MEMPHIS AREA TRANSIT AUTHORITY

Midtown

Alternatives Analysis

THE MAC
Midtown Area Connector
Connecting Memphis from the Inside Out

TECHNICAL MEMORANDUM: 11
Proposed Evaluation Framework

July 2014

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Section 1|

Proposed Evaluation Framework

Introduction

This document describes the evaluation process that is proposed to select the Locally Preferred Alternative (LPA) for improved High Capacity Transit (HCT) service such as light rail, streetcar, and/or Bus Rapid Transit (BRT) in Memphis' Midtown Corridor. The study will be conducted consistent with recent MAP-21 FTA guidance, which is much less proscriptive than previous guidance, but still advises a logical process to narrow reasonable options into a LPA.

For this project, one challenge will be that the Midtown "Corridor" is much more a diverse service area than a clearly defined corridor. As a result, many of the potential solutions may not be mutually exclusive in that if one were implemented, another would not. Thus, the evaluation framework is designed to accommodate the comparison of both competing and complementary alternatives. In addition, to make the process as manageable as possible, a key element will be a Tier 1 Screening to first select mode-neutral alignments (or sub-corridors) for improved service, followed by a Tier 2 Evaluation to compare the mode-specific alternatives that would serve each alignment or sub-corridor.

In summary, this process will be conducted as follows (see also **Figure 1**):

1. **Identification of Potential Alignments,** in terms of starting and ending points, and the alignment in between. It is likely that many or most of these alignments will have terminus that are beyond the specific extent of the defined "corridor" – for example, an inner terminus in downtown and an outer terminus at the University of Memphis.

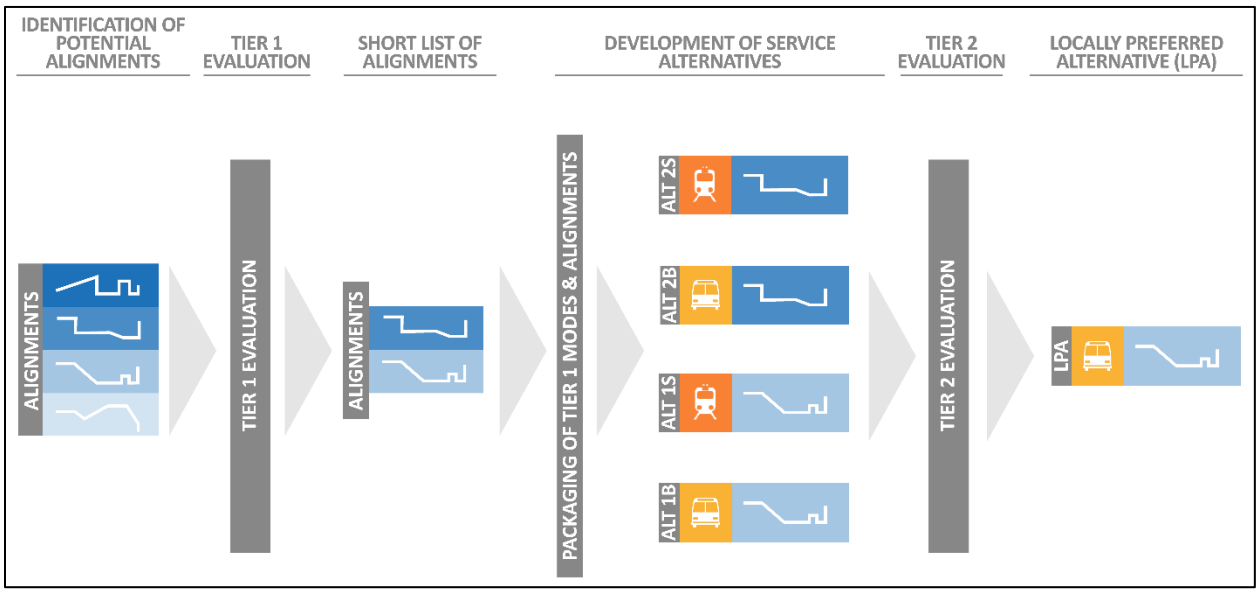
2. **Tier 1 Alignment Screening,** which will screen the initial alignments down to a short list of alignments, using a set of screening criteria developed from the project goals and objectives. The Tier 1 Screening will focus on the potential benefits or increased transit investment in general, rather than by specific mode.

