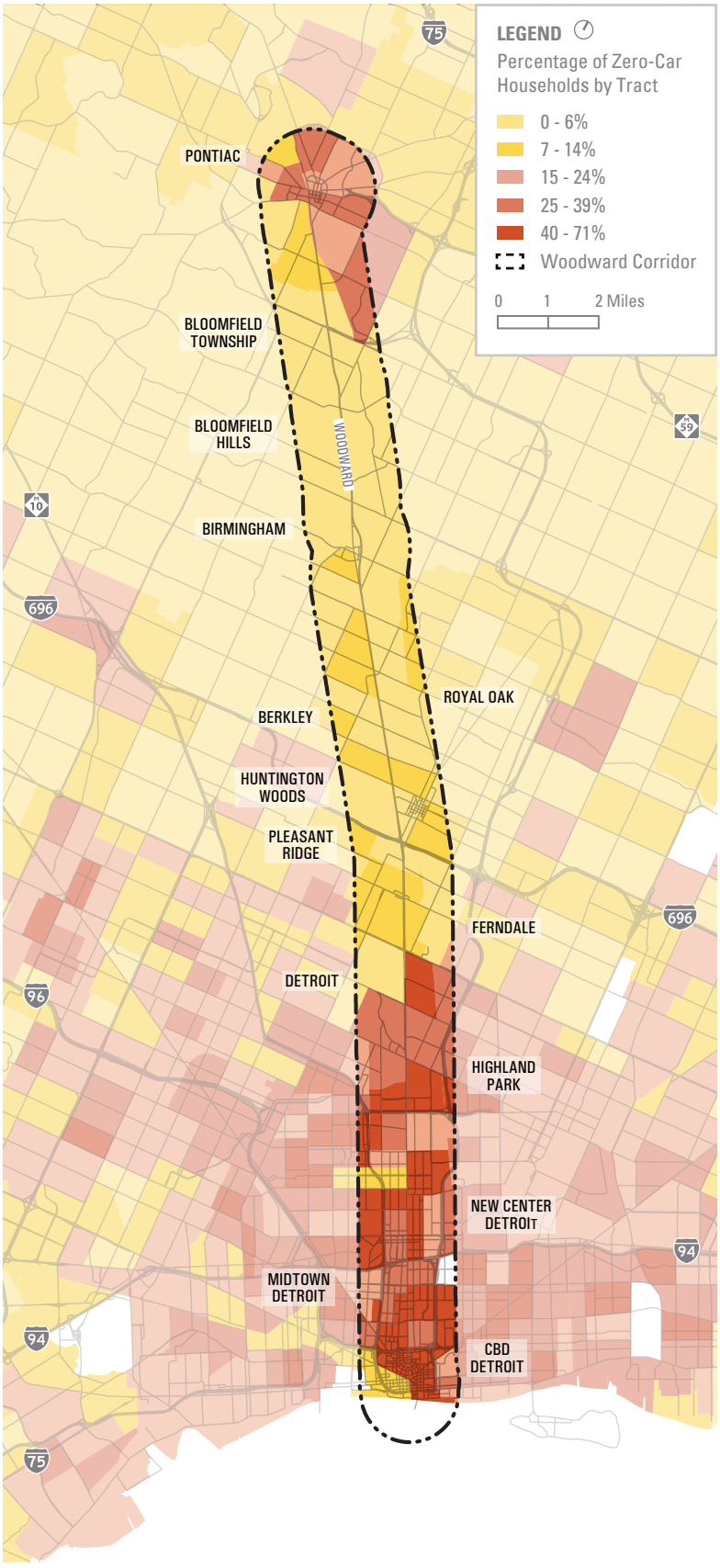


FIGURE 3-4. ZERO-CAR HOUSEHOLDS

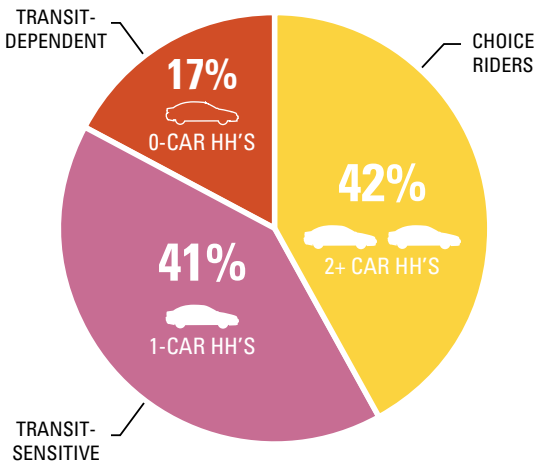
Source: ACS 2012 5-Year Estimate

One-Car Households

There are 57,567 one-car households in the corridor, which represent the transit-sensitive population. These households are distributed more evenly throughout the entire corridor than zero-car households and represent 41 percent of the households in the corridor. **Figure 3-5** shows the composition of transit-dependent, transit-sensitive, and choice rider populations throughout the corridor based on vehicles available.

FIGURE 3-5. HOUSEHOLD TYPES BY VEHICLES AVAILABLE

Source: ACS 2012 5-Year Estimate



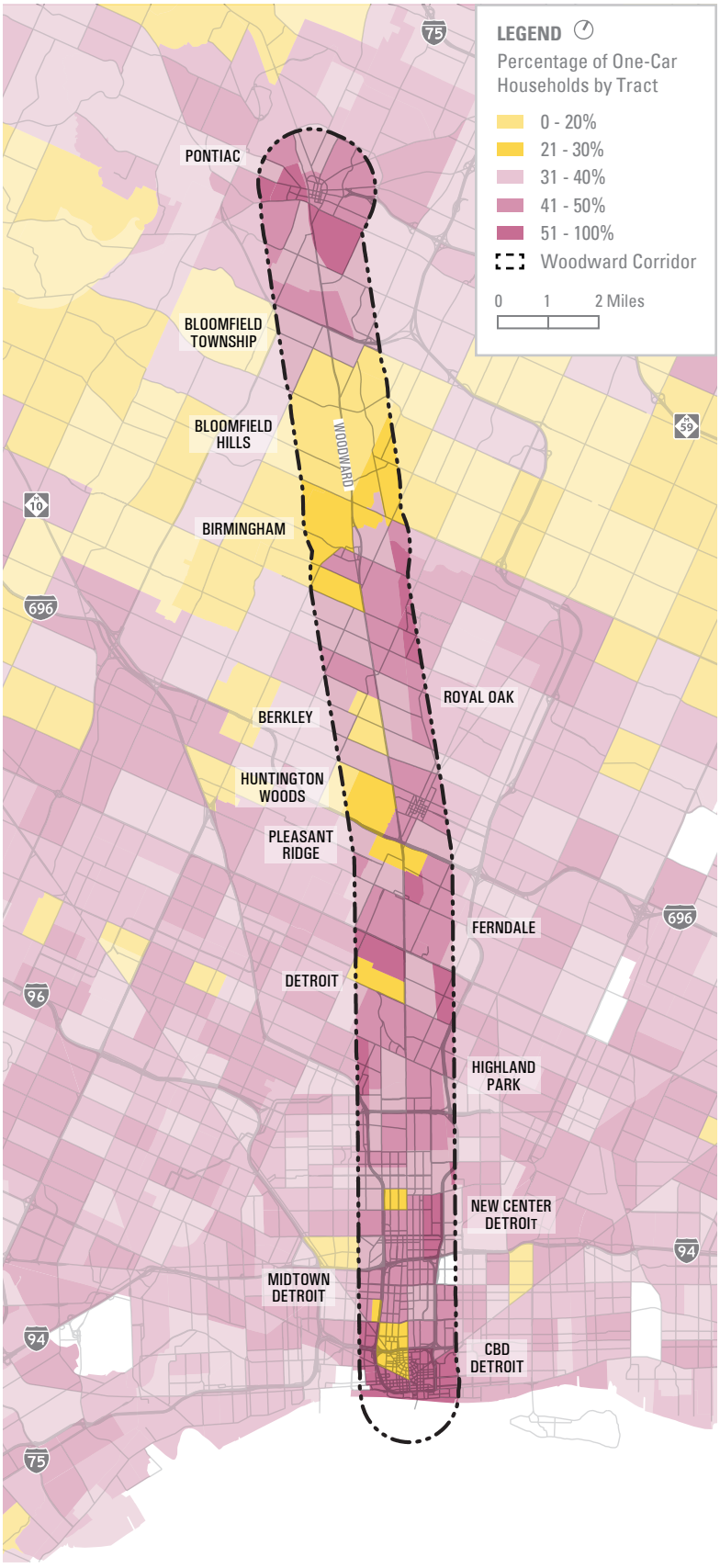


FIGURE 3-6. ONE-CAR HOUSEHOLDS

Source: ACS 2012 5-Year Estimate

Persons in Poverty

There are 75,979 people below the poverty level within the Woodward corridor, representing 24 percent of the corridor's total population. The highest concentrations of persons in poverty are in Detroit, Highland Park, and Pontiac.

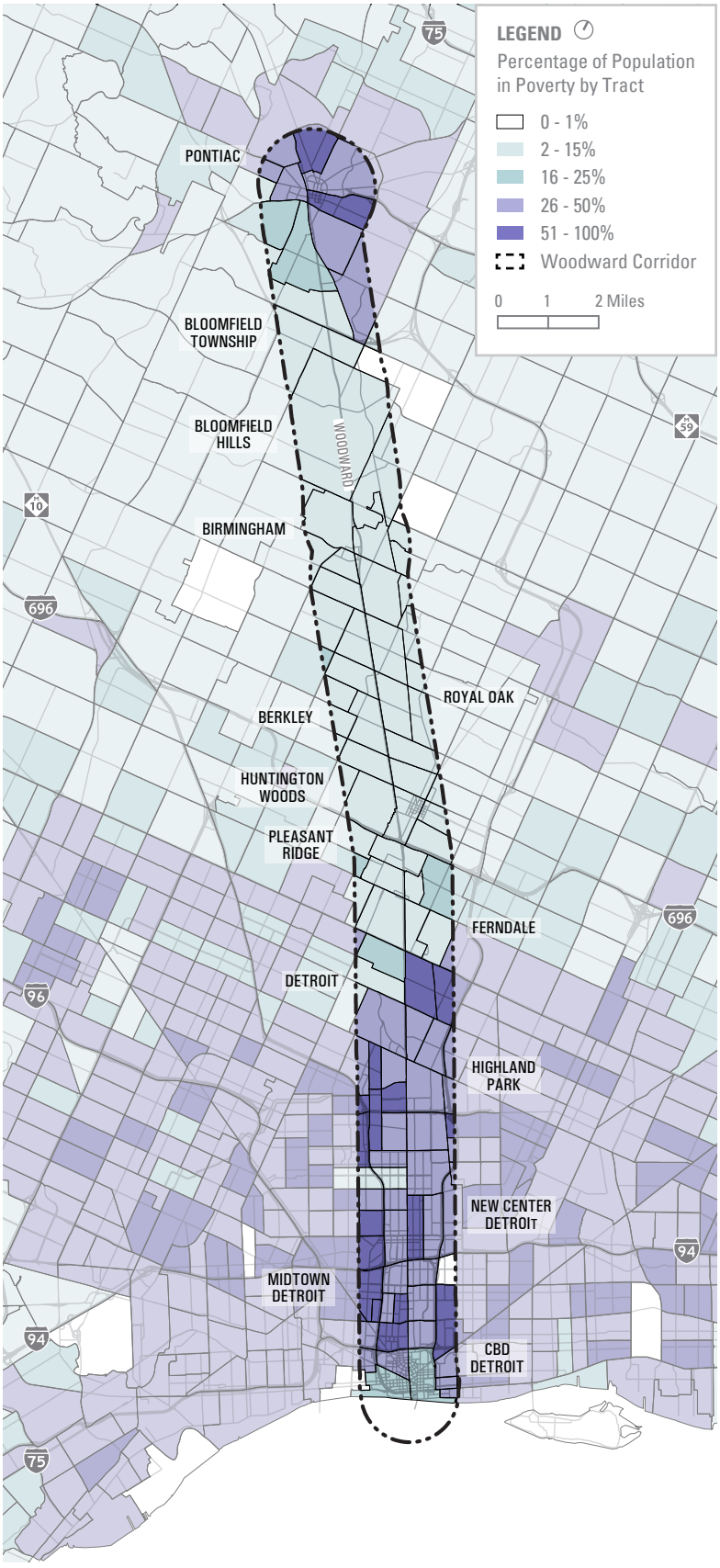


FIGURE 3-7. POPULATION IN POVERTY

Source: ACS 2012 5-Year Estimate

Age-Based Populations

The age-based transit-dependent population is characterized by persons who are 17 years of age and under and 65 years of age or older. These two groups make up 40 percent of the population (91,182 persons) along the corridor with 55,858 persons who are 17 years and younger and 35,324 persons who are 65 years and older.

The lowest concentrations of youth occur in the urbanized areas of Detroit's CBD, Detroit's Midtown District, Downtown Ferndale, and Downtown Royal Oak, while higher concentrations of youth are distributed relatively evenly among the rest of the communities.

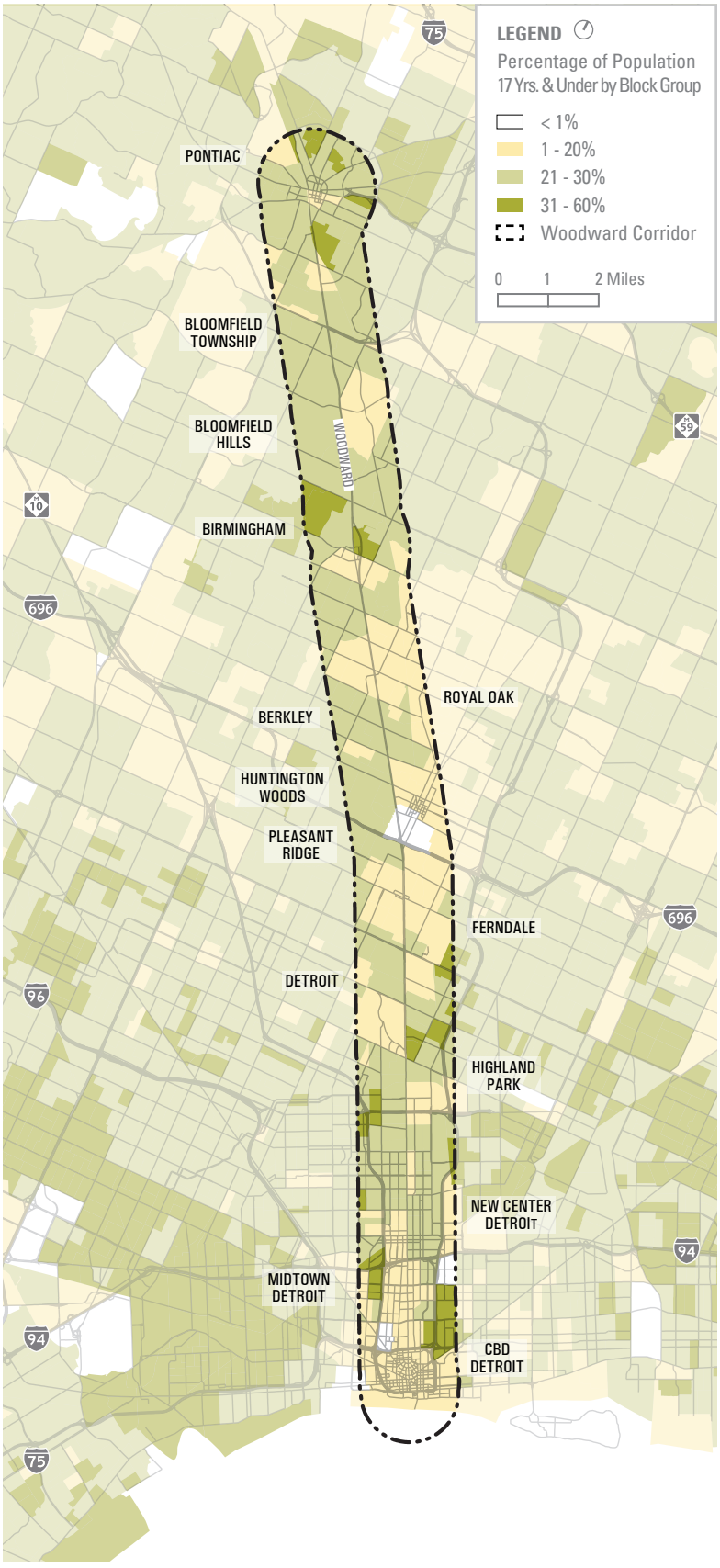


FIGURE 3-8. POPULATION AGE 17 YEARS AND YOUNGER

Source: 2010 Census

Concentrations of elderly persons occur in small areas throughout the corridor with the highest concentrations occurring in Bloomfield Hills and Bloomfield Township. With the number of senior citizens expected to double by 2030[3], transit options will become even more important to allowing older non-drivers to be mobile, be interdependent, have access to services and amenities, and have social and educational opportunities.

[3] National Institute of Aging, AARP

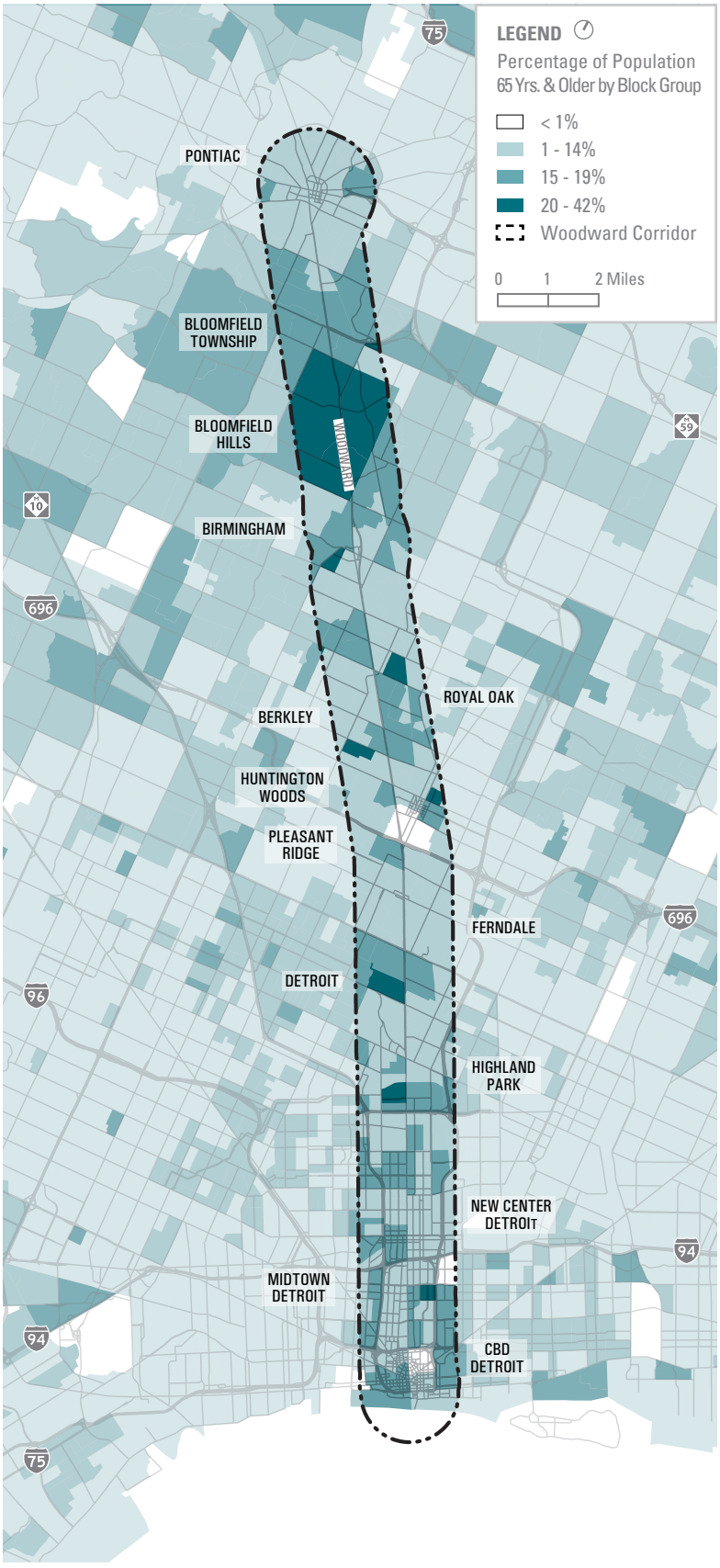


FIGURE 3-9. POPULATION AGE 65 YEARS AND OLDER

Source: 2010 Census

3.1.3 EMPLOYMENT

There are 232,563 jobs along the entire Woodward corridor with the highest concentration of jobs being in Detroit's Central Business District (CBD) and Midtown District. Figure 3-10 shows the major employers along the corridor. All but two of the corridor's major employers are located in Detroit with high density employment nodes occurring in the CBD near Campus Martius and the Renaissance Center. The Detroit Medical Center (DMC), located in Detroit's Midtown District, is the largest employer in the corridor with approximately 11,497 employees. The DMC is also the largest healthcare provider in SE Michigan.

As illustrated in **Figure 3-10,** the region contains particular areas of specialization, which can be identified by industry clusters, or concentrations of interdependent firms in related industries. Industry clusters share common resources and technologies, depend on similar labor pools and institutions, and achieve a productive advantage in geographically congregating near each other. The largest among these is the cluster of firms involved in Education and Medical, which includes three hospitals, one university, and one public school system. Furthermore, SEMCOG's 2010-2040 projections suggest that the Education and Medical industry cluster will have the fastest growing job sectors by 2040, adding 45,490 jobs in Wayne County and 50,837 jobs in Oakland County. The next largest industry clusters within the corridor are Public Administration and Other Non-Private, Digital and Creative, Business and Finance, and Hospitality and Tourism, respectively.

TOP FIVE EMPLOYERS IN THE CORRIDOR

- 11,491 DETROIT MEDICAL CENTER
- 9,591 CITY OF DETROIT
- 9,192 QUICKEN LOANS INC.
- 8,807 HENRY FORD HOSPITAL
- 7,812 BEAUMONT HOSPITAL

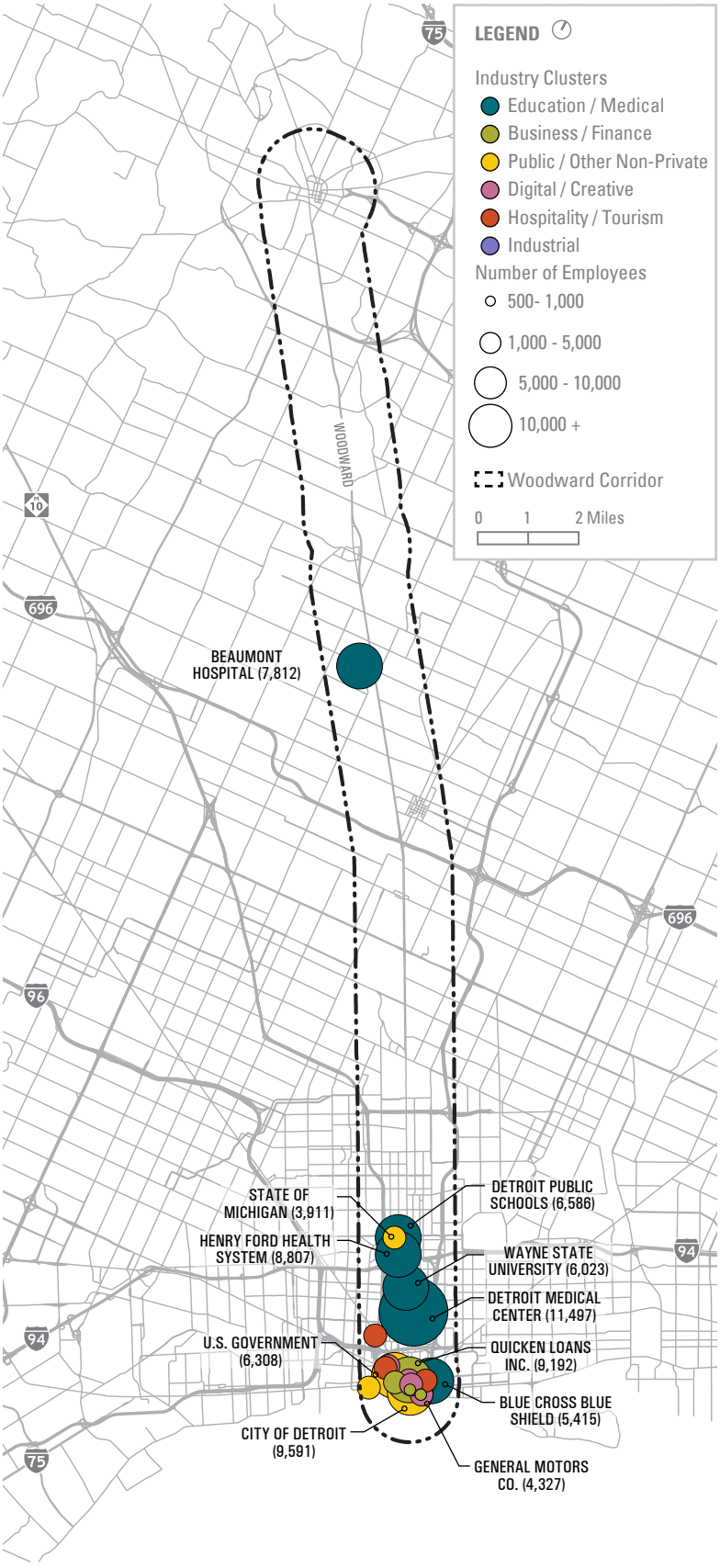


FIGURE 3-10. MAJOR EMPLOYERS IN THE CORRIDOR

Source: Crain's Detroit Business 2014 Book of Lists, CMS

3.1.3 COMMUNITY AND PUBLIC SERVICE FACILITIES

Figure 3-11 illustrates the community facilities that exist within the Woodward Avenue corridor. These facilities have the ability to generate substantial transit ridership and often employ a significant number of residents. While community facilities are present throughout the entire corridor, the most significant concentrations occur in Greater Downtown Detroit, Highland Park, the Ferndale/Royal Oak area, and Pontiac.

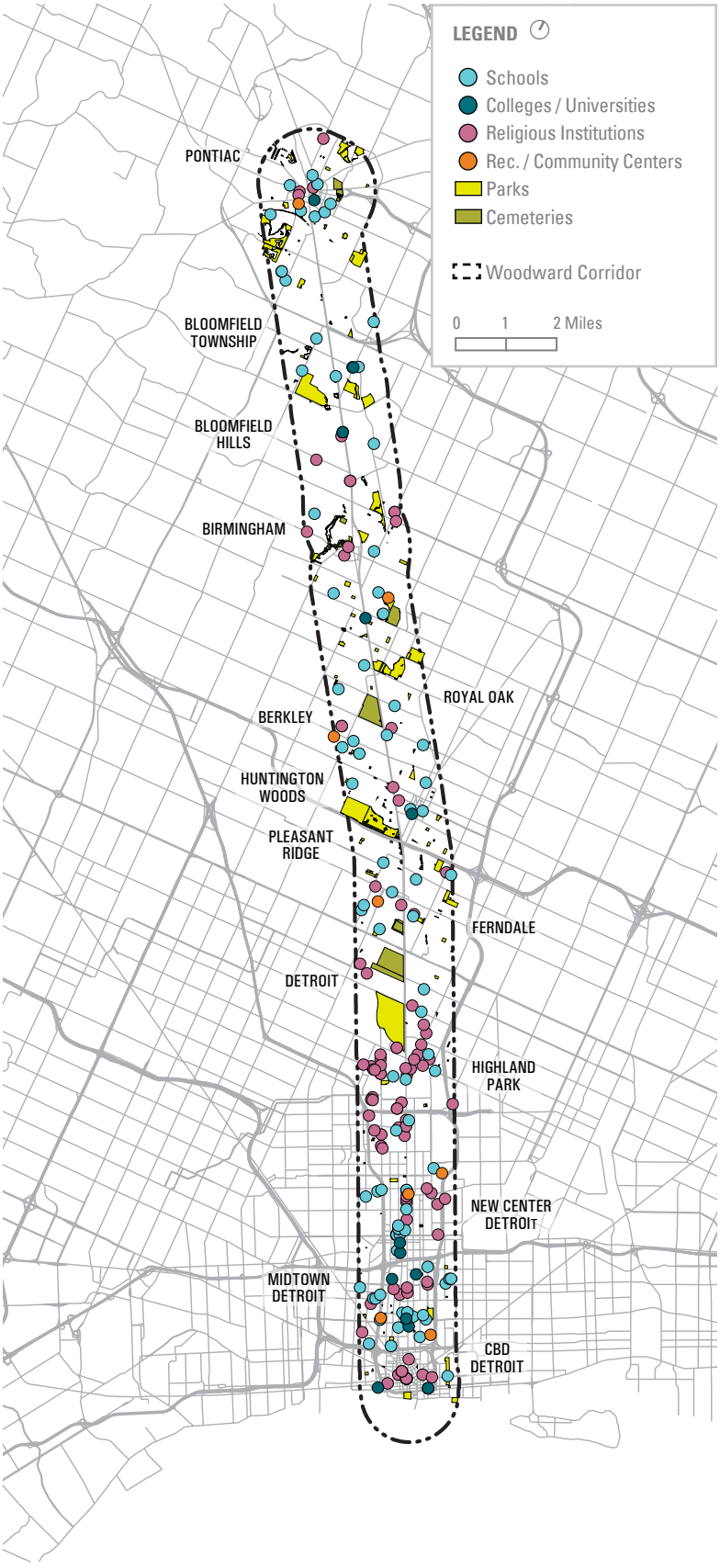


FIGURE 3-11. COMMUNITY FACILITIES

Source: Oakland County, City of Detroit, SEMCOG

Figure 3-12 illustrates the public service facilities that exist within the Woodward Avenue corridor. These facilities represent a concentration of potential "choice" riders that could utilize a rapid transit system along Woodward Avenue for their daily commute. While public service facilities are present within each community along the corridor, the most significant concentrations occur in Greater Downtown Detroit and the Ferndale/ Royal Oak area.

