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**THE REPORT OF THE  
ANNUAL ACTUARIAL VALUATION  
OF THE  
HIGHWAY AND TRANSPORTATION EMPLOYEES'  
AND HIGHWAY PATROL RETIREMENT SYSTEM  
STATE OF MISSOURI  
JUNE 30, 2001**

**Gabriel, Roeder, Smith & Company**

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# TABLE OF CONTENTS

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	<u>Pages</u>
Introduction	1
Summary of Results & Comments	2-5
<b>Section A: Valuation Results</b>	
Development of Contribution Rate and Liabilities	A3-A4
Amortization of Unfunded Actuarial Accrued Liabilities	A5-A6
Statement of Resources and Obligations	A7-A8
GASB Reporting	A9-A11
Gain/Loss Analysis	A12
<b>Section B: Summary of Benefits</b>	B1-B7
<b>Section C: Financial Information</b>	
Summary of Fund Operations	C1
Development of Funding Value of Assets	C2
Separation of Assets	C3
<b>Section D: Member Data</b>	
Active Members	D1-D3
Retirees and Survivors	D4-D7
Vested Deferred Cases	D8
Disabled Retirees	D9
<b>Section E: Assumptions Used in the Valuation</b>	E1-E9
<b>Section F: Financial Principles</b>	F1-F5
<b>Section G: Long Term Disability Benefits Plan</b>	G1-G7

January 28, 2002

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, 2001** 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.

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 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.    Mark K. Johnson

MKJ/mj

## SUMMARY

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The contribution rate for the plan year beginning July 1, 2002 was determined in accordance with the June 30, 2001 valuation.

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Investment experience was poor this year, and the Market Value of Assets actually dropped during the year. The actuarial asset smoothing process permitted an investment gain to be recognized, but that was due to the phase-in of previous gains. The Actuarial Value of Assets now exceeds the Market Value of Assets, which means that investment return for the next several years must exceed the assumed rate in order to prevent a loss from being recognized.

The **total contribution rate** for the plan year beginning July 1, 2002 is shown below. There was a demographic experience loss that offset the recognized investment gain. Changes in the valuation this year include the introduction of the BackDROP and inclusion of the first set of active members that are in the Year 2000 plan by virtue of their date of hire. The resulting contribution rates this year are near the levels seen in the prior valuation. Based upon the results of this valuation, the employer contribution rates allocated between normal cost, unfunded liability and expenses effective July 1, 2002 are:

	<b>Employer Contribution Rates Expressed As % of Active Payroll for Total Benefits</b>		
	<b>Non-Uniformed Employees</b>	<b>Uniformed Patrol</b>	<b>Combined Rate</b>
Normal Cost	11.51%	12.77%	11.71%
Unfunded Liability	10.95%	19.58%	12.27%
Expenses	0.21%	0.21%	0.21%
<b>Total</b>	<b>22.67%</b>	<b>32.56%</b>	<b>24.19%</b>
Illustrative \$	\$62,749,971	\$16,369,954	\$79,119,925

The dollar contribution amounts shown above are illustrative and based on 6/30/2001 valuation payroll. Actual dollar contributions should be based on covered payroll for the fiscal year beginning 7/1/2002. The combined rate of 24.19% 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

## SUMMARY & RECOMMENDATIONS

### (CONCLUDED)

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prior valuation, the total combined dollar contribution recommended was \$75,197,103. This represented a combined rate of 24.07%. Unfunded Actuarial Accrued Liabilities were amortized over a 35-year closed period. This is a one-year reduction in the amortization period from the June 30, 2000 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, 2001 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.

**SUMMARY OF KEY VALUATION RESULTS  
AS OF JUNE 30, 2001**

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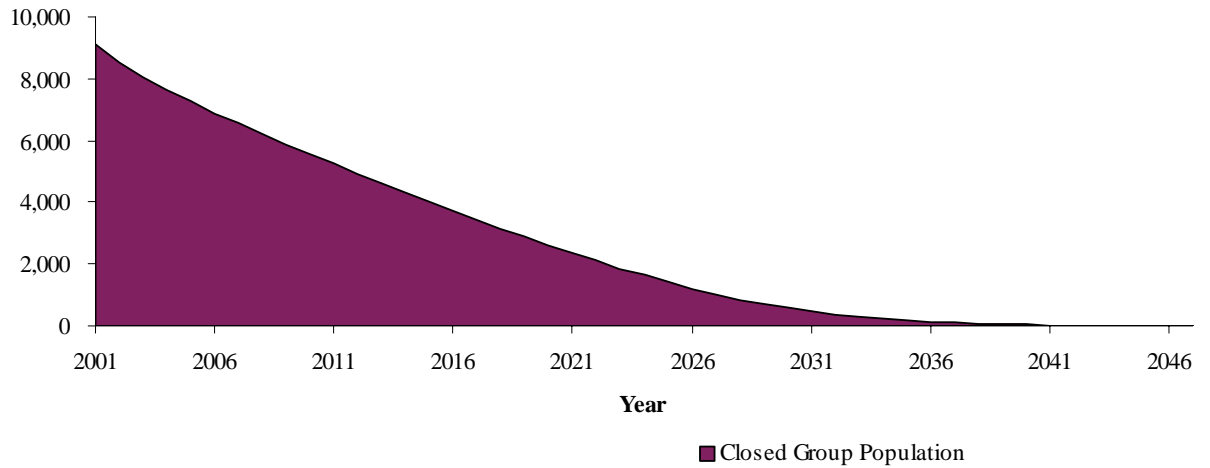
	<b>2001</b>	<b>2000</b>
<b>Number of Participants</b>		
Retirees - Regular Pensioners	\$ 6,035	\$ 5,595
Normal and Work Related Disability Pensioners	110	186
Vested Terminated Employees	1,018	912
Active Employees	9,087	9,171
Active Participants on LTD	70	76
<b>Total</b>	<b>16,320</b>	<b>15,940</b>
<b>Valuation Payroll</b>		
Non-Uniformed Employees	276,772,984	268,302,644
Uniformed Patrol Employees	50,276,273	44,229,365
<b>Total</b>	<b>327,049,257</b>	<b>312,532,009</b>
<b>Present Value of Future Benefits</b>	<b>2,703,085,090</b>	<b>2,543,197,504</b>
<b>Entry Age Accrued Liability</b>	<b>2,301,402,527</b>	<b>2,188,826,322</b>
<b>Entry Age Normal Cost</b>		
Non-Uniformed Employees	11.51%	11.24%
Uniformed Patrol Employees	12.77%	12.84%
<b>Unfunded Actuarial Accrued Liability</b>		
Non-Uniformed Employees	10.95%	11.15%
Uniformed Patrol Employees	19.58%	19.88%
<b>Recommended Contribution Rates*</b>		
<b>Total System Benefits</b>		
Non-Uniformed Employees	22.67%	22.60%
Uniformed Patrol Employees	32.56%	32.93%
<b>Book Value of Assets</b>	<b>\$1,364,466,366</b>	<b>\$1,212,014,135</b>
<b>Market Value of Assets</b>	<b>\$1,404,896,990</b>	<b>\$1,468,239,119</b>
<b>Actuarial Value of Assets</b>	<b>\$1,520,800,409</b>	<b>\$1,422,796,011</b>

\* Includes the contribution for expenses of 0.21% of payroll.

