MEMPHIS AREA TRANSIT AUTHORITY

SHORT RANGE TRANSIT PLAN

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NELSON
NYGAARD

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EXECUTIVE SUMMARY

The Memphis Area Transit Authority (MATA) retained the consultant team of Nelson\Nygaard Consulting Associates, Kimley-Horn Associates and TRUST Marketing to develop a Short Range Transit Plan (SRTP). The objective of the SRTP was to conduct a detailed review of MATA's transit services, identify strengths and weaknesses in the existing system and develop a series of recommendations that correct weaknesses and strengthen assets. The planning process was designed to be as inclusive as possible, so that members of the riding and non-riding community in Memphis had ample opportunities to provide input and comment on the study process and findings. The SRTP process was designed around a series of five main work tasks:

- Preparing a needs assessment based on an inventory MATA services, evaluating regional socio-economic trends, assessing regional travel markets, and reviewing MATA's services against a set of peer transit agencies.
- Collecting ideas and suggestions from stakeholders, riders and members of the non-riding public and MATA drivers. The SRTP collected and reflected upon public input at all major stages of the effort.
- Conducting a detailed analysis of MATA's individual routes and services that considered ridership by stop and by time of day and relative service productivity.
- Using the collected data to develop, analyze and evaluate potential service improvement options.
- Developing final recommendations, including capital and funding needs

BACKGROUND

MATA is the largest transit agency in the State of Tennessee, transporting some 40,000 riders every day throughout Memphis and the surrounding areas. The agency was formed in 1975 to serve the Memphis metropolitan area and currently operates 34 numbered fixed-route bus routes, three rail trolley lines and a paratransit service for persons with disabilities.

MATA spends approximately $55-$60 million annually on operating expenses (including driver wages, fuel, vehicle maintenance and agency administration) and another $5-$10 million on capital costs (purchasing and maintaining transit vehicles and infrastructure). Funding for the system comes from a combination of federal, state and local sources. MATA's federal funds are largely provided by the Federal Transit Administration (FTA), distributed on a formula basis and account for about 20% of operating and 80% of capital costs. The State of Tennessee contributes about 15% of MATA's operating costs and 10% of capital costs. MATA's largest single source of funds is the City of Memphis, which provides between 40-45% of the operating costs of the

services and another 10% of the capital costs. The remaining 20% of operating costs are raised through passenger fares and advertisement revenues[1].

TRANSIT NEEDS ASSESSMENTS

Initial stages of the SRTP involved collecting ideas and input, and conducting analyses to determine the opportunities to strengthen and improve MATA's transit services. The needs assessment included a lot of ideas, which are broadly summarized in the following statements:

- MATA currently operates a very efficient service overall. It carries a high number of passengers per service mile and hour. Proposed changes should retain this strength.
- Downtown Memphis is MATA's strongest market for riders; this has historically been true and will continue to be true for the foreseeable future.
- There are emerging markets and communities in Memphis and Shelby County with a demonstrated need for transit service and/or areas that are becoming important employment and service markets. These communities are in southeast and northeast Memphis as well as the employment markets in suburban Shelby County.
- MATA as an agency has been shrinking in terms of both the number of service hours operated and the number of riders using the system. Funding is the primary culprit of MATA's negative growth rate, but learning from its peers, MATA may consider implementing new, higher speed services, such as Bus Rapid Transit (BRT) to attract new riders and resources to the system.
- MATA primarily serves a market of travelers that depend on bus service to travel. As a result, the bus route network needs to provide broad geographic coverage.
- Service reliability is a challenge for MATA. Service reliability is very important to riders and the existing network has a difficult time keeping buses on schedule. There are many reasons why bus service does not stay on time, such as traffic congestion, large numbers of boardings and alightings at some stops as well as having long and complicated routes.
- MATA's existing network is complicated. Routes could be simplified by making them straighter and more direct.
- There are not enough opportunities to travel north and south. This is true along primary corridors in the western end of town close to downtown Memphis, as well as in the eastern parts of Memphis and Shelby County.

[1] All funding percentages roughly reflect historical allocations based on MATA's fiscal year 2003 through 2009 budget documents. Funding programs from all sources are subject to change.

- Service would be strengthened by categorizing routes more clearly so that service levels can be better matched to demand.
- MATA current network includes several bus routes that operate on the same corridor and provide overlapping service that is competitive rather than complementary. This erodes the effectiveness of the bus network.

SERVICE SCENARIO DEVELOPMENT

Building on the needs assessment, the study team developed three alternatives for organizing MATA's bus network. Each option incorporated the system's ridership patterns, but did not directly consider the existing route structure. During the initial phases of developing scenarios, the study team also did not consider service costs or the number of available vehicles and instead, developed the best possible network. After the options were developed, however, the team estimated service hours and vehicle requirements, compared them with the available resources and scaled the network to work within MATA's existing budget. The three options are:

1. **"Pure" Grid System** – The pure grid option organizes MATA's bus routes according to a grid and assigns bus routes to the major north-south and east-west corridors in the City of Memphis as well as some parts of Shelby County. By operating along major corridors, passengers use the system similarly as a vehicle moves around town – a passenger travels along one corridor, gets off the bus at a major intersection and gets on a bus heading in a different direction. The strengths of the system are that it provides excellent service coverage, is easy to understand, and increases north-south connections. It is also fairly easy to increase or decrease service. However, for a grid system to be truly functional, the frequency of service must be high. Another challenge to the grid option is Memphis' road network; while some locations are laid out according to a grid, others are not.
2. **Transit Hubs and Centers** – The transit hubs and centers organizes MATA's bus routes around a series of transit hubs, such as the North End Terminal, Airways Transit Center and the American Way Transit Center plus a handful of "super stops" (locations where several bus routes converge). In this scenario, bus routes would be organized into a hierarchy with key corridor routes and also designed to provide fast and direct connections to and between transit hubs. The strength of the model is that it provides good service coverage, is easy to understand, improves north-south connections and most riders would still have direct access to a bus route. The disadvantage of this approach, however, is that some transit trips would not follow the most direct path possible (thereby increasing travel time) and the option requires capital investments in passenger and pedestrian amenities and facilities.

3. **Update/Modify Existing Network** – The third "modified network" option retains more of the existing bus network and would continue to configure MATA's service according to a radial design. Changes include adapting the current services to incorporate the key corridor service concept and improving service by increasing service levels and simplifying routes. The bus network would continue to rely on the North End Terminal, but to a lesser extent. Improvements would primarily be made on a route-by-route basis, largely by eliminating branches, straightening and simplifying routes, and reducing competition between routes. The advantages of the option are that it improves the network with less dramatic changes and thus would be easier to implement. The weaknesses are that it does not provide as much service coverage as the other options and is less effective at serving new and emerging markets.

SERVICE SCENARIO EVALUATION PROCESS

The study team and MATA staff were also tasked with evaluating the scenarios and determining which option, or combination of options, held the most promise for Memphis. The evaluation process involved a series of iterative steps, which included input and comment from stakeholders and members of the public, consideration of the impacts on other MATA services, such as MATA*plus*, and comment and input from MATA staff.

As a result of the evaluation, the Hubs and Centers concept emerged as the preferred option. Riders and members of the public generally preferred this option because they perceived it to offer greater coverage and create a clearer and more understandable service structure. Riders also preferred the way routes were structured in south Memphis, especially along the Winchester Road and Shelby Drive corridors. While the Hubs and Centers concept emerged as the preferred alternative, both members of the public and staff suggested several changes to the concept.

The study team shared and discussed the comments received with MATA staff and ultimately incorporated many of the comments into preferred alternative. These changes included strengthening service to southeast Memphis by increase service hours and re-routing some of the bus lines; eliminating the transfer on Route 40 (Stage Road); and adding a flex service to strengthen neighborhood services. The study team also made additional efforts to ensure the focus of the service design reflects the needs and desires of the transit dependent markets, incorporate more ideas about transit integration with bicycle and pedestrian infrastructure and provides support for riders at critical transfer locations.

PREFERRED ALTERNATIVE

The Preferred Alternative includes recommendations for a clear service hierarchy that would create a strong core set of services, or network 'backbone', and builds the rest of the network around the core network. The option also reduces redundancies in the network, provides a clear

and simple strategy for addressing service in south Memphis and strengthens the north-south connections. It also recommends eliminating most service branches, straightening routes, and scheduling services according to consistent headways. By simplifying the service, the preferred alternative also creates a structure that makes it easier for MATA to expand or contract services as budgets require.

In total the Preferred Alternative would create a network of 40 routes, seven more routes than operating in the current system. The new routes are primarily feeder and neighborhood (Flex) services that would be designed to connect people from neighborhoods to transit hubs and the key corridor network. Detail on the proposed network is documented in a map of weekday service and a table that shows the proposed service hours and frequency by day of the week. In general, the 40 routes are categorized according to:

- **Key Corridor Routes** – Eight routes (Jackson, Watkins, Chelsea, Poplar, Lamar, Elvis Presley, Third and Hollywood/East Parkway/Airways) were designed as key corridor routes. These routes will operate for 18 hours a day (roughly 5:00 am to 11:00 pm) on weekdays. During peak periods, buses will be scheduled to run with 15 or 20-minute frequencies and off-peak service would be scheduled so buses arrive every 30-40 minutes. The Key Corridor Routes would also operate seven days per week, although they would have shorter service spans on Saturday (roughly 5:00 AM to 8:00 PM) and Sunday (roughly 8:00 AM to 8:00 PM).
- **Emerging Key Corridor Routes** – Five routes (Thomas/Frayser, Summer/North Parkway, McLemore/Park, Mitchell and Winchester) are designated as emerging key corridor routes. While likely candidates to be in the key corridor route category, funding constraints and slightly less demand along these corridors mean these routes would operate with a reduced schedule. These routes would operate 17 hours a day (roughly 5:00 am to 10:00 pm) on weekdays with weekday peak period service frequencies of 20-30 minutes. Most of these routes would also be scheduled for operation on Saturday (approximately 6:00 AM to 6:00 PM) and Sunday (8:00 AM to 8:00 PM).
- **Mainline Routes** - There are 13 routes that are designated as "mainline" routes, inclusive of radial routes that connect to the North End Terminal and crosstown routes that connect to other MATA routes at transit hubs and/or super stops. These routes would generally operate for 13 hours per day (roughly 6:00 am to 7:00 pm) with 30 or 60-minute headways. Mainline routes, mostly but not entirely, operate on Saturday. With one exception (Route 40 Stage), they would not operate on Sundays.
- **Feeder Routes** – The network includes eight feeder routes that provide connections from neighborhoods and employment areas to the Airways and American Way Transit Centers, as well as newly-designated "super stops". The routes would operate on

weekdays only, with service available for roughly 12 hours a day between the hours of 6:30 am and 6:30 pm.

- **Express Routes** – There are four express routes included in the alternative (Wolfchase, Poplar, Walnut Grove and Getwell). The services are designed to offer three morning and three afternoon trips to meet the needs of commuters traveling from the outlying areas into Memphis, as well as commuters starting in downtown Memphis and traveling to suburban employment centers. Express routes would operate on weekdays only.
- **Flex Route Demonstration Project** – The alternative includes a flex route to be implemented as a pilot or demonstration project in the Whitehaven neighborhood of southwest Memphis. The Flex Route is intended to maintain a level of door-to-door type of service in this high-need community and provide connections to the key corridor transit routes. The Flex Route is designed to operate seven days per week, from 7:00 AM to 5:00 PM.
- **Airport Shuttle** – A shuttle service is recommended to connect the Airways and American Way Transit Centers with the Memphis International Airport and major employment centers in the vicinity of the airport. Anyone able to reach one of the transit hubs, therefore, would have access to the airport. The shuttle would operate daily for 18 hours a day (roughly 5:00 am to 11:00 pm) and be scheduled with departures every 20 minutes.

Figure ES-1 Preferred Alternative

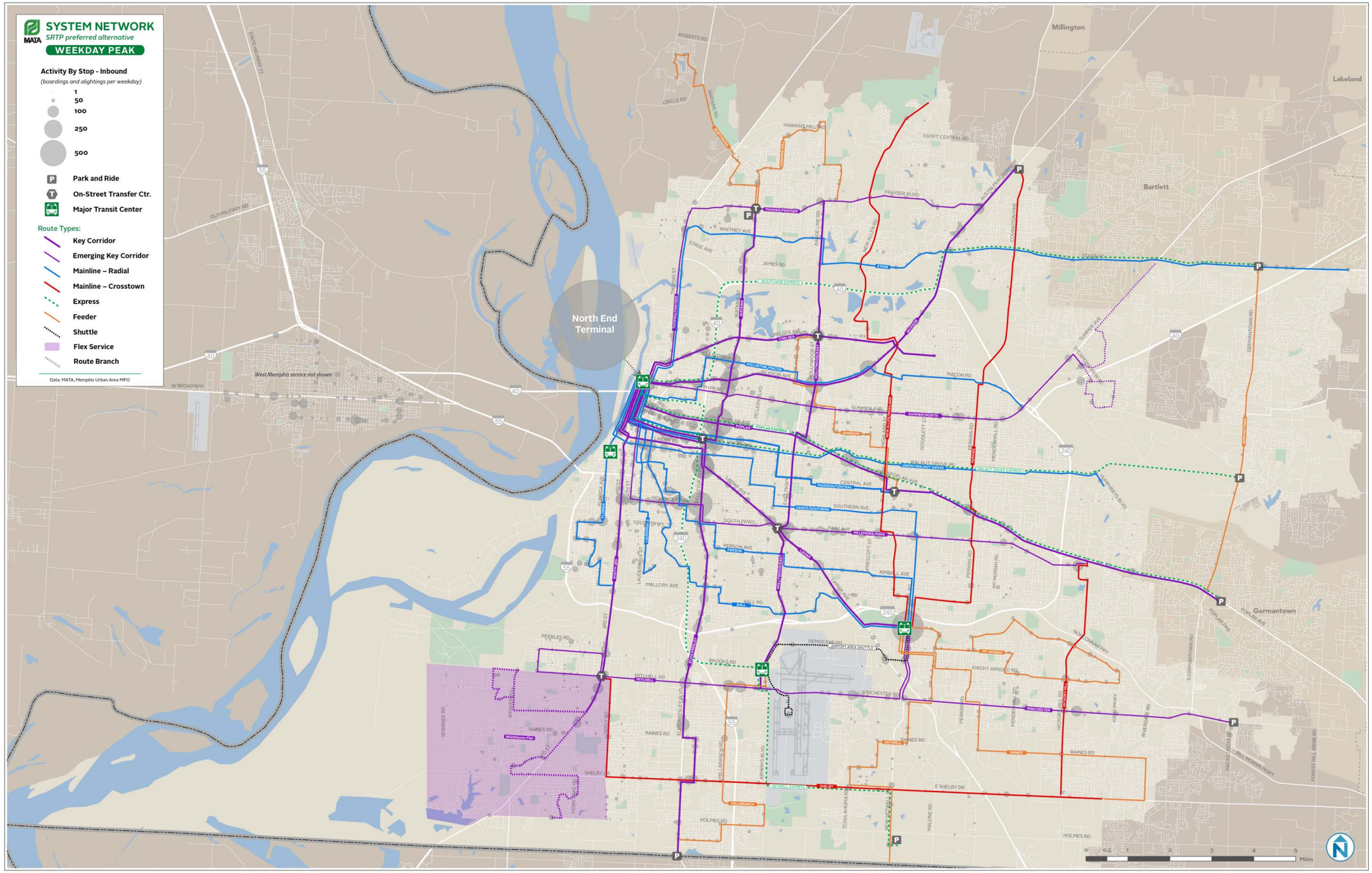

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Figure ES-2 Preferred Alternative Routes

Weekday Route	WEEKDAY Service Span Start	WEEKDAY Service Span End	WEEKDAY Headway (min) Peak	WEEKDAY Headway (min) Base	WEEKDAY Headway (min) Eve	SATURDAY Service Span Start	SATURDAY Service Span End	SATURDAY Headway (min) Base	SATURDAY Headway (min) Eve	SUNDAY Service Span Start	SUNDAY Service Span End	SUNDAY Headway (min)
Key Corridor Routes												
52 Jackson	5:00 AM	11:00 PM	15	35	60	5:00 AM	8:00 PM	35	35	8:00 AM	8:00 PM	35
10 Watkins	5:00 AM	11:00 PM	15	30	60	5:00 AM	8:00 PM	30	60	8:00 AM	8:00 PM	60
8 Chelsea	5:00 AM	11:00 PM	20	40	40	5:00 AM	8:00 PM	30	40	8:00 AM	8:00 PM	40
50 Poplar	5:00 AM	11:00 PM	15	30	70	5:00 AM	8:00 PM	35	60	8:00 AM	8:00 PM	35
56 Lamar	5:00 AM	11:00 PM	20	40	40	5:00 AM	8:00 PM	30	40	8:00 AM	8:00 PM	40
43 Elvis Presley	5:00 AM	11:00 PM	15	30	60	5:00 AM	8:00 PM	30	60	8:00 AM	8:00 PM	60
39 Third	5:00 AM	11:00 PM	20	30	60	5:00 AM	8:00 PM	35	60	8:00 AM	8:00 PM	60
32 Hollywood/East Parkway	5:00 AM	11:00 PM	15	30	60	5:00 AM	8:00 PM	30	60	8:00 AM	8:00 PM	60
Emerging Key Corridor Routes												
11 Thomas/Frayser	5:00 AM	10:00 PM	30	30	60	6:00 AM	6:00 PM	30	-	8:00 AM	8:00 PM	45
53 Summer/North Parkway	5:00 AM	10:00 PM	35	35	65	6:00 AM	6:00 PM	35	-	8:00 AM	8:00 PM	65
57 McLemore/Park	5:00 AM	10:00 PM	20	35	70	5:00 AM	7:00 PM	35	-	8:00 AM	8:00 PM	70
21 Mitchell	5:00 AM	10:00 PM	35	30	60	6:00 AM	6:00 PM	35	-	8:00 AM	8:00 PM	70
20 Winchester	5:00 AM	10:00 PM	35	60	60	6:00 AM	6:00 PM	60	-	8:00 AM	8:00 PM	91
Mainline Routes												
34 Union/Walnut Grove	6:00 AM	7:00 PM	30	60	-	6:00 AM	6:00 PM	60	-	-	-	-
13 Lauderdale	6:00 AM	7:00 PM	60	60	-	6:00 AM	6:00 PM	60	-	-	-	-
12 Florida	6:00 AM	7:00 PM	35	35	-	6:00 AM	6:00 PM	70	-	-	-	-
16 Madison/Central	6:00 AM	7:00 PM	35	35	-	-	-	-	-	-	-	-
35 Vance/Southern	6:00 AM	7:00 PM	60	60	-	-	-	-	-	-	-	-
38 Hickory Hill	6:00 AM	7:00 PM	30	60	-	6:00 AM	6:00 PM	60	-	-	-	-
40 Stage	6:00 AM	10:00 PM	60	90	90	5:00 AM	8:00 PM	90	-	9:00 AM	7:00 PM	90
7 Shelby	6:00 AM	11:00 PM	60	60	60	-	-	-	-	-	-	-
9 New Allen	6:00 AM	7:00 PM	60	60	-	-	-	-	-	-	-	-
19 Vollintine/Macon	6:00 AM	7:00 PM	60	60	-	6:00 AM	6:00 PM	60	-	-	-	-
4 Person	6:00 AM	7:00 PM	30	60	-	6:00 AM	6:00 PM	60	-	-	-	-
14 Ball	6:00 AM	10:00 PM	35	60	60	6:00 AM	6:00 PM	60	-	-	-	-
30 Perkins	6:00 AM	7:00 PM	30	60	-	6:00 AM	6:00 PM	60	-	-	-	-
Feeder Routes												
37 Johnson	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
6 Northhaven	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
18 Hawkins Mill	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
82 Germantown	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
25 Raines	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
29 Mt Moriah	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
26 Getwell	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
5 Millbranch	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
Express and Shuttle Routes												
500 Poplar Express	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	
64 Airport Area Shuttle	5:00 AM	11:00 PM	20	20	20	5:00 AM	8:00 PM	20	-	6:00 AM	6:00 PM	20
61 Wolfchase Express	2 trips in AM peak, 2 trips in PM peak					-	-	-	-	-	-	-
63 Walnut Grove Express	3 trips in AM peak, 3 trips in PM peak					-	-	-	-	-	-	-
62 Getwell Express	3 trips in AM peak, 3 trips in PM peak					-	-	-	-	-	-	-
Flex Routes												
F1 Whitehaven Flex Pilot	7:00 AM	5:00 PM	on-demand			7:00 AM	5:00 PM	on-demand		7:00 AM	5:00 PM	on-demand

Peak: the weekday AM and PM peak periods; Base: off-peak daytime service; Eve: service after 8:00 PM

SHORT RANGE TRANSIT PLAN

The SRTP developed a combination a high-level policy recommendations about how the bus services should be designed and operated as well as more practical and applied service improvement recommendations about the design and operation of individual bus routes.

The highest level policy recommendations developed as part of the SRTP are the agency mission and vision statements, agency goals, and performance measures. As part of the SRTP, MATA staff worked with the study team and Board of Commissioners to update these guiding principles; they were adopted by the MATA Board in 2011.

