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**EAST  
WEST BRT**  
a feasibility study

MILWAUKEE COUNTY EAST-WEST BUS RAPID TRANSIT

Locally Preferred  
Alternative Report

REVISION # 2

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DATE August 12, 2016



**Prepared for:**

Milwaukee County  
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# 1. EXECUTIVE SUMMARY

The East-West Corridor Locally Preferred Alternative (LPA) is a BRT route that will run along Wisconsin Avenue and Bluemound Road from the Downtown Transit Center in Milwaukee through the Milwaukee Regional Medical Campus in Wauwatosa to the Swan Boulevard Park-and-Ride. While the LPA is routed along Wisconsin Avenue in downtown Milwaukee, a hybrid Wells/Wisconsin alignment will be carried forward into the next project phase as a back-up alternative, should it be determined that there are serious operational or infrastructure issues that would occur because of BRT along Wisconsin.

**The Locally Preferred Alternative**  
**Length:** 9.0 miles  
**Number of Stations:** 19  
**Frequency of Service:**  
 Every 10 minutes (peak)  
 Every 15 – 30 minutes (off-peak)  
**Number of BRT Vehicles:** 12  
**Capital Costs:** \$ 42M - \$ 48M  
**Annual Operating Cost:** \$ 3.7 M  
**Average Daily Ridership:**  
 19,500 – 23,500  
 (+40% over existing corridor ridership)  
**Station Area Population:** 47,000  
**Station Area Jobs:** 120,000  
**Key Station Area Demographics:**  
 Zero-Car Households: 4,800 (23%)  
 Residents below the Poverty Line: 12,700 (26%)  
 Residents of Color: 19,700 (40%)

While the alignment and stations have been determined, the specific runningway type (curbside, center or mixed traffic) will be decided during the subsequent environmental clearance and engineering phases of this project. Carrying these runningway options forward will enable the community to better understand the benefits and impacts of each and will help to inform the detailed design and decision-making process.

The East-West BRT will operate more frequently and with more reliability than the current bus service. This improved service will accommodate increasing demand for connectivity within and through the East-West Corridor and encourage local residents to consider transit as an attractive daily alternative to driving.

The LPA (see Figure 1-1) was selected based on a thorough technical analysis as well as feedback from the public and guidance and input from the Stakeholder Advisory Group, and

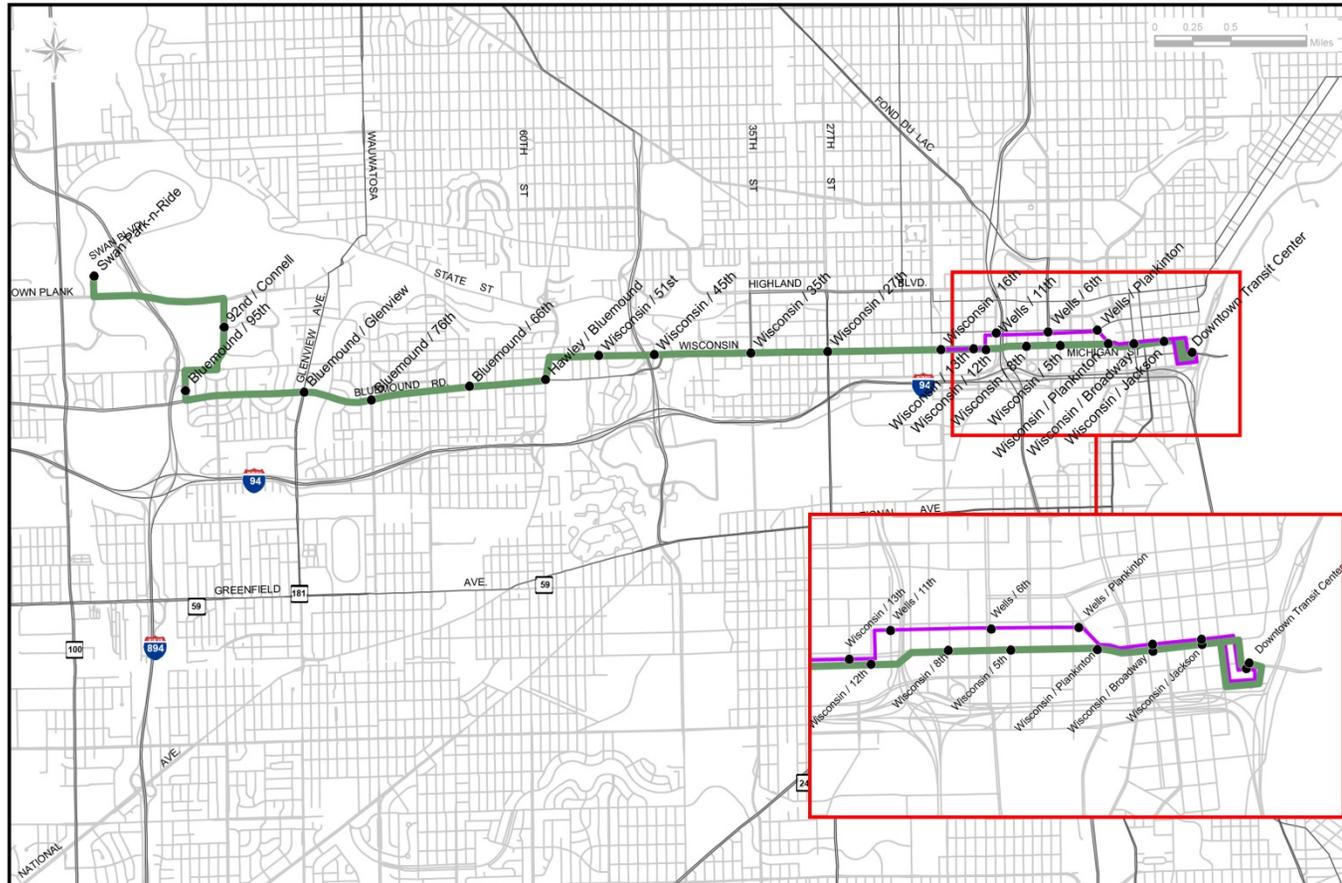
city and county committees. It is also responsive to the transportation needs that were defined in the project Purpose and Need Statement (available under separate cover):

- To reduce vehicle traffic volume, alleviate traffic congestion, and provide a reliable travel option unaffected by congestion in the Milwaukee area's most heavily travelled and congested travel corridor.
- To reduce transportation energy consumption and air pollutant emissions.
- To mitigate and operate as a viable alternative to the extreme traffic congestion which may be expected for multiple years during the reconstruction of the East-West Freeway.
- To provide those without an automobile real access to jobs, healthcare, education, and other elements of daily life.
- To provide a transit alternative that will be an attractive choice for those who own an automobile and currently choose to travel by automobile in the East-West Corridor.
- To efficiently serve the substantial travel demand of the Milwaukee Regional Medical Center and the Milwaukee central business district, and to accommodate and encourage their planned aggressive growth.
- To encourage new, denser, mixed-use development and redevelopment.
- To provide the transit element of the identified multi-modal improvements as recommended in the current and previous regional transportation plans.

The key outcomes of the alternative development and evaluation process were:

- **Optimize station locations.** By reducing the number of stations and integrating dedicated lanes / transit-signal priority, the LPA will offer measurable time savings for transit trips in the corridor. Station locations were also designed to facilitate connections to the existing transit network to optimize connectivity and mobility throughout the MCTS network.
- **Maximize use of dedicated lanes.** A goal of this project is to maximize the use of dedicated lanes throughout the corridor as a means to increase reliability, reduce travel times, and catalyze economic development. There may, however, be portions of the corridor where dedicated lane operations would have adverse impacts; in those areas, the BRT would operate in mixed traffic. Design details will be developed in coordination with corridor stakeholders during the next project phase.
- **Minimize impacts to traffic and parking.** Feedback from members of the public, project committees, and elected officials suggest concerns regarding the potential impact of dedicated lane operations on parking and traffic. As previously discussed, design details – including the use of mixed traffic operations in congested/constrained areas – will be developed in coordination with corridor stakeholders during the next project phase.

