

Introduction to Waukesha Metro Transit Development Plan

The study will perform the following functions:

- Analyze public transit needs by examining land use patterns, concentrations of employment, and travel habits and patterns, particularly for the transit-dependent population.
- Evaluate the current operations of the Waukesha Metro Transit System.
- Identify and recommend alternative transit service improvements that address the performance evaluation findings and the identified transit service needs.
- Recommend service and capital improvements for Waukesha Metro Transit .

Who is preparing the plan?

The Southeastern Wisconsin Regional Planning Commission (SEWRPC) has been asked by the City of Waukesha to develop the plan. The Commission is preparing the plan under the



Waukesha Transit Commission Board

Mike Liburdi
Eric Payne (Alderman)
Joe Pieper (Alderman)
Chad O'Donnell
Steve Kassens

Public Transit Service Objectives and Standards

The transit service objectives provide a basis for measuring the performance of the transit systems, identifying unmet transit service needs, and designing and recommending improvements. The following objectives were adopted by the Waukesha Transit Commission:

1. Public transit should serve those areas of the City and its immediate environs which can be efficiently served, including those areas which are fully developed to medium or high densities and, in particular, the transit-dependent population in those areas;
2. The public transit system should promote utilization of its service by being safe, reliable, convenient, and comfortable;
3. The public transit system should be economical and efficient, meeting all other objectives at the lowest possible cost.

Waukesha Metro Transit Service Characteristics: 2012

Service Hours for Fixed Routes

Weekdays: 5:30 a.m. to 9:30 p.m.

Saturdays: 8:15 a.m. to 10:15 p.m.

Sundays: 9:15 a.m. to 7:15 p.m.

Service Frequency

- Weekday peak periods: Buses depart every 30 min.

- Weekday off-peak periods: Buses on Routes 1, 4, and 8 depart every 30 min. Buses on all other routes depart every 60 min.

- Saturdays: Buses on Route 1 depart every 30 min., while buses on all other routes depart every 60 min.

- Sundays: Buses on Route 1 depart every 30 min. Buses on Routes 2, 4, 5/6, and 7/8 depart every 60 min.

Fares

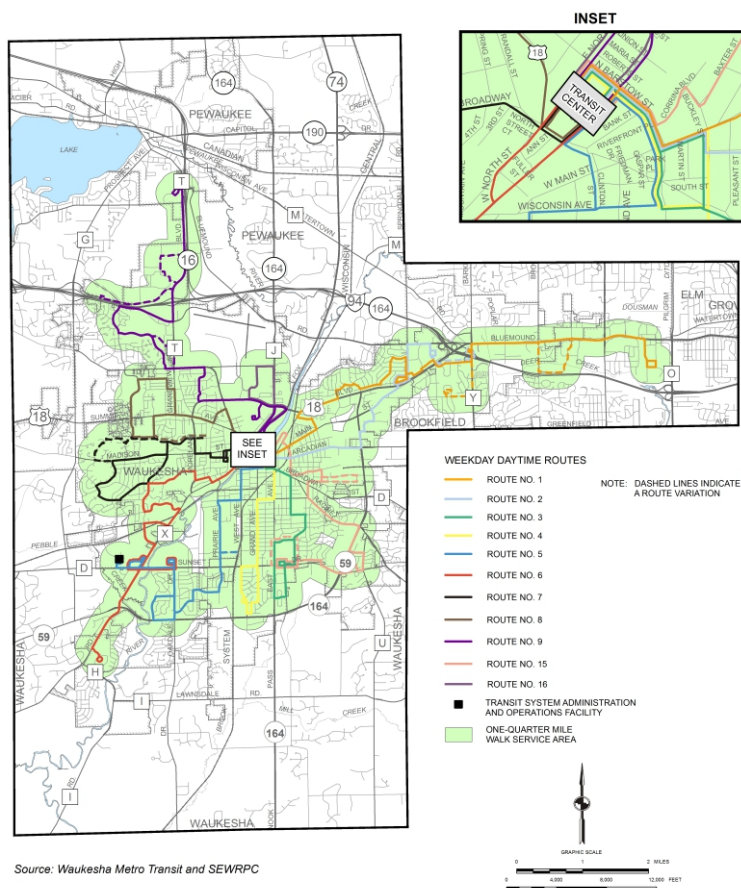
Adult cash fare: \$2.00

Seniors and people with disabilities: \$1.00

Students: \$1.35

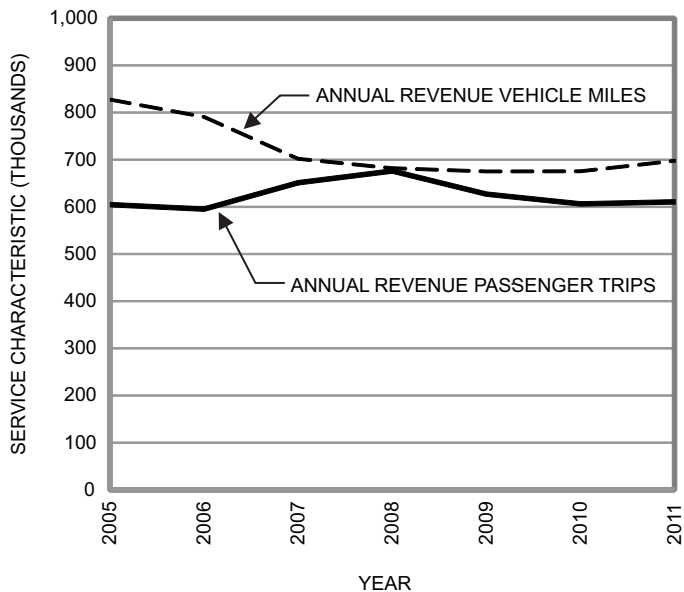
Metrolift paratransit service

- Operated by City of Waukesha, Metrolift provides curb-to-curb transportation to persons with disabilities who cannot use Waukesha Metro Transit's fixed routes.
- Fulfills Federal requirements for Waukesha Metro Transit to provide paratransit service to complement its fixed-route service.
- Available during same hours as fixed-route service.
- Fare: \$4.00

