

Waukesha Metro Transit Operations Analysis and Service Change Plan: 2013-2017



**Alternative Transit Service Changes** 



#### Introduction to Presentation

- Review of Significant Findings of Transit System Performance Evaluation
- Feasibility of Changing to Demand-Responsive Dial-A-Ride System
- Service Improvement Alternatives
- Comparison of Alternatives
- Next Steps



#### Major Findings of Transit System Performance Evaluation

#### **Areas with Excellent Performance**

- Existing transit system serves the vast majority (89%) of both the population and jobs in the City of Waukesha
- Limited service provided outside the City, largely to some densely populated residential areas and employment concentrations in the City and Town of Brookfield
- 2006 State management performance audit found that system is about average when compared to similar "peer" transit systems from around the country and in Wisconsin for ridership and financial performance

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### Findings of Transit System Evaluation (continued)

- Six routes (Nos. 1, 3, 4, 5, 8, and 9) have performance measures that generally exceed the acceptable performance levels and could continue to be operated without change
- The remaining routes (Nos. 2, 6, 7, and 15) have some performance measures that do not meet targets and merit study of possible changes
- The highest passenger activity occurs on route segments that serve the Downtown Transit Center, major commercial areas, or multi-family housing complexes.
- Overcrowding is not a problem on buses; buses with as few as 20 seats could be operated on some routes



### Feasibility of Changing to Demand-Responsive Dial-A-Ride System

- Commission staff reviewed the feasibility of providing Dial-A-Ride (DART) service in the Waukesha Metro Transit service area
  - DART service typically provided as public transit using automobiles and accessible vans or small buses to transport passengers between their specific origins and destinations
  - DART vehicles do not operate over fixed routes or on fixed schedules except to satisfy special demand
  - Shared-ride taxi service is an example of DART service that is widely used in Wisconsin



### Feasibility of Demand-Responsive Dial-A-Ride System (continued)

- Research indicates that the population density within the existing Metro service area is too high for DART service
  - 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 generally exceed 3,000 persons/square mile (see Map 1)
  - DART service could still be appropriate as a replacement for bus service in areas, or during periods, with low transit ridership

Map 1

#### 164 CIER PF FF 190 LAKE ANST . MILES AU 2,000 FEET UKEE EVV/ DOUSMAN BLUEMOUND KFIELD/ WAUKESHA METRO TRANSIT SERVICE AREA LIMITED TRANSIT SERVICE AREA (PEAK-HOURS ONLY AS OF NOVEMBER 2010) Л OVERALL POPULATION DENSITY BY QUARTER SECTION: 2010 0 - 999 PERSONS PER SQUARE MILE 1000 - 1999 PERSONS PER SQUARE MILE WAUKESHA 2,000 - 2,999 PERSONS PER SQUARE MILE 3,000 OR MORE PERSONS PER SQUARE MILE /AUKESH/ RD MILL CREEK 164 Ś WAUKESHA

#### 2010 POPULATION DENSITY WITHIN THE EXISTING WAUKESHA METRO TRANSIT SYSTEM SERVICE AREA

#### Source: SEWRPC

SD/ama/rlm 05/23/12 I:\Tran\WORK\Waukesha Transit\WaukTDP09\Maps\Chap 5\Map 5-1 PopDen in the WMT Transit Service Area 2000.mxd



### Feasibility of Demand-Responsive Dial-A-Ride System (continued)

- DART/taxi total costs and costs per passenger will be lower than a bus system only if transit ridership is low
  - Bus service has a higher cost per vehicle mile than taxi service due, in part, to higher operator wages and higher bus capital/maintenance costs
  - Bus service can have a lower cost per passenger and lower total costs when transit ridership is high
    - Buses have more passenger capacity than taxis and service is designed to carry multiple trips
    - 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 increasing costs of operation



### Feasibility of Demand-Responsive Dial-A-Ride System (continued)

- 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 1)
- 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
  - Assumed no change in Federal transit funding level; a 10 percent reduction in State transit operating assistance; and taxi fares higher than bus fares
  - Concluded that the savings from reducing bus service would not offset higher costs for providing DART service due to need to operate more dial-aride vehicles than buses and need to use existing drivers per Federal labor protection agreement