Figure 1-1: The Locally Preferred Alternative



# 2. INTRODUCTION

## 2.1 Project Overview

Milwaukee County and its partners conducted a feasibility study to evaluate transit investment in the seven-mile East-West Corridor connecting major employment and activity centers between downtown Milwaukee, the Milwaukee Regional Medical Center (MRMC), and Milwaukee County Research Park (MCRP). Completing the feasibility study is a first step towards applying for funding through the Federal Transit Administration’s (FTA) Small Starts program.

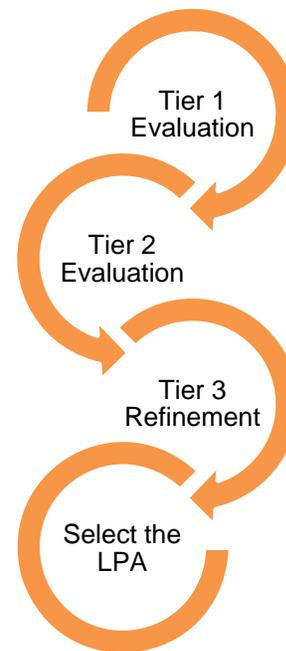
Figure 2-1: East-West Study Corridor



## 2.2 Project Process

In order to evaluate the initial group of transit modes and alignment options and identify the appropriate mode-alignment pairings that comprised the detailed alternatives, the East-West Corridor Study followed a three-step method.

- The first step (“Tier 1 Evaluation”) entailed the assessment of each mode and alignment relative to overall implementation viability.
- The second step (“Tier 2 Evaluation”) assessed the mode/alignment pairings that passed the Tier 1 Evaluation and compared the benefits and impacts of each.
- The alternative(s) that fared best against the detailed criteria in this second step were identified as Preferred Alternative(s) and further refined in the third step (“Tier 3”). The Locally Preferred Alternative was identified at the conclusion of the third step.



The evaluation criteria associated with each step are a combination of quantitative and qualitative performance measures.

- The Tier 1 Evaluation applied fewer and broader measures, including information from previous corridor/area studies. The analysis largely relied on order-of-magnitude estimates and the outcomes of similar transit projects from around the country.
- The Tier 2 Evaluation applied more detailed and alternative-specific evaluation results.
- The Tier 3 Evaluation evaluated the Preferred Alternative(s) against federal criteria to identify and refine the Locally Preferred Alternative.

This three-step process resulted in the identification of an LPA that not only meets locally-identified project purpose and needs, but is also competitive for federal funding.

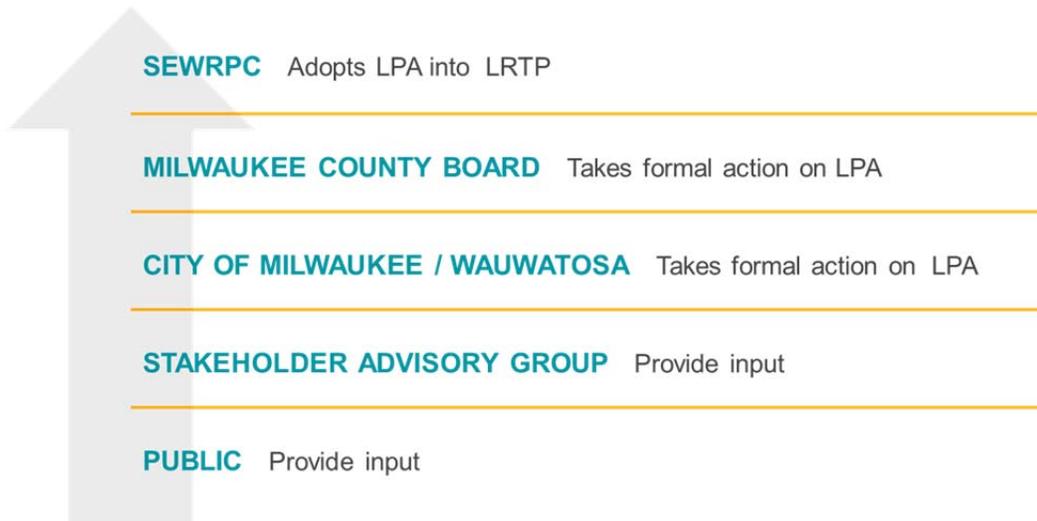
## 2.3 Project Decision-Making

The project was led by Milwaukee County and was supported by a Stakeholder Advisory Group (SAG) that provided technical guidance and policy oversight. The SAG worked with

Milwaukee County and community stakeholders to develop a Locally Preferred Alternative that is responsive to local need for transportation investment within the East-West corridor while being competitive for federal capital funding.

The LPA was recommended by the project team to the Cities of Milwaukee and Wauwatosa in June 2016. The City of Wauwatosa Common Council approved the LPA and recommended it to the Milwaukee County Board in June 2016; the City of Milwaukee Common Council approved the LPA and recommended it to the Milwaukee County Board in July 2016. The Milwaukee County Board then approved the LPA and recommended its inclusion in the Southeast Wisconsin Regional Planning Commission 2035 Regional Transportation Plan in August 2016.

**Figure 2-2: East-West Corridor Study Decision-Making Process**



## 2.4 Summary of Public Involvement

Milwaukee County has engaged the public throughout the feasibility study with public information meetings, in person meetings, an advisory group, and online platforms in order to share study progress and receive input on the alternative development and evaluation process.

As part of the public engagement program, Milwaukee County hosted three open house-style Public Involvement Meetings (PIMs) in April and May 2016, connected with Title VI groups,

neighborhood and community groups, Business Improvement Districts (BIDs), business groups, educational and healthcare institutions, employers, and elected officials. A Stakeholder Advisory Group (SAG) comprised of institutional, governmental and stakeholder representatives, has met three times to review the analyses and provide study guidance and feedback. The Stakeholder Advisory Group also served as a conduit of study information back to their constituencies.

Milwaukee County engaged in over 70 individual stakeholder meetings, including briefings for two dozen local officials and neighborhood meetings. The County used an email contact list of hundreds of local third-party organizations and individuals in order to expand the reach of the study. These third-party representatives included neighborhood associations, business improvement districts, educational institutions, local organizations, and engaged citizens who, in turn, provided study information to their respective constituencies. The study also conducted outreach to Title VI organizations representing groups like minorities, low-income residents, the elderly, persons with limited English proficiency and persons with disabilities.

Milwaukee County held three public information meetings for the feasibility study on April 12<sup>th</sup>, April 14<sup>th</sup>, and May 18<sup>th</sup> of 2016. In total, 308 people attended the meetings, which were held in the east, west, and central portions of the corridor in Downtown Milwaukee, at the Zoofari Conference Center in Wauwatosa, and at Marquette University respectively. In addition to spoken comments and questions during the meetings, 113 written comments were received from the public. Of those comments, 44 percent supported BRT in Milwaukee, 19 percent were neutral, and 37 percent were opposed. Comments from the Downtown Milwaukee meeting were the most positive (83 percent positive or neutral) compared to the Marquette (63 percent) and Wauwatosa (56 percent) meetings. The range of topics was quite broad and included safety for pedestrians and bicyclists, traffic and parking, integration with existing bus service, funding, dedicated versus shared lanes and disruption to existing neighborhoods. The feedback favored Wisconsin Avenue for the downtown alignment and including dedicated lanes wherever possible.

Finally, Milwaukee County developed and maintained a dedicated website (EastWestBRT.com) to share study information and provide an additional opportunity for the public to provide feedback. The study has received 85 online comments (as of June 20, 2016), of which more than half were in support of BRT, about 33 percent neutral, and 16 percent against. While the range of topics covered was similar to the public meetings, as the study has developed the online comments have grown increasingly positive. Since the May

18<sup>th</sup> public meeting, 80 percent of the online comments have been either positive or neutral about the BRT feasibility study.

## 3. PROJECT PURPOSE AND NEED

### 3.1 Project Purpose and Need

The purpose of the East-West Corridor Study is to identify and implement the transit investment strategy that will accommodate anticipated growth in travel demand and mitigate congestion within the corridor, support mobility options that match emerging demographic trends and preferences within the corridor, leverage the existing transportation infrastructure to expand network capacity and personal mobility within the corridor, and encourage sustainable development patterns that reduce reliance on single-occupant vehicles.

This Purpose and Need Statement identifies several needs in the corridor, which are summarized below.