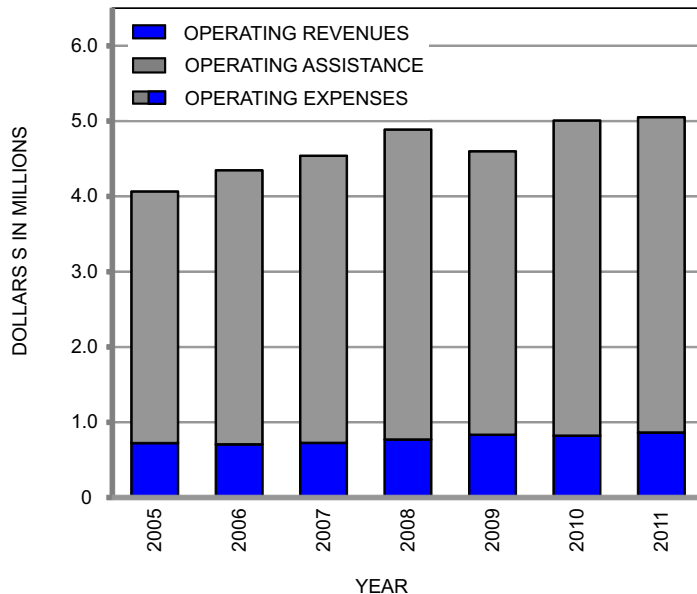


Waukesha Metro Transit: Annual Service Levels and Expenses

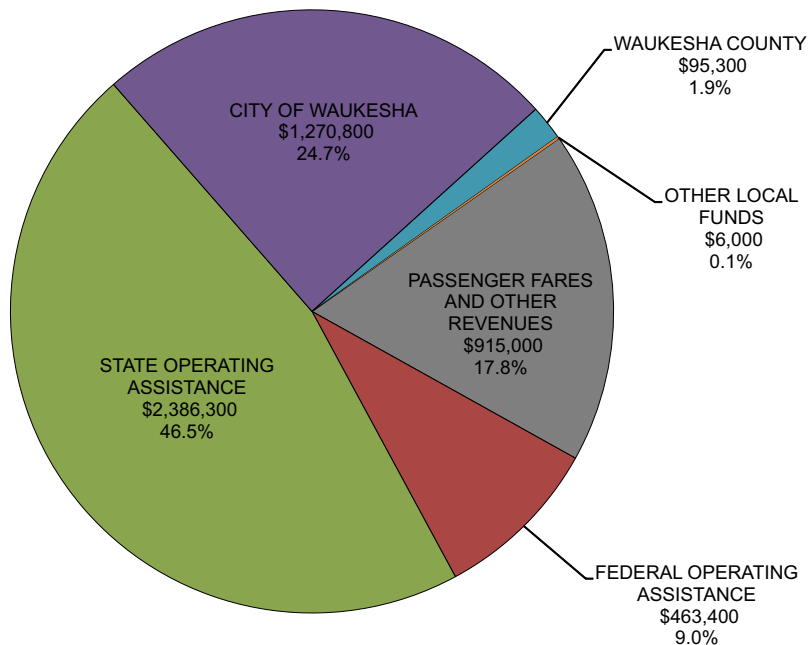
ANNUAL RIDERSHIP AND SERVICE: 2005-2011



ANNUAL OPERATING EXPENSES AND REVENUES: 2005-2011



WHO PAYS FOR WAUKESHA METRO TRANSIT'S OPERATING EXPENSES?



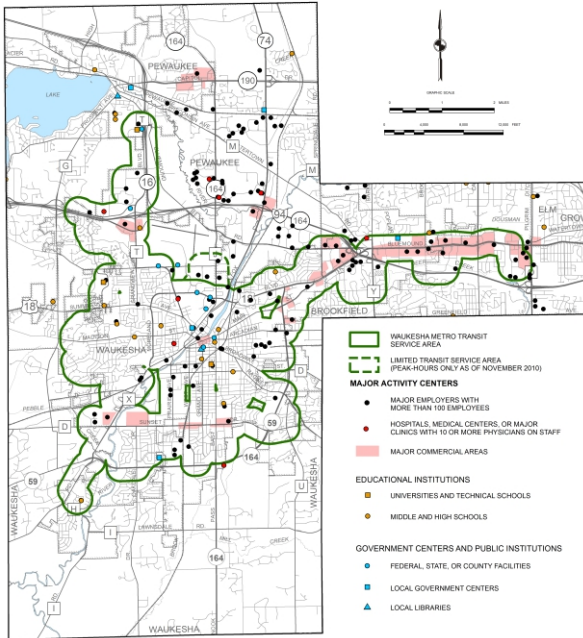
**2012 ANNUAL OPERATING BUDGET:
\$5,136,800**

Evaluation of Waukesha Metro Transit

SERVICE TO POPULATION, EMPLOYMENT, AND ACTIVITY CENTERS

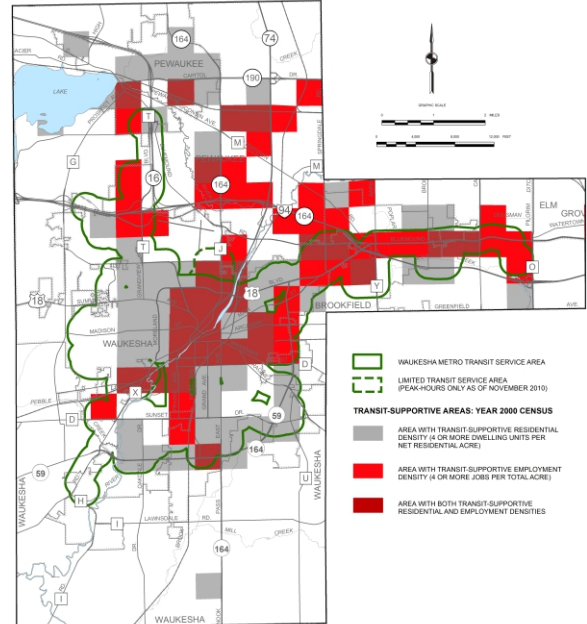
- In 2010, WMT provided excellent coverage of the population, employment, and activity centers in the Waukesha area serving 89% of both the population and jobs in the City of Waukesha. Limited service was provided outside the City.

MAJOR ACTIVITY CENTERS WITHIN AND OUTSIDE THE WALK ACCESS SERVICE AREA FOR WAUKESHA METRO TRANSIT: 2010



Source: SEWRPC

TRANSIT-SUPPORT AREAS FOR FIXED-ROUTE TRANSIT SERVICES WITHIN AND OUTSIDE THE WALK SERVICE AREA FOR WAUKESHA METRO TRANSIT: 2010



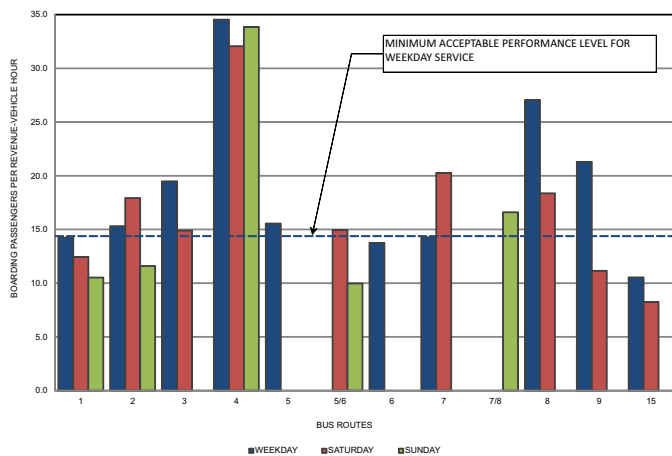
Source: SEWRPC

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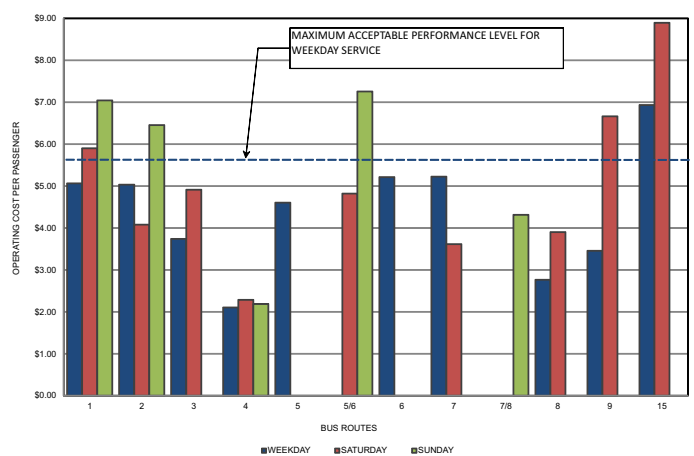
ROUTE PERFORMANCE

- Six routes (Nos. 1, 3, 4, 5, 8, and 9) have acceptable performance levels and could continue to be operated without change, while the remaining routes (Nos. 2, 6, 7, and 15) have some performance measures that merit study of possible changes.

