

THE REPORT OF THE  
ANNUAL ACTUARIAL VALUATION  
OF THE  
HIGHWAY AND TRANSPORTATION EMPLOYEES'  
AND HIGHWAY PATROL RETIREMENT SYSTEM  
STATE OF MISSOURI  
JUNE 30, 2003  
INCLUDING EFFECT OF OUTSOURCING DISABILITY

Gabriel, Roeder, Smith & Company



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December 5, 2003

The Retirement Board  
Highway and Transportation Employees'  
and Highway Patrol Retirement System  
Jefferson City, Missouri

Ladies and Gentlemen:

The results of the regular annual **actuarial valuation as of** June 30, 2003 of the Highway and Transportation Employees' and Highway Patrol Retirement System, as established by Chapter 104 of the Missouri Revised Statutes, are presented in this report.

The member statistical data required for the valuation was furnished by your Executive Director, together with pertinent data on financial operations. Data was reviewed for reasonableness, but was not audited by the actuary. The actuarial assumptions used in making the valuation are shown in Section E of this report.

**Your attention is directed particularly** to the summary of results on pages 2, 3 and 4.

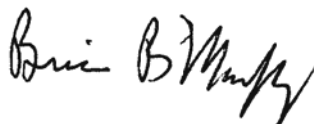
This report replaces our report dated November 13, 2003 and accounts for the outsourcing of all future disability claims.

The actuarial calculations were performed in accordance with accepted actuarial procedures. The calculations were based upon current plan provisions of the Retirement System, the plan provisions of the Missouri State Employees Year 2000 Plan and upon actuarial assumptions that are internally consistent and reasonably based upon the actual experience of the System.

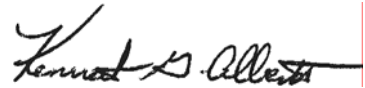
The cooperation of the Executive Director and the staff in furnishing materials requested for this valuation, and the complete and excellent condition of the records, is acknowledged with appreciation.

Respectfully submitted,

GABRIEL, ROEDER, SMITH & COMPANY



Brian B. Murphy, F.S.A.



Kenneth G. Alberts

KGA/lr

## SUMMARY

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The contribution rate for the plan year beginning July 1, 2004 is determined in accordance with the June 30, 2003 valuation.

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Investment return was positive this year, but fell below the assumed rate as it was for most systems in the country. The market value of assets dropped slightly. The actuarial asset smoothing process is currently realizing asset losses for the prior three years. Due to these accumulated losses, investment return must exceed the assumed rate for the next several years in order to meet the actuarial assumptions. In the absence of investment gain, contributions are expected to rise.

The **total contribution rate** for the plan year beginning July 1, 2004 is shown below. The contribution rate includes a charge for outsourcing of future disability claims as well as the combining of the remaining LTD liabilities and assets. The resulting contribution rates are higher this year than the levels seen in the prior valuation. This is due to the changes in the administration of the disability program and the effect of realized losses flowing into the Unfunded Actuarial Accrued Liabilities. Based upon the results of this valuation, the employer contribution rates allocated between normal cost, unfunded liability and expenses effective July 1, 2004 are:

	<b>Employer Contribution Rates Expressed as % of Active Payroll for Total Benefits</b>			
	<b>Non-Uniformed</b>		<b>Uniformed Patrol</b>	<b>Combined Rate</b>
	<b>Civilian Patrol Employees</b>	<b>MoDOT Employees</b>		
Normal Cost	11.61%	11.61%	13.30%	11.85%
Unfunded Liability	15.64%	15.64%	29.21%	17.59%
Expenses	0.46%	0.46%	0.46%	0.46%
Disability Insurance*	0.57%	0.57%	0.57%	0.57%
<b>Total</b>	<b>28.28%</b>	<b>28.28%</b>	<b>43.54%</b>	<b>30.47%</b>
Illustrative \$	\$9,594,691	\$67,642,799	\$19,866,244	\$97,103,734

\* Actual charge by the insurance company is 0.61% of payroll. The difference of 0.04% of payroll is funding from a portion of the assets that were formerly held as a reserve for the LTD benefits.

## SUMMARY & RECOMMENDATIONS

### (CONCLUDED)

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The dollar contribution amounts shown on the previous page are illustrative and based on 6/30/2003 valuation payroll. Actual dollar contributions should be based on covered payroll for the fiscal year beginning 7/1/2004. The combined rate of 30.47% is below the actual benefit payout rate. The ability to contribute less than the benefit payout is one of the advantages of a funded retirement plan. For the prior valuation, the total combined dollar contribution illustrated was \$85,701,659. This represented a combined rate of 27.40%, although a higher rate was in fact adopted. Unfunded Actuarial Accrued Liabilities were amortized over a 33-year closed period. This is a one-year reduction in the amortization period from the June 30, 2002 valuation. Continued yearly reductions in the amortization period will result in a 30-year period being used for the June 30, 2006 valuation. This is consistent with GASB amortization period requirements. A comparative summary of results can be found on page 4.

**Conclusion:** Based upon the results of the June 30, 2003 regular annual actuarial valuation, it is our opinion that the Highway and Transportation Employees' and Highway Patrol Retirement System is in sound condition in accordance with actuarial principles of level percent of payroll financing. In order to remain in this condition, it is important that investment earnings return to more normal levels.

**SUMMARY OF KEY VALUATION RESULTS  
AS OF JUNE 30, 2003**

	2003	2002
<b>Number of Participants</b>		
Retirees - Regular Pensioners**	6,401	6,254
Normal and Work Related Disability Pensioners	75	85
Vested Terminated Employees	1,207	1,130
Active Employees	8,895	8,695
Active Participants on LTD	10	71
<b>Total</b>	<b>16,588</b>	<b>16,235</b>
<b>Valuation Payroll</b>		
Civilian Patrol Employees	\$ 33,927,478	N/A
MoDOT Employees	239,189,530	N/A
Non-Uniformed Total	273,117,008	\$ 267,465,419
Uniformed Patrol Employees	45,627,184	45,282,073
<b>Total</b>	<b>318,744,192</b>	<b>312,747,492</b>
<b>Present Value of Future Benefits</b>	<b>2,832,114,394</b>	<b>2,754,914,229</b>
<b>Entry Age Accrued Liability</b>	<b>2,418,145,741</b>	<b>2,358,452,163</b>
<b>Entry Age Normal Cost</b>		
Civilian Patrol Employees	11.61%	N/A
MoDOT Employees	11.61%	N/A
Non-Uniformed Total	11.61%	11.51%
Uniformed Patrol Employees	13.30%	13.04%
<b>Unfunded Actuarial Accrued Liability #</b>		
Civilian Patrol Employees	15.64%	N/A
MoDOT Employees	15.64%	N/A
Non-Uniformed Total	15.64%	13.58%
Uniformed Patrol Employees	29.21%	24.91%
<b>Recommended Contribution Rates*</b>		
<b>Total System Benefits</b>		
Civilian Patrol Employees	28.28%	N/A
MoDOT Employees	28.28%	N/A
Non-Uniformed Total	28.28%	25.54%
Uniformed Patrol Employees	43.54%	38.40%
<b>Book Value of Assets</b>	<b>\$1,156,478,118</b>	<b>\$1,304,776,991</b>
<b>Market Value of Assets</b>	<b>\$1,241,550,328</b>	<b>\$1,260,842,815</b>
<b>Actuarial Value of Assets</b>	<b>\$1,363,952,522</b>	<b>\$1,450,507,432</b>

\* Includes contributions for administrative expenses and disability insurance of 0.46% of payroll and 0.57% of payroll, respectively.

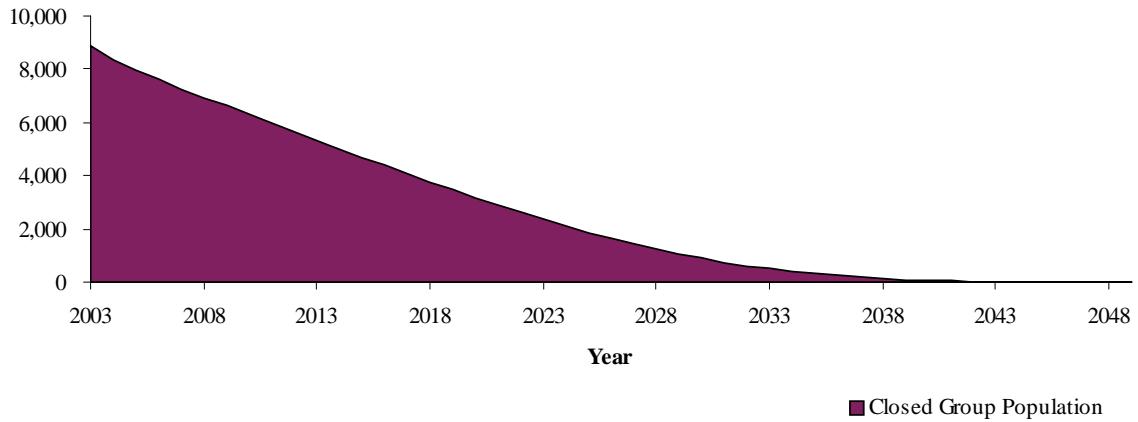
\*\* Valuation results based on 6,442 pensioners, 74 disability pensioners, 1,207 vested terminated members, 8,892 active members and 80 long-term disability participants which includes 39 ex-spouses and excludes 6 defective records.

# Assets were not separately valued for the Civilian Patrol and MoDOT.

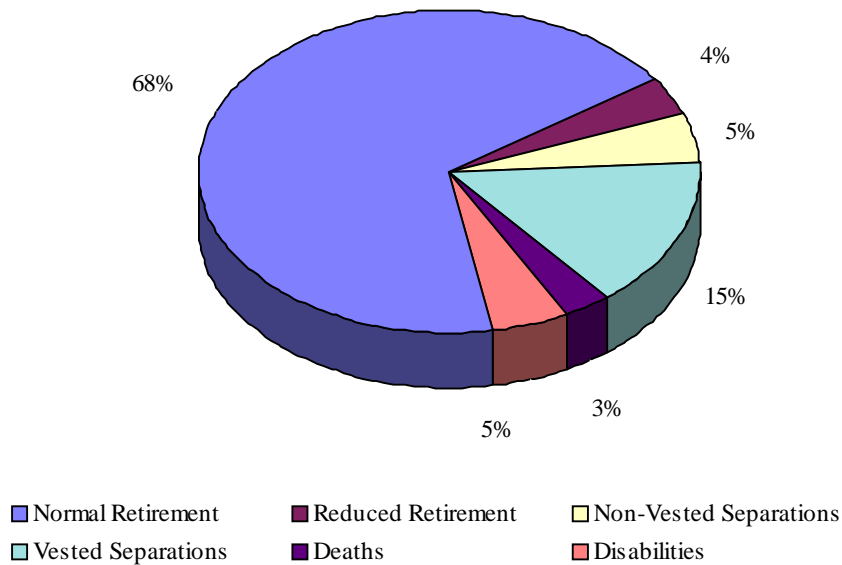
**EXPECTED DEVELOPMENT OF PRESENT POPULATION  
AS OF JUNE 30, 2003**

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**Closed Group Population Projection**



**Expected Terminations from Active Employment for Current Active Members**



The charts show the expected future development of the present population in simplified terms. The retirement system presently covers 8,892 active members. Eventually, 5% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. Of the present population, 87% is expected to receive monthly retirement benefits either by retiring directly from active service, or by separating from service with a vested benefit and 8% of the present population is expected to become eligible for death-in-service or disability benefits. Within 13 years, over half of the covered membership is expected to consist of new hires.

# SECTION A



## Valuation Results



## **METHOD OF FINANCING FUTURE BENEFITS FOR PRESENT ACTIVE MEMBERS**

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The valuation was prepared in accordance with Section 104.1066 of the Missouri Revised Statutes, which requires the use of the entry-age normal actuarial cost method for determining normal cost and level percent-of-payroll financing of unfunded actuarial accrued liabilities. Details of the application of these methods are described below.

*Normal cost* and the allocation of present values between service rendered before and after the valuation date were determined using an individual entry-age actuarial cost method having the following characteristics:

- (i) the annual normal costs for each individual active member, payable from the date of employment to the date of retirement, are sufficient to accumulate the value of the member's benefit at the time of retirement.
- (ii) for the purposes of determining the normal cost, the benefits of the Year 2000 Plan were used. This creates a normal cost that is a constant percentage of the member's year-by-year projected covered pay even as members transition from the current plan benefits to the Year 2000 Plan benefits.

The normal retirement component of the normal cost for the Non-Uniformed group was increased by 0.45% of payroll (5% of the normal retirement normal cost of 8.92%) to account for anticipated changes in retirement behavior of this group as the transition to the Year 2000 Plan occurs.

The *Present Value of Future Benefits* was calculated using the benefits assumed to be payable in the future to current active, vested terminated and retired members. It was assumed that current active and retired Uniformed Patrol members hired prior to July 1, 2000 would elect to retain the benefits under the current plan. Active members hired on or after July 1, 2000 have their benefits determined by the Year 2000 Plan. The present value of future benefits for Non-Uniformed active members hired prior to July 1, 2000 was increased by 0.2% to reflect the ability of members to select the plan benefits that are most advantageous to them. These results are derived from a comparative analysis of the type and amount of benefits payable to plan members under various situations. We expect that this assumption will be revised as experience emerges with regard to plan-to-plan transition. The calculated normal and early retirement benefits were increased by 4.3% for Uniformed members and 2.6% for Non-Uniformed members to account for the inclusion of unused sick leave in the calculation of Average Pay.