FIGURE 3-12. PUBLIC SERVICE FACILITIES

Source: Oakland County, City of Detroit, SEMCOG

3.2 Transportation

The purpose of this section is to provide a brief overview the transportation network and the existing and future conditions and any deficiencies within and surrounding the corridor. More detail of the analysis can be found in the Transportation Report for this project. Much of the existing information was presented in the Purpose and Need document.

3.2.1 ROADWAY PERFORMANCE

Existing Conditions

The laneage of Woodward Avenue varies throughout the corridor into seven general cross sections:

- Jefferson Avenue to Campus Martius: A boulevard with three lanes in each direction, left-turns are allowed at the intersections
- Campus Martius: Three lanes surrounding a circular park in the middle of Woodward Avenue
- Campus Martius to Park Street/Witherell Street: Two lanes in each direction, left-turns are shared with through traffic lanes
- Park Street/Witherell Street to Grand Boulevard: Four lanes in each direction with a center left turn lane, parking is utilized in the outside lanes
- Grand Boulevard to McNichols Road: Three lanes in each direction with a center left-turn lane, on-street parking is utilized in the outside lanes
- McNichols Road to Downtown Pontiac: A boulevard with four lanes in each direction, left-turns are all indirect at median
- Downtown Pontiac: A circular one-way roadway system around downtown Pontiac, laneage varies from three lanes to six lanes

The jurisdiction of Woodward Avenue south of Adams Street is the City of Detroit; north of Adams Street is MDOT. Regionally, Woodward Avenue is used by commuters to Downtown Detroit as an alternative to I-75 or M-10; however, locally, Woodward is also used to access other destinations for those living and working in the corridor. There is a mixture of long distance and short distance travel.

On-street parking is allowed in the following areas along Woodward Avenue:

- South of Adams Street (Detroit): Pocket parking with meters
- I-75 Service Drive (Detroit) to Grand Boulevard (Detroit): On-street parking in outside with a mix of metered and unmetered parking. This section will be rebuilt with the M-1 Rail streetcar and will allow on-street parking in the southbound direction only.
- Grand Boulevard (Detroit) to McNichols Road (Detroit): On-street parking in outside lane, some peak hour restrictions
- McNichols Road (Detroit) to 8 Mile Road (Detroit): On-street parking in outside northbound lane
- 8 Mile Road (Ferndale) to I-696 (Pleasant Ridge): Pocket on-street parking with some metered and some unmetered
- I-696 (Pleasant Ridge) to Quarton Road (Birmingham): Some service drives in the Woodward Avenue ROW with angle and parallel parking

A preliminary crash analysis was conducted along the corridor to determine if there are any locations that have any crash patterns. There were five intersections along Woodward Avenue that are considered critical crash locations. These are summarized below in **Table 3-1**.

TABLE 3-1. CRITICAL CRASH INTERSECTIONS

Source: Parsons Brinckerhoff

INTERSECTION	2010	2011	2012	AVERAGE CRASH FREQUENCY	AVERAGE DAILY TRAFFIC (ADT)	AVERAGE CRASH RATE
Woodward at MLK/Mack Ave.	27	26	33	29	32,750	2.40
Woodward at 8 Mile Road	29	39	13	27	24,700	2.99
Woodward at 10 Mile Road	59	45	42	49	47,400	2.81
Woodward at Maple Road	41	40	30	37	81,500	1.24
Woodward at Square Lake Rd.	59	51	34	48	89,300	1.47

Average daily traffic (ADT) volumes vary along Woodward Avenue. Generally, daily traffic volumes south of 8 Mile Road are less 25,000 vehicles per day and increase to 60,000 vehicles per day in Royal Oak. The daily traffic volumes decrease to less than 25,000 vehicles per day north of Square Lake Road.

Cass Avenue and John R Street are similar and both have lower traffic volumes with daily traffic volumes at or less than 8,000 vehicles per day. **Figure 3-13** illustrates the daily traffic volumes along Woodward Avenue, Cass Avenue, and John R Street.

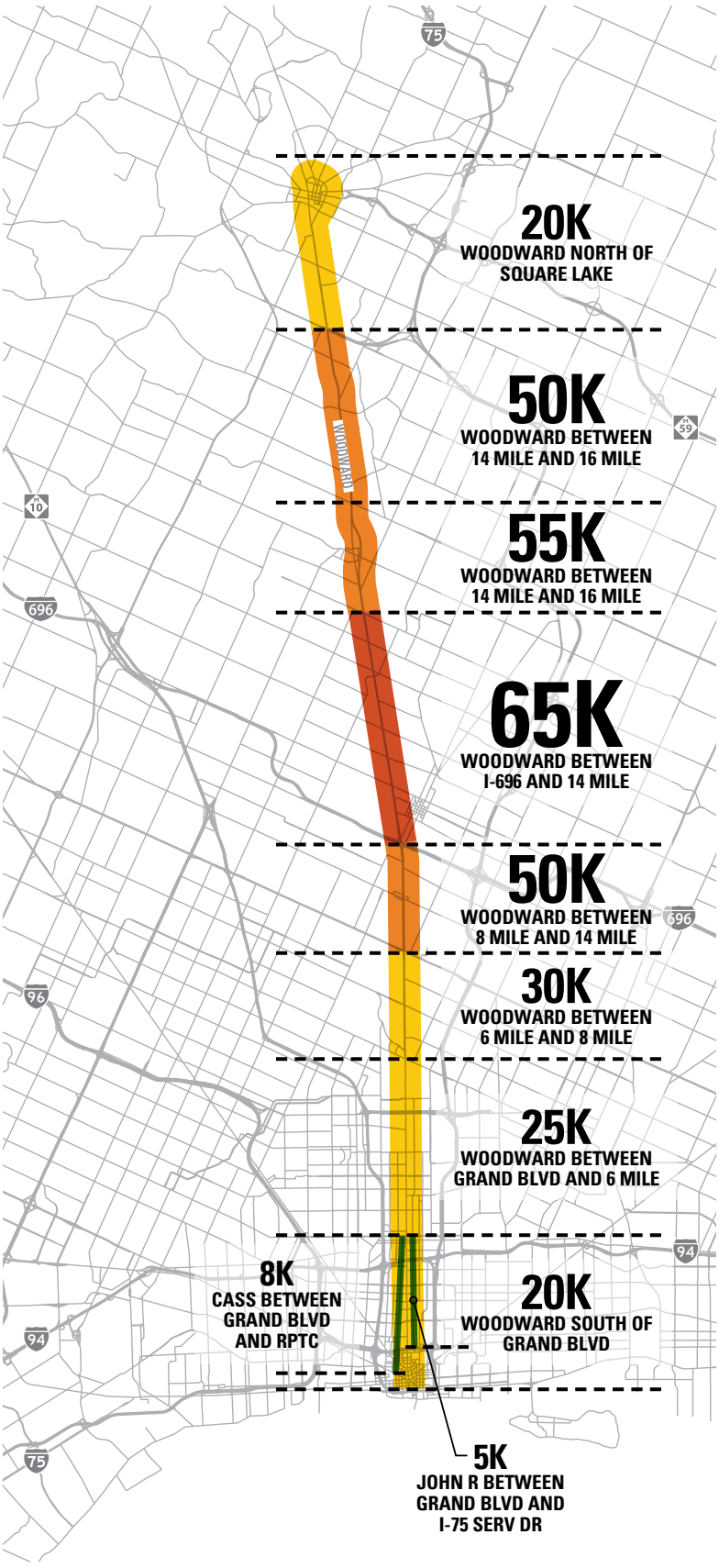


FIGURE 3-13. DAILY TRAFFIC VOLUMES: WOODWARD, CASS, AND JOHN R Source: SEMCOG

To determine intersection congestion levels, Synchro models were developed for all of the signalized intersections along Woodward Avenue. Within the last ten years, the City of Detroit and MDOT collected vehicular turning movement counts and approach counts for many of the signalized intersections along the corridor. Parts of the corridor had counts that were taken in excess of five years, specifically between 8 Mile Road and Long Lake Road. As a result, several new counts were taken within this section of the corridor to update the counts. The counts, number of lanes, and signal timings were input into Synchro to determine the level of congestion at each of the intersections for the morning and evening peak hours.

Synchro theoretically determines the control delay and level of service by movement, approach, and for an entire intersection. The level of service (LOS) is based on the amount of delay experienced by drivers traveling along the roadway through an intersection. The LOS criteria for signalized intersections used by Synchro are provided in the 2010 Highway Capacity Manual and are summarized below. More information on the analysis can be found in the Transportation Technical Report for this project.

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS[1]

LEVEL OF SERVICE (LOS)	DESCRIPTION	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)
A	Operations with very low control delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B	Operations with low control delay occurring with good progression and/or short cycle lengths.	> 10.0 and ≤ 20.0
C	Operations with average control delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 and ≤ 35.0
D	Operations with longer control delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 and ≤ 55.0
E	Operations with high control delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55.0 and ≤ 80.0
F	Operation with control delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	> 80.0

There were 134 signalized intersections and two unsignalized intersections reviewed as part of the analysis. Based on the analysis, most intersections in the study corridor are currently operating at acceptable LOS (LOS D or better) during the AM and PM peak hours. The Transportation Report summarizes the AM and PM peak-hour LOS and delay for all intersection analyzed in the study corridor. **Table 3-3** on the following page summarizes the seven intersections along the corridor that have one or more approach operating at LOS E or LOS F under existing conditions.

TABLE 3-2. INTERSECTIONS WITH ONE OR MORE APPROACH AT LOS E OR F, EXISTING CONDITIONS

Source: Parsons Brinckerhoff

	AM PEAK HOUR					PM PEAK HOUR				
INTERSECTION	NB	SB	EB	WB	TOTAL	NB	SB	EB	WB	TOTAL
Woodward & Bethune	A	A	D	D	**A**	A	A	D	E	**B**
Woodward & Merrill Plaisance	-	A	F	-	**B**	-	A	D	-	**B**
Woodward & Grixdale	A	A	D	F	**A**	A	A	F	D	**A**
Woodward & 7 Mile Road	A	A	E	D	**B**	A	A	D	D	**B**
Woodward & State Fair	A	A	-	D	**A**	A	A	-	E	**B**
Woodward & State Fair Entry Gate #5	A	A	-	F	**D**	A	A	-	D	**A**
Woodward & Quarton	A	C	D	C	**C**	B	B	F	C	**C**

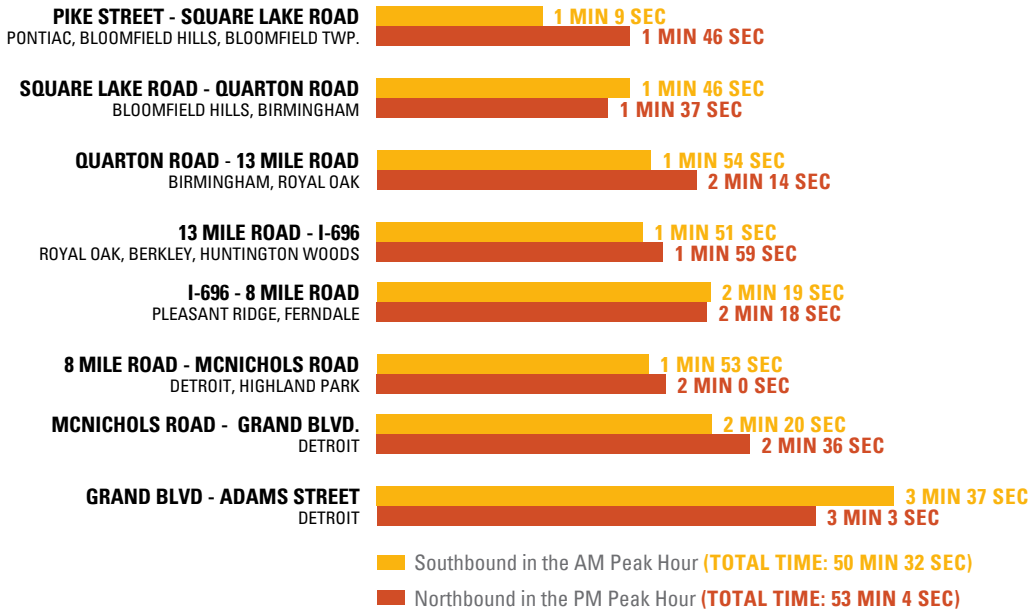
NB = Northbound SB = Southbound EB = Eastbound WB = Westbound

Most of the approaches in the figure shown above are a result of very little green time given to the side street and a low volume, resulting in poor levels of service. A change in the signal timing would likely reduce the congestion levels for these approaches. The exception is eastbound Quarton Road at Woodward Avenue which has high traffic volumes in the eastbound and northbound directions. Reducing the green time from Woodward Avenue to give to Quarton Road would result in added delay to northbound Woodward Avenue. One of the only options at this intersection is to add lanes for eastbound traffic.

Existing travel times were estimated using the Synchro model, which takes into account the speed limit and the amount of congestion expected at each signalized intersection. **Figure 3-14** on the following page illustrates the travel time along Woodward Avenue between Downtown Pontiac (Pike Street) and Downtown Detroit (Adams Street) for southbound in the AM peak hour and northbound in the PM peak hour. Traffic volumes are typically heavier going southbound in the morning and the opposite (northbound) for the afternoon rush hour.

FIGURE 3-14. TRAVEL TIME PER MILE BY SEGMENT, EXISTING CONDITIONS

Source: Parsons Brinckerhoff



Highway Level of Service

Two freeways parallel Woodward Avenue within the southern portion of the study area; M-10 to the west and I-75 to the east. These freeways are approximately one-half to one mile on either side of Woodward Avenue from Downtown Detroit to Highland Park. M-10, also known as the Lodge Freeway, terminates in Downtown Detroit on the western side, and I-75 has a spur (I-375) that terminates in Downtown Detroit on the eastern side. North of Highland Park, M-10 curves to the west; it is eight miles west of Woodward Avenue at its northern terminus in Farmington Hills. I-75 continues to parallel Woodward Avenue closely (within two miles) until I-696. North of I-696, I-75 remains within five miles of Woodward Avenue until Pontiac.

Daily recurrent congestion along I-75 and M-10 does occur, typically in the following areas:

- Southbound I-75 between 12 Mile Road and 8 Mile Road in the morning
- Southbound M-10 between the McNichols Road and the Davison Freeway in the morning
- Northbound I-75 between the Davison Freeway and 12 Mile Road in the evening
- Southbound I-75 between 14 Mile Road and I-696 in the evening
- Northbound M-10 between I-94 and the Davidson Freeway in the evening

At times, Woodward Avenue can experience some additional congestion that is mainly due to incidents that may occur along I-75 or M-10. When incidents do occur, drivers often shift from adjacent freeways to local roadways including Woodward Avenue.

Over the next 25 years (to the year 2040), traffic volumes along I-75 and M-10 are expected to increase at a higher percentage than the percentage along Woodward Avenue at approximately eight to 10 percent.

Future Conditions With No Changes to Laneage

Utilizing the SEMCOG Travel Demand Forecasting model, it was estimated that there would be a six percent increase in traffic volumes for the next 25 years for the corridor. Much of the area is built out with little room for land use changes or growth along the corridor. Some of the areas that may experience growth are the cities of Detroit and Pontiac. Over the next 25 years it is expected that I-75 will be widened from three lanes in each direction to four lanes between Square Lake Road and 8 Mile Road. As a result, the model predicts higher traffic growth along I-75, thereby reducing some of the growth along Woodward Avenue.

The existing year Synchro models were used to develop the future year (2040) models to determine the amount of congestion at each of the signalized intersections. A six-percent growth rate was added to the existing year volumes and traffic signals were adjusted in areas of increased congestion. **Table 3-3** below summarizes the intersection of Woodward and Quarton Road which may have one or more approach operating at LOS E or LOS F under future conditions.

TABLE 3-3. INTERSECTIONS WITH ONE OR MORE APPROACH AT LOS E OR F, FUTURE CONDITIONS WITH NO CHANGES TO LANEAGE

Source: Parsons Brinckerhoff

	AM PEAK HOUR					PM PEAK HOUR				
INTERSECTION	NB	SB	EB	WB	TOTAL	NB	SB	EB	WB	TOTAL
Woodward & Quarton	A	C	C	C	**B**	D	A	F	C	**D**

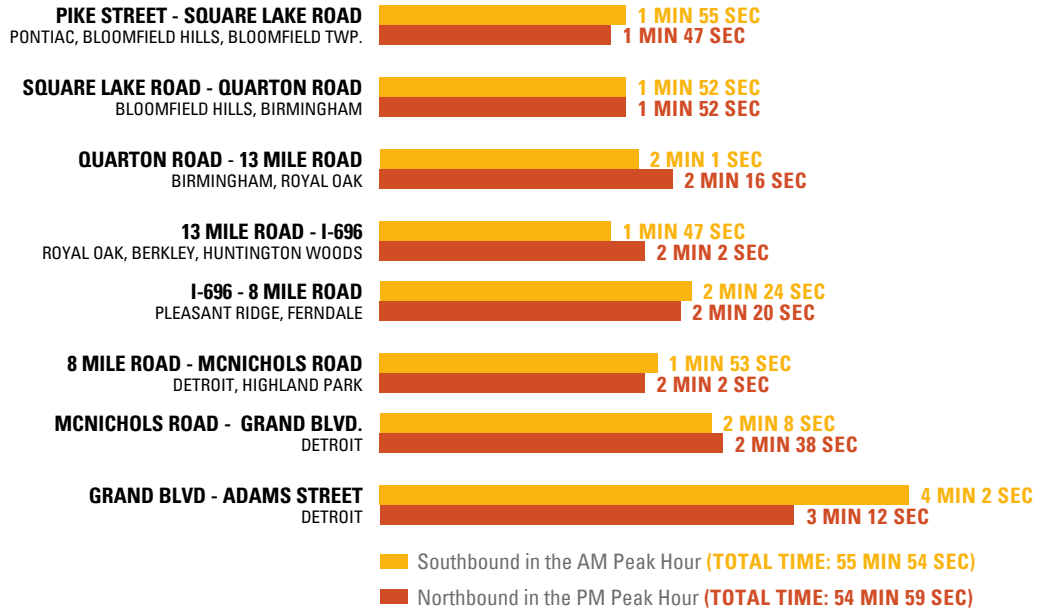
NB = Northbound SB = Southbound EB = Eastbound WB = Westbound

As shown in **Table 3-3**, eastbound Quarton Road at Woodward Avenue is still expected to operate at a LOS F during the PM peak hour. Reducing any green time along Woodward Avenue any more than what is in the model would result in a LOS E for northbound Woodward Avenue. The only option to reduce congestion is to add lanes for eastbound Quarton Road at Woodward Avenue.

Future travel times along Woodward were estimated using the Synchro model. **Figure 3-13** illustrates the travel time along Woodward Avenue between Downtown Pontiac (Pike Street) and Downtown Detroit (Adams Street) for southbound in the AM peak hour and northbound in the PM peak hour. Traffic volumes are typically heavier going southbound in the morning and the opposite (northbound) for the afternoon rush hour.

FIGURE 3-15. TRAVEL TIME PER MILE BY SEGMENT, FUTURE CONDITIONS: NO CHANGES TO LANEAGE

Source: Parsons Brinckerhoff



As shown in **Figure 3-15**, northbound in the PM peak hour take longer than southbound in the AM peak hour, which is due to increased traffic volumes in the PM peak hour compared to the AM peak hour. The section south of McNichols Road experiences higher delay in the PM peak hour than in the AM peak hour.

Future Conditions with Removal of a Lane

One of the options discussed is the removal of a travel lane in each direction along Woodward Avenue and John R Street for an exclusive BRT lane. Synchro was utilized in determining the impact to the signalized and the two unsignalized intersections with the removal of a travel lane in each direction. Similar to the existing conditions analysis, the model for this future conditions analysis assumed a six percent increase in traffic volumes for the next 25 years. Typically, with a removal of a travel lane in each direction, a diversion of traffic may occur, especially if there is congestion along part of the corridor. However, for this analysis, it was assumed that there would not be a diversion in any of the traffic. The SEMCOG model was run with a reduction of a traffic lane along Woodward Avenue, which determined a six percent reduction in traffic may occur. Some of this traffic may divert to other roadways while others may switch modes from automobile to transit.

A traffic lane was removed in each direction along the following roadways:

- Woodward Avenue between Bethune Street (Detroit) to Pike Street (Pontiac)
- John R Street between I-75 Service Drive and Warren Avenue
- Cass Avenue between Michigan Avenue and the I-75 Service Drive

Cass Avenue remained with one lane in each direction north of the I-75 Service Drive and no center left-turn lanes at the signalized intersections, the following exceptions were made to maintain a LOS D or better:

- Left-turn lanes at both the north and south I-75 Service Drives (the current bridge can accommodate)
- Southbound right-turn lane at the north I-75 Service Drive (may require additional right-of-way)
- Left-turn lanes at Temple Street (to accommodate future arena traffic)

John R Street between Warren Avenue and Grand Boulevard was converted to a two-way roadway with a lane removed in each direction, resulting in one lane in each direction with a center left-turn lane at the signalized intersections south of the viaduct. North of the viaduct, there are only three lanes of traffic, so there would not be a center left-turn lane at the signalized intersections. Traffic volumes for the northbound movements were made to be the same as the southbound movements. The unsignalized intersections at John R and the I-75 Service Drives were also signalized for this analysis. It was assumed that transit signal priority would be installed at all the signalized intersection to improve reliability of service.

The future year Synchro models were used to determine the level of congestion at each of the signalized intersections with a lane removed. The traffic signal timings were adjusted in the areas of increased congestion. **Table 3-4** below summarizes the five intersections along the corridor that have one or more approach operating at LOS E or LOS F under future conditions.

TABLE 3-4. INTERSECTIONS WITH ONE OR MORE APPROACH AT LOS E OR F, FUTURE CONDITIONS WITH REMOVAL OF ONE LANE

Source: Parsons Brinckerhoff

	AM PEAK HOUR					PM PEAK HOUR				
INTERSECTION	NB	SB	EB	WB	TOTAL	NB	SB	EB	WB	TOTAL
Woodward & Catalpa	A	A	D	D	**B**	B	D	F	C	**D**
Woodward & Adams	E	-	-	D**	**E**	D	-	-	D**	**D**
Woodward & Quarton	A	F	F	C	**E**	B	D	F	E	**D**
Woodward & Long Lake Road	A	F	D	D	**E**	C	B	D	E	**C**
Woodward & Square Lake Road	B	D	D	D	**D**	F	E	D	C	**E**

NB = Northbound SB = Southbound EB = Eastbound WB = Westbound

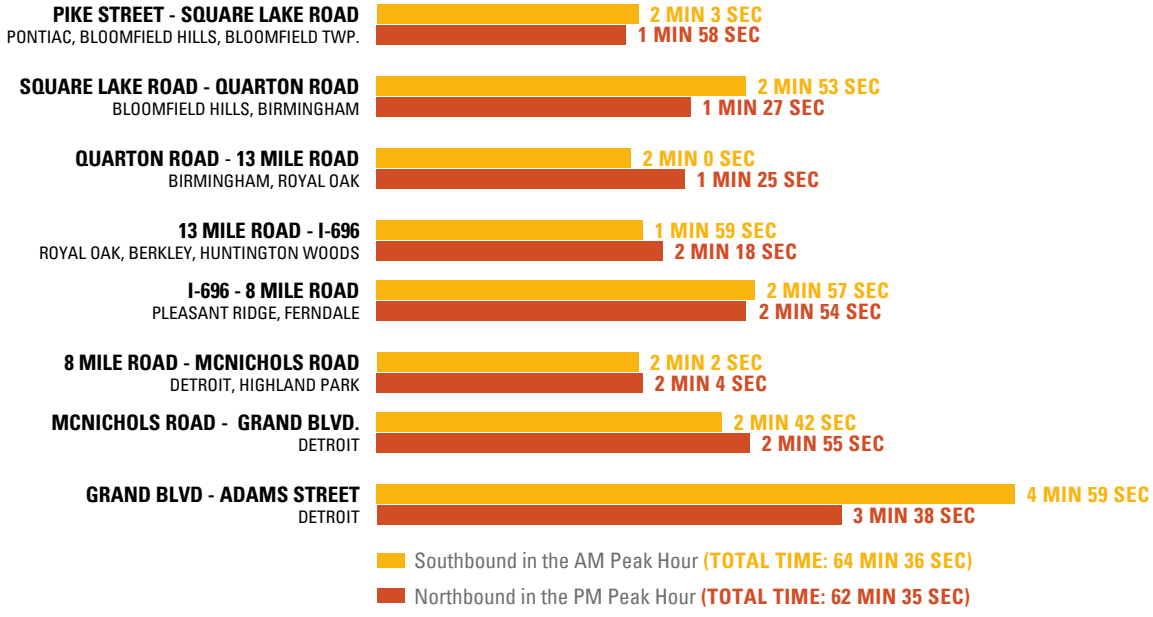
*WB Adams is actually SB Adams

There are several approaches or intersections that are expected to fail with a lane removed along Woodward Avenue, all of these intersections are in Oakland County north of I-696, most in areas with the highest traffic volumes along the corridor. Eastbound Catalpa Road currently has high eastbound traffic volumes in the evening rush hour, with a six-percent increase in the future, the approach is a LOS F. Removing any time from Woodward Avenue to give to Catalpa Road would degrade southbound Woodward Avenue to a LOS E. In the interest of keeping Woodward Avenue at a better LOS due to higher traffic volumes, eastbound Catalpa Road has the worse LOS. Northbound Woodward Avenue is expected to experience a LOS E with Southbound Adams Road in the AM peak hour. Additional time cannot be taken away from Southbound Adams Road because it is already at its minimum green time. Quarton Road and Woodward Avenue are already bad today, so the additional traffic plus the removal of the lane on Woodward Avenue decreased levels of service for some of the approaches. In order to alleviate this, additional lanes would have to be added for some approach. Woodward Avenue at Square Lake Road would also experience failing levels of service during the evening rush hour. Again, green time from Square Lake Road cannot be given to Woodward Avenue because Square Lake Road is already at its minimum times.

Travel times were also estimated using the Synchro model. **Figure 3-16** illustrates the travel time along Woodward Avenue between Downtown Pontiac (Pike Street) and Downtown Detroit (Adams Street) for southbound in the AM peak hour and northbound in the PM peak hour. Traffic volumes are typically heavier going southbound in the morning and the opposite (northbound) for the afternoon rush hour.

FIGURE 3-16. TRAVEL TIME PER MILE BY SEGMENT, FUTURE CONDITIONS: REMOVAL OF A LANE

Source: Parsons Brinckerhoff



In the morning, travel times are expected to increase for southbound, specifically due to delays between Square Lake Road and Quarton Road. Otherwise most sections would experience a one to two-minute increase in travel time. In the evening, some segments are expected to stay around the same or have a slight increase, while other areas may end up decreasing in travel times. This is due to the change in signal timing allowing more green time along Woodward Avenue. Given a reduction of lanes on Woodward Avenue, it actually allows more green time to Woodward Avenue than the side streets. This is because the pedestrian crossing time across Woodward Avenue can be decreased. Most of the side streets along Woodward Avenue are controlled by the pedestrian crossing times and not vehicular demand. Reducing the laneage along Woodward Avenue actually increases the allotted green time to Woodward Avenue, improving progression.

Mitigation

Improvements to the above intersections could improve level of service. Utilizing Synchro, it was found that the following roadway improvements would improve the overall intersection LOS to a D, with some of the approaches still experiencing a LOS E:

- Construct an eastbound through lane for eastbound Catalpa Road at Woodward
- Construct a northbound right-turn only lane for northbound Woodward at Adams Road
- Construct an eastbound right-turn only lane for Quarton Road at Woodward
- Construct an eastbound right-turn only lane for Long Lake Road at Woodward
- Construct a westbound through lane for Long Lake Road at Woodward
- Add dedicated dual right-turn lanes for each direction at Square Lake Road and Woodward

With these improvements, the intersection level of service and travel time would improve and is shown in **Table 3-5** and **Figure 3-17**, respectively.

