MEMPHIS AREA TRANSIT AUTHORITY

Midtown
Alternatives Analysis

THE MAC
Midtown Area Connector
Connecting Memphis from the Inside Out

TECHNICAL MEMORANDUM: 3
Tier 2 Screening Summary

January 2016

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Executive Summary

The evaluation process developed to select the Locally Preferred Alternative (LPA) for the Memphis Midtown Alternatives Analysis (AA) consists of a two-step process. The first step involves an initial Tier 1 screening intended to narrow a long list of potential alternatives into a short-list of alternatives, followed by a Tier 2 process in which the short-listed alternatives will be evaluated in more detail. This document reports on the Tier 2 screening process and results.

As with the Tier 1 screening, the Tier 2 evaluation was based on the project goals and objectives and consisted of a combination of qualitative and quantitative measures. In some cases, the Tier 2 measures were the same as the Tier 1 measures, but in many cases, additional criteria were used (for example, ridership, operating and capital costs, cost-effectiveness, and impacts on natural and historic resources and the environment). Also, in many cases, the Tier 2 evaluation was much more detailed than the Tier 1 screening.

In addition, the process was iterative. If it was determined that some alternatives perform poorly on specific criteria, they were refined so that they can better meet project goals and objectives. In some cases, the measurement methodologies were further developed in order to more accurately distinguish the advantages and disadvantages between alternatives. Ultimately, the candidate alternatives were analyzed carefully in comparison with one another and their ability to meet project goals and function as an effective part of Memphis' local and regional transportation system. When all factors are considered, seven alternatives rated as BEST or GOOD overall. Tier 2 Evaluation resulted in seven alternatives listed below and illustrated in **Figure 1**.

- Alternative 6 Airport via Poplar and East Parkway
- Alternative 7 Germantown via Poplar
- Alternative 8 University of Memphis via Poplar, Cooper, and Union
- Alternative 9 Fairgrounds via Madison
- Alternative 11 University of Memphis via Union and Poplar
- Alternative 23 Elvis Presley, Cleveland, Watkins Crosstown
- Alternative 26 University of Memphis via Union, Cooper, and Central

Three of these alternatives would operate between the University of Memphis and downtown Memphis, which is the core of Midtown. Alternative 7 also serves downtown Memphis and the University of Memphis, but continues traveling east after serving the University of Memphis. Three of these alternatives would not serve the University of Memphis: Alternative 6, which would operate between the airport and downtown, Alternative 9, which would operate between downtown and the Fairgrounds, and Alternative 23, which would operate along Elvis Presley Boulevard, Cleveland Street, and Watkins Street.

Tier 2 analysis was a detailed evaluation of each alternative and resulted in the selection of a Locally Preferred Alternative. Each of these alternatives was analyzed in detail. This was done through a collaborative process involving MATA staff, the project team, the project's advisory committees, consultation with key stakeholders, and input received through the public involvement process. The results of the Tier 2 process are provided in Error! Reference source not found..

Figure 1: Tier 2 Alternatives

Table 1: Tier 2 Screening Results

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR	⚠ FAIR	⚠ FAIR	✓✓ BEST	⚠ FAIR	⚠ FAIR
7 Germantown via Poplar	✓ GOOD	⚠ FAIR	⚠ FAIR	✓✓ BEST	✓ GOOD	✓ GOOD
8 U of M via Poplar, Cooper, and Union	⚠ FAIR	✓ GOOD	✓ GOOD	✓✓ BEST	✓ GOOD	✓ GOOD
9 Fairgrounds via Madison	⚠ FAIR	✓✓ BEST	⚠ FAIR	⚠ FAIR	⚠ FAIR	⚠ FAIR
11 U of M via Union and Poplar	✓✓ BEST	✓✓ BEST	✓✓ BEST	✓✓ BEST	⚠ FAIR	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	✓✓ BEST	⚠ FAIR	✕ POOR	✓✓ BEST	⚠ FAIR	⚠ FAIR
26 U of M via Union, Cooper, and Central	✓ GOOD	⚠ FAIR	✓✓ BEST	✓✓ BEST	⚠ FAIR	✓ GOOD

**Note: Alternative 9 is the Streetcar Extension. Total length of Streetcar is 7.20 miles (extension line is 2.82 miles).*

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings. Alternatives received a FAIR overall rating if they had three or more FAIR ratings or if they had one POOR rating. Any alternative with more than one poor rating received an overall rating of POOR.

Section 1 |

Introduction

Overview

The evaluation process that has been developed to select the Locally Preferred Alternative (LPA) for the Memphis Midtown Alternatives Analysis (AA) consists of a two-step process:

- An initial Tier 1 screening process that focuses on narrowing a long list of potential alternatives into a short-list of alternatives.
- A Tier 2 evaluation in which short-listed alternatives will be evaluated in more detail.

This memo presents the results of the Tier 2 screening process.

Tier 2 Alternatives

The Tier 1 screening processes narrowed candidate alternatives from 16 to the top seven alternatives. Unlike Tier 1, Tier 2 is in more depth with its screening, defining station locations, considering the environment around these stations, and developing an operating plan to integrate the proposed services with existing local bus routes.

The seven alternatives that scored highest in Tier 1 are presented below. Note that the alternative numbers were developed for internal purposes, and do not correspond to current MATA services.

- 6 Airport via Poplar and East Pkwy
- 7 Germantown via Poplar
- 8 U of M via Poplar, Cooper, and Union
- 9 Fairgrounds via Madison
- 11 U of M via Union and Poplar
- 23 Elvis Presley, Cleveland, Watkins Crosstown
- 26 U of M via Union, Cooper, and Central

Tier 2 Screening Process

Similar to Tier 1, the Tier 2 alternatives were screened according to 18 criteria that are directly tied to the project goals articulated in the Purpose and Needs statement (see **Table 2**). These criteria include both qualitative and quantitative measures that were examined at varying levels of detail.

For each criterion, the study team considered how well the alternative fulfilled the screening criterion objective and assigned each alternative a rating of BEST, GOOD, FAIR or POOR. The ratings reflect

relative, rather than absolute scores. The screening process involved combining qualitative and quantitative data as well as comparing and contrasting the alternatives against each other. As a result, an alternative's rating can only be interpreted relative to the other alternatives. Additionally, because the alternatives are located close to each other, the differences between alternatives were often subtle. Consequently, in some cases, more than one alternative received a BEST rating and in other cases, none of the alternatives received a BEST rating.

As discussed in other technical memos, the approach used in the Tier 2 screening process involved measuring each alternative against each individual criterion. In order to determine how each alternative scored in terms of the five project goals, alternatives were then ranked based on results of the Tier 2 screening criteria tied to each project goal. For each goal, the highest performing alternatives were those that received the most BEST and GOOD ratings for the Tier 2 screening criteria tied to that project goal.

Key Assumptions

The evaluation process involved a number of assumptions. Among the most critical of these is determining the influence (or capture) area associated with each alternative. In general, the public transportation industry considers high capacity transit within walking distance of a destination if it is within ½-mile of the route or service. As a result, a ½-mile buffer was used to determine access for criteria associated with population, employment, and destinations (i.e. when people are walking to/from the alternatives).

A second major assumption is related to the proposed operation of services. During the Tier 2 screening, operating plans were developed to accommodate two scenarios: a rapid replacement of local service, where the local bus route would be completely replaced by rapid transit (see **Figure 2**), and an express overlay, where local service would be preserved at present levels with a less frequent limited stop service that runs in conjunction with the local service (see **Figure 3**). As the rapid replacement scenario requires more intensive changes to local bus routes and result in a higher level of service on each of the alternatives, all station area analyses and buffers use the rapid replacement scenario instead of the express overlay. It is recommended that further sensitivity analysis be completed during the environmental phase of the project to maximize the overall transit network. Detailed descriptions of the operations are documented in Technical Memorandum #8, the Operating Plans Report.

Table 2: Tier 2 Evaluation Objectives and Screening Criteria

Objective	Evaluation Criteria
ENHANCE *Make Midtown Corridor transit service more compelling*	
Provide better transit service for existing riders and attract new riders	➲ Total projected ridership ➲ Projected transit-dependent ridership
Provide fast, frequent, and reliable service	➲ Directness, average speeds, frequency, and alternative traffic conditions
Improve transit options for Memphis' most vulnerable residents	➲ Transit-sensitive residents and social service centers within ½-mile of stations
CONNECT *Connect neighborhoods and improve local circulation*	
Improve access for residents	➲ Residents within ½-mile of alternative (current and projected)
Improve access to jobs	➲ Jobs within ½-mile of alternative (current and projected)
Improve connections with major attractions and destinations	➲ Anchors and major activity centers within ½-mile of alternative
Improve access to civic and cultural assets	➲ Special use generators within ½-mile of stations
Improve access to visitor destinations and accommodations	➲ Visitor destinations and visitor accommodations within ½-mile of service
Complement other transit investments and transit plans	➲ Integration with existing and other proposed MATA services
DEVELOP *Support local and regional economic development goals*	
Support small businesses and retail districts	➲ Small businesses within ½-mile of stations
Foster compact, mixed-use development	➲ Transit-supportive land uses within ½-mile of stations
Attract residential and commercial growth	➲ Economic development potential
THRIVE *Strengthen Memphis neighborhoods and downtown*	
Support community desires	➲ Community and stakeholder support
Support and enhance the character of neighborhoods	➲ Parking and neighborhood impacts
SUSTAIN *Create an environment that will be sustainable over the long term*	
Develop cost-effective transit solutions	➲ Operating, capital costs, and annualized operating and capital cost per passenger
Reduce greenhouse gases	➲ Changes in Automobile Passenger Miles Traveled (PMT)
Minimize impacts to natural, historical, and cultural resources	➲ Natural, historical, cultural impacts

Figure 2: Tier 2 Alternatives, Rapid Replacement of Local Services

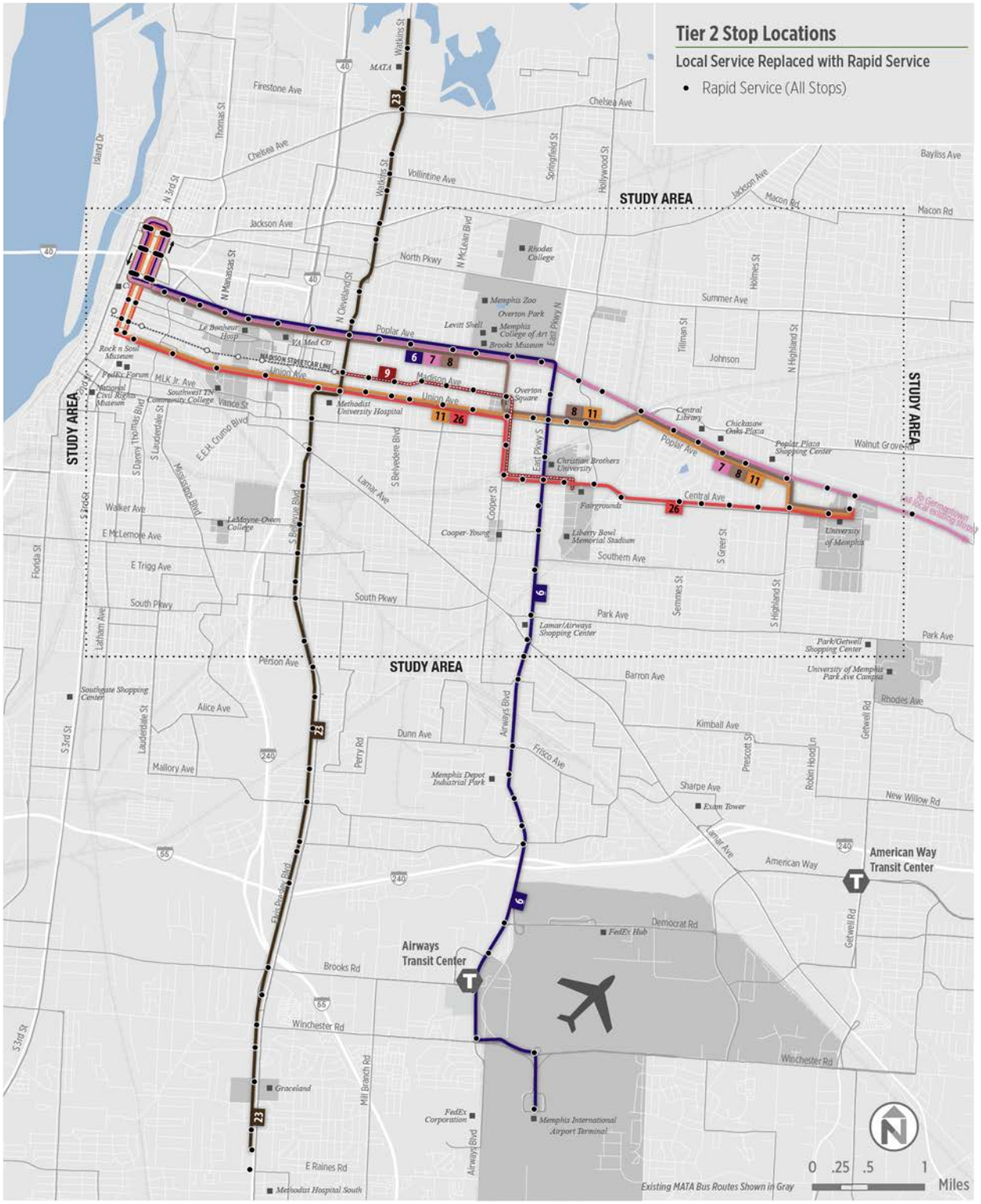
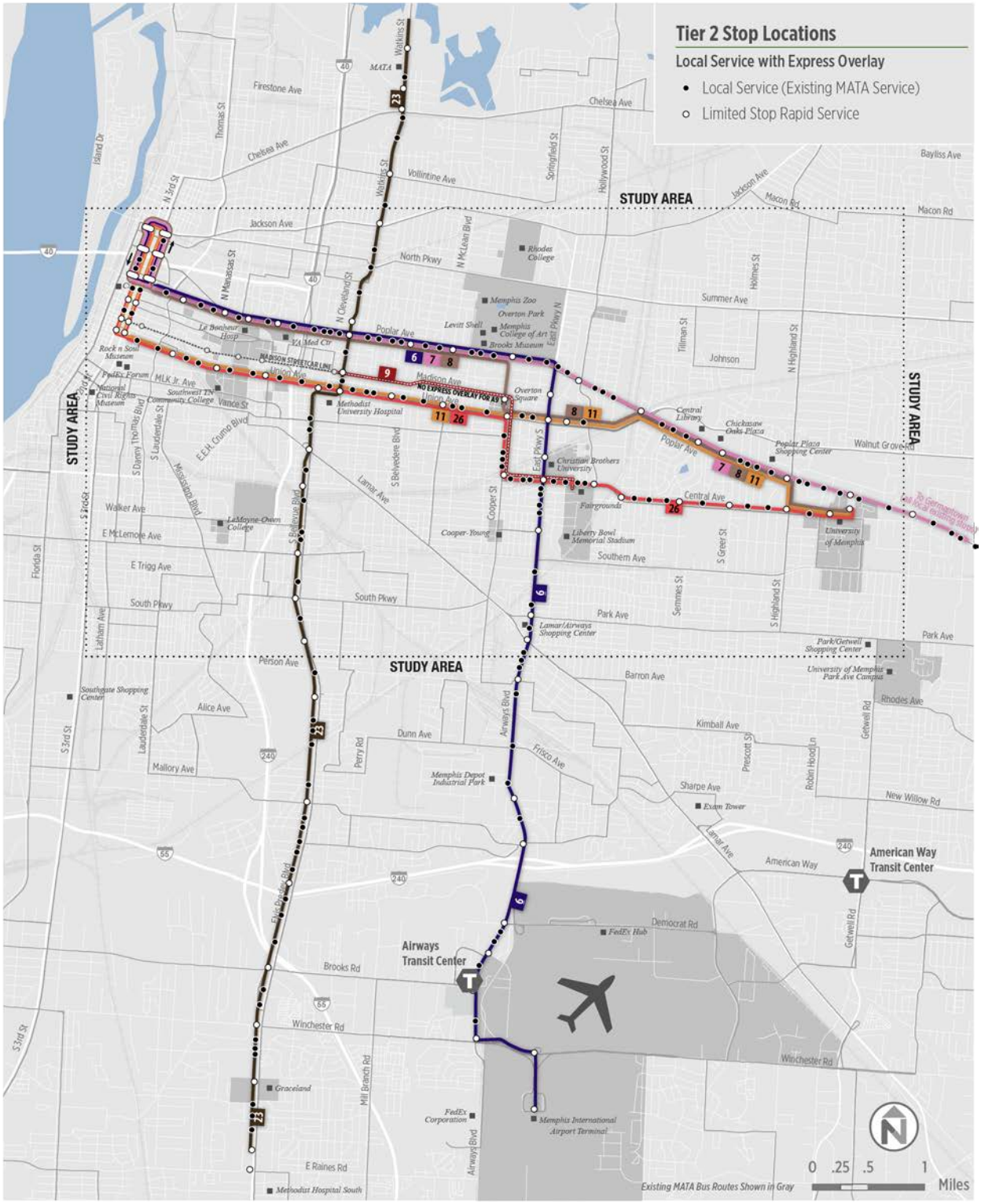


Figure 3: Tier 2 Alternatives, Express Overlay



Findings: Tier 2 Screening

The alternatives have different strengths and weaknesses and each option offers potential as a viable Midtown Corridor. The differences between the alternatives are that some alternatives have greater potential and offer better choices in terms serving population and employment nodes as well as transit-dependent populations, which generally equates to higher transit ridership. The results of the Tier 2 screening process are shown in Error! Reference source not found. and a brief description of each alternative is included below.

