1.0 Purpose and Need

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1.0 Purpose and Need

1.1 Introduction

The Federal Transit Administration (FTA), as the lead Federal agency, and the City of Detroit, as the Project sponsor, jointly prepared this Final Environmental Impact Statement (FEIS) to evaluate and assess potential impacts to the human and natural environment which may result with construction and operation of the proposed Woodward Avenue Light Rail Transit (LRT) Project ("the Project"). The Project includes construction and operation of a LRT System along the 9.3 mile Woodward Avenue Corridor ("the Corridor") in two phases. The City intends to build the entire 9.3 mile LRT system at once (both phases); however, this FEIS contemplates phased mitigation should Phase I be constructed before Phase II. Phase I, which is the 3.4 mile segment of the LRT system that runs through Downtown, was initiated through an application by the Michigan Department of Transportation (MDOT) for Transportation Investment Generating Economic Recovery (TIGER) funding from the U.S. Department of Transportation. The TIGER grant has since been transferred from MDOT to the City of Detroit ("the City"). The City will use the awarded $25 million TIGER grant, along with local and independent third party funds, to fund Phase I of the proposed Project. Funding to design and construct Phase II of the Project will be identified and obtained at a later date.

This chapter summarizes previous planning activities and the transportation system context for the Project and identifies the need for and purpose of LRT in the study.

1.1.1 Public-Private Partnership

The City partnered with M-1 Rail, a consortium of private investors pledging funds to the Project. FTA designated M-1 Rail, as a partner in the project, as a Participating Agency, which is defined at 23 USC 139. M-1 Rail has been included as a Participating Agency and participates in the Coordination meetings with the other Cooperating and Participating agencies. As a private institution, and in accordance with FTA regulations at 23 CFR 771.109(c)(6), they were afforded the opportunity to provide comments and participate in the EIS process. However, the final selection of a Preferred Alternative was made by the City.

1.1.2 Alternatives Evaluated in the FEIS

The Preferred Alternative selected by the City, Alternative A4, is a composite of the Project alternatives proposed in the DEIS (A1, B2, and B3), and all potential impacts were analyzed in the context of these alternatives. Therefore, all of the Project alternatives (A1, B2, B3, and A4) were carried forward into this FEIS.

1.1.3 Mitigation

The City intends to build the entire 9.3 mile LRT system at once, which includes Phase I and Phase II. However, if phased construction is warranted, Phase I will be built first, and Phase I mitigation will be implemented. When Phase II is built, the City will implement the mitigation described for Phase II, though in many instances, the type of mitigation is the same for both phases.

1.2 Summary of Purpose and Need

The purpose of the Project is to:

- Improve public transit service and provide greater mobility options for the Woodward Avenue Corridor;
- Improve transportation equity among all travelers;
- Improve transit capacity along the Corridor;
- Improve linkages to major activity centers along the Corridor; and
- Support the City's economic development goals and encourage reinvestment in Detroit's urban core.

The need for the Project is based on the following considerations:

- Strong existing bus ridership and large potential ridership due to major activity centers along the Corridor;
- A heavily transit-dependent population along the Corridor;
- Overcrowding, reliability issues, and lack of rapid transit alternatives with the current bus system;
- Air quality issues due to the region's nonattainment status; and
- Focus of local policy on transit improvements rather than roadway improvements as part of a more balanced and sustainable approach to future growth.

The proposed LRT system represents a major step to promote regional and local rapid transit improvements in Southeast Michigan.

1.3 Study Area Description and MPO Planning Background

1.3.1 Study Area Description

The study area (Figure 1-1) is located in Wayne County, Michigan. It comprises the Woodward Avenue Corridor, which extends 9.3 miles from Downtown Detroit (Downtown) near the Detroit River, north to the Michigan State Fairgrounds near 8 Mile Road. The majority of the study area lies within the City of Detroit, while approximately two miles (from Webb to McNichols [6 Mile] Streets) is within the City of Highland Park. The study area boundary extends approximately one-half mile to the east and west of the Corridor and is the area within which project impacts may occur.

From south to north, the study area includes the densely developed Downtown Central Business District (CBD) and many of the City's prominent historical sites, civic buildings, sports venues and cultural attractions; medical, higher education, and additional cultural institutions north of the CBD; well as residential areas and the Michigan State Fairgrounds.

Figure 1-1. Study Area Boundary and Cultural, Entertainment, Government, and Recreational Attractions and Destinations

Source: Woodward Avenue LRT Project Team, 2011

1.3.2 MPO Planning Background

The Project is included in the financially constrained 2035 *Regional Transportation Plan* of the Southeast Michigan Council of Governments (SEMCOG) - the Metropolitan Planning Organization (MPO). The Project is consistent with local land use and transportation plans and is supported by a series of local, regional, and State plans that have expressed the need to expand transit options in the Detroit region. The Detroit Transit Options for Growth Study (DTOGS), a systems planning analysis prepared by the Detroit Department of Transportation (DDOT), identified the Woodward Avenue Corridor as best suited for rapid transit; selected the Project

that is evaluated in this FEIS; and initiated FTA's New Starts planning process. DTOGS' goals, developed in collaboration with project stakeholders, focused on transportation and mobility, economic opportunity and investment, communities and environment, and public involvement.

1.4 Transportation Facilities and Services

1.4.1 Transit

Transit ridership in the study area is currently over 22,000 trips per weekday. Three primary carriers provide transit service in the study area:

- DDOT, the major transit provider in southeastern Michigan, operates slightly more than half of its 40 bus routes to Downtown from outlying neighborhoods, and 20 other routes operate east-west or north-south to connect neighborhoods; 10 of DDOT's Downtown-oriented routes run at least partially along Woodward Avenue, including Route 53, which runs the entire length from Downtown to 8 Mile Road and had an annual ridership of 3.8 million in 2009;
- Suburban Mobility Authority for Regional Transportation (SMART), the second largest transit provider in Michigan, operates six routes along Woodward Avenue within the study area with a combined annual ridership of 2.5 million in 2009 and;
- Detroit Transportation Corporation People Mover, providing connections among major activity nodes in Downtown via 13 stations on a fully automated, elevated rail system, with approximately 5,500 daily passengers in 2009.

In addition to the above, Transit Windsor of Ontario, Canada, operates one route that provides service to Detroit via the Detroit-Windsor Tunnel and circulates through Downtown, including along Woodward Avenue. Two transit centers are located at the southern and northern ends of the study area: the Rosa Parks Transit Center and the State Fair Transit Center, respectively. The former provides connections to 21 DDOT bus routes, the SMART suburban bus system, Transit Windsor, and the People Mover, while the latter is served by six bus routes and provides park-and-ride service at the northern end of the study area. Finally, Wayne State University and Detroit Medical Center, each with facilities in the study area, operate shuttle services between parking facilities and campus and hospital buildings, respectively, along fixed routes. The University's two shuttle routes are free for faculty and students; the Medical Center's shuttle is free for patients, employees, and visitors.

In addition to maintaining the existing bus system, SEMCOG's 2035 *Long Range Transportation Plan* (LRTP) includes the addition of three rapid transit lines: Ann Arbor-Detroit Regional Rail, Washtenaw-Livingston Commuter Rail Service, and LRT along Woodward Avenue. The LRTP proposes continued expansion of the rapid transit system to other major roadways, including M-59, Gratiot, and Woodward Avenue north of 8 Mile Road, as funding becomes available.

1.4.2 Passenger Rail

The Detroit-Chicago corridor is a federally-designated High Speed Rail Corridor and part of the Midwest Regional Rail system. Amtrak's Wolverine line provides intercity passenger rail service to Detroit, with its station located at Woodward Avenue and West Baltimore Street. In 2009, nearly 60,000 passengers boarded at the Detroit Amtrak station. The planned Ann Arbor-Detroit Regional Rail would also use this station, with service scheduled to begin at a future date.

1.4.3 Roadway System

Woodward Avenue, under local jurisdiction south of Adams Street and State Highway M-1 north of Adams Street, is located in an area with significant access to several State and U.S. highways, as well as the interstate system (Figure 1-1). Two freeways, M-10 and I-75, parallel Woodward Avenue in the study area to the west and east, respectively. These freeways are typically used for access to major destinations in the study area, with principal side streets serving as connectors. Woodward Avenue is used principally as a connector to Downtown or to destinations along the avenue for residents within and north of the study area.

Per MDOT statistics, Woodward Avenue carried between 20,000 and 25,000 vehicles on an average weekday in 2009. During the morning and evening peak hours, signalized intersections operate at generally acceptable levels of delay. Average auto travel time from Downtown to State Fair Avenue is about 15 minutes.

1.5 Travel Patterns and Markets

Woodward Avenue is a primary transportation corridor in the region with multiple activity nodes along its length, including local and regional attractors. Approximately 10 percent of trips both start and end within the study area, while the majority of trips start or end outside of the study area (Table 1-1). This reflects the number and range of cultural, entertainment, government, recreational, and other non-work related destinations along Woodward Avenue (Figure 1-1).

Table 1-1. Average Daily Work and Non-Work Trips to and from the Study Area (2005)

Type of Trip	Starting and Ending Within Study Area		Starting or Ending Outside of Study Area		Total Study Area Trips	
	Number	Percent	Number	Percent	Number	Percent
Work-Related	18,570	26%	232,088	33%	250,658	32%
Shopping	4,460	6%	52,534	8%	56,994	7%
K-12 School	1,702	2%	32,057	5%	33,759	4%
University	11,648	16%	41,948	6%	53,596	7%
Other	35,360	49%	339,118	49%	383,478	49%
Total	71,740		697,745		778,485	

Source: SEMCOG Travel Demand Model
Note: Percentages may not add up to 100% due to rounding.

In 2005, approximately 32 percent of all trips within the study area were work-related. The majority of the trips within the study area are non-work related, representing diverse trip types including shopping, school and university, recreational and cultural, and other trips that occur in the study area.

The study area is a heavily used transit corridor due to its density, the number and variety of destinations, and the high number of transit-dependent persons living and/or working in and visiting the study area on a daily basis. The socioeconomic indicators correlated to transit-dependence shown in Table 1-2 on the next page illustrate the significance of this population as a market for the existing transit services in the study area and for any future transit options.

The study area has experienced some economic redevelopment activity since 2000, most notably in Downtown and New Center (Figure 1-1). Several public and private initiatives which focus on

redevelopment and revitalization of the Corridor have been undertaken in both Detroit and Highland Park. The Detroit Strategic Framework Plan (Framework Plan) and the Woodward Avenue Transit-Oriented Development (TOD) Strategy are two key ongoing economic development initiatives promoting sustainable development and transit-supportive and targeted growth. They would likely expand the travel market for future transit expansion.

Table 1-2. Socioeconomic Indicators Correlated to Transit Dependence

Characteristic	Study Area		City of Detroit		Wayne County		7-County Region	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total Population	74,922		952,717		2,061,162		4,833,493	
Persons Age 65+	8,680	11.6%	99,854	10.5%	249,881	12.1%	567,361	11.7%
Persons Age 17 and Younger	17,874	23.9%	295,917	31.1%	577,032	28.0%	1,266,307	26.2%
Disabled Persons (Ages 5+)	18,256	27.0%	214,821	24.9%	366,751	19.4%	714,897	16.0%
Persons Living in Poverty	24,262	34.0%	243,240	26.0%	332,598	16.4%	503,599	11.0%
Households with income < $40,000	22,759	72.4%	210,401	62.4%	377,073	49.1%	742,720	40.2%
Zero-Car Households	11,987	38.2%	73,714	21.9%	106,146	13.8%	165,676	9.0%
1-Car Households	12,883	41.1%	148,532	44.1%	299,601	39.0%	3645,005	35.0%

Source: 2000 Census, SEMCOG Travel Demand Model Traffic Analysis Zone database
Notes: Percents are specific to each characteristic in each geographic area, and not related to the total population in each geographic area.
The seven-county SEMCOG region includes Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne Counties.

1.6 Performance of the System

Woodward Avenue carries between 20,000 and 25,000 vehicles per day, on average, and serves as the local bus system's busiest corridor. Additionally, suburban SMART routes on 8-Mile Road and Gratiot, Michigan, Grand River, and Jefferson Avenues converge in the Detroit CBD within the Woodward Avenue study area. Even outside the CBD, Woodward Avenue serves as an important transit corridor for suburban riders, with six bus routes serving the State Fair Transit Center. Performance of the existing transit system, comprising local, suburban, and Detroit People Mover services, would be improved with better connectivity among the services, which would be provided by the Project.

Currently, transit service in the study area suffer from three principal deficiencies: overcrowding, slow travel speeds (compared to travel by auto), and poor on-time performance. Transit demand exceeds supply, despite round-the-clock local bus service on Woodward Avenue (DDOT Route 53) and eight-minute service headways during peak hours. Route 53 is crowded and, on average, exceeds capacity by one-third during weekday peak times. During morning peak travel times, scheduled bus travel time on Route 53 along Woodward Avenue is about 33 minutes, compared to about 15 minutes by auto. Travel speeds will likely decrease and transit travel time will increase without transportation improvements in the study area to account for future traffic growth. Finally, recent statistics from April 2009 show on DDOT Route 53, the principal bus service along Woodward Avenue, that nearly one-quarter of buses were early, late, or no-shows due to operational issues, peak-hour traffic congestion, or extended dwell times at stops due to overcrowding.

The Detroit-Ann Arbor region is a non-attainment area for particulate matter ($PM_{2.5}$) and a maintenance area for carbon monoxide, which are indicators of the area's reliance on auto travel and bus transit. SEMCOG forecasts show that traffic congestion will worsen in the region (with consequent impacts on air quality and mobility) without other travel options.