TABLE 3-5. INTERSECTIONS WITH ONE OR MORE APPROACH AT LOS E OR F, FUTURE CONDITIONS: REMOVAL OF ONE LANE WITH ROADWAY IMPROVEMENTS

Source: Parsons Brinckerhoff

	AM PEAK HOUR					PM PEAK HOUR				
INTERSECTION	NB	SB	EB	WB	TOTAL	NB	SB	EB	WB	TOTAL
Woodward & Catalpa	A	A	C	D	B	B	D	C	C	C
Woodward & Adams	A	-	-	D**	B	B	-	-	D**	B
Woodward & Quarton	A	D	E	D	D	C	E	C	E	D
Woodward & Long Lake Road	B	D	D	D	D	C	B	C	D	C
Woodward & Square Lake Road	A	C	C	C	C	D	C	D	D	D

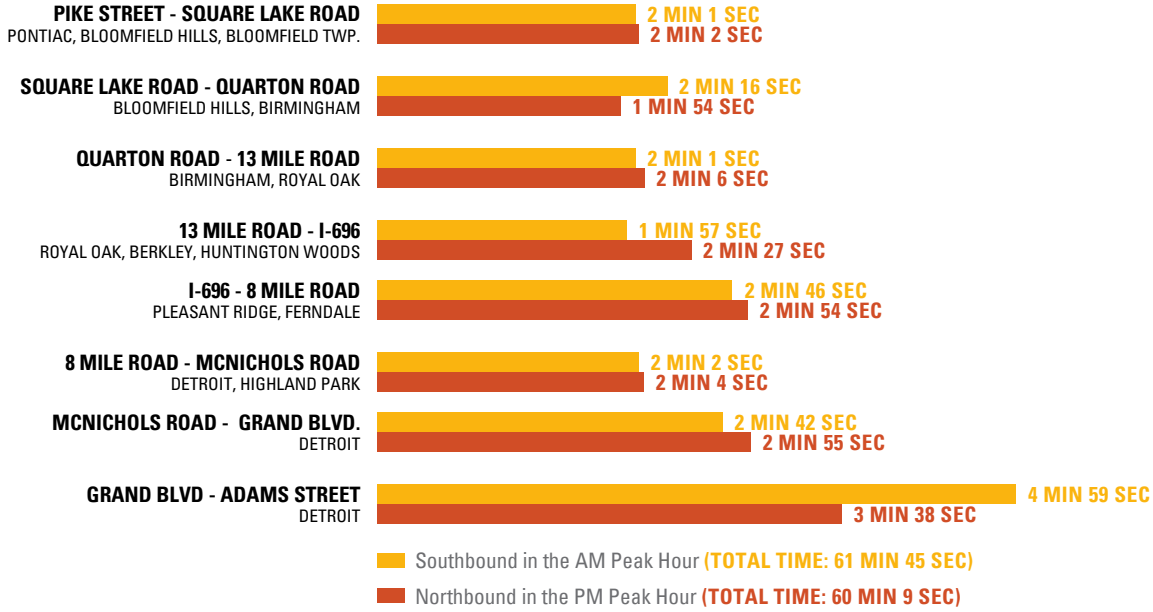
NB = Northbound SB = Southbound EB = Eastbound WB = Westbound

*WB Adams is actually SB Adams

As shown in the table above, with the improvements listed above, most approaches are a LOS D or better. However, the intersection of Quarton Road at Woodward Avenue is still expected to experience a LOS E for some of the approaches in the AM and PM peak hours. In order to mitigate this, additional lanes would be necessary either along Quarton Road or Woodward Avenue. Given that the overall intersection is a LOS D, it was deemed that additional improvements would not be needed.

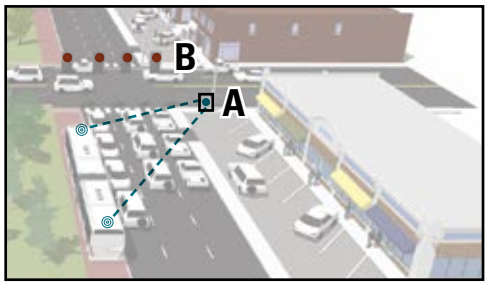
FIGURE 3-17. TRAVEL TIME PER MILE BY SEGMENT, FUTURE CONDITIONS: REMOVAL OF A LANE WITH ROADWAY IMPROVEMENTS

Source: Parsons Brinckerhoff

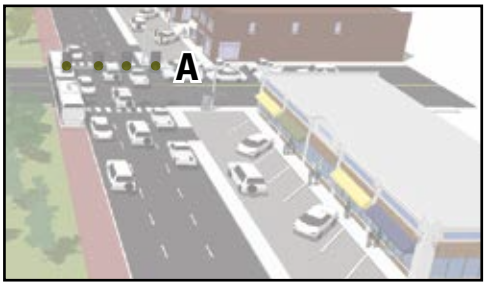


With the following improvements along the corridor, the travel time improved by giving additional time to Woodward Avenue as well as a reduction in congestion at some of the intersections within Oakland County. With the implementation of Transit Signal Priority along the corridor as shown below, the travel time of the BRT as well as the vehicular traffic along the corridor will be less than what is shown above.

WHEN A BRT VEHICLE APPROACHES A RED LIGHT:

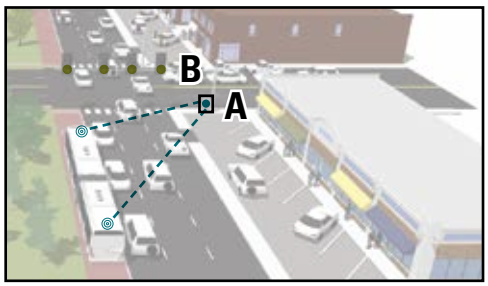


Signal controller detects the BRT vehicle (A), ends green light on cross-street early (B).



Woodward signal will turn green (A), BRT vehicle proceeds through intersection.

WHEN A BRT VEHICLE APPROACHES A GREEN LIGHT:



Signal controller detects the BRT vehicle (A), extends green light on Woodward (B).

BRT vehicle proceeds through intersection on extended green light (A).

3.2.2 TRANSIT SYSTEM PERFORMANCE

Four major transit service providers operate along the Woodward Avenue corridor. The alignments of transit services in the corridor are shown in **Figure 3-18**. This section summarizes transit service and facilities along the Woodward corridor.

Detroit Department of Transportation

DDOT has provided public transportation service in Detroit for approximately 90 years. In its first 30 years of service, the agency offered streetcar service. In 1937, bus service was established. By 1956, streetcar service was discontinued and bus service remained as the sole transit mode.

DDOT is the major bus transit provider in SE Michigan and is also the state's largest transit carrier. The agency serves an area of 144 square miles and 951,270 people with more than 40 fixed routes (2010). Average weekday ridership totals 121,000 trips, occurring in Detroit and 22 neighboring communities. Annual ridership totals 36.6 million (fixed route and demand response combined). The department provides demand response service through its Detroit Metrolift service, which completed 101,000 trips in 2010.

Downtown Detroit to New Center has the largest and most dense ridership concentration, totaling 126,119 trips. This area also includes several major destinations (see **Figure 3-19**) within the corridor, making it a focal point for transit services.

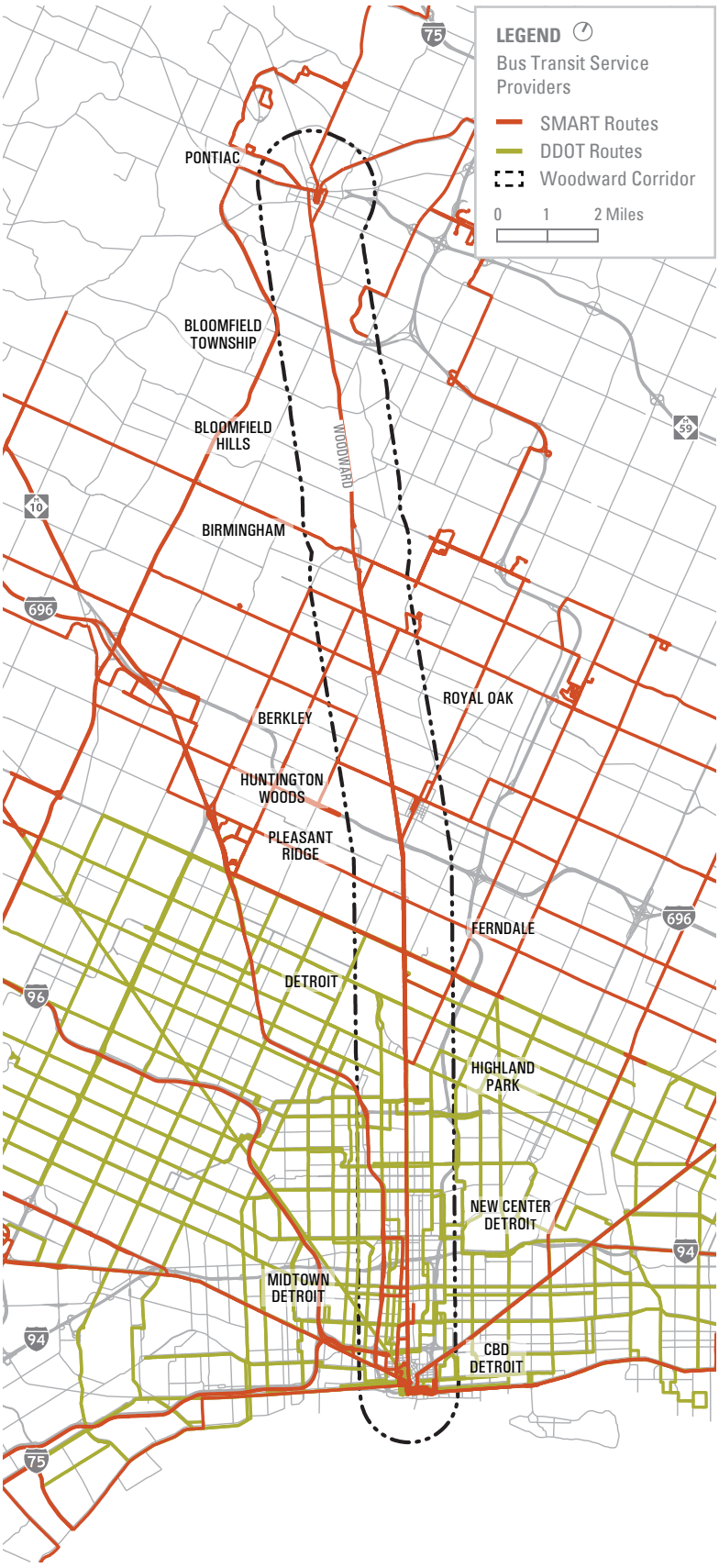


FIGURE 3-18. EXISTING TRANSIT SERVICE

Source: 2010 Census

Route 53 is the primary route on Woodward Avenue, a local bus route operating from the State Fairgrounds Transit Center just south of Eight Mile Road to the Rosa Parks Transit Center in Downtown Detroit, and serves virtually the entire alignment of Woodward Avenue within Detroit. Route 53 operates daily from 4:00 AM to midnight. During most of the day, the route's end-to end running time is about 50 minutes.

DDOT ROUTE 53 SCHEDULE

DAYS OF OPERATION	TIME	HEADWAY (MINUTES)
Monday - Friday	4am - 5am	30
	5am - 6 am	15
	6am - 2pm	10
	2pm - 6pm	8
	6pm - 9pm	15
	9pm - 12am	30
Saturday	4am - 6am	30
	6am - 6pm	10
	6pm - 8pm	20
	8pm - 12am	30
Sunday	4am - 6am	40
	6am - 8pm	20
	8pm - 12am	30

Route 53 has an annual ridership of 3.7 million (2011), which represents 10 percent of DDOT's 2011 annual ridership. Ridership is the highest in Downtown Detroit and in the segment of the route south of I-94, although ridership is relatively high throughout the length of the route. In addition to Route 53, eight routes (7, 16, 18, 23, 25, 31, 36 and 78) travel on a portion of Woodward Avenue near downtown, many of them on their way to/from connections at the Rosa Parks Transit Center. In addition, four routes (12, 17, 30 and 54) use a short segment of Woodward south of Eight Mile Road to access the State Fairgrounds Transit Center. Fifty percent of DDOT's bus routes travel to Downtown from outlying neighborhoods. DDOT's 19 other bus routes run east-west or north-south, connecting neighborhoods and feeding riders to Downtown routes.

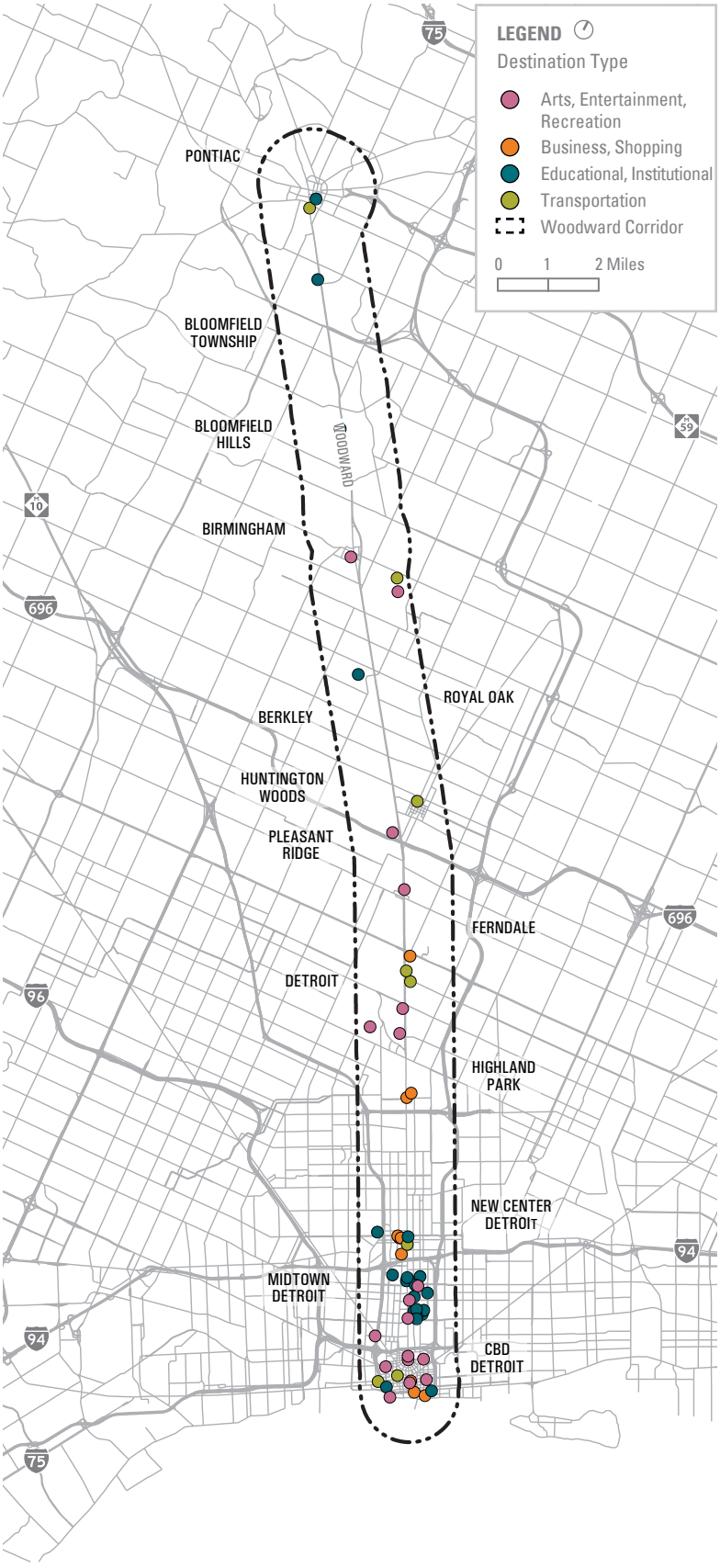


FIGURE 3-19. MAJOR DESTINATIONS WITHIN THE CORRIDOR Source: 2010 Census

Suburban Mobility Authority for Regional Transportation

With annual ridership at 12.1 million trips (demand response and fixed route) and average weekday ridership at 41,000 trips (2010), the SMART is the second largest transit provider in Michigan. SMART was formed as SE Michigan's regional bus system and has coverage of 1,074 miles with a population of 3,167,075 in more than 75 communities throughout Macomb, Oakland, and Wayne Counties. SMART operates five routes primarily on Woodward Avenue:

SMART ROUTES ON WOODWARD

ROUTE	STOP DESIGNATION	SERVICE DESCRIPTION
450	Local	Operates from the Phoenix Center in Pontiac to the State Fairgrounds Transit Center just south of 8 Mile Road in Detroit, with weekday peak period service to the SMART Transit Center in Downtown Detroit, located at the Buhl Building.
460	Local	Operates from the Somerset Collection Transit Center in Troy to the State Fairgrounds Transit Center just south of 8 Mile Road in Detroit, with weekday peak period service to the SMART Transit Center in Downtown Detroit. The route essentially operates as a short turn route paralleling Route 450 from Troy south to Detroit.
445	Limited	A commuter-oriented route (southbound in the morning, northbound in the evening) that originates at Telegraph Road and Maple in Birmingham, joins the Woodward Avenue alignment at Maple and continues to the SMART Transit Center in Downtown Detroit
465	Limited	A reverse commute route (northbound in the morning, southbound in the evening) that originates at the General Motors Truck and Bus plant in Pontiac and serves a number of other industrial sites in Auburn Hills before joining the Woodward Avenue alignment just south of Maple near the Amtrak Station in Birmingham and continuing to the SMART Transit Center in Downtown Detroit.
475	Limited	A commuter-oriented route that originates at the Troy Civic Center Park-and-Ride in Troy and enters the Woodward Avenue alignment just south of Maple near the Amtrak Station in Birmingham before continuing to the SMART Transit Center in Downtown Detroit.

Regardless of their local or limited stop designation, the stopping pattern on SMART bus routes effectively precludes them from providing bus service for trips that both begin and end within the City of Detroit. On weekdays, Routes 450 and 460 operate from 5:00 AM to 2:00 AM on a combined 15-minute headway during most of the day, over the combined segments of the routes from Woodward and Daines to Woodward and the State Fairground Transit Center, where passengers can take DDOT route 53 to complete their trip into Detroit (the route operates to the SMART transit center in downtown Detroit during the peak periods), with each separate route operating at a 30 minute headway. Headways are calculated from the Detroit end of the trip (arrival times on the southbound trips, departure times on northbound trips); headways are irregular on the other ends of the trips.

Travel times during the off-peak period on Route 450 (with the northern terminus at Phoenix Center in Pontiac) to Woodward and State Fairground average around 45-50 minutes. Travel times to Downtown Detroit during peak periods average around 70-75 minutes during the morning peak and around 85-90 minutes during the afternoon peak. Travel times on Route 460 (with the northern terminus at Somerset Collection in Troy) to Woodward and State Fairground range from around 40 to 50 minutes. Travel times on Route 460 to Downtown Detroit during the peak periods range from around 70 minutes during the morning peak to around 80 minutes during the afternoon peak. On Saturdays and Sundays the route operates only as far south as Woodward and the State Fairgrounds. Saturday service is from 5:00 AM to 2:00 AM, and the two routes operate on an irregular combined headway ranging from 15 to 25 minutes during most of the day (hourly after 10:00 PM). Sunday service operates from 6:00 AM to Midnight, with the two routes operating a combined irregular 15-25 minute headway.

Route 445 operates three trips each morning between 6:28 and 7:28 AM from Telegraph and Maple in Birmingham to downtown Detroit. Running time is 62 minutes. In the afternoon, the route operates four trips northbound between 4:05 and 5:35 PM, with a running time of 61-63 minutes.

Route 465, the reverse commute route, operates five morning northbound trips between 4:08 and 6:40 AM, from downtown Detroit to Big Beaver and Crooks in Auburn Hills. Running time is 56-58 minutes. Six trips operate in the afternoon between 2:42 and 5:09 PM, with a running time of 79-85 minutes. Route 475 operates four morning trips southbound between 6:10 and 7:38 AM, from Troy Civic Center P&R to downtown Detroit. Running time is 65-67 minutes. The route operates four afternoon trips northbound between 4:20 and 6:13 PM, with a running time of 65-69 minutes. Routes 445, 465 and 475 operate no early morning, mid-day, evening, night, weekend or Holiday service. Boardings along the route are fairly dispersed, with higher ridership stops in the terminal areas (Detroit, Pontiac, and the Amtrak station), at key activity centers and bus transfer points along the route, both in Detroit and in the suburban areas. Ridership on the express routes is much more uniform across the limited stops on those routes, and is only large at the terminal points.

Detroit Transportation Corporation

The Detroit Transportation Corporation (DTC) operates the Detroit People Mover (DPM) service, connecting major activity centers in Downtown via an elevated, fully automated guideway system and 13 stations. Eight computer-controlled driverless vehicles travel along a 2.9-mile single-track, one-way, clock-wise loop. In 2009, approximately 5,500 daily passengers used the DPM, with a total annual ridership of 2.1 million passengers. DPM's ridership for special events is estimated at 10,000 to 15,000 passengers. Originally planned as a downtown circulator, the DPM never realized its true potential in the absence of a broader regional rapid transit system. It serves a much needed circulation function within Downtown, with connections to Cobo Hall (convention center), Joe Louis Arena (hockey/entertainment arena), the Renaissance Center (General Motors international headquarters), various employers in Downtown's Financial District, Greektown Casino and entertainment district, Comerica Park (baseball/entertainment stadium), Ford Field (football/entertainment stadium), the Theatre District on Broadway, and connections to the Rosa Parks Transit Center on Washington Boulevard and Michigan Avenue.

Transit Windsor

Transit Windsor is Windsor, Ontario, Canada's transit service provider that operates one bus route that shuttles passengers between Downtown Detroit and Windsor, Ontario, via the Detroit-Windsor Tunnel. The bus circulates through Downtown and has one stop along Woodward Avenue at Larned Street. It also stops at the Rosa Parks Transit Center. This route had an annual ridership of about 200,000 in 2009.

Capacity

Decreased availability of revenue sources from the gas tax, vehicle registration fees, and alternate revenue streams have challenged transit providers' ability to maintain capital equipment and service operations throughout Michigan. Despite these challenges, MDOT notes in its *2035 State Long-Range Transportation Plan*:

> "Public transit ridership [in Michigan] increased by about 15.5 percent from FY 2005 to FY 2010, while miles of service increased by about 7.5 percent. The public's demand for more transit choices has not wavered…Michigan transit agencies were able to achieve a net increase in miles of service during a period when state operating assistance per year stayed the same."

Detroit (15 percent) and Highland Park (eight percent) have the highest proportion of zero-car households along the corridor. This demand is ever-present in the capacity issues faced by transit providers operating within the corridor, particularly during peak service hours. Similarly, during the peak service hours, the Transit Windsor route between Detroit and Windsor, Ontario, operates at capacity. On an average weekday, the DPM has available capacity all day, but operates over capacity during large events in Downtown Detroit.

Despite demand, funding cuts have impacted the level of service that transit providers offer customers. Particularly in the cases of DDOT and SMART, funding cuts have had a marked impact on service offerings through increased reliability and reduced coverage. Since January 2012, DDOT has undergone three rounds of service cuts that have reduced and stabilized wait times on some routes, increased wait times on others, eliminated some routes, but overall improved the service reliability of the system. In December 2011, SMART instituted a reduction in service to forestall a $7,000,000 budget deficit. This resulted in an 18 percent reduction of weekday service, a 29 percent reduction of Saturday service, and a 31 percent reduction of Sunday service. These service reductions were achieved by shortening the Main Corridor (arterial) routes into the City of Detroit and eliminating lower productivity routes in each of the three counties SMART serves: Wayne, Oakland, and Macomb. In determining which routes would be affected, SMART worked to maintain a balance between funds received and service provided. After reductions, the income-to-service balance was achieved. Through the reductions in service, SMART has maintained an on-time performance of 87 percent system-wide and continues to monitor reliability through route surveys, automatic vehicle location data, and bus operator input. Service reductions have allowed SMART to meet budgetary requirements in FY2012 and FY2013 without further reductions.

MDOT has responded to increased transit service demand and Michiganders' desire for improved transportation options with increased support for transit projects. Along the Woodward Avenue corridor, demand has been slowly building for transit facilities and services since 2006, when the City of Detroit hosted Super Bowl XL. Emphasis on transit has accelerated between 2011 and 2013, in which projects with transit components were initiated within study area communities as shown in **Table 3-6** below.

TABLE 3-6. STUDY AREA TRANSIT PROJECTS, 2011-2013

		TRANSIT-RELATED PROJECTS
YEAR COMPLETED	2011	Pontiac Transportation Center
	2011	Woodward Avenue Light Rail Transit Project
	2012	Woodward Avenue Streetcar Project
	2012	Woodward Avenue Rapid Transit Alternatives Analysis
	2013	Woodward Avenue Complete Streets Master Plan
	2013	Troy Multi-Modal Transit Center
	2013	Birmingham Multi-Modal Transportation Plan
	2013	Ferndale Multi-Modal Transportation Plan

Travel Time Comparison Between Roadway and Transit Systems

Trips extending the entire length between Downtown Pontiac and Downtown Detroit are typically made by automobile via I-75. Woodward Avenue serves local commuters and is also used as an alternate to avoid peak hour congestion on I-75. While the distance between Downtown Pontiac and Downtown Detroit is longer when using I-75 (31 miles compared to 27 miles along Woodward), the higher speed limits and lack of signalized intersections reduces the travel time.

On a typical off-peak day, the average travel time from Downtown Pontiac to Downtown Detroit via automobile is 52 minutes and 110 minutes via transit. Travel by transit during the peak hours between Pontiac and Detroit is done via SMART Route 450; however, during off-peak periods, SMART service stops at the City of Detroit limits, forcing passengers to transfer to DDOT Route 53. This additional transfer adds time onto travel times, causing longer off-peak trip travel times than the peak period trips. **Tables 3-7 and 3-8** below show the differences between automobile and proposed BRT travel times.

TABLE 3-7. AUTOMOBILE VERSUS PROPOSED TRANSIT TRAVEL TIME, SOUTHBOUND AM

Source: Parsons Brinckerhoff

		AUTO TRAVEL TIME KEEPING ALL LANES	AUTO TRAVEL TIME REMOVING ONE LANE FOR BRT	BRT
SEGMENT	Adams to Grand	4 - 5	5 - 6	5 - 6
	Grand to McNichols	7 - 8	11 - 12	6 - 7
	McNichols to 8 Mile	7 - 8	7 - 8	7 - 8
	8 Mile to I-696	6 - 7	7 - 8	7 - 8
	I-696 to 13 Mile	5 - 6	6 - 7	6 - 7
	13 Mile to Quarton	5 - 6	4 - 5	4 - 5
	Quarton to Square Lake	8 - 9	9 - 10	11 - 12
	Square Lake to Pike	8 - 9	9 - 10	13 - 14
	Total	51 - 56 minutes	58 - 62 minutes	61 - 63 minutes

TABLE 3-8. AUTOMOBILE VERSUS PROPOSED TRANSIT TRAVEL TIME, NORTHBOUND PM

Source: Parsons Brinckerhoff

		AUTO TRAVEL TIME KEEPING ALL LANES	AUTO TRAVEL TIME REMOVING ONE LANE FOR BRT	BRT
SEGMENT	Adams to Grand	12 - 13	11 - 12	13 - 14
	Grand to McNichols	11 - 12	10 - 11	11 - 12
	McNichols to 8 Mile	6 - 7	4 - 5	4 - 5
	8 Mile to I-696	5 - 6	6 - 7	6 - 7
	I-696 to 13 Mile	8 - 9	8 - 9	7 - 8
	13 Mile to Quarton	7 - 8	8 - 9	7 - 8
	Quarton to Square Lake	7 - 8	8 - 9	6 - 7
	Square Lake to Pike	8 - 9	9 - 10	5 - 6
	Total	66 - 70 minutes	66 - 70 minutes	61 - 63 minutes

Ongoing Project: Ann Arbor to Detroit

The Ann Arbor and Detroit commuter rail service is a segment of the Pontiac-Detroit-Chicago Amtrak corridor. Using existing infrastructure the commuter rail connects downtown Detroit to City of Ann Arbor. In addition, the recent announcement of over a half billion dollars in FRA High Speed Rail (HSR) funds is good news for both the Amtrak trains and the Ann Arbor-Detroit Commuter service as many of the necessary improvements will benefit both of the projects. SEMCOG and MDOT are working closely with FRA and FTA to ensure that the capital improvements for both commuter and Amtrak service are coordinated.

Ongoing work includes the identification and agreement with host railroads on key track improvements, refurbishment of passenger cars, acquiring the necessary locomotives, preliminary design of stations and layover facilities, and coordination with Amtrak. One major capital improvement, the West Detroit connecting track, is expected to be under construction this spring. The terminal station of this service is at the Amtrak station in Detroit, which will connect to both the proposed M-1 RAIL and any future rapid transit along Woodward.

Ongoing Project: M-1 Rail Streetcar

The M-1 Rail streetcar will be an urban fixed rail at-grade circulator system connecting Downtown Detroit to the New Center area along Woodward Avenue. It would operate in mixed traffic and run from Larned Street in Downtown Detroit north to Chandler Street/Delaware Street in New Center. The route is 3.31 miles long with 20 station stops at 12 locations. The streetcar system is envisioned to follow a side-running alignment through a majority of the corridor, with transitions to median-running operations at the north and south ends. M-1 RAIL will use modern vehicle technology to link cultural, entertainment, health care, sports, and educational activity centers along the corridor to address unmet higher level transit needs along Woodward.

Ongoing Project: Greater Downtown TOD Strategy

The Greater Downtown TOD Strategy was created in support of the M-1 Rail streetcar project on Woodward Avenue between Jefferson Avenue and Grand Boulevard. The M-1 Rail streetcar provides the opportunity to connect major destinations, employment, educational and medical centers in the Greater Downtown to neighborhoods, improving access to jobs and services for residents along the corridor, and offering a new opportunity to live in a walkable environment. The Greater Downtown TOD Strategy seeks to leverage the transit investment to create a framework to guide future development in support of the creation of more dense, vibrant, and walkable districts and neighborhoods.

The success of the Greater Downtown TOD Strategy is predicated on the collaborative cooperation of a diverse range of participants that share the responsibility for shaping the vision for the corridor and in creating a positive community impact in response to the light rail investment. The process was guided by the Greater Downtown TOD Planning Group, made up of members from the public, private and philanthropic sectors, lead by the Detroit Economic Growth Corporation and Downtown Detroit Partnership/M-1 Rail. Through interviews, workshops and critiques of the work, residents and stakeholders participated in the authorship of the vision, principles and action plans that will guide investment and development throughout their communities.

Ongoing Project: Detroit Future City (Detroit Strategic Framework Plan)

Detroit Future City articulates a shared vision for Detroit's future, and recommends specific actions for reaching that future. The vision resulted from a 24-month-long public process that drew upon interactions among Detroit residents and civic leaders from both the nonprofit and for-profit sectors, who together formed a broad-based group of community experts. From the results of this citywide public engagement effort, in turn, a team of technical experts crafted and refined the vision, rendered specific strategies for reaching it, shared their work publicly at key points, and shaped it in response to changing information and community feedback throughout the process.

