Montana Highway Patrol Officers' Retirement System

Actuarial Valuation as of June 30, 2013

Produced by Cheiron

October 2013

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October 31, 2013

Public Employees' Retirement Board
100 North Park, Suite 200
Helena, Montana 59620

Dear Members of the Board:

At your request, we have conducted the annual actuarial valuation of the Montana Highway Patrol Officers' Retirement System as of June 30, 2013. The results of the valuation are contained in this report. The purpose of the valuation is discussed in the Foreword.

This report contains information on the System's assets, as well as analyses which combine asset and liability performance and projections. The report also discloses employer contribution levels and required disclosures under the Governmental Accounting Standards Board Statement No. 25. The purpose of this report is to present the annual actuarial valuation of the Montana Highway Patrol Officers' Retirement System. This report is for the use of the Public Employees' Retirement Board and its auditors in preparing financial reports in accordance with applicable law and accounting requirements.

Your attention is called to the Foreword in which we refer to the general approach employed in the preparation of this report. We also comment on the sources and reliability of both the data and the actuarial assumptions on which our findings are based. The results of this report are only applicable for Fiscal Year ending 2013 and rely on future system experience conforming to the underlying assumptions. To the extent that actual system experience deviates from the underlying assumptions, the results would vary accordingly.

We hereby certify that, to the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This actuarial report was prepared exclusively for the Montana Highway Patrol Officers' Retirement System for the purpose described herein. This valuation report is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.

Sincerely,
Cheiron

Stephen T. McElhaney, FSA, FCA
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Principal Consulting Actuary

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FOREWORD

Cheiron has performed the Actuarial Valuation of the Montana Highway Patrol Officers' Retirement System as of June 30, 2013. The purpose of this report is to:

1) **Measure and disclose**, as of the valuation date, the financial condition of the System;

2) **Indicate trends** in the financial progress of the System;

3) **Determine the sufficiency of the statutory contribution rate** paid by the employers for Fiscal Year 2013 to meet the requirements of an Annual Required Contribution (ARC) under GASB 25; and

4) **Provide specific information** and documentation required by the Governmental Accounting Standards Board (GASB).

An actuarial valuation establishes and analyzes system assets and liabilities on a consistent basis, and traces the progress of both from one year to the next. It includes measurement of the System's investment performance as well as an analysis of actuarial liability gains and losses.

Section I presents a summary containing our findings and disclosing important trends experienced by the System in recent years.

Section II contains details on various asset measures, together with pertinent performance measurements.

Section III shows similar information on system liabilities, measured for actuarial, accounting, and government reporting purposes.

Section IV develops the employer contribution rate determined using actuarial techniques.

Section V includes the required disclosures under GASB Statement No. 25.

The appendices to this report contain a summary of the System's membership at the valuation date, a summary of the major provisions of the System, and the actuarial methods and assumptions used in the valuation.

In preparing our report, we relied on information (some oral and some written) supplied by the staff of the Public Employee Retirement Administration. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

The actuarial assumptions reflect our understanding of the likely future experience of the System and the assumptions as a whole represent our best estimate for the future experience of the System. The results of this report are dependent upon future experience conforming to these assumptions. To the extent that future experience deviates from the actuarial assumptions, the cost of the benefits would vary from our projections.

SECTION I
BOARD SUMMARY

General Comments

This is the fifth valuation of the Highway Patrol Officers' Retirement System performed by Cheiron.

The period to amortize unfunded actuarial liability decreased from 49.7 years at the June 30, 2012 valuation to 44.6 years as of June 30, 2013. During the year ended June 30, 2013, the System's assets gained 12.88% on a market value basis. However, due to the System's asset-smoothing technique which recognizes only a portion of the gains and losses, the return on the actuarial asset value was 11.86%. This return was above the assumed rate of return of 7.75% and resulted in an actuarial gain on investments of $3.9 million.

The System experienced an actuarial gain on system liabilities resulting from salary increases different than assumed and members retiring, terminating, becoming disabled and dying at rates different from the actuarial assumptions. Experience gains and losses are normal in the course of the System's experience. The System will experience actuarial gains and losses over time, because we cannot predict exactly how people will behave. When a system experiences alternating gains and losses that are small compared to the total actuarial liability, then the system's actuarial assumptions are reasonable. The experience gain caused a decrease of $1.6 million in the actuarial liability.

The actuarial liability increased however by $2.2 million due to legislative changes contained in House Bill 336, a bill which increased the benefit multiplier as well as employer and member contributions for all employees. In addition, members hired on or after July 1, 2013 are subject to more stringent eligibility criteria as well as a reduced Guaranteed Annual Benefit Adjustment (GABA). House Bill 97, effective July 1, 2013 and pertaining to member compensation, had no impact on the June 30, 2013 actuarial valuation.

As of the June 30, 2013 Actuarial Valuation, the System's unfunded actuarial liability was $69.9 million. This is a decrease from last year's unfunded actuarial liability of $71.2 million. The funded ratio increased from 58% at the prior valuation to 60% at June 30, 2013.

Montana Code Annotated (MCA) 19-2-407 requires an analysis of how market performance is affecting the actuarial funding of the Retirement System. It is our understanding of the Code to report certain key results on a market value of assets basis. The market value at June 30, 2013 was $4.0 million greater than actuarial value. If market value were used rather than actuarial value, the funded ratio on the valuation date would be 62%, and the amortization period for the unfunded actuarial liability would be 39.0 years.

This report does not reflect any changes in pension accounting requirements from newly issued GASB Statements Nos. 67 and 68. Statement No. 67 will be effective for the plan year ending June 30, 2014. Statement No. 68 will be effective for most employers' fiscal years ending June 30, 2015. All references and calculations with respect to GASB reflect current Statements Nos. 25 and 27. In addition, in accordance with the System's funding policy, the contribution levels

SECTION I
BOARD SUMMARY

are compared to an amount that would satisfy the requirements for an Annual Required Contribution (ARC) under GASB No. 25. Since the concept of the ARC will disappear when GASB Nos. 67 and 68 become effective, the System will need to define a different calculation basis for measuring funding sufficiency.

The following table compares the results at June 30, 2013 before and after House Bill 336, and compares to the June 30, 2012 valuation results.

