

**MISSOURI DEPARTMENT OF TRANSPORTATION AND HIGHWAY PATROL  
EMPLOYEES' RETIREMENT SYSTEM (MPERS)**

ACTUARIAL VALUATION REPORT

AS OF JUNE 30, 2011

# TABLE OF CONTENTS

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	<u>Pages</u>
Introduction	1-2
Summary of Results & Comments	3-15
<b>Section A: Valuation Results</b>	
Development of Contribution Rate and Liabilities	A1-A2
Statement of Resources and Obligations	A3
Amortization of Unfunded Actuarial Accrued Liabilities	A4
GASB Reporting	A5-A7
Gain/Loss Analysis	A8-A9
<b>Section B: Summary of Benefits</b>	B1-B12
<b>Section C: Financial Information</b>	
Summary of Fund Operations	C1
Development of Funding Value of Assets	C2
Allocation of Assets	C3
<b>Section D: Member Data</b>	
Active Members	D1-D10
Retirees and Survivors	D11-D18
Disabled Retirees	D19-D20
<b>Section E: Assumptions Used in the Valuation and Glossary</b>	E1-E14
<b>Section F: Financial Principles and Operational Techniques</b>	F1-F4
<b>Section G: Supplemental information for Comprehensive Annual     Financial Reporting</b>	G1-G11

December 16, 2011

The Retirement Board  
Missouri Department of Transportation  
and Highway Patrol Employees' Retirement System  
1913 William Street  
Jefferson City, Missouri 65102-1930

Ladies and Gentlemen:

The results of the regular annual actuarial valuation as of June 30, 2011 of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System, as established by Chapter 104 of the Missouri Revised Statutes, are presented in this report. The purposes of this valuation were:

- to measure the System's funding progress;
- to determine the employer contribution rate for Fiscal Year 2013;
- to determine actuarial information for reporting purposes in compliance with Governmental Accounting Standards Statements No. 25 and No. 43 for the 2011 fiscal year.

Your attention is directed particularly to the summary of the results on pages 3-15.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. This report should not be relied on for any purpose other than the purpose described.

The member statistical data required for the valuation together with pertinent data on financial operations was furnished by your Executive Director and her staff. Member data was reviewed for reasonableness, but was not audited by the actuary. Financial data was received in aggregate and reviewed for reasonableness. Individual investments were not reviewed. Assets are not audited by the actuary. We are not responsible for the accuracy or completeness of the data provided by MPERS.

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.

The valuation results summarized in this report involve actuarial calculations that require assumptions about future events. We believe that the assumptions and methods used in this report are reasonable and appropriate for the purpose for which they have been used. However, other assumptions and methods could also be reasonable and could result in materially different results. In addition, because it is not possible or practical to consider every possible contingency, we may use summary information, estimates or simplifications of calculations to facilitate the modeling of future events. We may also exclude factors or data that are deemed to be immaterial.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. This report does not contain an analysis of the potential range of such future measurements.

To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries. The actuarial assumptions used for the valuation produce results which, individually and in the aggregate, are reasonable. The actuarial assumptions used in making the valuation are shown in Section E of this report.

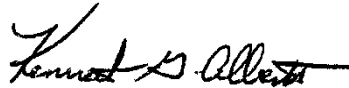
This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. Heidi Barry is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

We would like to acknowledge Brian B. Murphy, FSA, MAAA as the Peer Review Actuary.

Respectfully submitted,



Heidi G. Barry, ASA, MAAA



Kenneth G. Alberts

## SUMMARY

This report contains the results of the June 30, 2011 valuation. The table below shows a summary of the data used in the valuation as well as the unfunded actuarial accrued liability for the two experience rated groups. This data was the basis for determining valuation results and recommended employer contribution rates.

	Non-Uniformed			Uniformed Patrol	Total
	Civilian Patrol Employees	MoDOT Employees	Non-Uniformed Total		
Participants					
Active Members					
Closed Plan	530	3,203	3,733	754	4,487
Year 2000 Plan (also closed)	576	2,662	3,238	422	3,660
Year 2011 Tier (open)	40	7	47	37	84
Total Active Members	1,146	5,872	7,018	1,213	8,231
<i>Total Active Members Prior Year</i>	<i>1,144</i>	<i>6,208</i>	<i>7,352</i>	<i>1,105</i>	<i>8,457</i>
Retiree -- Regular Pensioners					
Closed Plan	429	3,711	4,140	799	4,939
Year 2000 Plan (also closed)	383	2,285	2,668	1	2,669
Year 2011 Tier (open)	0	0	0	0	0
Total Regular Pensioners	812	5,996	6,808	800	7,608
Self Insured Disability Pensioners	6	63	69	3	72
Fully Insured Disability Pensioners	8	86	94	1	95
Terminated Vested Members	222	1,466	1,688	158	1,846
Total	2,194	13,483	15,677	2,175	17,852
Active Member Valuation Payroll	\$42,793,273	\$246,425,127	\$289,218,400	\$72,420,601	\$361,639,001
<i>Active Mem. Val. Payroll Prior Year</i>	<i>\$41,931,141</i>	<i>\$260,802,058</i>	<i>\$302,733,199</i>	<i>\$67,178,053</i>	<i>\$369,911,252</i>
Unfunded Actuarial Accrued Liability	N/A	N/A	\$1,405,157,141	\$465,142,010	\$1,870,299,151

The June 30, 2011 valuation results are used to determine the contribution rate for the plan year beginning July 1, 2012. A summary of valuation results and recommended contribution rates follows.

## SUMMARY - (CONTINUED)

The **total contribution rate** for the plan year beginning July 1, 2012 is shown below.  
**Before recognizing payroll projections provided by MoDOT.**

	<b>FY 2013 Employer Contribution Rates Expressed As % of Active Payroll For Total Benefits</b>				
	<b>Non-Uniformed</b>			<b>Uniformed Patrol Total</b>	<b>Combined Rate (MPERS Total)</b>
	<b>Civilian Patrol Employees</b>	<b>MoDOT Employees</b>	<b>Total</b>		
Normal Cost	11.25%	11.25%	11.25%	12.06%	11.42%
Unfunded Liability	34.05%	34.05%	34.05%	41.71%	35.59%
Expenses	0.73%	0.73%	0.73%	0.73%	0.73%
Subtotal	46.03%	46.03%	46.03%	54.50%	47.74%
Disability Insurance	0.53%	0.53%	0.53%	0.53%	0.53%
<b>Total</b>	<b>46.56%</b>	<b>46.56%</b>	<b>46.56%</b>	<b>55.03%</b>	<b>48.27%</b>
Illustrative \$	\$19,924,548	\$114,735,539	\$134,660,087	\$39,853,057	\$174,513,144
Projected \$	\$21,446,908	\$123,502,051	\$144,948,959	\$42,898,080	\$187,847,039
Prior Year Illustrative \$			\$137,592,239	\$39,386,492	\$176,978,731

The Illustrative dollar contribution amounts are the total employer rate multiplied by payroll on the valuation date. The Projected dollar amounts are the total employer rate multiplied by the valuation payroll projected to the fiscal year the rate is effective. The projection factor is 1.0764. Actual contributions will be based on the actual payroll during the 2013 Fiscal Year. The total contribution is based on a 13-year amortization period for unfunded retiree liabilities and a 28-year amortization period for other unfunded liabilities from July 1, 2012 in accordance with Board policy adopted September 17, 2009.

The contributions above are Employer contributions only. In addition, Employee contributions are estimated to be (on average) 0.01% for Non-Uniformed members and 0.07% for Uniformed members.

The combined contribution rate is less than the actual benefit payout rate. The difference is intended to be made up by investment return. The ability to contribute less than the benefit payout is one of the advantages of a funded retirement plan.

Prior year Illustrative dollars are based on rates of 45.45% for Non-Uniform and 58.63% for Uniform.

## SUMMARY - (CONTINUED)

The **total contribution rate** for the plan year beginning July 1, 2012 is shown below.  
**After recognizing payroll projections provided by MoDOT.**

	<b>FY 2013 Employer Contribution Rates Expressed As % of Active Payroll For Total Benefits</b>				
	<b>Non-Uniformed</b>			<b>Uniformed Patrol Total</b>	<b>Combined Rate (MPERS Total)</b>
	<b>Civilian Patrol Employees</b>	<b>MoDOT Employees</b>	<b>Total</b>		
Normal Cost	11.25%	11.25%	11.25%	12.06%	11.42%
Unfunded Liability	38.41%	38.41%	38.41%	41.71%	39.11%
Expenses	0.73%	0.73%	0.73%	0.73%	0.73%
Subtotal	50.39%	50.39%	50.39%	54.50%	51.26%
Disability Insurance	0.53%	0.53%	0.53%	0.53%	0.53%
<b>Total</b>	<b>50.92%</b>	<b>50.92%</b>	<b>50.92%</b>	<b>55.03%</b>	<b>51.79%</b>
Illustrative \$	\$21,790,335	\$125,479,675	\$147,270,010	\$39,853,057	\$187,123,067
Projected \$	\$22,607,473	\$125,479,675	\$148,087,148	\$42,898,080	\$190,985,227
Prior Year Illustrative \$			\$137,592,239	\$39,386,492	\$176,978,731

The Illustrative dollar contribution amounts are the total employer rate multiplied by payroll on the valuation date. The Projected dollar amounts are the total employer rate multiplied by the valuation payroll projected to the fiscal year the rate is effective. The projection factor is 1.0112 for non-uniformed and 1.0764 for uniformed. Actual contributions will be based on the actual payroll during the 2013 Fiscal Year. The total contribution is based on a 13-year amortization period for unfunded retiree liabilities and a 28-year amortization period for other unfunded liabilities from July 1, 2012 in accordance with Board policy adopted September 17, 2009.

The contributions above are Employer contributions only. In addition, Employee contributions are estimated to be (on average) 0.01% for Non-Uniformed members and 0.07% for Uniformed members.

The combined contribution rate is less than the actual benefit payout rate. The difference is intended to be made up by investment return. The ability to contribute less than the benefit payout is one of the advantages of a funded retirement plan.

Prior year Illustrative dollars are based on rates of 45.45% for Non-Uniform and 58.63% for Uniform.

## SUMMARY - (CONTINUED)

**Assumptions and Methods:** There were no changes in the assumptions and methods for the June 30, 2011 valuation, other than the method change to reflect the near term downsizing of MoDOT in the financing of UAAL as discussed on page 9.

**Experience:** Although system assets recognized a 21.7% rate of return on a market basis, the fund recognized a 6.5% rate of return on an actuarial basis after accounting for the smoothing of this year's gain and the prior gains and losses (please see page C-2). In aggregate, there was an experience gain of \$71 million (approximately 2.2% of beginning of year liabilities). This gain was made up of a \$24 million investment loss and a \$95 million liability gain and resulted in the funding status increasing from 42.2% to 43.3%. In addition to the gains related to pay increases, there were gains and losses related to demographic experience (things happening to members). The table below shows a comparison of actual activity versus expected activity (based on valuation assumptions):

### Demographic Experience

	<u>Non-Uniformed</u>			<u>Uniformed</u>		
	<u>Actual</u>	<u>Expected</u>	<u>%</u>	<u>Actual</u>	<u>Expected</u>	<u>%</u>
Retirement	235	253.8	93%	22	25.6	86%
Death	7	8.4	83%	1	0.9	111%
Disability	34	22	155%	1	1	100%
Vested Terminations	108	125.1	86%	3	12.3	24%
Other Terminations	153	159.4	96%	12	8.3	145%
Pay Increases	0.65%	5.70%	11%	0.09%	5.90%	2%
Changes in Total Payroll (before addition of Water Patrol)	(4.46%)	3.75%	(219%)	1.21%	3.75%	32%

### **Funding Policy:**

*Permanent Policy:* The total contribution will be based on normal cost plus a 24-year amortization of unfunded actuarial accrued liabilities. The amortization period is a closed 24-year period starting July 1, 2012.

*Temporary Accelerated Policy:* The total contribution is based on normal cost plus a 13-year amortization period for unfunded retiree liabilities and a 28-year amortization period for other unfunded liabilities. Both amortization periods are closed periods starting July 1, 2012.

This temporary accelerated policy was adopted by the Retirement Board on September 17, 2009 and will remain in effect until such time as the retiree liability becomes 100% funded or the permanent policy produces a higher contribution rate.



## SUMMARY - (CONTINUED)

**Rate Reconciliation:** The table below shows the computed rate last year and the approximate effect of the changes that occurred during the year.

	<b>Non-Uniform</b>	<b>Uniform</b>
Computed employer contribution rate, prior valuation	45.45%	58.63%
Effects of:		
Change in disability premiums	0.00%	0.00%
Transfer of Water Patrol members	(0.06%)	(2.88%)
Change in assumptions	0.00%	0.00%
Phase-in of 2011 Tier members	(0.02%)	(0.08%)
10/11 recognized investment loss (gain)	0.11%	1.70%
10/11 liability experience loss (gain)	(1.92%)	(1.33%)
Change in administrative expenses	0.12%	0.12%
Change due to payroll increase less than expected	3.97%	1.47%
Misc (demographic, payroll weighting etc.)	(1.09%)	(2.60%)
Computed employer contribution rate, current valuation	46.56%	55.03%
Recognition of short term wage inflation due to MoDOT downsizing	4.36%	0.00%
Alternate computed employer contribution rate, current valuation	50.92%	55.03%

**Accelerated Amortization Schedule:** In accordance with RSMo 105.684 an accelerated amortization schedule was prepared and presented to the Board. On September 17, 2009, the Board adopted that accelerated schedule as a temporary funding policy, until such time as the retiree liability becomes 100% funded or the permanent policy produces a higher contribution rate.

**Funded Status of Retiree Liability:** The chart below indicates the funding status of retiree liabilities on a funding value asset basis and a market value asset basis:

<b>Asset Basis</b>	<b>June 30, 2011</b>			<b>June 30, 2010</b>
	<b>Non-Uniformed</b>	<b>Uniformed</b>	<b>Total</b>	<b>Total</b>
Funding Value	67.6%	77.2%	69.8%	67.6%
Market Value	72.6%	86.8%	75.9%	64.4%

## SUMMARY - (CONTINUED)

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**2011 Tier:** Legislation passed in the summer of 2010 effectively closed the Y2K Plan benefits to new hires and opened a new tier known as the 2011 Tier. All new hires after January 1, 2011 will enter the 2011 Tier. The 2011 Tier includes the following:

- 4% employee contribution rate;
- 10-year vesting;
- later retirement eligibility;
- no DROP eligibility.

There were 84 members covered under this Tier as of June 30, 2011.

**Valuation Method for June 30, 2011 valuation:** Currently the ultimate entry age normal cost method is used for the Closed and Y2K (also closed) members (not the 2011 Tier). This method uses the benefits of the Y2K plan to establish the normal cost. This method was used to maintain a level normal cost as more and more members were covered under the Y2K plan, given the similarities of the non-uniform benefits and the fact that Closed plan members could elect Y2K benefits. Because the 2011 Tier provides for 4% member contributions (the other plans had no member contributions) and substantially different benefits, it made more sense to compute the normal cost for this Tier separately. Therefore we are using a blended normal cost calculation. The blend is the average of the Y2K normal cost (for Closed plan and pre 2011 members) and the 2011 Tier normal cost.

**Recommendation for June 30, 2011 valuation:** We do not recommend any changes to the assumptions or funding methods for this valuation.

**Recommendation for June 30, 2012 valuation and beyond:** The Governmental Accounting Standards Board (GASB) has released its preliminary draft of the revised statements No. 25 and No. 27. In the current statements many practitioners believe that the use of the ultimate normal cost method is acceptable for reporting purposes. Under the exposure draft, the use of the ultimate normal cost method will not be acceptable for accounting purposes (many public sector actuaries believe it is still acceptable under actuarial standards). To minimize the differences between what is used for funding and what is used for reporting, we recommend that the Board adopt the traditional entry age normal cost method for future valuations (which will use a blended normal cost between the Closed Plan, the Y2K plan and the 2011 Tier). If it were adopted for this valuation, the Non-Uniform rate would be 50.89% and the Uniform rate would be 57.39%.

## SUMMARY - (CONTINUED)

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**Water Patrol:** Effective July 1, 2011, 82 members of the Water Patrol were moved from the Missouri State Employees Retirement System (MOSERS) to the MPERS. These members add \$26 million dollars to MPERS accrued liabilities. MOSERS transferred \$17 million dollars to MPERS on behalf of these members. Since this group was better funded than the other MPERS members, this transfer had a positive impact on MPERS' overall funded status. Of the 82 members, 10 were included with the Civilian Patrol and 72 were included with the Uniform Patrol. Data for these 82 members was provided by MOSERS. In future years, this data is expected to be provided with the other MPERS data.