Table 3: Tier 2 Screening Results

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR	⚠ FAIR	⚠ FAIR	✓✓ BEST	⚠ FAIR	⚠ FAIR
7 Germantown via Poplar	✓ GOOD	⚠ FAIR	⚠ FAIR	✓✓ BEST	✓ GOOD	✓ GOOD
8 U of M via Poplar, Cooper, and Union	⚠ FAIR	✓ GOOD	✓ GOOD	✓✓ BEST	✓ GOOD	✓ GOOD
9 Fairgrounds via Madison	⚠ FAIR	✓✓ BEST	⚠ FAIR	⚠ FAIR	⚠ FAIR	⚠ FAIR
11 U of M via Union and Poplar	✓✓ BEST	✓✓ BEST	✓✓ BEST	✓✓ BEST	⚠ FAIR	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	✓✓ BEST	⚠ FAIR	✕ POOR	✓✓ BEST	⚠ FAIR	⚠ FAIR
26 U of M via Union, Cooper, and Central	✓ GOOD	⚠ FAIR	✓✓ BEST	✓✓ BEST	⚠ FAIR	✓ GOOD

**Note: Alternative 9 is the Streetcar Extension. Total length of Streetcar is 7.20 miles (extension line is 2.82 miles).*

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings. Alternatives received a FAIR overall rating if they had three or more FAIR ratings or if they had one POOR rating. Any alternative with more than one poor rating received an overall rating of POOR.

Alternative 6: Airport via Poplar Avenue and E. Parkway/Airways Boulevard

Alternative 6 rated FAIR overall. The alternative received three FAIR ratings, one GOOD rating and one BEST rating. The alternative would serve land uses that are relatively transit supportive, however, it does not serve some of the larger destinations that would generate higher numbers of transit riders, such as the University of Memphis and the concentration of destinations along Union Avenue.

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR	⚠ FAIR	⚠ FAIR	✓✓ BEST	⚠ FAIR	⚠ FAIR

Alternative 7: Germantown via Poplar Avenue and University of Memphis

Alternative 7 rated FAIR overall. The alternative would serve land uses that are relatively transit-supportive and would serve a high number of small businesses. Alternative 7 has the ability to increase access to destinations and development potential, which are particularly low once outside of Midtown. While the alternative would serve an area that has relatively high population and employment densities and the route would be very direct, the alternative would serve a low number of transit-dependent individuals.

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
7 Germantown via Poplar	✓ GOOD	⚠ FAIR	⚠ FAIR	✓✓ BEST	✓ GOOD	✓ GOOD

Alternative 8: University of Memphis via Poplar Avenue, Cooper Street, and Union Avenue

Alternative 8 rated GOOD overall. It received one BEST rating, three GOOD ratings, and one FAIR rating. The alternative would make Midtown Corridor transit service more compelling by improving service for a high number of existing riders and would serve areas with high population and employment densities. It would also improve service for a relatively large number of residents and jobs per mile of service and would connect a variety of activity centers, special use generators, and visitor destinations. While the alternative would serve areas with only moderate development potential, it would serve transit-supportive areas but lacks the amount of transit ridership needed to advance.

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
8 U of M via Poplar, Cooper, and Union	⚠ FAIR	✓ GOOD	✓ GOOD	✓✓ BEST	✓ GOOD	✓ GOOD

Alternative 9: Memphis Fairgrounds via Madison Avenue, Cooper Street, and Central Avenue

In the Tier 2 evaluation, Alternative 9 rated GOOD overall. Alternative 9 received three GOOD ratings, and two FAIR ratings. This analysis considered both the existing Madison Avenue Line and the proposed extension to the Fairgrounds as one complete alternative. The alternative would be well positioned through central Midtown and has strong development potential. The alternative also serves a number of key destinations and activity generators, however due to the shortness of the route, provides few opportunities to transfer to the network. It also had the highest capital cost.

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
9 Fairgrounds via Madison	⚠ FAIR	✓✓ BEST	⚠ FAIR	⚠ FAIR	⚠ FAIR	⚠ FAIR

Alternative 11: University of Memphis via Union and Poplar Avenues

Alternative 11 rated BEST overall, scored highly on most criteria, and outperformed all other alternatives. Alternative 11 would serve a very high number of residents, would provide access to a large number of jobs, and would provide connections to a relatively high number of activity centers, special use generators, and visitor destinations. Alternative 11 would also support local and regional economic development goals, as it would serve areas with high development potential and transit-supportive land uses. The alternative is in line with the city's priorities, would provide direct service, and would connect areas with high population and employment densities.

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
11 U of M via Union and Poplar	✓✓ BEST	✓✓ BEST	✓✓ BEST	✓✓ BEST	⚠ FAIR	✓✓ BEST

Alternative 23: Graceland via Elvis Presley Boulevard, Cleveland Street, and Watkins Street

Alternative 23 rated FAIR overall, receiving three FAIR ratings an two BEST ratings. Since the alternative would serve neither downtown nor the University of Memphis, it would directly serve a relatively low number of residents and jobs and would provide access to significantly fewer activity centers than most other alternatives under consideration. However, the alternative has very strong existing ridership, being one of the busiest bus routes in the MATA system. It also provides the most number of transfer opportunities to other routes, crossing nearly every radial route in the system, further improving regional access to destinations.

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
23 Elvis Presley, Cleveland, Watkins Crosstown	✓✓ BEST	⚠ FAIR	✕ POOR	✓✓ BEST	⚠ FAIR	⚠ FAIR

Alternative 26: University of Memphis via Union and Central Avenues

Alternative 26 rated GOOD overall. The alternative received one BEST rating, two GOOD ratings, and two FAIR ratings. Alternative 26 would provide connections to a high number of activity centers, special use generators, and visitor destinations. The alternative is also surrounded by areas with transit-supportive land uses as well as a relatively high number of parcels with development potential.

Alternative	Enhance	Connect	Develop	Thrive	Sustain	Overall Rating
26 U of M via Union, Cooper, and Central	✓ GOOD	⚠ FAIR	✓✓ BEST	✓✓ BEST	⚠ FAIR	✓ GOOD

Section 2 |

Enhance: Make Midtown Corridor Transit Service More Compelling

Introduction

One of the goals of implementing high capacity transit in the Midtown Corridor is to make transit service in the corridor more compelling. When public transit works well, it means time savings, better access to jobs and resources, and increased overall livability. Transit ridership is already robust in Memphis' Midtown area; however, further improvements would make public transit a competitive alternative to other modes of transportation. In addition to attracting new riders, investing in high capacity transit would improve the lives of people who rely on public transit every day. This section will analyze how each alternative will enhance transit service in the Midtown Corridor.

Objectives

For this goal, each alternative's performance was evaluated according to three objectives:

- **Provide better transit service for existing riders and attract new riders.** An important part of investing in premium transit service is to improve transit service for existing riders, and to make transit more compelling in order to attract new riders.
- **Provide fast, frequent, and reliable service.** Faster and more direct transit service is more attractive to more people than slower and indirect service.
- **Improve transit options for Memphis' most vulnerable residents.** The availability of transit service provides a critical lifeline and independence to transit-dependent populations. As such, investing in High Capacity Transit (HCT) should improve transit options for those residents who are most vulnerable.

Screening Results

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings in the criteria tied to the "Enhance" goal. The results of the "Enhance" goal screening process are shown in **Table 4** and a brief description of each alternative is included below.

Two alternatives emerged with a BEST rating for the Enhanced category. Alternative 11 University of Memphis via Union and Poplar Avenues would serve areas of significant underlying demand for transit. Alternative 11 also scored well based on service to areas with high MATA bus ridership and also

directness and speed. Alternative 23 also scored well for project ridership and transit dependent populations.

- 11 University of Memphis via Union and Popular Avenues
- 23 Graceland via Elvis Presley Boulevard, Cleveland Street, Watkins Street

Two alternatives were rated GOOD when considering the project's goal to make Midtown Corridor transit service more compelling. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings.

- 7 Germantown via Poplar Avenue
- 26 University of Memphis via Union Avenue, Cooper Street, and Central Avenue

Three alternative had a rating of FAIR when considering the project's goal to make Midtown Corridor transit service more compelling. An alternative was rated as FAIR if they had three or more FAIR ratings or if they had one POOR rating.

- 6 Memphis International Airport via Poplar Avenue and E. Parkway
- 8 University of Memphis via Poplar Avenue, Cooper Street, and Union Avenue
- 9 Memphis Fairgrounds via Madison Avenue

Table 4: "Enhance" Screening Criteria Results

Alternatives	Total Projected Ridership	Transit-Dependent Populations	Directness and Speed	Overall Rating
6 Memphis International Airport via Poplar Avenue and E. Parkway	⚠ FAIR	⚠ FAIR	✓ GOOD	⚠ FAIR
7 Germantown via Poplar Avenue	✓ GOOD	✓ GOOD	✓ GOOD	✓ GOOD
8 University of Memphis via Poplar Avenue, Cooper Street, and Union Avenue	⚠ FAIR	⚠ FAIR	⚠ FAIR	⚠ FAIR
9 Memphis Fairgrounds via Madison Avenue	✓ GOOD	⚠ FAIR	⚠ FAIR	⚠ FAIR
11 University of Memphis via Union and Poplar Avenues	✓✓ BEST	✓ GOOD	⚠ FAIR	✓✓ BEST
23 Graceland via Elvis Presley Boulevard, Cleveland Street, Watkins Street	✓✓ BEST	✓✓ BEST	✓ GOOD	✓✓ BEST
26 University of Memphis via Union Avenue, Cooper Street, and Central Avenue	✓ GOOD	✓ GOOD	✓ GOOD	✓ GOOD

**Note: Alternative 9 is the Streetcar Extension. Total length of Streetcar is 7.20 miles (extension line is 2.82 miles).*

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings. Alternatives received a FAIR overall rating if they had three or more FAIR ratings or if they had one POOR rating. Any alternative with more than one poor rating received an overall rating of POOR.

"Enhance" Tier 2 Screening Criteria

Total Projected Ridership

The purpose of this report is to summarize the ridership demand forecasting methodology and results in support of the Memphis Midtown Alternatives Analysis (AA). This ridership forecasting effort included: 1) calibration of the existing Memphis Area Transit Authority (MATA) transit system; 2) ridership forecasts for the seven alternatives selected through the Tier 2 screening process; and 3) documentation of findings and conclusions compliant with current Federal Transit Administration (FTA) reporting requirements.

Integrating the new high-capacity transit service with the existing MATA service and any future changes to MATA routes is important to ensure that appropriate levels of service are provided along the proposed alternatives. In addition, a well-integrated network would allow passengers to easily connect to the service without significant penalties on travel time. As some of the proposed alternatives do not follow existing bus routes, appropriate changes in service were made to ensure efficient use of resources and vehicles, as well as to provide better transfer opportunities between existing local bus routes and the new services.

In the interest of complying with the proposed project schedule and taking into consideration the nature of the Tier 2 alternative evaluation, the team agreed to use Simplified Trips-on-Project Software (STOPS) for screening the alternatives. Using STOPS, the impacts of the alternatives on the corridor boardings were examined using the existing land use and travel conditions (referred to as 'existing year conditions' in this report). All ridership and automobile passenger miles traveled (PMT) values presented in this report are current and horizon year forecasts. FTA guidance suggests using existing conditions which provide the most easily understood, most reliable, and most readily available information for decision-making. The FTA requires all sponsors to calculate the measure for evaluation based on current year inputs.

Methodology

The travel demand modeling component of this study consisted of the following elements:

- Coding and analysis of the existing No Build system;
- Coding and analysis of the existing (2015) Build Alternatives;
- Coding and analysis of the future (2035) Build Alternatives; and
- Documentation of findings compliant with current FTA reporting requirements.

To estimate trips on the proposed BRT system, the project team utilized FTA's national model, STOPS. The STOPS model is designed to estimate transit project ridership using a streamlined set of procedures. STOPS includes many of the same computations of transit level of service and market share found in regional travel demand models. STOPS produces all of the reporting needed by project sponsors to review ridership forecasts in detail, and to support grant applications to the FTA New and

Small Starts program. When using STOPS, the FTA review of forecasts can be focused on the inputs, assumptions, and forecasts produced rather than on the modeling tool being used.

The focus of the forecasting effort for this study was on performing analysis and refining the results of the existing conditions first, followed by forecasting ridership for the horizon year build alternatives, once the team was comfortable with the results that STOPS produced for the base year.

To compare the alternatives against each other the following ranges were developed based on the results. For total boardings, the low and high numbers were used to develop the ranges. **Table 5** shows the ranges for each rating.

Table 5: Rating Ranges for Total Boardings

Range	Rating
0 – 1,000	✕ POOR
1,001 – 2000	⚠ FAIR
2,001 – 3,000	✓ GOOD
> 3,000	✓✓ BEST

A similar approach was used to compare the alternatives against each other for activity per miles. This shows the amount of activity per mile, which is based on the total boardings divided by the length of the alternatives. **Table 6** shows those ranges. **Table 7** shows the results for total boardings and activity per mile for each alternative.

Table 6: Rating Ranges for Activity per Mile

Range	Rating
0 - 150	✕ POOR
151 – 300	⚠ FAIR
301 – 450	✓ GOOD
> 451	✓✓ BEST

Key Findings (2035 Results)

The following provides a summary of the results of the ridership analysis that was completed for the seven alternatives evaluated in the Tier 2 process.

- Alternatives 11 and 23 are projected to generate the highest daily boardings (approximately 3,000 to 3,500), and Alternatives 8 and 9 are projected to generate the lowest daily boardings (approximately 1,200 to 1,300).
- Based on the service plans developed, several stop locations were identified as high ridership locations.
- Based on the ridership results, the team recommends revising service plans to reflect less aggressive service cuts to existing bus routes compared with the original Tier 2 service plans.

Table 7: Projected Ridership (2035)

Alternative	Total Projected Ridership	Rating	Activity per Mile	Rating	Overall Rating
6 Airport via Poplar and East Pkwy	1726	⚠ FAIR	147	✕ POOR	⚠ FAIR
7 Germantown via Poplar	2138	✓ GOOD	274	⚠ FAIR	✓ GOOD
8 U of M via Poplar, Cooper, and Union	1205	⚠ FAIR	142	✕ POOR	⚠ FAIR
9 Fairgrounds via Madison*	1301	⚠ FAIR	461	✓✓ BEST	✓ GOOD
11 U of M via Union and Poplar	3061	✓✓ BEST	354	✓ GOOD	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	3512	✓✓ BEST	318	✓ GOOD	✓✓ BEST
26 U of M via Union, Cooper, and Central	2430	✓ GOOD	267	⚠ FAIR	✓ GOOD

**Note: Alternative 9 is the Streetcar Extension. Total length of Streetcar is 7.20 miles (extension line is 2.82 miles).*

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings. Alternatives received a FAIR overall rating if they had three or more FAIR ratings or if they had one POOR rating. Any alternative with more than one poor rating received an overall rating of POOR.