Table I-1
Montana Highway Patrol Officers' Retirement System
Summary of Plan Changes

Valuation as of:	June 30, 2012	Before House Bill 336 June 30, 2013	After House Bill 336 June 30, 2013
Assets and Liabilities			
Actuarial Liability (AL)	$ 167,823,843	$ 173,414,589	$ 175,593,829
Actuarial Value of Assets (AVA)	96,655,208	105,735,765	105,735,765
Unfunded AL (UAL)	$ 71,168,635	67,678,824	$ 69,858,064
Funded Ratio (AVA/AL)	57.6%	61.0%	60.2%
Contributions as a Percentage of Payroll			
Statutory Funding Rate	45.38%	45.38%	48.38%
Normal Cost Rate	23.60%	24.33%	25.23%
Available for Amortization of UAL	21.78%	21.05%	23.15%
Period to Amortize	49.7 years	52.8 years	44.6 years
Projected 30-year Level Funding Rate	51.16%	51.54%	53.31%
Projected Shortfall (Surplus)	5.78%	6.16%	4.93%

SECTION I
BOARD SUMMARY

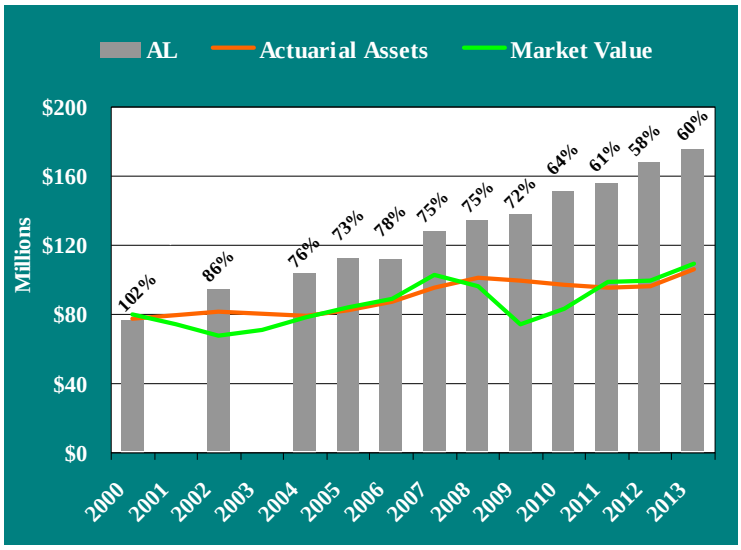
Trends

Assets and Liabilities

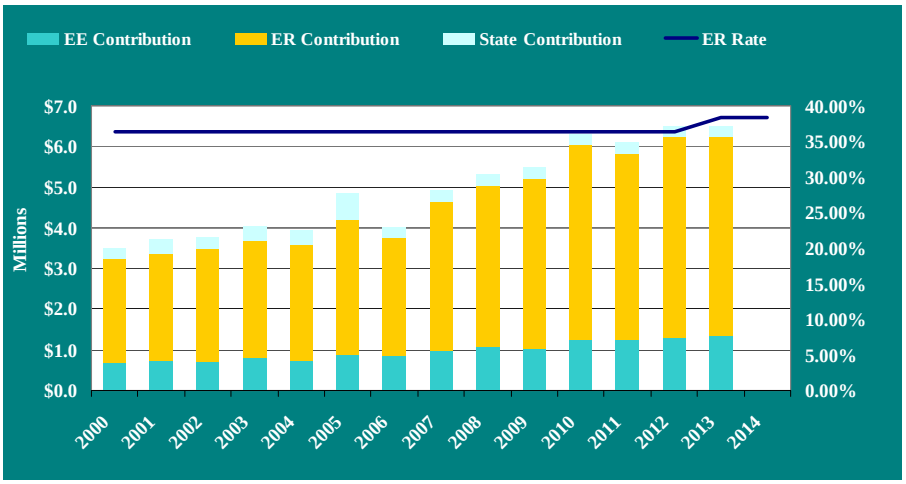
The market value of assets (MVA) increased over last year, returning 12.88% from the value at the prior valuation. The determination of the System's actuarial value of assets reflects only a portion of the amount by which the return was below the assumed rate of 7.75%.

Over the period July 1, 2008 to June 30, 2013, the System's assets returned approximately 2.7% per year measured at actuarial value, compared to a current valuation assumption of 7.75% per year.

For funding purposes, the target amount is represented by the top of the gray bar. We compare the actuarial value of assets to this measure of liability in developing the funded percent. These are the percentages shown in the graph labels.



Contribution Rates



The stacked bars in this graph show the contributions made by members, employers, and the State (left-hand scale). The navy line shows the employer contribution rate as a percent of payroll (right-hand scale).

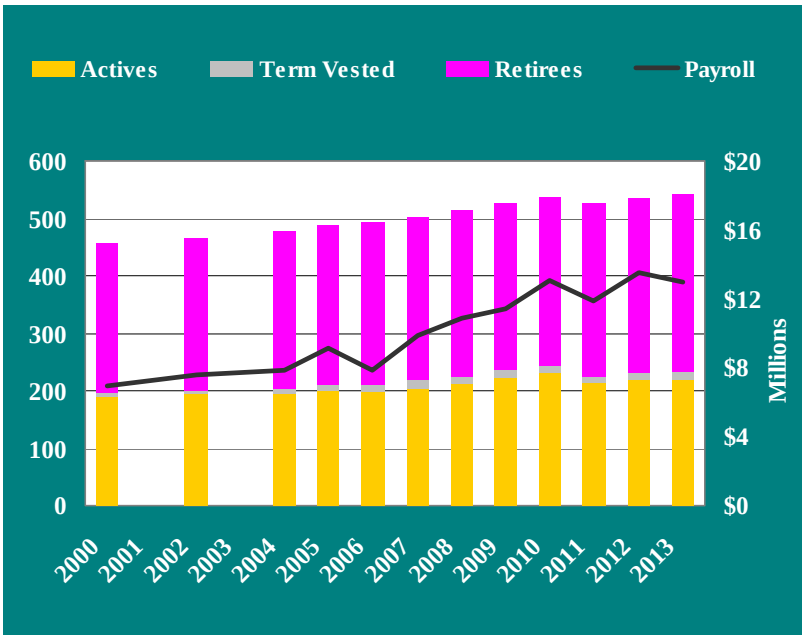
The employer and member contribution rates are set by State law. The actuarial valuation determines the extent to which the statutory contributions will meet the requirements of funding the System.