#### Table 1

#### COMARISON OF OPERATING COSTS PER PASSENGER FOR THE WAUKESHA METRO TRANSITSYSTEM AND SHARED-RIDE TAXI SYSTEMS IN THE REGION: 2010 ESTIMATED

	2010 Estimated								
					Total				
			Total		Operating		Public		
	Total		Operating	E	Expense Per		Operating		
Transit System	Passengers <sup>a</sup>		Expenses		Passenegr		Revenues		
City of Waukesha Metro Transit	736,800	\$	5,007,300	\$	6.80	\$	822,600		
Shared-ride Taxi Systems in Region									
Hartford Taxi	20,600	\$	226,600	\$	11.00	\$	67,500		
Ozaukee County Taxi Service	74,600	\$	1,348,000	\$	18.07	\$	158,200		
Port Washington Transport Taxi	19,200	\$	268,900	\$	14.01	\$	48,000		
Washington County Taxi Service	84,000	\$	1,913,200	\$	22.78	\$	309,700		
West Bend Taxi	120,400	\$	1,108,800	\$	9.21	\$	350,000		
Whitewater Taxi System	29,700	\$	198,500	\$	6.68	\$	57,300		

<sup>a</sup> 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 transfering between bus routes.

Source: SEWRPC.

### Alternatives Considered

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- Three alternative service plans developed
  - Alternative 1 Status Quo Alternative
    - Keep existing 2012 transit system
  - 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 limited local funding over planning period
- Table 2 presents the proposed service changes identified under Alternatives 2 and 3
- Performance in 2017 of all alternatives is compared in Table 3

#### AAB/ab 06/04/12 Doc #204462v1

#### Table 2

#### SUMMARY OF PROPOSED ROUTING AND SERVICE CHANGES UNDER ALTERNATIVES 1 AND 2

	Altern	ative 1	Alternative 2					
Bus Route	Alignment Changes	Impact on Service	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	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 t he Westbrook Shopping Center	<ul> <li>Changes would allow route to serve proposed new Woodman's Market. Les Paul Pkwy. and Main St.</li> <li>Changes would replace service currently provided by Route No 1 over Greenway Ter,, Stardust Dr., Avalon Dr. and Ruben Dr.</li> </ul>	Restructure route between East Ave. and Main St. and t he Westbrook Shopping Center	<ul> <li>Changes would allow route to serve proposed new Woodman's Market. Les Paul Pkwy. and Main St.</li> <li>Changes would replace service currently provided by Route No 1 over Greenway Ter,, Stardust Dr., Avalon Dr. and Ruben Dr.</li> </ul>				
3	<ul> <li>Restructure route between downtown terminal and Hart well Avenue. and College Ave</li> <li>Extend route to Minooka Parkw ay Estates Subdivision over Larc hmont Dr. and Sunset Dr.</li> </ul>	Changes allow route to replace service currently provided by Route No 15 to east side industrial area and to the Minooka Park Estates Subdivision	<ul> <li>Restructure route between downtown terminal and Hart well Avenue. and College Ave</li> <li>Extend route to Minooka Parkw ay Estates Subdivision over Larc hmont Dr. and Sunset Dr.</li> </ul>	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	<ul> <li>No Changes</li> </ul>		<ul> <li>No Changes</li> </ul>					
5	Eliminate route segments along Sunset Dr. serving the Fox Run Shopping Center and Badger Drive.	<ul> <li>Segments identified as having low ridership in performance evaluation</li> </ul>	Combine with Route No. 6 and operate as Route No. 5/6	<ul> <li>Change would reduce service on weekdays to lev els currently provided on evenings and weekends</li> <li>Service to Waukesha West High School reduced and pr ovided schooldays only</li> </ul>				
6	<ul> <li>Restructure route to follow Route No. 7 alignment between downtown terminal and Cambridge Ave. and Gra ndview Blvd</li> <li>Change route extension to Wau kesha West High School to operat e for only four round trips on schooldays</li> </ul>	Change would facilitate providing two- way service over route seg ments serving the Merrill Crest subdivision	Combine with Route No. 5 (see above)	<ul> <li>Change would reduce service on weekdays to lev els currently provided on evenings and weekends</li> <li>Service to Waukesha West High School eliminated</li> </ul>				
7	<ul> <li>Restructure route to follow Route No. 6 alignment between downtown terminal and Cambridge Ave. and Gra ndview Blvd</li> <li>Extend route to the Heritage Hills subdivision and the Meado wbrook Marketplace Shopping Center</li> </ul>	<ul> <li>Change would serve new residential area and shopping center and facilitate providing two-way service over segments of R oute Nos. 6 and 7 serving the Merrill Crest subdivision</li> <li>Change would eliminate service over Comanche Ln. and Crestwood Dr., and over Madison S t. between University Dr. and Grandview Blvd.</li> </ul>	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	Extend route to Silvernail Plaza and Grandview Plaza Shopping Centers	Change would eliminate unprod uctive route segments and w ould replace service to Peb ble valley subdivision provided by Route No. 9	Combine with Route No. 7 (see above)	Change would reduce service on weekdays and Saturdays to the levels currently provided on Sundays				