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2.0 Alternatives Considered

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2.0 Alternatives Considered

2.1 Introduction

The Project evaluated in this Final Environmental Impact Statement (FEIS) was based on the Detroit Transit Options for Growth Study (DTOGS), prepared by the Detroit Department of Transportation (DDOT) and its planning partners, including the City of Detroit, neighboring cities, the Southeast Michigan Council of Governments (SEMCOG), Wayne County, the State of Michigan, and regional and Federal agencies. This chapter summarizes the Project planning analysis and describes the reasonable Project alternatives, including the No Build Alternative and Preferred Alternative (A4), which are evaluated in this FEIS. Since the publication of the Draft Environmental Impact Statement (DEIS), the Project alternatives were further refined and the Preferred Alternative was selected. The refinements, as well as the various concepts that were considered and dismissed, along with the development of the Preferred Alternative, are discussed in this chapter.

The Project involves the construction of a Light Rail Transit (LRT) system on Woodward Avenue from Downtown Detroit to 8 Mile Road (Figure 2-1). The LRT would be an at-grade system entirely within existing rights-of-way. It would be fully functional as a stand-alone project, but would be designed to accommodate possible future expansions. Section 2.4 describes the Preferred Alternative's alignment, LRT stations, associated facilities, and construction staging areas and phasing plan.

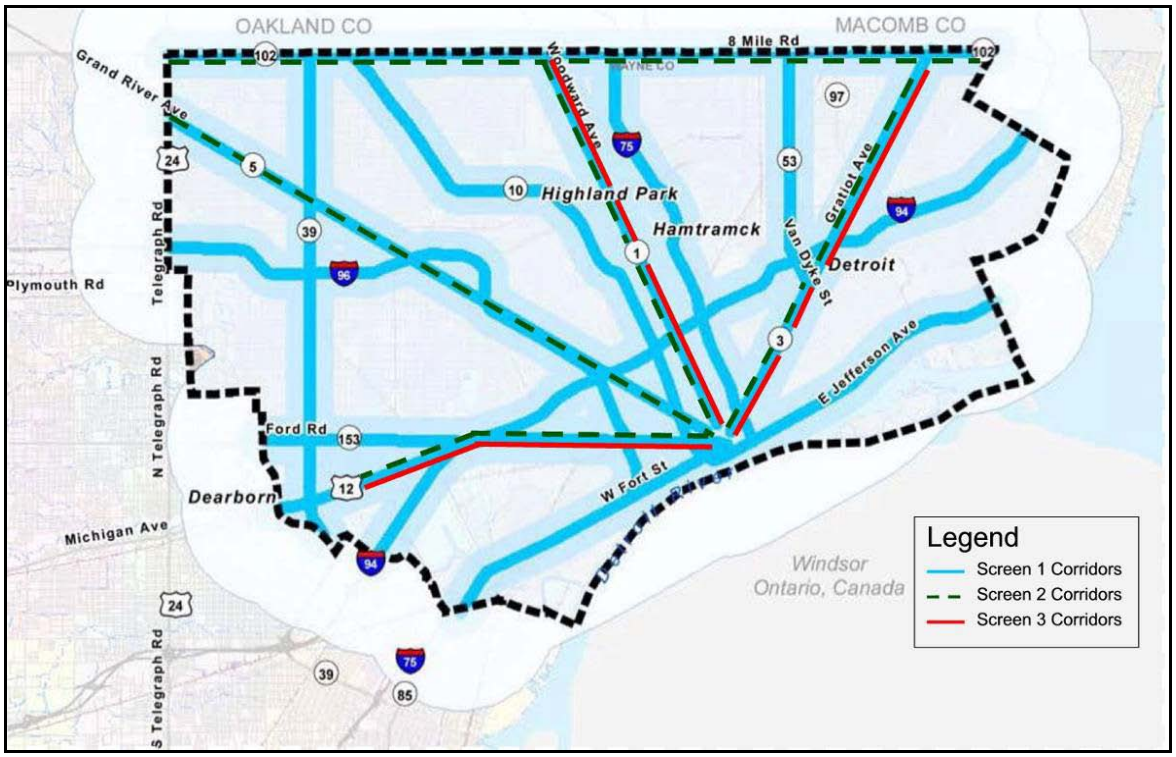
2.2 Alternatives Screening and Selection Process

2.2.1 Corridor and Transit Technology Alternatives

DTOGS identified a wide range of potential transit improvements in a study area encompassing the City of Detroit and the Cities of Dearborn, Hamtramck, and Highland Park. Fourteen transit corridors identified in the SEMCOG Regional Transportation Plan (Figure 2-1), including adjacent primary roadways within a two-mile buffer area, and 13 transit technologies were initially identified for evaluation.

DTOGS used a systematic process to narrow the number of alternatives, ultimately resulting in selection of the Project: LRT on Woodward Avenue between Downtown Detroit and the Michigan State Fairgrounds near 8 Mile Road.

Figure 2-1. Map of DTOGS Corridors



Source: *Detroit Transit Options for Growth Study: Locally Preferred Alternative Report*, Final Draft: June 2008, Expanded Version: April 2009; Detroit Department of Transportation

The evaluation process comprised:

- Screen 1 – A fatal flaw analysis using socioeconomic, transportation, social equity, conceptual engineering, and community goals and objectives criteria was employed to select 5 of the initial 14 corridors to advance to Screen 2 (Table 2-1).
- Screen 2 – Individual alignments within each of the remaining five corridors were evaluated for their suitability for rapid transit, using criteria addressing transportation and mobility; land use and development opportunities; communities and the environment; and cost and engineering considerations. In addition, input was received from residents, neighborhoods, and the business community at four DTOGS Project public open house meetings in March 2007, via the Project website, and through a Project survey about the initial 14 corridors.

  Thirteen initial transit technologies were also evaluated to determine their consistency with Project goals and their suitability for the remaining five corridors, using criteria addressing capital and operating and maintenance costs, right-of-way requirements, passenger-carrying capacity, and trip length. Eight technologies eliminated from further consideration were found to not sufficiently address study goals, were not well suited to the remaining corridors, and/or were cost prohibitive. The remaining technologies were then evaluated based on technical feasibility, ability to meet study goals and objectives, right-of-way opportunities and constraints, and public input obtained at the March 2007 open house meetings.

  On the basis of Screen 2 and public input, three rapid transit alignments and three transit technologies were advanced for detailed evaluation:

Rapid Transit Alignments

1. Gratiot Avenue – on Gratiot Avenue generally between Downtown Detroit and 8 Mile Road, and on Woodward Avenue between Downtown and New Center;
2. Michigan Avenue – on Michigan Avenue generally between Downtown and Evergreen Road, and on Woodward Avenue between Downtown and New Center; and,
3. Woodward Avenue – on Woodward Avenue generally between Downtown and 8 Mile Road

Transit Technologies

1. Conventional bus (i.e., the service currently operated by DDOT);
2. Bus rapid transit (BRT); and,
3. LRT

Detailed Definition and Analysis – The three alignments and three transit technologies advanced from Screen 2 were paired into six BRT and LRT alternatives that were further refined, including development of conceptual design and operating details, ridership forecasts, general capital, and operating and maintenance costs. A No Build and a Transportation System Management (TSM) alternative were also defined for each of the three alignments, consistent with FTA guidance. These alternatives were evaluated based on criteria addressing transportation and mobility, economic opportunity and investment, communities and the environment, cost-effectiveness per FTA's New Starts index for rating projects, and public input. Based on technical evaluations and strong public preference, LRT in the Woodward Avenue Corridor from Downtown Detroit to the Michigan State Fairgrounds near 8 Mile Road was selected as the Project. For more information, please see the DTOGS report located on the Project website at http://www.woodwardlightrail.com.

Table 2-1. DTOGS Alternatives Screening Evaluation: Screen 1 Fatal Flaw

	West Subsector				Northwest Subsector			Northeast Subsector		North Subsector			East Subsector	
Evaluation Criteria	**Fort Corridor**	**US 12 (Michigan) Corridor**	**M-153 (Ford) Corridor**	**I-94 Corridor**	**M-39 Corridor**	**Grand River Corridor**	**I-96 Corridor**	**Van Dyke Corridor**	**Gratiot Corridor**	**Woodward Corridor**	**I-75 Corridor**	**M-10 (Lodge Freeway) Corridor**	**Jefferson Corridor**	**M-102 (8 Mile) Corridor**
Socioeconomic Criteria														
Total Population	⊙	◉	⊙	●	◘	●	●	◉	◉	◉	◉	◘	◉	●
Population Density (persons/square mile)	◉	◘	●	●	●	●	●	●	●	●	●	●	◉	●
Total Employment	◘	●	⊙	●	◉	●	◘	⊙	◘	●	●	●	●	◘
Employment Density (jobs/square mile)	●	●	◉	◉	◉	◘	◉	◉	●	●	●	●	●	◉
Social Equity Criteria														
Zero Car Households	⊙	⊙	○	◉	○	●	●	○	⊙	⊙	⊙	⊙	⊙	○
Population Below Poverty Level	⊙	◉	⊙	●	◉	●	●	⊙	◉	◉	◘	◘	⊙	◉
Population Over 65	⊙	◉	⊙	●	◉	○	⊙	⊙	◉	◘	◉	●	⊙	●
Community Goals and Objectives Criteria														
Consistency with Corridor Plans	●	●	◘	○	○	●	○	●	●	●	○	○	⊙	●
Consistency with SEMCOG plans and City of Detroit Master Plan	●	●	⊙	⊙	⊙	●	○	●	●	●	○	⊙	●	●
Conceptual Engineering Criteria														
Potential Capital Cost Estimate	◘	●	◘	○	⊙	◘	○	◘	●	●	⊙	⊙	●	●
Potential Right-of-Way Availability	◉	●	⊙	○	⊙	●	○	●	●	●	⊙	⊙	●	●
Transportation Criteria														
Number of Major Trip Generators	◉	◘	⊙	●	◉	●	●	⊙	◘	◘	◘	●	◘	●
Average Daily Traffic on Major Roadways Serving Corridor	◉	◘	●	NA	NA	◉	◉	◉	●	◘	◉	◉	◘	◘
Average Daily Ridership on Transit Routes Serving Corridor	◉	◉	○	○	⊙	●	○	◘	●	●	○	⊙	◘	◘
Other Factors Criteria														
Public Perception	○	●	○	○	○	●	○	○	●	●	○	○	●	⊙
Total Screen 1 Rating	61	78	50	61	50	86	60	60	81	83	60	67	70	78
Screen 1 Recommendation	-	+	-	-	-	+	-	-	+	+	-	-	-	+

Source: Adapted from *DTOGS: LPA Report*, Final Draft: June 2008, Expanded Version: April 2009; DDOT
● = Very Good (5 points); ◘ = Good (4 points); ◉ = Fair (3 points); ⊙ = Poor (2 points); ○ = Very Poor (1 point)
(+) = recommended for further evaluation; (-) = eliminated from further evaluation

2.2.2 Downtown Alignment Alternatives

Following selection of the Project, two stakeholder workshops were held to develop and evaluate six potential LRT alignments in the Downtown section of the Corridor. Based on stakeholder input at the workshops, two Downtown alignments were recommended for further study:

- Alternative D-2 – Dual tracks south on Woodward Avenue to Grand River Avenue, south on Washington Boulevard to Larned Street, followed by a single-track one-way loop east on Larned Street to Randolph Street, then west on Congress Street back to Washington Boulevard; and,
- Alternative F – South on Woodward Avenue, shifting to Washington Boulevard, south from Grand River Avenue as a single-track one-way loop, east along Larned Street north on Randolph Street, continuing north along Broadway, and then returning back to Woodward Avenue via Witherell Street. This alternative was subsequently dismissed due to lower projected ridership than other alternatives and redundancy with the existing Detroit People Mover (DPM).

Subsequently, project stakeholders retained Alternative D-2, and identified two additional Downtown alignment alternatives, as follows:

- Modified Alternative D-2 – Dual tracks south on Woodward Avenue to State Street, then proceeding along the same D-2 Alignment, until returning via State Street to Woodward Avenue; and,
- Woodward Avenue – An alignment proceeding entirely along Woodward Avenue and terminating between Congress Street and Larned Street.

These three Downtown alignment alternatives – D-2, Modified D-2, and Woodward Avenue – were advanced for further evaluation in the DEIS and are described below in Section 2.3.2 as Downtown Design Options 1, 2, and 3, respectively.

Following the publication of the DEIS, further public input was received and a fourth Downtown alignment alternative was added for evaluation. Downtown Design Option 4 is described below in Section 2.3.2.

2.3 Alternatives Evaluated in This FEIS

2.3.1 No Build Alternative

The No Build Alternative includes the following transit, roadway, and non-motorized elements.

Transit

The No Build Alternative includes increased service frequencies for DDOT Route 53 (Woodward Avenue) and reorganization of feeder bus routes to optimize travel times. Route 53 would continue to use 40-foot buses for current services and would operate on 10-minute headways all day. There would also be an express route with 30-minute headways but only in the peak direction during the peak period. Schedules of some cross routes would be adjusted to coincide with Route 53 service to accommodate transfers. The No Build Alternative does not include any new bus routes. Also, the No Build Alternative assumes bus services on existing roads in mixed traffic; it does not assume any change in future (2030) bus travel speeds or travel times on Routes 53. The No Build Alternative assumes DDOT's existing fare and transfer structure.

The Ann Arbor to Detroit Commuter Rail project, which is currently listed in SEMCOG's Transportation Improvement Program (TIP) for the Detroit-Warren-Livonia Metropolitan Statistical Area (MSA) for fiscal years 2008 through 2011, is also included in the No Build Alternative.

Roadway
The No Build Alternative includes all capacity-related transportation system projects listed in SEMCOG's TIP for the Detroit-Warren-Livonia MSA for fiscal years 2008 through 2011. In addition to the TIP projects, the No Build Alternative also includes capacity-related transportation projects listed in SEMCOG's financially-constrained Regional Transportation Plan (RTP) for the Corridor.