SECTION I
BOARD SUMMARY

Participant Trends

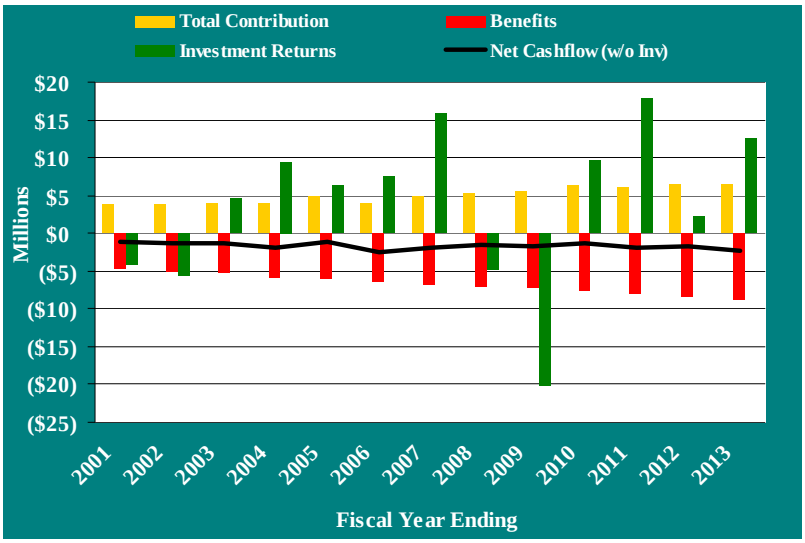
The bars show the number of participants in each category and should be read using the left-hand scale. The active-to-inactive ratio has remained relatively constant with 0.7 actives for each inactive in 2000 and also 0.7 actives for each inactive today.

The black line shows the covered payroll in the System and is read using the right-hand scale.



Net Cash Flow

This graph shows the historical contributions compared to benefit payments. The difference between these two measures is shown in the solid black line and is the net cash flow (without including investment returns).



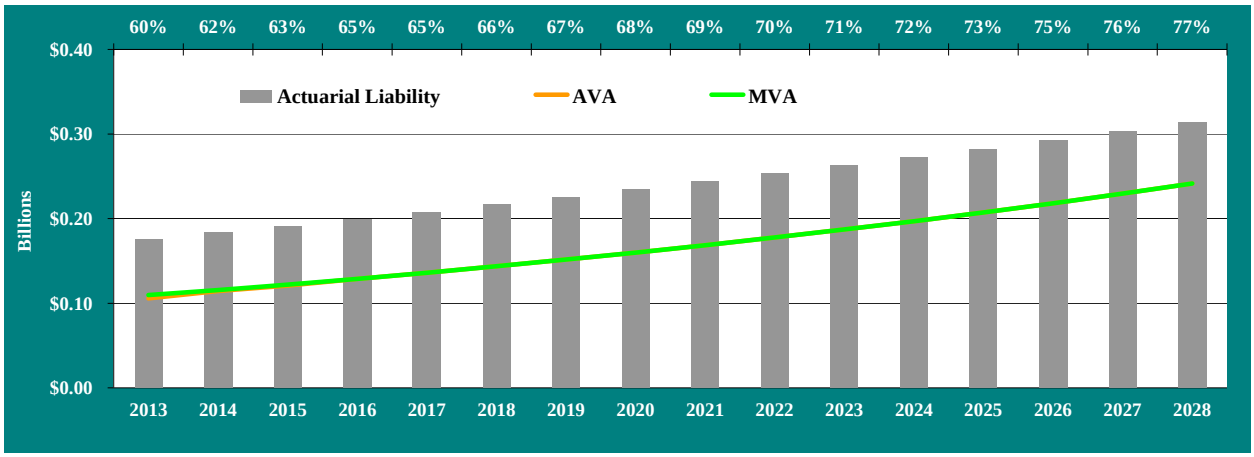
SECTION I
BOARD SUMMARY

Future Outlook

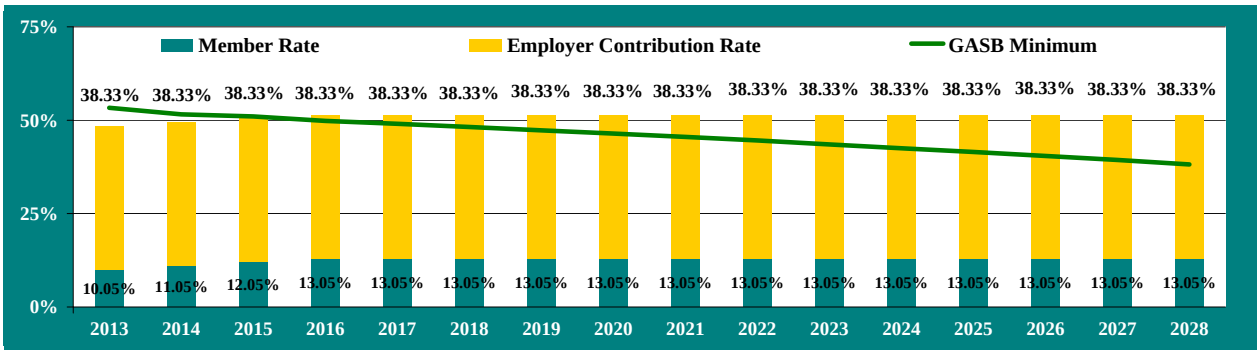
Baseline Projections

These graphs show the expected progress of the System over the next 15 years assuming the System's assets earn 7.75% on its *market value*, and that contributions continue to be made at the current statutory rates.

The values on top of the chart show that the funded status of the System is expected to increase gradually from the current ratio of 60% to 77% by the end of the 15-year period.



