Gabriel Roeder Smith & Company
Consultants & Actuaries

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

ACTUARIAL VALUATION REPORT

AS OF JUNE 30, 2008

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October 10, 2008

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, 2008 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 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. The actuarial assumptions used in making the valuation are shown in Section E of this report.

Your attention is directed particularly to the summary of the results on pages 2-6.

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

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

The signing actuaries are Members of the American Academy of Actuaries (M.A.A.A.) as indicated, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

Brian B. Murphy, F.S.A., E.A., M.A.A.A.

Kenneth G. Alberts

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## SUMMARY

This report contains the results of the June 30, 2008 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** | | | | |
|---|---|---|---|---|---|
| | **Civilian Patrol Employees** | **MoDOT Employees** | **Uniformed Total** | **Uniformed Patrol** | **Total** |
| Participants | | | | | |
| Active Members | | | | | |
| Closed Plan | 647 | 3,920 | 4,567 | 778 | 5,345 |
| Year 2000 Plan | 478 | 2,484 | 2,962 | 292 | 3,254 |
| Total Active Members | 1,125 | 6,404 | 7,529 | 1,070 | 8,599 |
| *Total Active Members Prior Year* | *1,135* | *6,451* | *7,586* | *1,054* | *8,640* |
| Retiree -- Regular Pensioners | | | | | |
| Closed Plan | 418 | 3,851 | 4,269 | 756 | 5,025 |
| Year 2000 Plan | 304 | 1,838 | 2,142 | 1 | 2,143 |
| Total Regular Pensioners | 722 | 5,689 | 6,411 | 757 | 7,168 |
| Self Insured Disability Pensioners | 6 | 89 | 95 | 4 | 99 |
| Fully Insured Disability Pensioners | 3 | 54 | 57 | 1 | 58 |
| Terminated Vested Members | 217 | 1,320 | 1,537 | 150 | 1,687 |
| Total | 2,073 | 13,556 | 15,629 | 1,982 | 17,611 |
| Active Member Valuation Payroll | $40,220,687 | $261,235,905 | $301,456,592 | $67,968,061 | $369,424,653 |
| *Active Mem. Val. Payroll Prior Year* | *$39,772,873* | *$259,468,418* | *$299,241,291* | *$61,601,130* | *$360,842,421* |
| Unfunded Actuarial Accrued Liability | N/A | N/A | $946,205,647 | $289,525,854 | $1,235,731,501 |

The June 30, 2008 valuation results are used to determine the contribution rate for the plan year beginning July 1, 2009. A summary of valuation results and recommended contribution rates follows.

The **total contribution rate** for the plan year beginning July 1, 2009 is shown below.

| | Employer Contribution Rates Expressed As % of Active Payroll For Total Benefits | | | | | |
|---|---|---|---|---|---|---|
| | Non-Uniformed | | | | Uniformed Patrol | |
| | FY2010 | | | FY2009 Total# | FY2010 | FY2009 |
| | Civilian Patrol Employees | MoDOT Employees | Total | | | |
| Normal Cost | 11.15% | 11.15% | 11.15% | 11.16% | 13.04% | 13.03% |
| Unfunded Liability | 18.84% | 18.84% | 18.84% | 18.42% | 25.50% | 26.05% |
| Expenses | 0.88% | 0.88% | 0.88% | 0.58% | 0.88% | 0.58% |
| Subtotal | 30.87% | 30.87% | 30.87% | 30.16% | 39.42% | 39.66% |
| Disability Insurance | 0.56% | 0.56% | 0.56% | 0.56% | 0.56% | 0.56% |
| Total | 31.43% | 31.43% | 31.43% | 30.72% | 39.98% | 40.22% |
| Illustrative $ | $12,641,362 | $82,106,445 | $94,747,807 | $91,926,925 | $27,173,631 | $24,775,974 |

The dollar contribution amounts shown above are illustrated and based on the June 30, 2008 valuation payroll. Actual dollar contributions should be based on covered payroll for the fiscal year beginning July 1, 2009. The total contribution is based on a closed 27-year amortization period from July 1, 2009 of all UAAL in accordance with Board policy adopted September 28, 2006.

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.

\# *After the June 30, 2007 report was issued, the disability premium was reduced to 0.56% and the Non-Uniformed rate was reduced to 30.72% and the Uniformed group was reduced to 40.22%.*

**Assumptions and Methods:** There were no changes in the assumptions and methods for the June 30, 2008 valuation.

**Experience:** Aggregate experience during the year was less favorable than expected resulting in an experience loss of approximately $4.7 million which is approximately 0.2% of beginning of year accrued liabilities. The primary source of experience loss was an increase in expenses and a liability experience loss. System assets earned (2.39%) this year (please see page C-2) compared with an assumed rate of 8.25%. This loss was more than offset by the portion of the gains related to return on investments from prior years being recognized this year. The funded status of the fund increased from 58.2% funded last year to 59.1% funded this year.

Contributions are computed to be a level percent of payroll. This means that if all assumptions are met (a rare occurrence) that the computed contribution rate will not change from year to year and computed contribution dollars will increase with payroll growth from year to year. The illustrative dollar contribution last year was $116,702,899. The payroll growth assumption is 3.75%. Therefore the expected illustrative dollar contribution this year (before actual experience) was $121,079,258. The actual illustrative dollar contribution this year is $121,921,438. The actual illustrative dollar contribution is within 7/10 of 1% of the expected, indicating that, in aggregate, actual experience was close to assumed experience.

**Funding Policy:** The total contribution is based on normal cost plus a 27-year amortization of unfunded actuarial accrued liabilities from July 1, 2009. This policy was adopted by the Retirement Board on September 28, 2006.

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

| | Non-Uniform | Uniform |
|---|---|---|
| Computed employer contribution rate, prior valuation | 30.73% # | 40.23% # |
| Effects of: | | |
| Change in disability premiums | (0.01%) | (0.01%) |
| Revised methods and assumptions | 0.00% | 0.00% |
| 07/'08 recognized investment gain | (0.39%) | (0.52%) |
| 07/'08 liability experience loss | 0.22% | 1.72% |
| Change in administrative expenses | 0.30% | 0.30% |
| Misc (demographic, payroll weighting, contribution delay, etc.) | 0.58% | (1.74%) |
| Computed employer contribution rate, current valuation | 31.43% | 39.98% |

**Accelerated Amortization Schedule:** In accordance with RSMo 105.684 we have computed employer contribution rates under a closed 25-year period, beginning on July 1, 2009 and ending on June 30, 2034.

| Non-Uniformed | Uniformed Patrol |
|---|---|
| 32.24% | 41.07% |

# Published rate from prior report, before recognizing reduction in disability premium that occurred between the report publication date and the beginning of the fiscal year for which the contributions were due.

**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:

| Asset Basis | Non-Uniformed | Uniformed | Total |
|---|---|---|---|
| Funding Value | 92.5% | 100.0% | 95.2% |
| Market Value | 89.1% | 100.0% | 91.7% |

**Recommendation:** Next year there will be several areas of the valuation that will have upward pressure on the contribution rates: 1) the continuing recognition of the 2007/2008 investment losses; 2) the fact that the 2005/2006 investment gains have been completely recognized as of June 30, 2008 (leaving only the remaining portion of the 2006/2007 gains and an unknown but likely loss from 2008/2009 to add to the 2007/2008 loss); and 3) the fact that inflation has been running higher than assumed in recent months which will likely lead to a post retirement COLA next year higher than the 2.6% assumed COLA and a corresponding liability loss. In addition, there continues to be an unfunded retiree liability. For these reasons, together with the fact that the Fund is less than 60% funded, we recommend that the Board take this opportunity to reconsider its funding policy. We recommend that the Board consider a more aggressive funding policy, such as:

- Funding the unfunded retiree liability over a 3 to 5 year period (whenever there is an unfunded retiree liability on a market value basis);
- Shortening the overall amortization period to between 20 and 25 years;
- Increasing the current rates by a fixed percent of payroll (such as 0.50% to 1.00% of payroll for the next 2-3 years).

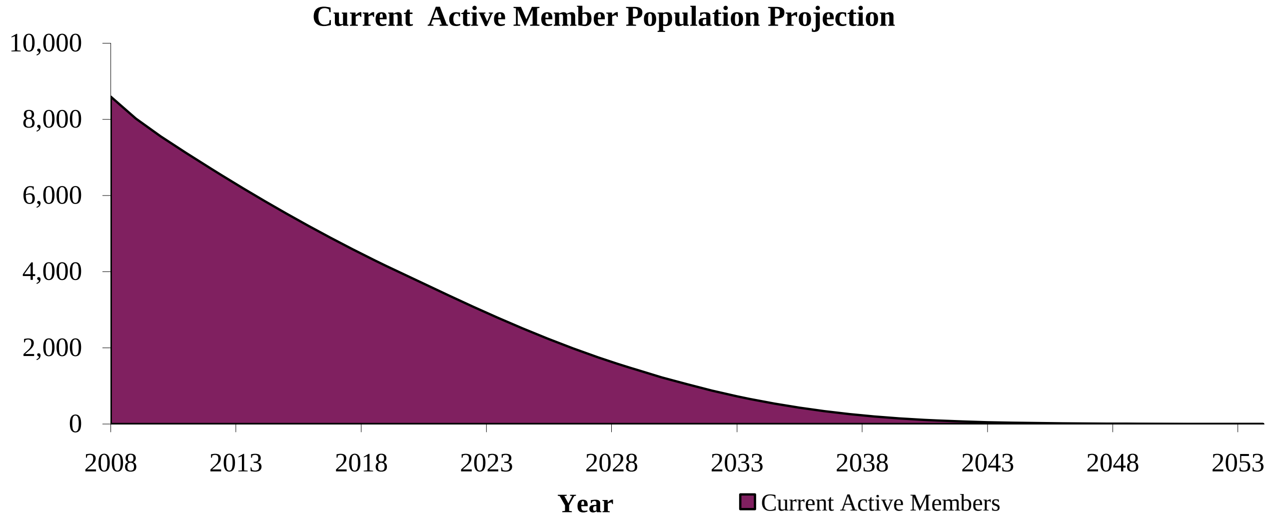
GRS would be pleased to prepare projections of future contribution rates taking into account the items mentioned above, as well as exploring the effect that different funding policies would have on current and future contribution rates.

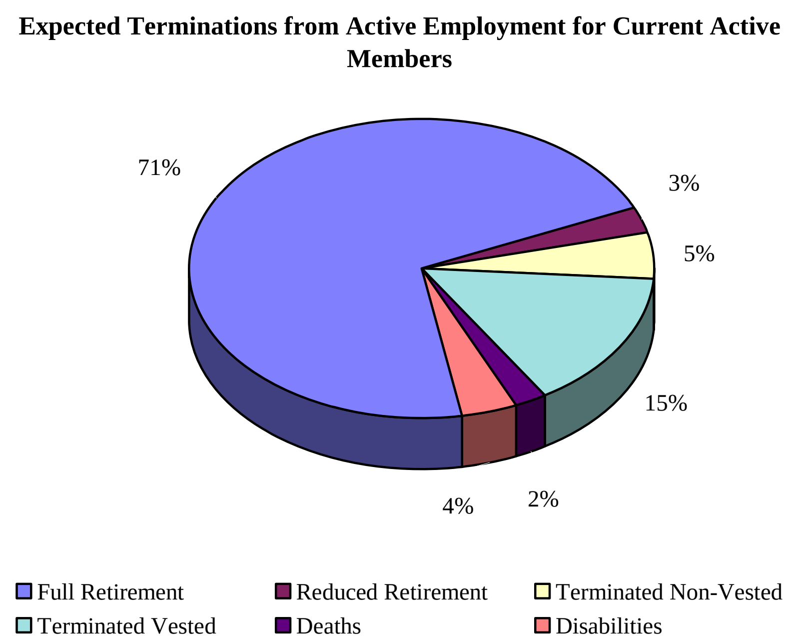
**Conclusion:** Based upon the results of the June 30, 2008 regular annual actuarial valuation, it is our opinion that the Missouri Department of Transportation and Highway Patrol Employees' Retirement System continues to be financed in accordance with actuarial principles of level percent of payroll 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. We are pleased to report that for the fifth year in a row the funded ratio has increased. (see page 10)

## SUMMARY OF KEY VALUATION RESULTS

| Actuarial Present Value | June 30, 2008 (1) Actuarial Present Value | June 30, 2008 (2) Portion Covered By Future Normal Cost Contributions | June 30, 2008 (3) Actuarial Accrued Liabilities (1) - (2) | June 30, 2007 Actuarial Accrued Liabilities |
|---|---|---|---|---|
| **Active Members** | | | | |
| Service retirement benefits based on service rendered before and likely to be rendered after valuation date | $ 1,358,517,471 | $350,193,338 | $ 1,008,324,133 | $ 952,008,573 |
| Disability benefits likely to be paid to present active members who become totally and permanently disabled | 44,724,066 | 11,297,391 | 33,426,675 | 32,937,689 |
| Survivor benefits likely to be paid to widows and children of present active members who die before retiring | 28,638,885 | 8,848,922 | 19,789,963 | 19,019,437 |
| Separation benefits likely to be paid to present active members | 51,993,637 | 23,153,659 | 28,839,978 | 28,249,938 |
| Active Member Totals | $ 1,483,874,059 | $393,493,310 | $ 1,090,380,749 | $ 1,032,215,637 |
| **Terminated Vested Members** | | | 56,359,055 | 55,036,195 |
| **Retired Lives** | | | 1,872,893,977 | 1,810,015,577 |
| **Total Actuarial Accrued Liability** | | | $ 3,019,633,781 | $ 2,897,267,409 |
| **Actuarial Value of Assets** | | | 1,783,902,280 | 1,685,807,004 |
| **Unfunded Actuarial Accrued Liability** | | | $ 1,235,731,501 | $ 1,211,460,405 |