**Method Change:** Page 4 of this report reflects the current methods and assumptions, including an assumption that payroll growth will average 3.75% in the future. At the September 2011 Board meeting the Board requested that the computed contribution reflect the short term contraction in the payroll of MoDOT. MoDOT subsequently submitted the following projected payroll and employee counts:

FY12	\$239 million	Salaried headcount at 6/30/11	5,838
FY13	\$230 million	Salaried headcount at 6/30/12	5,472
FY14	\$228 million	Salaried headcount at 6/30/13	5,106
FY15	\$235 million	Salaried headcount at 6/30/14	5,106
FY16	\$235 million	Salaried headcount at 6/30/15	5,106
FY17	\$242 million	Salaried headcount at 6/30/16	5,106

As a result of this projection, we revised our calculations to reflect the following payroll growth for the non-uniformed group (of which MoDOT represents the majority):

FY 12: 0.55%  
FY 13: 0.57%  
FY 14: 0.59%  
FY 15 and later: 3.75% per annum.

This change was applied to the expected contributions from the previously adopted employer rates as well as the annuity factors used to finance the UAAL. Liabilities were not affected by this change. Should the future pay increases for individuals result in lower than assumed pay increases, those gains will materialize in the following valuation. **Results using these assumptions are shown on page 6.** The Board formally adopted the change at its December 2011 Board meeting.

## SUMMARY - (CONTINUED)

The expected near term dollar contributions under the two approaches will differ. The table below shows the near term dollar contributions under the current method and the proposed method:

Fiscal Year	MPERS Total Projected Dollar Contributions Assuming no Future Gains/Losses (\$Millions)	
	Current Method (3.75% Assumed Wage Growth per Annum, All Groups)	Proposed Method (Non-Uniformed Select Wage Growth Assumption of 0.55%, 0.57%, 0.59%)
2013	\$187.8	\$191.0
2014	194.9	193.5
2015	202.2	200.7
2016	209.8	208.2
2017	217.6	216.1

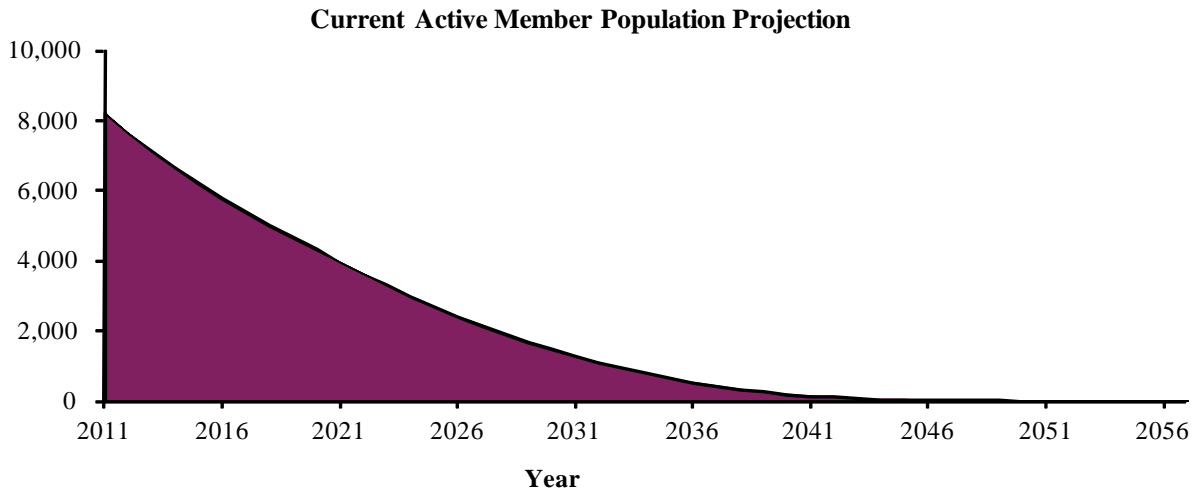
It is important to note that gains/losses (including the past investment gains/losses yet to be recognized in the valuation) will affect the amounts above.

**Conclusion:** Based upon the results of the June 30, 2011 regular annual actuarial valuation, it is our opinion that the Missouri Department of Transportation and Highway Patrol Employees' Retirement System continues to be financed in accordance with actuarial principles of level percent of payroll financing. This statement is based upon the fact that the employer is contributing to the system based upon actuarially determined rates and presumes a continuation of payment of actuarially determined contributions. In addition, we commend the 2009 Board in its decision to more aggressively address the unfunded retiree liability issue and the 2011 Board in its decision to reflect the near term downsizing of MoDOT.

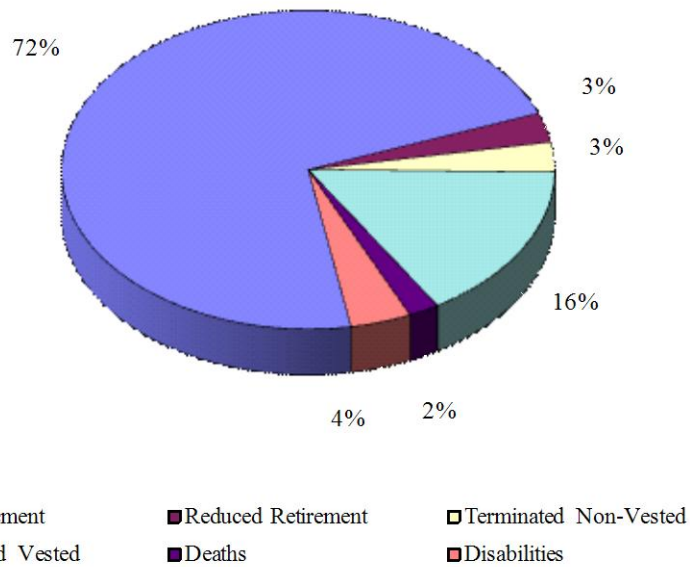
## SUMMARY OF KEY VALUATION RESULTS (CONTINUED)

Actuarial Present Value	June 30, 2011			June 30, 2010
	(1) Actuarial Present Value	(2) Portion Covered By Future Normal Cost Contributions	(3) Actuarial Accrued Liabilities (1) - (2)	Actuarial Accrued Liabilities
<b>Active Members</b>				
Service retirement benefits based on service rendered before and likely to be rendered after valuation date	\$ 1,427,838,716	\$314,610,082	\$ 1,113,228,634	\$ 1,087,976,011
Disability benefits likely to be paid to present active members who become totally and permanently disabled	59,233,848	18,026,798	41,207,050	42,036,267
Survivor benefits likely to be paid to widows and children of present active members who die before retiring	24,927,925	7,436,347	17,491,578	17,655,211
Separation benefits likely to be paid to present active members	44,350,860	21,788,919	22,561,941	23,511,581
Active Member Totals	\$ 1,556,351,349	\$361,862,146	\$ 1,194,489,203	\$ 1,171,179,070
<b>Terminated Vested Members Retired Lives</b>			57,976,898	53,332,069
			2,045,123,768	2,034,355,786
<b>Total Actuarial Accrued Liability</b>			\$ 3,297,589,869	\$ 3,258,866,925
<b>Actuarial Value of Assets</b>			1,427,290,718	1,375,844,573
<b>Unfunded Actuarial Accrued Liability</b>			\$ 1,870,299,151	\$ 1,883,022,352

## EXPECTED DEVELOPMENT OF PRESENT POPULATION AS OF JUNE 30, 2011 (CONTINUED)



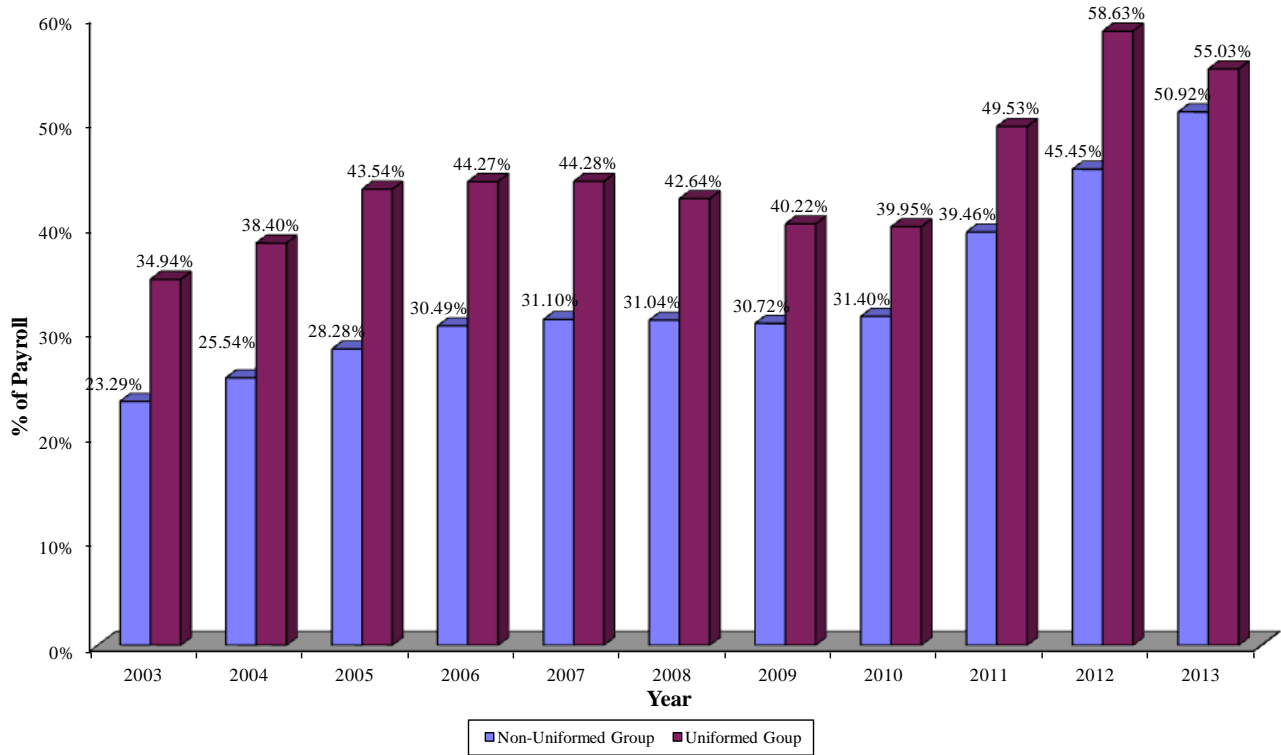
### Expected Terminations from Active Employment for Current Active Members



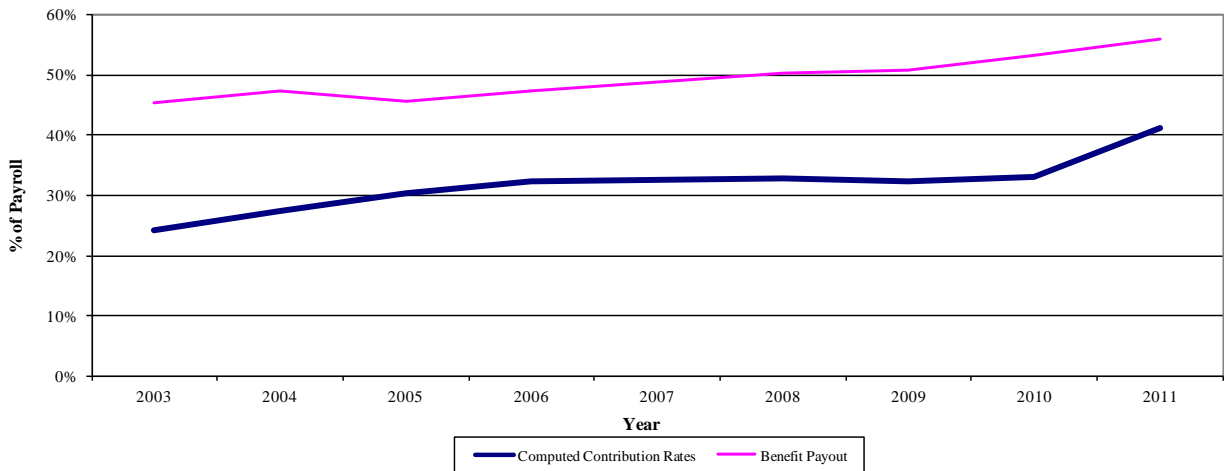
The charts above show the expected future development of the present population in simplified terms. The retirement system presently covers 8,231 active members. Eventually, 3% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. Of the present population, 91% is expected to receive monthly retirement benefits either by retiring directly from active service, or by separating from service with a vested benefit and 6% of the present population is expected to become eligible for death-in-service or disability benefits. Within 11 years, over half of the covered membership is expected to consist of new hires.

# HISTORICAL CONTRIBUTION RATES AND BENEFIT PAYOUTS

## Computed Contribution Rates

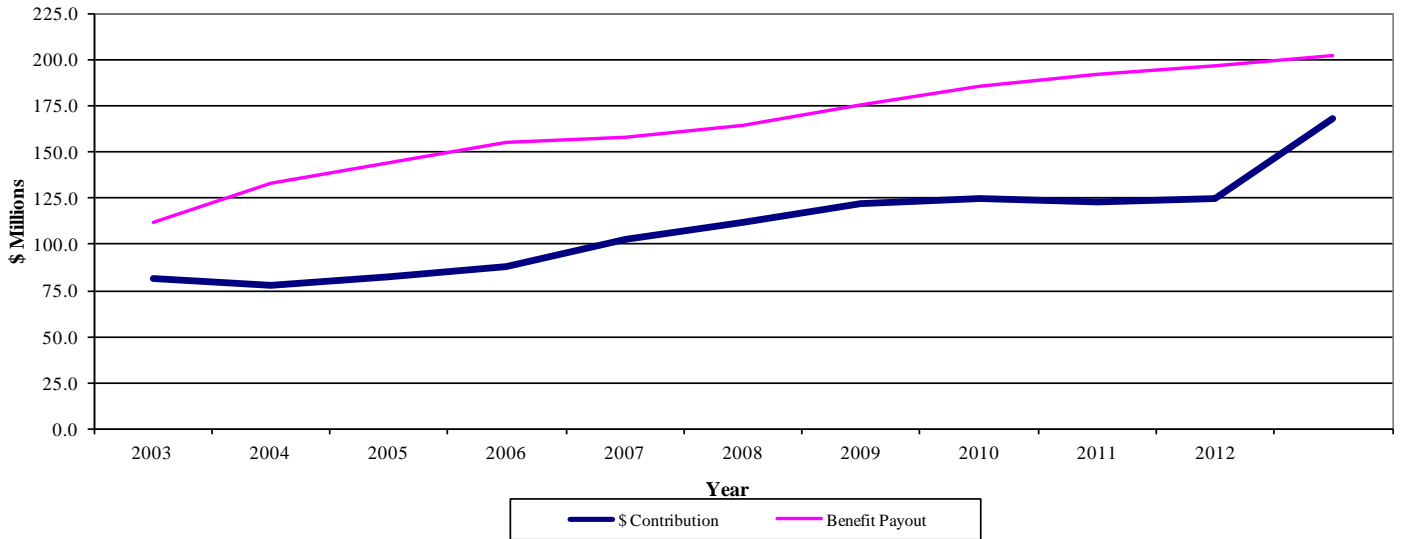


## Contribution Rates vs. Benefit Payout



# HISTORICAL CONTRIBUTION RATES AND BENEFIT PAYOUTS (CONTINUED)

**Contribution Dollars vs. Benefit Payout Dollars  
(in millions)**

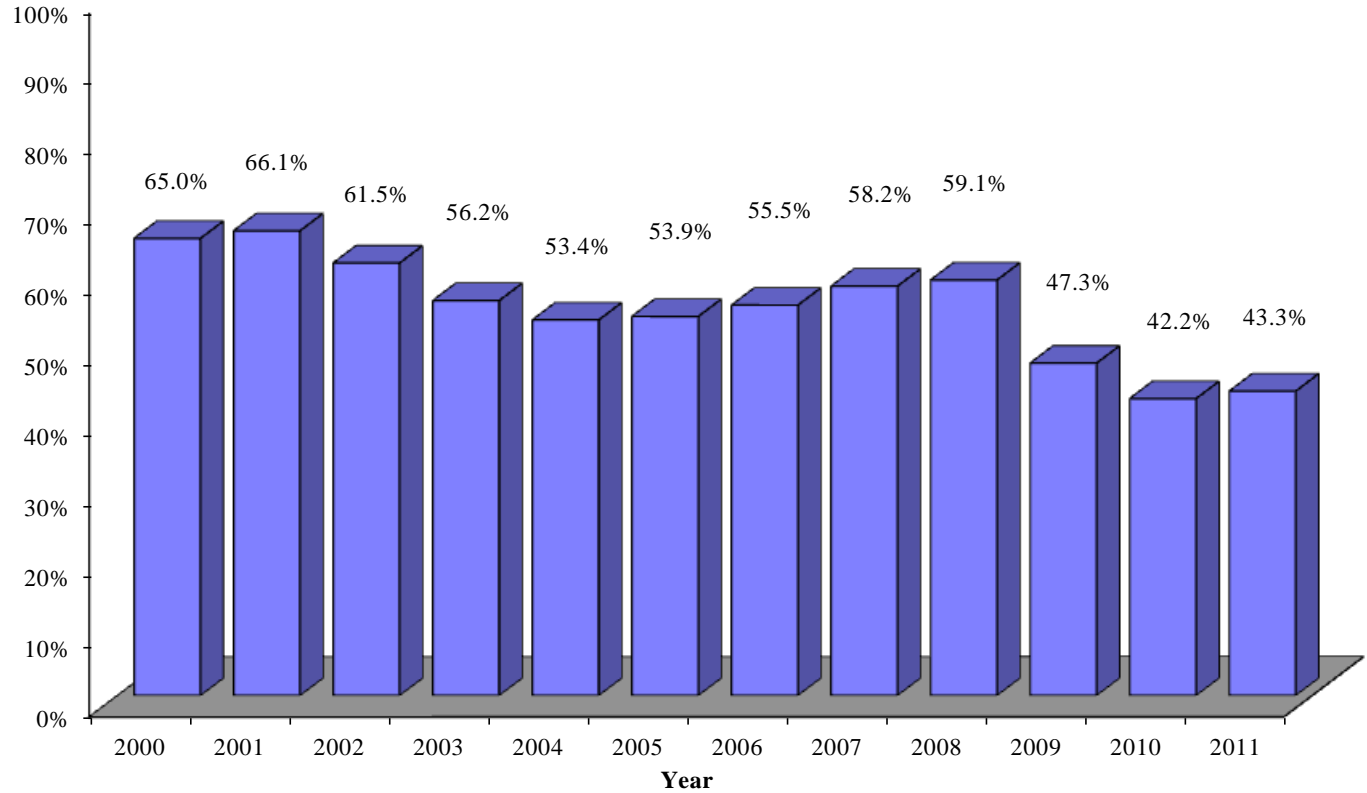




## HISTORICAL FUNDED RATIOS (CONCLUDED)

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### Actuarial Value of Assets as Percents of Accrued Liabilities (Funded Ratio)