TOTAL PASSENGERS PER REVENUE VEHICLE HOUR

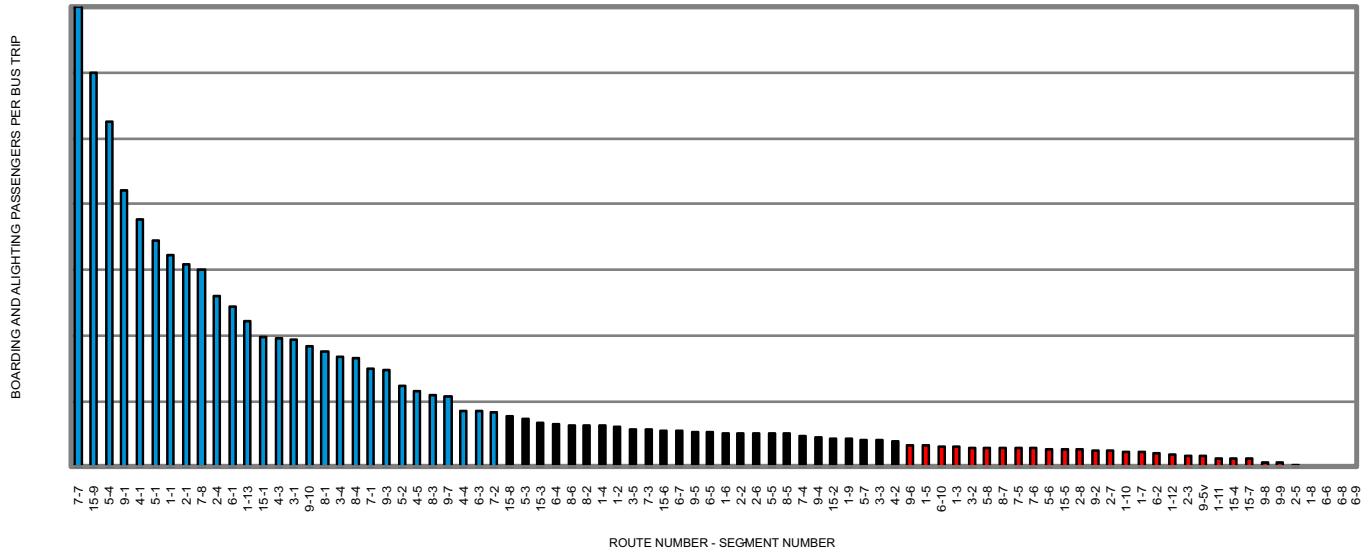


OPERATING COST PER PASSENGER

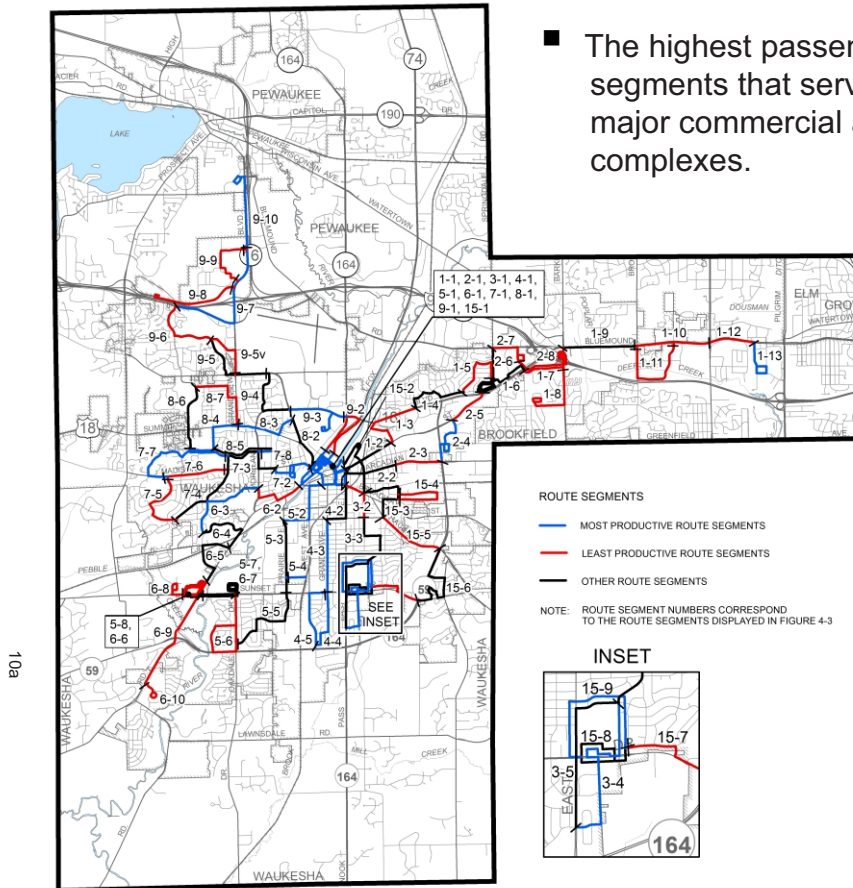


Evaluation of Waukesha Metro Transit System

PRODUCTIVE AND UNPRODUCTIVE ROUTE SEGMENTS: MARCH 2010



- The highest passenger activity occurs on route segments that serve the Downtown Transit Center, major commercial areas, or multi-family housing complexes.



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Evaluation of Waukesha Metro Transit System

Comparison to Peer Transit Systems

Transit Systems in National Peer Group

- Altoona Metro Transit (Altoona, Pennsylvania)
- Battle Creek Transit (Battle Creek, Michigan)
- Cambria County Transit Authority (Johnstown, Pennsylvania)
- Decatur Public Transit System (Decatur, Illinois)
- Dubuque – KeyLine (Dubuque, Iowa)
- Great Falls Transit District (Great Falls, Montana)
- Saginaw Transit Authority Regional Service (Saginaw, Michigan)

Transit Systems in Wisconsin Peer Group

- Eau Claire Transit System
- Janesville Transit System
- La Crosse Municipal Transit Utility
- Oshkosh Transit System
- Sheboygan Transit System
- Wausau Area Transit System

COMPARISON OF KEY INDICATORS OF RIDERSHIP AND FINANCIAL PERFORMANCE FOR WAUKESHA METRO TRANSIT AND OTHER BUS SYSTEMS IN THE WISCONSIN AND NATIONAL PEER GROUPS: 2004 AND 2008

Performance Measure	Operating Data ^a								
	Waukesha Metro Transit			Average ^b for Bus Systems in Wisconsin Peer Group ^c			Average ^b for Bus Systems in National Peer Group ^d		
	2004	2008	Average Annual Percent Change	2004	2008	Average Annual Percent Change	2004	2008	Average Annual Percent Change
Ridership									
Total Passengers ^e	730,247	819,046	2.9	787,836	859,947	2.2	702,962	713,474	0.4
Service Levels									
Revenue Vehicle Miles	784,376	682,177	-3.4	587,141	586,294	0.0	578,534	554,330	-1.1
Revenue Vehicle Hours	58,566	51,488	-3.2	41,984	41,111	-0.5	44,969	41,827	-1.8
Service Effectiveness									
Passengers per Capita	10.81	12.04	2.7	12.98	13.63	1.2	8.92	8.58	-1.0
Revenue Vehicle Hours per Capita	0.87	0.76	-3.3	0.70	0.66	-1.4	0.55	0.52	-1.2
Passengers per Revenue Vehicle Mile	0.93	1.20	6.6	1.35	1.47	2.2	1.31	1.23	-1.6
Passengers per Revenue Vehicle Hour	12.47	15.91	6.3	19.04	20.75	2.2	16.62	16.34	-0.4
Service Efficiency									
Operating Expense per Revenue Vehicle Mile	\$4.55	\$6.31	8.5	\$4.50	\$5.62	5.7	\$5.56	\$6.30	3.1
Operating Expense per Revenue Vehicle Hour	\$60.92	\$83.54	8.2	\$63.34	\$80.35	6.1	\$70.99	\$83.70	4.2
Cost Effectiveness									
Operating Expense per Passenger	\$4.89	\$5.25	1.8	\$3.58	\$4.12	3.5	\$4.48	\$5.22	3.9
Operating Revenue per Passenger	\$0.94	\$0.84	-2.7	\$0.59	\$0.75	6.0	\$0.72	\$0.84	4.1
Net Cost per Passenger	\$3.95	\$4.41	2.8	\$2.99	\$3.37	3.0	\$3.76	\$4.38	3.9
Farebox Recovery Rate	19.2	16.0	-4.4	16.8	16.5	-0.4	16.4	15.8	-0.9

^a Based on ridership, service, and financial data obtained from the Federal Transit Administration National Transit Database and Waukesha Metro Transit for the years 2004 and 2008. Performance measures are for fixed-route bus operations only.

^b Averages reflect the mean of the individual performance measure values calculated for each transit system in the peer group.

^c Key performance indicators were developed based on information reported by six other urban bus systems in Wisconsin identified above.

