City of Madison

DEPARTMENT OF

TRANSPORTATION

East-West Bus Rapid Transit

Downtown Routing

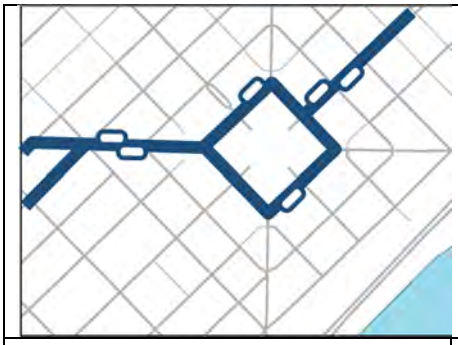
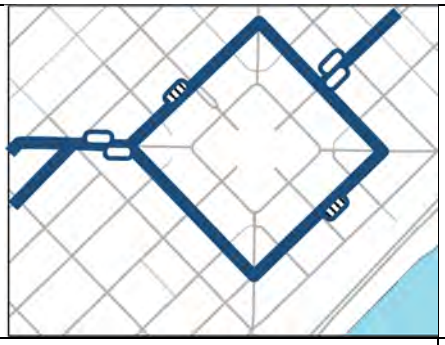
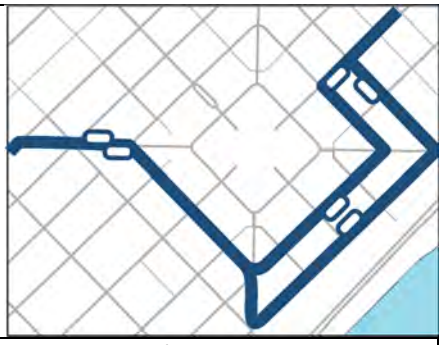
2020-01-27

Executive Summary

The City of Madison is planning to implement its first Bus Rapid Transit (BRT) line in 2024 along the east-west corridor. BRT is a high-quality bus-based transit system that delivers fast, reliable, and cost-effective transit services. Bus Rapid Transit will be transformative for Madison's transportation future. Streets serving Madison employment and cultural centers cannot provide the capacity needed to maintain the anticipated economic and residential growth. Madison needs a sustainable transportation system that moves residents to jobs, events, and cultural centers.

BRT routing through downtown Madison is complex because of the constrained geography, network of one-way streets, frequent special events, and competing needs of other modes like autos and bikes. Interactions with the local bus system and planning for future BRT lines is also a factor. This memo describes and evaluates alternative BRT routes in downtown Madison.

A. Alternatives Considered

		
Alt 1: Capitol Square	Alt 1A: Outer Loop with stations Alt 1B: Outer Loop with no stations	Alt 3A: Wilson/Doty and Fairchild

Many different downtown alternatives were evaluated and have since been screened to four alternatives which are under consideration. All alternatives follow the University Avenue and Johnson Street couplet through the UW campus and East Washington Avenue through the isthmus. The alternatives for BRT routing through downtown Madison differ around the state capitol, between about Broom Street and Blair Street.

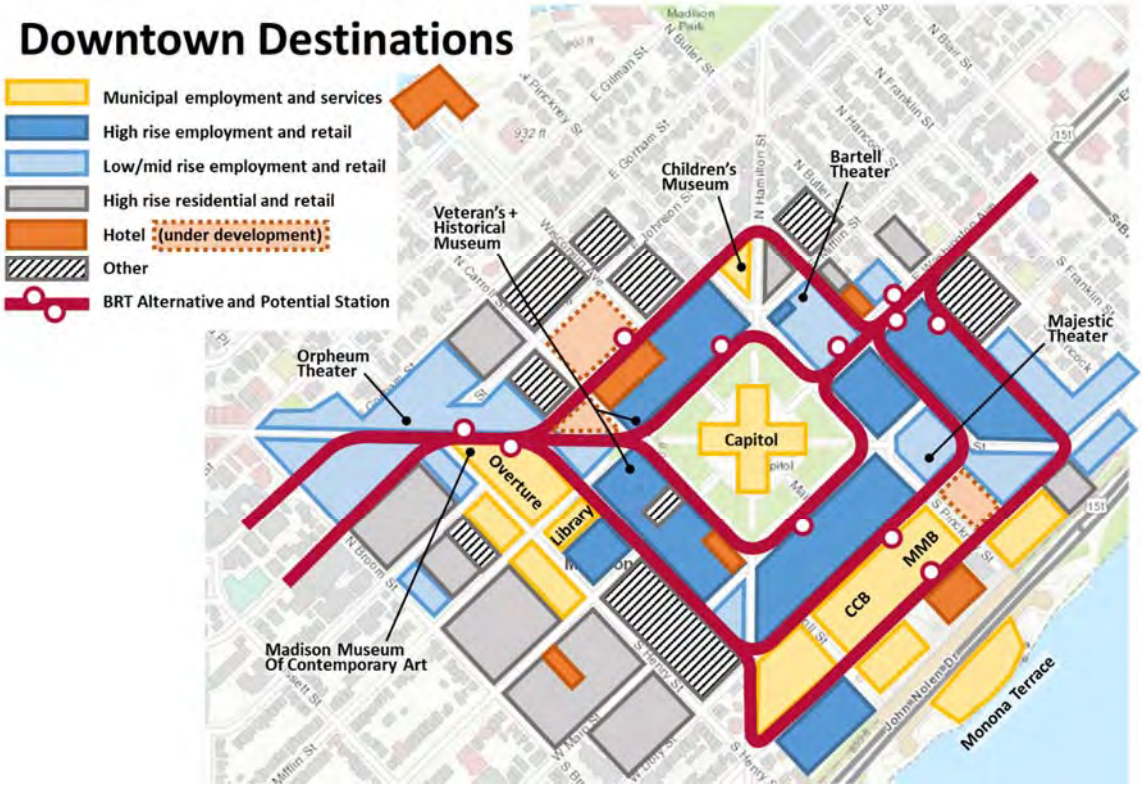
- Alternative 1 uses the route used by most bus routes today: State Street and around the Capitol Square, using existing bus lanes. Stations would be where existing high-use bus stops are on the Capitol Square.
- Alternative 1A routes BRT around the Outer Loop while local bus service remains on the Capitol Square. New permanent BRT stations would be built on Doty and Dayton Streets.[1]
- Alternative 1B is the same as 1A but does not have stations on the Outer Loop and therefore does not directly serve the Capitol.
- Alternative 3A operates in a new contraflow lane on Fairchild Street, then on Wilson and Doty Streets, and Webster and Butler Streets. New stations would be built at Martin Luther King, Jr Blvd.

B. Ability to Serve Regional Destinations

Employment downtown is concentrated on the south side of the Isthmus. Alternative 3A, with stations at Martin Luther King, Jr Blvd, provides the best service to these jobs. However, all of the high employment blocks south of the Capitol Square are within a few blocks of a BRT station for all alternatives.

[1] Note that the costs of the two Outer Loop stations with Alternative 1 is relatively small when compared to the street modification costs and parking revenue reductions associated with the other alternatives.

Other regional destinations downtown are concentrated around the Capitol. All are within a few blocks of a BRT station in any alternative. Frequent users of the BRT system are likely to adapt to where BRT stations are located for all alternatives. Downtown Madison visitors are likely to be new, inexperienced users of the system, and would likely be best served by Alternative 1, which is the simplest of the Alternatives.



C. Dedicated Running Way

The ability to provide dedicated running way (bus lanes) is an important component of BRT systems in that it allows buses to compete with auto travel times. For this reason, fixed guideway based systems in the Small Starts grant program must provide over 50% dedicated running way. The alternatives presented in this report were developed to optimize the amount of dedicated running way. The following table summarizes the amount of dedicated running way associated with each alternative.

	Alt 1	Alt 1A	Alt 1B	Alt 3A
Percentage of Dedicated Running Way	70%	76%	76%	59%
Length of Alternative	1.9	2.1	2.1	2.6
Length of Bus Lanes	1.3	1.6	1.6	1.6

D. Station Location

Station location is important for both wayfinding, passenger comfort, and passenger security. Station size is important to shield users from the weather. It is likely stations serving the Capitol will be higher use, and larger stations would be desirable.

Sidewalks on the Capitol Square (Alternative 1) are wide and comfortable. There is ample space for pedestrian circulation, shelters, and seating. BRT stations on the Square would have ample room to have a larger station.

Alternative 1A would have stations on the Outside Loop. These stations would be four blocks apart from each other, and it would be somewhat difficult for new users to navigate to their return station. The sidewalks and terraces are about 12 to 13 feet wide, which would require smaller BRT stations

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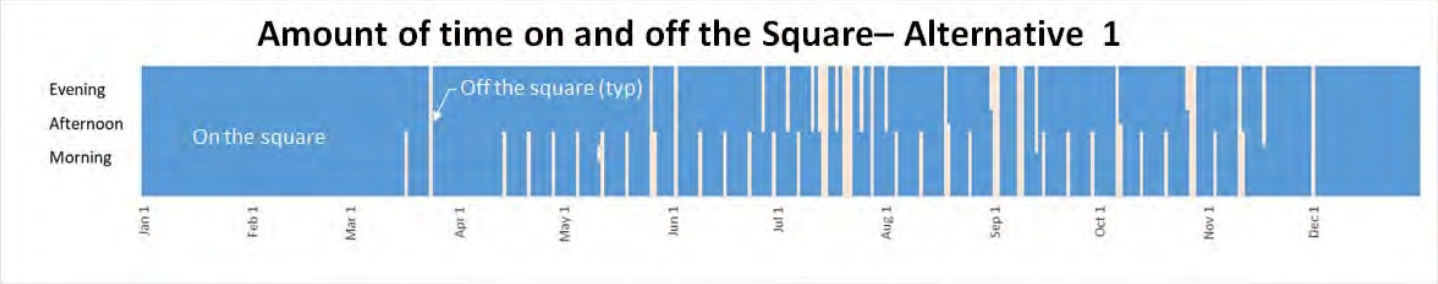
Alternative 1B would not have stations serving the Square, so station and location is not applicable.

Alternative 3A has similar space constraints to Alternative 1A but the station areas near the Madison Municipal Building are closer together and there is more pedestrian activity there.

E. Detours

Buses are currently detoured from the Capitol Square or State Street areas about 10% of the time transit service is provided. These detours occur mostly during the weekend and in the summer. Alternative 1A would incur the detours that currently exist, usually detouring to the Outer Loop. Alternatives 1A, 1B, and 3A would be detoured for State Street events, about 3% of the time transit is in service. It is possible that additional special events could require use of the Capitol Square. The time the Square is available is somewhat limited with most weekends being scheduled throughout the summer so possible future new events are likely to provide only small increases to the number of detours.



F. Transfers

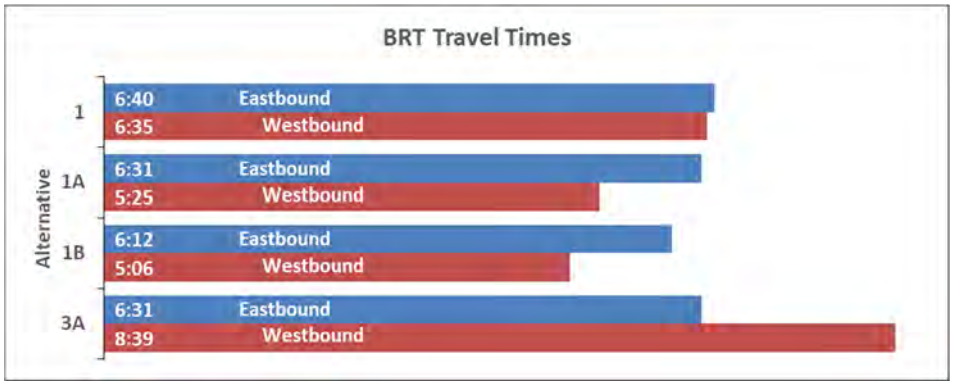
One in four boardings on the Capitol Square is a transfer. Transfers are the way residents access different parts the city. Transfers are needed because it is impossible to provide direct routes from all origins to all destinations. Transfers from BRT to and from the local system are easiest when they are in the same place. When transfers occur in the same location, passengers do not have to walk, which is important for passengers with mobility concerns. There is also less confusion associated with transfers that occur at the same location.

Transfers are best handled by Alternative 1. Most bus routes going through the isthmus go around the Capitol Square and serve time points there. Time points are where buses wait to collect passengers and get back on schedule. They allow people to easily make transfers and see the bus they will be transferring to.

Alternatives 1A and 3A will require riders to walk one block from the Outer Loop to the Capitol Square to make transfers, and the transfers may not be at a time point.

G. BRT Travel Times

Eastbound, all alternatives are substantially similar. Westbound, Alternatives 1A and 1B are the fastest, saving about a minute over Alternative 1. Alternative 3A is substantially slower, costing at least two minutes over Alternative 1 because of the circuitous routing.



H. Traffic, Parking, Bike Impacts

There are currently about 400 buses per average weekday going around the Capitol Square in each direction and 300 on State Street. BRT would add about 70 buses in each direction. However, in order to maintain smooth operations for BRT, Metro will need to remove some local bus routes from both State Street and the Capitol Square. As a result, State Street will see an overall reduction in bus traffic as regional and commuter routes are moved away from State Street. Bus volumes on the Capitol Square will likely remain comparable to what exists currently.

Traffic impacts are minor with all alternatives. Alternatives 1A, 1B, and 3A remove the peak period travel lane on Doty Street but this change is not likely to substantially increase congestion. Parking impacts are shown below.

- Alternative 1 removes about 4 parking spaces on East Washington Avenue between Pinckney Street and Doty Street, with an anticipated annual revenue loss of up to $8,000.
- Alternatives 1A and 1B remove about 85 metered parking spaces on the right side of Fairchild, Doty, and Webster Streets, with an anticipated annual revenue loss of up to $170,000.
- Alternative 3A removes about 104 metered spaces – 68 on Fairchild, Doty, and Webster Streets, and 36 on Wilson Street, with an anticipated revenue loss of $136,000 to $208,000.

Bike infrastructure changes mainly focus on the Capitol Loop. Alternatives 1A and 1B remove the existing bike lanes around the Outer Loop and replace them with shared bus and bike lanes. Alternative 3A removes the bike lanes entirely on Fairchild Street where bikes would be in mixed traffic. 3A would replace the bike lane on Doty Street with a shared bus and bike lane, and would have no effect on Dayton Street. Alternative 1 does not affect any bike lanes.

I. Business

Numerous studies have linked transit to economic development and job growth. One study by the American Public Transit Association found that every $1 invested in public transit yielded a $4 return in economic returns.[2] Transit in some cities is becoming the dominant transportation mode in the downtown, replacing auto traffic altogether. For example, San Francisco is removing all personal automobiles on 2.2 miles of Market Street between the Embarcadero and Octavia Blvd, and is pursuing the same measures on 10th Street. The potential economic advantages BRT could bring to Madison are substantial.