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**SECTION A**

VALUATION RESULTS

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**COMPUTED CONTRIBUTIONS TO SUPPORT BENEFITS  
FOR FISCAL YEAR 2013  
CONTRIBUTIONS COMPUTED AS OF JUNE 30, 2011**

Contributions for	Non-Uniformed Employees			Uniformed Patrol			Total
	Closed & Year 2000	2011 Tier	Total	Closed & Year 2000	2011 Tier	Total	
Normal Cost							
Age & service benefits	9.64%	7.09%	9.63%	11.10%	10.57%	11.09%	9.92%
Disability benefits #	0.67%	0.63%	0.67%	0.32%	0.30%	0.32%	0.60%
Survivor benefits	0.23%	0.25%	0.23%	0.26%	0.24%	0.26%	0.24%
Separation benefits	0.73%	0.90%	0.73%	0.46%	0.92%	0.46%	0.68%
Total Normal Cost	11.27%	8.87%	11.26%	12.14%	12.03%	12.13%	11.44%
Member Contributions	0.00%	4.00%	0.01%	0.00%	4.00%	0.07%	0.02%
Employer Normal Cost	11.27%	4.87%	11.25%	12.14%	8.03%	12.06%	11.42%
Unfunded Actuarial Accrued Liabilities*			38.41%			41.71%	39.11%
Expense Provision			0.73%			0.73%	0.73%
Subtotal			50.39%			54.50%	51.26%
Disability Insurance			0.53%			0.53%	0.53%
Total Contribution Rate			50.92%			55.03%	51.79%
Illustrative Dollar Contribution			\$147,270,010			\$39,853,057	\$187,123,067
Prior Year							
Total Contribution Rate##			45.45%			58.63%	47.86%
Illustrative Dollar Contribution			\$137,592,239			\$39,386,492	\$176,978,731

# Includes costs for benefits payable after conversion to normal retirement and/or benefits payable to survivors. Costs for disability benefits payable prior to conversion are shown under Disability Insurance which is outsourced.

\* Amortized as a level-percentage of payroll over a 13-year amortization period for unfunded retiree liabilities and a 28-year amortization period for other unfunded liabilities from July 1, 2012.

## After post-valuation change in disability premium.

## DEVELOPMENT OF LIABILITIES AS OF JUNE 30, 2011

	Non-Uniformed Employees	Uniformed Patrol	Total
<b>Present Value of Future Benefits - Inactives</b>			
Retirees and Survivors	\$ 1,554,267,452	\$ 469,272,661	\$ 2,023,540,113
Disability Pensioners	19,598,684	1,984,971	21,583,655
Vested Terminated Employees	48,761,679	9,215,219	57,976,898
Subtotal PVFB - Inactives	1,622,627,815	480,472,851	2,103,100,666
<b>Present Value of Future Benefits - Actives</b>			
Age & Service benefits	1,012,393,081	415,445,635	1,427,838,716
Normal and Work Related Disability benefits	48,990,154	10,243,694	59,233,848
Survivor benefits	17,980,973	6,946,952	24,927,925
Separation benefits	35,135,668	9,215,192	44,350,860
Subtotal PVFB - Actives	1,114,499,876	441,851,473	1,556,351,349
<b>Total Present Value of Future Benefits</b>	<b>2,737,127,691</b>	<b>922,324,324</b>	<b>3,659,452,015</b>
<b>Less Present Value of Future Entry Age Normal Costs</b>	<b>268,307,070</b>	<b>93,555,076</b>	<b>361,862,146</b>
<b>Equals Actuarial Accrued Liability</b>	<b>2,468,820,621</b>	<b>828,769,248</b>	<b>3,297,589,869</b>
<b>Less Actuarial Value of Assets</b>	<b>1,063,663,480</b>	<b>363,627,238</b>	<b>1,427,290,718</b>
<b>Equals Unfunded Actuarial Accrued Liability</b>	<b>1,405,157,141</b>	<b>465,142,010</b>	<b>1,870,299,151</b>
<b>Amortization Payment on UAAL*</b>	<b>\$ 112,344,059</b>	<b>\$ 32,512,057</b>	<b>\$ 144,856,116</b>
<b>as a % of Projected Payroll</b>	<b>38.41%</b>	<b>41.71%</b>	<b>39.11%</b>

\*Amortized as a level-percentage of payroll over a 13-year amortization period for unfunded retiree liabilities and a 28-year amortization period for other unfunded liabilities from July 1, 2012.

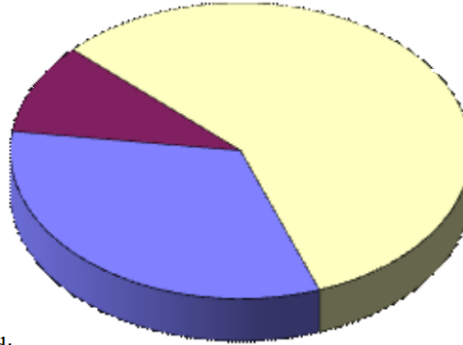
**SYSTEM RESOURCES & OBLIGATIONS**  
**SOURCES AND USES OF \$3,659.5 MILLION**  
**AS OF JUNE 30, 2011**

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(\$ Millions)

**Uses of Funds**

To future retirees for  
service yet to be  
rendered: \$361.9

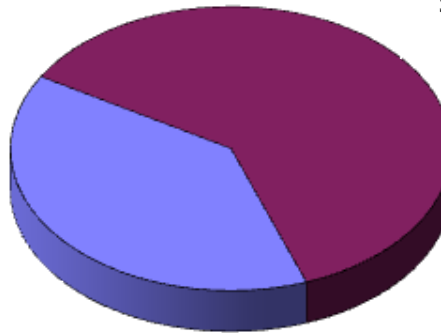


To present retirees,  
beneficiaries and vested  
terminants: \$2,103.1

To future retirees for  
service already rendered:  
\$1,194.5

**Sources of Funds**

Future  
Contributions:  
\$2,232.2



Present  
Assets:  
\$1,427.3

**FINANCING UNFUNDED ACTUARIAL ACCRUED LIABILITIES (UAAL)  
WHICH WERE CALCULATED USING A WAGE INFLATION ASSUMPTION  
OF 3.75% AND AN INVESTMENT RETURN ASSUMPTION OF  
8.25% COMPOUNDED ANNUALLY  
13/28 YEAR AMORTIZATION\***

Fiscal Year Ending June 30	Active Employee Payroll	Unfunded Actuarial Accrued Liability at End of Year	Annual UAAL Contributions During Fiscal Year		UAAL at Year End as % of Payroll
			Dollars	% of Payroll	
2011	\$ 361,639,001	\$ 1,870,299,151			
2012	375,200,464	1,888,518,983	\$ 130,757,362	34.85%	503.3%
2013	389,270,481	1,885,881,027	152,243,685	39.11%	484.5%
2014	403,868,124	1,877,083,911	157,952,823	39.11%	464.8%
2015	419,013,179	1,861,396,696	163,876,054	39.11%	444.2%
2016	434,726,173	1,838,019,787	170,021,406	39.11%	422.8%
2017	451,028,404	1,806,078,953	176,397,209	39.11%	400.4%
2018	467,941,969	1,764,618,845	183,012,104	39.11%	377.1%
2019	485,489,793	1,712,595,967	189,875,058	39.11%	352.8%
2020	503,695,660	1,648,871,054	196,995,373	39.11%	327.4%
2021	522,584,247	1,572,200,808	204,382,699	39.11%	300.9%
2022	542,181,156	1,481,228,938	212,047,050	39.11%	273.2%
2023	562,512,949	1,374,476,448	219,998,814	39.11%	244.3%
2024	583,607,185	1,250,331,106	228,248,770	39.11%	214.2%
2025	605,492,454	1,239,367,930	109,652,098	18.11%	204.7%
2026	628,198,421	1,223,220,960	113,764,052	18.11%	194.7%
2027	651,755,862	1,201,302,059	118,030,204	18.11%	184.3%
2028	676,196,707	1,172,968,550	122,456,337	18.11%	173.5%
2029	701,554,084	1,137,518,492	127,048,449	18.11%	162.1%
2030	727,862,362	1,094,185,556	131,812,766	18.11%	150.3%
2031	755,157,201	1,042,133,469	136,755,745	18.11%	138.0%
2032	783,475,596	980,449,996	141,884,085	18.11%	125.1%
2033	812,855,931	908,140,405	147,204,739	18.11%	111.7%
2034	843,338,028	824,120,396	152,724,916	18.11%	97.7%
2035	874,963,204	727,208,427	158,452,100	18.11%	83.1%
2036	907,774,324	616,117,399	164,394,054	18.11%	67.9%
2037	941,815,861	489,445,647	170,558,831	18.11%	52.0%
2038	977,133,956	345,667,172	176,954,787	18.11%	35.4%
2039	1,013,776,479	183,121,057	183,590,592	18.11%	18.1%
2040	1,051,793,097	0	190,475,239	18.11%	0.0%

\* Amortized as a level-percentage of payroll over a 13-year amortization period for unfunded retiree liabilities and a 28-year amortization period for other unfunded liabilities from July 1, 2012.

**GASB No. 25**  
**SCHEDULE OF FUNDING PROGRESS\***  
**JUNE 30, 2011**

<b>Year Ending June 30</b>	<b>Actuarial Asset Value</b>	<b>Entry Age 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>
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%
2004	1,331,588,207	2,492,918,976	1,161,330,769	53.41%	316,224,468	**	367.25%
2005#	1,417,348,982	2,627,409,025	1,210,060,043	53.94%	334,030,151	**	362.26%
2006	1,521,142,953	2,740,437,837	1,219,294,884	55.51%	341,227,890	**	357.33%
2007#	1,685,807,004	2,897,267,409	1,211,460,405	58.19%	365,012,472	**	331.90%
2008	1,783,902,280	3,019,633,781	1,235,731,501	59.08%	375,600,448	**	329.00%
2009	1,471,496,660	3,113,393,645	1,641,896,985	47.26%	379,590,273	**	432.54%
2010#	1,375,844,573	3,258,866,925	1,883,022,352	42.22%	378,063,006	**	498.07%
2011	1,427,290,718	3,297,589,869	1,870,299,151	43.28%	362,654,376	**	515.72%

\* Prior to 2003 this schedule was not required for the LTD Plan because it used the aggregate funding method. Therefore the LTD Plan assets and liabilities were excluded prior to 2003. In 2003 the LTD Plan was merged into the base plan. Assets and liabilities for existing LTD members are included beginning in 2003.

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

+ Introduction of Year 2000 Plan; Change in Actuary.

# New assumptions adopted.

**GASB No. 25**  
**SCHEDULE OF EMPLOYER CONTRIBUTIONS\***  
**NON-UNIFORMED GROUP ##**  
**JUNE 30, 2011**

<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>
1997	\$ 228,828,537		\$ 59,838,662	26.15%	26.15%	\$ 59,838,662	100.00%
1998	234,703,387		61,140,232	26.05%	26.05%	61,140,232	100.00%
1999+	244,185,511	**	54,990,577	22.52%	22.52%	54,990,577	100.00%
2000#	257,124,568	**	56,567,405	22.00%	22.00%	56,567,405	100.00%
2001	273,311,348	**	63,654,213	23.29%	23.29%	63,654,213	100.00%
2002	260,972,727	**	60,780,548	23.29%	23.29% @	60,780,548	100.00%
2003	271,173,431	**	63,156,292	23.29%	23.29% @	63,156,292	100.00%
2004	269,890,983	**	68,932,856	25.54%	25.54%	68,932,856	100.00%
2005	283,070,661	**	80,052,383	28.28%	28.28%	80,052,383	100.00%
2006	286,784,251	**	87,440,518	30.49%	30.49%	87,440,518	100.00%
2007#	302,223,556	**	93,991,526	31.10%	31.10% @	93,991,526	100.00%
2008	307,243,438	**	95,368,363	31.04%	31.04%	95,368,363	100.00%
2009	311,718,239	**	95,759,843	30.72%	30.72%	95,759,843	100.00%
2010#	310,637,016	**	97,540,023	31.40%	31.40%	97,540,023	100.00%
2011	294,637,164	**	116,263,825	39.46%	39.46%	116,263,825	100.00%

\* Prior to 2003 this schedule was not required for the LTD Plan because it used the aggregate funding method. Therefore the LTD Plan assets and liabilities were excluded prior to 2003. In 2003 the LTD Plan was merged into the base plan. Assets and liabilities for existing LTD members are included beginning in 2003.

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

+ Introduction of Year 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.

## Includes non-uniformed employees of MoDOT, Patrol, and MPERS.

This information is presented in draft form for review by the System's auditor. Please let us know if there are any items that the auditor changes so that we may maintain consistency with the System's financial statements.



**GASB No. 25**  
**SCHEDULE OF EMPLOYER CONTRIBUTIONS\***  
**UNIFORMED PATROL GROUP**  
**JUNE 30, 2011**

<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>
1997	\$ 42,242,106		\$ 16,546,233	39.17%	39.17%	\$ 16,546,233	100.00%
1998	43,987,039		16,600,708	37.74%	37.74%	16,600,708	100.00%
1999+	43,882,573	**	13,901,999	31.68%	31.68%	13,901,999	100.00%
2000#	44,297,237	**	13,484,079	30.44%	30.44%	13,484,079	100.00%
2001	50,088,675	**	17,500,983	34.94%	34.94%	17,500,983	100.00%
2002	47,681,512	**	16,659,920	34.94%	34.94% @	16,659,920	100.00%
2003	48,172,519	**	16,831,478	34.94%	34.94% @	16,831,478	100.00%
2004	46,333,484	**	17,792,058	38.40%	38.40%	17,792,058	100.00%
2005	50,959,490	**	22,187,762	43.54%	43.54%	22,187,762	100.00%
2006	54,443,639	**	24,102,199	44.27%	44.27%	24,102,199	100.00%
2007#	62,788,916	**	27,802,932	44.28%	44.28% @	27,802,932	100.00%
2008	68,357,010	**	29,147,429	42.64%	42.64%	29,147,429	100.00%
2009	67,872,034	**	27,298,132	40.22%	40.22%	27,298,132	100.00%
2010#	67,425,990	**	26,936,683	39.95%	39.95%	26,936,683	100.00%
2011	68,017,212	**	33,688,925	49.53%	49.53%	33,688,925	100.00%

\* Prior to 2003 this schedule was not required for the LTD Plan because it used the aggregate funding method. Therefore the LTD Plan assets and liabilities were excluded prior to 2003. In 2003 the LTD Plan was merged into the base plan. Assets and liabilities for existing LTD members are included beginning in 2003.

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

+ Introduction of Year 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.

This information is presented in draft form for review by the System's auditor. Please let us know if there are any items that the auditor changes so that we may maintain consistency with the System's financial statements.

