

Brown County Planning Commission / Green Bay MPO in partnership with
Green Bay Metro

Green Bay Metro East Side Route Study

May 4, 2015

Brown County Planning Commission/Green Bay MPO

Green Bay Metro East Side Route Study

Green Bay MPO Planning Area Communities

City of Green Bay
City of De Pere
Village of Allouez
Village of Ashwaubenon
Village of Bellevue
Village of Hobart
Village of Howard
Village of Suamico(part)
Town of Green Bay(part)
Town of Lawrence (part)
Town of Ledgeview (part)
Town of Pittsfield (part)
Town of Rockland (part)
Town of Scott (part)
Town of Little Suamico (part)

MPO Staff Contact/Report Author

Dan Teaters, Transportation/GIS Planner
Brown County Planning Commission/Green Bay MPO
305 East Walnut Street, Room 320
PO Box 23600
Green Bay, WI 54305-6480
Phone: (920) 448-6480
Fax: (920) 448-4487
Email: teaters_dw@co.brown.wi.us
Web: www.co.brown.wi.us/planning



U.S. Department
of Transportation
**Federal Highway
Administration**



U.S. Department
of Transportation
**Federal Transit
Administration**



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Green Bay Metro East Side Route Study

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Brown County Planning Commission/Green Bay MPO Staff

Chuck Lamine, AICP, Planning Director	lamine_cf@co.brown.wi.us
Cole Runge, Principal Planner/MPO Director	runge_cm@co.brown.wi.us
Aaron Schuette, Principal Planner	schuette_am@co.brown.wi.us
Peter Schleinz, Senior Planner	schleinz_pj@co.brown.wi.us
Lisa Conard, Senior Transportation Planner	conard_lj@co.brown.wi.us
Jeff DuMez, LIO Coordinator	dumez_jd@co.brown.wi.us
Dan Teaters, Transportation/GIS Planner	teaters_dw@co.brown.wi.us
Ker Vang, Transportation/GIS Planner	vang_kv@co.brown.wi.us
Kathy Meyer, Administrative Coordinator	meyer_ka@co.brown.wi.us
Sandra Wentland, Administrative Secretary	wentland_sl@co.brown.wi.us

(MPO staff in bold type)

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Background

As the largest public transportation provider in Brown County, Green Bay Metro provides a very valuable service to the metropolitan area; however, decades of low density development have pushed many large employers, educational institutions, commercial developments, and other activity centers to the edge of the transit service area or outside of the service area altogether.

Prior to 2011, Green Bay Metro bus service was largely characterized as a single hub system with the Transportation Center serving as the main transfer point between routes. The location of the Transportation Center represented the geographic center point between destinations on the west and east sides of the Fox River. The Transportation Center is and will remain fairly centrally located into the future; however, with destinations moving further away from the downtown, it makes reaching those locations via a bus nearly impossible.

Due to the increasing distance between the Transportation Center and many key destinations, in 2010 Green Bay Metro staff wanted to improve and extend service throughout the Green Bay Metro service area. The result was the implementation of a multi-hub system that saw additional transit hubs developed at Bay Park Square Mall, Green Bay Plaza, and the Shopko transfer point in the City of De Pere. The addition of the two hubs on the west side of the Fox River has largely addressed issues of providing access to the main activity centers on that side of the river.

With the success of the two west side hubs realized, Green Bay Metro staff is again looking to improve and extend service; however, the focus is now on the east side of Green Bay Metro's service area. The following report provides a conceptual plan for the implementation of a new hub as well as the modification of bus routes to accommodate the proposed transit hub.

Green Bay Metro – East Side Route Survey

When evaluating a transit system for potential improvements, data collection from multiple sources can offer valuable insight into the operation of the public transit system. In particular, transit users can offer firsthand accounts of potential issues or, more generally, how the transit system is currently being used and how it could be improved. To gather that information, a rider survey was developed to identify origins and destinations, trip details, level of satisfaction with bus frequency, and desired destinations not currently served by transit. The survey also enabled bus patrons to provide comments.

Survey Results

The survey was administered on Metro’s fixed route buses on Wednesday, March 4th, 2015. A total of 448 surveys were completed and returned to Green Bay Metro staff. The following section will provide a detailed review of each survey question and the answers provided by riders.

Questions 1 and 2 – Trip Origins and Destinations

The first two questions were designed to collect information that would reveal how transit users are traveling throughout the community. The questions sought to identify where each trip began (trip origin) and where each trip was going to end (trip destination). Some of the origins and destinations that were provided lacked a specific reference such as an address or intersection; therefore, those trips could not be mapped. For the surveys that included a recognizable origin and destination, each point was located and mapped using a line and an arrow to show direction of travel. This information provided valuable perspective into how people were using Green Bay Metro buses to travel around the Green Bay Metropolitan Area. All of the recorded trips were compiled into one map and can be seen in Appendix A.

Question 3 - Trip Type

According to the survey results, over forty percent of the trips on the Green Bay Metro buses are for work purposes. The second most common trip type was school related. With work and school accounting for sixty percent of the trips, large employers as well as schools must be considered as high priority destinations.

Table 1: Survey Question 3 Results - Trip Type

Trip Type	Counts	Percent
Work	193	43%
School	77	17%
Combined	52	12%
Other	44	10%
Shopping/Dining	31	7%
Medical	23	5%
No Answer	2	<1%
Total	448	100%

Question 4 – Shift Workers

In addition to question three which recorded a passenger's trip type, the survey also sought to identify if survey respondents were shift workers, and if so, what shift they worked. For those people that work first shift, Green Bay Metro service hours cover the hours in which a first shift worker would need to travel to and from work. For those people that work second shift, Green Bay Metro service hours will only offer an opportunity to go to work. Second shift workers are unable to utilize transit for their return trip because the buses stop running at 9:45pm and second shift typically ends at either 10:00pm or 11:00pm. The same scenario is true for people that work third shift; however, the difficulty facing third shift individuals is getting to work at 10:00pm.

In the comments section of the survey, several comments addressed the issues facing people working second and third shift and their ability to access their places of employment via Green Bay Metro buses. Many of the comments pertaining to this issue requested extending service by 1 hour to allow second shift workers to get home from work and for third shift workers to get to work.

Question 5 - Transfers

One of the more common complaints recorded in the comments section of the survey was the length of time that a passenger is required to be on the bus to travel across town. For some people a 1.5 hour ride on the bus is necessary to access to their destination. Long trips on the bus are often a deterrent for many experienced and inexperienced transit riders. However, for a public transportation system that is serving a large geographic area, transfers are necessary to link bus routes together to provide access from one side of the service area to another.

The fifth survey question identified if the survey participant was required to make a transfer as a part of their trip. The survey results show that all but three routes (5, 14, & 18) required over half of the passengers to make a transfer during their trip. Two factors that may contribute to the high rate of transfers between routes include limited crossing points over the Fox River and the East River and peripheral development throughout most of the metropolitan area.

The Green Bay Metropolitan area is split by two rivers. The Fox River is the main water feature that splits the metropolitan area in half while the East River runs parallel to the Fox River approximately 1 mile to the east. There are a limited number of vehicular crossing points at both the Fox River and the East River which causes a funneling effect on the local transportation network. It also acts as a barrier which hinders the ability for Green Bay Metro to design routes that could provide better access to certain parts of the community. The bridges can create congestion during peak travel times in addition to the increased potential for congestion when on occasion the bridges open as ships enter and exit the Port of Green Bay.

The Green Bay Metropolitan area is largely characterized as having low density development throughout. Traditional zoning codes that promote the separation of uses combined with decades of peripheral development have produced a metropolitan area where destinations such as large employers, educational institutions, commercial developments, and activity centers are spread out and in many cases are not easily accessed without an automobile. The low density development

patterns have a direct impact on the design of the local transportation network which serves the local residential, commercial, and industrial areas of town creating longer distances between the places that people work, live, and recreate.

The following table describes transfer activity between routes based on survey responses.

Table 2: Survey Question 5 Results - Transfers

Route	Total	Yes	Percent	No	Percent	No Answer
1	62	39	62.9%	23	37.1%	1
2	47	38	80.9%	9	19.1%	1
3	43	25	58.1%	18	41.9%	0
4	29	19	65.5%	10	34.5%	0
5	13	5	38.5%	8	61.5%	1
6	15	11	73.3%	4	26.7%	1
7	83	57	68.7%	26	31.3%	1
8	36	22	61.1%	14	38.9%	1
10	24	20	83.3%	4	16.7%	0
11	24	18	75.0%	6	25.0%	1
14	18	5	27.8%	13	72.2%	0
17	7	3	42.9%	4	57.1%	0
18	38	29	76.3%	9	23.7%	2
Total		291		148		9

Question 6 - Bus Arrival/Timeliness

It is extremely important that a transit system stay on schedule; however, sometimes there are delays which result in the bus running behind schedule. Many of the delays that Green Bay Metro buses experience are caused by the draw bridges over the Fox River, rail road crossings, poor weather, mobility device boardings and alightings, or bus mechanical issues. Despite the occasional delays, the overwhelming majority of survey respondents' perception was that the buses do arrive on time.

Table 3: Survey Question 6 Results - Bus Arrival

On Time	Count	Percent
Yes	377	84.0%
No	47	10.5%
No Answer	24	5.5%
Total	448	100%

Question 7 - Frequency of Service

Many of the current Green Bay Metro routes are designed to be completed within one hour. In addition to one hour service, many of the routes are designed as a loop or have a loop within the route. For routes that contain loops, a transit user may be able to board a bus and get to a destination; however, these routes do not offer a convenient return option along the same path. To resolve this, Green Bay Metro has designed two sets of paired routes (Routes 3 and 4 and Routes 8 and 9). The paired routes utilize nearly identical roads; however, the two routes run in opposite directions.

In addition to using paired routes, Green Bay Metro also increases service frequency through the use of multiple buses on the same route. Placing two buses on one route creates a scenario where each bus will complete the route in one hour but the departure times are staggered by thirty minutes to create a half hour frequency. This type of service is provided on Routes 1, 6, and 7.

Even with the increased frequency between two buses, Route 6 will on occasion reach maximum capacity on the buses during certain times of the day. Green Bay Metro recently placed a third bus on this route during Saturday peak travel hours to help alleviate some of the capacity issues. Route 6 is the only route that receives this type of increase in bus capacity during peak hours.

As shown in the following table, about two thirds of the survey respondents are satisfied with the current bus service frequency while more than a quarter of survey respondents were not satisfied with the current frequency of the bus service. For respondents that were not satisfied, two additional questions were asked to determine their desired frequency of the bus. The results of these follow up questions are summarized below and in Tables 4 and 5.

Table 4: Survey Question 7 Results - Frequency of Service

Satisfaction with Bus Frequency	Count	Percent
Yes	287	64.0%
No	127	28.5%
No Answer	34	7.5%
Total	448	100%

Question 7a - Patron Requested Frequency of Service

Of the 147 respondents that answered this question, approximately seventy three percent requested a thirty minute frequency.

Table 5: Survey Question 7a Results - Requested Frequency

How Frequent Should the Bus Run	Count	Percent of Respondents
15 minutes	33	22.5%
30 minutes	108	73.5%
45 minutes	3	2%
1 hour	3	2%
Question Response Total	147	100%

Question 7b - Would you ride the bus more often if the bus arrived as frequently as you would like

Trip frequency is one of the main reasons why people are willing to take the bus versus another form of transportation. More frequency often results in more flexibility and increased efficiency for transit riders. The results clearly show that people would be willing to ride the bus more often if the bus arrived as frequently as they would like.