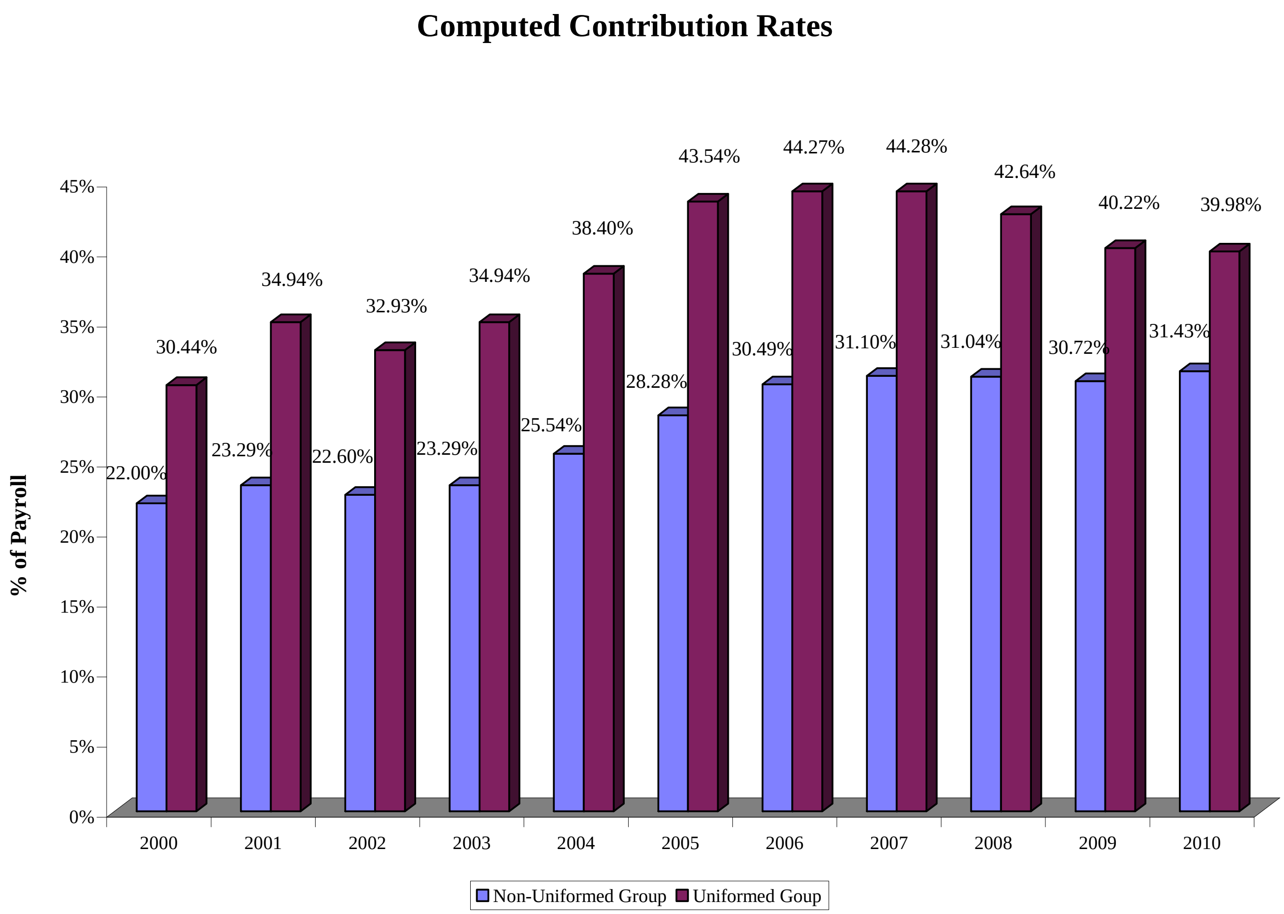
# EXPECTED DEVELOPMENT OF PRESENT POPULATION AS OF JUNE 30, 2008

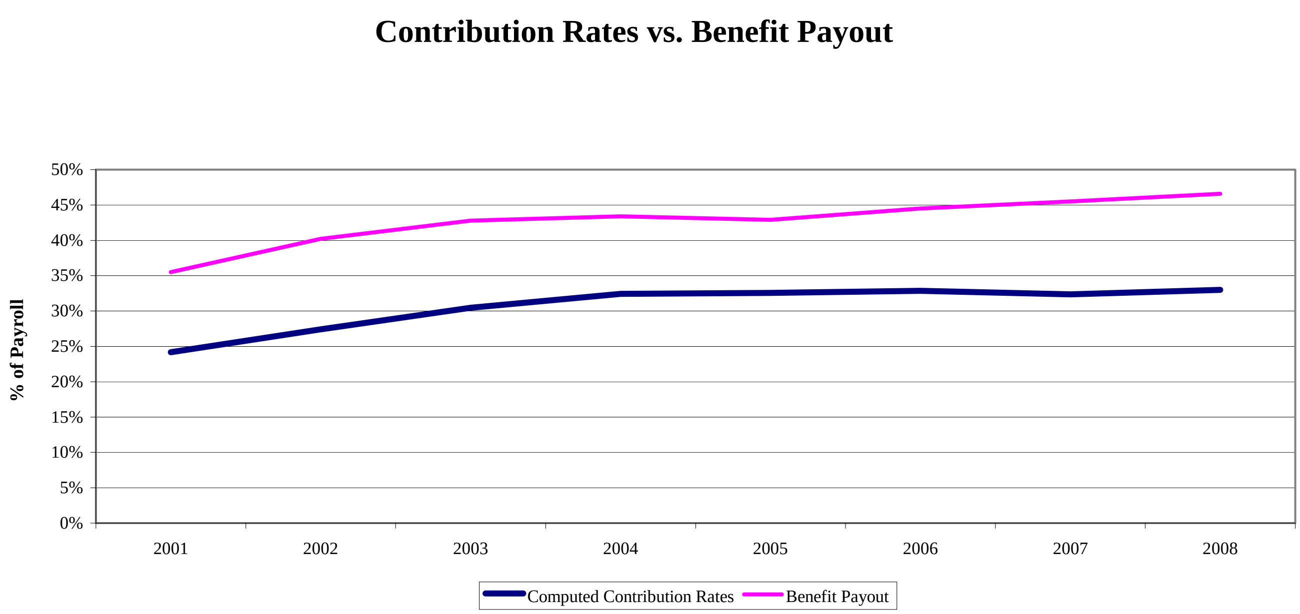



The charts above show the expected future development of the present population in simplified terms. The retirement system presently covers 8,599 active members. Eventually, 5% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. Of the present population, 89% 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.

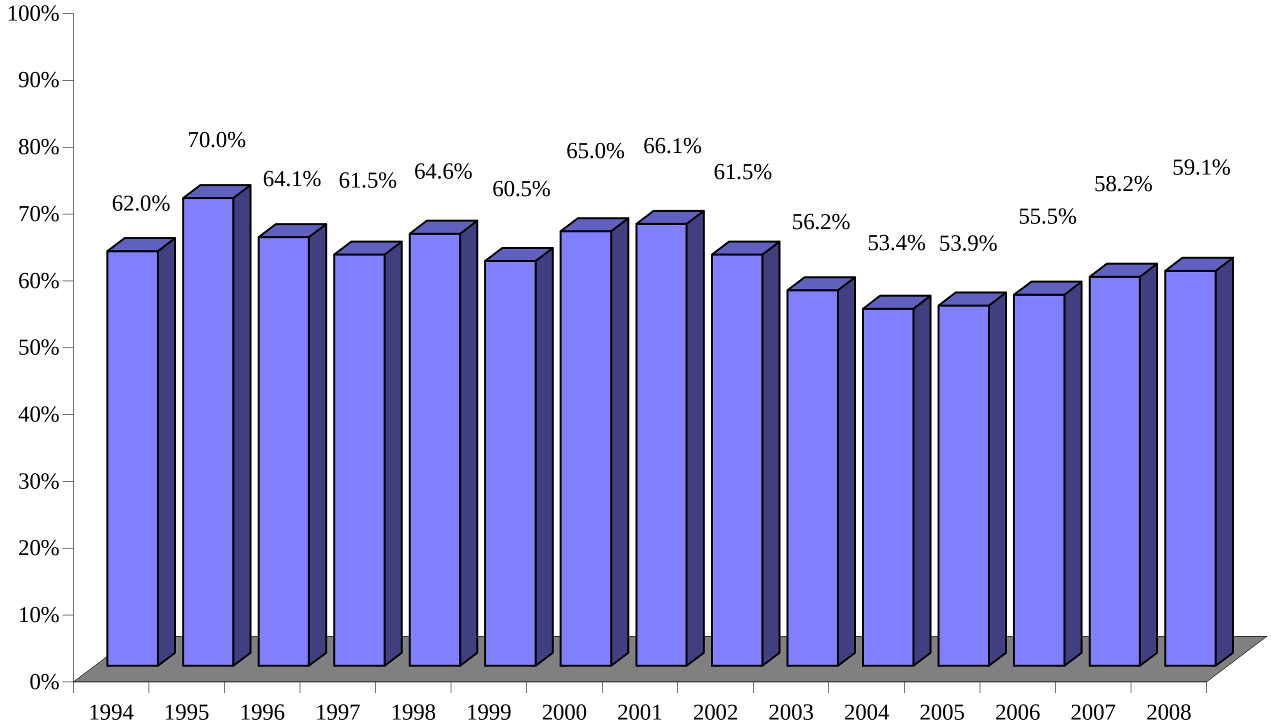
# Historical Contribution Rates and Benefit Payouts



# HISTORICAL FUNDED RATIOS

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



# SECTION A

## VALUATION RESULTS

# Computed Contributions to Support Benefits
# For Plan Year Beginning July 1, 2009
# Contributions Computed as of June 30, 2008

| Contributions for | Non-Uniformed Employees | Uniformed Patrol | Total |
|---|---|---|---|
| Normal Cost | | | |
| Age & service benefits | 9.75% | 12.18% | 10.20% |
| Disability benefits # | 0.43% | 0.15% | 0.38% |
| Survivor benefits | 0.26% | 0.25% | 0.26% |
| Separation benefits | 0.71% | 0.46% | 0.66% |
| Total Normal Cost | 11.15% | 13.04% | 11.50% |
| Unfunded Actuarial Accrued Liabilities* | 18.84% | 25.50% | 20.06% |
| Expense Provision | 0.88% | 0.88% | 0.88% |
| Subtotal | 30.87% | 39.42% | 32.44% |
| Disability Insurance | 0.56% | 0.56% | 0.56% |
| Total Contribution Rate | 31.43% | 39.98% | 33.00% |
| Illustrative Dollar Contribution | $ 94,747,807 | $ 27,173,631 | $ 121,921,438 |
| Prior Year | | | |
| Total Contribution Rate | 30.72% | 40.22% | 32.34% |
| Illustrative Dollar Contribution | $ 91,926,925 | $ 24,775,974 | $ 116,702,899 |

# *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.*

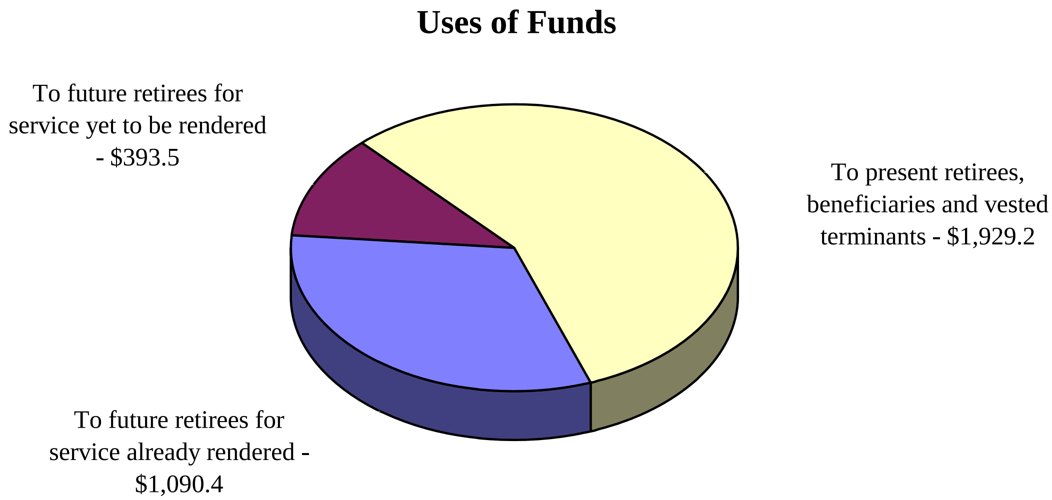
* *Amortized as a level-percentage of payroll over 27 years from July 1, 2009.*

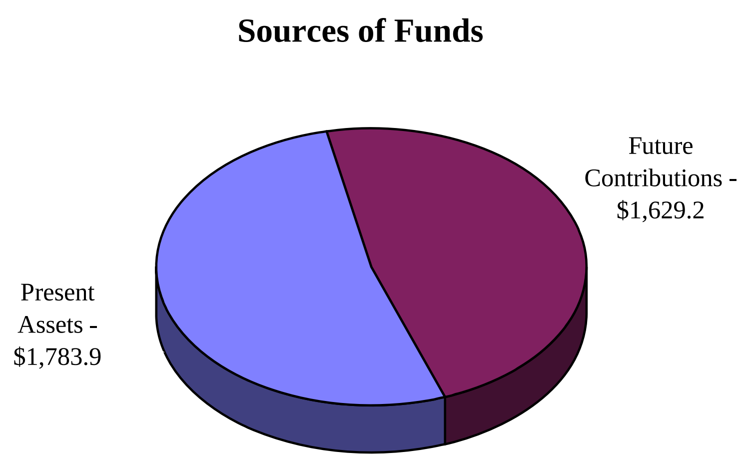
# DEVELOPMENT OF LIABILITIES
# AS OF JUNE 30, 2008

| | Non-Uniformed Employees | Uniformed Patrol | Total |
|---|---|---|---|
| **Present Value of Future Benefits - Inactives** | | | |
| Retirees and Survivors | $ 1,430,985,281 | $ 412,914,988 | $ 1,843,900,269 |
| Disability Pensioners | 26,557,097 | 2,436,611 | 28,993,708 |
| Vested Terminated Employees | 47,837,394 | 8,521,661 | 56,359,055 |
| Subtotal PVFB - Inactives | 1,505,379,772 | 423,873,260 | 1,929,253,032 |
| **Present Value of Future Benefits - Actives** | | | |
| Age & Service benefits | 987,602,336 | 370,915,135 | 1,358,517,471 |
| Normal and Work Related Disability benefits | 40,448,715 | 4,275,351 | 44,724,066 |
| Survivor benefits | 21,926,041 | 6,712,844 | 28,638,885 |
| Separation benefits | 42,584,759 | 9,408,878 | 51,993,637 |
| Subtotal PVFB - Actives | 1,092,561,851 | 391,312,208 | 1,483,874,059 |
| **Total Present Value of Future Benefits** | 2,597,941,623 | 815,185,468 | 3,413,127,091 |
| **Less Present Value of Future Entry Age Normal Costs** | 303,372,450 | 90,120,860 | 393,493,310 |
| **Equals Actuarial Accrued Liability** | 2,294,569,173 | 725,064,608 | 3,019,633,781 |
| **Less Actuarial Value of Assets** | 1,348,363,526 | 435,538,754 | 1,783,902,280 |
| **Equals Unfunded Actuarial Accrued Liability** | 946,205,647 | 289,525,854 | 1,235,731,501 |
| **27-Year Amortization Payment on UAAL** | $ 61,119,164 | $ 18,652,704 | $ 79,771,868 |
| **as a % of Projected Payroll** | 18.84% | 25.50% | 20.06% |

