Washington State
Department of Transportation

Measures, Markers and Mileposts

Gray Notebook Special Excerpt

Transportation Benchmarks 2006 Report

Transportation Benchmarks Annual Update

Overview of The Transportation Benchmarks

On August 20, 2003, the Washington State Transportation Commission adopted a set of benchmarks to measure the performance of the state's transportation system. Benchmark development was guided by the requirements of the Revised Code of Washington (RCW) 47.01.012, which established policy goals in the areas of safety, pavement condition, bridge condition, traffic congestion and driver delay, per capita vehicle miles traveled, non-auto share of commute trips, administrative efficiency, and transit cost efficiency. These policy goals are the basis for the performance benchmarks discussed here.

This update includes the latest results for the transportation benchmarks first introduced two years ago. For more background and information about the development of each benchmark, including issues related to data quality and availability, measure effectiveness, and benchmark intent, see the Transportation Benchmarks Implementation Report (August 2003), which is available on-line at www.wsdot.wa.gov/accountability/benchmarks/.

Some of the policy goals establish a general standard or target to assess achievement, such as "improving safety" or "none in poor condition." Others are closer to the traditional definition of benchmarking: measuring Washington's performance or comparing Washington to other states to gain information that will help WSDOT improve its performance.

Safety Goal

The benchmark law established a goal to improve safety. While many criteria and measures are used to track safety on the state transportation system, the Transportation Commission and WSDOT use the state motor vehicle fatality rate to determine progress.

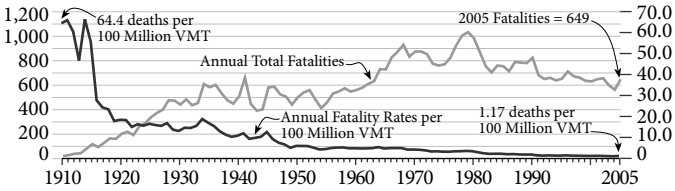
Based on the national Fatality Analysis Reporting System (FARS) numbers, the 2005 Washington State fatality rate was 1.17 deaths per 100 million vehicle miles traveled (VMT) on all Washington roadways, while the total fatality count shows 649 people killed in motor vehicle collisions. In addition, six other people died on the highways in non-motor-vehicle-related accidents. For more information, see the gray box to the right.

In 2004 (the most recent year for which state-by-state data is available), Washington ranked as the 6th state in the nation for fewest road fatalities, averaging 1.02 deaths per 100 million VMT. By comparison, the national average was 1.44 fatalities per 100 million VMT.

For an in-depth analysis of the highway safety statistics, please refer to the Highway Safety Annual Update on pp. 50-55 of this edition of the *Gray Notebook*.

Washington Motor Vehicle Total Fatalities and Fatality Rates

1910-2005



Sources: Washington State Highway Transportation Commission, Washington State Patrol, Fatality Analysis Report System (FARS), Office of Financial Management, Dept. of Licensing, WSDOT

FARS Fatality Count and WSDOT Fatality Count

The Fatality Analysis Reporting System (FARS), used by the Washington State Traffic Safety Commission and developed by the National Center for Statistics and Analysis, uses data similar to WSDOT's benchmarks when calculating fatality rates. Both FARS and WSDOT data exclude certain fatalities: fatal collisions that are ruled suicides; deaths due to natural causes rather than injuries received in the collision; and collisions that occur on private roadways. If a FARS analyst confirms that the facts of the collision in the police report need to be changed to recategorize a fatality, then WSDOT's data will be changed to reflect that.

There are key differences between the two systems, however. To qualify as a FARS case, there must be a motorized vehicle involved in the crash. WSDOT, in following the direction given by the Blue Ribbon Commission on Transportation, considers non-auto-related fatalities on the highways. In addition, FARS does not count traffic fatalities due to natural catastrophic events, whereas WSDOT does count those fatalities. (This year, FARS has no outstanding death certificates, and therefore there is no difference between WSDOT and FARS data based on late death certificates, as there was last year.)

The preliminary FARS count for 2005 is 649 deaths in Washington State, which amounts to a fatality rate of 1.17 deaths per 100 million VMT. WSDOT's data includes six more fatalities: three fatalities associated with an I-90 rock slide; one bicycle accident in which a pedestrian was killed, one two-bicycle accident in which one bicyclist was killed, and one solo bicycle accident fatality. This puts the total highway fatalities tabulated by WSDOT to 655, and the fatality rate at 1.18 per 100 million VMT, compared to the 1.17 reported by FARS.