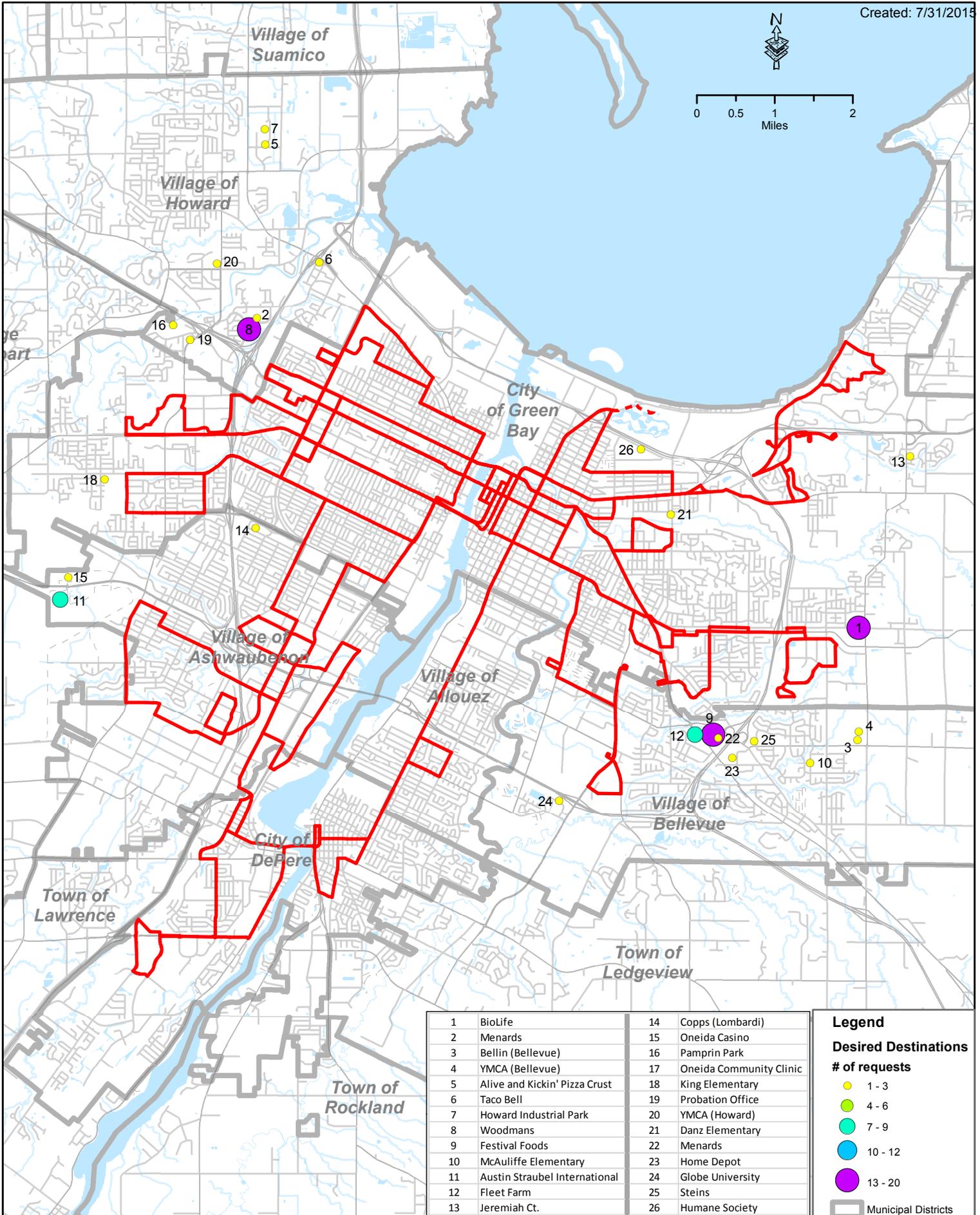
Table 6: Survey Question 7b Results – Frequency as Often as Desired

Would you ride the bus more often if the bus arrived as frequently as you would like	Count	Percent of respondents
Yes	255	90%
No	28	10%
Question Response Total	283	100%

Question 8 – Desired destinations that Green Bay Metro does not provide service to

With the addition of a transit hub on the east side of the Fox River, some of the existing bus routes will need to be modified to accommodate the proposed hub location. The addition of an East Side Hub and the creation of new routes provide passengers an opportunity to reach new destinations and potentially enjoy more frequent service. Question eight sought to gather information about the destinations passengers would like to go that are currently not served by a transit route. Identification of these locations was possible only if the survey respondents provided a geographic location such as an address, intersection, or an establishment’s name. Many of the answers provided were generalized and could not be located. It should be noted that while it is not located on the map, one of the most common requests identified by survey respondents was the Village of Howard. Respondents requested service to Howard on thirty-three individual surveys which was more than any other location requested.

The following map shows all of the requested locations identified by the survey respondents.



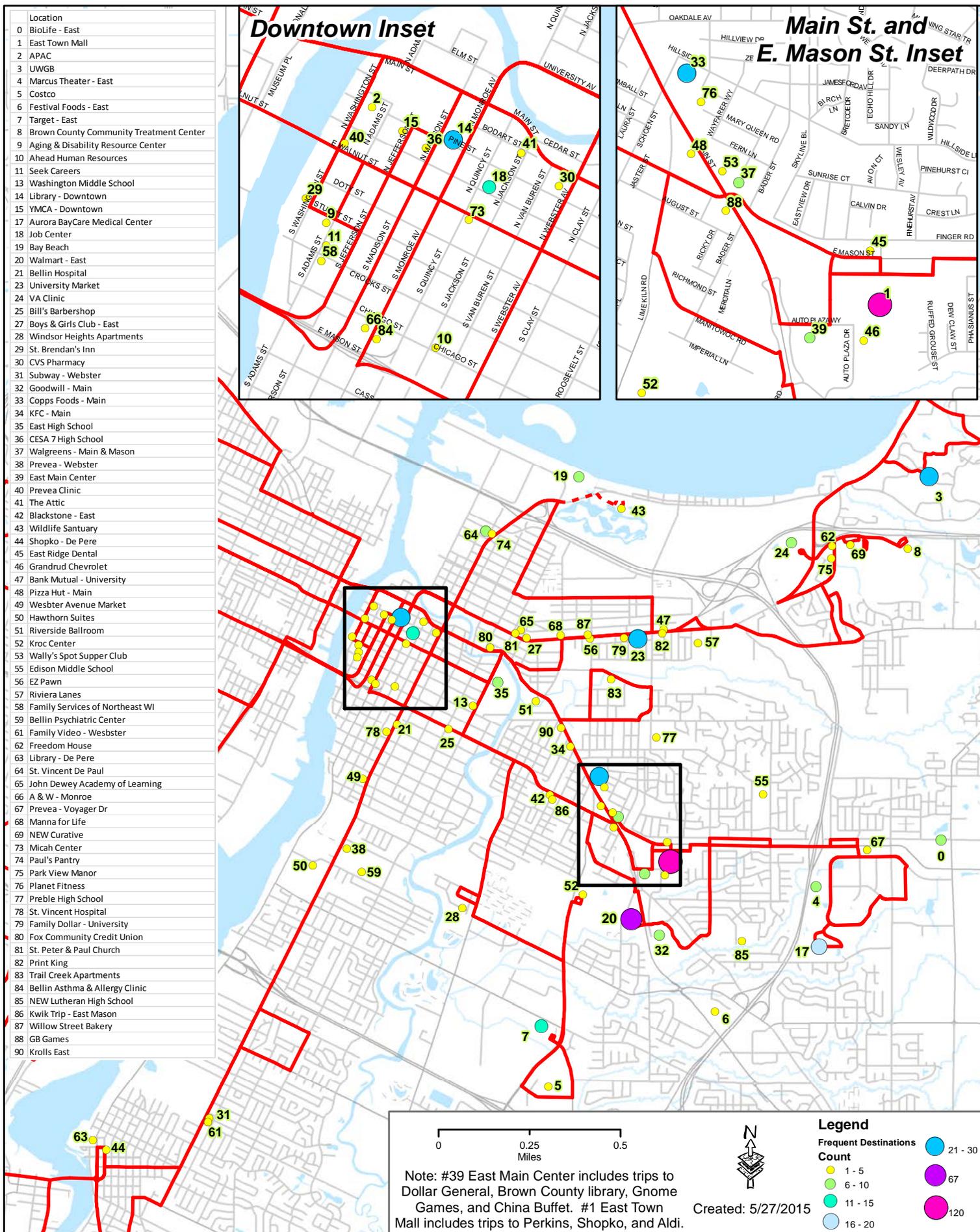
Question 9 – Frequently visited destinations on the east side

In addition to identifying locations that people would like to go that are not currently served by transit, another important element to consider when assessing and potentially redesigning a public transit system is the destinations that are currently served by a transit route that people frequently visit. These destinations are typically large employers, educational institutions, commercial developments, or activity centers and should continue to be served by the new routes that are developed as a part of the proposed development of an east side hub.

Question nine sought to identify destinations that bus patrons visit frequently. These locations have been identified on the following map with circles that represent how many times the locations were recognized by the bus patrons.

Note: The East Town Mall point is a composite of the number of times that survey participants identified the following destinations: Perkins, Shopko, Aldi, and The East Town Mall. The East Main Center point represents the number of times that survey participants identified the following destinations: Dollar General, Brown County Library, Gnome Games, and China Buffet.

Frequent East Side Destinations



- 0 BioLife - East
- 1 East Town Mall
- 2 APAC
- 3 UWGB
- 4 Marcus Theater - East
- 5 Costco
- 6 Festival Foods - East
- 7 Target - East
- 8 Brown County Community Treatment Center
- 9 Aging & Disability Resource Center
- 10 Ahead Human Resources
- 11 Seek Careers
- 12 Washington Middle School
- 13 Library - Downtown
- 14 YMCA - Downtown
- 17 Aurora BayCare Medical Center
- 18 Job Center
- 19 Bay Beach
- 20 Walmart - East
- 21 Bellin Hospital
- 23 University Market
- 24 VA Clinic
- 25 Bill's Barbershop
- 27 Boys & Girls Club - East
- 28 Windsor Heights Apartments
- 29 St. Brendan's Inn
- 30 CVS Pharmacy
- 31 Subway - Webster
- 32 Goodwill - Main
- 33 Copps Foods - Main
- 34 KFC - Main
- 35 East High School
- 36 CESA 7 High School
- 37 Walgreens - Main & Mason
- 38 Prevea - Webster
- 39 East Main Center
- 40 Prevea Clinic
- 41 The Attic
- 42 Blackstone - East
- 43 Wildlife Sanctuary
- 44 Shopko - De Pere
- 45 East Ridge Dental
- 46 Grandrud Chevrolet
- 47 Bank Mutual - University
- 48 Pizza Hut - Main
- 49 Webster Avenue Market
- 50 Hawthorn Suites
- 51 Riverside Ballroom
- 52 Kroc Center
- 53 Wally's Spot Supper Club
- 55 Edison Middle School
- 56 EZ Pawn
- 57 Riviera Lanes
- 58 Family Services of Northeast WI
- 59 Bellin Psychiatric Center
- 61 Family Video - Webster
- 62 Freedom House
- 63 Library - De Pere
- 64 St. Vincent De Paul
- 65 John Dewey Academy of Learning
- 66 A & W - Monroe
- 67 Prevea - Voyager Dr
- 68 Manna for Life
- 69 NEW Curative
- 73 Micah Center
- 74 Paul's Pantry
- 75 Park View Manor
- 76 Planet Fitness
- 77 Preble High School
- 78 St. Vincent Hospital
- 79 Family Dollar - University
- 80 Fox Community Credit Union
- 81 St. Peter & Paul Church
- 82 Print King
- 83 Trail Creek Apartments
- 84 Bellin Asthma & Allergy Clinic
- 85 NEW Lutheran High School
- 86 Kwik Trip - East Mason
- 87 Willow Street Bakery
- 88 GB Games
- 90 Krolls East