## SYSTEM RESOURCES & OBLIGATIONS
## SOURCES AND USES OF $3,413.1 MILLION
## AS OF JUNE 30, 2008

### ($ Millions)



# 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
## 27-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 | |
| 2008 | $ 369,424,653 | $ 1,235,731,501 | | | |
| 2009 | 383,278,077 | 1,259,020,326 | $ 75,582,437 | 19.72% | 328.5% |
| 2010 | 397,651,005 | 1,279,843,208 | 79,798,109 | 20.06% | 321.9% |
| 2011 | 412,562,918 | 1,299,269,739 | 82,790,540 | 20.06% | 314.9% |
| 2012 | 428,034,027 | 1,317,067,939 | 85,895,185 | 20.06% | 307.7% |
| 2013 | 444,085,303 | 1,332,982,307 | 89,116,255 | 20.06% | 300.2% |
| 2014 | 460,738,502 | 1,346,731,721 | 92,458,114 | 20.06% | 292.3% |
| 2015 | 478,016,196 | 1,358,007,151 | 95,925,293 | 20.06% | 284.1% |
| 2016 | 495,941,803 | 1,366,469,181 | 99,522,492 | 20.06% | 275.5% |
| 2017 | 514,539,621 | 1,371,745,320 | 103,254,585 | 20.06% | 266.6% |
| 2018 | 533,834,857 | 1,373,427,082 | 107,126,632 | 20.06% | 257.3% |
| 2019 | 553,853,664 | 1,371,066,818 | 111,143,881 | 20.06% | 247.6% |
| 2020 | 574,623,176 | 1,364,174,281 | 115,311,777 | 20.06% | 237.4% |
| 2021 | 596,171,545 | 1,352,212,903 | 119,635,968 | 20.06% | 226.8% |
| 2022 | 618,527,978 | 1,334,595,745 | 124,122,317 | 20.06% | 215.8% |
| 2023 | 641,722,777 | 1,310,681,119 | 128,776,904 | 20.06% | 204.2% |
| 2024 | 665,787,381 | 1,279,767,832 | 133,606,038 | 20.06% | 192.2% |
| 2025 | 690,754,408 | 1,241,090,032 | 138,616,264 | 20.06% | 179.7% |
| 2026 | 716,657,698 | 1,193,811,614 | 143,814,374 | 20.06% | 166.6% |
| 2027 | 743,532,362 | 1,137,020,163 | 149,207,413 | 20.06% | 152.9% |
| 2028 | 771,414,826 | 1,069,720,384 | 154,802,691 | 20.06% | 138.7% |
| 2029 | 800,342,882 | 990,826,975 | 160,607,792 | 20.06% | 123.8% |
| 2030 | 830,355,740 | 899,156,908 | 166,630,585 | 20.06% | 108.3% |
| 2031 | 861,494,080 | 793,421,063 | 172,879,231 | 20.06% | 92.1% |
| 2032 | 893,800,108 | 672,215,151 | 179,362,202 | 20.06% | 75.2% |
| 2033 | 927,317,612 | 534,009,882 | 186,088,285 | 20.06% | 57.6% |
| 2034 | 962,092,022 | 377,140,315 | 193,066,596 | 20.06% | 39.2% |
| 2035 | 998,170,473 | 199,794,307 | 200,306,593 | 20.06% | 20.0% |
| 2036 | 1,035,601,866 | 0 | 207,818,091 | 20.06% | 0.0% |

# GASB No. 25
## Schedule of Funding Progress*
## June 30, 2008

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

* *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, 2008

| Fiscal Year Ending June 30, | Estimated Covered Payroll | | Actual Employer Contributions | Actual Employer Contribution % | Annual Required Contribution (ARC) % | Annual Pension Cost | Percentage of APC Contributed |
|---|---|---|---|---|---|---|---|
| 1995 | $ 208,329,222 | | $ 56,144,725 | 26.95% | 26.95% | $ 56,144,725 | 100.00% |
| 1996 | 215,155,118 | | 56,842,321 | 26.42% | 26.42% | 56,842,321 | 100.00% |
| 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% | 31.1%@ | 93,991,526 | 100.00% |
| 2008 | 307,243,438 | ** | 95,368,363 | 31.04% | 31.04% | 95,368,363 | 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, 2008

| Fiscal Year Ending June 30, | Estimated Covered Payroll | | Actual Employer Contributions | Actual Employer Contribution % | Annual Required Contribution (ARC) % | Annual Pension Cost | Percentage of APC Contributed |
|---|---|---|---|---|---|---|---|
| 1995 | $ 35,232,287 | | $ 14,462,854 | 41.05% | 41.05% | $ 14,462,854 | 100.00% |
| 1996 | 39,557,621 | | 15,743,114 | 39.80% | 39.80% | 15,743,114 | 100.00% |
| 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% |

* *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, 2007 TO JUNE 30, 2008

| | UAAL = | AAL - | Assets |
|---|---|---|---|
| Beginning of Year Values (at July 1) | $1,211,460,405 | $2,897,267,409 | $1,685,807,004 |
| Normal Cost | 47,283,438 | 47,283,438 | 0 |
| Contributions | (124,515,792) | 0 | 124,515,792 |
| Disbursements | 0 | (189,063,895) | (189,063,895) |
| Interest | 96,759,648 | 233,176,117 | 136,416,469 |
| Expected Value Before Any Changes | 1,230,987,699 | 2,988,663,069 | 1,757,675,370 |
| Effect of Changes in Assumptions & Methods | 0 | 0 | 0 |
| Expected Value After Changes | 1,230,987,699 | 2,988,663,069 | 1,757,675,370 |
| End of Year Values (at June 30) | 1,235,731,501 | 3,019,633,781 | 1,783,902,280 |
| Gain/(Loss) for Year | (4,743,802) | $(30,970,712) | $26,226,910 |

# Development of Gain/(Loss)
# July 1, 2007 to June 30, 2008

| | Total | Non-Uniform | Uniform |
|---|---|---|---|
| Beginning of Year UAAL (at July 1) | $ 1,211,460,405 | $ 937,436,779 | $ 274,023,626 |
| Normal Cost | 47,283,438 | 38,217,976 | 9,065,462 |
| Contributions | (124,515,792) | (95,368,363) | (29,147,429) |
| Interest | 96,759,648 | 74,981,081 | 21,778,567 |
| Net Change in LTD Assets | 0 | 0 | 0 |
| Expected Value Before Any Changes | 1,230,987,699 | 955,267,473 | 275,720,226 |
| Effect of Changes in Assumptions & Methods | 0 | 0 | 0 |
| Expected Value After Changes | 1,230,987,699 | 955,267,473 | 275,720,226 |
| End of Year UAAL (at June 30) | 1,235,731,501 | 946,205,647 | 289,525,854 |

| | | | |
|---|---|---|---|
| Aggregate Gain/(Loss) for Year | $ (4,743,802) | $ 9,061,826 | $ (13,805,628) |
| Gain/(Loss) as a % of Beginning of Year Liabilities | (0.16)% | 0.41% | (2.03)% |

| | | | |
|---|---|---|---|
| Asset Gain/(Loss) for Year | $ 26,226,910 | $ 20,192,275 | $ 6,034,635 |
| Liability Gain/(Loss) for Year | (30,970,712) | (11,130,449) | (19,840,263) |
| Aggregate Gain/(Loss) for Year | $ (4,743,802) | $ 9,061,826 | $ (13,805,628) |

# SECTION B

## SUMMARY OF BENEFITS

# MISSOURI DEPARTMENT OF TRANSPORTATION AND HIGHWAY PATROL EMPLOYEES' RETIREMENT SYSTEM SUMMARY OF BENEFIT PROVISIONS EVALUATED AS OF JUNE 30, 2008

**Closed 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.

### Normal Retirement Eligibility (unreduced benefit)

***All Employees:*** The earlier of attaining:

1. Age 65 with at least 4 years of creditable service.
2. Age 60 with at least 15 years of creditable service.
3. Age 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.

### 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).

**Year 2000 Plan**

### Participation

Participants include:

1. All new employees who first become members on or after July 1, 2000.
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.

### Normal Retirement Eligibility (unreduced benefit)

***All 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:***

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

### Final Average Pay Used for Benefit Determination

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

# Summary of Benefit Provisions Evaluated as of June 30, 2008 (Continued)

## Closed Plan

### Normal Retirement Benefit Amount

***Non-Uniformed Employees:***

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

***Uniformed Patrol Employees:***

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

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.

### Early Retirement (reduced benefit)

***Eligibility: Non-Uniformed Employees***

Age 55 with at least 10 years of creditable service.

***Amount:***

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

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

### Vested Deferred Benefits

***Eligibility: All Employees***

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

### 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.

## Year 2000 Plan

### 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 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. Uniformed Patrol members are eligible for the temporary benefit when they reach mandatory retirement age (currently age 60) and have five years of creditable service.

### Early Retirement (reduced benefit)

***Eligibility: All Employees***

Age 57 with at least 5 years of creditable service.

***Amount:***

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

### Vested Deferred Benefits

***Eligibility: All Employees***

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

### Minimum Base Benefit

Same.

# SUMMARY OF BENEFIT PROVISIONS EVALUATED AS OF JUNE 30, 2008 (CONTINUED)

**Closed 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.

**Year 2000 Plan**

## 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.

| Closed Plan | Year 2000 Plan |
|---|---|
| **Pop-Up Provision** | **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. | Same. |
| **$5,000 Death 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 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. | 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** | **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. | **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.<br><br>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. | **Portability:** Same as Closed Plan Section 105.691.<br><br>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.<br><br>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, 2008 (CONTINUED)

| Closed Plan | Year 2000 Plan |
|---|---|
| **Public Employment Prior Service (Subsidized purchase):** | **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. | Not available. |
| **Disability** | **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.<br><br>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. | Same. |
| **Post-Retirement Benefit Adjustments** | **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.<br><br>For employees hired on or after August 28, 1997 the annual percentage increase is equal to the lesser of:<br>i) 80% of the CPI-U increase, or<br>ii) 5%. | Benefits are increased to retired members (including survivors) annually in accordance with the following:<br><br>Annual benefit percentage increase equal to the lesser of:<br>i) 80% of the CPI-U increase, or<br>ii) 5%. |
| **Member Contributions** | **Member Contributions** |
| None | None |

## 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.

# Sample Benefit Computation for Closed Plan Members
# Retiring July 1, 2008
# Non-Uniformed Employee

| | Data | Description |
|---|---|---|
| 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 x 20 x $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% |
|---|---|
| 2009 | $12,800 |
| 2010 | 13,133 |
| 2011 | 13,474 |
| 2012 | 13,825 |
| 2013 | 14,184 |
| 2014 | 14,553 |
| 2015 | 14,931 |
| 2016 | 15,319 |
| 2017 | 15,718 |
| 2018 | 16,126 |

# SAMPLE BENEFIT COMPUTATION FOR CLOSED PLAN MEMBERS
# RETIRING JULY 1, 2008
# UNIFORMED PATROL

| | Data | Description |
|---|---|---|
| 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 x 20 x $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% |
|---|---|
| 2009 | $17,066 |
| 2010 | 17,510 |
| 2011 | 17,965 |
| 2012 | 18,432 |
| 2013 | 18,912 |
| 2014 | 19,403 |
| 2015 | 19,908 |
| 2016 | 20,426 |
| 2017 | 20,957 |
| 2018 | 21,501 |

# Sample Benefit Computation for Year 2000 Plan Members Retiring July 1, 2008

| | 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% |
|---|---|
| 2009 | $20,000 |
| 2010 | 20,520 |
| 2011 | 14,316 |
| 2012 | 14,689 |
| 2013 | 15,071 |
| 2014 | 15,462 |
| 2015 | 15,864 |
| 2016 | 16,277 |
| 2017 | 16,700 |
| 2018 | 17,134 |

# SECTION C

## FINANCIAL INFORMATION

## SUMMARY OF FUND OPERATIONS

| | 2008 | 2007 |
|---|---|---|
| Market Value of Fund (Beginning of Fiscal Year) | $1,825,204,289 | $1,598,136,375 |
| Post Valuation Audit Adjustment | 0 | (216,305) |
| Contributions | | |
| Employer | 123,323,265 | 121,243,361 |
| Transfer from MOSERS | 251,443 | 102,672 |
| Service Purchase (Employee) | 941,084 | 427,254 |
| Total Contributions | $ 124,515,792 | $ 121,773,287 |
| Investment Return | | |
| Interest | $ 11,278,346 | $ 12,366,494 |
| Dividends | 6,469,546 | 13,439,676 |
| Realized Capital Gains | 349,449,702 | 179,492,019 |
| Realized Capital Losses | (221,568,306) | (71,468,586) |
| Miscellaneous Income | 129,955 | 0 |
| Securities Lending Income | 413,514 | 468,095 |
| Other | 6,065,485 | 5,950,971 |
| Total Investment Return | $ 152,238,242 | $ 140,248,669 |
| Other Income (Rental Income and Misc) | 31,546 | 31,580 |
| Increase (Decrease) in Unrealized Appreciation | (167,619,572) | 160,813,279 |
| Benefit Payments | | |
| Retirement Payments | $ 168,590,195 | $ 160,062,302 |
| Retirement Payments - BackDROP | 14,631,932 | 13,177,432 |
| Death Benefits | 520,000 | 530,000 |
| Long-Term Disability Payments | 223,501 | 288,908 |
| Insured Disability Program | 1,835,734 | 1,905,122 |
| Service Transfer Payments - Employer | 0 | 6,715 |
| Total Benefit Payments | $ 185,801,362 | $ 175,970,479 |
| Expenses | | |
| Investment | $ 27,552,226 | $ 17,512,525 |
| Actuarial | 53,380 | 71,613 |
| Outsourcing Disability Costs | 0 | 0 |
| Other | 3,209,153 | 2,027,979 |
| Total Expenses | $ 30,814,759 | $ 19,612,117 |
| Market Value of Fund (End of Fiscal Year) | $1,717,754,176 | $1,825,204,289 |