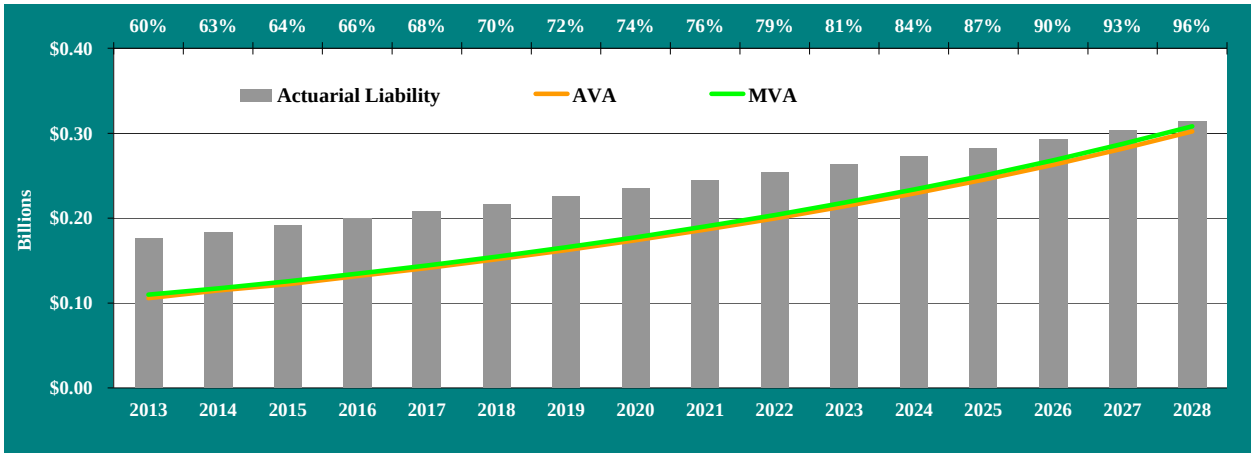
The chart below shows that the total contribution computed on a GASB Annual Required Contribution basis will continue to exceed the statutory rate until 2016, at which point it becomes less than the statutory rate.



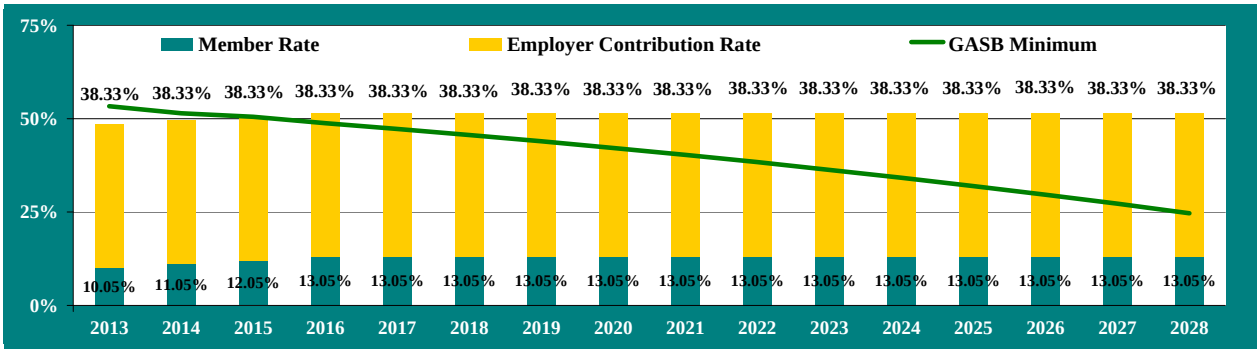
SECTION I
BOARD SUMMARY

Projections with Asset Returns of 9.25%

The future funding status of this System will be largely driven by the investment earnings. Changes in the rate of return on market value can have significant effects on the System's status. These two charts below show what the next 15 years would look like with a 9.25% annual return in each year (i.e., 1.5% greater than the assumed rate of return).



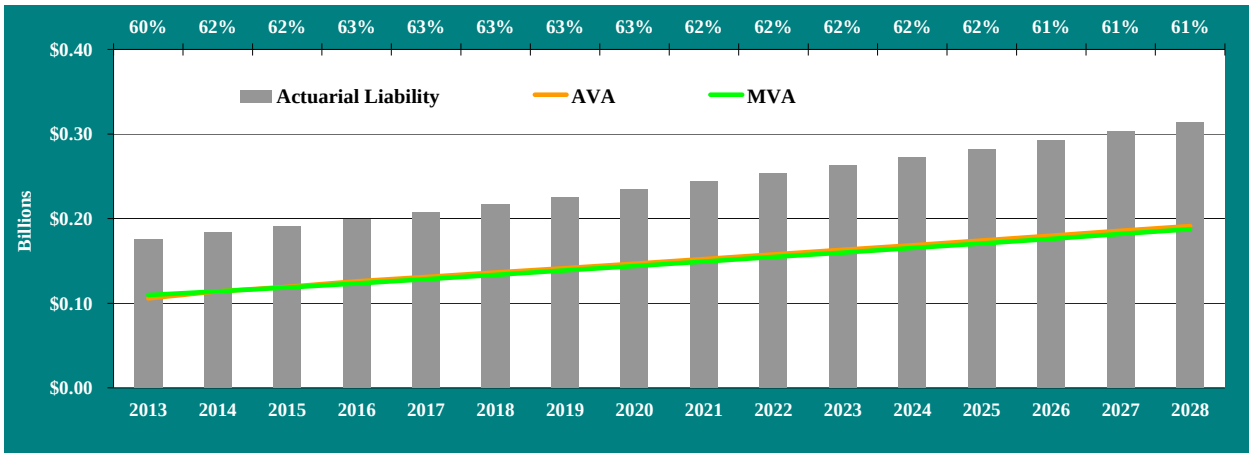
Compared to the baseline projections, the funded status improves to a much greater extent. The GASB Annual Required Contribution still drops below the statutory contribution rate by 2016.



