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March 12, 2012

Mr. Chris Petykowski, P.E.
City of Madison
Department of Public Works
Engineering Division
City-County Building, Room 115
210 Martin Luther King, Jr. Boulevard
Madison, WI 53703

Re: East Johnson Street Traffic Study

Dear Mr. Petykowski:

Enclosed is the East Johnson Street Traffic Study (EJSTS) draft report. Please provide your review comments at your earliest convenience. We will make the necessary changes prior to the report's entry into the City of Madison's Legistar system.

Please call with any questions.

Sincerely,

STRAND ASSOCIATES, INC.®

Jeffrey S. Held, P.E., PTOE

Enclosure: Report

c/enc: Brian Smith, City of Madison, Traffic Engineering

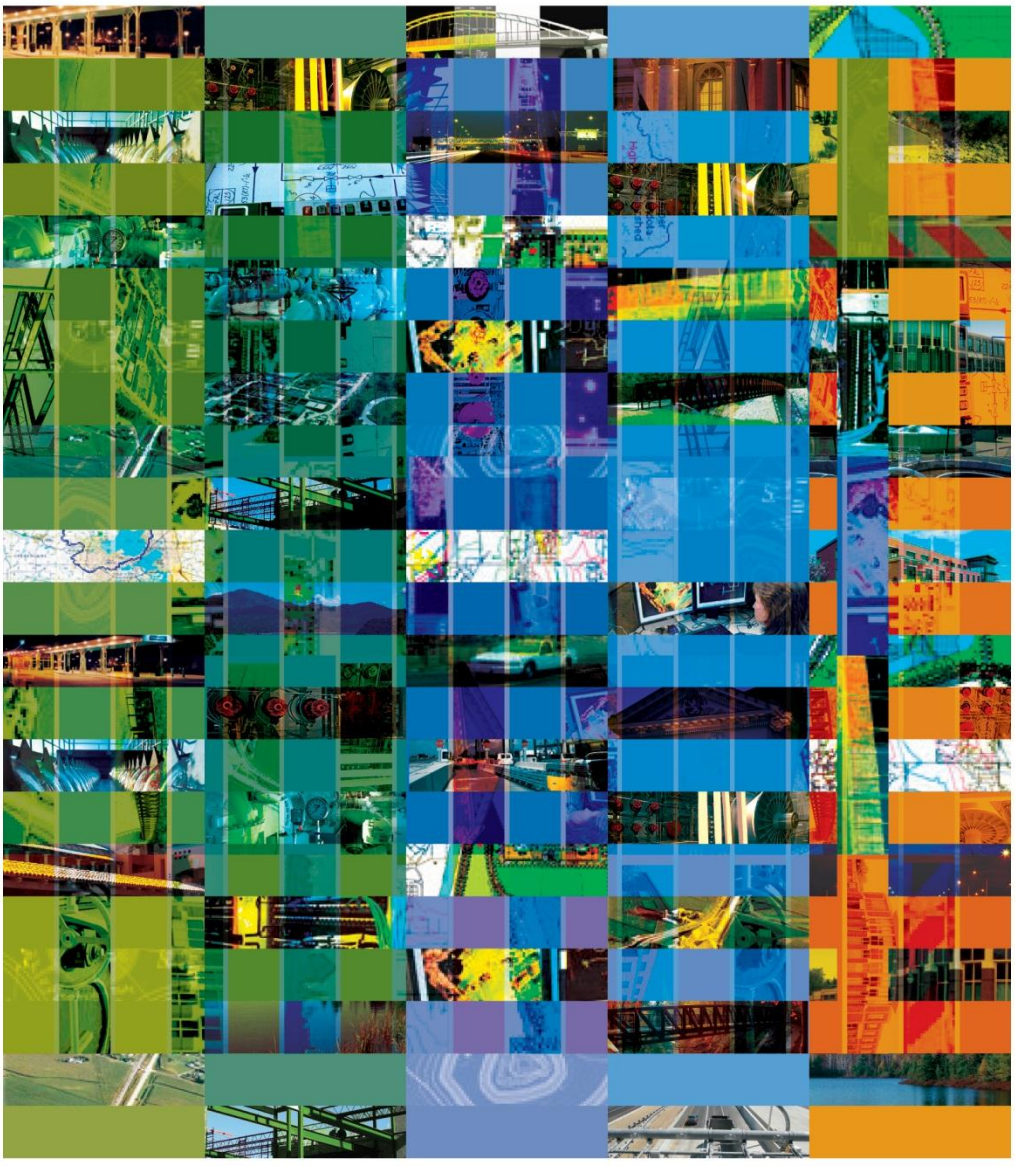
DRAFT

Professional

Engineering

Services

East Johnson Street Traffic Study



Report

City of

Madison, WI

March 2012

STRAND ASSOCIATES®

DRAFT

Report for
City of Madison, Wisconsin

East Johnson Street Traffic Study

Prepared by:

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910 West Wingra Drive
Madison, WI 53715
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March 2012

STRAND ASSOCIATES®

TABLE OF CONTENTS

TABLE OF CONTENTS Continued

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

At the request of the City of Madison, Strand Associates, Inc.® completed a study of converting the arterial street one-way pair of East Johnson Street and East Gorham Street to two-way operation generally between Wisconsin Avenue and Baldwin Street on the near-east side of Madison.

A. Reason for Study

The East Johnson Street Traffic Study (EJSTS) has been prepared for two primary reasons. First, multiple planning documents previously completed for the City of Madison Isthmus area have included varying recommendations to evaluate and/or implement changes to the Johnson/Gorham one-way pair. Most recently, the Tenney-Lapham Neighborhood Plan (TLNP) completed in 2008 articulates an overall desire to strengthen the vitality of the commercial core on East Johnson Street, attract and retain businesses, increase home ownership, and improve neighborhood livability. One of the action steps included in the TLNP is to "…study the strategy of redesigning the traffic flow on East Johnson Street and East Gorham Street to two-way instead of one-way between Wisconsin Avenue and Baldwin Street…". This report satisfies this recommended action step.

The second reason for the EJSTS is the upcoming reconstruction project on East Johnson Street. The City of Madison is planning to reconstruct East Johnson Street from Butler Street to Baldwin Street in 2014. The project will use federal transportation funding and it will be designed by City of Madison Engineering and Transportation staff. If the 2014 reconstruction is to include infrastructure changes that would be required for the two-way operation of Johnson Street, this must be determined by May or June 2012.

The EJSTS does not constitute a larger evaluation of transportation on the Madison Isthmus or Region. This study focuses solely on two-way conversion scenarios and evaluates these scenarios against the option of allowing the Johnson/Gorham one-way pair to maintain current one-way operating conditions.

The EJSTS limits and key intersections are shown in Figure ES-1. This study evaluates East Johnson Street from Wisconsin Avenue to First Street.

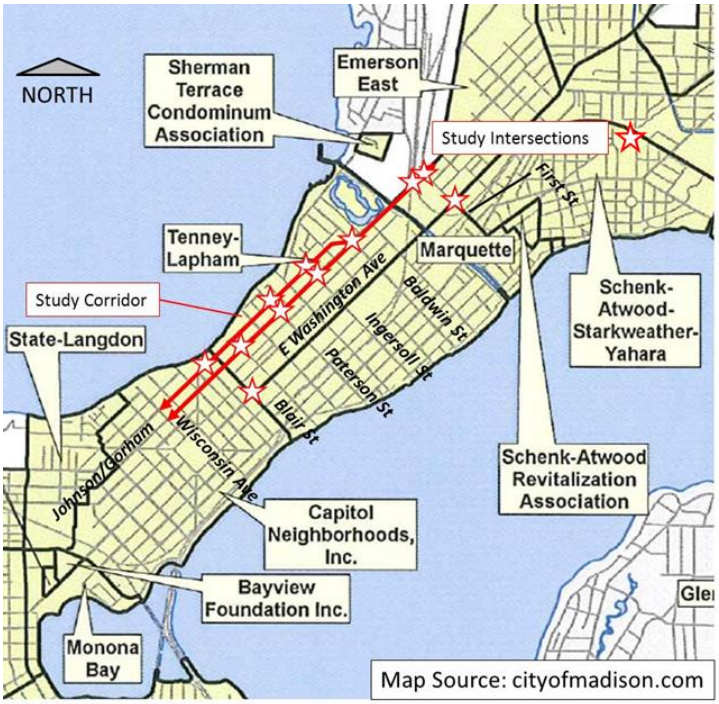

Figure ES-1 EJSTS Area

B. Study Process and Background

The EJSTS process was carried out in two phases. Phase 1 consisted of a Planning Level Analysis and generally

developed the operational scenarios evaluated in this study. Phase 2 consisted of a Detailed Scenario Evaluation and considered various impacts of the operational scenarios based on neighborhood and City goals for the project. Public Information Meeting (PIM) No. 1 was held early in Phase 1 on November 10, 2011. PIM No. 2 was held March 1, 2012, and included presentation of the study findings and feedback from the public and local stakeholders.

East Johnson Street and East Gorham Street operate as a one-way pair street system on the Madison Isthmus. The pair is classified as a Principal Arterial by the Madison Area Transportation Planning Board (TPB). There are two other arterial streets on the Isthmus: East Washington Avenue, classified as a Principal Arterial, and Williamson Street, classified as a Minor Arterial. On an average weekday, over 100,000 motor vehicles use the combined system of the Johnson/Gorham one-way pair, East Washington Avenue, and Williamson Street. For reference, the most heavily traveled portion of the Beltline carries approximately 130,000 vehicles per day (vpd), and west of Verona Road and east of Stoughton Road the Beltline carries less than 100,000 vpd.

Many studies of one-way to two-way operations have been completed in the United States and abroad. The net impact of conversion has been found to vary depending on the variables considered and the methods used to measure benefits and drawbacks. A sample of studies was reviewed to help inform the EJSTS process, but the focus was on the actual Johnson/Gorham one-way pair and its unique context. Some of the elements unique to the Johnson/Gorham one-way pair include:

1. Lack of alternate routes through the Isthmus as a result of Lakes Mendota and Monona

2. Challenges associated with street crossings of the Yahara River and the multiple sets of railroad tracks in the study area.

3. Providing functional connectivity between a two-way East Johnson Street and East Washington Avenue to encourage the use of East Washington Avenue as an alternate route. This may include the connections between West Johnson Street and University Avenue and the Johnson and Gorham Pair at Bassett and Broom Streets.

4. Diverse land uses and multimodal corridor users.

5. Business visibility and exposure versus the ability to provide on-street parking.

6. Constrained urban environment along the study corridor.

At the beginning of the EJSTS, the study team created an online survey using *surveymonkey.com* (see Figure ES-2); 499 people completed the survey with 57 percent living in the Tenney-Lapham Neighborhood (TLN) and 38 percent living directly on Johnson or Gorham Streets in the TLN. The team reviewed the results for both TLN residents and the survey as a whole in the analysis of the improvement scenarios.

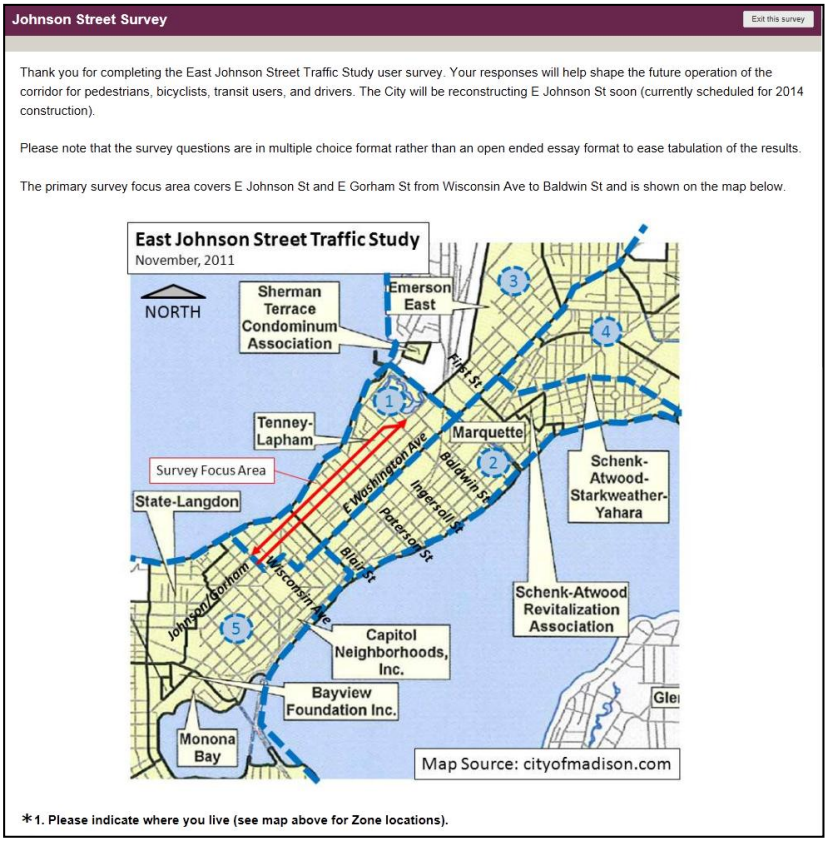

Figure ES-2 Online Survey

The survey provided the following results.