Detroit Future City establishes a set of policy directions and actions designed to achieve a more desirable and sustainable Detroit in the near term and for future generations. The Strategic Framework is organized into Five Planning Elements and a civic engagement chapter. These Five Elements include: Economic Growth, Land Use, City Systems, Neighborhoods, and Public Land and Buildings. These Elements outline a detailed approach to addressing the realities and imperatives that will enable Detroit to move toward a more prosperous and sustainable future. The Detroit Strategic Framework City Systems Element specifically addresses the critical role of transit in shaping both the future city and region. Today, 163,500 metro Detroiters enter the city for employment while 111,400 Detroit residents leave the city to access employment. This massive inflow and outflow of residents and employees points to the critical need for a regional transit system. To this end, the Detroit Strategic Framework advocates for a tiered regional transit hierarchy that offers fast, efficient and convenient transportation between neighborhoods and job centers. Woodward is a critical corridor to facilitate these transit connections. The Detroit Strategic Framework recommends a combination of BRT and light rail along the Woodward corridor.

3.2.3 BIKE AND PEDESTRIAN FACILITIES

The metro Detroit region has been in a process to develop a comprehensive 'greenway' network to promote cycling and walking with connections to existing and future transit systems. An analysis of the inventory of non-motorized facilities shows six communities along the corridor have non-motorized plans (Detroit, Ferndale, Royal Oak, Berkley, Birmingham, and Pontiac), three communities have Complete Streets policies (Ferndale, Berkley, and Birmingham), and Oakland County has a non-motorized plan. Huntington Woods is in the process of updating its Master Plan to include a Complete Streets policy. Currently, SEMCOG is teaming up with MDOT to create a comprehensive regional non-motorized plan to be part of SEMCOG's Regional Transportation Plan; this process will collect all non-motorized plans for the region and conduct a gap analysis.

Figure 3-20 on the following page shows non-motorized transportation projects to date. The existing off-road recreation trails in and around the corridor contribute to the economy and quality of life in the metro area, but improvements to non-motorized networks that directly connect people to destinations are needed to enhance mobility. The facilities that do exist are disjointed and less valuable than if they were connected in a single network. The proposed projects and those in process aim to fill in these gaps; however, a regional non-motorized plan will create the resources necessary to facilitate coordinated non-motorized planning across jurisdictions.

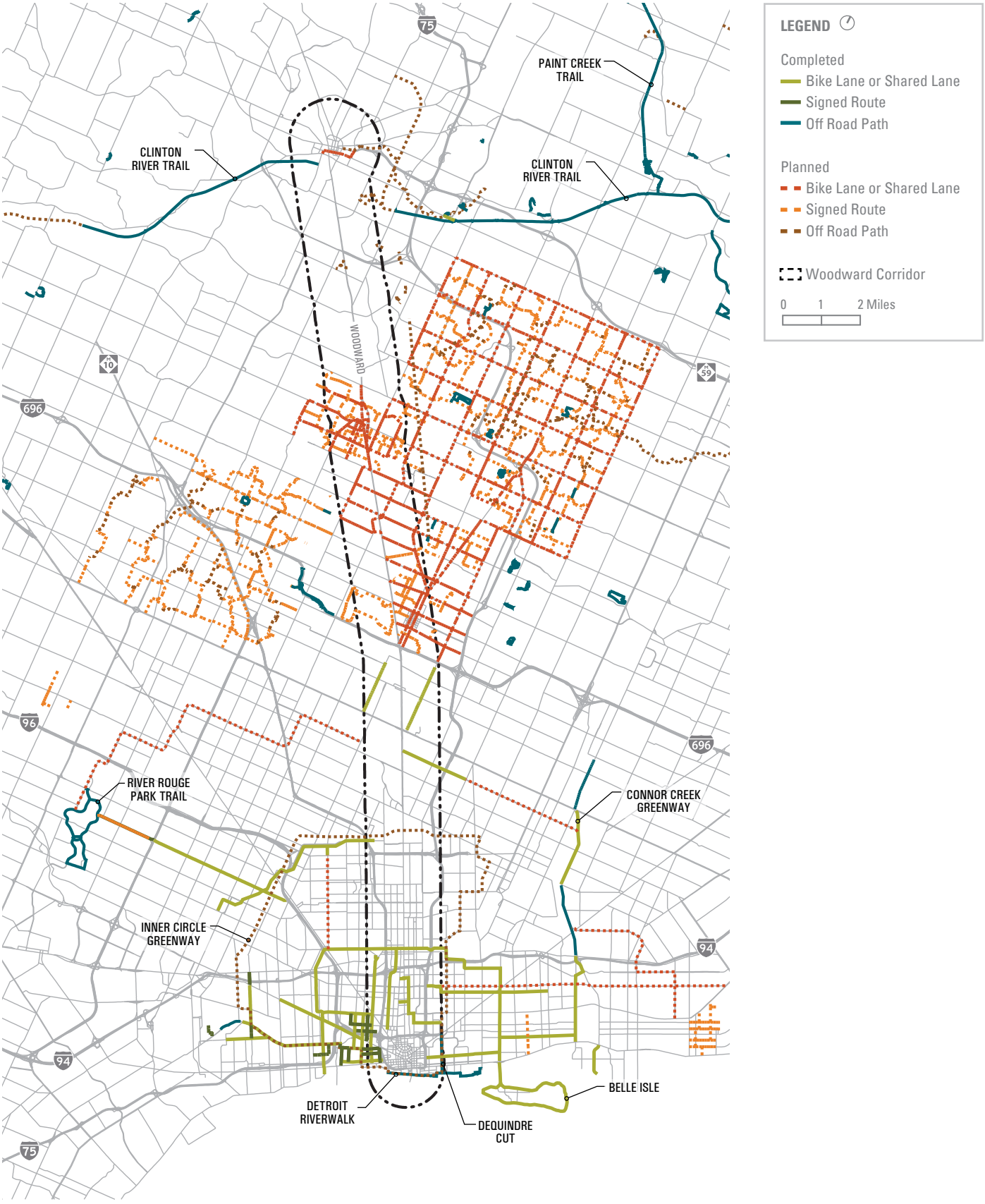


FIGURE 3-20. NON-MOTORIZED TRANSPORTATION PROJECTS

Source: SEMCOG, City of Detroit, SEMCOG

Sidewalks

There are continuous sidewalks northbound and southbound along Woodward Avenue between Jefferson Avenue in Detroit and Lincoln Street in Birmingham, providing another common transit-supportive amenity that promotes use of transit; however, sidewalks in Royal Oak, Berkley, and Birmingham in this segment run adjacent to buildings rather than adjacent to the road edge, which is not conducive to bicyclists. Gaps in sidewalk availability begin to appear at Lincoln Street in Birmingham. There are no sidewalks northbound or southbound along Woodward in Bloomfield Hills for three miles (between Quarton Road and Hickory Grove Road). Sidewalks or multi-use "safety paths" are inconsistent north of Hickory Grove Road through Bloomfield Township. Sidewalk continuity on both sides of the roadway reemerges at South Boulevard to the Woodward Avenue Loop in Pontiac.

Crossings

As of 2013, all 11 communities along the corridor are working to update all pedestrian ramps at signalized and non-signalized intersections to be in compliance with Americans with Disabilities Act (ADA) requirements. These updates typically occur with roadway reconstruction or signal modernization and are ongoing.

All traffic signals along the study corridor have pedestrian crossing signals, except for single-direction crossover signals associated with a larger cross-street and the following intersections:

- Oak Avenue (Birmingham)
- Big Beaver Road (Bloomfield Township)
- Long Lake Road (Bloomfield Hills)

In addition to the presence of sidewalks along the corridor, the distance that pedestrians have to cross Woodward Avenue factors into the quality of the non-motorized environment and the experience of a transit user once they have alighted from the vehicle and are traveling on foot. The distance required for a pedestrian to use a signalized marked crosswalk was calculated for each segment of the corridor. On Woodward Avenue from Downtown Detroit to McNichols Road, the crossings are all less than a ten-minute walk from one side of Woodward Avenue to the other side when using a signalized marked crosswalk. The maximum distance for pedestrians crossing Woodward Avenue at a signalized intersection in Detroit and Highland Park occurs north of McNichols Road. This area includes a boulevard with signals spaced every 0.33 miles to 0.5 miles.

Between 8 Mile Road and Quarton Road, signal spacing is further apart than in Detroit, resulting in longer distances to cross. Crossing times range between four minutes and 22 minutes. Between Quarton Road and Hickory Grove Road, there are six traffic signals without pedestrian crossings. In order to cross at a signalized marked crosswalk, the maximum time a pedestrian would hypothetically be required to walk would be over an hour (67 minutes). Between Hickory Grove and the start of the Woodward Loop in Pontiac, crossing times range between 12 and 30 minutes. In Pontiac, the signals are more closely spaced, with an average crossing time of five minutes.

Existing Activity and Planned Improvements

Pedestrian activity information was collected at various locations along the corridor. It was found that there is a high amount of pedestrian activity within the city of Detroit, especially near transit stops. Pedestrian activity starts to diminish north of 8 Mile Road, with more pedestrian activity near major activity centers and the downtowns of Ferndale, Birmingham, and Pontiac. There are currently no bicycle lanes on Woodward Avenue, Cass Avenue, John R Road, Grand Boulevard, Washington Avenue, or 11 Mile Road. Bicycle lanes are scheduled to be constructed on Cass Avenue in 2014.

Most communities in the study area have recommended improvements to non-motorized facilities as part of their recent planning efforts. The City of Detroit Non-Motorized Urban Transportation Master Plan (2006) defines locations and types of non-motorized facilities, which it recommends for the entire City, and proposes a strategy to implement the recommended improvements. Guidelines for bicycle lane standards were also developed as part of the plan by the City of Detroit Traffic Engineering Division. The plan outlines additional strategies related to future maintenance and growth of the non-motorized system. The City of Highland Park's Master Plan (2010) notes that Woodward Avenue should be striped and signed for bicycle lanes as well. Ferndale, Royal Oak, Birmingham, and Bloomfield Township have also recently completed plans specific to non-motorized and multi-modal transportation. Pleasant Ridge, Huntington Woods, Bloomfield Hills, and Pontiac do not have any plans that directly address non-motorized transportation.

As part of the Woodward Complete Streets Master Plan, bicycle counts were collected at various locations along the corridor during the AM and PM peak periods. It was found that areas near major activity centers have more bicycle activity than in areas with lower density areas. At most, there were 46 bicyclists at a location during the four hour peak period, which was located on Cass Avenue south of Warren Avenue. Within the Midtown Detroit area, there were more bicyclists along Cass Avenue than on Woodward Avenue and John R Street. North of 8 Mile, bicycle use was higher near 9 Mile Road, with 28 bicyclists in an eight hour period and tapered to 13 bicyclists near 13 Mile Road. Information was not collected north of 13 Mile Road.

3.2.4 ALTERNATIVE COMMUTING OPTIONS

In addition to analyzing rapid transit alternatives for the Woodward corridor, this project initiated the review of strategies, programs, and policies that were recommended as part of SE Michigan's Transportation Demand Management (TDM) Strategy, which was completed in 2013 and identifies alternative commuting options that align closely with rapid transit service. Strategies that were identified as part of this project include:

Information and Outreach

SE Michigan's TDM Strategy recommends that information-based programs be the first of many initiatives designed to encourage alternative commuting habits. A localized multimodal travel planning app accessible to all travelers within SE Michigan could be developed to increase the knowledge of alternative travel options and the benefits of each mode. In conjunction with the travel planning app, SE Michigan could develop a TDM marketing campaign to increase awareness of alternative travel options. In some cases, short-term increases in transit ridership of up to 50% have occurred as a result of targeted TDM marketing campaigns.

Employer-Based Programs

Establishing public-private partnerships through the development of employer-based programs is another key component of SE Michigan's TDM Strategy. Because the Woodward Avenue corridor is home to so many major employers, their participation in employer-based TDM programs can have a major impact on the travel patterns on Woodward Avenue. Employer-based TDM programs can include a variety of different initiatives; telecommuting and flexible scheduling can decrease the number of employees traveling during peak hours, while bicycle and transit benefits can encourage employees to use alternate travel modes through various employer-offered incentives. Furthermore, SE Michigan can develop a Commute Trip Reduction (CRT) program that requires (in some cases by law) employers of a certain size to develop policies to reduce single-occupant vehicle (SOV) trips.

Transit Programs and Services

As the RTA of SE Michigan establishes forthcoming transit initiatives, there are several TDM programs that can further support the capital investments of the organization. One such program that has already been identified by the RTA is the creation of an EcoPass that provides unlimited transit service across a number of transit systems. Fare integration, which expedites purchases, transfers, and boarding, could be developed in conjunction with an EcoPass system. Another initiative that could act as a catalyst to increase transit ridership is the distribution of EcoPasses during major road construction, providing commuters with a free alternative and promoting the existing transit systems.

Project Development Practices

The application of TDM strategies can also be initiated through a more regional, project development perspective. Aligning capital improvement projects to follow the development of transit systems can ensure that alternative commute options are in place before additional strain is placed on constrained detour routes during construction. Concurrently, modification of Michigan law to allow high-occupancy vehicle (HOV) lanes in construction zones can further reduce the strain and increase throughput during construction. As part of any TDM strategy that is initiated for the region, SE Michigan must maintain updated travel survey information to ensure that the policies and programs are meeting the needs of local commuters.

3.2.5 PLANNED TRANSPORTATION INFRASTRUCTURE IMPROVEMENTS WITHIN STUDY AREA

The Southeast Michigan Council of Governments (SEMCOG) is the Metropolitan Planning Organization (MPO) for the southeastern Michigan area. SEMCOG maintains the short-range Transportation Improvement Program (TIP) for the region, which lists all transportation projects between 2014 and 2017 that are receiving federal funding. SEMCOG also maintains the long-range Regional Transportation Plan (RTP), which lists project in the long-range vision. The following lists are projects related to Woodward Avenue that are either listed in the TIP or the RTP.

Transportation Improvement Program Projects

- **Woodward Avenue Streetcar:** Construction of a Streetcar system along Woodward Avenue between Larned Street in Downtown Detroit to Bethune Avenue in New Center Detroit, approximately 3.3 miles in length. The project will reconstruct parts or all of Woodward Avenue. Project owner is M-1 Rail.
- **I-75 between Canfield to Piquette:** Rehabilitate roadway surface of I-75 between Canfield Street to Piquette Street in Detroit, approximately 0.5 miles in length. Project owner is MDOT.
- **9 Mile Road between Woodward Avenue and western Ferndale city limits:** Rehabilitate roadway, approximately 1.1 miles in length. Project owner is the City of Ferndale.
- **Old Woodward Avenue between Brown Street and Landon Avenue:** Add in center left-turn lane, approximately 0.4 miles in length. Project owner is the City of Birmingham.
- **Saginaw Street between Woodward Avenue to Montcalm Street:** Reconstruct roadway, approximately 0.9 miles in length. Project owner is the City of Pontiac.

Regional Transportation Plan Projects

- **I-94 between I-96 to Connor Avenue:** Widen freeway to 4 lanes in both directions, reconstruct I-75 and M-10 interchanges, approximately 13 miles in length. Project owner is MDOT.
- **I-75 between 8 Mile Road to Square Lake Road:** Widen freeway to 4 lanes in both directions, reconstruct interchanges, approximately 18 miles in length. Project owner is MDOT.

4.0 Evaluation Framework

The Woodward AA began with a streamlined list of modal alternatives in consideration of previous rapid transit studies completed for the corridor.

The evaluation framework for the AA involves a technical process with quantitative and qualitative evaluation measures and a broader public involvement process from which public feedback is considered in alternatives evaluation. FTA guidance recommends a tiered approach to evaluating alternatives that traditionally consists of:

FTA TIERED APPROACH TO EVALUATING ALTERNATIVES	
INITIAL SCREENING	A long list of modal and alignment alternatives is developed and then examined for their alignment with the project Purpose and Need.
TIER 1 SCREENING	The long list of alignment alternatives is refined with testing against quantitative and qualitative evaluation criteria.
TIER 2 SCREENING	A comprehensive set of evaluation criteria, typically an expanded list from the Tier I Screening criteria, are used for a detailed evaluation of the refined alignment alternatives and modal alternatives from the Initial Screening. Agency, stakeholder, and public feedback are considered within this screening level.
LPA SELECTION	Based on the detailed evaluation performed in the Tier II Screening, a Locally Preferred Alternative (LPA) is selected.

The Woodward AA began with a streamlined rather than long list of modal alternatives in consideration of previous rapid transit studies completed for the Woodward corridor. Accordingly, this AA adopts an adjusted FTA evaluation approach, with the preferred modal option selected at the Initial Screening level of analysis rather than the Tier 2 Screening and LPA Selection levels. The comprehensive evaluation approach for this AA is as follows:

WOODWARD AA ADJUSTED APPROACH TO EVALUATING ALTERNATIVES	
MODAL SCREENING	A modal screening is conducted to select the preferred modal alternative that will move forward for further evaluation. Previous rapid transit studies have enabled an early decision on the preferred mode in the case of this AA.
TIER 1 SCREENING	A long list of the most promising alignment alternatives is developed. The long list is refined through examination of alternatives against the project Purpose and Need. Alternative advancing into the Tier 2 Screening are listed.
TIER 2 SCREENING	A comprehensive set of evaluation criteria, typically an expanded list from the Tier I Screening criteria, are used for a detailed evaluation of the refined alignment alternatives and modal alternatives from the Initial Screening. Agency, stakeholder, and public feedback are considered within this screening level.
LPA SELECTION	Based on the detailed evaluation performed in the Tier II Screening, a Locally Preferred Alternative (LPA) is selected.

The Tier 2 Screening and the LPA selection processes take into consideration public, stakeholder, and Steering Committee feedback regarding evaluation criteria and alternatives evaluated in this document. The details of the public involvement process are outlined in Chapter 2 of this report.

4.1 Modal Pre-Screening

A modal pre-screening was conducted as the first step of the alternatives evaluation. This process considered a long list of modal alternatives for Woodward Avenue, eliminated modes due to their history within the study area, considered other factors such as major right-of-way impacts or costs, and selected BRT as the preferred modal option for Woodward.

This section provides a description of modes evaluated as well as the evaluation criteria and process for examining the modal options against each other.

4.1.1 MODES CONSIDERED

Commuter Rail

In recognition of commuter rail's past history within the study area, the lack of continuous rail tracks, and the absence of a ridership level required to sustain commuter rail, this modal option was eliminated early in the evaluation process and was not considered further.

Commuter rail is a mode that carries longer distance trips from suburban areas into a central city. It operates along railroad corridors, characteristically using tracks owned by private railroad companies and shared with freight operations. Trains can be as long as 10 cars, ranging from 1,700 to 2,300 feet, with the individual vehicle length ranging from 170 to 230 feet. Commuter rail cars can be either single-level or bi-level (such as in Seattle, Washington) and, to date, have been high-floor vehicles. Traditionally, commuter rail trains are powered by diesel or electric locomotives, usually in a "push-pull" configuration. In recent years, the use of diesel multiple unit (DMU) vehicles for commuter rail have become more common. Commuter rail is characterized by stations spaced two to six miles apart, with P&R facilities at outlying stations. Stations tend to have an extended shelter or canopy running the extent of the platform, matching the length of trains. Grade separated crossings of the tracks for pedestrians are often provided. High level platforms can allow level boarding and optimal access for persons with disabilities. Service levels in many systems focus on weekday peak period service, with all-day service provided in larger metropolitan areas.

Commuter rail once existed between Pontiac and downtown Detroit and was operated by SEMTA (Southeast Michigan Transit Authority). The service was discontinued in the 1980s due to low ridership. Currently, the track between Highland Park and downtown Detroit has been abandoned and parts have been converted to a non-motorized route.

Light Rail Transit

This mode was previously considered for a 9.3 mile portion of the corridor between downtown Detroit to 8 Mile Road. The Woodward Light Rail project failed to advance into preliminary engineering after securing environmental clearance in August 2011. Cost of implementation was one of the primary factors in this determination. Recent history and the corridor's 27-mile length from Downtown Detroit to Downtown Pontiac were considered in this mode's evaluation. However, LRT was not initially eliminated because public feedback suggested that there remained public support for this option despite its inability to move forward to implementation in Detroit. LRT was evaluated in the screening process.

Light rail transit (LRT) has similar features to a modern streetcar system, except that it is characterized by larger vehicles and multi-car trains. Train length depends on passenger demand, service frequency, and block length (where operated on streets). "Light" denotes more flexibility in operation than heavy rail systems, such as subways and automated guideway systems, which are completely grade-separated. LRT operates in its own right-of-way, either along an exclusive guideway such as a former rail right-of-way, or along urban streets. Exclusive guideways on urban streets often involve the median of a roadway or a separate travelway next to a roadway. It may also share lanes with other vehicles. In downtown areas, LRT tends to operate on-street but in segregated lanes (such as those in Phoenix, Arizona, shown above) and does not mix with general traffic as streetcars do. With operation in a separate transitway along a street, LRT requires limitations to local property access, such as driveways and parking garages, to avoid conflicts between general traffic and LRT vehicles. This includes restricting local access to right-in, right-out access with median treatments, and full local access restriction if operating alongside a roadway.

Bus Rapid Transit

BRT can operate in a variety of service strategies, including line-haul service along an entire corridor with limited stops, branching of service, and circulation into local neighborhoods at the end of a route. One of the key features of BRT is the flexibility it offers in serving dispersed land uses. This mode is successful as the first level of rapid transit to help build ridership and density and to support other forms of rapid transit. BRT's flexibility and success in serving metro areas with dispersed land uses similar to SE Michigan contributed to the inclusion of this mode in the screening process.

The main elements of BRT vary from place to place. These elements can include stations, passenger information, off-board fare collection, new low-floor buses, unique branding, and bus priority signalization improvements. BRT lines may also include pavement striping, overhead signage designating BRT lanes, or exclusive lanes where possible to enhance operations. Implementation of BRT expands upon existing local bus service provided by SMART or DDOT.

Passenger stations may include amenities such as a canopy or shelter, benches, lighting, art, landscaping, off-board fare collection, real-time "next bus" information using intelligent transportation systems (ITS) technology, and information kiosks. These elements have a uniform design throughout the line. BRT stations can utilize bus bulbs/platforms that extend from the curb and are level with the vehicle doorways. Some BRT systems use guidance and docking systems to minimize the space between the platform and the vehicle, minimizing the need for ramps or bridgeplates and allowing for fast boarding and alighting for all riders, including persons with disabilities.

BRT vehicles are painted with a distinctive color and graphics scheme that distinguish them from other fixed route buses in the system. BRT vehicles may be similar in size to a standard 40-foot bus with multiple entry/exit doors to facilitate passenger loading and unloading, or a longer 60-foot articulated bus may be used where passenger demand warrants. BRT vehicles are generally 12'-0" high and approximately 8'-6" wide.

Streetcar

Due to the length of the Woodward Avenue corridor (27 miles), the urban to suburban setting with varying densities and the different markets the rapid transit system will serve, the streetcar is not being considered as one of the modes for the AA. Streetcar is planned for Woodward Avenue between Grand Boulevard and Downtown Detroit. This 3.3-mile long corridor will serve the Woodward Avenue Streetcar project being implemented by M-1 Rail.

Streetcars are the modern technological descendent of the historic streetcar or trolley. A distinctive feature of streetcars is that the vehicles draw power from an overhead wire, or catenary, which is a system that allows the vehicles to operate in mixed traffic and pedestrian areas.

Streetcars provide the same level of flexibility and have similar operating characteristics as the larger light rail systems. The main streetcar system elements include stations/stops, low-floor vehicles, and amenities similar to those described for BRT. The stations typically consist of a platform level with the streetcar to facilitate passenger boarding and alignment, a canopy or shelter, benches, fare collection equipment, lighting, and information kiosks that are of uniform design along the alignment.

In addition to the stations, other fixed facilities include the tracks, the overhead catenary system, substations (located approximately one mile apart), and signal and communication systems. The fixed guideway would consist of tracks formed of continuously welded rails and embedded at-grade in a concrete slab. The streetcar would be either single or double-tracked. It could have dedicated space within the roadway or located within traffic lanes shared with other traffic.

A vehicle maintenance and storage facility would be required to accommodate a new streetcar fleet. The facility would have to be located on-site adjacent to or close to the line; and connected by a lead track. Streetcars are generally 65' to 70' long and 8'-1" to 8'-6" wide. Smaller than a LRT vehicle, the streetcar vehicle size enables them to operate in a number of urbanized settings and make sharper turns. Operator cabs at both ends of the vehicle allow bi-directional operation. Streetcars can operate either as a single or two car train and either in exclusive or mixed in with traffic.

4.1.2 MODE EVALUATION CRITERIA

The following evaluation criteria were developed for the AA based on Woodward AA Steering Committee input and the Purpose and Need of the project. Within the AA process, evaluation criteria are developed to assist in selecting a mode and alignment combination that most objectively meets the purpose and need. The weights assigned to the variables of the criteria are added to reflect the emphasis given to each of the factors. Weighting of evaluation factors was developed in consideration of public feedback obtained at December 2012 public meetings and FTA norms for criteria weighting.

Phasing

This criterion evaluates how the preferred alternative may or may not be implemented for the 27-mile Woodward corridor. This evaluation factor acknowledges that the ability to implement a transit option by segment is valuable. As the cost to implement an alternative increases so does the likelihood that phasing may be necessary. Factors considered in phasing include the mode that is selected as well as the effort necessary to construct the alternative. This criterion also considers logical termini, such as the beginning and ending of a phase and the ridership that is required for a phase.

Flexibility

This evaluation criterion recognizes that a transit system that can more easily divert from Woodward Avenue to reach major destinations offers an added benefit since several major destinations in the study corridor, including commercial downtowns, are not located directly on Woodward Avenue. This criterion also examines the ease with which future route changes could be made in if additional development occurs along or close to the corridor.

Integration with Existing Transit System

The use of existing transit infrastructure is crucial to the success of any new transit option along Woodward Avenue. This criterion evaluates how existing routes along the corridor, or that intersect with the corridor can be integrated in any new alternative. This ranges from being able to transfer easily from one transit system to another transit system or the ability to share resources such as stations or dedicated lanes. The ability of an option to work with exiting transit systems is beneficial.

Capital Cost

Capital cost entails the initial investment needed to get a new transit system up and running. The cost factor weighs heavily in the ability of the region to implement the system. Capital costs include designing the system and building infrastructure to support the system. Depending on the type of mode chosen, the capital cost can include the stations, overhead catenary systems, vehicle storage and maintenance facilities, vehicles, new traffic signals, right-of-way acquisition among other items. Capital cost is higher with those involving rail compared to those without rail.

Operations and Maintenance Cost

The long-term cost of the transit system entails the continual investment needed to maintain infrastructure and the cost for operation of the system after the capital cost investment has been made. This cost considers such items as maintaining the stations, the vehicles, operators for the system and the vehicles, roadway or trackway maintenance, station security, as well as others. The cost to maintain a fixed rail system is higher than other modes due to overhead catenary systems and the vehicle storage and maintenance facility. However, streetcar and LRT vehicles can last longer than BRT vehicles. Newer technologies are more equipped in bridging the gaps between life cycle costs between rail and BRT.

Ridership

Ridership involves the expected level of use the transit system will experience. This use is quantified in the number of trips being made. Traditionally, it was thought that LRT systems have higher ridership than BRT systems. However, more BRT systems are being built to mimic LRT systems, and ridership between the two modes is increasingly narrowing as BRT systems mimic rail-like features. Computer-based models have been built to evaluate various modes and the expected ridership. These models are based on surveys that have been conducted within SE Michigan and throughout the United States.

Economic Development

This criterion captures the potential economic development growth along the corridor related to the transit investment. It should be noted that economic development benefits are not calculated the same way within every transit system; therefore, economic growth can be difficult to accurately attribute to a project. It has been found that economic development around LRT systems is often greater than BRT systems; however, with the addition of more BRT systems that are mimicking rail features and addressing the issue of being permanent, studies are showing that the differential is being narrowed and that development around BRT stations may even rival those around LRT.

The Cleveland BRT system has reported $3 billion in economic development along the Euclid Avenue BRT corridor. The economic development along the corridor was largely a result and by-product of many transit supportive land use policies and local campaigns. The Cleveland example serves a model for economic development generated by BRT systems.

Reliability

This criterion recognizes that a system with a predictable on-time performance has a substantial benefit. Reliability often depends on the level of congestion along the corridor and its impact to the transit schedule. In order to bypass congestion that a mixed-in transit system currently has, exclusive guideways are often the solution to achieve reliability. Another factor that can also improve reliability outside of exclusive guideways are bypass lanes at signalized intersections or signalization that adjusts when a transit vehicle is approaching. Reliability also considered the level at which users understand where the system will travel – this is often achieved by either fixed guideway systems or exclusive guideways where passengers can see where the vehicle is traveling.

Social Equity

Social equity assumes all individuals should be afforded equal access to transportation infrastructure. This criterion recognizes that options supportive of equal access are beneficial to all potential users. Social equity evaluates the location of the alignment and stations along the corridor to ensure that the alternative does not unfairly favor one group while causing disservice to another group. Along Woodward Avenue, there is great diversity in transit users in terms of demographic backgrounds that can benefit from all types of transit. This criterion will evaluate where the route is proposed along the Corridor and also where the potential stations will be located. As part of this analysis, all routes and stations are the same, causing all to be evaluated in the same way. The next phase of the project will have more definition based on generalized station locations and populations served as part of the evaluation of this criterion.