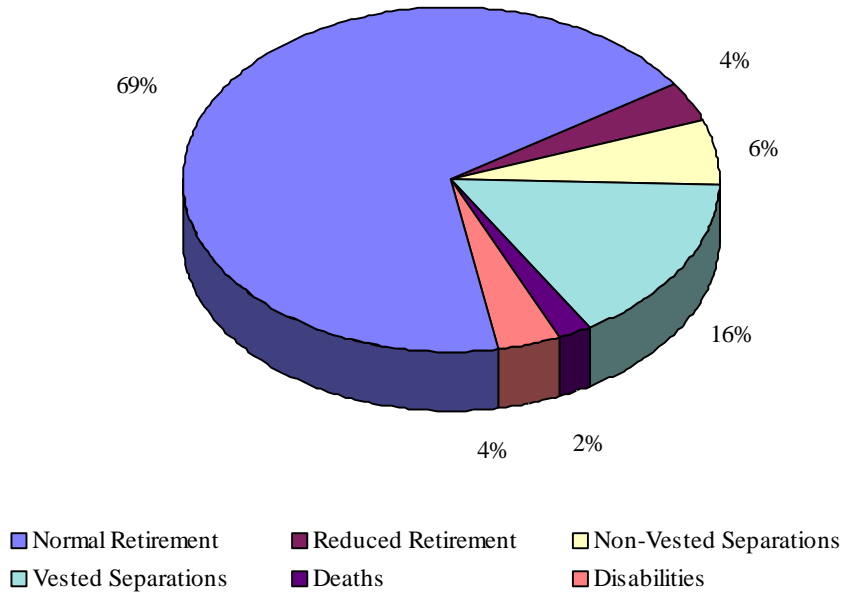
# Expected Development of Present Population AS OF JUNE 30, 2001

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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 9,087 active members. Eventually, 6% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. 89% of the present population is expected to receive monthly retirement benefits either by retiring directly from active service, or by separating from service with a vested benefit. 6% 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**

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### **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 MSEP 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 MSEP 2000 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 9%) to account for anticipated changes in retirement behavior of this group as the transition to MSEP 2000 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 5% to account for the inclusion of unused sick leave in the calculation of Average Compensation.

## 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, 2001 resulted in *Unfunded Actuarial Accrued Liabilities* which were amortized as a level percent of payroll over a period of 35 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  
AS OF JUNE 30, 2001**

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Contributions for	Contributions Expressed as Percents of Payroll	
	Non-Uniformed Employees	Uniformed Patrol
<b>DEVELOPMENT OF NORMAL COST</b>		
Age & service benefits	9.95%	11.72%
Disability benefits	0.47%	0.21%
Survivor benefits	0.32%	0.27%
Separation benefits	0.77%	0.57%
Total Normal Cost	11.51%	12.77%
<b>TOTAL SYSTEM BENEFITS</b>		
Unfunded Actuarial Accrued Liabilities*	10.95%	19.58%
Expense Provision	0.21%	0.21%
Recommended Contribution Rate	22.67%	32.56%
* Amortized as a level-percentage of payroll over 35 years.		

**DEVELOPMENT OF LIABILITIES  
AS OF JUNE 30, 2001**

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	<b>Non-Uniformed Employees</b>	<b>Uniformed Patrol</b>
<b>Present Value of Future Benefits - Inactives</b>		
Retirees and Survivors	\$1,065,995,116	\$294,559,071
Normal and Work Related Disability Pensioners	12,777,911	1,394,016
Vested Terminated Employees	17,971,155	5,019,625
<b>Subtotal PVFB - Inactives</b>	<b>1,096,744,182</b>	<b>300,972,712</b>
<b>Present Value of Future Benefits - Actives</b>		
Age & Service benefits	910,522,034	268,099,966
Disability benefits	43,055,645	4,029,831
Survivor benefits	26,952,993	5,498,700
Separation benefits	38,272,877	8,936,151
<b>Subtotal PVFB - Actives</b>	<b>1,018,803,549</b>	<b>286,564,647</b>
<b>Total Present Value of Future Benefits</b>	<b>2,115,547,731</b>	<b>587,537,359</b>
<b>less Present Value of Future Entry Age Normal Costs</b>	<b>327,774,580</b>	<b>73,907,984</b>
<b>equals Actuarial Accrued Liability</b>	<b>1,787,773,151</b>	<b>513,629,375</b>
<b>less Actuarial Value of Assets</b>	<b>1,197,922,536</b>	<b>322,877,873</b>
<b>equals Unfunded Actuarial Accrued Liabilities</b>	<b>589,850,616</b>	<b>190,751,502</b>
<b>35 Year Amortization Payment on UAAL</b>	<b>\$ 32,765,240</b>	<b>\$ 10,649,629</b>
<b>as a % of projected payroll</b>	<b>10.95%</b>	<b>19.58%</b>

**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  
35 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	
2001	\$ 276,772,984	\$ 589,850,615			
2002	287,843,903	604,839,530	\$ 32,356,680	11.24%	210.1%
2003	299,357,660	620,639,841	32,765,239	10.95%	207.3%
2004	311,331,966	636,379,720	34,075,849	10.95%	204.4%
2005	323,785,245	651,999,622	35,438,883	10.95%	201.4%
2006	336,736,655	667,432,909	36,856,438	10.95%	198.2%
2007	350,206,121	682,605,175	38,330,696	10.95%	194.9%
2008	364,214,366	697,433,515	39,863,924	10.95%	191.5%
2009	378,782,941	711,825,730	41,458,481	10.95%	187.9%
2010	393,934,259	725,679,460	43,116,820	10.95%	184.2%
2011	409,691,629	738,881,247	44,841,493	10.95%	180.4%
2012	426,079,294	751,305,511	46,635,152	10.95%	176.3%
2013	443,122,466	762,813,439	48,500,558	10.95%	172.1%
2014	460,847,365	773,251,780	50,440,581	10.95%	167.8%
2015	479,281,260	782,451,534	52,458,204	10.95%	163.3%
2016	498,452,510	790,226,527	54,556,532	10.95%	158.5%
2017	518,390,610	796,371,866	56,738,794	10.95%	153.6%
2018	539,126,234	800,662,262	59,008,345	10.95%	148.5%
2019	560,691,283	802,850,204	61,368,679	10.95%	143.2%
2020	583,118,934	802,663,984	63,823,426	10.95%	137.7%
2021	606,443,691	799,805,546	66,376,363	10.95%	131.9%
2022	630,701,439	793,948,158	69,031,418	10.95%	125.9%
2023	655,929,497	784,733,882	71,792,674	10.95%	119.6%
2024	682,166,677	771,770,828	74,664,381	10.95%	113.1%
2025	709,453,344	754,630,178	77,650,957	10.95%	106.4%
2026	737,831,478	732,842,955	80,756,995	10.95%	99.3%
2027	767,344,737	705,896,517	83,987,275	10.95%	92.0%
2028	798,038,526	673,230,759	87,346,766	10.95%	84.4%
2029	829,960,067	634,233,987	90,840,636	10.95%	76.4%
2030	863,158,470	588,238,449	94,474,262	10.95%	68.1%
2031	897,684,809	534,515,486	98,253,232	10.95%	59.5%
2032	933,592,201	472,270,273	102,183,362	10.95%	50.6%
2033	970,935,889	400,636,120	106,270,696	10.95%	41.3%
2034	1,009,773,325	318,668,291	110,521,524	10.95%	31.6%
2035	1,050,164,258	225,337,304	114,942,385	10.95%	21.5%
2036	1,092,170,828	119,521,666	119,540,080	10.95%	10.9%
2037	1,135,857,661	0	124,321,683	10.95%	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  
35 YEAR AMORTIZATION  
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	
			2001	\$ 50,276,273	
2002	52,287,324	196,589,949	\$ 9,511,391	18.19%	376.0%
2003	54,378,816	201,725,497	10,649,629	19.58%	371.0%
2004	56,553,969	206,841,403	11,075,614	19.58%	365.7%
2005	58,816,128	211,918,313	11,518,639	19.58%	360.3%
2006	61,168,773	216,934,568	11,979,385	19.58%	354.6%
2007	63,615,524	221,865,983	12,458,560	19.58%	348.8%
2008	66,160,145	226,685,613	12,956,902	19.58%	342.6%
2009	68,806,551	231,363,490	13,475,179	19.58%	336.3%
2010	71,558,813	235,866,344	14,014,186	19.58%	329.6%
2011	74,421,166	240,157,298	14,574,753	19.58%	322.7%
2012	77,398,013	244,195,535	15,157,743	19.58%	315.5%
2013	80,493,934	247,935,937	15,764,053	19.58%	308.0%
2014	83,713,691	251,328,693	16,394,615	19.58%	300.2%
2015	87,062,239	254,318,873	17,050,400	19.58%	292.1%
2016	90,544,729	256,845,965	17,732,416	19.58%	283.7%
2017	94,166,518	258,843,374	18,441,712	19.58%	274.9%
2018	97,933,179	260,237,874	19,179,381	19.58%	265.7%
2019	101,850,506	260,949,017	19,946,556	19.58%	256.2%
2020	105,924,526	260,888,490	20,744,418	19.58%	246.3%
2021	110,161,507	259,959,417	21,574,195	19.58%	236.0%
2022	114,567,967	258,055,600	22,437,163	19.58%	225.2%
2023	119,150,686	255,060,700	23,334,649	19.58%	214.1%
2024	123,916,713	250,847,341	24,268,035	19.58%	202.4%
2025	128,873,382	245,276,145	25,238,757	19.58%	190.3%
2026	134,028,317	238,194,681	26,248,307	19.58%	177.7%
2027	139,389,450	229,436,327	27,298,239	19.58%	164.6%
2028	144,965,028	218,819,032	28,390,169	19.58%	150.9%
2029	150,763,629	206,143,979	29,525,775	19.58%	136.7%
2030	156,794,174	191,194,129	30,706,806	19.58%	121.9%
2031	163,065,941	173,732,647	31,935,079	19.58%	106.5%
2032	169,588,579	153,501,193	33,212,482	19.58%	90.5%
2033	176,372,122	130,218,068	34,540,981	19.58%	73.8%
2034	183,427,007	103,576,206	35,922,621	19.58%	56.5%
2035	190,764,087	73,240,996	37,359,525	19.58%	38.4%
2036	198,394,650	38,847,921	38,853,906	19.58%	19.6%
2037	206,330,436	0	40,408,062	19.58%	0.0%