MATA'S MISSION STATEMENT

MATA's mission is to provide a reliable, safe, accessible, clean and customer-friendly public transportation system that meets the needs of the community.

MATA'S VISION STATEMENT

MATA will provide as efficient, effective, and innovative transit services as funding allows. We will operate transit services that are logical and practical, and by doing so, we will attract an increasing number of customers to our services. In addition, MATA services will support regional goals of improving access to places where people live, work, and play; reducing dependence on fossil fuels; improving air quality; and strengthening the area's livability.

MATA AGENCY GOALS

1. Increase ridership while maintaining service efficiency.
2. Operate reliable transportation services.
3. Sustain a customer-focused service environment.
4. Ensure a safe and clean environment, for both customers and employees.

MATA PERFORMANCE MEASURES

Following up on the agency goals, MATA staff and the Board of Commissioners agreed on a set of performance measures that reflect the agency goals, are fairly easily-measured and can be reported back to the Board on a regular basis. The performance measures by goal are:

1. Ridership/Service Efficiency
   - Average monthly transit boardings
   - Passengers per revenue hour (all modes)
2. Service Reliability/Service Quality
   - On-time performance (FR and MATA*plus*)
   - Vehicle miles between trouble calls

3. Customer Focus
   - Passenger complaints per 100,000 miles
   - Average customer call wait time
4. Safety and Security
   - Accidents per 100,000 miles
   - Preventable accidents per 100,000 miles

SERVICE GUIDELINES AND STANDARDS

The SRTP also included strengthening MATA's strategic framework for ongoing service planning and evaluation through development of service guidelines and standards. The guidelines provide a structure for service design generally as well as define appropriate levels of service, minimum levels of performance, service performance measures and guidelines on bus stop spacing and amenities. The guidelines are designed to provide flexibility and to respond to varied customer needs throughout the MATA service area. Adherence to the guidelines, however, is dependent upon resource availability, and in particular, the amounts of funding provided by MATA's local, state and federal partners. In the event of constrained resources, MATA will meet these guidelines as closely as possible and will work to achieve consistency as resources permit.

SUMMARY OF PREFERRED ALTERNATIVE

Through the Preferred Alternative, the SRTP process also developed recommendations re-organizing MATA's current radial service design into a model that is developed around a series of key corridor routes that connect at transit hubs, super stops and park and ride lots. The approach accomplishes several things including:

- Provides more and easier to use service to existing riders. Most of the riders and neighborhoods currently within ¼ mile of transit route will still be within ¼ mile of transit route. In addition, ridership is expected to increase by 15%.
- Simplifies system by straightening routes, eliminating route branches and scheduling service to operate with consistent headways.
- Organizes MATA fixed-route buses first around a clear hierarchy of services built around a core network of bus routes that offer fast and direct service between major locations. Secondary services provide less frequent, but important connections between neighborhoods and key destinations. Bus routes will also connect to a network of transit centers and hubs where passengers can transfer between routes and change direction of travel. The intent is to shorten travel times and reduce the need for passengers to travel into downtown.

- Opens new markets and starts to address gaps in the current service network, especially along the Winchester Road corridor as well as north south connections at the eastern end of the service area (i.e. Hickory Hill to Poplar Avenue and Stage Road to Poplar Avenue).
- Matches service types and levels to reflect demand:
  - Highest demand routes become Key Corridor Routes that create MATA's service "core". These trunk line routes provide the highest level of service and carry the most passengers.
  - Emerging Key Corridor Routes have slightly lower service levels as compared to the Key Corridor Routes; as funding becomes available service levels may be upgraded.
  - Mainline routes service neighborhoods and communities with lower density, but high need communities.
  - Feeder routes designed bring passengers to connect to a key corridor route and/or a transit center or hubs.
  - Express routes provide connections between downtown Memphis and major employers and/or employment centers. These routes will start to build 'choice' rider market.
  - Flex service serves low density neighborhoods that have high need for service. This type of service may be implemented as a demonstration project. The plan recommends southwest Memphis as potential demonstration site.
- Uses the Key Corridor Routes to create a framework for future development of Bus Rapid Transit (BRT) on highest ridership corridors.
- By developing transit centers and hubs, MATA will not only encourage use by making the system more comfortable and easy to use, improvements associated with the physical infrastructure will improve the pedestrian environment for all residents and increase MATA's physical presence in the community.
- The preferred scenario is also estimated to increase ridership by as much as 15% and by increasing ridership, lowers the average cost per rider.

SRTP FUNDING AND FINANCING

The SRTP was intentionally designed to work within MATA's available budget (in 2011) in terms of both operating and capital costs. There are, however, several considerations associated with the cost estimates and plan implementation.

Operating Costs

The fixed-route bus service improvements recommended as part of the SRTP were designed to work within MATA's available operating resources and provide about 410,000 annual service hours at an annual cost of approximately $36 million ($2011). This is in line with MATA's current expenses on fixed-route transit services, which includes approximately 417,000 annual service hours and costs approximately $36.7 million ($2011) annually to operate.

The analysis conducted as part of the SRTP included detailed analysis of each route with conservative operational assumptions (i.e. operating speeds and recovery time) that were reviewed with MATA staff. This level of effort was required to ensure that all proposals would work within the available resources. The analysis, however, remains a planning effort and implementation will require more detailed scheduling of the routes, run-cutting and compliance with provisions of the collective bargaining agreement. Therefore, the final costs of the proposal may change. If additional resources are available, they should be reinvested in the system according to some of the priorities outlined in the preferred alternative.

Other recommendations associated with the Preferred Alternative include making improvements to MATA's transit hubs, passenger amenities and park and ride lot infrastructure. Investments in these infrastructure will also increase MATA's operating costs because there are needs for additional staffing, maintenance, utility and security costs.

Capital Costs - Vehicles

Transit capital costs, as mentioned, include vehicle costs and maintenance as well as transit infrastructure. Similar to the example of operating costs, the SRTP preferred alternative was designed to work within MATA's existing fleet. The primary constraint is the number of vehicles needed to operate peak period service as this is the maximum amount of vehicles required at any one time. MATA's current operations have a peak vehicle requirement of 123 (as of September, 2011) and the proposed SRTP has a peak vehicle requirement of 119. Also similar to the analysis of operating costs, the peak vehicle requirement reflects a planning rather than operational exercise. Thus, although the estimate is based on sound analysis, there may be differences when the actual schedules are prepared and thus it is possible that full implementation will require more than 119 vehicles, but is unlikely to exceed 123 vehicles. The SRTP, therefore, is not expected to have additional vehicle requirements other than the normal replacement cycle accounted for in MATA's normal vehicle maintenance and replacement cycles.

Full implementation of the SRTP includes development of bus rapid transit service along some of Memphis' strongest corridors, Poplar Avenue and Elvis Presley Boulevard. Implementation of these projects, however, would likely require the acquisition of new vehicles to reflect demand for higher capacity and a higher level of service overall. These projects are likely to occur towards the

end of the five-year planning horizon covered in the SRTP and are not specifically identified as part of this project.

Capital Costs – Infrastructure

The Preferred Alternative does, however, assume investment in MATA's passenger infrastructure to realize full implementation of the concept. Most of the proposed changes will center around MATA's existing resources - the North End Terminal and Airways and American Way Transit Centers; staffing these facilities for longer hours, for example, requires an additional $105,500 annually. There will also be additional costs associated investments in the super stops and park and ride lots, such as increased maintenance, utility needs and security.

The SRTP also calls for considerable improvements in passenger amenities system wide and to the broader pedestrian environment in Memphis and Shelby County. Funding for passenger amenities, such as additional shelters and benches, are the responsibility of MATA. Improvements to the pedestrian environment (i.e. crosswalks and sidewalks) are best funded by individual municipalities as part of ongoing efforts to improve community livability and walkability. The study team does, however, recommend that MATA work closely with partner municipalities to communicate the importance of these projects, help prioritize particular locations and link infrastructure and transit improvements.

The proposed infrastructure improvements are recommended as part of full implementation of the SRTP recommendations. The cost for the investments is estimated at between $3 million and $9 million and includes improvements at 29 locations. Prioritization and implementation for these improvements needs to be negotiated with the City of Memphis and other municipalities. Costs may also be shared between multiple partners.

FIVE YEAR IMPLEMENTATION PLAN

Implementation of the SRTP and the preferred alternative is designed to be achievable over a five-year period (see Figure ES-3), allowing the first two to three years to focus on final service planning and scheduling and implementation, including adjustments and refinements to the routes. The final years of the implementation period should focus on service expansion and implementation of bus rapid transit service. As discussed, the capital elements of the preferred alternative are essential to its success. Meeting the proposed implementation schedule assumes work on these projects begins in the immediate term.

Figure ES-3 Five Year Implementation Plan

	Operating Projects	Capital Projects
Year 1	▪ Reschedule service to accommodate Preferred Alternative concept (may be implemented over 2-3 service change periods) ▪ Monitor route performance and make adjustments as necessary ▪ Explore partnerships to share airport shuttle costs (FedEx and Memphis International Airport) ▪ Engage University of Memphis and other local colleges and universities regarding new University Pass program ▪ Plan and hold public outreach campaign to educate riders about service changes	▪ Identify grant funds to support site planning and implementation for proposed super stops and park-and-ride lots. Improvements include pedestrian intersection improvements, expanded shelter facilities, information kiosks and lighting. ▪ Identify potential locations/suitable facilities for park and ride locations ▪ Work with University of Memphis to site on-street transfer location
Year 2	▪ Reschedule service to accommodate Preferred Alternative concept (may be implemented over 2-3 service change periods) ▪ Monitor route performance and make adjustments as necessary ▪ Introduce Express services ▪ Introduce Flex service ▪ Public outreach including "how to use Flex service" brochure – mail to homes within southwest Memphis Flex zone ▪ Initiate planning for BRT corridors — develop BRT Strategic Plan which outlines vision and implementation plan for BRT services in Memphis	▪ Begin on-street transfer location capital improvements ▪ Secure agreements to use park-and-ride surface parking facilities ▪ Begin BRT capital planning
Year 3	▪ Route changes complete, but may require some minor adjustments based on schedules and experience ▪ Develop ongoing service performance evaluation process	▪ Continue work towards on-street transfer location capital improvements ▪ Secure agreements to use park-and-ride surface parking facilities
Year 4	▪ Increase span of service and frequency on Emerging Key Corridor Routes to match service standards ▪ Continue BRT planning — inventory and plan for station improvements along Poplar Avenue, and Elvis Presley Boulevard; apply for grant funding for capital improvements	▪ Full implementation of on-street transfer location capital improvements
Year 5	▪ Begin implementation of BRT service	▪ Begin implementation of BRT service

1. INTRODUCTION

The Memphis Area Transit Authority (MATA) retained a team of consultants ("the study team"), led by Nelson\Nygaard Consulting Associates and including Kimley-Horn Associates and TRUST Marketing to develop a Short Range Transit Plan (SRTP). The objective of the SRTP was to conduct a detailed review of MATA's public transportation services, identify strengths and weaknesses in the existing system and develop a series of recommendations that correct weaknesses and strengthen assets. The planning process was designed to be as inclusive as possible, so that members of the riding and non-riding community in Memphis had ample opportunities to provide input and comment on the study process and findings. Ultimately, the study team was tasked to develop a series of recommendations that could be implemented in the short-term to best position MATA to provide the best and most efficient transit service possible. This report documents the SRTP planning process, results and recommendations.

METHODOLOGY, APPROACH, AND REPORT ORGANIZATION

The SRTP process was designed around a series of five main work tasks. The study team's approach to conducting each of these tasks is listed below. Results are summarized in subsequent report chapters and report appendices.

1. **Inventory MATA services, gauge regional socio-economic trends and assess regional travel markets** – One of the initial tasks of the SRTP was to inventory MATA's existing services and understand the environment in which the agency operates. This process involved reviewing and documenting trends in population and employment, trends in population and employment densities; and the size and distribution of population groups that have a higher need for public transportation services. The study team also examined the total market for travel in the Memphis region and compared these patterns with the public transportation network. The objective of this task was to evaluate MATA services and to identify under-served and emerging markets for transit services. The existing conditions work also included a peer review that involved researching similarly sized and positioned transit agencies to understand both how MATA compares with these agencies and ascertain relative strengths and weaknesses. The findings from all these analyses are presented in Chapter 2 (Overview of MATA and Existing Services) and Chapter 3 (Assessment of Transit Needs and Opportunities).

2. **Input from stakeholders, riders and members of the non-riding public and MATA drivers** – Collecting input from stakeholders and members of the public was a significant component of developing the SRTP. Outreach efforts included development of a project website and contacts database, interviews with stakeholders, surveys of riders and members of the general public, meetings with MATA and MATA*plus* drivers, rider drop-in sessions and public opportunities to comment on the SRTP documents. A listing of the outreach activities undertaken as part of the SRTP are shown in Appendix A. Findings and inputs to the SRTP recommendations are incorporated into each of the chapters of this final report.

3. **Analysis of MATA's individual routes and services** – One of the most significant tasks of the SRTP was a detailed analysis of each of MATA's fixed-routes as well as trolley lines and paratransit services. This route evaluation process was built using detailed data on ridership patterns, including passenger boardings and alightings by stop and by time of day on each route. The data allowed the study team to document and analyze how well each route performs on an overall and segment-by-segment basis. Data to support the route evaluation analysis came from a combination of data previously collected by MATA and data collected as part of this study. Data collection efforts conducted as part of the SRTP focused on routes where only limited or no data was available and routes that had undergone significant changes since the last counts. The results of the route evaluation process are not included in this final report, largely because the volume of documentation is significant. Findings are summarized in Chapter 3.

4. **Development and analysis of service improvement options** – Input and analysis collected through the market analysis, stakeholder and public input and route level analysis led to the development of service improvement options. The study team worked closely with MATA staff through this process and ultimately developed three options, or scenarios, that offered an alternative approach to the organization of MATA's fixed-route bus service. Each alternative was developed with sufficient detail to understand the constraints and opportunities of the option so it could easily be communicated to people not directly involved in the planning process (i.e. stakeholders and members of the public). The three options were presented to the MATA Board prior to being presented and discussed with members of the public. The scenario development process and evaluation of the scenarios is presented in Chapter 4.

5. **Final recommendations, including capital and funding needs** – A preferred alternative emerged from the scenario analysis process and implementation of this scenario formed the basis of the SRTP. The preferred alternative was further articulated with additional detail, including a set of service design guidelines (see Appendix B); an assessment of the capital needs and costs associated with implementation of the

preferred alternative; and a funding and financing plan. The recommendations are in Chapter 5 and 6.

RELATED DOCUMENTS

In addition to this Final Report, the SRTP also produced a series of technical memos, summary memos and power point presentations. As discussed, the final report contains the most relevant findings from the earlier analyses, but does not reproduce any document in its entirety. In cases where the memos are short, they are included as an appendix. In cases where the documents are long, they are not included but instead are available upon request. These documents are:

- Transit Operating Environment (Existing Conditions)
- Market Analysis
- Stakeholder Report
- Peer Review
- Results of the Preference Survey (Power Point presentation)

2. MATA AND MATA SERVICES

OVERVIEW OF MATA

MATA is the largest transit agency in the State of Tennessee, transporting some 40,000 riders every day throughout Memphis and the surrounding areas. The agency was formed in 1975 to serve the Memphis metropolitan area and currently operates 33 numbered fixed-route bus routes, three rail trolley lines and a paratransit service for persons with disabilities.

MATA is governed by a Board of nine Commissioners appointed by the Mayor of Memphis and confirmed by the Memphis City Council. The Board typically meets monthly and is responsible for policy and financial oversight, as well as setting the strategic direction for the agency. Day-to-day management of the agency is carried out by a team led by a General Manager, two Assistant GM's and eight Directors. Directors manage agency departments and are organized by function. MATA employs an extensive network of some 530 employees, about 80% of whom are bus operators and maintenance personnel.

MATA spends approximately $55-$60 million annually on operating expenses (including driver wages, fuel, vehicle maintenance and agency administration) and another $5-$10 million on capital costs (purchasing and maintaining transit vehicles and infrastructure). Funding for the system comes from a combination of federal, state and local sources. MATA's federal funds are largely provided by the Federal Transit Administration (FTA); these funds are distributed on a formula basis and account for about 20% of operating and 80% of capital costs. The State of Tennessee contributes about 15% of MATA's operating costs and 10% of capital costs. MATA's largest single source of funds is the City of Memphis, which provides between 40-45% of the operating costs of the services and another 10% of the capital costs. The remaining 20% of operating costs are raised through passenger fares and advertisement revenues[2]. The City of Memphis funds MATA out of the general fund and thus, MATA has no dedicated funding source other than fares, contracts and advertisement revenues.

[2] All funding percentages roughly reflect historical allocations based on MATA's fiscal year 2003 through 2009 budget documents. Funding programs from all sources are subject to change.

Historically, MATA has also had access to federal funds through direct appropriations by Congress (i.e. earmarks) and competitive grant programs. While these funds are not part of the primary revenue streams supporting ongoing operating needs, they have become an increasingly important part of the capital budget in recent years.

OVERVIEW OF MATA'S TRANSPORTATION SERVICES

As discussed, MATA operates three primary categories of service: fixed-route bus service, rail trolley service, and paratransit service (MATA*plus*). MATA also operates limited special event shuttles.

Fixed-Route Bus Service

Fixed-route bus service is by far the largest component of the MATA service network. Bus service is provided with a fleet of 149 active vehicles, the majority of which are 40-foot diesel-powered buses. These buses are used on 33 fixed-route bus services, of which 30 operate in Shelby County, Tennessee. The remaining three routes operate entirely or mostly within West Memphis, Arkansas. MATA provides these bus routes as a contracted service that is funded entirely by the City of West Memphis.

MATA's bus network is configured as a radial service design, meaning the majority of the bus routes travel from outlying communities into downtown Memphis. Consequently, about 70 percent of the buses serve MATA's North End Terminal, which is located at the corner of Main Street and A.W. Willis Avenue in downtown Memphis. The bus network is comprised nearly exclusively of local service; there are also two express routes.

Although the individual span of service varies by route, bus services generally operate weekdays between the hours of 5:00 am and 12:15 am; on Saturdays between 5:00 am and 8:00 pm and on Sundays and holidays between 9:00 am and 6:00 pm.

Rail Trolley Service

A distinctive feature of MATA's service network is the vintage rail trolley service that operates in downtown Memphis. The trolley service functions as a local circulator in downtown Memphis, and allows residents and visitors to connect to most major destinations and attractions in the central business district. MATA currently maintains an active fleet of 19 vintage trolleys which provide service on three lines:

- The Main Street Line operates along Main Street, providing north-south bidirectional service between Central Station and the North End Terminal. Trolleys are scheduled to arrive every 10 minutes and operate between approximately 6:30 am and 11:30 pm on Mondays through Thursdays. The trolley offers late-night service on Fridays (to 12:45 am) and Saturdays (to 12:00 am) and Sundays between 10:15 am and 6:15 pm.

- The Madison Avenue Line is an east-west route that extends from Main Street to Watkins Street along Madison Avenue, providing connections between downtown (including the other trolley lines) and the Medical District. The weekday service operates with 16-minute frequencies between the hours of 6:00 am and 11:00 pm. Saturday service has a slightly longer service span and Sunday operates both for a shorter time frame and has reduced service frequencies (every 25 minutes).
- The Riverfront Line runs in a counter-clockwise loop between Central Station and the North End Terminal traveling to the Mississippi's riverfront just east of Riverside Drive. The Riverfront Line operates weekdays and Saturdays from approximately 9:00 am and 11:00 pm, with later service on Friday and Saturday nights. Sunday services are scheduled between 10:00 and 6:00 pm. Service is scheduled on 13-minute frequencies.

Paratransit Service (*MATA*plus)

In accordance with the federal Americans with Disabilities Act (ADA), MATA provides paratransit services (MATA*plus*) for individuals who are unable to use fixed-route service. Under ADA, MATA is required to offer complementary paratransit services for eligible individuals who begin and end their trip within ¾-mile of a fixed-route during the operating hours of the route. ADA regulations also limit the fares for complementary paratransit service at not more than twice the adult cash fare for fixed-route service.

Special Event Shuttle Service

In addition to the regularly scheduled service, MATA operates shuttle service to special events at the FedEx Forum in downtown Memphis and the Liberty Bowl Memorial Stadium in Midtown Memphis. Events are primarily sporting events, including University of Memphis basketball and Memphis Grizzlies basketball games. The frequency of service, and pick-up locations vary based on the event and venue, although pick-up locations are often in Collierville, Southeast Memphis, Germantown, Bartlett, and East Memphis.

MATA VISION, MISSION, GOALS, AND PERFORMANCE MEASURES

Prior to the SRTP, MATA's publicly stated mission was "to provide a quality regional transit system that meets the present and future needs of all the people it serves." The agency vision statement was "to provide the safest, cleanest, most efficient, and most progressive transit service as the mode of choice for the greatest number of people in the Memphis area by fostering development, increasing mobility, alleviating congestion and pollution within Board-established performance levels and within available financial resources".