# MISSOURI MPERS
## DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS

| | Valuation Date of June 30 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|
| **A.** | **Actuarial value at beginning of year** | $1,353,436,505 | $1,417,476,479 | $1,521,142,953 | $1,685,807,004 | | |
| **B.** | **Market value at end of year** | 1,441,054,574 | 1,598,136,375 | 1,825,204,289 | 1,717,754,176 | | |
| **C.** | **Market value at beginning of year** | 1,353,436,505 | 1,441,054,574 | 1,598,136,375 | 1,825,204,289 | | |
| **D.** | **Cash flow** | | | | | | |
| | D1. Contributions | 102,604,826 | 111,542,717 | 121,773,287 | 124,515,792 | | |
| | D2. Benefit Payments | (157,742,337) | (164,997,183) | (175,970,479) | (185,801,362) | | |
| | D3. Administrative Expenses | (1,916,592) | (1,927,594) | (2,099,592) | (3,262,533) | | |
| | D4. Non-Investment Net Cash Flow | (57,054,103) | (55,382,060) | (56,296,784) | (64,548,103) | | |
| **E.** | **Investment income** | | | | | | |
| | E1. Market total (B - C - D4) | 144,672,172 | 212,463,861 | 283,364,698 | (42,902,010) | | |
| | E2. Assumed Rate of Return | 8.25% | 8.25% | 8.25% | 8.25% | | |
| | E3. Amount for Immediate Recognition (A+.5xD4)xE2 | 109,305,030 | 114,657,300 | 123,172,051 | 136,416,469 | | |
| | E4. Amount for Phased-In Recognition | 35,367,142 | 97,806,561 | 160,192,647 | (179,318,479) | | |
| **F.** | **Phased in recognition of investment income** | | | | | | |
| | F1. Current Year (33 1/3% of E4) | 11,789,047 | 32,602,187 | 53,397,549 | (59,772,826) | | |
| | F2. First Prior Year | 0 | 11,789,047 | 32,602,187 | 53,397,549 | $(59,772,826) | |
| | F3. Second Prior Year | 0 | 0 | 11,789,048 | 32,602,187 | 53,397,549 | $(59,772,827) |
| | F4. Total Recognized Investment Gain (F1 + F2 + F3) | 11,789,047 | 44,391,234 | 97,788,784 | 26,226,910 | (6,375,277) | (59,772,827) |
| | F5. Phase-In of Initial (BOY) difference between MVA and AVA | 0 | 0 | 0 | 0 | | |
| **G.** | **Actuarial value at end of year (A + D4 + E3 + F4)** | 1,417,476,479 | 1,521,142,953 | 1,685,807,004 | 1,783,902,280 | | |
| | **Less LTD Assets** | 127,497 | 0 | 0 | 0 | 0 | 0 |
| **H.** | **Preliminary Plan AVA** | 1,417,348,982 | 1,521,142,953 | 1,685,807,004 | 1,783,902,280 | | |
| **I.** | **Corridor (Maximum of 120% of Market Value)** | 1,729,265,489 | 1,917,763,650 | 2,190,245,147 | 2,061,305,011 | | |
| **J.** | **Corridor (Minimum of 80% of Market Value)** | 1,152,843,659 | 1,278,509,100 | 1,460,163,431 | 1,374,203,341 | | |
| **K.** | **Final Plan AVA after corridor adjustment, if any** | 1,417,348,982 | 1,521,142,953 | 1,685,807,004 | 1,783,902,280 | | |
| | **Difference between market and actuarial values** | 23,578,095 | 76,993,422 | 139,397,285 | (66,148,104) | | |
| | **Market Rate of Return** | 10.92% | 15.03% | 18.04% | (2.39)% | | |
| | **Ratio of Funding Value to Market Value** | 98.35% | 95.18% | 92.36% | 103.85% | | |

# Actuarial value reset to market value as of the beginning of year for June 30, 2005, valuation also includes a post 6/30/2004 valuation audit adjustment.

## ALLOCATION OF ASSETS BETWEEN GROUPS

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

| | June 30 2008 | June 30 2007 |
|---|---|---|
| 1. Other Income | $ 31,546 | $ 31,580 |
| 2. Investment Income | | |
| a) Uniformed Patrol | 36,845,194 | 33,506,544 |
| b) Non-Uniformed Employees | 115,393,048 | 106,865,166 |
| c) Total | 152,238,242 | 140,371,710 |
| 3. Other Income Split | | |
| a) Uniformed Patrol | | |
| (2a) / (2c) x (1) | 7,635 | 7,538 |
| b) Non-Uniformed Employees | | |
| (2b) / (2c) x (1) | 23,911 | 24,042 |
| c) Total | 31,546 | 31,580 |
| 4. Funding Value of Assets | 1,783,902,280 | 1,685,807,004 |
| 5. Market Value of Assets | | |
| a) Uniformed Patrol | 419,388,731 | 438,089,587 |
| b) Non-Uniformed Employees | 1,298,365,445 | 1,387,114,702 |
| c) Total | 1,717,754,176 | 1,825,204,289 |
| 6. Funding Value of Assets Split | | |
| a) Uniformed Patrol | | |
| (5a) / (5c) x (4) | 435,538,754 | 404,631,102 |
| b) Non-Uniformed Employees | | |
| (5b) / (5c) x (4) | 1,348,363,526 | 1,281,175,902 |
| 7. Total Assets Allocated | 1,783,902,280 | 1,685,807,004 |

# SECTION D

## SUMMARY OF MEMBER DATA

# CIVILIAN PATROL CLOSED ACTIVE MEMBERS
# AS OF JUNE 30, 2008
# 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 | | 2 | 4 | | | | | 6 | $ 182,492 |
| 30-34 | | 17 | 22 | | | | | 39 | 1,454,927 |
| 35-39 | | 15 | 36 | 14 | | | | 65 | 2,598,260 |
| 40-44 | | 16 | 41 | 34 | 21 | 3 | | 115 | 4,488,394 |
| 45-49 | | 13 | 28 | 32 | 42 | 25 | 6 | 146 | 5,981,567 |
| 50 | | 1 | 6 | 4 | 8 | 8 | 4 | 31 | 1,211,776 |
| 51 | | 1 | 4 | 6 | 7 | 9 | 3 | 30 | 1,395,902 |
| 52 | | 2 | 6 | 3 | 8 | 5 | 6 | 30 | 1,230,978 |
| 53 | | 3 | 6 | 6 | 6 | 4 | 3 | 28 | 1,154,247 |
| 54 | | 2 | 4 | | 4 | 6 | 3 | 19 | 834,990 |
| 55 | | 3 | 7 | 1 | 7 | 3 | 5 | 26 | 1,120,849 |
| 56 | | 2 | 4 | 4 | 5 | 4 | 2 | 21 | 869,389 |
| 57 | | 1 | 6 | 4 | 4 | 4 | 3 | 22 | 816,768 |
| 58 | | | 3 | 2 | 3 | 1 | 1 | 10 | 358,285 |
| 59 | | 1 | 6 | 4 | 1 | 2 | 2 | 16 | 593,375 |
| 60 | | 1 | 3 | 4 | 6 | 2 | 4 | 20 | 779,216 |
| 61 | | 1 | 2 | 4 | 1 | | 3 | 11 | 390,274 |
| 62 | | | 2 | 1 | 1 | | | 4 | 118,435 |
| 63 | | | 1 | 1 | 1 | | | 3 | 70,209 |
| 64 | | | 1 | 1 | | | | 2 | 81,610 |
| 65 | | | | 1 | | | | 1 | 25,366 |
| 66 | | | | | | | | | |
| 67 | | | | | | | | | |
| 68 | | | | | | | | | |
| 69 | | | | | | | | | |
| 70 | | | | | | | 1 | 1 | 31,136 |
| Over 70 | | | | | 1 | | | 1 | 29,532 |
| **Totals** | **0** | **81** | **192** | **126** | **126** | **76** | **46** | **647** | **$ 25,817,977** |

Average Age: 48.1 years
Average Service: 18.1 years
Average Pay: $39,904

# Civilian Patrol Year 2000 Active Members
## as of June 30, 2008
## 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 | 1 | | | | | | | 1 | $ 16,363 |
| 20-24 | 40 | 3 | | | | | | 43 | 1,043,970 |
| 25-29 | 83 | 24 | | | | | | 107 | 3,431,450 |
| 30-34 | 39 | 28 | | | | | | 67 | 2,229,807 |
| 35-39 | 44 | 21 | | | | | | 65 | 1,939,805 |
| 40-44 | 27 | 23 | | | | | | 50 | 1,583,138 |
| 45-49 | 25 | 20 | | | | | | 45 | 1,312,778 |
| 50 | 5 | 5 | | | | | | 10 | 294,252 |
| 51 | 3 | 3 | | | | | | 6 | 165,146 |
| 52 | 6 | 1 | | | | | | 7 | 177,741 |
| 53 | 3 | 5 | | | | | | 8 | 229,282 |
| 54 | 2 | 6 | | | | | | 8 | 230,375 |
| 55 | 5 | 3 | | | | | | 8 | 237,193 |
| 56 | 3 | 3 | | | | | | 6 | 178,896 |
| 57 | 4 | 1 | | | | | | 5 | 111,002 |
| 58 | 3 | 4 | | | | | | 7 | 207,972 |
| 59 | 4 | 4 | | | | | | 8 | 269,034 |
| 60 | 2 | 2 | | | | | | 4 | 101,054 |
| 61 | 1 | 6 | | | | | | 7 | 206,889 |
| 62 | 2 | 3 | | | | | | 5 | 159,133 |
| 63 | 1 | 1 | | | | | | 2 | 56,850 |
| 64 | 1 | 3 | | | | | | 4 | 116,464 |
| 65 | 1 | | | | | | | 1 | 7,870 |
| 66 | 1 | 2 | | | | | | 3 | 72,448 |
| 67 | | | | | | | | | |
| 68 | | | | | | | | | |
| 69 | | | | | | | | | |
| 70 | | | | | | | | | |
| Over 70 | | 1 | | | | | | 1 | 23,798 |
| **Totals** | **306** | **172** | **0** | **0** | **0** | **0** | **0** | **478** | **$ 14,402,710** |

Average Age: 38.8 years
Average Service: 3.7 years
Average Pay: $30,131

## MoDOT Closed Active Members
## as of June 30, 2008
## 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 | | 49 | 5 | | | | | 54 | $ 1,864,526 |
| 30-34 | | 157 | 114 | 4 | | | | 275 | 11,416,254 |
| 35-39 | | 109 | 301 | 127 | 3 | | | 540 | 24,276,275 |
| 40-44 | | 106 | 179 | 235 | 156 | 16 | | 692 | 31,915,613 |
| 45-49 | | 95 | 184 | 198 | 320 | 160 | 38 | 995 | 46,160,608 |
| 50 | | 16 | 32 | 26 | 48 | 40 | 19 | 181 | 8,159,280 |
| 51 | | 13 | 28 | 33 | 38 | 37 | 20 | 169 | 7,667,665 |
| 52 | | 8 | 24 | 29 | 42 | 23 | 28 | 154 | 7,247,824 |
| 53 | | 10 | 29 | 25 | 28 | 15 | 22 | 129 | 5,829,787 |
| 54 | | 7 | 23 | 28 | 27 | 19 | 27 | 131 | 5,934,575 |
| 55 | | 14 | 21 | 19 | 40 | 7 | 25 | 126 | 5,673,502 |
| 56 | | 8 | 19 | 18 | 24 | 10 | 14 | 93 | 4,148,443 |
| 57 | | 10 | 12 | 14 | 26 | 9 | 12 | 83 | 3,748,838 |
| 58 | | 8 | 13 | 16 | 19 | 7 | 11 | 74 | 3,251,183 |
| 59 | | 6 | 14 | 14 | 14 | 3 | 9 | 60 | 2,754,283 |
| 60 | | 4 | 9 | 13 | 7 | 3 | 12 | 48 | 2,145,313 |
| 61 | | 5 | 9 | 16 | 9 | 2 | 6 | 47 | 1,947,697 |
| 62 | | 2 | 7 | 3 | | 3 | 8 | 23 | 1,039,308 |
| 63 | | 3 | 1 | 2 | 4 | 2 | 1 | 13 | 530,983 |
| 64 | | 1 | 2 | 2 | 4 | 1 | 2 | 12 | 579,536 |
| 65 | | 1 | 1 | 1 | | | | 3 | 104,640 |
| 66 | | 4 | 1 | | | | 1 | 6 | 247,720 |
| 67 | | | 1 | | | | | 1 | 41,128 |
| 68 | | | 1 | | | | | 1 | 49,895 |
| 69 | | | | 2 | | | 1 | 3 | 146,558 |
| 70 | | | | | | | 2 | 2 | 87,416 |
| Over 70 | | 1 | | 2 | | 1 | 1 | 5 | 213,336 |
| **Totals** | **0** | **637** | **1,030** | **827** | **809** | **358** | **259** | **3,920** | **$ 177,182,186** |

Average Age: 46.7 years
Average Service: 17.8 years
Average Pay: $45,200

# MoDOT Year 2000 Active Members
## as of June 30, 2008
## by Attained Age and Years of Service

| Attained Age | Count by Complete Years of Service to Valuation Date 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | Totals No. | Valuation Payroll |
|---|---|---|---|---|---|---|---|---|---|
| Under 20 | 8 | | | | | | | 8 | $ 138,922 |
| 20-24 | 214 | 2 | | | | | | 216 | 6,496,024 |
| 25-29 | 336 | 137 | | | | | | 473 | 17,360,224 |
| 30-34 | 262 | 159 | | | | | | 421 | 14,938,233 |
| 35-39 | 219 | 122 | | | | | | 341 | 11,114,714 |
| 40-44 | 208 | 125 | | | | | | 333 | 11,091,327 |
| 45-49 | 197 | 113 | | | | | | 310 | 10,119,906 |
| 50 | 27 | 14 | | | | | | 41 | 1,229,508 |
| 51 | 26 | 17 | | | | | | 43 | 1,319,242 |
| 52 | 23 | 14 | | | | | | 37 | 1,271,464 |
| 53 | 21 | 14 | | | | | | 35 | 1,276,732 |
| 54 | 26 | 14 | | | | | | 40 | 1,299,306 |
| 55 | 21 | 13 | | | | | | 34 | 1,172,167 |
| 56 | 15 | 14 | | | | | | 29 | 881,819 |
| 57 | 13 | 7 | | | | | | 20 | 679,071 |
| 58 | 9 | 11 | | | | | | 20 | 677,401 |
| 59 | 14 | 5 | | | | | | 19 | 678,869 |
| 60 | 9 | 7 | | | | | | 16 | 579,596 |
| 61 | 11 | 5 | | | | | | 16 | 547,098 |
| 62 | 7 | 2 | | | | | | 9 | 333,942 |
| 63 | 4 | 2 | | | | | | 6 | 187,574 |
| 64 | 5 | 2 | | | | | | 7 | 308,928 |
| 65 | 3 | 3 | | | | | | 6 | 208,840 |
| 66 | 1 | | | | | | | 1 | 21,988 |
| 67 | | 1 | | | | | | 1 | 28,893 |
| 68 | 1 | | | | | | | 1 | 61,219 |
| 69 | | | | | | | | | |
| 70 | 1 | | | | | | | 1 | 30,712 |
| Over 70 | | | | | | | | | |
| **Totals** | **1,681** | **803** | **0** | **0** | **0** | **0** | **0** | **2,484** | **$ 84,053,719** |