#### Table 2 (continued)

	Altern	ative 1	Alternative 2					
Bus Route	Alignment Changes	Impact on Service	Routing Changes	Service Changes				
9	• Eliminate route segments operated over Pebble V alley Rd., University Drive, and Silvernail Rd. (segme nts 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	• Eliminate route segments operated over Pebble V alley Rd., University Drive, and Silvernail Rd. (segme nts 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)	Eliminate route.	Segments with significant ridership incorporated into restructured Route No. 3 (see above)				
16	No Changes		No Changes					

Source SEWRPC.

AAB/ab 08/21/12 Doc# 204578v4

Table 3

				Forecast 2017 <sup>a</sup>																
			Alternative 1 - Existing 2012 Service				Alternative 2 - Desirable Service					Alternative 3 - Fiscally Constrained Service				d Service				
		2012				Differen	ice fi	rom				Difference from					Difference		ce from	
Characteristic		Budget		Number	A	Iternative 1	Α	Iternative 2		Number		Status Quo	Α	Iternative 2		Number	9	Status Quo	A	Iternative 1
Fixed-Route Bus Service																				
R evenue 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 <sup>b</sup>		775,000		733,200		-71,300		35,900		804,500		71,300		107,200		697,300		-35,900		-107,200
Total Passengers per																				
Revenue venicie 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 <sup>⁰</sup>		794,300		751,600		-72,800		37,400		824,400		72,800		110,200		714,200		-37,400		-110,200
Total Operating Expensesa	\$	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 Assistancea	\$	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
	Ť	0.47	Ť	,	Ŷ	0.10	Ŷ	0.01	Ψ	7.01	ľ	0.10	Ŷ	0.12	Ψ	0.00	Ψ	0.01	Ű	0.12
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

#### COMPARISON OF KEY CHARACTERISTICS FOR WAUKESHA METRO TRANSIT UNDER THE ALTERNATIVE SERVICE PLANS

<sup>a</sup> 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, trhen 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 limitted 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 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.

<sup>b</sup> Total passengers represent counts of all passengers boarding transit vehicles including transfer and free passengers.

Source SEWRPC.



SEWRPC

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



#### Alternative 1 – Status Quo Alternative

- WisDOT 2011 management performance audit of existing transit system
  - "one of the best transit systems in the Midwest"
- Maintain existing 2012 transit system over period without any changes
- 2010 population served estimated at about 65,100 persons
- Existing 2012 transit system shown on Map 2

#### EXISTING WAUKESHA METRO TRANSIT WEEKDAY DAYTIME ROUTES: 2012

Map 2



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### Alternative 2 – Desirable Service

- Alternative 2 routing and service changes intended to largely maintain existing system routes and service levels and provide for some expansion
- Elimination of some unproductive services with savings used to fund new and improved services
- The proposed changes would increase annual revenue bus miles and hours by about 7 percent from the 2012 budget
- Alternative 2 transit system is shown on Map 3

#### Map 3

#### WAUKESHA METRO TRANSIT WEEKDAY DAYTIME ROUTES UNDER ALTERNATIVE 2

![](_page_18_Figure_2.jpeg)

