



MEMPHIS REGIONAL RAIL PROGRAM

DOWNTOWN - AIRPORT CORRIDOR ALTERNATIVES ANALYSIS

EXECUTIVE SUMMARY

EVALUATION OF ALTERNATIVE ALIGNMENTS AND TECHNOLOGIES

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Memphis Area Transit Authority

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EXECUTIVE SUMMARY**Introduction**

The Memphis Area Transit Authority (MATA) has embarked upon the implementation of its 1997 Regional Transit Plan for high capacity transit services operating in three corridors by the year 2020. The first phase of work (Phase I Corridor Selection), initiated in 2000, led to the selection of the priority corridor for the initial service. In January 2001, the MATA Board of Commissioners, acting upon the recommendation of the Regional Rail Steering Committee (RRSC), adopted the Southeast Corridor as the region's top priority for implementation of high capacity transit service. The MATA Board recognized that the first phase of regional high capacity transit must be effective in attracting riders and enhancing the economic vitality of the region. The Board's deliberations also recognized that the area around Memphis International Airport is the largest generator of jobs in the region and thus should be the primary destination to be served by the first leg of the regional system. The Downtown – Airport corridor segment was thus selected for further study in an Alternatives Analysis, which is the subject of this report.

The current phase of work, Phase II, was initiated in March 2001. This phase of work consists of the evaluation of alternative transit technologies and the development and evaluation of alignment alternatives within the selected corridor. This phase initiates the "Alternatives Analysis," which is concluded in Phase III. The Alternatives Analysis includes the identification and analysis of potential alignments or routes, transit technologies or modes, station locations, capital and operating cost estimates, funding sources, ridership projections, economic development and redevelopment, land use, engineering feasibility and environmental analysis.

The current Phase II study consists of the following tasks:

- Development of appropriate criteria for evaluation of technologies and alignments
- Identification of appropriate technologies
- Identification of initial alignment alternatives
- Initial (Tier 1) screening of alignments and technologies

At the conclusion of this current Phase II, the initial and refined sets of technologies and alignments will be reduced to a set of feasible alternatives that achieve the criteria and objectives identified for this study. In Phase III, the Alternatives Analysis will be continued as the set feasible alternatives are evaluated in greater detail, and a Draft Environmental Impact Statement (DEIS) will be prepared. At the conclusion of the DEIS, a locally preferred alternative (LPA), likely consisting of a single technology and a preferred alignment, will be selected. This LPA would then be moved forward into a more detailed environmental evaluation and preliminary engineering.

Purpose and Need for Study

This Alternatives Analysis is intended to address the following transportation needs and problems in the Downtown – Airport Corridor and the Memphis region:

- General mobility
- Work force development
- Economic development and redevelopment of underutilized areas.

A set of study-specific goals and objectives have been developed to reflect the public input obtained during the Phase I Corridor Selection Study, as well as those community goals and objectives that were developed during the 1997 Regional Transit Plan and region’s Long Range Transportation Plan. Enhancing mobility and access to jobs has emerged as the top reason for considering high capacity transit. Other issues that were identified by the community as important considerations are economic development, quality of life, and effectiveness (in terms of costs and service).

Based on the goals and objectives, criteria and performance measures have been defined to assist in the evaluation of alternative transit technologies and alignments.

Transit Technology Alternatives

Following a brief exercise to identify the range of transit technologies that could address the region’s high capacity transit needs, three high capacity transit technologies were selected for further study in Phase II: **Bus Rapid Transit** in a busway, **Light Rail Transit**, and **Monorail**.

The three alternative technologies were evaluated using a series of thirteen criteria:

- | | |
|--------------------------------------|----------------------------------|
| System Capacity | Traffic and Safety |
| Service Characteristics | Security |
| Access and Connectivity to Community | Aesthetics |
| Capital Costs | Right-of-Way Requirements |
| Operating and Maintenance Costs | Ease of Implementation (Phasing) |
| Development Potential | Technical Maturity |
| | Procurement Considerations |

The RRSC met on November 8, 2001 and discussed the relative merits of bus rapid transit, light rail transit and monorail transit for application to the Downtown – Airport Corridor. The discussion centered on the likely impacts of each technology on neighborhoods and the potential of each technology to encourage neighborhood and community redevelopment. Following the discussion, the RRSC voted unanimously to recommend elimination of both the Bus Rapid Transit and Monorail options from further consideration, and to carry light rail transit as the preferred technology. The RRSC’s action was confirmed and adopted by the MATA Board at their meeting on November 28, 2001.