^d Key performance indicators were developed based on information reported by seven other urban bus systems in the United States identified above.

^e This measure of ridership counts all passengers each time they board a transit vehicle. Passengers who transfer one or more times to different routes of a transit system are counted as two or more passengers in completing a single trip between a specific origin and destination.

Waukesha Metro Transit System

Alternative Service Changes

Alternative service changes were grouped into three plans:

- **Alternative 1 - Existing System**

Keep the existing 2012 transit system without any changes

- **Alternative 2 - Desirable Service**

Proposes modest expansion of the transit system to provide some service expansion while eliminating unproductive services

- **Alternative 3 - Fiscally Constrained Service**

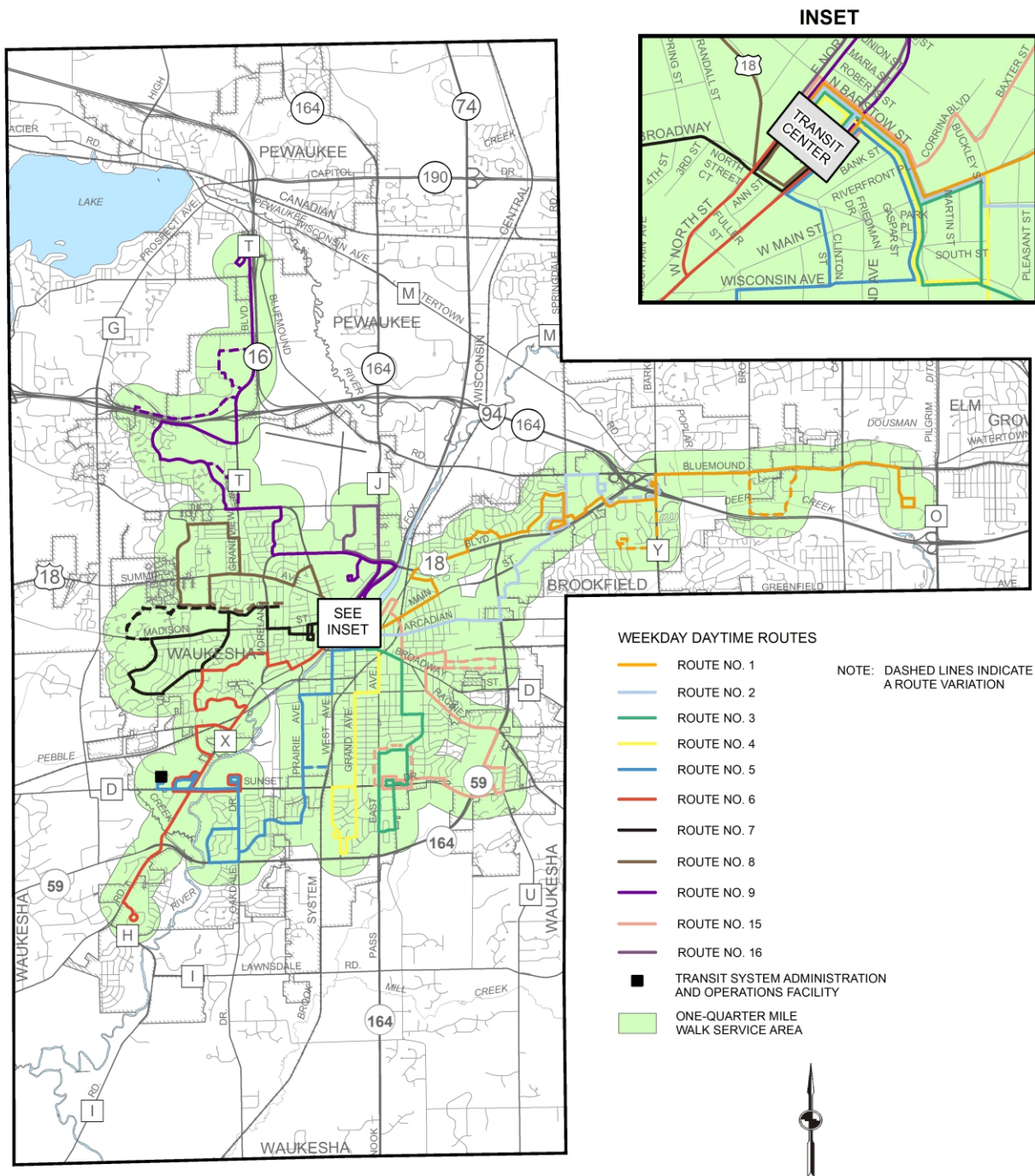
Reflects potential for reductions in Federal and State transit assistance and limited local funding over planning period

Public Funding Assumptions for the Alternatives

- Combined Federal/State transit funds expected to fund about 55.5 percent of total transit system operating expenses under the 2012 budget
- Operating expenses increase with inflation (2%/yr)
- Federal and State transit assistance funds remain flat over next five years
- Combined percentage would decrease to about 52.5 percent in 2013 and to about 50.5 percent in 2017

Waukesha Metro Transit System Alternative 1

- WisDOT management performance audit of existing transit system identified Waukesha Metro as “one of the best transit systems in the Midwest” in terms of policies and practices
- Alternative would keep the existing 2012 transit system without any changes
- 2010 population served estimated at about 65,100 persons