3. **Development of Service Alternatives,** which will define how High Capacity Transit service would operate in the alignments that emerge from the Tier 1 screening.

4. **Tier 2 Service Alternative Evaluation,** which will consist of a detailed evaluation of the service alternatives, using evaluation criteria developed from the project goals and objectives.

5. **Selection of Locally Preferred Alternative,** which will be done based on the results of the Tier 2 Evaluation.

Figure 1: Evaluation Framework



Finally, an important note is that, as described above and indicated in **Figure 1**, the process is designed to produce the selection of a Locally Preferred Alternative (LPA) that would be a single project. However, the process may determine that two different alternatives would provide similar benefits and would complement rather than compete with each other, and the LPA could also consist of a package of improvements.

Goals and Objectives

The screening and evaluation process will be based on goals and objectives that will be developed as part of the Purpose and Need Statement. Draft goals and objectives are presented in **Figure 2**. The draft objectives were used to create screening and evaluation criteria for each of the evaluation phases. These are described in subsequent sections to illustrate how the proposed process would work; *appropriate revisions will be made to reflect the final adopted project goals and objectives.*

Figure 2: Draft Goals and Objectives

GOAL 1

ENHANCE — *Make Midtown Corridor transit service more compelling*

Objectives:

- Provide better transit service for existing transit users and attract new riders
- Provide fast, frequent, comfortable, and reliable service
- Improve transit options for Memphis' most vulnerable residents

GOAL 2

CONNECT — *Connect neighborhoods and improve local circulation*

Objectives:

- Improve access to transit for Midtown Corridor residents
- Improve access to jobs
- Improve connections with major attractions and destinations
- Enhance access to civic and cultural assets
- Enhance access to visitor destinations
- Complement other transit investments and transit plans

GOAL 3

DEVELOP — *Support local and regional economic development goals*

Objectives:

- Support small businesses and retail districts
- Foster compact, mixed-use development
- Attract residential and commercial growth

GOAL 4

THRIVE — *Strengthen Midtown Corridor neighborhoods and business areas*

Objectives:

- Support community desires
- Support and enhance the character of neighborhoods
- Support walkable neighborhoods and multimodal transportation choices

GOAL 5

SUSTAIN — *Create an environment that will be sustainable over the long term*

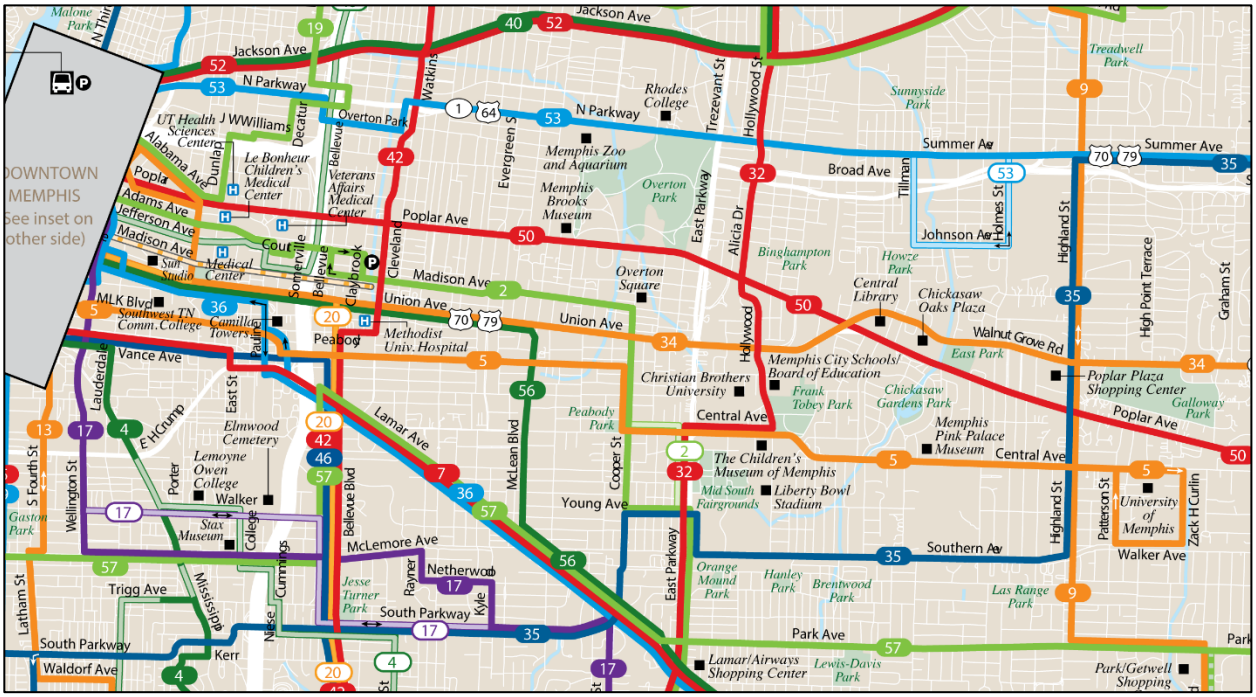
Objective:

- Develop implementable transit services
- Develop cost-effective transit solutions
- Reduce greenhouse gases
- Minimize impacts to natural, historical, and cultural resources

Identification of Potential Alignments

One of the initial steps in the project will be to identify potential alignments for High Capacity Transit service. To begin, we will identify and refine potential services identified as part of previous efforts such as the Short Range Transit Plan. We will then identify additional potential alignments, which will most likely be focused around other major arterials. Then, for each alignment, logical terminal points will be identified, which could be within or outside of the defined corridor. For example, the western end of many alignments could be downtown Memphis, and the eastern end of some could be the University of Memphis. Finally, the alignments will be defined in consideration of how different HCT modes could operate. For example, on Madison Avenue, one alignment could run from the end of the existing Madison Avenue streetcar line as streetcar service, while as second, for BRT, could extend into downtown.

Figure 3: Midtown Corridor Study Area



Tier 1 Screening

The Tier 1 screening will screen the initial alignments to determine which would provide the highest transit potential, without respect to mode or operating details. This will be done using screening criteria that consist of a range of qualitative and quantitative measures, as summarized in **Table 1** and detailed below:

Enhance

Provide Better Transit Service for Existing Riders and Attract New Riders: One strong indication of underlying transit demand is ridership on existing services, and current ridership along each alignment will be determined using MATA ridership count data.

A second important proxy for underlying demand is the number of residents and jobs that would be served, in terms of population density and employment density. These figures will be determined for current conditions (using Census ACS 2012 and LEHD 2011 data) and 2035.

Table 1: Tier 1 Evaluation Criteria

Objective	Screening Criteria
ENHANCE *Make Midtown Corridor transit service more compelling*	
Provide better transit service for existing riders and attract new riders	➲ Ridership on existing transit services ➲ Population and employment density within ½-mile of alignment
Provide fast, frequent, and reliable service	➲ Directness and average auto speeds
Improve transit options for Memphis' most vulnerable residents	➲ Transit-sensitive residents and social service centers within ½-mile of alignment
CONNECT *Connect neighborhoods and improve local circulation*	
Improve access for residents	➲ Residents within ½-mile of alignment (current and projected)
Improve access to jobs	➲ Jobs within ½-mile of alignment (current and projected)
Improve connections with major attractions and destinations	➲ Anchors and major activity centers within ½-mile of alignment
Improve access to civic and cultural assets	➲ Special use generators within ½-mile of alignment
Improve access to visitor destinations and accommodations	➲ Visitor destinations and visitor accommodations within ½-mile of service
Complement other transit investments and transit plans	➲ Consistency with other transit investments and plans
DEVELOP *Support local and regional economic development goals*	
Support small businesses and retail districts	➲ Small businesses within ½-mile of alignment
Foster compact, mixed-use development	➲ Transit-supportive land uses within ½-mile of alignment
Attract residential and commercial growth	➲ Amount of undeveloped and underdeveloped land along alignment
THRIVE *Strengthen Memphis neighborhoods and downtown*	
Support community desires	➲ Community and stakeholder support
SUSTAIN *Create an environment that will be sustainable over the long term*	
Develop implementable transit services	➲ Fatal flaw analysis

Provide Fast, Frequent, and Reliable Transit Service: Faster and more direct transit service is more attractive to more people than slower and indirect service. To measure the attractiveness of each alignment in these terms, directness of the transit alignment will be compared to the most direct possible alignment from end-to-end, and as appropriate, between key intermediate locations. Relative speeds along each alignment will be measured using peak period automobile travel times, as alignments that are faster for cars would also be faster for transit, and relative differences will be similar.