Public right of way on the Square is used in multiple ways, including sidewalk cafes, food carts, and special events. Some in the business community have expressed concern with buses on the Capitol Square. Concerns have included the idling and fumes of buses, the space bus shelters consume, and the potential to prevent future special events from occurring on the Square. Section 5 suggests mitigative measures that could be explored to address many of these concerns, including eliminating stops, using electric buses, and improving signal progression.

[2] https://www.apta.com/research-technical-resources/economic-impact-of-public-transit/

J. Equity

The study team conducted 55 interviews of bus riders to understand how they uses buses on the Square. The results of the review are discussed in Section 6. Key themes include:

- Transfers – The number of riders transferring was more numerous than anticipated. And those that transferred tended towards persons of color, low income, and the elderly.
- Location of transfers – The location of transfers (e.g. different alighting and boarding locations) tended to be a concern, particularly for those with mobility concerns who strongly opposed having transfers be one block away. These included those in walkers as well as those with knee and hip problems. The elderly were over represented in this group. When staff mentioned using the Outer Loop as an option for transfers, there were greater concerns expressed by those with mobility concerns as the Outer Loop is hillier and harder to walk on.
- Shelters – Shelters with walls were important to most of those interviewed. Since the interviews were conducted in the winter, having a wind block was a commonly expressed desire.
- Detours – Most respondents did not feel the detours were much of a problem. Some had missed a bus because of a detour, but it was considered it an infrequent event (e.g. once every couple of years.)
- Safety – Safety was not a large concern for men who were interviewed. Conversely, for women it was a very high concern. Factors that made women feel safe included lighting and the amount of pedestrian traffic. Motor vehicle traffic contributed less to the feeling of safety.

K Recommendation

BRT will be transformative in the way residents travel. Madison's downtown is a key destination within the network, serving both as an employment and cultural center. BRT routing through the downtown will influence future employment development, and the accessibility of all that Madison offers.

Alternative 1 is recommended for the downtown BRT routing for the following reasons:

1. It provides the most direct access to the visible economic and cultural center of the City.
2. Eastbound and westbound stations are within a block or two of each other – new and occasional downtown users will more easily be able to find the correct station.
3. There is generous space for stations – providing more shelter and better pedestrian circulation.
4. Alternative 1 does not reduce parking revenue.
5. It reduces the number of buses on State Street during the PM peak and replaces some with electric buses.
6. It allows transfers to and from local routes without walking, providing BRT access to portions of the City not on the BRT route.
7. It minimizes impacts to the urban environment on the Capitol Square with mitigative measures
   - Increased BRT bus volumes will be electric buses and will be offset by rerouting some local routes
   - Some local route station locations can be eliminated or relocated.
   - BRT station infrastructure can be positioned to maintain existing sidewalk space for special events.
8. BRT and local buses will continue to be detoured for special events, but detours can be made easier for the travelling public with improved real-time signage and benches and shelters on the Outer Loop detour stops.

With Alternative 1 BRT will detour 10% of the time now, and up to 12% in the future. However the benefits Alternative 1 provides outweigh the adverse effects detours create.

With Alternative 1, staff recommend evaluating the possible changes outlined in Section 5 to reduce the effect that bus traffic has on pedestrians and businesses on the Capitol Square. These changes include, potentially, moving or closing bus

stops on the Capitol Square, moving some local routes off of the Capitol Square, designing transit infrastructure to be minimal and blend in with its surrounding environment, and reducing the amount of idling on the square. These changes will require investigation and Transportation staff will recommend changes that can be implemented with minimal impacts while meeting the goal of improving the pedestrian experience on the Capitol Square.

In an effort to keep the report concise, some portions of the October 31, 2019 report have been eliminated (for Alternatives that have since been dismissed), or been rewritten in a more abbreviated narrative.

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Preface

The Madison Transportation Department issued a Downtown Routing report on October 31, 2019, laying out the options for routing the East-West bus rapid transit line through downtown Madison. A public meeting was held, as well as discussion with the Transportation Policy and Planning Board and individual meetings with stakeholders. This report updates that previous report. The following list summarizes changes to the report.

1. Alternative 2 (the Broom/Henry couplet) is no longer being considered because it cannot reliably and consistently operate with Overture Center events and loading.
2. Alternative 3 (two-way Broom) is no longer being considered because it does not provide sufficient service to the State Street area and there are other, better, off-square alternatives.
3. A new alternative 1B is added (Outer Loop with no stations).
4. A new alternative 3A is added (State Street and two-way Fairchild Street).
5. All alternatives now use State Street, and all include the rerouting many local bus routes to West Washington Avenue.
6. Text throughout the document was revised to focus on the most relevant factors that have been discussed.
7. An additional section on equity was incorporated.
8. An additional section on business concerns was incorporated.
9. The Recommendation section was added.

1. Introduction

The City of Madison is planning to implement its first Bus Rapid Transit (BRT) line in 2024 along the east-west corridor. BRT is a high-quality bus-based transit system that delivers fast, reliable, and cost-effective transit services. It does this through the provision of dedicated lanes, off-board fare collection, limited stops, and frequent service. With the right features, BRT is able to avoid the causes of delay that typically slow regular bus services, such as traffic congestion and waiting for people to pay as they board.

BRT is a key transportation strategy in the Imagine Madison Comprehensive Plan. The first stage implementation runs between the West Towne Mall area and East Towne, generally following Mineral Point Road or Odana Road, Whitney Way, University Avenue, and East Washington Avenue. The buses are planned to be electric 60-foot articulated buses which are both quieter and have more capacity that Metro Transit's current fleet.

BRT routing through downtown Madison is complex because of the constrained geography, network of one-way streets, frequent special events, and competing needs of other modes like autos and bikes. Interactions with the local bus system and planning for future BRT lines is also a factor. The purpose of this memo is to describe and evaluate the alternative routes in downtown Madison.

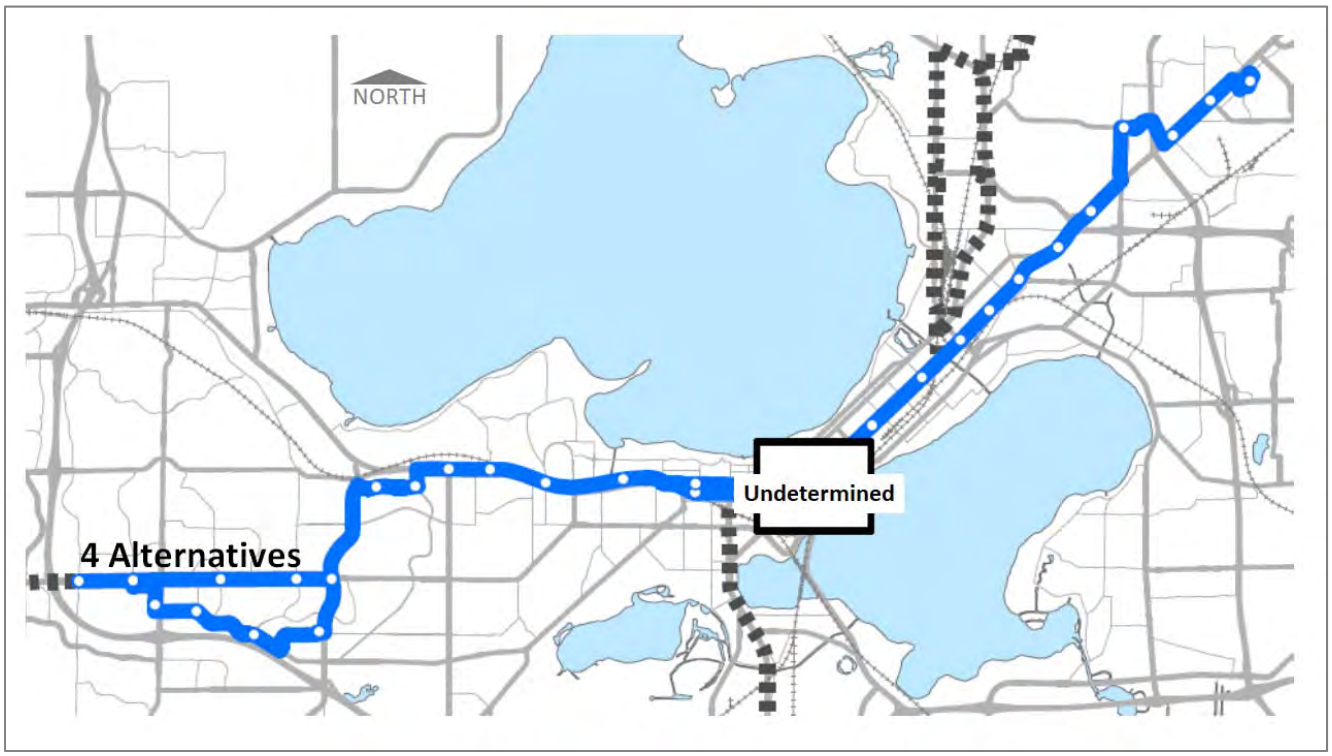


Figure 1-1 Focus of Report

2. Goals and Objectives

The locally preferred alternative route, stations, and roadway changes downtown seeks to address the following objectives and criteria.

- Serve important regional destinations (State Street, Capitol Square, Monona Terrace, government offices)
  - BRT needs to serve where people are going. This also includes serving major employment centers such as city and state offices on Wilson Street.
- Provide dedicated running way (bus lanes)
  - Dedicated running ways allow BRT to compete with, and even provide faster travel times than auto traffic. Having at least 50 percent dedicated running ways will help the project achieve an FTA Small Starts grant.
- Provide good BRT station locations. These locations:
  - Are logically spaced and located. Intuitively most riders tend to return to the stop where they got off. On one-way streets, sometimes station pairs are a block apart. However, station pairs that are more than one block apart add confusion to unfamiliar users. New and occasional users may get frustrated and have a poor experience if they cannot find the stations.
  - Are amply sized stations to serve potential riders. This includes the pedestrian environment and space at stations, including room to accommodate shelters, platforms, and sidewalk space.
  - Are located in visible, trafficked areas that promote security. One advantage of BRT is its increased frequency later into the night and it is important that riders are able to safely and comfortably walk to the stations.
- Minimize and/or accommodate detours.
- Provide convenient transfers from BRT to local Metro routes. Allowing easy transfers from regular Metro routes to BRT routes opens up the advantages of the BRT system to all residents served by Metro.
- Minimize BRT travel times
- Minimize traffic impacts.
- Accommodate local bus integration.
- Minimize impacts to on-street parking and parking revenue lost.
- Accommodate and address bike traffic.

3. Alternatives

West of the Capitol Square, BRT is planned to use the University Avenue and Johnson Street one-way couplet, and east of the Capitol Square, BRT will use East Washington Avenue. All other routes into and out of downtown are likely to be slow, circuitous, unreliable, and/or unbuildable. However, MPO and Metro staff recognized in the 2013 BRT feasibility study that there are several ways to route BRT through downtown Madison. This memo lays out the options identified in the area between Bassett Street and Blair Street.

A. Alternative 1: State Street and Capitol Square

Alternative 1 uses the route used by most bus routes today. From Johnson and Gorham Streets, the route follows State Street which is restricted to buses, bikes, and authorized vehicles, then continues around the Capitol Square, and to East Washington Avenue.

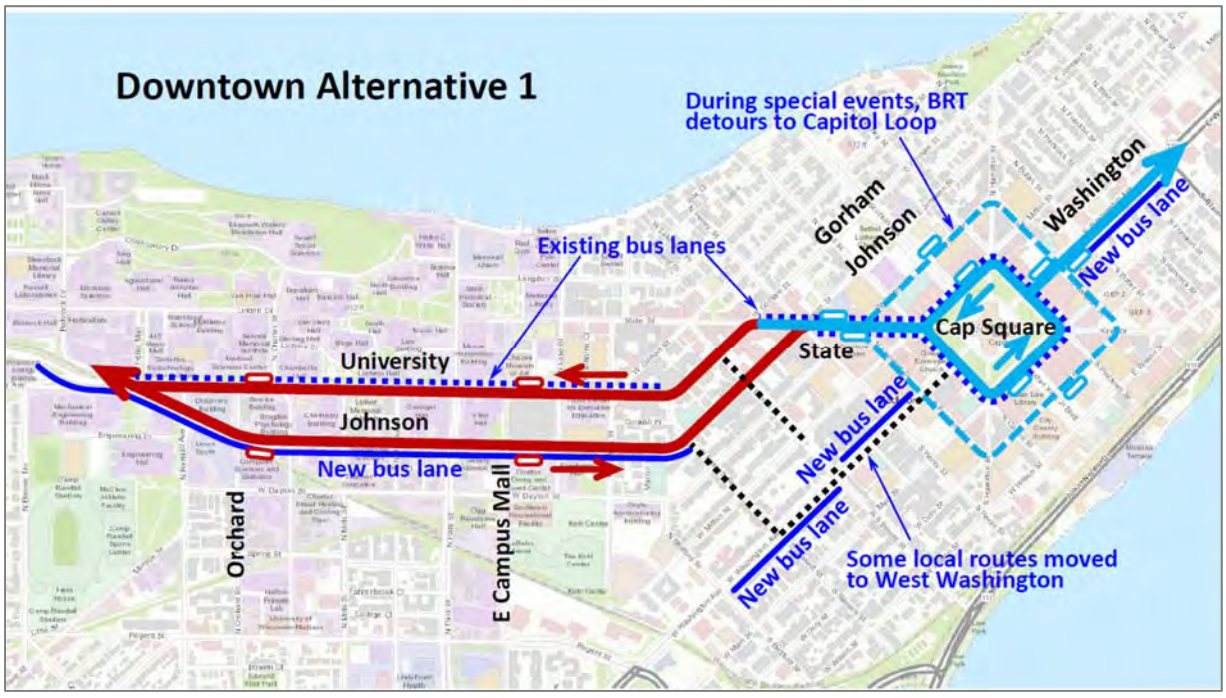


Figure 3-1 Downtown Alternative 1

The route is subject to being detoured by the Dane County Farmer's Market as well as other downtown events. Most of the time, BRT would use the Outside Loop detour, serving temporary stations on Dayton and Doty Streets, as Metro has been doing for many years. Detour information will be disseminated through signage, message boards, and through programmable message boards. Detours would likely be in effect about 10 percent of the time there is transit service, usually on weekends in the summer.

Because State Street is saturated with bus traffic during peak periods, many local routes – likely regional and commuter routes – would be rerouted from State Street to Broom and Bassett Street and West Washington Avenue with a new bus lane on West Washington Avenue in at least one direction. This change would free capacity on State Street so that BRT would be able to operate consistently without being delayed by local buses. Further, the change would reduce the overall number of buses on State Street during peak periods and people dining and walking on State Street would have a quieter, more pleasant experience. This change is part of all alternatives.

B. Alternative 1A: Outer Loop

Alternative 1A has the same route at Alternative 1 except that instead of using the outer loop detour only for special events, it would use it all the time. Parking would be removed from the right side of Webster, Doty, Dayton, and Fairchild Streets in order to add a new bus, bike, and right turn lane.