Alignment Alternatives

A wide range of alternatives was identified during the early stages of this Phase to address the needs and opportunities in the Downtown - Airport Corridor. Potential options included the use of existing railroad, utility and street rights-of-way to connect the Downtown with the Airport. The use of shared rights-of-way was a key criterion in the early identification of the preliminary conceptual alternatives.

Early in Phase II, seven preliminary conceptual alignments were drawn to serve as a starting point for discussions by MATA, the RRSC and the consultant team. The seven alternatives were developed to represent the range of potential alignment solutions. Driving the selection of alternative alignments was an effort to achieve the following objectives:

1. Connect the Downtown and the Airport;
2. Connect major activity centers, including the rail line in the Medical Center;
3. Serve residential areas including transit dependent enclaves;
4. Use existing rights-of-way, including privately held railroads and utility alignments;
5. Identify the most direct route between the major destinations; and
6. Provide a path suitable for the three competing transit modes: BRT, LRT and Monorail.

A technical workshop held in Memphis on June 25 and 26, 2001, brought together the technical team (MATA staff with key staff from the consultants) to review information on the conceptual alignment alternatives, to examine the three alternative technologies in their application to the alternative alignments and to identify the most suitable alternative alignments in the Downtown - Airport corridor. As a result of the workshop deliberations, a series of combined alignments and modes were recommended for consideration by MATA. The recommended alternatives included the following alignments and modes:

- Alternative 1** – Madison Avenue (Medical Center rail line) to Cooper Street to Young Avenue to Airways Boulevard to Plough Boulevard to the Airport terminal – using **LRT** and **BRT** modes.
- Alternative 2A** – The Medical Center line to Pauline Street to Lamar Avenue, running southeast from the Downtown to Airways Boulevard to Plough Boulevard to the Airport – using **LRT** and **BRT** modes.
- Alternative 2B** – Vance Avenue from the Downtown to the “City Lead” tracks, along the Burlington Northern Santa Fe (BNSF) tracks to Airways Boulevard and Plough Boulevard to the Airport - using all three alternative modes (**BRT**, **LRT** and **Monorail**).
- Alternative 3A** – The Medical Center line to Interstate 240 to Plough Boulevard and the Airport - using **Monorail** mode.

Alternative 3B – The Medical Center line to I-240 to Plough Boulevard and the Airport - using **BRT** mode.

The seven conceptual alternatives, the transit technologies and the refined set of combined alignments and modes were presented to the RRSC and the public in a series of meetings held in July 2001.

Following the RRSC's recommendation in November 2001 to eliminate bus rapid transit and monorail from further consideration, a set of four refined alignment alternatives was defined for the selected technology, light rail transit (LRT). These alignments are shown on Figure S-1 and listed below:

- **Alternative 1**, using street rights-of-way along Madison, Cooper, Young, Airways and Plough to reach the airport.
- **Alternative 2A**, using street right-of-way along Madison, Pauline, Lamar, Airways and Plough to reach the airport.
- **Alternative 2B**, using a combination of streets and rail rights-of-way along Vance, City Lead Tracks, BNSF Tracks, Airways and Plough to reach the airport.
- **Alternative 3**, using street and Interstate rights-of-way along I-240 and Plough to reach the airport.

Tier 1 Screening of Refined Alignment Alternatives

An initial (Tier 1) screening of the four refined alignment alternatives was conducted using a set of 11 performance criteria. These criteria reflect important considerations for the Memphis region as reflected in the goals and objectives, and aid in addressing the range of impacts that a major investment in high capacity transit may have on the community. The 11 performance criteria are:

- Access and Mobility to Major Job Centers
- Access and Mobility for the General Public
- Access and Mobility for Low-Income Transit-Dependent Populations
- Operating Costs
- Operating Efficiency
- Capital Costs
- Transit and Pedestrian Friendly Neighborhoods
- Redevelopment Potential
- Corridor Traffic Congestion
- Environmental Impacts
- Expansion Capability to Regional System

Table S.1 provides an overview of the way the four alternative alignments function when evaluated against 11 performance criteria.