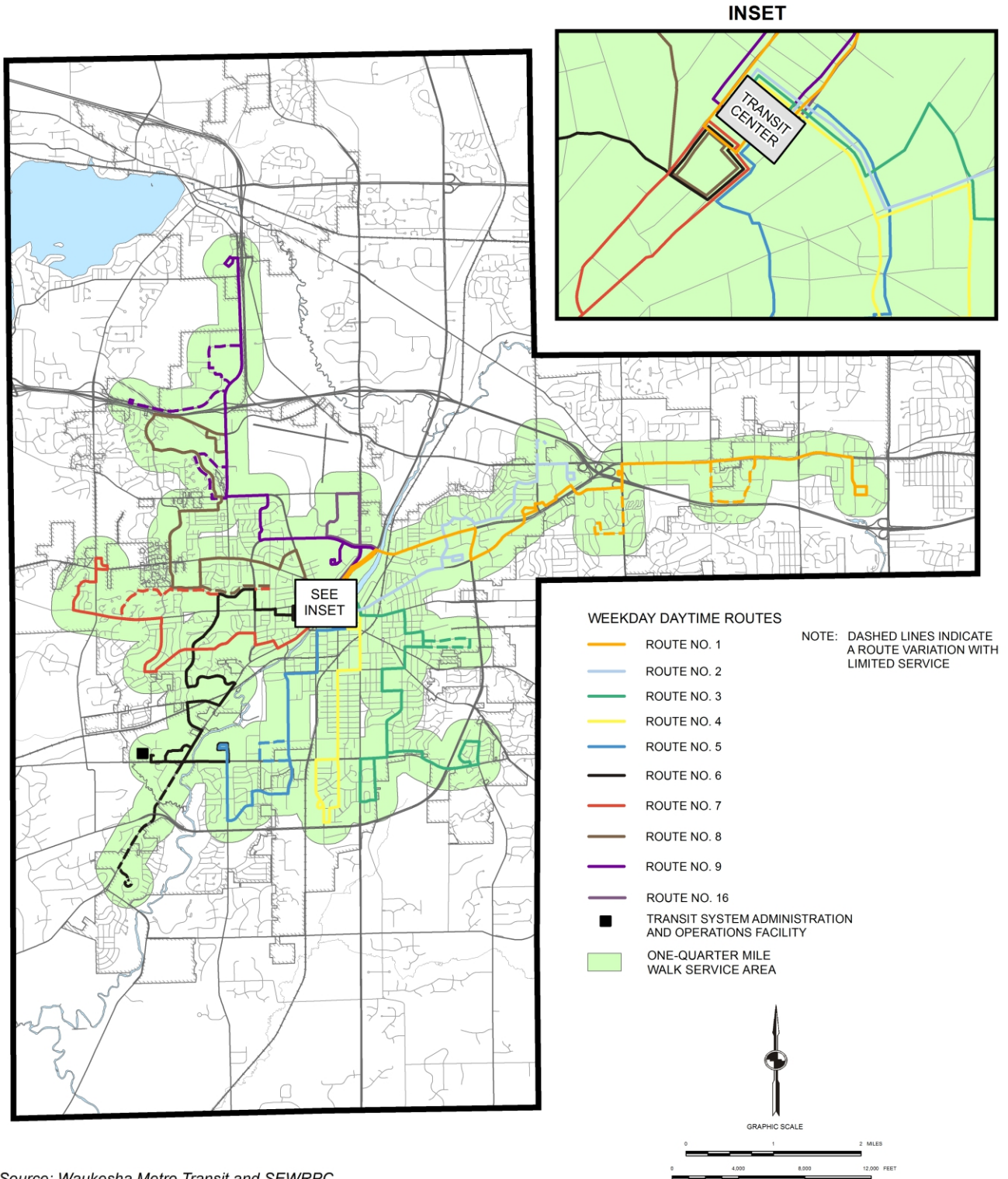
Waukesha Metro Transit System

Alternative 2 - Desirable Service

- Routing and service changes (see below) are intended to largely maintain existing system routes and service levels but would also provide for some expansion
- Savings from eliminating unproductive services would be used to fund new and improved services

Bus Route	Alignment Changes	Impact on Service
1	Restructure route between downtown terminal and the Westbrook Shopping Center	Changes would reduce travel times between downtown terminal and the Brookfield Square Shopping Center
2	Restructure route between East Ave. and Main St. and the Westbrook Shopping Center	Changes would allow route to serve proposed new Woodman's Market. Les Paul Pkwy. and Main St. Changes would replace service currently provided by Route No 1 over Greenway Ter., Stardust Dr., Avalon Dr. and Ruben Dr.
3	Restructure route between downtown terminal and Hartwell Avenue. and College Ave Extend route to Minooka Parkway Estates Subdivision over Larchmont Dr. and Sunset Dr.	Changes allow route to replace service currently provided by Route No 15 to east side industrial area and to the Minooka Park Estates Subdivision
4	No Changes	--
5	Eliminate route segments along Sunset Dr. serving the Fox Run Shopping Center and Badger Drive.	Segments identified as having low ridership in performance evaluation
6	Restructure route to follow Route No. 7 alignment between downtown terminal and Cambridge Ave. and Grandview Blvd Change route extension to Waukesha West High School to operate for only four round trips on schooldays	Change would facilitate providing two-way service over route segments serving the Merrill Crest subdivision
7	Restructure route to follow Route No. 6 alignment between downtown terminal and Cambridge Ave. and Grandview Blvd Extend route to the Heritage Hills subdivision and the Meadowbrook Marketplace Shopping Center	Change would serve new residential area and shopping center and facilitate providing two-way service over segments of Route Nos. 6 and 7 serving the Merrill Crest subdivision Change would eliminate service over Comanche Ln. and Crestwood Dr., and over Madison St. between University Dr. and Grandview Blvd.
8	Extend route to Silvernail Plaza and Grandview Plaza Shopping Centers	Change would eliminate unproductive route segments and would replace service to Pebble valley subdivision provided by Route No. 9
9	Eliminate route segments operated over Pebble Valley Rd., University Drive, and Silvernail Rd. (segments to be served by restructured Route No. 8 as noted above)	Change would provide for more direct routing to the Pewaukee campus of the Waukesha County Technical College
15	Eliminate route	Segments with significant ridership incorporated into restructured Route No. 3 (see above)
16	No Changes	--

Waukesha Metro Transit System Alternative 2 - Desirable Service



Source: Waukesha Metro Transit and SEWRPC

- The proposed changes would increase annual revenue bus miles and hours by about 7 percent from the 2012 budget
- 2010 population served estimated at about 65,100 persons

Waukesha Metro Transit System

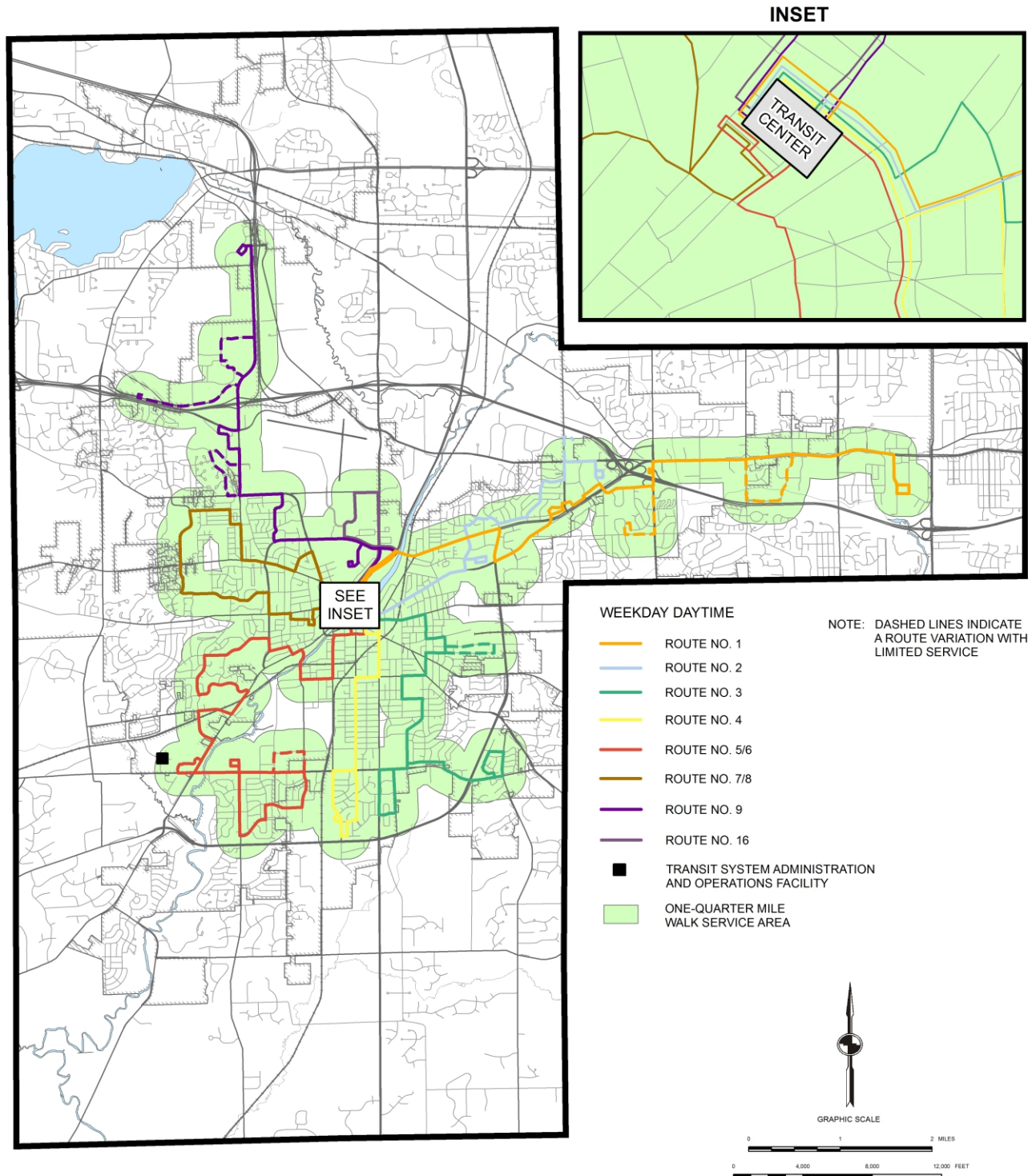
Alternative 3 - Fiscally Constrained Service

- Alternative envisions reductions in Federal and State transit assistance and possible limits on local funds
- A substantially reduced system of routes would need to be operated with service focused on the core areas of the City which have high residential and employment densities and good existing ridership
- Proposed routing and service changes shown below