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Pavement Condition Goal

The benchmark law enacted in 2002 established a goal that no interstate highways, state routes, and local arterials should be in poor condition. Pavement is in good condition if it is smooth and has few defects. Pavement rated in poor condition is characterized by cracking, patching, roughness, and rutting.

Pavement data for calendar year 2005 is not yet available. Therefore, this report provides the most recent data, which is up to and including calendar year 2004 data. Calendar year 2005 data is scheduled to be published in the Pavement Assessment Annual Update in the December 2006 *Gray Notebook*.

State Highway Pavement

WSDOT has been rating pavement conditions since 1969. The graph to the right shows pavement trends from 1973 to 2004. WSDOT uses Lowest Life Cycle Cost (LLCC) analysis to manage two types of pavement for preservation, chip seal and Hot Mix Asphalt (HMA). (Concrete is the third type). The principles behind LLCC are that if rehabilitation is done too early, pavement life is wasted; if rehabilitation is done too late, very costly repair work may be required, especially if the underlying structure is compromised. WSDOT continually looks for ways to best strike the balance between these two basic principles.

While the goal for pavement is zero miles in "poor" condition, marginally good pavement may deteriorate into "poor" condition during the lag time between assessment and actual rehabilitation. A small percentage of marginally good pavement may move into "poor" condition for any given year. WSDOT's policy goal for the 2003-05 biennium was to maintain 90% of all pavement types in "fair" or better condition.

In 2003, the percent of all state highway pavement in "poor" condition increased to 10%, up from 9.3% as reported in the 2002 pavement survey. In 2000, there were 1,068 lane miles (6.1%) of pavement in "poor" condition. In 2003 the total was 1,774 lane miles, and in 2004, 1,797 or 10.1%. Since 2000, WSDOT has seen an increase of 729 lane miles in "poor" condition.

In 2003, 79 more chip seal lane miles fell into "poor" condition, bringing the total to 3.3% of all state highway lane miles. Contributing factors may include the annual pavement condition survey being conducted before chip seal construction, and the fact that small roadway sections are combined to create more cost-effective regional contracts and achieve an economy of scale. This leads to some pavement not getting fixed immediately. For 2003, the increase in "poor" condition of HMA was 51 lane miles, to a total of 5.8% of state highway lane miles. Total lane miles of concrete in poor condition remained the same from 2002 to 2003.

From 2003 to 2004, 21 more chip seal lane miles fell into "poor" condition; total chip seal lane miles in "poor" condition were 3.4%. The condition of HMA improved from 2003 to 2004; 162 fewer lane miles were in "poor" condition, or 4.9% of total lane miles. Total lane miles of concrete in "poor" condition increased to 152 miles or 1.8% of the total. This is attributable to more faulting and cracking in the concrete leading to an increase in roughness of ride. As noted in the December 31, 2004 *Gray Notebook,* WSDOT is working with the University of Washington to develop a method to predict when concrete pavement will need rehabilitation and hopes to have an explanation for this sudden deterioration by the end of 2005.

Local Arterial Road Pavement

The local arterial road network is surveyed every biennium. Updated data will be available in the next benchmarks report. For more information on arterial road conditions, please see Washington's City Arterials Condition Report 2004, available at www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/Pavement-Technology.

As of December 31, 2004, WSDOT owns and maintains 20,002.88 lane miles of highway, including ramps, collectors, and special use lanes. Special use lanes include High Occupancy Vehicle (HOV), climbing, chain-up, holding, slow vehicle turnout, two-way turn, weaving/speed change (previously referred to as auxiliary), bicycle, transit, truck climbing shoulder, turn and acceleration lanes. Special use and ramp/collector lane miles make up 1,688.02 of the 20,002.88 lane miles. There are approximately 69 lane miles under construction.

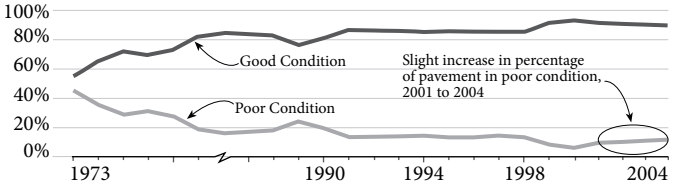
Pavement Condition Rating Summary 2000-2004

Percent of Pavement in Poor Condition

2000	2001	2002	2003	2004
6.1	8.9	9.3	10.0	10.1

Note: This data is that same data that was reported in the previous benchmarks report. Data for 2005 is not yet available.