Transit Dependent Populations

Certain population subgroups are more likely to use transit than the population as a whole. For these transit dependent populations, the availability of transit service provides a critical lifeline and independence. This Tier 2 criterion evaluates the number of transit dependent residents that would be served by each alternative. Four socioeconomic populations with a high propensity to use transit were considered for this analysis: non-white individuals, older adults, individuals in poverty, and individuals

with a disability. While individuals without access to a vehicle are sometimes considered in this type of analysis, in the case of Memphis, there is a great deal of overlap between individuals living below the poverty level and individuals without access to a vehicle; therefore the number of individuals without access to a vehicle was not considered in this analysis in order to minimize double counting.

Methodology

The study team gathered demographic data to estimate the number of individuals in each transit-dependent subgroup that would be served by each alternative. The total number of these individuals that would be served by each alternative formed the basis for the ratings.

Due to the way the Census conducts questions on household backgrounds and habits, socioeconomic data was collected at both the block level and Block Group level. The number of older adults and non-white individuals was obtained from the 2010 Census at the block level (generally the size of a city block). In contrast, the number of disabled individuals, individuals in poverty, and individuals without access to a vehicle was obtained from the 2008-2012 American Community Survey (ACS), which gives data at the Block Group level (generally a cluster of city blocks).

To determine how many transit dependent individuals would be served by each alternative, the study team summed all the individuals in blocks within ½-mile of each alternative (see **Figure 4**). For block group-based data, all block groups within ½ mile of the alternative were counted as well. However, as block groups could span outside of the ½ mile buffer, a pro-rated population based on the land area within the buffer was used.

In order to consider the various geographic sizes (block vs. block group) and the length of each alternative, all data was converted into a density (e.g. non-white individuals per acre). The density for each subgroup was then divided by the average density across all alternatives and multiplied by 100 to produce an index value. Therefore, an index of 100 is average; a score below 100 indicates an alternative that would improve transit service for a below average number of individuals within the transit dependent subgroup, while a score above 100 indicates an alternative that would improve transit for an above average number of individuals within the transit dependent subgroup. The average index across all population subgroups was calculated in order to determine an overall transit dependent population index, which acts as a single metric that takes into account the four socioeconomic subgroups by which to compare each alternative. **Table 8** shows the results of the transit dependent population index ratings.

NON-WHITE INDIVIDUALS

Minorities, or non-white individuals, includes individuals who are generally much more familiar and comfortable with transit, may have limited resources for transportation, may have difficulty obtaining a driver's license, and also tend to locate in denser neighborhoods closer to the urban core. Non-White population block level data was obtained from the 2010 Census.

OLDER ADULTS

Older adults are more likely to ride transit than the general population for a variety of reasons, including increased incidence of an inability to own or operate a private vehicle (relative to the larger population). Block level data for older adults (residents 65+) was obtained from the 2010 Census.

INDIVIDUALS IN POVERTY

Income status is one of the strongest indicators of a higher-than-average reliance on public transportation; people with lower incomes are less likely to have reliable access to a private vehicle and thus are more likely to use transit. Individuals in poverty data was obtained from the American Community Survey (2012) at the Block Group level. ACS gives data on the number of people below the poverty threshold only for people ages 18 and over. The ACS' poverty thresholds are dependent on household size. In 2012, the threshold was an annual income of $11,945 for a single person household, $15,450 for a household of two, and higher for additional people.

INDIVIDUALS WITH A DISABILITY

Individuals with a disability are more likely to ride transit than the general population, largely because they are less likely to be able to operate a vehicle. Data on individuals with a disability was obtained from American Community Survey (2012) at the Block Group level. Like the calculation of individuals in poverty, data for individuals with a disability was only available for ages 18 and older.

Table 8: Transit Dependent Population Indexes

Alternative	Population in Poverty	Individuals with Disability	Older Adults	Persons of Color	Rating
6 Airport via Poplar and East Pkwy	100%	86%	89%	115%	⚠ FAIR
7 Germantown via Poplar	110%	102%	96%	90%	✓ GOOD
8 U of M via Poplar, Cooper, and Union	94%	96%	103%	91%	⚠ FAIR
9 Fairgrounds via Madison	106%	117%	65%	61%	⚠ FAIR
11 U of M via Union and Poplar	99%	105%	113%	94%	✓ GOOD
23 Elvis Presley, Cleveland, Watkins Crosstown	99%	91%	124%	162%	✓✓ BEST
26 U of M via Union, Cooper, and Central	91%	102%	109%	87%	✓ GOOD

**Note: Alternative 9 is the Streetcar Extension. Total length of Streetcar is 7.20 miles (extension line is 2.82 miles).*

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings. Alternatives received a FAIR overall rating if they had three or more FAIR ratings or if they had one POOR rating. Any alternative with more than one poor rating received an overall rating of POOR.

Figure 4: Transit Dependent Populations

Directness, Average Speeds, Frequency, and Traffic Conditions

Direct route alternative and adequate speed are important for a high-quality, high-capacity transit service. A direct alternative is more easily understood by riders, and can provide faster, more efficient service. Existing congestion was assessed by comparing the difference between travel times during peak and off-peak hours, giving on insights on the amount of capital investments needed to improve reliability along the corridor. This criterion focuses on determining which alternatives may perform well in terms of relative directness and reliability.

Methodology

Similar to Tier 1, the **directness of each alternative** was evaluated by comparing the actual alternative to the most direct path between the alternative's two termini. Google Maps identified the most direct (shortest) reasonable vehicle path between the two termini of each alternative. Direct paths produced by Google were tailored by the study team based on judgments about the shortest possible path, especially when Google directed the use of circuitous highways that offer high-speed travel but did not meet our criteria for directness. The final measure of directness is a ratio that compares the length of the actual alternative to the length of the most direct path between the alternative's termini. The closer the figure is to 1.0, the more direct the alternative; a directness of 1.0 indicates that the length of an alternative is as direct as the most direct possible path, while a directness of 1.2 indicates that the alternative is 20% longer than the most direct possible path.

The **average speeds of the services** were based on the existing schedules as well as a travel time reduction based on comparable high capacity transit services in other cities. For the operating plan, a series of peers were selected based on stop spacing and types of improvements along the route (e.g. bus lanes, queue jump lanes). Phase I of Boston's Silver Line and Kansas City's MAX were selected as the closest peers based on such criteria. Using the percent time savings that both of these systems achieved compared to the former local bus route, an estimation of travel times on the BRT segments were made. For a more detailed descriptions of calculation of run times as well as the scenarios (replacement of local service versus limited-stop express overlay) considered for each alternative, see the Operating Plan.

The range of the speed is dependent on the number of stops that each service pattern makes. The lower speed is for a service that would stop more frequently, replacing all local bus routes that formerly operated on the corridor. The higher speed corresponds to a limited stop overlay that would stop less frequently but would operate in conjunction with the existing MATA local service.

Frequency is defined in the operating plan and varies based on whether local service is replaced entirely by the new rapid transit service or both a limited stop and local service are offered. However, it is envisioned that frequency would be as high as 6 buses per hour during the peak.

The existing **traffic conditions** on each alternative were calculated with the help of Google Map's traffic feature, which show estimated travel times based off of past conditions. An index of traffic conditions was created that compared the off-peak travel time to peak travel times. A percent increase in travel

time during peak periods was calculated and used as a proxy for traffic conditions. The higher percent would indicate larger susceptibility to traffic and thus have a lower rating. A low percent change would indicate less variation in travel time throughout the day and thus result in a higher rating. Any variations in traffic conditions would suggest the need for additional capital improvements, such as queue jump or signal priority, to compensate for such variation, and therefore rate more negatively.

For all three of these criteria, an individual subscore rated the alternative based on a comparison to the other alternatives. An average of the subscores determined the final rating for this section as a whole.

Findings

Although some of the alternatives scored well in terms of directness and in travel speeds, the traffic variability on all alternatives was significant enough that no alternative received a BEST when considering traffic conditions. As a result, no alternative received a rating of BEST. **Table 9** shows the results for directness, speeds, and travel time variations for each alternative

Four alternatives rated as GOOD. These alternatives rated strongly in one or more criteria, but less well in another. Of particular note, 7 Germantown via Poplar and 23 Elvis Presley, Cleveland, Watkins Crosstown rated the highest in terms of directness. 23 Elvis Presley, Cleveland, Watkins Crosstown also had the highest operation speed.

- **6 Airport via Poplar and East Pkwy**
- **7 Germantown via Poplar**
- **23 Elvis Presley, Cleveland, Watkins Crosstown**
- **26 U of M via Union, Cooper, and Central**

The following alternatives were rated as FAIR due to lower scores on several criteria. Of particular note, Alternatives 8 and 11 rated poorly on existing traffic conditions. Alternative 9, although provides a direct alternative, has a low estimated operating speed.

- **8 U of M via Poplar, Cooper, and Union**
- **9 Fairgrounds via Madison**
- **11 U of M via Union and Poplar**

Table 9: Directness, Speeds, and Travel Time Variations

Alternative	Directness Ratio		Travel Speeds (mph)		Traffic Conditions Index		Criteria Rating
6 Airport via Poplar and East Pkwy	1.10	Fair	16.6 – 18.5	Good	57%	Good	✓ GOOD
7 Germantown via Poplar	1.00	Best	14.3 – 15.9	Fair	57%	Good	✓ GOOD
8 U of M via Poplar, Cooper, and Union	1.11	Fair	13.6 – 15.1	Fair	75%	Poor	⚠ FAIR
9 Fairgrounds via Madison	1.00	Best	7.7	Poor	57%	Good	⚠ FAIR
11 U of M via Union and Poplar	1.03	Good	16.6 - 16.7	Good	99%	Poor	⚠ FAIR
23 Elvis Presley, Cleveland, Watkins Crosstown	1.00	Best	21.4 – 21.9	Best	67%	Fair	✓ GOOD
26 U of M via Union, Cooper, and Central	1.02	Good	15.5 – 17.0	Good	67%	Fair	✓ GOOD

Findings

The team recommends revising service plans to reflect a more precise service modifications to bus routes, compared to the original Tier 2 service plans. **Table 10** summarizes the overall rating for the Enhance category.

Table 10: "Enhance" Overall Results

Alternative	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR
7 Germantown via Poplar	✓ GOOD
8 U of M via Poplar, Cooper, and Union	⚠ FAIR
9 Fairgrounds via Madison	⚠ FAIR
11 U of M via Union and Poplar	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	✓✓ BEST
26 U of M via Union, Cooper, and Central	✓ GOOD

Section 3 |

Connect: Neighborhoods & Improve Local Circulation

Introduction

A core goal for the Memphis Midtown Corridor Study is to connect neighborhoods and improve local and regional circulation. Improving transit means better access for residents, employees, and visitors to the employment, retail, and cultural assets that the city has to offer. This section will analyze how each alternative will improve access for both residents and visitors to the various key destinations within the Memphis area.

Objectives

For this goal, each alternative was evaluated according to six objectives:

- **Improve access for residents.** One of the most important reasons to implement premium transit service is to improve transit access for Memphis' residents.
- Improve access to jobs. Another important reason to implement premium transit is to improve access to jobs in Memphis.
- **Improve connections with major attractions and destinations.** Transit services work best when they have strong terminal anchors at both ends, such as a downtown core or an outlying transit center. In addition, major activity centers along the route such as a high density housing complex or university can have a significant impact on ridership.
- **Improve access to civic and cultural assets.** Special use generators along each corridor are activity centers that have distinctive activity patterns, such as a sports arena or convention center (unlike "major activity centers" above, which have a sustained ridership pattern). These special use generators can have significant impacts on HCT demand.
- **Improve access to visitor destinations and accommodations**. HCT service provides the potential to effectively serve Memphis visitors and special event patrons in a highly visible way.
- **Integration with Existing and Other Proposed MATA Services**. The proposed alternatives would require re-aligning local bus routes to avoid redundancies in service and to ensure strong connections to the new service. Changes range from minimal to significant re-routing of local bus routes.

Screening Results

Two alternatives rates an overall scope of BEST, including Alternatives 9 and 11. One alternatives received a GOOD rating, Alternative 8, U of M via Poplar, Cooper, and Union.

While there was no alternative that rated poorly on average across all criteria, several alternatives rated only as FAIR. These include Alternative 6 Airport via Poplar and East Pkwy, Alternative 7 Germantown via Poplar and 23 Elvis Presley, Cleveland, Watkins Crosstown, and Alternative 26 U of M via Union, Cooper, and Central. The results of the "Connect" goal screening process are shown in **Table 11**.

Table 11: "Connect" Screening Criteria Results

Alternative	Residents	Jobs	Anchors + Activity Centers	Special Use Generators	Visitor Destinations	Transit Integration	**Overall Rating**
6 Airport via Poplar and East Pkwy	✕ POOR	✓ GOOD	⚠ FAIR	⚠ FAIR	⚠ FAIR	✓ GOOD	⚠ FAIR
7 Germantown via Poplar	✓✓ BEST	✓ GOOD	✕ POOR	⚠ FAIR	⚠ FAIR	✓✓ BEST	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	✓ GOOD	✓ GOOD	⚠ FAIR	⚠ FAIR	⚠ FAIR	✓✓ BEST	✓ GOOD
9 Fairgrounds via Madison	✓✓ BEST	✓ GOOD	✓ GOOD	✓ GOOD	✓ GOOD	⚠ FAIR	✓✓ BEST
11 U of M via Union and Poplar	✓ GOOD	✓✓ BEST	✓ GOOD	✓ GOOD	✓ GOOD	⚠ FAIR	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	✕ POOR	⚠ FAIR	⚠ FAIR	⚠ FAIR	⚠ FAIR	✓✓ BEST	⚠ FAIR
26 U of M via Union, Cooper, and Central	✓ GOOD	✓ GOOD	✓✓ BEST	✓ GOOD	✓✓ BEST	✕ POOR	⚠ FAIR

"Connect" Tier 2 Screening Criteria

Population Served, 2010 and 2040

One of the most important reasons to implement premium transit service is to improve transit access for Memphis' residents. This Tier 2 criterion evaluates both current (2010) and future (2040) population distribution and density near stations along each alternative.

Methodology

Memphis' existing population distribution and density was obtained from the 2010 U.S. Census, which divides the data into Census blocks (generally one city block). Future population distribution and density was compiled from the Memphis Urban Area Metropolitan Planning Organization's 2040 population and employment traffic analysis zone model, which divides the data into traffic analysis zones (TAZ, generally a cluster of city blocks).

To assess the number of residents that would be served by each alternative, the study team summed all of the residents from blocks and TAZs within ½-mile of each station along the alternative (see **Figure 5**). The total number of residents served by each alternative for 2010 and for 2040 was reported, as well as the number of residents per mile in order to provide an additional measure that accounts for the length of each alternative. Because the land area of a TAZ sometimes can span outside of the ½ mile buffer, a prorated population was counted based on what percentage of the TAZ is located within the buffer. Unlike Tier 1, this analysis included the downtown and University of Memphis areas based off of the proposed stops within these areas. These measures indicate the total number of residents and the density of residents served by the alternatives.