As part of the SRTP, MATA staff, the Board of Commissioners and the study team worked closely to update this statement and add a vision statement, goals and performance measures. While the sentiment of the original statement was considered accurate, MATA sought to simplify the

statements so they could be more easily articulated and clearly tied to specific goals. The study team compiled a series of mission and vision statements from other agencies and reviewed them with staff in conjunction with identifying the agency's most important markets, services and goals. Through a series of discussions and reviews, the Board of Commissioners adopted the following statements:

MATA'S MISSION STATEMENT

MATA's mission is to provide a reliable, safe, accessible, clean and customer-friendly public transportation system that meets the needs of the community.

MATA'S VISION STATEMENT

MATA will provide as efficient, effective, and innovative transit services as funding allows. We will operate transit services that are logical and practical, and by doing so, we will attract an increasing number of customers to our services. In addition, MATA services will support regional goals of improving access to places where people live, work, and play; reducing dependence on fossil fuels; improving air quality; and strengthening the area's livability.

MATA AGENCY GOALS

1. Increase ridership while maintaining service efficiency.
2. Operate reliable transportation services.
3. Sustain a customer-focused service environment.
4. Ensure a safe and clean environment, for both customers and employees.

MATA PERFORMANCE MEASURES

Following up on the agency goals, MATA staff and the Board of Commissioners agreed on a set of performance measures that reflect the agency goals, are fairly easily-measured and can be reported back to the Board on a regular basis. The performance measures by goal are:

1. Ridership/Service Efficiency
   - Average monthly transit boardings
   - Passengers per revenue hour (all modes)
2. Service Reliability/Service Quality
   - On-time performance (FR and MATA*plus*)
   - Vehicle miles between trouble calls
3. Customer Focus
   - Passenger complaints per 100,000 miles
   - Average customer call wait time
4. Safety and Security
   - Accidents per 100,000 miles
   - Preventable accidents per 100,000 miles

3. TRANSIT NEEDS AND OPPORTUNITIES

OVERVIEW

A major objective of the SRTP was to understand the strengths and weaknesses of the existing transit network and identify opportunities for improvement. The transit needs assessment was developed using a variety of data sources and incorporated a variety of perspectives and viewpoints. The main tasks that contributed to the needs assessment were:

- **Market Analysis** - an analytical perspective on the market for travel generally and for transit services in particular. This analysis was based on a detailed review of population and employment distribution and trends, densities and growth rates as well as economic development and travel patterns.
- **Public and Stakeholder Input** – includes opinions, priorities and preferences expressed by stakeholders, MATA drivers, current riders and members of the general public.
- **Peer Review** – a relative analysis of MATA's system and services as compared with other similarly sized and positioned transit agencies.
- **Route Evaluations** – a detailed examination of MATA's individual routes in terms of how riders are currently using the routes and how well the routes are performing relative to the overall system.

The findings of the needs assessment are presented below and organized by each of these four main tasks. A final section summarizes the findings and implications of the analysis for the SRTP.

MARKET ANALYSIS

MATA serves a large and diverse service area that includes the urbanized portions of the City of Memphis and Shelby County, plus portions of West Memphis, Arkansas. The region, like cities everywhere, is dynamic. As the region grows and changes, the demand for transit service also changes. Currently, the demand for transit is highest in urbanized Memphis; a trend that is both historically true and one that will likely continue. Growth in the suburban ring east of the urbanized area, however, is occurring faster than in the urban core, and suburban communities

such as Germantown, Bartlett and Cordova are emerging as new population and employment centers. Understanding the demand and potential market for service to these growth areas is a key part of the SRTP.

The market analysis inventoried and analyzed a variety of demographic, socio-economic and travel pattern data, including a trend analysis on the changes in population and employment in Memphis, Shelby County and the surrounding communities, an analysis of the size and spatial distributi0n of population groups with a greater need for transit services, and an analysis of the current travel patterns in the region. Sources for the data include the US Census Bureau as well as the regional models developed and maintained by the Memphis Metropolitan Planning Organization (Memphis MPO). Most of the analysis was conducted at a planning district level (see Figure 3-1). Additional information and maps are included in the Market Analysis Technical Memo. Key findings from the analysis include:

- None of the planning districts in the study area have overall population densities that meet industry standards for the highest frequency transit service such as light rail. Of the planning districts used for this study, only Midtown, University and the CBD demonstrated densities greater than 3 households per acre, which is considered appropriate for higher capacity transit service, such as high frequency bus service or bus rapid transit (BRT)/enhanced bus service.
  - It is important to note, however, that the planning districts are fairly large and consequently mask smaller areas with higher densities. Indeed, several neighborhoods within planning districts have significantly higher densities than shown for the planning district as a whole (see Figure 3-2).
- In terms of average employment density at the district level, only the Memphis CBD has sufficient employment density to support high capacity transit (see Figure 3-3). However, similar to population, the large planning districts mask some neighborhoods and districts with higher density employment.
- Looking at Memphis' population in terms of transit dependent characteristics suggests that the key demographic traits accounting for a high propensity to use transit are low income, zero-vehicle households and minority status. These are some of MATA's strongest markets for service.
- The transit needs index suggests that the five planning districts with the highest likelihood of using transit are the CBD, North Memphis, Southwest Memphis, the Airport and Frayser (see Figure 3-4).
- Poplar Avenue is a critical transportation corridor and home to much of the region's activity and employment centers. Overall, however, the corridor does not contain large

transit dependent populations. As a result, it will be important to connect neighborhoods to the corridor as well as support travel along the corridor.

- The Memphis MPO Travel Demand Model identifies Shelby Farms/Germantown as a key market for transit service, especially for home-based work trips. The data also suggests that there are a lot of people traveling between Shelby Farms/Germantown and the Raleigh/Bartlett area, Hickory Hill and East Memphis.
- The MPO Travel Demand Model also identifies Hickory Hill as both an important origin and destination for trips, including all trips and home-based work trips. Important markets are between Hickory Hill and East Memphis and the Airport.

In summary, the MATA service area is growing and changing. While much of MATA's service operates in areas with the most population and employment and the largest concentrations of key population groups, the service may be less well oriented around the shortest path between these markets. For example, the existing service orientation supports travel between east to west and is concentrated around the western part of the urban areas; this is a critical market for service and also reflects MATA's funding source. At the same time, there is a growing market for services in the eastern part of the service area and providing north-south connections, especially in the eastern parts of the service are and between existing service areas and new employment markets might be under-served.

PUBLIC AND STAKEHOLDER INPUT

The perspective and priorities of members of the public, existing transit riders and stakeholders, and drivers of both MATA fixed-routes and MATA*plus* demand response services were an important part of understanding the needs and opportunities for service improvements. As part of the existing conditions and assessment, outreach activities included 1) a series of public meetings held as part of the Memphis MPO's Long Range Transportation Plan; 2) a preference or trade-off survey conducted with members of the public and current riders; 3) focus groups with MATA and MATA*plus* drivers; and 4) interviews with stakeholders. Detailed summaries from each of these efforts are available either as technical memos or presentation materials. The salient findings from the combined outreach process include:

- There is a strong level of support and appreciation for MATA. Nearly every individual participating in the outreach process expressed a desire for MATA to succeed and feels the agency plays an important role in the community.
- Despite this, there is a sense of considerable frustration with MATA services, especially among riders. Riders and rider groups were nearly uniform in their sentiment that MATA's existing bus and paratransit services are inadequate. While there were many complaints, most frustrations related to not enough service overall, the lack of reliability, the indirectness of travel and long travel times.

Figure 3-1 SRTP Study Area and Planning District Boundaries

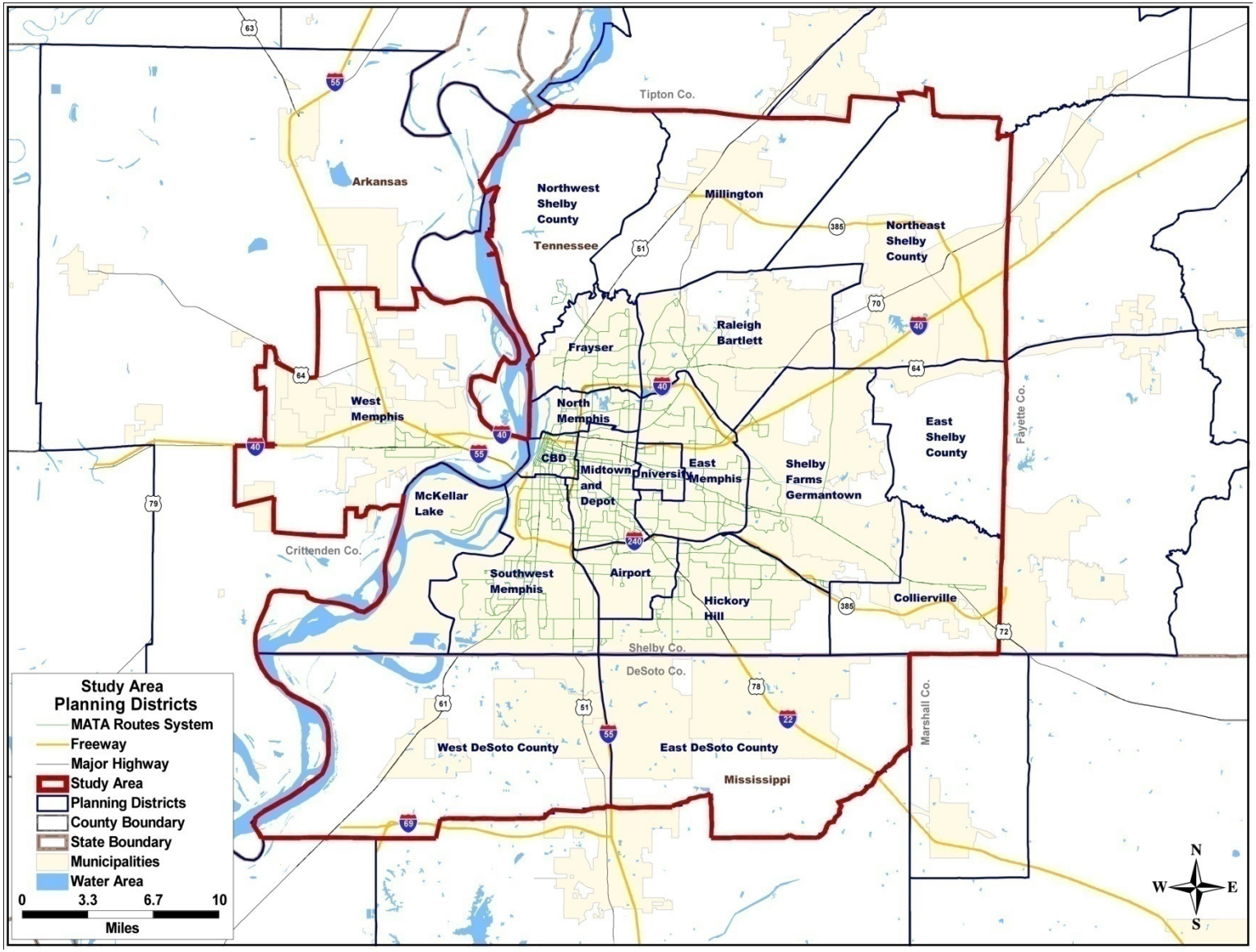


Figure 3-2 Population Density

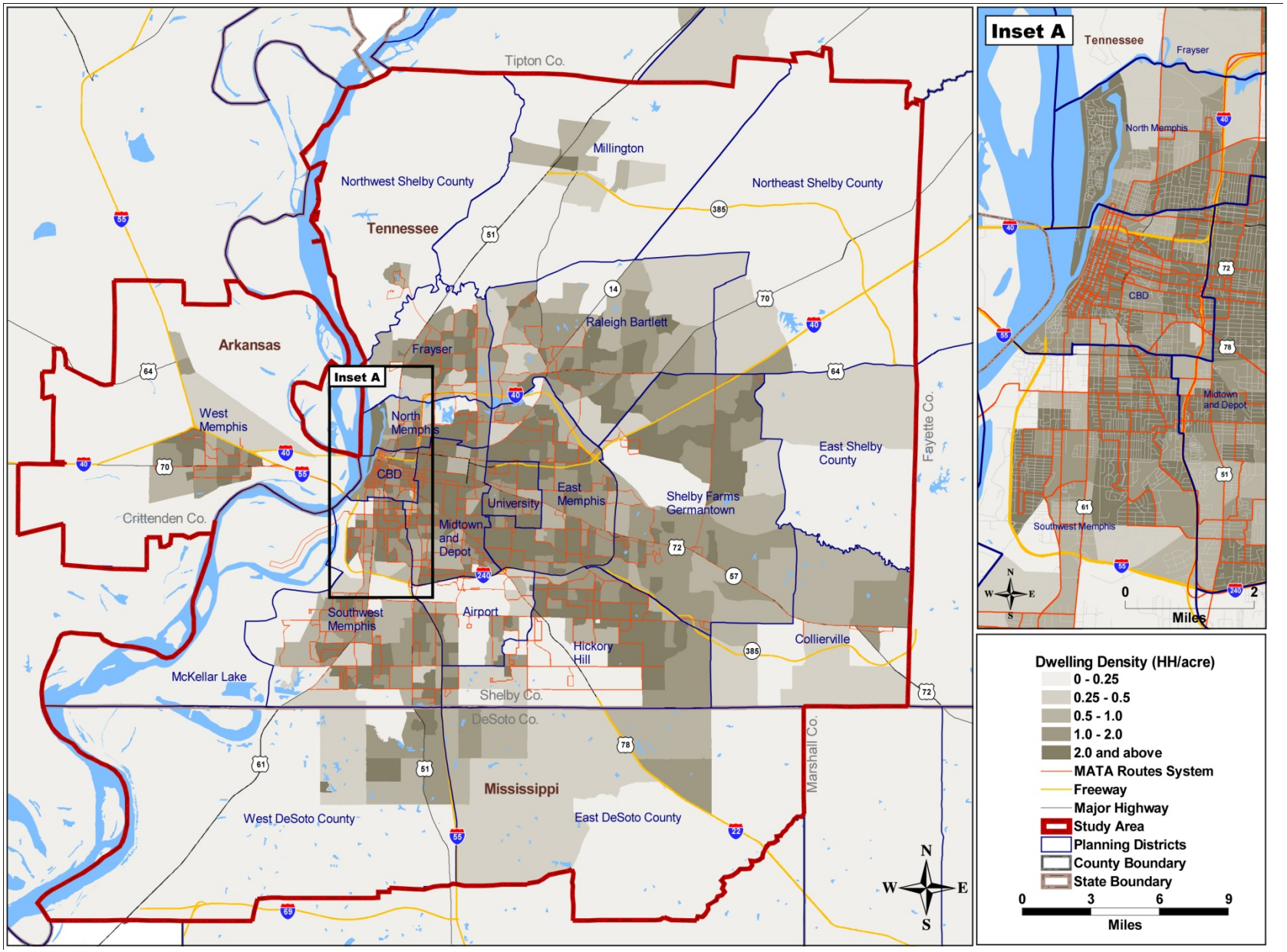


Figure 3-3 Employment Density

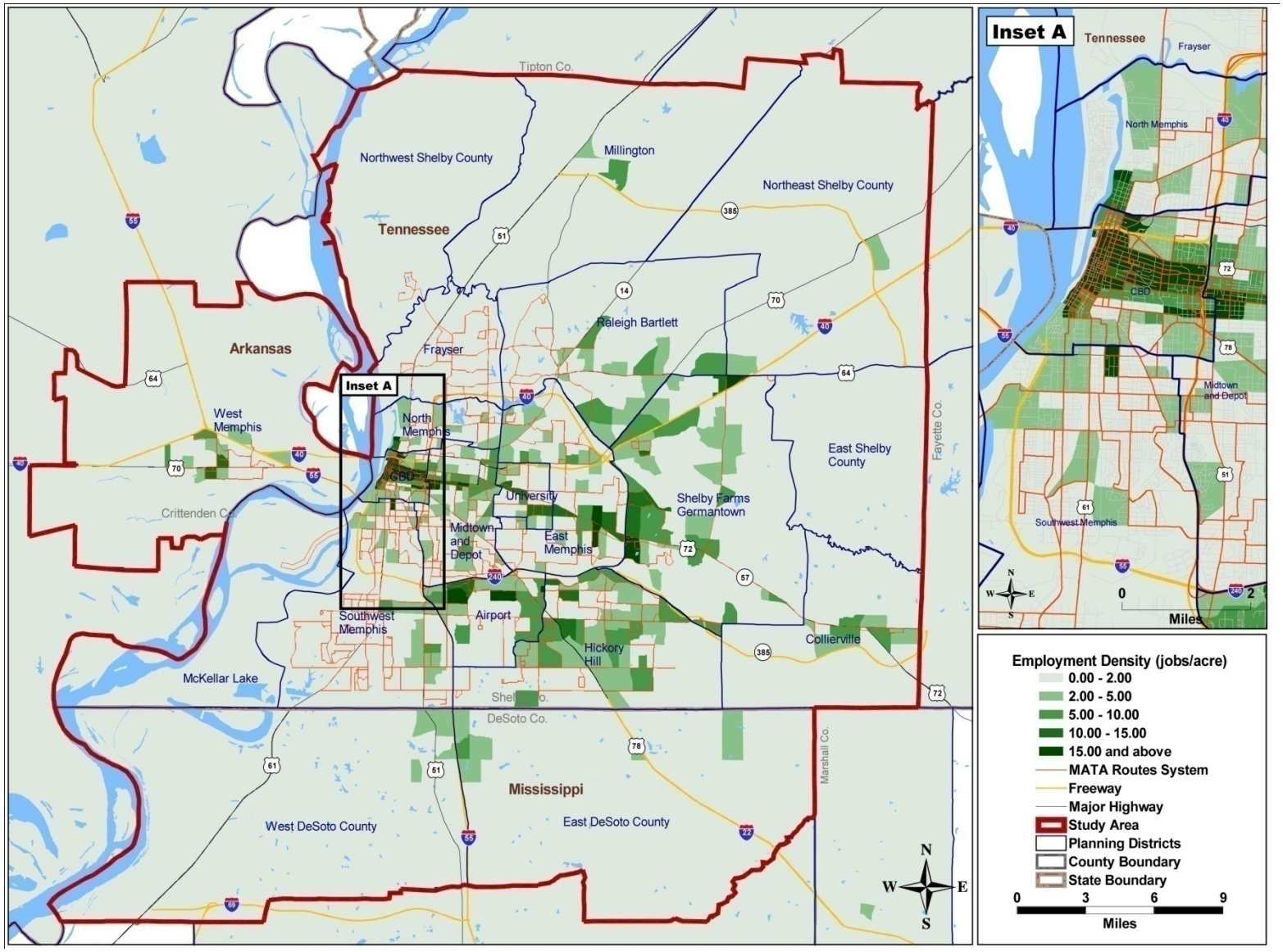
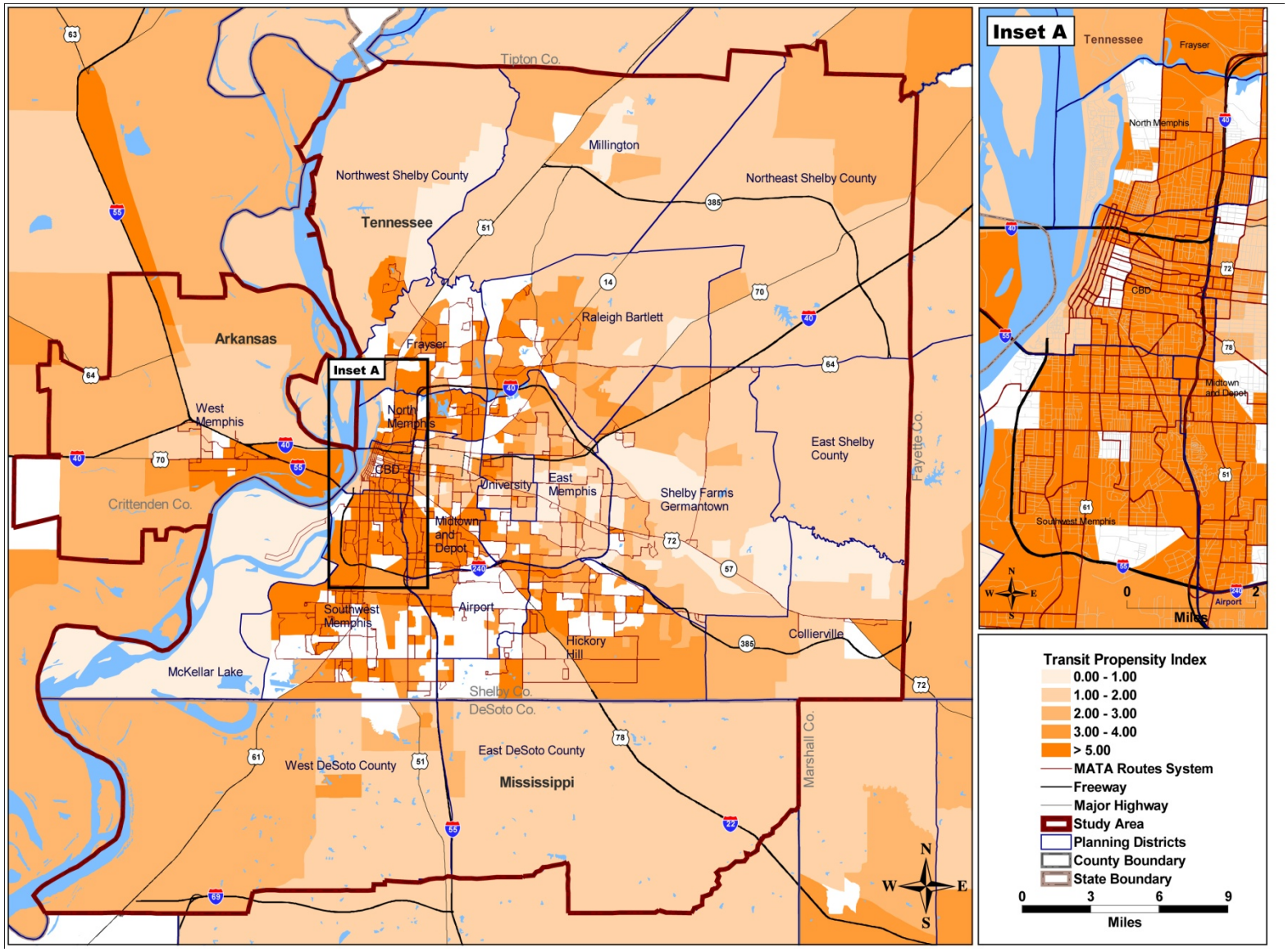


Figure 3-4 Transit Dependency Index



- MATA has an image problem. This is true for riders, who have experience with the system and are frustrated with how it works (see above). It is also true for members of the community, including those in leadership positions and individuals who do not regularly ride the bus. Despite limited direct experience, these individuals uniformly felt MATA services were outdated, unreliable, unnecessarily complex and don't take people where they want to go.
- Non-riders also expressed a strong opinion that MATA does not have a clear focus about the type of service or agency it wants to be. Most people, including both riders and stakeholders felt MATA should focus on serving people who have no other way to travel and hope that MATA can be at the forefront of Memphis and Shelby County's effort to become a more vibrant, sustainable, and youthful city.
- Members of the broader community also recognize that MATA operates in a challenging environment and that Memphis is not a very transit oriented community. Most also acknowledge that MATA has not been sufficiently funded to meet community expectations.
- Many individuals, organizations and institutions would like to work more closely with MATA to improve transit services and help design a system that more closely meets their specific needs but also the community at large.
- Individuals with disabilities are a critical market for MATA. More than any other group, riders with disabilities and stakeholders representing individuals with disabilities expressed gratitude for MATA services, but also frustration about how challenging it was for them to rely on MATA as their primary source of transportation.