Non-Motorized
A shared-use path for pedestrians and bicycles is currently being constructed along Kirby Street on either side of Woodward Avenue. There are plans to also construct a shared-use path along Canfield Street on either side of Woodward Avenue within the next few years. There are no other plans to improve or construct any other non-motorized facilities within the study area.

2.3.2 The Project

The Project is LRT (Figure 2-2) on Woodward Avenue from Downtown Detroit to the Michigan State Fairgrounds near 8 Mile Road. Two mainline design options, Option A (Figure 2-7) and Option B (Figure 2-8), and four Downtown design options, A1, B2, B3, and A4 (Figures 2-3 through 2-6) are evaluated in this FEIS. Additional maps showing the alignments are located on the Project website at http://www.woodwardlightrail.com/NEPA.html, in Appendix D, and in the *Transportation Technical Report* (2011).

LRT has been defined as an at-grade system entirely within existing rights-of-way. The Project LRT alternative would be fully functional as a stand-alone project, but it would be designed to accommodate possible future extensions.

Figure 2-2. LRT Example

Source: Houston METRORail, 2011

LRT uses electric rail vehicles and may operate with just one vehicle or two that are joined; if the latter, the LRT would not be expected to be longer than 180 feet. However, some city blocks in Downtown are shorter than 180 feet; therefore, LRT vehicles would be given priority at traffic signals to avoid blocking intersections and crosswalks. LRT vehicles are powered by an Overhead Catenary System (OCS) of wires supported by poles. The overhead electrical system would include overhead wires used to power the LRT vehicles, poles to support the wires, and traction power substations (TPSS) (Figure 2-7 and Figure 2-8). The design of the OCS would utilize either a center or side pole configuration along the Corridor. The overhead wire is typically suspended 17 to 22 feet above the street over each track. The poles would be located either between the two tracks or on either side of the roadway, depending on the configuration of the alternative at the given location. The poles are typically located every 100 to 120 feet. At sharp curves, the poles and support wires would need to be more closely spaced. The OCS wires

are electrically charged and present a safety risk if contact with the wires occurs. Existing LRT systems, similar to the Project, use warning signs to illustrate the risks of severe electric shock if contact occurs with the wires.

Because Woodward Avenue is designated as a National Scenic Byway and an All-American Road (known as the Automotive Heritage Trail on the America's Byways system), all signage for the LRT would be visually consistent with and would complement the existing wayfinding signage for the Woodward Avenue Signage Program. Signage design and further coordination efforts with the Woodward Avenue Signage Program will take place during the design phase.

Figure 2-3. Mainline Design Option A and Downtown Design Option 1 (A1)

Source: Woodward Avenue LRT Project Team, 2011

Figure 2-4. Mainline Design Option B and Downtown Design Option 2 (B2)

Source: Woodward Avenue LRT Project Team, 2011

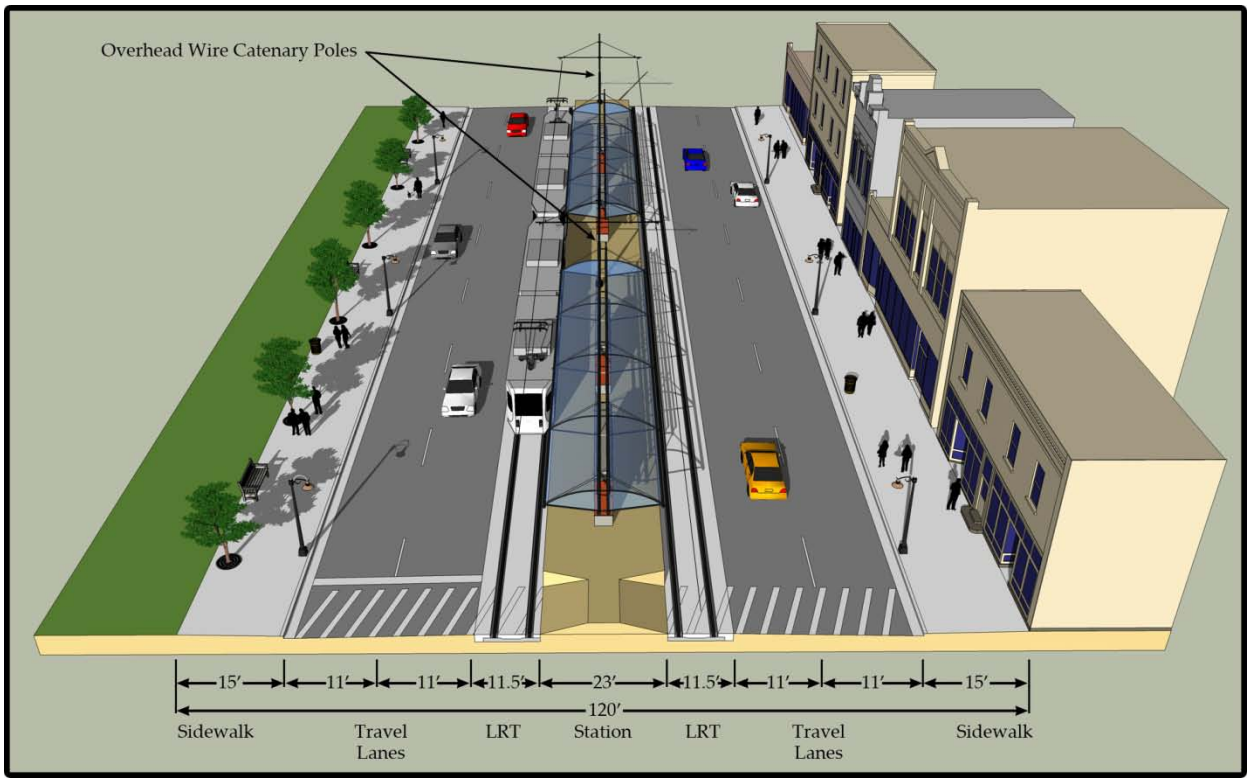
Figure 2-5. Mainline Design Option B Downtown Design Option 3 (B3)

Source: Woodward Avenue LRT Project Team, 2011

Figure 2-6. Mainline Design Option A Downtown Design Option 4 (A4)

Source: Woodward Avenue LRT Project Team, 2011

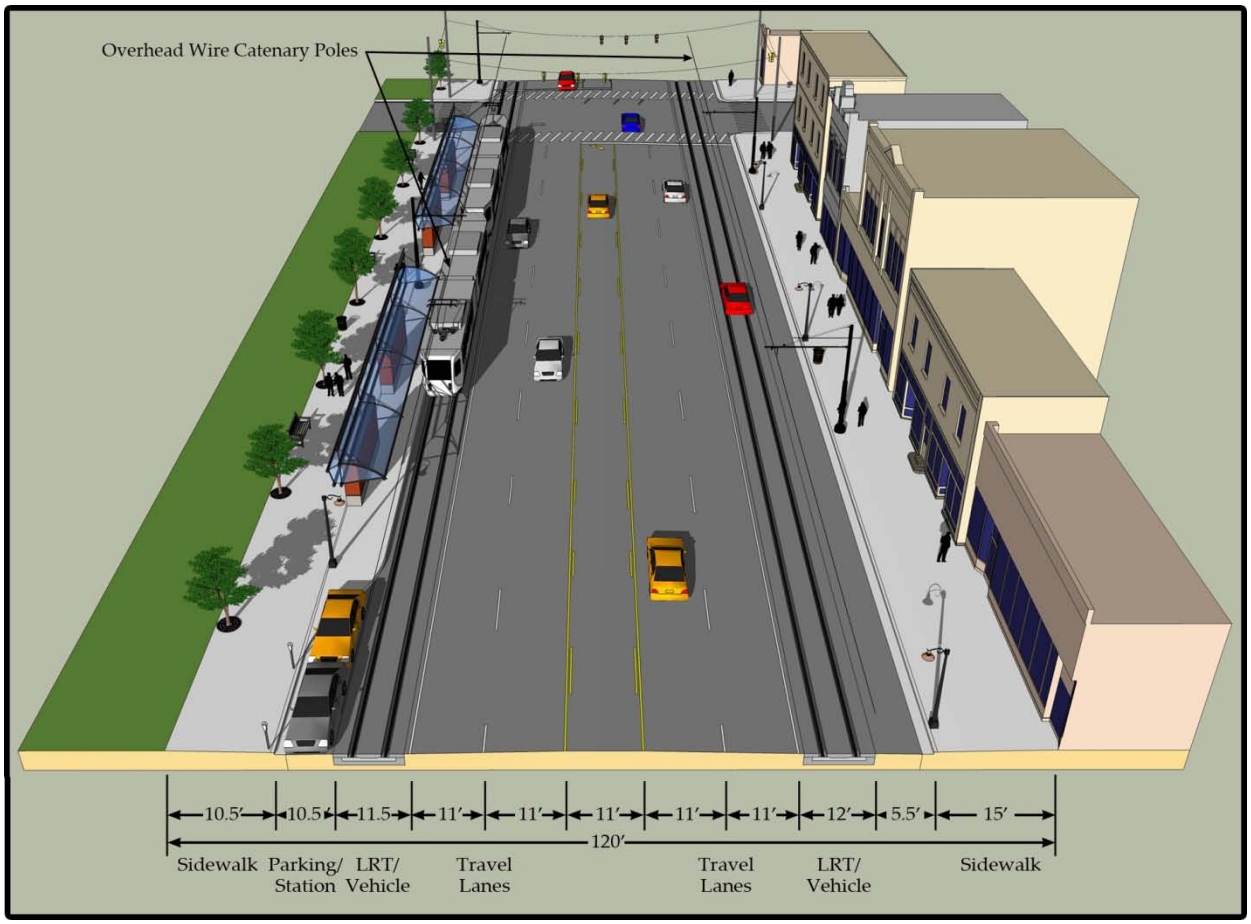
Figure 2-7. Cross-Section of Operating Option A: Median-Running/Traffic Separated



Source: Woodward Avenue LRT Project Team, 2011

The dimensions shown are subject to change following selection of a Preferred Alternative and further engineering studies.

Figure 2-8. Cross-Section of Operating Option B: Curb-Running/Mixed Traffic



Source: Woodward Avenue LRT Project Team, 2011
The dimensions shown are subject to change following selection of a Preferred Alternative and further engineering studies.

Existing road rights-of-way vary considerably in the Project corridor. In Downtown, it ranges from 78 feet along Washington Boulevard to 109 feet along Woodward Avenue south of Adams Street. North of Adams Street the right-of-way widens along Woodward Avenue to 120 feet until reaching Grand Boulevard. The narrowest section of Woodward Avenue – at 100 feet – is found north of Grand Boulevard to Manchester Parkway, where the right-of-way then returns to 120 feet. The widest section of the right-of-way is found north of McNichols Road where it widens to 204 feet.

Operating Options on Woodward Avenue
The two operating options on Woodward Avenue are as follows:

Operating Option A: Median-Running/Traffic Separated (Figure 2-7)
The LRT would operate in the center median of Woodward Avenue from north of Adams Street to the Michigan State Fairgrounds. Within this section, the LRT would be separate from vehicular traffic. However, there may or may not be a physical barrier between the LRT and vehicular traffic. Stations with center platforms would be located in the median. There would be 15 stations north of Adams Street (Table 2-2). This option includes two Downtown Design Options. Downtown Design Option 1 (described below) was originally identified as part of the DTOGS project. Downtown Option 4 (described below) is a hybrid of Downtown Design Option

1 and Downtown Design Option 3 and was developed in response to public comments on the DEIS.

Operating Option B: Curb-Running (Figure 2-8)
The LRT would operate in the right-most travel lane of Woodward Avenue from Adams Street to just north of Grand Boulevard. From north of Grand Boulevard to the Michigan State Fairgrounds, the LRT would operate in the median, as described for Operating Option A. Within the curb-running/mixed traffic section, the LRT would be running with vehicular traffic. There would be 15 stations north of Adams Street (Table 2-2). This option includes two Downtown Design options, Downtown Options 2 and 3, which were identified during stakeholder meetings.

Downtown Design Options
Four Downtown design options for the Project are described below (Figure 2-9):
Downtown Option 1: Woodward, Grand River, Washington, Larned, Randolph, Congress
Median-running dual tracks south on Woodward Avenue to Grand River Avenue. On Grand River Avenue, the LRT would run westbound against vehicular traffic in an exclusive right-of-way. It would then travel south in the median on Washington Boulevard to Larned Street, at which point it would transition to a single-track, curb-running, one-way loop east on Larned Street to Randolph Street, then west on Congress Street back to Washington Boulevard, and then east with vehicular traffic on Grand River Avenue back to Woodward Avenue. This option has five stations and would be implemented with Woodward Avenue Operating Option A.