Findings

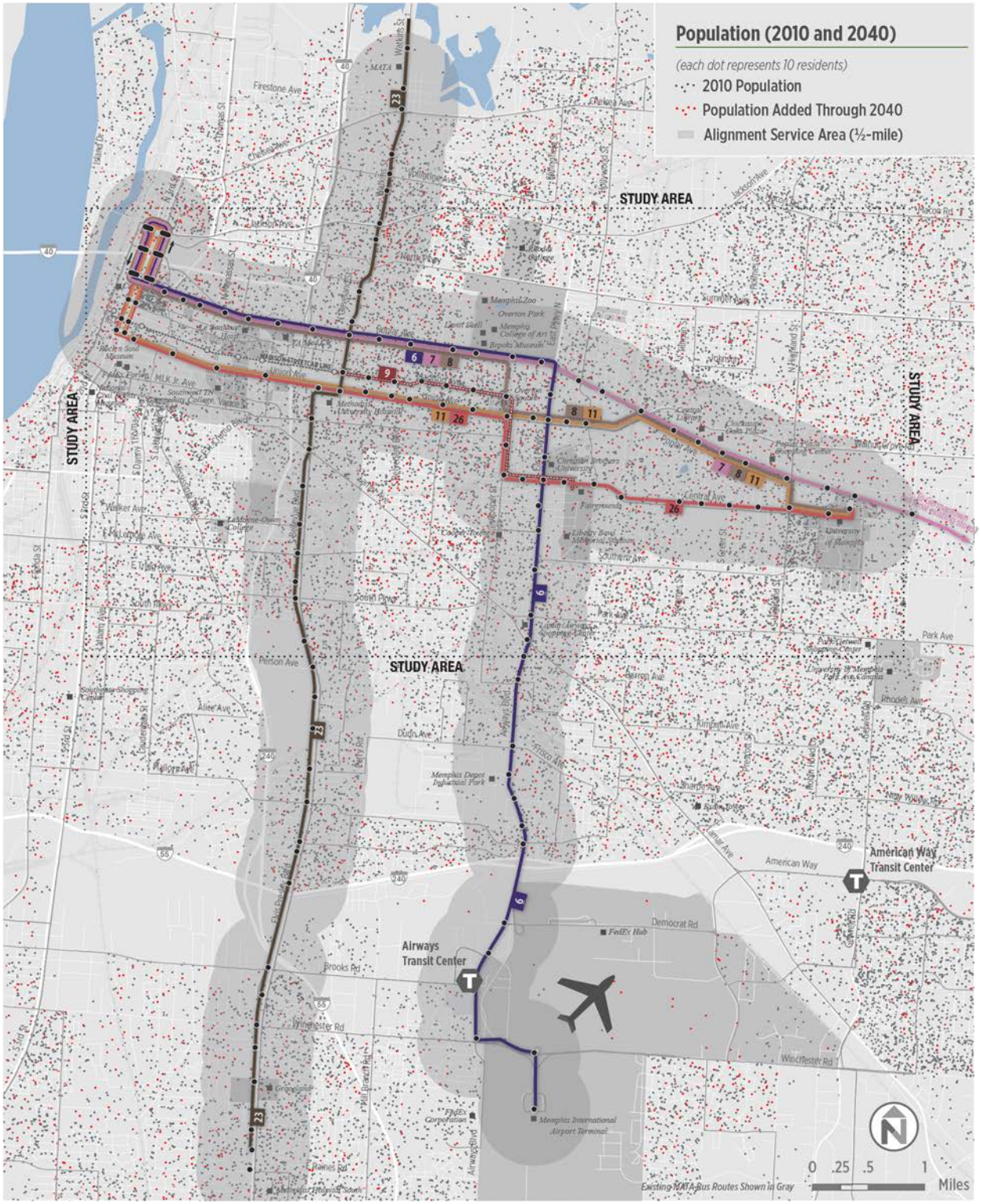
All alternatives serving east-west corridors scored highly on population served, either rating GOOD or BEST. However, the north-south alternatives including **6 Airport via Poplar and East Pkwy** and **23 Elvis Presley, Cleveland, Watkins Crosstown** score low on population served primarily because of the low density land and non-residential land uses located on the southern parts of the alternatives. Because these two alternatives were considerably lower than the other alternatives, these both scored as POOR. **Table 12** shows the results for population served within ½ mile for each alternative

Table 12: Population Served Within 1/2 Mile

Alternative	2010 Population Served		2040 Population Served		Rating
	Total Pop	Pop/Acre	Total Pop	Pop/Acre	
6 Airport via Poplar and East Pkwy	35,883	5.68	42,375	5.69	✕ POOR
7 Germantown via Poplar*	33,433	7.02	37,566	7.78	✓✓ BEST
8 U of M via Poplar, Cooper, and Union	36,284	6.89	41,450	7.78	✓ GOOD
9 Fairgrounds via Madison	24,999	7.28	29,340	8.42	✓✓ BEST
11 U of M via Union and Poplar	37,820	6.81	43,418	7.91	✓ GOOD
23 Elvis Presley, Cleveland, Watkins Crosstown*	38,611	5.44	42,102	5.86	✕ POOR
26 U of M via Union, Cooper, and Central	37,262	6.63	43,550	7.79	✓ GOOD

* Alternatives 7 and 23 will continue to operate on the existing Routes 50 and 42. Because these areas will operate as at present without the BRT features, these outer areas are not included into this analysis.

Figure 5: 2010 and 2040 Population within 1/2-mile of Alternatives



Jobs Served, 2010 and 2040

An important reason to implement premium transit is to improve access to Memphis jobs. Transit that serves areas of high employment and employment density provides key connections to job opportunities and improves transit productivity. This Tier 2 criterion evaluates both current (2010) and future (2040) employment distribution and density near stations along each alternative.

Methodology

Memphis' existing job distribution and density was obtained from 2010 Census Longitudinal Employer-Household Dynamics (LEHD) data, which divides the data into Census blocks (generally one city block). Future job distribution and density was obtained from the Memphis Urban Area Metropolitan Planning Organization's 2040 population and employment model, which divides the data into traffic analysis zones (TAZ, generally a cluster of city blocks).

To assess the number of jobs that would be served by each alternative, the study team summed all of the employment from blocks and TAZs located within ½-mile of each alternative. The total number of jobs served by each alternative for 2010 and for 2040 was reported, as well as the number of jobs per acre in order to account for the length of each alternative (see **Figure 6**). Because the land area of a TAZ sometimes can span outside of the ½ mile buffer, a prorated number of jobs was counted based on what percentage of the TAZ is located within the buffer. Both of these measures indicate the total number of jobs and the density of jobs served by the alternatives.

Job access was also assessed based on the ability to transfer to other routes. Because there is fair amount of transfer activity between feeder and crosstown routes to radial routes, it is important to include accessibility with a one-stop connection. A count of "convenient" connections was performed. A "convenient" connection in this sense means that there is no significant backtracking to access the new coverage that the connecting line offers. In effect, a connection from one line to another, only to head back in the direction from where the passenger came, would not count. Based on the comparative number of connections available by route, the rating can be adjusted: less than seven convenient transfers would lower the rating, more than 10 would increase the rating.

Findings

All alternatives, with the exception of Alternative 23, scored highly on population served, either rating GOOD or BEST. The rating for Alternative 23 was FAIR. **Table 13** shows the results for population served within ½ mile for each alternative.

Figure 6: 2010 and 2040 Jobs within 1/2-mile of Alternatives

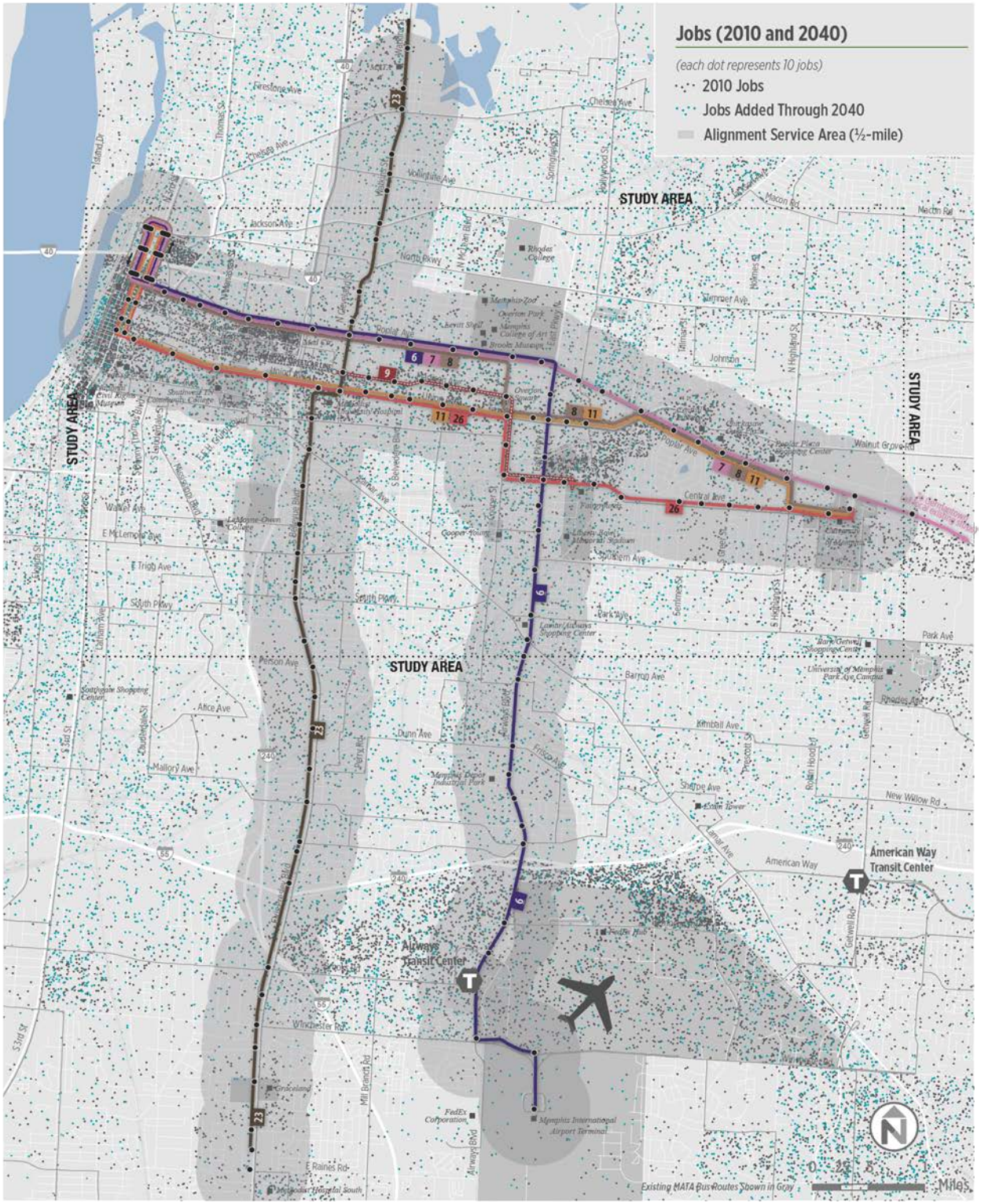


Table 13: Employees Served Within 1/2 Mile

Alternative	2010 Employees Served		2040 Employees Served		Transfer Ability*	Rating
	Total Emp	Emp/Acre	Total Emp	Emp/Acre		
6 Airport via Poplar and East Pkwy	63,951	10.12	76,930	10.34	(=)	✓ GOOD
7 Germantown via Poplar	60,617	12.73	63,069	13.05	(=)	✓ GOOD
8 U of M via Poplar, Cooper, and Union	65,193	12.38	68,942	12.93	(=)	✓ GOOD
9 Fairgrounds via Madison	69,677	20.30	67,289	19.30	(-)	✓ GOOD
11 U of M via Union and Poplar	85,576	15.41	86,771	15.82	(+)	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	25,585	3.60	39,030	5.43	(+)	⚠ FAIR
26 U of M via Union, Cooper, and Central	81,842	14.56	83,809	14.98	(=)	✓ GOOD

* (-) provides convenient transfers to 7 or less routes, (=) provides convenient transfers to eight to ten routes, (+) provides convenient transfers to over 10 routes

Anchors and Major Activity Centers

Premium transit can provide an important connection to major attractions and destinations. Conversely, major attractions and destinations situated along a transit line can have a significant impact on ridership and ensure that a corridor can generate all day transit demand. Additionally, major activity centers can act as a strong terminal anchor for premium transit service. This Tier 2 criterion evaluates the number of activity centers and anchors that would be served near stations on each alternative. Note that activity centers oriented primarily toward visitors, such as Graceland or the airport, are included in a separate criterion on visitor attractions and accommodations.

Methodology

The ratings in this Tier 2 screening criterion were based on the same destinations and activity centers evaluated in Tier 1. These destinations and activity centers were determined using the local knowledge of study team members, discussions with MATA staff, and from internet searches defined key major shopping centers, colleges and universities, community centers, and hospitals (see **Figure 7**).The team mapped the location of each major activity center. Using a ½-mile service area buffer around each proposed station, the total number of major activity centers that would be served by each alternative was summed.

The total number of major activity centers potentially served by each alternative was used as one measure to assess each alternative, but this method gave longer alternatives an advantage due to their larger service area. Therefore, the study team also reported a second measure of major activity centers served normalized by the length of the alternative. While the presence of strong anchors or terminals helps improve the attractiveness of transit service, the initial pre-screening ensured that candidate alternatives originate and terminate at an anchor or, in the case of alternative 9, extend an existing high capacity transit line that currently terminates at an anchor.

Like in the previous criteria, an adjustment factor based off of convenient transfers is applied. A detailed overview on how convenient transfers were assessed can be found in the chapter on *Access to Jobs*.

Findings

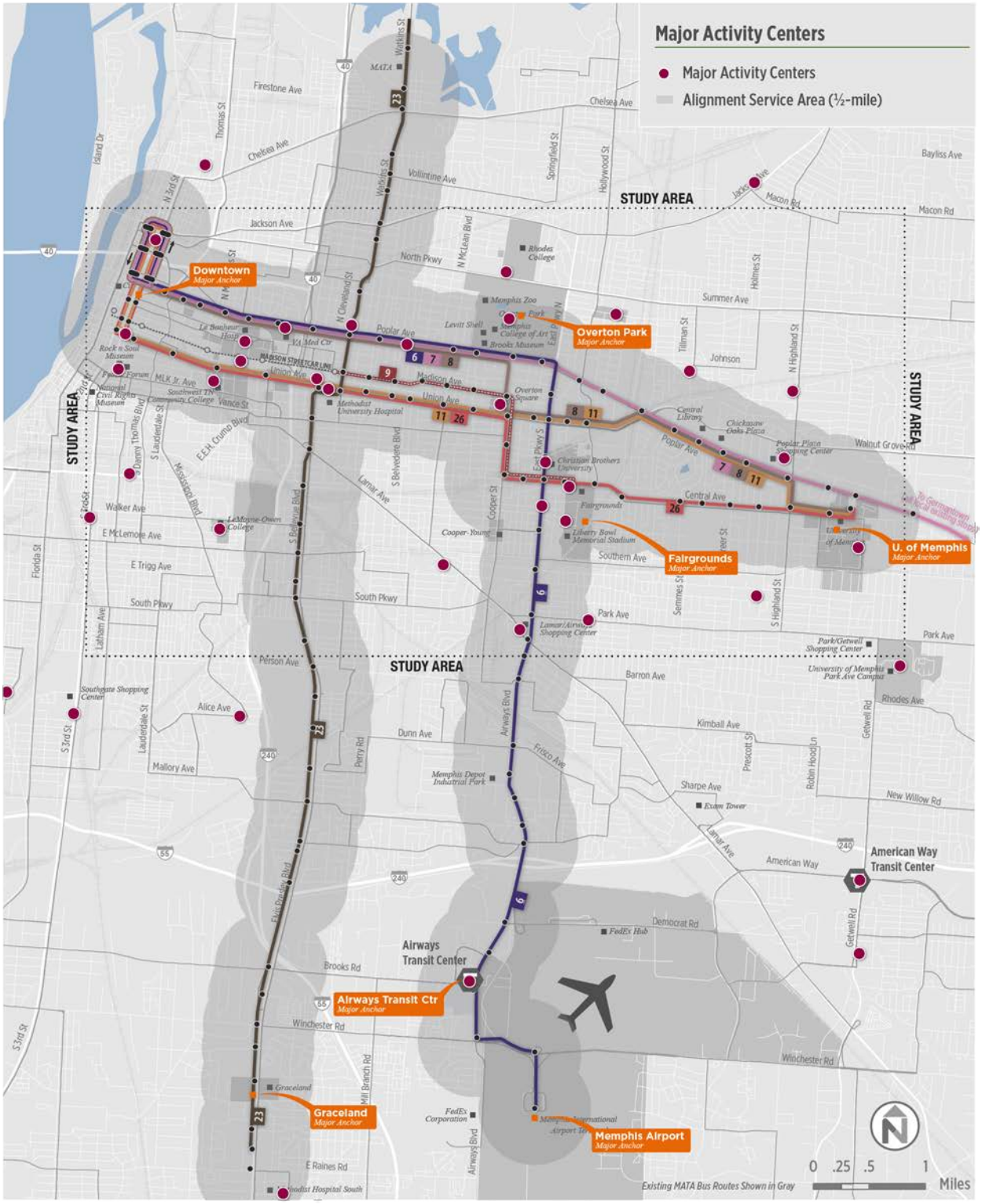
There was only one alternative that rated as BEST, **26 U of M via Union, Cooper, and Central**, which had both a high number of activity centers per mile as well as opportunities to transfer to other lines in a convenient manner (see **Table 14**). Two alternatives scored as GOOD, three alternatives scored as FAIR, and one alternative scored as POOR.