**DEVELOPMENT OF GAIN/(LOSS)  
JULY 1, 2010 TO JUNE 30, 2011**

	UAAL =	AAL -	Assets
Beginning of Year Values (at July 1)	\$1,883,022,352	\$3,258,866,925	\$1,375,844,573
Normal Cost	49,871,712	49,871,712	0
Contributions	(150,452,096)	0	150,452,096
Disbursements	0	(204,988,655)	(204,988,655)
Interest	151,200,403	262,457,947	111,257,544
Expected Value Before Any Changes	1,933,642,371	3,366,207,929	1,432,565,558
Effect of Transfer of Water Patrol to MPERS	8,787,924	26,397,200	17,609,276
Adjustment*	(726,383)	0	726,383
Expected Value After Changes	1,941,703,912	3,392,605,129	1,450,901,217
End of Year Values (at June 30)	1,870,299,151	3,297,589,869	1,427,290,718
Gain/(Loss) for Year	\$ 71,404,761	\$ 95,015,260	\$ (23,610,499)

\* All contributions (including the Water Patrol asset transfer) are treated the same in the development of the Funding Value of Assets and are assumed to be made in the middle of the year, on average. The adjustment in the gain/loss is made to provide consistency with that assumption.

**DEVELOPMENT OF GAIN/(LOSS)  
JULY 1, 2010 TO JUNE 30, 2011**

	<b>Total</b>	<b>Non-Uniform</b>	<b>Uniform</b>
Beginning of Year UAAL (at July 1)	\$ 1,883,022,352	\$ 1,442,749,286	\$ 440,273,066
Normal Cost	49,871,712	38,978,035	10,893,677
Contributions	(150,452,096)	(116,722,519)	(33,729,577)
Interest	151,200,403	115,819,856	35,380,547
Net Change in LTD Assets	0	0	0
Expected Value Before Any Changes	1,933,642,371	1,480,824,658	452,817,713
Effect of Changes in Assumptions & Methods	8,787,924	(123,535)	8,911,459
Effect of Interest Adjustment*	(726,383)	(28,813)	(697,570)
Expected Value After Changes	1,941,703,912	1,480,672,310	461,031,602
End of Year UAAL (at June 30)	1,870,299,151	1,405,157,141	465,142,010
Aggregate Gain/(Loss) for Year	\$ 71,404,761	\$ 75,515,169	\$ (4,110,408)
Gain/(Loss) as a % of Beginning of Year Liabilities	2.19%	3.05%	(0.52)%
Asset Gain/(Loss) for Year	\$ (23,610,499)	\$ (4,483,918)	\$ (19,126,581)
Liability Gain/(Loss) for Year	95,015,260	79,999,087	15,016,173
Aggregate Gain/(Loss) for Year	\$ 71,404,761	\$ 75,515,169	\$ (4,110,408)

\* All contributions (including the Water Patrol asset transfer) are treated the same in the development of the Funding Value of Assets and are assumed to be made in the middle of the year, on average. The adjustment in the gain/loss is made to provide consistency with that assumption.

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**SECTION B**

SUMMARY OF BENEFITS

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**MISSOURI DEPARTMENT OF TRANSPORTATION AND  
HIGHWAY PATROL EMPLOYEES' RETIREMENT SYSTEM  
SUMMARY OF BENEFIT PROVISIONS EVALUATED  
AS OF JUNE 30, 2011**

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**Closed Plan**

**Year 2000 Plan**

**Participation**

Participants include:

All MPERS 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 active employees who first became members on or after July 1, 2000 but prior to January 1, 2011.
2. MPERS active members and vested former members who elect to transfer to the Year 2000 Plan at retirement.
3. MPERS 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. MPERS members who left state employment prior to becoming vested (not eligible for a future retirement benefit) and return to work in a benefit eligible position on or after July 1, 2000 but prior to January 1, 2011.

**Normal Retirement Eligibility (unreduced benefit)**

*Non-Uniformed 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 48 with age plus creditable service equal to 80 or more.

**Normal Retirement Eligibility (unreduced benefit)**

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

1. Age 62 with at least 5 years of creditable service.
2. Age 48 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.
3. Age 48 with age plus creditable service equal to 80 or more.

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

1. Mandatory retirement at age 60 with at least 5 years of creditable service.
2. Age 48 with age plus creditable service equal to 80 or more.

**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 eligibility).

**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).

**SUMMARY OF BENEFIT PROVISIONS EVALUATED  
AS OF JUNE 30, 2011  
(CONTINUED)**

---

**Closed Plan**

**Year 2000 Plan**

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**Normal Retirement Benefit Amount**

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**Normal Retirement Benefit Amount**

*Non-Uniformed Employees:*

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

*All Employees:*

Life Benefit: 1.7% 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.

Temporary Benefit: If member retires between ages 48 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. All Uniformed Patrol members are eligible for the temporary benefit.

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

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**Early Retirement (reduced benefit)**

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**Early Retirement (reduced benefit)**

*Eligibility: Non-Uniformed Employees*

Age 55 with at least 10 years of creditable service.

*Eligibility: All Employees*

Age 57 with at least 5 years of creditable service.

*Amount:*

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

*Amount:*

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

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

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**Vested Deferred Benefits**

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**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 is eligible for early or normal retirement, considering years of creditable service.

*Eligibility: All Employees*

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

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**Minimum Base Benefit**

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**Minimum Base Benefit**

Receive a monthly base benefit of no less than \$15 for each full year of creditable service. Must be eligible to receive a normal or early retirement benefit the first of the month immediately following the date you leave state employment. Not required to immediately start drawing a benefit.

Same.

**SUMMARY OF BENEFIT PROVISIONS EVALUATED**  
**AS OF JUNE 30, 2011**  
**(CONTINUED)**

---

**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 is 50% of the benefit the retired member was receiving on the date of death (the normal form of payment), or 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 within one year of the marriage. 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.

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

**Death Prior to Retirement**

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 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. The election must be completed within one year of the date of marriage.

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

**SUMMARY OF BENEFIT PROVISIONS EVALUATED  
AS OF JUNE 30, 2011  
(CONTINUED)**

---

**Closed Plan**

**Year 2000 Plan**

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**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.

**Pop-Up Provision**

Same.

**\$5,000 Death Benefit**

MPERS provides a \$5,000 death benefit for a designated beneficiary(ies) of members who retire from service or elect normal or work-related disability benefits after September 28, 1985. Members who die while on terminated vested status or long-term disability status do not qualify for this benefit. Long-term disability recipients who retire on or after September 28, 1985 are eligible to receive this benefit.

**\$5,000 Death Benefit**

MPERS provides a \$5,000 death benefit for a designated beneficiary(ies) of members who retire from service or elect work-related disability benefits. Members who die while on terminated vested status or long-term disability status do not qualify for this benefit. Long-term disability recipients who retire on or after September 28, 1985 are eligible to receive this benefit.

**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.

**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:** 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.

**Police Service:** Not available.

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

**Portability:** Same as Closed Plan Section 105.691.

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 MPERS. Any non-federal public employment **not covered** by a retirement plan must be purchased.

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 MPERS.

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 MPERS. Any non-federal public employment **not covered** by a retirement plan must be purchased.



**SUMMARY OF BENEFIT PROVISIONS EVALUATED**  
**AS OF JUNE 30, 2011**  
**(CONTINUED)**

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**Closed Plan**

**Year 2000 Plan**

**Public Employment Prior Service (Subsidized purchase):**

Section 104.040.6 allows, prior to retirement, uniformed patrol members only, may purchase up to a maximum of 4 years full-time "public employment". Public employment refers to employment with a city, county, municipality, public school, or other political subdivision. Federal and out-of-state employment is not eligible. Members must purchase all months of service they are eligible for up to 4 years.

**Public Employment Prior Service (Subsidized purchase):**

Not available.

**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.

**Disability**

Same.

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 August 28, 1997 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% of initial benefit at which time the increases will have the minimum removed.

**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-U increase, or
- ii) 5%.

For employees hired on or after August 28, 1997 the annual percentage increase is equal to the lesser of:

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

**Member Contributions**

None.

**Member Contributions**

None.

**SUMMARY OF BENEFIT PROVISIONS EVALUATED**  
**AS OF JUNE 30, 2011**  
**(CONCLUDED)**

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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 MPERS. 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. 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.

# SUMMARY OF BENEFIT PROVISIONS EVALUATED AS OF JUNE 30, 2011

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2011 Tier

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## **Participation**

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Participants include:

1. All employees who first become members on or after January 1, 2011.

## **Normal Retirement Eligibility (unreduced benefit)**

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

1. Age 67 with at least 10 years of creditable service.
2. Age 55 with age plus creditable service equal to 90 or more.

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

1. Age 55 with at least 10 years of creditable service.
2. Mandatory retirement at age 60.

## **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**

---

*All Employees:*

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

Temporary Benefit: If member retires between ages 55 and 62 with age plus creditable service equal to 90 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. Uniformed Patrol members are eligible for the temporary benefit when they reach mandatory retirement age (currently age 60) and have ten years of creditable service.

## **Early Retirement (reduced benefit)**

---

*Non-Uniformed Employees:*

*Eligibility:*

Age 62 with at least 10 years of creditable service.

*Amount:*

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

**SUMMARY OF BENEFIT PROVISIONS EVALUATED  
AS OF JUNE 30, 2011  
(CONTINUED)**

---

**2011 Tier**

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**Vested Deferred Benefits**

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***Eligibility: All Employees***

Fully vested in accrued pension with 10 years of creditable service. The benefit will commence at age 67 for non-uniformed individuals and at age 55 for uniformed individuals.

**Minimum Base Benefit**

---

Receive a monthly base benefit of no less than \$15 for each full year of creditable service. Must be eligible to receive a normal or early retirement benefit the first of the month immediately following the date you leave state employment. Not required to immediately start drawing a benefit.

**Death Prior to Retirement**

---

The spouse of the member who dies after accruing 10 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 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. The election must be completed within one year of the date of marriage.

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

**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.

**\$5,000 Death Benefit**

---

MPERS provides a \$5,000 death benefit for a designated beneficiary(ies) of members who retire from service or elect work-related disability benefits. Members who die while on terminated vested status do not qualify for this benefit.

**SUMMARY OF BENEFIT PROVISIONS EVALUATED**  
**AS OF JUNE 30, 2011**  
**(CONCLUDED)**

---

**2011 Tier**

---

**Police Service:** Not available.

**Portability:** Same as Closed Plan Section 105.691.

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 MPERS. Any non-federal public employment **not covered** by a retirement plan must be purchased.

**Public Employment Prior Service (Subsidized purchase):**

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Not available.

**Disability**

---

Benefits that may be payable during the period of disability (whether 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**

---

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-U increase, or
- ii) 5%.

**Member Contributions**

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4% contributions with interest credited to the account annually at 4%. The state of Missouri employer shall pick up and pay the contributions. A deduction shall be made from each member's compensation equal to the amount of the member's contributions picked up by the employer.

**SAMPLE BENEFIT COMPUTATION FOR CLOSED PLAN MEMBERS  
RETIRING JULY 1, 2011  
NON-UNIFORMED EMPLOYEE**

	<b>Data</b>	<b>Description</b>
A.	\$40,000	Final Average Pay
B.	20	Years of Creditable 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

Year Ended June 30	Annual Amount Payable if Price Inflation is 3.25% and Post-Retirement Increases are 2.6%
2011	\$12,800
2012	13,133
2013	13,474
2014	13,825
2015	14,184
2016	14,553
2017	14,931
2018	15,319
2019	15,718
2020	16,126

**SAMPLE BENEFIT COMPUTATION FOR CLOSED PLAN MEMBERS  
RETIRING JULY 1, 2011  
UNIFORMED PATROL**

	<b>Data</b>	<b>Description</b>
A.	\$40,000	Final Average Pay
B.	20	Years of Creditable 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.

Year Ended June 30	Annual Amount Payable if Price Inflation is 3.25% and Post-Retirement Increases are 2.6%
2011	\$17,066
2012	17,510
2013	17,965
2014	18,432
2015	18,912
2016	19,403
2017	19,908
2018	20,426
2019	20,957
2020	21,501

# SAMPLE BENEFIT COMPUTATION FOR YEAR 2000 PLAN MEMBERS RETIRING JULY 1, 2011

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

E1. Retirement Benefit Formula: 0.017 x 20 x \$40,000 = \$13,600

E2. Supplemental Benefit Formula: .008 x 20 x \$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

Year Ended June 30	Annual Amount Payable if Price Inflation is 3.25% and Post-Retirement Increases are 2.6%
2011	\$20,000
2012	20,520
2013	14,316
2014	14,689
2015	15,071
2016	15,462
2017	15,864
2018	16,277
2019	16,700
2020	17,134



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## **SECTION C**

### FINANCIAL INFORMATION

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## SUMMARY OF FUND OPERATIONS

	2011	2010
Market Value of Fund (Beginning of Fiscal Year)	\$1,309,502,954	\$1,226,247,217
Post Valuation Audit Adjustment	3,214,356	(5,113,357)
Contributions		
Employee	45,361	N/A
Employer	149,952,750	124,052,534
Transfer from MOSERS	17,609,276	0
Service Purchase (Employee)	453,985	424,172
Total Contributions	\$ 168,061,372	\$ 124,476,706
Investment Return		
Interest	\$ 15,839,447	\$ 12,652,126
Dividends	4,821,145	2,984,078
Real Estate	5,399,849	4,248,139
Realized Capital Gains	122,341,759	182,791,424
Realized Capital Losses	(67,339,564)	(168,651,368)
Miscellaneous Income	0	0
Securities Lending Income	109,966	(21,879)
Other	187,212	263,524
Total Investment Return	\$ 81,359,814	\$ 34,266,044
Other Income (Rental Income and Misc)	33,141	33,145
Increase (Decrease) in Unrealized Appreciation	213,935,299	144,993,737
Benefit Payments		
Retirement Payments	\$ 188,987,116	\$ 183,931,207
Retirement Payments - BackDROP	10,792,932	10,358,181
Death Benefits	575,000	535,000
Long-Term Disability Payments	101,875	137,624
Insured Disability Program	1,696,845	1,759,262
Service Transfer Payments - Employer	0	0
Total Benefit Payments	\$ 202,153,768	\$ 196,721,274
Expenses		
Investment	\$ 18,770,289	\$ 16,265,710
Other	2,834,887	2,413,554
Total Expenses	\$ 21,605,176	\$ 18,679,264
Market Value of Fund (End of Fiscal Year)	\$1,552,347,992	\$1,309,502,954

# MISSOURI MPERS

## DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS

Valuation Date of June 30	2007	2008	2009	2010	2011	2012	2013
<b>A. Actuarial value at beginning of year</b>	\$1,521,142,953	\$1,685,807,004	\$1,783,902,280	\$1,471,496,660	\$1,375,844,573		
<b>B. Market value at end of year</b>	1,825,204,289	1,717,754,176	1,226,247,217	1,309,502,954	1,552,347,992		
<b>C. Market value at beginning of year</b>	1,598,136,375	1,825,204,289	1,717,754,176	1,226,247,217	1,309,502,954		
<b>D. Cash flow</b>							
D1. Contributions	121,773,287	124,515,792	123,057,975	124,476,706	168,061,372		
D2. Benefit Payments	(175,970,479)	(185,801,362)	(192,014,685)	(196,721,274)	(202,153,768)		
D3. Administrative Expenses	(2,099,592)	(3,262,533)	(2,603,223)	(2,413,554)	(2,834,887)		
D4. Non-Investment Net Cash Flow	(56,296,784)	(64,548,103)	(71,559,933)	(74,658,122)	(36,927,283)		
<b>E. Investment income</b>							
E1. Market total (B - C - D4)	283,364,698	(42,902,010)	(419,947,026)	157,913,859	279,772,321		
E2. Assumed Rate of Return	8.25%	8.25%	8.25%	8.25%	8.25%		
E3. Amount for Immediate Recognition (A+.5xD4)xE2	123,172,051	136,416,469	144,220,091	118,318,827	111,983,927		
E4. Amount for Phased-In Recognition	160,192,647	(179,318,479)	(564,167,117)	39,595,032	167,788,394		
<b>F. Phased in recognition of investment income</b>							
F1. Current Year (33 1/3% of E4)	53,397,549	(59,772,826)	(188,055,706)	13,198,344	55,929,465		
F2. First Prior Year	32,602,187	53,397,549	(59,772,826)	(92,738,309)	13,198,344	\$55,929,465	
F3. Second Prior Year	11,789,048	32,602,187	53,397,549	(59,772,827)	(92,738,308)	13,198,345	\$55,929,464
F4. Total Recognized Investment Gain (F1 + F2 + F3)	97,788,784	26,226,910	(194,430,983)	(139,312,792)	(23,610,499)	69,127,810	55,929,464
<b>G. Actuarial value at end of year (A + D4 + E3 + F4)</b>	1,685,807,004	1,783,902,280	1,662,131,455	1,375,844,573	1,427,290,718		
Less LTD Assets	0	0	0	0	0		
<b>H. Preliminary Plan AVA</b>	1,685,807,004	1,783,902,280	1,662,131,455	1,375,844,573	1,427,290,718		
<b>I. Corridor (Maximum of 120% of Market Value)</b>	2,190,245,147	2,061,305,011	1,471,496,660	1,571,403,545	1,862,817,590		
<b>J. Corridor (Minimum of 80% of Market Value)</b>	1,460,163,431	1,374,203,341	980,997,774	1,047,602,363	1,241,878,394		
<b>K. Additional Investment Gain/(Loss) recognized due to corridor</b>	0	0	(190,634,795)	0	0		
<b>L. Final Plan AVA after corridor adjustment, if any</b>	1,685,807,004	1,783,902,280	1,471,496,660	1,375,844,573	1,427,290,718		
Difference between market and actuarial values	139,397,285	(66,148,104)	(245,249,443)	(66,341,619)	125,057,274		
Market Rate of Return	18.04%	(2.39)%	(24.97)%	13.28%	21.67%		
Ratio of Funding Value to Market Value	92.36%	103.85%	120.00%	105.07%	91.94%		
Funding Value Rate of Return	14.80%	9.84%	(3.04)%	(1.46)%	6.51%		

