



Fatal Flaw Analysis: Results Summary
Michigan/Grand River Avenue Transportation Study

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URS

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TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PART 1 EVALUATION	1
2.1	Methodology	1
2.2	Summary of Recommendations	3
3.0	PART 2 EVALUATION	5
3.1	Methodology	5
3.2	Recommendations	6



1.0 INTRODUCTION

The Fatal Flaw Analysis is a two-part evaluation process designed to refine a preliminary list of potential transit modes and alignments in preparation for a more detailed level of evaluation during the next phase of Michigan/Grand River Transportation Study. The Study will be completed when a Locally Preferred Alternative (LPA) is adopted into the Tri-County Regional Planning Commission's long-range plan. The Fatal Flaw Analysis is one of the initial steps in the AA process to develop and select a LPA.

2.0 PART 1 EVALUATION

2.1 Methodology

The list of potential transit modes subjected to Part 1 of this Fatal Flaw Analysis included:

- Bus (conventional and trolley)
- Bus Rapid Transit (BRT) (conventional and guided)
- Light Rail Transit (LRT)
- Modern streetcar
- Heavy rail
- Magnetic levitation (MagLev)
- Commuter rail (conventional and Diesel Multiple Unit)
- Automated Guideway Transit (People Mover, Monorail, and Personal Rapid Transit)

Part 1 of the evaluation process subjected these transit modes to an analysis based on five criteria:

1. Conceptual cost
2. Transit ridership
3. Irresolvable environmental issues
4. Agency and public opposition
5. Consistency with local plans and policies.

The results of this analysis are shown in Table 1. Modes that failed three or more of the criteria have been eliminated from further consideration and are highlighted in red.

More detailed information on the data inputs, evaluation, and ranking process are available in the "Fatal Flaw Options and Evaluation" report, available under separate cover.



Table 1: Results of Part 1 Mode Evaluation

Part 1 Criteria: Mode Evaluation	Transit Technology									
	Bus	Bus Rapid Transit	Light Rail	Modern Streetcar	MagLev	Heavy Rail	Commuter Rail	People Mover	Monorail	PRT
Conceptual Cost	●	●	⊙	●	○	○	○	⊙	○	⊙
Transit Ridership	●	⊙	⊙	●	○	○	⊙	○	○	○
Irresolvable Environmental Issues	●	●	●	●	○	○	○	○	○	○
Agency and Public Opposition	○	⊙	●	●	○	○	○	○	○	○
Consistency with Local Plans and Policies	⊙	⊙	●	⊙	○	●	⊙	○	⊙	○

Rating Definition	
●	Mode meets criterion very well (pass)
⊙	Mode meets criterion sufficiently (pass)
○	Mode does not meet criterion (fail)

Note 1: A failure in any of the sub-criterion resulted in failure at the criterion level.

Note 2: A failure in three or more of the criteria resulted in mode failure.



2.2 Summary of Recommendations

Major considerations that led to the retention or elimination of the modes under evaluation are discussed below.

Transit Modes Retained

Generally, the following modes were retained for the Part 2 analysis because they demonstrated:

- Feasible conceptual costs
- An ability to serve the densest areas of residential and employment population
- Suitability in meeting Corridor travel needs
- Consistency with local plans and policies.

Bus

Enhanced bus service was retained at this level of analysis because CATA currently operates conventional bus service within the Corridor, and the FTA requires that improved bus service be retained throughout the AA process for baseline comparison purposes.

Bus Rapid Transit (BRT)

BRT results in improved travel times and increased transit ridership over conventional bus service at a cost that is comparatively less than LRT. BRT could serve the densest areas of existing and projected residential and employment population. BRT is an incremental approach to premium transit service that received public support, poses no irresolvable environmental issues, and is consistent with local plans and policies.

Light Rail Transit (LRT)

LRT will generate benefits for the Corridor that are similar to those associated with BRT (reduced travel times, increased ridership). While LRT has comparatively higher capital costs than BRT and modern streetcar, it has the strongest record of encouraging transit-supportive adjacent development. LRT also provides higher capacity service than either BRT or streetcar. LRT received public support, poses no irresolvable environmental issues, and is consistent with local plans and policies.

Modern Streetcar

Modern streetcars result in improved travel times and increased ridership over conventional bus service. While streetcar capital costs are higher than typical BRT costs, they are lower than typical LRT capital costs. Streetcars, unlike BRT, have a proven track record of success in encouraging transit-supportive adjacent development. Streetcars received public support, pose no irresolvable environmental issues, and are consistent with local plans and policies.

Transit Modes Eliminated

The following modes were recommended to be eliminated from Part 2 of the Fatal Flaw Analysis. Generally, mode failure can be attributed to three or more of the following reasons:



- Significant costs make implementation infeasible
- Mode does not serve existing or likely future pockets of residential and employment density
- Mode does not fit the geographic scale or density of the Corridor
- Mode is not a top choice of Corridor stakeholders or the general public;
- Mode creates irresolvable environmental issues.