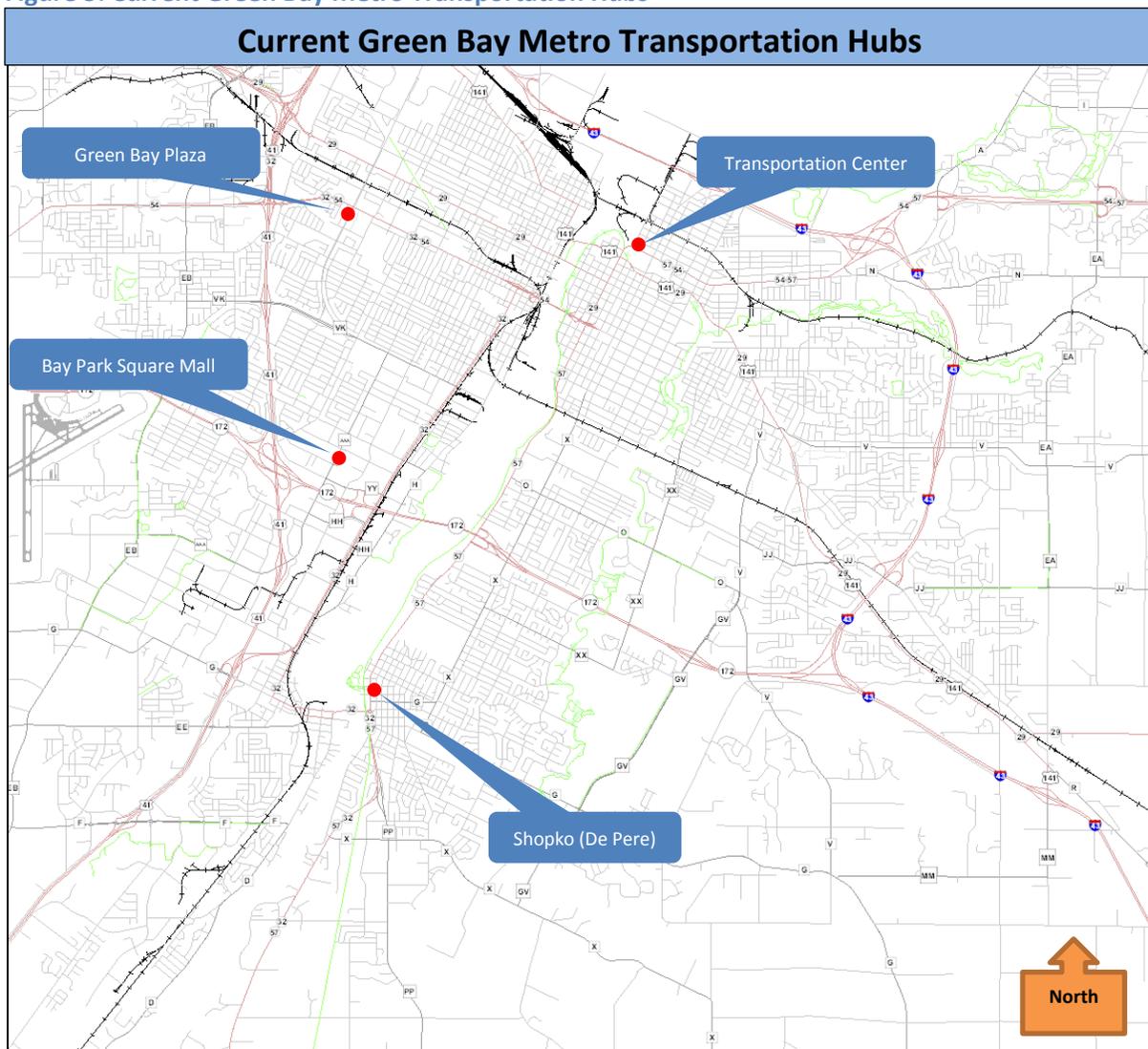


Note: #39 East Main Center includes trips to Dollar General, Brown County library, Gnome Games, and China Buffet. #1 East Town Mall includes trips to Perkins, Shopko, and Aldi.

East Side Hub

The development of an additional transit hub on the east side of the Fox River stems from continued development on the urban periphery and a need to serve destinations that have located there. Green Bay Metro has responded to the peripheral development through the utilization of multiple transit hubs as shown in the following map. Each hub allows transit routes to begin and/or transfer with other bus routes at these locations. This method has been successful on the west side of the Fox River, and as development continues to occur on the far eastern side of the Green Bay Metropolitan Area, the demand to expand transit to these areas is increasing as well. With the current configuration of the east side bus routes, Green Bay Metro cannot provide service to some destinations due to the long travel time (greater than 30 minutes in one direction) from the Transportation Center. The development of an east side hub would allow connections to be made from the other hubs as well as extend service further east.

Figure 3: Current Green Bay Metro Transportation Hubs



East Side Hub Location Analysis

To develop a strategy for locating a transportation hub on Green Bay's east side, Green Bay MPO staff identified five key components of a metropolitan area that are important considerations for locating and potentially developing a transit hub in addition to adjusting and creating new bus routes to accommodate a transit hub. These five considerations are the location of minority populations, geographic income distribution, population density, employment density, and other activity centers. Data was collected for each of the five components and were assessed as they relate to the current Green Bay Metro transit routes. The following sections discuss the key findings from each analysis.

Note: The minority population and income distribution data were obtained from the US Census Bureau while the employment data were obtained from the Wisconsin Department of Transportation (WisDOT).

Assessment of Minority Populations

A 1994 Presidential Executive Order (12898) requires any agency that is a recipient of federal funding to make environmental justice part of its mission by identifying and addressing the effects of all programs, policies, and activities on minority population and low-income populations. For Green Bay Metro, the development of a new transit hub on the east side of Green Bay Metro's service area may create an opportunity to improve the existing transit routes. Under Executive Order 12898, the development of the east side hub should;

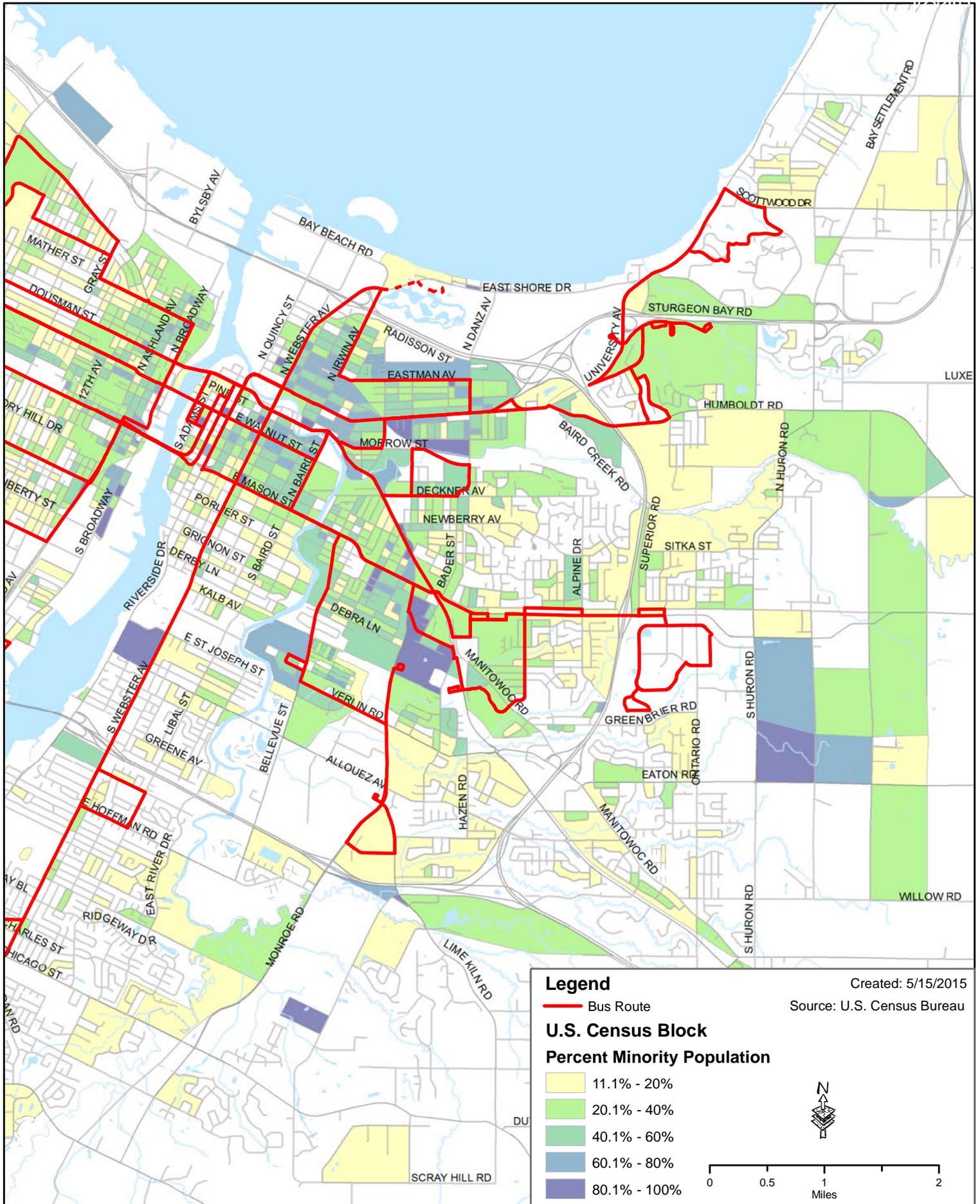
- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations,
- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process,
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Findings

Under the Green Bay MPO Title VI and Non-Discrimination Program, a target threshold was set to identify geographic areas that have a percentage of minority residents greater than or equal to the average of Brown County in 2010. This threshold, based on 2010 U.S. Census population data, was identified as 11.1 percent. As shown in Figure 4, a large amount of the Green Bay Metropolitan Area identified as having a minority population above 11.1 percent is currently served by Green Bay Metro bus routes.

In particular, the Main Street and University Avenue corridors have some of the highest minority population concentrations in Brown County. In relationship to the current bus routes, one location that is near the geographic center of the Green Bay Metro service area east of the Fox River is just south of the intersection of East Mason Street and Main Street. Multiple census blocks near this area have a minority population greater than eighty percent. Additionally, several other adjacent census blocks have minority populations that exceed forty percent.

The development of a transit hub near the intersection of East Mason Street and Main Street has the potential to improve the current transit service on the east side of Green Bay Metro's service area. East side destinations may become more accessible and trip times could be reduced in addition to creating an opportunity to increase service frequency between the new hub and the Transportation Center.



Assessment of Low Income Areas

The second socio-economic group examined was low income households. WisDOT and FHWA environmental justice orders define "low-income" as "a person whose household income is at or below the US Department of Health and Human Services (HHS) poverty guidelines." For those individuals and/or families that are considered low-income, transportation costs are particularly burdensome when considering that car ownership and operating expenses equate to approximately \$9,100 per year (2013 estimate by AAA). The lack of mobility options for individuals in poverty severely limits their ability to access educational facilities, employment centers, or other activity centers.