Figure S.1
Refined Alignment Alternatives



**Table S.1
Summary of Evaluation Criteria Results**

CRITERIA	ALTERNATIVE			
	1	2A	2B	3
Miles (New Construction/ Total with Medical Center Line)	8.3 / 10.5	8.5 / 9.9	8.8 / 8.8	9.8 / 11.3
Number of Stations	16	14	9	13
Park and Ride Spaces	1,050	1,050	1,050	1,050
Mobility and Access to Major Job Centers*				
Employees 2023	124,231	116,159	88,627	114,037
2023 Jobs per Square Mile	11,832	11,733	10,071	10,092
Mobility and Access to the General Public*				
2023 Households	29,268	23,936	20,245	23,227
2023 Household per Square Mile	2,787	2,418	2,301	2,055
Projected Daily Riders	10,673	11,316	6,279	8,335
Projected Trips per Mile	1,286	1,331	714	850
Mobility and Access for Low-income Transit-Dependent Population*				
1990 Median Income	\$17,995	\$16,782	\$14,948	\$14,503
1990 Median Income Compared to County Average	-33.7%	-38.1%	-44.9%	-46.5%
1990 Persons Below Poverty Level (# / %)	14,692 / 30.4%	14,760 / 35.3%	17,212 / 46.0%	15,704 / 38.4%
1990 Zero Auto Ownership Households (# / %)	6,878 / 33.1%	6,310 / 38.1%	6,234 / 45.2%	6,773 / 42.6%
1990 Households	20,754	16,544	13,803	15,904
Operating & Maintenance Costs				
Annual O& M Costs	\$9,834,655	\$8,926,640	\$7,275,605	\$9,190,366
Cost per Vehicle Revenue Hour	\$192.63	\$208.16	\$226.21	\$227.86
Cost per Unlinked Passenger Trip	\$3.27	\$2.80	\$4.11	\$3.91
Cost per Route Mile	\$939,318	\$906,258	\$831,498	\$814,749
Operating Efficiency and Effectiveness				
Cost per Rider	\$3.27	\$2.80	\$4.11	\$3.91
Passengers per Vehicle Mile	4.47	5.04	3.15	3.24
Passengers per Vehicle Hour	58.95	74.41	55.05	58.28
Capital Costs				
Total Capital Cost (in \$ million)	\$364 - \$454	\$362 - \$452	\$359 - \$448	\$418 - \$508
Capital Cost per Mile (in \$ million)	\$44.0 - \$54.7	\$42.6 - \$53.2	\$45.4 - \$56.7	\$42.7 - \$51.8

Table S.1
Summary of Evaluation Criteria Results, continued

CRITERIA	ALTERNATIVE			
	1	2A	2B	3
Transit and Pedestrian Friendly Areas				
Stations that Satisfy the Criteria	8 (50%)	4 (29%)	0 (0%)	4 (31%)
Stations that Somewhat Satisfy the Criteria	5 (31%)	6 (42%)	5 (56%)	5 (38%)
Stations that Fail to Satisfy the Criteria	3 (19%)	4 (29%)	4 (44%)	4 (31%)
Redevelopment Potential				
Potential to Encourage Redevelopment Activity	High	Low to Medium	Low to Medium	Low to Medium
Corridor Traffic Congestion				
Miles of Congested Parallel & Cross Streets within 1 mile of alignment	6.6 miles	2.9 miles	4.5 miles	10.1 miles
Environmental Impacts				
Potential for Neighborhood Disruption	Low	Low	Low	Low
Percent of Alignment through Historic Districts	28.0%	26.7%	22.3%	11.2%
Community Facilities within 1/2 Mile of Alignment	31	24	22	29
<i>Schools</i>	5	6	6	7
<i>Parks</i>	14	10	9	11
<i>Medical Center / Hospitals</i>	5	2	2	1
<i>Other Community Facilities</i>	7	6	3	6
<i>Cemeteries</i>	0	0	2	4
Noise Sensitive Areas – 1, 2, & 3 Family Residential Parcels within 100 feet of Alignment	386	502	270	298
Potential for Displacement / Relocation	Low to Moderate	Low	Low	Low
Miles Congested Roadway Along Alignment	3.60	3.96	1.22	0
Stream Crossings	Nonconnah Creek	Nonconnah Creek / Cane Creek	Nonconnah Creek / Cane Creek	Nonconnah Creek / Cane Creek
Floodplain Impacts	Minimal	Minimal	Minimal	Minimal
Endangered Species Impacts	Minimal	Minimal	Minimal	Minimal
Potential to Affect Low Income and Minority Populations (Environmental Justice)	Low	Low to Moderate	Moderate	Low
Expansion Capability to Regional System				
Connection to Primary Trunk Lines	Strong	Partial	Fails	Marginal
Connection to Multiple Trunk Lines	Partial	Partial	Fails	Fails

* Within the 1 mile wide corridor centered on the alignment.