4.2 Tier 1 Screening

Following the selection of BRT as the preferred rapid transit mode, preliminary alignment and station location alternatives were developed to determine which would be advanced into to the Tier 2 screening for further analysis. This process considered a comprehensive series of alignment alternatives and station locations, evaluating each combination through discussions with the Steering Committee. Several engagement sessions were initiated to allow Steering Committee members to provide input on alternatives that would be favored in each community.

Rider Profile Group Exercise

In May 2013, the Steering Committee took part in an exercise that provided exposure to the variety of potential riders that may utilize rapid transit service on Woodward. The differing transportation needs of riders were emphasized; the need of traditional and reverse commuters for speedy service, flexible hours of operation for transit dependent populations, and the need for seamless transfers between BRT and local bus service were some of the topics discussed as part of the exercise. Steering Committee members developed an understanding of the importance of station locations in both their local communities, but also in the broader context of the corridor.

Station Location Exercise

In June 2013, the Steering Committee participated in an exercise that allowed them to provide focused input on each preliminary station location. Maps of the study area and preliminary station locations were distributed to each Steering Committee member, who evaluated each by ranking the station locations into three tiers based on their priority. The Steering Committee was also asked to elaborate on their ratings with comments, which were helpful in uncovering insight about who might be the most prominent users at each stop, what changes might need to happen for the stop to be more successful, and if certain stations required closer analysis in the upcoming bus tour and ongoing technical analysis.

While the two groups only agreed on the classification tier of 14 of the 44 total potential locations, a discussion following the exercise resulted in more consensuses. To expand on the tiers provided, the Steering Committee added a fourth tier that reflected stations that should not be considered in further technical analysis. Many Steering Committee members requested additional information regarding travel times and proposed solutions from the concurrent Woodward Avenue Complete Streets project. This exercise, in conjunction with ongoing technical analysis, revealed the station locations that should be evaluated as part of the Tier 2 screening.

The ratings and comments are summarized on the following pages in **Table 4-1**.

TABLE 4-1. STATION LOCATION EXERCISE SUMMARY

Type 1 = "No Brainer" Type 2 - "Maybe If..." Type 3 - "Potential Future" Type 4 - "Definitely No" (category created by Group A)

	GROUP A		GROUP B	
POTENTIAL STOP	**RATING**	**COMMENTS**	**RATING**	**COMMENTS**
Downtown Pontiac	1		1	
Pontiac Transit Center	2	"Prefer to relocate Transit Center to Downtown Pontiac"	2	"If they fix the circle" "Implementation of livability study"
St. Joseph's Hospital	1		1	
Square Lake Rd	1		2	
Long Lake Rd	1		-	
Between Long Lake Rd & Cranbrook	-		2	
Cranbrook	2	"Cranbrook needs to provide shuttle"	-	
Quarton / 16 Mile Rd	4	"No"	2	"Issue is the desire of the city whether to have a stop"
Maple / 15 Mile Rd	1		1	
Lincoln St	4	"No"	2	
14 Mile Rd	1		1	
Normandy Rd	4		3	
13 Mile Rd & Coolidge Hwy	1	"Huge employment center"	1	
12 Mile Rd & Coolidge Hwy	-	"Get outvoted on downtown" "Want to know time difference between all-Woodward and stopping downtown"	2	"Would like this alternate route to be studied, but would defer to keeping the spine healthy"
11 Mile Rd & Coolidge Hwy	-		2	"Concern with impact on residential areas of running vehicles on 11 Mile"
12 Mile Rd	3	"Deed restrictions"	1	
Catalpa Dr	-		2	
11 Mile Rd	1		1	
Royal Oak Transit Center / Sherman Ave	-	"What is the time difference between serving downtown RO and downtown Berkley versus express service on BRT?"	2	"Stopping in Downtown RO is not 'rapid'"
Lincoln Ave	2	"OCC can be served by Detroit Zoo"	3	"Less walkable to downtown than other stops" "Disturbs residential area" "Not 'rapid'"
Detroit Zoo	1	"Align with times of use" "Park and ride" "Needs to be more pedestrian friendly" "Bridge to be redone" "Woodward in ditch a problem"	1	"Work on pedestrian crossings over Woodward and 696"

TABLE 4-1. STATION LOCATION EXERCISE SUMMARY (CONT.)

Type 1 = "No Brainer" Type 2 - "Maybe If..." Type 3 - "Potential Future" Type 4 - "Definitely No" (category created by Group A)

	GROUP A		GROUP B	
POTENTIAL STOP	RATING	COMMENTS	RATING	COMMENTS
Oakland Park Blvd / Sylvan Ave	4	"No"	2	"Change to Woodward Heights" "Needed if there is no pedestrian crossing solution to I-696"
9 Mile Rd	1		1	
8 Mile Rd	2	"If the bridge is removed"	1	"Stop somewhere in 8 Mile / State Fair area"
State Fair Transit Center	1	"If budget stays" "New multi-modal hub at Gateway Shopping Center"	2	"Dependent on future development of State Fair, on potential future rapid tansit connection on 8 Mile, on ability to manage DDOT/ SMART transfer point"
7 Mile Rd	1		1	
6 Mile Rd / McNichols	1		1	
Manchester St (Model T Plaza)	1	"Future TOD" "Large amount of riders, but the development is currently ugly" "Vehicle maintenance?"	1	
Glendale St / McClean St	4		2	
Tuxedo St / Tennyson St	2	"Girls high school. Maybe time specific stops"	3	
Calvert St / Trowbridge St	4		1	"Would help serve Hamtramck"
Chicago Blvd / Arden Park Blvd	3	"Need development on Woodward"	3	
Hazelwood St / Holbrook St	1	"High school" "Good crosstown route DDOT"	2	
Grand Blvd	1	(dot location neither at Grand or Amtrak but in between)	1	
Detroit Amtrak Station	1		-	
Palmer Ave / Ferry Ave	4		-	
Warren Ave	1		1	
Canfield St	4		1	"Currently the most traffic generation"
MLK / Mack Ave	1		2	"Lots of TOD potential"
Temple St (Future Arena)	2		-	
Montcalm St	4		1	
Grand Circus Park	1		-	
Rosa Parks Transit Center	1		1	
Larned St	1		-	

Woodward Avenue Bus Tour

In July 2013, the Steering Committee participated in a bus tour that extended the entire 27-mile corridor from Downtown Pontiac to Downtown Detroit. This bus tour provided a "user" experience in conjunction with guided commentary from the project team. At multiple locations along the route, the tour was halted to allow for discussion amongst the Steering Committee and team members. This tour provided input on what alignment options should be evaluated as part of the Tier 2 screening.

Community Representative Meetings

In addition to the input received during Summer 2013, meetings were held with each of the nine communities within the Woodward Avenue corridor to further evaluate and discuss potential station locations. These one-on-one stakeholder meetings were held in November 2013, in advance of the December 2013 public meeting. These meetings resulted in further refinements to station locations, including eliminating some Type 2/3 stations, adding some Type 3 stations (especially at potential P&R locations), and shifting the location of Type 1 stations to better serve the communities.

4.3 Tier 2 Screening

Following the initial evaluation of BRT alignment alternatives as part of the Tier 1 screening, several alternatives were advanced to the Tier 2 screening for further analysis. This process considered a series of alignment alternatives, station location alternatives, and cross section alternatives, evaluating each combination against a comprehensive collection of criteria.

This section provides a description of the alternatives evaluated, as well as the evaluation criteria and process for examining the alternatives against each other.

4.3.1 ALIGNMENT ALTERNATIVES CONSIDERED

The Tier 2 screening consisted of a comprehensive evaluation of alignment alternatives, using an "all-Woodward" Mainline Alternative as a base while evaluating several different "off-Woodward" alignments throughout Oakland County and the City of Detroit.

Mainline Alternative

The Mainline Alternative acted as the "base" alternative that all other alternatives were evaluated against. The Mainline Alternative consists of a northern terminus in Downtown Pontiac and a southern terminus at the Rosa Parks Transit Center in Downtown Detroit. The alignment maintains service on Woodward Avenue throughout the entire 27-mile study area with the exception of two diversions at the northern and southern termini: on Water and Pike Streets in Downtown Pontiac to provide access the Pontiac Transit Center and on Adams Street in Downtown Detroit to provide access the Rosa Parks Transit Center.

Pontiac Alternative

A secondary alternative was developed for Downtown Pontiac that would exclusively use Pike Street as the east-west access to Downtown Pontiac and Pontiac Transit Center stations. This alternative provides more direct access to the proposed station near Lot 9 and reduces the additional turning movement associated with the Mainline Alternative.

FIGURE 4-1. PONTIAC MAINLINE ALTERNATIVE

FIGURE 4-2. PONTIAC ALTERNATIVE

Berkley Alternatives

Preliminary alternative testing and discussions with area stakeholders initiated the development of an alternative that would serve both Royal Oak Beaumont Hospital and Downtown Berkley, which could potentially provide better access to Beaumont Hospital, Berkley's primary business district, destinations in Downtown Berkley, and adjacent neighborhoods. This alternative consists of an off-Woodward diversion that accesses Downtown Berkley via Coolidge Highway. Options for reconnecting to Woodward included both 12 Mile and 11 Mile; as such, stations were evaluated at the 12 Mile and 11 Mile intersections with Coolidge Highway.

Royal Oak Alternatives

Preliminary alternative testing and discussions with area stakeholders initiated the development of alternatives that would serve Downtown Royal Oak, which could potentially provide better access to the Royal Oak Transit Center, Oakland County Community College, Royal Oak's shopping district, and adjacent neighborhoods. This alternative consists of an off-Woodward diversion that accesses Downtown Royal Oak via 11 Mile Road, Lafayette Street, and Washington Avenue. A second Royal Oak alternative consisted of an off-Woodward diversion that accesses Downtown Royal Oak via Lincoln Avenue.

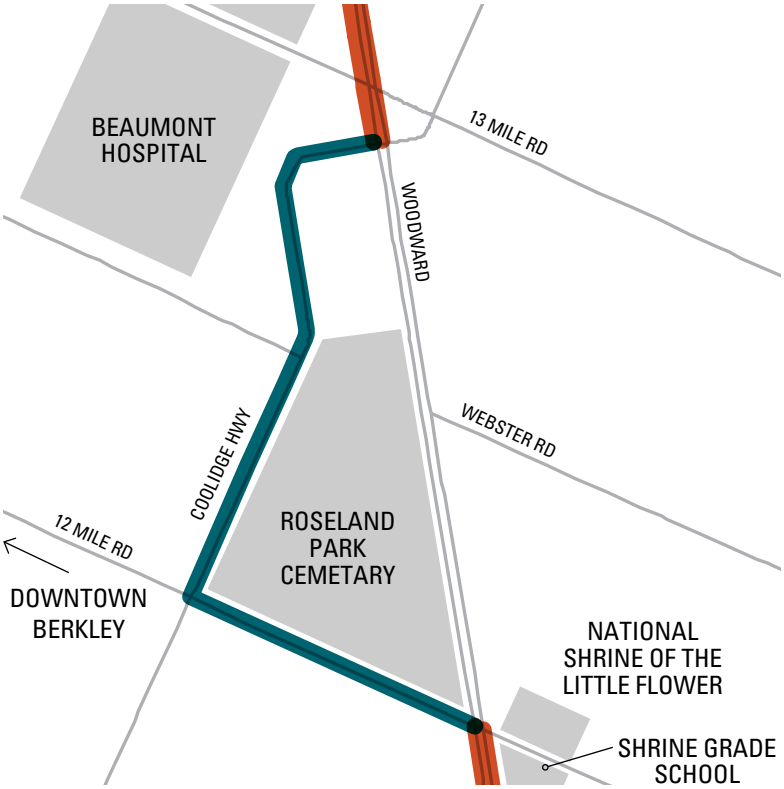


FIGURE 4-3. BERKLEY ALIGNMENT ALTERNATIVE

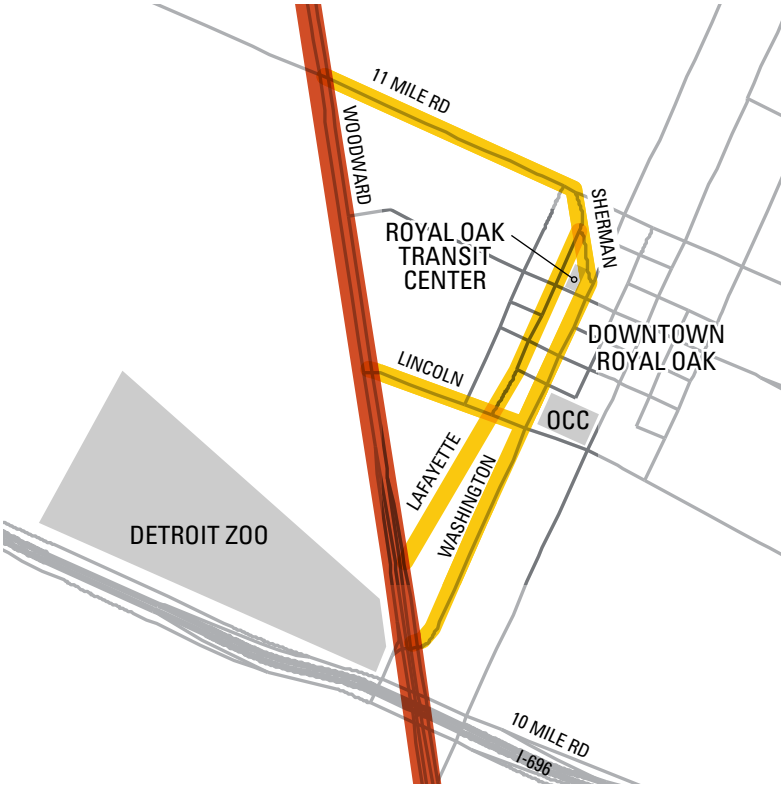


FIGURE 4-4. ROYAL OAK ALIGNMENT ALTERNATIVE

Detroit Alternative #1

Due to the development of the M-1 Rail Streetcar on Woodward, several alternatives were developed to provide alternate routing south of Grand Boulevard. This alternative is an off-Woodward diversion to Cass Avenue beginning at Grand Boulevard. Cass Avenue provides a direct north/south connection to the southern terminus of the alignment, the Rosa Parks Transit Center. This alternative would not require BRT vehicles to interact with the M-1 Rail Streetcar.

Detroit Alternative #2

This alternative is an off-Woodward diversion to Cass Avenue beginning at Warren Avenue. Between Grand Boulevard and Warren Avenue, the BRT vehicle would be mixed in traffic before diverting west to Cass Avenue. Cass Avenue provides a direct north/south connection to the southern terminus of the alignment, the Rosa Parks Transit Center. This alternative would require minimal interaction between BRT vehicles and the M-1 Rail Streetcar.

FIGURE 4-5. DETROIT ALTERNATIVE #1

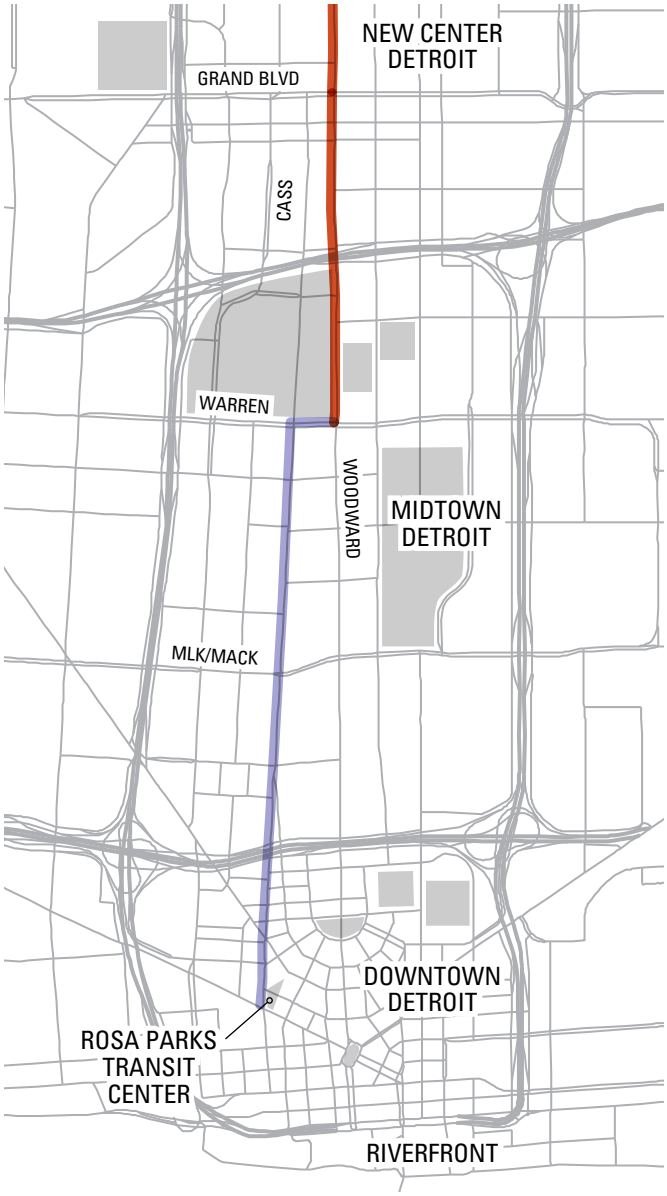


FIGURE 4-6. DETROIT ALTERNATIVE #2

Detroit Alternative #3

This alternative consists of an off-Woodward diversion using Cass Avenue and John R Street as a north/south one-way loop. The BRT vehicle would utilize the I-75 service drive to connect from Cass Avenue to John R Street. The southbound loop on Cass Avenue would divert from Woodward at Grand Boulevard, while the northbound loop on John R Street would divert back to Woodward at Warren Avenue. Between Warren Avenue and Grand Boulevard on the northbound loop, the BRT vehicle would be mixed in traffic. The diversion back to Woodward at Warren Avenue was considered due to the one-way southbound configuration of John R Street north of Warren Avenue. This alternative would require minimal interaction between BRT vehicles and the M-1 Rail Streetcar.

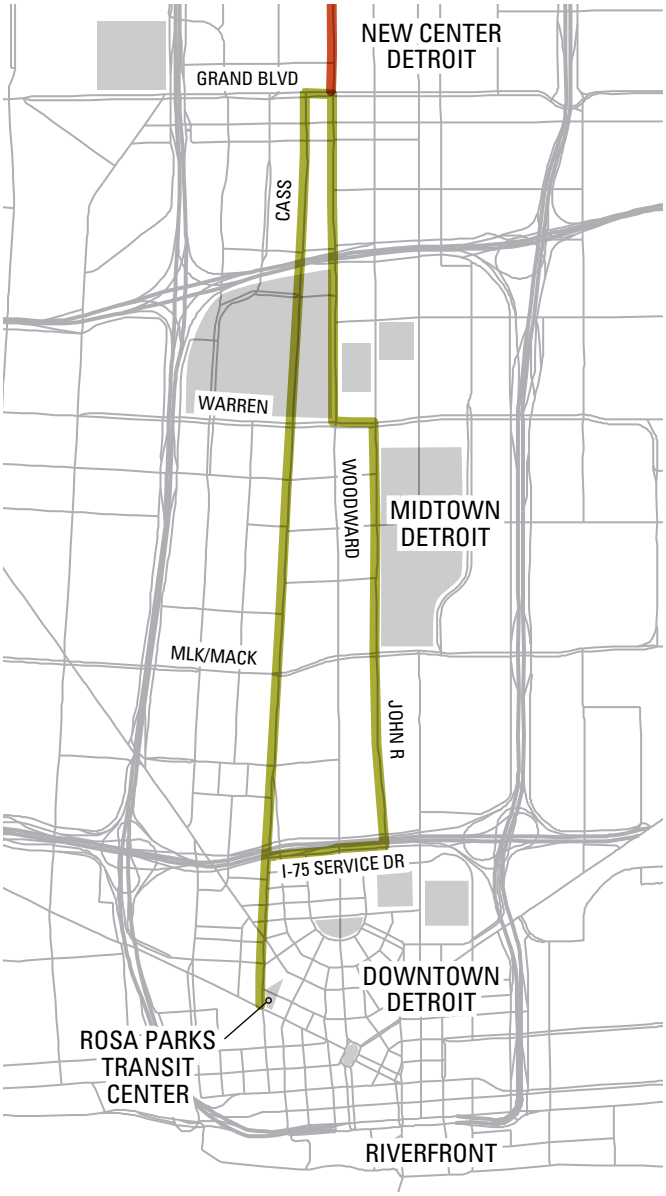


FIGURE 4-7. DETROIT ALTERNATIVE #3

Detroit Alternative #4

Similar to Detroit Alternative #3, this alternative consists of an off-Woodward diversion using Cass Avenue and John R Street as a north/south one-way loop. The BRT vehicle would utilize the I-75 service drive to connect from Cass Avenue to John R Street. Both northbound and southbound loops would divert to and from Woodward at Grand Boulevard. Due to the one-way southbound configuration of John R Street north of Warren Avenue, this alternative would require conversion of this segment to accommodate two-way traffic. Additionally, the John R Street bridge over I-94 would need to be maintained as part of the ongoing I-94 expansion. This alternative would not require BRT vehicles to interact with the M-1 Rail Streetcar.

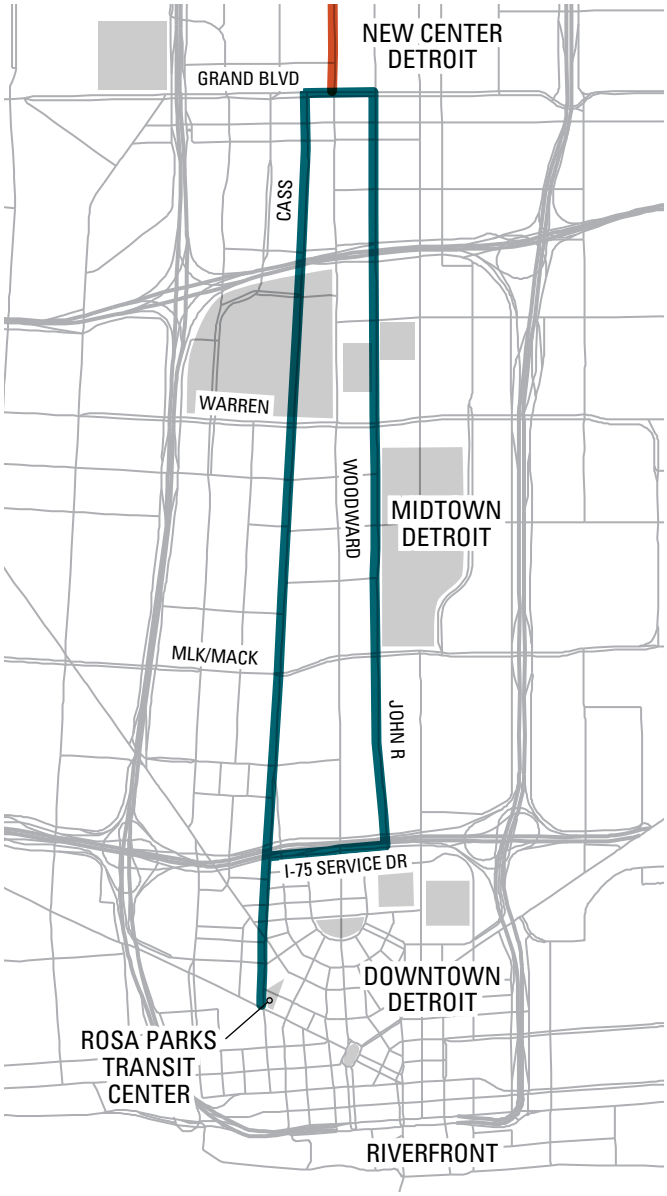


FIGURE 4-8. DETROIT ALTERNATIVE #4

4.3.2 ALIGNMENT ALTERNATIVES EVALUATION CRITERIA

The following evaluation criteria were developed for the Tier 2 Screening of alignment alternatives based on Woodward AA Steering Committee input and the Purpose and Need for the project. Within the AA process, evaluation criteria are developed to assist in selecting an alignment that most objectively meets the purpose and need. The weights assigned to the variables of the criteria are added to reflect the emphasis given to each of the factors. Weighting of evaluation factors was developed in consideration of public feedback obtained at December 2013 public meetings, and FTA norms for criteria weighting.

Transit Travel Time

Transit travel time evaluates the amount of travel time for each of the BRT alignment routes. This criterion compares the variation in travel time between the routes, with those alignment options that have the lowest travel time scoring better than those with the higher travel times. The preliminary travel times were based on the speed limit of the roadway, whether the alignment option could have dedicated transitways, the number of signals, and the number of turns that the route would take. Additional turns and signals add additional time to the transit travel time. It was assumed that most of corridor could be in dedicated transitways, the exceptions being along Woodward Avenue south of Grand Boulevard and along 11 Mile Road and 12 Mile Road in Oakland County.

Travel time was determined for each of the alternatives based on prevailing speed limits along the corridor as well as the number of signals, number of stations, and number of turns. If the BRT was considered in an exclusive lane, then the BRT travel at the posted speed limit and there was five (5) seconds of delay at each of the traffic signals. If the BRT was shared in with traffic, then there was 15 seconds of delay at each of the traffic signals. It was assumed that each station had 20 seconds of dwell time and there was also acceleration and deceleration time of approximately 20 seconds added. For each turn, there was approximately 20 seconds of acceleration and deceleration time added.

For each of the alternatives, the alignment was considered exclusive along most of the corridor. The exceptions are as follows:

- Woodward Avenue south of Grand Boulevard
- Cass Avenue between Grand Boulevard and I-75 when service was 2-way (Detroit Options 1 and 2)
- Washington Boulevard north of Lincoln Avenue
- 11 Mile Road between Sherman Drive and Woodward Avenue
- 12 Mile Road between Woodward Avenue and Coolidge Highway
- Coolidge Highway between Woodward Avenue and 12 Mile Road

Table 4-2 on the following page summarizes the travel time for each of the alternatives. This information was utilized as an input into the forecasting model.

TABLE 4-2. TRAVEL TIME SUMMARY BY ALTERNATIVE

Source: Parsons Brinckerhoff

ALTERNATIVE	AVERAGE TRAVEL TIME (ONE WAY)	AVERAGE DISTANCE (ONE-WAY IN MILES)	NUMBER OF STATIONS	NUMBER OF TURNS	NUMBER OF SIGNALS
All Woodward	1 hr 8 min	25.4	24	5	72
Pontiac 2	1 hr 7 min	25.3	24	3	71
Berkley	1 hr 12 min	25.9	25	9	72
Royal Oak 1	1 hr 12 min	25.5	25	10	76
Royal Oak 2	1 hr 13 min	25.9	25	11	77
Detroit 1	1 hr 7 min	25.2	23	5	65
Detroit 2	1 hr 6 min	25.3	23	5	67
Detroit 3	1 hr 7 min	25.4	23	5	65
Detroit 4	1 hr 6 min	25.4	23	5	65

Connectivity to Major Destinations

Major destinations are locations that attract customers, visitors, and employees that live both near and far from the destination. Alignment options that connect riders to goods, services, and job opportunities at these destinations provide a greater benefit than options offering limited or no access to these key destinations.

Transfer Opportunities and Intermodal Connections

The use of existing transit infrastructure is crucial to the success of any new transit service along Woodward Avenue. This criterion evaluates how existing routes that run along or intersect with the alignment option, including DDOT and SMART bus services, the DPM, and the M-1 RAIL streetcar, can be integrated in any new alternative. This ranges from being able to transfer easily from one transit system to another transit system or the ability to share resources (stations or dedicated lanes). In addition, this criterion evaluates how the alignment option connects to other intermodal facilities within the study area, including the Pontiac Transportation Center, the Royal Oak Transit Center, the Detroit Amtrak Station and the Rosa Parks Transit Center. The ability of an option to work together with exiting transit systems is beneficial. Those alignments that have more connections to multi-modal centers would score higher than those that have fewer connections.

Transit Ridership

Ridership involves the expected level of use the transit system will experience. This use is quantified in the number of trips being made. Computer based models have been built to evaluate various modes and the expected ridership. These models are based on surveys that have been conducted within SE Michigan and throughout the United States. The higher the ridership, the more successful the transit system. This evaluation criterion reviews the amount of transit ridership that each alignment would have and the ease of transfer from one mode to another to increase ridership along the alignment. This criterion looks at the amount of riders along the corridor, within the transit system, and also the user benefits (both positive and negative) of each alternative. Typically, those alignments that have higher transit ridership would score higher than those that have lower transit ridership.

As part of the Tier 2 Alternatives evaluation, ridership forecasts were developed for each of the alternatives considered. A technical memo describing the development of the ridership forecasts can be found as an appendix to this report. The ridership forecasted utilized an incremental logit (Ilogit) mode choice model. The Ilogit model was developed utilizing a transit on-board survey that was conducted by SEMCOG in 2010. FTA allows for three methods to determine ridership for projects that may enter into project development, this data driven method is one of those approaches. The first step in the development of the Ilogit mode choice model was to refine the on-board survey to determine calibration target values to calibrate the Ilogit model.