PEER REVIEW

An additional analysis involved comparing MATA's services with a peer group of ten similarly sized and positioned transit agencies[3]. The peer review was used to understand how the agency compared and what the agency could learn from others about improving service. The full peer review is available as a separate technical memo. Key findings include:

- **MATA is a productive and cost effective system**. MATA generally outperforms its peers in service productivity measures and cost effectiveness measures, from both a system wide and bus-only perspective. Consistent with the system analysis (see below),

[3] Peer agencies include Jacksonville Transportation Authority, Jacksonville, FL; Hillsborough Area Regional Transit Authority, Tampa, FL; Transit Authority of River City, Louisville, KY; Indianapolis Public Transportation Corporation, Indianapolis IN; Hampton Roads Transit, Norfolk, VA; Charlotte Area Transit System, Charlotte, NC; Greater Dayton Regional Transit Authority, Dayton, OH; Metropolitan Transit Authority, Nashville TN; Birmingham-Jefferson County Transit Authority, Birmingham, AL; Central Ohio Transit Authority, Columbus OH

the findings demonstrate MATA has done a good job overall at operating an efficient and effective system.

- **MATA's services have shrunk over time – both in terms of ridership and service hours deployed.** MATA, as a system, has slowly been shrinking over the last decade, both in terms of service hours deployed and ridership. The data suggests service cuts have been effective as reflected by MATA's consistent high levels of productivity. However, the peer analysis also demonstrates that transit systems that have increased ridership over this time period have generally done so by increasing service, expanding service areas and diversifying their service network. Other agencies anecdotally suggest that focusing on service quality can also help attract riders. In both cases, agencies have adopted a more dynamic approach to transit service planning and these strategies have helped them retain and expand their ridership.
- **MATA service structure does not follow a clear service design.** Although much of MATA services are oriented towards a radial system, the system design is not sufficiently or consistently followed (i.e. with direct and fast service into downtown) to realize the benefit of this design. Likewise, MATA's system operates around a handful of transit centers but with the exception of the downtown hub, the service is not strategically designed around these centers. As a result, MATA's route network is more complex than its peers, with many indirect routes and only a limited cross-town network that supports transfers outside of downtown.
- **MATA services do not have a clear hierarchy of routes.** Unlike almost all of the peer agencies, MATA does not have an internal route hierarchy that is designed to serve different markets and rider groups. By comparison, most peers provide more express services and several similarly-sized and positioned agencies have higher end services, such as light rail or BRT.
- **On a per capita basis, MATA's population uses less transit as compared to the peer group**. The annual number of unlinked transit trips per capita in Memphis is lower as compared to the peer group average. This finding at least partially reflects the fact that there is relatively less transit service (in terms of miles per capita) in Memphis as compared to many of the peer cities. However, it also suggests that MATA might be able to do more to capture a larger share of the transit dependent market and do more to capture new markets.
- **MATA may benefit from market-based strategies.** MATA has not adopted a market-based approach to attracting riders, as shown by the lack of a strong service hierarchy and the relatively low per capita usage of its service. Strategies adopted by the

peer agencies such as U-Pass programs, employer partnerships, and fare restructuring offer the potential for MATA to diversify and increase ridership.

MATA SYSTEM ANALYSIS

The SRTP process also included an analysis of MATA's productivity as a mechanism to broadly gauge the system's productivity and efficiency. The analysis considered service inputs (costs), outputs (revenue service hours and miles) and consumption (ridership and farebox revenues). Performance data was then expressed in terms of three performance indicators commonly used in the transit industry:

- **Cost efficiency.** These indicators are the ratios of *service inputs* to *service outputs*, and measure the efficiency of resource allocation within the agency.
- **Cost effectiveness.** These indicators are the ratio of *service inputs* to service *consumption* and measure how well the service is utilized by the community.
- **Service effectiveness.** These indicators are the ratio of *service* consumption to *service outputs* and measure how well the capacity of service is being utilized by the consumer.

An assessment of how well MATA services performed with regard to the three categories of performance indicators (cost efficiency, cost effectiveness, and service effectiveness), as well as average subsidy per passenger is shown in Figure 3-5 and discussed below. The data shown includes performance metrics only for MATA; however, the text references the relative performance of MATA as compared with the peer group discussed previously.

As these numbers are considered, however, it is worth noting that individual service types will perform differently and are not comparable. The fixed-route bus service and trolley services, for example, are scheduled services that are designed to carry large numbers of passengers per trip. Paratransit service, on the other hand, provides services to individuals with higher needs and is designed as more flexible service catering to individual transportation needs. As a result, while hourly costs of service are lower than fixed-route services, the number of passengers carried per mile is considerably lower and thus average costs per passenger trip are higher.

Cost Efficiency

- **Operating Cost per Revenue Hour.** This indicator is a good measure of cost efficiency. It involves dividing total operating costs by the number or annual revenue hours (i.e., when the vehicle is in service and working to carry passengers). MATA's system wide operating cost per hour is $91. MATA's hourly operating costs are exactly the same as the peer group average of $91 per hour.

Cost Effectiveness

- **Operating Cost per Passenger.** This standard also measures cost effectiveness by assessing total operating costs over consumption of service (total ridership). MATA's system wide operating cost per passenger is $4.50 and the operating cost per passenger for bus service is $4.05. Trolley services have a slightly higher cost per passenger trip ($5.93) while paratransit service is much higher ($16.70). As discussed, due to the type of service provided, paratransit costs are expected to be considerably higher as compared to fixed-route services. These costs are consistent with the average cost per passenger of $4.67 reported by the MATA peer group for the same time period.
- **Farebox Recovery Ratio.** This indicator measures cost effectiveness and is the ratio of fare revenue to total operating costs. MATA's farebox recovery rate is 18.3% (19.9% for bus service). By comparison, the peers examined as part of the peer review prepared for this study had an average farebox recovery ratio of 16%.
- **Average Subsidy per Passenger.** This indicator is closely related to operating cost per passenger, but also factors in fare revenues. This indicator is often better understood by policy makers who want to know how much each passenger is being subsidized. System wide, the subsidy per passenger trip is $3.67. This subsidy is 17% less than the peer group subsidy of $4.40 per passenger trip.

Service Effectiveness

- **Passengers per Revenue Hour and Passengers per Revenue Mile.** These indicators provide a good measure of service effectiveness – that is, how well the service is being consumed in relation to the amount of service available. Both of these indicators track closely to each other. On average, MATA carries 20.14 passengers per hour and about 1.4 passengers per mile, inclusive of all service types. Consistent with other metrics, the bus and trolley services carry more passengers per hour and per mile than the paratransit service. MATA outperforms the peer group for both of these metrics; the peer group average number of passengers per revenue hour is 16.4 and the number of passengers per revenue mile is 1.2.

Figure 3-5 MATA Annual Performance Data and Indicators for 2009

	System wide	Bus	Trolley	Paratransit
Service Supplied				
Vehicle Revenue Miles	8,525,398	6,207,708	374,280	1,943,410
Vehicle Revenue Hours	581,635	421,643	38,151	121,841
Service Costs				
Operating Expenses	$52,672,966	$41,981,656	$6,602,770	$4,088,540

	System wide	Bus	Trolley	Paratransit
Service Consumed				
Unlinked Passenger Trips	11,716,787	10,358,212	1,113,806	244,766
Farebox Revenue	$9,616,007	$8,350,435	$769,193	$496,379
Performance Metrics				
Cost Efficiency				
Operating Cost per Revenue Hour	$90.56	$99.57	$173.07	$33.56
Cost Effectiveness				
Operating Costs per Passenger	$4.50	$4.05	$5.93	$16.70
Farebox Recovery Ratio	18.3%	19.9%	11.6%	12.1%
Average Subsidy per Passenger	$3.67	$3.25	$5.24	$14.68
Service Effectiveness				
Passengers per Vehicle Revenue Mile	1.37	1.67	2.98	0.13
Passengers per Vehicle Revenue Hour	20.14	24.57	29.19	2.01

ROUTE LEVEL ANALYSIS

One of the most extensive components of the SRTP was the analysis of MATA's fixed-route bus services, the trolley lines and the paratransit service. In each case, the study team looked at each route; documented service productivity, passenger boardings and alightings by stop, and ridership by time of day; and used this information to understand each route's strengths and weaknesses. The process also led the team to identify potential route level service improvements - the list of potential improvements was intended as a broad range of possibilities without regard to costs, feasibility or how strategies may impact other goals.

After the route evaluations were prepared, the study team and MATA staff met to review each route individually, consider the results of the route evaluation and discuss the potential opportunities to improve the route. Through this process, the team identified strategies that had promise and were feasible. The route evaluations are extensive and thus it is not practical to include them in this report, except for the analysis of MATA*plus* and trolley lines, both of which are included as Appendix C. Key findings are summarized as:

- Some routes serve multiple markets that are not closely related geographically or otherwise (i.e. serve similar employment or neighborhood types), so for example, a route may travel both west along Poplar and south to the airport. These types of routes are difficult to operate because the two legs of the routes may not be evenly balanced in terms of the amount of travel time needed or riders carried. Thus one leg may be over-served and another under-served. A route that travels in two different directions is also difficult for passengers to understand.

- Some routes have multiple branches, or deviations such that the route travels on one street for some trips and a different street for other trips. Similar to the example above, having a bus travel on different routes makes it difficult to accurately schedule the route (and thus meet time points on the route schedule) and makes it difficult for passengers to remember how the route works.
- Many routes spend too much time traveling through neighborhoods. Although traveling on neighborhood streets means some riders will have short walks to their bus route, it also means that other travelers are subjected to circuitous routes that meander on streets with few riders. Transit routes that stay on the main roads, on the other hand, are able to travel faster and more directly between critical destinations.
- Many routes do not follow direct paths between destinations. For example, a bus route that is primarily traveling north and south may also take passengers several blocks to the east before heading north again. This type of indirect routing also results from providing neighborhood service and traveling on small streets. In general, passengers prefer as direct a route of travel as possible.
- Several routes operate on the same street, but with no single route that operates the entire length of the street or roadway. An example is Winchester Road, a corridor with several major destinations including lots of employment. There is currently no single bus route that operates all the way along Winchester Road; instead parts of nearly 12 routes (including night, Sunday and branch service) operate along some part of the corridor. Thus while there are a lot of buses, there is no direct service.
- Several routes operate on the same street and compete with each other for riders. Similar to the example provided above, many of the routes overlapping on a single corridor compete with each other for the same riders and effectively over-serve one street at the expense of serving another area.
- MATA bus routes are not categorized or structured to serve specific travel markets. As discussed previously, of the 33 routes, all but two of them are classified as local routes. Without a classification system for its routes, MATA is not able to tailor service levels to specific markets or easily communicate to riders which routes have more and better and service. The lack of a service hierarchy also makes it more difficult to scale service levels up and down, as funding often requires.

KEY FINDINGS AND SERVICE DESIGN PRINCIPLES

Taking into consideration the entirety of the needs assessment, the study team identified a series of objectives and characteristics that should be carried forward to the scenario development phase. In summary, service improvements may consider the following findings:

- MATA currently operates a very efficient service; proposed changes should retain this strength.
- Downtown Memphis is MATA's strongest market for riders; this has historically been true and will continue to be true for the foreseeable future. However, there are emerging markets and communities that demonstrate a need for transit service or are becoming important employment and service markets for people living in other parts of Shelby County. These communities include neighborhoods in southeast and northeast Memphis as well as the employment markets in suburban Shelby County.
- MATA as an agency has been shrinking in terms of both the number of service hours operated and the number of riders using the system. Funding is the primary culprit of MATA's negative growth rate, but learning from the peers, MATA may consider implementing new, higher speed services, such as Bus Rapid Transit (BRT) to attract new riders and resources to the system.
- MATA primarily serves a market of travelers that depend on bus service to travel. As a result, the bus route network needs to provide broad geographic coverage.
- Service reliability is a major challenge for MATA and riders. Service reliability is very important to riders and the existing network has a difficult time keeping buses on schedule. There are many reasons why bus service does not stay on time, such as traffic congestion and uneven load patterns that lead to large numbers of boardings and alightings at some stops. In addition, when routes become too long and/or too complicated, keeping the bus on schedule becomes more difficult.
- The existing MATA network is complicated. Routes could be simplified by making them direct connections between major destinations. Straightening the routes would have the benefit of not only being easier to understand for the passengers but would also make the routes easier to schedule and operate, thereby making the service faster, more reliable, and more efficient.
- Riders want more opportunities to travel along north-south corridors; this is true along primary corridors in the western end of the study area close to downtown Memphis and for corridors in eastern Memphis and in Shelby County. Providing a direct connection from Hickory Hill and the Poplar Avenue corridor, for example, would serve an emerging market.
- Service would be strengthened by categorizing routes into a clear hierarchy so that service levels can be better matched to demand. Diversify the network so bus routes are designed to serve specific markets. MATA's existing bus network, with a limited number of exceptions, is not tailored to serve specific markets.

- Competition between bus routes should be eliminated. Currently, the MATA network includes several bus routes that operate on the same corridor but are not designed as complementary routes (which require coordinated schedules). As a result, the routes end up competing with each other and reducing the overall coverage of the bus network.

4. DEVELOPMENT OF SERVICE ALTERNATIVES

OVERVIEW

As discussed, the primary objective of the SRTP was to create a strategic direction for MATA services. The initial steps included understanding how well the existing system worked and identifying strengths and weaknesses. The next step, developing service alternatives, required creating options for MATA's strategic direction, including a broad, policy-level discussion for how MATA should structure, operate and manage the transit network, as well as more detailed recommendations on where, how and when routes should run. Thus, the study team developed service options that both set the broader strategic direction for service delivery and provide options for how this could be applied. This chapter discusses the process of setting the guiding principles, developing service networks and evaluating the proposed options.

MATA'S SERVICE FRAMEWORK

As discussed, prior to developing any specific service alternatives, the study team worked with MATA staff to develop a framework to both guide the development of the alternatives, evaluate the alternatives, and ultimately steer implementation. Prior to developing the service alternatives, therefore, MATA staff and the study team identified MATA's core service network and also identified a set of guiding transit planning principles.

MATA Core Network

The purpose of identifying MATA's core service network was to acknowledge and document MATA's strongest service corridors for transit. Similar to a light rail system that forms the core of a transit system, the idea is to use key bus routes as the backbone of MATA's service network. These routes would receive the highest level of service and be designated as the core network. Riders, in turn, could count on these routes to 1) come (more) often; 2) operate seven days per week; 3) operate at fairly high speeds and 4) travel directly. Other bus routes would generally provide less service, operate in corridors and neighborhoods with less demand, but would offer connections to the core network. In this way, MATA would balance its resources so both the highest demand corridors and the high need neighborhoods receive appropriate levels of service.

MATA staff was easily and with near unanimity able to identify the key corridors. Several MATA staff members noted that these corridors have historically been and continue to be the most important routes in the network. Once identified, the corridors and bus routes were carried forward and incorporated into the scenario design, and the evaluation process also considered how well these corridors would be served. The main corridors and corresponding bus routes were identified as (in no particular order) (see also Figure 4-1):

1. Poplar Avenue (Route 50)
2. Jackson Avenue (Routes 40 and 52)
3. Chelsea Avenue (Route 8)
4. Lamar Avenue (Routes 7, 30, 56 and 57)
5. Watkins Street/Cleveland Street (Routes 10 and 31)
6. Bellevue Boulevard/Elvis Presley Boulevard (Routes 20, 31,and 43)
7. Third Street (Route 39)
8. Hollywood Street/East Parkway/Airways Boulevard (Route 32)
9. Thomas Street/Frayser Boulevard (Route 10)
10. Summer Avenue (Route 53)
11. Park Avenue (Route 57)
12. Winchester Road (Routes 20,36 and 69)

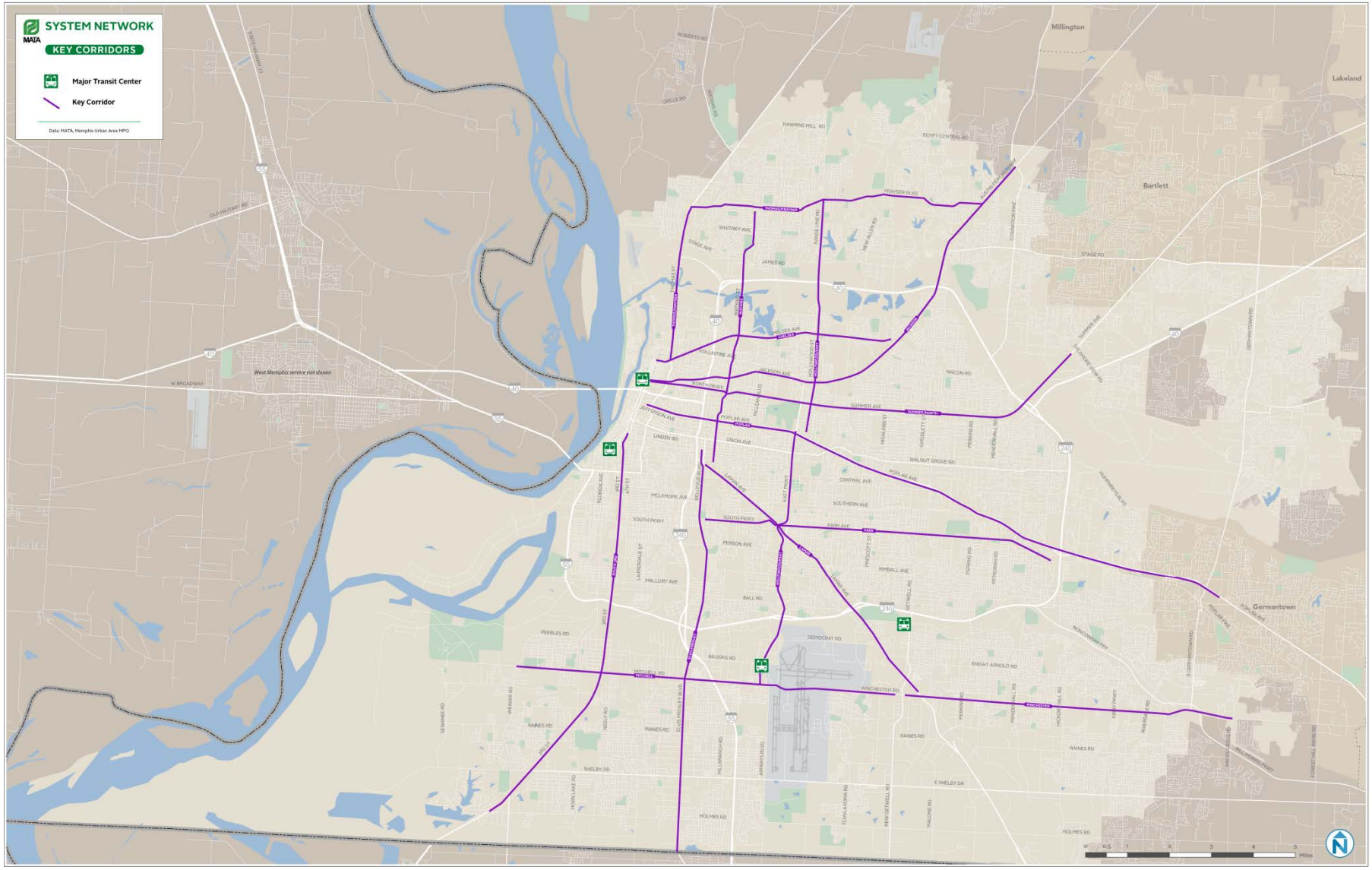
Service Design Principles

In addition to identifying a set of key corridor routes, MATA staff and the study team also discussed their philosophy for how the bus routes should work in consideration of MATA's target market and the available resources. Together the team discussed and debated different characteristics of successful transit systems and ultimately agreed to a series of service design guidelines or principles. Many of these principles arose as priorities of riders during the various public outreach processes. As routes were restructured and reconfigured, the team tried to incorporate, and in some cases balance, these principles. Towards the end of the study process, these design principles were incorporated into the final recommendations as Service Design Guidelines (see Chapter 6).