## ALLOCATION OF ASSETS BETWEEN GROUPS

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

<b>Allocation of Other Income</b>	<b>June 30</b>	
	<b>2011</b>	<b>2010</b>
1. Other Income	\$ 33,141	\$ 33,145
2. Investment Income		
a) Uniformed Patrol	20,992,660	8,552,868
b) Non-Uniformed Employees	60,367,154	25,713,176
c) Total	81,359,814	34,266,044
3. Other Income Split		
a) Uniformed Patrol		
(2a) / (2c) x (1)	8,551	8,273
b) Non-Uniformed Employees		
(2b) / (2c) x (1)	24,590	24,872
c) Total	33,141	33,145

<b>Allocation of Funding Value of Assets</b>	<b>June 30</b>	
	<b>2011</b>	<b>2010</b>
1. Funding Value of Assets	1,427,290,718	1,375,844,573
2. Market Value of Assets		
a) Uniformed Patrol	409,227,547	329,221,365
b) Non-Uniformed Employees	1,143,120,445	980,281,589
c) Total	1,552,347,992	1,309,502,954
3. Funding Value of Assets Split		
a) Uniformed Patrol		
(2a) / (2c) x (1)	363,627,238	345,900,272
b) Non-Uniformed Employees		
(2b) / (2c) x (1)	1,063,663,480	1,029,944,301
c) Total	1,427,290,718	1,375,844,573
4. Total Assets Allocated	1,427,290,718	1,375,844,573

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## **SECTION D**

### SUMMARY OF MEMBER DATA

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**CIVILIAN PATROL CLOSED ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34			13	1				14	\$ 485,494
35-39			27	16				43	1,846,296
40-44		2	29	33	16	2		82	3,384,496
45-49			24	39	27	24	2	116	5,013,175
50-54			20	27	35	33	17	132	5,456,973
55-59			22	18	15	14	17	86	3,708,128
60			3	3	4	2	3	15	630,901
61			3	2	2		1	8	299,133
62				5	4		1	10	344,925
63			3	3	2	2	1	11	400,991
64			1	1	5			7	273,824
65			1	2				3	91,860
66									
67					1			1	20,656
68				1				1	30,675
69									
70									
Over 70					1			1	34,619
<b>Totals</b>		<b>2</b>	<b>146</b>	<b>151</b>	<b>112</b>	<b>77</b>	<b>42</b>	<b>530</b>	<b>\$22,022,146</b>

Average Age: 49.6 years

Average Service: 19.9 years

Average Pay: \$41,551

**CIVILIAN PATROL YEAR 2000 ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24	14							14	\$ 389,905
25-29	68	25						93	3,338,980
30-34	49	58	10					117	4,403,754
35-39	25	31	12					68	2,409,660
40-44	29	36	4					69	2,286,877
45-49	26	29	12					67	2,314,513
50-54	18	28	6			3	1	56	1,900,728
55-59	19	19	6		2	1	1	48	1,554,448
60	1	3						4	117,181
61	2	3	2					7	215,697
62	2	5			1			8	254,663
63	1	5						6	179,647
64		4	2					6	172,380
65	3	1						4	120,618
66		1						1	41,712
67	1	2						3	95,598
68			1					1	26,221
69	1	2						3	75,358
70									
Over 70		1						1	24,576
<b>Totals</b>	<b>259</b>	<b>253</b>	<b>55</b>		<b>3</b>	<b>4</b>	<b>2</b>	<b>576</b>	<b>\$19,922,516</b>

Average Age: 40.8 years

Average Service: 6.0 years

Average Pay: \$34,588

**CIVILIAN PATROL 2011 TIER ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

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Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24	8							8	\$ 171,891
25-29	12							12	251,260
30-34	5							5	107,603
35-39	2							2	46,792
40-44	5							5	114,971
45-49	3							3	52,382
50-54	3							3	64,216
55-59	1							1	19,798
60	1							1	19,698
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
Over 70									
<b>Totals</b>	<b>40</b>							<b>40</b>	<b>\$ 848,611</b>

Average Age: 33.7 years  
Average Service: 0.3 years  
Average Pay: \$21,215



**MoDOT CLOSED ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34		1	96	5				102	\$ 4,093,654
35-39		2	194	125	1			322	14,750,882
40-44		3	178	300	98	4		583	27,644,732
45-49		1	138	198	206	187	4	734	35,354,988
50-54			131	164	154	267	102	818	39,370,100
55-59		1	71	122	107	84	55	440	20,153,707
60			12	19	9	11	6	57	2,698,723
61			12	13	7	11	6	49	2,314,400
62			9	6	6	3	6	30	1,379,743
63			3	4	6	3	2	18	892,400
64			1	9	9	3	1	23	1,005,057
65			1	3	3	1	2	10	415,318
66				1	1	2	1	5	225,175
67						1		1	40,879
68			1					1	32,637
69			2		1			3	99,547
70			1				1	2	116,326
Over 70				2	1		2	5	250,367
<b>Totals</b>		<b>8</b>	<b>850</b>	<b>971</b>	<b>609</b>	<b>577</b>	<b>188</b>	<b>3,203</b>	<b>\$150,838,635</b>

Average Age: 48.3 years

Average Service: 19.7 years

Average Pay: \$47,093

**MoDOT YEAR 2000 ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24	65	2						67	\$ 2,011,147
25-29	248	142	3					393	14,075,165
30-34	166	286	67					519	19,994,550
35-39	164	187	66					417	14,991,936
40-44	147	167	50					364	12,603,117
45-49	119	145	60	1				325	11,305,614
50-54	103	136	54	1	1	5	4	304	10,652,245
55-59	56	92	31	1	2	2		184	6,535,503
60	3	16	4		1		1	25	875,846
61	7	4	4	1		1		17	598,682
62	2	6	3					11	368,078
63	2	4	4					10	376,548
64	2	4	2					8	309,322
65		3	2	1				6	247,313
66	2	3	1					6	252,220
67		2	2					4	165,404
68		1						1	46,908
69									
70									
Over 70		1						1	31,071
<b>Totals</b>	<b>1,086</b>	<b>1,201</b>	<b>353</b>	<b>5</b>	<b>4</b>	<b>8</b>	<b>5</b>	<b>2,662</b>	<b>\$95,440,669</b>

Average Age: 40.0 years

Average Service: 6.1 years

Average Pay: \$35,853

**MoDOT 2011 TIER ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

---

Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24	2							2	\$ 40,260
25-29	3							3	65,268
30-34									
35-39									
40-44	2							2	40,295
45-49									
50-54									
55-59									
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
Over 70									
<b>Totals</b>	<b>7</b>							<b>7</b>	<b>\$145,823</b>

Average Age: 29.9 years  
Average Service: 0.3 years  
Average Pay: \$20,832

**UNIFORMED PATROL CLOSED ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

---

Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24									
25-29									
30-34			14					14	\$ 776,339
35-39			91	51				142	8,435,999
40-44	1	1	51	163	24			240	15,773,613
45-49			12	56	82	23	1	174	12,742,163
50-54			2	11	41	44	24	122	9,211,836
55-59			1		7	12	39	59	4,681,468
60							3	3	243,470
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
Over 70									
<b>Totals</b>	<b>1</b>	<b>1</b>	<b>171</b>	<b>281</b>	<b>154</b>	<b>79</b>	<b>67</b>	<b>754</b>	<b>\$51,864,888</b>

Average Age: 44.9 years

Average Service: 19.7 years

Average Pay: \$68,786

**UNIFORMED PATROL YEAR 2000 ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

---

Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24	38							38	\$ 1,531,254
25-29	96	32						128	5,596,189
30-34	32	95	19					146	6,980,272
35-39	11	47	21					79	3,721,537
40-44	6	10	6					22	986,982
45-49	2	3	2					7	305,407
50-54		1						1	50,725
55-59		1						1	48,771
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
Over 70									
<b>Totals</b>	<b>185</b>	<b>189</b>	<b>48</b>					<b>422</b>	<b>\$19,221,137</b>

Average Age: 31.4 years  
Average Service: 5.7 years  
Average Pay: \$45,548

**UNIFORMED PATROL 2011 TIER ACTIVE MEMBERS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE AND YEARS OF SERVICE**

---

Attained Age	Count by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20									
20-24	19							19	\$ 685,322
25-29	13							13	468,905
30-34	3							3	108,209
35-39	1							1	36,070
40-44	1							1	36,070
45-49									
50-54									
55-59									
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
Over 70									
<b>Totals</b>	<b>37</b>							<b>37</b>	<b>\$1,334,576</b>

Average Age: 25.8 years  
Average Service: 0.5 years  
Average Pay: \$36,070

## 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 %
2002	8,695	312,747,492	35,969	(0.1)%
2003	8,892	318,744,192	35,846	(0.3)%
2004	9,002	328,210,887	36,460	1.7 %
2005	9,193	345,695,867	37,604	3.1 %
2006	9,033	348,614,699	38,593	2.6 %
2007	8,640	360,842,421	41,764	8.2 %
2008	8,599	369,424,653	42,961	2.9 %
2009	8,784	377,652,245	42,993	0.1 %
2010	8,457	369,911,252	43,740	1.7 %
2011	8,231	361,639,001	43,936	0.4 %
<b>Ten-Year Average:</b>				2.0 %

**COUNT AND TOTAL MONTHLY BENEFITS OF  
CIVILIAN PATROL CLOSED RETIRED (NON-DISABLED)  
MEMBERS AND SURVIVORS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE**

---

Age	Number	Monthly Amount
Less than 20		
20-24	1	\$ 283
25-29		
30-34		
35-39		
40-44		
45-49	1	447
50-54	6	8,859
55-59	15	15,191
60-64	41	56,499
65-69	56	75,502
70-74	91	163,989
75-79	98	163,949
80-84	69	97,875
85-89	35	39,795
90 & Over	16	13,361
<b>TOTAL</b>	<b>429</b>	<b>\$ 635,750</b>



**COUNT AND TOTAL MONTHLY BENEFITS OF  
CIVILIAN PATROL YEAR 2000 RETIRED (NON-DISABLED)  
MEMBERS AND SURVIVORS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE**

---

Age	Number	Monthly Amount
Less than 20		
20-24		
25-29		
30-34		
35-39		
40-44		
45-49	1	\$ 1,802
50-54	26	71,404
55-59	86	207,497
60-64	128	237,735
65-69	107	160,842
70-74	20	19,341
75-79	3	1,256
80-84	6	9,297
85-89	5	8,289
90 & Over	1	285
<b>TOTAL</b>	<b>383</b>	<b>\$ 717,748</b>

**COUNT AND TOTAL MONTHLY BENEFITS OF  
 MoDOT CLOSED RETIRED (NON-DISABLED)  
 MEMBERS AND SURVIVORS  
 AS OF JUNE 30, 2011  
 BY ATTAINED AGE**

---

Age	Number	Monthly Amount
Less than 20	9	\$ 2,132
20-24	1	470
25-29		
30-34		
35-39	5	2,993
40-44	9	6,961
45-49	23	20,095
50-54	40	35,045
55-59	107	115,959
60-64	239	278,334
65-69	420	697,958
70-74	827	1,788,511
75-79	853	1,811,612
80-84	629	1,179,754
85-89	350	448,194
90 & Over	199	160,093
<b>TOTAL</b>	<b>3,711</b>	<b>\$ 6,548,111</b>

**COUNT AND TOTAL MONTHLY BENEFITS OF  
 MoDOT YEAR 2000 RETIRED (NON-DISABLED)  
 MEMBERS AND SURVIVORS  
 AS OF JUNE 30, 2011  
 BY ATTAINED AGE**

---

Age	Number	Monthly Amount
Less than 20	7	\$ 1,261
20-24		
25-29		
30-34		
35-39	1	1,092
40-44	1	303
45-49	1	1,010
50-54	201	536,055
55-59	491	1,234,608
60-64	780	1,507,393
65-69	550	930,020
70-74	122	174,254
75-79	30	39,840
80-84	38	71,955
85-89	37	46,585
90 & Over	26	36,230
<b>TOTAL</b>	<b>2,285</b>	<b>\$ 4,580,606</b>

**COUNT AND TOTAL MONTHLY BENEFITS OF  
UNIFORMED PATROL CLOSED RETIRED (NON-DISABLED)  
MEMBERS AND SURVIVORS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE**

---

Age	Number	Monthly Amount
Less than 20	1	\$ 2,365
20-24		
25-29	1	1,028
30-34		
35-39	5	10,715
40-44	1	1,946
45-49	2	2,845
50-54	27	100,541
55-59	108	397,027
60-64	164	682,958
65-69	158	717,375
70-74	124	550,957
75-79	86	398,938
80-84	67	290,062
85-89	35	88,470
90 & Over	20	46,170
<b>TOTAL</b>	<b>799</b>	<b>\$ 3,291,397</b>

**COUNT AND TOTAL MONTHLY BENEFITS OF  
UNIFORMED PATROL YEAR 2000 RETIRED (NON-DISABLED)  
MEMBERS AND SURVIVORS  
AS OF JUNE 30, 2011  
BY ATTAINED AGE**

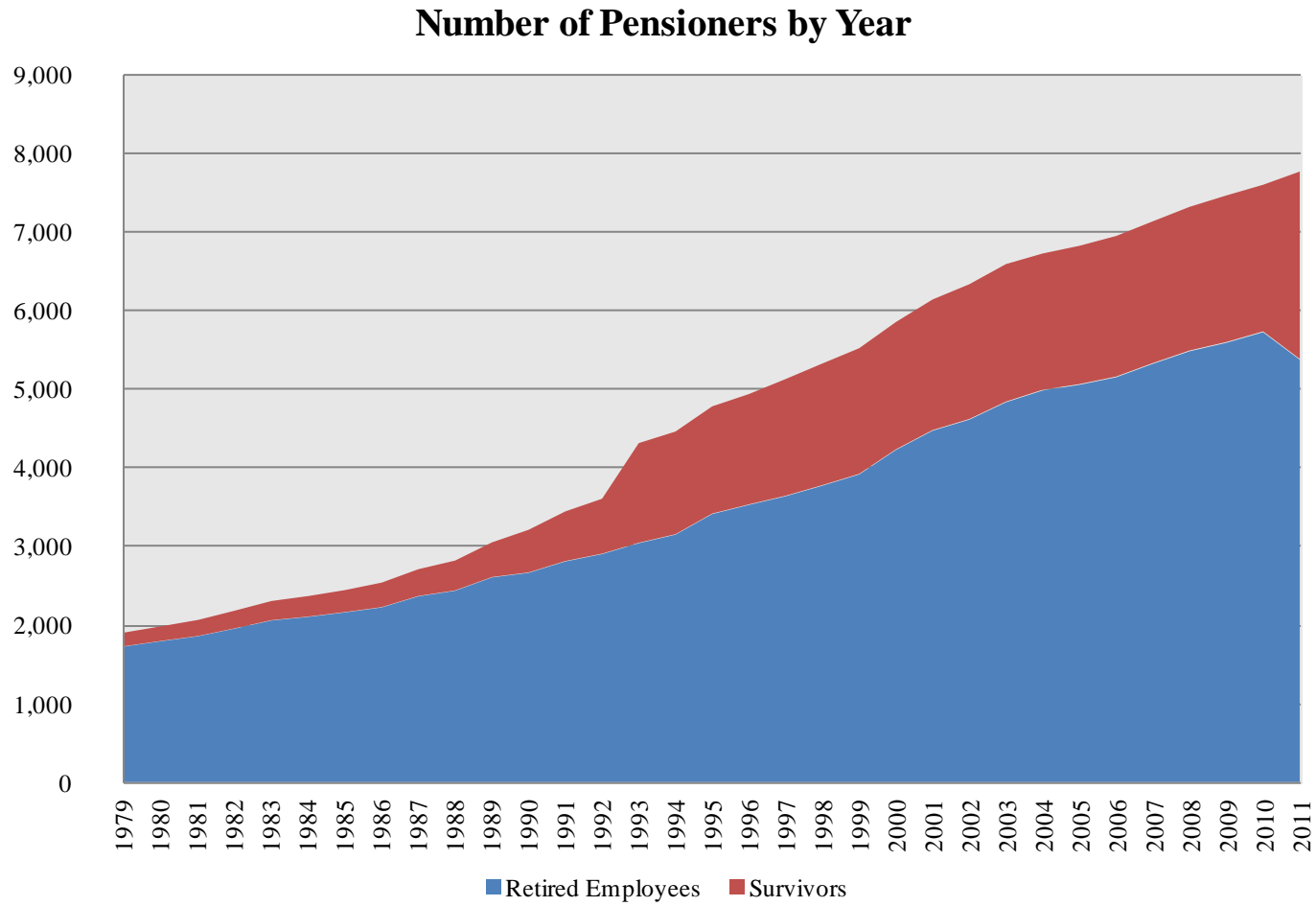
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Age	Number	Monthly Amount
Less than 20		
20-24		
25-29		
30-34		
35-39	1	\$ 1,536
40-44		
45-49		
50-54		
55-59		
60-64		
65-69		
70-74		
75-79		
80-84		
85-89		
90 & Over		
<b>TOTAL</b>	<b>1</b>	<b>\$ 1,536</b>

## GROWTH OF PENSION POPULATION BY YEAR

<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>
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%
2004	4,996	1,735	6,731	2.0%	142,359,307	328,210,887	43.4%
2005	5,068	1,761	6,829	1.5%	148,340,170	345,695,867	42.9%
2006	5,164	1,790	6,954	1.8%	155,230,301	348,614,699	44.5%
2007	5,336	1,805	7,141	2.7%	164,048,455	360,842,421	45.5%
2008	5,496	1,829	7,325	2.6%	172,112,941	369,424,653	46.6%
2009	5,604	1,866	7,470	2.0%	179,850,466	377,652,245	47.6%
2010	5,739	1,867	7,606	1.8%	187,267,535	369,911,252	50.6%
2011	5,388	2,387	7,775	2.2%	191,892,660	361,639,001	53.1%

# GROWTH OF PENSION POPULATION BY YEAR



**SELF INSURED DISABLED RETIRED MEMBERS  
AS OF JUNE 30, 2011**

---

Age	Number	Monthly Amount
Less than 20		
20-24		
25-29		
30-34	1	\$ 429
35-39	2	5,901
40-44	4	3,859
45-49	11	7,166
50-54	18	20,731
55-59	15	17,977
60-64	9	7,830
65-69	5	7,570
70-74	4	4,776
75-79	1	1,097
80-84	2	703
85-89		
90 & Over		
<b>TOTAL</b>	<b>72</b>	<b>\$ 78,039</b>

These members became disabled prior to outsourcing disability claims. Liabilities for these members include benefits payable during and after the period of disability.