The alternatives that received a score of GOOD had a high number of activity center as well as strong ability to connect to other routes in the system. These alternatives are:

- **9 Fairgrounds via Madison**
- **11 U of M via Union and Poplar**

Alternative **9 Fairgrounds via Madison** has the highest of activity centers per mile (over 3.0), but its isolation from the rest of the MATA network makes it difficult to access a wider range of regional activity centers. This alternative therefore rated as GOOD.

Figure 7: Major Activity Centers Served by Alternative



Even though **23 Elvis Presley, Cleveland, Watkins Crosstown** scores low on the corridor itself, the ability to conveniently transfer allows passengers to access a wide set of regional activity centers, and it was thus rated as FAIR.

Table 14: Number of Major Activity Centers Served by Alternative

Alternative	Major Activity Centers	Major Activity Centers per Mile	Convenient Transfers (Rating)	Rating
6 Airport via Poplar and East Pkwy	**15**	**1.3**	(=)	⚠ FAIR
7 Germantown via Poplar	**10**	**1.1**	(=)	✕ POOR
8 U of M via Poplar, Cooper, and Union	**12**	**1.5**	(=)	⚠ FAIR
9 Fairgrounds via Madison	**15**	**3.1**	(-)	✓ GOOD
11 U of M via Union and Poplar	**14**	**1.7**	(=)	✓ GOOD
23 Elvis Presley, Cleveland, Watkins Crosstown	**4**	**0.3**	(+)	⚠ FAIR
26 U of M via Union, Cooper, and Central	**17**	**2.0**	(=)	✓✓ BEST

* (-) provides convenient transfers to 7 or less routes, (=) provides convenient transfers to eight to ten routes, (+) provides convenient transfers to over 10 routes

Three alternatives rated as FAIR:

- **6 Airport via Poplar and East Pkwy**
- **8 U of M via Poplar, Cooper, and Union**
- **23 Elvis Presley, Cleveland, Watkins Crosstown**

These alternative had a medium number of activity center per mile and have fewer convenient transfer opportunities limiting access to the wider region as a whole.

The only alternative to receive a POOR rating was **7 Germantown via Poplar**. This alternative had a low number of activity centers per mile, and only offers a moderate number of transfers to other routes without significant backtracking.

Special Use Generators

Memphis, often referred to as the birthplace of Blues and Rock and Roll, has a legacy of hosting musical and cultural events. These events are often held at special use generators, which are activity centers that have distinctive activity patterns, such as a concert venue or sports arena. Although these special use generators do not sustained ridership patterns, they have the ability to attract significant populations during major events. This Tier 2 criterion evaluates the number of special use generators that would be served by each alternative's stations.

Methodology

The ratings in the Tier 2 screening criterion were based on the same special use generators evaluated in Tier 1, which were determined through local knowledge of study team members and discussions with MATA staff to include stadiums, arenas, and other special use generators (see **Figure 8**). The team mapped the location of each special use generator. With a ½-mile service area buffer around each proposed station, the total number of special use generators that would be served by each alternative could be counted.

The total number of special use generators potentially served by each alternative was used as one measure to assess each alternative, but this method gave some longer alternatives an advantage due to their larger service area. As such, the study team also reported a measure of special use generators served, normalized by the length of the alternative. Like in the previous criteria, an adjustment factor based off of convenient transfers is applied. A detailed overview on how convenient transfers were assessed can be found in the chapter on *Access to Jobs*. **Table 15** shows the results for number of special use generators served by alternative for each alternative.

Table 15: Number of Special Use Generators Served by Alternative

Alternative	Special Use Generators	Special Use Generators per Mile	Convenient Transfers (Rating)	Rating
6 Airport via Poplar and East Pkwy	**5**	**0.4**	(=)	⚠ FAIR
7 Germantown via Poplar	**3**	**0.3**	(=)	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	**3**	**0.4**	(=)	⚠ FAIR
9 Fairgrounds via Madison	**8**	**1.7**	(-)	✓ GOOD
11 U of M via Union and Poplar	**6**	**0.7**	(=)	✓ GOOD
23 Elvis Presley, Cleveland, Watkins Crosstown	**3**	**0.2**	(+)	⚠ FAIR
26 U of M via Union, Cooper, and Central	**8**	**0.9**	(=)	✓ GOOD

* (-) provides convenient transfers to 7 or less routes, (=) provides convenient transfers to eight to ten routes, (+) provides convenient transfers to over 10 routes

Figure 8: Special Use Generators Served by Alternative

Findings

No alternative rated as BEST as no candidate corridor had the combination of high number of special use generators and high number of convenient transfers. There are three alternatives that rated as GOOD and four rated as FAIR.

While none of the alternatives rate as BEST, there are three alternatives that rate as GOOD:

- **9 Fairgrounds via Madison**
- **11 U of M via Union and Poplar**
- **26 U of M via Union, Cooper, and Central**

These three alternatives have medium to high number of special use generators per mile, averaging above 0.8 per mile.

Although **23 Elvis Presley, Cleveland, Watkins Crosstown** has low number of special use generators per mile, it has the most number of transfers opportunities to other route, allowing wider access to regional special use generators. For this reason, it was rated as FAIR. The other alternatives that rate as FAIR have a medium to low number of special use generators per mile, and may not have significant number of transfer opportunities, thus having less accessibility to special use generators in the wider Memphis area:

- **6 Airport via Poplar and East Pkwy**
- **7 Germantown via Poplar**
- **8 U of M via Poplar, Cooper, and Union**
- **23 Elvis Presley, Cleveland, Watkins Crosstown**

Visitor Attractions and Hotels

Memphis is a destination for visitors from around the world, and any investment in premium transit should also promote tourism by serving these visitors in addition to local residents. **Figure 9** shows hotels and visitor attractions within and near the study area. Transit that provides transportation access for visitors to Memphis not only supports the local tourism economy and transit productivity, but also improves the visitor experience. This Tier 2 criterion evaluates the number of visitor attractions and hotels that would be served by each alternative.

Methodology

The ratings in the Tier 2 screening criterion were based on the same visitor attractions and hotels developed in Tier 1, which were determined through local knowledge of study team members, discussions with MATA staff, and lists of Memphis attractions from the Memphis Convention and Visitors Bureau. Hotel data was compiled from internet searches of hotels using Google Maps and Hotels.com. Using a ½-mile service area buffer around each proposed station, the total number of visitor attractions that would be served by each alternative was summed (see **Table 16**).

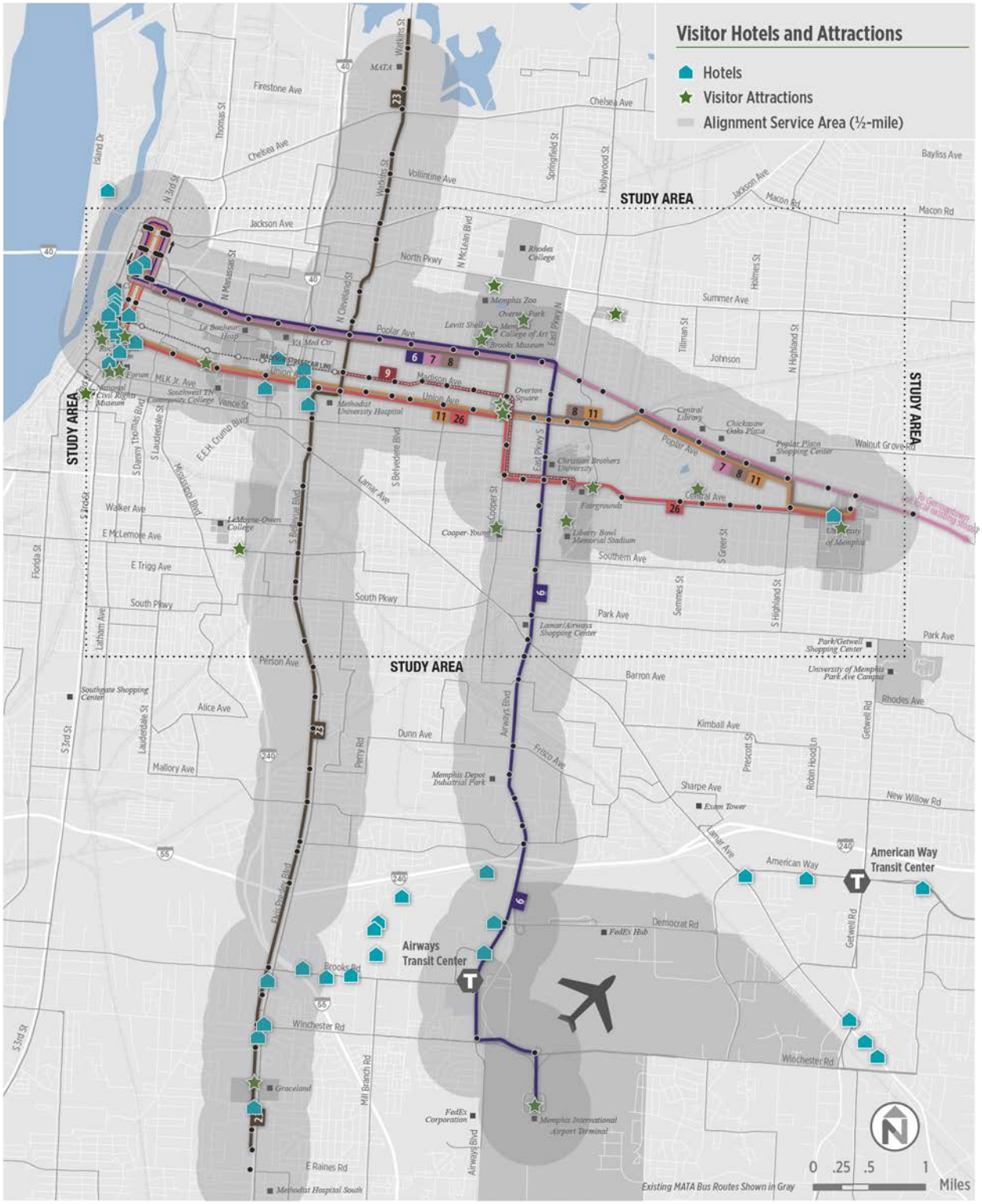
The total number of visitor attractions and hotels that would be served by each alternative was used as one measure to assess each alternative, but this method gave longer alternatives an advantage due to their larger service area. Therefore, the study team also reported a measure of visitor attractions and hotels served, normalized by the length of the alternative. Like in the previous criteria, an adjustment factor based off of convenient transfers is applied. A detailed overview on how convenient transfers were assessed can be found in the chapter on *Access to Jobs*.

Table 16: Number of Visitor Attractions and Hotels Served by Alternative

Alternative	Hotels	Attractions	Attractions and Hotels	Attractions and Hotels per Mile	Convenient Transfers (#of Routes)	Rating
6 Airport via Poplar and East Pkwy	14	11	**25**	**2.1**	(=)	⚠ FAIR
7 Germantown via Poplar	12	9	**21**	**2.3**	(=)	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	12	9	**21**	**2.5**	(=)	⚠ FAIR
9 Fairgrounds via Madison	20	13	**33**	**6.9**	(-)	✓ GOOD
11 U of M via Union and Poplar	21	11	**32**	**3.8**	(=)	✓ GOOD
23 Elvis Presley, Cleveland, Watkins Crosstown	11	1	**12**	**0.9**	(+)	⚠ FAIR
26 U of M via Union, Cooper, and Central	21	14	**35**	**4.1**	(=)	✓✓ BEST

* (-) provides convenient transfers to 7 or less routes, (=) provides convenient transfers to eight to ten routes, (+) provides convenient transfers to over 10 routes

Figure 9: Visitor Attractions and Hotels Served by Alternative



Findings

There was only one alternative that rated as BEST, **26 U of M via Union, Cooper, and Central**, which had both a high number of visitor destinations per mile along the entire corridor and also provides numerous connections to other lines, offering access to a larger set of attractions beyond the alternative itself (see **Table 16**). Two alternatives scored as GOOD and four alternatives scored as FAIR.

The alternatives that received a score of GOOD had a high number of visitor destinations and/or high number of convenient transfers. These alternatives are:

- **9 Fairgrounds via Madison**
- **11 U of M via Union and Poplar**

Alternative 9 Fairgrounds via Madison had a high number of activity centers per mile (over 3.0). Even though **23 Elvis Presley, Cleveland, Watkins Crosstown** scores low on the corridor itself, the line intersects with the most number of other MATA bus routes, allowing access a wide set of regional visitor destinations, and it was thus rated as FAIR.

The four alternatives that were rated as FAIR include:

- **6 Airport via Poplar and East Pkwy**
- **7 Germantown via Poplar**
- **8 U of M via Poplar, Cooper, and Union**
- **23 Elvis Presley, Cleveland, Watkins Crosstown**

The alternatives that rate as FAIR have a medium to low number of visitor destinations per mile, and may not have significant number of transfer opportunities, thus having less accessibility to visitor destinations in the wider Memphis area.

Consistency with Existing and Other Proposed MATA Services

This section evaluates how the **Operating Plan** of the proposed services integrates with existing and future MATA service. As several alternatives do not directly follow existing routes, local bus routes would need to be modified in order to accommodate the new rapid transit line. Supplementing the analysis in Tier 1, which considered how the proposed route alternatives fit with the Short Range Transit Plan, this Tier 2 analysis will consider the needed changes to best complement the implementation of a BRT service. Considerations to truncations and alternative changes are included in this section.

Methodology

Adjustments to MATA's existing service was developed with the intention to reduce redundancies between parallel services and support stronger connections between the local service and the BRT service. For the purpose of rating each of the alternatives, a qualitative approach will consider what kind of inconveniences and the passengers affected that may result from the service adjustments.

While some alternatives may require additional transfers, most alternatives will provide more frequent and reliable service for the majority of riders. Additional information on the precise details of potential route and schedule changes can be found in the Operating Plan.

Findings

Table 17 outlines both the benefits and potential inconveniences to riders to local bus routes that interact with the proposed BRT services. For nearly all the alternatives, there is little change if any on the service area. However, in some cases, the re-routing of existing MATA services may cause some stops to be served with different lines.

For both Alternatives 6 and 8, an initial attempt to reduce redundancies would have required truncations of Route 50. Due to the results of the ridership estimation model and the requirement of a transfer for a large portion of Route 50's riders, revisions to the operating plan retained Route 50 at present levels operating side by side with the future BRT. Because of this, operating costs, which is addressed later in this document, would be higher. **6 Airport via Poplar and East Pkwy** and **8 U of M via Poplar, Cooper, and Union** were rated GOOD and BEST in this section respectively for such preservation despite its high cost.

Alternatives **7 Germantown via Poplar** and **23 Elvis Presley, Cleveland, Watkins Crosstown** can completely replace existing service, providing additional frequency along these corridors. These two alternatives would have no impacts to local bus routes that would have negative impacts on existing riders. As such, these alternatives are rated as BEST.