Evaluation of Unique Segments of Alignment Alternatives

Each of the four refined alignment alternatives begins in the Downtown and extends east and south to end at the Airport area. Between the Downtown and Airport, each alignment alternative follows a unique route between these two common end areas. The assessment of characteristics of the entire alternative thus includes information relating to the commonly served areas at each end of the alignment -- the Downtown and Airport areas -- as well as for the unique routes or segments of the alignment. This comprehensive approach of analyzing the full areas served helps to create an understanding of the full contribution of each alternative's service potential for the entire community. However, that approach tends to mask the differences that may exist between the characteristics of the unique segments of each alternative.

As part of the Tier 1 screening of alignment alternatives, the unique segment of each alternative was highlighted and compared to the other three alignments for the nine criteria for which unique data was available. The purpose of this examination was to determine if and how the unique segment information may alter the results of the analysis of the alternatives shown in Table S.1. The results of the unique segment analysis are shown in Table S.2.

Agency Coordination and Public Involvement

Building upon the public involvement process initiated during the Corridor Selection Phase (Phase I) of this program, MATA has continued to implement activities for public information and agency coordination during the current phase. The following activities were conducted during the Phase II study.

- The Regional Rail Steering Committee (RRSC) has met monthly to review the progress of the study and provide guidance to the MATA staff and its consultant team. The Corridor Subcommittee met on February 25, 2002 to review the preliminary findings of the Tier 1 screening.
- MATA conducted a round of three public meetings in the corridor area on July 23 and 24, 2001 to inform citizens of the alternatives that are being considered during the Alternatives Analysis.
- MATA and FTA initiated formal scoping (as defined by the National Environmental Policy Act) by publishing a Notice of Intent in the *Federal Register* (August 3, 2001) to prepare an Environmental Impact Statement (EIS) for the corridor.
- MATA distributed scoping packages to 42 Federal, state and local agencies, to 143 community leaders, and eight Indian Tribes. The scoping or "early coordination" letters provide a summary of the project and an invitation to the August 2001 scoping meetings to provide input for the project.
- Two scoping meetings were held on August 23, 2001. The afternoon meeting was focused on obtaining input from federal, state and local agencies, while the evening meeting was held to engage the public at large.

**Table S.2
Evaluation of Unique Corridor Segments**

CRITERIA	ALTERNATIVES			
	1	2A	2B	3
Miles (New Construction)	6.4	4.8	4.3	6.8
Number of Stations	9	5	4	6
Park and Ride Spaces	250	250	150	200
1. Mobility and Access to Major Job Centers*				
2023 Employees	29,066	14,735	9,384	11,808
2023 Jobs per Square Mile	4,542	3,070	2,182	1,736
2. Mobility and Access to the General Public*				
2023 Households	15,557	9,213	6,998	8,172
2023 Household per Square Mile	2,431	1,919	1,627	1,202
3. Mobility and Access for Low-income Transit-Dependent Population*				
1990 Median Household Income	\$21,345	\$20,413	\$18,915	\$16,866
1990 Median Income Compared to County Average	-21.3%	-24.8%	-30.3%	-37.8%
1990 Persons Below Poverty Level (Number/%)	8,782 / 26.3%	7,224 / 30.1%	6,948 / 36.3%	8,294 / 35.7%
1990 Households with Zero Vehicles (Number /%)	3,219 / 23.0%	2,183 / 24.6%	1,986 / 29.7%	2,669 / 32.2%
1990 Households	14,014	8,873	6,698	8,303
6. Capital Costs				
Total Capital Cost (in \$ million)	\$259	\$215	\$208	\$285
Capital Cost per Mile (in \$ million)	\$40.4	\$45.0	\$48.1	\$42.1
7. Transit and Pedestrian Friendly Areas				
Stations that Satisfy Transit Friendly Criteria	4 (44%)	0 (0%)	0 (0%)	0 (0%)
Stations that Somewhat Satisfy Transit Friendly Criteria	4 (44%)	4 (80%)	3 (75%)	4 (67%)
Stations that Fail to Satisfy Transit Friendly Criteria	1 (11%)	1 (20%)	1 (25%)	2 (33%)
8. Redevelopment Potential				
Potential to Encourage Redevelopment Activity	High	Low to Medium	Low to Medium	Low to Medium

* Within the 1 mile wide corridor centered on the alignment.