Bus Route	Routing Changes	Service Changes
1	Restructure route between downtown terminal and the Westbrook Shopping Center	Changes would reduce travel times between downtown terminal and the Brookfield Square Shopping Center
2	Restructure route between East Ave. and Main St. and the Westbrook Shopping Center	Changes would allow route to serve proposed new Woodman's Market. Les Paul Pkwy. and Main St. Changes would replace service currently provided by Route No 1 over Greenway Ter., Stardust Dr., Avalon Dr. and Ruben Dr.
3	Restructure route between downtown terminal and Hartwell Avenue. and College Ave Extend route to Minooka Parkway Estates Subdivision over Larchmont Dr. and Sunset Dr.	Changes allow route to replace service currently provided by Route No 15 to east side industrial area and to the Minooka Park Estates Subdivision
4	No Changes	--
5	Combine with Route No. 6 and operate as Route No. 5/6	Change would reduce service on weekdays to levels currently provided on evenings and weekends Service to Waukesha West High School reduced and provided schooldays only
6	Combine with Route No. 5 (see above)	Change would reduce service on weekdays to levels currently provided on evenings and weekends Service to Waukesha West High School eliminated
7	Combine with Route No. 8 and operate as Route No. 7/8 does on Sundays.	Change would reduce service on weekdays and Saturdays to the levels currently provided on Sundays
8	Combine with Route No. 7 (see above)	Change would reduce service on weekdays and Saturdays to the levels currently provided on Sundays
9	Eliminate route segments operated over Pebble Valley Rd., University Drive, and Silvernail Rd. (segments to be served by restructured Route No. 8 as noted above)	Change would provide for more direct routing to the Pewaukee campus of the Waukesha County Technical College
15	Eliminate route.	Segments with significant ridership incorporated into restructured Route No. 3 (see above)
16	No Changes	--

Source SEWRPC.

Waukesha Metro Transit System Alternative 3 - Fiscally Constrained Service



Source: Waukesha Metro Transit and SEWRPC

- Proposed changes would reduce annual revenue bus miles and hours by between 16 and 20 percent from the 2012 budget
- Changes would reduce the 2010 service area population to about 55,900 persons, or by about 9,600 persons (15 percent)

Waukesha Metro Transit System

Capital Costs

Current Waukesha Metro Transit fleet includes:

- 23 35-foot long fixed-route buses
- 7 25- to 29-foot long paratransit vehicles

Capital Improvement Program (CIP) for transit system proposes replacing or rehabilitating 10 of the 23 large buses between 2012 and 2017 and retiring 3 others. No paratransit vehicles are scheduled for replacement or rehabilitation over period

Total five-year capital projects and their estimated costs(see table below)

- **Alternative 1 (Existing System)**
 Total costs \$6.41 million (\$1.28 million annually)
 Local share \$1.11 million (\$222,900 annually)
- **Alternative 2**
 One additional bus needed for system with proposed changes
 Total costs \$6.82 million (\$1.36 million annually)
 Local share \$1.18 million (\$236,800 annually)
- **Alternative 3**
 One less bus needed for system with proposed changes
 Total costs \$6.00 million (\$1.04 million annually)
 Local share \$1.04 million (\$208,900 annually)

Year	Equipment or Project Description	Unit Cost ^a	Alternative 1 - Existing 2012 System ^a		Alternative 2 - Desirable Service ^a		Alternative 3 - Fiscally Constrained Service ^a	
			Quantity	Total Cost ^b	Quantity	Total Cost ^b	Quantity	Total Cost ^b
2013	Replacement of 1998 Gillig Low-floor Buses ^a	\$ 410,000	6	\$ 2,460,000	7	\$ 2,870,000	5	\$ 2,050,000
	Replace Make-up Air Units	--	2	40,000	2	40,000	2	40,000
	Skidsteer	85,000	1	85,000	1	85,000	1	85,000
	Upgrade Furnishings at Metro Offices	--	--	40,000	--	40,000	--	40,000
	Replace ID Badge machine	8,500	1	8,500	1	8,500	1	8,500
	Replace Floor Scrubber	12,000	1	12,000	1	12,000	1	12,000
	Replace Transit Van	25,000	1	25,000	1	25,000	1	25,000
Subtotal	--	--	\$ 2,670,500	--	\$ 3,080,500	--	\$ 2,280,500	
2014	Rehab/Rebuild 2007 Bluebird Paratransit Buses	\$ 50,000	4	\$ 200,000	4	\$ 200,000	4	\$ 200,000
	Replace Maintenance Software	40,000	--	40,000	--	40,000	--	40,000
	Replace AC Reclaimer/Recycler	10,000	--	10,000	--	10,000	--	10,000
	Generator for Downtown Transit Center	40,000	--	40,000	--	40,000	--	40,000
	Outdoor Security Cameras at Downtown Transit Center	75,000	--	75,000	--	75,000	--	75,000
	Subtotal	--	--	\$ 365,000	--	\$ 365,000	--	\$ 365,000
2015	Rehab/Rebuild 2008 Gillig Buses	\$ 50,000	3	\$ 150,000	3	\$ 150,000	3	\$ 150,000
	Replace Back-up Generator	30,000	--	30,000	1	30,000	--	30,000
	Subtotal	--	--	\$ 180,000	--	\$ 180,000	--	\$ 180,000
2016	Replace 2004 Gillig Buses	\$448,000	7	\$ 3,136,000	7	\$ 3,136,000	7	\$ 3,136,000
2017	Replace AVL computer Equipment	--	--	\$ 60,000	--	\$ 60,000	--	\$ 60,000
Total Cost								
Federal Capital Assistance Funds.....				\$ 5,297,100		\$ 5,637,400		\$ 4,956,800
Local Share of Costs.....				1,114,400		1,184,100		1,044,700
Average Annual Costs over Planning Period								
Total Costs.....				\$ 1,282,300		\$ 1,364,300		\$ 1,200,300
Federal Share.....				1,059,400		1,127,500		991,400
Local Share.....				222,900		236,800		208,900

^aThe existing 2012 transit system has 13 1998 gillig buses in the bus fleet. Four of the 1998 buses are being replaced in 2012 with Federal funds applied for in 2011 and the remaining City share included in the approved City Budget. The other 3 Gillig buses will be retired.

^bUnder Alternative 2, one additional 1998 Gillig buses would need to be replaced and only two of the 1998 Gillig buses would be retired. The remainder of the capital projects would not change.

^cUnder Alternative 3, two fewer 1998 Gillig buses would need to be replaced and two more of the 1998 Gillig buses could be retired. The remainder of the capital projects would not change.

^dCosts are expressed in estimated year of expenditure dollars

^eAssumes 83 percent FTA funding for bus purchases to account for a 90 percent Federal share for ADA-related bus accessibility features and an 80 percent Federal share for the vehicle. An 80 percent Federal share was assumed for all other capital projects.

Waukesha Metro Transit System

Comparison of Alternatives

Comparative evaluation of alternatives conducted considering service, ridership, cost, and funding in the year 2017 (see table below)