Service Should be Simple

First and foremost service should be designed so that it is easy to understand. In this way, potential riders can learn about the options that are available to take them where they want to go and when they want to go without experiencing frustration and problems.

Figure 4-1 MATA Key Corridor Routes



Routes Should Operate Along a Direct Path

The fewer directional changes a route makes, the easier it is to understand. Conversely, circuitous alignments are disorienting and difficult to remember. Routes should not deviate from the most direct alignment without a compelling reason (e.g., looping to turn around at the end of a route)

Route Deviations Should be Minimized

As described above, service should be relatively direct, and to make service direct, the use of route deviations, such as multiple or irregular trip patterns, should be minimized. There are, however, instances when the deviation of service off of the most direct route is appropriate, for example to provide service to major shopping centers, employment sites, schools, isolated neighborhoods etc. In these cases, the benefits of operating off of the main route must be weighed against the additional time required, safety, and inconvenience caused to passengers already on board.

Major Transit Routes Should Operate Along Arterials

Potential transit users have at least a basic knowledge of an area's arterial road system and use that knowledge as points of reference. The operation of bus service along arterials therefore makes transit service easier to figure out and to use. It also makes service faster.

Routes Should be Symmetrical

Routes should operate along the same alignment in both directions to make it easy for riders to know how to get back to where they came from.

Routes Should Serve Well Defined Markets

To make service easy to understand and to eliminate service duplication, service should be developed to serve clearly defined markets.

Services Should be Well Coordinated

When multiple routes operate through the same corridor but to different destinations (for example, along Lamar Avenue or Watkins Street) service should be coordinated to maximize its effectiveness and minimize redundancy.

Service Should be Consistent

People can easily remember repeating patterns but have difficulty remembering irregular sequences. For example, routes that provide four trips an hour should depart from their terminals every 15 minutes.

Service Levels Should be Set Based on Service Guidelines.

Service guidelines help ensure that the appropriate amount of service is provided on each route, according to its classification. For example, service guidelines should establish minimum levels of service in terms of the number of trips, span, service frequencies, and/or passenger loadings.

SERVICE SCENARIO DEVELOPMENT

The study team developed three alternatives for organizing MATA's bus network. Each option incorporated the system's ridership patterns, but did not directly consider the existing route structure (see Figure 4-2). The options also considered population and employment, unmet and emerging travel needs, and comments heard throughout the study. Building on this and working within the framework of the key corridor routes and design principles, the study team created three different approaches to organize the bus routes.

During the initial phases of developing scenarios, the study team did not consider service costs or the number of available vehicles and instead, developed the best possible network. Once drawn, however, the team estimated service hours and vehicle requirements, compared them with the available resources and scaled the network to work within MATA's existing budget. A number of strategies were used to scale service costs and vehicle needs including eliminating routes, changing route lengths, adjusting service frequency, and modifying the days and hours of operation. The three options are:

1. **"Pure" Grid System** – The pure grid option attempts to organize MATA's bus routes according to a grid, and assigns bus routes to the major north-south and east-west corridors in the City of Memphis as well as some parts of Shelby County (see Figure 4-3). By operating along major corridors, passengers use the system similarly as a vehicle moves around town – a passenger travels along one corridor, gets off the bus at a major intersection and gets on a bus heading in a different direction. The key corridor routes were used to form the core of the grid system and offered the highest frequencies and longest span of service in the system.

   This type of transit network is partially or entirely used in some of the country's largest cities such as New York City and Chicago. The strengths of the proposal are with buses on main roads the network provides excellent service coverage, is easy to understand, and increases north-south connections. It is also fairly easy to increase or decrease service. However, for a grid system to be truly functional, the frequency of service must be high. This is necessary because the system is built around transfers; therefore, without efficient and timely transfers, the grid system becomes ineffective. Another challenge to the grid option is Memphis' road network; while some locations are laid out according to a grid, others are not. This is especially true in new and emerging markets outside of urban Memphis.

2. **Transit Hubs and Centers** – The transit hubs and centers would organize MATA's bus routes around a series of transit hubs, such as the North End Terminal, Airways Transit Center and the American Way Transit Center plus a handful of "super stops" (locations where several bus routes converge) (see Figure 4-4). The system was organized around the key corridor routes and designed to serve at least one transit hub or center. Transit

hubs and centers would be located at major activity centers, like downtown Memphis and the University of Memphis, as well as locations where lots of bus routes converge (i.e. Cleveland Street and Poplar Avenue) or areas with heavy bus ridership.

In this scenario, bus routes would be organized into a hierarchy with key corridor routes and also designed to provide fast and direct connections to and between transit hubs. Passengers would use the hubs to transfer to other services and change direction of travel. This service design model is similar to how airlines structure service around hubs where routes converge. The strength of the model is that it provides good service coverage, is easy to understand, improves north-south connections and most riders would still have direct access to a bus route. It is also offers a cost-effective way to balance the need for service coverage with direct service. The disadvantage of this approach, however, is that some transit trips would not follow the most direct path possible (thereby increasing travel time) and the option requires capital investments in passenger and pedestrian amenities and facilities.

3. **Update/Modify Existing Network** – The third "modified network" option retains more of the existing bus network and would continue to configure MATA's service according to a radial design. Changes include adapting the current services to incorporate the key corridor service concept and improving service by increasing service levels and simplifying routes (see Figure 4-5). The bus network would continue to rely on the North End Terminal, but to a lesser extent.

   Improvements would primarily be made on a route-by-route basis, largely by eliminating branches, straightening and simplifying routes, and reducing competition between routes. Routes were also classified according to a clear hierarchy and create a core network with fast and frequent service; other service levels were adjusted accordingly. The advantages of the option are that it improves the network with less dramatic changes and thus would be easier to implement. It also focuses the system so services are higher quality, even if there are fewer of them. The weakness are that it does not provide as much service coverage as the other options and is less effective at serving new and emerging markets.

Figure 4-2 MATA Ridership by Stop (Existing Service)

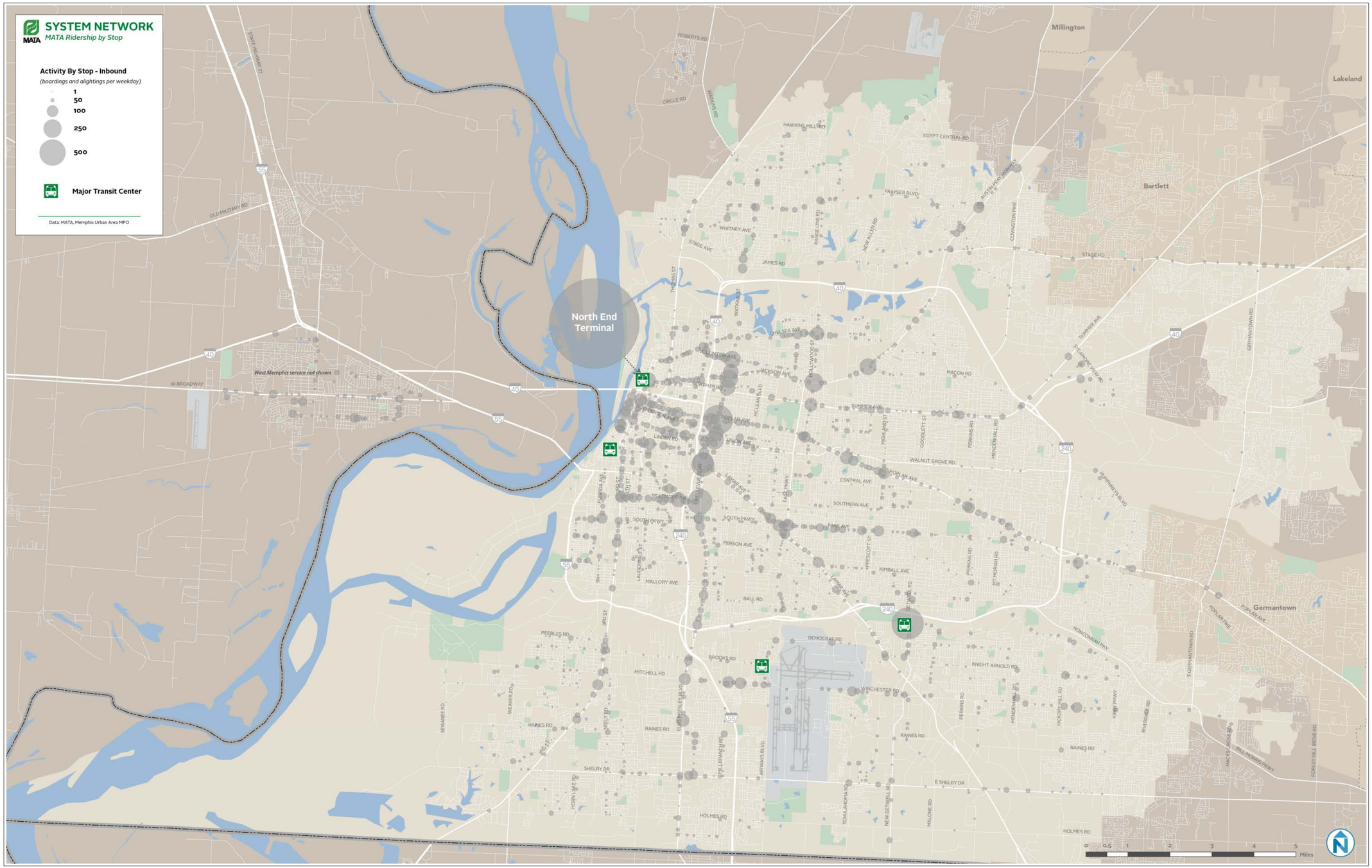


Figure 4-3 Pure Grid Scenario with Existing MATA Ridership

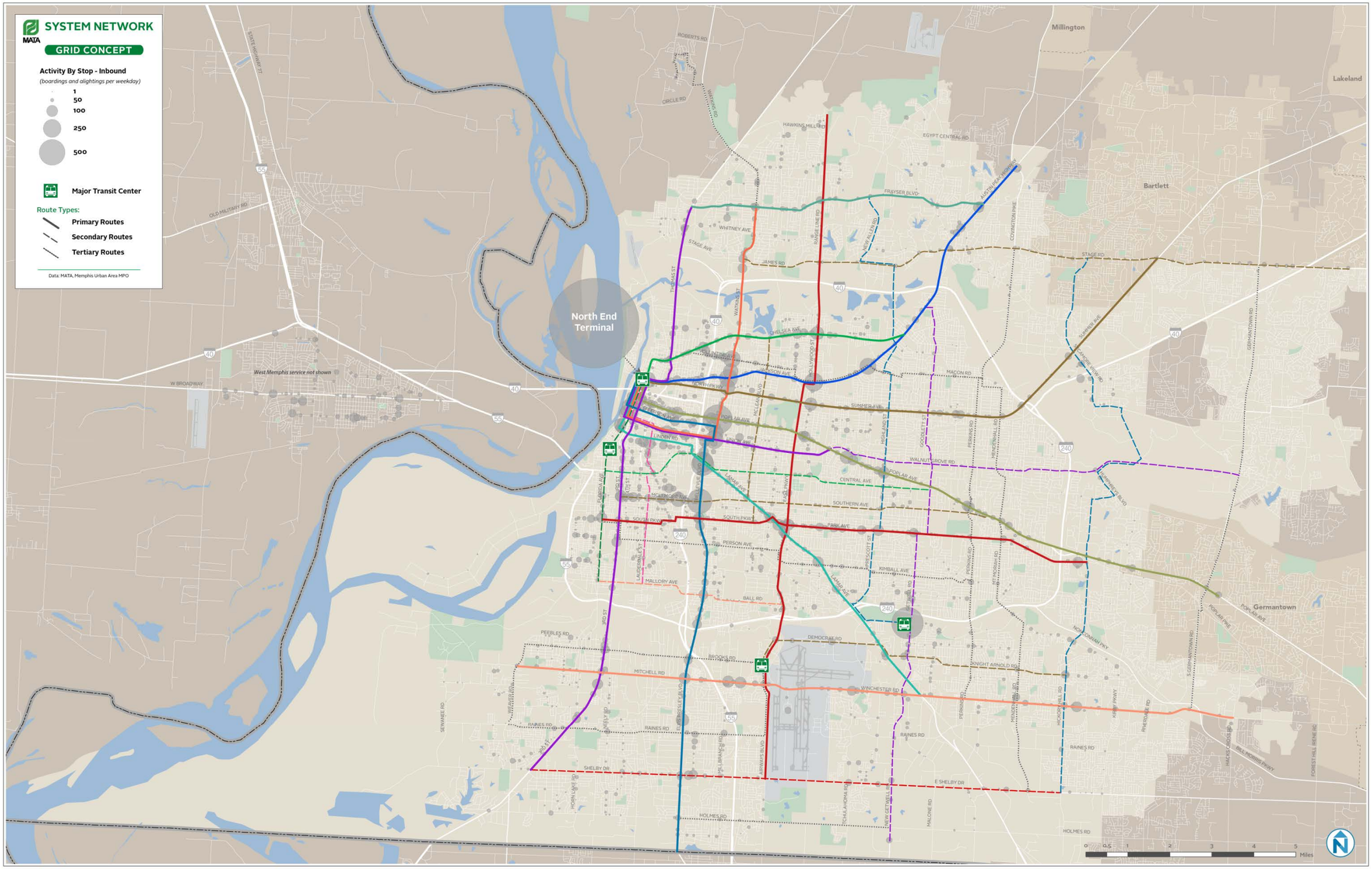


Figure 4-4 Transit Hubs and Centers Scenario with Existing MATA Ridership

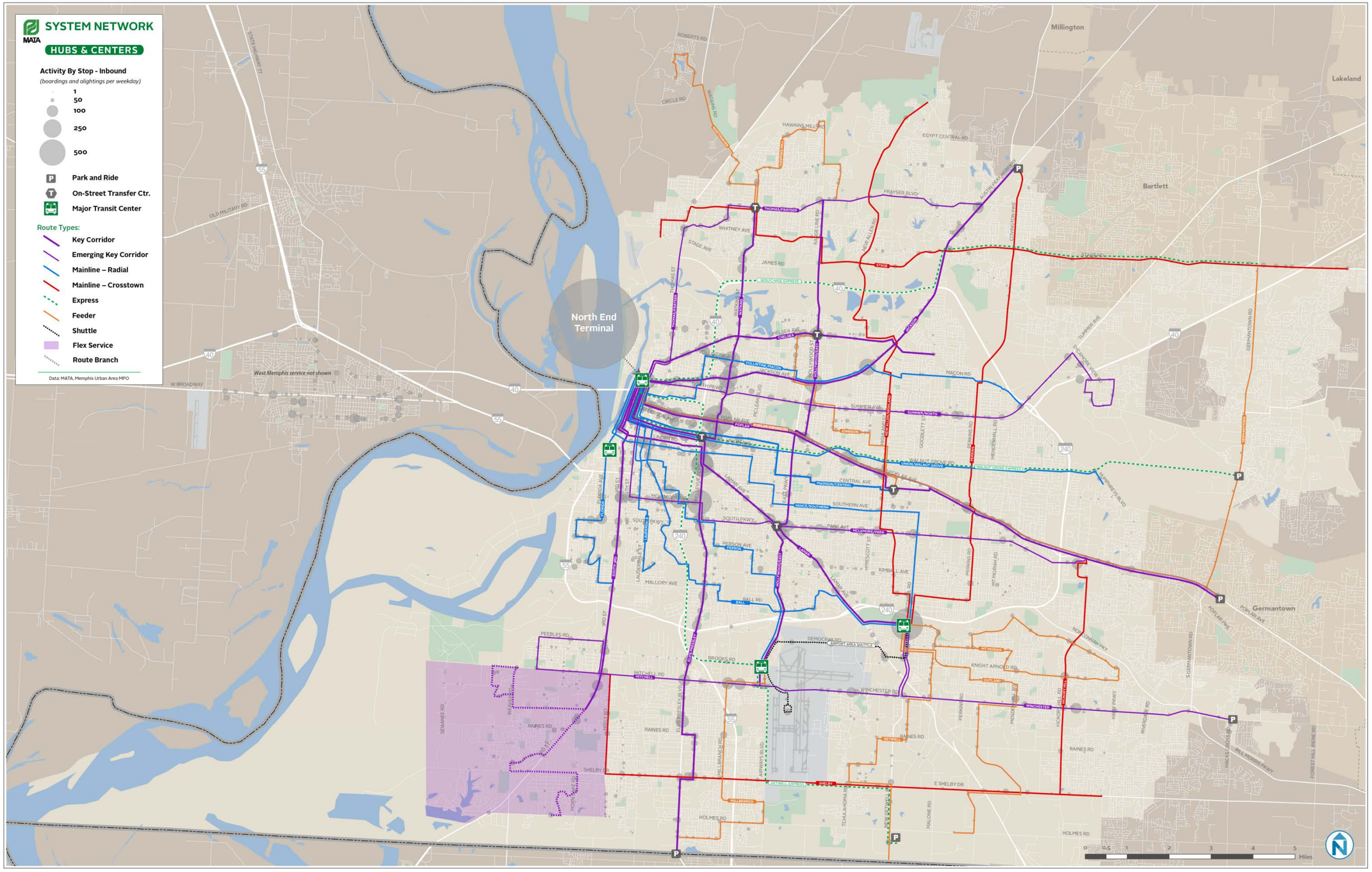
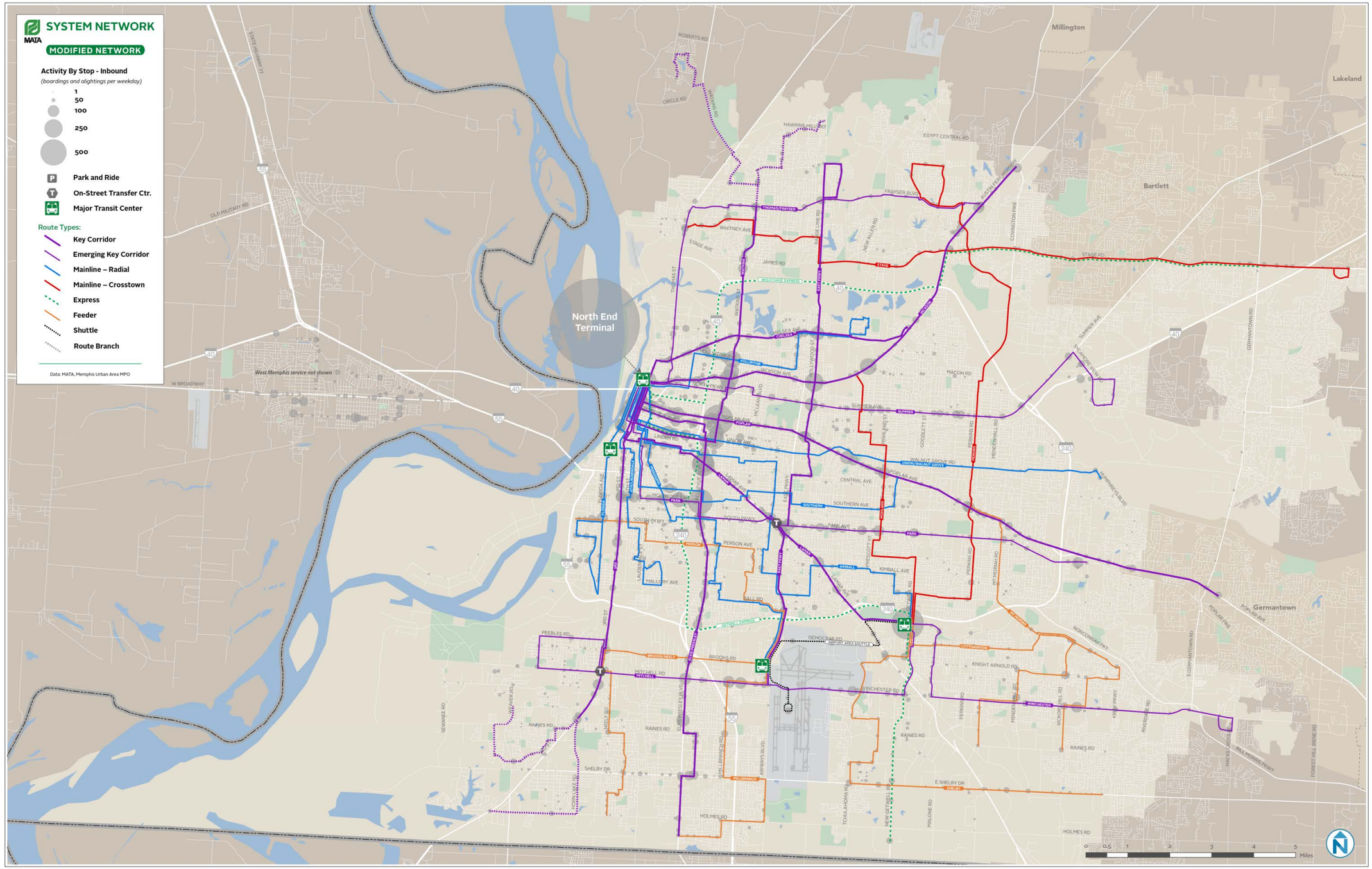


Figure 4-5 Modified Network Scenario with Existing MATA Ridership



SERVICE SCENARIO EVALUATION PROCESS

In addition to developing service options, the study team and MATA staff were also tasked with evaluating them and determining which option, or combination of options, held the most promise for Memphis. The evaluation process involved a series of iterative steps, which included input and comment from stakeholders and members of the public, consideration of the impacts on other MATA services, such as MATA*plus*, and comment and input from MATA staff.