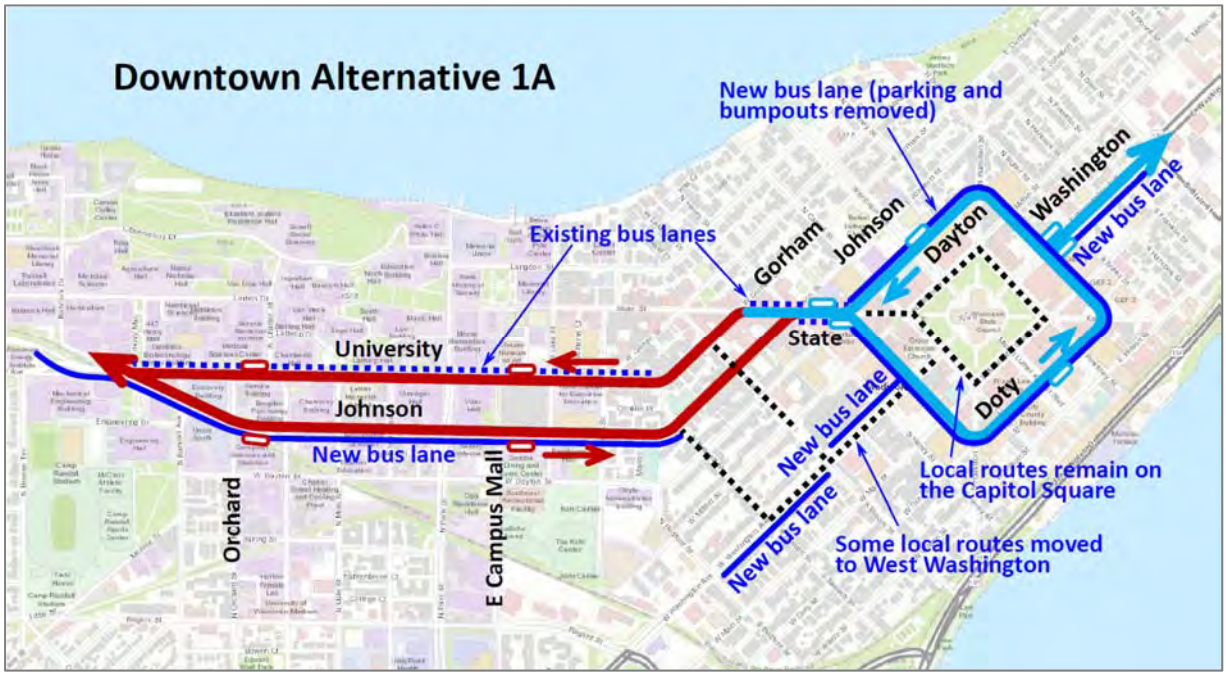


Figure 3-2 Downtown Alternative 1A

Permanent BRT stations would be constructed on Doty and Dayton Streets at Wisconsin Avenue and Martin Luther King Jr Boulevard respectively.

Some local buses would be rerouted to West Washington Avenue as described in Alternative 1. Alternative 1A would still be subject to some detours – events that impact State Street as well as some large races. Detours would likely be in effect about 3 percent of the time there is transit service, usually on weekends in the summer.

Local service would remain on the Capitol Square for several reasons:

1. Riders rely on transfers in multiple directions and may need to walk across the square to make their connections (ex from south to west) – the four block walk between Dayton Street and Doty Street is a large distance for transfers, particularly those with mobility concerns.
2. The limited sidewalk space on the Outside Loop makes it difficult to accommodate BRT as well as local buses.
3. The walk from civic destinations on the south side of the Capitol Square to westbound routes is beyond the one-quarter-mile walk distance, and key destinations would no longer be reasonable reachable by many city residents.

Alternative 1A would separate BRT from local service on the Square by one block. This could reduce BRT ridership and overall transit use.

1. Riders transferring to and from local service may avoid the walk to transfer and use local routes if available. (This is seen in other systems)
2. Transit service on the Capitol Square would access all portions of the city and would have more overall frequency, whereas BRT only serves the east-west routing, albeit faster. Many riders may choose to use the service that accesses all portions of the city.

3. Splitting transit service into two locations would make transit more complicated, particularly for new riders and tourist.
4. Opposing stations would be four blocks apart, making it more difficult to find the opposite complementing station to return home.[3]

C. Alternative 1B: Outer Loop without Capitol Stops

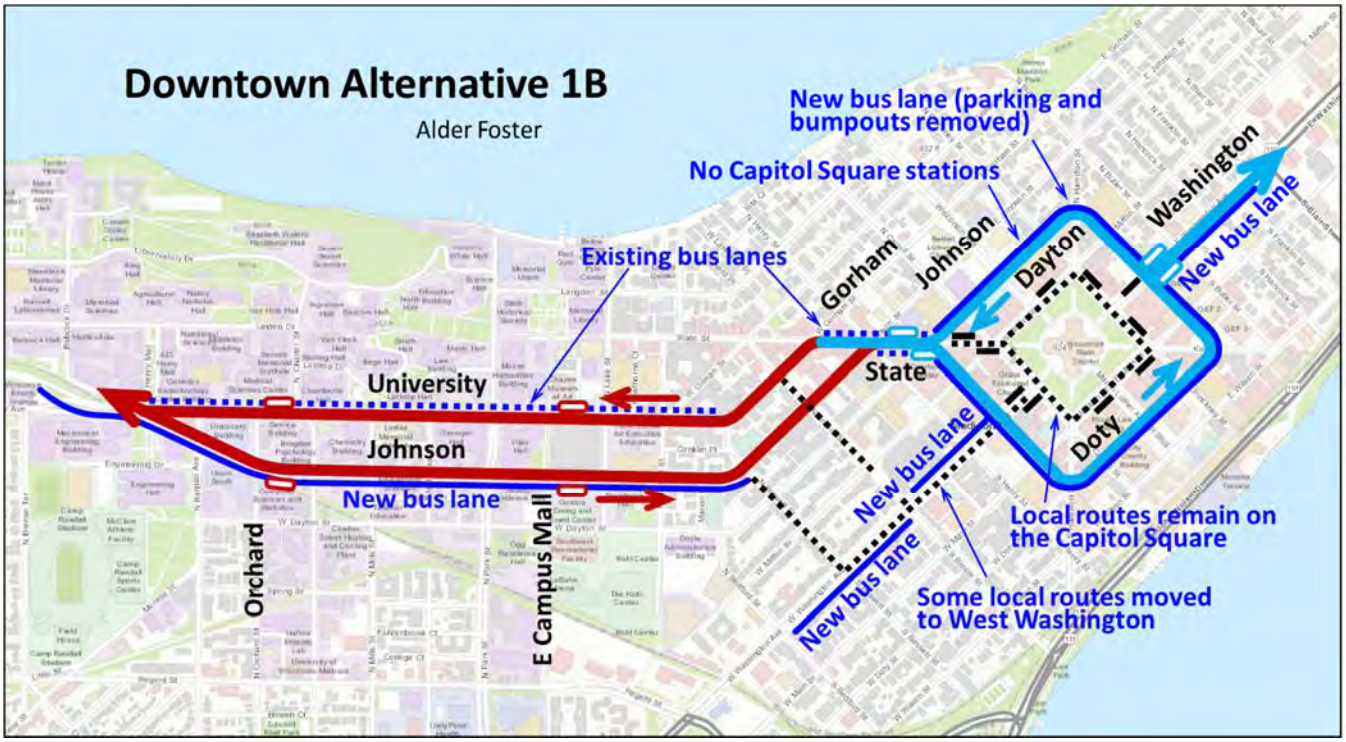


Figure 3-3 Alternative 1B: State Street and Capitol Loop without Stations

Alternative 1B uses the outer loop. Parking would be removed from the right side of Webster, Doty, Dayton, and Fairchild Streets in order to add a new continuous bus, bike, and right turn lane. In order to avoid the confusion of having competing service one block apart and opposing stations four blocks from each other, as is the case in Alternative 1A, Alternative 1B is routed on the Capitol Loop but does not serve stations on it. The remaining stations – State Street and Webster Street – would be about 0.4 miles apart, a more appropriate spacing for BRT. However, the Capitol Square stops have the highest number of boardings outside of the UW campus and transfer points, and transfers would be much more difficult to accommodate.

Some local buses would be rerouted to West Washington Avenue as described in Alternative 1. Alternative 1B would still be subject to some detours – events that impact State Street as well as some large races. Detours would likely be in effect about 3 percent of the time, usually on weekends in the summer.

C. Alternative 2: Broom/Henry and Wilson/Doty - Dismissed

Alternative 2 uses a series of one-way couplets (Broom/Henry Streets, Wilson/Doty Streets, and Webster/Butler Streets) to pass through downtown south of the Capitol Square. While less central to the downtown and Isthmus, this route was

1. [3] Virtually no transit routes, let alone BRT or light rail lines, have stations this far apart.

designed to minimize the number and severity of special event detours while serving the high demand employment area near Martin Luther King Jr Boulevard.

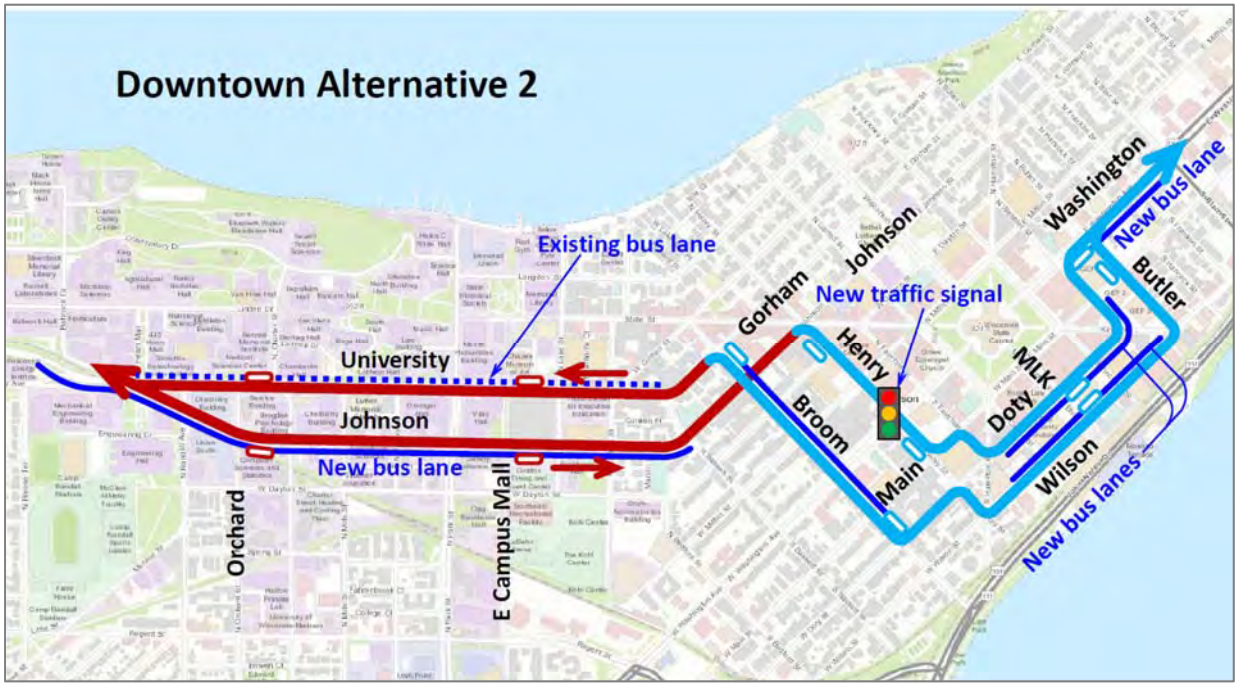


Figure 3-4 Downtown Alternative 2

Alternative 2 takes longer to travel than Alternative 1, adding at least a minute or two to every trip. Its stations are not as central and visible. For example, the stations near State Street are at Broom and Gorham westbound and Henry and Dayton eastbound – these station locations provide adequate service to the area but would be less prominent and more difficult to find.

Alternative 2 has since been dismissed since it was proposed in October. Reasons for its dismissal include:

- Impacts to loading on Henry Street at the Overture Center.
- There are other alternatives that are routed off the square that have closer stations and do not impact the Overture Center.

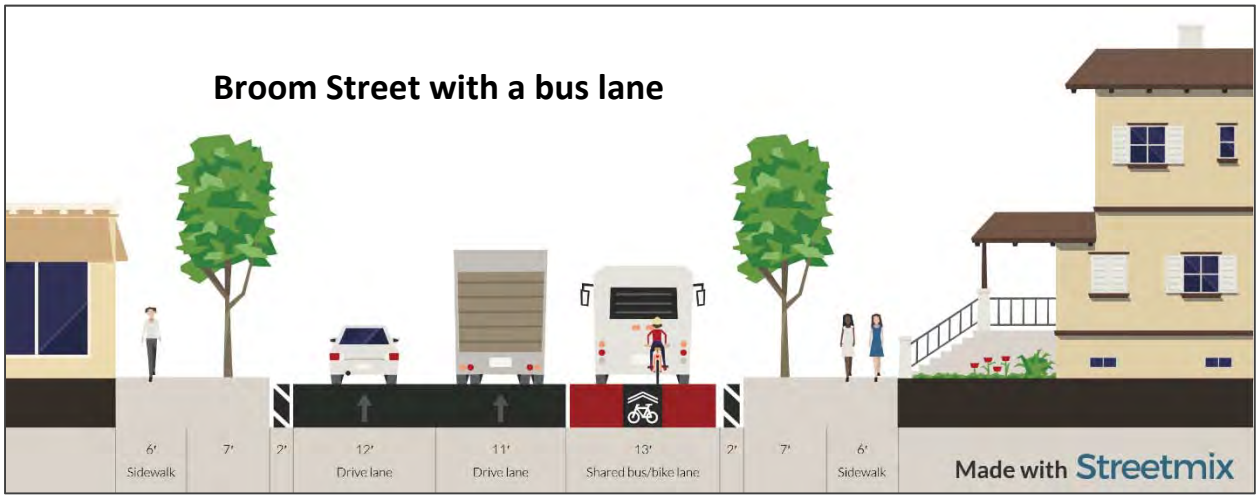


Figure 3-5 Broom Street with a Bus Lane

One advantage of Alternative 2 (and Alternative 3) is the provision of an additional station pair serving the Bassett neighborhood. This high-demand neighborhood would benefit from fast, frequent, all-day service. The blocks between Broom and Henry Street are long (1/8 mile) and Broom and Henry Streets are not a logical pair as Broom and Bassett Streets are, so this station pair may cause some confusion.

D. Alternative 3: Two-way Broom and Wilson/Doty - Dismissed

Alternative 3 is identical to Alternative 2 except that eastbound buses would use a new contraflow bus lane on Broom Street between Johnson Street and Main Street, rather than using Henry Street. While this reconfiguration of Broom Street would pose some challenges, it would locate the opposing stations closer to each other making the system easier to use and avoid potential operational issues on Henry Street.