## METHOD OF FINANCING FUTURE BENEFITS FOR PRESENT ACTIVE MEMBERS (CONCLUDED)

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The *Present Value of Future Normal Costs* was defined as the average normal cost rate multiplied by the present value of future payroll for the group.

The *Actuarial Accrued Liabilities* were defined as the difference between the present value of future benefits and the present value of future normal costs.

Actuarial Accrued Liabilities, less pension assets as of June 30, 2003 resulted in *Unfunded Actuarial Accrued Liabilities* which were amortized as a level percent of payroll over a period of 33 years. Continued yearly reductions in the amortization period will result in a 30-year period being used for the June 30, 2006 valuation. This is consistent with GASB amortization period requirements.

**COMPUTED CONTRIBUTIONS TO SUPPORT BENEFITS  
FOR PLAN YEAR BEGINNING 7/1/2004  
CONTRIBUTIONS COMPUTED AS OF JUNE 30, 2003**

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<b>Contributions for</b>	<b>Non-Uniformed Employees</b>	<b>Uniformed Patrol</b>
<b>DEVELOPMENT OF NORMAL COST</b>		
Age & service benefits	9.98%	11.86%
Normal and Work Related Disability benefits	0.49%	0.26%
Survivor benefits	0.37%	0.35%
Separation benefits	0.77%	0.83%
Total Normal Cost	11.61%	13.30%
<b>TOTAL SYSTEM BENEFITS</b>		
Unfunded Actuarial Accrued Liabilities*	15.64%	29.21%
Expense Provision	0.46%	0.46%
Disability Insurance	0.57%	0.57%
Recommended Contribution Rate	28.28%	43.54%

\* Amortized as a level-percentage of payroll over 33 years.

**DEVELOPMENT OF LIABILITIES  
AS OF JUNE 30, 2003**

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	<b>Non-Uniformed Employees</b>	<b>Uniformed Patrol</b>
<b>Present Value of Future Benefits - Inactives</b>		
Retirees and Survivors	\$1,193,870,068	\$339,929,723
Normal and Work Related Disability Pensioners	23,528,481	2,123,770
Vested Terminated Employees	22,546,064	6,272,935
Subtotal PVFB - Inactives	1,239,944,613	348,326,428
<b>Present Value of Future Benefits - Actives</b>		
Age & Service benefits	879,728,480	245,133,693
Normal and Work Related Disability benefits	38,369,795	3,717,666
Survivor benefits	26,067,363	5,072,643
Separation benefits	37,618,533	8,135,180
Subtotal PVFB - Actives	981,784,171	262,059,182
<b>Total Present Value of Future Benefits</b>	2,221,728,784	610,385,610
<b>Less Present Value of Future Entry Age Normal Costs</b>	343,639,645	70,329,008
<b>Equals Actuarial Accrued Liability</b>	1,878,089,139	540,056,602
<b>Less Actuarial Value of Assets</b>	1,074,374,687	289,577,835
<b>Equals Unfunded Actuarial Accrued Liabilities</b>	803,714,452	250,478,767
<b>33 Year Amortization Payment on UAAL as a % of projected payroll</b>	\$ 46,214,462 15.64%	\$ 14,414,449 29.21%

**FINANCING UNFUNDED ACTUARIAL ACCRUED LIABILITIES  
WHICH WERE CALCULATED USING A WAGE INFLATION ASSUMPTION  
OF 4.00% AND AN INVESTMENT RETURN ASSUMPTION OF  
8.25% COMPOUNDED ANNUALLY  
33 YEAR AMORTIZATION  
NON-UNIFORMED EMPLOYEES**

Fiscal Year Ending June 30	Active Employee Payroll	Unfunded Actuarial Accrued Liability at End of Year	Annual Contributions During Fiscal Year		UAAL as % of Payroll
			Dollars	% of Payroll	
2003	\$ 273,117,008	\$ 803,714,452			
2004	284,041,689	829,877,923	\$ 38,572,861	13.58%	292.2%
2005	295,403,356	850,247,227	46,214,462	15.64%	287.8%
2006	307,219,490	870,373,174	48,063,041	15.64%	283.3%
2007	319,508,270	890,158,733	49,985,563	15.64%	278.6%
2008	332,288,601	909,495,792	51,984,985	15.64%	273.7%
2009	345,580,145	928,264,117	54,064,385	15.64%	268.6%
2010	359,403,351	946,330,225	56,226,960	15.64%	263.3%
2011	373,779,485	963,546,160	58,476,038	15.64%	257.8%
2012	388,730,664	979,748,157	60,815,080	15.64%	252.0%
2013	404,279,891	994,755,197	63,247,683	15.64%	246.1%
2014	420,451,087	1,008,367,430	65,777,590	15.64%	239.8%
2015	437,269,130	1,020,364,469	68,408,694	15.64%	233.3%
2016	454,759,895	1,030,503,533	71,145,042	15.64%	226.6%
2017	472,950,291	1,038,517,430	73,990,843	15.64%	219.6%
2018	491,868,303	1,044,112,368	76,950,477	15.64%	212.3%
2019	511,543,035	1,046,965,578	80,028,496	15.64%	204.7%
2020	532,004,756	1,046,722,735	83,229,636	15.64%	196.8%
2021	553,284,946	1,042,995,158	86,558,821	15.64%	188.5%
2022	575,416,344	1,035,356,767	90,021,174	15.64%	179.9%
2023	598,432,998	1,023,340,790	93,622,021	15.64%	171.0%
2024	622,370,318	1,006,436,178	97,366,902	15.64%	161.7%
2025	647,265,131	984,083,726	101,261,578	15.64%	152.0%
2026	673,155,736	955,671,860	105,312,041	15.64%	142.0%
2027	700,081,965	920,532,064	109,524,523	15.64%	131.5%
2028	728,085,244	877,933,926	113,905,504	15.64%	120.6%
2029	757,208,654	827,079,760	118,461,724	15.64%	109.2%
2030	787,497,000	767,098,776	123,200,193	15.64%	97.4%
2031	818,996,880	697,040,759	128,128,201	15.64%	85.1%
2032	851,756,755	615,869,209	133,253,329	15.64%	72.3%
2033	885,827,025	522,453,909	138,583,462	15.64%	59.0%
2034	921,260,106	415,562,867	144,126,801	15.64%	45.1%
2035	958,110,510	293,853,574	149,891,873	15.64%	30.7%
2036	996,434,930	155,863,535	155,887,548	15.64%	15.6%
2037	1,036,292,327	0	162,123,049	15.64%	0.0%

**FINANCING UNFUNDED ACTUARIAL ACCRUED LIABILITIES  
WHICH WERE CALCULATED USING A WAGE INFLATION ASSUMPTION  
OF 4.00% AND AN INVESTMENT RETURN ASSUMPTION OF  
8.25% COMPOUNDED ANNUALLY  
33 YEAR AMORTIZATION  
UNIFORMED PATROL**

Fiscal Year Ending June 30	Active Employee Payroll	Unfunded Actuarial Accrued Liability at End of Year	Annual Contributions During Fiscal Year		UAAL as % of Payroll
			Dollars	% of Payroll	
2003	\$ 45,627,184	\$ 250,478,767			
2004	47,452,271	258,841,756	\$ 11,820,361	24.91%	545.5%
2005	49,350,362	265,195,011	14,414,449	29.21%	537.4%
2006	51,324,376	271,472,362	14,991,026	29.21%	528.9%
2007	53,377,351	277,643,545	15,590,667	29.21%	520.2%
2008	55,512,445	283,674,840	16,214,294	29.21%	511.0%
2009	57,732,943	289,528,744	16,862,866	29.21%	501.5%
2010	60,042,261	295,163,625	17,537,381	29.21%	491.6%
2011	62,443,951	300,533,334	18,238,876	29.21%	481.3%
2012	64,941,709	305,586,792	18,968,431	29.21%	470.6%
2013	67,539,377	310,267,539	19,727,168	29.21%	459.4%
2014	70,240,952	314,513,241	20,516,255	29.21%	447.8%
2015	73,050,590	318,255,159	21,336,905	29.21%	435.7%
2016	75,972,614	321,417,568	22,190,381	29.21%	423.1%
2017	79,011,519	323,917,130	23,077,996	29.21%	410.0%
2018	82,171,980	325,662,210	24,001,116	29.21%	396.3%
2019	85,458,859	326,552,136	24,961,161	29.21%	382.1%
2020	88,877,213	326,476,393	25,959,607	29.21%	367.3%
2021	92,432,302	325,313,749	26,997,992	29.21%	351.9%
2022	96,129,594	322,931,309	28,077,911	29.21%	335.9%
2023	99,974,778	319,183,485	29,201,028	29.21%	319.3%
2024	103,973,769	313,910,879	30,369,069	29.21%	301.9%
2025	108,132,720	306,939,073	31,583,832	29.21%	283.9%
2026	112,458,029	298,077,315	32,847,185	29.21%	265.1%
2027	116,956,350	287,117,093	34,161,073	29.21%	245.5%
2028	121,634,604	273,830,588	35,527,516	29.21%	225.1%
2029	126,499,988	257,969,000	36,948,616	29.21%	203.9%
2030	131,559,988	239,260,727	38,426,561	29.21%	181.9%
2031	136,822,388	217,409,392	39,963,623	29.21%	158.9%
2032	142,295,284	192,091,708	41,562,168	29.21%	135.0%
2033	147,987,095	162,955,157	43,224,655	29.21%	110.1%
2034	153,906,579	129,615,476	44,953,641	29.21%	84.2%
2035	160,062,842	91,653,932	46,751,786	29.21%	57.3%
2036	166,465,356	48,614,368	48,621,858	29.21%	29.2%
2037	173,123,970	0	50,566,732	29.21%	0.0%

## SUMMARY STATEMENT OF SYSTEM RESOURCES & OBLIGATIONS

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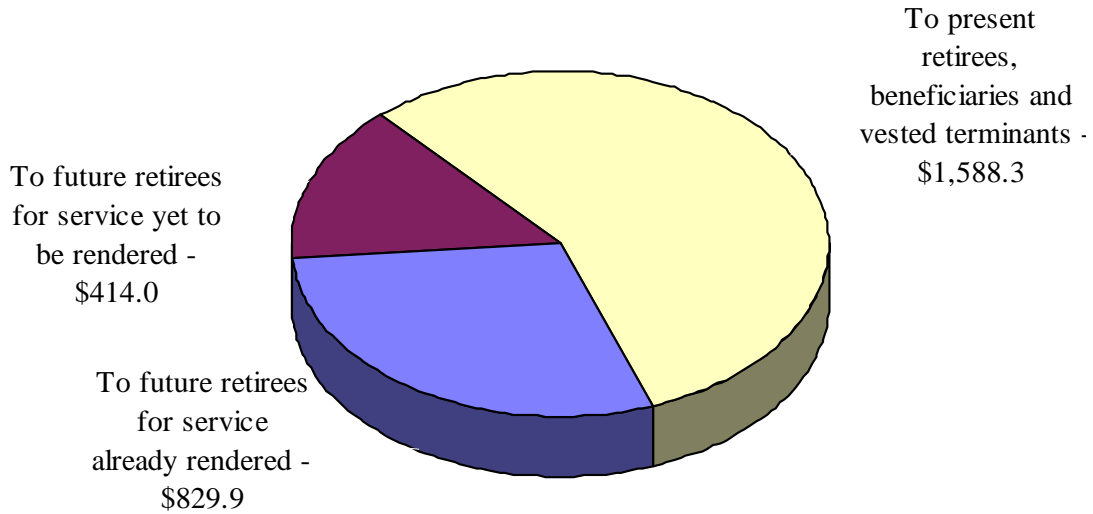
<b>Present and Expected Future Resources at June 30</b>	<b>2003</b>	<b>2002</b>
A. Present valuation assets		
1. Market value of assets from system financial statements	\$1,241,550,328	\$1,268,150,170
2. Market Value Adjustment	122,755,668	190,763,839
3. LTD Assets	(353,474)	(8,406,577)
4. Valuation Assets: 1 + 2 + 3	\$1,363,952,522	\$1,450,507,432
B. Actuarial present value of expected future contributions		
1. For normal costs	413,968,653	396,462,066
2. For unfunded actuarial accrued liability	1,054,193,219	907,944,731
3. Total	1,468,161,872	1,304,406,797
C. Total Present and Expected Future Resources	\$2,832,114,394	\$2,754,914,229
<b>Present and Expected Future Obligations</b>		
A. To present retirants and beneficiaries	\$1,559,452,042	\$1,469,558,410
B. To present vested terminated members	28,818,999	25,670,418
C. To present active members		
1. Allocated to service rendered prior to valuation date (actuarial accrued liability)	829,874,700	876,105,998
2. Allocated to service likely to be rendered after valuation date	413,968,653	383,579,403
3. Total	1,243,843,353	1,259,685,401
D. Total Actuarial Present Value of Expected Future Benefit Payments	\$2,832,114,394	\$2,754,914,229