- To reduce vehicle traffic volume, alleviate traffic congestion, and provide a reliable travel option unaffected by congestion in the Milwaukee area's most heavily travelled and congested travel corridor.
- To reduce transportation energy consumption and air pollutant emissions.
- To mitigate and operate as a viable alternative to the extreme traffic congestion which may be expected for multiple years during the reconstruction of the East-West Freeway (IH 94) between S. 70<sup>th</sup> and S. 16<sup>th</sup> Streets.
- To provide those without an automobile real access to jobs, healthcare, education, and other elements of daily life.
- To provide a transit alternative that will be an attractive choice for those who own an automobile and currently choose to travel by automobile in the East-West Corridor.
- To efficiently service the substantial travel demand of the Milwaukee Regional Medical Center, and to accommodate and encourage its planned aggressive growth.
- To efficiently serve the substantial travel demand of the Milwaukee central business district, and to accommodate and encourage its planned aggressive growth.
- To encourage new, denser, mixed-use development and redevelopment—which results in more efficient public infrastructure and services and lower energy use per household.

- To provide the transit element of the identified multi-modal improvements needed to address the existing and forecast long-range future travel demand in the East-West Corridor as recommended in the current and previous regional transportation plans.

### 3.2 Goals and Objectives

The following four goals and related objectives have been established for the East-West Corridor. These have been utilized for the development of evaluation criteria used in comparing the alternative transit investment options for the corridor.

**Table 3-1: East-West Corridor Goals and Objectives**

| Goal   | Objectives   |
|--|--|
| Increase the efficiency, attractiveness and utilization of transit for all users                 | <ul style="list-style-type: none"> <li>■ Provide reliable, frequent service that improves the experience of existing customers and attracts “choice” riders</li> <li>■ Provide capacity for future growth in transit ridership</li> <li>■ Provide enhanced passenger amenities and infrastructure</li> </ul>   |
| Efficiently manage the forecasted increase in corridor travel demand                             | <ul style="list-style-type: none"> <li>■ Provide frequent, high-capacity, one-seat transit connections between key East-West Corridor activity generators</li> <li>■ Manage increasing corridor travel demand through more efficient use of the existing transportation network</li> <li>■ Contribute to acceptable levels of traffic operations and parking supply in the corridor</li> <li>■ Improve pedestrian and bicycle connections to East-West Corridor transit</li> <li>■ Coordinate with existing and planned transit services</li> </ul>      |
| Contribute to a socially-, economically-, and environmentally-sustainable transportation network | <ul style="list-style-type: none"> <li>■ Promote a more efficient and sustainable transportation system that reduces energy usage, emissions, and costs of living</li> <li>■ Increase mobility and accessibility for transit-dependent populations</li> <li>■ Support regional planning efforts for a more balanced, multi-modal transportation network in the region</li> <li>■ Support local and regional goals for compact, mixed-use development along the corridor</li> <li>■ Support institutional and key stakeholder planning efforts</li> </ul> |

| Goal  | Objectives   |
|---|--|
| Develop and select an implementable and community-supported project | <ul style="list-style-type: none"> <li>■ Define and select transit improvements with strong public, stakeholder and agency support</li> <li>■ Define and select transit improvements that are cost-effective and financially feasible, both in the short- and long-term</li> <li>■ Define and select transit improvements that are competitive for Federal Transit Administration funding</li> </ul> |

### 3.3 Evaluation Criteria

The table below presents the evaluation criteria used during the alternatives evaluation. Note that each successive step links to the overall goals established for the study, and builds upon the criteria from the previous step, ensuring a consistent rating throughout.

**Table 3-2: Evaluation Criteria**

| Project Goals  | Evaluation Phases                                      |  |
|--|--|--|
|  | Tier 1<br>(qualitative analysis)                       | Tier 2<br>(qualitative and quantitative)   |
| Increase the efficiency, attractiveness and utilization of transit for all users | Typical ridership capacity<br>Service reliability      | Ridership<br>Transit travel times  |
| Efficiently manage the forecasted increase in corridor travel demand             | Connectivity between population and employment centers | Traffic impacts<br>Parking impacts<br>Potential right-of-way impacts<br>Bicycle and pedestrian impacts |

| Evaluation Phases  |   |  |
|--|---|--|
| Project Goals  | Tier 1<br>(qualitative analysis)                      | Tier 2<br>(qualitative and quantitative)                     |
| Contribute to a socially-, economically-, and environmentally-sustainable transportation network | Environmental impacts (visual, natural)               | Station area population and employment densities             |
|  | Demonstrated ability to catalyze economic development | Station area equity characteristics                          |
|  | Consistency with existing corridor character          | Station area land use and economic development opportunities |
|  | Compatibility with local and regional plans           | Environmental impacts/benefits                               |
| Develop and select an implementable and community-supported project                              | Typical per-mile capital cost                         | Capital and operating and maintenance costs                  |
|  | Community support                                     | Cost effectiveness   |
|  |   | Community support  |

## 4. THE TIER 1 ANALYSIS

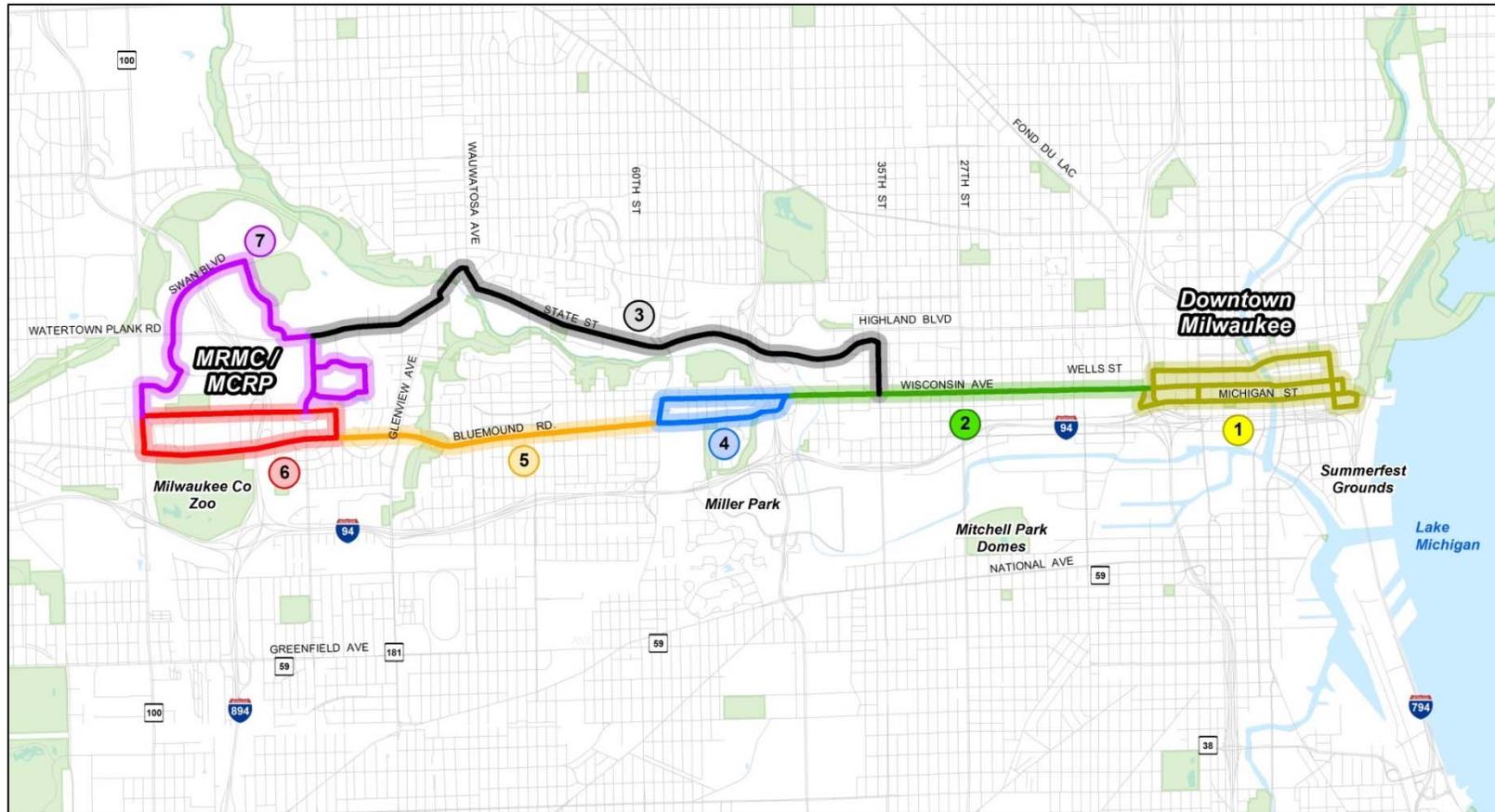
The Tier 1 Analysis was structured to efficiently identify the alternatives that do not meet the project purpose and need or goals and objectives, and to remove them from further consideration in future phases of the project. This initial level of screening focused on two areas:

- Transit modes
  - No Build (existing system and any committed improvements), BRT, modern streetcar, light rail, and commuter rail
- Alignments
  - Seven segments, as shown in Table 4-1 and Figure 4-1.