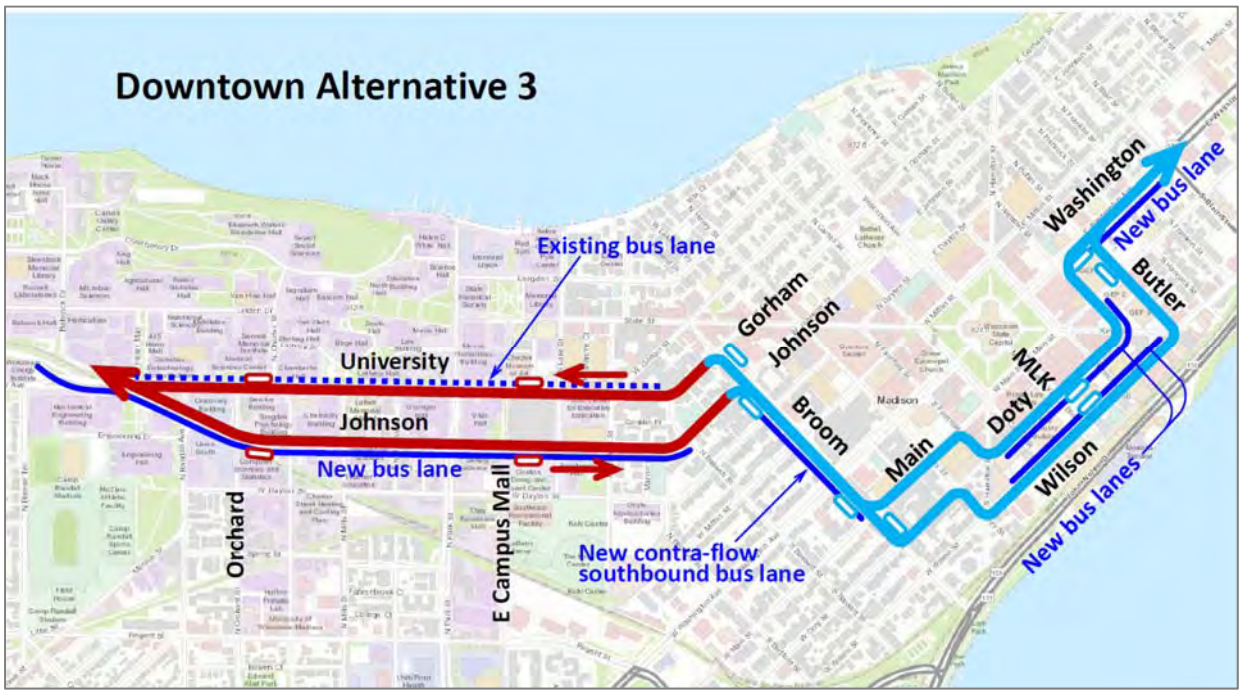


Figure 3-6 Downtown Alternative 3

To add the southbound contraflow lane on Broom Street, parking would be removed and the street would be restriped with a northbound bike lane, two northbound travel lanes, and one southbound bus-only lane. The bus lane would need to be well signed and marked with accompanying enforcement because buses will not have the ability to pass parked cars. At the northbound approach to Johnson Street, Broom Street would be widened by one lane to account for one through lane dedicated to the left turn at Gorham Street, one through lane toward Gilman Street, and one dedicated right turn lane to Johnson Street.

Alternative 3 has since been dismissed since it was proposed in October. Alternative 3A provides more direct access to the Capitol Square and has fewer impacts on Broom Street

F. Alternative 3A

Alternative 3A avoids the Capitol Square area by using Fairchild Street in both directions, the Wilson and Doty Street one-way couplet, and Webster and Butler Street. Parking on the left side and the bike lane on the right side of Fairchild Street would be removed in order to add a contra-flow northbound bus lane. Additionally, parking would be removed on Wilson and Doty Streets to add bus lanes.

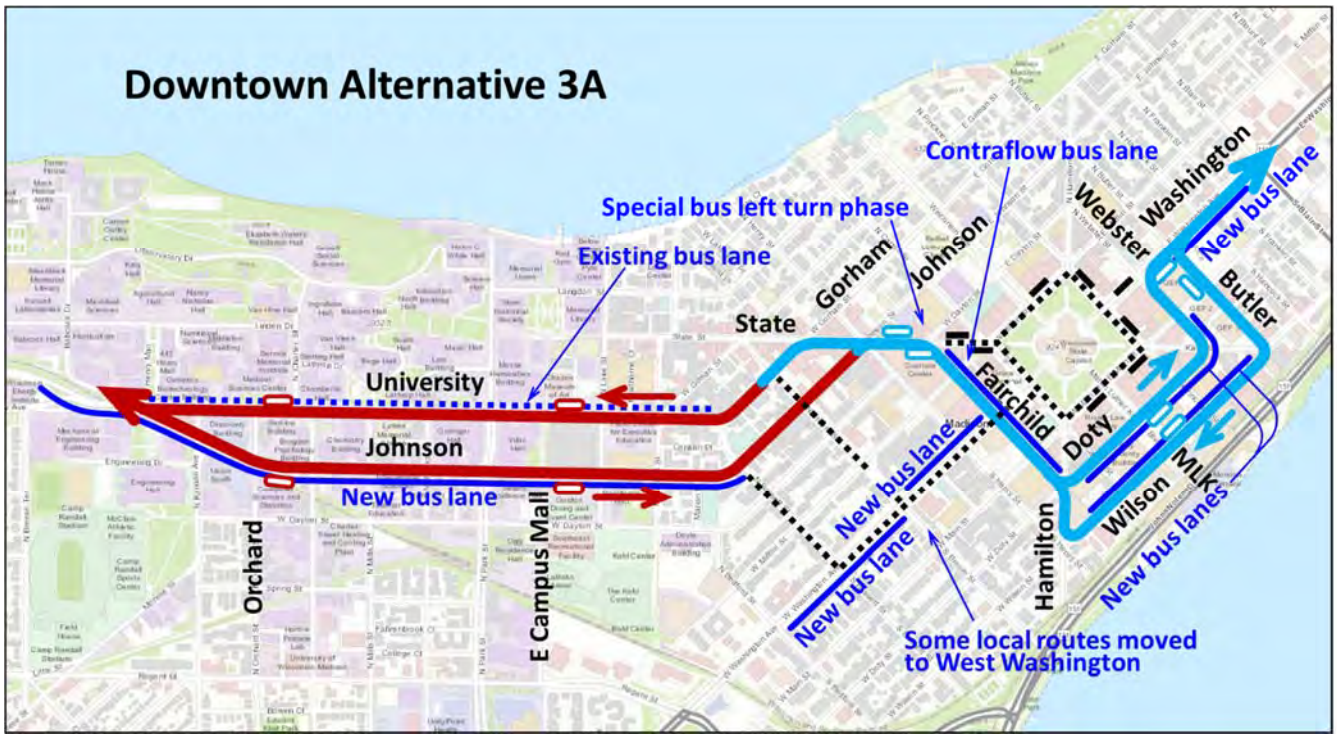


Figure 3-7 Alternative 3A: State Street, Fairchild Street, and Wilson – Doty Street

The route concentrates service on the south side of the Capitol Square which has over 70 percent of the employment. Riders traveling to the City-County Building, Madison Municipal Building, Monona Terrace, and other civic and employment destinations would be directly served by a station pair at Martin Luther King Jr Boulevard in both directions. However, the route would slow in the westbound direction, adding a minute or two compared to other alternatives. Transfers and coordination with local routes would also be challenging because transfers would be several blocks away – riders would likely transfer in other places.

Some local buses would be rerouted to West Washington Avenue as described in Alternative 1. Alternative 3A would still be subject to some detours – events that impact State Street as well as some large races. Detours would likely be in effect about 3 percent of the time, usually on weekends in the summer.

E. Other Dismissed Alternatives

Many alternative routes were developed with the very general goals of being fast and reliable, avoiding frequent detours, and serving major downtown destinations. The route options below were dismissed from further analysis in order to focus on more likely routes.

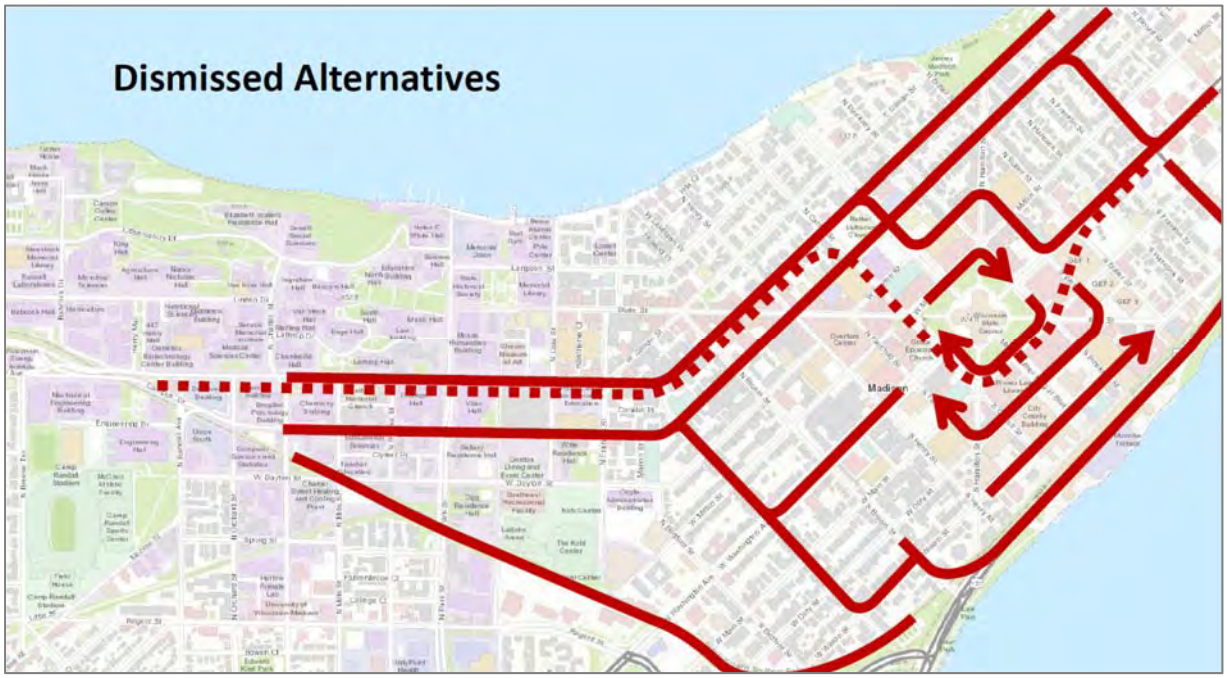


Figure 3-8 Dismissed Alternatives

Tunnel from East Washington and Blair to West Washington and Henry or underneath University Avenue
A tunnel through downtown would eliminate congestion for BRT. It would be fast and free from detours. However, the cost could easily exceed $1 billion and therefore is unfeasible.

Johnson and Gorham Streets to Wisconsin and Blair Streets
Routing on the north side of the Capitol would provide inadequate service to employment areas on the south side of the Capitol Square.

Bassett Street
A Broom and Bassett Street couplet is logical for BRT because it avoids the State Street and Capitol Square area; however, it was dismissed from consideration because the eastbound route does not get close enough to State Street and the Capitol Square to effectively serve it.

West Washington Avenue
A BRT route on West Washington Avenue would eliminate detours and the unreliability of service on State Street but would be slower and would still rely on the Capitol Square and its many detours.

Two-way Wilson Street
A contraflow eastbound bus and bike lane on Wilson Street is attractive because it provides a two-way path around the south side of the Capitol Square free from most event detours. However, Wilson Street has a constrained cross section and a shared lane conflicts with the need for a high quality two-way bike facility.

Contraflow Main or Doty Street
A contraflow lane on Main Street would put the BRT station, and possibly the BRT running way, on State property where the city does not have jurisdiction. A contraflow lane on Doty Street would not fit within the cross section and would present sight-line issues for traffic exiting garages.

John Nolen Drive
John Nolen Drive was dismissed as a viable BRT corridor because it is frequently congested during peak periods and does not provide adequate service to the employment areas downtown.

4. Evaluation

A. Ability to Serve Regional Destinations

Employment

Employment downtown between Broom Street and Blair Street is heavily concentrated on the south side of the Isthmus. These jobs are mainly public city, state, and county jobs. Alternative 3A, with stations at Martin Luther King, Jr Blvd, provides the best service to these jobs. Alternative 1 provides good access in that complimenting stations are relatively close. Alternative 1A provides slightly less access to employment centers because the westbound BRT station lies about 0.4 miles north of the complementing eastbound station, and even farther from Wilson Street employers.

Alternative 1B does not include stations on the Capitol Loop. As a result, employees within a block or so of Martin Luther King, Jr Blvd will not have access to the stations and will need to board either on State Street or East Washington Ave.

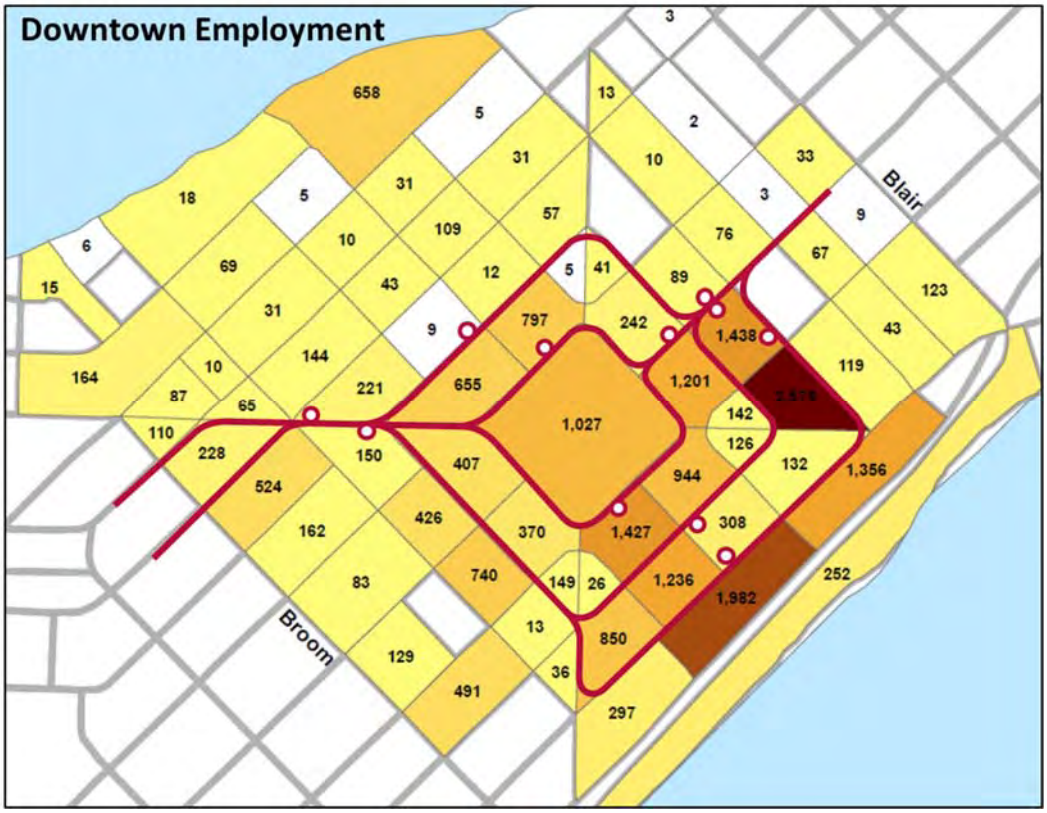


Figure 4-1 Downtown Employment Concentration

Destinations

Other regional destinations downtown are concentrated around the Capitol. All are within a few blocks of a BRT station in any alternative. Alternative 1 or 1A provides the most equal access to all destinations. Alternative 3A favors the south side, so destinations such as the Children's museum would be distant from a BRT station.