# SYSTEM RESOURCES & OBLIGATIONS AS OF JUNE 30, 2003

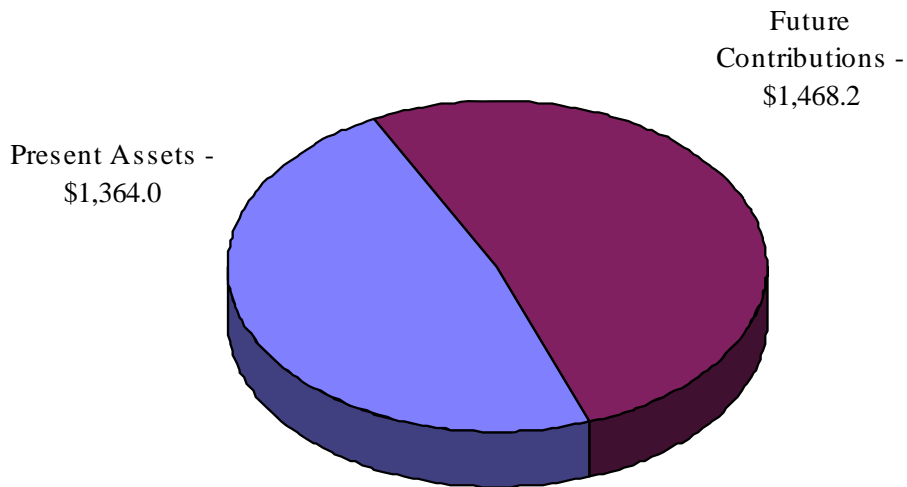
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(\$ Millions)

## Uses of Funds



## Sources of Funds





**GASB No. 25**  
**SCHEDULE OF FUNDING PROGRESS\***  
**JUNE 30, 2003**

<b>Year Ending June 30,</b>	<b>Actuarial Asset Value</b>	<b>Entry Age Normal Accrued Liability</b>	<b>Unfunded Accrued Liability (UAAL)</b>	<b>Funded Ratio</b>	<b>Estimated Covered Payroll</b>		<b>UAAL as a Percentage of Covered Payroll</b>
1991	\$ 560,976,822	\$ 841,195,967	\$ 280,219,145	66.69%	\$ 220,856,988	**	126.88%
1992	622,018,133	904,097,721	282,079,588	68.80%	220,919,382		127.68%
1993	688,963,225	1,000,704,491	311,741,266	68.85%	228,032,159		136.71%
1994	746,946,221	1,204,313,635	457,367,414	62.02%	236,748,214		193.19%
1995	931,031,253	1,330,909,279	499,878,026	69.95%	243,561,510		205.24%
1996	916,553,828	1,429,910,844	513,357,016	64.10%	254,712,739		201.54%
1997	1,015,906,708	1,651,811,690	635,904,982	61.50%	271,070,643		234.59%
1998	1,126,961,804	1,744,052,411	617,090,607	64.62%	278,690,426		221.43%
1999+	1,242,744,403	2,052,700,427	809,956,023	60.54%	288,068,083	**	281.17%
2000#	1,422,796,011	2,188,826,322	766,030,311	65.00%	301,421,805	**	254.14%
2001	1,520,800,409	2,301,402,527	780,602,118	66.08%	323,400,023	**	241.37%
2002	1,450,507,432	2,358,452,163	907,944,731	61.50%	308,654,239	**	294.16%
2003	1,363,952,522	2,418,145,741	1,054,193,219	56.40%	319,345,949	**	330.11%

\* Since the Long Term Disability Plan uses the aggregate funding method, this schedule is not required for the LTD Plan and the assets and liabilities have been excluded.

\*\* Values are estimated from contribution rate and amount.

+ Introduction of MSEP 2000 Plan; Change in Actuary.

# New assumptions adopted.

**GASB No. 25**  
**SCHEDULE OF EMPLOYER CONTRIBUTIONS**  
**AND DEVELOPMENT OF NET PENSION OBLIGATION\***  
**NON-UNIFORMED GROUP**  
**JUNE 30, 2003**

<b>Fiscal Year Ending June 30,</b>	<b>Estimated Covered Payroll</b>		<b>Actual Employer Contributions</b>	<b>Actual Employer Contribution %</b>	<b>Annual Required Contribution (ARC) %</b>	<b>Annual Pension Cost</b>	<b>Percentage of APC Contributed</b>	<b>Net Pension Obligation</b>
1991	\$ 190,667,552	**	\$ 35,864,567	18.81%	18.81%	\$ 35,864,567	100.00%	\$ 0
1992	190,312,781		37,929,337	19.93%	19.93%	37,929,337	100.00%	0
1993	197,027,356		41,454,556	21.04%	21.04%	41,454,556	100.00%	0
1994	204,032,785		40,949,380	20.07%	20.07%	40,949,380	100.00%	0
1995	208,329,222		56,144,725	26.95%	26.95%	56,144,725	100.00%	0
1996	215,155,118		56,842,321	26.42%	26.42%	56,842,321	100.00%	0
1997	228,828,537		59,838,662	26.15%	26.15%	59,838,662	100.00%	0
1998	234,703,387		61,140,232	26.05%	26.05%	61,140,232	100.00%	0
1999+	244,185,511	**	54,990,577	22.52%	22.52%	54,990,577	100.00%	0
2000#	257,124,568	**	56,567,405	22.00%	22.00%	56,567,405	100.00%	0
2001	273,311,348	**	63,654,213	23.29%	23.29%	63,654,213	100.00%	0
2002	260,972,727	**	60,780,548	23.29%	23.29% @	60,780,548	100.00%	0
2003	271,173,431	**	63,156,292	23.29%	23.29% @	63,156,292	100.00%	0

\* Contributions for the Long Term Disability Plan are de minimus and are excluded from this schedule.

\*\* Values are estimated from contribution rate and amount.

+ Introduction of MSEP 2000 Plan; Change in Actuary.

# New assumptions adopted.

@ The ARC is the rate adopted by the Retirement Board. This rate exceeded the actuarially calculated rate.

**GASB No. 25**  
**SCHEDULE OF EMPLOYER CONTRIBUTIONS**  
**AND DEVELOPMENT OF NET PENSION OBLIGATION\***  
**UNIFORMED PATROL GROUP**  
**JUNE 30, 2003**

<b>Fiscal Year Ending June 30,</b>	<b>Estimated Covered Payroll</b>		<b>Actual Employer Contributions</b>	<b>Actual Employer Contribution %</b>	<b>Annual Required Contribution (ARC) %</b>	<b>Annual Pension Cost</b>	<b>Percentage of APC Contributed</b>	<b>Net Pension Obligation</b>
1991	\$ 30,189,436	**	\$ 10,545,170	34.93%	34.93%	\$ 10,545,170	100.00%	\$ 0
1992	30,606,601		11,101,014	36.27%	36.27%	11,101,014	100.00%	0
1993	31,004,803		9,868,829	31.83%	31.83%	9,868,829	100.00%	0
1994	32,715,429		9,739,383	29.77%	29.77%	9,739,383	100.00%	0
1995	35,232,287		14,462,854	41.05%	41.05%	14,462,854	100.00%	0
1996	39,557,621		15,743,114	39.80%	39.80%	15,743,114	100.00%	0
1997	42,242,106		16,546,233	39.17%	39.17%	16,546,233	100.00%	0
1998	43,987,039		16,600,708	37.74%	37.74%	16,600,708	100.00%	0
1999+	43,882,573	**	13,901,999	31.68%	31.68%	13,901,999	100.00%	0
2000#	44,297,237	**	13,484,079	30.44%	30.44%	13,484,079	100.00%	0
2001	50,088,675	**	17,500,983	34.94%	34.94%	17,500,983	100.00%	0
2002	47,681,512	**	16,659,920	34.94%	34.94% @	16,659,920	100.00%	0
2003	48,172,519	**	16,831,478	34.94%	34.94% @	16,831,478	100.00%	0

\* Contributions for the Long Term Disability Plan are de minimus and are excluded from this schedule.

\*\* Values are estimated from contribution rate and amount.

+ Introduction of MSEP 2000 Plan; Change in Actuary.

# New assumptions adopted.

@ The ARC is the rate adopted by the Retirement Board. This rate exceeded the actuarially calculated rate.

**DEVELOPMENT OF GAIN/(LOSS)  
JULY 1, 2002 TO JUNE 30, 2003**

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	UAAL =	AAL -	Assets
Beginning of Year Values (at July 1)	\$907,944,731	\$2,358,452,163	\$1,450,507,432
Normal Cost	37,613,653	37,613,653	0
Contributions	(79,987,770)	0	79,987,770
Disbursements	\$0	(145,786,200)	(145,786,200)
Interest	73,157,508	190,110,186	116,952,678
Expected Value Before Any Changes	938,728,122	2,440,389,802	1,501,661,680
Effect of Changes in Benefits & Methods	(6,834,739)	1,911,907	8,746,646
Expected Value After Changes	931,893,383	2,442,301,709	1,510,408,326
End of Year Values (at June 30)	1,054,193,219	2,418,145,741	1,363,952,522
Gain/(Loss) for Year	\$(122,299,836)	\$24,155,968	\$(146,455,804)

The changes in benefits and methods are the outsourcing of future disability benefits (prior to normal retirement age) and the combining of the remaining LTD plan assets and liabilities with the base plan. The asset amount shown above is the actuarial value of LTD assets as of 6/30/2002 brought to 6/30/2003 with 8.25% interest and reduced by \$353,474 which is used for leveling the outsourcing premium for a period of 3 years.

# SECTION B



## Summary of Benefits

# HIGHWAY & TRANSPORTATION EMPLOYEES' AND HIGHWAY PATROL RETIREMENT SYSTEM

## SUMMARY OF BENEFIT PROVISIONS EVALUATED AS OF JUNE 30, 2003

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### Closed Plan

### Year 2000 Plan

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#### Participation

Participants include:

All HTEHPRS active members, vested terminated members, disability recipients, retirees and survivors who first became members prior to July 1, 2000 and who do not elect to transfer to the Year 2000 Plan.

#### Participation

Participants include:

1. All new employees who first become members on or after July 1, 2000.
2. HTEHPRS active members and vested former members who elect to transfer to the Year 2000 Plan at retirement.
3. HTEHPRS retirees who elected to transfer to the Year 2000 Plan during the election window from July 1, 2000 through July 1, 2001, and their survivors.
4. HTEHPRS members who left state employment prior to becoming vested (not eligible for a future retirement benefit) and returns to work in a benefit eligible position on or after July 1, 2000.

#### Normal Retirement Eligibility (unreduced benefit)

*All Employees:* The earlier of attaining:

1. Age 65 with at least 4 years of creditable service.
2. Age 60 with at least 15 years of creditable service.
3. Age 50 with age plus creditable service equal to 80 or more.

*Uniformed Patrol Employees Only:* The earlier of attaining:

1. Age 55 with at least 4 years of creditable service.
2. Mandatory retirement at age 60 with 5 or more years of creditable service.

#### Final Average Pay used for Benefit Determination

Final Average Pay is the average annual pay of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining average pay). Employees retiring from active service will receive 1/12 of a year of creditable service for every 168 hours of unused sick leave (usable only for benefit computation, not

#### Normal Retirement Eligibility (unreduced benefit)

*All Employees:* The earlier of attaining:

1. Age 62 with at least 5 years of creditable service.
2. Age 50 with age plus creditable service equal to 80 or more.

*Uniformed Patrol Employees Only:*

1. Age 60 with at least 5 years of creditable service.

#### Final Average Pay used for Benefit Determination

Final Average Pay is the average annual pay of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining average pay). All members will receive 1/12 of a year of creditable service for every 168 hours of unused sick leave (usable only for benefit computation, not eligibility).

**Normal Retirement Benefit Amount*****Non-Uniformed Employees:***

Life Benefit: 1.6% of final average pay times years of creditable service.

***Uniformed Patrol Employees:***

Life Benefit: 2.1333% of final average pay times years of creditable service.

Supplemental Benefit: \$90 per month payable until age 65. Offset by any amount earned during gainful employment. This benefit does not apply to uniformed members hired on or after January 1, 1995.

**Early Retirement (reduced benefit)*****Eligibility: Non-Uniformed Employees***

Age 55 with at least 10 years of creditable service.

***Amount:***

Normal retirement amount reduced by 0.6% for each month that retirement precedes eligibility for normal retirement.

*Uniformed Patrol* members are not eligible for early retirement.

**Vested Deferred Benefits*****Eligibility: All Employees***

Fully vested in accrued pension with 5 years of creditable service. The benefit will commence at the age the individual would have been eligible for early or normal retirement, considering years of creditable service.

**Normal Retirement Benefit Amount*****All Employees:***

Life Benefit: 1.7% of final average pay times years of creditable service.

Temporary Benefit: If member retires between ages 50 and 62 with age plus creditable service equal to 80 or more, a temporary benefit is payable in the amount of 0.8% of final average pay times years of creditable service until attainment of the minimum age at which reduced social security benefits are payable or death, whichever occurs first.

**Early Retirement (reduced benefit)*****Eligibility: All Employees***

Age 57 with at least 5 years of creditable service.