Alternative **26 U of M via Union, Cooper, and Central** required the most re-routing of alternatives due to the fact that existing services could not be fully replaced by the BRT, and changes to one route to replace coverage required a larger re-design of the system network. This alternative was therefore rated as POOR.

All other alternatives have minor shifts to local bus routes including alternative changes to maintain coverage and some truncations. However, the ridership affected is far less than that on existing Route 50, and therefore rated between FAIR and GOOD.

Table 17: Integration with Local Bus Network

Alternative	Benefits	Potential Inconveniences	Subscore
6 Airport via Poplar and East Pkwy	▪ Increased service parallel to Route 2. ▪ Increased service on Route 32. ▪ Increased service on the inner section of Poplar Avenue	▪ Truncation of Route 32 would require transfers for passengers traveling south of Lamar Avenue.	✓ GOOD
7 Germantown via Poplar	▪ Increased service on Poplar Avenue ▪ No changes to coverage	▪ None	✓✓ BEST
8 U of M via Poplar, Cooper, and Union	▪ Increased service on the inner section of Poplar Avenue	▪ None	✓✓ BEST
9 Fairgrounds via Madison	▪ Increased service on Madison Avenue and Young Avenue. ▪ Increased service on Route 32	▪ No longer provides "front door" service previously served by Route 2, however service is still within short walking distance. ▪ No longer provides a direct service from downtown to Memphis International Airport.	⚠ FAIR
11 U of M via Union and Poplar	▪ Increased service on the inner sections of Union Avenue ▪ Minimal changes to overall coverage ▪ Increased frequency on Route 32	▪ Truncation of Route 34 would require transfers for some riders. ▪ Service to Cooper Young would require walking to East Parkway or Union ▪ No longer provides a direct service from downtown to Memphis International Airport.	⚠ FAIR
23 Elvis Presley, Cleveland, Watkins Crosstown	▪ Increased service on existing Route 42	▪ None	✓✓ BEST

Alternative	Benefits	Potential Inconveniences	Subscore
26 U of M via Union, Cooper, and Central	▪ Increased service on Union Avenue and Central Avenue. ▪ Frequency increase on Route 32 ▪ Minimal changes to coverage.	▪ No longer provides a direct service from downtown to Memphis International Airport. ▪ Rerouting of Route 56 to serve MLK Boulevard would require additional walking to destinations or transfers on Union Avenue. ▪ Service to Cooper Young would require walking to East Parkway or Union ▪ Frequency decrease on Madison Avenue, however the high frequency service on Union Avenue is within walking distance.	✕ POOR

Findings

Overall findings from the "Connect" Tier 2 screening process include. **Table 18** provides an overview of the findings.

Table 18: "Connect" Screening Criteria Results

Alternative	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR
7 Germantown via Poplar	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	✓ GOOD
9 Fairgrounds via Madison	✓✓ BEST
11 U of M via Union and Poplar	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	⚠ FAIR
26 U of M via Union, Cooper, and Central	⚠ FAIR

Section 4 |

Develop: Support Local & Regional Economic Development Goals

Introduction

A major benefit of high capacity transit is its ability to guide and promote urban and economic growth. This is therefore an explicit goal for developing high capacity transit in the city of Memphis. High frequency transit can help make neighborhoods attractive places to live, work, and shop; however, the success of such revitalization is dependent on zoning and local support. This section will analyze each alternative's potential to support small business and retail districts as well as the alternative's potential to create compact, mixed-use neighborhoods and to attract and accommodate future residential and commercial growth.

Objectives

For this goal, each alternative was evaluated according to three objectives:

- Support small businesses and retail districts. Premium transit service can bring significant commercial activity to support local and small businesses.
- Foster compact, mixed-used development. It is important to ensure that major new service investments serve areas that are as "transit supportive" as possible. Transit supportive land uses are generally medium or high intensity, mixed-use development, and can also be a major activity center such as a college or university.
- Attract residential and commercial growth. Premium transit service can help stimulate development in ways that fuel growth. Beyond zoning and local support, there must also be land available for development, which would generally consist of vacant or underutilized parcels such as surface parking lots.

Screening Results

Two alternatives received a BEST rating, including Alternatives 11 **U of M via Union and Poplar** and Alternative 26 **U of M via Union, Cooper, and Central**. One rated as GOOD (Alternative 8 **U of M via Poplar, Cooper, and Union**) based off of the criteria to expand service to small businesses, have compatible land uses near proposed stations, and had strong development potential based on the underutilization of parcels. Two had an overall rating of FAIR and one had a POOR rating. The following alternatives rated GOOD under the "Develop" screening criteria:

Table 19: "Develop" Screening Criteria Results

Alternative	Small Businesses	Land Use	Development	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR	✕ POOR	✓✓ BEST	⚠ FAIR
7 Germantown via Poplar	⚠ FAIR	⚠ FAIR	⚠ FAIR	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	✓ GOOD	✓ GOOD	⚠ FAIR	✓ GOOD
9 Fairgrounds via Madison	✓✓ BEST	✓✓ BEST	✕ POOR	⚠ FAIR
11 U of M via Union and Poplar	✓ GOOD	✓ GOOD	✓ GOOD	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	✕ POOR	✕ POOR	✓✓ BEST	✕ POOR
26 U of M via Union, Cooper, and Central	✓ GOOD	✓ GOOD	✓ GOOD	✓✓ BEST

"Develop" Tier 2 Screening Criteria

Small Businesses

Memphis has a strong network of over 7,000 small businesses that collectively employ over 85,000 residents and contribute to the region's economic vitality. Transit that provides better access for small businesses not only supports economic development goals, but it also improves local job access. This Tier 2 criterion evaluates the number of small businesses that would be served by stations along each alternative.

Methodology

The ratings in this Tier 2 criterion were based on the number of small businesses that would be served by each alternative. The study team first gathered data on Memphis businesses, including location and number of employees, from the Memphis Chamber (2011 Survey of Business Owners). The team then mapped the location of each "small business," which we defined as a business with 50 or fewer employees. Using a ½-mile service area buffer around each proposed station, the total number of small businesses that would be served by each alternative was summed.

The total number of small businesses that would be served by each alternative was used as one measure to assess each alternative by, but this figure gave longer alternatives an advantage due to their larger service area. Therefore, the study team also reported a second measure of small businesses served, normalized by the length of the alternative. Both measures were considered in the final rating of each alternative.

Table 20: Number of Small Businesses per Alternative

Alternative	Small Businesses Served	Small Businesses Served per Mile	Rating
6 Airport via Poplar and East Pkwy	834	71	⚠ FAIR
7 Germantown via Poplar	780	86	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	834	101	✓ GOOD
9 Fairgrounds via Madison	921	192	✓✓ BEST
11 U of M via Union and Poplar	1100	132	✓ GOOD
23 Elvis Presley, Cleveland, Watkins Crosstown	349	27	✕ POOR
26 U of M via Union, Cooper, and Central	1046	123	✓ GOOD

Findings

There was only one alternative that rated as BEST, **9 Fairgrounds via Madison**, which had both a high number of small businesses served as well as small businesses served per mile (see **Table 20**). Madison Avenue is a key area with large number of businesses.

The alternatives that received a score of GOOD had a high number of visitor destinations and/or high number of convenient transfers. All of the alternatives serve key business areas such as downtown and Overton Square:

- **8 U of M via Poplar, Cooper, and Union**
- **11 U of M via Union and Poplar**
- **26 U of M via Union, Cooper, and Central**

Two alternatives rated as fair, **6 Airport via Poplar and East Pkwy** and **7 Germantown via Poplar** serve only a moderate number of small businesses. Compared to Union Avenue, Poplar Avenue and Madison Avenue, Poplar hosts fewer small businesses.

Finally, **23 Elvis Presley, Cleveland, Watkins Crosstown** rates poorly compared to the other alternatives. The alternative serves few small businesses for most of its alternative, especially areas that are zoned with low density land uses.

Land Use and Zoning

As a major transit investment, it is important to ensure that land uses and zoning are as transit-supportive as possible. Transit-supportive zoning are generally medium or high intensity developments (including major activity centers such as colleges and universities) or corridors with a mix of land uses.

This Tier 2 criterion evaluates planned land uses (by area) within ½-mile of each of the proposed stations. Unlike Tier 1, the downtown and the University of Memphis areas are clearly defined and evaluated in Tier 2.

Methodology

Like in Tier 1, the Tier 2 criterion were based on a quantitative score of the transit-supportiveness of land uses in the service area of each alternative.

The analysis was based on the planned land use zoning from the Shelby County Official Zoning Map (updated July 2013). The study team assigned a transit-supportiveness rating of LOW, MEDIUM, or HIGH to each zoning code, based on the description of the code in the *Memphis and Shelby County Unified Development Code* (February 2014). The zoning classifications were assigned the ratings as shown in **Table 21**, and the study team applied these ratings to each parcel in Memphis based on its zoning designation.

Table 21: Transit-Supportiveness of Memphis Zoning Codes

LOW (land uses that provide low support for transit service)	**MEDIUM** (land uses that provide moderate support for transit service)	**HIGH** (land uses that provide significant support for transit service)
• Parks • Open Space • Floodway • Conservation Agriculture • Manufactured Home Park • Residential Estate • Residential Single Family • Medium Density Residential • Campus Master Plan-2 (Suburban) • Employment • Warehouse & Distribution • Heavy Industrial • Residential Corridor Overlay • Neighborhood Conservation Overlay	• Residential Urban • High Density Residential • South Main Commercial • Sports & Entertainment	• Residential Work • Office General • Commercial Mixed Use • Mixed Use • Central Business • Campus Master Plan-1 (Urban)

To assess the transit supportiveness of the area that would be served by each alternative station, the study team rated each alternative based on the breakdown (by area) of low, medium, and high land uses that would be served by each alternative (see **Figure 10**).

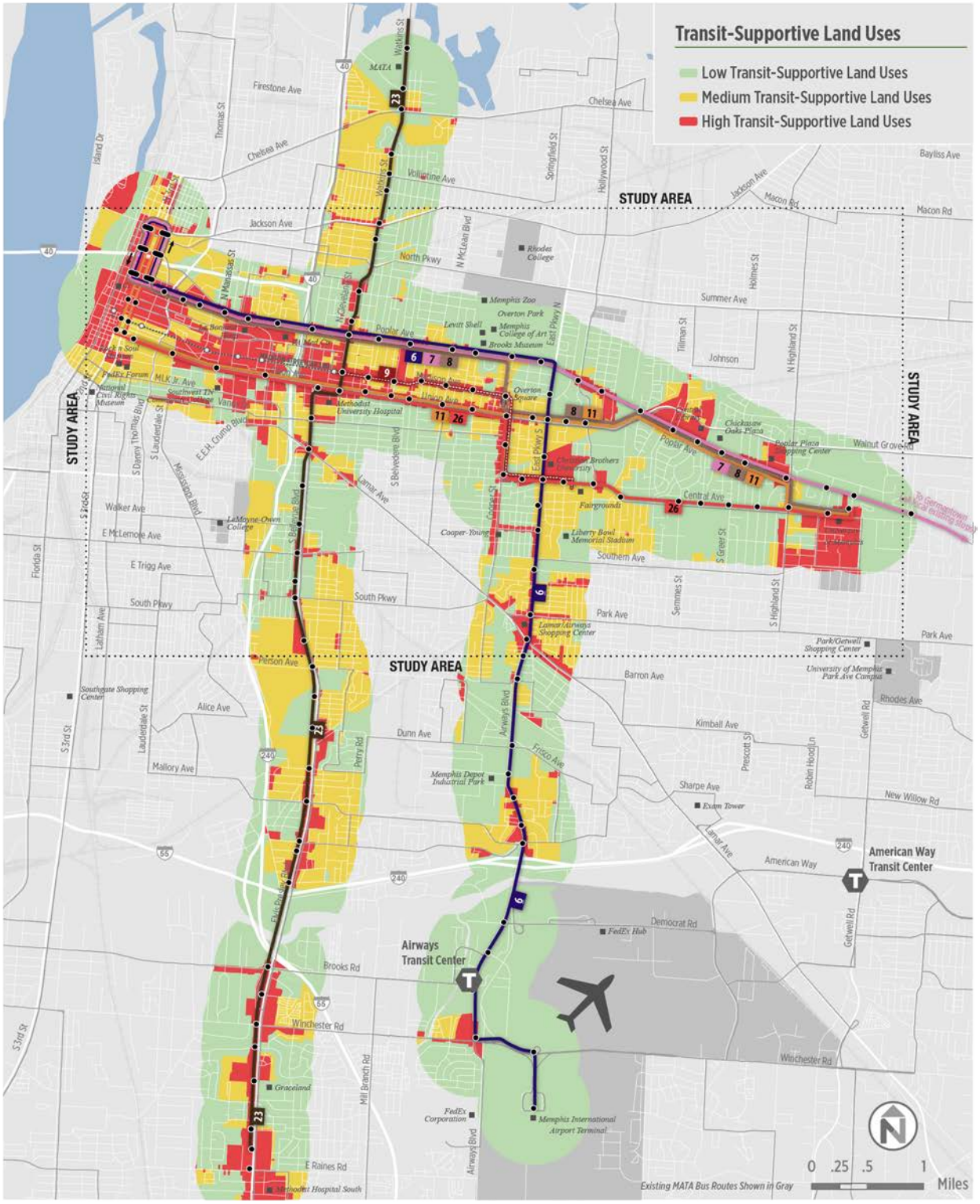
For each alternative, a score was given based off of each acre of land. For every acre of high supportiveness, 3 points were given, 2 for medium, and 1 for low. To compensate for the differences in land area, results were normalized by the total land area served, resulting in a raw score.

To compare scores across all alternatives, the percent difference of each alternative's to the average of all scores results in the overall index for this screening criteria. Therefore, an index value of 100 is a score that is at the average of all alternatives; a score below 100 indicates an alternative with a lower than average propensity to support transit, while a score above 100 indicates an alternative with a higher than average propensity to support transit (see **Table 22**).

Table 22: Transit-Supportiveness of Zoning Codes

SCORE	RATING
Below 95	✕ POOR
Between 95 and 99	⚠ FAIR
Between 100 and 105	✓ GOOD
Above 105	✓✓ BEST

Figure 10: Transit-Supportive Land Uses Map



Findings

Most alternatives' ratings clustered between an average index value of 95–105, these alternatives were given ratings of FAIR or GOOD (see **Table 23**). Two alternatives scored below 95, therefore these alternatives were given a rating of POOR. One alternatives received an index score above 110, higher than all other alternatives, and was given a BEST rating. **9 Fairgrounds via Madison**, which would serve several medical, mixed-use, and commercial districts scores the highest. Contributing to its higher rating is the fact that the alternative is short, concentrating in the densest parts of Memphis.

Three alternatives scored between 100–105, indicating that they would serve areas with relatively higher transit-supportive land uses, and received a GOOD rating, serving primarily higher density zoned areas and university/medical districts.

- **8 U of M via Poplar, Cooper, and Union**
- **11 U of M via Union and Poplar**
- **26 U of M via Union, Cooper, and Central**

Table 23: Land Use Rating by Alternative

Alternative	% High	% Medium	% Low	Index	Rating
6 Airport via Poplar and East Pkwy	18.5%	56.3%	56.3%	91.2	✕ POOR
7 Germantown via Poplar	25.9%	52.3%	52.3%	97.6	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	27.5%	49.8%	49.8%	100.0	✓ GOOD
9 Fairgrounds via Madison	35.3%	32.5%	32.5%	114.0	✓✓ BEST
11 U of M via Union and Poplar	29.9%	45.9%	45.9%	103.5	✓ GOOD
23 Elvis Presley, Cleveland, Watkins Crosstown	15.3%	53.8%	53.8%	90.9	✕ POOR
26 U of M via Union, Cooper, and Central	27.7%	45.0%	45.0%	102.8	✓ GOOD

One alternatives scored between 95–99, indicating that they would serve areas that are relatively less transit supportive than average, and received a FAIR rating. **7 Poplar to Germantown**, although has a strong inner portion of the route, would serve primarily lower-zoned density neighborhoods once past Overton Park.