1. Top Transportation Goals for all respondents included the following:

   a. Improve conditions for bicyclists.
   b. Improve pedestrian crossings.
   c. Maintain/improve transit service.

2. Top Livability Goals for all respondents included the following:

   a. Maintain current businesses and/or attract new ones.
   b. Maintain mature trees.
   c. Improve corridor aesthetics.

3. Top Transportation Goals for <u>TLN residents</u> included the following:

   a. Improve conditions for bicyclists.
   b. Improve pedestrian crossings.
   c. Maintain parking.

4. Top Livability Goals for TLN residents included the following:

    a. Maintain current businesses and/or attract new ones.
    b. Improve corridor aesthetics.
    d. Maintain mature trees.

The survey also allowed people to provide written comments; 272 comments were provided including 177 from residents of TLN. About 50 percent of the comments indicated a preference for maintaining one-way operation. About 20 percent preferred two-way operation, and the remaining 30 percent did not provide a preference. It is interesting to note that the group most likely to indicate a preference for two-way operation were those who lived in the TLN but not directly on Johnson or Gorham. The group least likely to indicate a preference for two-way operation were those living in the TLN and directly on Johnson or Gorham.

Based on feedback from PIM No. 1 and the online survey, as well as experience with other one-way to two-way conversion studies, the project team developed multiple evaluation scenarios for the Johnson Street corridor. The following four were carried to planning level analysis.

1. Scenario 1–Maintain one-way operation

2. Scenario 2–Full two-way conversion of East Johnson and East Gorham Streets from Wisconsin Avenue to Baldwin Street including 24-hour on-street parking.

3. Scenario 3–Two-way conversion of East Johnson and East Gorham Streets from east of Blair Street to Baldwin Street with peak-period parking restrictions inbound in the morning and outbound in the afternoon on East Johnson Street.

4. Scenario 4–Two-way conversion of East Johnson and East Gorham Streets from east of Blair Street to Baldwin Street with peak-period parking restrictions inbound in the morning on Gorham Street and outbound in the afternoon on East Johnson Street.

The EJSTS team considered several factors in evaluating the four operational scenarios. These included corridor-specific design considerations, such as the base assumption that the street will not be made wider because of the high value residents and property owners place on mature trees and the canopy they provide. Traffic and crash data was used from existing sources as well as field data collection completed by the study team. The Madison area's Metropolitan Planning Organization and the Madison Area Transportation Planning Board (TPB) also provided their current travel demand models for use in the study. Finally, for key locations, traffic operations modeling was completed using Synchro/SimTraffic software.

C. Study Findings

The evaluation of the operational scenarios considered eleven elements based on feedback from residents and stakeholders as well as elements that every public works project must consider. The EJSTS found that the following scenarios best meet the individual goals that were evaluated:

1.	Bicycle conditions:	Scenario 1 (one-way)
2.	Pedestrian crossings:	Scenario 1
3.	Transit:	Scenario 3 (two-way)
4.	Parking:	Scenario 2 (two-way)
5.	Business Accessibility:	Scenario 3 (two-way)
6.	Maintain Trees:	Scenarios 1, 2, 3, and 4
7.	Improve Aesthetics:	Scenarios 1, 2, 3, and 4
8.	Motor Vehicle Operations and Congestion:	Scenario 1
9.	Diversion to Other Streets:	Scenario 1
10.	Safety:	Scenario 1
11.	Cost:	Scenario 1

D. Conclusions

In general, the analysis performed for the EJSTS resulted in the following findings:

1. Scenario 1–Maintain one-way operation

    a. Bicycle accommodations east of Blair Street would be improved by providing additional width for the travel and parking lanes, as well as relocating the shared bicycle and parking lane.

    b. Facilities for pedestrians crossing East Johnson Street would be improved, and more importantly, the gaps in traffic for pedestrians to cross would generally be longer than in the other scenarios. It is recognized that vehicles must yield to pedestrians by law; however, the length and number of gaps are a good indication of the relative pedestrian comfort level provided by the scenarios.

    c. Corridor aesthetics would be improved.

2. Scenarios 2, 3, and 4–Two-way operation

    a. All two-way scenarios would provide bike accommodations. Narrow parking and travel lane widths are likely to cause encroachment into the bike facilities. Also, Scenarios 3 and 4 restrict parking during peak periods to provide a second travel lane in the peak direction. During these restrictions, no bicycle accommodation is provided.

b. The two-way scenarios would include enhanced pedestrian facilities, but available gaps in traffic for pedestrians to cross would generally be shorter in length and occur less often.

c. Corridor aesthetics would be improved.

d. The two-way scenarios would require a lane width exception for opposing travel lanes, which may be difficult to achieve.

e. The two-way scenarios reduce volumes on Johnson Street by about 2,000 to 9,000 vpd.

f. The two-way scenarios are likely to divert traffic to other corridors. East Washington Avenue receives an additional 4,000 to 7,000 vpd and is highly congested. Mifflin and Dayton Streets (both residential streets) receive an additional 1,000 to 7,000 vpd combined.

g. Even with no growth in traffic assumed and optimistic operational assumptions, significant and sometimes severe additional congestion is expected at key intersections with two-way operation.

Based on the findings of the EJSTS, the study team believes Scenario 1–Maintain One-way Operation should be moved forward into design as it best balances the multiple goals that have been identified as most important to a successful 2014 reconstruction project on East Johnson Street. We recommend that the design team consider a potential future two-way conversion of East Johnson Street when evaluating design elements, so as not to preclude conversion if ~~in~~ traffic patterns or other conditions on the Isthmus should change.

SECTION 1
REASON FOR STUDY

At the request of the City of Madison, Strand Associates, Inc.® completed a study of converting the arterial street one-way pair of East Johnson Street and East Gorham Street (Johnson/Gorham one-way pair) to two-way operation between Wisconsin Avenue and Baldwin Street on the near-east side of Madison. The following section documents the reason for the EJSTS.

1.01 PREVIOUS PLANNING DOCUMENTS

Multiple planning documents previously completed for the City of Madison Isthmus area have included varying recommendations to evaluate and/or implement changes to the Johnson/Gorham one-way pair. Most recently, the Tenney-Lapham Neighborhood Plan (TLNP) completed in 2008 (see Figure 1.01-1) articulates an overall desire to strengthen the vitality of the commercial core on East Johnson Street, attract and retain businesses, increase owner occupancy, and improve neighborhood livability. The TLNP lists the top goal under Transportation Goals, Action Steps/Projects, Design Standards, and Implementers as follows:

Figure 1.01-1 Tenney-Lapham Neighborhood Plan

"Goal 1: Reduce the arterial use (speed and volume) of East Johnson and Gorham Streets between First Street and Wisconsin Avenue. Align their street use with their residential and local retail uses."

One of the action steps included in the TLNP is to "…study the strategy of redesigning the traffic flow on East Johnson Street and East Gorham Street to two-way instead of one-way between Wisconsin Avenue and Baldwin Street…". This report satisfies this recommended action step.

1.02 2014 EAST JOHNSON STREET RECONSTRUCTION PROJECT

The City of Madison is planning to reconstruct East Johnson Street from Butler Street to Baldwin Street in 2014. The reconstruction project will use state and federal transportation funding and it will be designed by City of Madison Engineering and Transportation staff. There are multiple reasons that East Johnson Street needs to be reconstructed including the following:

1. The pavement rating is a 5 out of 10, indicating somewhat poor pavement structure that requires significant maintenance to prevent failure and provides a relatively rough ride for motor vehicles and bicycles.

2. The curb rating is a 4 out of 10, indicating significant deterioration of the curb face and gutter creating localized drainage issues and other problems.

3. The utilities are severely outdated and in need of replacement:

   a. The storm sewer dates to the 1900s and 1920s and consists of 12-inch clay pipe.
   b. The sanitary sewer dates to the 1900s and consists of 6-inch clay pipe.
   c. The water main includes 4-inch iron pipe from the 1880s and 12-inch iron pipe from the 1920s.

The 2014 reconstruction will address these items including new pavement, curb and gutter, and sidewalk replacement as needed. The storm sewer, sanitary sewer, and water main will be upgraded and/or completely replaced. Street lighting will be improved. Also, streetscaping improvements will be made to enhance corridor aesthetics and improve the street's functionality in terms of transportation and land use. If the 2014 reconstruction is to include infrastructure changes that would be required for the two-way operation of Johnson Street, this must be determined by May or June 2012. This is another reason for the EJSTS.

1.03 SCOPE AND GOALS OF STUDY

The EJSTS does not constitute a larger evaluation of transportation on the Madison Isthmus or Region. This study focuses on developing two-way conversion scenarios and evaluates these scenarios against the option of allowing the Johnson/Gorham Streets one-way pair to maintain its current one-way operation. This study does not evaluate significant changes in traffic patterns and circulation to surrounding streets and systems such as the Capitol Square or the Capitol Loop.

The EJSTS limits and key intersections are shown in Figure 1.03-1. This study primarily evaluates East Johnson Street from Wisconsin Avenue to First Street. It also evaluates the impact of two-way conversion on East Gorham Street from Baldwin Street to Wisconsin Avenue. Figure 1.03-1 shows the existing signalized intersections along Johnson Street and Gorham Street as well as two important intersections on East Washington Avenue: at Blair Street and at First Street. The impacts of conversion on some of these key intersections have been studied in finer detail including the use of traffic operations modeling.

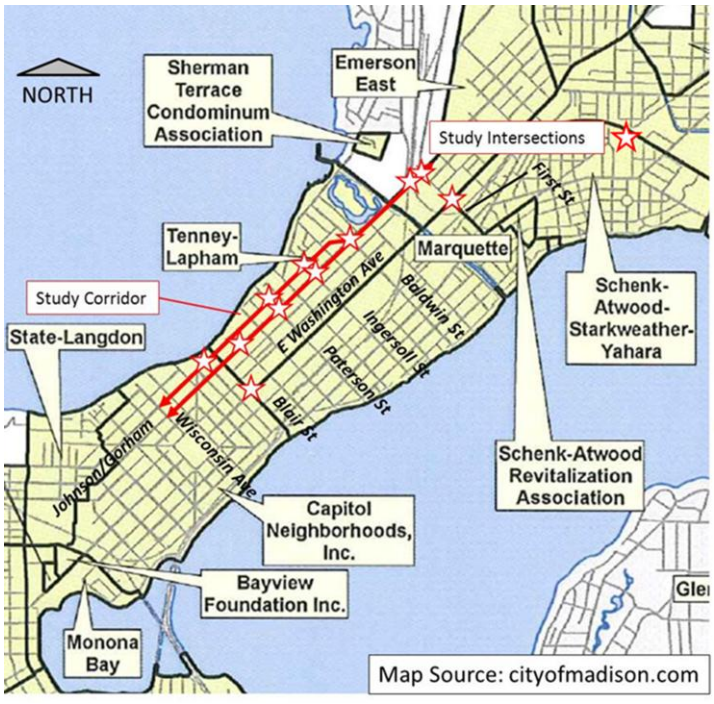

Figure 1.03-1 EJSTS Area

SECTION 2
STUDY PROCESS

2.01 GENERAL OVERVIEW OF STUDY PROCESS

The EJSTS process was carried out in two phases, as illustrated in Figure 2.01-1.