Improve Transit Options for Memphis' Most Vulnerable Residents: Transit services that enable accessibility through good connections with jobs, retail centers, and social services provide benefits for all, and particularly for transit-dependent populations. To determine benefits to groups that typically use transit at very high rates, the number of minority residents, individuals in poverty, and households without automobiles will be determined within a half-mile of each alignment.

Connect

Improve Access for Residents: The number of residents who would be served will be measured in terms of the number who would be within a half-mile of HCT service.

Improve Access to Jobs: The number of jobs that would be served will be measured in terms of the number that would be within a half-mile of HCT service.

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. Each alternative will be assessed by the strength of its terminal anchors and major activity centers along the route.

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, and will be noted for each alternative.

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. This measure will assess the visitor destinations and number of hotels served by each alternative.

Complement Other Transit Investments and Transit Plans: There are a number of transit investments that are new or currently being considered in Memphis, such as the Airways Transportation Center, that could have an impact on High Capacity Transit service. In addition, there are a number of plans, such as the MATA SRTP, or a number of neighborhood plans, that

would impact High Capacity Transit service. As such, this measure will assess the compatibility with other transit investments and established plans.

Develop

Support Small Businesses and Retail Districts: High Capacity Transit service can bring significant activity to support local and small businesses. The number of small businesses served along each alignment will be identified and tabulated.

Foster Compact, Mixed-Use 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, but can also be a major activity center, such as a college or university. This measure will evaluate land use types by square footage or units per acre within a half-mile of each potential service, and the degree to which development patterns are transit-supportive.

Attract Residential and Commercial Growth: High Capacity Transit service can help stimulate development in ways that stimulate 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. The evaluation will consider how much potential there is for new development based on the amount of available undeveloped and underdeveloped land along each alignment.

Thrive

Support Community Desires: MATA desires to implement High Capacity Transit service in neighborhoods where it would be viewed as both a transportation enhancement as well as an opportunity to stimulate desirable, new development. A number of approaches will be used to assess community support. These will include a review of local plans and stakeholder input received through the stakeholder involvement process.

Sustain

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. These issues, where they exist, will be identified for each alternative.

Each measure will be examined at varying levels of detail, as appropriate, and a summary of the results will be prepared for each measure. Based on the results for each measure, each alignment will be assigned a rating of "Best", "Good", "Fair," or "Poor." To facilitate decision-making, these rankings will indicate how each alignment would perform relative to each other, rather than in absolute terms.

Finally, the rankings for the individual screening criteria will be used to develop ratings of how well each alignment would achieve the overall project goals. These ratings will also be presented in terms of "Best," "Good," "Fair," and "Poor," and will be relative ratings. An example of this was done in the recent Kansas City Downtown Corridor Alternatives, which was also conducted by HDR and Nelson\Nygaard, as shown in **Figure 4**.

Figure 4: Kansas City Tier 1 Screening Results Presentation

Development of Service Alternatives

Following the selection of the most promising alignments, each will be paired with HCT service, as appropriate. In some cases, both modes will be evaluated, but in others (for example, an extension of the existing Madison Avenue streetcar line), only a single mode would be examined. Decisions on which modes will be examined for each alignment will be made through a collaborative process involving MATA and the project team, and based on input from the project's advisory committees, key stakeholders, and the public.

For each mode and alignment combination, operating plans will be developed that will define how service would operate in each corridor in terms of span of service, service frequencies, station and stop locations, running times, vehicle types, and other relevant information. The operating plans will also consider how new services would integrate with existing services, and appropriate changes to existing services. Conceptual designs will also be produced at a level of detail sufficient to produce capital cost estimates.