### Alternative 2 (continued)

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- The major routing changes would include:
  - Modifying Route No. 1 to provide for faster travel into and out of downtown Waukesha
  - Modifying Route No. 2 to serve the proposed new Woodman's Market and the Majestic Theater in the Town of Brookfield on weekends
  - Restructure Route No. 3 to incorporate segments serving east side industrial area and Minooka Park Estates subdivision presently served by Route No.15; Route No. 15 would be eliminated
  - Swap alignments of Route Nos. 6 and 7 on the west side of the City to enable Route No. 7 to be extended to serve the Meadowbrook Marketplace Shopping Center and new residential development

### Alternative 2 (continued)

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- Reduce service over Route No. 6 to Waukesha West High School to four round trips on schooldays
- Extend Route No. 8 north over Pebble Valley Road, University Drive, and Silvernail Road to serve the Silvernail Plaza and Grandview Plaza Shopping Centers
- Eliminating segments on Route No. 9 operated over Pebble Valley Road, University Drive, and Silvernail Road to provide more direct service to the Pewaukee campus of the Waukesha County Technical College
- No changes are proposed for Route Nos. 4 and 16 which would continue to operate as at present
- The routing changes would reduce the 2010 service area population by about 400 persons to about 65,100 persons

![](_page_21_Picture_0.jpeg)

#### Alternative 3 – Fiscally Constrained Service

- Alternative 3 envisions possible limits on local funds
  - Commission staff attempted to maintain the level of local funds provided under the transit system's 2012 operating budget
  - Substantially reduced system of routes would be operated with service focused on the core areas of the City which have high residential and employment densities and good existing ridership
  - Service to outlying, lower-density areas would be significantly reduced or eliminated

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### Alternative 3 – Fiscally Constrained Service (continued)

- The major routing changes would include:
  - Modifying the alignments for Route Nos. 1, 2, 3, and 9 as proposed under Alternative 2
  - Combining Route Nos. 5 and 6 to operate as a large loop as currently operated on weekday evenings and weekends
  - Combining Route Nos. 7 and 8 to operate as a large loop as currently operated on Sundays
  - Eliminating Route No. 15
  - Reducing service to Waukesha high and middle schools including service to Waukesha West High School and other special school day trips
- Alternative 3 transit system shown on Map 4

Map 4

#### WAUKESHA METRO TRANSIT WEEKDAY DAYTIME ROUTES UNDER ALTERNATIVE 3

![](_page_23_Figure_2.jpeg)

Source: Waukesha Metro Transit and SEWRPC

I:\Tran\WORK\Waukesha Transit\WaukTDP09\Maps\Ch.5\Map 5-3 Alt 2Rev Wkday Fixed-Route Letter.mxd

![](_page_24_Picture_0.jpeg)

### Alternative 3 – Fiscally Constrained Alternative (continued)

- 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)

![](_page_25_Picture_0.jpeg)

#### **Capital Needs**

- The current Waukesha Metro Transit fleet includes:
  - 23 35-foot long fixed-route buses seven
  - 7 25- to 29-foot long paratransit vehicles
- The capital improvement program (CIP) for the 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
- Other equipment also needed for operations and maintenance

### Capital Needs (continued)

- The total five-year capital projects and their estimated costs are shown in Table 4
  - Alternative 1 (Existing System):
    - Total costs \$6.41 million (\$1.28 million annually)
    - Local share \$1.11 million (\$222,900 annually)
  - Alternative 2:

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- Total costs \$6.82 million (\$1.36 million annually)
- Local share \$1.18 million (\$236,800 annually)
- Alternative 3:
  - Total costs \$6.00 million (\$1.04 million annually)
  - Local share \$1.04 million (\$208,900 annually)

AAB/ab 8/21/2012 Doc #204506v2

#### Table 4

				Alter	nativ	re 1 -	Alternative 2 -			Alternative 3 -			
				Existing 2	2012	System <sup>a</sup>	Desireal	ervice <sup>b</sup>	Fiscally Cons	ed Service <sup>c</sup>			
Year	Equipment or Project Description	Unit	t Cost <sup>a</sup>	Quantity	-	Total Cost <sup>d</sup>	Quantity	Т	otal Cost <sup>d</sup>	Quantity	Т	otal Cost <sup>d</sup>	
2013	Replacement of 1998 Gillig Low-floor Buses <sup>a</sup>	\$	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		\$	2,260,500	
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	\$4	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					\$	6,411,500		\$	6,821,500		\$	6,001,500	
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 <sup>e</sup>					1,059,400			1,127,500			991,400	
Local Share						222,900			236,800			208,900	

#### PROPOSED CAPITAL EQUIPMENT EXPENDITURES FOR WAUKESHA METRO TRANSIT: 2013-2017

<sup>a</sup> The 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.