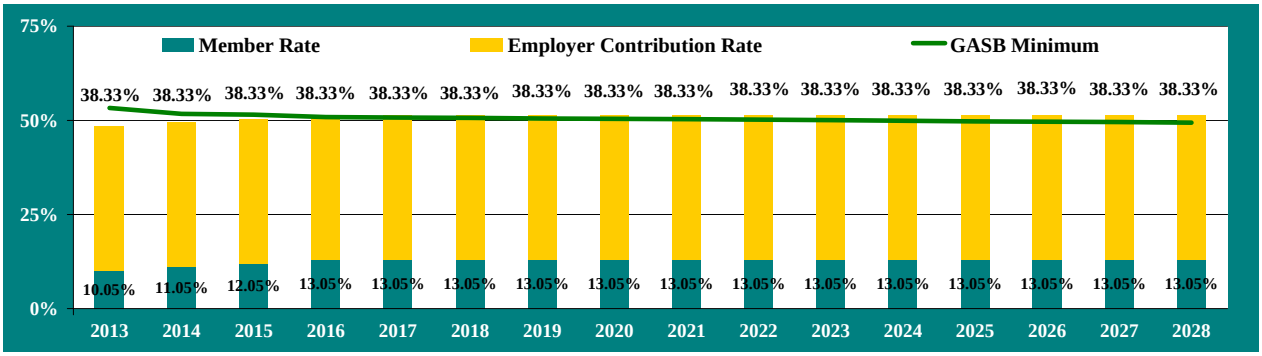
SECTION I
BOARD SUMMARY

Projections with Asset Returns of 6.25%

To further demonstrate how the future funding of this System will be driven by investment earnings, we show the anticipated system funding projections if the invested assets earn 6.25% per year over the entire 15-year period (i.e., 1.5% less than the assumed rate of return).



Under this scenario, the funded status gradually declines after a slight increase in the early years. The GASB Annual Required Contribution remains closer to the statutory contribution rate.



SECTION I
BOARD SUMMARY

Table I-2
Montana Highway Patrol Officers' Retirement System
Summary of Principal System Results

Valuation as of:	June 30, 2012	June 30, 2013	% Change
Participant Counts			
Active Members	218	219	0.5%
Disabled Members*	9	9	0.0%
Retirees and Beneficiaries*	296	301	1.7%
Terminated Vested Members	11	14	27.3%
Terminated Non-Vested Members	10	11	10.0%
Total**	544	554	1.8%
Annual Salaries of Active Members*	$ 13,513,915	$ 13,000,215	(3.8%)
Average Annual Salary	$ 61,990	$ 59,362	(4.2%)
Annual Retirement Allowances for Retired Members and Beneficiaries	$ 8,085,061	$ 8,782,354	8.6%
Assets and Liabilities			
Actuarial Liability (AL)	$ 167,823,843	$ 175,593,829	4.6%
Actuarial Value of Assets (AVA)	96,655,208	105,735,765	9.4%
Unfunded AL	$ 71,168,635	$ 69,858,064	(1.8%)
Funded Ratio (AVA/AL)	57.6%	60.2%	
Present Value of Accrued Benefits (PVAB)	$ 148,277,977	$ 159,274,389	7.4%
Market Value of Assets	99,291,245	109,690,706	10.5%
Unfunded PVAB	$ 48,986,732	$ 49,583,683	1.2%
Accrued Benefit Funding Ratio	67.0%	68.9%	
Ratio of Actuarial Value to Market Value	97.3%	96.4%	
Contributions as a Percentage of Payroll			
Statutory Funding Rate	45.38%	48.38%	
Normal Cost Rate	23.60%	25.23%	
Available for Amortization of UAL	21.78%	23.15%	
Period to Amortize	49.7 years	44.6 years	
Projected 30-year Level Funding Rate	51.16%	53.31%	
Projected Shortfall (Surplus)	5.78%	4.93%	

* Based on PERA categorization for the annual report. For actuarial valuation purposes, 22 members in 2012 and 23 members in 2013 were valued as disabled members with offsetting reductions to the number of retired members.

** A reconciliation of participant counts appears at the beginning of Appendix A.

SECTION II
ASSETS

Pension plan assets play a key role in the financial operation of the System and in the decisions the Trustees may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely have an impact upon benefit levels, State contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on system assets including:

- **Disclosure** of system assets at June 30, 2012 and June 30, 2013;
- Statement of the **changes** in market values during the year;
- Development of the **Actuarial Value of Assets**;
- An assessment of **investment performance**; and
- A projection of the System's expected **cash flows** for the next 10 years.

Disclosure

The market value of assets represents "snap-shot" or "cash-out" values which provide the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace.

The actuarial values are market values which have been smoothed and are used for evaluating the System's ongoing liability to meet its obligations.

The actuarial value of assets is the current market value, adjusted by a four-year smoothing of gains and losses on a market value basis. Each year's gain or loss is the determined as the difference between the actual market return and the expected market return using the assumed rate of investment return.

SECTION II
ASSETS

Table II-1
Changes in Market Values

Value of Assets – June 30, 2012		**$ 99,291,245**
Additions		
Member Contributions	$ 1,336,682	
Employer Contributions	4,903,465	
State Contributions	274,503	
Investment Return	12,826,205	
Other	0	
Total Additions	**$ 19,340,855**	
Deductions		
Benefit Payments	$ 8,760,072	
Administrative Expenses	181,322	
Total Deductions	**$ 8,941,394**	
Value of Assets – June 30, 2013		**$ 109,690,706**

SECTION II
ASSETS

Actuarial Value of Assets (AVA)

The actuarial value of assets represents a "smoothed" value developed by the actuary to reduce, or eliminate, volatile results which could develop from short-term fluctuations in the market value of assets. For this System, the actuarial value has been calculated by taking the market value of assets less 75% of the investment gain (loss) during the preceding year, less 50% of the investment gain (loss) during the second preceding year, and less 25% of the investment gain (loss) during the third preceding year. The tables below illustrate the calculation of actuarial value of assets for the June 30, 2013 valuation.