**Table 4-1: East-West Corridor Tier 1 Alignment Segments**

| Segment Boundaries                        | Potential Alignments                                |
|---|---|
| Downtown                                  | Wisconsin Avenue<br>Michigan Street<br>Wells Street |
| 10th Street to 45th Street                | Wisconsin Avenue                                    |
| State Street                              | State Street  |
| 45th Street to Hawley Road                | Wisconsin Avenue<br>Bluemound Road                  |
| Hawley Road to 89th Street                | Bluemound Road                                      |
| 89th Street to Highway 100 / Mayfair Road | Wisconsin Avenue<br>Bluemound Road                  |
| MPMC / MCRP / Swan Boulevard / Mayfair Rd | --  |

**Figure 4-1: East-West Corridor Segments for Tier 1 Evaluation**



The analysis followed a two-step process: first, transit modes were subjected to evaluation; second, the alignments were subjected to evaluation.

This initial screening is intended to rely on readily available information and focus on high-level, qualitative assessment of modal and alignment options as a means to evaluate a comparatively large number of alternatives. A series of evaluation criteria were developed to assess each alternative's ability to meet the stated project purpose and need, and its ability to ultimately be competitive for federal funding. Each of the modal and alignment options were evaluated against the criteria and rated as "pass" or "fail."

The performance of the alternatives against each evaluation criteria was then aggregated, and an overall assessment of "pass" or "fail" was assigned to each alternative. An alternative that received one or more "fail" rankings was assigned an overall assessment of "fail." An overall assessment of "fail" means that the mode or alignment does not meet the stated purpose and need for the East-West Corridor Study and will not be carried forwarded into more detailed definition and evaluation project phases, but may meet the needs of future studies conducted in the area and region.

## 4.1 Screening of Modes

Table 4-2 summarizes the results of the initial screening of modes. Modes with one or more “fail” rating were removed from further definition and evaluation in subsequent phases of the study. As shown in Table 4-3, the BRT was recommended for more detailed definition and evaluation in subsequent project phases.

**Table 4-2: Summary Results of the Tier 1 Screening of Modes**

| Tier 1 Mode Evaluation Criteria |                            |                                 |                       |   |  |   |                                |
|---------------------------------|----------------------------|---------------------------------|-----------------------|---|--|---|--------------------------------|
| Mode / Alternative              | Typical Ridership Capacity | Typical Service Characteristics | Environmental Impacts | Demonstrated Ability to Catalyze Economic Development | Consistency with Existing and Planned Corridor Character | Compatibility with Local and Regional Plans | Typical Per-Mile Capital Costs |
| Bus Rapid Transit               | Pass                       | Pass                            | Pass                  | Pass  | Pass   | Pass  | Pass                           |
| Streetcar                       | Pass                       | Pass                            | Pass                  | Fail  | Pass   | Fail  | Fail                           |
| Light Rail                      | Fail                       | Pass                            | Fail                  | Pass  | Fail   | Fail  | Fail                           |
| Commuter Rail                   | Fail                       | Fail                            | Fail                  | Fail  | Fail   | Fail  | Pass                           |

### 4.1.1 Modes Recommended for Detailed Definition and Evaluation

The failure of Streetcar, Light Rail and Commuter Rail from further consideration as part of the East-West Corridor Study is not intended to indicate that these modes should not be considered and recommended as investments in other corridors throughout the region. Their deferment reflects that these modes are not a good match to the East-West Corridor’s stated purpose and need. In future years, these modes may become appropriate for detailed consideration within the East-West Corridor.

**Table 4-3: Modes for Detailed Evaluation**

| Mode / Alternative | Assessment |
|--------------------|------------|
| Bus Rapid Transit  | Pass       |
| Streetcar          | Fail       |
| Light Rail         | Fail       |
| Commuter Rail      | Fail       |

The detailed mode alternatives include:

- No Build (no changes to the existing transit service beyond planned and financially committed improvements)
- BRT in Mixed Traffic
- BRT in Dedicated Curb Lane
- BRT in Dedicated Center Lane

Table 4-4 shows the typical characteristics of BRT, the mode that was carried forward into the Tier 2 Detailed Definition and Evaluation of Alternatives.

**Table 4-4: Typical Characteristics of BRT**

| Mode | Typical Characteristics   | Example Services   |
|------|---|--|
| BRT  | <ul style="list-style-type: none"> <li>• Mixed traffic with transit signal priority or exclusive bus lanes</li> <li>• Level boarding at high-quality stations</li> <li>• 40- to 60-foot buses that have multiple doors, sleek styling, and onboard visual/automated next stop announcements</li> <li>• Wide stop spacing (typically half to one mile) and frequent, seven-day-a-week service</li> <li>• Branded service through use of a distinct name, logo, color scheme, bus wrap, and set of visual identifiers</li> <li>• Off-board fare payment</li> <li>• Transit signal priority</li> <li>• “Real time” bus arrival information available at stations and through web/mobile apps on desktop computer or smartphone</li> <li>• Typical corridor length of five to 20 miles</li> <li>• Vehicle carries approximately 50-90 riders (depending on length of bus)                             <ul style="list-style-type: none"> <li>○ Cost: \$5 – \$30 million per mile; \$500,000 to \$1,200,000 per vehicle</li> </ul> </li> </ul> |  <p data-bbox="1097 634 1360 667">Kansas City, MO MAX</p> |

## 4.2 Screening of Alignments

Table 4-5 summarizes the results of the initial screening of alignments. Alignments with one or more “fail” overall ratings were removed from further definition and evaluation in subsequent phases of the study. As shown in Table 4-6, the Downtown, 10<sup>th</sup> to 45<sup>th</sup> Street, 45<sup>th</sup> to Hawley Road, Hawley Road to 89<sup>th</sup> Street, and 89<sup>th</sup> to Highway 100/Mayfair Road segments were recommended for more detailed definition and evaluation in subsequent project phases.

The MRMC / MCRP / Swan Boulevard / Mayfair Road segment (as currently configured) does not achieve the balance of access and ridership; because it is critical that the East-West Corridor include a direct connection to the MRMC campus, a revised alignment was studied during the Tier 2 definition and evaluation of alternatives.

**Table 4-5: Summary of the Tier 1 Alignment Evaluation Results**

| Tier 1 Evaluation Alignment Results       |                                       |                       |  |
|---|---------------------------------------|-----------------------|--|
| Segment Boundaries                        | Engineering / Operational Feasibility | Environmental Impacts | Consistency with Existing and Planned Corridor Character |
| Downtown                                  | Pass                                  | Pass                  | Pass   |
| 10th Street to 45th Street                | Pass                                  | Pass                  | Pass   |
| State Street                              | Fail                                  | Pass                  | Fail   |
| 45th Street to Hawley Road                | Pass                                  | Pass                  | Pass   |
| Hawley Road to 89th Street                | Pass                                  | Pass                  | Pass   |
| 89th Street to Highway 100 / Mayfair Road | Pass                                  | Pass                  | Pass   |
| MRMC / MCRP / Swan Boulevard / Mayfair Rd | Fail                                  | Pass                  | Pass   |

**Table 4-6: Alignments for Detailed Definition and Evaluation**

| Segment Boundaries                        | Assessment |
|---|------------|
| Downtown                                  | Pass       |
| 10th Street to 45th Street                | Pass       |
| State Street                              | Fail       |
| 45th Street to Hawley Road                | Pass       |
| Hawley Road to 89th Street                | Pass       |
| 89th Street to Highway 100 / Mayfair Road | Pass       |
| MRMC / MCRP / Swan Boulevard / Mayfair Rd | Fail       |