***Amount:***

Normal retirement amount reduced by 0.5% for each month that retirement precedes eligibility for normal retirement.

**Vested Deferred Benefits*****Eligibility: All Employees***

Fully vested in accrued pension with 5 years of creditable service. The benefit will commence at the age the individual would have been eligible for early or normal retirement considering years of creditable service.

## **Closed Plan**

## **Year 2000 Plan**

### **Death Prior to Retirement**

A death benefit is payable to the surviving spouse or eligible children of the member who dies after earning 3 years of creditable service. The survivor annuity shall be the total monthly payment equal to twenty-five percent of the deceased member's accrued annuity calculated as if the member was of normal retirement age as of the date of death.

The spouse of the member who dies after accruing 5 years of creditable service may elect to receive an annuity as if the employee had retired on the date of death and elected a joint and 100% survivor annuity.

If no eligible spouse survives or upon the death of the spouse, 80% of the member's accrued annuity will be paid to eligible children until age 21.

If the death is duty-related, there is no service requirement and the minimum annuity is 50% of the final average pay (FAP) to the surviving spouse or eligible children.

### **Death After Retirement**

The benefit payable for death after retirement is the 50% joint and survivor form of payment. Alternate forms of payment including period certain annuities or other joint and survivor percentages are available as optional forms of payment elected at time of retirement.

A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary. Additionally, a member may designate a new spouse as beneficiary in the event of the death of the spouse the member was married to at the date of retirement. However, if the member wishes to provide their new spouse with the Joint & 100% option, they must notify our office and complete the necessary paperwork within one year from their date of marriage.

For period certain annuities, beneficiaries may be changed at any time.

### **Death Prior to Retirement**

The spouse shall receive a benefit computed as if the member had been normal retirement age on the date of death and elected the joint and 100% survivor option form of payment, provided the member had at least 5 years of creditable service.

If no eligible spouse survives, 80% of the member's accrued annuity will be paid to eligible children.

If the death is duty related, there is no service requirement and the minimum annuity is 50% of the final average pay (FAP) to the surviving spouse or eligible children.

### **Death After Retirement**

The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement.

A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary. Additionally, a member may designate a new spouse as beneficiary in the event of the death of the spouse the member was married to at the date of retirement. However, if the member wishes to provide their new spouse with a joint & survivor option, they must notify our office and complete the necessary paperwork within one year from their date of marriage.

For period certain annuities, beneficiaries may be changed at any time.



## Closed Plan

## Year 2000 Plan

### Pop-Up Provision

Benefits to members who choose a reduced survivor form of payment and whose spouse precedes the member in death, will “pop-up” or revert to the amount the member would have received had he/she not elected a reduced survivor option.

### \$5000 Death Benefit

HTEHPRS provides a \$5,000 death benefit for a designated beneficiary(ies) of members who retire or elect normal or work-related disability benefits after September 28, 1985.

### Purchase of Service

Military: Prior to retirement, qualifying members may purchase up to a maximum of 4 years military service that includes active service, and/or active and inactive duty training from which they were honorably discharged. All months the member is eligible for must be purchased. This service credit can be used to satisfy the vesting requirement. Periods of military service cannot coincide with employment in a state agency.

Police Service: Prior to retirement, uniformed patrol members only, may purchase up to a maximum of 4 years police service. Members must purchase all months of service they are eligible for.

Portability: Section 105.691 allows vested members to acquire (purchase/transfer) service credit for any non-federal, full-time public sector employment within Missouri.

Service may be purchased/transferred by using the member’s own money and/or using the value of the retirement benefit in the prior retirement plan if that plan has an agreement with HTEHPRS. Any non-federal public employment **not covered** by a retirement plan must be purchased.

### Pop-Up Provision

Same.

### \$5000 Death Benefit

HTEHPRS provides a \$5,000 death benefit for a designated beneficiary(ies) of members who retire or elect work-related disability benefits.

### Purchase of Service

Military: Prior to retirement, qualifying members may purchase up to a maximum of 4 years military service that includes active service from which they were honorably discharged. All months the member is eligible for must be purchased. This service credit cannot be used to satisfy the vesting requirement. Periods of military service cannot coincide with employment in a state agency.

Police Service: Not available.

Portability: Same as Closed Plan Section 105.691.

In addition, Section 104.1090 provides that in-state vested service with another retirement system may be granted after 10 years of state service if the other retirement plan agrees to transfer assets equal to the accrued liability to HTEHPRS.

**Disability**

Benefits that may be payable during the period of disability (whether Normal, Work-related, or LTD) are administered through a separate program and were not considered for purposes of the valuation.

Normal retirement benefits become payable at the time a disabled member becomes eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability.

**Post-Retirement Benefit Adjustments**

For active and inactive employees hired prior to 8/28/97 and current retirees, the benefits of pensioners and their beneficiaries are increased annually by 80% of the increase in the Consumer Price Index (subject to a maximum increase of 5% and a minimum of 4%). These increases are made until the total of the increases reaches 65% at which time the increases will have the minimum removed.

For employees hired on or after 8/28/97 the annual percentage increase is equal to the lesser of:

- i) 80% of the CPI increase, or
- ii) 5%.

**Member Contributions** None

**Disability**

Same.

**Post-Retirement Benefit Adjustments**

Benefits are increased to retired members (including survivors) annually in accordance with the following:

Annual benefit percentage increase equal to the lesser of:

- i) 80% of the CPI increase, or
- ii) 5%.

**Member Contributions** None

**SUMMARY OF BENEFIT PROVISIONS EVALUATED**  
**AS OF JUNE 30, 2003**  
**(CONTINUED)**

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**The Closed Plan & Year 2000 Plan**  
**BackDROP Option**

Legislation effective January 1, 2002 provides a Deferred Retirement Option Provision (BackDROP) to members of HTEHPRS. It is available in both the Closed Plan and the Year 2000 Plan.

To be eligible to participate in the BackDROP, a member must have been eligible to retire under normal age and/or service conditions for at least two years. A retroactive starting date is established for BackDROP purposes which is the later of: 1) the member's normal retirement date or 2) five years prior to the annuity starting date under the retirement plan selected by the member.

The BackDROP period for the accumulation of the BackDROP account is from the retroactive starting date to the annuity starting date. This results in a BackDROP period of one to five years depending upon the individual situation.

A theoretical BackDROP account is accumulated that includes 90% of the value of the benefit payments that would have been paid during the BackDROP period had the member retired at the retroactive starting date with their respective option election. These payments include applicable post-retirement benefit increases. These payments do not include any reduction for spouse options during the BackDROP period. The member may choose the BackDROP period in twelve-month increments or their maximum period, not to exceed 60 months.

The member is paid the resulting lump sum value of the BackDROP account as of the annuity starting date or as three equal annual installments beginning at the annuity starting date.

The annuity benefit payable from the actual retirement date is computed with years of service and final average pay as of the retroactive starting date for the BackDROP. Post-retirement benefit increases that occurred during the BackDROP period are applied in the calculation of the monthly annuity.

**SAMPLE BENEFIT COMPUTATION FOR MEMBERS  
RETIRING JUNE 30, 2003  
NON-UNIFORMED EMPLOYEE**

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	<b>Data</b>	<b>Description</b>
A.	\$40,000	Final Average Pay
B.	20	Years of Credited Service
C.	60	Age of Retiree
D.	50%	Automatic percentage to continue to spouse after retirant's death

**Sample Computation Steps**

E. Retirement Benefit Formula:  $0.016 \times 20 \times \$40,000 = \$12,800$

**Benefit payable to:**

F. Retiree while spouse is alive (E)	\$12,800
G. Spouse after retiree's death (D x E)	\$ 6,400
H. Retiree after spouse's death	\$12,800

<b>Year Ended June 30</b>	<b>Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%</b>
2004	\$12,800
2005	13,158
2006	13,527
2007	13,906
2008	14,295
2009	14,695
2010	15,107
2011	15,530
2012	15,964
2013	16,411

**SAMPLE BENEFIT COMPUTATION FOR MEMBERS  
RETIRING JUNE 30, 2003  
UNIFORMED PATROL**

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	<b>Data</b>	<b>Description</b>
A.	\$40,000	Final Average Pay
B.	20	Years of Credited Service
C.	60	Age of Retiree
D.	50%	Automatic percentage to continue to spouse after retirant's death

**Sample Computation Steps**

E. Retirement Benefit Formula:  $0.021333 \times 20 \times \$40,000 = \$17,066$

**Benefit payable to:**

F. Retiree while spouse is alive (E)	\$17,066
G. Spouse after retiree's death (D x E)	\$ 8,533
H. Retiree after spouse's death	\$17,066

Amounts shown below do not include the \$1,080 annual supplementary benefit payable to age 65.

<b>Year Ended June 30</b>	<b>Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%</b>
2004	\$17,066
2005	17,544
2006	18,035
2007	18,540
2008	19,060
2009	19,593
2010	20,142
2011	20,706
2012	21,286
2013	21,882

**SAMPLE BENEFIT COMPUTATION FOR MEMBERS  
RETIRING JUNE 30, 2003  
YEAR 2000 PLAN**

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	<b>Data</b>	<b>Description</b>
A.	\$40,000	Final Average Pay
B.	20	Years of Credited Service
C.	60	Age of Retiree
D.	0%	Automatic percentage to continue to spouse after retirant's death

**Sample Computation Steps**

E1. Retirement Benefit Formula:	$0.017 \times 20 \times \$40,000 = \$13,600$
E2. Supplemental Benefit Formula:	$.008 \times 20 \times \$40,000 = \$6,400$

**Benefit payable to:**

F1. Retiree prior to age 62 (E1+E2)	\$20,000
F2. Retiree after age 62 (E1)	\$13,600
G. Spouse after retiree's death (D x E)	\$ 0

<b>Year Ended June 30</b>	<b>Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%</b>
2004	\$20,000
2005	20,560
2006	21,136
2007	21,727
2008	22,336
2009	22,961
2010	23,604
2011	24,265
2012	24,945
2013	25,643

# SECTION C



## Financial Information

**SUMMARY OF FUND OPERATIONS**  
**JUNE 30, 2003**

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	<b>Book Value</b>	<b>Market Value</b>
Fund as of July 1, 2002	\$1,312,427,299	\$1,268,238,498
Contributions		
Employer	79,987,770	79,987,770
Transfer from MOSERS	2,050,813	2,050,813
Service Purchase (Employee)	533,444	533,444
Total Contributions	\$ 82,572,027	\$ 82,572,027
Investment Income		
Interest	\$ 24,693,846	\$ 24,693,846
Dividends	10,875,905	10,875,905
Realized Capital Gains	31,811,075	31,811,075
Realized Capital Losses	(157,370,771)	(157,370,771)
Miscellaneous Income	137,332	137,332
Adjustment in Book Value	0	0
Securities Lending Income	129,258	129,258
Total Investment Income	\$ (89,723,355)	\$ (89,723,355)
Increase (Decrease) in Unrealized Appreciation	N/A	129,261,011
Benefit Payments		
Retirement Payments	\$ 143,386,832	\$ 143,386,832
Death Benefits	410,000	410,000
Long-Term Disability Payments	537,513	537,513
Refund and Final Settlement	0	0
Total Benefit Payments	\$ 144,334,345	\$ 144,334,345
Expenses		
Investment	\$ 3,011,653	\$ 3,011,653
Actuarial	115,190	115,190
Other	1,336,665	1,336,665
Total Expenses	\$ 4,463,508	\$ 4,463,508
Fund as of June 30, 2003	\$1,156,478,118	\$1,241,550,328



**DEVELOPMENT OF ACTUARIAL VALUE OF RETIREMENT SYSTEM ASSETS**  
**JUNE 30, 2003**

Valuation Date of June 30	2000	2001	2002	2003	2004
<b>A. Actuarial value at beginning of year</b>	\$1,289,072,760	\$1,431,554,156	\$1,529,835,552	\$1,458,914,009	
<b>B. Market value at end of year</b>	1,477,276,993	1,413,243,545	1,268,150,170	1,241,550,328	
<b>C. Market value at beginning of year</b>	1,448,562,782	1,477,276,993	1,413,243,545	1,268,238,498	
<b>D. Cash flow</b>					
D1. Contributions	70,519,534	81,353,019	77,440,468	79,987,770	
D2. Benefit Payments	(95,402,855)	(111,985,065)	(133,498,815)	(144,334,345)	
D3. Administrative Expenses	(663,889)	(835,215)	(1,415,592)	(1,451,855)	
D4. Non-Investment Net Cash Flow	(25,547,210)	(31,467,261)	(57,473,939)	(65,798,430)	
<b>E. Investment income</b>					
E1. Market total (B - C - D4)	54,261,421	(32,566,187)	(87,619,436)	39,110,260	
E2. Assumed Rate of Return	8.25%	8.25%	8.25%	8.25%	8.25%
E3. Amount for Immediate Recognition (A+.5xD4)xE2	105,294,680	116,805,193	123,840,633	117,646,221	
E4. Amount for Phased-In Recognition	(51,033,259)	(149,371,380)	(211,460,069)	(78,535,961)	
<b>F. Phased in recognition of investment income</b>					
F1. Current Year (33 1/3% of E4)	(17,011,086)	(49,790,460)	(70,486,690)	(26,178,654)	TBA
F2. First Prior Year	18,013,291	(17,011,086)	(49,790,460)	(70,486,690)	\$(26,178,654)
F3. Second Prior Year	0	18,013,290	(17,011,087)	(49,790,460)	(70,486,689)
F4. Total Recognized Investment Gain (F1 + F2 + F3)	1,002,205	(48,788,256)	(137,288,237)	(146,455,804)	(96,665,343)
F5. Phase-In of Initial (BOY) difference between MVA and AVA	61,731,721	61,731,720	0	0	0
<b>G. Actuarial value at end of year (A + D4 + E3 + F4)</b>	1,431,554,156	1,529,835,552	1,458,914,009	1,364,305,996	
<b>Less LTD Assets</b>	8,758,145	9,035,143	8,406,577	353,474	240,332
<b>H. Plan AVA</b>	1,422,796,011	1,520,800,409	1,450,507,432	1,363,952,522	
<b>Difference between market and actuarial values</b>	45,722,837	(116,592,007)	(190,763,839)	(122,755,668)	
<b>Recognized actuarial rate of return</b>	13.17%	9.16%	(0.90)%	(2.02)%	

This schedule reflects a change in asset valuation method adopted following an experience study. The asset value used in the 6/30/1999 valuation was different than the amount shown in the schedule above.