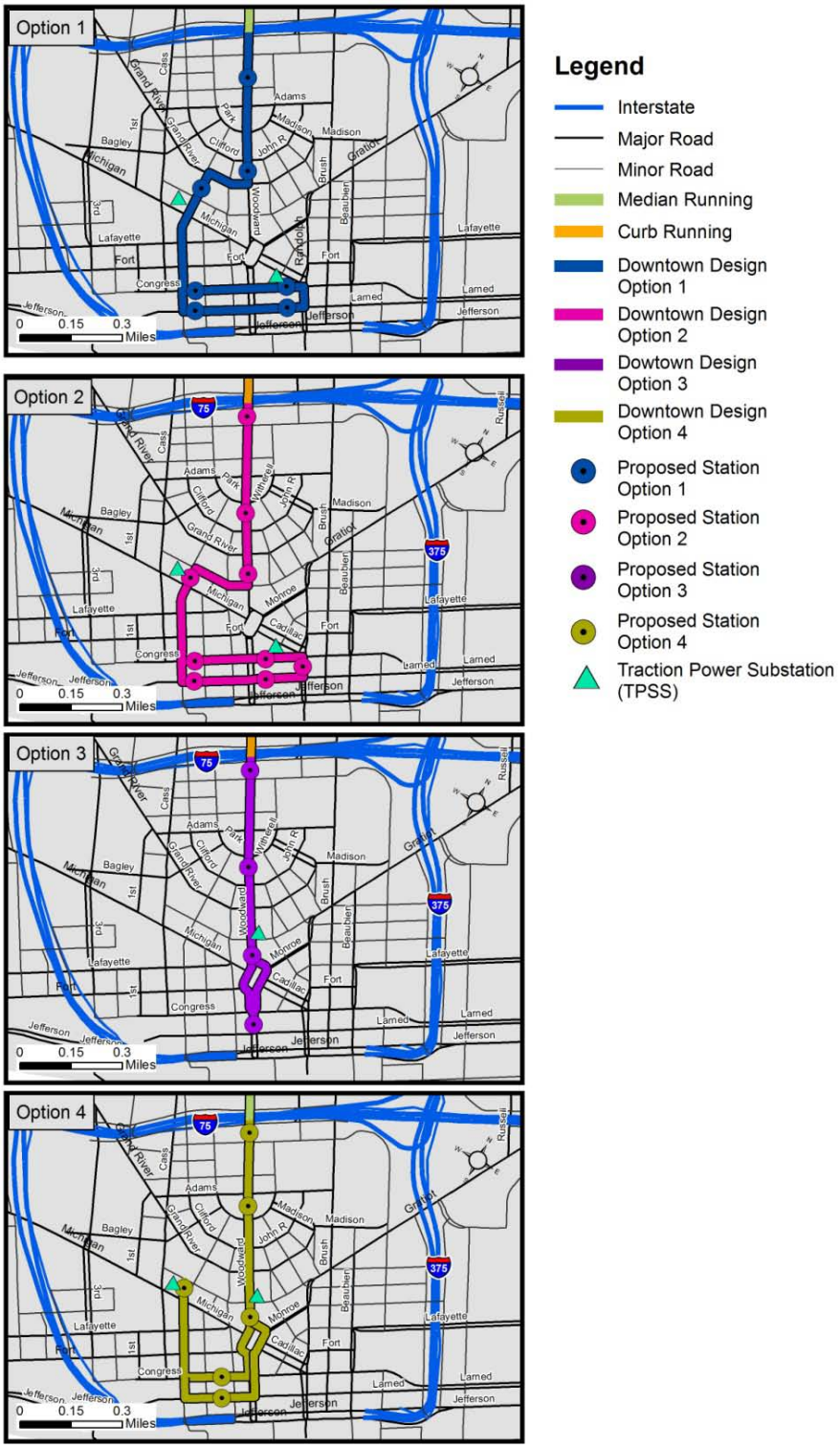
Downtown Option 2: Woodward, State, Washington, Larned, Randolph, Congress
Curb-running single tracks south on Woodward Avenue to State Street, then south on the west side of Washington Boulevard to Larned Street, at which point it would transition to a single-track, curb-running, one-way loop east on Larned Street to Randolph Street, west on Congress Street back to the east side of Washington Boulevard, and east against vehicular traffic on State Street in an exclusive right-of-way, back to northbound Woodward Avenue. This option has seven stations and would be implemented with Woodward Avenue Operating Option B.

Downtown Option 3: Woodward Avenue
Curb-running single tracks south on Woodward Avenue to Campus Martius, clockwise travel around Campus Martius with vehicular traffic, and then continuing south on Woodward Avenue to a stop on Woodward Avenue between Congress and Larned streets. It would then reverse direction to travel north on Woodward Avenue, clockwise around Campus Martius with vehicular traffic and then continue north. This option has four stations and would be implemented with Woodward Avenue Operating Option B.

Downtown Option 4: Woodward, Park, Campus Martius, Congress, Washington, Larned
Median-running dual tracks south on Woodward Avenue to Park Avenue/Witherell Street. Then the LRT would transition to curb-running single tracks continuing on Woodward Avenue to Campus Martius, counter-clockwise travel around Campus Martius with vehicular traffic, and then continuing south on Woodward Avenue with the southbound track turning west onto the south side of Congress Street. The alignment would then turn north on Washington Boulevard in the median with double tracks until the final stop at the Rosa Parks Transit Center at the northwest corner of Washington Boulevard and Michigan Avenue. The train would then reverse along the median-running tracks along Washington Boulevard, turning left (east) onto the south side of Larned Street, and again onto northbound Woodward Avenue, counter-clockwise around Campus Martius. It would then transition to median-running north of Park Avenue/Witherell Street. This option has five stations and would be implemented with Woodward Avenue Operating Option A.

Each of the Downtown Design Options would lie entirely within existing available right-of-way.

Figure 2-9. Downtown Design Options



Source: Woodward Avenue LRT Project Team, 2011

Combining the operating and Downtown design options, four Project alternatives were defined for evaluation in this FEIS.

- Alternative A1 – median-running (Figure 2-3) with Downtown design option 1; 16 stations;
- Alternative B2 – curb-running (Figure 2-4) with Downtown design option 2; 21 stations;
- Alternative B3 – curb-running (Figure 2-5) with Downtown design option 3; 18 stations; and
- Alternative A4 – combination of median- and curb-running (Figure 2-6) with Downtown design option 4; 19 stations.

In the DEIS, Alternative A1 evaluated 15 stations. Before the City had selected Alternative A4 as the Preferred Alternative, another station at Grand River Avenue was evaluated for Alternative A1. The Grand River Avenue station is included in the FEIS since its impacts were not examined in Alternative A1 under the DEIS.

The City intends to build the entire 9.3 mile LRT system at once, which includes Phase I and Phase II. However, if phased construction is warranted, Phase I will be built first. Phase I is 3.4 miles of LRT in Downtown and will include a temporary vehicle storage and maintenance facility (VSMF) at Amsterdam Street. Phase II is the remaining 5.9 miles of LRT along Woodward Avenue from Downtown to the Michigan State Fairgrounds and will involve the construction of a permanent VSMF at the Highland Park Ford plant. Operations of the VSMF at the Amsterdam Street site will cease with the construction of Phase II. Maps in Appendix D illustrate the demarcation line for the Project's potential phasing.

2.3.3 Stations

In general, LRT stations are designed to include several components that are essential for traveler safety and security, as well as amenities for passenger comfort and convenience. LRT station design also reflects compliance with Americans with Disabilities Act (ADA) requirements. Primary elements of LRT stations include the platform(s), shelter, wheelchair ramps, and station amenities such as lighting, benches, security systems, and information displays. Platforms for the proposed Project alternatives will be compatible with low-floor LRT vehicles, typically requiring a 14-inch station platform height. The platform length would likely range from 190 to 200 feet based on the LRT vehicle length of two linked vehicles and space available for each LRT station at the proposed locations. Platform length would also depend on whether the alignment is median- or curb-running.

Table 2-2. LRT Station Locations

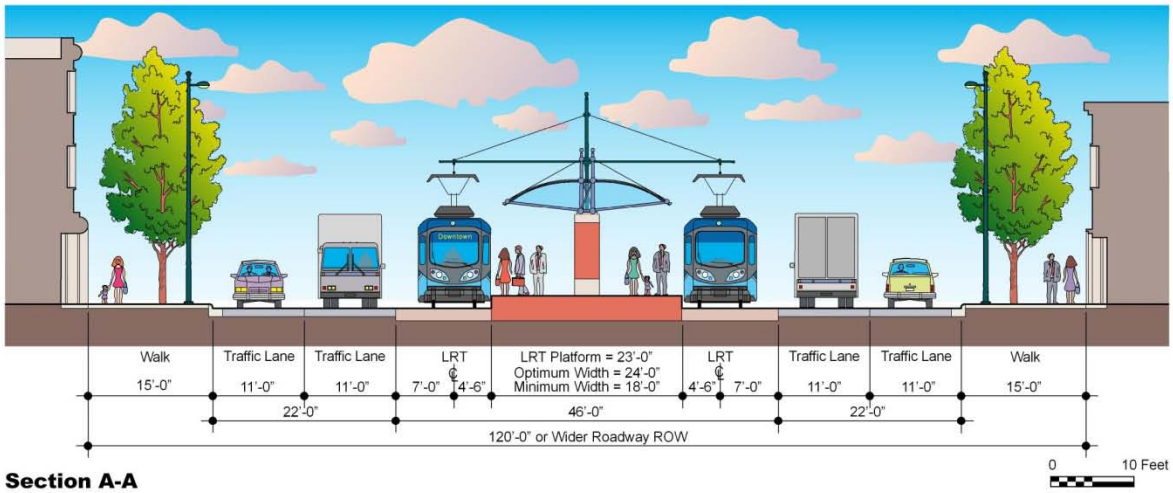
Station	Alternative			
	A1	B2	B3	A4
Rosa Parks Transit Center (Washington Boulevard)	X	X		
Rosa Parks Transit Center (W of Washington , N of Michigan)				X
Cobo Center: Larned at Washington Boulevard & Congress at Washington	X	X		
Cobo Center: Larned at Shelby Street & Congress at Shelby Street				X
Woodward: Larned at Woodward & Congress at Woodward		X	X	
Randolph St.: Larned at Randolph & Congress at Randolph	X			
Michigan Avenue			X	X
Randolph Street		X		
State/Gratiot		X		
Grand River	X			
Adams/Grand Circus Park		X	X	X
Foxtown/Stadium	X	X	X	X
Temple Street		X	X	X
MLK Jr. Blvd./Mack Avenue	X	X	X	X
Canfield Street		X	X	X
Warren Avenue	X	X	X	X
Ferry Street		X	X	X
Piquette Street/Amtrak Station	X	X	X	X
Grand Boulevard	X	X	X	X
Hazelwood Street/Holbrook Street	X	X	X	X
Calvert Street	X	X	X	X
Glendale Street	X	X	X	X
Manchester Street	X	X	X	X
McNichols Road	X	X	X	X
7 Mile Road	X	X	X	X
Michigan State Fairgrounds	X	X	X	X
Total Stations	**16**	**21**	**18**	**19**

Source: Woodward Avenue LRT Project Team, 2011

Platform width would typically range from 15 to 24 feet for double-sided median platforms for Alternatives A1 and A4 (the Preferred Alternative), and 10.5 to 12 feet for single-sided platforms for all Build Alternatives. A minimum LRT station width of 15 feet was used for Alternative A1 for double-sided platforms. For single-sided platforms, a minimum width of 10.5 feet was used. For Alternatives B2 and B3, all stations are single-sided; therefore, a minimum station width of 10.5 feet was used. Stations operating under Alternatives B2 and B3 would bump out approximately eight feet from the existing edge of sidewalks. The parking lane would be removed on one side of the street to accommodate the LRT station platform. The platforms would be 10.5 feet wide, requiring the removal of 4.5 feet of sidewalk width on each side of the street, leaving 10.5 feet of existing sidewalk width on one side and 15 feet of sidewalk width on the other side of the street. In locations along the LRT alignment where stations would be located on both sides of the street, sidewalks would be approximately 10.5 feet wide.

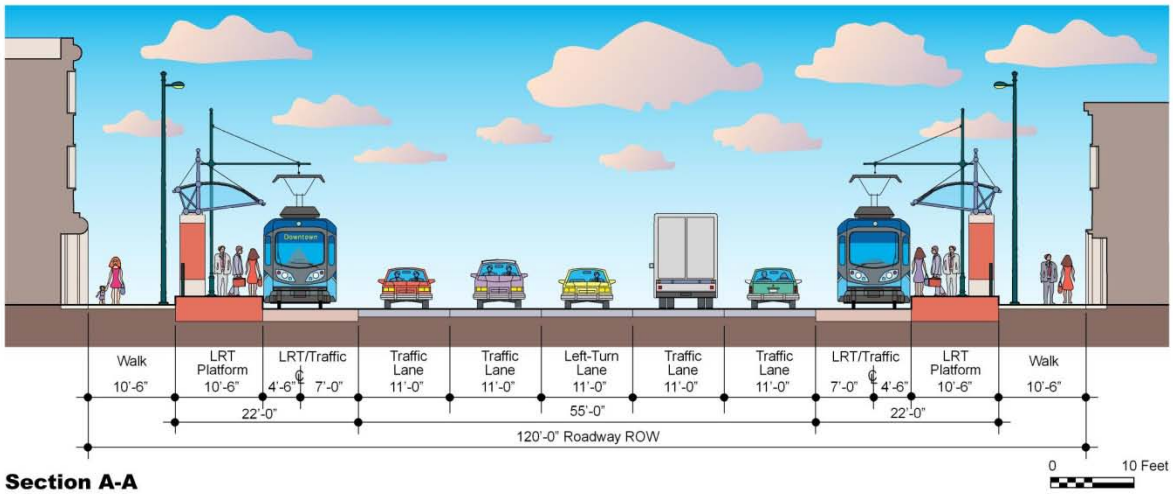
Shelter designs would include a conventional canopy (Figure 2-10 and Figure 2-11). The DEIS described a 10-foot roof-mounted square billboard extending above the canopy for curb-running stations. However, the City has decided against billboards: no billboards orrooftop mounted structures, nor vertical elements (as described in the DEIS) will be included as part of the station canopy designs for the Project. Canopy design guidelines will be further developed during the Project's design phase.