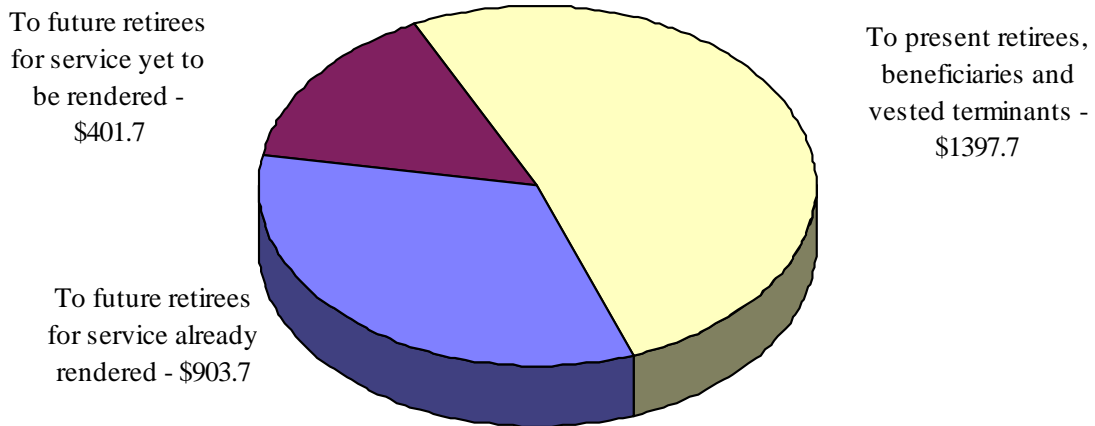
## SUMMARY STATEMENT OF SYSTEM RESOURCES & OBLIGATIONS

<b>Present and Expected Future Resources at June 30</b>	<b>2001</b>	<b>2000</b>
A. Present valuation assets		
1. Market value of assets from system financial statements	\$ 1,413,243,545	\$ 1,477,276,993
2. Market Value Adjustment	116,592,007	(45,722,837)
3. LTD Assets	(9,035,143)	(8,758,145)
4. Valuation Assets: 1 + 2 + 3	<u>\$ 1,520,800,409</u>	<u>\$ 1,422,796,011</u>
B. Actuarial present value of expected future contributions		
1. For normal costs	401,682,564	354,371,182
2. For unfunded actuarial accrued liability	780,602,118	766,030,311
3. Total	<u>1,182,284,682</u>	<u>1,120,401,493</u>
C. Total Present and Expected Future Resources	<u>\$ 2,703,085,091</u>	<u>\$ 2,543,197,504</u>
<b>Present and Expected Future Obligations</b>		
A. To present retirants and beneficiaries	\$ 1,374,726,114	\$ 1,238,216,910
B. To present vested terminated members	22,990,780	21,047,062
C. To present active members		
1. Allocated to service rendered prior to valuation date (actuarial accrued liability)	903,685,633	929,562,350
2. Allocated to service likely to be rendered after valuation date	401,682,564	354,371,182
3. Total	<u>1,305,368,197</u>	<u>1,283,933,532</u>
D. Total Actuarial Present Value of Expected Future Benefit Payments	<u>\$2,703,085,091</u>	<u>\$2,543,197,504</u>

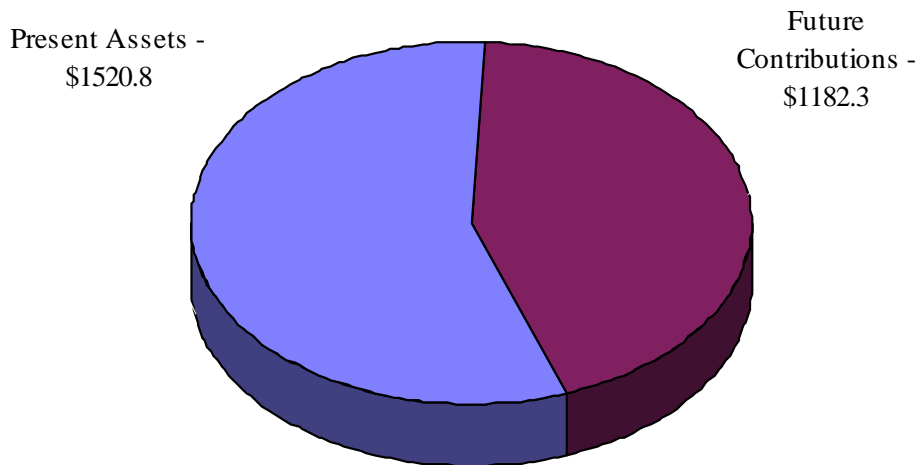
# SYSTEM RESOURCES & OBLIGATIONS AS OF JUNE 30, 2001

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## Uses of Funds



## Sources of Funds













**GASB No. 25**  
**SCHEDULE OF FUNDING PROGRESS\***  
**JUNE 30, 2001**

<b>Year</b>	<b>Actuarial</b>	<b>Entry Age Normal</b>	<b>Unfunded</b>				<b>UAAL as a</b>
<b>Ending</b>	<b>Asset</b>	<b>Accrued</b>	<b>Accrued</b>	<b>Funded</b>	<b>Covered</b>		<b>Percentage of</b>
<b>June 30,</b>	<b>Value</b>	<b>Liability</b>	<b>Liability (UAAL)</b>	<b>Ratio</b>	<b>Payroll</b>		<b>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%
* 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\***  
**UNFORMED PATROL GROUP**  
**JUNE 30, 2001**

Year Ending June 30,	Covered Payroll		Actual Employer Contributions	Actual Employer Contribution %	Annual Required Contribution (ARC) %	Annual Pension Cost	Percentage of of APC Contributed	Net Pension Obligation
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
* 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.								

**GASB No. 25**  
**SCHEDULE OF EMPLOYER CONTRIBUTIONS AND DEVELOPMENT OF NET PENSION OBLIGATION\***  
**NON-UNIFORMED GROUP**  
**JUNE 30, 2001**

Year Ending June 30,	Covered Payroll		Actual Employer Contributions	Actual Employer Contribution %	Annual Required Contribution (ARC) %	Annual Pension Cost	Percentage of APC Contributed	Net Pension Obligation
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
* 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.								

**DEVELOPMENT OF GAIN/(LOSS)  
JULY 1, 2000 TO JUNE 30, 2001**

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	UAAL =	AAL -	Assets
Beginning of Year Values (at July 1)	\$766,030,311	\$2,188,826,322	\$1,422,796,011
Normal Cost	36,543,558	36,543,558	0
Contributions	(81,353,019)	0	81,353,019
Disbursements	\$0	(112,329,847)	(112,329,847)
Interest	61,349,110	177,451,987	116,102,877
Expected Value Before Any Changes	782,569,960	2,290,492,020	1,507,922,060
Effect of Changes in Benefits & Methods	(22,299,086)	(22,299,086)	0
Expected Value After Changes	760,270,874	2,268,192,934	1,507,922,060
End of Year Values (at June 30)	780,602,118	2,301,402,527	1,520,800,409
Gain/(Loss) for Year	\$(20,331,244)	\$(33,209,593)	\$12,878,350



## **Section B**

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### **Summary of Benefits**

# SUMMARY OF BENEFIT PROVISIONS EVALUATED AS OF JUNE 30, 2001

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## Highway and Transportation Employees' and Highway Patrol Retirement System

## MSEP 2000 (Missouri State Employees' Plan 2000)

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### Participation

Participants include:

All HTEHPRS active members, vested terminated members, retirees and survivors who first became members prior to July 1, 2000 and who do not elect to transfer to the MSEP 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 MSEP 2000 plan prior to retirement.
- (3) HTEHPRS retirees who elect to transfer to the MSEP 2000 plan during the election window from July 1, 2000 through July 1, 2001, and their survivors.