Input from stakeholders and members of the public was critical to the evaluation process, therefore, once the three scenarios were fully documented, the study team held a series of outreach activities. Outreach activities included four evening public meetings held Monday November 7th through Thursday November 10th 2011, plus five "drop-in sessions" held at the North End Terminal and American Way Transit Center (see Figure 4-6). The meetings were advertised by placing posters on all MATA vehicles and at all the transit centers, sending emails to stakeholders and the study's contact list, postings alerts on MATA's Facebook page, placing advertisements in local newspapers, radio ads and recorded messages sent to people's phones. In total, approximately 115 individuals participated in the public meetings; another 60-80 people spoke to study team members at the drop-in sessions; and the study team received over 60 written comments.

Figure 4-6 Public Outreach on Proposed Service Scenarios

	Monday 11/7	Tuesday 11/8	Wednesday 11/9	Thursday 11/10
Drop In Sessions – North End Terminal	-	7 am – 10 am	2 pm – 4 pm	8 am– 10 am pm
Drop In Sessions – American Way	-	2 pm – 4pm	2 pm – 4pm	-
Evening Public Meetings	Hickory Hill	Frayser	Whitehaven	Memphis Central Library

Source: Nelson\Nygaard Consulting Associates

Comments received during the public outreach process covered a wide variety of topics, including existing MATA services as well as changes to the routes that were being proposed for implementation shortly after the public outreach process (December 2011). Most people who participated in the outreach process appreciated being asked and nearly all had ideas for how MATA could improve the bus service. Comments on the proposed scenarios and potential larger scale changes for the MATA network may be generally summarized as:

- Despite reluctance and concern about change, many people were interested in and supportive of proposed changes. Most people compared the scenarios in terms of how they personally would be affected, i.e., how their particular bus route would change.

- There was strong preference overall for options that have a lot of routes (provide service coverage), even if the frequency of service is less. Most passengers felt that being able to get where they need to go is more important than getting to some places more quickly.
- Riders and non-riders appreciated the benefits of keeping buses on the main roads. Many of these individuals wanted buses on all the main roads. Others, however, were skeptical about asking people to walk further to bus routes, especially considering the high portion of riders who are older adults and persons with disabilities.
- Concern over elimination of the bus service into the neighborhoods. This sentiment was especially strong in Whitehaven.
- Concern that the service in southeastern Memphis, in the industrial areas near and along Winchester Road doesn't run frequently enough or late enough into the evenings. A similar comment was made about the industrial areas in north Memphis, especially along Frayser Boulevard.
- While riders are willing to accept transfers, they were vocal about needing facilities that are safe and secure. People are concerned about personal safety while they wait for the buses as well as when they walk to and from the stops.

In addition to considering comments from the public, MATA staff also reviewed the scenarios in greater detail and in consideration of agency operations. This review also provided ideas for improvements and changes. In addition, the study team evaluated the impact of the potential changes on MATA*plus* and MATA's trolley services. Each of the three options provided a similar level of service coverage as compared with the existing route network, therefore, impacts to MATA*plus* would be minimal and consideration of ADA paratransit services alone did not warrant choosing one option over another. Likewise, all three options offered ample opportunity to complement the existing trolley services and this also was not a deciding factor (see Appendix C for the analysis of MATA*plus* and MATA trolley services).

EVALUATION RESULTS

As a result of the evaluation, the "Pure Grid" option was dropped from further analysis fairly early in the process, primarily because of cost, but also because the current ridership and demand for service is not well-matched to a grid route structure. Consequently, there would be several routes that require a fairly high frequency to maintain the integrity of the grid structure, but would not otherwise warrant such a high level of service, and thus would be high cost, low productivity routes.

Of the remaining two options, the Hubs and Centers concept emerged as the preferred option. Riders and members of the public generally preferred the option over the Modified Network Scenario, largely because they perceived it to offer greater coverage and because it was perceived

to operate a clearer and more simple option. While there were some concerns, as discussed, riders also preferred the way routes were structured in south Memphis, especially along the Winchester Road and Shelby Drive corridors. There was also support for the Park and Ride lots on the outer end of the network and the proposed express routes. Staff was also supportive of this option because it strengthened the assets in the existing system, such as the North End, Airways and American Way Transit Centers.

While the Hubs and Centers concept emerged as the preferred alternative, both members of the public and staff suggested several changes to the concept. These changes were incorporated into the final design (see next chapter) and include:

- Strengthening the service to southeast Memphis by increasing service hours and re-routing some of the bus lines.
- Eliminating the transfer on Route 40 and operating the route directly into downtown Memphis.
- Adding a flex service overlay to provide neighborhood service to southwest Memphis. This service is recommended for implementation as a pilot or demonstration project.
- Making minor adjustments to several routes.

5. PREFERRED ALTERNATIVE

INTRODUCTION

As discussed, the Hubs and Centers alternative emerged as the preferred alternative for the SRTP. The alternative structures MATA's bus routes according to a combination of the route hierarchy and a series of transit hubs and centers. The concept also incorporates the key corridor routes framework by strengthening MATA's most productive routes with increased service levels and working towards a system where these routes are very similar in terms of days and hours of operation and frequency of service. The key corridor routes would also connect to the system's largest transit centers. The North End Terminal would continue to be the most important transit hub in the network, followed by the American Way and Airways Transit Centers.

This chapter describes the preferred alternative in more detail. It includes an overview of the concept framework as well as a description of the routes. It also outlines required capital investments and projects that should be incorporated into the alternative as funding permits.

OVERVIEW OF PREFERRED ALTERNATIVE

The Preferred Alternative includes recommendations for a clear service hierarchy that would create a strong core set of services, or network 'backbone', and builds the rest of the network around the core network. The option also reduces redundancies in the network, provides a clear and simple strategy for addressing service in south Memphis and strengthens the north-south connections. It also recommends eliminating most service branches, straightening routes, and scheduling services according to consistent headways. By simplifying the service, the preferred alternative also creates a structure that should make it easier for MATA to expand or contract services as budgets require.

In total the Preferred Alternative would create a network of 40 routes, seven more routes than operating in the current system. The new routes are primarily feeder and neighborhood (Flex) services that would be designed to connect people from neighborhoods to transit hubs and the key corridor network. Detail on the proposed network is documented in a series of maps that show

the proposed routes by day of week (see Figures 5-1 – 5-3) and a table that shows the proposed service hours and frequency by day of the week (Figure 5-4). In general, the 40 routes are categorized according to:

- **Key Corridor Routes** – Eight routes (Jackson, Watkins, Chelsea, Poplar, Lamar, Elvis Presley, Third and Hollywood/East Parkway/Airways) were designed as key corridor routs. These routes will operate for 18 hours a day (roughly 5:00 am to 11:00 pm) on weekdays. During peak periods, buses will be scheduled to run with 15 or 20-minute frequencies and off-peak service would be scheduled so buses arrive every 30-40 minutes. The Key Corridor Routes would also operate seven days per week, although they would have shorter service spans on Saturday (roughly 5:00 AM to 8:00 PM) and Sunday (roughly 8:00 AM to 8:00 PM).

- **Emerging Key Corridor Routes** – Five routes (Thomas/Frayser, Summer/North Parkway, McLemore/Park, Mitchell and Winchester) are designated as emerging key corridor routes. While likely candidates to be in the key corridor route category, funding constraints and slightly less demand along these corridors mean these routes would operate with a reduced schedule. These routes would operate 17 hours a day (roughly 5:00 am to 10:00 pm) on weekdays with weekday peak period service frequencies of 20-30 minutes. Most of these routes would also be scheduled for operation on Saturdays (approximately 6:00 AM to 6:00 PM) and Sunday (8:00 AM to 8:00 PM).

- **Mainline Routes** - There are 13 routes that are designated as "mainline" routes, inclusive of radial routes that connect to the North End Terminal and crosstown routes that connect to other MATA routes at transit hubs and/or super stops. These routes would generally operate for 13 hours per day (roughly 6:00 am to 7:00 pm) with 30 or 60-minute headways. Mainline routes, mostly but not entirely, operate on Saturday. With one exception (Route 40 Stage), they would not operate on Sundays.

- **Feeder Routes** – The network includes eight feeder routes that provide connections from neighborhoods and employment areas to the Airways and American Way Transit Centers, as well as newly-designated "super stops". The routes would operate on weekdays only, with service available for roughly 12 hours a day between the hours of 6:30 am and 6:30 pm.

- **Express Routes** – There are four express routes included in the alternative (Wolfchase, Poplar, Walnut Grove and Getwell). The services are designed to offer three morning and three afternoon trips to meet the needs of commuters traveling from the outlying areas into Memphis, as well as commuters starting in downtown Memphis and traveling to suburban employment centers. Express routes would operate on weekdays only.

- **Flex Route Demonstration Project** – The alternative includes a flex route to be implemented as a pilot or demonstration project in the Whitehaven neighborhood of southwest Memphis. The Flex Route is intended to maintain a level of door-to-door type of service in this high-need community and provide connections to the key corridor transit routes. The Flex Route is designed to operate seven days per week, from 7:00 AM to 5:00 PM.
- **Airport Shuttle** – A shuttle service is recommended to connect the Airways and American Way Transit Centers with the Memphis International Airport and major employment centers in the vicinity of the airport. Anyone able to reach one of the transit hubs, therefore, would have access to the airport. The shuttle would operate daily for 18 hours a day (roughly 5:00 am to 11:00 pm) and be scheduled with departures every 20 minutes.

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Figure 5-1 Preferred Alternative – Weekday Service

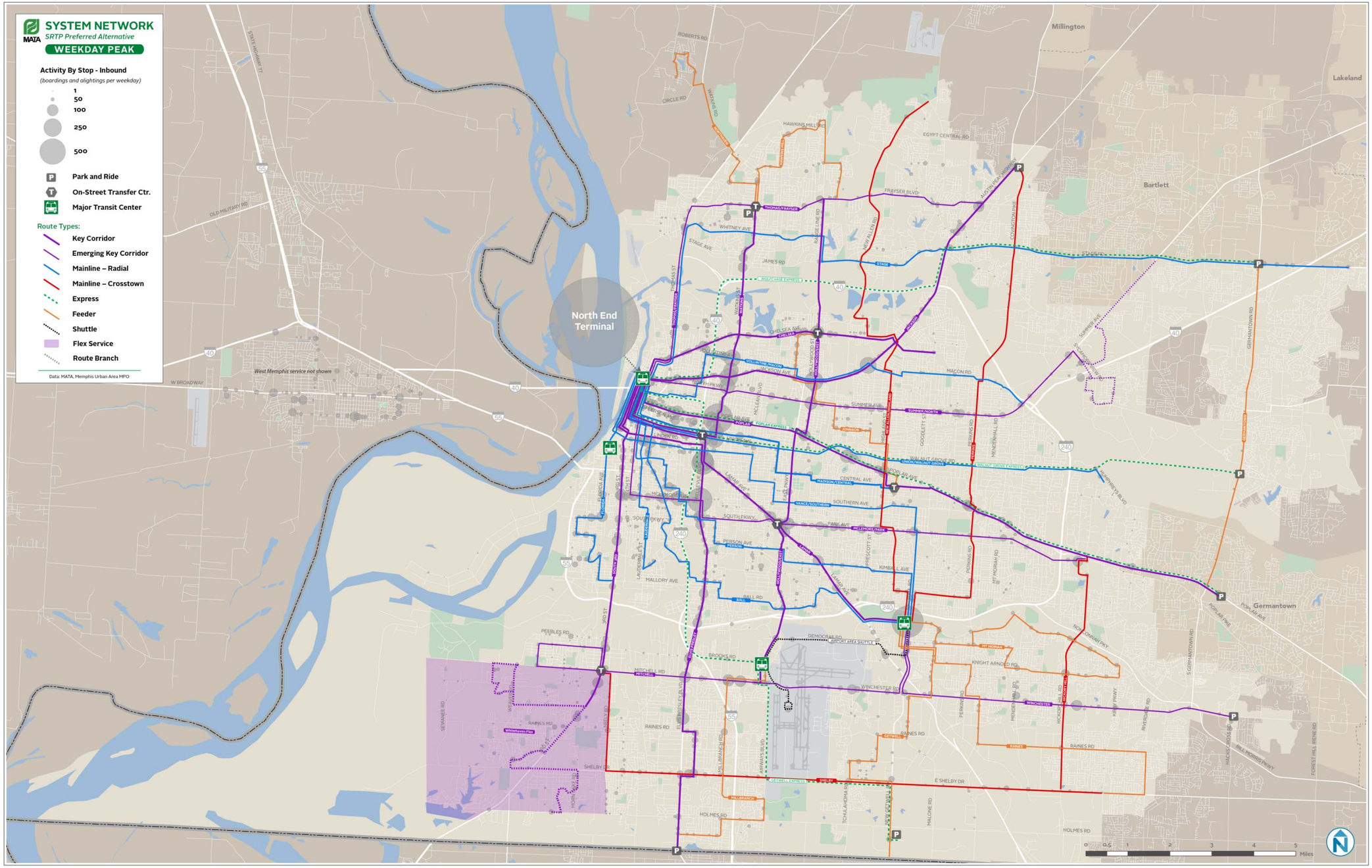

Figure 5-2 Preferred Alternative – Saturday Service

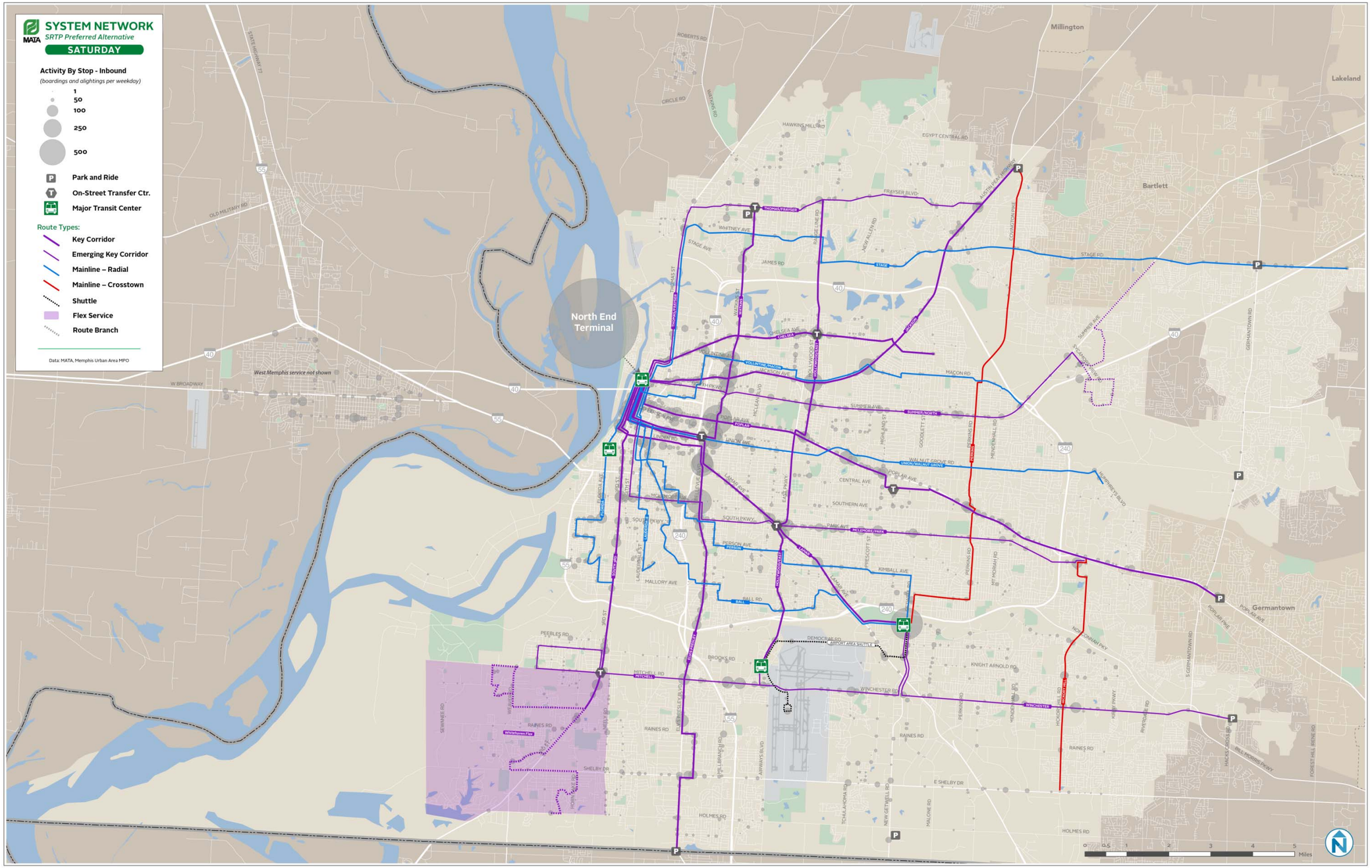

Figure 5-3 Preferred Alternative – Sunday Service

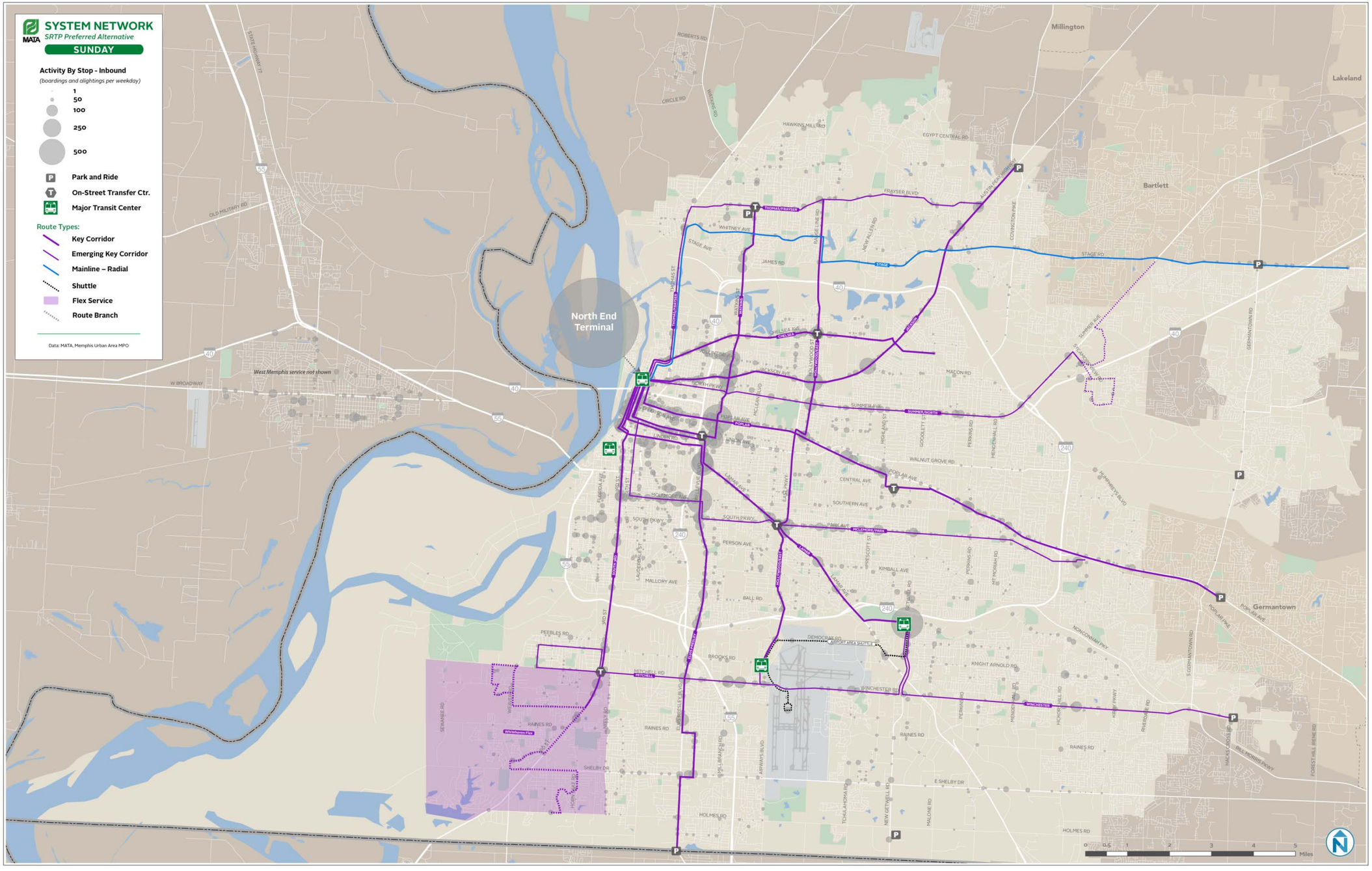

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Figure 5-4 Preferred Alternative Routes