Figure 2-10. Operating Option A Cross Section at Station



Source: Woodward Avenue LRT Project Team, 2011

Figure 2-11. Operating Option B Cross Section at Station



Source: Woodward Avenue LRT Project Team, 2011

2.3.4 Facilities

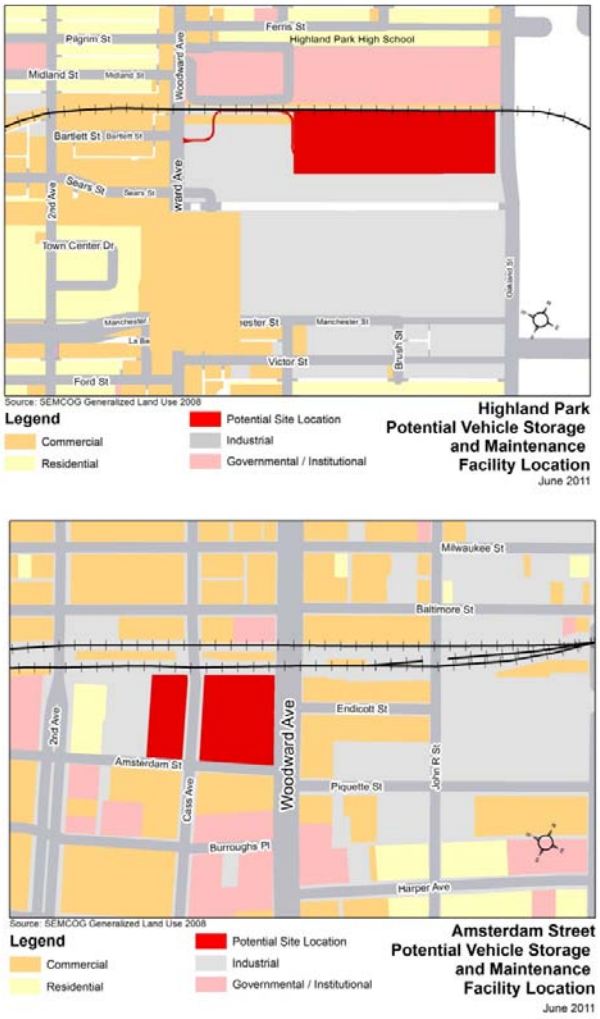
This section describes the type and location of all ancillary facilities needed to support the maintenance and operations for the Project Alternatives (Table 2-3).

Vehicle Storage and Maintenance Facility

The proposed VSMF would house the administrative offices and provide for indoor storage, inspection, and repair and light maintenance of LRT equipment. The square footage of the facility is anticipated to be between 75,000 SF and 110,000 SF, depending on site size, configuration, and facility design. For the DEIS, there were three sites considered for the VSMF (Figure 2-12), which were identified on the basis of proximity to Woodward Avenue, size and configuration, zoning, land use, site ownership, and potential utilities and traffic impacts. The three potential sites were as follows:

- MLK Boulevard Site (4.2 acres) – would occupy two lots north and south of West Stimson Street, just west of Woodward Avenue and south of MLK/Mack Avenue. This site would have frontage on Woodward Avenue.
- Amsterdam Street Site (4.6 acres) – would occupy two lots east and west of Cass Avenue between Amsterdam Street and the two grade-separated tracks owned by Consolidated Rail Corporation (CR) and Canadian National Railway (CN), respectively, just south of Baltimore Avenue. This site would have frontage on Woodward Avenue and is adjacent to the Amtrak station.
- Highland Park Ford Plant Site (19.0 acres) – would occupy one large lot east of Woodward Avenue north of Manchester Street and the former Highland Park Ford Plant. As this site is about 900 feet east of Woodward Avenue, direct access would be via the right-of-way for CR's currently abandoned rail line.

Figure 2-12. Vehicle Storage and Maintenance Facility Site Options



Source: Woodward Avenue LRT Project Team, 2011

Of the three potential VSMF sites considered in the DEIS, the MLK Boulevard site would be nearest to residential use. The proposed VSMF at this site for Phase I has been

eliminated from consideration at this time due to potentially significant adverse effects to the human and natural environment for both environmental justice (EJ) and Section 106 reasons. Therefore, this VSMF site has been removed from further evaluation in this FEIS.

If the City pursues a phased approach to Project implementation, a temporary VSMF would be constructed at the Amsterdam Street site. Once the full Project was completed, the Highland Park Ford Plant would become the permanent site for the VSMF and the temporary VSMF at the Amsterdam Street site will cease operations. The changes to each of the two potential VSMF sites are described in more detail below.

Amsterdam Street Site

Since the publication of the DEIS, a preliminary concept plan was developed for the proposed Amsterdam Street VSMF site. The VSMF itself would be located on the parcel east of Cass Avenue, which is approximately three acres in size. The small size and shape of the site are not sufficient to accommodate the requirements for a permanent VSMF facility. Therefore, it is proposed that a temporary VSMF be built on this site until a larger facility could be constructed during Phase II of the Project.

An administrative building and parking for the VSMF would be located on the 1.6-acre parcel to the west of Cass Avenue, which is currently occupied by a parking lot. Operations at the Amsterdam Street site would be relatively small since it would only serve Phase I of the Project.

Highland Park Ford Plant Site

The Highland Park Ford Plant is under consideration as a location for the permanent VSMF in Phase II. The VSMF would occupy one large lot east of Woodward Avenue north of Manchester Street and adjacent to the northern boundary of the former Highland Park Ford Plant, a National Historic Landmark (NHL; Appendix F). The large vacant lot is currently used for storage. As this site is about 900 feet east of Woodward Avenue, direct access would be via the right-of-way for CR's currently abandoned rail line. The exact location under study for the maintenance facility at the Highland Park Ford Plant site does not incorporate either the original administration building or factory. These structures comprise a NHL and, therefore, any retrofitting of the buildings may result in an adverse effect determination under Section 106 of the National Historic Preservation Act (36 CFR Part 800), because it is both a historic resource and a NHL. This regulation, specifically 36 CFR Part 800.10, provides for special protections of NHLs and requires the Federal agency "to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to any National Historic Landmark that may be directly or adversely affected by an undertaking."

Table 2-3. Ancillary Facilties

Facility Type and Location	Alternative A1	Alternative B2	Alternative B3	Alternative A4 (Preferred Alternative)
Vehicle Storage and Maintenance Facility (VSMF)				
Amsterdam Street site	X	X	X	X
Highland Park Ford Plant site	X	X	X	X
Park and Ride Lot				
Southeast corner of 8Mile Road and Woodward Avenue (Shoppes at Detroit's Gateway Park)	X	X	X	X
Traction Power Substation (TPSS)				
#1 - 1119 Washington Boulevard	X	X		X
#2 - 100 and 114 Cadillac Square	X	X		
#3 - 1208 Woodward Avenue			X	X
#4 - 3439 Woodward Avenue	X	X	X	X
#5 - 6161 Woodward Avenue	X	X	X	X
#6 - 20 Westminster Street	X	X	X	X
#7 - 12921, 12937, 12941, and 12961 Woodward Avenue (Highland Park)	X	X	X	X
#8 - 17400 Woodward Avenue	X	X	X	X
#9 - 19816 Woodward Avenue	X	X	X	X
Construction Staging Areas (CSA)				
#1 - West side of Woodward Avenue, between Henry Street and Sproat Street	X	X	X	X
#2 - West side of Woodward Avenue, between Sibley Street and Sproat Street	X	X	X	X
#3 - Northeast corner of East Bethune Street and Woodward Avenue	X	X	X	X
#4 - Southwest corner of Sears Street and Woodward Avenue (Highland Park)	X	X	X	X

Source: Adapted from *FEIS Transportation Technical Report: Woodward Avenue Light Rail Transit Project*, March 2011, DDOT

Park and Ride Lot

A park and ride lot, which would be provided at the same location for all Project alternatives, would be located near the proposed Shoppes at Detroit's Gateway Park at the southeast corner of 8 Mile Road and Woodward Avenue. The lot is accessible from northbound and southbound Woodward Avenue. A pedestrian overpass would provide access from the parking lot to the median-located rail station. An existing bus stop and transfer station at the Michigan State Fairgrounds would be maintained.

Traction Power Substations

LRT's electric traction power system requires a Traction Power Substation (TPSS) be placed approximately every mile, depending on the frequency and size of the vehicles. These substations, which are approximately 25 feet by 60 feet in dimension, require vehicular access and a relatively small site (35 feet by 70 feet). These facilities do not need to be immediately adjacent to the tracks. Because of this flexibility, substations can be located to minimize visual intrusions and can be visually shielded by fencing, landscaping, or walls, or can be incorporated into existing buildings. Figure 2-13 shows an example of a typical substation, for illustrative purposes only. Nine TPSS sites have been preliminarily identified: eight TPSS for Alternatives A1 and B2; seven for Alternative B3; and eight for Alternative A4 (the Preferred Alternative). The locations will be refined during Preliminary Engineering and the Final Design phase of project development.

Construction Staging Areas

During construction of the LRT, several small sites will be required for the temporary storage of materials and equipment and will be located in the general vicinity of the Project. Following construction of the Project, the construction staging areas (CSAs) would be made available for other, more permanent development. Four CSAs have been initially identified (Figure 2-6). Two sites, located north of I-75 and west of Woodward Avenue, are approximately 0.9 acre and 1.6 acres in size, respectively. A third site, 1.6 acres in size, is proposed for the northeast corner of East Bethune Street and Woodward Avenue. A fourth site, 0.9 acre in size, is proposed in Highland Park at the southwest corner of Sears Street and Woodward Avenue. Each of these four parcels is presently undeveloped and vacant.

Figure 2-13. TPSS Example

Source: Woodward Avenue LRT Project Team, 2010-2011

2.4 Preferred Alternative

Project Alternative A4 has been selected as the Preferred Alternative (Figure 2-6). Project Alternative A4 consists of Operating Option A and Downtown Design Option 4. The Preferred Alternative is LRT on Woodward Avenue from Downtown Detroit to the Michigan State Fairgrounds near 8 Mile Road and is a hybrid alternative that was selected based on public comments received after the publication of the DEIS. Since the Preferred Alternative (A4) is a hybrid of A1, B2, and B3, the impacts for the Preferred Alternative were previously evaluated in the DEIS and the DEIS technical reports for the other Project Alternatives (A1, B2, and B3).

The LRT would operate in the center median of Woodward Avenue from north of I-75 to the Michigan State Fairgrounds. Within this section, the LRT would run separately from vehicular traffic. There may or may not be a physical barrier between the LRT and vehicular traffic. Stations with center platforms would be located in the median. There would be 14 stations north of I-75.

South of I-75, the LRT would operate on median-running dual tracks south on Woodward Avenue to Park Avenue/Witherell Street. It would then transition to curb-running single tracks continuing on Woodward Avenue to Campus Martius; operate counter-clockwise around Campus Martius with vehicular traffic; and then continue south on Woodward Avenue with the southbound track turning west onto the south side of Congress Street. The alignment would then turn north on Washington Boulevard with median-running dual tracks until the final stop at the Rosa Parks Transit Center at the northwest corner of Washington Boulevard and Michigan Avenue. The LRT would then reverse direction along the median-running tracks on Washington Boulevard, turning left (east) to the south side of Larned Street; turn left (north) onto northbound Woodward Avenue and counter-clockwise around Campus Martius, after which it would transition to the median-running dual tracks north of Park Avenue/Witherell Street. Five stations would be sited in the Downtown portion of the LRT alignment.

The Preferred Alternative would have 19 LRT stations sited along the alignment. The LRT stations are identified in Table 2-2. The LRT stations would be designed to include a number of components essential for safety and security, as well as amenities for passenger comfort and convenience and ADA compliance. Design guidelines for LRT stations would be developed during the Project's design phase. If the Preferred Alternative is implemented in phases, two VSMF sites would be constructed under the Preferred Alternative: one temporary VSMF site at Amsterdam Street under Phase I, and one permanent site at the Highland Park Ford Plant under Phase II. The entrance to the VSMF would need to be signalized, but LRT vehicles would only access the facility during off-peak hours. This signal is not expected to have an impact on the morning or evening peak-hour traffic operations. A park and ride lot would be provided at the southeast corner of 8 Mile Road and Woodward Avenue at the Shoppes at Detroit's Gateway Park. The lot would be accessible from northbound and southbound Woodward Avenue and would be expected to have 400 parking spaces. A pedestrian overpass would provide access from the parking lot to the proposed median-located LRT station. Eight TPSS sites have been preliminarily identified for the Preferred Alternative; the locations of these sites will be refined during Preliminary Engineering and the Final Design phase of project development. During construction of the LRT, four CSAs would be needed. Table 2-3 identifies the locations of these sites.

The City intends to build the entire 9.3 mile LRT system at once, which includes Phase I and Phase II. However, if the Preferred Alternative is constructed in two phases, Phase I would involve construction of LRT tracks, 12 LRT stations, and 4 TPSS sites between Downtown and Grand Boulevard. A temporary VSMF would be constructed at the Amsterdam Avenue site to service the Phase I LRT system until Phase II is built. Phase II would involve construction of the northern segment of the Woodward Avenue LRT Project from Grand Boulevard to the Michigan State Fairgrounds, comprising LRT tracks, seven LRT stations, four TPSS sites, and the permanent VSMF at the Highland Park Ford Plant site. Following completion of the permanent VSMF construction, the temporary facility at Amsterdam Avenue would be demolished.

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3.0 Transportation

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3.0 Transportation

3.1 Introduction

This chapter summarizes the existing transit, non-motorized transportation, and vehicular system in the study area and the potential impacts of the No Build Alternative and the Project Build Alternatives including the Preferred Alternative (A4). Safety and security of the existing system and the Project are also discussed. The results of operational and safety evaluations conducted following issuance of the Draft Environmental Impact Statement (DEIS), including travel lane configurations, proposed passenger and commercial vehicle travel restrictions, and emergency response access, are summarized in this chapter. Details are provided in the *Transportation Technical Report* (2011).

3.2 Public Transportation

3.2.1 Existing Transit Service

Four major transit service providers, three shuttle services, and two transit centers provide service in the study area, as summarized below. Along Woodward Avenue, Detroit Department of Transportation (DDOT) and Suburban Mobility Authority for Regional Transportation (SMART) buses operate at or over capacity during the peak commuting hours. On an average weekday, the Detroit People Mover (DPM) has available capacity all day, but operates over capacity during large events in Downtown Detroit. During the peak commuting hours, the Transit Windsor route between Detroit and Windsor, Ontario, operates at capacity.