<sup>b</sup> Under 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..

<sup>c</sup> Under 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..

<sup>d</sup> Costs are expressed in estimated year of expenditure dollars

<sup>e</sup> Assumes 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.

Source: Waukesha Metro Transit and SEWRPC.

![](_page_28_Picture_0.jpeg)

### Capital Needs – Vehicle Type Analysis

- Alternative bus types, sizes, and fuel types analyzed by Commission staff
- Bus types and significant findings in Table 5
  - 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
    - Use of smaller diesel buses would have issues associated with operating a mixed vehicle fleet (spare parts inventories, vehicle assignment, spare vehicles, driver training)

Table 5

#### COMPARISON OF ALTERNATIVE BUS TYPES AND SIZES FOR CITY OF WAUKESHA METRO TRANSIT

	Di	esel	Diesel-Electric Hybrid	Compressed Natural Gas (CNG)	Elec	ctric		
Vehicle Category								
Typical Vehicle Size <sup>1</sup>	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 <sup>2</sup>	\$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 <sup>3</sup>	\$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 <sup>4</sup>	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 <sup>5</sup>	\$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 <sup>6</sup>	\$0.75/mile	\$0.85/mile	\$0.60 – \$1.20/mile	\$0.70 – \$1.30/mile	N/A	N/A		
Infrastructure Cost/ Special Considerations	<ul> <li>Environmental Protection Agen require all heavy-duty diesel-er strict standards that reduce em</li> <li>Large buses tend to damage pay buses.</li> <li>There is a negative public perce exists on 35-foot buses used by</li> <li>Buses with as few as 20 seats m existing Waukesha Metro Trans</li> </ul>	acy rules that took effect in 2007 ngine vehicles to comply with issions by 90 percent. vement slightly more than small eption that excessive capacity Waukesha Metro Transit. nay be adequate for some of the sit routes.	<ul> <li>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.</li> <li>Hybrid buses tend to have lower noise levels than diesel buses.</li> <li>Hybrid buses may also be available in sizes as small as 22 feet with 22 seats.</li> <li>Additional training for drivers and maintenance staff will likely be required for hybrid buses.</li> </ul>	<ul> <li>CNG fueling infrastructure may cost as much as \$2 million<sup>7</sup>.</li> <li>Federal rebates for CNG fuel may reduce the cost by \$0.57/DGE.</li> <li>CNG fuel price is generally more stable than diesel fuel price.</li> <li>Indoor air quality and cleanliness in garages tend to be better with CNG than with diesel.</li> <li>Additional training for drivers and maintenance staff will likely be required for CNG buses.</li> </ul>	<ul> <li>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). A Waukesha Metro Transit bus typically travels between 150 and 250 miles on an average weekday.</li> <li>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.</li> <li>Electric buses tend to have lower noise levels than diesel buses.</li> <li>Indoor air quality and cleanliness in garages tend to be better with electricity than with diesel.</li> <li>Additional training for drivers and maintenance staff will likely be required for electric buses</li> </ul>			
Availability of Vehicles	Very High	Availability	High Availability	High Availability	Limited A	vailability		

<sup>&</sup>lt;sup>1</sup> The 25- to 27-foot diesel buses could be similar to the medium-duty small buses currently used to provide paratransit (pictured). Waukesha Metro Transit acquired 3 new cutaway vehicles in paratransit service. Ebus is the only current manufacturer of a 22-foot electric bus.

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<sup>&</sup>lt;sup>2</sup> 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 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. <sup>3</sup> 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.

<sup>&</sup>lt;sup>4</sup> 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. <sup>5</sup> Diesel fuel cost estimates were derived from the State Urban Mass Transit Operating Assistance application for 2012 prepared by Waukesha Metro Transit. ENG 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.

<sup>&</sup>lt;sup>6</sup> 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.