State Highway Pavement Trends, 1973-2004



Source: WSDOT

Note: This data is that same data that was reported in the previous benchmarks report. Data for 2005 is not yet available.

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Bridge Condition Goal

The benchmark law established a goal for no bridges to be structurally deficient, and for safety retrofits to be performed on state bridges at the highest seismic risk levels. WSDOT tracks bridge condition but does not use the "zero deficient bridge" goal. Moving to the "zero deficient bridges" standard would promote cheap and fast fixes that would ultimately be counterproductive. A "zero deficient bridge" approach would require setting aside WSDOT's Bridge Management System (BMS), which is the basis for preserving bridges to get optimum service life.

The structural deficiency rating is based on inspection findings, and does not measure important cost-effective preservation activities. At the same time, some bridges are more vital and expensive than others. BMS considers the cost-effectiveness of several feasible corrective actions for any given bridge deficiency, providing cost-effective indices for each potential action in various time periods.

Bridge Condition Results

This report provides data for fiscal year 2006 (July 2005 – June 2006). WSDOT's policy is to maintain 95% of its bridges at a structural condition of at least fair, meaning all primary structural elements are sound. In 2006, 2.5% of bridges showed a condition rating of "poor." (This is rounded to 3% in the table below).

No bridge currently rated as "poor" is unsafe for public travel, but some bridges may have structural deficiencies that restrict the weight and type of truck traffic allowed. Any bridge determined to be unsafe is simply closed to traffic. In 2006, WSDOT did not close any bridges due to unsafe conditions.

Bridge Seismic Retrofit Program

WSDOT's Bridge Seismic Retrofit Program prioritizes state bridges for seismic retrofit, and performs these retrofits as funding permits. The number of seismic projects does not match perfectly with the number of bridges; a seismic retrofit project may encompass more than one bridge, while one bridge might have multiple retrofit projects planned. Some bridges have been partially but not completely retrofitted to withstand earthquake forces.

A total of 920 bridges are part of the Bridge Seismic Retrofit Program. Retrofit priorities are based on seismic risk of a site, structural detail deficiencies, and route importance. From 1991 to the end of June 2006, WSDOT has fully or partially retrofitted 358 bridges: 195 bridges are completely retrofitted, and 163 are partially retrofitted. Fifteen additional bridges are under contract to be retrofitted.

As of June 30, 2006, 547 bridges need complete retrofits, in addition to the 163 that have been partially completed. These two groups combine for a total of 710 bridges left to be retrofitted for earthquake safety.

The 2005 Transportation Partnership Account (TPA) fund includes $87 million to perform bridge seismic retrofits on bridges designated "High" and "Moderate" risk. Design and construction is scheduled to start after July 2007 and be completed in eight years.

Bridges in the Seismic Retrofit Program
Cumulative 1991-2005, 2006

	1991-2005	2006
Completely retrofitted	191	195
Partially retrofitted	162	163
No work done to date	569	547[1]
Under Contract for work	15 (in 2005)	15
Total Bridges in Seismic Retrofit Program	937	920[1]

Source: WSDOT Bridge Office

[1] The number of bridges in the seismic retrofit program decreased in 2006 due to further analysis that determined that some bridges do not warrant a retrofit.

Bridge Structural Condition Ratings

Category	Description	2000	2001	2002	2003	2004	2005	2006
Good	A range from no problems to some minor deterioration of structural elements.	84%	85%	87%	86%	87%	89%	88%
Fair	All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.	11%	11%	10%	11%	10%	9%	9%
Poor	Advanced deficiencies such as section loss, deterioration, cracking, spalling, scour, or seriously affected primary structural components. Bridges rated in poor condition may be posted with truck weight restrictions.	5%	4%	3%	3%	3%	2%	3%

Source: WSDOT Bridge Office

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Per Capita Vehicle Miles Traveled Goal

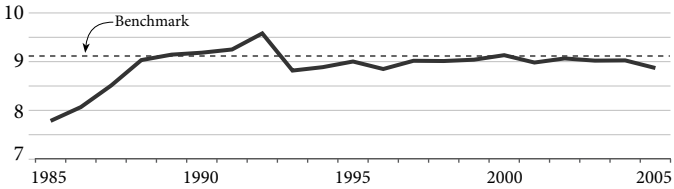
The benchmark law established a goal for Vehicle Miles Traveled (VMT) per person to be maintained at 9,133, the level it was when the benchmarks were developed in 2000. In calendar year 2005, Washington State citizens traveled 8,869 vehicle miles per person on all roadways, down from 9,026 in 2004, and below the benchmark level of 9,133 miles per person. Since the late 1980s, annual VMT per person in Washington has stayed at roughly 9,000 miles per person, meaning the number of vehicle miles traveled throughout the state has grown at roughly the same pace as the number of new residents.