**FULLY INSURED DISABLED RETIRED MEMBERS  
AS OF JUNE 30, 2011**

---

Age	Number	Monthly Amount
Less than 20		
20-24		
25-29	1	\$ 2,108
30-34	1	2,394
35-39	7	16,316
40-44	8	16,026
45-49	12	22,172
50-54	29	48,054
55-59	31	28,148
60-64	6	2,650
65-69		
70-74		
75-79		
80-84		
85-89		
90 & Over		
<b>TOTAL</b>	<b>95</b>	<b>\$ 137,868</b>

These members became disabled after disability claims became outsourced. Liabilities for these members during the period of disability are an obligation of the insurance company and not included in this valuation. Liabilities for these members after the period of disability are included in the valuation.

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## **SECTION E**

### **ASSUMPTIONS USED IN THE VALUATION AND GLOSSARY**

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# SUMMARY OF VALUATION METHOD AND ASSUMPTIONS

## JUNE 30, 2011

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*The actuarial assumptions used* in the valuation are shown in this Section of the report unless stated otherwise. The assumptions were established for the June 30, 2010 actuarial valuation, following a five-year actuarial investigation. They were adopted by the Board after obtaining the advice of the Actuary and other professionals.

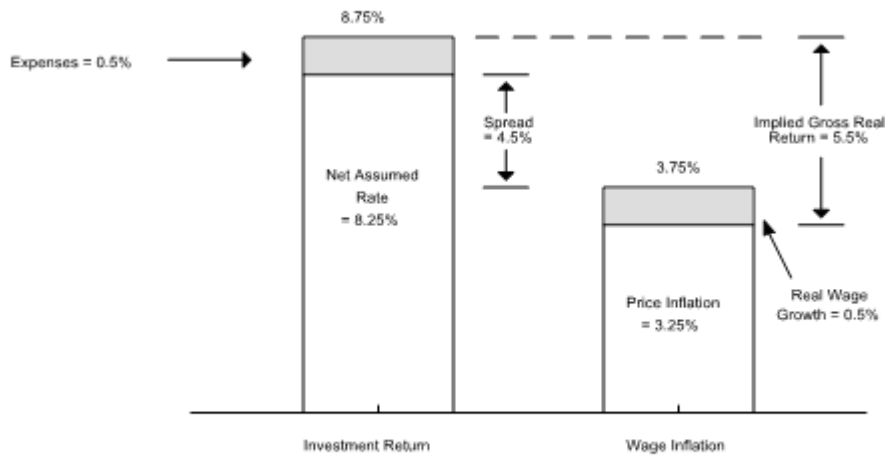
### Economic Assumptions

*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 3.75%. The real rate of return over wage growth is defined to be the portion of total investment return, which is more than the rate of wage inflation. The 8.25% investment return rate and 3.75% wage inflation rate translates to an assumed real rate of return over wage growth net of expenses of 4.5%. Based upon other assumptions, the net real rate of return over price inflation is 5%.

*Pay increase assumptions for merit and seniority* for individual active members are shown on pages E-3 and E-4. Part of the total assumed pay increase at each age is for merit and/or seniority, and the other 3.75% recognizes wage inflation. *The active member payroll* for MoDOT members is assumed to increase 0.00% annually in each of the first three years and 3.75% annually thereafter. The active member payroll for all other members is assumed to increase 3.75% annually for all years.

*The price inflation rate* is assumed to be 3.25% 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 macro economic factors.

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



**SUMMARY OF VALUATION METHOD AND ASSUMPTIONS**  
**JUNE 30, 2011**  
**(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 1994 Group Annuity Mortality Tables projected to the year 2002 set forward 2 years for males and set back 3 years for females. Pre-retirement mortality used was 70% for males and 50% for females of the post-retirement tables set forward 2 years for males and set back 3 years for females. Disabled pension mortality was based on PBGC Disabled Mortality tables. Related values are shown on page E-5.

*The probabilities of age and service retirement* are shown on page E-7. Upon retirement, members are assumed to pick the BackDROP period that when combined with the remaining annuity produces the highest liability.

*The probabilities of withdrawal from service* are shown on pages E-9 and E-10. *The probabilities of disability* are shown on page E-8.

*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. Data was furnished as of May 31 and assumed to be statistically equivalent to June 30.

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

## AGE BASED SALARY SCALE

Age	Salary Increase Assumptions for an Individual Member					
	Non-Uniformed			Uniformed		
	Merit & Seniority	Base (Economic)	Increase Next Year	Merit & Seniority	Base (Economic)	Increase Next Year
20	8.00%	3.75%	11.75%	8.50%	3.75%	12.25%
21	8.00%	3.75%	11.75%	8.50%	3.75%	12.25%
22	8.00%	3.75%	11.75%	8.50%	3.75%	12.25%
23	7.30%	3.75%	11.05%	7.80%	3.75%	11.55%
24	6.52%	3.75%	10.27%	7.02%	3.75%	10.77%
25	5.66%	3.75%	9.41%	6.16%	3.75%	9.91%
26	4.72%	3.75%	8.47%	5.22%	3.75%	8.97%
27	4.50%	3.75%	8.25%	5.00%	3.75%	8.75%
28	4.10%	3.75%	7.85%	4.60%	3.75%	8.35%
29	3.70%	3.75%	7.45%	4.20%	3.75%	7.95%
30	3.30%	3.75%	7.05%	3.80%	3.75%	7.55%
31	2.90%	3.75%	6.65%	3.40%	3.75%	7.15%
32	2.50%	3.75%	6.25%	3.00%	3.75%	6.75%
33	2.35%	3.75%	6.10%	2.85%	3.75%	6.60%
34	2.20%	3.75%	5.95%	2.70%	3.75%	6.45%
35	2.05%	3.75%	5.80%	2.55%	3.75%	6.30%
36	1.90%	3.75%	5.65%	2.40%	3.75%	6.15%
37	1.75%	3.75%	5.50%	2.25%	3.75%	6.00%
38	1.65%	3.75%	5.40%	2.15%	3.75%	5.90%
39	1.55%	3.75%	5.30%	2.05%	3.75%	5.80%
40	1.45%	3.75%	5.20%	1.95%	3.75%	5.70%
41	1.35%	3.75%	5.10%	1.85%	3.75%	5.60%
42	1.25%	3.75%	5.00%	1.75%	3.75%	5.50%
43	1.15%	3.75%	4.90%	1.65%	3.75%	5.40%
44	1.05%	3.75%	4.80%	1.55%	3.75%	5.30%
45	0.95%	3.75%	4.70%	1.45%	3.75%	5.20%
46	0.85%	3.75%	4.60%	1.35%	3.75%	5.10%
47	0.75%	3.75%	4.50%	1.25%	3.75%	5.00%
48	0.70%	3.75%	4.45%	1.20%	3.75%	4.95%
49	0.65%	3.75%	4.40%	1.15%	3.75%	4.90%
50	0.60%	3.75%	4.35%	1.10%	3.75%	4.85%
51	0.55%	3.75%	4.30%	1.05%	3.75%	4.80%
52	0.50%	3.75%	4.25%	1.00%	3.75%	4.75%
53	0.46%	3.75%	4.21%	0.96%	3.75%	4.71%
54	0.42%	3.75%	4.17%	0.92%	3.75%	4.67%
55	0.38%	3.75%	4.13%	0.88%	3.75%	4.63%
56	0.34%	3.75%	4.09%	0.84%	3.75%	4.59%
57	0.30%	3.75%	4.05%	0.80%	3.75%	4.55%
58	0.30%	3.75%	4.05%	0.80%	3.75%	4.55%
59	0.30%	3.75%	4.05%	0.80%	3.75%	4.55%
60	0.30%	3.75%	4.05%	0.80%	3.75%	4.55%
Ref.	161			161 +.50%		

# SERVICE BASED SALARY SCALE

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## Non-Uniformed

% Merit Increases in Salaries Next Year	
Service Index	Rate
1	11.0%
2	10.5%
3	5.0%
4	4.5%
Ref	339

## POST-RETIREMENT MORTALITY

Age	Regular		Disabled		Age	Regular		Disabled	
	Male	Female	Male	Female		Male	Female	Male	Female
21	0.00042	0.00034	0.04589	0.02630	61	0.00896	0.00471	0.05928	0.03390
22	0.00044	0.00036	0.04589	0.02630	62	0.01015	0.00534	0.06109	0.03470
23	0.00047	0.00037	0.04589	0.02630	63	0.01144	0.00606	0.06242	0.03550
24	0.00050	0.00038	0.04589	0.02630	64	0.01287	0.00691	0.06346	0.03620
25	0.00052	0.00040	0.04589	0.02630	65	0.01429	0.00785	0.06441	0.03700
26	0.00054	0.00042	0.04380	0.02570	66	0.01561	0.00896	0.06527	0.03780
27	0.00056	0.00044	0.04142	0.02530	67	0.01700	0.01015	0.06622	0.03860
28	0.00059	0.00047	0.03904	0.02470	68	0.01840	0.01144	0.06736	0.03940
29	0.00061	0.00050	0.03686	0.02420	69	0.02002	0.01287	0.06869	0.04020
30	0.00063	0.00052	0.03439	0.02370	70	0.02203	0.01429	0.07020	0.04110
31	0.00065	0.00054	0.03221	0.02320	71	0.02419	0.01561	0.07191	0.04210
32	0.00066	0.00056	0.03040	0.02270	72	0.02658	0.01700	0.07372	0.04330
33	0.00068	0.00059	0.02869	0.02220	73	0.02931	0.01840	0.07562	0.04470
34	0.00069	0.00061	0.02736	0.02180	74	0.03239	0.02002	0.07771	0.04650
35	0.00073	0.00063	0.02641	0.02140	75	0.03629	0.02203	0.07999	0.04920
36	0.00077	0.00065	0.02584	0.02120	76	0.04064	0.02419	0.08256	0.05290
37	0.00082	0.00066	0.02575	0.02100	77	0.04546	0.02658	0.08626	0.05780
38	0.00088	0.00068	0.02594	0.02080	78	0.05080	0.02931	0.09139	0.06310
39	0.00094	0.00069	0.02622	0.02080	79	0.05666	0.03239	0.09908	0.06860
40	0.00101	0.00073	0.02679	0.02090	80	0.06306	0.03629	0.10716	0.07460
41	0.00108	0.00077	0.02736	0.02100	81	0.06948	0.04064	0.11600	0.08130
42	0.00115	0.00082	0.02821	0.02130	82	0.07654	0.04546	0.12559	0.08850
43	0.00122	0.00088	0.02898	0.02160	83	0.08413	0.05080	0.13604	0.09620
44	0.00131	0.00094	0.02983	0.02190	84	0.09269	0.05666	0.14735	0.10430
45	0.00142	0.00101	0.03059	0.02240	85	0.10301	0.06306	0.15969	0.11280
46	0.00155	0.00108	0.03135	0.02290	86	0.11443	0.06948	0.17338	0.12210
47	0.00170	0.00115	0.03230	0.02350	87	0.12693	0.07654	0.18810	0.13220
48	0.00187	0.00122	0.03354	0.02420	88	0.14065	0.08413	0.20425	0.14320
49	0.00206	0.00131	0.03486	0.02490	89	0.15466	0.09269	0.22135	0.15510
50	0.00230	0.00142	0.03639	0.02570	90	0.17019	0.10301	0.23987	0.16820
51	0.00257	0.00155	0.03810	0.02640	91	0.18663	0.11443	0.26021	0.18250
52	0.00285	0.00170	0.03990	0.02720	92	0.20352	0.12693	0.28234	0.19800
53	0.00320	0.00187	0.04171	0.02810	93	0.22212	0.14065	0.30647	0.21500
54	0.00361	0.00206	0.04370	0.02880	94	0.24023	0.15466	0.33203	0.23300
55	0.00412	0.00230	0.04579	0.02950	95	0.25938	0.17019	0.35995	0.25250
56	0.00471	0.00257	0.04807	0.03010	96	0.27894	0.18663	0.39035	0.27390
57	0.00534	0.00285	0.05045	0.03070	97	0.29761	0.20352	0.42351	0.29720
58	0.00606	0.00320	0.05273	0.03150	98	0.31663	0.22212	0.45961	0.32260
59	0.00691	0.00361	0.05520	0.03230	99	0.33876	0.24023	0.49808	0.34950
60	0.00785	0.00412	0.05729	0.03310	100	0.35883	0.25938	0.53998	0.37890
Ref	#303sb-2x1	#303sb3x1	#250sb0x0.95	#251sb0x1		#303sb-2x1	#303sb3x1	#250sb0x0.95	#251sb0x1

Pre-Retirement mortality is 70% of the regular post-retirement mortality values for males and 50% of the regular post-retirement mortality values for females.

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

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<b>Sample Attained</b>	<b>Present Value of \$1 Monthly for Life</b>		<b>Future Life Expectancy (years)</b>	
	<b>Ages</b>	<b>Men</b>	<b>Women</b>	<b>Men</b>
50	\$139.96	\$136.07	30.74	35.46
55	135.25	130.02	26.15	30.74
60	128.88	122.23	21.80	26.15
65	120.71	112.78	17.81	21.80
70	110.83	101.31	14.17	17.81
75	98.83	87.62	10.86	14.17
80	84.68	72.85	8.04	10.86
Ref:	#303sb-2x1	#303sb3x1		

The present values shown above are for illustrative purposes only and include a 50% survivor benefit but do not include the value of future post-retirement increases. Males are assumed to be 3 years older than their spouses.