Table II-2
Market Value Gain/(Loss)

Value of Assets – June 30, 2012	$ 99,291,245
Total Contributions	6,514,650
Benefit Payments	(8,760,072)
Expected Return at 7.75%	7,609,685
Expected Value at June 30, 2013	$ 104,655,508
Actual Value at June 30, 2013	$ 109,690,706
Investment Gain/(Loss)	$ 5,035,198

Table II-3
Develop Excluded Gain/(Loss)

	Total Gain/(Loss)	Excluded Portion
Exclude 75% of 2013 Gain/(Loss)	$ 5,035,198	$ 3,776,399
Exclude 50% of 2012 Gain/(Loss)	$ (5,394,905)	$ (2,697,452)
Exclude 25% of 2011 Gain/(Loss)	$ 11,503,978	$ 2,875,994
Total Excluded Gain/(Loss) for AVA Calculation		$ 3,954,941

Table II-4
Actuarial Value of Assets

Market Value of Assets – June 30, 2013	$ 109,690,706
Total Gain/(Loss) excluded	3,954,941
Actuarial Value of Assets – June 30, 2013	$ 105,735,765

SECTION II
ASSETS

Investment Performance

The market value of assets (MVA) returned 12.88% during fiscal year ended 2013, which is more than the assumed 7.75% return. A return of 11.86% on the actuarial value of assets (AVA) is primarily the result of the asset smoothing method being utilized for the calculation of the actuarial value of assets. Since only 25% of the gain or loss from the performance of the System is recognized in a given year, in periods of very good performance, the AVA can lag significantly behind the MVA. In a period of negative returns, the AVA does not decline as rapidly as the MVA.

Table II-5
Annual Rates of Return

Year Ending June 30,	Market Value	Actuarial Value
2005	8.14%	5.27%
2006	9.03%	9.39%
2007	18.07%	12.07%
2008	(4.83%)	7.73%
2009	(20.98%)	(0.15%)
2010	13.04%	(1.16%)
2011	21.79%	(0.04%)
2012	2.24%	3.32%
2013	12.88%	11.86%

SECTION II
ASSETS

Table II-6
Projection of System's Benefit Payments and Contributions (in thousands)

Year Beginning July 1,	Expected Benefits	Expected Contributions*	Net Cash Flow (excluding Investment Return)	Expected Investment Return**	Net Cash Flow (including Investment Return)
2013	$ 9,163	$ 6,643	$ (2,520)	$ 8,405	$ 5,885
2014	9,545	7,052	(2,493)	8,862	6,369
2015	10,025	7,482	(2,543)	9,354	6,811
2016	10,530	7,936	(2,594)	9,880	7,286
2017	11,051	8,253	(2,798)	10,437	7,639
2018	11,657	8,584	(3,073)	11,019	7,946
2019	12,276	8,927	(3,349)	11,624	8,275
2020	12,844	9,284	(3,560)	12,257	8,697
2021	13,465	9,655	(3,810)	12,922	9,112
2022	14,238	10,042	(4,196)	13,613	9,417

* Expected contributions include Employer Contributions, State Contributions and Member Contributions. For illustration purposes, we have assumed that all contribution rates will increase as stated in the Summary of Plan Provisions (Appendix C) and that payroll will increase at the actuarially assumed rate of 4.00% per year.

** Expected investment return is based upon an assumed return of 7.75% per annum.

Expected benefit payments are projected for the closed group valued at June 30, 2013. Projecting any farther than 10 years using a closed-group would not yield reliable predictions due to the omission of new hires.

SECTION III
LIABILITIES

In this section, we present detailed information on system liabilities including:

- **Disclosure** of system liabilities at June 30, 2012 and June 30, 2013; and
- Statement of **changes** in these liabilities during the year; and
- Details on the source of actuarial gains and losses between this valuation and the last; and
- Development of actuarial unfunded liability on a market value basis as required under MCA 12-2-407.

Disclosure

Several types of liabilities are calculated and presented in this report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them.

- **Present Value of Benefits:** Used for analyzing the financial outlook of the System, this represents the amount of money needed today to fully pay off all future benefits and expenses of the System, assuming participants continue to accrue benefits and all of our assumptions are met.

- **Actuarial Liability:** Used for funding calculations and GASB disclosures, this liability is calculated taking the Present Value of Benefits and subtracting the present value of future Member Contributions and future Employer Normal Costs under an acceptable actuarial funding method. This method is referred to as the **Entry Age Normal** (EAN) funding method.

- **Present Value of Accrued Benefits:** Used for communicating the current level of liabilities, this liability represents the total amount of money needed today to fully pay off the current accrued obligations of the System, assuming no future accruals of benefits. These liabilities are also required for accounting purposes (FASB ASC Topic No. 960) and used to assess whether the System can meet its current benefit commitments.

The following table discloses each of these liabilities for the current and prior valuations. With respect to each disclosure, a subtraction of the appropriate value of system assets yields, for each respective type, a **net surplus** or an **unfunded liability**.

SECTION III
LIABILITIES

Table III-1
Liabilities/Net (Surplus)/Unfunded

	June 30, 2012	June 30, 2013
Present Value of Benefits		
Active Participant Benefits	$ 82,121,875	$ 82,369,735
Retiree and Inactive Benefits	111,957,125	120,013,772
Present Value of Benefits (PVB)	**$ 194,079,000**	**$ 202,383,507**
Market Value of Assets (MVA)	$ 99,291,245	$ 109,690,706
Future Member Contributions	10,120,408	13,333,467
Future Employer Contributions	40,627,008	38,479,636
Funding Shortfall/(Surplus)	44,040,339	40,879,698
Total Resources	**$ 194,079,000**	**$ 202,383,507**
Actuarial Liability		
Present Value of Benefits (PVB)	$ 194,079,000	$ 202,383,507
Present Value of Future Normal Costs (PVFNC)	26,255,157	26,789,678
Actuarial Liability (AL=PVB–PVFNC)	**167,823,843**	**175,593,829**
Actuarial Value of Assets (AVA)	96,655,208	105,735,765
Net (Surplus)/Unfunded (AL – AVA)	**$ 71,168,635**	**$ 69,858,064**
Present Value of Accrued Benefits		
Present Value of Benefits (PVB)	$ 194,079,000	$ 202,383,507
Present Value of Future Benefit Accruals (PVFBA)	45,801,023	43,109,118
Present Value of Accrued Benefits (PVAB=PVB–PVFBA)	**$ 148,277,977**	**$ 159,274,389**
Market Value of Assets (MVA)	99,291,245	109,690,706
Net Unfunded (PVAB – MVA)	**$ 48,986,732**	**$ 49,583,683**

SECTION III
LIABILITIES

Changes in Liabilities

Each of the Liabilities disclosed in the prior table are expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- New hires since the last valuation
- Benefits accrued since the last valuation
- System amendments increasing benefits
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, or dying at rates different than expected
- A change in actuarial or investment assumptions
- A change in the actuarial funding method

Unfunded liabilities will change because of all of the above, and also due to changes in the System's assets resulting from:

- Employer contributions different than expected
- Investment earnings different than expected
- A change in the method used to measure system assets

In each valuation, we report on those elements of change which are of particular significance, potentially affecting the long-term financial outlook of the System. Below we present key changes in liabilities since the last valuation. On the next page we provide more detail on the sources of the actuarial (gain)/loss as measured on the basis of actuarial liability.