## 5. DETAILED DEFINITION OF ALTERNATIVES

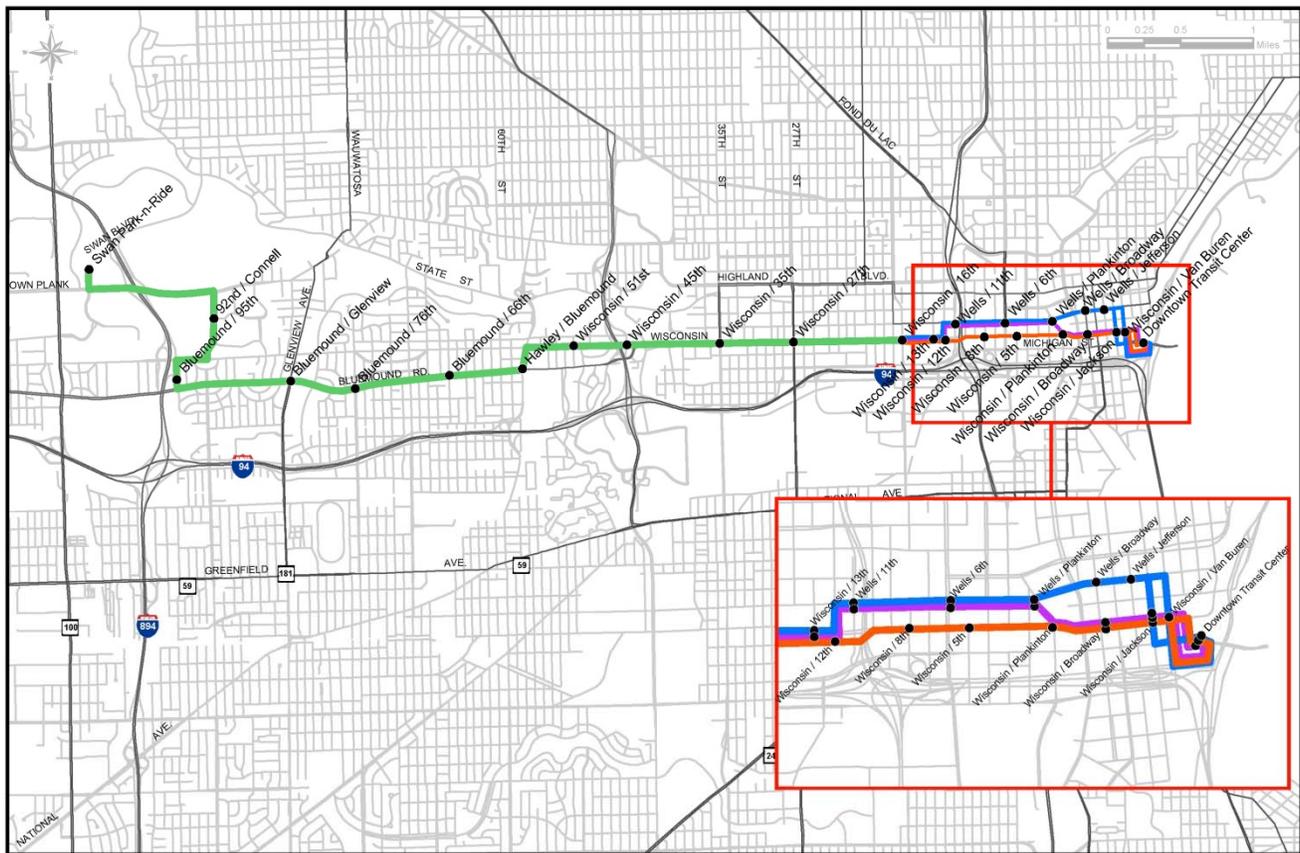
The Detailed Definition of Alternatives report (available under separate cover) defined the key physical and service elements of the transit alternatives that advanced through the Tier 1 screening of the East-West Corridor Study and were evaluated during the detailed evaluation of alternatives project phase. These detailed alternatives are summarized below.

### 5.1 Alternatives for Detailed Definition

Figure 5-1 illustrates the alignment options that were studied during the initial screening phase and recommended for detailed development:

- Downtown (Downtown Transit Center to approximately 12th Street)
  - Michigan Street
  - Wisconsin Avenue
  - Wells Street
- Wisconsin Avenue (from approximately 12th Street to Hawley Road)
- Bluemound (from Hawley Road to 95th Street)
- 95th Street (Bluemound Road to Wisconsin Avenue)
- Wisconsin Avenue (95th Street east to 92nd Street)
- 92<sup>nd</sup> Street (Wisconsin Avenue north to Watertown Plank Road)
- Watertown Plank Road (92<sup>nd</sup> Street west to the Swan Park-and-Ride)

**Figure 5-1: Alignments for Detailed Definition and Evaluation**



All alignments are combined with the modes that moved forward from the Tier 1 evaluation. These modes are listed below:

- No Build (no changes to the existing transit service beyond planned and financially committed improvements)
- BRT in Mixed Traffic
- BRT in Dedicated Curb Lane
- BRT in Dedicated Center Lane

The combination of the modes and alignments creates the alternatives that were evaluated in the Tier 2 Analysis.

## 5.2 Key Physical and Service Elements

For purposes of estimating cost and ridership and assessing impacts and benefits, this study defines the detailed alternatives based on the categories below.

- Service plan
- Stop spacing
- Stop facilities
- Runningways
- Transit vehicles
- Technology and customer information
- Identity and branding
- Maintenance facility

### 5.2.1 No Build Alternative

There would be no changes to the physical and service elements in the No Build Alternative.

### 5.2.2 BRT in Mixed Traffic

The BRT in Mixed Traffic Alternative includes substantial changes to the service plan, vehicles and technology used within the East-West Corridor, but – like the current MCTS service and the No Build Alternative – will operate in mixed traffic throughout the corridor.

### 5.2.3 BRT in a Dedicated Curb Lane

The BRT in Dedicated Curb Lane would include the service, vehicular, and technology improvements of the BRT in Mixed Traffic Alternative, but would operate in a curbside lane that is exclusively dedicated to transit service either at peak hour or 24 hours a day, seven days a week. Dedicated lane operations will offer many operational benefits, including reduced travel times, improved service reliability and reduced bus stacking.

### 5.2.4 BRT in a Dedicated Center Lane

Like the BRT in Dedicated Curb Lane Alternative, the BRT in Dedicated Center Lane Alternative will operate in a lane that is exclusively dedicated to transit service either at peak hour or 24 hours a day, seven hours a week – but the BRT in Dedicated Center Lane Alternative will operate in a center-running (rather than side-running) lane.

## 5.3 Detailed Alignment Alternatives

For purposes of the detailed definition and evaluation phase, it was assumed that each mode alternative will maintain consistent runningway operations for the length of the corridor. For instance, the BRT in a Dedicated Curb Lane will operate in a bus-only lane constructed along the curb for all segments. It is also assumed that dedicated lane operations could be either curb- or center-running, and those lanes could either be converted from existing traffic use or newly constructed.

The characteristics of each detailed alternative are summarized in Table 5-1 below.