Tier 2 Evaluation

As with the Tier 1 screening, the Tier 2 evaluation will be based on the project goals and objectives and will consist of a combination of qualitative and quantitative measures. In some cases, the Tier 2

measures will be the same as the Tier 1 measures, but in many cases, additional criteria will be 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 will be much more detailed than the Tier 1 screening.

In addition, the process will be iterative. If it is determined that some alternatives perform poorly on specific criteria, they may be refined so that they can better meet project goals and objectives. In some cases, the measurement methodologies may be further developed in order to more accurately distinguish the advantages and disadvantages between alternatives. Ultimately, the candidate alternatives will be analyzed carefully in comparison with one another, as well as their ability to meet project goals and function as an effective part of Memphis' local and regional transportation system.

The Tier 2 evaluation criteria is summarized in **Table 2** and detailed below. A summary of both the Tier 1 and Tier 2 criteria, and the differences between them, is also provided in the appendix.

Enhance

Provide Better Transit Service for Existing Riders and Attract New Riders: One of the most important reasons to implement HCT service would be to improve transit service for Memphis residents, workers, and visitors. The Tier 2 Evaluation will develop estimates of total ridership, ridership by transit-dependent persons, and new transit ridership.

Provide Fast, Frequent, and Reliable Transit Service: *Same as Tier 1 screening*.

Improve Transit Options for Memphis' Most Vulnerable Residents: *Same as Tier 1 screening*.

Connect

Improve Access for Residents: *Same as Tier 1 screening*.

Improve Access to Jobs: *Same as Tier 1 screening*.

Improve Connections with Major Attractions and Destinations: *Same as Tier 1 screening*.

Improve Access to Civic and Cultural Assets: *Same as Tier 1 screening*.

Improve Access to Visitor Destinations: *Same as Tier 1 screening*.

Compliment Other Transit Investments and Transit Plans: New HCT service will become an important high-level component of the MATA system, and thus it will be important to integrate the new service with existing bus service. Potential integration with other modes will be reviewed with MATA staff. Integration issues and opportunities will be described, as well as potential bus operating cost savings.

Develop

Support Small Businesses and Retail Districts: *Same as Tier 1 screening*.

Table 2: Tier 2 Evaluation 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 ➲ Number of new transit riders
Provide fast, frequent, and reliable service	➲ Directness, average speeds, frequency, and alignment 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 alignment (current and projected)
Improve access to jobs	➲ Jobs within ½-mile of alignment (current and projected)
Improve connections with major attractions and destinations	➲ Anchors and major activity centers within ½-mile of alignment
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
Support walkable neighborhoods and multimodal transportation choices	➲ Pedestrian and bicycle environment and connectivity
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 Vehicle Miles Traveled (VMT)
Minimize impacts to natural, historical, and cultural resources	➲ Natural, historical, cultural impacts

Foster Compact Mixed-Use Development: *Same as Tier 1 screening*.

Attract Residential and Commercial Growth: The Tier 2 evaluation will use qualitative and quantitative methods to estimate the extent to which each alternative would produce changes in development patterns and the resulting magnitude of changes in population and employment, considering economic development potential. These estimates will consider:

- Economic conditions in the project corridor
- Mechanisms by which the project would improve those conditions
- The availability of land in station areas for development and redevelopment

Thrive

Support Community Desires: Stakeholder and community support will be determined through the stakeholder involvement process.

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. Descriptions of potential impacts will be identified along each line, as well as order of magnitude estimates of the number of spaces that could be impacted. In addition, other potential impacts of each alternative on the character of neighborhoods will be discussed.

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. Generally, transit riders will walk up to one-half mile to access High Capacity Transit. Five factors will be used to determine the quality of the pedestrian environment and connectivity — Walkscore.com walk scores, sidewalk density, street width, a qualitative assessment of the pedestrian conditions along each alternative, and compatibility with existing plans.

Similar to the importance of the pedestrian environment and connections, many riders access transit by bicycle, and thus the bicycle environment and connectivity is also important. Five factors will also be used to determine the quality of the bicycle environment and connectivity — Walkscore.com bike scores, bicycle infrastructure and amenities, a qualitative assessment of the bicycle conditions along each alternative, and compatibility with existing plans.