<sup>&</sup>lt;sup>7</sup> Waukesha Metro Transit's existing bus garage would have to be retrofitted to install CNG fueling infrastructure, such as pressurized tanks and ventilation for this infrastructure, such as provided by Waukesha Metro Transit based on a study conducted by the University of Wisconsin-Milwaukee in the 1990's.

![](_page_30_Picture_0.jpeg)

- Air pollutant emissions for small vehicles
  - No advantage to using small versus large diesel buses regarding
  - EPA rules require significantly reduced emissions from all new diesel buses; no longer emit large volumes of pollutants
  - Small diesel buses do not emit significantly less air pollutants; emissions largely related to the engine/drivetrain and fuel type used
  - Transit system currently operates such "clean" diesel buses; will only consider them for replacement vehicles

![](_page_31_Picture_0.jpeg)

- Capital Costs for small vehicles
  - No cost advantage to using small buses
  - Cost of a small buses about one-half that of a large one but small buses have shorter lifespan
  - Savings in capital costs for small buses offset by the shorter lifespan for small buses
    - Few bus manufacturers produce small buses with the 12-year, 500,000 mile useful life of larger heavy-duty buses
    - Every 7 years versus every 12-15 years; means small buses replaced more often
  - Maintenance costs for small buss would also be higher than for a large bus

![](_page_32_Picture_0.jpeg)

- Vehicle fuel type
  - Alternative fuel buses (hybrid, CNG, electric) not yet widely used
  - Issues should be considered before committing to such vehicles:
    - Fuel cost savings tend to be offset by the required higher capital investment
    - Use of CNG vehicles will require a new fueling system and infrastructure at the City bus garage (estimated cost: \$2 million)
    - Maintenance costs for hybrid and CNG buses vary widely and substantial savings generally would not be expected; additional training for maintenance staff would be needed; insufficient data available to make conclusions on electric vehicle maintenance costs

![](_page_33_Picture_0.jpeg)

- Issues to be considered (continued)
  - Hybrid and electric buses provide for quieter operation but require battery replacement which adds to operating costs
  - Electric buses have limited operating range under a single charge; likely to require overnight and/or on-route charging
  - Use of CNG and electric buses tend to result in cleaner garages with better indoor air quality

![](_page_34_Picture_0.jpeg)

- Conclusions for Vehicle Analysis
  - Continuing to provide fixed-route bus service with 35-foot diesel buses in the immediate future appears to be the 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
  - Waukesha should monitor Wisconsin transit operators using hybrid buses
    - Madison Metro Transit
    - Oshkosh Transit System

### Comparison of Alternatives

SEWRPC

- Comparative evaluation of alternatives conducted considering service, ridership, cost, and funding in the year 2017 (see Table 3)
  - Alternative 1 (existing 2012 system)
    - Existing transit system would have productivity and cost measures close to those for Alternative 2 with desirable service expansion
    - Existing system would require much higher total and local public funding requirements than Alternative 3 fiscally constrained system

![](_page_36_Picture_0.jpeg)

## *Comparison of Alternatives (continued)*

#### • Alternative 2 (desirable service)

- Would provide for both an expansion of transit service and the elimination of unproductive portions of existing system operations
- Costs of route extensions and restructuring paid for largely by savings achieved through elimination of unproductive services
- Proposed service expansion would still require a 41 percent increase in the City's public funding for the transit system by 2017

![](_page_37_Picture_0.jpeg)

## *Comparison of Alternatives (continued)*

- Alternative 3 (fiscally constrained service)
  - Would eliminate poorly performing routes and services in the outlying portions of the City; limit service to portions of City with densest development and highest transit-dependent person concentrations
  - Would improve productivity and the cost recovery rates over Alternative 2; total and City public funds in 2017 would be significantly below that for both Alternative 2 and existing system.
  - However, would greatly reduce service (about 16 percent below the existing system and about 22 percent below Alternative 2) and have much lower ridership than with the existing system or under Alternative 2

![](_page_38_Picture_0.jpeg)

#### Next Steps

- Waukesha Transit Commission reviews alternatives
- Commission staff revise alternatives as necessary
- Public informational meeting held to obtain comment on study findings to date
- Public comments reviewed by Waukesha Transit Commission with potential changes identified by comments
- Recommended plan selected and final chapters prepared and reviewed