Table 7: Department of HHS 2015 Poverty Guidelines

Persons in family/household	Poverty guideline
1	\$11,770
2	15,930
3	20,090
4	24,250
5	28,410
6	32,570
7	36,730
8	40,890
For families/households with more than 8 persons, add \$4,160 for each additional person	

Source: Department of Health and Human Services 2015 Poverty Guidelines

To ensure that areas of low-income households are considered throughout this planning process, the following map was created to identify census block groups that were at or below the poverty threshold of \$20,090 for a three member household (determined by the Department of Health and Human Services 2015 Poverty Guidelines).

Findings

As shown in Figure 5 there are a few census block groups that had an average annual median household income below the 2015 poverty level of \$20,090 for a three person household. There is one census block group east of the Fox River that has been identified as below the 2015 poverty threshold. The location of this census block group is just south of the East Mason Street and Main Street intersection. This census block group overlaps with some census blocks that were identified as having a high percentage of minority residents. The census block group identified on the east side of the Green Bay Metro service area as having an average household income below the poverty threshold is currently served by Green Bay Metro.

Assessment of Population Density

Population density is an important factor to consider when planning public transportation. As noted earlier in this report, the Green Bay Metropolitan Area is largely characterized as a low density metropolitan area. The Florida Department of Transportation (FDOT) developed general parameters for local governments to promote and implement development that is supportive of transit investment. Because the majority of the Green Bay Metropolitan Area is suburban in nature, the recommended density to support transit investment in a suburban area was 5-30 households per acre. To map this threshold a calculation was required to develop a comparable density threshold based on population. The conversion is necessary because the geographic data obtained from the U.S. Census Bureau is based on population, not households per acre. The following equation was used to develop the density threshold of 7,872 Persons per Square Mile.

$$5 \text{ Households per Acre} \times (2.46 \text{ Persons per Household}^1) = 12.3 \text{ Persons per Acre}$$

To develop the threshold of persons per square mile, the 12.3 persons per acre above must be converted using the following calculation.

$$640 \text{ Acres per Square Mile} \times 12.3 \text{ Persons per Acre} = 7,872 \text{ Persons per Square Mile}$$

Findings

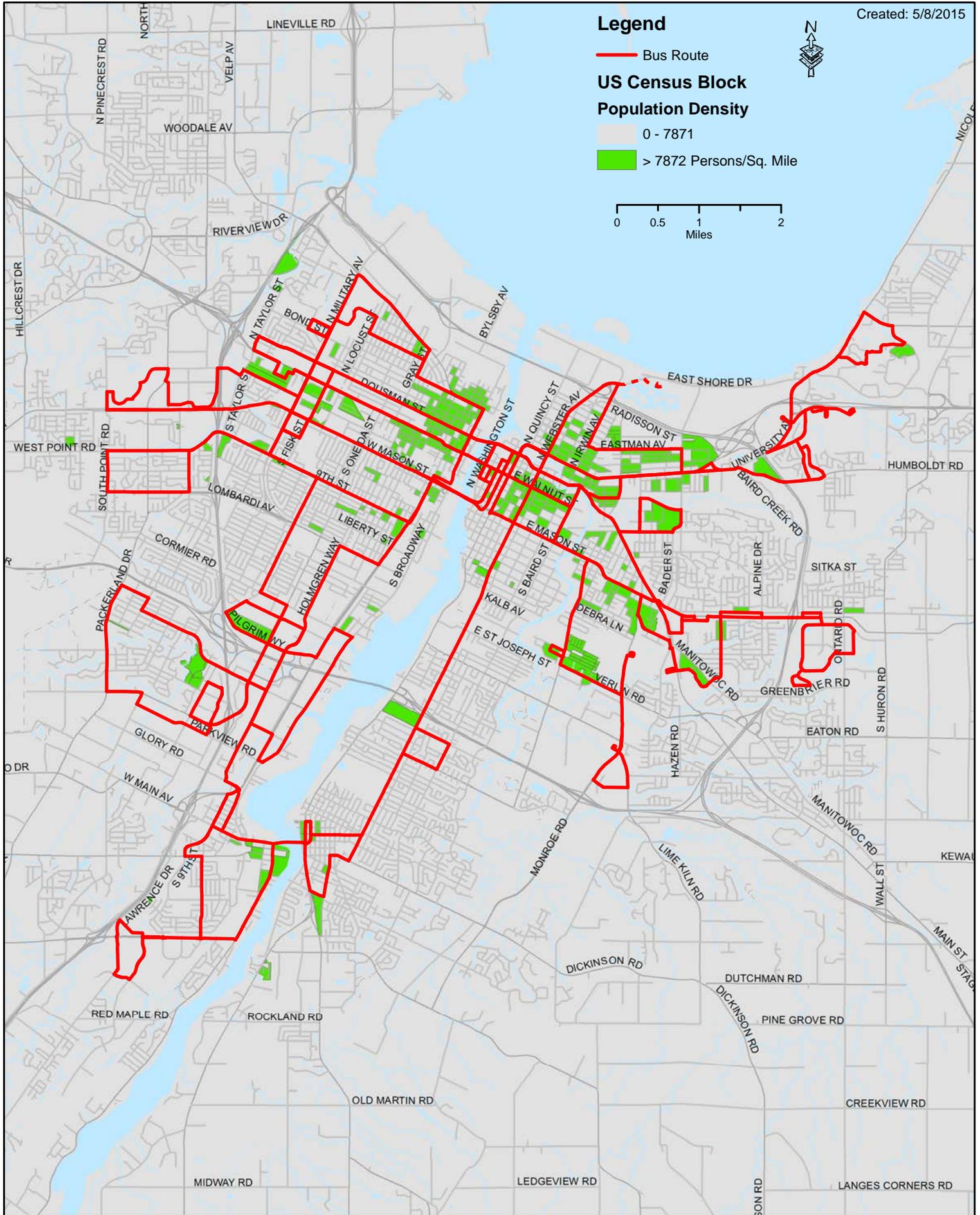
Due to the low density development throughout the Green Bay Metropolitan Area there are very few locations that exhibited population densities above the threshold of 7,872 persons/square mile. The majority of the census blocks that do exceed this threshold are areas that have large apartment complexes and nearly all of the census blocks that do meet the population density threshold are currently served by bus routes. The census blocks that meet this threshold are shown in Figure 6.

¹ Source: American Community Survey – 2009-2013 Brown County estimate

Figure 6
2010 US Census Blocks with Population Density
Greater Than or Equal To 7,872 Persons per Sq. Mile



Created: 5/8/2015



Assessment of Employment Centers

Based on the Green Bay Metro bus rider survey conducted on March 4, 2015, the most common type of trip was for work purposes. With forty-three percent of respondents indicating that their bus trips were for work purposes, it is important to identify where large employment destinations are in relationship to the transit system before a location is identified for the development of a new transit hub. The current route structure offered by Green Bay Metro provides access to dense employment areas; however, if existing routes are altered, it is of utmost importance to determine if service will continue to be provided to those same employment areas.

For the employment analysis, data was gathered from WisDOT in the form of Traffic Analysis Zones (TAZs). The TAZs are a dataset containing demographic and geographic information that is used for forecasting travel demand. Figure 7 shows employment density across the Green Bay Metropolitan Area by TAZ.

Findings

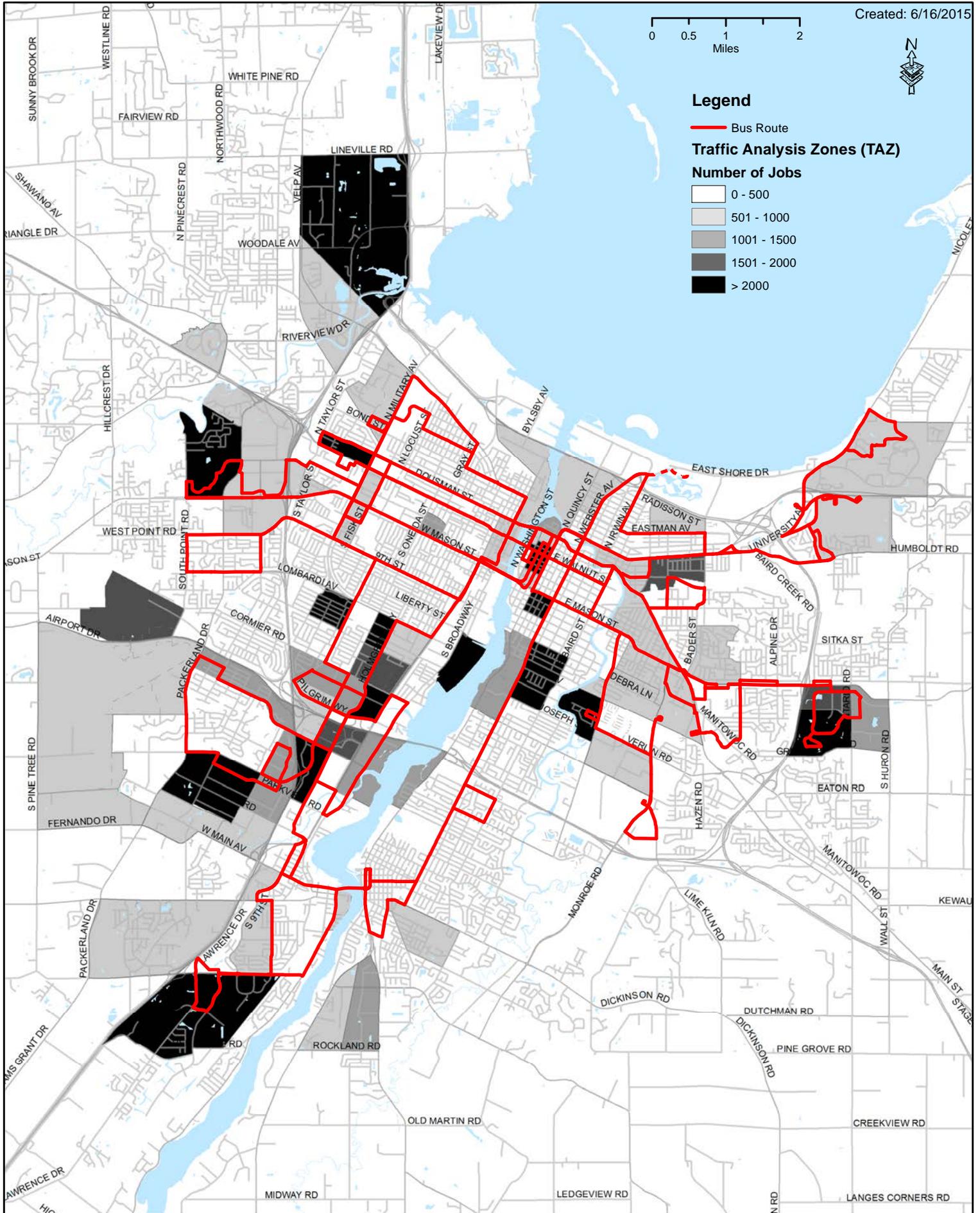
According to the March 4, 2015, Green Bay Metro bus rider survey, the percentage of people who use Green Bay Metro for work trips was more than double the second most reported trip type. This is a good indication that providing public transportation to areas that have a high number of jobs is essential for the success of Green Bay Metro, the individuals who utilize Green Bay Metro to access their place of employment, and for the community as a whole. The areas shown on the following map (Figure 7) as having the highest number of jobs represent many of the business and industrial parks in the Green Bay Metropolitan Area.