Phase 1 consisted of the Planning Level Analysis (PLA). The PLA included Public Involvement Meeting (PIM) No. 1, an online survey for corridor users to complete, development of conversion scenarios, and planning-level analysis of these scenarios using the Madison Transportation Planning Board's (TPB) Cube travel demand model. Based on the results of the PLA, the study team agreed that additional evaluation of the two-way conversion scenarios was appropriate and proceeded with Phase 2.

Phase 2 included Detailed Scenario Evaluation for four possible future operational strategies along the Johnson/Gorham pair. The factors evaluated were based on the most highly rated goals from the online survey as well as fundamental engineering considerations such as safety and cost. The evaluation results were presented at PIM No. 2 on March 1, 2012. PIM No. 2 presented the draft findings and recommendation and allowed for comments and questions to be addressed by the study team. Finally, presentations will be made to numerous project stakeholders in March, April, and May 2012. The final EJSTS report will be completed following these presentations to fully document the process, findings, and conclusions.

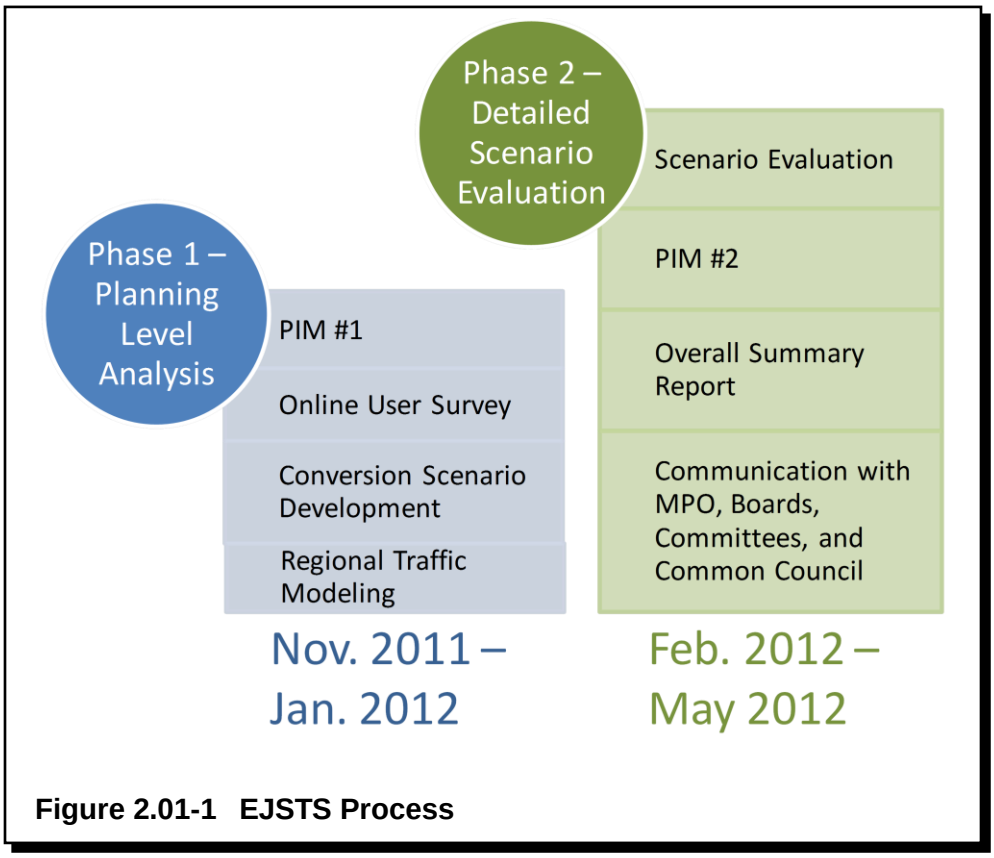

Figure 2.01-1 EJSTS Process

2.02 CURRENT CONDITIONS

East Johnson Street and East Gorham Street operate as a one-way pair street system on the Madison Isthmus. The pair is classified as a Principal Arterial by the City and TPB. There are two other arterial streets on the Isthmus: East Washington Avenue is classified as a Principal Arterial; and Williamson Street is classified as a Minor Arterial. It is useful to compare conditions on the Johnson/Gorham Streets one-way pair to those on Williamson Street because it is possible that a two-way East Johnson Street would function similarly to Williamson Street.

Table 2.02-1 displays current conditions on the three primary transportation corridors on the east side of the Isthmus.

Item	E Johnson	E Gorham	Johnson/Gorham	E Washington	Williamson
2010 MV Volumes (vpd)	15,000–21,500	13,000–19,000	28,000–40,500	45,000–51,000	17,000–21,500
MV Travel Lanes	2 (3 during peak periods)	2	4 (5 during peak periods)	6	2 (3 during peak periods)
Parking Lanes	2 (1 during peak periods)	1	3 (2 during peak periods)	2	2 (1 during peak periods)
Transit Routes	5	5	5	8	0–2
Bicycle Facilities	Bike/ Parking Lane Designated Bike Route	Bike/ Parking Lane Designated Bike Route	-	Bike/ Parking Lane	None
Average Speeds	28 to 30 mph	28 to 29 mph	-	-	21 to 31 mph
85th Percentile Speed	32 to 34 mph	32 to 34 mph	-	-	27 to 35 mph
E = East MV = Motor Vehicle vpd = vehicles per day mph = miles per hour					

Table 2.02-1 Current Conditions

On an average weekday, over 100,000 motor vehicles use the Johnson/Gorham Streets one-way pair, East Washington Avenue, and Williamson Street combined. For reference, the most heavily traveled portion of the Beltline highway carries approximately 130,000 vehicles per day (vpd), and west of Verona Road and east of Stoughton Road the Beltline carries less than 100,000 vpd. On-street parking is provided on both sides of East Johnson Street along the study corridor, with a weekday PM peak-hour restriction on the right-hand parking lane between Wisconsin Avenue and Blair Street to provide a third eastbound (outbound) travel lane.

The Johnson/Gorham Streets one-way pair is an important transit corridor, carrying five Metro Transit routes and supporting some of the highest passenger boarding rates in the City. Bike

facilities are provided in one direction only on East Johnson Street (outbound) and East Gorham Street (inbound). Williamson Street was reconstructed in 2011 and does not include bike accommodations. While bikes may legally use Williamson Street, most use the parallel options of Jennifer Street to the south or the Capital City Trail to the north.

Average travel speed data was obtained via field data collection and also from City of Madison Traffic Engineering existing data. The average travel speeds along East Johnson Street and East Gorham Street are about 28 to 30 miles per hour (mph), while they are 21 to 31 mph on Williamson Street. The 85th percentile speed is often used to evaluate speeds on a corridor. This is the speed that 85 percent of the traffic is traveling at or below. While Williamson Street experiences a wider range in 85th percentile speeds depending on where it is measured, the upper threshold is similar for both corridors at 35 mph on Williamson Street and 34 mph on the Johnson/Gorham one-way pair.

2.03 UNIQUE CORRIDOR ELEMENTS

Many studies of one-way to two-way operations have been completed in the United States and abroad. The net impact of conversion has been found to vary depending on the variables considered and on the methods used to measure benefits and drawbacks. For instance, some studies argue that safety is improved with two-way operation, but what constitutes a safer street can vary depending on the analyst. Some studies show there are fewer crashes but they are more severe. The study team performed a brief review of position papers and studies on one-way versus two-way street systems to guide the EJSTS process, but the main study focus was on the actual Johnson/Gorham Streets one-way pair. The Johnson/Gorham Streets one-way pair differs from many studied corridors because of its unique geographic context, which provides both benefits and drawbacks. Following is a discussion of some of these considerations.

A. Lack of Alternate Routes

The Isthmus between Lake Mendota and Lake Monona on which downtown Madison lies is a unique element impacting the overland transportation systems. Near the study area, the Isthmus is less than 1 mile across, constraining the transportation system. In addition, the size of the lakes results in a significantly longer distance from the near east side to the near west side if traveling around rather than through the Isthmus, as shown in Figure 2.03-1. This feature can enhance the efficiency of transit service on the isthmus. At the same time, the lack of alternative routes can also lead to increased motor vehicle traffic volumes.

Figure 2.03-1 Travel Distances Around and Through the Isthmus

B. Railroad and River Constraints

Crossing railroad tracks and rivers is challenging. At-grade railroad crossings can pose a safety risk. Reducing the number of railroad crossings is a priority for railroad agencies and state and federal departments of transportation. Because the railroads were constructed prior to the roadways, the Office of the Commissioner of Railroads dictates if streets and highways may cross railroad tracks. The alternative of grade separating railroad crossings is difficult in urban areas because the cost of separations often exceeds several million dollars. River crossings require bridges and include significant capital costs for construction and for ongoing maintenance.

Figure 2.03-2 shows the railroad tracks and Yahara River on the Madison Isthmus. It is no coincidence that the three corridors that cross both features are the three arterial traffic routes in the area. The combination of Wisconsin & Southern railroad lines and the Yahara River makes modifications to these routes more difficult.

Figure 2.03-2 Rail and River Crossings on the Isthmus

C. Connectivity to East Washington Avenue

The unique topography of the Isthmus and the limited opportunities to cross the railroad tracks and Yahara River reduce the number of transportation corridors in the study area that are able to accommodate high volumes of travelers. Analysis shows that any two-way conversion scenario will reduce the total capacity of the Johnson/Gorham Streets pair requiring other corridors and modes to carry greater traffic volumes. Direct connections to East Washington Avenue at each end of the study corridor will be important. Figure 2.03-3 schematically illustrates the key connection points for the two-way conversion scenarios at each end.

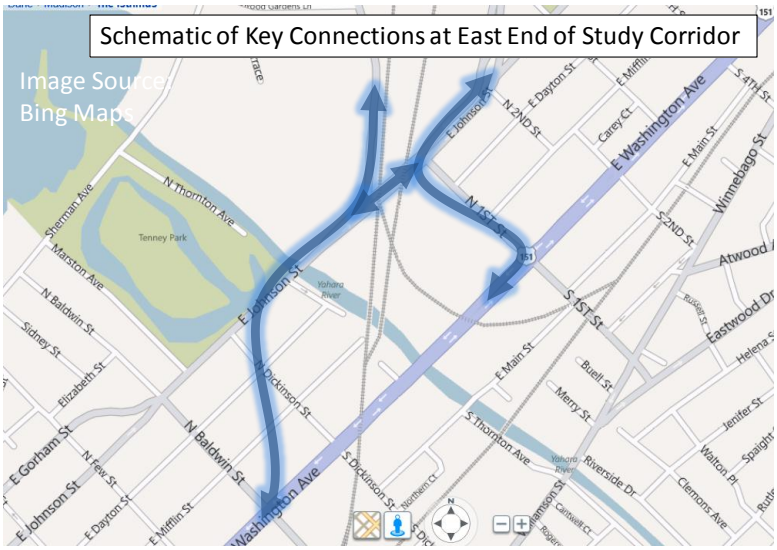

Figure 2.03-3 Schematic Key Connections to East Washington Avenue*

* Note: These do not illustrate potential new streets

D. Diverse Corridor Uses and Users

The study corridor is an area that has diverse land uses including high, medium, and low density residential, commercial, schools, churches, parks, and more. Area residents and visitors also use modes other than the personal automobile for a large percentage of their trips. As a result, the Johnson/Gorham Streets one-way pair serves a wide range of users including drivers in personal vehicles, trucks, and buses, transit riders, bicyclists, and pedestrians.

E. Business Access and On-Street Parking

East Johnson Street includes a collection of commercial uses generally between Livingston Street and Brearly Street, a few of which are shown in Figure 2.03-4. One of the goals of the neighborhood plan is to maintain and strengthen this core of existing businesses and to attract new ones to the neighborhood. Often, two-way traffic is preferred by businesses because it increases the visibility of store fronts and provides access to travelers in both directions. However, one tradeoff of two-way operation for the East Johnson Street corridor would be the loss of some on-street parking spaces near intersections (to allow for short turn bays). In some scenarios, parking restrictions during certain peak periods would be implemented to allow for a second motor vehicle travel lane in the peak direction. For Johnson Street, this would eliminate on-street parking for businesses during the rush hour(s).