Average Age: 38.1 years
Average Service: 3.7 years
Average Pay: $33,838

# Uniformed Patrol Closed Active Members
# as of June 30, 2008
# 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 | | 5 | | | | | | 5 | $ 270,876 |
| 30-34 | | 27 | 54 | | | | | 81 | 4,640,030 |
| 35-39 | | 17 | 182 | 30 | | | | 229 | 14,641,868 |
| 40-44 | | 5 | 65 | 100 | 15 | 1 | | 186 | 13,289,167 |
| 45-49 | | 2 | 17 | 35 | 65 | 24 | | 143 | 11,092,185 |
| 50 | | | 2 | 1 | 5 | 7 | 3 | 18 | 1,407,550 |
| 51 | | | 1 | 1 | 7 | 10 | 6 | 25 | 1,992,827 |
| 52 | | | | | 4 | 10 | 8 | 22 | 1,700,659 |
| 53 | | | | | 5 | 4 | 5 | 14 | 1,140,112 |
| 54 | | | | | 1 | 4 | 16 | 21 | 1,687,453 |
| 55 | | | | | | | 13 | 13 | 1,081,741 |
| 56 | | | | | | 3 | 7 | 10 | 815,517 |
| 57 | | | | | 1 | 2 | 2 | 5 | 407,888 |
| 58 | | | | | | 1 | 4 | 5 | 400,811 |
| 59 | | | | | | | 1 | 1 | 88,240 |
| 60 | | | | | | | | | |
| 61 | | | | | | | | | |
| 62 | | | | | | | | | |
| 63 | | | | | | | | | |
| 64 | | | | | | | | | |
| 65 | | | | | | | | | |
| 66 | | | | | | | | | |
| 67 | | | | | | | | | |
| 68 | | | | | | | | | |
| 69 | | | | | | | | | |
| 70 | | | | | | | | | |
| Over 70 | | | | | | | | | |
| **Totals** | **0** | **56** | **321** | **167** | **103** | **66** | **65** | **778** | **$ 54,656,924** |

Average Age: 42.8 years
Average Service: 17.7 years
Average Pay: $70,253

# Uniformed Patrol Year 2000 Active Members as of June 30, 2008 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 | 41 | | | | | | | 41 | $ 1,611,756 |
| 25-29 | 78 | 39 | | | | | | 117 | 5,277,431 |
| 30-34 | 33 | 63 | | | | | | 96 | 4,577,638 |
| 35-39 | 4 | 23 | | | | | | 27 | 1,324,232 |
| 40-44 | 4 | 5 | | | | | | 9 | 420,467 |
| 45-49 | | 1 | | | | | | 1 | 48,751 |
| 50 | | | | | | | | | |
| 51 | | | | | | | | | |
| 52 | | | | | | | | | |
| 53 | | 1 | | | | | | 1 | 50,862 |
| 54 | | | | | | | | | |
| 55 | | | | | | | | | |
| 56 | | | | | | | | | |
| 57 | | | | | | | | | |
| 58 | | | | | | | | | |
| 59 | | | | | | | | | |
| 60 | | | | | | | | | |
| 61 | | | | | | | | | |
| 62 | | | | | | | | | |
| 63 | | | | | | | | | |
| 64 | | | | | | | | | |
| 65 | | | | | | | | | |
| 66 | | | | | | | | | |
| 67 | | | | | | | | | |
| 68 | | | | | | | | | |
| 69 | | | | | | | | | |
| 70 | | | | | | | | | |
| Over 70 | | | | | | | | | |
| **Totals** | **160** | **132** | **0** | **0** | **0** | **0** | **0** | **292** | **$ 13,311,137** |

Average Age: 30.1 years
Average Service: 4.2 years
Average Pay: $45,586

# 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% |
| | | | Ten-Year Average | 3.0% |

# Count and Total Monthly Benefits of Civilian Patrol Closed Retired (Non-Disabled) Members and Survivors as of June 30, 2008 by Attained Age

| Age | Number | Monthly Benefit Amount |
|---|---|---|
| Less than 20 | | |
| 20-24 | | |
| 25-29 | | |
| 30-34 | | |
| 35-39 | | |
| 40-44 | | |
| 45-49 | 1 | $ 1,308 |
| 50-54 | 3 | 2,210 |
| 55-59 | 16 | 18,705 |
| 60-64 | 36 | 39,801 |
| 65-69 | 76 | 126,625 |
| 70-74 | 98 | 152,629 |
| 75-79 | 104 | 152,416 |
| 80-84 | 53 | 66,991 |
| 85-89 | 23 | 23,664 |
| 90 & Over | 8 | 7,234 |
| **TOTAL** | **418** | **$ 591,583** |

# Count and Total Monthly Benefits of Civilian Patrol Year 2000 Retired (Non-Disabled) Members and Survivors as of June 30, 2008 by Attained Age

| Age | Number | Monthly Benefit Amount |
|---|---|---|
| Less than 20 | | |
| 20-24 | | |
| 25-29 | | |
| 30-34 | | |
| 35-39 | | |
| 40-44 | | |
| 45-49 | | |
| 50-54 | 32 | $ 78,137 |
| 55-59 | 104 | 251,933 |
| 60-64 | 98 | 160,801 |
| 65-69 | 52 | 71,805 |
| 70-74 | 3 | 1,412 |
| 75-79 | 4 | 3,091 |
| 80-84 | 6 | 11,147 |
| 85-89 | 4 | 5,080 |
| 90 & Over | 1 | 271 |
| **TOTAL** | **304** | **$ 583,677** |

# COUNT AND TOTAL MONTHLY BENEFITS OF MODOT CLOSED RETIRED (NON-DISABLED) MEMBERS AND SURVIVORS AS OF JUNE 30, 2008 BY ATTAINED AGE

| Age | Number | Monthly Benefit Amount |
|---|---|---|
| Less than 20 | 13 | $ 2,444 |
| 20-24 | 4 | 3,062 |
| 25-29 | | |
| 30-34 | 2 | 562 |
| 35-39 | 3 | 2,463 |
| 40-44 | 17 | 12,237 |
| 45-49 | 20 | 17,186 |
| 50-54 | 40 | 38,236 |
| 55-59 | 111 | 101,546 |
| 60-64 | 249 | 316,136 |
| 65-69 | 649 | 1,203,601 |
| 70-74 | 939 | 1,920,752 |
| 75-79 | 759 | 1,413,365 |
| 80-84 | 560 | 870,594 |
| 85-89 | 329 | 317,088 |
| 90 & Over | 156 | 85,632 |
| **TOTAL** | **3,851** | **$ 6,304,904** |

# COUNT AND TOTAL MONTHLY BENEFITS OF MODOT YEAR 2000 RETIRED (NON-DISABLED) MEMBERS AND SURVIVORS AS OF JUNE 30, 2008 BY ATTAINED AGE

| Age | Number | Monthly Benefit Amount |
|---|---|---|
| Less than 20 | 8 | $ 3,984 |
| 20-24 | 1 | 323 |
| 25-29 | | |
| 30-34 | | |
| 35-39 | 1 | 1,046 |
| 40-44 | | |
| 45-49 | 8 | 16,314 |
| 50-54 | 182 | 462,811 |
| 55-59 | 500 | 1,263,234 |
| 60-64 | 646 | 1,317,087 |
| 65-69 | 307 | 480,945 |
| 70-74 | 35 | 43,347 |
| 75-79 | 28 | 42,223 |
| 80-84 | 64 | 95,286 |
| 85-89 | 41 | 46,516 |
| 90 & Over | 17 | 24,624 |
| **TOTAL** | **1,838** | **$ 3,797,740** |

# Count and Total Monthly Benefits of Uniformed Patrol Closed Retired (Non-Disabled) Members and Survivors as of June 30, 2008 by Attained Age

| Age | Number | Monthly Benefit Amount |
|---|---|---|
| Less than 20 | 1 | $ 2,102 |
| 20-24 | | |
| 25-29 | | |
| 30-34 | 2 | 3,936 |
| 35-39 | 1 | 1,792 |
| 40-44 | | |
| 45-49 | 6 | 11,331 |
| 50-54 | 24 | 79,573 |
| 55-59 | 126 | 435,880 |
| 60-64 | 165 | 664,139 |
| 65-69 | 143 | 615,719 |
| 70-74 | 98 | 433,858 |
| 75-79 | 80 | 337,827 |
| 80-84 | 52 | 166,185 |
| 85-89 | 34 | 91,112 |
| 90 & Over | 24 | 36,326 |
| **TOTAL** | **756** | **$ 2,879,780** |

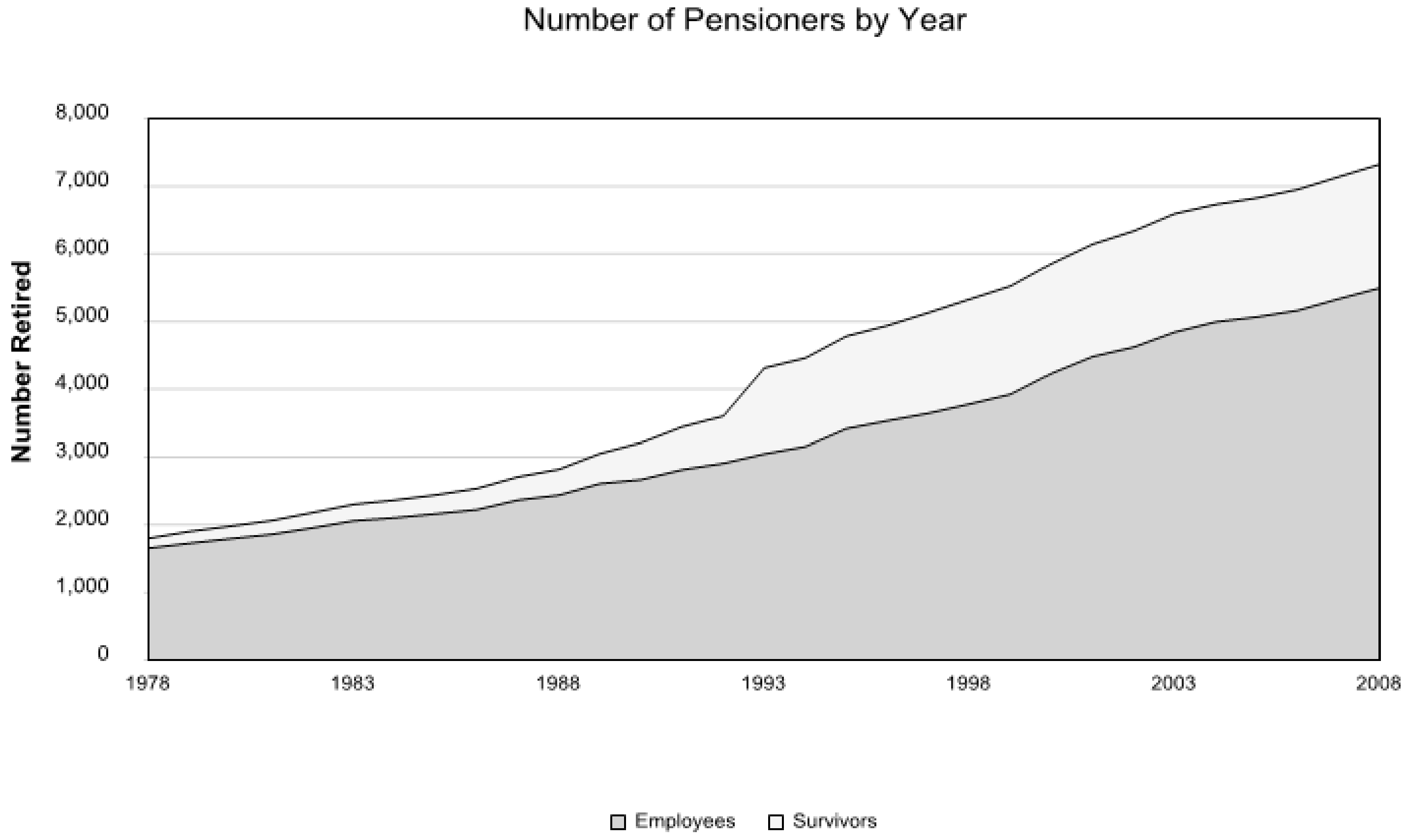
# Count and Total Monthly Benefits of Uniformed Patrol Year 2000 Retired (Non-Disabled) Members and Survivors as of June 30, 2008 by Attained Age

| Age | Number | Monthly Benefit Amount |
|---|---|---|
| Less than 20 | | |
| 20-24 | | |
| 25-29 | | |
| 30-34 | 1 | $ 1,490 |
| 35-39 | | |
| 40-44 | | |
| 45-49 | | |
| 50-54 | | |
| 55-59 | | |
| 60-64 | | |
| 65-69 | | |
| 70-74 | | |
| 75-79 | | |
| 80-84 | | |
| 85-89 | | |
| 90 & Over | | |
| **TOTAL** | **1** | **$ 1,490** |

# GROWTH OF PENSION POPULATION BY YEAR

| Year | Retired Employees | Survivors | Total | % Increase | Annual Benefits | Active Payroll | Benefits as a % of Payroll |
|---|---|---|---|---|---|---|---|
| 1978 | 1,658 | 145 | 1,803 | 5.9% | | | |
| 1979 | 1,730 | 174 | 1,904 | 5.6% | | | |
| 1980 | 1,797 | 186 | 1,983 | 4.1% | | | |
| 1981 | 1,860 | 204 | 2,064 | 4.1% | | | |
| 1982 | 1,957 | 225 | 2,182 | 5.7% | | | |
| 1983 | 2,061 | 244 | 2,305 | 5.6% | | | |
| 1984 | 2,107 | 261 | 2,368 | 2.7% | | | |
| 1985 | 2,164 | 280 | 2,444 | 3.2% | | | |
| 1986 | 2,227 | 312 | 2,539 | 3.9% | | | |
| 1987 | 2,369 | 341 | 2,710 | 6.7% | | | |
| 1988 | 2,440 | 380 | 2,820 | 4.1% | | | |
| 1989 | 2,610 | 441 | 3,051 | 8.2% | | | |
| 1990 | 2,669 | 543 | 3,212 | 5.3% | | | |
| 1991 | 2,814 | 632 | 3,446 | 7.3% | | | |
| 1992 | 2,908 | 699 | 3,607 | 4.7% | | | |
| 1993 | 3,047 | 1,269 | 4,316 | 19.7% | | | |
| 1994 | 3,156 | 1,307 | 4,463 | 3.4% | | | |
| 1995 | 3,419 | 1,365 | 4,784 | 7.2% | | | |
| 1996 | 3,536 | 1,405 | 4,941 | 3.3% | | | |
| 1997 | 3,646 | 1,486 | 5,132 | 3.9% | | | |
| 1998 | 3,781 | 1,549 | 5,330 | 3.9% | $ 80,686,152 | $284,889,796 | 28.3% |
| 1999 | 3,924 | 1,600 | 5,524 | 3.6% | 91,512,311 | 298,673,247 | 30.6% |
| 2000 | 4,236 | 1,621 | 5,857 | 6.0% | 100,794,676 | 312,532,009 | 32.3% |
| 2001 | 4,482 | 1,663 | 6,145 | 4.9% | 115,998,915 | 327,049,257 | 35.5% |
| 2002 | 4,623 | 1,716 | 6,339 | 3.2% | 125,623,460 | 312,747,492 | 40.2% |
| 2003 | 4,845 | 1,751 | 6,596 | 4.1% | 136,320,125 | 318,744,192 | 42.8% |
| 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 | 5,495 | 1,830 | 7,325 | 2.6% | 172,113,941 | 369,424,653 | 46.6% |

# GROWTH OF PENSION POPULATION BY YEAR



# Self Insured Disabled Retired Members as of June 30, 2008

| Age | Number | Monthly Benefit Amount |
|---|---|---|
| Less than 20 | | |
| 20-24 | | |
| 25-29 | | |
| 30-34 | 2 | $ 3,065 |
| 35-39 | 2 | 2,360 |
| 40-44 | 8 | 5,787 |
| 45-49 | 24 | 19,196 |
| 50-54 | 15 | 15,553 |
| 55-59 | 20 | 22,281 |
| 60-64 | 12 | 10,423 |
| 65-69 | 6 | 6,306 |
| 70-74 | 5 | 6,107 |
| 75-79 | 1 | 96 |
| 80-84 | 2 | 1,274 |
| 85-89 | 1 | 759 |
| 90 & Over | 1 | 587 |
| **TOTAL** | **99** | **$ 93,794** |

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, 2008

| Age | Number | Monthly Benefit Amount |
|---|---|---|
| Less than 20 | | |
| 20-24 | | |
| 25-29 | | |
| 30-34 | 1 | $ 3,133 |
| 35-39 | 4 | 9,465 |
| 40-44 | 8 | 16,145 |
| 45-49 | 14 | 29,325 |
| 50-54 | 15 | 17,824 |
| 55-59 | 10 | 10,180 |
| 60-64 | 6 | 3,718 |
| 65-69 | | |
| 70-74 | | |
| 75-79 | | |
| 80-84 | | |
| 85-89 | | |
| 90 & Over | | |
| **TOTAL** | **58** | **$ 89,790** |

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.