Typically, an on-board survey asks those individuals riding a bus questions relating to the origin, destination, and purpose of their trip. The number of questionnaires for each route is based on the current ridership of each route. A sample of riders for each route is conducted based on the ridership. The higher the ridership, the higher the number of responses. Surveys were taken on all bus providers within the SEMCOG area including DDOT, DPM, SMART, Ann Arbor Area Transportation Authority (AAATA), University of Michigan (UM), Blue Water Area Transit (BWAT), and Lake Erie Transit (LET). From the on-board survey, a trip matrix was created and assigned to the transit network. Through the assignment, it was found that some adjustments had to be made to the network including limiting SMART stops within the City of Detroit as well as an adjustment to an assignment parameter. **Table 4-3** is a summary of ridership for each of the seven service providers as well as the results of the on-board survey assignment:

TABLE 4-3. SERVICE PROVIDERS AND RIDERSHIP

Source: Parsons Brinckerhoff

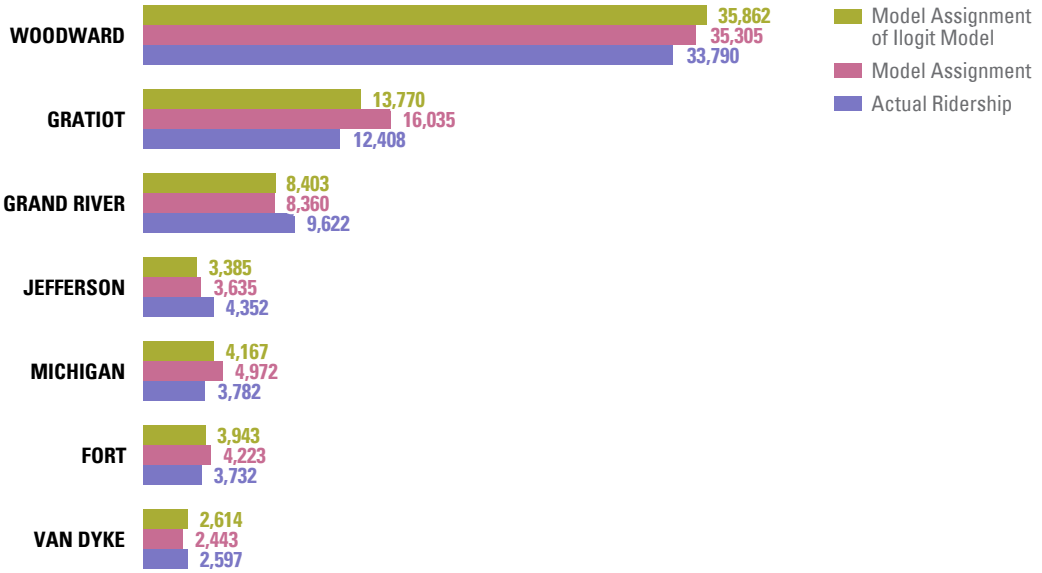
SERVICE PROVIDER	ACTUAL RIDERSHIP	MODEL ASSIGNMENT	MODEL ASSIGNMENT OF ILOGIT MODEL
Detroit Department of Transportation (DDOT)	124,532	121,483	122,120
Detroit People Mover (DPM)	4,011	2,078	2,738
Suburban Mobility Authority for Regional Transportation (SMART)	34,010	43,319	38,766
Ann Arbor Area Transportation Authority (AAATA)	21,886	23,667	24,067
University of Michigan (UM)	34,303	36,377	36,413
Blue Water Area Transit (BWAT)	2,661	1,849	1,914
Lake Erie Transit (LET)	887	378	424
Total	**222,280**	**229,151**	**226,444**

Given that the service areas of DDOT, DPM, and SMART overlap as well as the service area of AAATA and UM, combining the ridership of those providers actually show that the actual versus assigned ridership is close overall. For example, there are 162,553 trips for DDOT, DPM and SMART and the assignment had a total of 166,880 trips (within three percent).

Overall ridership for each of the service providers is important; however, this project is along a key corridor within Southeast Michigan. Along the Woodward Avenue corridor, there are 12 routes that are either along Woodward Avenue or run closely parallel. There are also several other corridors within SE Michigan which are critical, including Gratiot Avenue, Michigan Avenue, and Grand River Avenue. **Figure 4-9** on the following page summarizes the ridership along those routes and the model assignment.

FIGURE 4-9. RIDERSHIP BY CORRIDOR

Source:



As shown in **Table 4-3** on the previous page and **Figure 4-9** above, the assignment of the on-board survey and that of the Ilogit model results are fairly close along the Woodward Avenue corridor (within five percent).

The Ilogit model was developed utilizing the on-board survey as well as factors from other Ilogit models from around the country. There were three key modes within the Ilogit model: bus, streetcar, and BRT. The streetcar mode was added due to the construction of the M1-RAIL streetcar that is expected to be built along Woodward Avenue within the next several years. The Ilogit model was calibrated utilizing a base year trip table from the on board survey. This ensured that the Ilogit model was calibrated for the Detroit area. The figures above summarize the ridership for each of the providers as well as the corridors from the Ilogit model. In addition to ensuring that the Ilogit model accurately predicted the current ridership, the new streetcar and BRT modes were also added. In order to predict the amount of ridership on those new modes, unincluded attribute values were added to the model which make these modes more "attractive" than the current bus modes. These values were determined based on other systems within the United States and the proposed M1-RAIL system and the BRT system within Southeast Michigan. Service attributes not part of travel demand models include "its visibility, reliability, span of service hours, comfort, protection from the weather, the chances of finding a seat, and passenger amenities." These values are detailed within the technical memo.

The Ilogit model considered the following types of trips within the decision making process:

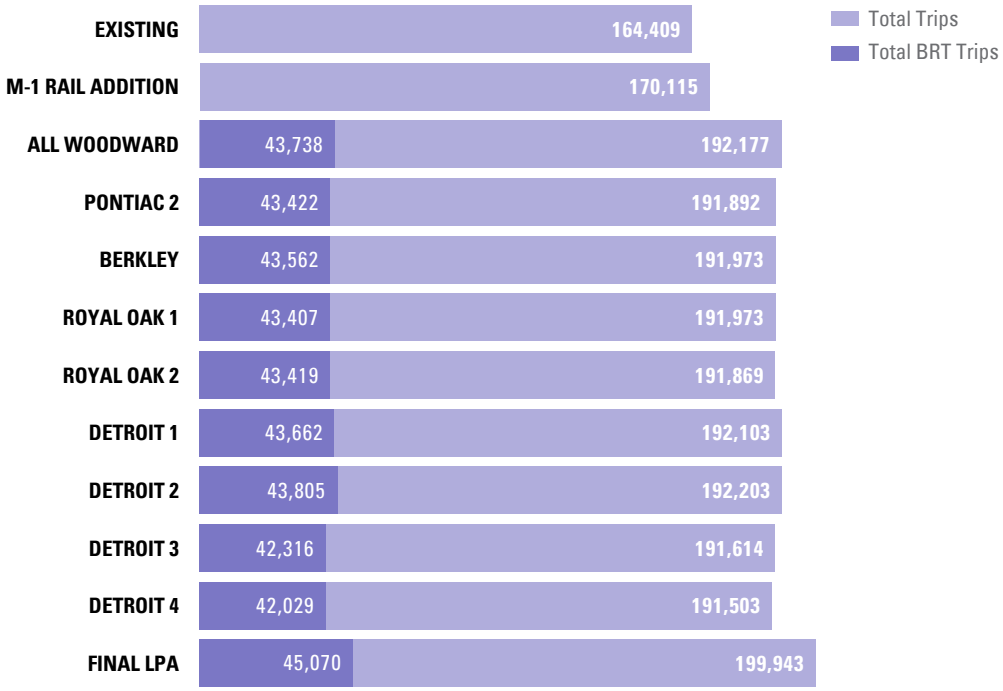
- Drive to any mode of transit (bus, streetcar, and BRT)
- Walk to local bus only
- Walk to streetcar only
- Walk to BRT only
- Walk to local bus and streetcar
- Walk to local bus and BRT

Once the Ilogit model was calibrated, a baseline alternative was tested to determine if the model is predicting trips for each type of mode within the model (bus, streetcar, and BRT). This baseline alternatives was the "All-Woodward" alternative and was mixed in with general purpose traffic (i.e. no travel time advantage). Through this evaluation it was found that the Ilogit model was predicting transit trips for the existing and proposed modes. The transit trips were then assigned to the transit network and compared with the existing ridership.

Once the Ilogit model was deemed acceptable, each of the alternatives that were developed as part of the Tier 1 analysis was evaluated. Park/Kiss and Ride was considered at all stations, meaning that all trips could access the stations via automobile. During this analysis there was not a station at 12 Mile Road and Woodward Avenue. The feeder bus system was changed for all the alternatives and a detail of these changes can be found within the Technical Memorandum. **Figure 4-10** below summarizes the number of trips for each of the alternatives.

FIGURE 4-10. NUMBER OF TRIPS BY ALTERNATIVE

Source:



It was found that ridership did not vary much between the alignment alternatives. This is because the alignments are all within one-quarter mile of each other and the zonal sizes within the SEMCOG model are too large to show an appreciable difference. However, in comparing small variations in the ridership, it was found that the Berkley alternative had a lower ridership than the Royal Oak alternatives.

The increase in trips associated with the Final LPA is due to servicing both Woodward Avenue and downtown Royal Oak and the additional station at 12 Mile Road. There was a reduction in park/kiss and ride due to the reduction in park and ride locations along the route. A more detailed analysis will be conducted in the next phase of the project which will determine user costs and detailed station by station boardings and alightings and ridership between stations.

Once it was determined that the LPA would include a route into Royal Oak and utilize the Detroit 4 option, the final alternative was run within the llogit model. A station was added at 12 Mile Road and Park/Kiss and Ride was only allowed at the following stations:

- Downtown Pontiac (Pontiac)
- Square Lake Road (Bloomfield Township)
- Old Woodward Avenue (Birmingham)
- 12 Mile Road (Royal Oak)
- 10 Mile Road (Royal Oak)
- 8 Mile Road (Detroit)
- Temple Street (Detroit)
- Rosa Parks Transit Center (Detroit)

Figure 4-11 illustrates the ridership along the LPA alignment at each station as well as the percentage of Park and Ride patrons at each station.

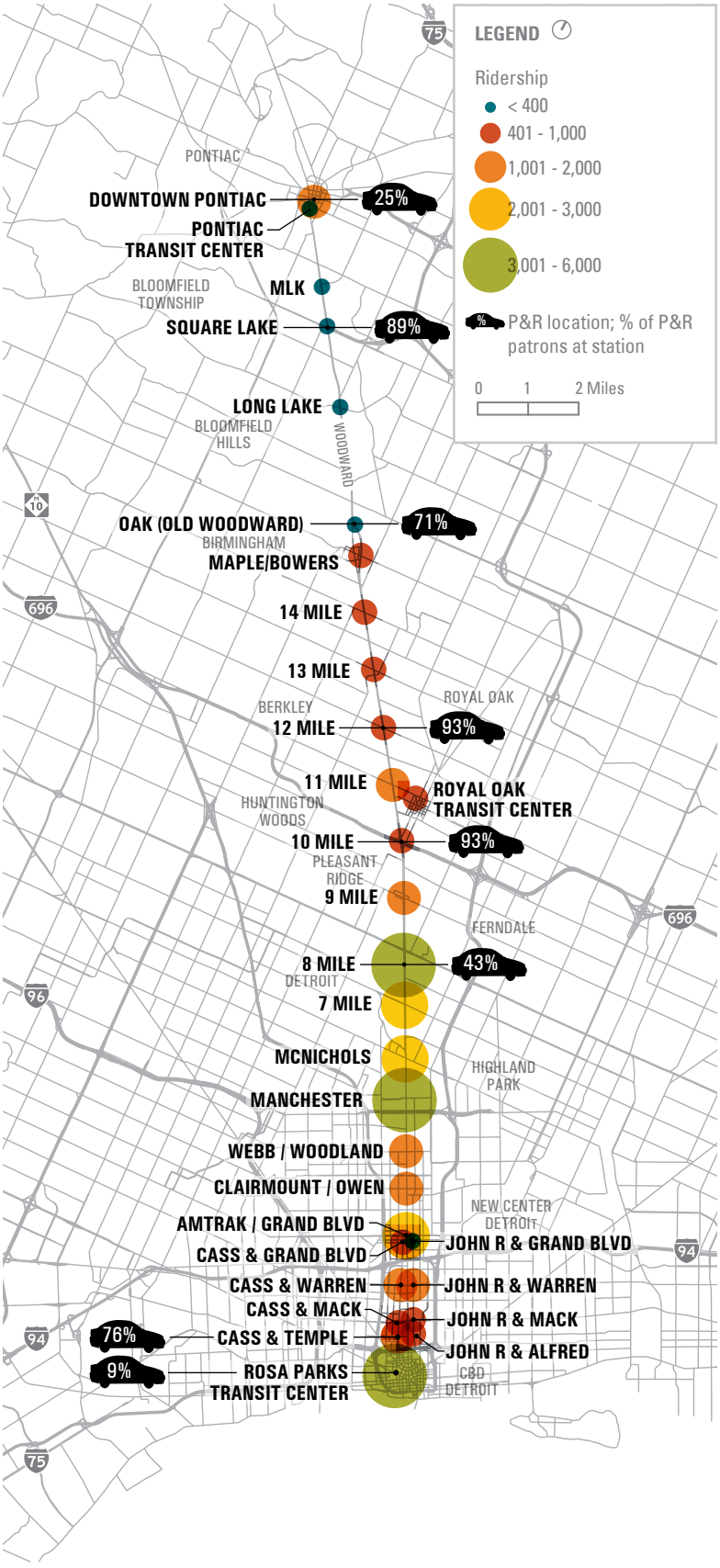


FIGURE 4-11. RIDERSHIP AND PARK-AND-RIDE PATRONS, LPA ALIGNMENT Source: Parsons Brinckerhoff

Legibility

This evaluation criterion reviews how the alignment is servicing the corridor and how easily transit riders would access the service. In particular, this criterion reviews if the alignment option stays on one roadway, thereby reducing the amount of confusion on where the service is located, or moves to different roadways. In addition, this criterion also evaluates whether the alignment option stays on the same roadway in both the northbound and southbound direction. Those options that stay on the same roadway (i.e. Woodward Avenue) would score higher than those that go off of Woodward Avenue. In addition, options that stay on the same roadway both northbound and southbound would score higher than those that utilize one roadway southbound and another roadway northbound.

Service to Transit Dependent Populations

This evaluation criterion recognizes that alignment options supporting broad transit access benefit all potential users. Along Woodward Avenue, there is great diversity among transit users in terms of economic, cultural and racial backgrounds that can benefit from transit. Alignment options that serve a greater cross section of users, especially those from zero-car and low-income households and limited English proficient populations, provide a greater benefit than those that offer limited access to these groups.

Accommodation of Exclusive and Shared Bicycle Lanes

This evaluation criterion evaluates whether the alignment would allow for exclusive bicycle lanes, shared bicycle lanes (consistent with the Woodward Complete Streets Master Plan), or would negatively impact the potential for the planned dedicated bicycle facilities along the route. Those alignments that could allow for planned dedicated bicycle facilities would score higher than those that would not accommodate dedicated facilities.

Auto Accessibility

The conversion of roadways from one-way to two-way travel can often improve auto accessibility within an area. Conversely, the conversion of a two-way roadway to a one-way roadway can reduce auto accessibility, but can also improve safety along the corridor. This criterion evaluates whether the alternative would require the conversion of a roadway from one-way operation to two-way operation. The conversion from one-way to two-way would improve accessibility and therefore score higher than conversion from a two-way to a one-way (which none of the alternatives are recommending).

Streetcar Operational Impacts

The M-1 Rail streetcar project on Woodward Avenue between downtown Detroit and the New Center area will be in place before the BRT service begins operation. This criterion evaluates the impact of streetcar operations on BRT alignment options. Those options that avoid impacts from streetcar operations would score higher than options that potentially increase BRT or streetcar travel time or delay.

Jobs Access

The ability of transit riders to access job opportunities is central to the purpose and need of the Woodward AA as it relates to creating mobility options in the Woodward corridor.

Downtown Viability

Some downtowns are directly accessed from Woodward Avenue, including Detroit, Ferndale, Birmingham, and Pontiac. However, several other downtowns are not directly served by Woodward Avenue, including Royal Oak and Berkley. These downtowns have the potential to generate more ridership than the land uses along Woodward Avenue in each segment. Therefore, this evaluation factor recognizes that a transit system that can more easily divert from Woodward Avenue to reach nearby downtowns and major destinations has an added benefit. This evaluation criterion also evaluates how easily the route could be changed in the future if there are additional developments along or close to the corridor.

On-Street Parking

This criterion will evaluate the impact that the alignment option would have to on-street parking along the corridor. The reduction of on-street parking can be seen as a negative impact to business owners along the corridor. However, the introduction of BRT along the corridor can often overcome the loss of parking and provide greater economic impact to the businesses. This criterion evaluates how much of the on-street parking may be impacted. Alignment options that have no impact to parking would score higher than options that remove on-street parking.

TOD Opportunities

This criterion evaluates the potential economic development growth along the corridor related to the transit investment by factoring in four variables within ¼-mile radius of the stops along each route alternative: available vacant or underutilized land, investment in future TOD, proximity to a major destination, and proximity to a downtown or district center. These variables were analyzed using the Woodward AA Land Use & Multi-Modal Analysis.

Capital Cost

Capital cost is the initial investment needed to get a new transit system up and running. Capital costs include designing the system and building infrastructure to support the system, including the stations, vehicle storage and maintenance facilities, vehicles, new traffic signals, right-of-way acquisition, as well as other items. This important criterion relates to the ability of the region to implement the system. Those options that have lower capital costs would score higher than options with higher costs.

Operations and Maintenance Cost

Operations and maintenance cost is the continual investment needed to operate of the system and maintain infrastructure after the capital cost investment has been made. This cost includes labor for operating the vehicles, maintaining the vehicles and stations, collecting fares, providing station security, as well as parts and materials needed for maintenance, insurance, and administrative costs. This important criterion relates to the ability of the region to sustain the long-term cost of the transit system. Those options that have lower operations and maintenance costs would score higher than options with higher costs.

Implementation

This criterion evaluates how the preferred alternative may or may not be implemented for the 27-mile Woodward corridor. This evaluation factor acknowledges that the ability to phase/implement a transit option by segment is valuable. The more expensive the alternative, the greater the likelihood that it may need to be implemented in phases. Factors considered in phasing include the type of mode that is chosen as well as the effort necessary to construct the alternative. This criterion also considers logical termini, such as the beginning and ending of a phase and the ridership that is required for a phase.

See **Figure A-1** in Appendix A for the Alignment Alternatives Evaluation Results.

4.3.3 STATION LOCATIONS CONSIDERED

The Tier 2 screening consisted of a comprehensive evaluation of station locations, using a tiered approach to determine stations that would be included in the LPA and those that would require additional analysis during the EA phase.

Several station locations for each segment of the corridor were considered based on a variety of factors, including initial ridership projections and community preferences. The initial station locations were then evaluated based on the criteria below, resulting in 26 stations recommended as part of the LPA.

Figure 4-12 illustrates the station locations selected in the LPA.

Additional Evaluation Needed

Several stations locations that were considered but did not score high enough against the evaluation criteria are listed below. These station locations will be evaluated in more detail during the EA phase.

Cranbrook Educational Community

This potential location is situated at the intersection of Woodward Avenue and Tamarack Way, which represents the main entrance to the Cranbrook Educational Community off of Woodward Avenue. Initial evaluation of this location determined that minimal development density exists in the area and that ridership forecasts did not project enough to warrant a station. Additionally, a significant distance exists between Woodward Avenue and Cranbrook's facilities, further reducing the viability of this station. After discussions with community leaders, it was determined that this station location did not meet enough of the evaluation thresholds to advance for further analysis.

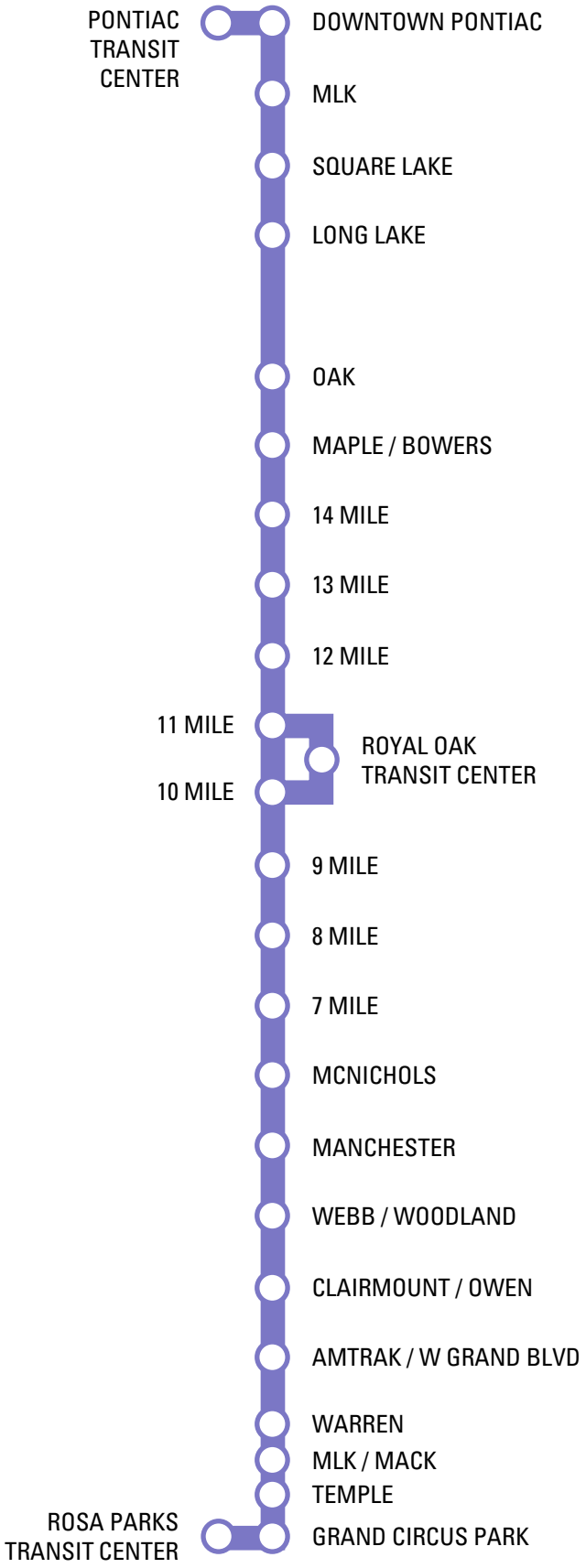


FIGURE 4-12. LPA STATION LOCATIONS

Quarton Road

This potential station location is situated at the intersection of Woodward Avenue and Quarton Road/ Big Beaver Road, representing the border between Birmingham and Bloomfield Hills, and was evaluated based on the project goal of providing one mile spacing between stations. Initial evaluation of this location determined that minimal development density exists in the area and that ridership forecasts did not project enough to warrant a station. After discussions with community leaders, it was determined that this station could be located further south near Oak Street, which would serve the northern portion of Downtown Birmingham and could potentially accommodate a P&R facility.

Lincoln Street

This potential station location is situated in Birmingham between Maple Road and 14 Mile Road, and was evaluated based on input received from local stakeholders. Initial evaluation of this location determined that it deviated from the primary project goal of providing "rapid" transit service, due to its half mile spacing from both the 14 Mile Road and Maple Road stations, which are preferred by community stakeholders and scored higher during the initial evaluation. Additionally, the evaluation determined that a station in this location could potentially dilute ridership at the aforementioned stations.

12 Mile Road/Coolidge Highway

This potential station location is situated in Downtown Berkley, and was evaluated based on input received from local stakeholders as part of the two off-Woodward alignment alternatives that would serve Downtown Berkley by using Coolidge Highway. Initial evaluation of this location determined that minimal development density and potential in the area would limit the viability of a station and that ridership forecasts did not project enough to warrant a station. Additionally, the increased travel time (approximately five to 10 minutes) resulting from an off-Woodward alignment in Downtown Berkley would significantly impact the ability for the overall system to remain "rapid".

11 Mile Road/Coolidge Highway

This potential station location is situated at the southern end of Downtown Berkley, and was evaluated based on input received from local stakeholders as part of the second off-Woodward alignment alternative that would serve Downtown Berkley by using Coolidge Highway and diverting back to Woodward Avenue on 11 Mile Road. Initial evaluation of this location determined that minimal development density and potential in the area would limit the viability of a station and that ridership forecasts did no project enough to warrant a station. Additionally, the increased travel time (approximately five to 10 minutes) resulting from an off-Woodward alignment using 11 Mile Road to divert back to Woodward Avenue would significantly impact the ability for the overall system to remain "rapid".

Catalpa Drive

This potential station location is situated between 12 Mile Road and 11 Mile Road, and was evaluated based on input received from local stakeholders. Initial evaluation of this location determined that, if recommended in conjunction with stations at 12 Mile Road and 11 Mile Road, it deviated from the primary project goal of providing "rapid" transit service, due to its half mile spacing from both of the aforementioned stations. Additionally, this station was evaluated as an alternative to an 11 Mile Road station, but ridership forecast did not project enough to warrant such a shift due to the intermodal connections provided at 11 Mile Road. This station location also does not provide a feasible connection to Downtown Berkley, due to the one-mile distance between Woodward Avenue and Coolidge Highway along Catalpa Drive.

Lincoln Avenue

This potential station location is situated between 11 Mile Road and 10 Mile Road, and was evaluated based on input received from local stakeholders to provide a more direct connection to the Oakland Community College campus in Downtown Royal Oak and as part of the second off-Woodward alignment alternative that would serve Downtown Royal Oak by using Lincoln Avenue to divert to/from Woodward Avenue. Initial evaluation of this location determined that, if recommended in conjunction with stations at 11 Mile Road and 10 Mile Road, it deviated from the primary project goal of providing "rapid" transit service, due to its half-mile spacing from both of the aforementioned stations. Additionally, ridership forecasts did not project enough to warrant a station and that a station in this location could potentially dilute ridership at the aforementioned stations. Based on additional stakeholder input, it was determined that the use of Lincoln Avenue as either a transit corridor or non-motorized connection was not preferred, due to the residential nature of the street.

4.3.4 STATION LOCATION EVALUATION CRITERIA

In consideration of Woodward AA Steering Committee input and the creation of the Purpose and Need for the project, the following evaluation criteria were developed for the Tier 2 Screening of station locations. Within the AA process, evaluation criteria are developed to assist in selecting general station locations that most objectively meets the purpose and need. The weights assigned to the variables of the criteria are added to reflect the emphasis given to each of the factors. Weighting of evaluation factors was developed in consideration of public feedback obtained at December 2013 public meetings, and FTA norms for criteria weighting.

Connections to Destinations

This criterion evaluates each station based on its proximity to major destinations. Major destinations were defined in the AA process as locations that attract a significant number of customers, visitors, and employees that live both near and far from the destination. Within the context of the Woodward Avenue corridor, major destinations include sports stadia, hospitals, museums, and universities. Stations that connect riders to goods, services, job opportunities, and events at these destinations provide a greater benefit than stations that offer limited or no access to such destinations. To quantify this criterion, each station location was evaluated on whether it was within (3) ¼ mile, (2) ½ mile, or (1) over ½ mile from a major destination.

Connection to Downtowns

This criterion evaluates each station based on its proximity to downtown districts of corridor communities. Downtowns were defined in the AA process as areas that attract a significant number of customers, visitors, and employees that live both near and far from the area. Within the context of the Woodward Avenue corridor, downtowns include Detroit, Highland Park, Ferndale, Royal Oak, Berkley, Birmingham, and Pontiac. Stations that connect riders to goods, services, and job opportunities within these downtowns provide a greater benefit than stations that offer limited or no access to these areas. To quantify this criterion, each station location was evaluated on whether it was within (3) ¼ mile, (2) ½ mile, or (1) over ½ mile from a community's "downtown" area.

Station Spacing

This criterion evaluates each station based on its spacing from adjacent stations that were considered as part of the Tier 2 Screening. Based on Woodward AA Steering Committee input, one of the primary goals of this project was to recommend a truly "rapid" transit system. Preliminary discussions and analysis concluded that the factor that most significantly impacts the speed of the system would be station spacing, and that to achieve the travel time advantage goals of this project, stations should be spaced primarily 1 mile apart. To quantify this criterion, each station was evaluated on whether it was located at least (3) one mile, (2) ½ mile mile, or (1) ¼ mile from adjacent stations, in order to maintain "rapid" service.

TOD Opportunities

This criterion evaluates each station based on its proximity to "opportunity sites" that could be redeveloped with TOD uses that would support the rapid transit system. Opportunity sites were defined in the AA process as vacant and/or underutilized land of 20,000 square feet or more that are identified by local land use and zoning regulations for TOD or other favorable uses (e.g. mixed-use, commercial, multi-family residential). To quantify this criterion, each station was evaluated on whether it was within (3) ¼ mile, (2) ½ mile, or (1) over ½ mile from an "opportunity site" and whether or not local regulations identify the site (3) for TOD, (2) for favorable uses, or (1) for non-TOD uses.

Connection to crosstown routes

This criterion evaluates each station based on its proximity to crosstown SMART and/or DDOT bus routes. Based on Woodward AA Steering Committee input, one of the primary goals of this project was to recommend a system that would provide transfer opportunities with local bus routes. To quantify this criterion, each station was evaluated on whether its location would allow it to be directly linked with (3) multiple crosstown SMART/DDOT routes, (2) 1 crosstown SMART/DDOT route, or (1) no crosstown SMART/DDOT routes. As part of the EA phase, feeder network recommendations could include modifications to existing routes if considerable transfer potential exists or is currently underutilized.

Connection to transit centers

This criterion evaluates each station based on its proximity to existing transit centers that provide connections to multiple local and regional systems, including SMART/DDOT bus service and Amtrak rail service. To quantify this criterion, each station was evaluated on whether it was within (3) ¼ mile, (2) ½ mile, or (1) over ½ mile from a transit center.

Community support

This criterion evaluates each station based on the input received from the Woodward AA Steering Committee, key stakeholders, and the community from the project's ongoing engagement process. A variety of exercises and discussions were held to allow these groups to provide their input on each potential station location. To quantify this criterion, each station was evaluated based on scoring and comments from these focused engagement sessions to determine whether it received (3) strong, (2) moderate, (1) weak support from the Steering Committee, stakeholders, and the community.