Detroit Department of Transportation
DDOT, the largest transit provider in Michigan, carries 38.6 million annual passengers (2009) on 42 routes in Detroit and 22 neighboring communities in southeastern Michigan. DDOT also provides paratransit service (Detroit MetroLift), with about 271,000 annual passenger trips (2009). Ten Downtown-oriented routes run at least partially along Woodward Avenue, including Route 53, with an annual ridership of 3.8 million (2009).

Suburban Mobility Authority for Regional Transportation
SMART serves Detroit, including Downtown, and more than 70 suburban communities in the counties of Macomb, Oakland, and Wayne. SMART is the second largest transit provider in Michigan with 12.4 million passengers annually (2009), including service with flexible pick-up and drop-off according to passenger needs for approximately 412,000 passengers annually. SMART service within Detroit consists of express commuter routes traveling between the suburbs and Downtown, while local service is more typical in suburban areas. Six SMART routes provide service along Woodward Avenue, with a combined annual ridership of 2.5 million (2009).

Detroit Transportation Corporation
The Detroit Transportation Corporation (DTC) operates the DPM, connecting major activity centers in Downtown via a fully automated, elevated rail system and 13 stations. Eight computer-controlled driverless vehicles travel along a 2.9-mile single-track, one-way 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.

Transit Windsor
Transit Windsor provides one bus route that shuttles passengers between Downtown 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.

Other Transit Providers
Three shuttle services are operated within the study area by Wayne State University and the Detroit Medical Center. Service is free for faculty students, patients, visitors, and employees. Both services travel in a loop around their respective campuses and serve both buildings and parking lots. The university shuttle's northernmost stop is on Woodward Avenue at Burroughs Street; the southernmost is on Mack Avenue at John R Street. The Medical Center shuttle's stop closest to Woodward Avenue is on John R Street north of Mack Avenue. Finally, the College for Creative Studies offers shuttle service between its main campus at 201 East Kirby Street and a satellite campus in the Argonaut Building in the New Center area.

Transit Centers
Rosa Parks Transit Center
Located at 360 Michigan Avenue, the Rosa Parks Transit Center is a 25,000-square-foot facility with over two acres of exterior transit access. It serves as a single transfer point for 21 DDOT bus routes, the SMART suburban bus system, Transit Windsor, and the DPM. The center also has a Megabus stop, taxi access, a café, retail space, ticket information, and vending machines.

State Fair Transit Center
Located on the Michigan State Fairgrounds at 8 Mile Road and Woodward Avenue, the State Fair Transit Center is served by up to six DDOT bus routes seven days a week. The SMART suburban bus system serves a stop on Woodward Avenue, just outside the transit center.

Other Transportation Systems
Intercity passenger rail service is provided by Amtrak's Wolverine line, with a station at 11 Baltimore Street, west of Woodward Avenue. In 2009, 58,169 passengers arrived at and departed from the station, an increase of 4 percent since 2006. Three round trips are provided daily between the cities of Pontiac and Chicago via Detroit. The proposed Detroit-Ann Arbor Commuter Rail would also use this Amtrak station. SMART and DDOT bus routes have stops near the Amtrak station, providing connectivity between the transit systems.

A Greyhound Bus Terminal at 1001 Howard Street in Downtown Detroit offers intercity bus service.

3.2.2 Long-Term Effects

No Build
The No Build Alternative comprises existing transit services plus modification of DDOT's Route 53 service along Woodward Avenue. Route 53 buses would generally run less frequently (six buses per hour), with headways of 10 minutes throughout the day. During peak commuting periods, an Express Route 53 with limited stops and 30-minute headways would be added to Woodward Avenue (DDOT *5-Year Service Plan, Years 2008-2013*, August 2008), which would increase overall service during peak commuting periods. This increase would result in an average 7.5-minute headway during the weekday morning and evening peak periods (compared to a current eight-minute headway all day), and a 10-minute headway on weekends (compared to current 10- to 15-minute headways). Due to increased vehicle traffic on Woodward Avenue, bus travel times between State Fair Avenue and Downtown Detroit would increase slightly, by one

minute in the morning peak period and 30 seconds in the evening peak period (Table 3-1). No specific changes to future SMART or DTC services were identified for the No Build Alternative.

Table 3-1. Transit Travel Times on Project Alignment

Alternative	Transit Mode	Transit Travel Time
Existing	DDOT Route 53	47 – 50 min
No Build	DDOT Route 53	48 – 50 min
A1	LRT	32 – 33 min
B2	LRT	37 – 38 min
B3	LRT	31 – 32 min
A4	LRT	34 – 36 min

Source: DDOT, 2011

Preferred Alternative (A4)

The Preferred Alternative (A4) would partially replace existing DDOT Route 53 bus service with light rail transit (LRT) facilities and service, though Route 53 would continue to operate. Stop level data indicated there is enough ridership at bus stops between the proposed LRT stations to justify continuing service on Route 53 at a reduced level. The operating plan calls for maintaining Route 53 at 15 minute headways (it currently operates at eight minute headways during peak hours). As indicated in Chapter 2, the Preferred Alternative (A4) would have 19 station stops. Service would be as follows:

- Woodward Avenue LRT would operate with 10-minute headways in the peak direction during the morning and evening peak periods, and 15-minute headways during off-peak hours.
- The schedule for Route 53 (Woodward Avenue) bus service would be revised to 15-minute service all day; alternating Route 53 service would be extended northward to central Oakland County.
- Off-peak service and bi-directional service would be provided for all bus routes along Woodward Avenue, and hours of operation would be expanded.
- Service mileage extensions would be added on Routes 17, 41, and 43.
- Routes 8, 14, 17, 32, and 43 would feed LRT stops, and schedules would be adjusted to coordinate bus and LRT services.
- A park-and-ride facility with 400 parking spaces would be provided at the southeast corner of 8 Mile Road and Woodward Avenue, the site of a proposed development.

The proposed LRT services, combined with local bus services along Woodward Avenue, would result in transit service with six-minute headways in the peak direction during the morning and evening peak periods, and 7.5-minute headways in the off-peak period, including weekends. Compared to the No Build Alternative, this would result in an increase in frequency of 25 percent in peak inbound, 67 percent in peak outbound, and 33 percent in off-peak weekday transit trips, and would be monitored and adjusted based on demand. LRT travel times for the Preferred Alternative would be approximately 14 minutes faster than by bus under the No Build Alternative (Table 3-1).

SMART service along Woodward Avenue may see an increase in travel time due to the reduced number of travel lanes. DTC may see an increase in ridership with LRT passengers transferring

to the DPM once they reach Downtown. The Rosa Parks Transit Center may experience an increase in transfers due to improved access to the transfer center for LRT passengers, compared to the Route 53 bus service. There would likely be no change in activity at the State Fair Transit Center since access to it would not change.

Alternative A1
Alternative A1 would provide the same level of transit service as described above for the Preferred Alternative but would have 16 station stops along its median-running alignment. The LRT travel time with Alternative A1 would be 16 to 17 minutes faster than by bus in the No Build Alternative (Table 3-1).

Under this alternative, SMART and DTC would experience the same impacts to service as described under the Preferred Alternative. That is, SMART service along Woodward Avenue may see an increase in travel time due to the reduced number of travel lanes while DTC may see an increase in ridership with LRT passengers transferring to the DPM once they reach Downtown.

Alternatives B2 and B3
Alternatives B2 and B3 would provide the same level of transit service as described above for the Preferred Alternative, but Alternatives B2 and B3 would be in a curb-running alignment south of Piquette Street, and would have 21 and 18 station stops, respectively. The combined bus and LRT services would again lead to increases of 25 percent in peak inbound, 67 percent in peak outbound, and 33 percent in off-peak transit trips compared to the No Build Alternative. LRT travel time with Alternative B2 would be 11 to 12 minutes faster than by the bus service under the No Build Alternative (Table 3-1). LRT travel time with Alternative B3, the alternative with the shortest route and fewest stops, would have the fastest travel time, approximately 17 to 18 minutes faster than the No Build Alternative (Table 3-1).

The addition of the Project and the reduced number of travel lanes for general traffic would increase bus travel times by 9 to 11 minutes.

Alternative B2 would have the same impacts to SMART and DTC services as described under the Preferred Alternative. That is, SMART service along Woodward Avenue may see an increase in travel time due to the reduced number of travel lanes while DTC may see an increase in ridership with LRT passengers transferring to the DPM once they reach Downtown. Alternative B3, which does not have close proximity to the Rosa Parks Transit Center, would not experience an increase in riders transferring from the LRT.

3.2.3 Short-Term Construction Effects

Project construction would take about 36 to 42 months for the entire 9.3 mile LRT system.

Preferred Alternative (A4)
Construction of the Preferred Alternative (A4) would be least disruptive to existing bus service and on-street parking spaces since construction would occur away from the curb and adjacent bus stops. Bus riders would experience longer trips due to construction at disrupted intersections and crosswalks. Existing traffic patterns would be affected during construction, which would result in longer travel times and may require temporary detours for some routes.

Alternative A1
Construction effects of Alternative A1 would be similar to the Preferred Alternative (A4).

Alternatives B2 and B3

The majority of construction activity for the curb-running alternatives would occur in the outside traffic lane and the existing parking lane. This may interfere with the ability of buses to pull into existing stops during construction. In addition, existing traffic patterns would be affected during construction, which may result in longer travel times and may require temporary detours for some routes. Construction of LRT platforms adjacent to existing sidewalks may also result in relocations of some bus stops.

3.2.4 Mitigation

In areas where construction would prevent buses from pulling into existing stops and make it difficult for passengers to reach the buses, bus stops would need to be relocated outside the immediate construction zone. A clear and accessible path from the sidewalk through the construction zone would need to be maintained. Where temporary detours or stop relocations are necessary, DDOT and any other affected service provider would issue a Rider Alert, which would be posted at the affected stops, on buses, at schedule distribution outlets, and on the DDOT website. Traffic detours for motor vehicles and bicycles would also be posted, as needed.

3.3 Safety and Security (Motorized and Non-Motorized)

3.3.1 Existing Conditions

Existing bus transit in the study area currently travels in mixed traffic with passenger automobiles, trucks, and bicycles. With no designated bicycle lanes, bicyclists must either travel in the rightmost travel lane, in conformance with the Michigan Vehicle Code (2010), or on adjacent sidewalks.

Based on Southeast Michigan Council of Governments (SEMCOG) crash data, from 2005 to 2008 there were 64 sideswipe, head-on, and left-turn crashes involving automobiles between signalized intersections along the portion of Woodward Avenue within the study area. Also during this period, the study area intersections at Woodward Avenue/MLK Jr. Boulevard/Mack Avenue and Woodward Avenue/Warren Avenue were considered critical crash intersections with higher than regional accident rates for similar types of intersections. These two intersections have a high percentage of head-on left-turn crashes.

There were 203 crashes involving DDOT buses on Woodward Avenue during the three-year period. Along the Corridor, about half of the crashes involving a single auto were between an auto and a pedestrian or bicyclist. Between 2005 and 2008, there were 172 vehicle crashes (eight fatal) along Woodward Avenue. Of the 172, 145 were between vehicles and pedestrians, while 27 involved vehicles and bicyclists. Thirty-eight crashes (five fatal) involving vehicles and pedestrians occurred outside the 250-foot radius of a signalized intersection, indicating that jaywalking pedestrians are at risk.

All roadways along the Project alignments have sidewalks on both sides of the street. All traffic signals have phases for pedestrian crossings, with crossing times updated to 2005 Michigan Department of Transportation (MDOT) guidelines. Within Downtown, the City of Detroit installed pedestrian countdown signals, which allow a minimum of seven seconds crossing time; a walking speed of four feet per second was assumed for the “do not walk” phase of the signals.

In case of a specific emergency onboard a bus, the bus operator notifies a dispatcher who requests the Detroit Police Department to respond to the situation. Incident data are compiled on a bi-weekly basis and forwarded to the Detroit Police Department, which are then used to assign patrol units to address specific concerns throughout the bus system.

In June 2006, the Detroit City Council adopted the City of Detroit Non-Motorized Urban Transportation Master Plan. However, while Woodward Avenue is listed as a regional connector, there is currently no funding to construct bicycle lanes on Woodward Avenue or in Downtown. In August 2010, the State of Michigan passed a Complete Streets law, which states that future transportation improvements identified in a plan must be appropriate to the context of the community and consider all legal users of the public right-of-way. Complete Streets would be taken into consideration during Final Design of the Preferred Alternative as rules and guidance are being promulgated by the State.

There are five fire houses and a medical emergency room within a half-mile vicinity of the Project Alternatives. The fire house locations are:

- Engine 1 – 111 Montcalm Street
- Engine 5 – 433 West Alexandrine Street
- Engine 17 – 6100 Second Boulevard
- Engine 35 – 111 Kenilworth Street
- Engine 44 – 35 7-Mile Road

The Detroit Medical Center is located approximately a half mile east of Woodward Avenue with access from St. Antoine Street south of Canfield Street

3.3.2 Long-Term Effects

No Build Alternative

Safety and security conditions with the No Build Alternative are expected to be largely similar to existing conditions, as no roadway safety, pedestrian facility improvements, or bicycle facilities or accommodations are proposed in the study area. However, with projected traffic growth, there is potential for crash frequencies to increase proportionally. There would be no change anticipated to emergency services' response times.

Preferred Alternative (A4)

Vehicular Safety Impacts and Mitigation

From 2005 to 2008, there were 64 sideswipe, head-on, and left-turn crashes between signalized intersections along the portion of Woodward Avenue within the study area. The Preferred Alternative (A4) is expected to reduce these types of crashes by constructing the LRT in the median, thereby separating the northbound and southbound lanes for auto travel. Also, all intersections that have a left-turn-only lane are proposed to have protected left-turn phases, including the intersection of Woodward Avenue and MLK Jr. Boulevard/Mack Avenue, which has historically experienced a high crash rate. This would help protect against angle and head-on left-turn crashes.