Characteristic	2012 Budget	Forecast 2017 ^a								
		Alternative 1 - Existing 2012 Service			Alternative 2 - Desirable Service			Alternative 3 - Fiscally Constrained Service		
		Number	Difference from		Number	Difference from		Number	Difference from	
Alternative 1	Alternative 2		Status Quo	Alternative 2		Status Quo	Alternative 1			
Fixed-Route Bus Service										
Revenue Vehicle Hours	53,100	53,100	-3,600	8,600	56,700	3,600	12,200	44,500	-8,600	-12,200
Ridership										
Revenue Passengers	630,000	598,500	-58,200	31,700	656,700	58,200	89,900	566,800	-31,700	-89,900
Total Passengers ^b	775,000	733,200	-71,300	35,900	804,500	71,300	107,200	697,300	-35,900	-107,200
Total Passengers per Revenue Vehicle Hour	14.6	13.8	-0.4	-1.9	14.2	0.4	-1.5	15.7	1.9	1.5
Total System										
Total Passengers ^b	794,300	751,600	-72,800	37,400	824,400	72,800	110,200	714,200	-37,400	-110,200
Total Operating Expenses	\$ 5,136,800	\$ 5,636,000	\$ -387,000	\$ 715,000	\$ 6,023,000	\$ 387,000	\$ 1,102,000	\$ 4,921,000	\$ -715,000	\$ -1,102,000
Total Operating Revenues	\$ 915,000	\$ 988,300	\$ -85,200	\$ 62,600	\$ 1,073,500	\$ 85,200	\$ 147,800	\$ 925,700	\$ -62,600	\$ -147,800
Total Public Assistance	\$ 4,221,800	\$ 4,647,700	\$ -301,800	\$ 652,400	\$ 4,949,500	\$ 301,800	\$ 954,200	\$ 3,995,300	\$ -652,400	\$ -954,200
Cost Recovery Rate	17.8%	17.5%	-0.3%	-1.3%	17.8%	0.3%	-1.0%	18.8%	1.3%	1.0%
Required Public Assistance										
Total	\$ 4,221,800	\$ 4,647,700	\$ -301,800	\$ 2,162,600	\$ 4,949,500	\$ 301,800	\$ 2,464,400	\$ 2,485,100	\$ -2,162,600	\$ -2,464,400
City of Waukesha	\$ 1,270,800	\$ 1,689,800	\$ -106,400	\$ 291,300	\$ 1,796,200	\$ 106,400	\$ 397,700	\$ 1,398,500	\$ -291,300	\$ -397,700
Total Operating Expense per Total Passenger	\$ 6.47	\$ 7.50	\$ 0.19	\$ 0.61	\$ 7.31	\$ -0.19	\$ 0.42	\$ 6.89	\$ -0.61	\$ -0.42
Public Assistance per Total Passenger										
Total	\$ 5.32	\$ 6.18	\$ 0.18	\$ 0.59	\$ 6.00	\$ -0.18	\$ 0.41	\$ 5.59	\$ -0.59	\$ -0.41
City of Waukesha Share	\$ 1.60	\$ 2.25	\$ 0.07	\$ 0.29	\$ 2.18	\$ -0.07	\$ 0.22	\$ 1.96	\$ -0.29	\$ -0.22

^a The forecasts of ridership, service levels, and financial data for the transit system for the years 2013 through 2017 were prepared by Commission staff based on the following assumptions:

1. All proposed routing and service changes would be implemented and in effect by January 1, 2013
2. Systemwide average operating costs per total vehicle hour for the bus system would increase by about 5 percent in 2013 due to system contraction, then increase by 2 percent annually.
3. Increases in the total property tax levy for the bus and paratransit services provided by Waukesha Metro Transit would be limited to no more than one percent per year over the planning period.
4. The base adult cash fare for the bus system would increase in 2015 from \$2.00 to \$2.25 per trip (12.5%). Metrolift fares would increase in 2012 from \$3.75 to \$4.00 per trip (6.7%) and again in 2015 from \$4.00 to \$4.25 per trip (6.3%)
5. The annual allocation of Federal Section 5307/5340 funds to Waukesha County would remain at the 2011 level of about \$974,600 from 2012 through 2017, and that allocation would continue to be divided equally between the City of Waukesha and Waukesha County resulting in a total of about \$487,300 in Section 5307/5340 funds being available each year to the City. Of this amount, about \$463,400 would be used for capital needs associated with system operations and the remainder used for capital and planning projects.
6. The combined Federal Section 5307/5340 program capital assistance funds and State 85.20 program operating assistance funds used by the transit system are expected to fund about 55.5 percent of total transit system operating expenses under the 2012 budget. This percentage would be expected to decrease to about 52.5 percent in 2013 and then by 0.5 percent per year over the planning period to about 50.5 percent in 2017.

^b Total passengers represent counts of all passengers boarding transit vehicles including transfer and free passengers.

Source SEWRPC.

Advantages and disadvantages of each alternative are being considered by the Waukesha Transit Commission

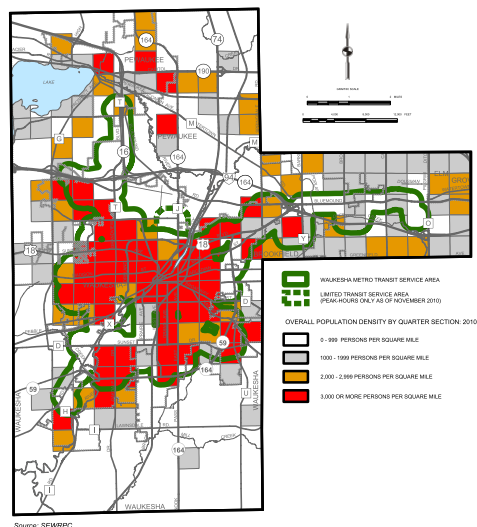
Waukesha Metro Transit System

Other Analyses Done for Plan

ANALYSIS OF DIAL-A-RIDE TRANSIT (DART) SERVICE

Commission staff examined feasibility of providing Dial-A-Ride (DART) service in the Waukesha Metro Transit service area by expanding Waukesha Metrolift service. Shared-ride taxi service is an example of DART

- Research indicates DART services generally serve small urban areas with densities of less than 2,000 persons/square mile
- 2010 Population densities within the central portions of the Metro service area exceed 3,000 persons/square mile (see map) making existing Metro service area inappropriate to be served by only a DART/taxi system.
- DART/taxi service could still be appropriate as a replacement for bus service in limited areas, or during periods, with low transit ridership
- DART/taxi total costs and costs per passenger will be lower than a bus system only if transit ridership is low
- Bus service can have a lower cost per passenger and lower total costs when transit ridership is high as buses have more passenger capacity than taxis and bus service is designed to carry multiple trips



Transit System	2010 Estimated		
	Total Passengers ^a	Total Operating Expenses	Total Operating Expense Per Passene ^{gr}
City of Waukesha Metro Transit	736,800	\$ 5,007,300	\$ 6.80
Shared-ride Taxi Systems in Region			
Hartford Taxi	20,600	\$ 226,600	\$ 11.00
Ozaukee County Taxi Service	74,600	\$ 1,348,000	\$ 18.07
Port Washington Transport Taxi	19,200	\$ 268,900	\$ 14.01
Washington County Taxi Service	84,000	\$ 1,913,200	\$ 22.78
West Bend Taxi	120,400	\$ 1,108,800	\$ 9.21
Whitewater Taxi System	29,700	\$ 198,500	\$ 6.68

^a Reflects the total number of passengers boarding the transit vehicles operated by each transit system during the year. For the fixed-route bus service provided by Waukesha Metro Transit, the figure includes passengers transferring between bus routes.

Source: SEWRPC.

- DART/Taxi systems tend to have higher costs per passenger than bus systems as they generally serve an individual ride. A DART/taxi system with high transit ridership will require more vehicles/drivers than a bus system which will increase the cost of operation
- Replacing bus service with DART/taxi service within the existing Waukesha Metro Transit service area may not result in lower costs or improve efficiency of transit system (see table)







- Analysis of replacing evening and Sunday bus service with DART service for all routes except Route Nos. 1 and 4 was conducted for 2012 transit system budget
- Concluded that the savings from reducing bus service would not offset higher costs for providing DART service due to need to operate more dial-a-ride vehicles than buses and need to use existing bus drivers per Federal labor protection agreement

Waukesha Metro Transit System

Other Analyses Done for Plan

ANALYSIS OF ALTERNATIVE VEHICLES FOR FIXED-ROUTE SERVICE

Commission staff examined alternative bus types, sizes, and fuel types for the Metro bus system (see table below)

Vehicle Category	Diesel		Diesel Electric Hybrid	Compressed Natural Gas (CNG)	Electric	
						