Weekday Route	WEEKDAY Service Span Start	WEEKDAY Service Span End	WEEKDAY Headway (min) Peak	WEEKDAY Headway (min) Base	WEEKDAY Headway (min) Eve	SATURDAY Service Span Start	SATURDAY Service Span End	SATURDAY Headway (min) Base	SATURDAY Headway (min) Eve	SUNDAY Service Span Start	SUNDAY Service Span End	SUNDAY Headway (min)
Key Corridor Routes												
52 Jackson	5:00 AM	11:00 PM	15	35	60	5:00 AM	8:00 PM	35	35	8:00 AM	8:00 PM	35
10 Watkins	5:00 AM	11:00 PM	15	30	60	5:00 AM	8:00 PM	30	60	8:00 AM	8:00 PM	60
8 Chelsea	5:00 AM	11:00 PM	20	40	40	5:00 AM	8:00 PM	30	40	8:00 AM	8:00 PM	40
50 Poplar	5:00 AM	11:00 PM	15	30	70	5:00 AM	8:00 PM	35	60	8:00 AM	8:00 PM	35
56 Lamar	5:00 AM	11:00 PM	20	40	40	5:00 AM	8:00 PM	30	40	8:00 AM	8:00 PM	40
43 Elvis Presley	5:00 AM	11:00 PM	15	30	60	5:00 AM	8:00 PM	30	60	8:00 AM	8:00 PM	60
39 Third	5:00 AM	11:00 PM	20	30	60	5:00 AM	8:00 PM	35	60	8:00 AM	8:00 PM	60
32 Hollywood/East Parkway	5:00 AM	11:00 PM	15	30	60	5:00 AM	8:00 PM	30	60	8:00 AM	8:00 PM	60
Emerging Key Corridor Routes												
11 Thomas/Frayser	5:00 AM	10:00 PM	30	30	60	6:00 AM	6:00 PM	30	-	8:00 AM	8:00 PM	45
53 Summer/North Parkway	5:00 AM	10:00 PM	35	35	65	6:00 AM	6:00 PM	35	-	8:00 AM	8:00 PM	65
57 McLemore/Park	5:00 AM	10:00 PM	20	35	70	5:00 AM	7:00 PM	35	-	8:00 AM	8:00 PM	70
21 Mitchell	5:00 AM	10:00 PM	35	30	60	6:00 AM	6:00 PM	35	-	8:00 AM	8:00 PM	70
20 Winchester	5:00 AM	10:00 PM	35	60	60	6:00 AM	6:00 PM	60	-	8:00 AM	8:00 PM	91
Mainline Routes												
34 Union/Walnut Grove	6:00 AM	7:00 PM	30	60	-	6:00 AM	6:00 PM	60	-	-	-	-
13 Lauderdale	6:00 AM	7:00 PM	60	60	-	6:00 AM	6:00 PM	60	-	-	-	-
12 Florida	6:00 AM	7:00 PM	35	35	-	6:00 AM	6:00 PM	70	-	-	-	-
16 Madison/Central	6:00 AM	7:00 PM	35	35	-	-	-	-	-	-	-	-
35 Vance/Southern	6:00 AM	7:00 PM	60	60	-	-	-	-	-	-	-	-
38 Hickory Hill	6:00 AM	7:00 PM	30	60	-	6:00 AM	6:00 PM	60	-	-	-	-
40 Stage	6:00 AM	10:00 PM	60	90	90	5:00 AM	8:00 PM	90	-	9:00 AM	7:00 PM	90
7 Shelby	6:00 AM	11:00 PM	60	60	60	-	-	-	-	-	-	-
9 New Allen	6:00 AM	7:00 PM	60	60	-	-	-	-	-	-	-	-
19 Vollintine/Macon	6:00 AM	7:00 PM	60	60	-	6:00 AM	6:00 PM	60	-	-	-	-
4 Person	6:00 AM	7:00 PM	30	60	-	6:00 AM	6:00 PM	60	-	-	-	-
14 Ball	6:00 AM	10:00 PM	35	60	60	6:00 AM	6:00 PM	60	-	-	-	-
30 Perkins	6:00 AM	7:00 PM	30	60	-	6:00 AM	6:00 PM	60	-	-	-	-

Weekday Route	WEEKDAY Service Span Start	WEEKDAY Service Span End	WEEKDAY Headway (min) Peak	WEEKDAY Headway (min) Base	WEEKDAY Headway (min) Eve	SATURDAY Service Span Start	SATURDAY Service Span End	SATURDAY Headway (min) Base	SATURDAY Headway (min) Eve	SUNDAY Service Span Start	SUNDAY Service Span End	SUNDAY Headway (min)
Feeder Routes												
37 Johnson	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
6 Northhaven	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
18 Hawkins Mill	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
82 Germantown	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
25 Raines	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
29 Mt Moriah	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
26 Getwell	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
5 Millbranch	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	-
Express and Shuttle Routes												
500 Poplar Express	6:30 AM	6:30 PM	60	60	-	-	-	-	-	-	-	
64 Airport Area Shuttle	5:00 AM	11:00 PM	20	20	20	5:00 AM	8:00 PM	20	-	6:00 AM	6:00 PM	20
61 Wolfchase Express	2 trips in AM peak, 2 trips in PM peak					-	-	-	-	-	-	-
63 Walnut Grove Express	3 trips in AM peak, 3 trips in PM peak					-	-	-	-	-	-	-
62 Getwell Express	3 trips in AM peak, 3 trips in PM peak					-	-	-	-	-	-	-
Flex Routes												
F1 Whitehaven Flex Pilot	7:00 AM	5:00 PM	on-demand			7:00 AM	5:00 PM	on-demand		7:00 AM	5:00 PM	on-demand

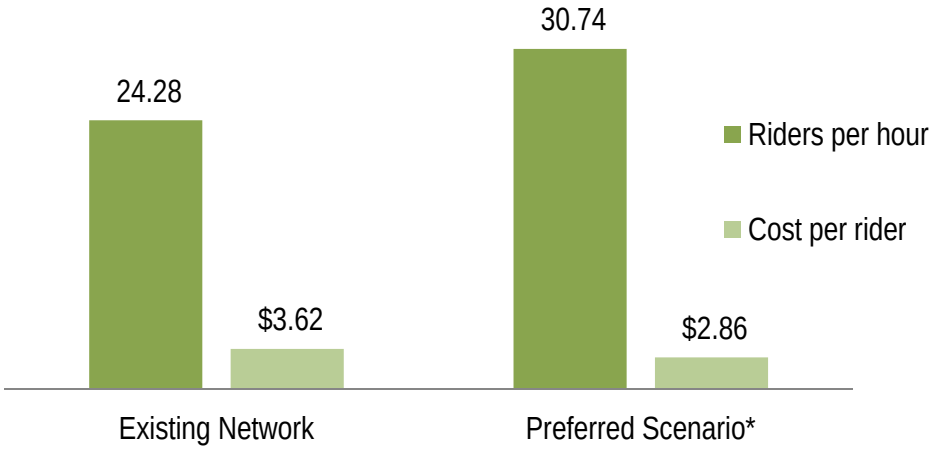
Peak: the weekday AM and PM peak periods; Base: off-peak daytime service; Eve: service after 8:00 PM

BENEFITS OF THE PREFERRED ALTERNATIVE

The preferred scenario offers MATA a number of benefits, most of which stem from a combination of simplifying the network and categorizing the routes into a clear hierarchy that matches service types and levels of service to the demand for service. The network will be simplified by 1) straightening the routes; 2) eliminating route branches and deviations, and 3) scheduling service to operate with consistent headways. These three benefits will greatly improve passengers' ability to understand and use the system and simultaneously will also work to make the service easier to operate and thus improve service reliability.

The preferred scenario is also estimated to increase ridership by as much as 15% (see Figure 5-5), and by increasing ridership, lowers the average cost per rider. The ridership forecasts were prepared by the study team and were estimated according to a route level analysis that compared existing ridership levels with the proposed service changes. The team used elasticities based on research sponsored by the Transit Cooperative Research Program (TCRP) to estimate changes in ridership resulting from the proposed changes. Using a conservative approach, the study team estimated an overall increase in ridership by as much as 15%. The additional ridership would further improve the efficiency of MATA service.

Figure 5-5 Estimated Ridership and Cost per Rider: Existing Network and Proposed Hubs and Centers Concept.



CAPITAL REQUIREMENTS

Vehicles

The Preferred Alternative was designed to work within MATA's existing resources, including the number of vehicles used in peak service. Although the number of routes is increased somewhat, the number of vehicles used during the weekday peak period is not increased (see Figure 5-6). This is the critical metric to determine if the Preferred Alternative can be operated within the existing fleet.

Figure 5-6 Vehicle Requirements – Existing Network and Preferred Alternative

	Existing Network			Preferred Alternative Network		
	Weekday	Saturday	Sunday	Weekday	Saturday	Sunday
Peak	123	49	21	119	-	-
Base				89	60	31
Evening				33	18	-

Infrastructure

The Preferred Alternative assumes significant investment in MATA's passenger infrastructure to realize full implementation of the concept. This includes development of a network of transit centers, "super stops" or transit hubs, enhanced bus stops and park and ride lots (see Figure 5-7; see page 6-6 for more detail). The network would take advantage of MATA's existing resources - the North End, Airways and American Way Transit Centers– and uses these as the largest and most important centers. The other facilities, however, are required to ensure adequate passenger waiting areas and a comfortable pedestrian environment for riders to make connections. Many of these projects, while recommended as part of this plan, are needed to support the current set of bus service. The cost for the investments is between $3 million and $9 million. Some of these projects should be initiated by MATA, while others, especially the pedestrian infrastructure improvements, may be initiated by the City of Memphis or other Shelby County municipalities.

Figure 5-7 Preferred Alternative - Estimated Capital Costs

Facility Type	Number	Proposed Improvements	Order of Magnitude Costs
Transit Centers	3	n/a	n/a
Transit Super Stops	6	Add shelters with lighting, signage, information board, trash can and bike parking; Allows for signalized pedestrian crosswalk, roadway and accessibility improvements	Low: $1,176,900 High: $2,703,000

Facility Type	Number	Proposed Improvements	Order of Magnitude Costs
Enhanced Bus Stops	15	Similar improvements as super stops, but less extensive (new stop signage, improved shelters, bike parking, curb cuts, etc.)	Low: $1,367,250 High: $3,382,500
Park and Ride Lots	8	Add curb cuts and other ADA improvements, roadway improvements, improve existing parking spaces or develop new spaces.	Low: $712,000 High: $2,532,000

Full implementation of the Preferred Alternative would also increase the operating costs at MATA's primary transit centers because it assumes increased operating hours at each facility. Assuming each transit center is staffed for 12 hours a day on weekdays (6:00 AM to 6:00 PM) and for eight hours a day on Saturday (8:00 AM to 4:30 PM) would increase operating costs by approximately $105,500 (see Figure 5-8)[4]. Although they will not be staffed facilities, super stops will also result in additional operating costs for MATA. Increases in operating costs associated with the super stops include additional maintenance, utility costs and potentially security.

Figure 5-8 Preferred Alternative - Estimated Operating Cost Increases

Facility	Current Operations	Proposed Operations	Increase in Operation Cost
North End Terminal	M-F 7:00 AM – 6:00 PM Sat 8:00 AM – 4:30 PM	M-F 6:00 AM – 6:00 PM Sat 8:00 AM – 4:30 PM	+ 1 hour weekdays Estimated Cost Increase - $9,300
Airways Transit Center	M-F 8:00 AM – 5:00 PM	M-F 6:00 AM – 6:00 PM Sat 8:00 AM – 4:30 PM	+ 3 hour weekdays; +8 hours Saturday Estimated Cost Increase – $43,400
American Way Transit Center	M-F 6:00 AM – 10:00 AM 2:00 PM – 6:00 PM	M-F 6:00 AM – 6:00 PM Sat 8:00 AM – 4:30 PM	+ 1 hour weekdays; +8 hours Saturday Estimated cost increase – $53,500

UNFUNDED SERVICE PROJECTS

As discussed, the Preferred Alternative was initially conceived without consideration of costs and available resources and included more routes, longer service hours and higher frequencies. As part of adjusting the proposal to work within MATA's available resources, the routes were shortened, service hours cut and frequencies reduced. This process was necessary in order to

[4] Costs for keeping the transit centers open for longer hours are based on existing costs of staff (estimated at $20 per hour inclusive of wage and benefits) plus utilities (average of $17 per hour based on an average of existing hourly costs)..

develop a scenario that was realistic and achievable without the addition of new funding. The process, however, required elimination of several services that the study team felt belonged in the plan, both to increase the robustness of MATA's service network as well as provide additional services to under-served areas. It is important to note that the study team considers these service expansion projects as necessary parts of the plan. They were reluctantly removed in order to develop a system that works within the available resources.

Consequently, the Preferred Alternative includes approximately $4.5 million annually of unfunded services that should be included in the base line analysis but have been designated for the next round of service expansions (see Figure 5-8). These projects primarily involve increasing service hours or service frequency on key routes plus a handful of new routes. All would strengthen the network considerably, improve the attractiveness and usefulness of the network and attract more riders.

Figure 5-9 Preferred Alternative – Service Expansion Needs

Service Expansion Needs	Weekday Revenue Hours
Expand hours of service on Key Corridor routes to run to midnight	15.0
Expand hours of service on Emerging Key Corridor routes to run to midnight	20.0
Increase peak frequency on 13 Lauderdale to 30 minutes	4.5
Increase peak frequency on 35 Vance/Southern to 30 minutes	9.0
Increase peak frequency on 40 Stage to 30 minutes	13.5
Increase peak frequency on 7 Shelby to 30 minutes	9.0
Increase peak frequency on 9 New Allen to 30 minutes	9.0
Convert Poplar Express to BRT-Lite Service with 20-minute frequencies	48.0
Add feeder route for area south of Mitchell between Neely and Elvis Presley	12.0
Extend 11 Thomas/Frayser east to Germantown Road	31.5
Add express service between NET and Airways Transit Center	24.0

In addition to the need for improvements to the existing network of service, the SRTP also identified new and emerging markets that warrant additional or new transit services (see Figure 5-9). These markets primarily involve providing commuter service to eastern Shelby County and eastern DeSoto County in northern Mississippi. These services may be explored as new funding partners are identified.

Figure 5-10 Preferred Alternative – Service Expansion to serve New Markets and Underserved Areas

Service Expansion: New Markets for Service
Express service between Hickory Hill and Germantown
Express service between Hickory Hill and Colliervielle
Express service between Germantown and Bartlett
Explore new service between Hickory Hill and DeSoto County MS

Provide new service to area north of Memphis toward Milington

PUBLIC AND STAKEHOLDER INPUT

As part of finalizing the preferred scenario, MATA staff and the study team encouraged MATA staff and the Board, as well as stakeholders, riders and members of the public to review and comment on final on the final study documents. To facilitate this input and comment period, the study team prepared a handful of summary documents that outline and describe the preferred alternative.

Summary documents (see Appendix D) together with several of the study documents were posted to the SRTP website, with paper copies available on request at key locations, including the customer information desks at the North End Terminal. The study team alerted members of the public and riders that the information was available by placing posters and advertisements and sending out emails to anyone who had been in contact with the project at any time. The study team set up a telephone hotline to encourage people to call the team directly with comments; comments were also provided via the web and text messaging. In total 105 comments were received; 33 came in the form of letters, 16 were sent via email, 24 received on the phone and 32 text messages.

The comments received during this period included

- Suggestions to keep the focus on transit dependent riders.
- Support for the SRTP overall; this sentiment was especially called out by at least one traveler living in the Hickory Hill neighborhood.
- Concern about some of the SRTP methodology, especially the way the ride check data was collected and the surveys
- A desire to see more integration with the bicycle and pedestrian infrastructure
- Concern about the potential increase in transfers.
- Comments on the individual technical memos.
- Comments on MATA services overall.

The study team shared and discussed the comments received with MATA staff. The study team agreed to update the technical memos to reflect the comments submitted, to the extent possible and as appropriate. The SRTP was also updated to reflect the more general comments to the extent possible. For example, additional efforts were made to ensure the focus of the service design reflects the needs and desires of the transit dependent markets, incorporate more ideas about integration with bicycle and pedestrian infrastructure and support for riders at critical transfer locations.

6. RECOMMENDED SHORT RANGE TRANSIT PLAN

OVERVIEW

The SRTP developed a combination a high-level policy recommendations about how the bus services should be designed and operated as well as more practical and applied service improvement recommendations about the design and operation of individual bus routes. This final chapter of the SRTP summarizes the policy recommendations and specific service improvements as well as outlines a strategy for implementation.

AGENCY MISSION, VISION, AND GOALS

The highest level policy recommendations developed as part of the SRTP are the agency mission and vision statements, agency goals, and performance measures outlined in Chapter 2 of this report. These statements are repeated in the following text; they were adopted by the MATA Board in 2011.

MATA'S MISSION STATEMENT

MATA's mission is to provide a reliable, safe, accessible, clean and customer-friendly public transportation system that meets the needs of the community.

MATA'S VISION STATEMENT

MATA will provide as efficient, effective, and innovative transit services as funding allows. We will operate transit services that are logical and practical, and by doing so, we will attract an increasing number of customers to our services. In addition, MATA services will support regional goals of improving access to places where people live, work, and play; reducing dependence on fossil fuels; improving air quality; and strengthening the area's livability.

MATA AGENCY GOALS

1. Increase ridership while maintaining service efficiency.
2. Operate reliable transportation services.
3. Sustain a customer-focused service environment.

4. Ensure a safe and clean environment, for both customers and employees.

MATA PERFORMANCE MEASURES

Following up on the agency goals, MATA staff and the Board of Commissioners agreed on a set of performance measures that reflect the agency goals, are fairly easily-measured and can be reported back to the Board on a regular basis. The performance measures by goal are:

1. Ridership/Service Efficiency
   - Average monthly transit boardings
   - Passengers per revenue hour (all modes)
2. Service Reliability/Service Quality
   - On-time performance (FR and MATA*plus*)
   - Vehicle miles between trouble calls
3. Customer Focus
   - Passenger complaints per 100,000 miles
   - Average customer call wait time
4. Safety and Security
   - Accidents per 100,000 miles
   - Preventable accidents per 100,000 miles

SERVICE GUIDELINES AND STANDARDS

After the guiding principles, the next level of strategic recommendations involves identifying service guidelines and standards that provide a framework for ongoing service planning and evaluation. MATA staff and the study team began work on the service guidelines and standards early in the study process and adapted them through conversations about service and operations, and ultimately to reflect the preferred alternative that is recommended in the SRTP. The guidelines provide set a structure for service design generally (see also design principles outlined in Chapter 4) as well as define appropriate levels of service, minimum levels of performance, service performance measures and guidelines on bus stop spacing and amenities.

The guidelines set minimum thresholds that must be met for continued operation of the service. However, the guidelines are also designed to provide flexibility and to respond to varied customer needs throughout the MATA service area. Finally, it should be noted that adherence to these service guidelines is dependent upon resource availability, and in particular, the amounts of funding provided by MATA's local, state and federal partners. In the event of constrained resources, MATA will meet these guidelines as closely as possible and will work to achieve consistency as resources permit. A full set of the Service Guidelines and Standards is included with this report as Appendix B.

SUMMARY OF PREFERRED ALTERNATIVE

The more practical and applied aspects of the SRTP recommendations include guidance for how MATA should organize and structure its services. The recommendations include re-organizing MATA's current radial service design into a model that is developed around a series of key corridor routes that connect at transit hubs, super stops and park and ride lots. The recommendations reflect the preferred alternative, which is documented in more detail in the previous chapter. The approach accomplishes several things including:

- Provides more and easier to use service to existing riders. Most of the riders and neighborhoods currently within ¼ mile of transit route will still be within ¼ mile of transit route. In addition, ridership is expected to increase by 15%.
- Simplifies system by straightening routes, eliminating route branches and scheduling service to operate with consistent headways.
- Organizes MATA fixed-route buses first around a clear hierarchy of services built around a core network of bus routes that offer fast and direct service between major locations. Secondary services provide less frequent, but important connections between neighborhoods and key destinations. Bus routes will also connect to a network of transit centers and hubs where passengers can transfer between routes and change direction of travel. The intent is to shorten travel times and reduce the need for passengers to travel into downtown.
- Opens new markets and starts to address gaps in the current service network, especially along the Winchester Road corridor as well as north south connections at the eastern end of the service area (i.e. Hickory Hill to Poplar Avenue and Stage Road to Poplar Avenue).
- Matches service types and levels to reflect demand:
  - Highest demand routes become Key Corridor Routes that create MATA's service "core". These trunk line routes provide the highest level of service and carry the most passengers.
  - Emerging Key Corridor Routes have slightly lower service levels as compared to the Key Corridor Routes; as funding becomes available service levels may be upgraded.
  - Mainline routes service neighborhoods and communities with lower density, but high need communities.
  - Feeder routes designed bring passengers to connect to a key corridor route and/or a transit center or hubs.
  - Express routes provide connections between downtown Memphis and major employers and/or employment centers. These routes will start to build 'choice' rider market.