### Normal Retirement Eligibility (unreduced benefits)

**Non-Uniformed Employees:** The earlier of attaining:

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

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

- (1) Age 55 with at least 4 years of credited service.
- (2) Age 50 with age plus credited service equal to 80 or more.

### Average Compensation used for Benefit

#### Determination

The average annual pay of a member for the three consecutive years of service during which pay was highest. Employees retiring from active service shall receive 1/12 of a year of Creditable Service for each 21 days of unused sick leave.

### Normal Retirement Eligibility (unreduced benefits)

**General Employees:** The earlier of attaining:

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

### Average Compensation used for Benefit

#### Determination

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). A lump sum payment is included unless it is for unused vacation or sick leave. However, unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).

**Normal Retirement Benefit Amount**

***Non-Uniformed Employees:***

Life Benefit: 1.6% of Average Pay times years of credited service.

***Uniformed Patrol Employees:***

Life Benefit: 2.1333% of Average Pay times years of credited 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**

***Eligibility: Non-Uniformed employees***

Age 55 with at least 10 years of credited service.

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

***Amount:***

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

**Vested Deferred Benefits**

***Eligibility: Non-Uniformed and Uniformed Patrol employees***

Fully vested in accrued pension with 5 years of creditable service. The benefit will commence at the date first eligible for the full-accrued benefit.

**Normal Retirement Benefit Amount**

***General Employees:***

Life Benefit: 1.7% of Average Pay times years of credited service.

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

**Early Retirement**

***Eligibility: General Employees***

Age 57 with at least 5 years of credited service.

***Amount:***

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

**Vested Deferred Benefits**

***Eligibility: General Employees***

Fully vested in accrued pension with 5 years of creditable service. The benefit will commence at the date first eligible for the full-accrued benefit.

**Death Prior to Retirement**

A death benefit is payable to the surviving spouse or minor children of an active employee who dies after earning 3 years of creditable service. The survivor annuity is equal to the following percentage of the accrued benefit.

<b><u>Creditable Service</u></b>	<b><u>Survivor Percentage</u></b>	<b><u>Creditable Service</u></b>	<b><u>Survivor Percentage</u></b>
3 years	25%	7 years	35%
4 years	25%	8 years	40%
5 years	25%	9 years	45%
6 years	30%	10 years	50%

20 or More Years of Vesting Service – 50%

The spouse of an active employee who died after accruing 5 years of creditable service may elect, in lieu of the above benefit, to receive an annuity as if employee had retired on the date of death and elected a joint and 100% survivor annuity.

**Death After Retirement**

The benefit payable under the 50% joint and survivor form of payment. Alternate forms of payment including certain periods or other joint and survivor percentages are available as optional forms of payment elected at time of retirement.

Pensioners who retired from active employment after September 28, 1985 with an immediate pension have a \$5,000 lump sum death benefit paid to their designated beneficiary.

**Disability**

Normal: A member may qualify if he/she is unable to perform their present job or any other position in the Department for which they are suited. The benefit amount is 1.6% (including uniformed patrol) times average compensation times creditable service. The benefit is payable for as long as the member is disabled. If a member is receiving benefits under the LTD plan they will continue to accrue service towards a normal disability benefit payable at normal retirement age.

**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 credited service.

If no eligible spouse survives, 80% of the member’s life income annuity will be paid to eligible children. If the death is duty related, the service requirement is waived, and the minimum spouse benefit is 50% of Average Pay.

**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 upon completion of one year of marriage. Additionally, a member may designate a new spouse as beneficiary upon completion of one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).

**Disability**

Normal retirement benefits become payable at the time the member is 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 indexed to the time of benefit commencement. The annual percentage increase in the pay used to compute benefits is the lesser of: i) 80% of the CPI increase and ii) 5%.

Work related: A member may apply if he/she becomes wholly and permanently incapable of holding any position of gainful employment as a result of an injury sustained while performing Department assigned duties. The benefit amount is 70% of the compensation being received at the time of injury and is payable for as long as the member is disabled.

**Long-Term Disability**

The plan of benefits, assets and liabilities of the LTD program are the subject of a separate report. At the expiration of LTD benefits, retirement benefits commence in an amount calculated as the product of (a) x (b) x (c), where:

- (a) equals 1.6% (2.1333% for uniformed)
- (b) equals average salary at the time of disability
- (c) creditable service at commencement of retirement benefits.

For the purpose of item (c), service is credited until the earlier of the date retirement benefits are claimed, or the age at which unreduced retirement benefits are available.

**Post-Retirement Benefit Adjustments**

For active and inactive employees as of 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 after 8/28/97 the annual percentage increase is equal to the lesser of:

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

**Member Contributions** None

**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, and
- ii) 5%.

**Member Contributions** None

**SUMMARY OF BENEFIT PROVISIONS EVALUATED  
AS OF JUNE 30, 2001  
(CONTINUED)**

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**Back DROP Option**

Legislative 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, at the earliest, 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 two 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.

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 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, 2001  
NON-UNIFORM**

	Data	Description																						
A.	\$40,000	Final Average Compensation																						
B.	20	Years of Credited Service																						
C.	60	Age of Retirant																						
D.	50%	Automatic percentage to continue to spouse after retirant's death																						
<b>Sample Computation Steps</b>																								
E.	Retirement Benefit Formula:	$0.016 \times 20 \times \$40,000 = \$12,800$																						
<b>Benefit payable to:</b>																								
F.	Retirant while spouse is alive (E)	\$12,800																						
G.	Spouse after retirant's death (D x E)	\$6,400																						
H.	Retirant after spouse's death	\$12,800																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Year Ended June 30</th> <th style="text-align: center;">Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">2002</td><td style="text-align: right;">\$12,800</td></tr> <tr><td style="text-align: center;">2003</td><td style="text-align: right;">13,158</td></tr> <tr><td style="text-align: center;">2004</td><td style="text-align: right;">13,527</td></tr> <tr><td style="text-align: center;">2005</td><td style="text-align: right;">13,906</td></tr> <tr><td style="text-align: center;">2006</td><td style="text-align: right;">14,295</td></tr> <tr><td style="text-align: center;">2007</td><td style="text-align: right;">14,695</td></tr> <tr><td style="text-align: center;">2008</td><td style="text-align: right;">15,107</td></tr> <tr><td style="text-align: center;">2009</td><td style="text-align: right;">15,530</td></tr> <tr><td style="text-align: center;">2010</td><td style="text-align: right;">15,964</td></tr> <tr><td style="text-align: center;">2011</td><td style="text-align: right;">16,411</td></tr> </tbody> </table>			Year Ended June 30	Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%	2002	\$12,800	2003	13,158	2004	13,527	2005	13,906	2006	14,295	2007	14,695	2008	15,107	2009	15,530	2010	15,964	2011	16,411
Year Ended June 30	Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%																							
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2007	14,695																							
2008	15,107																							
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2010	15,964																							
2011	16,411																							

**SAMPLE BENEFIT COMPUTATION FOR MEMBERS  
RETIRING JUNE 30, 2001  
UNIFORM**

	Data	Description
A.	\$40,000	Final Average Compensation
B.	\$20	Years of Credited Service
C.	\$60	Age of Retirant
D.	\$1	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.	Retirant while spouse is alive (E)	\$17,066
G.	Spouse after retirant's death (D x E)	\$8,533
H.	Retirant after spouse's death	\$17,066
wn below do not include the \$1080 supplementary benefit payable to age 65		
	Year Ended June 30	Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%
	\$2,002	\$17,066
	\$2,003	\$17,544
	\$2,004	\$18,035
	\$2,005	\$18,540
	\$2,006	\$19,060
	\$2,007	\$19,593
	\$2,008	\$20,142
	\$2,009	\$20,706
	\$2,010	\$21,286
	\$2,011	\$21,882