Table III-2

	Present Value of Benefits	Actuarial Liability	Present Value of Accrued Liability
Liabilities June 30, 2012	$ 194,079,000	$ 167,823,843	$ 148,277,977
Liabilities June 30, 2013	202,383,507	175,593,829	159,274,389
Liability Increase (Decrease)	8,304,507	7,769,986	10,996,412
Change Due to:			
Actuarial (Gain)/Loss	NC*	(1,648,111)	NC*
Plan Changes	3,148,240	2,179,240	1,408,078
Benefits Accumulated and Other Sources	5,156,267	7,238,857	9,588,334

* NC = not calculated.

SECTION III
LIABILITIES

Table III-3
Summary of Actuarial Gains and Losses as of June 30, 2013

Actuarial Liabilities as of July 1, 2012	$ 167,823,843
Normal Cost	3,092,360
Actual Benefit Payments	(8,760,072)
Interest	12,906,569
Expected Actuarial Liability as of July 1, 2013	175,062,700
Actual Liability as of July 1, 2013 before House Bill 336	$ 173,414,589
Liability (Gain)/Loss	$ (1,648,111)
Sources of Liability (Gain)/Loss	
Salary (Gain)/Loss	$ (3,127,685)
New Participant (Gain)/Loss	205,431
Active Retirements (Gain)/Loss	(264,518)
Active Terminations (Gain)/Loss	351,085
Active Deaths (Gain)/Loss	72,474
Active Disability (Gain)/Loss	200,820
Inactive Mortality (Gain)/Loss	401,213
Other (Gain)/Loss	513,069
Actual Liability as of July 1, 2013	$ 175,593,829
Liability (Gain)/Loss due to plan changes	$ 2,179,240
Actuarial Value of Assets as of July 1, 2012	$ 96,655,208
Net Cash Flow	(2,245,422)
Expected Earnings	7,405,392
Expected Actuarial Value of Assets as of July 1, 2013	101,815,178
Actual Actuarial Value of Assets as of July 1, 2013	$ 105,735,765
Investment (Gain)/Loss	$ (3,920,587)
Total Liability (Gain)/Loss	531,129
Total Actuarial (Gain)/Loss	$ (3,389,458)

SECTION III
LIABILITIES

Table III-4 shows the actuarial liabilities as of the prior and current valuation dates. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets. The funded ratio is the ratio of the actuarial value of assets to the actuarial liability.

Table III-4
Actuarial Liabilities for Funding

	June 30, 2012	June 30, 2013
1. Actuarial Liabilities		
Retiree and Inactive Benefits	$ 111,957,125	$ 120,013,772
Active Member Benefits	55,866,718	55,580,057
Total Actuarial Liability	**$ 167,823,843**	**$ 175,593,829**
2. Actuarial Value of Assets	$ 96,655,208	$ 105,735,765
3. Unfunded Actuarial Liability	$ 71,168,635	$ 69,858,064
4. Funded Ratio	57.6%	60.2%

Montana Code Annotated (MCA) 19-2-407 requires an analysis of how market performance is affecting the actuarial funding of the System. Table III-5 presented below shows the same information as in Table III-4 above, but using market value of assets rather than actuarial value of assets.

Table III-5
Actuarial Liabilities on Market Value Basis (MCA 19-2-407)

	June 30, 2012	June 30, 2013
1. Actuarial Liabilities		
Retiree and Inactive Benefits	$ 111,957,125	$ 120,013,772
Active Member Benefits	55,866,718	55,580,057
Total Actuarial Liability	**$ 167,823,843**	**$ 175,593,829**
2. Market Value of Assets	$ 99,291,245	$ 109,690,706
3. Unfunded Actuarial Liability	$ 68,532,598	$ 65,903,123
4. Funded Ratio	59.2%	62.5%

SECTION IV
CONTRIBUTIONS

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine what level (if any) of contributions is needed to properly maintain the funding status of the System. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

For this System, the funding method employed is the **Entry Age Actuarial Cost Method**. Under this method, there are two components to the total contribution: the **normal cost rate** and the **unfunded actuarial liability rate** (UAL rate). The normal cost rate is determined by taking the value, as of entry age into the System, of each member's projected future benefits. This value is then divided by the value, also at entry age, of each member's expected future salary. The normal cost rate is multiplied by current salary to determine each member's normal cost rate. Finally, the total normal cost rate is reduced by the member contribution to produce the employer normal cost rate. The difference between the EAN actuarial liability and the actuarial value of assets is the unfunded actuarial liability.

For purposes of determining the adequacy of the statutory funding rate, the UAL rate is calculated by subtracting the normal cost rate from the statutory rate. A calculation is then made to determine the period over which the UAL rate will amortize the unfunded actuarial liability. A second UAL rate is calculated based upon a 30-year amortization of the UAL, which is the maximum amortization period permitted under GASB Statement No. 25, but which should not necessarily be construed as a recommended contribution level. All UAL payments are determined as a level percentage of pay, assuming that total pay increases by the annual inflation rate of 4.00%.

SECTION IV
CONTRIBUTIONS

The tables below present and compare the contribution rates for the System for this valuation and the prior one.

Table IV-1
Statutory Basis

	June 30, 2012	June 30, 2013
Statutory Funding Rates		
Members	9.05%	10.05%
Employers	26.15%	28.15%
State	10.18%	10.18%
Total	45.38%	48.38%
Normal Cost Rate*	23.60%	25.23%
Funding Rate Available for Amortization	21.78%	23.15%
Unfunded Actuarial Liability (Surplus)	$71,168,635	$69,858,064
Years to Amortize**	49.7 years	44.6 years

* The normal cost rate is projected to be 21.00% for members eligible after July 1, 2013. It is expected that the average normal cost rate will decrease over the next generation of active plan members.