  - Flex service serves low density neighborhoods that have high need for service. This type of service may be implemented as a demonstration project. The plan recommends southwest Memphis as potential demonstration site.

- Uses the Key Corridor Routes to create a framework for future development of Bus Rapid Transit (BRT) on highest ridership corridors.
- By developing transit centers and hubs, MATA will not only encourage use by making the system more comfortable and easy to use, improvements associated with the physical infrastructure will improve the pedestrian environment for all residents and increase MATA's physical presence in the community.

SRTP FUNDING AND FINANCING

The SRTP was intentionally designed to work within MATA's available budget (in 2011) in terms of both operating and capital costs. There are, however, several considerations associated with the cost estimates and plan implementation, which are described below. An additional discussion on transit funding generally is presented in Chapter 7.

Operating Costs

The fixed-route bus service improvements recommended as part of the SRTP were designed to work within MATA's available operating resources and provide about 410,000 annual service hours at an annual cost of approximately $36 million ($2011). This is in line MATA's current expenses on fixed-route transit services, which includes approximately 417,000 annual service hours and costs approximately $36.7 million ($2011) annually to operate.

The analysis conducted as part of the SRTP included detailed analysis of each route with conservative operational assumptions (i.e. operating speeds and recovery time) that were reviewed with MATA staff. This level of effort was required to ensure that all proposals would work within the available resources. The analysis, however, remains a planning effort and implementation will require more detailed scheduling of the routes, run-cutting and compliance with provisions of the collective bargaining agreement. Therefore, the final costs of the proposal may change. If additional resources are available, they should be reinvested in the system according to some of the priorities outlined in the preferred alternative.

Capital Costs - Vehicles

Transit capital costs, as mentioned, include vehicle costs and maintenance as well as transit infrastructure. Similar to the example of operating costs, the SRTP preferred alternative was designed to work within MATA's existing fleet. The primary constraint is the number of vehicles needed to operate peak period service as this is the maximum amount of vehicles required at any one time. MATA's current operations have a peak vehicle requirement of 131 (as of September, 2011) and the proposed SRTP has a peak vehicle requirement of 119. Also similar to the analysis

of operating costs, the peak vehicle requirement reflects a planning rather than operational exercise. Thus, although the estimate is based on sound analysis, there may be differences when the actual schedules are prepared and thus it is possible that full implementation will require more than 119 vehicles, but is unlikely to exceed 123 vehicles (see Figure 5-6 for peak vehicle requirements). The SRTP, therefore, is not expected to have additional vehicle requirements other than the normal replacement cycle accounted for in MATA's normal vehicle maintenance and replacement cycles.

Full implementation of the SRTP, as discussed below, includes development of bus rapid transit service along some of Memphis' strongest corridors, Poplar Corridor and Elvis Presley Boulevard. Implementation of these projects, however, would likely require the acquisition of new vehicles to reflect demand for higher capacity and a higher level of service overall. These projects are likely to occur towards the end of the five-year planning horizon covered in the SRTP and are not specifically identified as part of this project.

Capital Costs – Infrastructure

As discussed, the preferred alternative assumes significant investment in MATA's passenger infrastructure to realize full implementation of the concept. Most of the proposed changes will center around MATA's existing resources - the North End Terminal and Airways and American Way Transit Centers; however, as discussed, staffing these facilities for longer hours would require an additional $105,500 annually. Other unstaffed passenger infrastructure, including super stops and park and ride lots, would also increase operating costs because the facilities need to maintained, most will require utilities and there may be some security needs.

However, the SRTP also calls for considerable improvements in passenger amenities system wide and to the broader pedestrian environment in Memphis and Shelby County. Funding for passenger amenities, such as additional shelters and benches, are the responsibility of MATA. Improvements to the pedestrian environment (i.e. crosswalks and sidewalks) are best funded by individual municipalities as part of ongoing efforts to improve community livability and walkability. The study team does, however, recommend that MATA work closely with partner municipalities to communicate the importance of these projects, help prioritize particular locations and link infrastructure and transit improvements.

The proposed infrastructure improvements are recommended as part of full implementation of the SRTP recommendations. The cost for the investments is estimated at between $3 million and $9 million and includes improvements at 29 locations (see Figure 6-1). Prioritization and implementation for these improvements needs to be negotiated with the City of Memphis and other municipalities. Costs may also be shared between multiple partners.

Figure 6-1 Preferred Alternative – Proposed Infrastructure Improvements

Facility Type	Locations	Proposed Improvements
Transit Centers	North End Terminal American Way Terminal South Intermodal Terminal	n/a
Transit Super Stops	Frayser Blvd/Watkins Rd Chelsea Ave/N. Hollywood St Bellevue Blvd/Union Ave University of Memphis Lamar Ave/Airways Blvd Third St/Mitchell Rd	Add shelters with lighting, signage, information board, trash can and bike parking (MATA). Add signalized pedestrian crosswalk, roadway and accessibility improvements (Municipal Partners)
Enhanced Bus Stops	To be determined	Similar improvements as super stops, but less extensive. Improvements include enhanced passenger amenities (new stop signage, improved shelters, bike parking) (MATA). Improved physical infrastructure (curb cuts, marked pedestrian crossing, etc.) (Municipal Partners)
Park and Ride Lots	Frayser Blvd/Watkins Rd Austin Peay/Jones Rd Germantown Rd/Stage Rd Germantown Road/Walnut Grove Rd Germantown Road/Poplar Elvis Presley/Stateline Near IRS Facility on Getwell	Identifying and marking parking spaces and potentially making improvements to parking facilities or developing new spaces (MATA) Add curb cuts and ADA improvements, roadway improvements (Municipal Partners).

MATA's revenue sources for capital projects are provided primarily through federal grants (typically 80%). The State of Tennessee Department of Transportation (TDOT) and the City of Memphis typically contribute the non-federal match at 10% each.

MATA recently completed several large capital projects including development of Airways Transit Center and the purchase and installation of an Intelligent Transportation System, both of which have been completed in the past year or two.

FIVE YEAR IMPLEMENTATION PLAN

Implementation of the SRTP and the preferred alternative is designed to be achievable over a five-year period (see Figure 6-2), allowing the first two to three years to focus on final service planning and scheduling and implementation, including adjustments and refinements to the routes. The final years of the implementation period should focus on service expansion and implementation of bus rapid transit service. As discussed, the capital elements of the preferred alternative are essential to its success. Meeting the proposed implementation schedule assumes work on these projects begins in the immediate term.

Figure 6-2 Preferred Alternative - Five Year Implementation Plan

	Operating Projects	Capital Projects
Year 1	▪ Reschedule service to accommodate Preferred Alternative concept (may be implemented over 2-3 service change periods) ▪ Monitor route performance and make adjustments as necessary ▪ Explore partnerships to share airport shuttle costs (FedEx and Memphis International Airport) ▪ Engage University of Memphis and other local colleges and universities regarding new University Pass program ▪ Plan and hold public outreach campaign to educate riders about service changes	▪ Identify grant funds to support site planning and implementation for proposed super stops and park-and-ride lots. Improvements include pedestrian intersection improvements, expanded shelter facilities, information kiosks and lighting. ▪ Identify potential locations/suitable facilities for park and ride locations ▪ Work with University of Memphis to site on-street transfer location
Year 2	▪ Reschedule service to accommodate Preferred Alternative concept (may be implemented over 2-3 service change periods) ▪ Monitor route performance and make adjustments as necessary ▪ Introduce Express services ▪ Introduce Flex service ▪ Public outreach including "how to use Flex service" brochure – mail to homes within southwest Memphis Flex zone ▪ Initiate planning for BRT corridors — develop BRT Strategic Plan which outlines vision and implementation plan for BRT services in Memphis	▪ Begin on-street transfer location capital improvements ▪ Secure agreements to use park-and-ride surface parking facilities ▪ Begin BRT capital planning
Year 3	▪ Route changes complete, but may require some minor adjustments based on schedules and experience ▪ Develop ongoing service performance evaluation process	▪ Continue work towards on-street transfer location capital improvements ▪ Secure agreements to use park-and-ride surface parking facilities
Year 4	▪ Increase span of service and frequency on Emerging Key Corridor Routes to match service standards ▪ Continue BRT planning — inventory and plan for station improvements along Poplar Avenue, and Elvis Presley Boulevard; apply for grant funding for capital improvements	▪ Full implementation of on-street transfer location capital improvements
Year 5	▪ Begin implementation of BRT service	▪ Begin implementation of BRT service

7. TRANSIT FUNDING

OVERVIEW

MATA's most significant challenge both in terms of providing quality public transportation services and maintaining those service levels is funding. A critical element of the funding challenge is that MATA receives 80% of its operating funds and nearly all of its capital funds from federal, state and local sources. While essential sources of funding, the amount available from many of these sources has been has been reduced or held constant over the past several years. Additionally, MATA has only a limited ability to influence changes to these funding sources. Consequently, MATA, like transit agencies around the country, struggles to provide its services within the budget of revenues it receives. These challenges have been exacerbated in recent years as the national recession has strained government sources at all levels, a trend that is also likely to continue for several critical reasons.

- Transit costs are largely driven by wages, fuel and insurance; items which historically have increased faster than the consumer price index (CPI). MATA has worked hard at keeping driver wages low, but there is pressure to adjust wagesto keep pace with cost of living increases. Fuel costs have stabilized recently but generally are trending upwards. Insurance costs rise steadily year-on-year and this trend shows no sign of reversing.
- Most analysts suggest federal budget pressures mean that level funding for transit (i.e. no adjustments for annual cost increases) may represent the best case scenario at the federal level. This is especially challenging for transit agencies, which typically get a signigicant amount of their funds from federal sources. State and local funds are in a similarly challenged are unlikely to increase dramatically in the short-term.
- MATA's most important source for local funds, the City of Memphis, is challenged by the same pressures facing MATA and thus has not been in a position to provide level funding over the past few years.

Developing a sustainable financial plan to sustain, manage and ideally grow MATA is a critical part of the agency mission. It is also one of the most difficult. As MATA looks forward to the next few years, therefore, it must become more proactive about working with partners and looking for new ways to raise revenue, recognizing that it is unlikely that there will be a single solution and instead the agency must look to broaden and diversifying funding opportunities.

POTENTIAL OPPORTUNITIES

The following chapter provides an overview of some of the most commonly used funding sources by transit agencies around the country. In some cases, MATA has already explored the potential partnership; in others opportunities may exist. The following section provides an overview of the potential opportunity, discusses how it may be applicable to MATA and where relevant, provides examples of best practices.

Fares

One of the most common methods of raising transit agency revenues involves fare revenue. MATA, however, has increased fares at regular intervals, most recently in December 2011 and thus its fare levels and recovery rates are competitive with other transit agencies in the country and thus raising fares was not pursued as a revenue strategy at this time.

Dedicated Taxes

One of the most common ways transit service agencies are able to achieve financial sustainability is by working with local and regional communities as well as state government to develop taxing mechanisms that dedicate resources to the transit agency. MATA does not currently have any dedicated funding source and does not directly receive funds as part of a tax used to support public transportation.

The feasibility of identifying local taxing mechanisms to support transit was not included as part of the SRTP process, but may be a topic for additional research. Discussions with stakeholders, however, reveal that the State of Tennessee allows a city, county or special district that operates a public transit system to impose a $0.01 per gallon sales tax to support it. Voter approval is required and the state department of revenue would collect the tax and distribute it to the transit operator. To date, no transit system in Tennessee has implemented the tax.

Previous estimates of this tax suggest that the $0.01 tax will raise about $3 million annually within the City of Memphis, which represents less than 15% of the local funds needed to support MATA's operations[5]. On the other hand, if the gasoline tax were implemented statewide, the tax is estimated to generate approximately $29 million annually. MATA historically has received about 25% of state funding for public transportation , which would amount to about $7.3m annually from a $0.01 tax levied statewide. At this level of funding, MATA could significantly increase its ability to deliver services. It is also worth noting that for the gasoline tax to be successful over time, the tax level (i.e., $0.01 per gallon) would need to be indexed as a percentage of the cost of gasoline, so that the purchasing power of the tax would not be eroded over time.

[5] In FY11, the City of Memphis provided approximately $22 million to support MATA's operations. (MATA's budget)

PARTNERSHIPS WITH UNIVERSITIES

One revenue-generating strategy that has been successful for transit agencies around the country, but not widely used in Memphis, is developing partnerships with universities and colleges. Universities and colleges typically have a strong interest and high demand for transit service because:

- Students do not always have access to private vehicles, but need and want to travel.
- University and college campuses often have limited and/or restricted parking facilities; offering transit programs is often equally or less expensive than developing parking structures.
- Many colleges are interesting in being more "green" and look to transit programs as one of the ways they can reduce the environmental impact of their institution.

Partnerships between transit agencies and universities and colleges are typically referred to as "UPass" programs; the moniker reflects both that such arrangements are with a university and often offers universal (i.e. fare-free) access to transit service. While UPass programs will not fully resolve MATA's revenue challenges, it may help reduce the budget challenges slightly It is also worth noting that UPass programs may be structured so the revenue collected is used as fare revenue or as local matching funds.

Best Practices - King County Metro (Seattle)

There are numerous examples of successful UPass programs from around the U.S., and one of the first and most successful cases is the University of Washington (UW) UPass. This program began in the early 1990s and offers students, faculty and staff unlimited, free-fare access to most public transportation services in the Puget Sound region. When the program was initially implemented, the largest regional operator, Seattle King County Metro (KCM) added transit service to the main UW campus in Seattle. UW also increased parking fees substantially and offered as a series of other transportation demand management programs, such as vanpool fare credits, discounted carpool parking, guaranteed ride home, etc. Students, faculty and staff accessed bus service by using their university ID card. Revenues to support the program were raised through a transportation fee charged to students, faculty, and staff, plus parking fees. The UPass program resulted in a significant increase in demand for transit services and over time as ridership has increased, so has transit service to the campus.

Since the program inception, UW has paid transit operators on a per trip basis according to a negotiated trip rate. The negotiated trip rate varies by operator, but is lower than the cash fare. In the early days of the programs, students, faculty and staff flashed their ID card when they boarded the bus and trips were measured through surveys. More recently, however, UW began participating in the regional smart card program so that UPass trips are now recorded by the fare

box and allocated to providers according to measured ridership. By more accurately recording use and reducing fraud, smart cards became an important strategy in keeping program costs low. For 2011, students are required to participate in the UPass program and paid a $76 fee per quarter. Participation is optional for faculty and staff, who pay $136/quarter for the program. Studies of UW's UPass program demonstrate that since the program began, drive alone commuting has decreased by some 38%[6]. The program also generates approximately $7.5 million[7] annually for King County Metro (who is among several transit providers participating in the program).

Best Practices - Rhode Island Public Transit Authority

The Rhode Island Public Transportation Authority (RIPTA) has also achieved considerable success developing UPass programs and partnerships with colleges and universities. Currently, RIPTA has some sort of transit agreement with every college and university in the state.

All private colleges in Rhode Island (Brown, Providence College, Rhode Island School of Design, Johnson & Wales, Bryant, Salve Regina, Roger Williams and Lincoln Tech) have UPass contracts with RIPTA. Contracts are negotiated individually and vary by institution but each institution has a pay-per-ride contract based on trips recorded through a Smart Card or magnetic swipe school ID. RIPTA generates ridership reports, which are provided to the institutions and used to generate monthly invoices. FY11 ridership from this program was estimated at 1.3 million riders and generated approximately $1.66 million[8] for RIPTA.

Public institutions in Rhode Island also all have transit programs, although financial constraints mean that most are not unlimited access programs. Each of the four campuses of Rhode Island Community Colleges sell RIPTA passes for half-fare, with the college absorbing the other 50% of the costs. In addition, the University of Rhode Island in Kingston contracts with RIPTA to run an on-campus shuttle plus additional limited service into a nearby town. URI pays for this service and URI students ride these routes for free. URI students can also purchase RIPTA fare products for half-fare. Combined, the half-fare program generated nearly $740,000 in pass and ticket sales for RIPTA in 2011[9].

PARTNERSHIPS WITH PUBLIC SCHOOLS

Transit agencies around the country have also successfully earned revenue through partnerships with public school districts, mostly typically with high schools. Common arrangements include contracting directly with the public school district to provide specific trips to a particular school or selling school districts bulk pass sales.

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[6] July 20, 2011 Letter from University of Washington President Michael K. Young to King County Council

[7] Ibid.

[8] Data provided by RIPTA

[9] Data provided by RIPTA

Historically, transit agencies have been reluctant to work directly with public school systems due to regulations from the Federal Transit Administration (FTA) that state that recipients of FTA grant funds are not allowed to provide public school transportation. Recent publications from the FTA, however, clearly state that, "public transportation vehicles can be used to transport students to and from school if they ride regularly scheduled mass transportation service that is open to the general public. Such service may be designed or modified to accommodate the needs of school students and personnel, using various fare collection subsidy systems. This is commonly known as 'tripper service'."[10] Clarification by the FTA combined with local pressure on school system budgets has encouraged in many transit agencies to partner directly with school districts. Similar to UPass programs, partnerships vary by location. Some public school districts pay for additional bus service, while other school districts purchase bus passes for their students.

Currently, the Memphis City Schools (MCS) appropriates dollars for approximately 1200 eligible students enrolled in MCS Prep Academies and college prep schools. These are students who are over-age for grade, have other particular issues, even advanced students who take college level courses at local colleges and universities. These students are not served by school buses, so MCS pays MATA $2.50 per student per day and MATA provides the students a free bus pass for their transportation use on school days. This partnership provides approximately $500,000 annually to MATA's revenues. In addition, there are other MCS students not served by the traditional "yellow school bus" service operated by MCS who can use MATA services at a reduced rate.

Best Practices- City of Providence Rhode Island

The City of Providence, Rhode Island does not provide yellow bus transportation for high school students, and instead issues monthly RIPTA bus passes to those high school students living more than 3 miles from school (whether public, charter or out-of-district)[11]. Students may also receive passes if they: 1) have a documented need written in their Individual Education Plan (IEP); 2) have a medical need and supporting doctor's note; and/or, 3) live within 2.5 miles of school and can show a financial hardship. Final eligibility decisions are made by the Supervisor of Transportation. This program is funded locally, through the Providence school department budget. Approximately 2,500 high school students receive passes each month, out of a total high school population of about 7,600. In total, the City spent about $1.38 million on RIPTA passes in FY09.

[10] FTA, Public Transportation and School Buses

[11] Students living within 3 miles are responsible for their own transportation to/from school. If they use RIPTA to get to/from school and have no other special circumstances, they must purchase a full fare bus pass.

PARTNERSHIPS WITH EMPLOYERS

Many transit agencies have also developed relationships with large employers. These partnerships range from: 1) UPass-type programs where every employee is given a bus pass and the pass is paid for by either the employer or a combination of the employer and employee, ; 2) working with a neighborhood, district or group of employers to provide U-Pass type of programs; 3) selling passes in bulk to major employers; and 4) working with an employer to provide targeted transit service to a specific employment site. Similar to school bus tripper service, any transit service designed to serve an employment site must be open to all members of the public.

MATA currently does not work directly with employers to sell or market transit services. There are opportunities, however, especially in some of the higher density employment communities, such as the Medical District, that already have a high concentration of transit service.

Best Practices – Portland Oregon

Tri-Met, the transit agency serving the greater Portland Oregon area works with over 900 worksites in the Portland area to offer transit passes as a benefit to employees. The program is offered in three primary ways (see Figure 7-1), each of which can be tailored to individual employers. In Oregon, employers are encouraged to participate in the program not only to meet employee needs and to earn potential tax savings, but also because Oregon has a mandatory commute trip reduction law that requires employers to work towards reducing drive-alone commuting.

Figure 7-1 Tri-Met Employer Pass Programs

	Universal Annual Pass Program	Annual Pass Program	Monthly Pass Program
Program Overview	All eligible employees get a pass; employer pays only for actual use	Interested employees get a pass; easy, once-a-year distribution	Employer sells tickets and passes to employees on site; most flexibility
Payment	Based on transit use per results of commute survey	$1,012 per employee (12 months for the price of 11!)	Regular ticket/pass prices + $2 shipping and handling per order
Renewable	Annually	Annually	Monthly
Employees carry	Sticker on ID badge	Sticker on ID badge	Regular ticket or pass
Eligible for Tax Savings	Yes	Yes	Yes

Source: Tri-Met Web-site