VMT is influenced by a range of trends in population, economy, land use, and employment, as well as investment in the transportation system. For 2005, the decline in per capita VMT was likely influenced by the spike in gasoline prices in the Summer and Fall 2005. Anecdotal evidence indicates that residents curtailed their "discretionary" travel (such as for summer vacations), and WSDOT data shows a substantial increase in commuter interest in ridesharing, particularly in the vanpool program (as reported in the December 31, 2005 edition of the *Gray Notebook,* p 64).

Although it is difficult for WSDOT to directly influence the public's traveling patterns, the Commute Trip Reduction (CTR) program supports this goal by working with employers to reduce VMT to their worksites. The commute VMT per CTR employee decreased from 8.7 miles per day in 1997 to 8.3 miles per day in 2005, even as CTR employees continued to live farther away from their worksite.

Annual Vehicle Miles Traveled per Capita

*In Thousands, 1985 to 2005**



Source: WSDOT Transportation Data Office and Office of Financial Management
* The method for calculating VMT changed in 1993 as more complete data became available. This accounts for the decrease shown in the graph from 1992 to 1993.

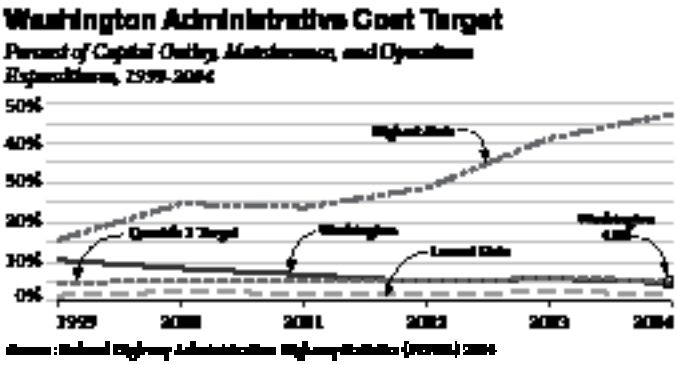
Administrative Efficiency Goal

The benchmark law established a goal that WSDOT's administrative cost as a percentage of transportation spending achieve the most efficient quartile nationally. Finding common ground for comparisons of administrative efficiency among state Departments of Transportation (DOTs) is very difficult. Each DOT accounts and tracks for expenditures in different ways, and the state DOTs vary widely in structure, size, and function, with the result that there is little direct comparability among the "administrative" activities.

The best national source of financial information is the Federal Highway Administration's (FHWA's) annual Highway Statistics report. WSDOT uses the general administration cost (line item A.4.a.) as a percentage of capital outlay, maintenance, and operations expenditures, to make the national comparison. While FHWA cautions strongly against using these numbers to compare states, all state DOTs complete the report annually, and it is the only national source for administrative costs. FHWA presents the data by fiscal year, and collects fiscal year data in the winter to publish the next Fall. Therefore, the most recent information for which data is available is fiscal year 2004.

In 2004, Washington's administrative cost was 4.8%, putting it at ninth-lowest nationally and inside the first quartile. This is down from 5.9% in 2003. A number of variables affected administrative cost reporting from 2003-04. In 2004, reduced WSDOT expenses included savings realized from staff position vacancies, a reduction in health care premiums, and elimination of funding for information technology projects. Also, in 2004 WSDOT spending for the highway construction program increased due to the 2003 "Nickel" Transportation Funding package.

The lowest state, Louisiana, was at 2.1%, and the highest state, Delaware, was at 47.3%.



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Non-Auto Share of Commute Trips Goal

The benchmark law established a goal to increase the non-auto share of commute trips. WSDOT and the Transportation Commission interpret this benchmark as the measure of the combined ability of many different transportation agencies to provide alternatives to drive alone commuting. The commute patterns for the state are calculated using data collected annually by the U.S. Census Bureau's American Community Survey (ACS).