Sustain

Develop Implementable Transit Solutions: *Only used in Tier 1 (consists of a fatal flaw analysis).*

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. This will be determined based on operating and capital costs relative to total ridership:

Operating Costs: Operating cost estimates will present costs for new services, as well as changes to costs for existing services.

Capital Costs: Engineering and design assumptions will be developed in sufficient detail to support accurate capital cost estimates, right-of-way requirements, and operating procedures and facility design. The engineering estimates will be produced at a conceptual level in order to identify fatal flaw and order-of-magnitude impacts or benefits. Cost estimates will be developed employing industry standard unit cost measurements using FTA standardized cost categories.

Cost-Effectiveness: Consistent with MAP-21 guidance, cost-effectiveness will be presented as annualized operating and capital costs per total passenger.

Reduce Greenhouse Gases: Potential reductions in greenhouse gases are closely related to Vehicle Miles of Travel (VMT), and the impacts of each project will be presented in terms of VMT reductions.

Minimize Impacts to Natural, Historical, and Cultural Resources: HCT service may have an impact on particularly important natural, historical, or cultural resources. This measure will assess the potential impacts, if any, or each measure.

In a similar manner as for the Tier 1 Screening, each measure will be examined at varying levels of detail, as appropriate, and a summary of the results will be prepared for each measure. Also similar to the Tier 1 Screening, based on the results for each measure, each service alternative will be assigned a rating of "Best", "Good", "Fair," or "Poor." Finally, the rankings for the individual screening criteria will be used to develop ratings of how well each service alternative would achieve the overall project goals.

Selection of Preferred Alternative

Finally, the results of the Tier 2 Evaluation will be used to select a Locally Preferred Alternative. This will be 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. An example of the logic through which this will be done, again from the recent Kansas City Downtown Corridor Alternatives Analysis, from start to finish, is shown in **Figure 5**.

Figure 5: Example Overview of Evaluation Framework and Selection of LPA (Kansas City)