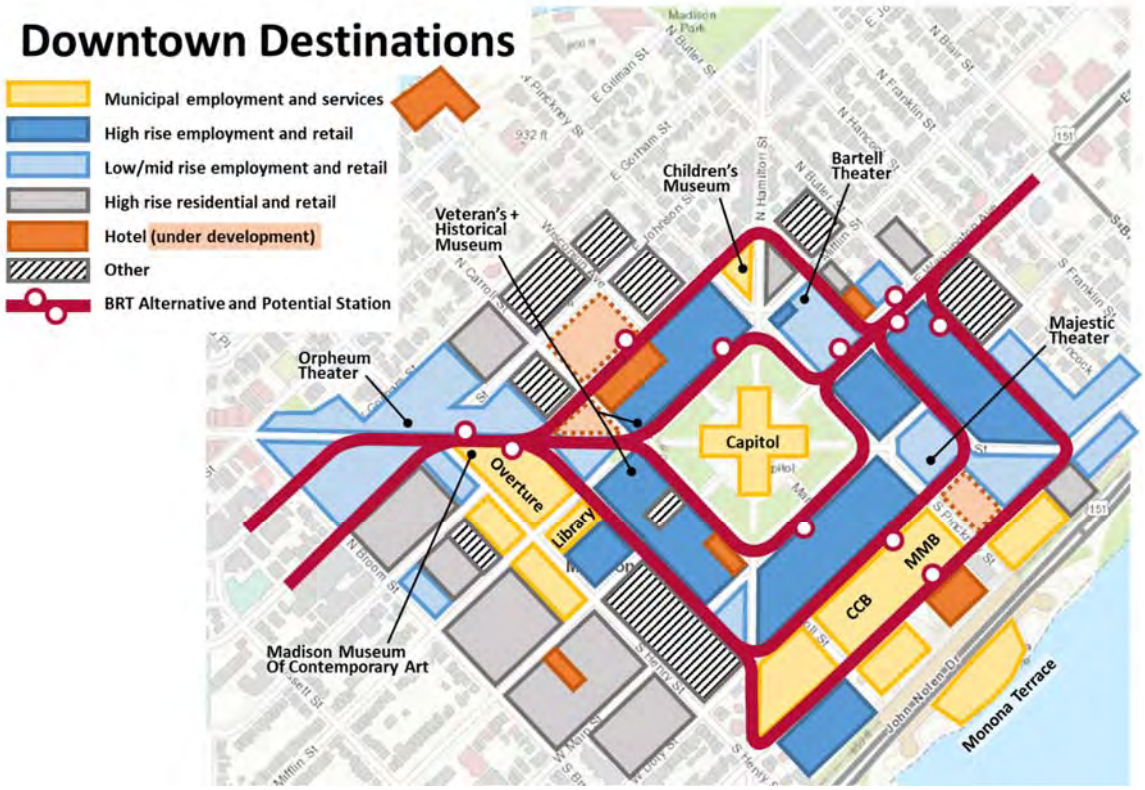


Figure 4-2 Downtown Destinations

B. Dedicated Running Way

The ability to provide dedicated running way (bus lanes) is an important component of BRT systems in that it allows buses to compete with auto travel times. For this reason, fixed guideway based systems in the Small Starts grant program must provide over 50 percent dedicated running way. Because of this, the alternatives presented in this report were developed to optimize the amount of dedicated running way. Table 4-1 summarizes the amount of dedicated running way associated with each alternative.

Table 4-1 Dedicated Running Way

	Alt 1	Alt 1A	Alt 1B	Alt 3A
Percentage of Dedicated Running Way	70%	76%	76%	59%
Length of Alternative	1.9	2.1	2.1	2.6
Length of Bus Lanes	1.3	1.6	1.6	1.6

C. Station Location

Station Pairs

Many design manuals recommend locating bus stops/stations in pairs, typically with one stop on each side of the street along two-way route segments.[4] This helps simplify planning of the return trip. Some often think of a station as one bus stop with two platforms. As with light rail, a passenger will board and get off at the same location. Center running BRT and LRT systems often have one station in the median that serves both directions. Side running BRT systems, which Madison's is likely to be, seek to have the same consistency. Where you get on the bus is close to where you got off the

[4] https://nacto.org/wp-content/uploads/2015/04/design_and_placement_of_transit_stops_kfh.pdf
https://nacto.org/wp-content/uploads/2015/04/service_design_guidelines_vta.pdf

bus. Midwest BRT lines, such as Cleveland's Healthline, Indianapolis' IndyGo, and Grand Rapids Silver Line all have opposing stations that complement each other and generally are within 400 feet of each other.

All alternatives would have complementing stops on the University Ave and Johnson St one-way pair that are about 450 feet apart, or 0.1 miles. This is not ideal, yet is common with transit stops that are in a grid or one-way pair system.

Around the Capitol Square the differences are more pronounced. Because of the State Capitol, complementing BRT stops cannot be closer than two blocks (0.2 miles) apart. Again, this is not ideal but has been part of Madison's transit system for over 100 years and is logical for the one-way loop nature around the Capitol.

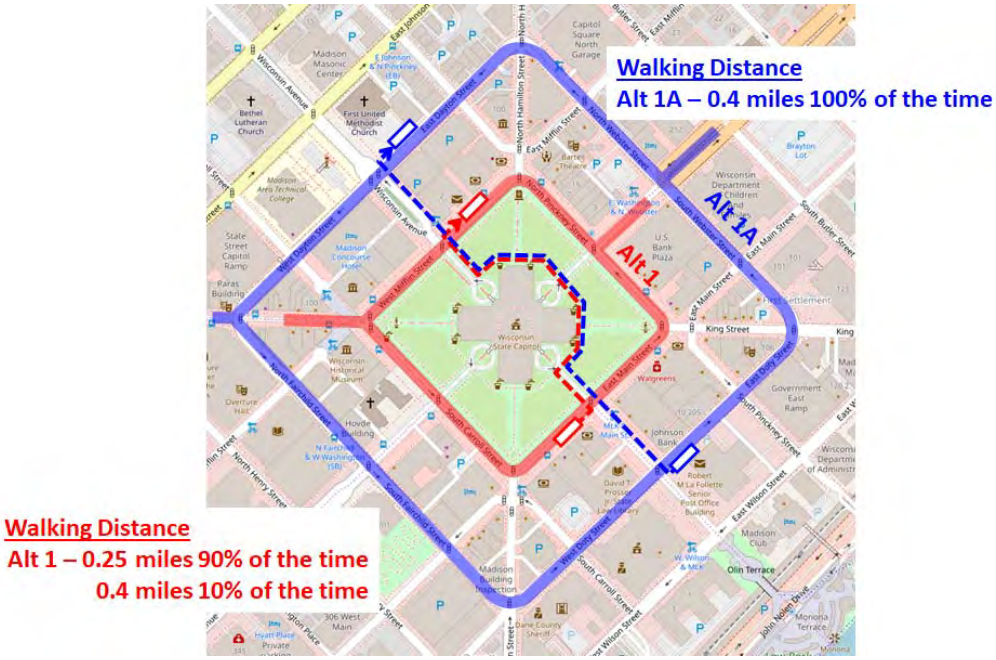


Figure 4-3 Station Pair Walking Distance Alt 1 and Alt 1A

Alternative 1 would have stations on the Capitol Square at MLK Jr Boulevard and Wisconsin Avenue at or near Metro's highly used bus stops on Main and Mifflin Streets. For special events BRT as well as local buses would relocate to the Outer Loop, at Dayton and Wisconsin and at Doty and Martin Luther King Jr Blvd. This places the complementing BRT stations about 0.4 miles from each other. This rerouting would occur about for about 10 percent of the time transit service is provided, generally falls on weekends in the summer, and has been Metro's custom for the last couple of decades. The detours associated with Alternative 1 would require the construction of two detour stations, which could cost an additional $1 to $1.5 million dollars total. The additional detour station costs associated with Alternative 1 is relatively modest when compared with street alteration costs and lost parking revenue associated with other alternatives.

Alternative 1A would have BRT run on the Outer Loop all of the time with stations at Dayton and Wisconsin and at Doty and MLK. While eliminating the need to detour BRT buses for special events, it places the complementing BRT stations 0.4 miles from each other 100 percent of the time transit service is provided. This distance is not a typical arrangement for BRT station pairing.[5]

Alternative 1B has complementing station pairs that are close. This is because stations serving the Capitol Square have been eliminated, which decreases service to central destinations and employment.

[5] This arrangement would result in additional 55,000 pedestrian miles traveled each year if applied to our existing bus system. This could be considered good or bad, depending on the value placed on activity vs convenience.

Alternative 3A provides reasonably spaced station pairs being one-block apart on Wilson/Doty, and on opposing corners on East Washington and Butler.

Station Areas

A defining characteristic between the alternatives is the space available for station amenities. The station accommodations between the alternatives vary greatly. A high quality station with protection from the weather and space for many people to circulate, particularly during afternoon peak periods when workers are heading home for the day, is highly desirable. The Figure 4-4 illustrates a current bus stop on the Capitol Square while it is raining. The 10-foot by 25-foot shelter is providing shelter for 18 people waiting for the bus. Near downtown, BRT stations are likely to be highly used. Because of the raised boarding area, shelter, and off board ticketing area, they will require more space. The minimum amount of space a small downtown BRT station would needs is 15 feet from face of curb to back of sidewalk, which allows a 5-foot boarding area, a 5-foot covered station area, and a 5-foot sidewalk.

Some locations may only be able to provide an overhang. These dimensions would provide minimum shelter and would be about the same width as Metro Transit's neighborhood bus shelters.

Figure 4-4 Bus Shelter Capitol Square

Larger stations characteristic of downtown areas generally require 20 feet or more. As mentioned, the current bus shelters on the square occupy about 20 feet including the boarding area in front and a 5-foot sidewalk behind.

The following graphic illustrates BRT stations in four locations. Note that even the smallest station (Grand Rapids, MI) still requires a considerable amount of room. Figures 4-5 and-6 illustrate the room needed for different types of stations.

BRT Station – Cleveland Healthline

BRT Station – IndyGo - Indianapolis

BRT Station – Grand Rapids MI

BRT Station – Viva - York Ontario

Figure 4-5 Size of BRT Stations

Generally, Alternatives that are off the Capitol Square such as Alternatives 1A, 1B, and 3A, will have limited room for stations and will probably only be able to accommodate narrow stations, similar to that shown for Grand Rapids in Figure 4-5.

Alternative 1 could have larger stations able to accommodate anticipated passenger volumes during peak hours. This could be accommodated by retrofitting/replacing existing stations, or removing two landscaped islands to provide stations that complement the local service stations.

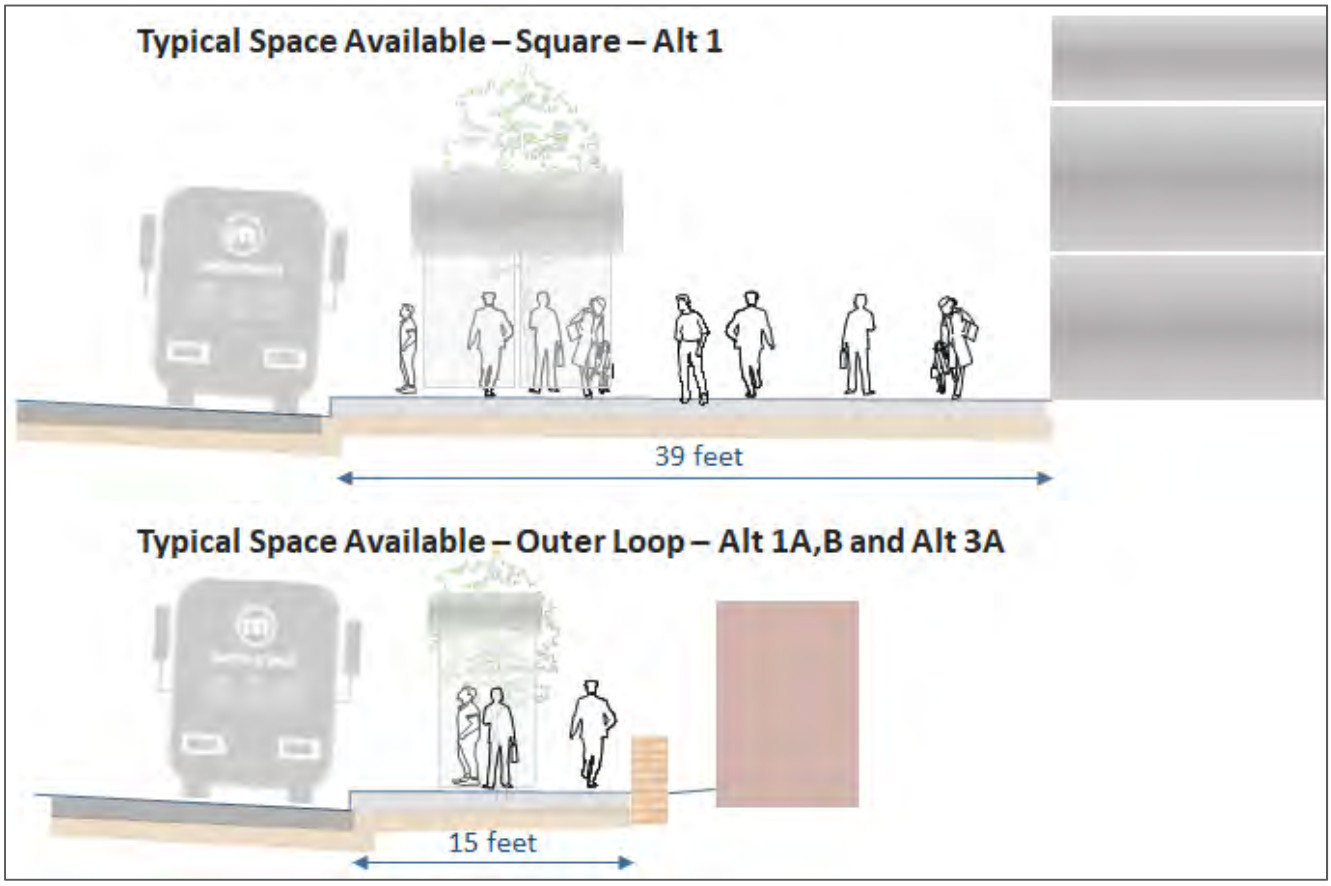


Figure 4-6 Typical Space Available for Stations

Table 4-1 Comparison of BRT Station Pairs

	Alt 1	Alt 1A	Alt 1B*	Alt 3A
Distance between Capitol Station Pair	0.25 miles	0.4 miles	NA	0.1 miles
Size of station serving State St	Moderate – 15 people	Moderate – 15 people	NA	Small – 8 people
Size of station serving Capitol Square based on available right of way	Large – 30 people	Doty/MLK – Moderate 15 people Dayton/Wisc - Small 8 people	NA*	Doty/MLK – Moderate 15 people Wilson/MLK - Moderate 15 people

*Alternative 1B does not have Stations serving downtown.