Slight changes from year to year in the commute patterns and trip distribution do not constitute a trend; these changes generally are not statistically significant unless indicated. Washington's 2004 commute trends, according to the ACS, showed a statistically significant growth in walking as a means of traveling to work, compared to the 2000 ACS commute trends (from 2.4% to 3.2%). Carpooling, transit, and other means showed a statistically significant decrease from the 2000 commute mode share. The drive-alone share of commuting in 2004 was not significantly different than the share in 2000. See the table below for complete results.

One of WSDOT's programs that influences the non-auto share of commute trips goal is the Commute Trip Reduction (CTR) program. The CTR program works with major employers in the state's nine most populous counties to encourage employees not to commute alone. The goals for the program are to reduce traffic delay, air pollution, and energy use. About 560,000 employees at more than 1,100 work sites in the state have access to CTR programs.

The percentage of commuters who drive alone to CTR worksites declined from 66.3% in 2003 to 65.7% in 2005. Overall, the percentage of commuters who drive alone to all CTR sites declined more than 7% from 1993 to 2005, and the drive-alone rate for the program remains below the state and national drive-alone rate. The drive-alone rate for those employers with complete data that began the program in 1993 declined more than 14% from 1993 to 2005.

Traffic Congestion and Driver Delay

WSDOT calculates annual changes in the peak period travel times for 12 Central Puget Sound commutes to track congestion trends. Information on congestion measures will be published later this year in the *Gray Notebook*.

Washington State Commuting Patterns – Workers 16 and Over, 2000-2004

	2000	2001	2002	2003	2004	Change from 2000-2004	Statistically Significant?
Total Workers 16 yrs & Older	2,753,377	2,739,113[1]	2,760,912	2,793,978	2,800,303	1.7%	N/A
Drive Alone	73.8%	74.4%	74.7%	73.8%	75.3%	1.5%	no
Carpool	11.5%	11.5%	11.4%	11.3%	10.3%	-1.2%	yes
Public Transportation	5.1%	5.5%	4.6%	5.0%	4.3%	-0.8%	yes
Walked	2.4%	3.1%	3.0%	3.2%	3.2%	0.8%	yes
Other Means	2.4%	1.8%	1.8%	2.2%	1.7%	-0.7%	yes
Worked at Home	4.8%	3.8%	4.5%	4.6%	5.2%	0.4%	no

Source: U.S. Census Bureau, American Community Survey, 2001 to 2004

[1] In the June 30, 2005, *Gray Notebook*, Total workers 16 yrs and older was reported incorrectly as 2,729,113. The correct number was 2,739,113.

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Transit Cost Efficiency Goal

The benchmark law required the Transportation Commission to establish a cost efficiency benchmark for the state's public transit agencies. To accomplish this mandate, the Commission worked with the Washington State Transit Association (WSTA), which proposed four measures to address cost efficiency, cost effectiveness, and service effectiveness. This report, prepared by WSTA, updates these four measures with 2004 data. The transit summary data for 2005 has not yet been finalized.

The four adopted benchmarks compile statewide averages for fixed-route (scheduled) service at urban, small urban, and rural transit agencies, and statewide averages for demand response (on-call paratransit) and vanpool services. This allows comparisons of the state's similar transit agencies with each other, although there are still important differences between the agencies. Identifying national peers for benchmarking is also difficult due to the large variations among systems in size, government support, fare levels, costs, and purposes, as well as data collection processes.

WSDOT's annual Washington State Summary of Public Transportation Systems provides an overview of each system and is a data source for the transit benchmarks calculated by WSTA. This report is available online at www.wsdot.wa.gov/Transit/. The National Transit Database was used to calculate the passenger mile measure. Also, see the Transportation Benchmarks Implementation Report (at www.wsdot.wa.gov/accountability/benchmarks/BenchmarksImplementationReport.pdf) for more background on benchmark limitations, measure development, recent trends, and comparing services and system types.

Operating Cost per Total Hour

Costs are directly related to the size of the transit system and the nature of the area served. Larger transit systems are more complex and incur costs for fixed facilities (transit centers, park-and-ride lots, etc.), security, and other areas that are not cost items for smaller systems. They also operate larger equipment in metropolitan areas with higher wage structures than small systems. The 2004 data shows a modest increase in cost per hour for urban systems with a significant increase in the cost per hour for small urban and rural systems.