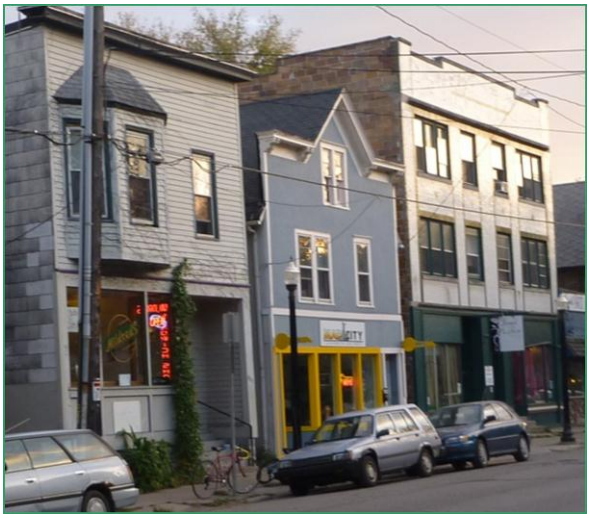

Figure 2.03-4 Johnson Street Commercial Land Uses

F. Constrained Urban Corridor

East Johnson Street is a confined urban corridor with mature street trees, short building setbacks, and modest terrace widths. Because the 2014 reconstruction project will use federal transportation dollars, there will be minimum requirements for items such as travel lane widths and on-street accommodation of bicycles. The existing distance from curb face to curb face on East Johnson Street is generally 44 feet within the study corridor. If the curbs are not moved closer to the buildings (doing so will cause the loss of most trees and reduce the terrace widths), it will be challenging to provide all the desired multimodal features within the existing width of the street.

2.04 ONLINE SURVEY

At the beginning of the EJSTS, the study team created an online survey using *surveymonkey.com*. Following is a brief summary of the survey results. A full summary report is included in Appendix A, and additional summary reports filtered by the area where respondents live are available upon request.

The survey required respondents to indicate where they lived based on a map that was included (see Figure 2.04-1). This allowed the team to assess how the opinions and concerns of varying groups differed. Of the 499 people completing the survey, 57 percent live in the Tenney-Lapham Neighborhood (TLN) and 38 percent live directly on Johnson or Gorham Streets in TLN. While the near-east side of Madison has a very high mode split, or percentage of trips occurring through means other than the personal automobile, the survey indicated that driving is still the most common way that people travel the corridor regardless of where they live. The survey asked respondents to pick their top three transportation goals and livability goals for the study corridor. The team used the results for both TLN residents and the survey as a whole to guide the analysis of the improvement scenarios.

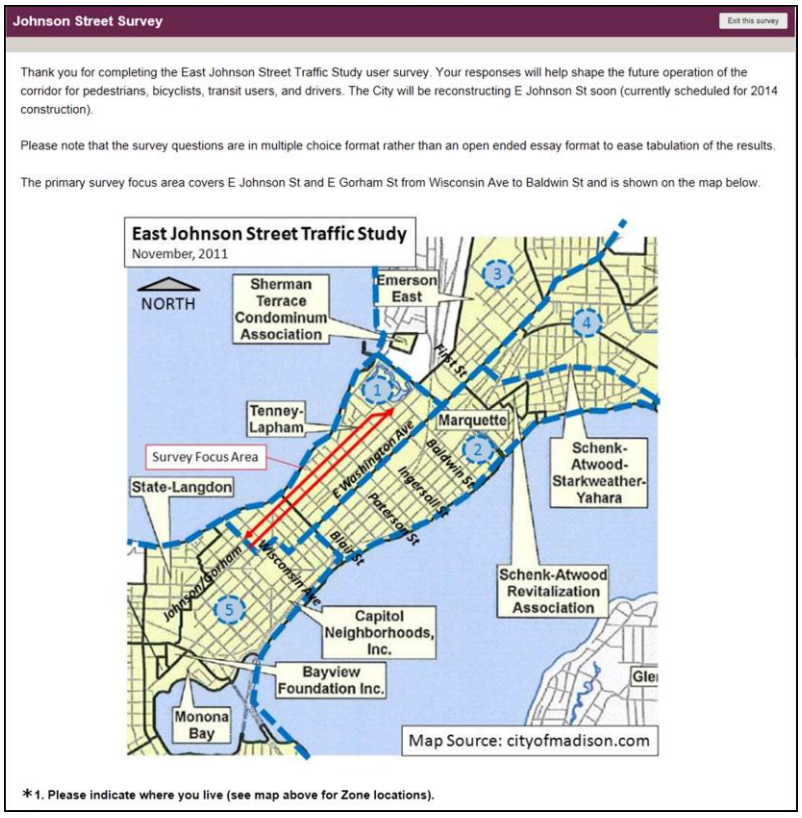

Figure 2.04-1 Online Survey

1. Top Transportation Goals for all respondents included the following:

    a. Improve conditions for bicyclists.
    b. Improve pedestrian crossings.
    c. Maintain/improve transit service.

2. Top Livability Goals for all respondents included the following:

    a. Maintain current businesses and/or attract new ones.
    b. Maintain mature trees.
    c. Improve corridor aesthetics.

3. Top Transportation Goals for TLN residents included the following:

    a. Improve conditions for bicyclists.
    b. Improve pedestrian crossings.
    c. Maintain parking.

4. Top Livability Goals for TLN residents included the following:

    a. Maintain current businesses and/or attract new ones.
    b. Improve corridor aesthetics.
    d. Maintain mature trees.

The survey also allowed people to provide written comments; 272 comments were provided including 177 from residents of TLN. About 50 percent of the comments indicated a preference for maintaining one-way operation. About 20 percent preferred two-way operation, and the remaining 30 percent did not provide a preference. It is interesting to note that the group most likely to indicate a preference for two-way operation were those who lived in the TLN but not directly on Johnson or Gorham. The group least likely to indicate a preference for two-way operation were those living in the TLN and directly on Johnson or Gorham.

2.05 OPERATIONAL SCENARIOS

Based on feedback from PIM No. 1, the online survey, as well as experience with other one-way to two-way conversion studies, the project team developed multiple scenarios for future operation of the Johnson Street corridor. Four were carried into planning level analysis.

A. Scenario 1: Maintain One-way Operation

This scenario would maintain existing operational conditions on East Johnson Street and East Gorham Street. The 2014 reconstruction project would still strive to meet neighborhood and City goals to the maximum practical extent. Figure 2.05-1 is a schematic representation of Scenario 1.

B. Scenario 2: Full Two-way Conversion

This scenario would convert East Johnson Street to two-way operation beginning at Wisconsin Avenue and continuing to Baldwin Street where it is currently two-way. There would be on-street parking on both sides of the street 24 hours per day. East Gorham Street would also be converted to two-way operation from Few Street to Wisconsin Avenue and have 24-hour parking on one side of the street. Figure 2.05-2 is a schematic representation of Scenario 2.

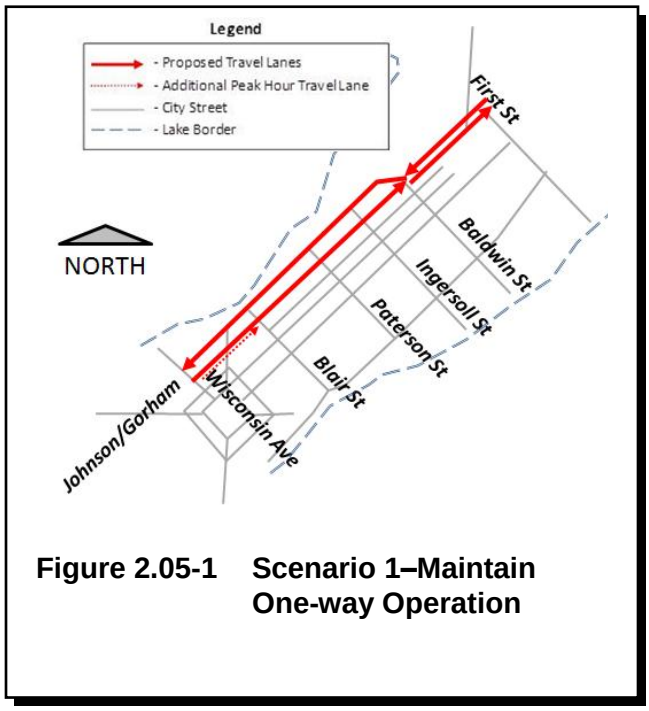

Figure 2.05-1 Scenario 1–Maintain One-way Operation

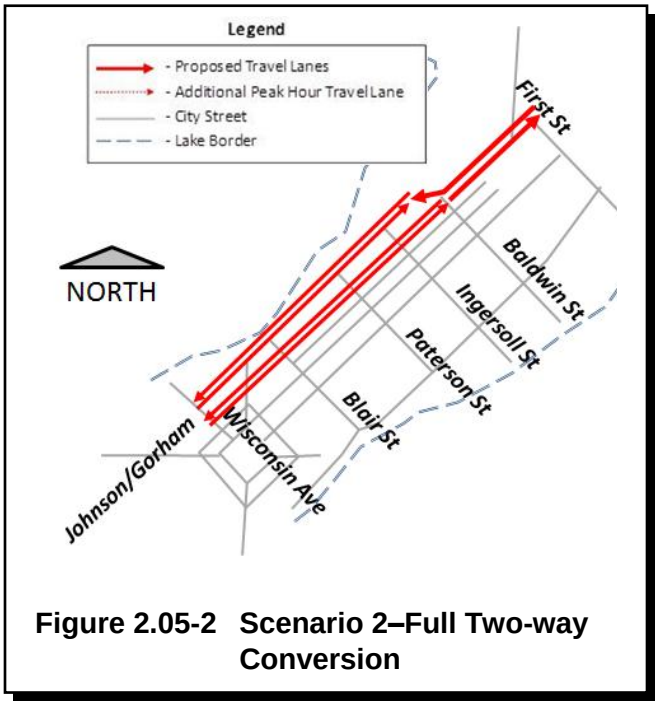

Figure 2.05-2 Scenario 2–Full Two-way Conversion

C. Scenario 3: Two-way operation east of Blair Street with peak-hour parking restrictions inbound and outbound on East Johnson Street

This scenario would maintain one-way operation on East Johnson and East Gorham Streets between Wisconsin Avenue and Blair Street. This scenario was developed because full conversion beginning at Wisconsin Avenue (Scenario 2) had the potential to show unacceptable levels of congestion and queuing.[1] With Scenario 3, the one-way operation on East Johnson Street is maintained until Blair Street where eastbound traffic can be directed to East Washington Avenue. East Gorham Street would be converted to two-way operation from Few Street to Blair Street and have 24-hour parking on one side of the street.

Scenario 3 also includes peak direction parking restrictions during the morning and afternoon rush hours which allows for a second through lane on East Johnson Street during the most heavily traveled periods. The parking restriction would be inbound during the morning rush hour and outbound during

[1] With Scenario 2, three afternoon peak-period one-way travel lanes would be reduced to a single travel lane at Wisconsin Avenue, and the existing street circulation patterns around the Capitol Square and Loop are not conducive to routing these vehicles to East Washington Avenue, the only parallel principal arterial.

the afternoon rush hour. Streets in Madison that have similar peak-period parking restrictions include Monroe Street, Regent Street, and Williamson Street. Figure 2.05-3 is a schematic representation of Scenario 3.

D. Scenario 4: Two-way operation east of Blair Street with peak-hour parking restrictions inbound on East Gorham Street and outbound on East Johnson Street

This scenario would maintain one-way operation on East Johnson and East Gorham Streets between Wisconsin Avenue and Blair Street for the same reasons noted under Scenario 3. East Johnson Street would be two-way from Blair Street to Baldwin Street. There would also be an outbound parking restriction during the afternoon rush hour on East Johnson Street to provide a second travel lane. East Gorham Street would be two-way from Few Street to Blair Street. There would be an inbound parking restriction during the morning rush hour on East Gorham Street to provide a second travel lane. During this morning rush hour, there would be no parking on either side of East Gorham Street. Figure 2.05-4 is a schematic representation of Scenario 4.