D. Detours

Alternative 1 will need to detour during summer weekends and at other event times, totaling about 10 percent of the time transit service is operational. It is possible to make the detours more intuitive for weekend riders by using better

signage and modern technology. Alternatives 1A, 1B, and 3A will be on detour about 3 percent of the time transit service is running, mostly caused by State Street closures. With additional events it is possible that Capitol Square and State Street detours could increase a small amount, perhaps to 12 percent and 4 percent respectively. Downtown events are nearing a saturation point in that most summer weekends already have events on the Capitol Square.

During Capitol Square detours, Alternative 1 would have smaller alternate stations on Doty and Dayton Streets. Variable message boards at the stations on the Capitol Square would direct riders to the Doty and Dayton Street stations.

Alternatives 1A, 1B and 3A would not need alternative stations.

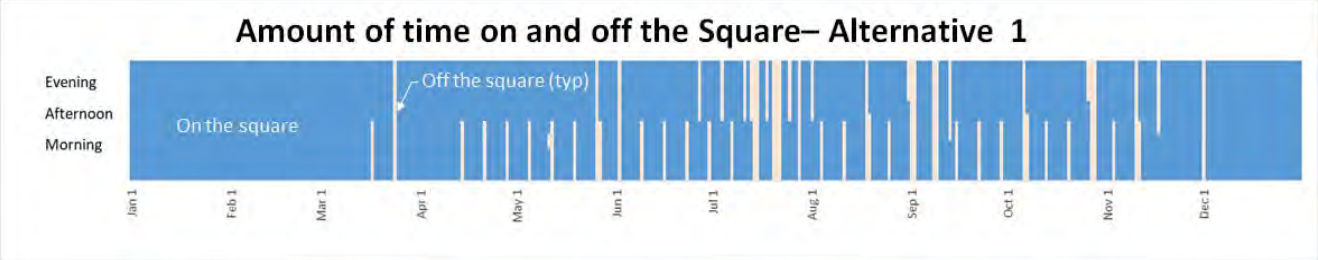


Figure 4-7 Regular Operating Time and Detours on the Capitol Square

E. Transfers and Local Route Integration

One in four boardings on the Capitol Square is a transfer. Transfers are the way residents access different parts the city. Transfer are needed because it is impossible to provide direct routes from all origins to all destinations. Transfers from BRT to and from the local system are easiest when they are in the same place. When transfers occur in the same location, passengers with mobility concerns do not have to walk. There is also less confusion associated with transfers that occur at the same location. Other transit agencies have found it is difficult to encourage transfers to other transit lines if the transfer is not in the immediate area, even when the other line provides substantial travel time savings. If transfers are not convenient, only residents adjacent to the east-west BRT line can directly take advantage of its travel time savings. Transfers provide access to BRT for all the other city residents living in the south, north, far west and far east portions of the city.

Transfers are best handled by Alternative 1. Most bus routes going through the Isthmus go around the Capitol Square and serve time points there. Time points are where buses wait to collect passengers and get back on schedule. They allow people to easily make transfers and see the bus they will be transferring to.

Alternatives 1A and 3A will require riders would have to walk one block from the Outer Loop to the Capitol Square to make transfers, and the transfers may not be at a time point, consequently there may be greater waiting times associated with transfers. People with mobility limitations are most impacted by having transfer areas not in the same location.

F. BRT Travel Times

In the October report, BRT travel times were estimated using a bus field test where the routes were driven in both directions.

Because the new Alternative 3A, with a contraflow lane on Fairchild, does not allow a field test, the study used a spreadsheet analysis tool that estimates time spent driving the bus, dwelling at stations, waiting for traffic signals, and traffic delay between Blair Street and Bassett Street. The results are similar to the previous bus test method.

Eastbound, all alternatives are substantially similar – Alternative 1B is slightly faster because it serves one less station. Westbound, Alternatives 1A and 1B are the fastest, saving about a minute over Alternative 1. Alternative 3 A is substantially slower, costing at least two minutes over Alternative 1 because of the circuitous routing.

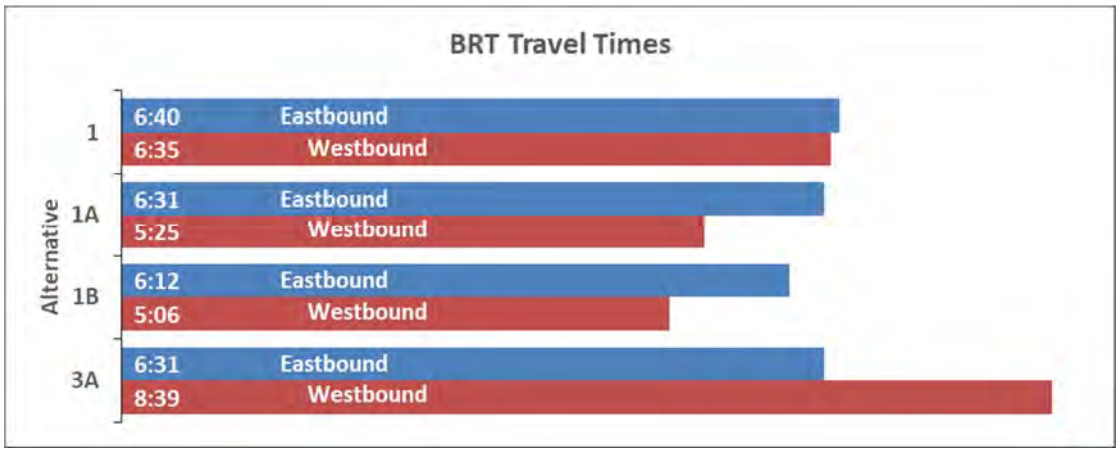


Figure 4-8 Alternative Travel Times

G. Traffic impacts

All alternatives have little to no effect on auto circulation. The only potential impact would be the loss of the eastbound peak-period third lane on Doty Street with Alternatives 1A, 1B, and 3A. Additionally, Alternative 3A may eliminate one travel lane on Wilson Street, depending on the outcome of the Wilson Street study.

On State Street, all alternatives remove most of the commuter bus service on State Street but add BRT service. Similarly, bus volumes on the Capitol Square are expected to remain about the same as present for all alternatives.

All alternatives include investigating the conversion of the eastbound right lane of East Washington Avenue to bus, bike, and right turn only between Webster Street and Blair Street. Staff are evaluating the operational impacts of this change. During the summer of 2019, the reconstruction of Johnson Street and Williamson Street caused major delays on East Washington Avenue so it was not possible to evaluate the effect of removing one lane in the field. Staff may pilot the closure of the lane on a trial basis and evaluate the length of the queueing.

H. Local Bus Integration

The net effect of bus traffic volume on the Capital Square from BRT is anticipated to be minimal.[6] The Capitol Square currently has about 400 buses passing through in the eastbound direction and 375 buses passing through in the westbound direction on a typical weekday. The BRT system will add about 70 bus trips in each direction, however, it will remove local bus trips from the Capitol Square from routes that the BRT line is replacing. BRT buses are planned to be electric, eliminating noise and exhaust emissions. There is some concern that the quieter electric buses will be harder for pedestrians to hear, but electric vehicles have been successfully deployed by other agencies and it is broadly believed that the environmental benefits outweigh potential risks.

Alternatives 1A, 1B, and 3A add BRT bus volumes to streets with higher traffic volumes. The additional 70 buses in each direction on the Outer Loop and Wilson Street are not significant compared to the 6,000 to 10,000 daily vehicles on those roads.

All alternatives include rerouting regional and commuter routes from State Street to West Washington Avenue, resulting in about 140 or fewer bus trips in each direction each weekday. There are currently about 300 bus trips per weekday in each direction on State Street. All alternatives would have about 70 BRT bus trips per weekday to State Street in each direction between Johnson/Gorham Street and the Capitol Square.

[6] The City of Madison is embarking on a concentrated effort to evaluate its route structure. It is unclear if bus volumes on the Capitol Square with BRT Alternative 1 would be slightly higher (e.g. 10 percent increase), about the same, or lower.

By moving the regional and commuter routes off of State Street, these changes will be most noticeable during the afternoon peak period. The 33 westbound trips per hour will be reduced to about 14 (10 local buses and 4 BRT buses), and may possibly be reduced even further pending the City's upcoming transit network study.

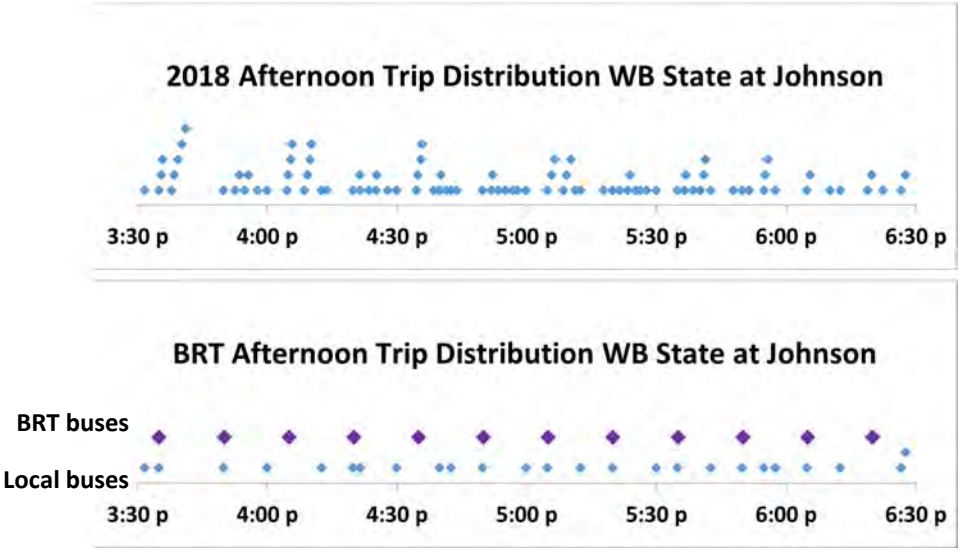


Figure 4-9 Bus traffic on State Street

I. Parking impacts

Parking changes similarly focus on the Capitol Loop. Alternatives 1A and 1B remove all the parking on the outside of the Outer Loop, affecting about 85 metered spaces. Alternative 3A removes the parking on the left side of Fairchild Street the right side of Doty and Webster Street, and probably the right side of Wilson Street, affecting from 68 to 104 metered spaces.[7]

Figure 4-10 Example Parking and Bicycle Impacts with Alternatives 1, 1A and B. Note that with Alternative 3A parking on the left side would be removed.

[7] The impact on Wilson Street is unclear because the Wilson Street study is ongoing. If parking needs to be removed on the right side of Wilson Street for bus lanes, it may impact up to 36 metered spaces for Alternative 3A.

Table 4-1 Parking Comparison

	Alt 1	Alt 1A, B	Alt 3A
Total Parking Spaces Removed	4	85	68-104
Total Metered Parking Spaces Removed	4	85	68-104*
Total Parking Revenue Lost yearly	$8,000	$170,000	$136,000-$208,000

*Depending on the outcome of the Wilson Street Study

J. Bike Network

Bike infrastructure changes mainly focus on the Outer Loop. Alternatives 1A and 1B remove the existing bike lanes around the Outer Loop and replace them with shared bus and bike lanes. Alternative 3A removes the bike lanes entirely on Fairchild Street where bikes would be in mixed traffic. Alternative 3A would replace the bike lane on Doty Street with a shared bus and bike lane, and would have no effect on Dayton Street. Alternative 1 does not affect the bike lanes on the Outer Loop.

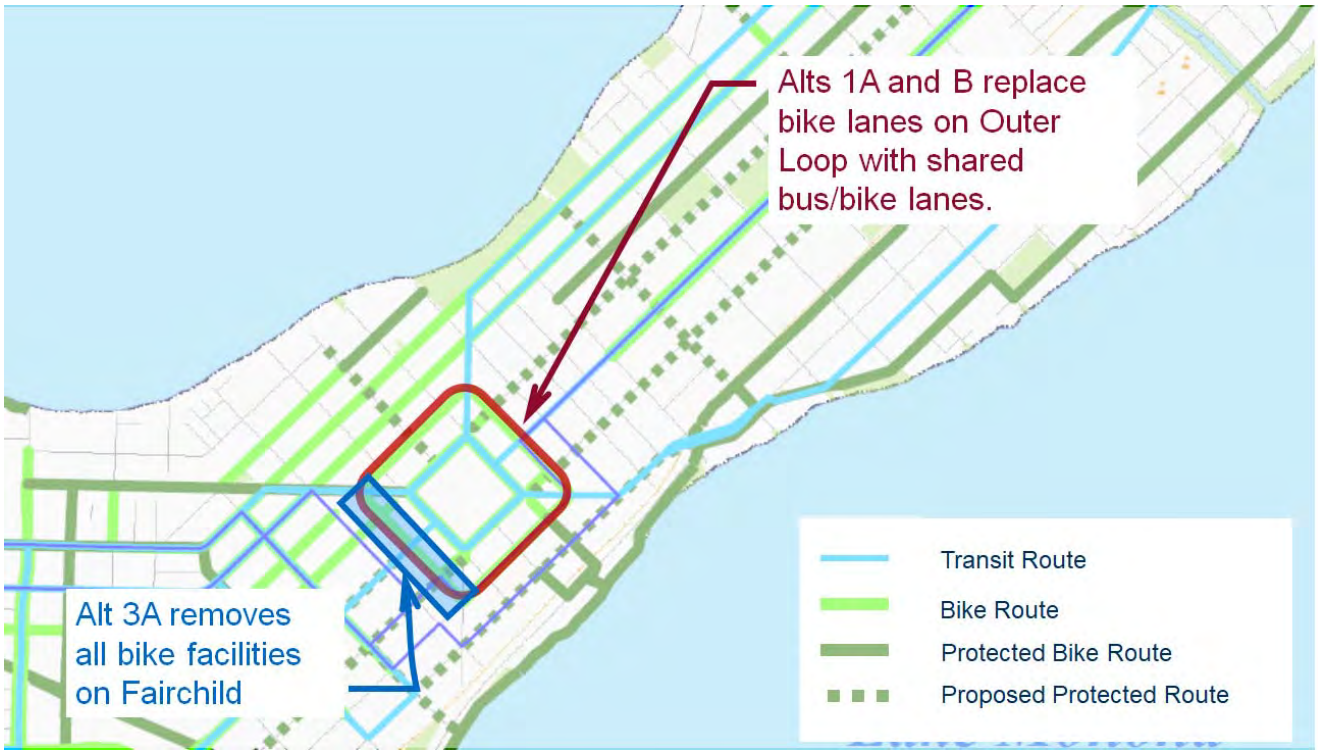


Figure 4-11 Bike Accommodations

5. Transit and Business

A. Economy, Transit, and Hierarchy

Numerous studies have linked transit to economic development and job growth. One study by the American Public Transit Association found that every $1 invested in public transit yielded a $4 in economic returns.[8] Another study found that areas in Chicago with public transit saw the greatest job growth.[9] That study showed that half of the jobs created in the region were within a half mile of a CTA or Metra station. Cleveland's Heathline BRT delivered more than $9.5 billion of economic impact as it connects the downtown to outlying areas.[10]

Figure 5-1 Portland Transit Mall

Transit service often resides centrally within a downtown business district and becomes part of the fabric of activities that make the space great. Transit Oriented Development (TOD) capitalizes on transit potential by maximizing residential, business, and leisure space within walking distance of transit. As cities mature, well maintained and efficient transit transitions from being a way to access the central business area to becoming the way.