The west side of the Fox River has significantly more areas with large employment totals; however, according to the Brown County Comprehensive Plan, much of the future development in the Green Bay Metropolitan Area is expected to occur on the far east side of the City of Green Bay, the Village of Bellevue, and the Town of Ledgeview. While other communities are expected to see significant growth, the focus of this project is east of the Fox River. A significant number of jobs on the east side of the Green Bay Metropolitan Area may not be present today; however, the expected growth will likely include several employment centers and therefore, locating a transit hub on the east side of the Green Bay Metro service area will provide options for future expansion of the bus system.

2010 Employment by Traffic Analysis Zone



Created: 6/16/2015



Assessment of Major Activity Centers

The Green Bay Metropolitan Area has evolved from a monocentric to a polycentric region with multiple areas of activities. Since Green Bay Metro began to provide bus service in the Green Bay area, downtown Green Bay served as the main activity center. Decades worth of peripheral development created multiple activity centers near the beltway (I-43, STH 172, and I-41) that can no longer be reached from the Transportation Center near downtown.

Most of the locations that are identified as an activity center are large employers, retail stores, or a service oriented business. Green Bay MPO staff used information collected from the Green Bay Metro bus rider survey conducted on March 4, 2015, ridership data collected from the 2014 Green Bay Metro Comprehensive Bus Stop Study, and local employment data to identify important activity centers throughout the Green Bay Metropolitan Area as shown on Figure 8.

Findings

Green Bay Metro works with local municipalities, business owners, and individuals to ensure that the bus service is adequately serving the community, local businesses, and individuals who use it. As shown in Figure 8, many of the area's major employers are served by a bus route in addition to other locations such as shopping centers and service oriented businesses. As discussed throughout the previous analyses, peripheral development continues to occur and the demand to serve the new businesses and activity centers with transit is also increasing. The top five most requested destinations that were recorded in the rider survey are shown. Some of these locations could be reached by redesigning routes around an east side hub.

As noted in the Survey Results Section under Question 8, respondents requested service to the Village of Howard on thirty-three individual surveys. The Village of Howard was identified more than any other location.

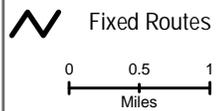
Major Activity Centers and Requested Destinations



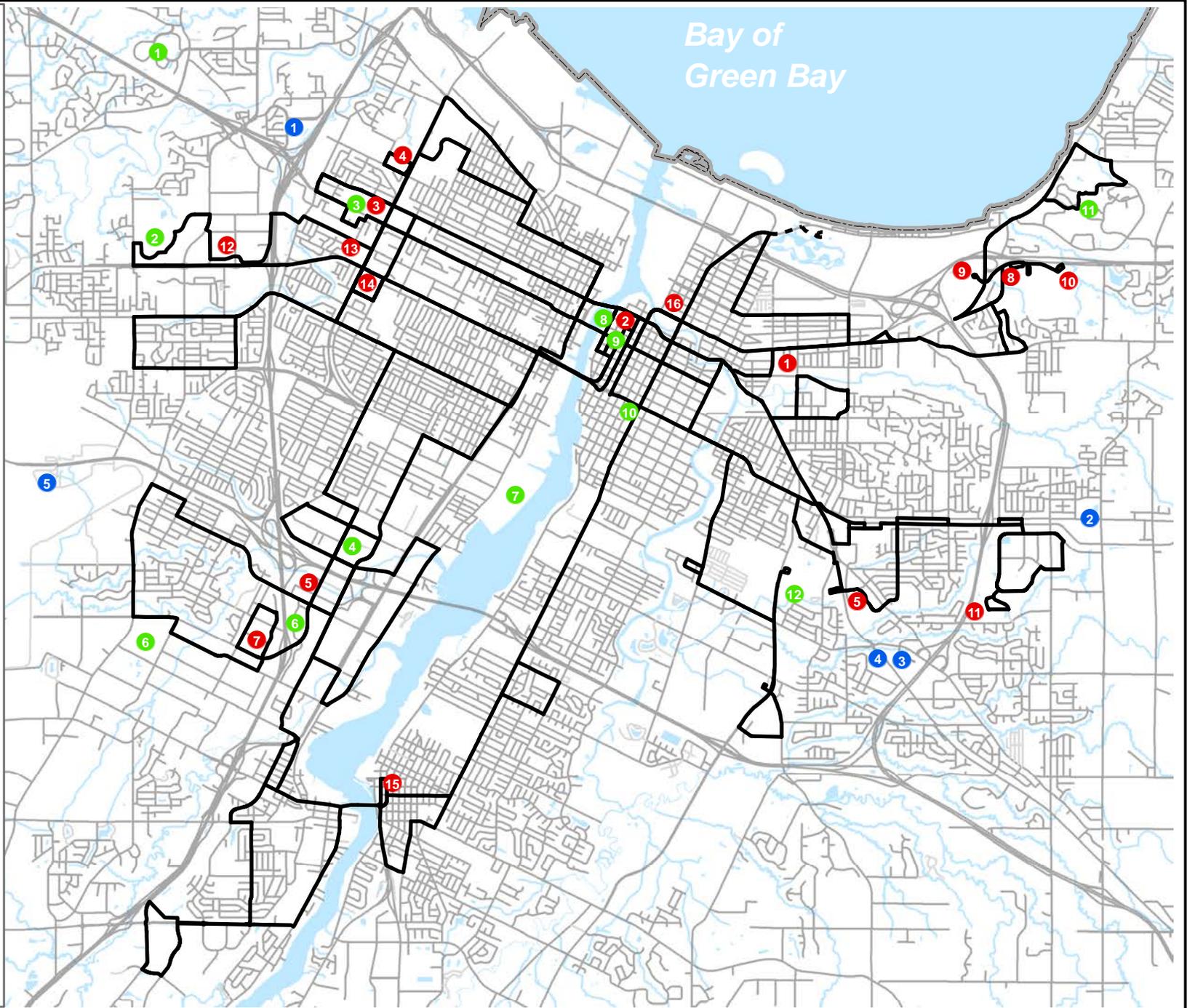
- Major Employers:**
- 1-United Health Group
 - 2-NWTC
 - 3-St. Mary's Hospital
 - 4-Bay Park Square Mall
 - 5-Goodwill (Oneida Street)
 - 6-Schneider National
 - 7-Georgia Pacific
 - 8-APAC
 - 9-Government District
 - 10-St. Vincent Hospital & Bellin Hospital
 - 11-UWGB
 - 12-JBS Packerland

- Frequented Destinations By Transit Riders:**
- 1-American Foods
 - 2-APAC
 - 3-ASPIRO (Dousman)
 - 4-ASPIRO (Stiles)
 - 5-Goodwill (East)
 - 6-Ashwaubenon Hotel District
 - 7-Innovative Services
 - 8-NEW Curative
 - 9-V.A. Clinic
 - 10-Brown County Community Treatment Center
 - 11-Aurora Baycare
 - 12-Wal-Mart (West)
 - 13-Goodwill (West Mason)
 - 14-Green Bay Plaza
 - 15-Shopko (De Pere)
 - 16-Green Bay Metro Transportation Center

- Destinations Requested By Transit Riders:**
- 1-Woodmans
 - 2-BioLife
 - 3-Festival Foods
 - 4-Fleet Farm
 - 5-Austin Straubel International Airport



Note: Requested Destinations were identified during the March 2015 East Side Study Rider Survey. Frequented Destinations were identified during the 2014 Green Bay Metro Comprehensive Bus Stop Study.



Proposed East Side Hub Location

After assessing the locations of minority populations and low income households, population densities, employment areas, and major activity centers, it was determined that the triangular piece of land that is bounded by Main Street to the east, East Mason Street to the south, and Lime Kiln Road to the west, would provide the best location for the development of an east-side transit hub. This location addresses current needs while also allowing for future expansion of the transit system to the east. Details on the development of the transit hub at this location can be found in the following section.

Figure 9: Proposed East Side Hub Location



Proposed East Side Hub Details

The proposed East Side Hub location is a favorable location for the following reasons:

- 1. Travel Time:** This location is approximately 15 minutes from the main Transportation Center. Time points from Route 14 indicate that this location could be reached in thirteen minutes; however, there is an opportunity to gain a small amount of time by leaving the Transportation Center and heading east to Webster Avenue instead of heading west to Monroe Ave. This change is detailed in the following Route Modifications and Justifications section. This location is also accessible using the current Route 1 path. Time points for Route 1 indicate that the bus could provide service to this location in less than 15 minutes. This location is perfectly situated geographically to function as a transit hub for the east side of the Green Bay Metro service area.
- 2. Right-Of-Way:** This location has abundant right-of-way available for the development of infrastructure that would accompany a transit hub. Between the back of the curb on Main Street and the adjacent sidewalk is a grass terrace approximately 19'-20' wide. This terrace offers an excellent location for the future development of a bus bay that would be large enough to accommodate several buses. In addition to the generous terrace between the curb and the sidewalk, a large rectangular piece of right-of-way (27' by 275') is available west of the sidewalk in front of the Pizza Hut. This additional right-of-way is adjacent to the grass terrace and could be used for the installation of a bus shelter or other accommodations.
- 3. Proposed Bus Traffic:** The redesign of Route 1, Route 14, and Route 18, and the addition of two new routes (a Main Connector and a Mason Connector) will be structured such that each route will utilize this triangle as a hub as well as a turnaround point. All traffic movements around East Mason Street, Lime Kiln Road, and Main Street will be right hand turns or straight movements. Delays because of traffic signals should be kept at a minimum with this design.

The following image is a conceptual graphic of the proposed improvements that are being proposed at this location. The areas shown for improvements are not necessarily the exact sizes that will be required for the improvements. It is expected that Green Bay Metro will work with the City of Green Bay Department of Public Works as well as the Wisconsin Department of Transportation to design and construct the proposed improvements.

Route Modification Summaries and Justifications

Hours of Operation Analysis

To accommodate a new east side hub, some of Green Bay Metro’s existing routes will require restructuring. The process will require the reduction of hours from some routes while other routes may gain hours. These deletions and additions are summarized in Tables 8 and 9.