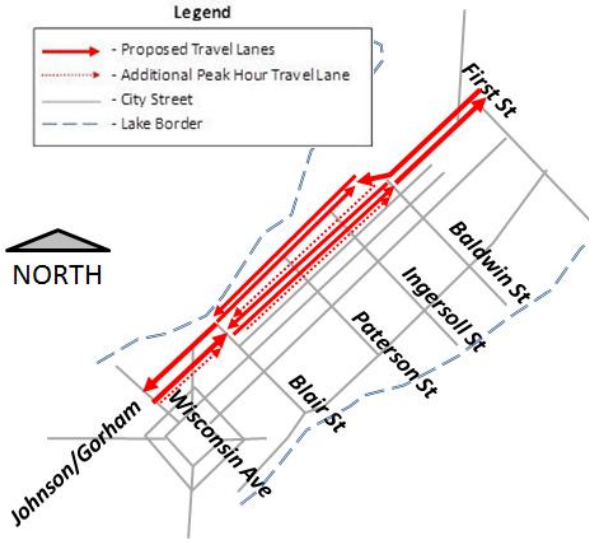

Figure 2.05-3 Scenario 3–Two-way with Inbound and Outbound Parking Restrictions on Johnson Street

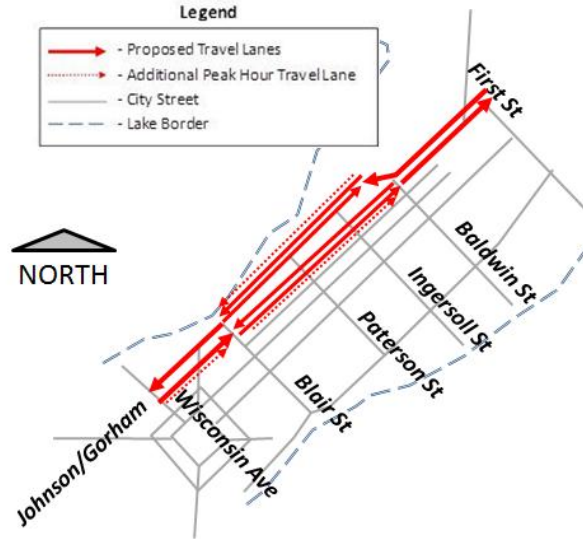

Figure 2.05-4 Scenario 4–Two-way with Parking Restriction Inbound on Gorham Street and Outbound on Johnson Street

2.06 OVERVIEW OF TOOLS USED FOR SCENARIO ANALYSIS

In general, the tools used to evaluate the four operational scenarios included engineering design standards, new and historic traffic and crash data, and travel demand and operations modeling. It is typically good practice to be "conservative" when performing traffic engineering for an improvement project. Conservative (higher) traffic volumes help ensure that the investment made in the project will result in acceptable operations for at least twenty years after construction. The traffic analysis performed for this study, however, trends in the opposite direction. Assumptions have been optimistic, assuming no traffic growth, in an effort to find a two-way strategy that operates within acceptable tolerances for delay, queuing, and congestion.

A. Design Considerations

The 2014 reconstruction project will be using federal funding as well as City of Madison funds. Because of this, East Johnson Street will be required to meet accepted state of practice as well as certain federal and state requirements.

Some of the key dimensions needed to evaluate the four operational scenarios include the following:

1. Bike lane adjacent to curb flag–5 feet desirable, 4 feet minimum.
2. Shared parking and bicycle lane (including gutter)–14 feet desirable, 12 feet minimum.
3. Motor vehicle travel lane–12 feet desirable, 11 feet minimum.[2]
4. Motor vehicle lane plus bike lane adjacent to curb (including gutter)–19 feet desirable, 15 feet minimum.

Wisconsin's "Complete Streets" law (TRANS 75) will apply to the 2014 reconstruction because of the federal funding. This requires that bicycles be accommodated on the street. Providing a nearby parallel accommodation is not considered adequate except in extreme circumstances to avoid environmental or historic resources. Currently, a shared parking/bicycle lane is provided on the left side of Johnson Street from Wisconsin Avenue to Brearly Street. If a two-way scenario were constructed, bicycle accommodations would be required in both directions on East Johnson Street.

The Johnson Street reconstruction will need to balance competing needs within the corridor. One base assumption for this study is that to minimize impacts, the existing width of the street will not be increased. Previous projects in the City of Madison show that residents and property owners put high value on mature trees and the canopy they provide. This value was echoed in the survey results as well indicated by "Maintain Mature Trees" being one of the top three livability goals.

[2] Lanes narrower than 11 feet do exist on Madison streets, including some that have been recently reconstructed. This occurs typically when these lanes travel in the same direction. Additional discussion of lane widths is included in the Study Findings section under the Bicycle Accommodations subsection.

B. Traffic and Crash Data

Multiple sources of data were used for the EJSTS. The City of Madison provided existing turning-movement counts, Synchro 7 models from the 2005 Outer Loop study, signal timing sheets, speed study information, 2010 modal share count information, and tube count data from 2010.

In addition, the study team performed field data collection including turning-movement counts at ten signalized locations along both East Johnson Street and East Gorham Street. Stationary count and speed data were also collected on East Johnson Street, East Gorham Street, and East Dayton Street.

C. Travel Demand Modeling

Urbanized areas in the United States with populations that exceed 50,000 people are required to have a Metropolitan Planning Organization (MPO). In the Madison area, the MPO is the Madison Area Transportation Planning Board (TPB). The TPB maintains travel demand models of Dane County for use in transportation planning. The models utilize Cube software. Figure 2.06-1 is a screen capture of a portion of one of the models used for the EJSTS.

Figure 2.06-1 Travel Demand Model Output

The travel demand models forecast daily traffic volumes on arterial and collector streets based on where people live, work, and shop and the transportation modes and network available to them. They are calibrated to existing traffic count information and are the industry standard for evaluating the impact that two-way conversion scenarios may have on travel through the Isthmus. The TPD provided the study team with the current Base (2005) travel demand model. Mifflin Street and Dayton Street were added to the model to provide a finer level of detail adjacent to the study corridors.

For this study, the four operational scenarios were tested using the Base traffic. The project team compared the Base model volumes to the year 2035 with Transport 2020 model volumes and found that despite the enhanced transit in the 2035 model, the traffic volumes are forecasted to be higher on the Isthmus than those in the Base model. The full buildout and increased density along East Washington Avenue in the BUILD corridor plan is not fully accounted for in the 2035 model. So, the model may actually underestimate 2035 motor vehicle volumes, even with enhanced transit systems and increased modal split. By using the Base model volumes, the EJSTS assumes that all traffic generated by higher densities, regional growth, and increased Isthmus employment between now and 2035 is accommodated solely by transit and nonmotorized travel modes.

D. Traffic Operations Modeling

In addition to the travel demand modeling, operations modeling was also completed at key locations using Synchro/SimTraffic software. Traffic operations modeling determines the congestion that occurs given certain traffic volumes and roadway geometry. The study team calculated the hourly turning movement volumes for the various scenarios using a combination of existing field counts and the results of the travel demand modeling. The travel demand modeling output was used to determine how traffic patterns and volumes would shift under the various scenarios. We assumed 10 percent of the daily traffic would occur during the peak hours being modeled, representing another optimistic assumption as observed peak-hour counts on downtown streets often exceed 12 percent of the total daily traffic volume.

SECTION 3
STUDY FINDINGS

Following is an overview of the findings for the EJSTS. Additional detail is provided in the report appendices, as noted.

3.01 PUBLIC INVOLVEMENT MEETING NO. 1

The first public involvement meeting was held on November 10, 2011, at the Christ Presbyterian Church, 944 East Gorham Street. Forty-seven people signed in and the team received eighteen written comments. The meeting included a PowerPoint presentation followed by questions and answers and a goals identification exercise. The team also provided the Web address for the online survey.

The questions from the audience were generally inquiries into the study process. Questions such as how many different scenarios would be evaluated were asked. Also, there were many questions regarding the streetscape including concern for the mature trees that line the study corridors as well as inquiries about overhead power lines, bicycle parking, and overall livability.

The study team also led a group activity in which the meeting attendees were able to work as a table to come up with the three most important goals for the corridor at each table. Then each group shared their goals. The goals were combined on a master list and discussed with the group.

Some of the recurring themes provided in the written comments reflected a desire to see lower traffic speeds and a better environment for pedestrians, bicyclists, renters, homeowners, and businesses. Many of the comments focused on the importance of improving the bicycle and pedestrian infrastructure along East Johnson and East Gorham Streets.

The meeting presentation and written comment sheets are included in Appendix B.

3.02 ROADWAY CROSS SECTION AND BICYCLE ACCOMMODATIONS

As noted previously, the study team made the assumption that East Johnson Street would not be made wider as part of the reconstruction project. The importance of the mature trees, the narrow existing terraces, and the short existing building setbacks support this base assumption. Figure 3.02-1 shows the existing East Johnson Street cross section in two locations.

Figure 3.02-1 Existing East Johnson Street Cross Section Looking East

The current width between the curb faces is generally 44 feet along the corridor. The dimensions shown in blue are at the minimum allowable widths. The dimensions in bold red are less than the minimum allowable widths and will require an Exception to Standards from FHWA to be reconstructed at the same width.

A. Scenario 1 Cross Section

Scenario 1 maintains the existing one-way operations. Figure 3.02-2 shows the proposed cross sections.

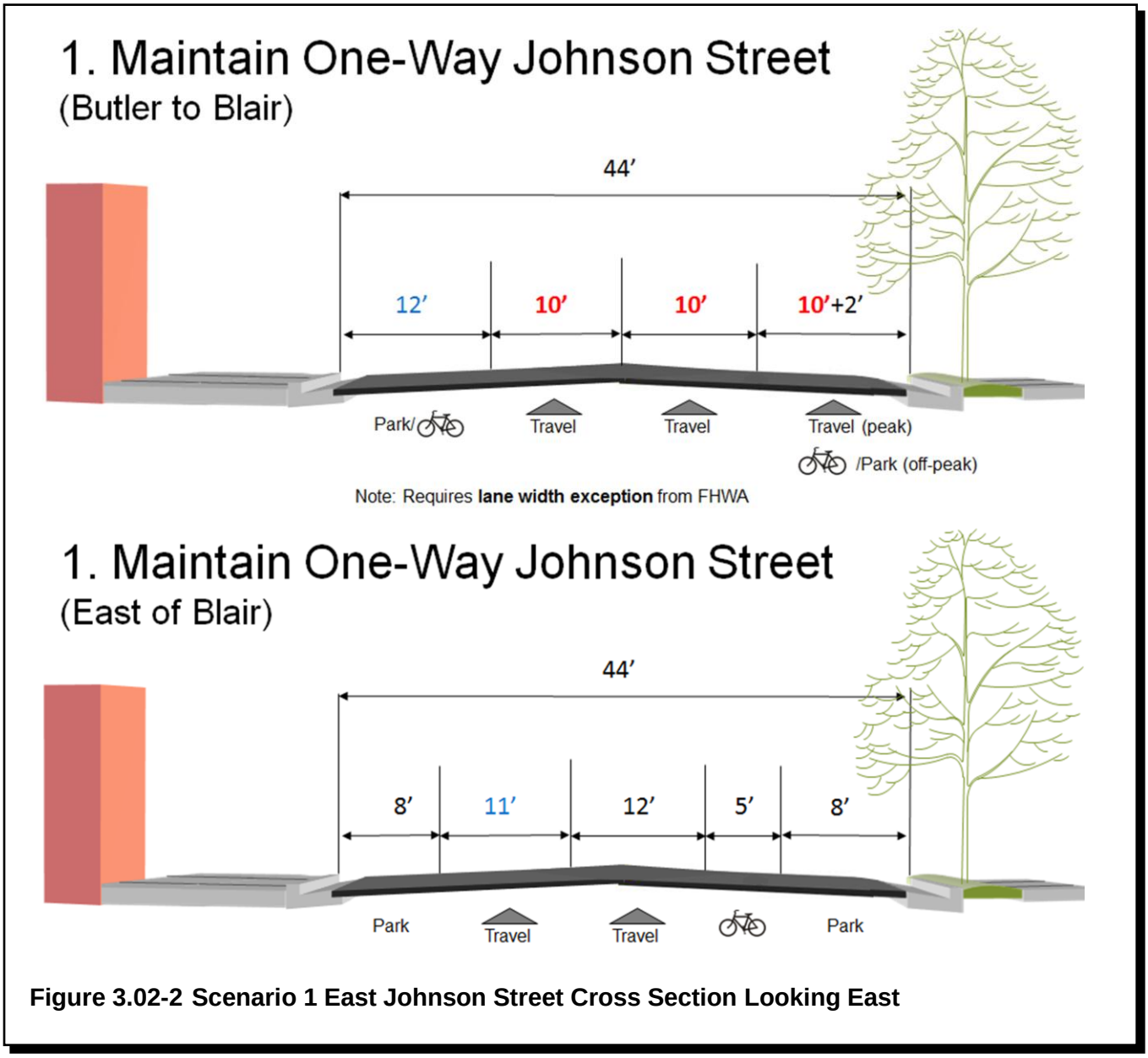

Figure 3.02-2 Scenario 1 East Johnson Street Cross Section Looking East

Based on experience with other projects, it is much more likely that FHWA will grant the Exception to Standards needed because of the 10-foot travel lanes if the street remains one-way. This is because traffic is traveling in the same direction, reducing conflicts between vehicles traveling in opposing directions (such as sideview mirrors), and there is already a precedent set by the current street. East of Blair Street, the proposed section represents a relatively significant improvement to the bicycle accommodation. It would be relocated to the right side of East Johnson Street, and the total width provided for the parking area, bicycle area, and travel lane is increased from 23 feet to 25 feet.