Two alternatives scored well below the average and received a POOR rating. **6 Airport via Poplar and East Pkwy** and **23 Elvis Presley, Cleveland, Watkins Crosstown** would serve areas, such as low density residential or industrial, all which are less supportive of transit.

Development Potential

Investing in premium transit can attract residential and commercial growth by spurring development of underutilized areas. This section analyzes each alternative's potential to spur residential and commercial growth by assessing the amount of undeveloped and underdeveloped land that would be served by each alternative. This Tier 2 criterion assesses the land value and building value to determine if there are better uses suitable for parcels near the proposed alternatives.

Methodology

To understand the potential redevelopment and development along each of the seven alternatives identified for high capacity transit service operations, an assessment of the availability of land was completed. This was completed by using existing parcel data from Shelby County and property assessment data from the Shelby County Assessor's Office.

Two pieces of information were critical to assess whether a parcel is underutilized or not – Total Land Value and Building Value. The Building Value is necessary to determine the value of the building compared to the land that it sits on. If the land is valued more than the building, then there could be a better use for the particular piece of property purely from a property valuation point of view. This ratio is known as *Underutilized Ratio*, and to determine this ratio, the Building Value is divided by the Land Value. If the ratio is less than 30 percent, then that parcel is considered to be underutilized.

BUILDING VALUE / LAND VALUE = *UNDERUTIILZED RATIO*

To determine the amount of underutilized land along each of the remaining alternatives, parcels within a half mile of each alternative were selected. The total acreage of underutilized land was calculated and is summarized in **Table 24**. **Figure 11** illustrates the amount of underutilized parcels along each of the remaining seven alternatives.

Findings

Both Alternatives **6 Airport via Poplar and East Pkwy** and **23 Elvis Presley, Cleveland, Watkins Crosstown** have the largest development potential and were rated as BEST. Their underutilized ratio is under 30 percent implying that there are better or more intensive land uses that could be suitable for parcels adjacent to the alternative.

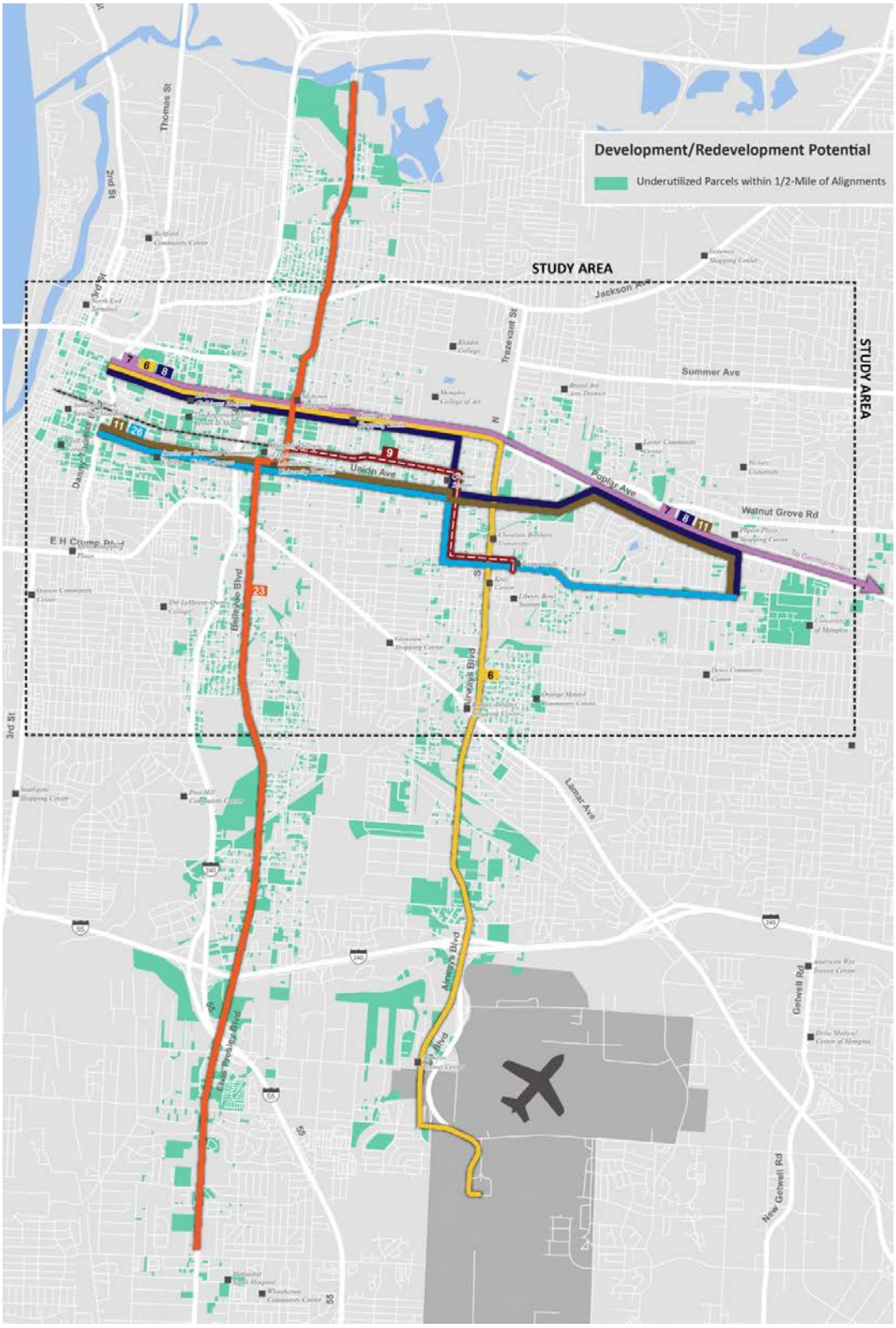
11 U of M via Union and Poplar and **26 U of M via Union, Cooper, and Central** also have relatively strong development potential, especially on the inner part of the alternative on Union Avenue. These two alternatives were rated as GOOD.

7 Germantown via Poplar and **8 U of M via Poplar, Cooper, and Union** received a FAIR rating, mostly due to the fact that Poplar Avenue is already developed to most of its potential. Finally, Alternative **9 Fairgrounds via Madison** has the lowest development potential of all alternatives due to the fact that the outer sections of Madison Avenue are already developed.

Table 24: Developable Land by Alternative

Alternative	Total Acres within ½ Mile	Under-utilized Acres within 1/2Mile	% Underutilized	Rating
6 Airport via Poplar and East Pkwy	5,692	1,272	22%	✓✓ BEST
7 Germantown via Poplar	8,880	1,507	17%	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	4,139	744	18%	⚠ FAIR
9 Fairgrounds via Madison	2,171	291	13%	✕ POOR
11 U of M via Union and Poplar	4,173	803	19%	✓ GOOD
23 Elvis Presley, Cleveland, Watkins Crosstown	6,228	1,396	22%	✓✓ BEST
26 U of M via Union, Cooper, and Central	3,912	800	20%	✓ GOOD

Figure 11: Development Potential



Findings

Overall findings from the "Develop" Tier 2 screening process are shown in **Table 25** and include:

- Overall, alternatives originating in downtown and serving the University of Memphis scored higher based on the "Develop" screening criteria due to higher density zoning and ability to serve larger number of small businesses.
- Land uses south of the Midtown area are generally less transit supportive than land uses along Union Avenue and Poplar Avenue within the study area. However, such areas have a higher degree of under-utilization, which results in stronger redevelopment potential.

Table 25: "Develop" Overall Results

Alternative	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR
7 Germantown via Poplar	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	✓ GOOD
9 Fairgrounds via Madison	⚠ FAIR
11 U of M via Union and Poplar	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	✕ POOR
26 U of M via Union, Cooper, and Central	✓✓ BEST

Section 5 |

Thrive: Strengthen Memphis Neighborhoods & Downtown

Introduction

It is essential for any large transit investment have support from local stakeholders and community residents. This ensures that transit fits into the larger goals and desires of the communities. High capacity transit has the ability to affect positive change to the neighborhoods it serves, including enhanced walkability, shorter commute times, and increased business activity. The most successful high capacity transit projects, however, not only promote the change that the community wants but also preserve the most valuable assets that define the neighborhood. This section will analyze community and stakeholder support for each alternative.

Objectives

For this goal, each alternative was evaluated based on one objective:

- Community and Stakeholder support. MATA desires to implement High Capacity Transit service in neighborhoods where it would be viewed as both a transportation enhancement and where the new development that could be stimulated by service would be desired.

Additional objectives to be considered during Tier 2 screening include:

- Support and enhance the character of neighborhoods. HCT service may impact on-street parking, in some cases requiring the elimination of spaces to site stops, but in other cases providing for the addition of spaces where stops would require less space than existing bus stops.
- Support walkable neighborhoods and multimodal transportation choices. The physical environment where transit operates strongly impacts transit demand because transit riders are usually also pedestrians at one or both ends of their trip. Thus, the walking environment along and around potential streetcar corridors is an important factor in the success of the service.

Screening Results

Community and stakeholder input along with parking impacts were considered for "Thrive" Tier 2 screening. The "Thrive" screening results corresponds directly to the results of the community and stakeholder input analysis. Parking was a screening consideration since it can be a contentious issue amongst residents and businesses. The results of this analysis are summarized in **Table 26,** below.

Table 26: "Thrive" Screening Criteria Results

Alternative	Community Support	Parking Impacts	Overall Rating
6 Airport via Poplar and East Pkwy	✓ GOOD	✓✓ BEST	✓✓ BEST
7 Germantown via Poplar	✓ GOOD	✓✓ BEST	✓✓ BEST
8 U of M via Poplar, Cooper, and Union	✓ GOOD	✓✓ BEST	✓✓ BEST
9 Fairgrounds via Madison	⚠ FAIR	⚠ FAIR	⚠ FAIR
11 U of M via Union and Poplar	✓✓ BEST	✓✓ BEST	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	✓✓ BEST	✓✓ BEST	✓✓ BEST
26 U of M via Union, Cooper, and Central	✓ GOOD	✓✓ BEST	✓✓ BEST

**Note: Alternative 9 is the Streetcar Extension. Total length of Streetcar is 7.20 miles (extension line is 2.82 miles).*

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings. Alternatives received a FAIR overall rating if they had three or more FAIR ratings or if they had one POOR rating. Any alternative with more than one poor rating received an overall rating of POOR.

"Thrive" Tier 2 Screening Criteria

Community and Stakeholder Support

MATA has made community support a vital component of the Midtown AA study. The ability of MATA and the City of Memphis to implement the Locally Preferred Alternative generated by this study hinge not only upon funding and feasibility from a technical standpoint. The success of this project will require the community support, stakeholder buy-in, and political will to provide a higher level of transit service that meets the greatest needs within the community and strengthens MATA's service system-wide.

Public and stakeholder input was used to gauge the overall community support for the seven alternatives considered in the Tier 2 screening. Some input gathered during the involvement, analysis, and reporting on the Tier 1 screening remained relevant during this second phase of the project. Additional public and stakeholder feedback was gathered through a variety of engagement activities between July 2015 and April 2016. These include meetings with city agencies, the Technical Advisory Committee (TAC), the Memphis MPO Active Transportation Advisory Committee (ATAC), the MATA Board of Commissioners, stakeholders, partners, and the general public.

For this Tier 2 screening stage of the Midtown AA study, a narrowed list of seven potential alternatives were presented along with more detailed information on the types of vehicles, amenities, and service standards that would likely be considered for the final recommendation. These presentations were made to the community in a variety of settings, in order to help determine a Locally Preferred Alternative (LPA) that would be put forward by MATA for further project development and possible funding. It was acknowledged by the planning team that two possible final alternatives might emerge as strong candidates through the study.

Individual stakeholders, organizations and associations, and a technical advisory committee of stakeholders within the study area were engaged between July 2015 and April 2016 to provide input on potential high capacity transit service and their level of support for the potential alternatives being considered. The stakeholders engaged during this process include representatives of:

- Existing MATA customers
- The business community
- Arts and educational institutions
- Private developers
- City of Memphis staff
- Transportation planning professionals
- Neighborhood associations
- Community development corporations
- Economic development professionals

Many of the general observations and comments from committee members, stakeholders and focus group attendees touched on similar themes, including directness of routes, frequency, expanded hours of service, and HCT service that compliments and strengthens existing routes all were common themes. Similar to the input collected during the Tier 1 screening, connections to jobs, education, and economic opportunities remained a top priority for any new high capacity transit service. Also important to note is the continued support from several stakeholders and the public for a north-south ("crosstown") HCT route, in this case Alternative #23.

Summary of Public Meetings #3 & #4

A third public meeting for the study was held at the Benjamin L. Hooks Central Library on July 16, 2015, with 61 attendees hearing updates and findings from previous rounds of public and stakeholder engagement. This meeting, which occurred at the launching point for the Tier 2 analysis, provided a more in-depth look at what types of transit service would be paired with the narrowed list of 7 alternatives. Details of regular bus, rapid bus ("BRT Light"), and bus rapid transit – vehicle types, road designs, station design and amenities, etc. – were presented along with a review of the overall scores in the five categories of the Tier 1 screening. The meeting was attended by bus riders, disability advocates, neighborhood stakeholders, local media, and interested members of the public. The meeting was also covered extensively in local media outlets, helping to boost attendance and inform the general public about The MAC.

Comments from participants ranged from general support, to technical questions about the analysis and next steps for the project, to some general questions and concerns about prioritizing new or enhanced service over existing facilities and routes. Once again, a need to carefully coordinate in a way to support and enhance existing transit service was expressed, and several questions were asked regarding the details of the analyses, funding considerations, and timeline for implementing the LPA resulting from the study.

A fourth and final public meeting was held at the Memphis Leadership Foundation on March 28, 2016. Attendees heard updates on the project's progress, including the draft results of the Tier 2 Screening process and the identification of the Locally Preferred Alternative, an east west rapid bus service between downtown Memphis and the University District along the Union Avenue and Poplar Avenue corridors. The presentation included some discussion of the various steps of the AA study analyses, including environmental scan, development potential, ridership projections, fatal flaw analysis, funding and branding strategies, and conceptual design of the corridor.

Also covered in this meeting were estimated project costs and potential funding sources at the federal, state, and local levels that could be used to implement the LPA. Discussion with the attendees was primarily centered on procedure and timeline for adoption and implementation, branding and outreach efforts that would be needed to market the new service, and how similar projects have performed compared to their ridership projections. One major conversation point was the travel time shown for the LPA corridor service. The project team agreed to revisit the number and placement of stations, signal priority and timing, and other possible measures to reduce the travel time for the new service.

Determining an LPA necessitates robust public input and feedback to ensure success of both the study and implementation of its recommendations. MATA and its consultant team continued to engage the public and stakeholders in the Midtown AA study process as it progressed toward the selection of the LPA by the MATA Board of Commissioners in late spring 2016.

Methodology

To assess the levels of support amongst stakeholders in the Midtown Alternatives Analysis study area, the consultant team conducted both a public forum and a series of stakeholder interviews and focus groups to gauge support for the proposed potential alternatives being considered. Alternatives were also considered against city and MATA plans for long-and near-term roadway improvements to gauge their implementability and priority from a public sector standpoint.

For the purposes of sharing information through the Tier 2 screening, two additional fact sheets were created at either end of this stage of planning. Fact Sheet #2, distributed at the beginning of Tier 2, communicated results of Tier 1 screening and showed Tier 2 alternatives and possible service elements, as well as additional analyses like ridership projection, development potential, and environmental scan. Fact Sheet #3 updated stakeholders with preliminary results of the Tier 2 screening and next steps to complete the screening and select an LPA.