**SAMPLE BENEFIT COMPUTATION FOR MEMBERS  
RETIRING JUNE 30, 2001  
MSEP 2000**

	Data	Description																						
A.	\$40,000	Final Average Compensation																						
B.	20	Years of Credited Service																						
C.	60	Age of Retirant																						
D.	0%	Automatic percentage to continue to spouse after retirant's death																						
<b>Sample Computation Steps</b>																								
E1.	Retirement Benefit Formula:	$0.017 \times 20 \times \$40,000 = \$13,600$																						
E2.	Supplemental Benefit Formula	$.008 \times 20 \times \$40,000 = \$6,400$																						
<b>Benefit payable to:</b>																								
F1.	Retirant prior to age 62 (E1+E2)	\$20,000																						
F2.	Retirant after age 62 (E1)	\$13,600																						
G.	Spouse after retirant's death (D x E)	\$0																						
<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px auto;"> <thead> <tr> <th style="width: 50%; text-align: center;">Year Ended June 30</th> <th style="width: 50%; text-align: center;">Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">2002</td><td style="text-align: right;">\$20,000</td></tr> <tr><td style="text-align: center;">2003</td><td style="text-align: right;">20,560</td></tr> <tr><td style="text-align: center;">2004</td><td style="text-align: right;">21,136</td></tr> <tr><td style="text-align: center;">2005</td><td style="text-align: right;">21,727</td></tr> <tr><td style="text-align: center;">2006</td><td style="text-align: right;">22,336</td></tr> <tr><td style="text-align: center;">2007</td><td style="text-align: right;">22,961</td></tr> <tr><td style="text-align: center;">2008</td><td style="text-align: right;">23,604</td></tr> <tr><td style="text-align: center;">2009</td><td style="text-align: right;">24,265</td></tr> <tr><td style="text-align: center;">2010</td><td style="text-align: right;">24,945</td></tr> <tr><td style="text-align: center;">2011</td><td style="text-align: right;">25,643</td></tr> </tbody> </table>			Year Ended June 30	Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%	2002	\$20,000	2003	20,560	2004	21,136	2005	21,727	2006	22,336	2007	22,961	2008	23,604	2009	24,265	2010	24,945	2011	25,643
Year Ended June 30	Annual Amount Payable if Price Inflation is 3.5% and Post-Retirement Increases are 2.8%																							
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2010	24,945																							
2011	25,643																							

## **Section C**

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### **Financial Information**

**SUMMARY OF FUND OPERATIONS**  
**JUNE 30, 2001**

	<b>BOOK VALUE</b>	<b>MARKET VALUE</b>
Fund as of July 1, 2000	1,219,474,795	1,477,276,994
<b>Contributions</b>		
Employer	81,155,196	81,155,196
Employee	197,823	197,823
Total Contributions	81,353,019	81,353,019
<b>Investment Income</b>		
Interest	32,201,142	32,201,142
Dividends	39,977,512	39,977,512
Realized Capital Gains	206,955,854	206,955,854
Realized Capital Losses	(91,522,629)	(91,522,629)
Miscellaneous Income	4	4
Adjustment in Book Value	0	0
Securities Lending Income	80,671	80,671
Total Investment Income	187,692,554	187,692,554
Increase (Decrease) in Unrealized Appreciation	N/A	(217,131,375)
<b>Benefit Payments</b>		
Retirement Payments	111,189,632	111,189,632
Death Benefits	305,000	305,000
Long Term Disability Payments	490,433	490,433
Refund and Final Settlement	0	0
Total Benefit Payments	111,985,065	111,985,065
<b>Expenses</b>		
Investment	3,127,367	3,127,367
Actuarial	35,000	35,000
Other	800,215	800,215
Total Expenses	3,962,582	3,962,582
Fund as of June 30, 2001	1,372,572,721	1,413,243,545



**DEVELOPMENT OF ACTUARIAL VALUE OF RETIREMENT SYSTEM ASSETS  
JUNE 30, 2001**

Valuation Date of June 30,	1999	2000	2001	2002	2003	2004
<b>A. Actuarial value at beginning of year</b>	\$1,134,177,608	\$1,289,072,760	\$1,431,554,156	\$1,529,835,552		
<b>B. Market value at end of year</b>	1,448,562,782	1,477,276,993	1,413,243,545			
<b>C. Market value at beginning of year</b>	1,319,372,770	1,448,562,782	1,477,276,993	1,413,243,545		
<b>D. Cash flow</b>						
D1. Contributions	69,242,112	70,519,534	81,353,019			
D2. Benefit Payments	(86,254,388)	(95,402,855)	(111,985,065)			
D3. Administrative Expenses	(677,532)	(663,889)	(835,215)			
D4. Non-Investment Net Cash Flow	(17,689,808)	(25,547,210)	(31,467,261)			
<b>E. Investment income</b>						
E1. Market total (B - C - D4)	146,879,820	54,261,421	(32,566,187)			
E2. Assumed Rate of Return	8.25%	8.25%	8.25%	8.25%	8.25%	8.25%
E3. Amount for Immediate recognition (A+.5xD4)xE2	92,839,948	105,294,680	116,805,193			
E4. Amount for Phased-In Recognition	54,039,872	(51,033,259)	(149,371,380)			
<b>F. Phased in recognition of investment income</b>						
F1. Current Year (33 1/3% of E4)	18,013,291	(17,011,086)	(49,790,460)	TBA	TBA	TBA
F2. First Prior Year	0	18,013,291	(17,011,086)	(49,790,460)	TBA	TBA
F3. Second Prior Year	0	0	18,013,290	(17,011,087)	(49,790,460)	TBA
F4. Total Recognized Investment Gain (F1 + F2 + F3)	18,013,291	1,002,205	(48,788,256)	(66,801,547)	(49,790,460)	
F5. Phase-In of Initial (BOY) difference between MVA and AVA	61,731,721	61,731,721	61,731,720	0		0
<b>G. Actuarial value at end of year (A + D4 + E3 + F4)</b>	1,289,072,760	1,431,554,156	1,529,835,552			
<b>Less LTD Assets</b>	8,012,962	8,758,145	9,035,143			
<b>H. Plan AVA</b>	1,281,059,798	1,422,796,011	1,520,800,409			
<b>Difference between market and actuarial values</b>	159,490,022	45,722,837	(116,592,007)			
<b>Recognized actuarial rate of return</b>	15.34%	13.17%	9.16%			

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

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

		<b>as of June 30,</b>	
		<b>2001</b>	<b>2000</b>
1.	Assets Allocated to Retirement Benefits	\$ 1,520,800,409	\$ 1,422,796,011
2.	Present Value Future Benefits		
	a) Uniformed Patrol	587,537,359	539,940,808
	b) Non-Uniformed	2,115,547,731	2,003,256,696
	c) Total	2,703,085,090	2,543,197,504
3.	Asset Allocation*		
	a) Uniformed Patrol		
	(2a) / (2c) x (1)	322,877,873	302,070,770
	a) Non-Uniformed		
	(2b) / (2c) x (1)	1,197,922,536	1,120,725,241
	Total Assets Allocated	1,520,800,409	1,422,796,011

\* Asset allocation ratio fixed at 2000 level. It is recommended that separate accounting be maintained going forward.

## **Section D**

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### **Summary of Member Data**



**COUNT AND AVERAGE SALARY OF  
UNIFORMED PATROL ACTIVE MEMBERS  
AS OF JUNE 30, 2001  
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	41								41
25-29	124	43							167
30-34	70	195	28						293
35-39	20	57	88	20	1				186
40-44	7	9	46	42	19				123
45-49	1	1	9	16	83	30			140
50-54				2	23	46	24		95
55-59					1	3	15	11	30
60-64							1	1	2
<b>Totals</b>	<b>263</b>	<b>305</b>	<b>171</b>	<b>80</b>	<b>127</b>	<b>79</b>	<b>40</b>	<b>12</b>	<b>1,077</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	\$33,352								\$33,352
25-29	36,477	\$40,375							37,481
30-34	36,538	40,975	\$47,917						40,579
35-39	37,419	42,480	49,713	\$56,482	\$53,587				46,923
40-44	38,934	39,477	49,297	56,485	62,096				52,420
45-49	37,910	41,303	49,863	55,433	63,708	\$70,706			63,027
50-54				71,387	59,121	69,680	\$74,274		68,320
55-59					62,441	71,094	74,370	\$70,005	72,044
60-64							69,755	66,835	68,295
<b>Totals</b>	<b>\$36,833</b>	<b>\$41,129</b>	<b>\$49,315</b>	<b>\$56,646</b>	<b>\$62,546</b>	<b>\$70,123</b>	<b>\$74,197</b>	<b>\$69,741</b>	<b>\$48,564</b>

Average Age: 37.3 years  
Average Service: 12.2 years

The Uniformed Patrol group includes 52 active members hired on or after July 1, 2000.