Table 8: Proposed Weekday Service Hour Deletions & Additions

<u>Deleted Hours</u>	Daily	
<u>Route</u>	<u>Hours</u>	<u>Comments</u>
#1 – Brown	-29	Route will be restructured – Begin at Proposed East Side Hub
# 14 – Pink	-16	Route will be restructured – Begin at Proposed East Side Hub
# 18 – Gold	-15	Route will be restructured – Begin at Proposed East Side Hub
Hours Deleted	-60	
<u>Additional Hours</u>	Daily	
<u>Route</u>	<u>Hours</u>	<u>Comments</u>
#1 – Brown	+15	New route created to serve East Town Mall and I43 Business Park
# 14 – Pink	+15	New route created to serve Main St. south of proposed hub location
# 18 – Gold	+15	New route from proposed hub location to serve Verlin Rd., Target/Copps, and Costco.
Main Connector	+14	New route to connect Transportation Center to proposed East Side Hub via Main St.
Mason Connector	+16	New route to connect Transportation Center to proposed East Side Hub via Mason St.
Hours Added	+75	
Total Hours Added Per Weekday	15	

Table 9: Proposed Saturday Service Hour Deletions & Additions

<u>Deleted Hours</u>	Daily	
<u>Route</u>	<u>Hours</u>	<u>Comments</u>
#1 – Brown	-11	Route will be restructured
# 14 – Pink	-11	Route will be restructured
# 18 – Gold	-11	Route will be restructured
Hours Deleted	-33	
<u>Additional Hours</u>	Daily	
<u>Route</u>	<u>Hours</u>	<u>Comments</u>
#1 – Brown	5.5	Route will be paired with proposed Route 18
# 14 – Pink	5.5	Route will be paired with proposed Main Connector
# 18 – Gold	5.5	Route will be paired with proposed Route 1
Main Connector	5.5	Route will be paired with proposed Route 14
Mason Connector	11	Mason Connector will continue to run independently every 30 min.
Hours Added	+33	
Total Hours Added Per Saturday	0	

Proposed Route Modifications

#1 – Brown

Route 1 – Brown will start and end at the new East Side Hub located on Main Street. The route will serve the East Town Mall, I43 Business Park, and Finger Road. The round-trip time is estimated to be 30 minutes, and it would transfer at the proposed east-side hub with the proposed Mason Connector, the proposed Main Connector, the proposed Route 14, and the proposed Route 18 during weekday service hours. This route is proposed to operate with one bus on a 30 minute loop during the weekdays and it is proposed to be paired with the proposed Route 18 on weekday evenings and Saturdays with one bus completing both Route 1 and Route 18 on a one hour loop.

Pros:

- Half hour frequency is maintained.
- Service is extended to BioLife.
- Seamless connections can be made at the proposed East Side Hub and at the Transportation Center.
- Few existing bus stops will be required to move.
- Service to additional destinations on the east side of the transit service area is possible without having to travel to the Transportation Center and back out again.

Cons:

- Passengers will have to make an additional transfer when traveling through the proposed East Side Hub.

Proposed Route 1 Details					
Proposed Miles	Estimated Round Trip (time)	Weekday Service Hours	Weekday Evening Service Hours	Saturday Service Hours	Proposed Departure Location
9.54	30 min.	Service every 30 min. 5:30 AM-6:00 PM	Hourly Service Paired with Rt 18 6:00 PM – 10:00 PM	Hourly Service Paired with Rt 18 8:00 AM – 7:00 PM	ESH*
		26 Trips/Day	3 Trips/Day	11Trips/Saturday	

*ESH – East Side Hub

#2 – Orange

No changes are proposed for this route.

#3 – Silver

No changes are proposed for this route.

#4 – Blue

No changes are proposed for this route.

#5 – Plum

No changes are proposed for this route.

#6 – Red

No changes are proposed for this route.

#7 – Lime

No changes are proposed for this route.

#8 – Green

No changes are proposed for this route.

#9 – Tan

No changes are proposed for this route.

#10 – Yellow

No changes are proposed for this route.

#11 – Sky

No changes are proposed for this route.

#13 – River

No changes are proposed for this route.

#14 – Pink

Route 14 has been restructured to provide service from the proposed East Side Hub to Main Street, Auto Plaza Way, Manitowoc Road, Pecan Street, Brosig Street, Edgewood Drive, Lime Kiln Road, and Steffens Court. The addition of the East Side Hub will allow this route to extend service to Festival Foods and Menards on Steffens Court. This route is proposed to operate with one bus on a 30 minute loop during the weekdays and it is proposed that this route be paired with the proposed Main Connector on weekday evenings and Saturdays with one bus completing both Route 14 and the Main Connector on a one hour loop.

Pros:

- One hour frequency is improved to half hour frequency on weekdays.
- The proposed route has been extended to fulfill many riders' desire to access Festival Foods and Menards in Bellevue.

Cons:

- Passengers will have to make an additional transfer when traveling through the proposed East Side Hub.

Proposed Route 14 Details					
Proposed Miles	Estimated Round Trip (time)	Weekday Service Hours	Weekday Evening Service Hours	Saturday Service Hours	Proposed Departure Location
6.64	30 min.	Service every 30 min. 5:30 AM-6:00 PM	Hourly Service Paired with Main Connector 6:00 PM – 10:00 PM	Hourly Service Paired with Main Connector 8:00 AM – 7:00 PM	ESH*
		26 Trips/Day	3 Trips/Day	11Trips/Saturday	

*ESH – East Side Hub

#17 – Brick

No changes are proposed for this route.

#18 – Gold

Similar to both Routes 1 and 14, Route 18 will begin at the new East Side Hub on Main Street. This route will continue to serve the Westminster Drive area, Verlin Road, Target/Copps, Costco, and the Kroc Center. Verlin Road will be utilized twice on this route, once on the outbound and once on the inbound portions of this route. The round-trip time would now be 30 minutes, and it would connect at the proposed east side hub with the proposed Mason Connector, the proposed Main Connector, the proposed Route 14, and the proposed Route 1. This route is proposed to operate with one bus on a 30 minute loop during the weekdays and it is proposed to be paired with the proposed Route 1 on weekday evening and Saturdays with one bus completing both Route 1 and Route 18 on a one hour loop.

Pros:

- One hour frequency is improved to half hour frequency during weekday service.

Cons:

- Passengers will have to make an additional transfer when traveling through the proposed East Side Hub.

Proposed Route 18 Details					
Proposed Miles	Estimated Round Trip (time)	Weekday Service Hours	Weekday Evening Service Hours	Saturday Service Hours	Proposed Departure Location
10.78	30 min.	Service every 30 min. 5:30 AM-6:00 PM	Hourly Service Paired with Rt 1 6:00 PM – 10:00 PM	Hourly Service Paired with Rt 1 8:00 AM – 7:00 PM	ESH*
		26 Trips/Day	3 Trips/Day	11Trips/Saturday	

*ESH – East Side Hub

Proposed Main Connector

The proposed Main Connector route will replace the first half of Route 14 which provides service to Main Street, Deckner Street, Morrow Street, North Henry Street, and Danz Avenue. The proposed route will connect to the proposed East Side Hub on Main Street between Lime Kiln Road and East Mason Street. This route is proposed to operate with one bus on a 30 minute loop during the weekdays and it is proposed that this route be paired with the proposed Route 14 on weekday evening and Saturdays with one bus completing both Route 14 and the Main Connector on a one hour loop.

Pros:

- One hour frequency is improved to half hour frequency during weekday service.

Cons:

- Passengers will have to make an additional transfer when traveling through the proposed East Side Hub.

Proposed Main Connector Details					
Proposed Miles	Estimated Round Trip (time)	Weekday Service Hours	Weekday Evening Service Hours	Saturday Service Hours	Proposed Departure Location
7.4	30 min.	Service every 30 min. 5:15 AM-5:45 PM	Hourly Service Paired with Rt 14 5:45 PM – 9:45 PM	Hourly Service Paired with Rt 14 7:45 AM – 6:45 PM	TC*
		26 Trips/Day	3 Trips/Day	11Trips/Saturday	

*TC – Transportation Center

Proposed Mason Connector

The proposed Mason Connector route will replace the first half of Route 1 which provides service to Monroe Avenue and East Mason Street. The results of the East Side Study Survey that was conducted on Wednesday, March 4, revealed that approximately 18 trips that were able to be mapped with a specific origin and destination originated on Monroe Avenue or East Mason Street sections of the current Route 1. The proposed Mason Connector will maintain the efficient connection between East Mason Street and the Transportation Center

Pros:

- Half hour frequency is maintained.

Cons:

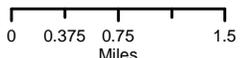
- Passengers will have to make an additional transfer when traveling through the proposed East Side Hub.

Proposed Mason Connector Details					
Proposed Miles	Estimated Round Trip (time)	Weekday Service Hours	Weekday Evening Service Hours	Saturday Service Hours	Proposed Departure Location & Time
7.12	30 min.	Service every 30 min. 5:15 AM-5:45 PM	Service every 30 min. 5:45 PM – 9:45 PM	Service every 30 min. 7:45 AM – 6:45 PM	TC*
		26 Trips	7 Trips	22Trips	

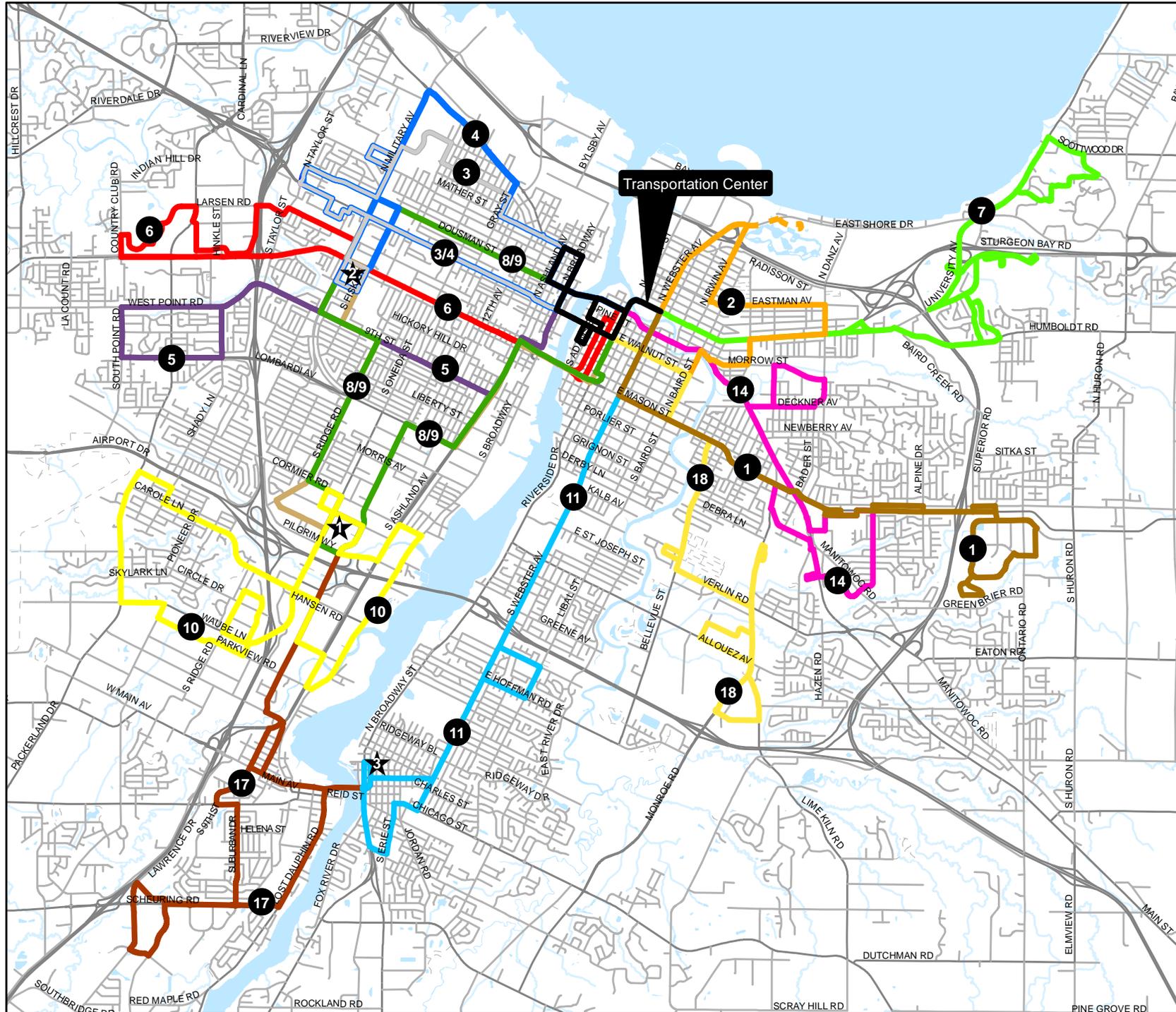
*TC – Transportation Center

Legend

- #1 Brown Line
- #2 Orange Zippin Line
- - - #2 Orange Zippin Line Upon Request
- #3 Silver Line
- #4 Blue Line
- #5 Plum Line
- #6 Red Line
- #7 Lime Line
- #8 Green Line
- #9 Tan Line
- #10 Yellow Line
- #11 Sky Line
- #13 River Line
- #14 Pink Line
- #17 Brick Line
- #18 Gold Line
- ★ Bay Park Square Mall Hub
- ★ Green Bay Plaza Hub
- ★ Shopko Hub