## RATES OF RETIREMENT

Age	Non-Uniformed				Uniformed	
	Male		Female		Male	Female
	Normal	Early	Normal	Early	Normal	
50	0.3000		0.3000		0.4000	0.4000
51	0.2500		0.1800		0.2000	0.2000
52	0.2500		0.1800		0.1500	0.1500
53	0.2000		0.1800		0.1500	0.1500
54	0.2000		0.2500		0.1500	0.1500
55	0.2000	0.0300	0.3000	0.0300	0.2500	0.2500
56	0.3000	0.0300	0.3000	0.0300	0.2500	0.2500
57	0.2500	0.0400	0.3000	0.0300	0.3000	0.3000
58	0.2000	0.0400	0.3000	0.0300	0.3500	0.3500
59	0.2500	0.0500	0.3000	0.0300	0.5000	0.5000
60	0.2000	0.1000	0.2000	0.0500	1.0000	1.0000
61	0.1500	0.0400	0.2000	0.0600	1.0000	1.0000
62	0.5000	0.4000	0.3500	0.4000	1.0000	1.0000
63	0.4000	0.4000	0.2500	0.3000	1.0000	1.0000
64	0.3000	0.4000	0.2500	0.3000	1.0000	1.0000
65	0.4000		0.4000		1.0000	1.0000
66	0.4500		0.4000		1.0000	1.0000
67	0.2500		0.4000		1.0000	1.0000
68	0.2500		0.4000		1.0000	1.0000
69	0.2500		0.4000		1.0000	1.0000
70	0.5000		0.5000		1.0000	1.0000
71	0.5000		0.5000		1.0000	1.0000
72	1.0000		1.0000		1.0000	1.0000
Ref	1822	1824	1823	1825	1826	1826

## RATES OF DISABILITY

Age	Non-Uniformed		Uniformed		Age	Non-Uniformed		Uniformed	
	Male	Female	Male	Female		Male	Female	Male	Female
21	0.0002	0.0003	0.0000	0.0000	51	0.0043	0.0045	0.0022	0.0022
22	0.0002	0.0003	0.0000	0.0000	52	0.0044	0.0048	0.0024	0.0024
23	0.0002	0.0003	0.0000	0.0000	53	0.0047	0.0053	0.0028	0.0028
24	0.0002	0.0005	0.0000	0.0000	54	0.0050	0.0059	0.0031	0.0031
25	0.0002	0.0005	0.0001	0.0001	55	0.0054	0.0066	0.0035	0.0035
26	0.0002	0.0005	0.0001	0.0001	56	0.0059	0.0070	0.0039	0.0039
27	0.0003	0.0006	0.0001	0.0001	57	0.0064	0.0077	0.0043	0.0043
28	0.0003	0.0008	0.0002	0.0002	58	0.0073	0.0082	0.0048	0.0048
29	0.0003	0.0010	0.0002	0.0002	59	0.0083	0.0085	0.0052	0.0052
30	0.0003	0.0010	0.0002	0.0002	60	0.0100	0.0090	0.0058	0.0058
31	0.0004	0.0011	0.0002	0.0002	61	0.0129	0.0091	0.0063	0.0063
32	0.0004	0.0013	0.0002	0.0002	62	0.0000	0.0094	0.0070	0.0070
33	0.0005	0.0014	0.0002	0.0002	63	0.0000	0.0098	0.0077	0.0077
34	0.0005	0.0014	0.0002	0.0002	64	0.0000	0.0101	0.0077	0.0077
35	0.0006	0.0014	0.0002	0.0002	65	0.0000	0.0000	0.0000	0.0000
36	0.0006	0.0016	0.0002	0.0002	66	0.0000	0.0000	0.0000	0.0000
37	0.0006	0.0016	0.0003	0.0003	67	0.0000	0.0000	0.0000	0.0000
38	0.0007	0.0018	0.0003	0.0003	68	0.0000	0.0000	0.0000	0.0000
39	0.0008	0.0018	0.0004	0.0004	69	0.0000	0.0000	0.0000	0.0000
40	0.0010	0.0019	0.0005	0.0005	70	0.0000	0.0000	0.0000	0.0000
41	0.0013	0.0022	0.0006	0.0006	71	0.0000	0.0000	0.0000	0.0000
42	0.0015	0.0024	0.0006	0.0006	72	0.0000	0.0000	0.0000	0.0000
43	0.0016	0.0027	0.0007	0.0007	73	0.0000	0.0000	0.0000	0.0000
44	0.0019	0.0029	0.0008	0.0008	74	0.0000	0.0000	0.0000	0.0000
45	0.0023	0.0032	0.0009	0.0009	75	0.0000	0.0000	0.0000	0.0000
46	0.0028	0.0035	0.0011	0.0011	76	0.0000	0.0000	0.0000	0.0000
47	0.0033	0.0037	0.0012	0.0012	77	0.0000	0.0000	0.0000	0.0000
48	0.0037	0.0038	0.0014	0.0014	78	0.0000	0.0000	0.0000	0.0000
49	0.0040	0.0040	0.0016	0.0016	79	0.0000	0.0000	0.0000	0.0000
50	0.0042	0.0042	0.0019	0.0019	80	0.0000	0.0000	0.0000	0.0000
Ref	#188x1.1	#503x1.6	#19x0.75	#19x0.75		#188x1.1	#503x1.6	#19x0.75	#19x0.75

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

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Service	Non-Uniformed		Uniformed	
	Male	Female	Male	Female
0-1	0.3000	0.1900	0.1400	0.1400
1-2	0.1600	0.1300	0.0650	0.0650
2-3	0.0800	0.0900	0.0350	0.0350
3-4	0.0650	0.0800	0.0300	0.0300
4-5	0.0500	0.0500	0.0300	0.0300
Ref	631	632	633	633

This assumption was first used in the June 30, 2010 valuation.

**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	0.0493	0.0510	0.0314	0.0314
26	0.0493	0.0510	0.0308	0.0308
27	0.0493	0.0510	0.0302	0.0302
28	0.0475	0.0510	0.0297	0.0297
29	0.0457	0.0510	0.0286	0.0286
30	0.0439	0.0510	0.0275	0.0275
31	0.0422	0.0510	0.0264	0.0264
32	0.0404	0.0510	0.0248	0.0248
33	0.0387	0.0493	0.0237	0.0237
34	0.0370	0.0476	0.0220	0.0220
35	0.0353	0.0459	0.0209	0.0209
36	0.0337	0.0442	0.0193	0.0193
37	0.0321	0.0425	0.0181	0.0181
38	0.0305	0.0408	0.0165	0.0165
39	0.0290	0.0391	0.0154	0.0154
40	0.0275	0.0374	0.0143	0.0143
41	0.0260	0.0357	0.0132	0.0132
42	0.0246	0.0340	0.0121	0.0121
43	0.0232	0.0323	0.0110	0.0110
44	0.0219	0.0306	0.0099	0.0099
45	0.0206	0.0289	0.0088	0.0088
46	0.0194	0.0272	0.0077	0.0077
47	0.0182	0.0255	0.0066	0.0066
48	0.0171	0.0238	0.0055	0.0055
49	0.0161	0.0221	0.0049	0.0049
50	0.0151	0.0204	0.0044	0.0044
51	0.0142	0.0187	0.0039	0.0039
52	0.0133	0.0170	0.0033	0.0033
53	0.0125	0.0153	0.0027	0.0027
54	0.0117	0.0136	0.0022	0.0022
55	0.0110	0.0119	0.0017	0.0017
56	0.0105	0.0102	0.0011	0.0011
57	0.0100	0.0085	0.0011	0.0011
58	0.0095	0.0068	0.0011	0.0011
59	0.0092	0.0051	0.0011	0.0011
60	0.0089	0.0034	0.0011	0.0011
Ref	#63x0.6	#684x0.85	#387x0.55	#387x0.55

## MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

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<b>Administrative Expenses:</b>	0.73% of payroll, based upon actual results from previous year.
<b>Disability Expenses:</b>	0.53% of payroll included in contribution. Retirement system pays premium directly to an outside insurance company or TPA.
<b>Marriage Assumption:</b>	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.
<b>Pay Increase Timing:</b>	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.
<b>Decrement Timing:</b>	Decrements of all types are assumed to occur mid-year.
<b>Eligibility Testing:</b>	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.
<b>Benefit Service:</b>	Exact fractional service is used to determine the amount of benefit payable.
<b>Decrement Relativity:</b>	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
<b>Normal Form of Benefit:</b>	The assumed normal form of benefit is a 50% joint & survivor benefit for married members in the Closed Plan and a straight life benefit for all other members.
<b>Optional Benefit Factors:</b>	Optional Benefit Factors are in accordance with tables adopted by the Board.
<b>Active Member Data:</b>	Actual census date of data was May 31. Data was assumed to be statistically equivalent to June 30.
<b>Other:</b>	Disability and turnover decrements do not operate during retirement eligibility.
<b>Miscellaneous Loading:</b>	The calculated normal and early retirement benefits were increased by 3.0% for Uniformed and 2.6% for Non-Uniformed to account for the inclusion of unused sick leave in the calculation of Average Pay. Post disability benefit liabilities were loaded by 150% to account for potential survivor benefits payable by the retirement system during the period of disability.

## **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 *Value of Future Benefits* was calculated using the benefits assumed to be payable in the future to current active, terminated vested 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. Computed costs were increased in accordance with the loads described on page E-11.

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, 2011, resulted in *Unfunded Actuarial Accrued Liabilities* which were amortized using the following funding policy.

*Permanent Policy:* The total contribution will be based on normal cost plus a 24-year amortization of unfunded actuarial accrued liabilities. The amortization period is a closed 24-year period starting July 1, 2012.

*Temporary Accelerated Policy:* The total contribution is based on normal cost plus a 13-year amortization period for unfunded retiree liabilities and a 28-year amortization period for other unfunded liabilities. Both amortization periods are closed periods starting July 1, 2012.

This temporary accelerated policy was adopted by the Retirement Board on September 17, 2009 and will remain in effect until such time as the retiree liability becomes 100% funded or the permanent policy produces a higher contribution rate.

# JUNE 30, 2011 ACTUARIAL VALUATION

## GLOSSARY

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***Actuarial Accrued Liability.*** The difference between (i) the actuarial present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability."

***Accrued Service.*** The service credited under the plan which was rendered before the date of the actuarial valuation.

***Actuarial Assumptions.*** Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

***Actuarial Cost Method.*** A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future plan benefits" between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."

***Actuarial Equivalent.*** A series of payments is called an actuarial equivalent of another series of payments if the two series have the same actuarial present value.

***Actuarial Present Value.*** The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

***Actuarial value of assets.*** Also referred to as funding value of assets, smoothed market value of assets, or valuation assets.

Valuation assets recognize assumed investment return fully each year. Differences between actual and assumed investment return are phased in over a closed 3-year period. This treatment helps remove the timing of investment activities from the valuation process. During periods when investment performance exceeds the assumed rate, valuation assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, valuation assets will tend to be greater than market value. If assumed rates are exactly realized for 4 consecutive years, valuation assets will become equal to market value.

***Actuary.*** A person who is trained in the applications of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries. The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation A.S.A. and ultimately to Fellowship with the designation F.S.A.

(Concluded on Next Page)

## JUNE 30, 2011 ACTUARIAL VALUATION GLOSSARY (CONCLUDED)

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***Amortization.*** Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.

***Experience Gain (Loss).*** A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.

***Normal Cost.*** The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost". Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.

***Plan Termination Liability.*** The actuarial present value of future plan benefits based on the assumption that there will be no further accruals for future service and salary. The termination liability will generally be less than the liabilities computed on a "going concern" basis and is not normally determined in a routine actuarial valuation.

***Reserve Account.*** An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.

***Unfunded Actuarial Accrued Liability.*** The difference between the actuarial accrued liability and actuarial value of assets. Sometimes referred to as "unfunded accrued liability."

The existence of unfunded actuarial accrued liabilities is not in itself bad, any more than a mortgage on a house is bad. Unfunded actuarial accrued liabilities do not represent a debt that is payable today. What is important is the ability to amortize the unfunded actuarial accrued liabilities and the trend in their amount (after due allowance for devaluation of the dollar).

***Valuation Payroll.*** Active member payroll that is intended to reflect the annual salary considered as covered compensation for Retirement System benefits.



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**SECTION F**

FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

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## 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 Missouri Department of Transportation and Highway Patrol Employees’ 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. However, “Level percent-of-payroll” does NOT mean “Fixed percent-of-payroll”. The level percent of payroll is an estimate that may change from one year to the next.

(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.

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**SECTION G**

SUPPLEMENTAL INFORMATION FOR COMPREHENSIVE ANNUAL  
FINANCIAL REPORTING

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December 16, 2011

The Retirement Board  
Missouri Department of Transportation  
and Highway Patrol Employees' Retirement System  
P.O. Box 1930  
Jefferson City, Missouri 65102-1930

Dear Board Members:

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. This report should not be relied on for any purpose other than the purpose described.

The basic financial objective of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS) is to establish and receive contributions which:

- (1) when expressed in terms of percents of active member payroll, will remain approximately level from generation to generation of Missouri citizens, and
- (2) when combined with present assets and future investment returns, will be sufficient to meet the present and future financial obligations of MPERS.

In order to measure progress toward this fundamental objective, MPERS has annual actuarial valuations performed. The valuations (i) measure present financial position, and (ii) establish contribution rates that provide for the current cost and level percent-of-payroll amortization of unfunded actuarial liabilities over a reasonable period. An actuarial valuation was performed based upon benefit conditions, data and assumptions as of June 30, 2011. This valuation indicates that contribution rates for the period beginning July 1, 2012 that are at least equal to the calculated contributions rates will meet the Board's financial objective. The calculated contribution rates are 50.92% of payroll for the 7,018 Non-Uniformed employees and 55.03% of payroll for the 1,213 Uniformed patrol employees.

The plan administrative staff provides the actuary with data for the actuarial valuation. The actuary relies on the data after reviewing it for internal and year to year consistency. The actuary summarizes and tabulates population data in order to analyze longer term trends.

Actuarial valuations are based upon assumptions regarding future activity in specific risk areas including the rates of investment return and payroll growth, eligibility for the various classes of benefits, and longevity among retired lives. These assumptions are adopted by the Board after considering the advice of the actuary and other professionals. The assumptions and the methods comply with the requirements of Statements No. 25 and No. 43 of the Governmental Accounting Standards Board. Each actuarial valuation takes into account all prior differences between actual and assumed experience in each risk area and adjusts the contribution rates as needed. Actuarial methods and assumptions were adopted by the Board pursuant to the June 30, 2009 Experience Study.

To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries. The actuarial assumptions used for the valuation produce results which, individually and in the aggregate, are reasonable.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. Heidi Barry is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

**Based upon the valuation results, it is our opinion that the Missouri Department of Transportation and Highway Patrol Employees' Retirement System continues to operate in accordance with actuarial principles of level percent-of-payroll financing. It is important to the well-being of the system that it continues to receive contributions at the actuarially determined levels. It is also important to continue to monitor both the total funded status and the funded status of the retiree liabilities to ensure that the funding policy is consistent with the expected life span of the respective unfunded obligation.**

Respectfully submitted,



Heidi G. Barry, ASA, MAAA



Kenneth G. Alberts



## SOLVENCY TEST

The MPERS funding objective is to meet long term benefit promises through contributions that remain approximately level from year to year as a percent of member payroll. If the contributions to the System are level in concept and soundly executed, the System will *pay all promised benefits when due – the ultimate test of financial soundness.*

A *solvency test* is one means of checking a system’s progress under its funding program. In a solvency test for a non-contributory plan, the plan’s present assets (cash and investments) are compared with: 1) The liabilities for future benefits to present retired lives and 2) The liabilities for service already rendered by members. In a system that has been following the discipline of level percent of payroll financing, the liabilities for future benefits to present retired lives (liability 1) will be fully covered by present assets (except in rare circumstances). In addition, the liabilities for service already rendered by members (liability 2) will be partially covered by the remainder of present assets. The larger the funded portion of liability 2, the stronger the condition of the system.

The schedule below illustrates the history of liability 2 of the System.

Val. Date June 30	(1) Retirees and Benef.	(2) Active and Inactive Members	Present Valuation Assets	Portion of Present Values Covered by Present Assets		
				(1)	(2)	Total
	-----\$ Millions-----					
1999	1,132	921	1,243	100%	12%	61%
2000	1,238	951	1,423	100%	19%	65%
2001	1,375	926	1,521	100%	16%	66%
2002#	1,470	888	1,451	99%	0%	62%
2003	1,555	863	1,364	88%	0%	56%
2004	1,626	867	1,332	82%	0%	53%
2005	1,669	958	1,417	85%	0%	54%
2006	1,734	1,007	1,521	88%	0%	56%
2007	1,810	1,087	1,686	93%	0%	58%
2008	1,873	1,147	1,784	95%	0%	59%
2009	1,947	1,166	1,471	76%	0%	47%
2010#	2,034	1,225	1,376	68%	0%	42%
2011	2,045	1,253	1,427	70%	0%	43%

# New Assumptions adopted.

## DERIVATION OF EXPERIENCE GAIN (LOSS)

Actual experience will never coincide exactly with assumed experience (except by coincidence). Gains and losses may offset each other over a period of years, but sizeable year-to-year variations from assumed experience are common. Detail on the derivation of the experience gain (loss) is shown below.

	<b>\$ Millions</b>
UAAL Beginning of Year (at July 1)	\$ 1,883,022,352
Normal Cost	49,871,712
Contributions	(150,452,096)
Interest	151,200,403
Net Change in LTD Assets	-
Expected UAAL Before Any Changes	1,933,642,371
Effect of Changes in Assumptions & Methods	8,787,924
Effect of Interest Adjustment*	(726,383)
Expected UAAL After Changes	1,941,703,912
End of Year UAAL (at June 30)	\$ 1,870,299,151
Gain/(Loss) for Year	\$ 71,404,761
Gain/(Loss) as a percent of actuarial accrued liabilities at start of year (\$3,258.9 million)	2.2%

\* All contributions (including the Water Patrol asset transfer) are treated the same in the development of the Funding Value of Assets and are assumed to be made in the middle of the year, on average. The adjustment in the gain/loss is made to provide consistency with that assumption.