Potential Park & Ride Locations

This criterion evaluates each station based on its proximity to a site that could be repurposed or redeveloped into a P&R facility. Potential P&R locations were defined as sites that included existing parking lots and/or decks that could become "shared use" facilities as well as vacant sites that could accommodate construction of new P&R facilities. To quantify this criterion, each station was evaluated based on whether it was within (3) ¼ mile, (2) ½ mile, or (1) over ½ mile from a potential Park & Ride site.

See **Figure A-2** in Appendix A for the Station Location Evaluation Results.

5.0 Locally Preferred Alternative Recommendation

5.1 Transportation and Mobility

The Locally Preferred Alternative (LPA) is summarized in this chapter. It includes all alignments, station locations, and cross sections that have been evaluated through technical analysis, stakeholder input, and community engagement. All items described in this chapter are recommended for additional analysis as part of the Environmental Assessment (EA) and engineering phases of this project.

5.1.1 PONTIAC LOOP

This segment represents the northern terminus of the project, including the one-way loop that encompasses Downtown Pontiac. There are two alignment alternatives in this segment that are recommended for further analysis.

Water Street Alignment

This alignment alternative utilizes the one-way loop to enter Downtown Pontiac from the south, accessing a station at Pike Street/Saginaw Street by traveling west on Water Street and north on Saginaw Street. The transit vehicle would complete the loop by traveling west on Pike Street and south on Woodward Avenue to access the Pontiac Transit Center.

Pike Street Alignment

This alignment alternative utilizes the one-way loop to enter Downtown Pontiac from the south, accessing a station at Pike Street/Saginaw Street by traveling west on Pike Street. The transit vehicle would complete the loop by continuing west on Pike Street and south on Woodward Avenue to access the Pontiac Transit Center.

Station Locations

1. **Downtown Pontiac Station (Tier 2)**

A station is recommended at the intersection of Pike Street and Saginaw Street to directly serve Downtown Pontiac. This station could be integrated into the currently vacant Lot 9 parcel, located in the southwest quadrant of this intersection. This is a Tier 2 station due to moderate ridership projections and moderate intermodal connections.

2. **Pontiac Transit Center Station (Tier 1)**

A station is recommended at the Pontiac Transit Center to provide direct intermodal connections with SMART bus service and Amtrak rail service. This station could be integrated into the design of the existing transit center. This is a Tier 1 station due to higher ridership projections and higher intermodal connections.

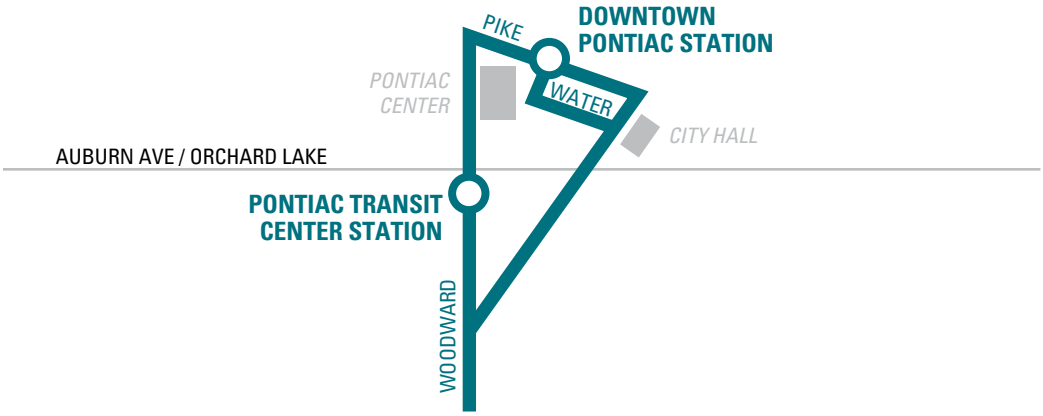


FIGURE 5-1. ALIGNMENT AND STATIONS, PONTIAC LOOP

Cross section

The recommended cross section for this segment consists of an exclusive, edge running, one-way transit lane. No road reconstruction would be required to accommodate the exclusive transit lane, although re-striping of existing general purpose lanes and parking lanes would be required. The transit lane will be delineated from general purpose lanes by a solid white line, red paint, and standard BUS ONLY pavement markings (MUTCD 3D-01).

FIGURE 5-2. CROSS SECTION, PONTIAC LOOP

5.1.2 PONTIAC LOOP TO QUARTON ROAD

This segment represents the southern portion of Pontiac, Bloomfield Township, and Bloomfield Hills that are located along the Woodward Avenue corridor.

Mainline alignment

This alignment alternative maintains service along Woodward Avenue throughout this entire segment.

Station Locations

3. **Martin Luther King Blvd. Station (Tier 2)**

A station is recommended north of Martin Luther King Boulevard to directly serve St. Joseph Mercy Hospital and the southern portion of Pontiac. This station could be constructed within the center of the median to serve both NB and SB median-edge transit lanes. This is a Tier 2 station due to moderate ridership projections and direct access to St. Joseph Mercy Hospital.

4. **Square Lake Road Station (Tier 3)**

A station is recommended north of Square Lake Road to directly serve Bloomfield Township neighborhoods and existing development at the intersection of Square Lake Road and Woodward Avenue. This station could be constructed within the center of the median to serve both NB and SB median-edge transit lanes. Additionally, surface parking lots located in the northwest quadrant of the intersection could be integrated into the system with signalized mid-block pedestrian crossings to designate this location as a P&R station. This is a Tier 3 station due to lower ridership projections, lower development potential, and lower pedestrian connections.

5. **Long Lake Road Station (Tier 3)**

A station is recommended either north or south of Long Lake Road to directly serve the Bloomfield Hills Town Center. This station could be constructed within the center of the median to serve both NB and SB median-edge transit lanes. This is a Tier 3 station due to lower ridership projections, lower development potential, and lower pedestrian connections.

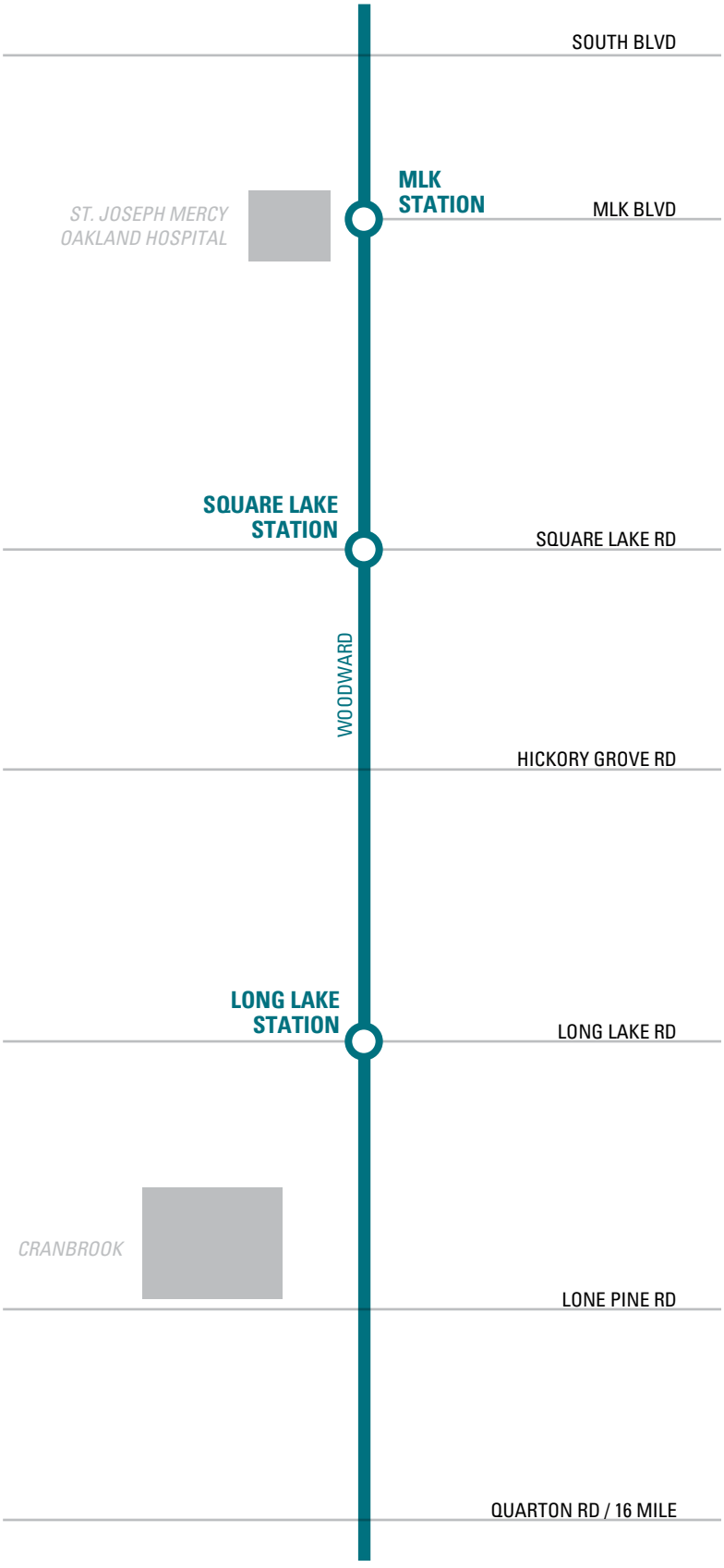


FIGURE 5-3. ALIGNMENT AND STATIONS, PONTIAC LOOP TO QUARTON ROAD

Cross section

The recommended cross section for this segment consists of median-edge running transit lanes. Existing median-edge general purpose lanes would be converted to transit lanes. No alteration or reconstruction of the median is recommended. From the Pontiac Loop to South Boulevard, the transit lanes will be exclusive and will be delineated from general purpose lanes by a solid white line, red paint, and standard BUS ONLY pavement markings (MUTCD 3D-01). From South Boulevard to Quarton Road, the transit lanes will be shared with automobile traffic.

FIGURE 5-4. CROSS SECTION, PONTIAC LOOP TO SOUTH BOULEVARD

FIGURE 5-5. CROSS SECTION, SOUTH BOULEVARD TO QUARTON

5.1.3 QUARTON ROAD TO 14 MILE ROAD

This segment represents the portion of Birmingham that is located along the Woodward Avenue corridor.

Mainline alignment

This alignment alternative maintains service along Woodward Avenue throughout this entire segment.

Station Locations

6. Oak Avenue Station (Tier 3)

A station is recommended north or south of Oak Avenue to directly serve the northern portion of Downtown Birmingham and adjacent neighborhoods. This station could be constructed within the center of the median to serve both NB and SB median-edge transit lanes. Additionally, adjacent land between Woodward Avenue and Old Woodward Avenue could be redeveloped as surface or structured parking to and integrated into the system with signalized mid-block pedestrian crossings to designate this location as a P&R station. This is a Tier 3 station due to lower ridership projections and lower development potential.

7. Maple Road Station (Tier 2)

A station is recommended south of Maple Road to directly serve the Downtown Birmingham core and Triangle District. This station could be constructed within the center of the median to serve both NB and SB median-edge transit lanes. This is a Tier 2 station due to moderate ridership projections and direct access to Downtown Birmingham.

8. 14 Mile Road Station (Tier 3)

A station is recommended north of 14 Mile Road to directly serve Birmingham's South Gateway and adjacent neighborhoods. This station could be constructed within the center of the median to serve both NB and SB median-edge transit lanes. This is a Tier 3 station due to lower ridership projections and lower development potential.

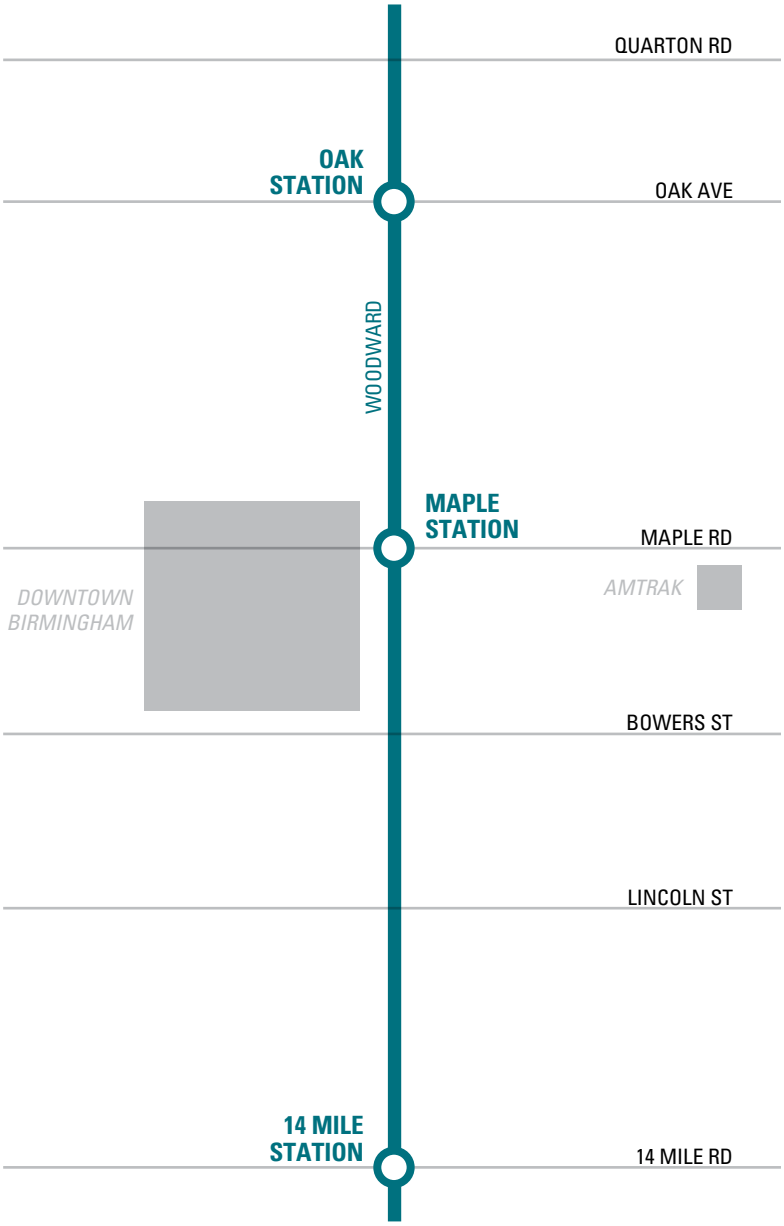


FIGURE 5-6. ALIGNMENT AND STATIONS, QUARTON ROAD TO 14 MILE ROAD

Cross section

The recommended cross section for this segment consists of exclusive, median-edge running transit lanes. Existing median-edge general purpose lanes would be converted to transit lanes. No alteration or reconstruction of the median is recommended. Transit lanes will be delineated from general purpose lanes by a solid white line, red paint, and standard BUS ONLY pavement markings (MUTCD 3D-01). See **Figure 5.7** below.

FIGURE 5-7. CROSS SECTION, QUARTON ROAD TO 14 MILE ROAD

5.1.4 14 MILE ROAD TO 10 MILE ROAD

This segment represents the portions of Berkley, Royal Oak, and Huntington Woods that are located along the Woodward Avenue corridor. There are two alignment alternatives for this segment that are recommended for further analysis.

Mainline alignment

This alignment alternative maintains service along Woodward Avenue throughout this entire segment.

Royal Oak alignment

This alignment alternative represents a potential "local" service that could be integrated directly with "express" service provided by the mainline alignment. This alignment would provide direct access to Downtown Royal Oak by traveling east/west on 11 Mile Road and north/south on Lafayette and Washington Avenues.

Station Locations

9. 13 Mile Road Station (Tier 2)

A station is recommended south of 13 Mile Road to directly serve Beaumont Hospital. This station could be constructed within the center of the median to serve both NB and SB median-center transit lanes (which would require the transit lanes to veer slightly to access the station), or separate stations could be constructed within the edges of the median to serve the NB and SB median-center transit lanes separately. This is a Tier 2 station due to moderate ridership projections and direct access to Beaumont Hospital.

10. 12 Mile Road Station (Tier 3)

A station is recommended north or south of 12 Mile Road to directly serve Downtown Berkley and adjacent neighborhoods. This station could be constructed within the center of the median to serve both NB and SB median-center transit lanes (which would require the transit lanes to veer slightly to access the station), or separate stations could be constructed within the edges of the median to serve the NB and SB median-center transit lanes separately. This is a Tier 3 station due to lower ridership projections, lower development potential, and moderate access to Downtown Berkley.

11. 11 Mile Road Station (Tier 2)

A station is recommended north of 11 Mile Road to directly serve adjacent neighborhoods and provide connections to local bus routes. This station could be constructed within the center of the median to serve both NB and SB median-center transit lanes (which would require the transit lanes to veer slightly to access the station), or separate stations could be constructed within the edges of the median to serve the NB and SB median-center transit lanes separately. This is a Tier 2 station due to higher ridership projections, lower development potential, and higher intermodal connections.

12. Royal Oak Transit Center Station (Tier 1)

A station is recommended at the Royal Oak Transit Center to provide direct intermodal connections with SMART bus service and Amtrak rail service. This station could be integrated into the design of the existing transit center. This is a Tier 1 station due to higher ridership projections, higher intermodal connections, and direct access to Downtown Royal Oak.

13. 10 Mile Road Station (Tier 1)

A station is recommended north of 10 Mile Road to directly serve the Detroit Zoo, the southern portion of Downtown Royal Oak, and adjacent neighborhoods. This station could be constructed within the center of the median to serve both NB and SB median-center transit lanes (which would require the transit lanes to veer slightly to access the station), or separate stations could be constructed within the edges of the median to serve the NB and SB median-center transit lanes separately. Due to the existing configuration of Woodward Avenue in this area, further analysis is required to determine the viability of constructing a "cap" over the I-696 tunnel to accommodate this station and provide enhanced east/west pedestrian access. This is a Tier 1 station due to higher ridership projections, higher development potential (including potential P&R in the northeast quadrant), and direct access to the Detroit Zoo.

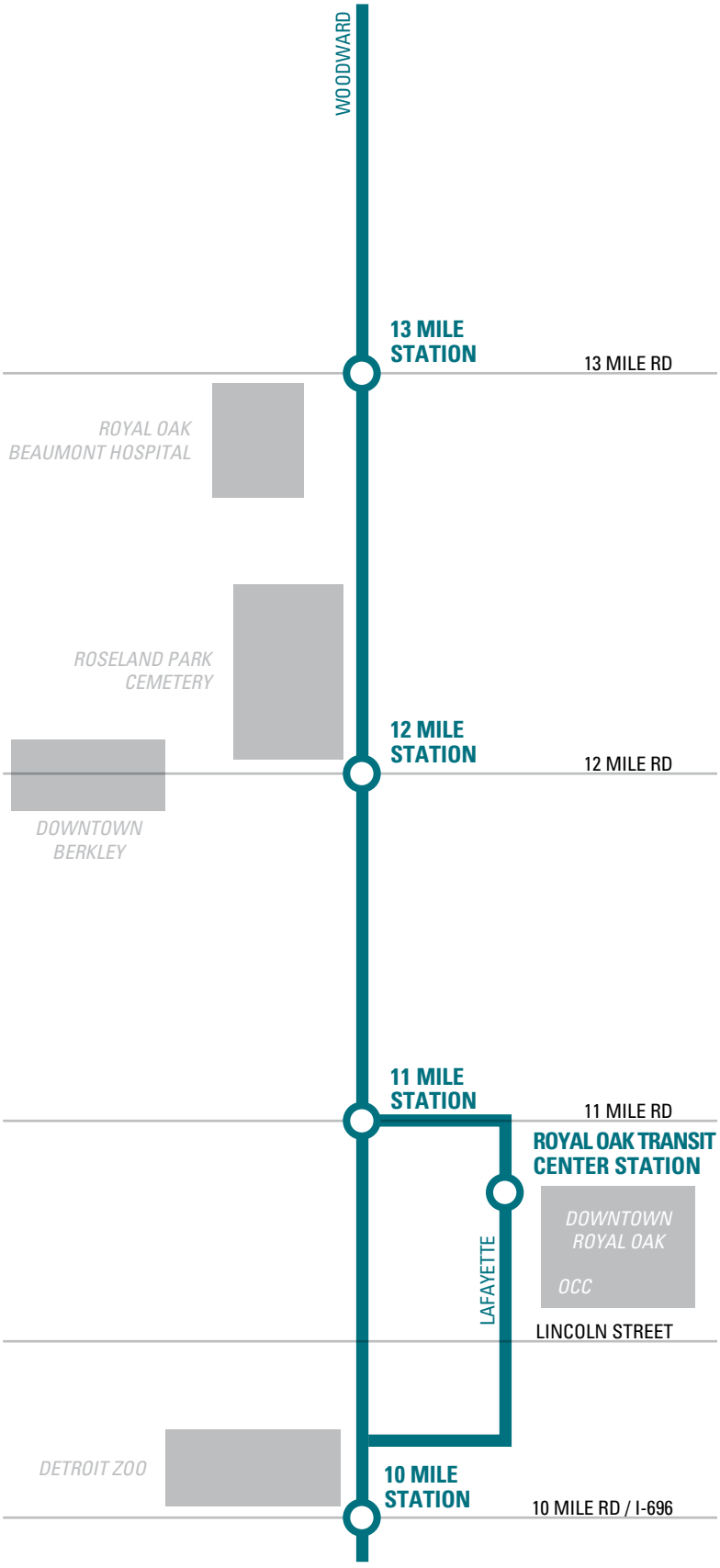


FIGURE 5-8. ALIGNMENT AND STATIONS, 14 MILE ROAD TO 10 MILE ROAD

Cross section

The recommended cross section for the Mainline alignment consists of exclusive, median-center running transit lanes. The median would be reconstructed to accommodate the exclusive transit lanes and expanded into the existing median-edge general purpose lanes. Transit lanes will be delineated from general purpose lanes by the physical barrier of the median, red paint, and standard BUS ONLY pavement markings (MUTCD 3D-01). **Figure 5.9** below illustrates the proposed conditions for all segments from 14 Mile Road south to McNichols Road.

The recommended cross section for the Royal Oak alignment consists of exclusive, edge running transit lanes. No road reconstruction would be required to accommodate the exclusive transit lanes, although re-striping of existing general purpose lanes and parking lanes would be required. The transit lane will be delineated from general purpose lanes by a solid white line, red paint, and standard BUS ONLY pavement markings (MUTCD 3D-01).

FIGURE 5-9. CROSS SECTION, 14 MILE ROAD TO MCNICHOLS ROAD

5.1.5 10 MILE ROAD TO 8 MILE ROAD

This segment represents the portions of Pleasant Ridge and Ferndale that are located along the Woodward Avenue corridor.

Mainline alignment

This alignment alternative maintains service along Woodward Avenue throughout this entire segment.

Station Locations

14. 9 Mile Road Station (Tier 2)

A station is recommended north of 9 Mile Road to directly serve Downtown Ferndale, the southern portion of Pleasant Ridge, and adjacent neighborhoods. This station could be constructed within the center of the median to serve both NB and SB median-center transit lanes (which would require the transit lanes to veer slightly to access the station), or separate stations could be constructed within the edges of the median to serve the NB and SB median-center transit lanes separately. This is a Tier 2 station due to higher ridership projections but lower development potential.

15. 8 Mile Road Station (Tier 1)

A station is recommended south of 8 Mile Road to directly serve existing and future development at the Michigan State Fairgrounds site, adjacent neighborhoods, and to provide intermodal connections with DDOT and SMART bus service. This station could be integrated into the design of the existing State Fairgrounds Transit Center. This is a Tier 1 station due to higher ridership projections, higher intermodal connections, and direct access to the State Fairgrounds site.

Cross section

The recommended cross section for this segment consists of exclusive, median-center running transit lanes. The median would be reconstructed to accommodate the exclusive transit lanes. Transit lanes will be delineated from general purpose lanes by the physical barrier of the median, red paint, and standard BUS ONLY pavement markings (MUTCD 3D-01). South of the I-696 bridge, the transit lanes would transition to the inside lane in order to travel north into Royal Oak. See **Figure 5-9**.

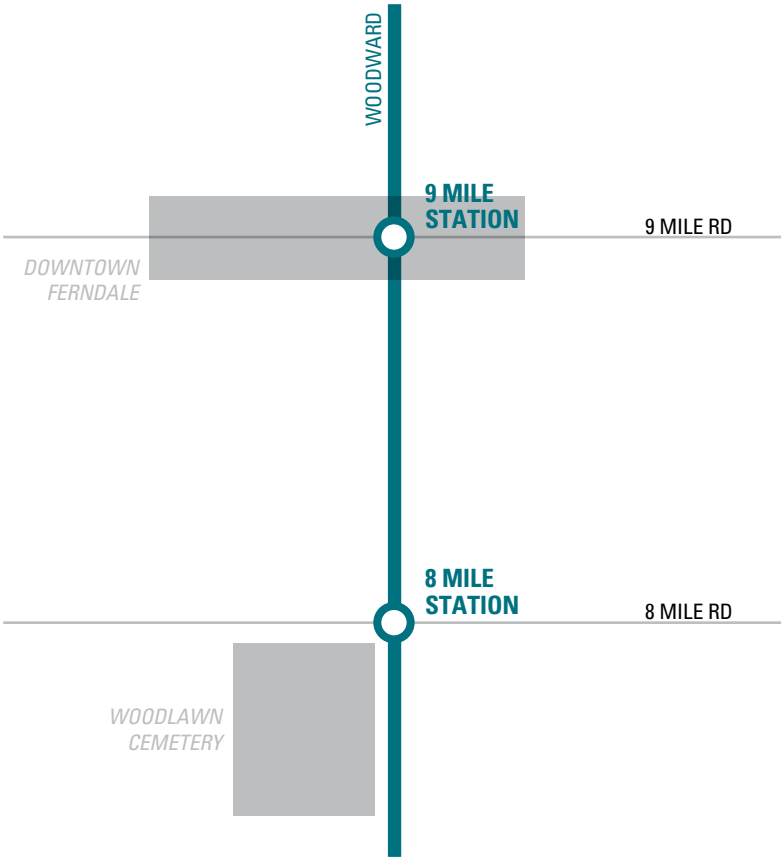


FIGURE 5-10. ALIGNMENT AND STATIONS, 10 MILE ROAD TO 8 MILE ROAD

5.1.6 8 MILE ROAD TO GRAND BOULEVARD

This segment represents the northern portion of Detroit and Highland Park that are located along the Woodward Avenue corridor.

Mainline alignment

This alignment alternative maintains service along Woodward Avenue throughout this entire segment.

Station Locations

16. 7 Mile Road Station (Tier 3)

A station is recommended north or south of 7 Mile Road to directly serve adjacent neighborhoods. This station could be constructed within the center of the median to serve both NB and SB median-center transit lanes (which would require the transit lanes to veer slightly to access the station), or separate stations could be constructed within the edges of the median to serve the NB and SB median-center transit lanes separately. This is a Tier 3 station due to higher ridership projections but lower development potential.

17. McNichols Road Station (Tier 3)

A station is recommended north or south of McNichols Road to directly serve adjacent neighborhoods. This station could be constructed within the center of the median to serve both NB and SB median-center transit lanes (which would require the transit lanes to veer slightly to access the station), or separate stations could be constructed within the edges of the median to serve the NB and SB median-center transit lanes separately. This is a Tier 3 station due to higher ridership projections but lower development potential.

18. Manchester Street Station (Tier 2)

A station is recommended north or south of Manchester Street to directly serve Downtown Highland Park and adjacent neighborhoods. This station could be constructed within the center of the roadway. Due to the narrow ROW within this segment, a single station would be constructed adjacent to a single bypass transit lane that both NB and SB transit vehicles would share to access the station. This is a Tier 2 station due to moderate ridership projections and moderate development potential.

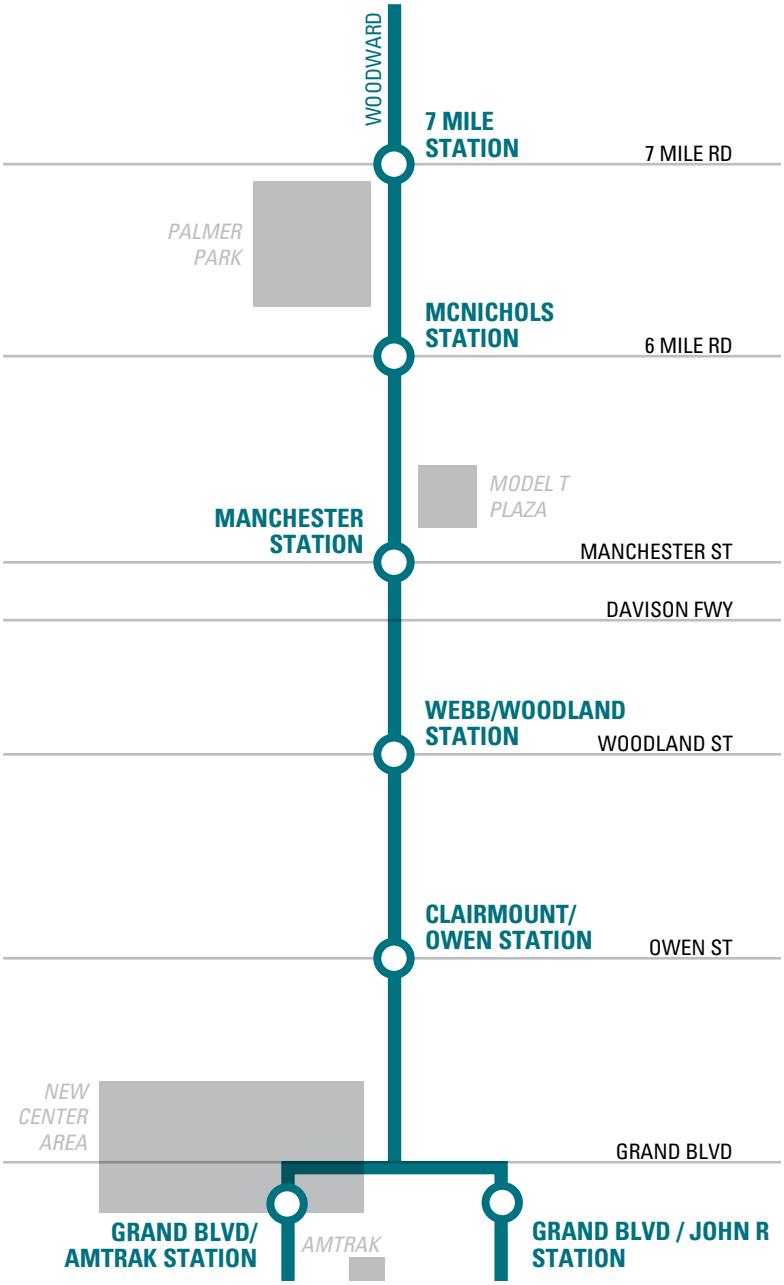


FIGURE 5-11. ALIGNMENT AND STATIONS, 8 MILE ROAD TO GRAND BOULEVARD

19. Webb Street/Woodland Street Station (Tier 3)

A station is recommended north or south of Webb/Woodland Streets to directly serve adjacent neighborhoods. This station could be constructed within the center of the roadway. Due to the narrow ROW within this segment, a single station would be constructed adjacent to a single bypass transit lane that both NB and SB transit vehicles would share to access the station. This is a Tier 3 station due to higher ridership projections but lower development potential.