**COUNT AND AVERAGE SALARY OF  
NON-UNIFORMED ACTIVE MEMBERS  
AS OF JUNE 30, 2001  
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	17								17
20-24	354	5							359
25-29	573	180	1						754
30-34	457	404	132	6					999
35-39	399	295	294	227	5				1,220
40-44	337	255	226	363	262	9			1,452
45-49	240	186	189	217	274	198	14		1,318
50-54	154	124	123	145	160	194	126	8	1,034
55-59	78	56	73	85	69	52	94	70	577
60-64	23	32	24	27	30	25	25	58	244
65-99	7	6	5	3	5		2	8	36
<b>Totals</b>	<b>2,639</b>	<b>1,543</b>	<b>1,067</b>	<b>1,073</b>	<b>805</b>	<b>478</b>	<b>261</b>	<b>144</b>	<b>8,010</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	\$23,868								\$23,868
20-24	27,631	\$26,339							27,613
25-29	30,260	33,426	\$27,857						31,013
30-34	29,028	36,754	38,399	\$38,214					33,446
35-39	28,515	34,511	41,440	42,683	\$37,536				35,753
40-44	28,492	32,371	36,187	44,301	39,106	\$42,278			36,324
45-49	29,218	34,098	35,894	39,878	42,781	41,839	\$43,109		37,482
50-54	31,140	31,179	36,985	37,636	40,628	45,831	48,671	\$53,855	39,288
55-59	26,950	31,711	31,990	35,707	37,536	37,761	49,676	51,775	38,294
60-64	35,294	33,149	34,249	34,801	37,685	40,103	45,041	53,333	40,929
65-99	36,081	26,415	32,637	38,907	43,765		33,383	54,195	39,170
<b>Totals</b>	<b>\$29,081</b>	<b>\$34,113</b>	<b>\$37,593</b>	<b>\$41,195</b>	<b>\$40,491</b>	<b>\$42,933</b>	<b>\$48,270</b>	<b>\$52,653</b>	<b>\$35,829</b>

Average Age: 41.5 years  
Average Service: 11.6 years

The Non-Uniformed group includes 1,033 active members hired on or after July 1, 2000.

## GROWTH OF ACTIVE MEMBER PAYROLL

---

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%
			Ten Year Average	3.1%

**COUNT AND AVERAGE MONTHLY BENEFITS OF  
UNIFORMED PATROL RETIRED MEMBERS  
AS OF JUNE 30, 2001  
BY ATTAINED AGE AND YEARS OF RETIREMENT**

---

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	2	2							4
45-49	1			2					3
50-54	46	1	1						48
55-59	96	42	2	1					141
60-64	33	86	1						120
65-69	6	40	48	2					96
70-74	3	5	58	11	1		1		79
75-79	9	5	6	20	13				53
80-84	2	4	7	5	17	2			37
85+	15	5	20		1	12	6		59
<b>Totals</b>	<b>213</b>	<b>191</b>	<b>143</b>	<b>41</b>	<b>32</b>	<b>14</b>	<b>7</b>		<b>641</b>

Attained Age	Average Benefit by Complete Years of Benefit Payment								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<40		\$337							\$337
40-44	\$1,742	1,886							1,814
45-49	2,361			\$114					863
50-54	3,204	490	\$1,632						3,115
55-59	3,233	3,140	630	710					3,151
60-64	3,642	3,343	550						3,402
65-69	2,166	3,954	4,063	867					3,833
70-74	2,302	1,759	4,278	2,656	\$241		\$171		3,714
75-79	1,808	1,152	1,411	3,116	2,277				2,310
80-84	828	1,404	861	3,534	2,703	\$256			2,093
85+	1,015	1,758	632		2,310	1,960	1,322		1,193
<b>Totals</b>	<b>\$2,990</b>	<b>\$3,199</b>	<b>\$3,313</b>	<b>\$2,729</b>	<b>\$2,441</b>	<b>\$1,716</b>	<b>\$1,158</b>		<b>\$3,032</b>

As of June 30, 2001 there were no Uniformed Patrol retired members or beneficiaries receiving benefits under the Year 2000 Plan.

**COUNT AND AVERAGE MONTHLY BENEFITS OF  
NON-UNIFORMED RETIRED MEMBERS  
AS OF JUNE 30, 2001  
BY ATTAINED AGE AND YEARS OF RETIREMENT**

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	10	14	5						29
40-44	8	2	1	1					12
45-49	17	5	5						27
50-54	265	14	4	2	1	1			287
55-59	432	99	17	7	2	1			558
60-64	556	269	26	12	4	2			869
65-69	330	539	155	3	12	2	1		1,042
70-74	114	300	414	45	10	9	3		895
75-79	83	113	274	197	30	8			705
80-84	72	124	37	169	105	3	2		512
85+	74	176	37	17	102	42	10		458
<b>Totals</b>	<b>1,961</b>	<b>1,655</b>	<b>975</b>	<b>453</b>	<b>266</b>	<b>68</b>	<b>16</b>		<b>5,394</b>

Attained Age	Average Benefit by Complete Years of Benefit Payment								Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<40	\$159	\$266	\$121						\$204
40-44	824	458	385	\$71					664
45-49	826	889	340						748
50-54	2,329	825	399	192	\$115	\$82			2,198
55-59	2,239	1,749	615	239	136	56			2,066
60-64	1,660	1,622	939	324	164	69			1,597
65-69	1,524	1,662	1,507	426	211	127	\$1,798		1,572
70-74	990	1,571	1,771	684	174	102	118		1,510
75-79	852	471	1,506	1,091	445	193			1,087
80-84	555	345	868	1,140	932	168	65		793
85+	641	258	578	584	752	886	886		539
<b>Totals</b>	<b>\$1,684</b>	<b>\$1,292</b>	<b>\$1,510</b>	<b>\$1,005</b>	<b>\$726</b>	<b>\$599</b>	<b>\$697</b>		<b>\$1,412</b>

As of June 30, 2001 there were 963 Non-Uniformed retired members or beneficiaries receiving benefits under the Year 2000 Plan.