**Table 5-1: Summary of Detailed Alternatives**

| Characteristic  | No Build  | BRT in Mixed Traffic  | BRT in Dedicated Curb Lane | BRT in Dedicated Center Lane |
|-----------------|---|---|----------------------------|------------------------------|
| Service Plan    | Same as existing bus routes / services          | Substantial increase in service levels throughout the week (i.e., more frequent weekday service and weekend service)  |                            |                              |
| Stop Spacing    | No changes to existing stop location or spacing | Station locations altered to maximize ridership activity and community development impact<br>Fewer overall stations for rapid transit line<br>Stations generally spaced a half-mile to 1 mile apart<br>Underlying local bus service present |                            |                              |
| Stop Facilities | No changes from existing                        | Station shelters and associated facilities to include level boarding, customer information, seating, and other features   |                            |                              |

| Characteristic                    | No Build                                   | BRT in Mixed Traffic   | BRT in Dedicated Curb Lane   | BRT in Dedicated Center Lane   |
|-----------------------------------|--|--|--|--|
| Runningway                        | Operates in mixed traffic                  |  | Operates in dedicated side-running lane throughout corridor<br>An existing traffic lane could be converted to transit-only use | Operates in dedicated center-running lane throughout corridor<br>An existing traffic lane could be converted to transit-only use |
| Transit Vehicles                  | Uses existing 40-foot bus vehicles         | Uses 40- or 60-foot articulated buses with right-door loading  | Uses 40- or 60-foot articulated buses with right- and/or left-door loading   |  |
| Technology / Customer Information | Uses existing technology and customer info | Integration of next-bus variable message signs at stations, online/mobile customer information, and traffic-signal priority for bus vehicles in the corridor |  |  |
| Identity / Branding               | No modifications to service branding       | Unique identity and branding elements integrated into vehicles, stations and associated service materials  |  |  |
| Maintenance Facility              | Utilizes existing maintenance facility     |  |  |  |

## 6. TIER 2 - DETAILED EVALUATION OF ALTERNATIVES

A combination of quantitative and qualitative evaluation criteria were used to assess the degree to which each of the detailed alternatives meets the project goals, as stated in the project Purpose and Need Statement. The results of the Detailed Evaluation Tier 2 Analysis are available under separate cover in a series of six technical memos and a summary report. A high level summary of the results is presented in Tables 6-1 and 6-2 below.

**Table 6-1: Summary of Detailed Evaluation Results by Alternative**

|   | Alternative 1:<br>via Wisconsin | Alternative 2:<br>via Wells | Alternative 3:<br>Hybrid |
|---|---------------------------------|-----------------------------|--------------------------|
| <b>Average Weekday Ridership (2035)</b>       |                                 |                             |                          |
| BRT   | 14,350                          | 13,900                      | 13,900                   |
| Corridor                                      | 32,500                          | 32,000                      | 31,700                   |
| Linked Trips on Project                       | 21,500                          | 21,350                      | 20,900                   |
| New Riders                                    | 8,350                           | 8,250                       | 8,000                    |
| O&M Costs                                     | \$3.70 M                        | \$ 3.78 M                   | \$ 3.75 M                |
| <b>Station Area Population and Employment</b> |                                 |                             |                          |
| 2010 Population                               | 46,600                          | 48,500                      | 47,100                   |
| 2035 Population                               | 53,500                          | 56,000                      | 54,250                   |
| 2010 Population Density (per sq. mile)        | 5,800                           | 5,950                       | 5,800                    |
| 2035 Population Density (per sq. mile)        | 6,650                           | 6,850                       | 6,700                    |
| Percent Change in Population Density          | 15%                             | 15%                         | 15%                      |
| 2010 Employment                               | 119,200                         | 121,150                     | 120,800                  |
| 2035 Employment                               | 126,100                         | 128,850                     | 128,250                  |
| 2010 Employment Density (per sq. mile)        | 14,800                          | 14,850                      | 14,900                   |
| 2035 Employment Density (per sq. mile)        | 15,650                          | 15,7800                     | 15,850                   |
| Percent Change in Employment Density          | 6%                              | 6%                          | 6%                       |
| <b>Equitable Access to Transit</b>            |                                 |                             |                          |
| Number of Residents below Poverty             | 12,700                          | 13,300                      | 12,950                   |
| Percent of Residents below Poverty            | 26%                             | 26%                         | 26%                      |
| Number of Residents of Color                  | 19,650                          | 20,400                      | 20,100                   |
| Percent of Residents of Color                 | 40%                             | 40%                         | 40%                      |
| Number of Zero-Car Households                 | 4,800                           | 5,250                       | 4,850                    |
| Percent of Zero-Car Households                | 23%                             | 24%                         | 23%                      |
| Development Potential                         | Medium - High                   | Medium - High               | Medium - High            |

|  | Alternative 1:<br>via Wisconsin                  | Alternative 2:<br>via Wells   | Alternative 3:<br>Hybrid      |
|--|--|-------------------------------|-------------------------------|
| <b>Safety</b>                            |  |                               |                               |
| Reduction in Disabling Injuries          | ~11 to 14 fewer disabling injuries every 5 years |                               |                               |
| Reduction in Fatalities                  | ~1 less fatality every 5 years                   |                               |                               |
| <b>Cultural and Historic Impacts</b>     |  |                               |                               |
| Number of Historic Resources             | 84   | 84                            | 84                            |
| Number of Cultural Resources             | 19   | 19                            | 19                            |
| <b>Natural Environment</b>               |  |                               |                               |
| Change in Vehicle Miles Travelled        | -14,237,000 to<br>-17,401,000                    | -14,226,000 to<br>-17,387,000 | -13,762,000 to<br>-16,821,000 |
| Carbon Monoxide (metric tons)            | 200 to 300                                       | 200 to 300                    | 200 to 300                    |
| Mono-Nitrogen Oxides (metric tons)       | 11 to 13   | 11 to 13                      | 10 to 13                      |
| Volatile Organic Compounds (metric tons) | 9 to 10  | 8 to 10                       | 8 to 10                       |
| Particulate Matter (kg)                  | 11 to 14   | 2 to 3                        | 2 to 2                        |
| Greenhouse Gases (metric tons)           | 7,100 to 8,700                                   | 7,100 to 8,700                | 6,900 to 8,400                |
| Energy Use (million Btu)                 | 103,000 to<br>125,000                            | 102,000 to<br>125,000         | 99,000 to 121,000             |

**Table 6-2: Summary of Detailed Evaluation Results by Alternative and Runningway Type**

|                                 | Alternative 1: via Wisconsin   |                     |                       | Alternative 2: via Wells |                     |                       | Alternative 3: Hybrid |                     |                       |
|---------------------------------|--|---------------------|-----------------------|--------------------------|---------------------|-----------------------|-----------------------|---------------------|-----------------------|
|                                 | Mixed Traffic  | Dedicated Curb Lane | Dedicated Center Lane | Mixed Traffic            | Dedicated Curb Lane | Dedicated Center Lane | Mixed Traffic         | Dedicated Curb Lane | Dedicated Center Lane |
| Capital Costs                   | \$ 41.9 M  | \$ 41.7 M           | \$ 47.9 M             | \$ 43.7 M                | \$ 43.4 M           | \$ 48.1 M             | \$42.5 M              | \$42.4 M            | \$ 47.6 M             |
| Cost-Effectiveness              | \$ 0.26 High   | \$ 0.26 High        | \$ 0.31 High          | \$ 0.27 High             | \$ 0.26 High        | \$ 0.31 High          | \$ 0.27 High          | \$ 0.26 High        | \$ 0.32 High          |
| Right-of-Way Impacts            | none   | none                | none                  | none                     | none                | none                  | none                  | none                | none                  |
| Parking Impacts                 |  |                     |                       |                          |                     |                       |                       |                     |                       |
| Number of Existing Spaces       | 1,425  | 1,425               | 1,425                 | 1,536                    | 1,536               | 1,536                 | 1,416                 | 1,416               | 1,416                 |
| Number of Impacted Spaces       | 90   | 232                 | 471                   | 85                       | 278                 | 522                   | 80                    | 216                 | 460                   |
| Percent of Spaces Impacted      | 6%   | 16%                 | 33%                   | 6%                       | 18%                 | 34%                   | 6%                    | 15%                 | 32%                   |
| Traffic Impacts                 | Certain intersections will require mitigation measures to enable the use of dedicated transit lanes; additional detailed traffic analysis will be performed during detailed engineering in the next project phase. |                     |                       |                          |                     |                       |                       |                     |                       |
| Bike and Pedestrian Impacts     |  |                     |                       |                          |                     |                       |                       |                     |                       |
| Impacts on Existing Facilities* | 1  | 1                   | 1                     | 1                        | 1                   | 1                     | 1                     | 1                   | 1                     |
| Compliance with Plans           | yes  | no                  | no                    | yes                      | no                  | no                    | yes                   | no                  | no                    |

\* 0 = No impact  
 1 = Some positive impacts for bicycles and pedestrians  
 2 = Definite positive impacts for bicycles and pedestrians

# 7. THE LOCALLY PREFERRED ALTERNATIVE

## 7.1 Findings

Based on this detailed evaluation of alternatives, an LPA (Figure 7-1) has emerged that is responsive to the need for transportation investment within the corridor (as defined in the Purpose and Need Statement) and which will be competitive for federal funding.