## ALLOCATION OF ASSETS BETWEEN GROUPS

---

The division between the Uniformed Patrol and Non-Uniformed Employee groups is in proportion to their present value of future benefits, as shown below:

	as of June 30	
	2003	2002
1. Assets Allocated to Retirement Benefits	\$ 1,363,952,522	\$ 1,450,507,432
2. Present Value Future Benefits		
a) Uniformed Patrol	610,385,610	590,947,795
b) Non-Uniformed Employees	2,221,728,784	2,163,966,434
c) Total	2,832,114,394	2,754,914,229
3. Asset Allocation*		
a) Uniformed Patrol		
(2a) / (2c) x (1)	289,577,835	307,954,122
b) Non-Uniformed Employees		
(2b) / (2c) x (1)	1,074,374,687	1,142,553,310
Total Assets Allocated	1,363,952,522	1,450,507,432

\* Asset allocation ratio between Uniformed Patrol and Non-Uniformed Employees is fixed at the 2000 level. For the 6/30/2000 valuation, the Present Value of Future Benefits was \$539,940,808 for the Uniformed Patrol group and \$2,003,256,696 for the Non-Uniformed Employee group. It is recommended that separate accounting be mandated going forward.

# SECTION D



## Summary of Member Data

**COUNT AND AVERAGE SALARY OF  
UNIFORMED PATROL ACTIVE MEMBERS  
AS OF JUNE 30, 2003  
BY ATTAINED AGE AND YEARS OF SERVICE**

Attained Age	Count by Complete Years of Service to Valuation Date								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
20-24	34								34
25-29	103	45							148
30-34	49	191	19						259
35-39	15	92	113	8					228
40-44	4	24	35	72	17				152
45-49	1	4	8	30	55	29			127
50-54				2	19	62	15		98
55-59						5	16	6	27
60-64									0
<b>Totals</b>	<b>206</b>	<b>356</b>	<b>175</b>	<b>112</b>	<b>91</b>	<b>96</b>	<b>31</b>	<b>6</b>	<b>1,073</b>

Age	Average Salary by Complete Years of Service to Valuation Date								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
20-24	\$20,999								\$20,999
25-29	31,039	\$35,977							32,540
30-34	29,574	37,648	\$41,752						36,422
35-39	26,248	37,817	44,043	\$49,117					40,538
40-44	18,057	37,903	42,931	48,065	\$52,528				44,987
45-49	32,948	38,165	44,236	48,590	56,685	\$57,981			53,514
50-54				49,414	55,172	61,861	\$68,359		61,305
55-59						59,043	68,039	\$65,865	65,890
60-64									
<b>Totals</b>	<b>\$29,194</b>	<b>\$37,504</b>	<b>\$43,581</b>	<b>\$48,305</b>	<b>\$55,592</b>	<b>\$60,542</b>	<b>\$68,194</b>	<b>\$65,865</b>	<b>\$42,523</b>

Average Age: 37.6 years  
Average Service: 12.3 years

The Uniformed Patrol group includes 146 active members hired on or after July 1, 2000.

**COUNT AND AVERAGE SALARY OF  
NON-UNIFORMED HIGHWAY DEPARTMENT ACTIVE MEMBERS  
AS OF JUNE 30, 2003  
BY ATTAINED AGE AND YEARS OF SERVICE**

Attained Age	Count by Complete Years of Service to Valuation Date								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
15-19	11								11
20-24	271	3							274
25-29	445	107	3						555
30-34	362	341	127	3					833
35-39	330	217	251	145	11				954
40-44	322	211	219	332	152	26			1,262
45-49	185	176	169	215	187	224	5		1,161
50-54	153	104	110	161	92	204	85	4	913
55-59	78	63	84	74	49	57	64	44	513
60-64	31	22	25	45	22	22	12	35	214
65-99	10	6	8	3	2	2		4	35
<b>Totals</b>	<b>2,198</b>	<b>1,250</b>	<b>996</b>	<b>978</b>	<b>515</b>	<b>535</b>	<b>166</b>	<b>87</b>	<b>6,725</b>

Attained Age	Average Salary by Complete Years of Service to Valuation Date								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
15-19	\$27,090								\$27,090
20-24	30,560	\$25,495							30,504
25-29	32,022	31,102	\$28,349						31,824
30-34	30,982	35,868	36,281	\$27,904					33,779
35-39	30,418	33,147	39,691	42,145	\$39,152				35,362
40-44	29,562	31,438	35,506	43,898	39,618	\$39,584			36,096
45-49	29,918	32,767	33,737	39,650	40,512	40,628	\$43,869		36,541
50-54	29,482	30,302	35,869	38,530	37,942	42,984	44,883	\$47,791	37,324
55-59	33,425	31,475	34,899	36,332	38,066	39,942	51,084	47,184	38,397
60-64	30,347	33,226	33,053	34,975	35,828	39,501	40,910	49,424	37,149
65-99	41,971	25,892	32,275	36,838	32,202	47,608		48,240	37,039
<b>Totals</b>	<b>\$30,762</b>	<b>\$33,000</b>	<b>\$36,239</b>	<b>\$40,767</b>	<b>\$39,295</b>	<b>\$41,382</b>	<b>\$46,956</b>	<b>\$48,162</b>	<b>\$35,567</b>

Average Age: 42.1 years  
Average Service: 11.7 years

The Non-Uniformed Highway Department group includes 1,395 active members hired on or after July 1, 2000.

**COUNT AND AVERAGE SALARY OF  
NON-UNIFORMED CIVILIAN PATROL ACTIVE MEMBERS  
AS OF JUNE 30, 2003  
BY ATTAINED AGE AND YEARS OF SERVICE**

Attained Age	Count by Complete Years of Service to Valuation Date								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
15-19	3								3
20-24	31	4							35
25-29	67	23							90
30-34	49	46	11						106
35-39	42	48	34	16	1				141
40-44	52	34	36	40	25	4			191
45-49	28	28	19	37	39	33	6		190
50-54	33	26	17	20	27	33	27	2	185
55-59	18	20	19	23	10	10	5	6	111
60-64	7	4	9	5	3	3	1	2	34
65-99	1		1	3		1		2	8
<b>Totals</b>	<b>331</b>	<b>233</b>	<b>146</b>	<b>144</b>	<b>105</b>	<b>84</b>	<b>39</b>	<b>12</b>	<b>1,094</b>

Attained Age	Average Salary by Complete Years of Service to Valuation Date								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
15-19	\$17,333								\$17,333
20-24	24,224	\$22,875							24,070
25-29	25,344	25,795							25,460
30-34	31,889	28,769	\$34,913						30,849
35-39	24,061	29,753	36,056	\$31,403	\$33,276				29,789
40-44	25,064	28,703	32,526	37,145	35,026	\$32,934			31,117
45-49	25,309	28,731	28,902	35,769	39,902	36,002	\$40,682		33,548
50-54	25,532	27,493	28,472	32,868	39,430	41,866	41,414	\$41,910	34,308
55-59	23,337	24,470	29,181	29,430	33,916	38,683	41,547	51,878	30,503
60-64	17,644	39,157	25,079	33,148	29,510	38,753	35,328	48,288	29,655
65-99	16,792		28,024	28,674		25,380		28,362	26,618
<b>Totals</b>	<b>\$25,647</b>	<b>\$28,230</b>	<b>\$31,659</b>	<b>\$34,012</b>	<b>\$37,690</b>	<b>\$38,451</b>	<b>\$41,162</b>	<b>\$45,699</b>	<b>\$31,012</b>

Average Age: 43.4 years  
Average Service: 12.0 years

The Non-Uniformed Civilian Patrol group includes 238 active members hired on or after July 1, 2000.

## GROWTH OF ACTIVE MEMBER PAYROLL

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Actuarial Valuation for June 30,	Number	Covered Payroll	Average Pay	% Change in Average Pay from Prior Year
1989	8,181	\$194,452,400	\$23,769	(0.5)%
1990	8,256	211,414,753	25,607	7.7%
1991	8,308	220,856,988	26,584	3.8%
1992	8,591	228,503,592	26,598	0.1%
1993	8,658	236,236,082	27,285	2.6%
1994	8,849	242,864,780	27,445	0.6%
1995	8,904	250,529,253	28,137	2.5%
1996	9,023	264,196,115	29,280	4.1%
1997	8,997	280,209,116	31,145	6.4%
1998	8,871	284,889,796	32,115	3.1%
1999	9,140	298,673,247	32,678	1.8%
2000	9,171	312,532,009	34,078	4.3%
2001	9,087	327,049,257	35,991	5.6%
2002	8,695	312,747,492	35,969	(0.1)%
2003	8,892	318,744,192	35,846	(0.3)%
			Ten Year Average	2.8%

**COUNT AND AVERAGE MONTHLY BENEFITS OF  
UNIFORMED PATROL RETIRED (NON-DISABLED) MEMBERS  
AS OF JUNE 30, 2003  
BY ATTAINED AGE AND YEARS OF BENEFIT PAYMENT**

Attained Age	Count by Complete Years of Benefit Payment								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<40	1								1
40-44	1	2							3
45-49	1		1						2
50-54	42	1	1	2					46
55-59	91	51		2					144
60-64	41	104	1	2					148
65-69	6	39	56						101
70-74	7	3	45	27	1	1	1		85
75-79	7	4	9	27	11	1			59
80-84	7	6	2	4	23	4			46
85+	17	9	2	17	1	8	11	2	67
<b>Totals</b>	<b>221</b>	<b>219</b>	<b>117</b>	<b>81</b>	<b>36</b>	<b>14</b>	<b>12</b>	<b>2</b>	<b>702</b>

Attained Age	Average Benefit by Complete Years of Benefit Payment								Average
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<40	\$ 724								\$ 724
40-44	1,812	\$ 947							1,235
45-49	1,955		\$ 2,550						2,253
50-54	3,359	3,867	1,765	\$ 123					3,195
55-59	3,307	3,340		680					3,282
60-64	3,917	3,497	2,598	682					3,569
65-69	2,639	3,995	4,085						3,964
70-74	1,704	3,875	4,543	3,653	\$ 742	\$ 261	\$ 185		3,857
75-79	2,042	1,716	1,808	3,989	2,682	386			2,967
80-84	1,262	1,454	1,587	2,044	3,287	2,060			2,451
85+	1,159	1,351	1,193	647	675	2,249	1,839	\$ 1,568	1,303
<b>Totals</b>	<b>\$3,067</b>	<b>\$3,356</b>	<b>\$3,948</b>	<b>\$2,821</b>	<b>\$2,959</b>	<b>\$1,920</b>	<b>\$1,701</b>	<b>\$1,568</b>	<b>\$3,219</b>

As of June 30, 2003 there was 1 Uniformed Patrol retired member or beneficiary receiving benefits under the Year 2000 Plan.



**COUNT AND AVERAGE MONTHLY BENEFITS OF  
NON-UNIFORMED RETIRED (NON-DISABLED) MEMBERS  
AS OF JUNE 30, 2003  
BY ATTAINED AGE AND YEARS OF BENEFIT PAYMENT**

Attained Age	Count by Complete Years of Benefit Payment								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<40	11	8	4	1					24
40-44	5	4	1						10
45-49	12	6	4	2					24
50-54	242	9	7	3	1				262
55-59	486	117	12	6	5	2			628
60-64	547	296	29	13	5	1			891
65-69	318	517	218	12	8	5	2		1,080
70-74	122	311	419	81	12	7	4		956
75-79	99	84	312	224	25	11	4		759
80-84	79	49	115	169	142	16	2		572
85+	117	64	168	13	85	76	11		534
<b>Totals</b>	<b>2,038</b>	<b>1,465</b>	<b>1,289</b>	<b>524</b>	<b>283</b>	<b>118</b>	<b>23</b>		<b>5,740</b>

Attained Age	Average Benefit by Complete Years of Benefit Payment								Average
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<40	\$ 318	\$ 220	\$ 37	\$ 25					\$ 226
40-44	851	880	475						825
45-49	925	1,007	491	97					804
50-54	2,423	890	863	203	\$ 124				2,295
55-59	2,298	1,908	759	363	192	\$ 75			2,154
60-64	1,861	1,752	966	415	311	94			1,764
65-69	1,634	1,835	1,580	483	252	143	\$ 1,008		1,688
70-74	1,231	1,605	1,845	1,231	300	134	92		1,597
75-79	980	959	1,707	1,506	673	197	116		1,406
80-84	737	650	532	1,252	1,118	417	157		924
85+	639	604	298	570	914	875	829		607
<b>Totals</b>	<b>\$1,786</b>	<b>\$1,611</b>	<b>\$1,402</b>	<b>\$1,279</b>	<b>\$ 924</b>	<b>\$654</b>	<b>\$ 534</b>		<b>\$1,538</b>

As of June 30, 2003 there were 1,309 Non-Uniformed retired members or beneficiaries receiving benefits under the Year 2000 Plan.