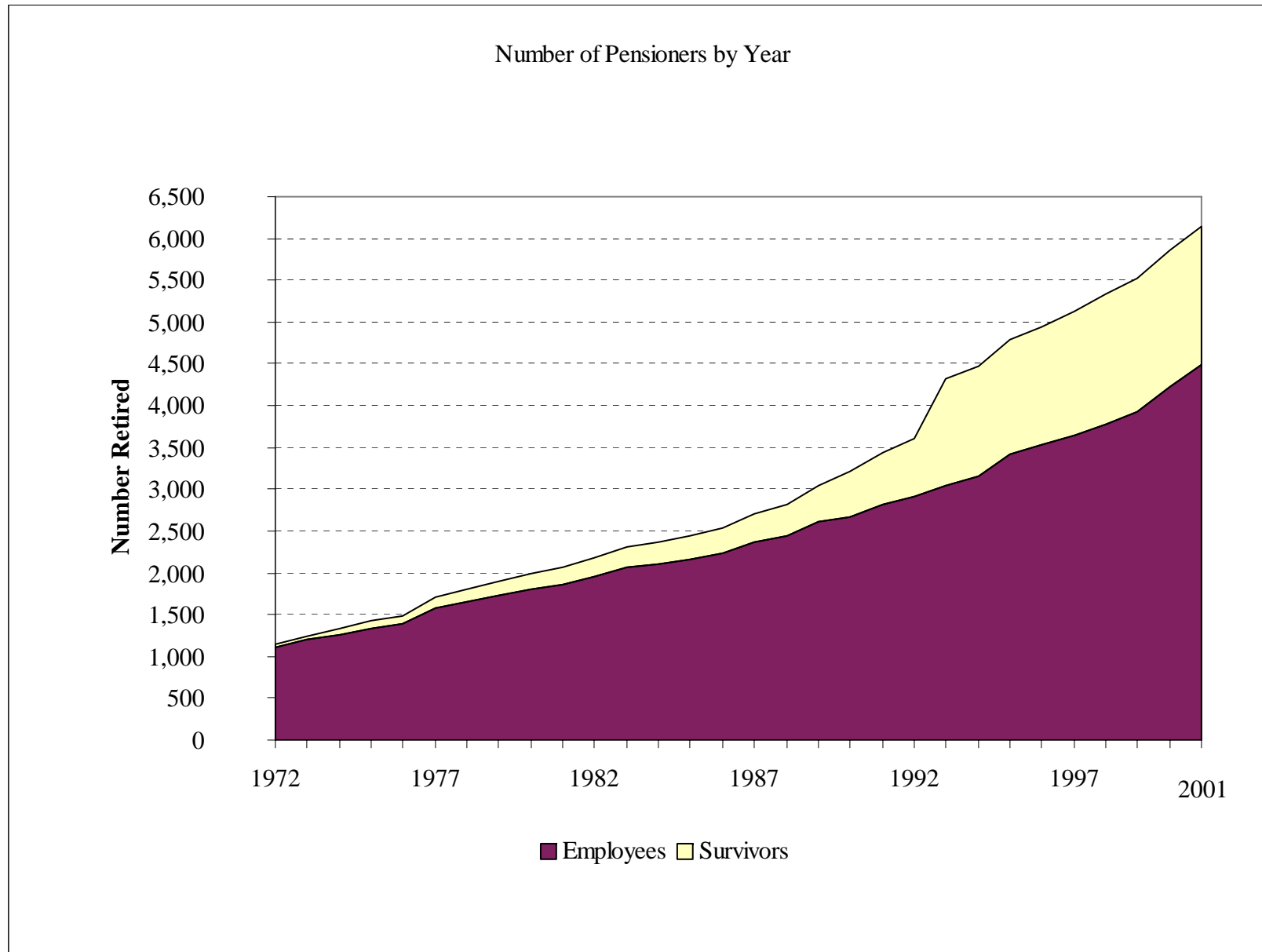
## GROWTH OF PENSION POPULATION BY YEAR

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<b>Year</b>	<b>Retired Employees</b>	<b>Survivors</b>	<b>Total</b>	<b>% Increase</b>	<b>Annual Benefits</b>	<b>Active Payroll</b>	<b>Benefits as a % of Payroll</b>
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%



# GROWTH OF PENSION POPULATION BY YEAR





**COUNT OF VESTED TERMINATED MEMBERS  
AS OF JUNE 30, 2001  
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		2							2
30-34		19	3						22
35-39		12	8						20
40-44		3	9	1					13
45-49			9	3	2	1			15
50-54			9	4	4				17
55-59			2						2
<b>Totals</b>		<b>36</b>	<b>40</b>	<b>8</b>	<b>6</b>	<b>1</b>			<b>91</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		18							18
30-34		101	7						108
35-39		118	63	15					196
40-44		103	66	36	5				210
45-49		57	50	28	17	4			156
50-54		38	69	29	12	2	1		151
55-59		13	23	25	11	1			73
60-64		4	8	3					15
<b>Totals</b>		<b>452</b>	<b>286</b>	<b>136</b>	<b>45</b>	<b>7</b>	<b>1</b>		<b>927</b>

**COUNT AND AVERAGE MONTHLY BENEFITS OF  
DISABLED RETIRED MEMBERS  
AS OF JUNE 30, 2001  
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	3			1					4
40-44	2	1							3
45-49	5	2		2					9
50-54	11	1		1	1				14
55-59	6	2	2	1	3	1			15
60-64	4		2	4			1		11
65-69		1	1	5	3				10
70-74				9	7				16
75-79				5	7	2			14
80-84				1	5	3	1		10
85+					1	2	1		4
<b>Totals</b>	<b>31</b>	<b>7</b>	<b>5</b>	<b>29</b>	<b>27</b>	<b>8</b>	<b>3</b>		<b>110</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	\$1,083			\$55					\$826
40-44	1,817	\$509							1,381
45-49	635	1,201		464					722
50-54	1,566	1,169		156	\$159				1,337
55-59	813	1,228	\$325	764	285	\$163			651
60-64	5,756		2,058	228			\$237		2,572
65-69		741	1,144	1,107	631				931
70-74				603	177				417
75-79				960	1,182	562			1,014
80-84				59	377	526	598		412
85+					740	869	504		745
<b>Totals</b>	<b>\$1,780</b>	<b>\$1,039</b>	<b>\$1,182</b>	<b>\$643</b>	<b>\$557</b>	<b>\$575</b>	<b>\$446</b>		<b>\$982</b>

## **Section E**

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### **Assumptions Used in the Valuation**

# APPENDIX

## SUMMARY OF VALUATION METHOD AND ASSUMPTIONS JUNE 30, 2001

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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.

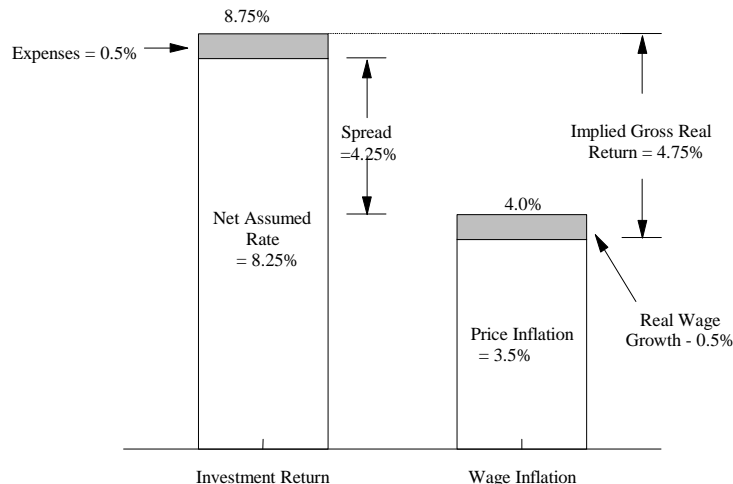
### Economic Assumptions

*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, 2001**  
**(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 MSEP 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 percent 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

Salary Increase Assumptions for an Individual Member						
Age	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%
Ref.	200			201		

## 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
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
60	0.00987	0.00590	0.06030	0.03310	100	0.30913	0.20689	0.56840	0.37890
Ref	#152sb1x1	#154sb2x1	#250sb0x1	#251sb0x1		#152sb1x1	#154sb2x1	#250sb0x1	#251sb0x1

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	\$180.95	\$186.04	28.28	32.80
55	168.29	174.10	23.98	28.28
60	153.43	160.07	19.90	23.98
65	136.45	143.76	16.09	19.90
70	118.18	125.60	12.69	16.09
75	99.69	106.82	9.82	12.69
80	81.60	88.21	7.39	9.82
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.



## RATES OF RETIREMENT

Age	Non-Uniform				Uniform	
	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 form 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-Uniform		Uniform		Age	Non-Uniform		Uniform	
	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-Uniform</b>		<b>Uniform</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

Age	Non-Uniform		Uniform	
	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:	0.21% of Payroll.
Marriage Assumption:	90% of participants are assumed to be married for purposes of death-in-service benefits.
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.
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 5% to account for the inclusion of unused sick leave in the calculation of Average Compensation.</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 MSEP 2000 Plan.</p> <p>The Normal Cost for the normal retirement decrement for Non-Uniformed members was increased by 0.45% to account for anticipated changes in the pattern of retirements due to the MSEP 2000 Plan.</p>
Valuation Payroll:	Payroll submitted for valuation purposes was pro-rated by 24/25 due to the inclusion of an extra pay period in the reported data. Active member Uniformed group liabilities were reduced by 2% to account for the inclusion of one-time lump sums in the reported pay. Total payment to the group was approximately \$1.74 million.

## **Section F**

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# **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.

## Section G

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# Long Term Disability Benefits Plan Actuarial Valuation

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*Highway and Transportation Employees' and Highway Patrol Retirement System*

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*E-1*

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*Highway and Transportation Employees' and Highway Patrol Retirement System*

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## SUMMARY OF KEY VALUATION RESULTS AND COMMENTS AS OF JUNE 30, 2001

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This portion of the valuation report summarizes the results of the actuarial valuation of the long-term disability benefits provided by HTEHPRS.