B. Scenario 2 Cross Section

Scenario 2 would convert East Johnson Street to two-way operation beginning at Wisconsin Avenue and continuing to Baldwin Street where it is currently two-way. There would be on-street parking on both sides of the street 24 hours a day. East Gorham Street would also be converted to two-way operation from Few Street to Wisconsin Avenue and have 24-hour parking on one side of the street. Figure 3.02-3 shows the proposed cross section.

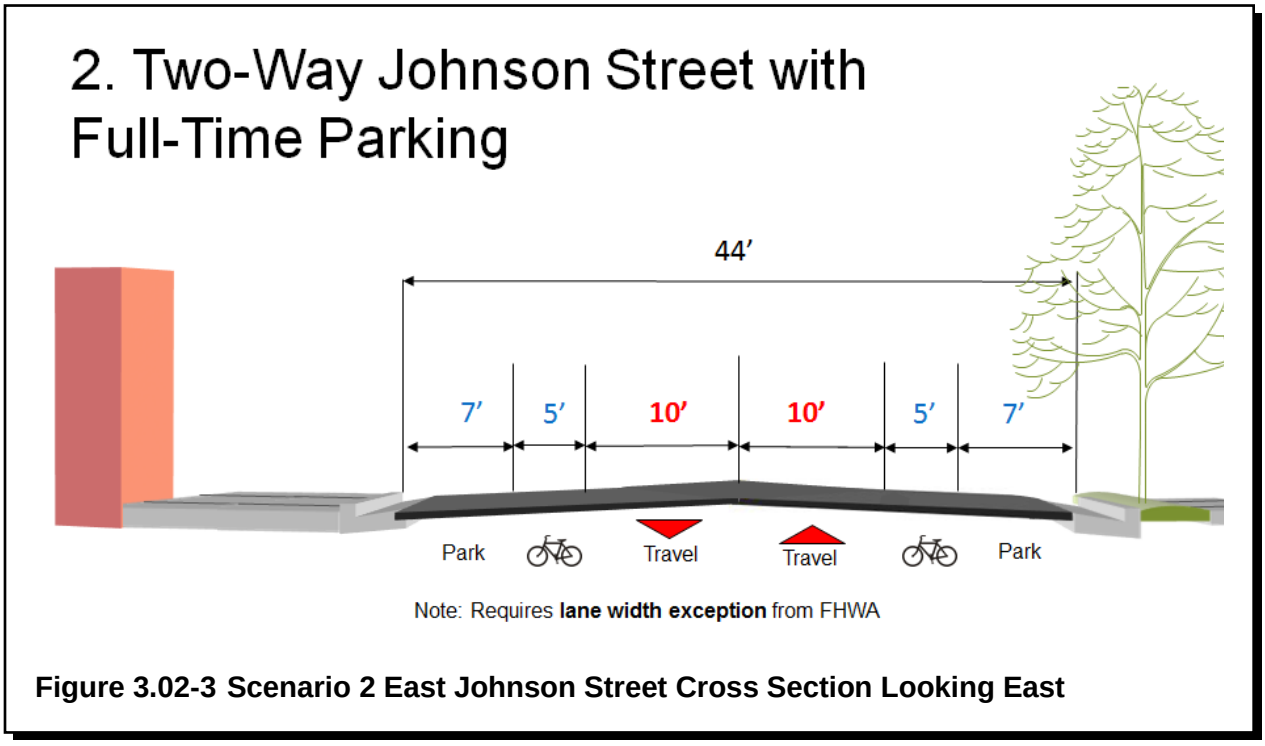

Figure 3.02-3 Scenario 2 East Johnson Street Cross Section Looking East

Based on experience with other projects, it will be difficult for FHWA to grant an Exception to Standards needed because of the 10-foot travel lanes. This is because traffic is now traveling in opposite directions. The bicycle accommodation is also poorer than that provided in Scenario 1. While bike accommodations are now provided in both directions on East Johnson Street, the space for bicycles is likely to be encroached upon by vehicles because of the 10-foot opposing travel lanes. Parked cars may also encroach on the bicycle space, particularly in the winter when snow prevents vehicles from being parked close to the curb face, because the minimum parking width is provided.

C. Scenario 3 Cross Section

Scenario 3 would maintain one-way operation on East Johnson and East Gorham Streets between Wisconsin Avenue and Blair Street. It also includes peak direction parking restrictions to allow for a second through lane on East Johnson Street during the most heavily traveled periods. East Gorham Street would be converted to two-way operation from Few Street to Blair Street and have 24-hour parking on one side of the street. Figure 3.02-4 shows the proposed cross section.

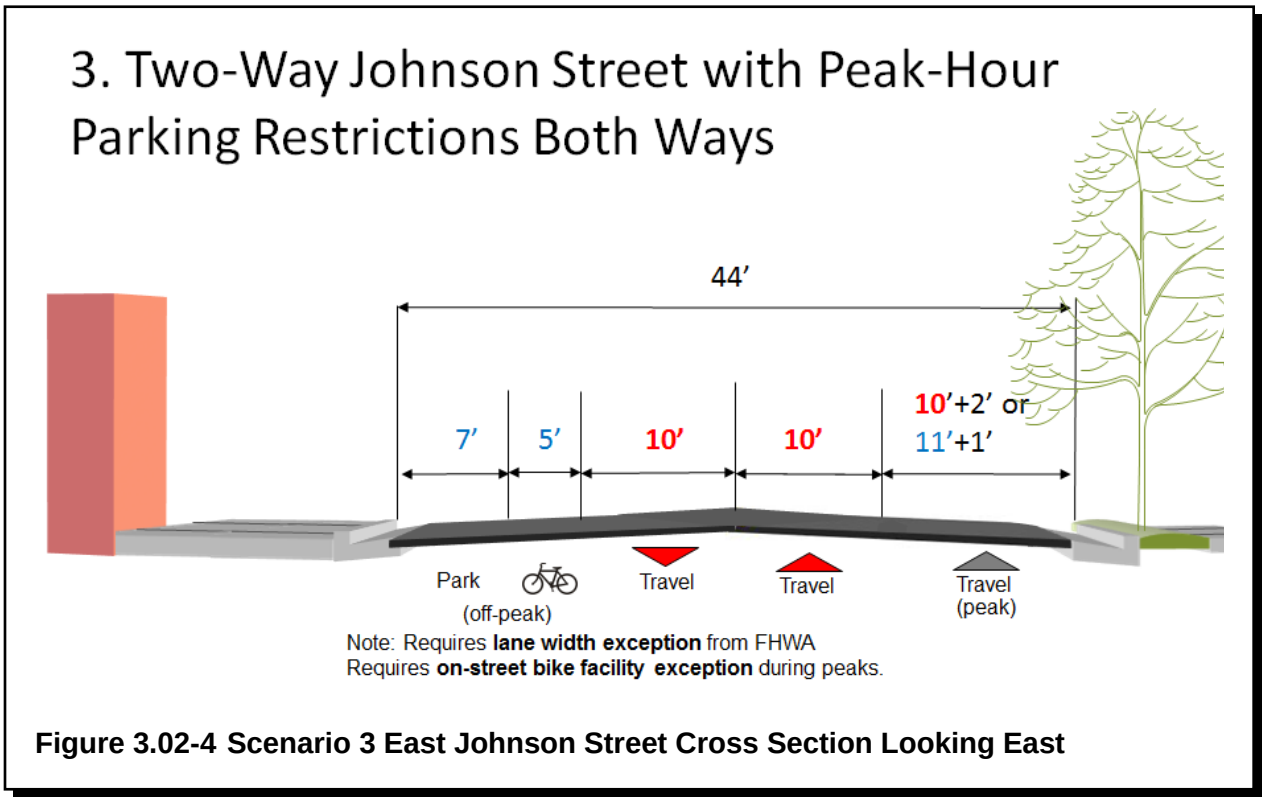

Figure 3.02-4 Scenario 3 East Johnson Street Cross Section Looking East

It will be difficult for FHWA to grant an Exception to Standards needed because of the 10-foot travel lanes in Scenario 3 for the same reasons as Scenario 2. The bicycle accommodation is poorer than that provided in Scenario 1 or Scenario 2. In addition to concerns about encroachment because of the narrow travel and parking lanes, there is not sufficient width to provide bike accommodation during the peak periods when parking is prohibited to allow for a second travel lane. This would require an on-street bicycle accommodation exception since bikes are not accommodated during these peak times. Cyclists wishing to travel Johnson Street during the peak period would need to occupy a full travel lane or find an alternate route.

D. Scenario 4 Cross Section

Scenario 4 would maintain one-way operation on East Johnson and East Gorham Streets between Wisconsin Avenue and Blair Street. Both would operate as two-way streets east of Blair Street. Scenario 4 also includes peak direction parking restrictions to allow for a second through lane inbound on East Gorham Street in the morning and outbound on East Johnson Street in the afternoon. This results in no on-street parking being provided at all on East Gorham Street during the morning rush hour. Figure 3.02-5 shows the proposed cross section.