Examples of transit contributing to the heart of a City include Market Street in San Francisco and 5th and 6th Avenues in Portland. Chicago is also initiating TOD investments along high frequency bus routes.

Figure 5-2 Cleveland's Healthline

High quality transit can also spur placemaking.[11] Cleveland's Healthline illustrates where BRT investment was used to create a sense of place along Euclid Avenue. The end station was placed directly adjacent to their public Square in order to fully integrate public events and activities with the BRT system with mutually beneficial results.

Modal hierarchies assign priority to different transportation modes over others. An example is prioritizing pedestrian travel over auto travel. Modal hierarchies are often associated with a Complete Streets policy. Modal hierarchies are being adopted in many communities across the nation, and are relevant to downtowns. The hierarchy prioritizes the movement of people, not just automobiles.

Consequently, transit in some cities is becoming the dominant transportation mode in the downtown, replacing auto traffic altogether. San Francisco is removing all personal automobiles on 2.2 miles of Market Street between the Embarcadero and Octavia Blvd, and is pursuing the same measures on 10th Street. In 2017 Toronto removed all personal automobiles from King Street, and New York City plans to remove personal motor vehicles from 14th Street. These cities have prioritized transit as a more sustainable mode to serve their business districts.

In Madison, on a typical weekday, buses make up about 15 percent of the traffic on the Square (which averages about 5000 vehicles per day per side). This bus traffic carries about 4800 trips to and from the Square, making buses an

[8] https://www.apta.com/research-technical-resources/economic-impact-of-public-transit/
[9] https://www.npr.org/2018/11/23/670373307/areas-with-mass-transit-see-job-growth-research-shows
https://www.chicagotribune.com/news/breaking/ct-biz-transit-business-report-20181018-story.html
[10] http://www.riderta.com/healthline/about
[11] Placemaking is a multi-faceted approach to the planning, design and management of public spaces. Placemaking capitalizes on a local community's assets, inspiration, and potential, with the intention of creating public spaces that promote people's health, happiness, and well-being.

efficient mode for serving the Capital Square. If these trips were accommodated by automobiles, traffic volumes on the Square could increase between 50 and 100 percent.

B. Use of the Square

While transit provides numerous economic and place making benefits, several downtown businesses and advocacy organizations have expressed concerns regarding buses on both the Capitol Square and on State Street. These concerns are multi-faceted and not solely due to existing transit service.

The Capitol Square is both the business and cultural heart of the Madison area. Consequently, it is sought both by tenants lining the Square as well as activities and festivals. These include:

- Sidewalk cafes and dining. Currently there are about 11 restaurant establishments that could have summertime seating within Madison's right of way directly on the Capitol Square, of which 8 were licensed in the 2019 year. There are additional sidewalk cafes on the spokes of the Square. Examples include Gennas, Canteen, Lucille, and Tipsy Cow. The sidewalk cafes on the spokes are about 200 feet from a bus stop and do not experience as much idling and noise as establishments directly on the Square. Individual restaurants with seating on the Capitol Square pay the City between $1,500 and $2,500 each, for a total investment of between $15,000 and $25,000 on a yearly basis. Figure 5-3 graphic illustrates where summer sidewalk cafes exist in relation to bus shelters.
- Event stalls – Arts and Craft Vendors. There are numerous events, such as Dane County Farmer's Market, Art on the Square, Taste of Madison, Concerts on the Square, and others where event organizers place stands and booths within public right of way on the Square. The City licenses about 50 Art and Craft vendors annually. Fees received by the City for this type of public right of way use contribute up to $38,000.
- Food Carts. Throughout the week and the year, food carts line the Capitol Square providing a service to downtown employees and weekend festival goers. Currently there are 43 licenses for food carts in the mall area and 39 available sites. Many of the vendors vend in the State Street mall during the week and on the Square on the weekends. City-wide, food carts generate about $85,000 of city revenue on a yearly basis. They provide an important role in the local economy and culture.
- Athletic / Community Events – There are several events throughout the year that although they do not pay fees for sidewalk usage, they require closure of the Square to accommodate spectators. Examples of this include the Madison Marathon, Ironman Wisconsin, Art Fair on the Square and the Taste of Madison. These events can set up a substantial amount of equipment within the right of way.

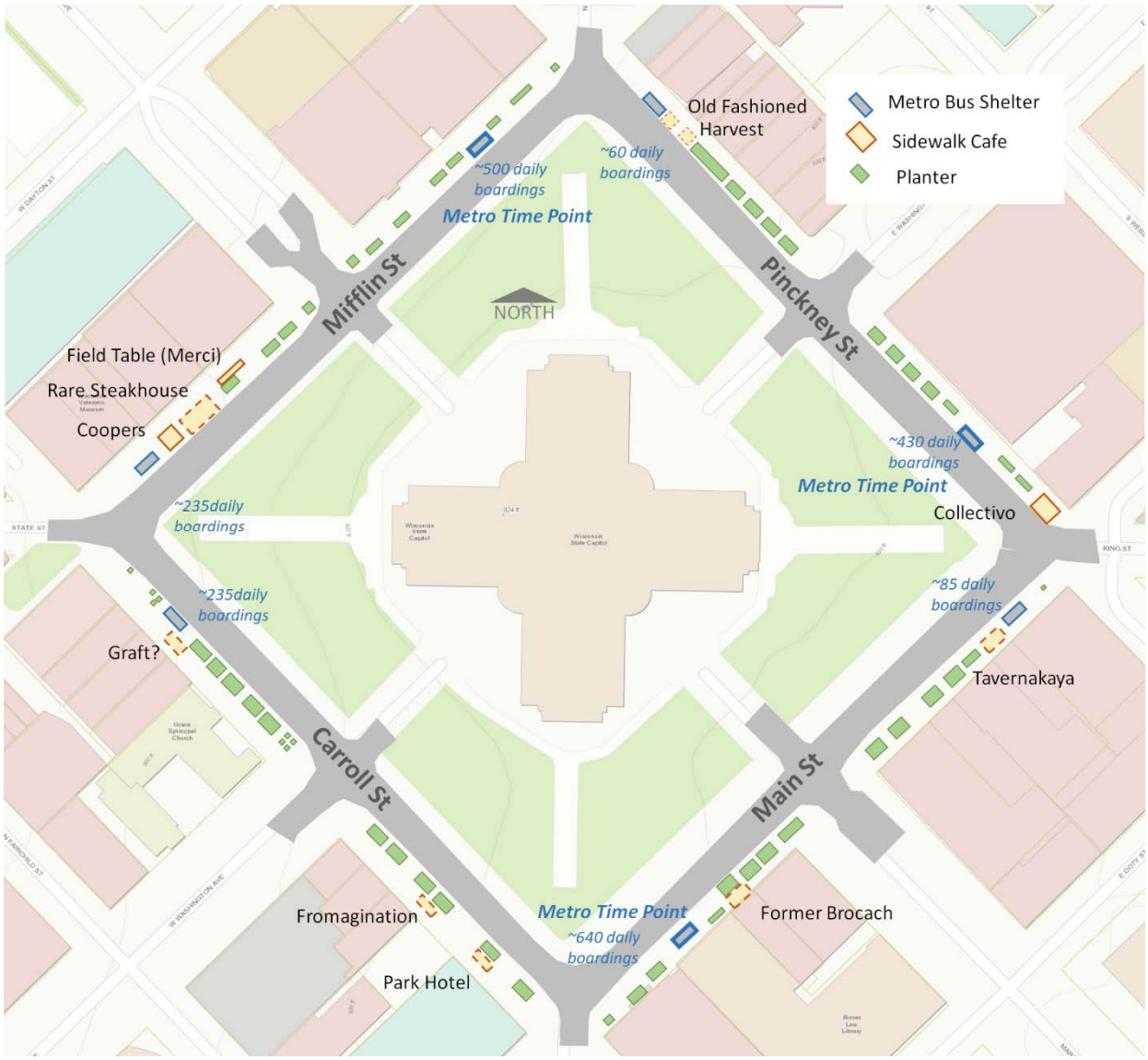


Figure 5-3 Sidewalk Cafes in relation to bus shelters

Buses

As mentioned in Section 4, the Square serves as a central endpoint for many Metro riders. The downtown employment, along with entertainment and dining make it a popular destination. For downtown employees, Metro provides a transportation alternative that is more cost effective than paying for parking. Almost 2400 people board buses on the Square, and another 2400 get off buses. Figure 5-4 shows the daily boardings on the Square during a weekday, March 2019.

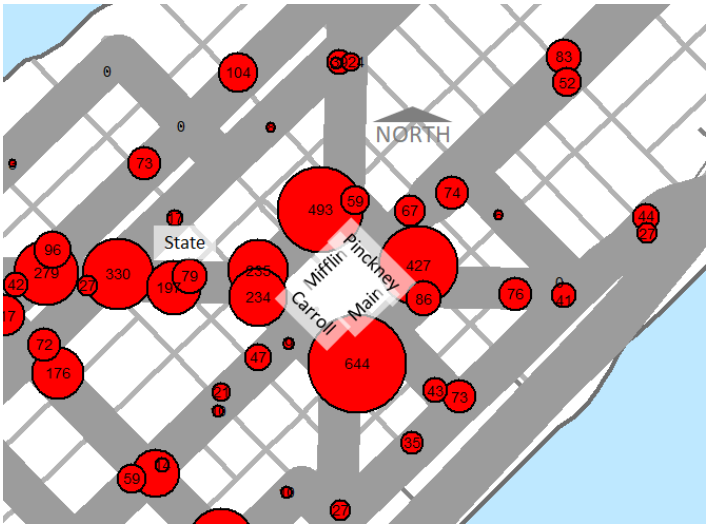


Figure 5-4 Weekday bus boardings on the Square (March 2018)

As mentioned previously, one in four bus boardings on the Square is a transfer. Many residents in outlying parts of the service area use the Square to transfer from route to route.

There are three time points located on the Square where buses stop and idle. The Main/Carroll and Mifflin/Pickney time points are the primary time point stops. A few routes also have time points on North Pinckney due to limited space at the previous two. Time points:

- Allow a bus that is running ahead of schedule to stop and get back on schedule.
- Provide opportunities for transfers. In the winter often a transferring passenger can wait on the bus until their next bus arrives.
- Provide bus drivers the opportunity to use rest rooms.

C. Business Concerns

Some of the concerns expressed by business entities are directly linked to bus traffic on the Capitol Square and State Street. Others concerns are more tangential in their relationship to transit, but may be fully independent of buses being located on, or off the Capitol Square. Figure 5-3 shows the current locations of outdoor cafes in relation to the bus shelters on the Square. Concerns directly resulting from buses include:

- Buses can be loud when idling. The noise comes not so much from the exhaust which is located above the bus, but from the engine compartment. During the summer when there are outdoor cafes, this noise can be irritating at time points or at signalized intersections where buses idle.
- Buses have fumes. This concern is somewhat less prevalent again because the exhaust pipes are above the bus, yet they still exist with some wind patterns.
- The bus shelters take up space. During special events buses are rerouted off of the Square, yet the bus shelter remains. If the shelter were not there, special events that use booths would have more booth space.
- If buses are using the Square during a special event, such as Farmers Market, where pedestrians randomly cross mid-block, there are safety concerns.
- Having buses on the Square may prevent or hinder the opportunity for other community enhancing events that could occur on the Square but would require detours.

These concerns are most prevalent from June through September when outdoor seating is used and events occur.

D. Other Concerns

There are other business concerns around the Square that are often associated with transit, but really are a larger social challenge that only tangentially relate to transit routes and facilities. These include:

- Panhandling. Because of the large amounts of pedestrian traffic walking around the Square (and State Street), panhandling is a growing concern. Some of this panhandling occurs where there are also congregations of people experiencing homelessness, but the problem is somewhat independent of homelessness. While panhandling can occur anywhere around the Square, areas of concentration seem to occur at the top of State Street and near the Walgreens store on Main Street. The study team believes the primary factor in the location of panhandling is the amount of pedestrian traffic (and potential donors) that foster the concentration of panhandling.[12]

[12] Reasons for this belief include:

- Other portions of the City have bus stops with more boardings, yet do not have similar panhandling problems.
- Within the Square, areas with more numerous panhandling problems occur in areas with relatively high pedestrian traffic, yet adjacent bus stops have relatively lower boarding volumes.
- A brief survey of panhandlers by City staff indicated that access to people, friends they know, and places to eat/get coffee are factors that determine the location where they chose to panhandle. During the evening peak hours, this can include bus stops and the ATM machines. At other times of the day, it is where there is pedestrian traffic.

For businesses on the Square, panhandling can be a large deterrent to potential patrons. Customers can be approached multiple times on their way to an establishment on the Square. Often restaurants with outdoor seating complain of panhandlers approaching patrons, as they are a captive audience asking for money.

- Homelessness. There is a population of people experiencing homelessness on the Capitol Square. Often they can be on the Square during the day, and spend the night at available shelters near the downtown. Some of these homeless use City street furniture to store their belongings. Sometimes street furniture adjacent to bus shelters can be used to store belongings, yet most often the belongings are removed by Metro staff.

- Disruptive Behavior. Some areas of the Square foster the congregation of people, and in some instances there are persons who exhibit disruptive behavior. The most problematic area is near the top of State Street, on North Carroll Street. This behavior may be linked yet separate from the homeless problem. People experiencing homelessness interviewed as part of this study indicated that they also felt threatened when there was disruptive behavior on the Square, bus stop or otherwise.

- Illegal behavior. Sometimes illegal behavior occurs near the Square. Generally this behavior occurs on side streets off of the Capitol Square and involves a motor vehicle.

These concerns are prevalent throughout the year, not just during the summer months.

As mentioned previously in this report, Metro detours off the Square during special events, which accounts to about 10 percent of the scheduling. Metro tried piloting keeping buses on the Square during Farmers Market in the summer of 2019. After this pilot, Metro decided to remain off the Square during special events to reduce complications. Metro intends to continue this practice and acknowledges that there could be more special events in the future. Currently use of the Square is somewhat saturated. Summer Saturdays are already taken, numerous Sundays, and many weekdays. Realistically, detours could grow a small amount, perhaps to 12 percent of the scheduling for Metro. Event fatigue and the desire to distribute events throughout the city by policy makers probably will be greater limiters on the number of events hosted in downtown, rather than Metro scheduling. As hotels are proposed and developed on East Washington Ave and University Ave, BRT will be an important way for visitors to access events on the Square.