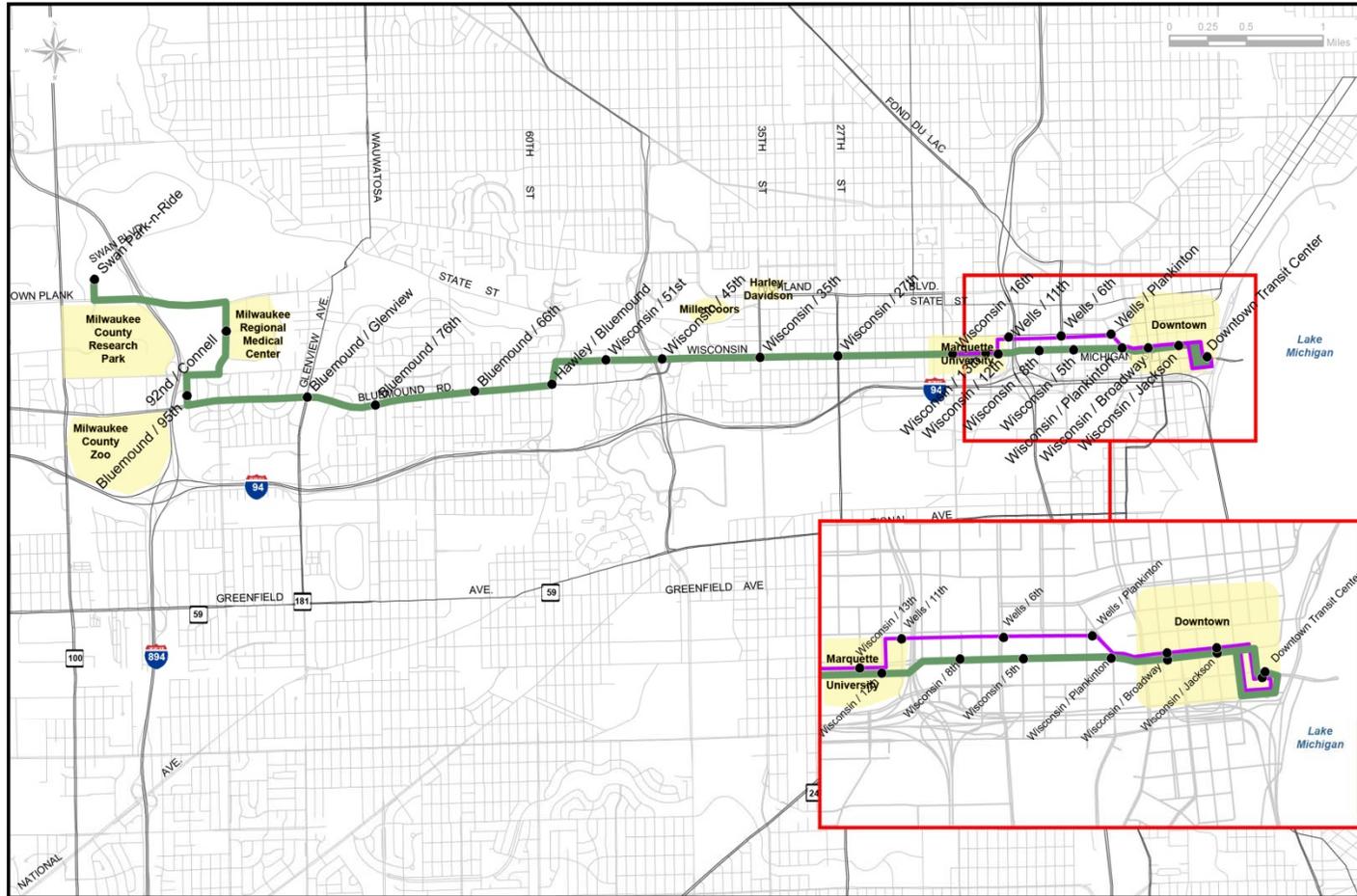
The East-West Corridor Locally Preferred Alternative (LPA) is a BRT route that will run along Wisconsin Avenue and Bluemound Road from the Downtown Transit Center in Milwaukee through the Milwaukee Regional Medical Campus in Wauwatosa to the Swan Boulevard Park-and-Ride. While the LPA is routed along Wisconsin Avenue in downtown Milwaukee, a hybrid Wells/Wisconsin

alignment will be carried forward into the next project phase as a back-up alternative, should it be determined that there are serious operational or infrastructure issues that would occur because of BRT along Wisconsin. Figure 7-2 includes some of the key elements of the LPA.

While the alignment and stations have been determined, the specific runningway type (curbside, center or mixed traffic) will be decided during the subsequent environmental clearance and engineering phases of this project. Carrying these runningway options forward will enable the community to better understand the benefits and impacts of each and will help to inform the detailed design and decision-making process.

**The Locally Preferred Alternative**  
**Length:** 9.0 miles  
**Number of Stations:** 19  
**Frequency of Service:**  
     Every 10 minutes (peak)  
     Every 15 – 30 minutes (off-peak)  
**Number of BRT Vehicles:** 12  
**Capital Costs:** \$ 42M - \$ 48M  
**Annual Operating Cost:** \$ 3.7 M  
**Average Daily Ridership:**  
     19,500 – 23,500  
     (+40% over existing corridor ridership)  
**Station Area Population:** 47,000  
**Station Area Jobs:** 120,000  
**Key Station Area Demographics:**  
     Zero-Car Households: 4,800 (23%)  
     Residents below the Poverty Line: 12,700 (26%)  
     Residents of Color: 19,700 (40%)

Figure 7-1: LPA Alignments and Stations



There are 19 preliminary stop locations and four alternative stop locations; all of which may be modified during the refinement of the preferred alternative and the environmental clearance process. The proposed stations are:

- Downtown Transit Center
- Wisconsin / Jackson
- Wisconsin / Broadway
- Wisconsin / Plankinton
- Wisconsin / 5<sup>th</sup>
- Wisconsin / 8<sup>th</sup>
- Wisconsin / 12<sup>th</sup>
- Wisconsin / 16<sup>th</sup>
- Wisconsin / 27<sup>th</sup>
- Wisconsin / 35<sup>th</sup>
- Wisconsin / 45<sup>th</sup>
- Wisconsin / 51<sup>st</sup>
- Hawley / Bluemound
- Bluemound / 66<sup>th</sup>
- Bluemound / 76<sup>th</sup>
- Bluemound / Glenview
- Bluemound / 95<sup>th</sup>
- 92<sup>nd</sup> / Connell
- Swan Park-n-Ride

The East-West BRT will operate more frequently and more reliability than the current bus service. This improved service will accommodate increasing demand for connectivity within and through the East-West Corridor and encourage local residents to consider transit as an attractive daily alternative to driving.

The LPA was selected based on a thorough technical analysis as well as feedback from the public and guidance and input from the Stakeholder Advisory Group, and city and county committees. It is also responsive to the transportation needs that were defined in the project Purpose and Need Statement (available under separate cover):