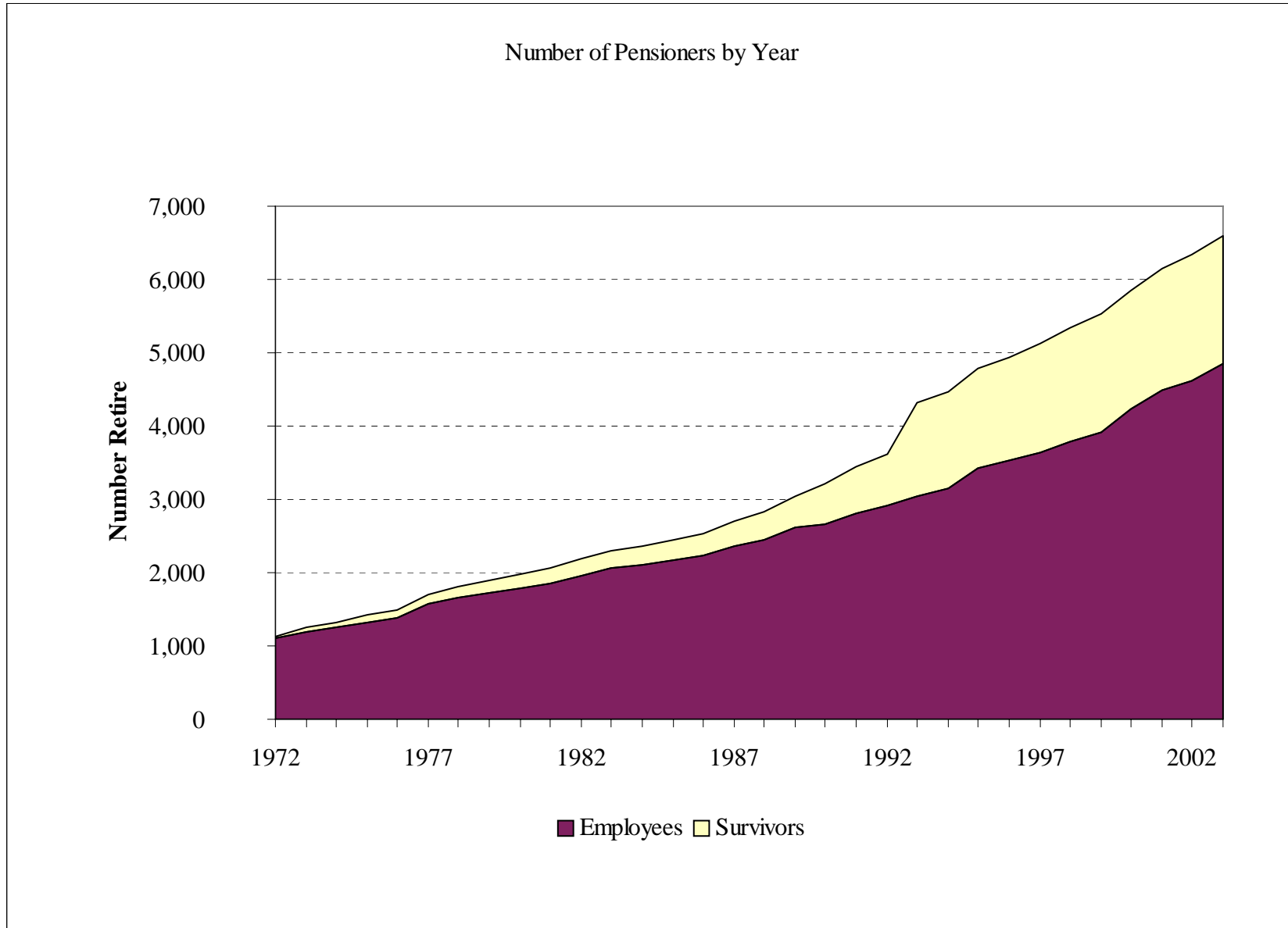
## GROWTH OF PENSION POPULATION BY YEAR

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Year	Retired Employees	Survivors	Total*	% Increase	Annual Benefits	Active Payroll	Benefits as a % of Payroll
1972	1,102	35	1,137				
1973	1,197	50	1,247	9.7 %	-	-	-
1974	1,262	65	1,327	6.4 %	-	-	-
1975	1,327	96	1,423	7.2 %	-	-	-
1976	1,389	103	1,492	4.8 %	-	-	-
1977	1,573	130	1,703	14.1 %	-	-	-
1978	1,658	145	1,803	5.9 %	-	-	-
1979	1,730	174	1,904	5.6 %	-	-	-
1980	1,797	186	1,983	4.1 %	-	-	-
1981	1,860	204	2,064	4.1 %	-	-	-
1982	1,957	225	2,182	5.7 %	-	-	-
1983	2,061	244	2,305	5.6 %	-	-	-
1984	2,107	261	2,368	2.7 %	-	-	-
1985	2,164	280	2,444	3.2 %	-	-	-
1986	2,227	312	2,539	3.9 %	-	-	-
1987	2,369	341	2,710	6.7 %	-	-	-
1988	2,440	380	2,820	4.1 %	-	-	-
1989	2,610	441	3,051	8.2 %	-	-	-
1990	2,669	543	3,212	5.3 %	-	-	-
1991	2,814	632	3,446	7.3 %	-	-	-
1992	2,908	699	3,607	4.7 %	-	-	-
1993	3,047	1,269	4,316	19.7 %	-	-	-
1994	3,156	1,307	4,463	3.4 %	-	-	-
1995	3,419	1,365	4,784	7.2 %	-	-	-
1996	3,536	1,405	4,941	3.3 %	-	-	-
1997	3,646	1,486	5,132	3.9 %	-	-	-
1998	3,781	1,549	5,330	3.9 %	\$ 80,686,152	\$284,889,796	28.3%
1999	3,924	1,600	5,524	3.6 %	91,512,311	298,673,247	30.6%
2000	4,236	1,621	5,857	6.0 %	100,794,676	312,532,009	32.3%
2001	4,482	1,663	6,145	4.9 %	115,998,915	327,049,257	35.5%
2002	4,623	1,716	6,339	3.2 %	125,623,460	312,747,492	40.2%
2003	4,845	1,751	6,596	4.1 %	136,320,125	318,744,192	42.8%

\* After 2003, members receiving LTD benefits (who began benefits prior to 2004) are included.

# GROWTH OF PENSION POPULATION BY YEAR



**COUNT OF VESTED TERMINATED MEMBERS  
AS OF JUNE 30, 2003  
BY ATTAINED AGE AND YEARS OF SERVICE**

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**UNIFORMED PATROL**

Attained Age	Count by Complete Years of Service to Valuation Date								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
25-29									0
30-34		37	2						39
35-39		15	11						26
40-44		6	6	1					13
45-49		1	12	3	1				17
50-54			7	5	4	2			18
55-59			4						4
60-64									0
<b>Totals</b>		<b>59</b>	<b>42</b>	<b>9</b>	<b>5</b>	<b>2</b>			<b>117</b>

**NON-UNIFORMED**

Attained Age	Count by Complete Years of Service to Valuation Date								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
25-29		20							20
30-34		91	13						104
35-39		139	56	11					206
40-44	1	147	85	34	3				270
45-49		75	66	44	19	4			208
50-54		54	55	31	16	5	1		162
55-59		25	49	25	7				106
60-64		4	7	2					13
65 and over			1						1
<b>Totals</b>	<b>1</b>	<b>555</b>	<b>332</b>	<b>147</b>	<b>45</b>	<b>9</b>	<b>1</b>		<b>1,090</b>

**COUNT AND AVERAGE MONTHLY BENEFITS OF  
DISABLED RETIRED MEMBERS  
AS OF JUNE 30, 2003  
BY ATTAINED AGE AND YEARS OF RETIREMENT**

Attained Age	Count by Complete Years of Retirement								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<40	4								4
40-44	6	3		1					10
45-49	3	1		2					6
50-54	8	7			1				16
55-59	6	1	1	1	2	2			13
60-64	4	1	1		2				8
65-69		1	1	3	2				7
70-74				2					2
75-79				1	1	1			3
80-84					4				4
85+							1		1
<b>Totals</b>	<b>31</b>	<b>14</b>	<b>3</b>	<b>10</b>	<b>12</b>	<b>3</b>	<b>1</b>		<b>74</b>

Attained Age	Average Benefit by Complete Years of Retirement								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<40	\$5,354								\$5,354
40-44	1,302	\$1,011		\$ 57					1,090
45-49	1,493	1,259		487					1,119
50-54	984	1,775			\$ 166				1,279
55-59	2,508	1,502	\$1,265	681	189	\$238			1,488
60-64	824	1,957	700		321				824
65-69		1,147	1,217	1,100	617				986
70-74				333					333
75-79				514	1,792	634			980
80-84					554				554
85+							\$529		529
<b>Totals</b>	<b>\$1,933</b>	<b>\$1,523</b>	<b>\$1,061</b>	<b>\$619</b>	<b>\$536</b>	<b>\$370</b>	<b>\$529</b>		<b>\$1,334</b>

Includes only those members who began receiving disability benefits prior to 2004.

**SCHEDULE OF LONG-TERM DISABILITY RECIPIENTS  
AS OF JUNE 30, 2003  
NUMBER AND AVERAGE BENEFITS BY AGE**

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<b>Age</b>	<b>Number</b>	<b>Percent</b>	<b>Benefit Amount</b>	<b>Average Benefit</b>
Less than 20	0	0%	\$ 0	\$ 0
20-24	0	0%	0	0
25-29	2	3%	1,977	989
30-34	3	4%	3,394	1,131
35-39	4	5%	2,576	644
40-44	16	20%	13,206	825
45-49	14	18%	12,363	883
50-54	19	24%	14,822	780
55-59	10	11%	5,800	580
60-64	11	14%	5,589	508
65-69	1	1%	454	454
70 & Over	0	0%	0	0
<b>TOTAL</b>	<b>80</b>	<b>100%</b>	<b>\$60,181</b>	<b>\$ 752</b>

Includes only those members who began receiving LTD benefits prior to 2004.

## SECTION E



### Assumptions Used in the Valuation

**APPENDIX**  
**SUMMARY OF VALUATION METHOD AND ASSUMPTIONS**  
**JUNE 30, 2003**

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*The actuarial assumptions used* in the valuation are shown in this Appendix of the report. The assumptions were established for the June 30, 2000 actuarial valuation, following a five-year actuarial investigation. They were adopted by the Board after obtaining the advice of the Actuary and other professionals.

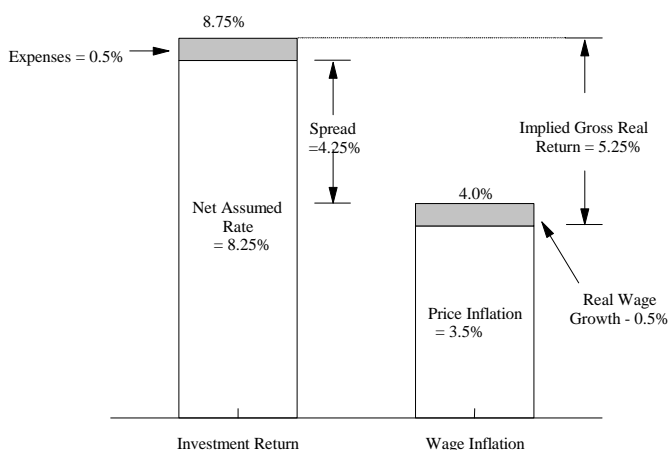
**Economic Assumptions**

*The investment return rate* used in making the valuations was 8.25% per year, compounded annually (net after investment expenses). The *wage inflation rate* was assumed to be 4.00%. The real rate of return is the portion of total investment return, which is more than the rate of wage inflation. The 8.25% investment return rate and 4.00% wage inflation rate translates to an assumed real rate of return net of expenses of 4.25%.

*Pay increase assumptions for merit and seniority* for individual active members are shown on page E-4. Part of the total assumed pay increase at each age is for merit and/or seniority, and the other 4.00% recognizes wage inflation. *The active member payroll* is assumed to increase 4.0% annually.

*The price inflation rate* is assumed to be 3.5% annually. This is the inflation rate upon which the post-retirement increases are based. The difference between wage and price inflation of 0.5% is attributable to overall productivity increases and societal factors.