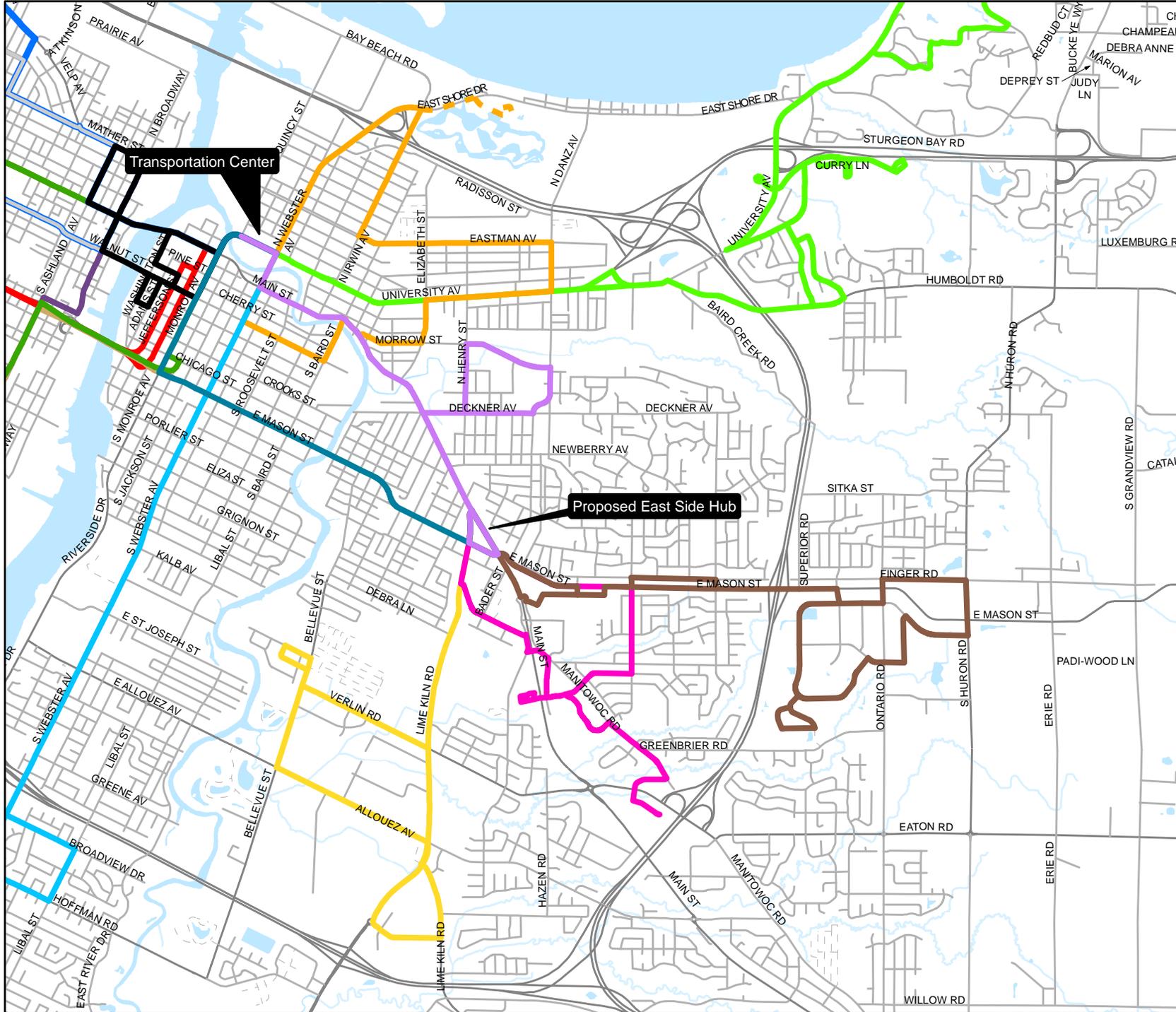


Created: 5/27/2015



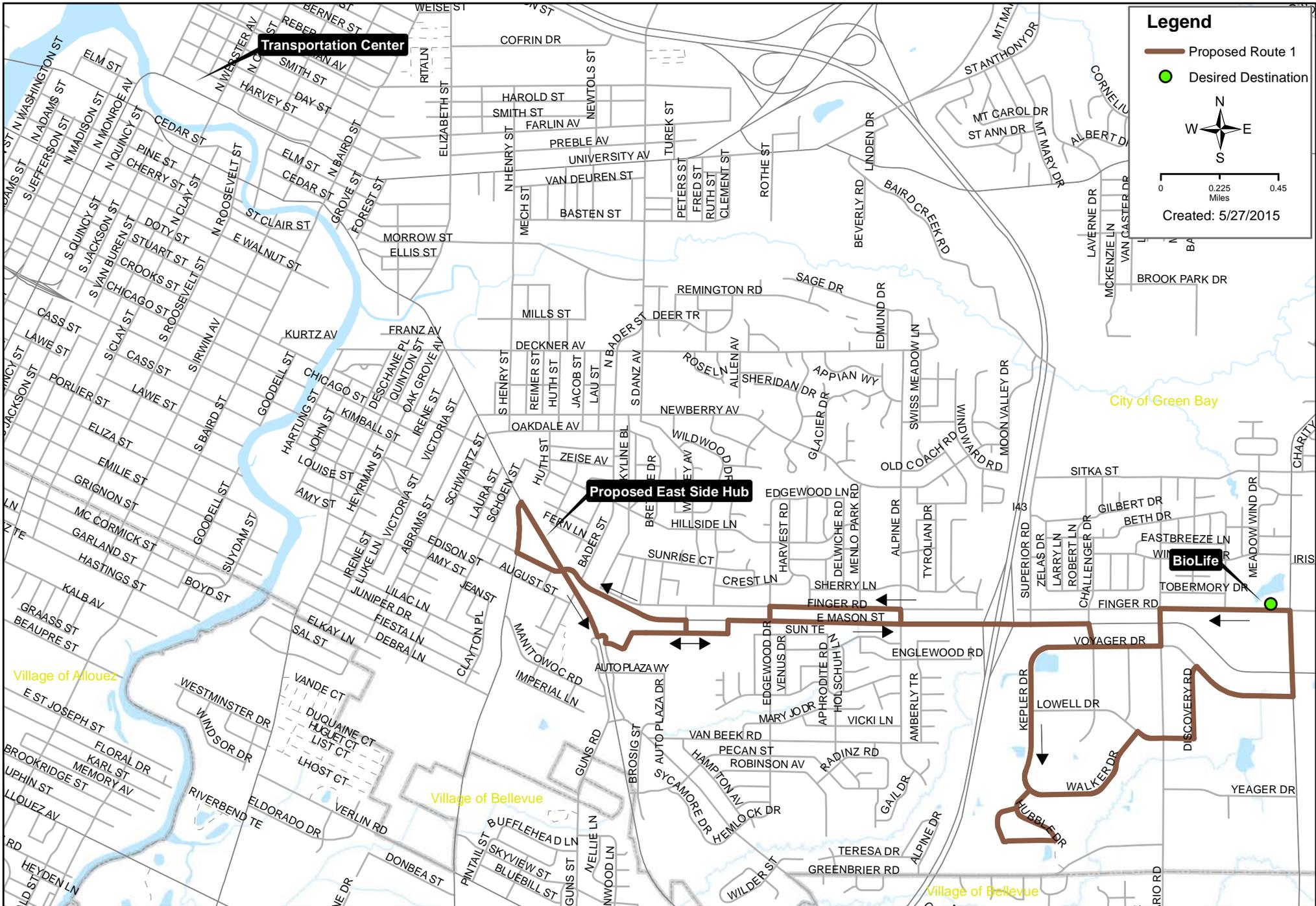
Legend

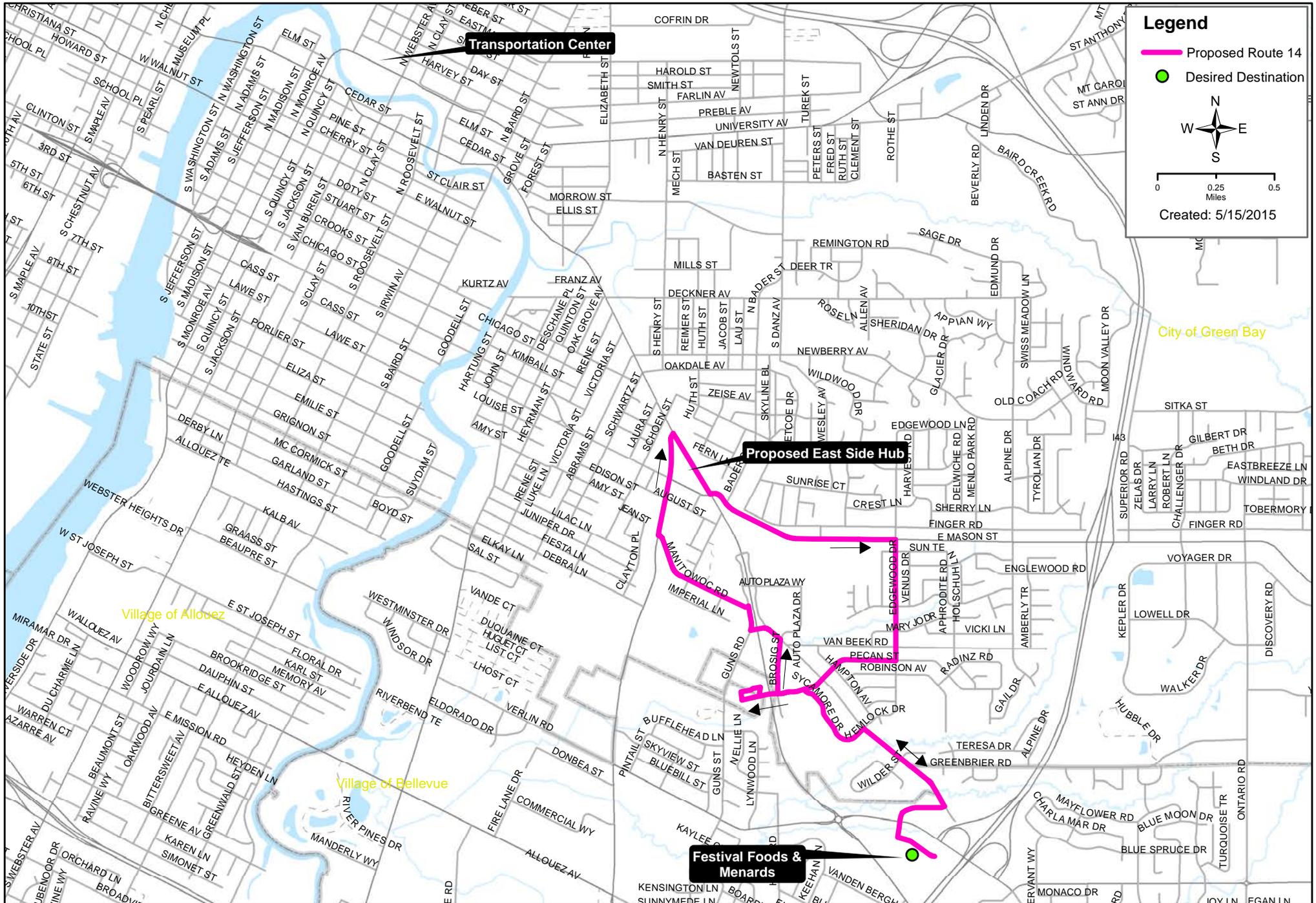
- #1 Proposed Brown Line
- #2 Orange Zippin Line
- #2 Orange Zippin Line Upon Request
- #3 Silver Line
- #4 Blue Line
- #5 Plum Line
- #6 Red Line
- #7 Lime Line
- #8 Green Line
- #9 Tan Line
- #10 Yellow Line
- #11 Sky Line
- #13 River Line
- #14 Proposed Pink Line
- #17 Brick Line
- #18 Proposed Gold Line
- Proposed Main Connector
- Proposed Mason Connector