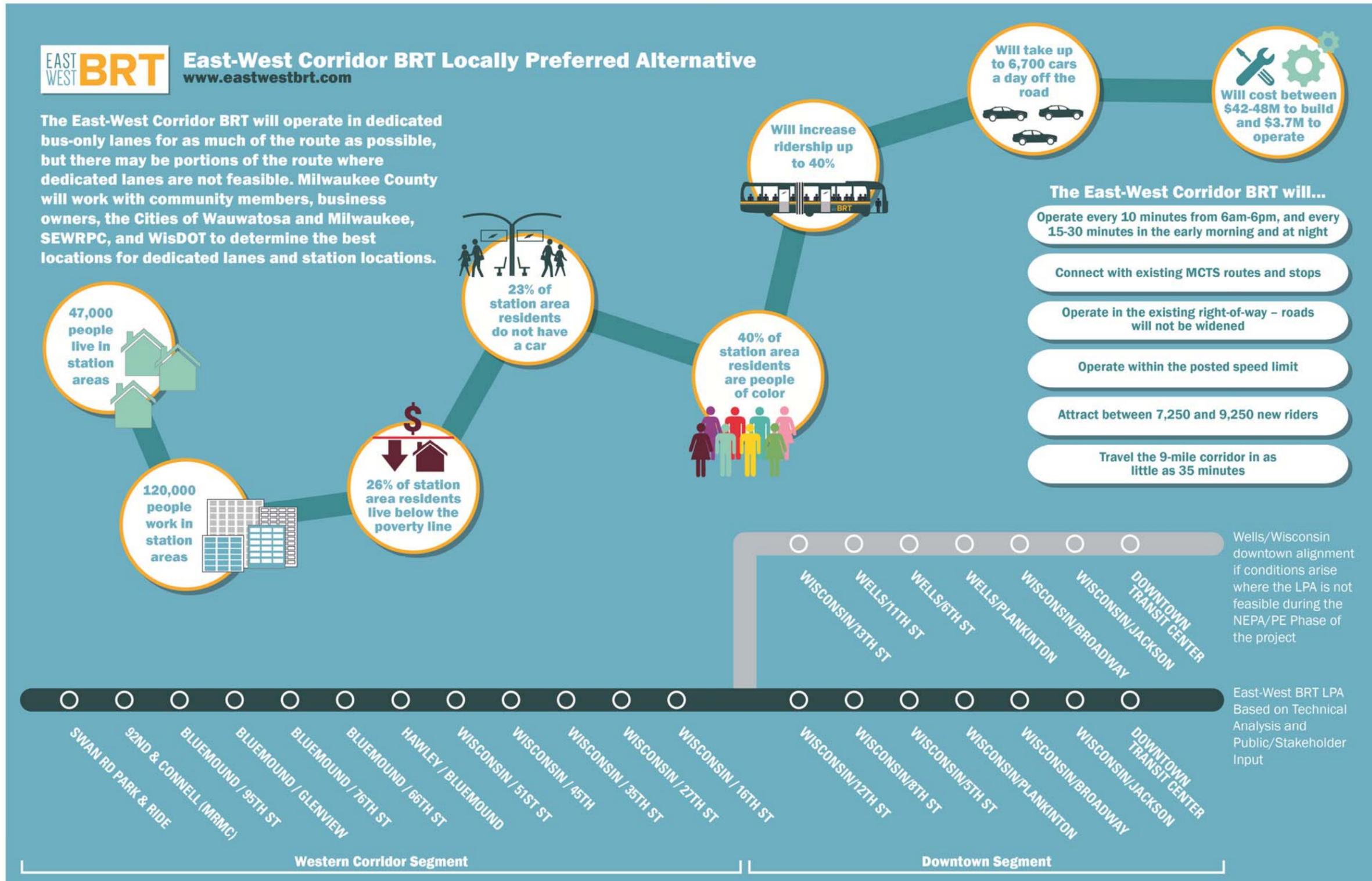
- To reduce vehicle traffic volume, alleviate traffic congestion, and provide a reliable travel option unaffected by congestion in the Milwaukee area's most heavily travelled and congested travel corridor.
- To reduce transportation energy consumption and air pollutant emissions.
- To mitigate and operate as a viable alternative to the extreme traffic congestion which may be expected for multiple years during the reconstruction of the East-West Freeway.
- To provide those without an automobile real access to jobs, healthcare, education, and other elements of daily life.

- To provide a transit alternative that will be an attractive choice for those who own an automobile and currently choose to travel by automobile in the East-West Corridor.
- To efficiently serve the substantial travel demand of the Milwaukee Regional Medical Center and the Milwaukee central business district, and to accommodate and encourage their planned aggressive growth.
- To encourage new, denser, mixed-use development and redevelopment.
- To provide the transit element of the identified multi-modal improvements as recommended in the current and previous regional transportation plans.

The key outcomes of the alternative development and evaluation process were:

- **Optimize station locations.** By reducing the number of stations and integrating dedicated lanes / transit-signal priority, the LPA will offer measurable time savings for transit trips in the corridor. Station locations were also designed to facilitate connections to the existing transit network to optimize connectivity and mobility throughout the MCTS network.
- **Maximize use of dedicated lanes.** A goal of this project is to maximize the use of dedicated lanes throughout the corridor as a means to increase reliability, reduce travel times, and catalyze economic development. There may, however, be portions of the corridor where dedicated lane operations would have adverse impacts; in those areas, the BRT would operate in mixed traffic. Design details will be developed in coordination with corridor stakeholders during the next project phase.
- **Minimize impacts to traffic and parking.** Feedback from members of the public, project committees, and elected officials suggest concerns regarding the potential impact of dedicated lane operations on parking and traffic. As previously discussed, design details – including the use of mixed traffic operations in congested/constrained areas – will be developed in coordination with corridor stakeholders during the next project phase.

Figure 7-2: The Locally Preferred Alternative Infographic



## 7.2 Next Steps

### Approval and Adoption of the LPA

The LPA was recommended by the project team to the Cities of Milwaukee and Wauwatosa in June 2016. The City of Wauwatosa Common Council approved the LPA and recommended it to the Milwaukee County Board in June 2016; the City of Milwaukee Common Council approved the LPA and recommended it to the Milwaukee County Board in July 2016. The Milwaukee County Board then approved the LPA and recommended its inclusion in the Southeast Wisconsin Regional Planning Commission 2035 Regional Transportation Plan in August 2016.

### National Environmental Policy Act

Milwaukee County Transit Service has begun preliminary work to ensure the compliance with the National Environmental Policy Act (NEPA). The first step in this process will be to work with the FTA to make a Class of Action (COA) Determination. At this time it is anticipated that the COA for this project will either be a Categorical Exclusion (CE) or an Environmental Assessment (EA). The COA will depend upon the final LPA and the potential impacts of the LPA. Milwaukee County anticipates receiving a COA determination in fall 2016.

The COA will affect the estimated time required to complete the appropriate NEPA documentation. A CE would likely take approximately six months to complete, wrapping up in the late summer or early fall 2017. However, an EA is anticipated to take longer, approximately one year, and would be completed in the winter of 2017/2018.

### Request to Enter Small Starts Project Development

It is anticipated that the East-West BRT Feasibility Study project will be funded through a portion of the FTA's Capital Investment Program, commonly known as Small Starts. This requires Milwaukee County to request entry into the Small Starts Project Development program from the FTA. This can be done either during or following the completion of the NEPA process. The anticipated timeline for the Small Starts application is outlined below:

- Request to enter Project Development: July 2016
- FTA review request to enter Project Development: July - August 2016

- Request to rating and inclusion in FY 2018 budget: September 2, 2016
- FTA review request for include in FY 2018 budget: September 2016 – February 2017
- Congress approval of budget: February 2017 – September 2017
- Negotiate/sign Small Starts Grant Agreement: October 2017 – February 2018

### **Small Starts Project Development**

During Small Starts Project Development, Milwaukee County will complete the requirements of the NEPA process, conduct final engineering, and vehicle procurement. The final design will be developed from the Preliminary Engineering completed for NEPA and include preparing the final plans, specifications and bid package for construction of the project.

### **Grant Agreement / Construction**

Milwaukee County will work with the FTA to develop a Grant Agreement, with the grant anticipated in winter 2017/2018. A Grant Agreement is the means by which the FTA provides funds for the capital costs of Small Starts projects. It will identify the maximum federal share and capital cost for the project.

Upon receipt of the Grant Agreement, Milwaukee County will begin the construction of the East-West Corridor in late spring 2018. The proposed construction schedule is outlined below:

- Prepare bid documents: December 2017 – February 2018
- Procurement: March 2018 – April 2018
- Construction: May 2018 – August 2019
- Testing: September 2019 – December 2019

### **Project Funding**

The funding for the East-West BRT Corridor project will likely require a combination of federal and state funding. These funding sources will likely include FTA Small Starts funds and matching funds from Milwaukee County. However, throughout the NEPA and Project Development phases, Milwaukee County will continue to explore additional funding sources. These additional sources include, but are not limited to, using WisDOT traffic mitigation funding before and during the construction of the I-94 East-West corridor, as discussed in the

### I-94 East-West Final Environmental Impact Statement - 3.9.6 Interstate Investment effects on Transit.

May 26, 2016 the Milwaukee County Board approved \$2.19 million to advance the project through NEPA and Final Design. An amendment to include this funding in the *Transportation Improvement Plan* was unanimously approved by the SEWRPC, July 28, 2016.