# SECTION E

## ASSUMPTIONS USED IN THE VALUATION

## SUMMARY OF VALUATION METHOD AND ASSUMPTIONS
## JUNE 30, 2008

***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, 2005 actuarial valuation, following a five-year actuarial investigation. They were adopted by the Board after obtaining the advice of the Actuary and other professionals.

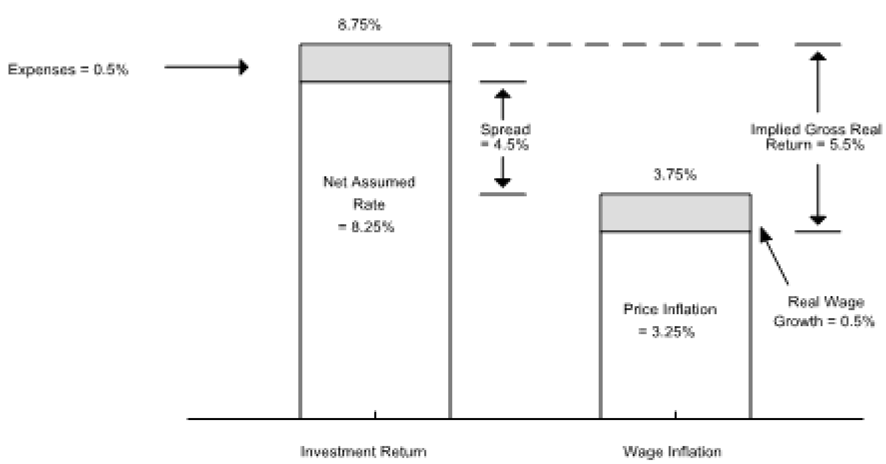
### Economic Assumptions

***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 page E-3. 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*** is assumed to increase 3.75% annually.

***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.



## Non-Economic Assumptions

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

***The probabilities of age and service retirement*** are shown on page E-6. 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-8 and E-9. ***The probabilities of disability*** are shown on page E-7.

***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 (M.A.A.A.) 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% | 6.00% | 3.75% | 9.75% |
| 21 | 8.00% | 3.75% | 11.75% | 6.00% | 3.75% | 9.75% |
| 22 | 8.00% | 3.75% | 11.75% | 6.00% | 3.75% | 9.75% |
| 23 | 7.30% | 3.75% | 11.05% | 5.80% | 3.75% | 9.55% |
| 24 | 6.52% | 3.75% | 10.27% | 5.60% | 3.75% | 9.35% |
| 25 | 5.66% | 3.75% | 9.41% | 5.40% | 3.75% | 9.15% |
| 26 | 4.72% | 3.75% | 8.47% | 5.20% | 3.75% | 8.95% |
| 27 | 4.50% | 3.75% | 8.25% | 5.00% | 3.75% | 8.75% |
| 28 | 4.10% | 3.75% | 7.85% | 4.50% | 3.75% | 8.25% |
| 29 | 3.70% | 3.75% | 7.45% | 4.00% | 3.75% | 7.75% |
| 30 | 3.30% | 3.75% | 7.05% | 3.50% | 3.75% | 7.25% |
| 31 | 2.90% | 3.75% | 6.65% | 3.00% | 3.75% | 6.75% |
| 32 | 2.50% | 3.75% | 6.25% | 2.50% | 3.75% | 6.25% |
| 33 | 2.35% | 3.75% | 6.10% | 2.25% | 3.75% | 6.00% |
| 34 | 2.20% | 3.75% | 5.95% | 2.00% | 3.75% | 5.75% |
| 35 | 2.05% | 3.75% | 5.80% | 1.75% | 3.75% | 5.50% |
| 36 | 1.90% | 3.75% | 5.65% | 1.50% | 3.75% | 5.25% |
| 37 | 1.75% | 3.75% | 5.50% | 1.25% | 3.75% | 5.00% |
| 38 | 1.65% | 3.75% | 5.40% | 1.20% | 3.75% | 4.95% |
| 39 | 1.55% | 3.75% | 5.30% | 1.15% | 3.75% | 4.90% |
| 40 | 1.45% | 3.75% | 5.20% | 1.10% | 3.75% | 4.85% |
| 41 | 1.35% | 3.75% | 5.10% | 1.05% | 3.75% | 4.80% |
| 42 | 1.25% | 3.75% | 5.00% | 1.00% | 3.75% | 4.75% |
| 43 | 1.15% | 3.75% | 4.90% | 0.88% | 3.75% | 4.63% |
| 44 | 1.05% | 3.75% | 4.80% | 0.76% | 3.75% | 4.51% |
| 45 | 0.95% | 3.75% | 4.70% | 0.64% | 3.75% | 4.39% |
| 46 | 0.85% | 3.75% | 4.60% | 0.52% | 3.75% | 4.27% |
| 47 | 0.75% | 3.75% | 4.50% | 0.40% | 3.75% | 4.15% |
| 48 | 0.70% | 3.75% | 4.45% | 0.39% | 3.75% | 4.14% |
| 49 | 0.65% | 3.75% | 4.40% | 0.38% | 3.75% | 4.13% |
| 50 | 0.60% | 3.75% | 4.35% | 0.37% | 3.75% | 4.12% |
| 51 | 0.55% | 3.75% | 4.30% | 0.36% | 3.75% | 4.11% |
| 52 | 0.50% | 3.75% | 4.25% | 0.35% | 3.75% | 4.10% |
| 53 | 0.46% | 3.75% | 4.21% | 0.33% | 3.75% | 4.08% |
| 54 | 0.42% | 3.75% | 4.17% | 0.31% | 3.75% | 4.06% |
| 55 | 0.38% | 3.75% | 4.13% | 0.29% | 3.75% | 4.04% |
| 56 | 0.34% | 3.75% | 4.09% | 0.27% | 3.75% | 4.02% |
| 57 | 0.30% | 3.75% | 4.05% | 0.25% | 3.75% | 4.00% |
| 58 | 0.30% | 3.75% | 4.05% | 0.00% | 3.75% | 3.75% |
| 59 | 0.30% | 3.75% | 4.05% | 0.00% | 3.75% | 3.75% |
| 60 | 0.30% | 3.75% | 4.05% | 0.00% | 3.75% | 3.75% |

# POST-RETIREMENT MORTALITY

| Age | Regular | | Disabled | | Age | Regular | | Disabled | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | | Male | Female | Male | Female |
| 21 | 0.00042 | 0.00035 | 0.04830 | 0.02630 | 61 | 0.01086 | 0.00646 | 0.06240 | 0.03390 |
| 22 | 0.00043 | 0.00036 | 0.04830 | 0.02630 | 62 | 0.01195 | 0.00705 | 0.06430 | 0.03470 |
| 23 | 0.00045 | 0.00037 | 0.04830 | 0.02630 | 63 | 0.01313 | 0.00767 | 0.06570 | 0.03550 |
| 24 | 0.00047 | 0.00038 | 0.04830 | 0.02630 | 64 | 0.01441 | 0.00831 | 0.06680 | 0.03620 |
| 25 | 0.00049 | 0.00039 | 0.04830 | 0.02630 | 65 | 0.01593 | 0.00901 | 0.06780 | 0.03700 |
| 26 | 0.00051 | 0.00040 | 0.04610 | 0.02570 | 66 | 0.01770 | 0.00987 | 0.06870 | 0.03780 |
| 27 | 0.00054 | 0.00042 | 0.04360 | 0.02530 | 67 | 0.01974 | 0.01086 | 0.06970 | 0.03860 |
| 28 | 0.00057 | 0.00043 | 0.04110 | 0.02470 | 68 | 0.02204 | 0.01195 | 0.07090 | 0.03940 |
| 29 | 0.00060 | 0.00045 | 0.03880 | 0.02420 | 69 | 0.02451 | 0.01313 | 0.07230 | 0.04020 |
| 30 | 0.00063 | 0.00047 | 0.03620 | 0.02370 | 70 | 0.02740 | 0.01441 | 0.07390 | 0.04110 |
| 31 | 0.00067 | 0.00049 | 0.03390 | 0.02320 | 71 | 0.03068 | 0.01593 | 0.07570 | 0.04210 |
| 32 | 0.00071 | 0.00051 | 0.03200 | 0.02270 | 72 | 0.03419 | 0.01770 | 0.07760 | 0.04330 |
| 33 | 0.00076 | 0.00054 | 0.03020 | 0.02220 | 73 | 0.03768 | 0.01974 | 0.07960 | 0.04470 |
| 34 | 0.00081 | 0.00057 | 0.02880 | 0.02180 | 74 | 0.04106 | 0.02204 | 0.08180 | 0.04650 |
| 35 | 0.00087 | 0.00060 | 0.02780 | 0.02140 | 75 | 0.04455 | 0.02451 | 0.08420 | 0.04920 |
| 36 | 0.00093 | 0.00063 | 0.02720 | 0.02120 | 76 | 0.04837 | 0.02740 | 0.08690 | 0.05290 |
| 37 | 0.00100 | 0.00067 | 0.02710 | 0.02100 | 77 | 0.05286 | 0.03068 | 0.09080 | 0.05780 |
| 38 | 0.00107 | 0.00071 | 0.02730 | 0.02080 | 78 | 0.05835 | 0.03419 | 0.09620 | 0.06310 |
| 39 | 0.00116 | 0.00076 | 0.02760 | 0.02080 | 79 | 0.06463 | 0.03768 | 0.10430 | 0.06860 |
| 40 | 0.00125 | 0.00081 | 0.02820 | 0.02090 | 80 | 0.07136 | 0.04106 | 0.11280 | 0.07460 |
| 41 | 0.00135 | 0.00087 | 0.02880 | 0.02100 | 81 | 0.07875 | 0.04455 | 0.12210 | 0.08130 |
| 42 | 0.00148 | 0.00093 | 0.02970 | 0.02130 | 82 | 0.08647 | 0.04837 | 0.13220 | 0.08850 |
| 43 | 0.00166 | 0.00100 | 0.03050 | 0.02160 | 83 | 0.09449 | 0.05286 | 0.14320 | 0.09620 |
| 44 | 0.00187 | 0.00107 | 0.03140 | 0.02190 | 84 | 0.10293 | 0.05835 | 0.15510 | 0.10430 |
| 45 | 0.00213 | 0.00116 | 0.03220 | 0.02240 | 85 | 0.11166 | 0.06463 | 0.16810 | 0.11280 |
| 46 | 0.00242 | 0.00125 | 0.03300 | 0.02290 | 86 | 0.12064 | 0.07136 | 0.18250 | 0.12210 |
| 47 | 0.00275 | 0.00135 | 0.03400 | 0.02350 | 87 | 0.12994 | 0.07875 | 0.19800 | 0.13220 |
| 48 | 0.00311 | 0.00148 | 0.03530 | 0.02420 | 88 | 0.13951 | 0.08647 | 0.21500 | 0.14320 |
| 49 | 0.00350 | 0.00166 | 0.03670 | 0.02490 | 89 | 0.14955 | 0.09449 | 0.23300 | 0.15510 |
| 50 | 0.00392 | 0.00187 | 0.03830 | 0.02570 | 90 | 0.16012 | 0.10293 | 0.25250 | 0.16820 |
| 51 | 0.00437 | 0.00213 | 0.04010 | 0.02640 | 91 | 0.17131 | 0.11166 | 0.27390 | 0.18250 |
| 52 | 0.00486 | 0.00242 | 0.04200 | 0.02720 | 92 | 0.18291 | 0.12064 | 0.29720 | 0.19800 |
| 53 | 0.00536 | 0.00275 | 0.04390 | 0.02810 | 93 | 0.19478 | 0.12994 | 0.32260 | 0.21500 |
| 54 | 0.00590 | 0.00311 | 0.04600 | 0.02880 | 94 | 0.20690 | 0.13951 | 0.34950 | 0.23300 |
| 55 | 0.00646 | 0.00350 | 0.04820 | 0.02950 | 95 | 0.22134 | 0.14955 | 0.37890 | 0.25250 |
| 56 | 0.00705 | 0.00392 | 0.05060 | 0.03010 | 96 | 0.23700 | 0.16012 | 0.41090 | 0.27390 |
| 57 | 0.00767 | 0.00437 | 0.05310 | 0.03070 | 97 | 0.25325 | 0.17131 | 0.44580 | 0.29720 |
| 58 | 0.00831 | 0.00486 | 0.05550 | 0.03150 | 98 | 0.27090 | 0.18291 | 0.48380 | 0.32260 |
| 59 | 0.00901 | 0.00536 | 0.05810 | 0.03230 | 99 | 0.29016 | 0.19478 | 0.52430 | 0.34950 |
| 60 | 0.00987 | 0.00590 | 0.06030 | 0.03310 | 100 | 0.30913 | 0.20690 | 0.56840 | 0.37890 |