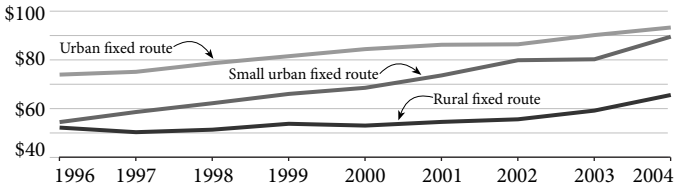
A closer review of the data indicates this increase reflects significant cost increases at two of the six agencies in the small urban category, Whatcom Transit (24% increase) and Kitsap Transit (15% increase). In 2004, Kitsap Transit has experienced a significant increase of approximately $2.0 million, or 10%, in its operating cost, primarily due to increased operating costs related to salaries and wages, benefits and fuel. The increase at Whatcom Transit has been traced preliminarily to the fact that 2003 was its first full year with maintenance "in-house"; previously it had contracted the work from the City of Bellingham.

Among the rural systems, increases at Mason Transit (25%) and Jefferson Transit (97.7%) drove the increased numbers. During this time, Mason Transit's operations were being brought in-house from a private operator, requiring a duplication of costs for several months. Mason Transit also purchased a new operating facility and renovated it, incurring a number of one-time costs. Many of these costs were classified as operating rather than capital costs.

The average cost per hour for demand-response service increased slightly in 2004. The cost per hour has remained stable over several years despite inflationary pressure.

Fixed Route Service: Average Cost per Hour

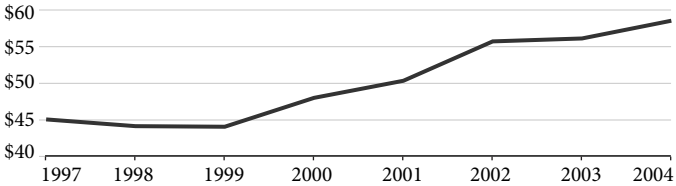
Washington State Average by Transit System Size, 1996-2004



Source: Washington State Transit Association

Demand Response Services: Average Cost per Total Hour

Washington State Average for All Transit Systems, 1997-2004



Source: Washington State Transit Association

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Boardings per Revenue Hour

This measure also illustrates the importance of the characteristics of the area served on a transit system's performance. Boardings[1] per revenue hour generally depend on density and service type – local, urban service performs better than express service.

Boardings per revenue hour increased by over 10% for urban systems and over 6% for small urban systems. The increase for the urban category is driven by King County Metro, which experienced an increase of approximately 15% in boardings despite a reduction in revenue hours. In this same time, rural fixed-route ridership per hour increased slightly, and demand response ridership per hour dropped slightly. These changes are both fairly negligible.

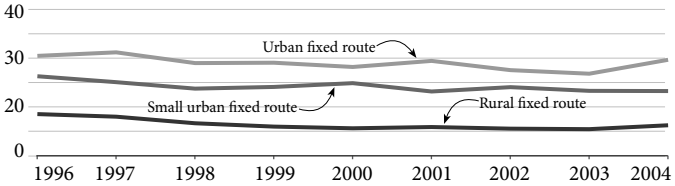
Cost per Passenger Mile

The trend for this measure generally reflects inflationary cost increases. The cost per passenger-mile increased sharply for small urban systems from 2000 to 2001, due to significant service reductions and fare increases in 2000 by several systems in this category. Passenger-mile data is not collected by rural transit systems.

The cost per passenger mile increased slightly for urban systems and appear to have increased for small urban systems.[2] Since data is incomplete for the small urban figures, there is no analysis available yet to explain this increase.

Fixed Route Service: Average Boardings per Revenue Hour

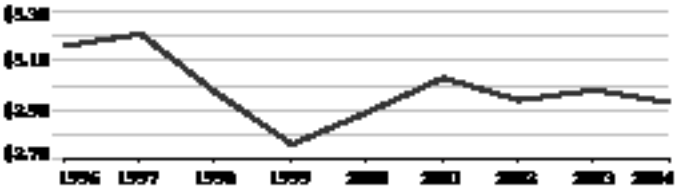
Washington State Average by Transit System Size, 1996-2004



Source: Washington State Transit Association

Demand Response Services: Average Boardings per Revenue Hour

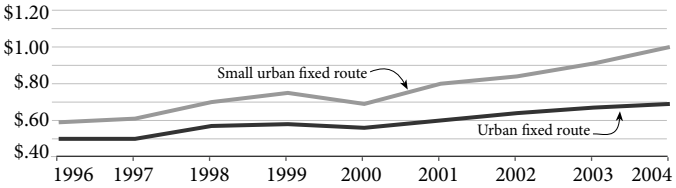
Washington State Average for All Transit Systems, 1996-2004



Source: Washington State Transit Association

Fixed Route Service: Average Cost per Passenger Mile

Washington State Average by Transit System Size, 1996-2004



Source: Washington State Transit Association

[1]"Boardings" are the total number of times a person boards the bus. For example, a person taking one bus and transferring to anothers bus to reach his destination would represent two boardings.