*The number of active members* is assumed to continue at the present number.





**SUMMARY OF VALUATION METHOD AND ASSUMPTIONS**  
**JUNE 30, 2003**  
**(CONTINUED)**

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**Non-Economic Assumptions**

*The mortality tables*, for post-retirement mortality, used in evaluating allowances to be paid to non-disabled pensioners were the 1971 Group Annuity Mortality Tables to the year 2000 set back 1 year for males and 7 years for females. Pre-retirement mortality used was 50% of the 71GAM2000 tables set back 1 year for males and 7 years for females. Disabled pension mortality was based on PBGC Disabled Mortality tables. Related values are shown on page E-4.

*The probabilities of age and service retirement* are shown on page E-5.

*The probabilities of withdrawal from service* are shown on pages E-7 and E-8. *The probabilities of disability* are shown on page E-6.

*The entry age normal actuarial cost method of valuation* was used in determining liabilities and normal cost. The normal cost was calculated as if everyone were in the Year 2000 plan.

Differences in the past between assumed experience and actual experience (“actuarial gains and losses”) become part of actuarial accrued liabilities.

Unfunded actuarial accrued liabilities are amortized to produce payments (principal & interest) which are level percents of payroll contributions.

*Employer contributions* were assumed to be *paid in equal installments* throughout the employer fiscal year.

*Present assets (cash & investments)* were used with a market value adjustment. Assets may be used in the valuation prior to the final audit. The exact method is shown on page C-2.

*The data about persons now covered and about present assets* were furnished by the System’s administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (M.A.A.A.) who has experience performing public plan valuations.

## AGE BASED SALARY SCALE

Age	Salary Increase Assumptions for an Individual Member					
	Non-Uniform			Uniform		
	Merit & Seniority	Base (Economic)	Increase Next Year	Merit & Seniority	Base (Economic)	Increase Next Year
20	3.00%	4.00%	7.00%	4.00%	4.00%	8.00%
21	3.00%	4.00%	7.00%	4.00%	4.00%	8.00%
22	3.00%	4.00%	7.00%	3.50%	4.00%	7.50%
23	3.00%	4.00%	7.00%	3.50%	4.00%	7.50%
24	3.00%	4.00%	7.00%	3.50%	4.00%	7.50%
25	3.00%	4.00%	7.00%	3.50%	4.00%	7.50%
26	3.00%	4.00%	7.00%	3.50%	4.00%	7.50%
27	3.00%	4.00%	7.00%	3.50%	4.00%	7.50%
28	2.95%	4.00%	6.95%	3.20%	4.00%	7.20%
29	2.90%	4.00%	6.90%	2.90%	4.00%	6.90%
30	2.85%	4.00%	6.85%	2.60%	4.00%	6.60%
31	2.80%	4.00%	6.80%	2.30%	4.00%	6.30%
32	2.70%	4.00%	6.70%	2.00%	4.00%	6.00%
33	2.50%	4.00%	6.50%	1.90%	4.00%	5.90%
34	2.30%	4.00%	6.30%	1.80%	4.00%	5.80%
35	2.20%	4.00%	6.20%	1.70%	4.00%	5.70%
36	2.10%	4.00%	6.10%	1.60%	4.00%	5.60%
37	2.00%	4.00%	6.00%	1.50%	4.00%	5.50%
38	1.90%	4.00%	5.90%	1.30%	4.00%	5.30%
39	1.80%	4.00%	5.80%	1.10%	4.00%	5.10%
40	1.70%	4.00%	5.70%	0.90%	4.00%	4.90%
41	1.60%	4.00%	5.60%	0.80%	4.00%	4.80%
42	1.50%	4.00%	5.50%	0.70%	4.00%	4.70%
43	1.50%	4.00%	5.50%	0.60%	4.00%	4.60%
44	1.40%	4.00%	5.40%	0.50%	4.00%	4.50%
45	1.30%	4.00%	5.30%	0.40%	4.00%	4.40%
46	1.00%	4.00%	5.00%	0.30%	4.00%	4.30%
47	0.90%	4.00%	4.90%	0.30%	4.00%	4.30%
48	0.90%	4.00%	4.90%	0.30%	4.00%	4.30%
49	0.80%	4.00%	4.80%	0.30%	4.00%	4.30%
50	0.80%	4.00%	4.80%	0.30%	4.00%	4.30%
51	0.70%	4.00%	4.70%	0.30%	4.00%	4.30%
52	0.70%	4.00%	4.70%	0.30%	4.00%	4.30%
53	0.60%	4.00%	4.60%	0.30%	4.00%	4.30%
54	0.60%	4.00%	4.60%	0.30%	4.00%	4.30%
55	0.60%	4.00%	4.60%	0.30%	4.00%	4.30%
56	0.60%	4.00%	4.60%	0.30%	4.00%	4.30%
57	0.60%	4.00%	4.60%	0.30%	4.00%	4.30%
58	0.50%	4.00%	4.50%	0.30%	4.00%	4.30%
59	0.40%	4.00%	4.40%	0.30%	4.00%	4.30%
60	0.30%	4.00%	4.30%	0.30%	4.00%	4.30%

## POST-RETIREMENT MORTALITY

Age	Regular		Disabled		Age	Regular		Disabled	
	Male	Female	Male	Female		Male	Female	Male	Female
21	0.00042	0.00035	0.04830	0.02630	61	0.01086	0.00646	0.06240	0.03390
22	0.00043	0.00036	0.04830	0.02630	62	0.01195	0.00705	0.06430	0.03470
23	0.00045	0.00037	0.04830	0.02630	63	0.01313	0.00767	0.06570	0.03550
24	0.00047	0.00038	0.04830	0.02630	64	0.01441	0.00831	0.06680	0.03620
25	0.00049	0.00039	0.04830	0.02630	65	0.01593	0.00901	0.06780	0.03700
26	0.00051	0.00040	0.04610	0.02570	66	0.01770	0.00987	0.06870	0.03780
27	0.00054	0.00042	0.04360	0.02530	67	0.01974	0.01086	0.06970	0.03860
28	0.00057	0.00043	0.04110	0.02470	68	0.02204	0.01195	0.07090	0.03940
29	0.00060	0.00045	0.03880	0.02420	69	0.02451	0.01313	0.07230	0.04020
30	0.00063	0.00047	0.03620	0.02370	70	0.02740	0.01441	0.07390	0.04110
31	0.00067	0.00049	0.03390	0.02320	71	0.03068	0.01593	0.07570	0.04210
32	0.00071	0.00051	0.03200	0.02270	72	0.03419	0.01770	0.07760	0.04330
33	0.00076	0.00054	0.03020	0.02220	73	0.03768	0.01974	0.07960	0.04470
34	0.00081	0.00057	0.02880	0.02180	74	0.04106	0.02204	0.08180	0.04650
35	0.00087	0.00060	0.02780	0.02140	75	0.04455	0.02451	0.08420	0.04920
36	0.00093	0.00063	0.02720	0.02120	76	0.04837	0.02740	0.08690	0.05290
37	0.00100	0.00067	0.02710	0.02100	77	0.05286	0.03068	0.09080	0.05780
38	0.00107	0.00071	0.02730	0.02080	78	0.05835	0.03419	0.09620	0.06310
39	0.00116	0.00076	0.02760	0.02080	79	0.06463	0.03768	0.10430	0.06860
40	0.00125	0.00081	0.02820	0.02090	80	0.07136	0.04106	0.11280	0.07460
41	0.00135	0.00087	0.02880	0.02100	81	0.07875	0.04455	0.12210	0.08130
42	0.00148	0.00093	0.02970	0.02130	82	0.08647	0.04837	0.13220	0.08850
43	0.00166	0.00100	0.03050	0.02160	83	0.09449	0.05286	0.14320	0.09620
44	0.00187	0.00107	0.03140	0.02190	84	0.10293	0.05835	0.15510	0.10430
45	0.00213	0.00116	0.03220	0.02240	85	0.11166	0.06463	0.16810	0.11280
46	0.00242	0.00125	0.03300	0.02290	86	0.12064	0.07136	0.18250	0.12210
47	0.00275	0.00135	0.03400	0.02350	87	0.12994	0.07875	0.19800	0.13220
48	0.00311	0.00148	0.03530	0.02420	88	0.13951	0.08647	0.21500	0.14320
49	0.00350	0.00166	0.03670	0.02490	89	0.14955	0.09449	0.23300	0.15510
50	0.00392	0.00187	0.03830	0.02570	90	0.16012	0.10293	0.25250	0.16820
51	0.00437	0.00213	0.04010	0.02640	91	0.17131	0.11166	0.27390	0.18250
52	0.00486	0.00242	0.04200	0.02720	92	0.18291	0.12064	0.29720	0.19800
53	0.00536	0.00275	0.04390	0.02810	93	0.19478	0.12994	0.32260	0.21500
54	0.00590	0.00311	0.04600	0.02880	94	0.20689	0.13951	0.34950	0.23300
55	0.00646	0.00350	0.04820	0.02950	95	0.22134	0.14955	0.37890	0.25250
56	0.00705	0.00392	0.05060	0.03010	96	0.23700	0.16012	0.41090	0.27390
57	0.00767	0.00437	0.05310	0.03070	97	0.25325	0.17131	0.44580	0.29720
58	0.00831	0.00486	0.05550	0.03150	98	0.27090	0.18291	0.48380	0.32260
59	0.00901	0.00536	0.05810	0.03230	99	0.29016	0.19478	0.52430	0.34950

Pre-Retirement mortality is 50% of the regular post-retirement mortality values.

**JOINT LIFE RETIREMENT VALUES  
(8.25% INTEREST)**

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Sample Attained	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)	
	Ages	Men	Women	Men
50	\$182.67	\$184.82	29.17	34.67
55	170.40	172.61	24.82	30.06
60	155.98	158.31	20.70	25.67
65	139.48	141.76	16.82	21.50
70	121.62	123.47	13.32	17.57
75	103.29	104.62	10.36	13.99
80	85.27	86.19	7.83	10.91
Ref:	#152sb1x1	#154sb2x1		

The present values shown above are for illustrative purposes only and include the value of future post-retirement increases at 2.8% per year and a 50% survivor benefit. Males are assumed to be 3 years older than their spouse.

## RATES OF RETIREMENT

Age	Non-Uniformed				Uniformed	
	Male		Female		Male	Female
	Normal	Early	Normal	Early	Normal	
50	0.1200		0.1200		0.5000	0.5000
51	0.1200		0.1200		0.2000	0.2000
52	0.1200		0.1200		0.2500	0.2500
53	0.1200		0.1200		0.1500	0.1500
54	0.1200		0.1200		0.2500	0.2500
55	0.1200	0.0800	0.1200	0.0600	0.3000	0.3000
56	0.1200	0.0800	0.1200	0.0600	0.3000	0.3000
57	0.1200	0.0800	0.1200	0.0600	0.3000	0.3000
58	0.1200	0.0800	0.1500	0.0600	0.3000	0.3000
59	0.1200	0.0800	0.1500	0.0600	0.3000	0.3000
60	0.1600		0.1000		1.0000	1.0000
61	0.1800		0.1000		1.0000	1.0000
62	0.5000		0.5000		1.0000	1.0000
63	0.4000		0.1500		1.0000	1.0000
64	0.3000		0.1500		1.0000	1.0000
65	0.4000		0.5000		1.0000	1.0000
66	0.3500		0.5000		1.0000	1.0000
67	0.3500		0.5000		1.0000	1.0000
68	0.3500		0.5000		1.0000	1.0000
69	0.3500		0.5000		1.0000	1.0000
70	1.0000		1.0000		1.0000	1.0000
Ref	466	469	467	470	468	468

The rates of retirement used were the above rates with the following adjustments:

- For Non-Uniformed members retiring prior to age 62, rates were reduced by 80% of the original value for the first 2 years of eligibility, 60% for the third year, 40% for the fourth and 20% for the fifth. For Uniformed members retiring prior to age 62, rates were reduced by 40% of the original value for the first 2 years of eligibility, 30% for the third year, 20% for the fourth and 10% for the fifth.
- At five full years of eligibility 100% of the original rate was used. For members retiring prior to age 62 and 6 or more years from initial eligibility, 110% of the original rates were used.
- For members retiring at age 62 or later who were eligible for the BackDROP, 150% of the original retirement rates were used.
- Members with a normal retirement age of 62 or greater did not have the above rates adjusted.