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

# JOINT LIFE RETIREMENT VALUES
# (8.25% INTEREST)

| Sample Attained Ages | Present Value of $1 Monthly for Life | | Future Life Expectancy (years) | |
|---|---|---|---|---|
| | Men | Women | Men | Women |
| 50 | $136.25 | $138.71 | 29.17 | 34.67 |
| 55 | 130.87 | 133.76 | 24.82 | 30.06 |
| 60 | 123.96 | 127.37 | 20.70 | 25.67 |
| 65 | 115.20 | 119.22 | 16.82 | 21.50 |
| 70 | 104.65 | 109.02 | 13.32 | 17.57 |
| 75 | 92.87 | 96.93 | 10.36 | 13.99 |
| 80 | 79.94 | 83.93 | 7.83 | 10.91 |

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 | 0.1800 | | 0.1800 | | 0.5000 | 0.5000 |
| 51 | 0.1800 | | 0.1800 | | 0.2500 | 0.2500 |
| 52 | 0.1800 | | 0.1800 | | 0.2000 | 0.2000 |
| 53 | 0.1800 | | 0.1800 | | 0.2000 | 0.2000 |
| 54 | 0.1800 | | 0.1800 | | 0.2000 | 0.2000 |
| 55 | 0.1800 | 0.0400 | 0.1800 | 0.0400 | 0.2500 | 0.2500 |
| 56 | 0.1800 | 0.0400 | 0.1800 | 0.0400 | 0.3000 | 0.3000 |
| 57 | 0.1800 | 0.0400 | 0.1800 | 0.0400 | 0.3500 | 0.3500 |
| 58 | 0.1800 | 0.0400 | 0.1800 | 0.0400 | 0.3500 | 0.3500 |
| 59 | 0.1800 | 0.0400 | 0.2000 | 0.0400 | 0.3500 | 0.3500 |
| 60 | 0.1800 | 0.0400 | 0.2000 | 0.0400 | 1.0000 | 1.0000 |
| 61 | 0.1800 | 0.0400 | 0.2000 | 0.0400 | 1.0000 | 1.0000 |
| 62 | 0.5000 | 0.3500 | 0.2500 | 0.4000 | 1.0000 | 1.0000 |
| 63 | 0.4000 | 0.0400 | 0.2000 | 0.3000 | 1.0000 | 1.0000 |
| 64 | 0.3000 | 0.0400 | 0.2000 | 0.3000 | 1.0000 | 1.0000 |
| 65 | 0.4500 | | 0.4000 | | 1.0000 | 1.0000 |
| 66 | 0.4000 | | 0.4000 | | 1.0000 | 1.0000 |
| 67 | 0.3500 | | 0.4000 | | 1.0000 | 1.0000 |
| 68 | 0.3500 | | 0.4000 | | 1.0000 | 1.0000 |
| 69 | 0.3500 | | 0.4000 | | 1.0000 | 1.0000 |
| 70 | 1.0000 | | 1.0000 | | 1.0000 | 1.0000 |

# RATES OF DISABILITY

| Age | Non-Uniformed | | Uniformed | | Age | Non-Uniformed | | Uniformed | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | | Male | Female | Male | Female |
| 21 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 51 | 0.0042 | 0.0050 | 0.0017 | 0.0017 |
| 22 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 52 | 0.0048 | 0.0058 | 0.0019 | 0.0019 |
| 23 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 53 | 0.0054 | 0.0069 | 0.0022 | 0.0022 |
| 24 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 54 | 0.0060 | 0.0082 | 0.0025 | 0.0025 |
| 25 | 0.0001 | 0.0006 | 0.0003 | 0.0003 | 55 | 0.0066 | 0.0054 | 0.0000 | 0.0000 |
| 26 | 0.0001 | 0.0006 | 0.0003 | 0.0003 | 56 | 0.0066 | 0.0067 | 0.0000 | 0.0000 |
| 27 | 0.0001 | 0.0006 | 0.0003 | 0.0003 | 57 | 0.0066 | 0.0083 | 0.0000 | 0.0000 |
| 28 | 0.0001 | 0.0006 | 0.0003 | 0.0003 | 58 | 0.0066 | 0.0099 | 0.0000 | 0.0000 |
| 29 | 0.0001 | 0.0007 | 0.0003 | 0.0003 | 59 | 0.0066 | 0.0115 | 0.0000 | 0.0000 |
| 30 | 0.0001 | 0.0007 | 0.0003 | 0.0003 | 60 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 31 | 0.0002 | 0.0008 | 0.0003 | 0.0003 | 61 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 32 | 0.0003 | 0.0008 | 0.0004 | 0.0004 | 62 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 33 | 0.0004 | 0.0009 | 0.0004 | 0.0004 | 63 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 34 | 0.0005 | 0.0010 | 0.0004 | 0.0004 | 64 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 35 | 0.0006 | 0.0010 | 0.0004 | 0.0004 | 65 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 36 | 0.0007 | 0.0011 | 0.0005 | 0.0005 | 66 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 37 | 0.0007 | 0.0012 | 0.0005 | 0.0005 | 67 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 38 | 0.0008 | 0.0013 | 0.0005 | 0.0005 | 68 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 39 | 0.0008 | 0.0015 | 0.0005 | 0.0005 | 69 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 40 | 0.0009 | 0.0016 | 0.0006 | 0.0006 | 70 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 41 | 0.0011 | 0.0018 | 0.0006 | 0.0006 | 71 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 42 | 0.0014 | 0.0020 | 0.0007 | 0.0007 | 72 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 43 | 0.0016 | 0.0023 | 0.0008 | 0.0008 | 73 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 44 | 0.0019 | 0.0026 | 0.0008 | 0.0008 | 74 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 45 | 0.0021 | 0.0029 | 0.0009 | 0.0009 | 75 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 46 | 0.0024 | 0.0032 | 0.0010 | 0.0010 | 76 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 47 | 0.0027 | 0.0035 | 0.0011 | 0.0011 | 77 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 48 | 0.0030 | 0.0038 | 0.0013 | 0.0013 | 78 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 49 | 0.0033 | 0.0041 | 0.0014 | 0.0014 | 79 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 50 | 0.0036 | 0.0045 | 0.0015 | 0.0015 | 80 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

# Rates of Separation from Active Employment
## Less Than 5 Years of Service

| Service | Non-Uniformed | | Uniformed | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| 0-1 | 0.2500 | 0.1800 | 0.0800 | 0.0800 |
| 1-2 | 0.1200 | 0.1100 | 0.0600 | 0.0600 |
| 2-3 | 0.0700 | 0.0900 | 0.0450 | 0.0450 |
| 3-4 | 0.0600 | 0.0700 | 0.0400 | 0.0400 |
| 4-5 | 0.0500 | 0.0600 | 0.0400 | 0.0400 |

This assumption was first used in the June 30, 2007 valuation.

# Rates of Separation from Active Employment
## More Than 5 Years of Service

| Age | Non-Uniformed | | Uniformed | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| 25 | 0.0470 | 0.0625 | 0.0450 | 0.0450 |
| 26 | 0.0470 | 0.0609 | 0.0450 | 0.0450 |
| 27 | 0.0470 | 0.0593 | 0.0450 | 0.0450 |
| 28 | 0.0426 | 0.0580 | 0.0426 | 0.0426 |
| 29 | 0.0402 | 0.0568 | 0.0402 | 0.0402 |
| 30 | 0.0378 | 0.0555 | 0.0378 | 0.0378 |
| 31 | 0.0354 | 0.0543 | 0.0354 | 0.0354 |
| 32 | 0.0340 | 0.0530 | 0.0330 | 0.0330 |
| 33 | 0.0322 | 0.0514 | 0.0294 | 0.0294 |
| 34 | 0.0304 | 0.0498 | 0.0258 | 0.0258 |
| 35 | 0.0286 | 0.0482 | 0.0222 | 0.0222 |
| 36 | 0.0268 | 0.0466 | 0.0186 | 0.0186 |
| 37 | 0.0250 | 0.0450 | 0.0150 | 0.0150 |
| 38 | 0.0232 | 0.0426 | 0.0140 | 0.0140 |
| 39 | 0.0214 | 0.0402 | 0.0130 | 0.0130 |
| 40 | 0.0196 | 0.0378 | 0.0120 | 0.0120 |
| 41 | 0.0178 | 0.0354 | 0.0110 | 0.0110 |
| 42 | 0.0160 | 0.0330 | 0.0100 | 0.0100 |
| 43 | 0.0150 | 0.0324 | 0.0094 | 0.0094 |
| 44 | 0.0140 | 0.0318 | 0.0088 | 0.0088 |
| 45 | 0.0130 | 0.0312 | 0.0082 | 0.0082 |
| 46 | 0.0120 | 0.0306 | 0.0076 | 0.0076 |
| 47 | 0.0110 | 0.0300 | 0.0070 | 0.0070 |
| 48 | 0.0106 | 0.0300 | 0.0062 | 0.0062 |
| 49 | 0.0102 | 0.0300 | 0.0054 | 0.0054 |
| 50 | 0.0098 | 0.0300 | 0.0046 | 0.0046 |
| 51 | 0.0094 | 0.0300 | 0.0038 | 0.0038 |
| 52 | 0.0090 | 0.0300 | 0.0030 | 0.0030 |
| 53 | 0.0082 | 0.0250 | 0.0026 | 0.0026 |
| 54 | 0.0074 | 0.0200 | 0.0022 | 0.0022 |
| 55 | 0.0066 | 0.0150 | 0.0018 | 0.0018 |
| 56 | 0.0058 | 0.0100 | 0.0014 | 0.0014 |
| 57 | 0.0050 | 0.0050 | 0.0010 | 0.0010 |
| 58 | 0.0040 | 0.0050 | 0.0010 | 0.0010 |
| 59 | 0.0030 | 0.0050 | 0.0010 | 0.0010 |
| 60 | 0.0021 | 0.0050 | 0.0010 | 0.0010 |

# MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

| | |
|---|---|
| **Administrative Expenses:** | 0.88% of payroll, based upon actual results from previous year. |
| **Disability Expenses:** | 0.56% of payroll included in contribution. Retirement system pays premium directly to an outside insurance company or TPA. |
| **Marriage Assumption:** | 90% of participants are assumed to be married for purposes of death-in-service benefits. Applies to disabled members entitled to future retirement benefits also. |
| **Pay Increase Timing:** | Beginning of (Fiscal) year.<br><br>This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date. |
| **Decrement Timing:** | Decrements of all types are assumed to occur mid-year. |
| **Eligibility Testing:** | Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur. |
| **Benefit Service:** | Exact fractional service is used to determine the amount of benefit payable. |
| **Decrement Relativity:** | Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects. |
| **Normal Form of Benefit:** | The assumed normal form of benefit is a 50% joint & survivor benefit for married members in the Closed Plan and a straight life benefit for all other members. |
| **Optional Benefit Factors:** | Optional Benefit Factors are in accordance with tables adopted by the Board.<br><br>The Normal Cost and Actuarial Accrued Liability for the normal, early, and vesting decrements were increased by 1.5% for Uniformed Year 2000 Plan members and 1.0% for Non-Uniformed Year 2000 Plan members to account for subsidized option factors codified in the Statute. |
| **Other:** | Disability and turnover decrements do not operate during retirement eligibility. |
| **Miscellaneous Loading:** | The calculated normal and early retirement benefits were increased by 4.3% for Uniformed and 2.6% for Non-Uniformed to account for the inclusion of unused sick leave in the calculation of Average Pay. 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

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-10.

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, 2008, resulted in ***Unfunded Actuarial Accrued Liabilities*** which were amortized as a level percent of payroll over a closed period of 27 years from July 1, 2009, in accordance with the adopted Board policy. This is consistent with GASB amortization period requirements.

## GLOSSARY

***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)

***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.

# SECTION F

## FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

# FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES OF THE RETIREMENT SYSTEM

***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)

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

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 ACCRUED LIABILITIES"

***"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.

---

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.

---

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

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

# SECTION G

## SUPPLEMENTAL INFORMATION FOR COMPREHENSIVE ANNUAL FINANCIAL REPORTING

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October 10, 2008

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:

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 which

(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, 2008. This valuation indicates that contribution rates for the period beginning July 1, 2009 that are at least equal to the calculated contributions rates will meet the Board's financial objective. The calculated contribution rates are 31.43% of payroll for the 7,529 Non-Uniformed employees and 39.98% of payroll for the 1,070 Uniformed patrol employees.

The actuarial valuations are based upon financial and participant data (which is prepared by retirement system staff) assumptions regarding future rates of investment return and inflation, and rates of retirement, turnover, death, and disability among MPERS' members and their beneficiaries. We review the data for internal and year-to-year consistency as well as general reasonableness prior to its use in the actuarial valuations. It is also summarized and tabulated for the purpose of analyzing trends. The assumptions were adopted by the Board of Trustees and were based upon actual experience of MPERS during the period July 1, 1999 to June 30, 2004. Assets were valued using a three-year smoothing method. The assumptions and methods utilized in this valuation, in our opinion, meet the parameters established by the Governmental Accounting Standards Board Statement No. 25.

The current benefit structure is outlined in the Introductory Section. We provided the information used in the supporting schedules in the Actuarial Section and the Schedules of Funding Progress in the Financial Section, as well as the employer contribution rates shown in the Schedule of Employer Contributions in the Financial Section.

The signing actuaries are Members of the American Academy of Actuaries (M.A.A.A.) as indicated, and meet 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. However, a material decline in the funded status for any reason would lead to a need for increased contributions.**

Respectfully submitted,

Brian B. Murphy, F.S.A., E.A., M.A.A.A.

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. Progress on solvency has been negatively impacted by the 2000-2002 investment market.

| 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% |

# *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.

| | **$ Millions** |
|---|---|
| UAAL Beginning of Year (at July 1) | $ 1,211,460,405 |
| Normal Cost | 47,283,438 |
| Contributions | (124,515,792) |
| Interest | 96,759,648 |
| Net Change in LTD Assets | - |
| Expected UAAL Before Any Changes | 1,230,987,699 |
| Effect of Changes in Assumptions & Methods | - |
| Expected UAAL After Changes | 1,230,987,699 |
| End of Year UAAL (at June 30) | $ 1,235,731,501 |

| | |
|---|---|
| Gain/(Loss) for Year | $ (4,743,802) |

| | |
|---|---|
| Gain/(Loss) as a percent of actuarial accrued liabilities at start of year ($2,897.3 million) | (0.2)% |

| **Valuation Date June 30** | **Experience Gain (Loss) as % of Beginning Accrued Liability** |
|---|---|
| 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)%** |

## SUMMARY OF ACTUARIAL ASSUMPTIONS AND METHODS

| | |
|---|---|
| Valuation Date: | June 30, 2008 |
| Actuarial Cost Method: | Entry Age |
| Amortized Method: | Level percent of payroll |
| Remaining Amortization Period: | 27 years from July 1, 2009 |
| Asset Valuation Method: | 3-year smoothing |
| Actuarial Assumptions: | |
| Investment Rate of Return: | 8.25% |
| Projected Salary Increase: | 3.75% to 11.75% |
| Cost-of-Living Adjustments: | 2.6% Compound |
| Includes Wage Inflation at: | 3.75% |

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 1999-2004 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 (CONTINUED)

***Pay increase assumptions*** for individual active members are shown on Tables IV. 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, 2005** valuation.