Magnetic Levitation (MagLev)

MagLev service is designed to serve destinations that are hundreds of miles apart. It is inappropriately scaled for transit service within the Corridor, and it has very high capital and operating and maintenance costs. There are currently no operational MagLev systems within the United States. It also received virtually no public support, faces irresolvable environmental issues, and is inconsistent with local plans and policies.

Heavy Rail

Heavy rail would improve Corridor travel times and increase transit ridership, but it has comparatively high capital costs. Although it has proven effective at encouraging transit-supportive development, the scale of the transit service would not complement the existing or envisioned pattern of development within the Corridor. Heavy rail received little public support.

Commuter Rail

Commuter rail has comparatively high capital and operating and maintenance costs, and the scale of service does not meet the Corridor's travel needs. It has also proven to be less effective at encouraging supportive development patterns, received limited public support, faces irresolvable environmental issues, and is inconsistent with some local plans and policies.

Automated Guideway Transit (AGT)

People Mover

People Mover's elevated trackway would detract from Corridor aesthetics and would be less effective than at-grade modes at encouraging adjacent development. The scale of service would not complement the scale of the Corridor. There are a limited number of operational People Mover systems in the United States. It would be difficult to extend such a system or link it to other modes.

Monorail

Monorail performs comparably to heavy rail when evaluated for cost and ridership. Monorail's elevated tracks, however, nullify any of the positive impacts on adjacent development patterns that are associated with heavy rail. It would be difficult to extend monorail service or link it to other modes. It received little public support.

PRT



There is only one PRT system that is operational within the United States. Like monorail, PRT's elevated tracks nullify any of the system's positive impacts on adjacent development. The scale of service is inappropriate for the Corridor, and is inconsistent with local plans and policies.

3.0 PART 2 EVALUATION

3.1 Methodology

As shown in Figure 1, the four modes carried into the Part 2 evaluation were bus, BRT, LRT, and modern streetcar. Part 2 of the Fatal Flaw Analysis assessed how BRT, LRT and Modern Streetcar could physically fit within the existing right-of-way of the Michigan/Grand Avenue Corridor. This assessment was accomplished using the following criteria:

- Impacts on potential traffic volumes
- Impacts on potential traffic flow
- Agency and public opposition.

The Corridor was divided into six segments based on the existing width of public right-of-way. Within each of these segments, multiple configurations for accommodating autos, transit, pedestrians and bicyclists were developed. Segment maps and graphic depictions of the potential transportation segment options are available in the "Fatal Flaw Options and Evaluation" report, available under separate cover.

Impacts on Potential Traffic Volumes

A traffic analysis was completed to determine the impact on traffic flow for each of the transportation segment options. Based on existing and projected average daily traffic counts, levels of service (LOS) were defined using the *Highway Capacity Manual 2000*. Levels of service range from A to F, similar to an alphabetic grading system, and depending upon a different set of traffic operational characteristics. For purposes of this analysis, LOS A through LOS D are considered acceptable, while LOS E and F are considered unacceptable. Following are the findings of this assessment.

- Existing and 2035 traffic volumes on Michigan/Grand River Avenue would require at least four travel lanes to operate at least at LOS D.
- No three-lane configurations scored higher than LOS E and no two-lane configurations scored higher than LOS F.



Impacts on Potential Traffic Flow

Center- and curb-running alignments of BRT, LRT and modern streetcar were evaluated for each of the six Corridor segments. In summary, center-running configurations are recommended for the following reasons:

- Preserves existing access to adjacent land uses
- Provides travel time advantages by minimizing delays associated with right-turning traffic,
- Minimizes impacts on on-street parking
- Provides separation between transit vehicles and bicycle lanes within the right-of-way.

Curb-running alignments typically:

- Block access to existing adjacent land uses
- Reduce travel time savings and safety due to increased interactions between transit and general traffic
- Create safety concerns because transit vehicles and bicyclists are adjacent to one another.

Agency and Public Opposition

Center-running BRT and rail (modern streetcar and LRT) garnered the most support from the business and developers meetings, web exercises and open houses in January 2010. Additionally, several open house participants who were commuter bicyclists expressed a preference for bike lanes within Michigan/Grand River Avenue.

3.2 Recommendations

The major outcome of the Part 2 evaluation was the elimination of all curb-running alignments from further analysis. The transportation alternatives recommended for detailed evaluation are:

- Improved bus service, as required by the Federal Transit Administration. This alternative will serve as basis of comparison for all other major transit improvements within the Corridor
- Center-running BRT for most of the Corridor
- Center-running LRT for most of the Corridor
- Center-running modern streetcar for most of the Corridor.

All four alternatives will include enhanced landscaping, streetscaping and bike lanes.