## RATES OF DISABILITY

Age	Non-Uniformed		Uniformed		Age	Non-Uniformed		Uniformed	
	Male	Female	Male	Female		Male	Female	Male	Female
21	0.0001	0.0006	0.0003	0.0003	51	0.0042	0.0059	0.0029	0.0029
22	0.0001	0.0006	0.0003	0.0003	52	0.0048	0.0068	0.0032	0.0032
23	0.0001	0.0006	0.0004	0.0004	53	0.0054	0.0081	0.0037	0.0037
24	0.0001	0.0006	0.0004	0.0004	54	0.0060	0.0097	0.0042	0.0042
25	0.0001	0.0007	0.0004	0.0004	55	0.0066	0.0063	0.0000	0.0000
26	0.0001	0.0007	0.0004	0.0004	56	0.0066	0.0079	0.0000	0.0000
27	0.0001	0.0007	0.0004	0.0004	57	0.0066	0.0097	0.0000	0.0000
28	0.0001	0.0007	0.0005	0.0005	58	0.0066	0.0116	0.0000	0.0000
29	0.0001	0.0008	0.0005	0.0005	59	0.0066	0.0135	0.0000	0.0000
30	0.0001	0.0008	0.0005	0.0005	60	0.0000	0.0000	0.0000	0.0000
31	0.0002	0.0009	0.0005	0.0005	61	0.0000	0.0000	0.0000	0.0000
32	0.0003	0.0010	0.0006	0.0006	62	0.0000	0.0000	0.0000	0.0000
33	0.0004	0.0011	0.0006	0.0006	63	0.0000	0.0000	0.0000	0.0000
35	0.0006	0.0012	0.0007	0.0007	65	0.0000	0.0000	0.0000	0.0000
36	0.0007	0.0013	0.0008	0.0008	66	0.0000	0.0000	0.0000	0.0000
37	0.0007	0.0014	0.0008	0.0008	67	0.0000	0.0000	0.0000	0.0000
38	0.0008	0.0016	0.0009	0.0009	68	0.0000	0.0000	0.0000	0.0000
39	0.0008	0.0017	0.0009	0.0009	69	0.0000	0.0000	0.0000	0.0000
40	0.0009	0.0019	0.0010	0.0010	70	0.0000	0.0000	0.0000	0.0000
41	0.0011	0.0022	0.0010	0.0010	71	0.0000	0.0000	0.0000	0.0000
42	0.0014	0.0024	0.0012	0.0012	72	0.0000	0.0000	0.0000	0.0000
43	0.0016	0.0027	0.0012	0.0012	73	0.0000	0.0000	0.0000	0.0000
44	0.0019	0.0031	0.0014	0.0014	74	0.0000	0.0000	0.0000	0.0000
45	0.0021	0.0034	0.0015	0.0015	75	0.0000	0.0000	0.0000	0.0000
46	0.0024	0.0038	0.0017	0.0017	76	0.0000	0.0000	0.0000	0.0000
47	0.0027	0.0041	0.0019	0.0019	77	0.0000	0.0000	0.0000	0.0000
48	0.0030	0.0045	0.0021	0.0021	78	0.0000	0.0000	0.0000	0.0000
49	0.0033	0.0049	0.0023	0.0023	79	0.0000	0.0000	0.0000	0.0000
50	0.0036	0.0053	0.0026	0.0026	80	0.0000	0.0000	0.0000	0.0000
Ref	#226x0.6	#227x1	#228x1	#228x1		#226x0.6	#227x1	#228x1	#228x1

**RATES OF SEPARATION FROM ACTIVE EMPLOYMENT  
LESS THAN 5 YEARS OF SERVICE**

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<b>Service</b>	<b>Non-Uniformed</b>		<b>Uniformed</b>	
	<b>Male</b>	<b>Female</b>	<b>Male</b>	<b>Female</b>
0-1	0.2000	0.1600	0.0500	0.0500
1-2	0.1000	0.0900	0.0400	0.0400
2-3	0.0700	0.0800	0.0300	0.0300
3-4	0.0600	0.0700	0.0200	0.0200
4-5	0.0500	0.0600	0.0200	0.0200
Ref	228	229	230	230

## RATES OF SEPARATION FROM ACTIVE EMPLOYMENT MORE THAN 5 YEARS OF SERVICE

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Age	Non-Uniformed		Uniformed	
	Male	Female	Male	Female
25	0.0400	0.0550	0.0250	0.0250
26	0.0390	0.0550	0.0250	0.0250
27	0.0390	0.0530	0.0250	0.0250
28	0.0380	0.0530	0.0230	0.0230
29	0.0360	0.0520	0.0210	0.0210
30	0.0340	0.0520	0.0180	0.0180
31	0.0320	0.0510	0.0160	0.0160
32	0.0300	0.0510	0.0140	0.0140
33	0.0290	0.0500	0.0140	0.0140
34	0.0270	0.0480	0.0140	0.0140
35	0.0250	0.0460	0.0140	0.0140
36	0.0240	0.0440	0.0140	0.0140
37	0.0220	0.0420	0.0140	0.0140
38	0.0210	0.0390	0.0130	0.0130
39	0.0190	0.0370	0.0120	0.0120
40	0.0180	0.0350	0.0110	0.0110
41	0.0160	0.0330	0.0100	0.0100
42	0.0150	0.0300	0.0100	0.0100
43	0.0140	0.0300	0.0100	0.0100
44	0.0130	0.0300	0.0090	0.0090
45	0.0130	0.0300	0.0090	0.0090
46	0.0120	0.0300	0.0080	0.0080
47	0.0110	0.0300	0.0080	0.0080
48	0.0100	0.0290	0.0080	0.0080
49	0.0090	0.0280	0.0070	0.0070
50	0.0080	0.0260	0.0070	0.0070
51	0.0070	0.0240	0.0060	0.0060
52	0.0060	0.0230	0.0030	0.0030
53	0.0060	0.0210	0.0030	0.0030
54	0.0050	0.0190	0.0020	0.0020
55	0.0040	0.0140	0.0020	0.0020
56	0.0030	0.0090	0.0020	0.0020
57	0.0020	0.0040	0.0010	0.0010
58	0.0010	0.0030	0.0010	0.0010
59	0.0010	0.0020	0.0010	0.0010
60	0.0010	0.0010	0.0010	0.0010
Ref	#391x1	#392x1	#393x1	#393x1



## MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

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Administrative Expenses:	0.46% of payroll, based upon actual results from previous year.
Disability Expenses:	0.57% of payroll included in contribution. Retirement system pays premium directly to an outside insurance company or TPA.
Marriage Assumption:	90% of participants are assumed to be married for purposes of death-in-service benefits. Applies to disabled members entitled to future retirement benefits also.
Pay Increase Timing:	Beginning of (Fiscal) year.  This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Normal Form of Benefit:	The assumed normal form of benefit is a 50% joint & survivor benefit for married members in the closed plan and a straight life for all other members.
Optional Benefit Factors:	Optional Benefit Factors are in accordance with tables adopted by the Board.
Other:	Disability and turnover decrements do not operate during retirement eligibility.
Miscellaneous Loading Factors:	<p>The calculated normal and early retirement benefits were increased by 4.3% for Uniformed and 2.6% for Non-Uniformed to account for the inclusion of unused sick leave in the calculation of Average Pay.</p> <p>The present value of future retirement and vested benefits for the Closed Plan Non-Uniformed active members was increased by 0.23% to account for the transition of some members into the Year 2000 Plan.</p> <p>The Normal Cost for the normal retirement decrement for Non-Uniformed members was increased by 0.46% to account for anticipated changes in the pattern of retirements due to the Year 2000 Plan. Differences in benefits between the Closed Plan and the Year 2000 Plan are not expected to yield significant changes in the pattern of retirements for the Uniformed group.</p>



## SECTION F



### Financial Principles and Operational Techniques

## FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES OF THE RETIREMENT SYSTEM

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*Promises Made, and To Be Paid For.* As each year is completed, the Retirement System in effect hands an “IOU” to each member then acquiring a year of service credit -- the “IOU” says: “The Highway and Transportation Employees’ and Highway Patrol Retirement System owes you one year’s worth of retirement benefits, payments in cash commencing when you qualify for retirement.”

The principal related financial question is: When shall the money required to cover the “IOU” be contributed? This year, when the benefit of the member’s service is received? Or, some future year when the “IOU” becomes a cash demand?

*The objective of level percent-of-payroll financing is that this year’s taxpayers contribute the money to cover the IOUs being handed out this year.* By following this objective, *the employer contribution rate will remain approximately level from year to year* --- and will not have to be increased for future generations of taxpayers.

(There are systems which have a design for deferring contributions to future taxpayers, lured by a lower contribution rate now and putting aside the consequence that the contribution rate must then relentlessly grow much greater over decades of time.)

An inevitable by-product of the level-cost design is the accumulation of reserve assets, for decades, and the income produced when the assets are invested. *Invested assets are a by-product and not the objective.* Investment income becomes the 3rd contributor for benefits to employees, and is interlocked with the contribution amounts required from employees and employer.

(Concluded on Next Page)

## FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES OF THE RETIREMENT SYSTEM (CONCLUDED)

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Translated to actuarial terminology, this level-cost objective means that the contribution rates must total at least the following:

*Normal Cost* (the value assigned to service being rendered this year)

. . . plus . . .

*Interest on Unfunded Actuarial Accrued Liabilities* (the difference between liabilities for service already rendered and the accrued assets of the Retirement System).

***Computing Contributions To Support System Benefits*** From a given schedule of benefits and from the employee data and asset data furnished by the system, the actuary determines the contribution rates to support the benefits, by means of *an actuarial valuation*.

An actuarial valuation has a number of ingredients such as: the rate of investment return which plan assets will earn; the rates of withdrawal of active members who leave covered employment; the rates of mortality; the rates of disability; the rates of pay increases and the assumed age or ages at actual retirement.

In an actuarial valuation the actuary must assume what the above rates will be, for the next year and for decades in the future. Only the subsequent actual experience of the plan can indicate the degree of accuracy of the assumptions.

***Reconciling Differences Between Assumed Experience and Actual Experience*** Once actual experience has occurred and has been observed, it will not coincide exactly with assumed experience, regardless of the skill of the actuary and the many calculations made. Most retirement systems cope with such differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is *continuing adjustments to the financial position*.

## THE ACTUARIAL VALUATION PROCESS

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The *actuarial valuation* is the mathematical process by which the contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

- A. ***Covered people data*** furnished by plan administrator, including:
  - Retired lives now receiving benefits
  - Former employees with vested benefits not yet payable
  - Active employees
  
- B. + ***Asset data*** (cash & investments), furnished by the plan administrator
  
- C. + ***Benefit provisions*** which specify eligibility and amounts of pensions
  
- D. + ***Assumptions concerning future experience in various risk areas***, which are established by the Retirement Board after consulting with the actuary
  
- E. + ***The funding method*** for employer contributions (the long-term, planned pattern for employer contributions)
  
- F. + ***Mathematically combining the assumptions, the funding method, and the data***
  
- G. = Determination of:
  - Plan Financial Position and/or
  - New Employer Contribution Rate

## MEANING OF “UNFUNDED ACTUARIAL ACCRUED LIABILITIES”

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*“Actuarial accrued liabilities” are the portion of the present value of plan promises to pay benefits in the future that are not covered by future normal cost contributions.* A liability has been established (“accrued”) because the service has been rendered but the resulting monthly cash benefit may not be payable until years in the future. Actuarial accrued liabilities are the result of complex mathematical calculations, which are made by the plan’s actuary.

If “actuarial accrued liabilities” exceed the plan’s accrued assets (cash & investments), the difference is *“unfunded actuarial accrued liabilities.”* This is the usual condition. If the plan’s assets equaled the plan’s “actuarial accrued liabilities,” then the plan would be termed “fully funded.” This is an unusual condition.

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Each time a plan adds a new benefit, which applies to service already rendered, an “actuarial accrued liability” is created, which is also an “unfunded actuarial accrued liability” because the plan can’t print instant cash to cover the value of the new benefit promises. Payment for such unfunded actuarial accrued liabilities is spread over a period of years, commonly in the 20-50 year range.

Unfunded actuarial accrued liabilities can occur in another way: if actual plan experience is less favorable than assumed plan experience, the difference is added to unfunded actuarial accrued liabilities. In plans where benefits are directly related to an employee’s pay near time of retirement, unfunded actuarial accrued liabilities rose dramatically during the 1970’s. Unexpected rates of pay increase created additional actuarial accrued liabilities, which could not be matched by reasonable investment results. More recent experience has generally been more favorable with some reductions in unfunded actuarial accrued liabilities.

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*The existence of unfunded actuarial accrued liabilities is not bad, but the changes from year to year in the amount of unfunded actuarial accrued liabilities are important, --- “bad” or “good” or somewhere in between.*

Even though unfunded actuarial accrued liabilities don’t constitute a bill payable immediately, it is important that policy-makers prevent the amount from becoming unreasonably high and *it is vital for plans to have a sound method for making payments toward them* so that they are controlled.

December 5, 2003

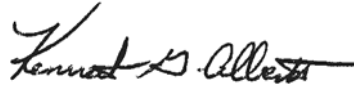
Mr. Norm Robinson, Executive Director  
Highway and Transportation Employees' and  
Highway Patrol Retirement System  
1913 Williams Street  
Jefferson City, MO 65109

Dear Norm:

Enclosed are 20 bound copies of the June 30, 2003 actuarial valuation of the Highway and Transportation Employees' and Highway Patrol Retirement System.

An additional unbound, 3-hole punched copy is enclosed for your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Kenneth G. Alberts", is written over a thin red horizontal line.

Kenneth G. Alberts

KGA:lr  
Enclosures

CC: Brian B. Murphy

BC: Norman Jones  
Brad Armstrong  
Mita Drazilov  
Judy Kermans



December 5, 2003

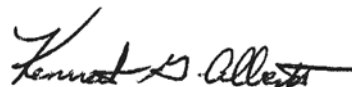
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