With a semi-exclusive right-of-way for the LRT, the only interaction between the LRT vehicle and automobiles or buses would be at signalized intersections. Left turns would not be permitted at unsignalized intersections along the LRT alignment to avoid conflict with LRT vehicles in the median. At signalized intersections where left turns would be allowed, there is potential for conflict between the LRT vehicle and a left-turning automobile. Mitigation for this potential conflict may include several changes in traffic operations. For example, direct left-turns from Warren Avenue onto Woodward Avenue may be prohibited; vehicles wanting to turn left would instead continue through the intersection past Woodward Avenue and then use a turnaround that would need to be constructed on either side of Woodward Avenue for vehicles to complete the

left turn. Removing the left-turns from Warren Avenue and re-directing them through turnaround lanes would reduce the number of potential head-on left-turn crashes at this intersection. Vehicles would still be allowed to turn left directly from Woodward Avenue onto Warren Avenue. See Section 6.4 of the *Transportation Technical Report* (2011) for more detailed information.

Pedestrian/Bicycle Safety Impacts and Mitigation

The Preferred Alternative (A4) is not expected to have a negative impact upon pedestrian safety. The use of barrier separation between LRT and general use lanes would be determined during Final Design. At the LRT stations located in the Woodward Avenue median, pedestrian safety would be improved, because the stations would provide a pedestrian refuge from having to cross the avenue entirely in one pedestrian signal. The stations would also provide a visible, elevated place to wait for the next light.

To improve LRT travel time, traffic signals are proposed to be removed at eight intersections in the study area due to low traffic volumes. Therefore, in some instances, the time it would take a pedestrian to safely cross Woodward Avenue at a signalized intersection would increase. This increased walk-time may motivate pedestrians to jaywalk at the newly unsignalized intersections, which may increase pedestrian/vehicle or pedestrian/LRT conflicts. Mitigation may include provision of either signalized or unsignalized crosswalks along the Project alignment where crossing distances would exceed one-quarter mile in densely developed areas and a half mile in less dense areas. More detailed analysis would be completed in the design phase on location and type of crossing. There would be sufficient space provided at LRT station platforms to safely accommodate passengers waiting to board or those exiting LRT vehicles.

The Preferred Alternative (A4) does not include provision for bicycle lanes. Cyclists would be expected to continue to ride in the rightmost travel lane, as per the Michigan Vehicle Code (2010). The average vehicle speed on Woodward Avenue, however, is expected to decrease with the Project due to the reduced number of travel lanes, allowing cyclists to more safely mix with the slower-moving vehicular traffic. Complete Streets legislation will be taken into consideration during final design of the Project in order to accommodate all modes of transportation utilized along Woodward Avenue.

Transit Safety and Security Impacts and Mitigation

All crosswalks accessing LRT station platforms are proposed to be at signalized intersections. However, signalized mid-block pedestrian crosswalks may be necessary at some locations to prevent jaywalking and would be added if warranted by demand. Station design features would include lighting and security systems to enhance passenger safety and security. In case of emergency, the operator of the LRT would notify a dispatcher, who would then notify the Detroit Police Department, similar to the existing emergency procedures followed by bus operators. Local police would also patrol the LRT stations and vehicles. Informational and educational safety campaigns for drivers, students, pedestrians, cyclists, and transit users would begin prior to construction of the LRT.

Emergency Services Impacts and Mitigation

The Preferred Alternative (A4) is not expected to impact emergency services' response times. Four of the fire houses have direct access to signalized intersections along Woodward Avenue, where all turning movements would be permitted. The fire house off Kenilworth Street would not be able to complete a left-turn onto Woodward Avenue due to prohibition of left turns at unsignalized intersections. Mitigation may include an emergency-only signal at Kenilworth

Street, or directing fire trucks to use John R Street to Owen Street to access Woodward Avenue to the south.

Detroit Fire Department (DFD) operations need a distance of approximately 20 feet from a building face to raise a ladder to access the building's windows. As the width of most sidewalks is 15 feet along the Project alignments, a fire truck would need to either occupy the parking lane (if available) or one of the general-use lanes. Under the median-running Preferred Alternative (A4), there would be no conflict between the required placement of a ladder truck and the LRT and its catenary infrastructure. Emergency Medical Service (EMS) vehicles accessing DMC emergency rooms would not be impacted by this alternative as the intersection of Woodward Avenue/Canfield Street is signalized.

Alternative A1

Alternative A1 would have the same Safety and Security effects as the Preferred Alternative (A4).

Alternatives B2 and B3

Vehicular Safety Impacts and Mitigation

North of Piquette Street, the alignments of all Build Alternatives (Preferred (A4), A1, B2, and B3) are identical. South of Piquette Street, Alternatives B2 and B3 would transition to curb-running travel in the outermost lane of traffic. Transit signal priority would be given to LRT vehicles, and transit-only signal phases would be implemented where the LRT alignment shifts from median-running to curb-running. There would be no other changes to traffic operations at intersections.

With LRT vehicles traveling in the outermost travel lane with autos, potential conflict between LRT vehicles and autos would be greater with Alternatives B2 and B3 than with the Preferred Alternative (A4). Motorists in the LRT/shared-use lane may seek to quickly merge into the adjoining lane when a LRT vehicle approaches from behind, increasing the potential for side-swipe and rear-end crashes. Motorists traveling in the lane next to the LRT/shared-use lane may instinctively swerve away from a passing LRT vehicle and into the adjoining lane, also increasing the potential for side-swipe crashes. An informational campaign may be needed to inform drivers of the potential interaction between LRT and other vehicles.

Pedestrian/Bicycle Impacts and Mitigation

The curb-running Project Build Alternatives would have no positive or negative impact on pedestrian safety at unsignalized intersections and would not provide any refuge for pedestrians crossing Woodward Avenue at midblock locations. All LRT stations would be located in the outside parking lane along existing sidewalks, with sufficient space to accommodate passengers waiting to board or those getting off LRT vehicles.

The number of signalized intersections between Downtown and Piquette Street would not change with these alternatives. Therefore, the maximum time for pedestrians to cross Woodward Avenue at a signalized intersection would remain the same.

Alternatives B2 and B3 do not include provision for bicycle lanes due to roadway width constraints. Bicycles on Woodward Avenue would continue to ride in the rightmost lane, either in the LRT/shared-use lane or the unoccupied parking lane when available. While most of the LRT/shared-use lane would be a smooth surface, a groove would be necessary in the pavement adjacent to each rail to accommodate the wheel flanges on LRT vehicles. This would adversely impact bicyclists, as there is potential for a bicycle wheel to get caught in the groove.

Transit Safety and Security Impacts and Mitigation
Safety and security measures at transit platforms and on LRT vehicles, as well as educational campaigns, would be the same as with all the Project Build Alternatives.

Emergency Services Impacts and Mitigation
Alternatives B2 and B3 would not impact emergency services' response times. The fire house off Kenilworth Street would not be able to complete a left-turn onto Woodward Avenue due to the prohibition of left-turns at unsignalized intersections. Mitigation may include an emergency-only signal at Kenilworth Street, or directing fire trucks to use John R Street to Owen Street to access Woodward Avenue to the south.

Alternatives B2 and B3 would conflict with DFD's operational need for an approximate 20-foot distance between a fire truck and a building face. As a typical sidewalk in this segment of the Corridor is 15 feet, the fire truck would need to occupy either a portion or all of the LRT/shared-use lane to position its ladder against the building face; this would require that the LRT's overhead catenary wire be disabled. Therefore, LRT operations would be impacted while the catenary wire is disabled to enable use of a ladder truck during a fire event along Woodward Avenue. EMS vehicles accessing DMC emergency rooms would not be impacted by these alternatives.

3.3.3 Short-Term Construction Effects

Preferred Alternative (A4)
Under the Preferred Alternative (A4), crosswalks across Woodward Avenue may need to be closed at signalized intersections while center stations and LRT tracks are under construction. During the construction of all four alternatives, cyclists would continue to ride in the rightmost traffic lane. Construction would likely result in reduced vehicle travel speeds, allowing cyclists to mix with vehicle traffic more safely.

Alternative A1
Construction effects of Alternative A1 would be similar to the Preferred Alternative (A4).

Alternatives B2 and B3
Construction effects of Alternatives B2 and B3 would be similar to the Preferred Alternative (A4) for the stations north of Grand Boulevard. Sidewalks may be closed during the construction of curb-running stations south of Grand Boulevard and Downtown.

3.3.4 Mitigation

Construction would be staged so that at least one crosswalk would be maintained and signage would be placed to guide pedestrians to available crossing locations. With Alternatives B2 and B3, construction fencing would be placed between the construction zone and the adjoining sidewalk. At curbside LRT stops under construction, a continuous sidewalk/path would be maintained along the sidewalk behind the construction zone.

3.4 Parking

3.4.1 Existing Conditions

On-Street Parking
This section summarizes the existing metered and non-metered parking within the study corridor. The project area was broken into several sections. Table 3-2 summarizes the existing parking spaces along the proposed light rail alignment.

Table 3-2. Estimated Parking Spaces (2009)

Section	Metered/Non-Metered Parking Spaces by Direction*		TOTAL Metered/Non-Metered Spaces (Total)
East-West Roadways	**EB**	**WB**	
Larned between Washington and Griswold	12 / 0	-	12 / 0 (12)
Larned between Griswold and Randolph	0 / 0	-	0 / 0 (0)
Randolph between Congress and Larned	5 / 0	9 / 0	14 / 0 (14)
Congress between Randolph and Bates	-	0 / 3	0 / 3 (3)
Congress between Bates and Griswold	-	0 / 0	0 / 0 (0)
Congress between Griswold and Washington	-	17 / 0	17 / 0 (17)
State between Woodward and Washington	-	0 / 0	0 / 0 (0)
Grand River between Woodward and Washington	7 / 0	-	7 / 0 (7)
North-South Roadways	**NB**	**SB**	
Washington between Grand River and State	17 / 0	23 / 0	40 / 0 (40)
Washington between State and Michigan	8 / 0	7 / 0	15 / 0 (15)
Washington between Michigan and Larned	0 / 0	2 / 0	2 / 0 (2)
Woodward between Larned and Campus Martius	3 / 0	0 / 0	3 / 0 (3)
Woodward between Campus Martius and State	6 /0	0 / 0	6 / 0 (6)
Woodward between State and Grand River	8 / 0	0 / 0	8 / 0 (8)
Woodward between Grand River and Adams	10 / 0	0 / 0	10/0 (10)
Woodward between Adams and I-75	0 / 0	0 / 0	0 / 0 (0)
Woodward between I-75 and Alexandrine	11 / 45	15 / 66	26 / 111 (137)
Woodward between Alexandrine and Kirby	22 / 49	44 / 30	66 / 79 (145)
Woodward between Kirby and Grand	32 / 19	36 / 27	68 / 46 (114)
Woodward between Grand and Clairmount	2 / 58	0 / 66	2 / 124 (126)
Woodward between Clairmount and McLean	0 / 96	0 / 91	0 / 187 (187)
Woodward between McLean and Sears	0 / 43	0 / 38	0 / 81 (81)
Woodward between Sears and McNichols	0 / 25	0 / 23	0 / 48 (48)
Woodward between McNichols and 7 Mile	0 / 56	0 / 42	0 / 98 (98)
Woodward between 7 Mile and 8 Mile	0 / 27	0 / 0	0 / 27 (27)

Section	Metered/Non-Metered Parking Spaces by Direction*		TOTAL Metered/Non-
TOTAL	**143 / 418**	**153 / 386**	**296 / 804 (1,100)**

Source: DDOT and the City of Detroit Municipal Parking Department, 2011
*Metered/Non-Metered (based on 20 feet per space), NB=Northbound, SB=Southbound, EB= Eastbound, WB=Westbound

Parking Utilization
Within Downtown, the percent utilization of metered parking spaces is high on most weekdays, as reported by the Municipal Parking Department. T here is restricted evening peak-period parking along Congress Street between Griswold Street and Washington Boulevard. All other parking within the study corridor, including parking in other portions of Downtown, is not restricted by time of day.

The highest parking occupancy was found to occur during the evening peak hour, except within the Wayne State University area, which had the highest occupancies during the noon pe riod. Table 3-3 summarizes parking utilization, that is, the percentage of occupied parking spaces compared to the number of spaces available.

The areas of highest utilization are near Wayne State University, which is located west of Woodward Avenue and north of Warren Avenue, as well as between McLean and Sears Streets in Highland Park. Overall, the section from McLean Street to Sears Street has the highest parking utilization along Woodward Avenue with 58 percent of the spaces occupied during the noon hour. During the evening peak period, the average utilization for the study corridor was 33 percent.

Table 3-3. Parking Utilization

Section	AM Peak Period	Noon Period	PM Peak Period
Woodward between Adams and I-75	NA	NA	NA
Woodward between I-75 and Alexandrine	22%	42%	32%
Woodward between Alexandrine and Kirby	18%	44%	52%
Woodward between Kirby and Grand	22%	27%	40%
Woodward between Grand and Clairmount	14%	32%	37%
Woodward between Clairmount and McLean	8%	14%	19%
Woodward between McLean and Sears	26%	58%	49%
Woodward between Sears and McNichols	10%	17%	27%
Woodward between McNichols and 7 Mile	10%	12%	23%
Woodward between 7 Mile and 8 Mile	11%	4%	15%
Average Parking Utilization	**16%**	**28%**	**33%**

Source: DDOT and the City of Detroit Municipal Parking Department, 2011

3.4.2 Long-Term Effects

No Build Alternative
The No Build Alternative would have no change in the amount or utilization of parking along the Woodward Avenue Corridor's roadways; there are currently 1,100 parking spaces (296 metered and 804 non-metered).