***Price Inflation*** is assumed to be 3.75%. 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.

***Total active member payroll*** is assumed to increase 3.75% a year, which is the portion of the individual pay increase assumptions attributable to wage inflation. This rate was first used for the **June 30, 2005** valuation.

***Non Economic Assumptions***

***The mortality table*** used to measure retired life mortality was the 1971 Group Annuity Mortality Tables projected to the year 2000 set back 1 year for males and 7 years for females. Related values are shown on Table I. This table was first used for the June 30, 2000 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, 2005** valuation. The rates for reduced retirement were first used in the **June 30, 2005** 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, 2005** 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, 2005** valuation. The withdrawal rates for Uniform members were first used in the **June 30, 2007** valuation. The withdrawal rates for Non-uniform members were first used in the **June 30, 2005** 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 (M.A.A.A.).

# Table I
# Joint Life Retirement Values
# (8.25% Interest)

| Sample Attained Ages | Present Value of $1 Monthly for Life | | Future Life Expectancy (years) | |
|---|---|---|---|---|
| | Men | Women | Men | Women |
| 50 | $136.25 | $138.71 | 29.17 | 34.67 |
| 55 | 130.87 | 133.76 | 24.82 | 30.06 |
| 60 | 123.96 | 127.37 | 20.70 | 25.67 |
| 65 | 115.20 | 119.22 | 16.82 | 21.50 |
| 70 | 104.65 | 109.02 | 13.32 | 17.57 |
| 75 | 92.87 | 96.93 | 10.36 | 13.99 |
| 80 | 79.94 | 83.93 | 7.83 | 10.91 |

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 | 0.1800 | | 0.1800 | | 0.5000 | 0.5000 |
| 51 | 0.1800 | | 0.1800 | | 0.2500 | 0.2500 |
| 52 | 0.1800 | | 0.1800 | | 0.2000 | 0.2000 |
| 53 | 0.1800 | | 0.1800 | | 0.2000 | 0.2000 |
| 54 | 0.1800 | | 0.1800 | | 0.2000 | 0.2000 |
| 55 | 0.1800 | 0.0400 | 0.1800 | 0.0400 | 0.2500 | 0.2500 |
| 56 | 0.1800 | 0.0400 | 0.1800 | 0.0400 | 0.3000 | 0.3000 |
| 57 | 0.1800 | 0.0400 | 0.1800 | 0.0400 | 0.3500 | 0.3500 |
| 58 | 0.1800 | 0.0400 | 0.1800 | 0.0400 | 0.3500 | 0.3500 |
| 59 | 0.1800 | 0.0400 | 0.2000 | 0.0400 | 0.3500 | 0.3500 |
| 60 | 0.1800 | 0.0400 | 0.2000 | 0.0400 | 1.0000 | 1.0000 |
| 61 | 0.1800 | 0.0400 | 0.2000 | 0.0400 | 1.0000 | 1.0000 |
| 62 | 0.5000 | 0.3500 | 0.2500 | 0.4000 | 1.0000 | 1.0000 |
| 63 | 0.4000 | 0.0400 | 0.2000 | 0.3000 | 1.0000 | 1.0000 |
| 64 | 0.3000 | 0.0400 | 0.2000 | 0.3000 | 1.0000 | 1.0000 |
| 65 | 0.4500 | | 0.4000 | | 1.0000 | 1.0000 |
| 66 | 0.4000 | | 0.4000 | | 1.0000 | 1.0000 |
| 67 | 0.3500 | | 0.4000 | | 1.0000 | 1.0000 |
| 68 | 0.3500 | | 0.4000 | | 1.0000 | 1.0000 |
| 69 | 0.3500 | | 0.4000 | | 1.0000 | 1.0000 |
| 70 | 1.0000 | | 1.0000 | | 1.0000 | 1.0000 |

# TABLE III
# RATES OF DISABILITY

| Age | Non-Uniformed | | Uniformed | | Age | Non-Uniformed | | Uniformed | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | | Male | Female | Male | Female |
| 21 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 51 | 0.0042 | 0.0050 | 0.0017 | 0.0017 |
| 22 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 52 | 0.0048 | 0.0058 | 0.0019 | 0.0019 |
| 23 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 53 | 0.0054 | 0.0069 | 0.0022 | 0.0022 |
| 24 | 0.0001 | 0.0005 | 0.0002 | 0.0002 | 54 | 0.0060 | 0.0082 | 0.0025 | 0.0025 |
| 25 | 0.0001 | 0.0006 | 0.0003 | 0.0003 | 55 | 0.0066 | 0.0054 | 0.0000 | 0.0000 |
| 26 | 0.0001 | 0.0006 | 0.0003 | 0.0003 | 56 | 0.0066 | 0.0067 | 0.0000 | 0.0000 |
| 27 | 0.0001 | 0.0006 | 0.0003 | 0.0003 | 57 | 0.0066 | 0.0083 | 0.0000 | 0.0000 |
| 28 | 0.0001 | 0.0006 | 0.0003 | 0.0003 | 58 | 0.0066 | 0.0099 | 0.0000 | 0.0000 |
| 29 | 0.0001 | 0.0007 | 0.0003 | 0.0003 | 59 | 0.0066 | 0.0115 | 0.0000 | 0.0000 |
| 30 | 0.0001 | 0.0007 | 0.0003 | 0.0003 | 60 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 31 | 0.0002 | 0.0008 | 0.0003 | 0.0003 | 61 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 32 | 0.0003 | 0.0008 | 0.0004 | 0.0004 | 62 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 33 | 0.0004 | 0.0009 | 0.0004 | 0.0004 | 63 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 34 | 0.0005 | 0.0010 | 0.0004 | 0.0004 | 64 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 35 | 0.0006 | 0.0010 | 0.0004 | 0.0004 | 65 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 36 | 0.0007 | 0.0011 | 0.0005 | 0.0005 | 66 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 37 | 0.0007 | 0.0012 | 0.0005 | 0.0005 | 67 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 38 | 0.0008 | 0.0013 | 0.0005 | 0.0005 | 68 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 39 | 0.0008 | 0.0015 | 0.0005 | 0.0005 | 69 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 40 | 0.0009 | 0.0016 | 0.0006 | 0.0006 | 70 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 41 | 0.0011 | 0.0018 | 0.0006 | 0.0006 | 71 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 42 | 0.0014 | 0.0020 | 0.0007 | 0.0007 | 72 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 43 | 0.0016 | 0.0023 | 0.0008 | 0.0008 | 73 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 44 | 0.0019 | 0.0026 | 0.0008 | 0.0008 | 74 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 45 | 0.0021 | 0.0029 | 0.0009 | 0.0009 | 75 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 46 | 0.0024 | 0.0032 | 0.0010 | 0.0010 | 76 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 47 | 0.0027 | 0.0035 | 0.0011 | 0.0011 | 77 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 48 | 0.0030 | 0.0038 | 0.0013 | 0.0013 | 78 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 49 | 0.0033 | 0.0041 | 0.0014 | 0.0014 | 79 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 50 | 0.0036 | 0.0045 | 0.0015 | 0.0015 | 80 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

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

| Service | Non-Uniformed | | Uniformed | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| 0-1 | 0.2500 | 0.1800 | 0.0800 | 0.0800 |
| 1-2 | 0.1200 | 0.1100 | 0.0600 | 0.0600 |
| 2-3 | 0.0700 | 0.0900 | 0.0450 | 0.0450 |
| 3-4 | 0.0600 | 0.0700 | 0.0400 | 0.0400 |
| 4-5 | 0.0500 | 0.0600 | 0.0400 | 0.0400 |

# Table V
# Rates of Separation from Active Employment
# More Than 5 Years of Service

| Age | Non-Uniformed | | Uniformed | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| 25 | 0.0470 | 0.0625 | 0.0450 | 0.0450 |
| 26 | 0.0470 | 0.0609 | 0.0450 | 0.0450 |
| 27 | 0.0470 | 0.0593 | 0.0450 | 0.0450 |
| 28 | 0.0426 | 0.0580 | 0.0426 | 0.0426 |
| 29 | 0.0402 | 0.0568 | 0.0402 | 0.0402 |
| 30 | 0.0378 | 0.0555 | 0.0378 | 0.0378 |
| 31 | 0.0354 | 0.0543 | 0.0354 | 0.0354 |
| 32 | 0.0340 | 0.0530 | 0.0330 | 0.0330 |
| 33 | 0.0322 | 0.0514 | 0.0294 | 0.0294 |
| 34 | 0.0304 | 0.0498 | 0.0258 | 0.0258 |
| 35 | 0.0286 | 0.0482 | 0.0222 | 0.0222 |
| 36 | 0.0268 | 0.0466 | 0.0186 | 0.0186 |
| 37 | 0.0250 | 0.0450 | 0.0150 | 0.0150 |
| 38 | 0.0232 | 0.0426 | 0.0140 | 0.0140 |
| 39 | 0.0214 | 0.0402 | 0.0130 | 0.0130 |
| 40 | 0.0196 | 0.0378 | 0.0120 | 0.0120 |
| 41 | 0.0178 | 0.0354 | 0.0110 | 0.0110 |
| 42 | 0.0160 | 0.0330 | 0.0100 | 0.0100 |
| 43 | 0.0150 | 0.0324 | 0.0094 | 0.0094 |
| 44 | 0.0140 | 0.0318 | 0.0088 | 0.0088 |
| 45 | 0.0130 | 0.0312 | 0.0082 | 0.0082 |
| 46 | 0.0120 | 0.0306 | 0.0076 | 0.0076 |
| 47 | 0.0110 | 0.0300 | 0.0070 | 0.0070 |
| 48 | 0.0106 | 0.0300 | 0.0062 | 0.0062 |
| 49 | 0.0102 | 0.0300 | 0.0054 | 0.0054 |
| 50 | 0.0098 | 0.0300 | 0.0046 | 0.0046 |
| 51 | 0.0094 | 0.0300 | 0.0038 | 0.0038 |
| 52 | 0.0090 | 0.0300 | 0.0030 | 0.0030 |
| 53 | 0.0082 | 0.0250 | 0.0026 | 0.0026 |
| 54 | 0.0074 | 0.0200 | 0.0022 | 0.0022 |
| 55 | 0.0066 | 0.0150 | 0.0018 | 0.0018 |
| 56 | 0.0058 | 0.0100 | 0.0014 | 0.0014 |
| 57 | 0.0050 | 0.0050 | 0.0010 | 0.0010 |
| 58 | 0.0040 | 0.0050 | 0.0010 | 0.0010 |
| 59 | 0.0030 | 0.0050 | 0.0010 | 0.0010 |
| 60 | 0.0021 | 0.0050 | 0.0010 | 0.0010 |

# 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% | 6.00% | 3.75% | 9.75% |
| 21 | 8.00% | 3.75% | 11.75% | 6.00% | 3.75% | 9.75% |
| 22 | 8.00% | 3.75% | 11.75% | 6.00% | 3.75% | 9.75% |
| 23 | 7.30% | 3.75% | 11.05% | 5.80% | 3.75% | 9.55% |
| 24 | 6.52% | 3.75% | 10.27% | 5.60% | 3.75% | 9.35% |
| 25 | 5.66% | 3.75% | 9.41% | 5.40% | 3.75% | 9.15% |
| 26 | 4.72% | 3.75% | 8.47% | 5.20% | 3.75% | 8.95% |
| 27 | 4.50% | 3.75% | 8.25% | 5.00% | 3.75% | 8.75% |
| 28 | 4.10% | 3.75% | 7.85% | 4.50% | 3.75% | 8.25% |
| 29 | 3.70% | 3.75% | 7.45% | 4.00% | 3.75% | 7.75% |
| 30 | 3.30% | 3.75% | 7.05% | 3.50% | 3.75% | 7.25% |
| 31 | 2.90% | 3.75% | 6.65% | 3.00% | 3.75% | 6.75% |
| 32 | 2.50% | 3.75% | 6.25% | 2.50% | 3.75% | 6.25% |
| 33 | 2.35% | 3.75% | 6.10% | 2.25% | 3.75% | 6.00% |
| 34 | 2.20% | 3.75% | 5.95% | 2.00% | 3.75% | 5.75% |
| 35 | 2.05% | 3.75% | 5.80% | 1.75% | 3.75% | 5.50% |
| 36 | 1.90% | 3.75% | 5.65% | 1.50% | 3.75% | 5.25% |
| 37 | 1.75% | 3.75% | 5.50% | 1.25% | 3.75% | 5.00% |
| 38 | 1.65% | 3.75% | 5.40% | 1.20% | 3.75% | 4.95% |
| 39 | 1.55% | 3.75% | 5.30% | 1.15% | 3.75% | 4.90% |
| 40 | 1.45% | 3.75% | 5.20% | 1.10% | 3.75% | 4.85% |
| 41 | 1.35% | 3.75% | 5.10% | 1.05% | 3.75% | 4.80% |
| 42 | 1.25% | 3.75% | 5.00% | 1.00% | 3.75% | 4.75% |
| 43 | 1.15% | 3.75% | 4.90% | 0.88% | 3.75% | 4.63% |
| 44 | 1.05% | 3.75% | 4.80% | 0.76% | 3.75% | 4.51% |
| 45 | 0.95% | 3.75% | 4.70% | 0.64% | 3.75% | 4.39% |
| 46 | 0.85% | 3.75% | 4.60% | 0.52% | 3.75% | 4.27% |
| 47 | 0.75% | 3.75% | 4.50% | 0.40% | 3.75% | 4.15% |
| 48 | 0.70% | 3.75% | 4.45% | 0.39% | 3.75% | 4.14% |
| 49 | 0.65% | 3.75% | 4.40% | 0.38% | 3.75% | 4.13% |
| 50 | 0.60% | 3.75% | 4.35% | 0.37% | 3.75% | 4.12% |
| 51 | 0.55% | 3.75% | 4.30% | 0.36% | 3.75% | 4.11% |
| 52 | 0.50% | 3.75% | 4.25% | 0.35% | 3.75% | 4.10% |
| 53 | 0.46% | 3.75% | 4.21% | 0.33% | 3.75% | 4.08% |
| 54 | 0.42% | 3.75% | 4.17% | 0.31% | 3.75% | 4.06% |
| 55 | 0.38% | 3.75% | 4.13% | 0.29% | 3.75% | 4.04% |
| 56 | 0.34% | 3.75% | 4.09% | 0.27% | 3.75% | 4.02% |
| 57 | 0.30% | 3.75% | 4.05% | 0.25% | 3.75% | 4.00% |
| 58 | 0.30% | 3.75% | 4.05% | 0.00% | 3.75% | 3.75% |
| 59 | 0.30% | 3.75% | 4.05% | 0.00% | 3.75% | 3.75% |
| 60 | 0.30% | 3.75% | 4.05% | 0.00% | 3.75% | 3.75% |