E. Mitigative Measures

The previous concerns affect the perception of the Square, customer satisfaction, and feelings of security. They are a challenge, both for businesses and those caught in the cycle of homelessness and poverty. City Transportation staff believe that these issues go beyond the location of transit service. The congregating of the homeless as well as panhandling would continue to exist with or without transit service on the Square.

For the challenges that are directly associated with transit on the Square there may be mitigative measures that preserve the advantages the Square has to offer transit while reducing the irritants. The following bullets summarize individual measures that could be considered to reduce Metro's impact to businesses on the Square. (Note that not all measures could be implemented, but those strategically selected.)

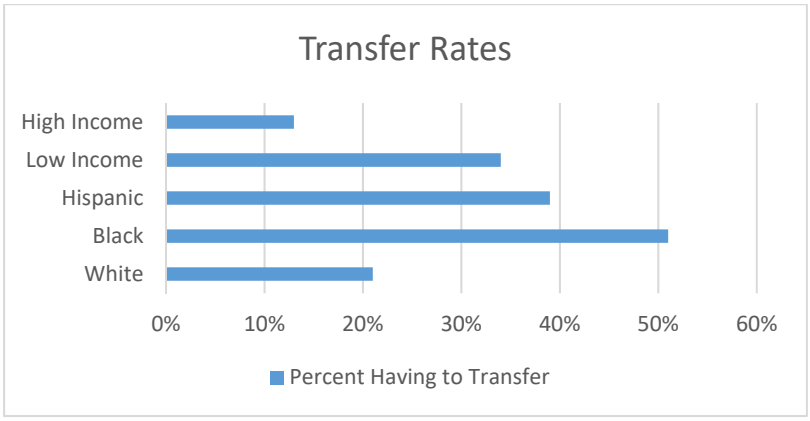
- Keep the number of buses using the Square constant when BRT is implemented. (About two main routes would be eliminated and combined within the BRT service.)
- Eliminate the stops on West Mifflin (by Coopers Tavern) and East Main (by Walgreens).
- Investigate relocating the North Pinckney bus stop to Hamilton.
- Investigate the use of Wisconsin Ave as a transit mall with amenities and streetscaping. If feasible, Mifflin Street stops could be permanently located there.
- Investigate retiming signals and signal progression on the Square to reduce bus idling at intersections.
- Consider relocating the East and West Mifflin Stops to Wisconsin Ave, and making a larger, better transit stop. This would eliminate idling in front of East and West Mifflin establishments, and could create a more attractive transit boarding area.

- Remove two of the landscaped planters on the Square, and locate the BRT boarding stations in those areas. This would preserve sidewalk space for booths while also providing two BRT stations.
- Convert to electric buses. BRT buses are planned to be fully electric, which provide significantly quieter operations. The remainder of Metro's fleet will also be converting to electric buses starting in 2023. The full conversion will take almost 15 years, yet electric buses could be assigned to routes that serve the Square.
- Investigate idling at time points during summer months. Some engines may be able to idle at reduced rpms, or even be turned off.

6. Equity

A. Background

Metro performed an on-board survey in 2015 with over 5700 completed surveys. The survey provided considerable amount of information, is able to provide information on the transfer rates and trip distances for Hispanics, Black, and low income riders. Generally, these populations transfer more often and have longer trips than white riders. Transfers are one factor being considered in BRT route selection.



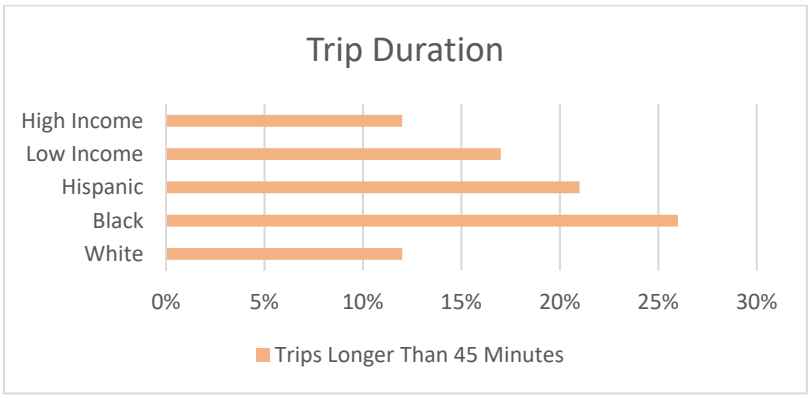


Figure 6-1 Transfer Rates and Trip Duration

B. Racial Equity/Social Justice (RESJ) Evaluation

The study team performed an additional review on downtown BRT routing to understand how routing would affect underserved communities and differently abled individuals. The study used the City's Racial Equity Social Justice (RESJ) tools to provide a framework for this analysis. The first part of the analysis used a group of individuals that work directly with underserved communities to provide input on how routing options might affect the communities that they serve. This RESJ Team included representation from the United Way, Latino Academy for Workforce Development, Forward Services Corporation and Dane County. City of Madison Community Development Division staff, as well as staff from Metro Transit and the City Department of Transportation also participated in the process.

The group first answered various questions included in the RESJ tool, of which a summary is shown below.

Q: Who (individuals or groups) could be impacted by the issues related to this policy plan or proposal? Who would benefit?

A: People working in downtown area, those making transfers, those with destinations on State Street, people traveling for non-work purposes. In addition, visitors to Madison, business owners, business customers, low-income individuals traveling from shelters such as Salvation Army, Beacon, and YWCA.

Q: Who would be burdened?

A: People who don't know Madison well, people who have to transfer, Low-income and other marginalized communities where stability is important. These are the people where it won't work to get up every day and have to try and figure out how the transit system might change and affect their commute. People that depend on the bus and do not have another travel resource. People that might experience issues walking longer distances from one set of stops to another, especially in extreme weather.

Q: Are there potential disproportional impacts on communities of color or low-income communities?

A: Yes. Transfers will be easier/more difficult based on which route variation is chosen. Residents that live on on the southside or in neighborhoods more on the periphery are more likely to transfer and will be affected by these choices.

Q: What are the potential unintended consequences (social, economic, health, environmental or other)?

A: Some of these route variations are either closer or further away from the Madison Municipal Building and City/County Building where a number of services and government offices are available such as the clerk's office, court house, etc. Some of these routes also are proposed to be taken off the Capitol Square and away from the Capitol building. Some residents may only know of the Capitol Building by traveling on these routes. Inequity would continue to grow if route access was removed from these locations.

Along with completing the RESJ tool template, there were comments made by people representing the organizations that provided insight into their transportation options. The *essence* of some of these comments are captured in the following statements.

"BRT is just one more choice for people with privilege to get downtown. For many in my community, buses are the only way to get downtown"

"For many neighborhoods in the city, children regularly go downtown to attend events like Farmers Market, Ironman, see the Capitol, etc.. For the children that I work with, they don't even know that those events exists. Why is it that the children that I work with don't know what's downtown? Pushing buses off of the Square seems like another way access to all that Madison has to offer is restricted."

"BRT is great for people who live along the corridor. But if you can't easily transfer to BRT, what good is it to all the other residents?"

C. Metro Rider Intercept Surveys

A key outcome of the RESJ evaluation discussion among this group was the need to directly ask downtown Metro transit riders how they fell about the downtown routes and stations. The study accomplished this through "intercept surveys", where City staff would ask a brief series of questions of people waiting for buses on the Capitol Square.

The RESJ Team discussed what types of questions would be helpful in identifying how various routes and stations would impact these communities' use of the transit system and the quality of service they would receive. Some of the key questions included in the survey are below:

1. *Why are you choosing to use Metro Transit today? What is the purpose of your trip (work, personal business, school, etc.?)*
2. *Are you transferring or traveling through the downtown or do you have a destination downtown?*
3. *If you transfer on the Square, is it important for the transfers to be located in the same general area? Would it be a problem if you had to walk 1 or more blocks between bus stops to make a transfer?*
4. *If stops on the Square are eliminated, would that create challenges for you?*
5. *How important is the bus shelter to your experience using Metro? Could the shelters be different in any way that would enhance your experience?*
6. *How often are you affected when buses are detoured off the Square for special events, like the Saturday Farmer's Market, Concerts on the Square, etc.? Have you missed a bus because you were unaware that the buses had temporarily moved off the Square?*
7. *Do you often have to wait for a bus late at night? How important is it to have shelters located in a highly-visible area that has a fair amount of pedestrian activity?*

The intercept surveys were conducted in mid-to-late December 2019. A total of 55 surveys were completed, and 25 of those were identified as "persons of color". Direct findings from the surveys included:

- 53% of responders indicated their trip purpose as personal business (doctor appointments, pay taxes, etc.); 33% were for work purposes.
- 38% were transferring on the Square to other bus routes; 62% had destinations (or origins) on or near the Square
- 55% felt that to walk to a transfer (for one or more blocks) would be a problem. 45% felt that a one block walk off the Square was not a large hardship.
- 78% of respondents felt that elimination of stops on the Square would be a problem for them (for a variety of reasons –most pronounced among disabled persons); 22% did not feel that moving off the Square would be a problem or they had no opinion
- 95% of respondents indicated that shelters were very important to their experience; half of those said that wild and cold were the biggest issues; about half of those respondents said that adding some sort of heaters or better windbreaks (such as having shelter walls extend all the way to the ground) would greatly enhance their waiting experience; having strong lighting and accurate real-time bus information was also cited by some respondents; only 5% said that shelters were not very important
- 75% of respondents indicated that detours of Metro buses off the Square during special events were not a major problem. 25% had missed buses but it was an infrequent event.
- 61% of those responding indicated that having bus shelters in highly-visible areas with lots of pedestrian traffic was important to them, especially at night; 38% said that this was not important or had no strong opinion

Themes developed from the conversations from the intercept surveys included:

- Transfers – The number of riders transferring was more numerous than anticipated. And those that transferred tended towards persons of color, low income, and the elderly.
- Location of transfers – The location of transfers (e.g. different alighting and boarding locations) tended to be a concern, particularly for those with mobility concerns who strongly opposed having transfers be one block away. These included those in walkers as well as those with knee and hip problems. The elderly were over represented

in this group. When staff mentioned using the Outer Loop as an option for transfers, there were greater concerns expressed by those with mobility concerns as the Outer Loops is hillier and harder to walk on.

- Shelters – Shelters with walls were important to most of those interviewed. Since the interviews were conducted in the winter, having a wind block was a commonly expressed desire. Some wished that the walls would meet the ground. Additionally, several shelters do not have working message boards, which many riders wished were operational.
- Detours – Most respondents did not feel the detours were much of a problem. Some had missed a bus because of a detour, but they considered it an infrequent event (e.g. once every couple of years.) Some credited mobile aps for helping them know where to catch the bus, detour or not.
- Safety – Safety was not a large concern for men who were interviewed. Conversely, for women it was a very high concern. Factors that made women feel safe included lighting and the amount of pedestrian traffic. Motor vehicle traffic contributed less to the feeling of safety. One woman expressed safety concerns on the outer loop, corresponding to problems that are occurring on the top of State Street.

7. Recommendation

Bus Rapid Transit will be transformative for Madison's transportation future. Streets serving Madison employment and cultural centers cannot provide the capacity needed to maintain the anticipated economic and residential growth. Failing to address business and worker access will have greater consequences than the locational impacts associated with any individual BRT route. Madison's downtown is a key destination, serving both as an employment and cultural center. BRT routing through the downtown will influence future employment and residential development, and the accessibility of all that Madison offers.

Studies have consistently shown transit access, and particularly rapid transit, as a key factor in business investment and job growth. As stated, one study showed $4 of economic benefit for every $1 invested in transit. It is important to give transit, and BRT, a prominent role in addressing Madison's future transportation needs.

Alternative 1 is recommended for the downtown BRT routing for the following reasons:

1. It provides the most direct access to the visible economic and cultural center of the City.
2. Eastbound and westbound stations are within a block or two of each other – new and occasional downtown users will more easily be able to find the correct station.
3. There is generous space for stations – providing more shelter and better pedestrian circulation.
4. Alternative 1 does not reduce parking revenue.
5. It reduces the number of buses on State Street during the PM peak and replaces some with electric buses.
6. It allows transfers to and from local routes without walking, providing BRT access to portions of the City not on the BRT route.
7. It can minimize impacts to the urban environment on the Capitol Square with mitigative measures such as:
   - Increased BRT bus volumes will be electric buses and will be offset by rerouting some local routes
   - Some local route station locations can be eliminated or relocated.
   - BRT station infrastructure can be positioned to maintain existing sidewalk space for special events.
8. BRT and local buses will continue to be detoured for special events, but detours can be made easier for the travelling public with improved real-time signage and benches and shelters on the Capitol Loop detour stops.

With Alternative 1 BRT will detour 10 percent of the time now, and perhaps slightly more with future events. However the benefits Alternative 1 provides outweigh the adverse effects detours create.

With Alternative 1, staff recommend evaluating the possible changes outlined in Section 5 to reduce the effect that bus traffic has on pedestrians and businesses on the Capitol Square. These changes include, potentially, moving or closing bus stops on the Capitol Square, moving some local routes off of the Capitol Square, designing transit infrastructure to be

minimal and blend in with its surrounding environment, and reducing the amount of idling on the square. These changes will require investigation and Transportation staff will recommend changes that can be implemented with minimal impacts while meeting the goal of improving the pedestrian experience on the Capitol Square.

Alternative 1A is not recommended for the following reasons:

1. Unfamiliar riders may be confused that most Metro service is on the Capitol Square, but BRT is one block away.
2. All transfers from local service to BRT would require walking a block. This will disproportionately impact those with mobility challenges.
3. Current users of the system could see an overall decrease in service because both the Capitol Square and Outer Loop will have lower levels of bus service than what currently exists on the Capitol Square. BRT could compete, rather than complement local service.
4. Employees concentrated on the south side of the Capitol who use BRT would have to walk 0.2 miles further (50 percent more distance) to the complementing station for one portion of their trip. This is a disproportionate impact to the regular users of transit.[13]
5. The amount of space for BRT stations is more limited. Therefore, the system's most highly used stops may have smaller shelters and platform areas.
6. Up to $170,000 of parking revenue could be lost on an annual basis.

Alternative 3A is not recommended for similar reasons as Alternative 1A.

1. Transfers from and to local service would not be direct.
2. Stations and routing are not intuitively placed.
3. The amount of space for BRT stations is more limited.
4. Between $136,000 and $208,000 of parking revenue could be lost on an annual basis.

However, if Alternative 1 is not selected, Alternative 3A provides more benefits than Alternative 1A in that the distance between complementing stations is not as great, and it more directly serves the higher concentration of jobs on the south portion of the square.

[13] The 0.4 miles between bus stop or BRT station pairs is much greater than the distance recommended in transit documents, or the actual distance observed with other BRT systems.