Table S.2
Evaluation of Unique Corridor Segments

CRITERIA	ALTERNATIVES			
	1	2A	2B	3
9. Traffic Congestion				
Miles Congested Roadway within 1/2 mile of Alignment	6.59	2.31	3.28	8.35
10. Environmental Impacts				
Potential for Neighborhood Disruption	Low	Low	Low	Low
Percent of Alignment through Historic Districts	22.6%	28.1%	9.2%	4.0%
Community Resources within 1/2 Mile of Alignment	12	10	10	13
<i>Schools</i>	4	5	2	6
<i>Parks</i>	5	4	5	4
<i>Medical Center / Hospitals</i>	0	0	0	0
<i>Other Community Facilities</i>	3	1	1	0
<i>Cemeteries</i>	0	0	2	3
Noise Sensitive Areas – 1, 2, & 3 Family Residential Parcels within 100 feet of Alignment	256	365	145	166
Potential for Displacement / Relocation	Moderate	Moderate	Low	Low
Miles Congested Roadway Along Alignment	3.60	3.68	1.22	0
Stream Crossings	Nonconnah Creek	Nonconnah Creek / Cane Creek	Nonconnah Creek / Cane Creek	Nonconnah Cr. / Cane Creek
Floodplain Impacts	Minimal	Minimal	Minimal	Minimal
Endangered Species Impacts	Minimal	Minimal	Minimal	Minimal
Potential to Affect Low Income and Minority Populations (Environmental Justice)	Low	Medium	Medium	Low
11. Expansion Capability to Regional System				
Connection to Primary Trunk Lines	Strong	Partial	Marginal	Marginal
Connection to Multiple Trunk Lines	Strong	Strong	Marginal	Fails

- The Corridor Subcommittee met on February 25, 2002 to review the preliminary findings of the Tier 1 screening.
- Two public meetings were held on February 25 and 26, 2002, to present the preliminary results of the alternatives evaluation to the public for their input and information.
- MATA staff members have attended meetings of at least 12 community organizations from April 2001 through February 2002 to make a presentation on the study process and possible outcomes.
- Three editions of the *MATATracks* newsletter (Winter 2001, Summer 2001 and Winter 2002) were prepared and distributed during this phase.
- A short video was produced to introduce and explain the regional rail program.
- A telephone survey of city and regional residents was conducted in December 2001 to gauge the perceptions of and interest levels in the proposed regional rail system and to obtain the public's opinions about the benefits of the proposed transit improvements.
- A new logo was introduced to help residents better identify the regional rail program. MATATRAC stands for "MATA Together Reaching All Communities." The logo is being used on study handouts, newsletters, graphics and other materials.
- MATA's website provided information on the regional rail program and upcoming meetings. Individuals were encouraged to submit comments and questions via email.

Recommendations

On November 8, 2001 the RRSC voted unanimously to recommend elimination of both BRT and Monorail options from further consideration. The effect of that decision is the elevation of LRT as the preferred technology for the Downtown-Airport Corridor. On November 28, 2001, the MATA Board confirmed and adopted the RRSC's recommendation regarding the selection of LRT as the preferred technology.

On February 25, 2002, the RRSC's Corridor Subcommittee recommended to the full RRSC that Alternatives 2B and 3 be eliminated from further consideration, and that Alternative 1 and 2A be retained for further study. At its March 14, 2002 meeting, the RRSC received the Corridor Subcommittee's recommendation, and the results of the public meetings held on February 25 and 26, 2002. The RRSC voted to recommend to the MATA Board that Alternative 1 and 2A be retained for further study, and that Alternative 2B and 3 be eliminated from further consideration. The MATA Board confirmed and adopted the RRSC's recommendations at its regular meeting on March 25, 2002.