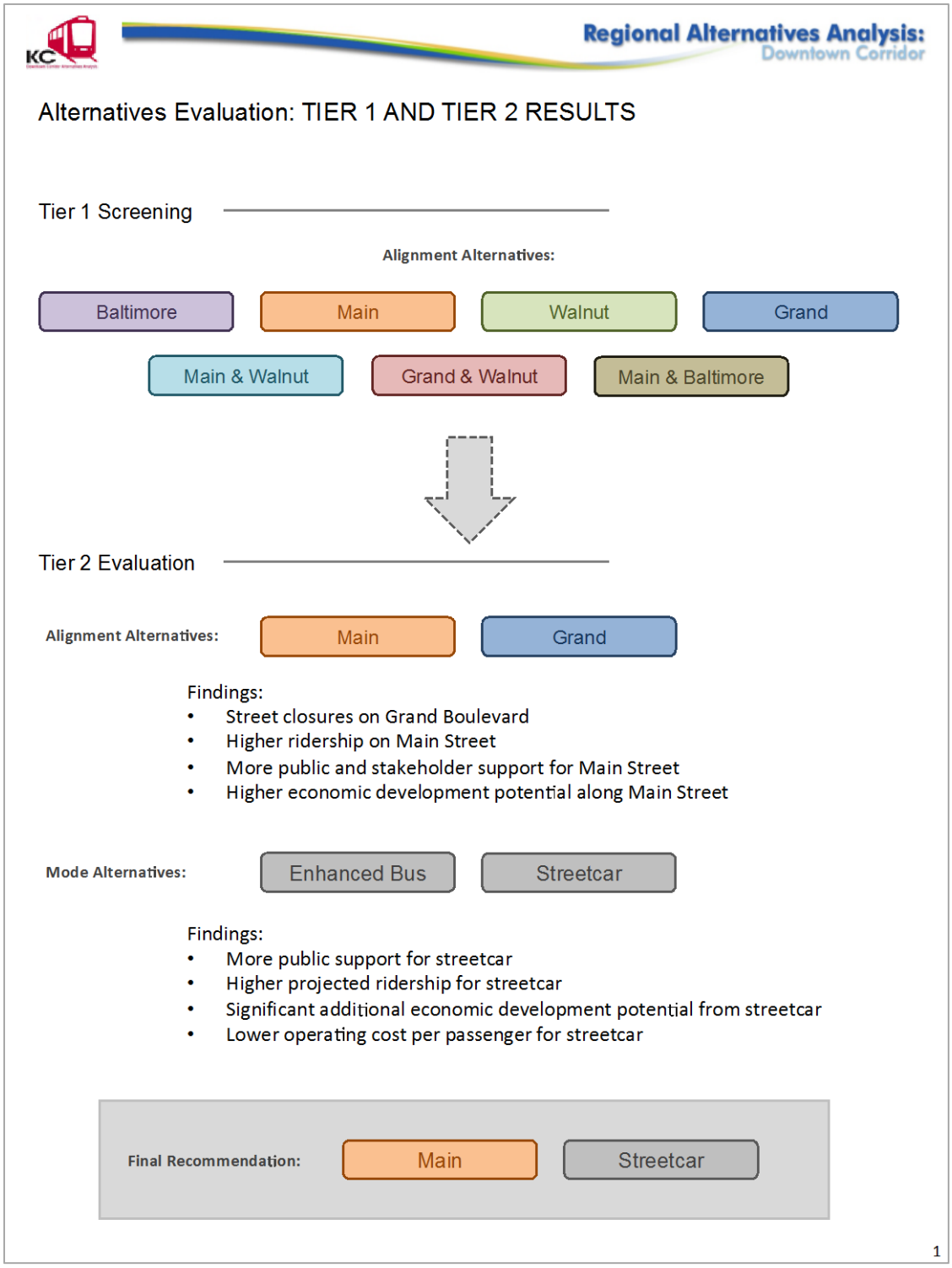


Table 3: Evaluation Criteria Summary

Objective	Phase 1 Screening Criteria	Phase 2 Evaluation Criteria
ENHANCE *Make Midtown Corridor transit service more compelling*		
Provide better transit service for existing riders and attract new riders	➲ Ridership on existing transit services ➲ Population and employment density within ½-mile of alignment	➲ Total projected ridership ➲ Projected transit dependent ridership ➲ Number of new transit riders
Provide fast, frequent, and reliable service	➲ Directness and average auto speeds	➲ Directness, average speeds, frequency, and alignment traffic conditions
Improve transit options for Memphis' most vulnerable residents	➲ Transit-sensitive residents and social service centers within ½-mile of alignment	➲ 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 alignment (current and projected)	➲ Residents within ½-mile of alignment (current and projected)
Improve access to jobs	➲ Jobs within ½-mile of alignment (current and projected)	➲ Jobs within ½-mile of stations (current and projected)
Improve connections with major attractions and destinations	➲ Anchors and major activity centers within ½-mile of alignment	➲ Anchors and major activity centers within ½-mile of stations
Improve access to civic and cultural assets	➲ Special use generators within ½-mile of alignment	➲ 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	➲ Visitor destinations and visitor accommodations within ½-mile of service
Complement other transit investments and transit plans	➲ Consistency with other transit investments and 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 alignment	➲ Small businesses within ½-mile of stations
Foster compact, mixed-use development	➲ Transit-supportive land uses within ½-mile of alignment	➲ Transit-supportive land uses within ½-mile of stations
Attract residential and commercial growth	➲ Amount of undeveloped and underdeveloped land along alignment	➲ Economic development potential
THRIVE *Strengthen Memphis neighborhoods and downtown*		
Support community desires	➲ Community and stakeholder support	➲ Community and stakeholder support
Support and enhance the character of neighborhoods		➲ Parking and neighborhood impacts
Support walkable neighborhoods and multimodal transportation choices		➲ Pedestrian and bicycle environment and connectivity
SUSTAIN *Create an environment that will be sustainable over the long term*		
Develop implementable transit services	➲ Fatal flaw analysis	
Develop cost-effective transit solutions		➲ Operating, capital costs, and annualized operating and capital cost per passenger
Reduce greenhouse gases		➲ Changes in Vehicle Miles Traveled (VMT)
Minimize impacts to natural, historical, and cultural resources		➲ Natural, historical, cultural impacts