<b>Valuation Date June 30</b>	<b>Experience Gain (Loss) as % of Beginning Accrued Liability</b>
1999	(7.7)%
2000	(0.1)%
2001	(9.3)%
2002	(4.5)%
2003	(5.2)%
2004	(2.9)%
2005	(1.5)%
2006	1.4 %
2007	1.1 %
2008	(0.2)%
2009	(12.6)%
2010	(3.8)%
<b>2011</b>	<b>2.2 %</b>

## SUMMARY OF ACTUARIAL ASSUMPTIONS AND METHODS

Valuation Date:	June 30, 2011
Actuarial Cost Method:	Entry Age
Amortized Method:	Closed, level percent of payroll
Remaining Amortization Period:	21-years#
Asset Valuation Method:	3-year smoothing
Actuarial Assumptions:	
Investment Rate of Return:	8.25%
Projected Salary Increase:	3.75% to 12.25%
Cost-of-Living Adjustments:	2.6% Compound
Includes Wage Inflation at:	3.75%

# *Single equivalent period.*

An actuarial valuation is based upon an actuarial cost method, an asset valuation method, and actuarial assumptions. These methods and assumptions are chosen by the Board of Trustees after consultation with the Actuary and other advisors.

The actuarial cost method is called the Entry Age Actuarial Cost Method. This method is consistent with the Board's level percent of payroll funding objective. With this method, the level percent of payroll is determined that will fund a member's retirement benefit over the member's entire working lifetime, from date of hire (Entry Age) to date of exit from the active member population. Differences in the past between assumed and actual experience become part of unfunded actuarial accrued liabilities and are amortized with level percent of payroll contributions. This cost method was first used in the **June 30, 1999** valuation.

The asset valuation method is a three year smoothed market value method in which assumed investment return is recognized immediately each year and differences between actual and assumed investment return are phased in over a closed three year period. This asset valuation method is intended to give recognition to the long term accuracy of market values while filtering out and dampening short term market swings. This method was first used in the **June 30, 1999** valuation.

The actuarial assumptions used in producing the valuation fall into two broad classes: economic assumptions, and demographic assumptions. Economic assumptions refer to long term rates of investment return, wage growth, covered population growth, and inflation. Demographic assumptions refer to retirement rates, turnover rates, disability rates, merit and seniority pay increases, and mortality rates. The current assumptions are based upon a 2004-2009 study of experience of the MPERS. The assumptions are reviewed from time to time to keep them reasonably current with expected experience.

### ***Economic Assumptions***

***The investment return rate*** used in making the valuation was 8.25% per year, compounded annually (net after administrative expenses). This rate of return is not the assumed real rate of return. The real rate of return over wage inflation is defined to be the portion of investment return which is more than the wage inflation rate. Considering wage inflation recognition of 3.75%, the 8.25% rate translates to an assumed real rate of return over wage inflation of 4.5%. This rate was first used for the **June 30, 2005** valuation.

## SUMMARY OF ACTUARIAL ASSUMPTIONS AND METHODS (CONCLUDED)

*Pay increase assumptions* for individual active members are shown on Tables VI and VII. Part of the assumption for each age is for a merit and/or seniority increase, and the other 3.75% recognizes wage inflation. These rates were first used for the **June 30, 2010** valuation.

*Price Inflation* is assumed to be 3.25%. This results in a 2.6% annual COLA assumption. It is assumed that the 2.6% COLA will always be paid.

The Active Member Group size is assumed to remain constant at its present level.

*The active member payroll* for MoDOT members is assumed to increase 0.00% annually in each of the first three years and 3.75% annually thereafter. The active member payroll for all other members is assumed to increase 3.75% annually for all years.

### *Non Economic Assumptions*

*The mortality table* used to measure retired life mortality was the 1994 Group Annuity Mortality Tables projected to the year 2002 set forward 2 years for males and set back 3 years for females. Related values are shown on Table I. This table was first used for the **June 30, 2010** valuation. Disabled pension mortality was based on PBGC Disabled Mortality tables.

*The probabilities of retirement* for members eligible to retire are shown on Table II. The rates for full retirement were first used in the **June 30, 2010** valuation. The rates for reduced retirement were first used in the **June 30, 2010** valuation. Upon retirement, members are assumed to pick the BackDROP period that when combined with the remaining annuity produces the highest liability.

*The probabilities of disability* for members eligible to retire are shown on Table III. The rates for disability were first used in the **June 30, 2010** valuation.

*The probabilities of withdrawal* from service, death in service and disability are shown for sample ages on Tables IV and V. The death-in-service and disability rates were first used in the **June 30, 2010** valuation. The withdrawal rates were first used in the **June 30, 2010** valuation.

*The data about persons now covered and about present assets* was furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary. Data was furnished as of May 31 and assumed to be statistically equivalent to June 30.

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The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA).

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

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<b>Sample Attained</b>	<b>Present Value of \$1 Monthly for Life</b>		<b>Future Life Expectancy (years)</b>	
	<b>Men</b>	<b>Women</b>	<b>Men</b>	<b>Women</b>
50	\$139.96	\$136.07	30.74	35.46
55	135.25	130.02	26.15	30.74
60	128.88	122.23	21.80	26.15
65	120.71	112.78	17.81	21.80
70	110.83	101.31	14.17	17.81
75	98.83	87.62	10.86	14.17
80	84.68	72.85	8.04	10.86
Ref:	#303sb-2x1	#303sb3x1		

The present values shown above are for illustrative purposes only and include a 50% survivor benefit but do not include the value of future post-retirement increases. Males are assumed to be 3 years older than their spouses.

**TABLE II**  
**RATES OF RETIREMENT**

Age	Non-Uniformed				Uniformed	
	Male		Female		Male	Female
	Normal	Early	Normal	Early	Normal	
50	0.3000		0.3000		0.4000	0.4000
51	0.2500		0.1800		0.2000	0.2000
52	0.2500		0.1800		0.1500	0.1500
53	0.2000		0.1800		0.1500	0.1500
54	0.2000		0.2500		0.1500	0.1500
55	0.2000	0.0300	0.3000	0.0300	0.2500	0.2500
56	0.3000	0.0300	0.3000	0.0300	0.2500	0.2500
57	0.2500	0.0400	0.3000	0.0300	0.3000	0.3000
58	0.2000	0.0400	0.3000	0.0300	0.3500	0.3500
59	0.2500	0.0500	0.3000	0.0300	0.5000	0.5000
60	0.2000	0.1000	0.2000	0.0500	1.0000	1.0000
61	0.1500	0.0400	0.2000	0.0600	1.0000	1.0000
62	0.5000	0.4000	0.3500	0.4000	1.0000	1.0000
63	0.4000	0.4000	0.2500	0.3000	1.0000	1.0000
64	0.3000	0.4000	0.2500	0.3000	1.0000	1.0000
65	0.4000		0.4000		1.0000	1.0000
66	0.4500		0.4000		1.0000	1.0000
67	0.2500		0.4000		1.0000	1.0000
68	0.2500		0.4000		1.0000	1.0000
69	0.2500		0.4000		1.0000	1.0000
70	0.5000		0.5000		1.0000	1.0000
71	0.5000		0.5000		1.0000	1.0000
72	1.0000		1.0000		1.0000	1.0000
Ref	1822	1824	1823	1825	1826	1826

**TABLE III**  
**RATES OF DISABILITY**

Age	Non-Uniformed		Uniformed		Age	Non-Uniformed		Uniformed	
	Male	Female	Male	Female		Male	Female	Male	Female
21	0.0002	0.0003	0.0000	0.0000	51	0.0043	0.0045	0.0022	0.0022
22	0.0002	0.0003	0.0000	0.0000	52	0.0044	0.0048	0.0024	0.0024
23	0.0002	0.0003	0.0000	0.0000	53	0.0047	0.0053	0.0028	0.0028
24	0.0002	0.0005	0.0000	0.0000	54	0.0050	0.0059	0.0031	0.0031
25	0.0002	0.0005	0.0001	0.0001	55	0.0054	0.0066	0.0035	0.0035
26	0.0002	0.0005	0.0001	0.0001	56	0.0059	0.0070	0.0039	0.0039
27	0.0003	0.0006	0.0001	0.0001	57	0.0064	0.0077	0.0043	0.0043
28	0.0003	0.0008	0.0002	0.0002	58	0.0073	0.0082	0.0048	0.0048
29	0.0003	0.0010	0.0002	0.0002	59	0.0083	0.0085	0.0052	0.0052
30	0.0003	0.0010	0.0002	0.0002	60	0.0100	0.0090	0.0058	0.0058
31	0.0004	0.0011	0.0002	0.0002	61	0.0129	0.0091	0.0063	0.0063
32	0.0004	0.0013	0.0002	0.0002	62	0.0000	0.0094	0.0070	0.0070
33	0.0005	0.0014	0.0002	0.0002	63	0.0000	0.0098	0.0077	0.0077
34	0.0005	0.0014	0.0002	0.0002	64	0.0000	0.0101	0.0077	0.0077
35	0.0006	0.0014	0.0002	0.0002	65	0.0000	0.0000	0.0000	0.0000
36	0.0006	0.0016	0.0002	0.0002	66	0.0000	0.0000	0.0000	0.0000
37	0.0006	0.0016	0.0003	0.0003	67	0.0000	0.0000	0.0000	0.0000
38	0.0007	0.0018	0.0003	0.0003	68	0.0000	0.0000	0.0000	0.0000
39	0.0008	0.0018	0.0004	0.0004	69	0.0000	0.0000	0.0000	0.0000
40	0.0010	0.0019	0.0005	0.0005	70	0.0000	0.0000	0.0000	0.0000
41	0.0013	0.0022	0.0006	0.0006	71	0.0000	0.0000	0.0000	0.0000
42	0.0015	0.0024	0.0006	0.0006	72	0.0000	0.0000	0.0000	0.0000
43	0.0016	0.0027	0.0007	0.0007	73	0.0000	0.0000	0.0000	0.0000
44	0.0019	0.0029	0.0008	0.0008	74	0.0000	0.0000	0.0000	0.0000
45	0.0023	0.0032	0.0009	0.0009	75	0.0000	0.0000	0.0000	0.0000
46	0.0028	0.0035	0.0011	0.0011	76	0.0000	0.0000	0.0000	0.0000
47	0.0033	0.0037	0.0012	0.0012	77	0.0000	0.0000	0.0000	0.0000
48	0.0037	0.0038	0.0014	0.0014	78	0.0000	0.0000	0.0000	0.0000
49	0.0040	0.0040	0.0016	0.0016	79	0.0000	0.0000	0.0000	0.0000
50	0.0042	0.0042	0.0019	0.0019	80	0.0000	0.0000	0.0000	0.0000
Ref	#188x1.1	#503x1.6	#19x0.75	#19x0.75		#188x1.1	#503x1.6	#19x0.75	#19x0.75

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

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Service	Non-Uniformed		Uniformed	
	Male	Female	Male	Female
0-1	0.3000	0.1900	0.1400	0.1400
1-2	0.1600	0.1300	0.0650	0.0650
2-3	0.0800	0.0900	0.0350	0.0350
3-4	0.0650	0.0800	0.0300	0.0300
4-5	0.0500	0.0500	0.0300	0.0300
Ref	631	632	633	633



**TABLE V**  
**RATES OF SEPARATION FROM ACTIVE EMPLOYMENT**  
**MORE THAN 5 YEARS OF SERVICE**

Age	Non-Uniformed		Uniformed	
	Male	Female	Male	Female
25	0.0493	0.0510	0.0314	0.0314
26	0.0493	0.0510	0.0308	0.0308
27	0.0493	0.0510	0.0302	0.0302
28	0.0475	0.0510	0.0297	0.0297
29	0.0457	0.0510	0.0286	0.0286
30	0.0439	0.0510	0.0275	0.0275
31	0.0422	0.0510	0.0264	0.0264
32	0.0404	0.0510	0.0248	0.0248
33	0.0387	0.0493	0.0237	0.0237
34	0.0370	0.0476	0.0220	0.0220
35	0.0353	0.0459	0.0209	0.0209
36	0.0337	0.0442	0.0193	0.0193
37	0.0321	0.0425	0.0181	0.0181
38	0.0305	0.0408	0.0165	0.0165
39	0.0290	0.0391	0.0154	0.0154
40	0.0275	0.0374	0.0143	0.0143
41	0.0260	0.0357	0.0132	0.0132
42	0.0246	0.0340	0.0121	0.0121
43	0.0232	0.0323	0.0110	0.0110
44	0.0219	0.0306	0.0099	0.0099
45	0.0206	0.0289	0.0088	0.0088
46	0.0194	0.0272	0.0077	0.0077
47	0.0182	0.0255	0.0066	0.0066
48	0.0171	0.0238	0.0055	0.0055
49	0.0161	0.0221	0.0049	0.0049
50	0.0151	0.0204	0.0044	0.0044
51	0.0142	0.0187	0.0039	0.0039
52	0.0133	0.0170	0.0033	0.0033
53	0.0125	0.0153	0.0027	0.0027
54	0.0117	0.0136	0.0022	0.0022
55	0.0110	0.0119	0.0017	0.0017
56	0.0105	0.0102	0.0011	0.0011
57	0.0100	0.0085	0.0011	0.0011
58	0.0095	0.0068	0.0011	0.0011
59	0.0092	0.0051	0.0011	0.0011
60	0.0089	0.0034	0.0011	0.0011
Ref	#63x0.6	#684x0.85	#387x0.55	#387x0.55

**TABLE VI**  
**AGE BASED SALARY SCALE**

Age	Salary Increase Assumptions for an Individual Member					
	Non-Uniformed			Uniformed		
	Merit & Seniority	Base (Economic)	Increase Next Year	Merit & Seniority	Base (Economic)	Increase Next Year
20	8.00%	3.75%	11.75%	8.50%	3.75%	12.25%
21	8.00%	3.75%	11.75%	8.50%	3.75%	12.25%
22	8.00%	3.75%	11.75%	8.50%	3.75%	12.25%
23	7.30%	3.75%	11.05%	7.80%	3.75%	11.55%
24	6.52%	3.75%	10.27%	7.02%	3.75%	10.77%
25	5.66%	3.75%	9.41%	6.16%	3.75%	9.91%
26	4.72%	3.75%	8.47%	5.22%	3.75%	8.97%
27	4.50%	3.75%	8.25%	5.00%	3.75%	8.75%
28	4.10%	3.75%	7.85%	4.60%	3.75%	8.35%
29	3.70%	3.75%	7.45%	4.20%	3.75%	7.95%
30	3.30%	3.75%	7.05%	3.80%	3.75%	7.55%
31	2.90%	3.75%	6.65%	3.40%	3.75%	7.15%
32	2.50%	3.75%	6.25%	3.00%	3.75%	6.75%
33	2.35%	3.75%	6.10%	2.85%	3.75%	6.60%
34	2.20%	3.75%	5.95%	2.70%	3.75%	6.45%
35	2.05%	3.75%	5.80%	2.55%	3.75%	6.30%
36	1.90%	3.75%	5.65%	2.40%	3.75%	6.15%
37	1.75%	3.75%	5.50%	2.25%	3.75%	6.00%
38	1.65%	3.75%	5.40%	2.15%	3.75%	5.90%
39	1.55%	3.75%	5.30%	2.05%	3.75%	5.80%
40	1.45%	3.75%	5.20%	1.95%	3.75%	5.70%
41	1.35%	3.75%	5.10%	1.85%	3.75%	5.60%
42	1.25%	3.75%	5.00%	1.75%	3.75%	5.50%
43	1.15%	3.75%	4.90%	1.65%	3.75%	5.40%
44	1.05%	3.75%	4.80%	1.55%	3.75%	5.30%
45	0.95%	3.75%	4.70%	1.45%	3.75%	5.20%
46	0.85%	3.75%	4.60%	1.35%	3.75%	5.10%
47	0.75%	3.75%	4.50%	1.25%	3.75%	5.00%
48	0.70%	3.75%	4.45%	1.20%	3.75%	4.95%
49	0.65%	3.75%	4.40%	1.15%	3.75%	4.90%
50	0.60%	3.75%	4.35%	1.10%	3.75%	4.85%
51	0.55%	3.75%	4.30%	1.05%	3.75%	4.80%
52	0.50%	3.75%	4.25%	1.00%	3.75%	4.75%
53	0.46%	3.75%	4.21%	0.96%	3.75%	4.71%
54	0.42%	3.75%	4.17%	0.92%	3.75%	4.67%
55	0.38%	3.75%	4.13%	0.88%	3.75%	4.63%
56	0.34%	3.75%	4.09%	0.84%	3.75%	4.59%
57	0.30%	3.75%	4.05%	0.80%	3.75%	4.55%
58	0.30%	3.75%	4.05%	0.80%	3.75%	4.55%
59	0.30%	3.75%	4.05%	0.80%	3.75%	4.55%
60	0.30%	3.75%	4.05%	0.80%	3.75%	4.55%
Ref.	161			161 +.50%		

**TABLE VII**  
**SERVICE BASED SALARY SCALE**

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**Non-Uniformed**

<b>% Merit Increases in Salaries Next Year</b>	
<b>Service Index</b>	<b>Rate</b>
1	11.0%
2	10.5%
3	5.0%
4	4.5%
Ref	339