0 0.25 0.5 1
Miles

Created: 5/27/2015





Legend

- Proposed Route 14
- Desired Destination



0 0.25 0.5
Miles

Created: 5/15/2015

City of Green Bay

Proposed Route Origins

With the changes proposed above, the Metro routes would now begin and end their trips at the following hubs:

Existing Metro Transportation Center

Routes: 2, 3, 4, 5, 6, 7, 8, 9, 11, Main Street Connector, Mason Street Connector

Bay Park Square Mall

Routes: 10

East Side Hub

Routes: 1, 14, 18

De Pere Shopko

Routes: 17

Estimated Route Distances

The routes that have been created and/or restructured to accommodate the proposed east side hub are designed to be completed within a half hour or an hour. Road tests may be necessary to determine if some of the assumptions about time and distances are correct. The following list describes each route's estimated round trip mileage.

Table 10: Estimated Round Trip Times and Route Distances

Route	Scheduled Round Trip Time	Estimated Route Distance
NEW # 1	30 min.	9.54
# 2	30 min.	6.6
# 3	60 min.	12.58
# 4	60 min.	14.06
# 5	60 min.	15.71
# 6	60 min.	14.40
# 7	60 min.	16.16
# 8	60 min.	12.75
# 9	60 min.	13.69
# 10	60 min.	15.67
# 11	60 min.	14.73
# 13	30 min.	5.07
NEW # 14	30 min.	6.64
# 17	60 min.	15.24
NEW # 18	30 min.	10.78
NEW Main Street Connector	30 min.	7.4
NEW Mason Street Connector	30 min.	7.12

Route Departures

The route departure times were scheduled to maximize connectivity at the Green Bay Metro Transportation Center. Departure times for the weekdays, weekday evenings, and Saturdays are shown in Table 11.

Table 11: Weekday, Weekday Evening, & Saturday Departure Times

Route	Weekday Departures		Weekday Evening Departures		Saturday Departures	
# 1	:30	:00	:30 (Paired with #18)		:00 (Paired with #18)	
# 2	:45	:15	:45	:15	:45	
# 3	:15		No Service Provided		No Service Provided	
# 4	:45		:45		:45	
# 5	:45		No Service Provided		No Service Provided	
# 6	:15	:45	:45		:45	
# 7	:15	:45	:45		:45	
# 8	:45		:45		:45	
# 9	:15		:15		:15	
# 10	:09		:09		:09	
# 11	:15		:15		:15	
# 13	:30	:00	:30	:00	:30	:00
# 14	:30	:00	:30 (Paired with Main St. Connector)		:00 (Paired with Main St. Connector)	
# 17	:45		:45		:45	
# 18	:30	:00	:00 (Paired with #1)		:30 (Paired with #1)	
Main Street Connector	:15	:45	:15 (Paired with #14)		:45 (Paired with #14)	
Mason Street Connector	:15	:45	:15	:15	:45	:15

The current Green Bay Metro route schedule has the majority of the routes departing the Green Bay Metro Transportation Center either 15 minutes before or 15 minutes after the hour. Some of the routes have been redesigned to depart their hubs on the hour and 30 minutes after the hour because of the proposed east side hub. These routes will meet at the Green Bay Metro Transportation Center and at the proposed East Side Hub to make transfers from one route to another seamless and efficient.

Estimated Financial Impacts on Communities in the Metro Service Area

Green Bay Metro uses a variety of factors to determine each community’s financial contribution. Annual revenue hours are one of these factors. The annual revenue hours account for all fixed route service, limited service, game day routes, and an additional 50 hours for route development. The proposed route changes paired with the development of a new transit hub on the east side of Green Bay Metro’s service area will have a net annual increase of 2,175 hours. The increase in revenue hours is attributed to the proposed changes to Route 1, Route 14, Route 18, and the addition of the Mason Street Connector and the Main Street Connector. None of the recommended changes to the aforementioned routes will have an impact on the total revenue hours for limited service routes, Green Bay Packer Game Day Routes, or the proposed G Line route.

Table 12: Projected Revenue Hours

Green Bay Metro 2016 Projections		2016 Projections with Proposed East Side Hub	
	Hours		Hours
Fixed Route Service	75,740	Fixed Route Service	77,915
NEW Proposed G Line	7,264	NEW Proposed G Line	7,264
Limited Service Routes	2,690	Limited Service Routes	2,690
Game Day Routes	660	Game Day Routes	660
Route Development	50	Route Development	50
Total Revenue Hours	86,404	Total Revenue Hours	88,579

In addition to revenue hours, Green Bay Metro uses mileage as another factor to determine the annual costs for each participating community. The annual mileage includes fixed routes, limited service routes, and Green Bay Packer Game Day routes. The establishment of a hub on the east side of the transit service area and the realignment and extension of some of the routes will impact the overall fixed route mileage only. The table below provides a comparison between the current route mileages for each of Green Bay Metro’s bus routes in addition to a detailed breakdown of the individual community mileage under the proposed routes.

Table 13: Mileage Estimates for Communities in the Metro Service Area

Route	Current Route Miles	Proposed Route Miles	Proposed Miles by Community	
# 1	13.73	9.58	Green Bay – 9.58	
# 2	6.60	6.60	Green Bay – 6.60	-
# 3	12.58	12.58	Green Bay – 12.58	-
# 4	14.06	14.06	Green Bay – 14.06	-
# 5	15.71	15.71	Green Bay – 15.71	-
# 6	14.40	14.40	Green Bay – 14.40	-
# 7	16.16	16.16	Green Bay – 16.16	-
# 8	12.75	12.75	Green Bay – 9.17	Ashwaubenon - 3.58
# 9	13.69	13.69	Green Bay – 10.20	Ashwaubenon - 3.49
# 10	15.67	15.67	Ashwaubenon – 15.67	-

Continued on the next page

Route	Current Route	Proposed Route	Proposed Miles by Community		
	Miles	Miles			
# 11	14.73	14.73	Green Bay – 3.4	Allouez – 7.22	De Pere – 4.11
# 13	5.07	5.07	Green Bay – 5.07		-
# 14	14.48	7.54	Green Bay – 6.05		Bellevue – 1.49
# 17	15.24	15.24	De Pere – 10.34		Ashwaubenon – 4.9
# 18	15.42	11.12	Green Bay – 3.21		Bellevue – 7.91
Main Street Connector	NA	7.40	Green Bay – 7.40		-
Mason Street Connector	NA	7.12	Green Bay – 7.12		-

Since each community's financial contribution for the fixed route system is based on its percentage of overall system mileage, it is estimated that the Village of Bellevue and the City of Green Bay would pay more due to the increase in mileage in those communities. To determine the percentage of overall system mileage, Green Bay Metro can utilize the individual route mileage for each route listed in Table 13 or include the net increase in mileage for the two communities listed in Table 14 to adjust the cost distribution amongst all participating communities. Since mileage for the limited service routes, Green Bay Packer Game Day Routes, and the proposed G Line are not affected by the proposals in this study, those mileage totals will remain the equivalent to the proposed 2016 totals.

Table 14: Mileage Impacts for Routes 1, 14, 18 and Additions of Main and Mason Connectors

	Current Fixed Route Miles	Proposed Fixed Route Miles	Change
Route 1	115,894.8 (City of GB)	66,312.76 (City of GB)	-49,582.04
Route 14	67,222 (City of GB)	48,200.35 (City of GB)	-19,021.65
		11,870.83 (Village of Bellevue)	+ 11,870.83
Route 18	23,206 (City of GB)	24,755.52 (City of GB)	+ 1,549.52
	32,154.2 (Village of Bellevue)	61,001.92 (Village of Bellevue)	+ 28,847.72
Main Connector	NA	58,955.8 (City of GB)	+ 58,955.8
Mason Connector	NA	68,060.08 (City of GB)	+ 68,060.08
City of Green Bay Mileage		Village of Bellevue Mileage	
Net Increase of 59,961.71 in 2016		Net Increase of 40,718.55 in 2016	

Conclusions

The Green Bay Metro transit system has evolved from a one hub system to the current four hub system. The development of a multi-hub system has largely been the result of decentralized development patterns which result in a community with activity centers that are located at the very edge of Green Bay Metro's service area. The addition of two hubs at important activity centers on the west side of the Green Bay Metro service area has allowed Green Bay Metro to expand its range of service through the hubs; however, with continued development on the east side of the Green Bay Metro service area, activity centers in those areas are becoming difficult to reach from the Transportation Center located near Downtown. The development of an additional hub on the east side of Green Bay Metro's service area would allow Green Bay Metro to achieve the following benefits:

- The development of an east side transit hub provides an opportunity to improve the existing transit service for an area of the community that has higher than average minority populations and an area that has household incomes below the 2015 poverty threshold.
- The proposed transit hub location is strategically located to provide an opportunity to create routes that continue to serve important areas of the community including those areas with high population and employment density as well as important activity centers including medical facilities and retail stores.
- The results from the Green Bay Metro rider survey highlighted the reasons why people are using transit, and work trips represented nearly half of the trips for survey respondents. The addition of the hub provides a foundation for Green Bay Metro to expand and extend service as new employers and activity centers develop along the urban periphery.
- The new hub will largely keep the current service intact while also adding service to some east-side destinations that were identified in the rider survey such as Festival Foods and Menards located on Steffens Court as well as Biolife on Finger Road.
- According to the 2014 Annual Route Review and Analysis Report, the three routes that are affected by the development of the new east side hub had varying performance across three system performance measures including Revenue per Hour, Passengers per Hour, and Operating Ratio or Percent of Expenses Recovered. The increased frequency on the redesigned Route 1, Route 14, and Route 18, should improve service and increase ridership.

Drawbacks

- This proposal would require the addition of one bus during the weekday service period which would require an increase in 15 service hours per weekday. If an increase in service hours is not feasible, the proposed routes have the flexibility to be paired together (Route 1 with Route 18 and Route 14 with the Main Connector), similar to the proposed weekday evening and Saturday service.
- Due to the expected increase in annual mileage, the City of Green Bay and the Village of Bellevue will likely see an increase in the annual cost to provide transit service.

Appendix