[2]The NTD did not have passenger-mile data for Ben Franklin Transit and Intercity Transit for 2004. The Small Urban number is a projected ratio based on the assumption that passenger miles would grow at the same rate as passengers from 2004 and 2003.

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Cost per Boarding

Fixed Route Service

Cost per boarding has increased at approximately the rate of inflation for urban systems. Rural and small urban systems have seen the cost per boarding increase at a much higher rate. Small urban systems saw a significant increase from 2000 to 2001 as service reductions increased the cost per hour of service and higher fares led to fewer passengers. This leveled off from 2001 to 2002. Rural systems faced inflation also and were hit particularly hard by increased health care and other employee costs.

The 2004 cost per boarding increase was relatively modest across the three system size categories. Significant cost increases seen in the small urban category were partially offset by increased ridership.

Demand Response

The cost per boarding is driven by two factors – the cost of providing service and the number of boardings. While the cost per hour of demand-response service has decreased slightly, this has been offset by a small but proportionately larger reduction in boardings per hour from 2003 (3.0) to 2004 (2.8).

This was caused by policy decisions at a number of transit systems to move demand-response riders to fixed-route service by offering them travel training on how to ride fixed-route transit. This shift helps riders achieve more travel flexibility and does not require advanced reservations. In addition, several transit agencies reduced their demand response service boundaries to be more consistent with the federally required three quarters of a mile on either side of a fixed route, and implemented disability standards that included conditional or limited eligibility for the demand response services.

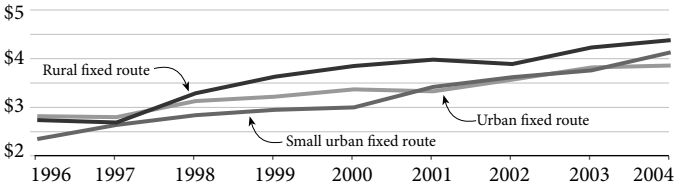
The net result of these changes is that the cost per boarding for demand-response service has increased slightly.

Vanpooling

The cost-effectiveness of vanpooling is particularly impressive when one considers average trip lengths, and that in many systems the vanpool passenger fares cover a substantial portion of the operating and capital cost of the program. Some systems choose to subsidize vanpool fares to make the service as attractive as possible. The 2004 operating cost per boarding was approximately 10% higher than in 2003. The operating costs are influenced by a variety of factors, including fuel costs, insurance, inflation, and Transit Board policies. These factors are believed to have driven the increase from 2003 to 2004.

Fixed Route Service: Average Cost per Boarding

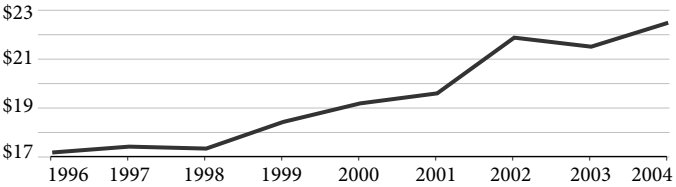
Washington State Average by Transit System Size, 1996-2004



Source: Washington State Transit Association

Demand Response Services: Average Cost per Boarding

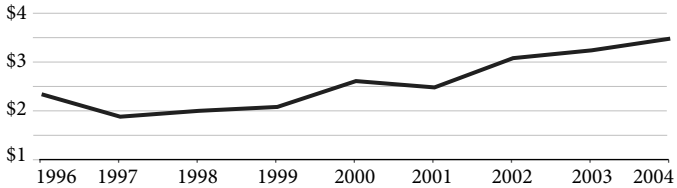
Washington State Average for All Transit Systems, 1996-2004



Source: Washington State Transit Association

Vanpool Service: Average Cost per Boarding

Washington State Average for All Transit Systems, 1996-2004



Source: Washington State Transit Association