Typical Vehicle Size ¹	35 or 40 feet	25 to 27 feet	35 or 40 feet	35 or 40 feet	35 feet	22 feet
Number of Seats	30 to 40 seats	19 to 22 seats	30 to 40 seats	30 to 40 seats	30 to 40 seats	22 seats
Minimum Useful Life	12 years (heavy-duty)	7 years (medium-duty)	12 years (heavy-duty)	12 years (heavy-duty)	12 years (heavy-duty)	7 years (medium-duty)
Total Capital Cost ²	\$315,000 - \$400,000	\$150,000 - \$190,000	\$500,000 - \$600,000	\$400,000 - \$460,000	\$560,000 - \$1,200,000	\$300,000
Local Share of Capital Cost ³	\$63,000 - \$80,000	\$30,000 - \$38,000	\$100,000 - \$120,000	\$80,000 - \$92,000	\$112,000 - \$240,000	\$60,000
Fuel/Energy Efficiency ⁴	4.0 - 4.5 mpg	5.5 - 6.5 mpg	30% better than heavy-duty diesel	20% worse than heavy-duty diesel	1 - 2 kilowatt-hours/mile	0.7 - 1.4 kilowatt-hours/mile
Fuel Cost ⁵	\$4.00/diesel gallon	\$4.00/diesel gallon	\$4.00/diesel gallon	\$1.30/diesel-gallon equivalent (DGE)	\$0.10/kilowatt-hour	\$0.10/kilowatt-hour
Fuel/Energy Cost Per Mile	\$0.90 - \$1.00/mile	\$0.60 - \$0.70/mile	\$0.70 - \$0.80/mile	\$0.35 - \$0.40/mile	\$0.10 - \$0.20/mile	\$0.07 - \$0.14/mile
Maintenance Cost Per Mile ⁶	\$0.75/mile	\$0.85/mile	\$0.60 - \$1.20/mile	\$0.70 - \$1.30/mile	N/A	N/A
Infrastructure Cost/ Special Considerations	Environmental Protection Agency rules that took effect in 2007 require all heavy-duty diesel-engine vehicles to comply with strict standards that reduce emissions by 90 percent. Large buses tend to damage pavement slightly more than small buses. There is a negative public perception that excessive capacity exists on 35-foot buses used by Waukesha Metro Transit. Buses with as few as 20 seats may be adequate for some of the existing Waukesha Metro Transit routes.		Batteries typically must be replaced at least once during the 12-year life of a hybrid bus. This cost is included in the estimated maintenance cost per mile. Hybrid buses tend to have lower noise levels than diesel buses. Hybrid buses may also be available in sizes as small as 22 feet with 22 seats. Additional training for drivers and maintenance staff will likely be required for hybrid buses.	CNG fueling infrastructure may cost as much as \$2 million. ⁷ Federal rebates for CNG fuel may reduce the cost by \$0.57/DGE. CNG fuel price is generally more stable than diesel fuel price. Indoor air quality and cleanliness in garages tend to be better with CNG than with diesel. Additional training for drivers and maintenance staff will likely be required for CNG buses.	Electric buses have limited range (100-120 miles per charge for a 35-foot bus and 45 miles per charge for a 22-foot bus). ⁸ Waukesha Metro Transit bus typically travels between 150 and 250 miles on an average weekday. Electric buses require overnight or on-route charging. Overnight chargers range from about \$20,000 for a slow charger (serves 1 bus overnight) to about \$60,000 for a fast charger (serves 5-6 buses). On-route chargers allow electric buses to stay in service longer, but are more costly. Electric buses tend to have lower noise levels than diesel buses. Indoor air quality and cleanliness in garages tend to be better with electricity than with diesel. Additional training for drivers and maintenance staff will likely be required for electric buses.	
Availability of Vehicles	Very High Availability		High Availability	High Availability	Limited Availability	

¹ The 25- to 27-foot diesel buses could be similar to the medium-duty small buses currently used to provide Waukesha Metro Transit Metroflex paratransit service or could be similar to "cutaway" style vehicles typically used to provide paratransit (pictured). Waukesha Metro Transit acquired 3 new cutaway vehicles in 2011 for use in paratransit service. Ebus is the only current manufacturer of a 22-foot electric bus.

² Capital cost estimates for diesel, diesel electric hybrid, compressed natural gas (CNG) and 35-foot electric buses were based on actual bus purchases in the "2010 Public Transportation Vehicle Database" published by the American Public Transportation Association (APTA) in June 2010. The capital cost estimate for a 22-foot electric bus was provided by Ebus. For all bus types, much of the variation in bus purchase price can be attributed to equipment included in the bus build (e.g. fareboxes, passenger counters, message signs, and radios), with the size of the bus generally having a minimal effect on bus purchase price.

³ Per Federal Transit Administration (FTA) Circular 9030.1D, 83 percent Federal funding is assumed for the capital cost of each bus, with the remaining 17 percent local funding share required to be provided by the City of Waukesha.

⁴ The fuel efficiency of the 35- and 40-foot heavy-duty diesel bus was calculated from vehicle mileage and fuel usage data for 2008 and 2009 prepared by Waukesha Metro Transit staff. The 25- to 27-foot medium-duty diesel bus fuel efficiency was estimated from interviews with staff of King County Metro Transit Authority in Seattle, Washington, and from "Transit Cooperative Research Program Synthesis 41: The Use of Small Buses in Transit Service" published by the Transportation Research Board in 2002. The diesel electric hybrid bus fuel efficiency was estimated in "Transit Bus Life Cycle Cost and Year 2007 Emissions Estimation" published by the FTA in July 2007. CNG bus fuel efficiency was estimated in "Compressed Natural Gas (CNG) Transit Bus Experience Survey: April 2009 - April 2010" published by the FTA in September 2010. For the electric buses, two electric bus manufacturers provided energy efficiency estimates: DesignLine USA for the 35-foot bus and Ebus for the 22-foot bus.

⁵ Diesel fuel cost estimates were derived from the State Urban Mass Transit Operating Assistance application for 2012 prepared by Waukesha Metro Transit. CNG fuel costs were estimated in "Compressed Natural Gas (CNG) Transit Bus Experience Survey: April 2009 - April 2010" published in September 2010. Electricity costs were estimated based on actual electricity rates charged to Waukesha Metro Transit by We Energies in August 2010.

⁶ Maintenance costs include parts (including engine rebuilds and battery replacement) and labor. Maintenance cost estimates were based on information provided by Waukesha Metro Transit staff and "Transit Bus Life Cycle Cost and Year 2007 Emissions Estimation" published by the FTA in July 2007. Limited maintenance cost data is available for electric buses—likely due to the limited availability of electric buses—although DesignLine USA asserts that maintenance costs could be up to 25% lower for electric buses than for heavy-duty diesel buses.

⁷ Waukesha Metro Transit's existing bus garage would have to be retrofitted to install CNG fueling infrastructure, such as pressurized tanks and ventilation for natural gas dispersion. A cost estimate of about \$2 million for this infrastructure was provided by Waukesha Metro Transit based on a study conducted by the University of Wisconsin Milwaukee in the 1990's.

Source: SEWRPC.

Major conclusions of analysis

- **Vehicle Size:** Smaller diesel buses (19 to 22 seats) may have enough seating capacity for peak times on some, but not all, of the existing Waukesha Metro Transit routes and could be used instead of larger buses. However, smaller diesel buses would create issues with operating a mixed vehicle fleet (spare parts inventories, vehicle assignment, spare vehicles, driver training)
- **Air pollutant emissions:** Use of smaller diesel buses would not significantly reduce air pollutants emitted from buses. Transit system will only consider "clean" diesel buses like it currently operates for replacement vehicles
- **Vehicle Fuel Type:** Alternative fuel buses (hybrid, CNG, electric) are not yet widely used and have several issues that would need to be considered before committing to them as they could increase system costs
- **Capital Costs for Small Vehicles:** No cost advantage for buying smaller vehicles. Cost of small buses about one-half that of a large one but small buses have shorter lifespan (7 years versus 12-15 years). Savings in capital costs for small buses offset by their shorter lifespan. Maintenance costs for small buses would also be higher than for a large bus
- Continuing to provide fixed-route bus service with 35-foot diesel buses for the immediate future appears to be best option. Continued use of diesel buses should be evaluated in future relative to the costs of diesel fuel and experience of other transit systems with hybrid buses