The results of this valuation indicate that the LTD Trust Fund assets are greater than the Present Value of Future Benefits for this program and no additional contribution is warranted.

	<b>2001</b>	<b>2000</b>
<b>Number of Participants</b>		
Pensioners	70	76
Active Employees	9,087	9,171
<b>Valuation Payroll</b>	327,049,257	312,532,009
<b>Book Value of Assets</b>	9,035,143	8,758,145
<b>Market Value of Assets</b>	8,346,555	9,037,874
<b>Actuarial Value of Assets</b>	9,035,143	8,758,145
<b>Present Value of Future Benefits</b>	5,259,491	5,119,981
<b>Present Value of Future Normal Cost</b>	0	0
<b>Recommended Contribution Rate</b>	0.00%	0.00%

**DETERMINATION OF NORMAL COST  
AS OF JUNE 30, 2001**

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	<b>Year Ended June 30</b>	
	<b>2001</b>	<b>2000</b>
1. Present Value of Future Benefits:		
a) Retirees	1,983,552	2,217,636
b) Actives	3,275,939	2,902,345
c) Total	5,259,491	5,119,981
2. Provision for Expenses (4%)	210,380	204,799
3. Trust Fund Assets	9,035,143	8,758,145
4. Present Value of Future Normal Costs: (1c) + (2) - (3)	0	0
5. Present Value of Future Salaries	3,539,338,258	3,194,334,976
6. Normal Cost Accrual rate: (4)/(5)	0.00000%	0.00000%
7. Expense Loading Factor	1.000	1.000
8. Total Normal Cost Percentage: (5) x (6) x (7)	0.00000%	0.00000%
9. Recommended Contribution as a Percentage of Payroll	0.00%	0.00%

**SCHEDULE OF CASH FLOW**

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	<b><u>2000-2001</u></b>	<b><u>1999-2000</u></b>
<b>Valuation Assets, Beginning of Year</b>	8,758,145	7,773,301
<b>External Cash Flow</b>		
Contributions	-	239,948
Benefits	(490,433)	(519,745)
Expenses	(23,832)	(20,498)
<b>Total</b>	(514,265)	(300,295)
<b>Investment Income</b>	791,263	773,879
<b>Adjustment for Change in Asset Method</b>	-	511,260
<b>Valuation Assets, End of Year</b>	9,035,143	8,758,145

## DEVELOPMENT OF LONG TERM DISABILITY ASSET ALLOCATION

	Year Ended June 30	
	2001	2000
1. Market value LTD Assets at July 1	9,037,874	9,004,362
2. Contributions for LTD	0	239,948
3. LTD Benefits Paid	490,433	519,745
4. Mean Investable LTD Funds (1) + .5 x [(2) - (3)]	8,792,658	8,864,464
5. Market Value for Total Assets at July 1	1,477,276,994	1,451,304,612
6. Total Contributions	81,353,019	70,519,534
7. Total Benefits Paid	111,985,065	95,402,855
8. Mean Investable Total Funds (5) + .5 x [(6) - (7)]	1,461,960,971	1,438,862,952
9. Total Fund Market Return	(29,438,821)	54,182,873
10. Total Fund Expenses	3,962,582	3,327,171
11. LTD Market Return [(4)/(8)] x (9)	(177,054)	333,807
12. LTD Expenses [(4)/(8)] x (10)	23,832	20,498
13. Market Value LTD assets at June 30 (1)+(2)-(3)+(11)-(12)	8,346,555	9,037,874
14. Book Value Total Fund at June 30	1,372,572,721	1,219,474,794
15. Actuarial Value Total Fund at June 30	1,529,835,552	1,431,554,156
16. Market Value Total Fund at June 30	1,413,243,545	1,477,276,993
17. Book Value LTD assets at June 30 [(14)/(16)] x (13)	8,106,355	7,460,659
18. Actuarial Value LTD assets at June 30 [(15)/(16)] x (13)	9,035,143	8,758,145

## **SUMMARY OF PROVISIONS EVALUATED AS OF JUNE 30, 2001**

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**Coverage.** All employees are covered on the first day of the month following date of hire.

**Eligibility Requirements.** All employees who are unable to perform their present job or any other position in the Department and whose disability has been diagnosed as being of such a nature as to exist for more than one year may qualify for LTD benefits. Disabilities resulting from war, declared or undeclared, or any act of war are not covered.

**Amount of Benefits.** Eligible employees will receive LTD benefits equal to 60% of their salary immediately prior to becoming disabled, less any primary Social Security benefits, less any benefits provided at the cost of the Department or Patrol including Workers Compensation indemnity benefits. The minimum monthly benefit is 9% of salary, or \$50, whichever is greater.

**Cost of Living Adjustments.** LTD recipients are not eligible to receive cost of living adjustments.

**Duration of Benefits.** Benefits commence after the later of a 180-day waiting period, the expiration of sick leave, or application for disability benefits. If benefits begin before age 60, benefits end at the earlier of age 65 or the age at which regular retirement benefits are claimed. If benefits begin on or after age 60, benefits continue until the earlier of the age at which retirement benefits are claimed, or the expiration of the period shown in the following table:

<b>LTD Benefit Schedule</b>	
<u>Age at Disability</u>	<u>Benefit Period (months)</u>
60	60
61	48
62	42
63	36
64	30
65	24
66	21
67	18
68	15
69 and Over	12

Benefits will also cease if the disabled employee regains more than 50% of their earning capacity.

**SAMPLE BENEFIT COMPUTATION FOR LTD  
RETIRING JULY 1, 2001**

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	<b>Data</b>	<b>Description</b>	
A.	\$40,000	Salary Immediately Prior to Disablement	
B.	\$11,000	Social Security Disability PIA	
<b>Sample Computation Steps</b>			
C.	LTD Retirement Benefit Formula:	0.60 x \$ 40,000 - \$ 11,000 =	\$13,000
<b>Benefit payable to:</b>			
D.	Retirant until normal retirement (C)		\$13,000

Projected Benefits to Member

Year Ended <b>June 30</b>	Amount Payable
2000	\$13,000
2001	\$13,000
2002	\$13,000
2003	\$13,000
2004	\$13,000
2005	\$13,000
2006	\$13,000
2007	\$13,000
2008	\$13,000
2009	\$13,000



**SCHEDULE OF LONG TERM DISABILITY RECIPIENTS  
AS OF JUNE 30, 2001  
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	1	1%	887	887
25-29	0	0%	0	0
30-34	2	3%	2,569	1,285
35-39	4	6%	2,718	680
40-44	13	19%	12,865	990
45-49	14	20%	13,692	978
50-54	15	21%	12,444	830
55-59	14	20%	8,160	583
60-64	7	10%	4,326	618
65-69	0	0%	0	0
70 & Over	0	0%	0	0
<b>TOTAL</b>	<b>70</b>	<b>100%</b>	<b>\$57,661</b>	<b>\$824</b>

## SUMMARY OF ACTUARIAL METHODS AS OF JUNE 30, 2001

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*The actuarial cost method of valuation* used in determining all benefit liabilities and normal cost was the aggregate cost method. Normal costs were computed as the level percentage of future active participant covered pay required to fund the difference between the present value of all future benefits and the actuarial value of assets.

*Assets are valued* on a market-related basis. At each year-end (June 30), the funding asset value is moved toward market value, by immediate recognition of assumed earnings and a three-year phase-in of the difference between actual and assumed earnings.

*Duration of benefits:* It was assumed that LTD benefits would be paid until first eligibility for normal retirement benefits.

### MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

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Operating Expenses	4% of the Present Value of Future Benefits for all future expenses.
Surviving Spouses	90% of employees dying in-service will have an eligible beneficiary the same age. Note that surviving spouse benefits are not payable from the LTD plan.
Disability Benefit	All future disabilities are assumed covered by LTD benefits.
Offsets to LTD Benefits	It was assumed Workers Compensation indemnity benefits would be zero, and that Social Security Disability PIA benefits would apply.

January 28, 2002

Mr. Norm Robinson, Executive Director  
Highway and Transportation Employees' and  
Highway Patrol Retirement System  
1445 Christy Drive  
Jefferson City, MO 65101

Dear Norm:

Enclosed are 20 bound copies of the June 30, 2001 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,

Mark K. Johnson

MKJ\mj  
Enclosures

CC: Brian B. Murphy