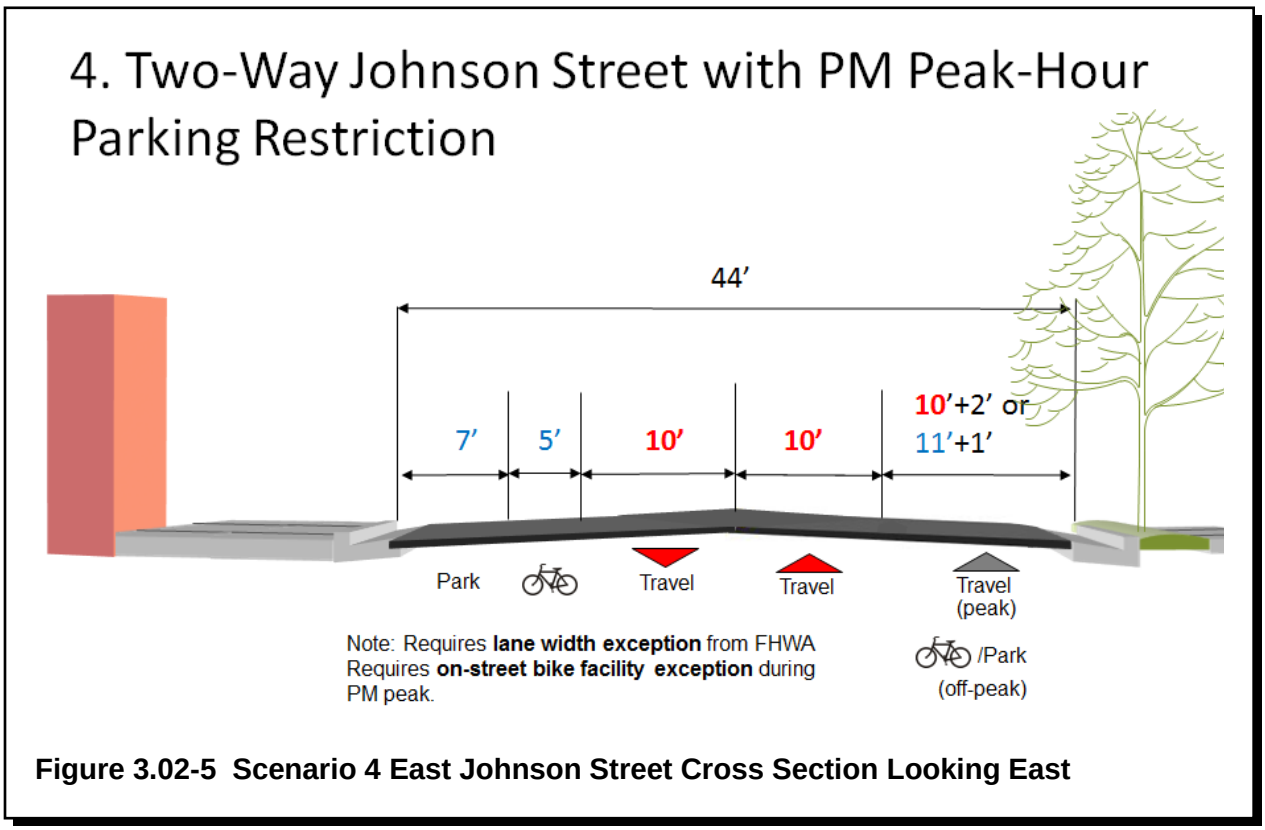

Figure 3.02-5 Scenario 4 East Johnson Street Cross Section Looking East

As noted, it will be difficult for FHWA to grant an Exception to Standards needed because of the 10-foot travel lanes in Scenario 4 for the same reasons as Scenarios 2 and 3. The bicycle accommodation is poorer than that provided in Scenario 1 or Scenario 2. In addition to concerns about encroachment because of the narrow travel and parking lanes, there is not sufficient width to provide bike accommodation during the afternoon peak period when parking is prohibited to allow for a second travel lane. This would require an on-street bicycle accommodation exception since bikes are not accommodated during these peak times. Cyclists wishing to travel Johnson Street during the peak period would need to occupy a full travel lane or find an alternate route. Scenario 4 would also eliminate the on-street bicycle accommodation on Gorham Street in the morning to accommodate a second inbound travel lane.

E. Summary of Bicycle Accommodations

Scenario 1 offers the best accommodation for bicyclists on East Johnson Street. Scenario 2 improves conditions since bike accommodations are provided in both directions, but this improvement is diminished by the encroachment that is likely to occur into the bicycle space because of narrow parking and motor vehicle travel lane widths. Scenarios 3 and 4 result in similar encroachment concerns and also do not provide any bike accommodation when parking is restricted during the rush hours, requiring on-street bicycle accommodation exceptions.

3.03 PEDESTRIAN CROSSINGS

Improving conditions for pedestrians was another key goal of survey respondents. With each operational scenario, the City will have the opportunity to provide enhancements such as improved marking and/or signage and other potential improvements. One pedestrian concern is crossing East Johnson Street during peak periods, particularly at unsignalized locations. The opportunity to cross a street is dependent on the availability of gaps in the traffic stream. The study team evaluated crossing opportunities two ways.

A. Simulation Of One-Way Versus Two-Way Operations

SimTraffic7 was used to evaluate the typical length of gaps in traffic on East Johnson Street during a weekday PM peak hour. The models spanned from the signalized intersections of Blount Street to Paterson Street and included the unsignalized Livingston Street intersection. Nine model runs were observed with randomized traffic arrivals at the end points of the models. The simulation showed that larger gaps were created in Scenario 1 (one-way operation) compared to Scenario 2 (full two-way conversion). The gaps in Scenario 1 tended to be 15 to 20 seconds in length or longer and occur more regularly because of the timing of the signals along the corridor. The gaps in Scenario 2 tended to be 10 to 15 seconds long and less frequent because of vehicles arriving from both directions. Video files of the simulation modeling can be provided upon request. The modeling suggests that one-way operation would provide more opportunities for pedestrians to cross Johnson Street at unsignalized intersections.

B. Highway Capacity Manual Analysis

Synchro7 was used to evaluate the delay experienced by vehicles turning left out of driveways. The length of the traffic gap needed for a vehicle to turn left out of a driveway is slightly less than the length of gap needed to cross the street as a pedestrian. However, the analysis is useful in comparing the relative frequency of gaps under the different operational scenarios. Delay is used to assign a Level of Service (LOS) to the driveways. LOS A represents very low delay while LOS F represents a condition where the demand exceeds the capacity of the driveway. Typically LOS D is considered the limit of acceptable delay, and LOS E or LOS F indicates that improvements may be needed. Table 3.03-1 shows the modeling results.

Existing PM Peak Hour Volumes

Scenario	*Location of Driveway*	*Side of Road*	*# of Lanes to cross*	*# of Left-Out*	*Delay*	*LOS*
One-Way (existing)	1/2 way between Blair and Blount	North	0	97	35.1	E
	Closer to Blair (Stop Controlled)	North	0	97	35.1	E
	Closer to Blount (Signal)	North	0	80	35.0	E
Two-Way (Scenario 3, 2-out 1-in)	1/2 way between Blair and Blount	North	1	15	36.2	E
			1	30	53.4	F
		South	2	1	74.3	F
	Closer to Blair (New Signal)	North	1	30	37.4	E
		South	2	1	68.8	F
	Closer to Blount (Signal)	North	1	15	35.9	E
			1	30	52.7	F
		South	2	1	130.5	F

Table 3.03-1 Delay and Level of Service for Left Turns from Driveways

The modeling indicates that for Scenario 1 (one-way) a high number of left turns (80 or more) can occur from a driveway during the PM peak hour before the delay results in LOS E conditions. For Scenario 3 (two-way with two lanes outbound in the PM peak), depending on where the driveway is located, LOS E is reached with a volume of 15 to 30 vehicles. In the most unfavorable locations, a single vehicle trying to turn left out of a driveway is predicted to wait an average of one to two minutes or more to do so. Detailed traffic modeling output is provided in Appendix C. This analysis also suggests that the one-way scenario provides more opportunity for pedestrian crossings than the two-way scenarios.

C. Summary of Pedestrian Crossings

Both methodologies used to examine the length and frequency of the gaps occurring in East Johnson Street traffic indicate that Scenario 1 (one-way) will provide more opportunity for pedestrian crossings at unsignalized locations than the two-way scenarios. Additionally, at signalized locations the one-way scenario results in fewer potential conflicts between turning traffic and legally crossing pedestrians (6 total) than two-way operation (12 total). Studies within the United States and abroad generally conclude that one-way operation is safer for pedestrians than two-way operation, provided that the one-way condition does not result in increased speeds compared to two-way operation. Speed data suggests that East Johnson Street (one-way) and Williamson Street (two-way) currently experience similar traffic speeds.

3.04 TRANSIT

Transit ridership is high in TLN. Maintaining or improving transit service is an important goal for the 2014 reconstruction. Figure 3.04-1 shows the current routes on the Madison Isthmus. The study team discussed how the operational scenarios would impact transit service with Metro Transit staff. There are two main factors influencing Metro Transit service.

Source: cityofmadison.com

Figure 3.04-1 Metro Transit Routes on the Madison Isthmus

A. Bus Operating Conditions

Bus operating conditions refer to where a bus travels relative to other motor vehicle traffic within the traffic stream, where boarding and alighting occur, and so on. Scenario 1 would maintain existing operating conditions. Currently, buses must make stops in the parking lane. This is not ideal on heavily traveled corridors because the bus must wait for a gap in traffic before proceeding on its route.

Scenario 2 would fully convert both East Johnson Street and East Gorham Street to two-way operation. If this were to occur, it is likely that Metro Transit would run routes in both directions on East Johnson Street, rather than continuing to provide inbound service on East Gorham Street and outbound service on East Johnson Street. This would be a modest improvement in service because the routes would be more central to the neighborhood and it would make navigating Metro Transit more intuitive for those who travel it less frequently.

Scenario 3 could potentially offer a more significant improvement to transit service if Johnson/Gorham Streets could be made to model the service provided on Williamson/Jenifer Streets. Jenifer Street acts as a transit priority corridor because there is a bus only signal at the east end. Other traffic cannot directly access Jenifer Street from Williamson Street. This is considered one of the best operating conditions for transit in Downtown Madison area by Metro Transit staff. If Gorham could act as a similar type of transit priority corridor, it would improve bus operating conditions.

Scenario 4 would likely result in service continuing to be split between East Gorham Street (inbound) and East Johnson Street (outbound). There is a modest improvement in operating conditions because of the parking lane restrictions during the peak periods. This would allow the buses to make stops in a travel lane rather than the parking lane.

B. Overall Traffic Congestion on the Isthmus

While the traffic analysis completed for the EJSTS is discussed in more detail in following sections of the report, a general discussion of the results is included here because of its impact on transit service. Scenario 1 would maintain current operating conditions and thus have little impact on traffic congestion. Traffic modeling suggests that Scenario 2 would increase overall congestion and have a negative impact on transit service. Scenarios 3 and 4 may increase congestion at certain key intersections but would have a less significant impact on transit service.

C. Summary of Transit Service

Scenario 1 would have a negligible impact on transit service. Scenario 2 would provide service more central to the neighborhood, but the increase in overall congestion would result in a net negative impact on transit. Scenario 3 has the potential to provide a transit priority corridor that could offset the lesser increase in congestion that is anticipated, resulting in a net positive impact on transit. Scenario 4 provides a modest improvement to bus operations since stops occur in a travel lane rather than a parking lane, but this is diminished to some degree by a somewhat modest increase in overall congestion. It should be noted that the impact of buses stopping in the peak direction travel lane in Scenario 3 (AM and PM) and 4 (PM only) was not quantified in the traffic modeling for this study.

3.05 ON-STREET PARKING

Feedback provided at PIM No. 1 and via the online survey indicates that parking is already considered inadequate along the East Johnson Street corridor and within TLN in general. Figure 3.05-1 shows a typical weekday on East Gorham Street with on-street parking being heavily used. Some homes and businesses do not have on-site parking and therefore rely on on-street parking. Currently, parking is provided on one side of East Gorham Street only. On East Johnson Street, parking is provided on both sides of the street, with a peak-hour parking restriction on the right side between Wisconsin Avenue and Blair to provide an additional travel lane during the afternoon peak period.

Figure 3.05-1 On-Street Parking on East Johnson Street

Scenario 1 would maintain existing parking conditions to the maximum extent possible. There would be a negligible impact on parking. Scenario 2 would provide a modest improvement in parking by eliminating the PM peak period parking restriction between Wisconsin Avenue and Blair Street. Scenario 3 would have a negative impact on parking because it would require parking restrictions on the north side (inbound) in the AM peak period and on the south side (outbound) in the PM peak period. Scenario 4 would also have a negative impact on parking because it would require parking restrictions on East Gorham Street in the AM peak period and on the south side (outbound) of East Johnson Street in the PM peak period.

3.06 BUSINESS ACCESSIBILITY

Two-way operation is generally considered better for commercial land use visibility. However, the two-way scenarios for East Johnson Street also result in less traffic using the corridors, reducing the amount of traffic the businesses in TLN are exposed to. On-street parking is also highly desired by businesses, but since that factor has already been discussed, it is not included again under this evaluation category.

Scenario 1 maintains current operation and therefore does not have a net impact on business accessibility. Scenario 2 provides an improvement in visibility because of the two-way operation, but this is offset by a forecasted reduction in daily traffic of more than 9,000 vpd. Scenario 3 also improves visibility, and because of the peak-hour parking restrictions, there is less reduction in daily traffic so the net benefit is considered positive. Scenario 4, similar to Scenario 2, provides two-way operation but reduces daily traffic by more than 6,000 vpd.

3.07 STREET TREES

As noted above, the study team has assumed that East Johnson Street will not be widened in any of the scenarios. Therefore, the number, type, and location of new street trees would be similar under each of the scenarios. There is no net impact on street trees because of Scenarios 1, 2, 3, or 4.

3.08 CORRIDOR AESTHETICS

Corridor aesthetics will be improved in a similar fashion under each of the improvements scenarios. Therefore, there is a positive net benefit to corridor aesthetics with Scenarios 1, 2, 3, and 4.