Presentations were also developed, tailored to the audiences but generally sharing the same information. Much of the public and stakeholder input was collected either at the beginning of Tier 2 screening, or in the form of reactions to the draft findings of the analysis, in the following venues:

- MATA AA Technical Advisory Committee, June 2015
- MATA Staff & Board and City of Memphis Staff Workshop, July 2015
- Memphis MPO ATAC, July 2015
- Public Meeting, July 2015, Benjamin L. Hooks Central Library
- Public Meeting, March 2016, Memphis Leadership Foundation
- Memphis MPO ATAC, March 2016
- MATA Board of Commissioners, April 2016

Similar to Tier 1, to calculate the overall Community Support rating, each alternative was again measured against how many of the stakeholder and public goals it would support – from connections to employment, linking cultural institutions and neighborhoods, and supporting improved transit service overall. Alternatives that would serve most of these stated goals and had expressed support from the stakeholders involved received a BEST rating overall. As the number of goals served and stated support decreased, alternatives received GOOD or FAIR ratings, the latter particularly where other routes were mostly identical but would make a greater number of key connections. Alternatives that would serve a minimal number of stakeholder goals or received unfavorable feedback or no stated support were given a POOR rating.

Table 27: Community Support

Alternative	Community Support	Rating
6 Airport via Poplar and East Pkwy	Supports connections with density of employment and population; Connects cultural and educational institutions; Connections to Aerotropolis employment as well as downtown and medical district	✓ GOOD
7 Germantown via Poplar	Supports connections with density of employment and population; Connects cultural and educational institutions; Supports move toward grid system with directness of route; Some voiced support for commuter service to east	✓ GOOD
8 U of M via Poplar, Cooper, and Union	Supports connections with density of employment and population; Connects cultural and educational institutions	✓ GOOD
9 Fairgrounds via Madison	Rail is a longer-term solution to attracting riders; Connects downtown with Overton Square and Fairgrounds; some concerns about impacts of construction and operation through historic areas	⚠ FAIR
11 U of M via Union and Poplar	Supports connections with density of employment and population; Supports move toward grid system with directness of route; Route matches city priorities; Connects cultural and educational institutions, including downtown to medical district, Overton Square, and university district	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	Supports move toward grid system with directness of route; Connecting Frayser to Whitehaven picks up higher population areas but lacks density of destinations/employment; highest level of support from existing MATA customers	✓✓ BEST
26 U of M via Union, Cooper, and Central	Connects some areas with a density of employment and population; Provides connections to cultural and educational institutions. Route matches city priorities.	⚠ FAIR

Findings

Community Support findings were based in large part on subjective analysis of the service characteristics, geographical coverage, and stakeholder support for the seven alternatives considered in Tier 2.

Two alternatives, 11 **U of M via Union and Poplar** and 23 **Elvis Presley, Cleveland, Watkins Crosstown**, were well supported by a broad range of stakeholders and met a number of the stated community goals for new high capacity transit service. These were rated BEST.

6 **Airport via Poplar and East Pkwy**, 7 **Germantown via Poplar**, and 8 **U of M via Poplar, Cooper, and Union**, also scored well on a variety of community goals and received support in the public and stakeholder activities. These were rated GOOD.

9 **Fairgrounds via Madison** and 26 **U of M via Union, Cooper, and Central** both met fewer of the stated community goals, or received comments and feedback expressing concern about the route, service types, or priorities being met. These were rated FAIR.

None of the seven Tier 2 alternatives was rated POOR.

Parking Impacts

Improvements in transit may require taking parking space to ensure that stops fulfill ADA standards, that proper amenities such as shelters can be constructed, and that there is sufficient space for the vehicle to provide easy and level boardings. On-street parking can occasionally be a contentious issue amongst local residents and businesses. Thus minimizing such impacts at the same time as being able to providing high quality transit stops.

Methodology

Using a combination of Google Streetview and satellite imagery, an inventory of parking spaces along the routes was developed. At each proposed station location, a range was estimated on the number of parking spaces are needed based on several criteria: near side (requires more spaces) or far side stop (requires less spaces), standard or articulated vehicle. Both the minimum and the maximums are recorded.

The analysis assumed 20 feet as the length of a standard parking space. The required space for a bus stops are outlined in **Table 28**. Such lengths allow for sufficient space for a vehicle to maneuver into the pull-out, align all doors adjacent to the sidewalk, and to have sufficient space to merge back into traffic. For several locations, existing stops can be used, however, many are shorter than the standards shown in **Table 28**.

For Streetcar, the length of the vehicle and door locations in each car would determine the platform length. While modern streetcars are envisioned for Alternative 9, streetcars come in variety of lengths. Although some cities allocate as little as 66 feet for a standard curbside streetcar bulb-out, the location within the street layout (median running versus side running) and vehicle design are still to be determined and thus, an assumed length equivalent to that of articulated bus is used for the purpose of this analysis for more conservative estimates.

Table 28: Minimum Space for Bus Stop

Stop Type	Standard 40 ft bus	Articulated 60 ft bus
Far Side	90 ft	110 ft
Near Side	100 ft	120 ft
Mid-Block	120 ft	140 ft

Findings

Nearly all proposed alternatives, except for **9 Madison Line** to Fairgrounds, have no on-street parking at the proposed stop locations. The cross sections of such streets contain traffic lanes adjacent to the curb. Thus no impact on parking is expected (see **Table 29**). Because of such street layout, vehicles will not pull out of traffic when stopping, but may interfere with one of the lanes of traffic.

Alternative 9, Madison Line to Fairgrounds has on-street parking on the Madison-street section of the alternative. Consequently, Alternative 9 is the only alternative to have impacts on existing parking spaces. The number of impacted spaces ranges from 19 to 39 spaces depending on the location of stations. Because this alternative only results in localized parking impacts instead of corridor-wide, it rates as FAIR.

Table 29: Parking Impacts

Alternative	Number of Spaces Impacted	Comments	Rating
6 Airport via Poplar and East Pkwy	0	Alternative has no existing on-street parking at proposed stop locations.	✓✓ BEST
7 Germantown via Poplar	0	Alternative has no existing on-street parking at proposed stop locations.	✓✓ BEST
8 U of M via Poplar, Cooper, and Union	0	Alternative has no existing on-street parking at proposed stop locations.	✓✓ BEST
9 Fairgrounds via Madison	19 – 39	On-street parking impacts occur only on Madison Avenue.	⚠ FAIR
11 U of M via Union and Poplar	0	Alternative has no existing on-street parking at proposed stop locations.	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	0	Alternative has no existing on-street parking at proposed stop locations.	✓✓ BEST
26 U of M via Union, Cooper, and Central	0	Alternative has no existing on-street parking at proposed stop locations.	✓✓ BEST

Section 6 |

Sustain: Create an Environment that will be Sustainable over the Long Term

Introduction

Any major public transit project should promote Memphis's environmental and economic sustainability. Thus, in addition to the environmental benefits of reduced pollution and greenhouse gas emissions, a major transit investment should also be easily implementable as well as cost-effective. This section will analyze whether each alternative will create an environmental that will be sustainable over the long term.

Objectives

For this goal, each alternative was evaluated based on one objective:

- Develop implementable transit services. Some corridors may have significant geometrical issues such as steep grades, difficult street geometry (such as narrow streets or tight turns), or other physical barriers (such as deficient bridges or low clearances) that could inhibit streetcar and/or BRT operations.

Additional objectives to be considered during Tier 2 screening include:

- Develop cost-effective transit solutions. Virtually all transit improvements increase costs, and it is important that the cost increases are reasonable relative to the benefits.
- Reduce greenhouse gases. Potential reductions in greenhouse gases are closely related to automobile passenger miles traveled (PMT).
- Minimize impacts to natural, historical, and cultural resources. HCT service may have an impact on particularly important natural, historical, or cultural resources.

Screening Results

The Tier 2 evaluation of the remaining alternatives for the Sustain category considered, capital costs, annualized operating and capital costs per passenger, potential impacts to natural, historic, and cultural resources as well as the change in passenger miles traveled (PMT). The results of this evaluation are summarized in Error! Reference source not found.. Additional analysis will be required in the NEPA phase to better understand the impacts to natural, historic, and cultural resources, therefore it was not included in the overall rating for the Sustain criteria.

Table 30: "Sustain" Screening Criteria Results

Alternative	Cost	Passenger Miles Traveled (PMT)	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR	✕ POOR	⚠ FAIR
7 Germantown via Poplar	✓ GOOD	⚠ FAIR	✓ GOOD
8 U of M via Poplar, Cooper, and Union	✓ GOOD	⚠ FAIR	✓ GOOD
9 Fairgrounds via Madison	⚠ FAIR	✕ POOR	⚠ FAIR
11 U of M via Union and Poplar	✓✓ BEST	✕ POOR	⚠ FAIR
23 Elvis Presley, Cleveland, Watkins Crosstown	⚠ FAIR	✕ POOR	⚠ FAIR
26 U of M via Union, Cooper, and Central	✓ GOOD	✕ POOR	⚠ FAIR

**Note: Alternative 9 is the Streetcar Extension. Total length of Streetcar is 7.20 miles (extension line is 2.82 miles).*

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings. Alternatives received a FAIR overall rating if they had three or more FAIR ratings or if they had one POOR rating. Any alternative with more than one poor rating received an overall rating of POOR.

"Sustain" Tier 2 Screening Criteria

Operating and Capital Costs, and Annualized Operating and Capital Cost per Passenger

The transportation network in Memphis consists of local streets and arterial roads that intersect freight rail lines. The proposed alternatives must seamlessly integrate with Memphis's infrastructure to produce a sustainable cost-effective solution to fulfill project goals and objectives. The Tier 2 analysis examined the remaining alternatives in greater detail with regard to cost-benefit analysis, including capital and operating costs and annualized operating and capital cost per passenger.

Methodology

This Tier 2 analysis looked specifically at the capital cost of each alternative as well as the operating and maintenance costs. The results were then used to compare the alternatives against each other.

Findings

Based the results shown in **Table 31,** only one alternative received a BEST rating, and that was Alternative 11. Three alternatives scored a GOOD rating, including Alternatives 7, 8, and 26. Alternatives 6, 9, and 23 scored an overall rating of FAIR.

Table 31: Capital Cost and Operating/Maintenance Cost Results

Alternative	Capital Cost (million - 2016)	Rating	Annual Operations & Maintenance Costs (million - 2016)	Rating	Overall Rating
6 Airport via Poplar and East Pkwy	$43.70	⚠ FAIR	$5.37	⚠ FAIR	⚠ FAIR
7 Germantown via Poplar	$37.00	✓ GOOD	$3.95	✓ GOOD	✓ GOOD
8 U of M via Poplar, Cooper, and Union	$35.20	✓ GOOD	$4.40	⚠ FAIR	✓ GOOD
9 Fairgrounds via Madison	$65.00	✕ POOR	$3.33	✓ GOOD	⚠ FAIR
11 U of M via Union and Poplar	$25.70	✓✓ BEST	$3.61	✓ GOOD	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	$43.80	⚠ FAIR	$5.16	⚠ FAIR	⚠ FAIR
26 U of M via Union, Cooper, and Central	$38.40	✓ GOOD	$4.53	⚠ FAIR	✓ GOOD

**Note: Alternative 9 is the Streetcar Extension. Total length of Streetcar is 7.20 miles (extension line is 2.82 miles).*

Alternatives received an overall rating of BEST if they had one BEST rating, three or more GOOD ratings, and no POOR ratings. Alternatives received an overall score of GOOD if they had three GOOD or BEST ratings and no POOR ratings or if they had two BEST ratings and no POOR ratings. Alternatives received a FAIR overall rating if they had three or more FAIR ratings or if they had one POOR rating. Any alternative with more than one poor rating received an overall rating of POOR.

Changes in Passenger Miles Traveled

The introduction of new and/or the enhancement of existing transit services adds to transportation alternatives other than the automobile to the general public. Additional transit options entices people to leave behind their automobile and transfer to transit, resulting in an overall reduction in automobile miles traveled. The Tier 2 analysis examined the alternatives in greater detail with regard to changes in automobile passenger miles traveled.

Methodology

This Tier 2 analysis looked at automobile passenger miles traveled by comparing the various alternatives to the No Build scenario. The project team also used the STOPS model to estimate changes in passenger miles traveled; STOPS inputs are detailed in Section 2 of this report as well as Technical Memorandum #13.

Findings

When comparing the build and no-build alternatives, systemwide automobile passenger miles traveled (PMT) increased for all alternatives. Since the goal is to reduce PMT, none of the alternatives received a GOOD or BEST rating. Alternatives 7 and 8 had the smallest increase in PMT and received a FAIR rating.

The remaining alternatives experience a greater increase in PMT than alternatives 7 and 8 and therefore received a POOR rating. The results of the PMT ratings are provided in **Table 32**.

The PMT increase could be attributed to transit service modifications in support of the project, i.e., route truncation, replacement of existing service routes or schedule modifications. Alternatives 7 and 8 underwent the least amount of changes in transit service resulting in a smaller increases in PMT compared to other alternatives. On the contrary, Alternatives 11 and 23 underwent the largest amount of transit service changes which resulted in the largest increase of PMT.

Based on the model results and sensitivity test as to how route modifications support the various alternatives, the team recommends revising service plans to reflect a more precise service modifications to bus routes, compared to the original Tier 2 service plans.

Table 32: PMT Change Results

Alternatives	2035 PMT Change	Rating
6 Airport via Poplar and East Pkwy	2,313	✕ POOR
7 Germantown via Poplar	340	⚠ FAIR
8 U of M via Poplar, Cooper, and Union	582	⚠ FAIR
9 Fairgrounds via Madison	5,241	✕ POOR
11 U of M via Union and Poplar	6,041	✕ POOR
23 Elvis Presley, Cleveland, Watkins Crosstown	5,742	✕ POOR
26 U of M via Union, Cooper, and Central	5,143	✕ POOR

Impacts to Natural, Historic and Cultural Resources

For the Tier 2 evaluation, natural, historic and cultural resources were reviewed. All alternatives are within developed areas of Memphis. These developed areas will allow for less overall environmental impact to be incurred by construction of any chosen alternative. Several of the alternatives already have a built-out corridor, allowing for little to no environmental impacts from a construction footprint for the project.

There are a number of historic districts and potentially-eligible historic properties that are located along the alternatives. Further analysis of each alternative will be required in the NEPA, Preliminary Engineering and Final Design phases of the project. Among the readily-apparent concerns are the Overton Park, Cooper-Young, and similar residential areas of Midtown Memphis. Both areas contain many potentially-eligible homes and buildings, as well as designated districts and landmarks. While the project's alternatives will primarily fall within existing rights-of-way and paved roadways, consideration will need to be given to historic properties to ensure impacts are minimized and mitigated appropriately. All seven alternatives will require further analysis during the NEPA phase to better understand the potential impacts to natural, historic and cultural resources. For the purposes of the Tier 2 evaluation, no rating was assigned to the seven alternatives and was not factored into the overall rating.

Section 7 |

Summary

As shown in Error! Reference source not found.**3**, when all factors were considered for the remaining seven alternative one outperformed the rest, Alternative 11 U of M via Union and Poplar. Three rated as GOOD, and three rated as FAIR. These alternatives, which are also shown in **Figure 12**, were:

- **6 Airport via Poplar and East Pkwy**
- **7 Germantown via Poplar**
- **8 U of M via Poplar, Cooper, and Union**
- **9 Fairgrounds via Madison**
- **11 U of M via Union and Poplar**
- **23 Elvis Presley, Cleveland, Watkins Crosstown**
- **26 U of M via Union, Cooper, and Central**

Three of these alternatives would operate between the University of Memphis and downtown Memphis, which is the core of Midtown. Alternative 7 also serves downtown Memphis and the University of Memphis, but continues traveling east after serving the University of Memphis. Three of these alternatives would not serve the University of Memphis: Alternative 6, which would operate between the airport and downtown, Alternative 9, which would operate between downtown and the Fairgrounds, and Alternative 23, which would operate along Elvis Presley Boulevard, Cleveland Street, and Watkins Street.

Table 33: Tier 2 Overall Ratings

Alternative	Overall Rating
6 Airport via Poplar and East Pkwy	⚠ FAIR
7 Germantown via Poplar	✓ GOOD
8 U of M via Poplar, Cooper, and Union	✓ GOOD
9 Fairgrounds via Madison	⚠ FAIR
11 U of M via Union and Poplar	✓✓ BEST
23 Elvis Presley, Cleveland, Watkins Crosstown	⚠ FAIR
26 U of M via Union, Cooper, and Central	✓ GOOD

Figure 12: Highest Rated Alternatives