Preferred Alternative (A4)
Table 3-4 summarizes the anticipated loss of parking spaces along Woodward Avenue. All of the Project Build Alternatives would reduce the number of parking spaces along Woodward Avenue and the respective alignments in Downtown Detroit. The Preferred Alternative (A4) would reduce the total number of parking spaces by 151 in Downtown Detroit to Piquette Street and five more north of Piquette Street. The number of parking spaces anticipated to be lost north of Piquette Street would be the same for all Project Alternatives. In the areas south of Piquette Street, very limited parking would be available between Grand Boulevard and McNichols Road.

Table 3-4. Parking Comparison of Alternatives

Alternative	Spaces Lost North of Piquette	Spaces Lost between Piquette and Downtown	Spaces Lost in Downtown Detroit	Total Spaces Lost
No Build	0	0	0	0
Alternative A1	-5	-7	-81	-93
Alternative B2	-5	-249	-39	-293
Alternative B3	-5	-249	0	-254
Alternative A4	-5	-111	-40	-156

Source: DDOT and City of Detroit Municipal Parking Department, 2011

Alternative A1
Alternative A1 would impact the least number of parking spaces of all Build Alternatives with an expected loss of 93 spaces south of Piquette Street and five more north of Piquette Street.

Alternatives B2 and B3
Alternatives B2 and B3 would result in 293 and 254 parking spaces being lost, respectively. This is due to the removal of parking on one side of the street north of Downtown Detroit, as well as more parking spaces removed near the LRT station locations.

3.4.3 Short-Term Construction Effects

No Build Alternative
The No Build Alternative would have no impact in the amount or utilization of parking along the Woodward Avenue Corridor's roadways.

Preferred Alternative
Construction of the entire 9.3 miles of LRT along the Woodward Avenue Corridor would be completed at once. However, if Phase I is built before Phase II, Phase I construction would entail construction of the southern section between Downtown and Grand Boulevard. Phase II would entail construction of the northern section, from Grand Boulevard to the Michigan State Fairgrounds. Construction of the LRT within Downtown Detroit would cause the temporary loss of all parking during construction staging. This is due to the narrower roadway widths and the possibility of roadway closures during construction. Access to businesses would be maintained during all phases and stages of construction.

Construction of the LRT between Adams Street and Grand Boulevard would entail closing half of Woodward Avenue. One travel lane along Woodward Avenue would be maintained in each direction, and left-turn lanes would be maintained at signalized intersections. Left-turn access at

unsignalized intersections and driveways may not be maintained; however, right-turn access would be maintained. On-street parking may be feasible between signalized intersections on the side of the roadway where traffic is maintained. On-street parking on the other side would not be maintained.

Between Grand Boulevard and McNichols Road, construction of the LRT would entail closing half of Woodward Avenue. One travel lane along Woodward Avenue would be maintained in each direction. Left-turn lanes may not be provided and left-turns along Woodward Avenue could be restricted. Parking would be removed during construction in this section.

North of McNichols Road, construction may entail closing the inner-most lanes of Woodward Avenue for the construction of the LRT guideway. Crossovers would be closed during construction, causing vehicles to travel to the next crossover to turn around. Parking along Woodward Avenue could be maintained, but may be restricted in the peak period in the peak direction (i.e., restricted along northbound Woodward Avenue in the evening rush hour).

Deliveries would be prohibited along all roadways with active construction.

Alternative A1
The impacts would be the same as under the Preferred Alternative (A4).

Alternatives B2 and B3
The impacts would be the same as under the Preferred Alternative (A4).

3.4.4 Mitigation

For all Project Build Alternatives, in areas where on-street parking would be removed, side-street parking immediately adjacent to Woodward Avenue or off-street parking within two blocks would be available as metered, non-metered, and paid parking.

3.5 Vehicular Operations

3.5.1 Existing Conditions

Lane and Vehicle Mix
Within Downtown Detroit, State Street and Grand River Avenue are one-way pairs with two to three lanes for travel in each direction. Washington Boulevard is a median-divided roadway with a 60-foot median with two lanes in each direction north of Michigan Avenue. South of Michigan Avenue, Washington Boulevard includes two lanes in each direction with a center left-turn lane at each signalized intersection. Congress and Larned streets are one-way pairs with three to four lanes in each direction. Randolph Street is a median-divided roadway with a 20-foot median and three lanes in each direction; parking is allowed along the outermost lanes.

For Woodward Avenue, there are three lanes in each direction with a median on Larned Street and Campus Martius. Between Campus Martius and Park Street/Witherell Street, Woodward Avenue has two lanes in each direction. North of Park Street/Witherell Street, Woodward Avenue typically has three or four 10-foot-wide through lanes in each direction, and a 10-foot-wide continuous center left-turn-only lane to McNichols Road. Typically, parking (unrestricted and metered) is allowed in the right-hand lane in both directions. The distance between traffic signals along the Corridor ranges from 0.04 miles (215 feet) to 0.30 miles.

To the north, Woodward Avenue between McNichols Road and State Fair Avenue is a median-divided roadway, with a 40-foot median dividing the northbound and southbound lanes of traffic. Direct left-turns are not allowed at any intersection and must be completed via an indirect left-

turn using median crossovers. Within this section, there are typically five 12-foot-wide lanes in each direction, with the right-hand lane used for unmetered parking and bus stops. The average distance between traffic signals is approximately 0.35 miles.

The vehicle mix on Woodward Avenue, based on data provided by MDOT, is 96.6 percent light vehicles and 3.4 percent heavy vehicles, including buses.

Operations and Travel Speeds
All study area intersections currently operate at acceptable levels of service (LOS D or better) during the morning and evening peak hours. However, while the overall intersections all operate at an acceptable LOS, the individual approaches of westbound Ferry Street and eastbound Peterboro Street operate at LOS F and E, respectively, during the evening peak hour.

Average travel time and speed varies along the 7.9-mile Woodward Avenue segment between State Fair Avenue and Adams Street, as shown in Table 3-5. The speed limit along most of Woodward Avenue is between 30 to 35 miles per hour (mph).

3.5.2 Long-Term Effects

No Build Alternative
Laneage and Vehicle Mix
The 10-foot-wide travel lanes on Woodward Avenue north of Downtown Detroit to McNichols Road would remain as they currently exist. Vehicle mix also is not expected to change in the study area.

The SEMCOG travel demand model was used to assist in forecasting future traffic in the study area. The projected change in morning and evening peak-period traffic volumes between 2005 and 2030 is minimal (showing either decreased volumes or less than five percent increase). Based on City of Detroit and MDOT consultation, a one percent per year straight-line growth rate (comprising 23 percent growth overall) was applied to 2009 traffic counts to project 2030 morning and evening peak-hour traffic volumes. (Please note this effort was conducted prior to the 2000 Census). No large traffic generating projects are planned or approved for the study area.

Operations and Travel Speeds
With projected 2030 No Build traffic volumes, all intersections would continue to operate at LOS D or better during the morning and evening peak hours. Westbound Ferris Street (LOS F) and eastbound M-8 (LOS E) would each have a single approach operating below LOS D during the evening peak hour. With adjusted signal timings, however, all the intersection approaches would operate at LOS D or better during both morning and evening time periods. Table 3-5 illustrates the vehicular travel time for all alternatives.

Table 3-5. Vehicular Travel Times and Average Speed on the Project Alignment*

Alternative	Southbound in the Morning	Northbound in the Evening
Existing	13 min 45 sec (34 mph)	16 min 6 sec (29 mph)
No Build	14 min 55 sec (32 mph)	16 min 28 sec (29 mph)
A1	22 min 46 sec (21 mph)	27 min 28 sec (17 mph)
B2, B3	21 min 5 sec (22 mph)	25 min 6 sec (19 mph)
A4	22 min 22 sec (21 mph)	25 min 57 sec (18 mph)

Source: DDOT, 2011
*Woodward Avenue between Adams Street and State Fair Avenue

Preferred Alternative (A4)
Lane and Vehicle Mix
Generally, the Preferred Alternative (A4) would remove a general-use lane from each direction of travel on Woodward Avenue between I-75 and State Fair Avenue. Lane widths along Woodward Avenue would be increased to 11 feet to meet FHWA's requirement for a minimum of 11-foot wide lanes. The center left-turn lane would be eliminated, and left turns to and from Woodward Avenue would be prohibited at unsignalized intersections. Under this alternative, vehicles that would have made a left-turn at an unsignalized intersection under the existing conditions and under the No Build alternative would be required to complete a u-turn on Woodward Avenue at the next signalized cross street to reach their destinations. Due to the narrower roadway width, commercial vehicles would be prohibited from making a u-turn at all signalized intersections between Downtown Detroit and McNichols Road. Commercial vehicles would be able to complete left- and right-turns at all signalized intersections. Vehicle mix along the Woodward Avenue Corridor is not expected to change under this alternative.

Operations and Travel Speeds
The analysis under this alternative assumes there would not be a large enough number of vehicles currently using Woodward Avenue to divert to other roadways that would significantly affect operations. Therefore, the non-LRT traffic volumes projected with the 2030 No Build Alternative were also used to evaluate future traffic conditions for the Preferred Alternative (A4). To improve LRT travel time, traffic signals are proposed to be removed at eight intersections in the study area due to low traffic volumes. Transit signal priority would be used at all remaining signalized intersections to give priority to LRT.

Under these conditions, all the signalized intersections would operate overall at LOS D or better during the morning and evening peak hours. However, there are seven individual intersection approaches that would operate at LOS E or LOS F during the peak hours. Non-LRT vehicle travel times would increase by 8 to 10 minutes with the Preferred Alternative (A4) (Table 3-5).

Alternative A1
Lane and Vehicle Mix
Lane and vehicle composition for Alternative A1 would be the same as discussed for the Preferred Alternative (A4).

Operations and Travel Speeds
Operations for Alternative A1 would be the same as the Preferred Alternative. Non-LRT vehicle travel times would increase by 8 to 11 minutes with Alternative A1 (Table 3-5).

Alternatives B2 and B3
Lane and Vehicle Mix
Alternatives B2 and B3 would include the same proposed alignment and roadway laneage north of Piquette Street as described for the Preferred Alternative (A4). South of Piquette Street, the number of travel lanes along Woodward Avenue would not change. However, lane width would be increased to 11 feet, and parking would be removed from one side of the street to accommodate the additional lane width. All turning movements at signalized and unsignalized intersections that are currently allowed would continue to be allowed for non-LRT vehicles. Vehicle mix along the Woodward Avenue Corridor is not expected to change under this alternative.

Operations and Travel Speeds
As described for the Preferred Alternative (A4), it was assumed that there would not be a large enough number of vehicles currently using Woodward Avenue to divert to other roadways that would significantly affect operations. With Alternatives B2 and B3, no traffic signals are proposed to be removed south of Piquette Street, and transit signal priority would be used at all signalized intersections to give priority to LRT vehicles while balancing the needs of vehicular traffic. Under these conditions, all signalized intersections would operate at LOS D or better during the morning and evening peak hours with each of these alternatives. However, there are seven individual intersection approaches that would perform at LOS E or LOS F during the peak hours; these are the same approaches as the Preferred Alternative (A4). Non-LRT vehicle travel times would increase by six to nine minutes (Table 3-5).

3.5.3 Short-Term Construction Effects

As discussed in Chapter 2.0, construction of the entire 9.3 mile LRT along the Woodward Avenue Corridor would be completed at once. However, if Phase I is built before Phase II, Phase I would entail construction of the southern section between Downtown and Grand Boulevard. Phase II would entail construction of the northern section, from Grand Boulevard to the Michigan State Fairgrounds. Construction of the LRT within Downtown Detroit would cause the temporary loss of all parking during construction staging. This is due to the need to utilize the parking lane as a travel lane and the possibility of some roadway closures during construction. Access to businesses would be maintained during all phases and stages of construction.

Construction of the LRT between Adams Street and Grand Boulevard would entail closing half of Woodward Avenue. One travel lane along Woodward Avenue would be maintained in each direction and left-turn lanes would be maintained at signalized intersections. Left-turn access at unsignalized intersections and driveways may not be maintained; however, right-turn access would be maintained. On-street parking may be feasible between signalized intersections on the side of the roadway where traffic is maintained. On-street parking on the other side would not be maintained.

Between Grand Boulevard and McNichols Road, construction of the LRT would entail closing half of Woodward Avenue. One travel lane along Woodward Avenue would be maintained in each direction. Left-turn lanes may not be provided and left-turns along Woodward Avenue could be restricted. Parking would be removed during construction in this section.

North of McNichols Road, construction may entail closing the inner-most lanes of Woodward Avenue. Crossovers would be closed during construction, requiring vehicles to travel to the next crossover to turn around. Parking along Woodward Avenue could be maintained, but may be restricted in the peak period in the peak direction (i.e., restricted along northbound Woodward Avenue in the evening rush hour).

Deliveries would be prohibited along all roadways with active construction. Maintenance of traffic plans will be prepared during the design phase of project development following completion of the environmental review process.

3.5.4 Mitigation

All intersections are anticipated to operate at an overall LOS D or better. No mitigation for vehicle operations is proposed at this time.

3.6 Permits and Approvals

Several permits and approvals are required for implementation of the Preferred Alternative (A4) (see Table 3-6), including some related to Woodward Avenue's inclusion in the National Highway System as the M-1 State trunk line.

Table 3-6. Permits and Approvals

Permit/Approval	Responsible Agency	Comments
Negotiate Lease Agreement	FHWA/MDOT/City of Detroit	Allows project facilities (rails, stations, catenary) to be constructed, operated and maintained within MDOT right-of-way (on Woodward Avenue north of Adams Street). As Woodward Avenue is also a part of the National Highway System, FHWA concurrence is necessary
Obtain Permit to Construct	MDOT/City of Detroit	MDOT Transportation Service Center (Traffic and Construction) approves plans for maintenance of traffic during construction
Secure Utility/Drainage Permits	Utility Owners/Operators (various)	Addresses prior rights or authority of existing utilities to require permit. Typically, sanitary and water facilities have "permits," which specify minimum cover and clearance requirements

Source: Woodward Avenue LRT Project Team, 2011