3.09 DIVERSION TO OTHER STREETS

The Base (2005) travel demand model provided by TPB was used as the basis for evaluating how much traffic would divert under the two-way scenarios and which streets would be most likely to receive the additional traffic. Table 3.09-1 is a simplified summary of the modeling results. Detailed results are provided in Appendix D.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
East Gorham Street	18,900	(-7,700)	(-7,300)	(-3,300)
East Johnson Street	23,200	(-9,200)	(-2,100)	(-6,500)
Dayton Street	3,600	+900	+1,500	+300
Mifflin Street	2,800	+5,800	+600	+900
East Washington Avenue	55,900	+6,900	+4,500	+6,600
Williamson Street	18,400	+1,800	+1,500	+1,800

Table 3.09-1 Daily Traffic Volumes from the Base (2005) Travel Demand Model (Trends between Blair Street and Baldwin Street)

The travel demand model indicates that Dayton Street, Mifflin Street, East Washington Avenue, and Williamson Street will see increased volumes under the two-way scenarios. There is some ripple effect created because East Washington Avenue is near capacity today. As traffic from Johnson and Gorham Streets begin using East Washington Avenue, some traffic moves away from East Washington Avenue to adjacent routes that are convenient for them, for example Williamson Street.

The model shows traffic is attracted to Mifflin Street rather than Dayton Street when assigning traffic. This may be due to the fact Mifflin Street connects to the Capitol Loop and therefore attracts a larger number of trips.

A. East Washington Avenue

East Washington Avenue carries about 56,000 vpd in Scenario 1. It is forecasted to carry more than 60,000 vpd in Scenarios 2, 3, and 4. For comparison purposes, the study team found only two locations in the state where arterial streets carry more than 60,000 vpd. One is Verona Road south of the Beltline. Verona Road is currently WisDOT's highest priority corridor for improvements in the State. The other location is on Stoughton Road south of WIS 30, where there are eight lanes of traffic compared to six lanes on East Washington Avenue.

B. Mifflin Street

Mifflin Street carries 2,800 vpd in Scenario 1. It is forecasted to carry more than 9,000 vpd in Scenario 2, which is more than triple what it carries today. This is similar to the volume of traffic on Fair Oaks Avenue north of Atwood Avenue. The character of Mifflin Street as a quiet neighborhood street and a bicycle boulevard would be impacted by this increase in traffic. Traffic calming is often recommended on streets where traffic is planned to be diverted. However, at these volume levels,

traffic calming would be difficult to sustain and rarely will a residential street accept a 300 percent increase in traffic without traffic calming to mitigate some of the impacts.

3.10 MOTOR VEHICLE OPERATIONS AND CONGESTION

As described at the end of the Study Process section, the EJSTS approach used a zero traffic growth assumption and other optimistic assumptions in the traffic operations analysis. This is demonstrated by the following:

1. Base year (2005) travel demand model volumes were used as the basis for the traffic analysis, despite the fact that the 2035 volumes forecasted by the TPD travel demand models predict an increase in future traffic even with enhanced transit in place including a commuter rail system. By using the Base model volumes, the EJSTS assumes that all traffic generated by higher densities, regional growth, and increased isthmus employment between now and 2035 is accommodated solely by transit and nonmotorized travel modes.

2. Key signalized intersections have been operationally modeled without full consideration of the operational constraints placed on them because of the need to provide signal progression and/or prevent gridlock from occurring.

3. Reduced capacity because of substandard lane widths, Metro Transit buses making stops, and high bicycle traffic were ignored in the analysis. Therefore, the operational analysis provides more optimistic results for Scenarios 2, 3, and 4 than what would likely be realized in the field.

Congestion is forecasted to increase under all the two-way scenarios and could be more severe than forecasted because of the optimistic assumptions used. Key intersections are discussed in the following subsections. Detailed modeling output and traffic volume calculations are provided in Appendix C.

A. Scenario 2: Johnson Street and Wisconsin Avenue

The capacity of the East Johnson Street corridor is significantly reduced at this location in Scenario 2. Currently, during the PM peak period there are three eastbound lanes provided from Broom Street to Blair Street. Scenario 2 reduces this to a single lane at Wisconsin Avenue. The travel demand model forecasts a 25 percent reduction in volume traveling eastbound on Johnson Street in Scenario 2 because of diversion to alternative routes. Even with this reduction, the operations modeling indicates severe congestion occurring at Wisconsin Avenue.

The Synchro7 model reports a queue length of nearly 1,900 feet with an additional indication that during the afternoon peak, the volume of traffic arriving at the intersection exceeds the capacity of the traffic signal. When this occurs, the model predicts the queue length after two signal cycles and notes that the actual queue could be much longer and will continue to grow until traffic volumes drop below capacity. So, the Synchro7 model is predicting that within 5 minutes (two signal cycles), the queue will back up through Carroll Street, State/Henry Streets, and Broom Street and will quickly grow during each successive signal cycle until volume drops significantly.

Observation of the simulation model confirms that the congestion and queuing would be extreme. Nine runs of the simulation model resulted in an average maximum queue length of 4,000 feet.

B. Scenario 3 and 4: Blair Street and East Washington Avenue

Scenarios 3 and 4 maintain one-way operation on East Johnson Street from Wisconsin Avenue to Blair Street. This would allow a more direct connection to East Washington Avenue for outbound traffic. For inbound traffic, a reasonable connection already exists via the Capitol Loop and Wisconsin Avenue.

The traffic analysis indicates that the left turn from Blair Street to East Washington avenue is already at capacity during the afternoon peak. Scenarios 3 and 4 add about 200 vehicles to this movement, resulting in an increase in congestion along Blair Street that reaches East Johnson Street. Similar to the Scenario 2 discussion above, the Synchro7 model reports a queue length of nearly 900 feet including an indication that the volume arriving exceeds the capacity of the traffic signal. So, the model is predicting that within 5 minutes (two signal cycles) the queue will back through Mifflin and Dayton Streets, nearly reaching East Johnson Street and will grow during each successive signal cycle until the volume drops. Observation of SimTraffic7 simulation modeling confirms that the queuing will frequently back to East Johnson Street potentially posing safety concerns and intersection gridlock.

C. Summary of Motor Vehicle Operations and Congestion

Scenario 1 would have little impact on motor vehicle operations and congestion. Modeling indicates that Scenario 2 would have a significant negative impact. Scenarios 3 and 4 would have a somewhat negative impact on operations and congestion.

3.11 SAFETY

The EJSTS team reviewed crash records from 2006 through 2010 on East Gorham Street, East Johnson Street, and Williamson Street. Additional summary information is provided in Appendix E.

A. East Gorham Street

East Gorham Street had the lowest corridor crash rate of the three streets evaluated, although it was still 1.55 times the statewide average for urban streets. The crash rates at signalized intersections were lower than Williamson Street but higher than East Johnson Street. It also had the fewest bicycle (6) and pedestrian (2) crashes.

B. East Johnson Street

East Johnson Street had a corridor crash rate that was higher than East Gorham Street but lower than Williamson Street and was 1.82 times the statewide average for urban streets. The crash rates at signalized intersections was the lowest of the three streets evaluated. East Johnson had the highest number of bicycle (26) and pedestrian (9) crashes.

C. Williamson Street

Examining crashes on Williamson Street is valuable since East Johnson Street would operate somewhat similarly to Williamson Street in Scenarios 3 and 4. Williamson Street had the highest corridor crash rate at 2.00 times the statewide average for urban streets. The crash rates at signalized intersections were also the highest of the three corridors evaluated. There were 7 pedestrian crashes and 14 bicycle crashes. It should be noted that bicycle accommodations are not provided on Williamson Street.

D. Summary of Safety Evaluation

Scenario 1 maintains one-way operation, which for the streets evaluated had lower corridor and intersection crash rates from 2006 through 2010. It also would relocate the bicycle lane to the right side of East Johnson Street and provide more width for the bicycle lane and the adjacent parking and motor vehicle travel lanes, which should improve safety. Scenario 2 provides substandard bicycle accommodations as well as significant traffic congestion, which would likely have a negative impact on safety. Scenarios 3 and 4 may operate similarly to Williamson Street, which had modestly higher crash rates than East Johnson or East Gorham Streets.

3.12 PROJECT COST

Scenario 1 represents the baseline in terms of improvement costs. The estimated construction cost for East Johnson Street maintaining one-way operation is $5 million. Each of the two-way scenarios would require additional modifications to East Gorham Street as well as varying combinations of existing infrastructure such as traffic signal equipment, and bus shelters. Detailed cost estimates have not been prepared for Scenarios 2, 3, or 4 at this time, but it is expected that two-way conversion would increase project costs by several hundred thousand dollars or more.

3.13 PUBLIC INVOLVEMENT MEETING NO. 2

The study findings were presented at PIM No. 2 on March 1, 2012. Comments in support of one-way operation and two-way operations were heard. Appendix F contains the PIM No. 2 sign-in sheets, a summary of questions from the meeting, and the written comment forms.

SECTION 4
CONCLUSIONS

4.01 CONCLUSIONS

Table 4.01-1 is a quantitative summary of the evaluation performed for the EJSTS. Positive values represent an anticipated improvement on conditions, while negative values indicate that conditions are expected to be poorer than they are with the existing one-way operations.

	1. Maintain 1-Way	2. Full 2-way	3. John. = Willy	4. Gor. 2-in, John. 2-out
Bike Conditions	**1**	0	**-1**	**-2**
Pedestrian Crossings	**1**	0	0	0
Transit	0	**-1**	**1**	0
Parking	0	**1**	**-1**	**-1**
Business Accessibility	0	0	**1**	0
Maintain Trees	0	0	0	0
Improve Aesthetics	**1**	**1**	**1**	**1**
MV Ops/Congestion	0	**-2**	**-1**	**-1**
Diversion	0	**-2**	**-1**	**-1**
Safety	**1**	**-1**	0	0
Cost	0	**-1**	**-1**	**-1**
TOTALS	**4**	**-5**	**-2**	**-5**

Table 4.01-1 EJSTS Evaluation Summary

In general, the analysis performed for the EJSTS resulted in the following findings:

1. Scenario 1–Maintain one-way operation

   a. Bicycle accommodations east of Blair Street would be improved by providing additional width for the travel and parking lanes, as well as relocating the shared bicycle and parking lane.

   b. Facilities for pedestrians crossing East Johnson Street would be improved, and more importantly, the gaps in traffic for pedestrians to cross would generally be longer than in the other scenarios. It is recognized that vehicles must yield to pedestrians by law; however, the length and number of gaps are a good indication of the relative pedestrian comfort level provided by the scenarios.

   c. Corridor aesthetics would be improved.

2. Scenarios 2, 3, and 4–Two-way operation

   a. All two-way scenarios would provide bike accommodations. Narrow parking and travel lane widths are likely to cause encroachment into the bike facilities. Also, Scenarios 3 and 4 restrict parking during peak periods to provide a second travel lane in the peak direction. During these restrictions, no bicycle accommodation is provided.

   b. The two-way scenarios would include enhanced pedestrian facilities, but available gaps in traffic for pedestrians to cross would generally be shorter in length and occur less often.

   c. Corridor aesthetics would be improved.

   d. The two-way scenarios would require a lane width exception for opposing travel lanes, which may be difficult to achieve.

   e. The two-way scenarios reduce volumes on Johnson Street by about 2,000 to 9,000 vpd.

   f. The two-way scenarios are likely to divert traffic to other corridors. East Washington Avenue receives an additional 4,000 to 7,000 vpd and is highly congested. Mifflin and Dayton Streets (both residential streets) receive an additional 1,000 to 7,000 vpd combined.

   g. Even with no growth in traffic assumed and optimistic operational assumptions, significant and sometimes severe additional congestion is expected at key intersections with two-way operation.

Based on the findings of the EJSTS, the study team believes Scenario 1–Maintain One-way Operation should be moved forward into design as it best balances the multiple goals that have been identified as most important to a successful 2014 reconstruction project on East Johnson Street. We recommend that the design team consider a potential future two-way conversion of East Johnson Street when evaluating design elements, so as not to preclude conversion if traffic patterns or other conditions on the Isthmus should change.