20. Clairmount Street/Owen Street Station (Tier 3)

A station is recommended north or south of Clairmount/Owen Streets to directly serve adjacent neighborhoods. This station could be constructed within the center of the roadway. Due to the narrow ROW within this segment, a single station would be constructed adjacent to a single bypass transit lane that both NB and SB transit vehicles would share to access the station. This is a Tier 3 station due to higher ridership projections but lower development potential.

21. Grand Boulevard/Amtrak Station (Tier 1)

A station is recommended at the Detroit Amtrak Station to directly serve the New Center area and provide direct intermodal connections with Amtrak rail service. This station could be integrated into the design of the existing transit center. This is a Tier 1 station due to higher ridership projections, higher intermodal connections, and direct access to the New Center Area.

Cross section

The recommended cross section for this segment consists of exclusive, median-center running transit lanes. From 8 Mile Road to McNichols Road, the median would be reconstructed to accommodate the exclusive transit lanes. See **Figure 5-9**.

From McNichols Road to Grand Boulevard (where the ROW is between 100'-120'), a 4' concrete/vegetated barrier would be constructed to physically separate the exclusive transit lanes from general purpose lanes. Transit lanes will be delineated from general purpose lanes by the physical barrier of the median/barrier, red paint, and standard BUS ONLY pavement markings (MUTCD 3D-01).

FIGURE 5-12. CROSS SECTION, MCNICHOLS ROAD TO GRAND BOULEVARD

5.1.7 GRAND BOULEVARD TO ROSA PARKS TRANSIT CENTER

This segment represents the southern terminus of the project, from Grand Boulevard to the Rosa Parks Transit Center. There are two alignment alternatives in this segment that are recommended for further analysis.

Mainline alignment

This alignment alternative maintains service along Woodward Avenue throughout this entire segment. Further analysis of operational impacts related to the M-1 Rail streetcar is required for this alignment alternative.

Detroit #4 alignment

This alignment alternative utilizes both Cass Avenue and John R. Street to create a one-way transit loop to directly access the Rosa Parks Transit Center, Detroit's Central Business District (CBD), Wayne State University, Detroit Medical Center, adjacent neighborhoods, and limit operational conflicts with the M-1 Rail streetcar. SB transit vehicles would divert off-Woodward to Cass Avenue using Grand Boulevard, and travel south on Cass Avenue before terminating at the Rosa Parks Transit Center. NB transit vehicles would travel north on Cass Avenue, divert to John R. Street using the I-75 service drive, and travel north on John R. Street before diverting back to Woodward Avenue using Grand Boulevard.

Station Locations

22. Warren Avenue Station (Tier 2)

A station is recommended north or south of Warren Avenue for both the Mainline alignment and Detroit #4 alignment to directly serve Wayne State University, Detroit Medical Center, and adjacent neighborhoods. For the Mainline alignment, NB and SB transit vehicles could share planned curbside stations with the M-1 Rail streetcar. For the Detroit #4 alignment, curbside stations on Cass Avenue and John R. Street could be constructed to serve the one-way transit vehicles. This is a Tier 2 station due to moderate ridership projections, but higher development potential, and direct access to Wayne State University and Detroit Medical Center.

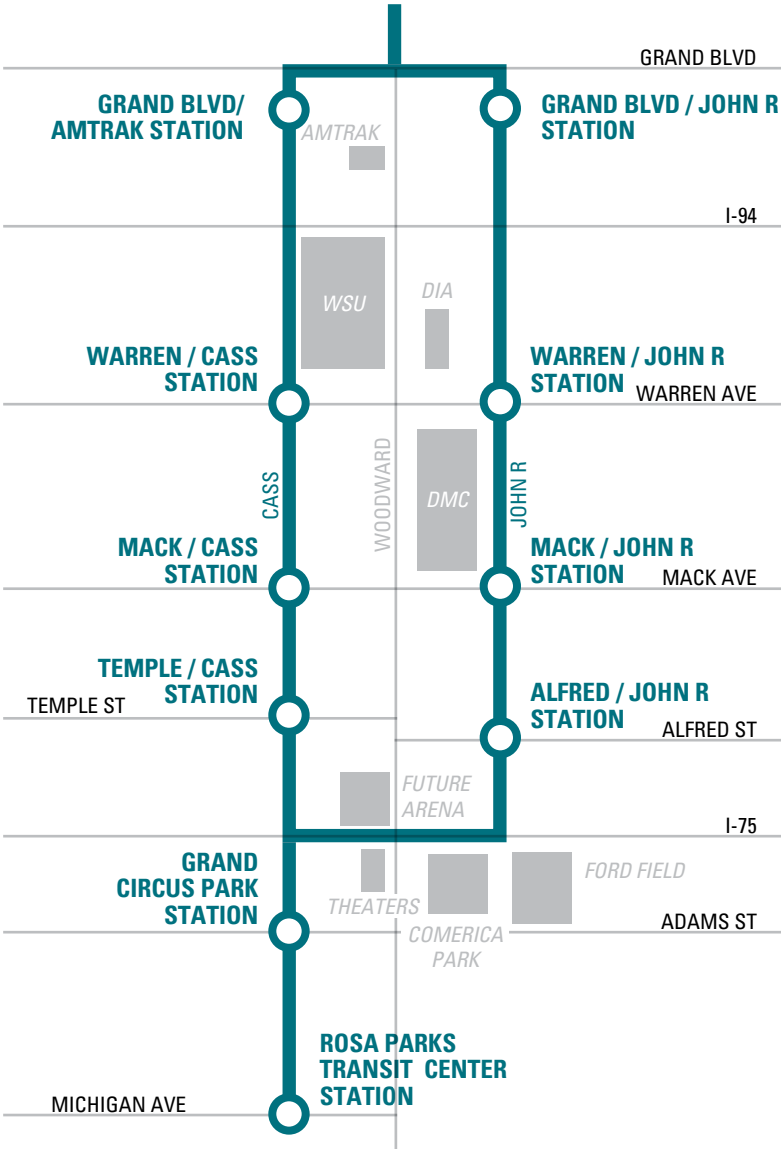


FIGURE 5-13. ALIGNMENT AND STATIONS, GRAND BOULEVARD TO ROSA PARKS TRANSIT CENTER

23. Martin Luther King Boulevard/Mack Avenue Station (Tier 2)

A station is recommended north or south of Martin Luther King Boulevard/Mack Avenue for both the Mainline alignment and Detroit #4 alignment to directly serve Detroit Medical Center, and adjacent neighborhoods. For the Mainline alignment, NB and SB transit vehicles could share planned curbside stations with the M-1 Rail streetcar. For the Detroit #4 alignment, curbside stations on Cass Avenue and John R. Street could be constructed to serve the one-way transit vehicles. This is a Tier 2 station due to moderate ridership projections, but higher development potential, and direct access to Detroit Medical Center.

24. Temple Street Station (Tier 3)

A station is recommended north or south of Temple Street for both the Mainline alignment and Detroit #4 alignment to directly serve Detroit Medical Center, and adjacent neighborhoods. For the Mainline alignment, NB and SB transit vehicles could share planned curbside stations with the M-1 Rail streetcar. For the Detroit #4 alignment, curbside stations on Cass Avenue and John R. Street could be constructed to serve the one-way transit vehicles. This is a Tier 3 station due to lower ridership projections.

25. Grand Circus Park Station (Tier 2)

A station is recommended north or south of Adams Street for both the Mainline alignment and Detroit #4 alignment to directly serve Detroit's CBD. For the Mainline alignment, NB and SB transit vehicles could share planned curbside stations with the M-1 Rail streetcar adjacent to Grand Circus Park. For the Detroit #4 alignment, curbside stations on Cass Avenue could be constructed north or south of Adams Street. This is a Tier 2 station due to higher ridership projections but moderate development potential.

26. Rosa Parks Transit Center Station (Tier 1)

A station is recommended at the Rosa Parks Transit Center to directly serve Detroit's CBD and provide direct intermodal connections with SMART and DDOT bus service. This station could be integrated into the design of the existing transit center. This is a Tier 1 station due to higher ridership projections, higher intermodal connections, and direct access to the Detroit's CBD.

Cross section

The recommended cross section for the Mainline alignment consists of shared, edge-running transit lanes that would accommodate both rapid transit vehicles and streetcars. No road reconstruction would be required to accommodate the shared transit lanes, although significant analysis would be required to coordinate service between the two systems.

The recommended cross section for the Detroit #4 alignment on Cass Avenue consists of a shared, edge running, one-way transit lane. No road reconstruction would be required to accommodate the shared transit lane, although re-striping of existing general purpose lanes and parking lanes would be required. The shared transit lane will be delineated from general purpose lanes by a solid white line.

FIGURE 5-14. CROSS SECTION, CASS AVENUE

The recommended cross section for the Detroit #4 alignment on John R. Street consists of an exclusive, edge running, one-way transit lane. No road reconstruction would be required to accommodate the exclusive transit lane, although re-striping of existing general purpose lanes and parking lanes would be required. The transit lane will be delineated from general purpose lanes by a solid white line, red paint, and standard BUS ONLY pavement markings (MUTCD 3D-01).

FIGURE 5-15. CROSS SECTION, JOHN R STREET

6.0 Next Steps

The selection of a local preferred alternative (LPA) represents the conclusion of the Woodward Avenue Rapid Transit Alternatives Analysis, but is only the first step of a long process towards project implementation and operation. This section outlines the next steps for advancing the LPA through a series of activities including a) Federal environmental review; b) the Federal Transit Administration's (FTA) Capital Investment Grant (CIG) program project development process; and c) the maturation of the Southeast Michigan Regional Transit Authority (RTA) and establishment of a dedicated revenue source to provide local match to Federal capital funding and ensure a reliable stream of revenue to operate and maintain (O&M) the proposed BRT system on Woodward Avenue.

6.1 Federal Environmental Review

Pursuant to the National Environmental Policy Act of 1969 (NEPA), all Federally-funded capital infrastructure projects must be subject to a review of their impacts on the human, natural, and physical environment. Because it is expected that Federal funding will be pursued to partially fund the capital cost of a new BRT line on Woodward Avenue, the LPA is therefore subject to NEPA. NEPA is intended to ensure that Federal agencies incorporate environmental values into their decisions and actions. NEPA further provides for a formal process for the public review and comment of anticipated impacts as an input for determining local political support for the proposed project as well as a Federal decision to fund or take any other necessary actions for it.

Transportation project effects on the environment can vary from very minor to very significant. To account for the variability of project impacts, three "classes of action" have been established to determine how compliance with NEPA is carried out and documented. An Environmental Impact Statement (EIS) is required for projects where it is known that the action will have a significant effect on the environment. An Environmental Assessment (EA) may be prepared for actions in which the degree of environmental impacts is not clearly established, but is not expected to be significant. Finally, Categorical Exclusions (CE) are those actions that do not individually or cumulatively have a significant effect on the environment. The Federal lead agency for NEPA analysis and documentation determines the most appropriate class of action. FTA will serve as the lead Federal agency for the environmental review of the Woodward Avenue BRT LPA, and it is expected that an EA will be the appropriate class of action for the project.

The RTA is expected to serve as the lead local agency for the subsequent EA. Other Federal, state, and local agencies with relevant jurisdiction will also be involved, and community groups and the general public will be provided an opportunity to participate in the review. The EA will examine a wide range of anticipated impacts to the environment of the LPA, including its effects on transportation, land use, adjacent neighborhoods and community facilities, cultural and historical assets, air and water quality, and several other natural and community resources. If and where negative impacts are identified, mitigation measures will be explored. The EA will also lead to further refinement of the project's design, capital cost estimate, and operating plan, and, if warranted by the financial analysis described later in this section, will evaluate the potential environmental impacts which would be generated if the LPA was implemented in two or more phases.

Should the environmental analysis and interagency review during the EA process find that the project has no significant impacts on the quality of the environment, FTA will issue a Finding of No Significant Impact (FONSI), thus completing the NEPA process. The EA for the BRT LPA is expected to take 12 to 24 months to complete.

For the purposes of technical preparation for the environmental review for the Woodward BRT, an Environmental Assessment (EA) was assumed pending formal guidance from FTA. The EA was deemed suitable due to the nature of the mode being BRT that would be within in the existing Right of Way (ROW) of the Woodward Avenue. Additional assumptions include that Cultural Resources Review would incorporate the exhaustive Section 106 work that was performed for the Woodward Light Rail Environmental Impact Statement (EIS that received a Record of Decision (ROD) in July 2011).

6.2 Capital Investment Grant Program Project Development

NEPA applies to all Federally-funded public transportation capital projects. When FTA discretionary Capital Investment Grant (CIG) program funding is being contemplated as a specific Federal revenue source – as it is for the Woodward Avenue BRT LPA - additional requirements apply. These requirements include a series of FTA approvals based upon the level of development of a proposed project and its "rating" against a set of statutory criteria intended to measure the merits of the project and the strength of the local financial commitment to match Federal funds for its construction and its ongoing O&M. Since the CIG program is intensely competitive and over-subscribed, these ratings help FTA to distinguish the most worthy projects for Federal investment.

CIG funding is eligible to fund up to 80 percent of a candidate projects' capital costs. However, due to the demand for funding, it is rare when FTA provides more than 50 percent of a project's cost through the program.

The specific project development requirements associated with CIG funding is established by the Moving Ahead for Progress in the 21st Century Act (MAP-21), which authorizes FTA programs. Although MAP-21 expired on September 30, 2014, it has been temporarily extended until a new Federal surface transportation authorization is passed by Congress and signed into law by the President. The process described here therefore reflects current MAP-21 CIG requirements. This process is not expected to change significantly under a future Federal authorization.

The Capital Investment Grant program features three categories of eligibility:

- New Starts: "Fixed guideway" projects such as heavy rail transit (HRT), light rail transit (LRT), commuter rail, BRT and streetcars costing more than $250 million or requesting greater than $75 million in CIG funding.
- Small Starts: Projects costing less than $250 million and requesting less than $75 million in CIG funding. In addition to the transit modes identified above, Small Starts funding may be used for "corridor-based bus rapid transit" projects that do not operate in a dedicated right-of-way.
- Core Capacity: Capital investment projects of any cost and funding amount that add capacity to existing rail or BRT systems.

The 27-mile Woodward Avenue BRT LPA is expected to qualify as a New Starts project. However, if the RTA decides to phase the implementation of the LPA, it is possible that each individual phase may qualify as a Small Start.

6.2.1 PROJECT DEVELOPMENT

The first step in the CIG process for both New Starts and Small Starts projects is FTA approval into the Project Development (PD) phase. Application to PD may occur simultaneous with, or anytime after, the initiation of the NEPA process. To be approved into PD, a project sponsor must demonstrate that sufficient funding has been committed to complete NEPA and associated design work and to develop the New Starts/Small Starts criteria for the project that FTA will use to evaluate and rate it for future approvals. The PD request must also feature a reasonable project schedule and must clarify the roles and responsibilities of stakeholder agencies in the development and funding of the project.

PD approval comes with pre-award authority, meaning that any local funding expended on project development activities can be counted as local match towards a future Capital Investment Grant.

6.2.2 PROJECT EVALUATION AND RATING

Proposed New Starts and Small Starts investments must be evaluated and rated according to project justification and local financial commitment criteria set forth in MAP-21. MAP-21's project justification criteria include the following:

- Mobility Improvements,
- Cost Effectiveness,
- Congestion Relief,
- Environmental Benefits,
- Economic Development, and
- Land Use.

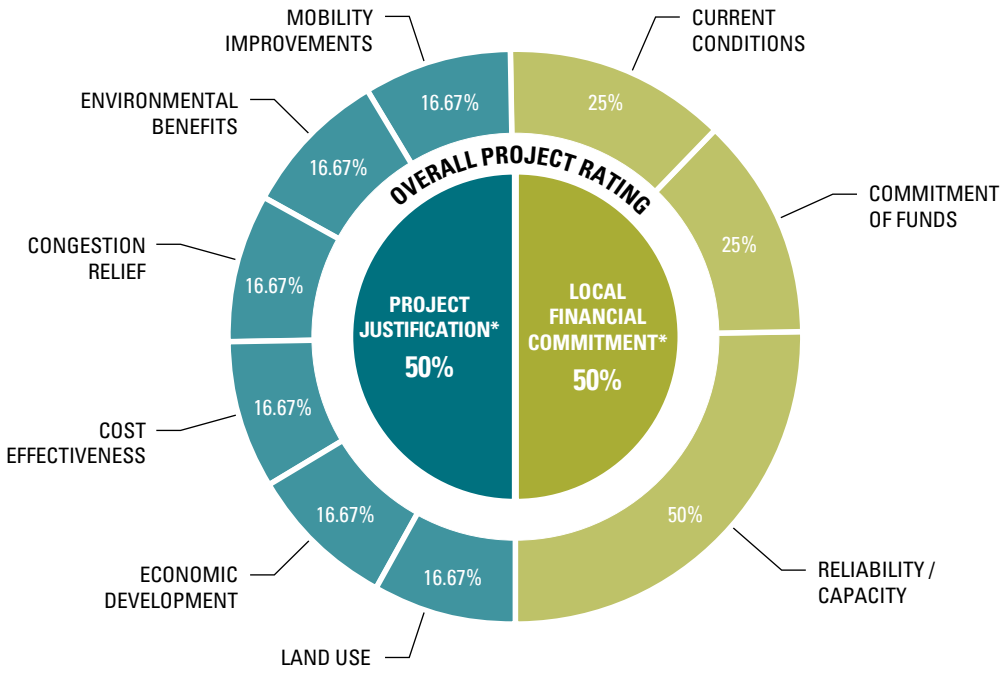
MAP-21 also requires FTA to examine the following when evaluating and rating local financial commitment:

- Current Financial Condition (of the project sponsor);
- Commitment of Capital and Operating Funding; and
- Reliability and Reasonability of the Project's Financial Plan (including the availability of local resources to recapitalize, maintain, and operate the overall existing and proposed public transportation system without requiring a reduction in existing services).

Each criterion is rated on a five-point scale, from Low to High. Summary project justification and local financial commitment ratings are prepared and combined to arrive at an overall project rating. For a New Starts project to advance into Engineering (as described in the following page), or for either a New Starts or Small Starts project to receive a Capital Investment Grant, it must achieve an overall project rating of at least Medium, as well as receive at least Medium summary ratings for both project justification and local financial commitment. **Figure 6.1** below presents FTA's New Starts and Small Starts evaluation framework.

FIGURE 6-1. NEW AND SMALL STARTS PROJECT EVALUATION AND RATING UNDER MAP-21

Source: FTA New and Small Starts Evaluation and Rating Process Final Policy Guidance. August 2013.



*Must be at least "Medium" for project to get "Medium" or better Overall Rating

FTA must evaluate and rate candidate New Starts projects for the purpose of approving their entry into Engineering, which is the second phase of the CIG process. Engineering approval occurs after completion of NEPA. In addition to a project's evaluation and rating against the MAP-21 project justification and local financial commitment criteria, FTA also reviews each project sponsor's technical capacity to effectively manage the design and construction of their proposed capital investment. The project's design and financial plan are expected to be refined during Engineering, resulting in a final project scope, schedule, and budget, as well as a 20-year capital and operating plan for its construction and operation.

6.2.3 CIG FUNDING

Small Starts projects do not have to apply for nor receive approval for Engineering. However, like New Starts projects, Small Starts must also be subject to all Federal environmental requirements, further design, and the development of a robust financial plan and project justification criteria in order to be considered for a Federal Capital Investment Grant. In fact – for both candidate New Starts and Small Starts investments – FTA will execute a Capital Investment Grant only when sufficient funding remains available within the program for obligation and the project achieves the following milestones:

- The project's scope, schedule, and budget is defined well enough to mitigate major design and construction risks and be determined by FTA to be reliable and ready for a capital grant;
- The project's financial plan demonstrates the local financial commitment of all but CIG funding to cover the project's capital cost; in other words, 50 percent of project costs. The financial plan must also demonstrate healthy financial contingencies should project costs increase or CIG funding does not materialize at the level or schedule assumed by the sponsor. Finally, the financial plan must demonstrate sufficient funding to operate the proposed investment while at the same time maintaining (if not enhancing) the current level of transit service throughout the service area of the project sponsor;
- The project sponsor is deemed by FTA to possess the technical capacity to construct and operate the proposed project; and
- The project receives a rating of at least Medium against the MAP-21 project justification and local financial commitment criteria.

6.3.0 FURTHER ESTABLISHMENT OF THE RTA AND DEDICATED REVENUE SOURCE

Section 6.2 described the requirements for receiving Federal discretionary funding to implement the BRT LPA and showed that in order to receive Federal discretionary transit funding the RTA will need to secure both the technical capacity to manage the construction and operation of the project and a dedicated and reliable source of revenue to match New Starts (or Small Starts) funding. Achieving both will require an unprecedented level of regional commitment to the improvement of transit on Woodward Avenue, as well as in future corridors of regional significance (Gratiot and Michigan Avenues, M-59, and others as determined by the RTA).

It is expected that as the Woodward Avenue BRT LPA progresses through NEPA, the RTA will in parallel evaluate staffing plans and budgets necessary to manage the subsequent design, construction, and operation of the project. As importantly, it will further analyze the cost to build and operate the project (as well as transit improvements in other regional corridors) and evaluate multiple revenue scenarios to meet cost requirements. These scenarios may include the identification of two or more operable segments within the scope of the BRT LPA and the generation of local revenue requirements necessary to implement these segments sequentially, rather than at once. It is anticipated that these collective analyses will ultimately inform the development of a long range RTA regional transit plan and the structure of a region-wide referendum which would provide voters in Macomb, Oakland, Washtenaw, and Wayne Counties with the opportunity to approve a new dedicated revenue source to cover the long-term administrative (including BRT project management staffing) costs of the RTA as well as a defined portion of the RTA plan.

It is anticipated that the RTA referendum might be held as early as November 2016. If successful, and if the revenues generated are sufficient to meet FTA requirements for a Capital Investment Grant, it is possible that the Woodward Avenue BRT LPA – or an initial segment of it – could be built and in operation by 2020.

Appendix A

FIGURE A-1. ALIGNMENT ALTERNATIVES EVALUATION RESULTS

BETTER ◎ ◒ ● WORSE

	ALIGNMENT ALTERNATIVES										
	DETROIT					SOUTH OAKLAND				NORTH OAKLAND	
CATEGORY	MAINLINE	1	2	3	4	MAINLINE	ROYAL OAK 1	ROYAL OAK 2	BERKLEY 1	PONTIAC 1	PONTIAC 2
1. MOBILITY											
1A. Transit Travel Time	●	◒	◒	◒	◎	◎	◒	●	◒	◒	◒
1B. Connectivity to Major Destinations	◎	●	◒	◎	◎	●	◎	◎	◒	◒	◒
1C. Transfer Opportunities and Intermodal Connections	◎	●	◒	◒	◎	◒	◎	◎	●	◎	◒
1D. Transit Ridership	◎	◎	◎	◒	◎	◒	◎	◎	●	◎	◒
1E. Legibility (ease of users' understanding of a route)	◎	◒	◒	●	◒	◎	●	◒	●	◒	◎
1F. Service to Transit Dependent Populations Within 1/2-Mile of Station Locations	●	◒	◒	◎	◎	●	◎	◎	◒	◎	◎
2. TRAFFIC AND SAFETY											
2A. Accommodation of Bicycle Lanes [1]	◎	●	●	◒	◒	N/A	N/A	N/A	N/A	◎	◒
2b. Auto Accessibility [2]	◒	◒	◒	◒	◎	N/A	N/A	N/A	N/A	◒	◎
2c. Streetcar Operational Impacts [3]	●	◎	◒	◒	◎	N/A	N/A	N/A	N/A	N/A	N/A
3. ECONOMIC DEVELOPMENT											
3A. Jobs Access	◎	◒	◒	◎	◎	◒	◎	◎	●	◒	◒
3B. Downtown Viability	◎	◒	◒	●	●	●	◎	◎	◒	◒	◎
3C. On-Street Parking	◎	●	◒	◒	◒	◎	●	●	◎	◒	●
3D. TOD Opportunities	◒	◒	◒	◎	◒	◒	◎	◎	◒	◒	◒
4. COST											
4A. Capital Cost	●	◎	◎	◒	◒	◎	●	●	◒	◒	◒
4B. Operating and Maintenance Cost [4]	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
5. EASE OF IMPLEMENTATION											
5A. Implementation	●	◎	◎	◒	◒	◎	◒	◒	●	◒	◎
5B. Community Acceptance	●	◎	◒	◒	◎	◎	◎	●	◒	◒	◒

[1] Bicycle lanes were currently present within these alignment alternatives.
[2] This criterion relates to any conversion of one-way street to two-way. No conversions are anticipated within South Oakland County.
[3] This criterion relates to impacts with the M-1 Rail streetcar in Detroit. No impacts exist north of Grand Boulevard.
[4] Initial cost estimates showed no significant difference in operating costs for any alignment alternatives.

FIGURE A-2. STATION LOCATION EVALUATION RESULTS

BETTER ◉ ◒ ● WORSE

CRITERIA	STATION LOCATIONS														
	Rosa Parks Transit Center	Grand Circus Park	Temple	MLK/Mack	Warren	Amtrak	West Grand	Clairmount/ Owen	Webb/ Woodland	Manchester	McNichols	7 Mile	8 Mile	9 Mile	Pleasant Ridge
Ridership	◉	◒	◉	◒	◉	◒	◉	◉	◉	◉	◉	◉	◉	◒	●
Connection to destinations	◉	◉	◉	◉	◉	◉	◉	●	●	◒	●	●	●	●	●
Connection to downtowns	◉	◉	◒	◒	◉	◉	◉	●	●	◉	●	●	●	◉	●
Station spacing	◉	◒	◒	◒	◒	◒	◒	◉	◉	◉	◉	◉	◉	◉	◒
TOD opportunities	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	●	◉	◒	●
Connection to crosstown routes	◉	◒	●	◉	◉	◒	◉	◉	◉	◉	◉	◉	◉	◉	◒
Connection to transit centers	◉	◒	●	●	◒	◉	◉	●	●	●	●	●	◉	●	●
Community support	◉	◉	◒	◉	◉	◉	◉	◒	◒	◉	◉	◉	◉	◉	◉
Potential park-and-ride locations	◒	●	◉	●	●	●	●	●	●	◉	●	●	◉	●	●
Ease of pedestrian access	To be further evaluated in next phase														
ROW availability	To be further evaluated in next phase														
OVERALL SCORE	◉	◉	◒	◉	◉	◉	◉	◒	◒	◉	◉	◒	◉	◉	●

CRITERIA	STATION LOCATIONS														
	10 Mile	Royal Oak Transit Center	11 Mile	11 Mile/ Coolidge	12 Mile/ Coolidge	12 Mile	13 Mile	14 Mile/ Lincoln	Maple/ Bowers	Oak/ Quarton	Long Lake/ Cranbrook	Square Lake	MLK	Downtown Pontiac	Pontiac Transit Center
Ridership	◒	◉	◉	●	●	●	◒	●	◒	●	●	●	●	◒	●
Connection to destinations	◉	◉	●	●	●	●	◉	●	●	●	●	●	◉	●	●
Connection to downtowns	◒	◉	●	◒	◉	◒	●	●	◉	◉	◉	●	●	◉	●
Station spacing	◉	◉	◉	●	●	◉	◉	◉	◉	◉	◉	◉	◉	◉	◒
TOD opportunities	◉	◒	◒	●	●	●	◉	◒	◉	◒	●	◒	◉	◉	◉
Connection to crosstown routes	◉	◉	◉	◉	◉	◒	◉	◉	◉	●	●	●	●	◉	◒
Connection to transit centers	●	◉	●	●	●	●	●	●	◒	●	●	●	●	●	◉
Community support	◉	◉	◉	◒	◒	◉	◉	◒	◉	◒	●	●	◉	◉	◉
Potential park-and-ride locations	◒	◉	●	●	◒	●	◒	●	◉	◒	●	◒	◉	◒	◉
Ease of pedestrian access	To be further evaluated in next phase														
ROW availability	To be further evaluated in next phase														
OVERALL SCORE	◉	◉	◒	●	◒	◒	◉	◒	◉	◒	●	●	◒	◉	◉

Woodward Avenue Rapid Transit Alternatives Analysis

Locally Preferred Alternative

Southeast Michigan Council of Governments

SEMCOG