** On a market value basis, the Years to Amortize the Unfunded Actuarial Liability was 45.1 years at June 30, 2012 and 39.0 years at June 30, 2013.

SECTION IV
CONTRIBUTIONS

Table IV-2
Calculated Contribution Basis

	June 30, 2012	June 30, 2013
Normal Cost Rate	23.60%	25.23%
Amortization Payment (30-years)	27.56%	28.08%
Total Calculated Contribution Rate	51.16%	53.31%
Less Statutory Rate	45.38%	48.38%
Shortfall (Surplus) in Statutory Rate	5.78%	4.93%

Table IV-3
Calculated Contribution on Market Value (MCA 19-2-407)

	June 30, 2012	June 30, 2013
Normal Cost Rate	23.60%	25.23%
Amortization Payment (30-years)	26.54%	26.49%
Total Calculated Contribution Rate	50.14%	51.72%
Less Statutory Rate	45.38%	48.38%
Shortfall (Surplus) in Statutory Rate	4.76%	3.34%

The following table projects the results for the next five valuations (assuming all assumptions are met, including 7.75% return).

Table IV-4
Projected Calculated Contribution Rates

Valuation Year	Rate
2014	51.60%
2015	51.00%
2016	49.81%
2017	49.02%
2018	48.18%

SECTION V
ACCOUNTING STATEMENT INFORMATION

Accounting Standard Codification Topic No. 960 of the Financial Accounting Standards Board specifies certain information for a plan to disclose regarding its funded status. Statement No. 25 of the Governmental Accounting Standards Board (GASB) establishes standards for disclosure of pension information by public employee retirement systems (PERS) and governmental employers in notes to financial statements and supplementary information.

The FASB ASC Topic No. 960 disclosures provide a quasi "snap shot" view of how the System's assets compare to its liabilities if contributions stopped and accrued benefit claims had to be satisfied. However, due to potential legal requirements and the possibility that alternative interest rates would have to be used to determine the liabilities, these values may not be a good indication of the amount of money it would take to buy the benefits for all members if the System were to terminate.

The GASB-25 actuarial liability is the same as the actuarial liability amount calculated for funding purposes.

Both the present value of accrued benefits (FASB ASC Topic No. 960) and the actuarial liability (GASB-25) are determined assuming that the System is on-going and participants continue to terminate employment, retire, etc., in accordance with the actuarial assumptions. Liabilities are discounted at the assumed valuation interest rate of 7.75% per annum.

FASB ASC Topic No. 960 specifies that a comparison of the present value of accrued (accumulated) benefits with the market value of the assets as of the valuation date must be provided. GASB Statement No. 25 requires the actuarial liability be compared with the actuarial value of assets for funding purposes. The relevant amounts as of June 30, 2013 are exhibited in Table V-1.

Tables V-2 through V-5 are exhibits to be used with the System CAFR report. Table V-2 is the Note to Required Supplementary Information, Table V-3 is a history of gains and losses in Accrued Liability, Table V-4 is the Schedule of Funding Progress, and Table V-5 is the Solvency Test which shows the portion of Accrued Liability covered by Assets.

SECTION V
ACCOUNTING STATEMENT INFORMATION

Table V-1
Accounting Statement Information

	June 30, 2012	June 30, 2013
A. FASB ASC Topic No. 960 Basis		
1. Present Value of Benefits Accrued and Vested to Date		
a. Members Currently Receiving Payments	$ 110,875,944	$ 117,914,093
b. Former Vested Members	1,081,181	2,099,679
c. Active Members	36,320,852	39,260,617
2. Total Present Value of Accrued Benefits (1 (a) + 1(b) + 1(c))	$ 148,277,977	$ 159,274,389
3. Assets at Market Value	99,291,245	109,690,706
4. Unfunded Present Value of Accrued Benefits (2 – 3)	$ 48,986,732	$ 49,583,683
5. Ratio of Assets to Present Value of Accrued Benefits (3 / 2)	67.0%	68.9%
B. GASB No. 25 Basis		
1. Actuarial Liabilities for retirees and beneficiaries currently receiving benefits and terminated employees not yet receiving benefits	$ 111,957,125	$ 120,013,772
2. Actuarial Liabilities for current employees	55,866,718	55,580,057
3. Total Actuarial Liability (1 + 2)	$ 167,823,843	$ 175,593,829
4. Net Actuarial Assets available for benefits	96,655,208	105,735,765
5. Unfunded Actuarial Liability (3 – 4)	$ 71,168,635	$ 69,858,064

SECTION V
ACCOUNTING STATEMENT INFORMATION

Table V-2
Note To Required Supplementary Information

The information presented in the required supplementary schedules was determined as part of the actuarial valuation at the date indicated. Additional information as of the latest actuarial valuation follows.

Valuation date	June 30, 2013
Actuarial cost method	Entry Age
Amortization method	Open
Remaining amortization period for Annual Required Contribution	30 years
Asset valuation method	Four-Year smoothed market
Actuarial assumptions:	
Investment rate of return*	7.75%
General wage growth*	4.00%
Merit salary increases	0.0% - 7.3%
*Includes inflation at	3.00%

The actuarial assumptions used have been recommended based on the most recent review of the System's experience (completed in 2010) and adopted by the Retirement Board.

The rate of employer contributions to the System is composed of the normal cost and amortization of the unfunded actuarial liability. The normal cost is a level percent of payroll cost which will pay for projected benefits at retirement for each participant. The actuarial liability is that portion of the present value of projected benefits that will not be paid by future normal costs. The difference between this liability and the funds accumulated as of the same date is the unfunded actuarial liability.

SECTION V
ACCOUNTING STATEMENT INFORMATION

Table V-3
Analysis of Financial Experience*

Gain and Loss in Accrued Liability During Years Ended June 30
Resulting from Differences Between Assumed Experience and Actual Experience

	Gain (or Loss) for Year ending June 30, (expressed in thousands)					
Type of Activity	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Investment Income on Actuarial Assets	$ (287)	$ (8,202)	$ (9,065)	$ (7,496)	$ (4,179)	$ 3,921
Combined Liability Experience	(932)	2,835	(4,848)	2,128	(5,603)	1,648
(Loss)/Gain During Year from Financial Experience	$ (1,219)	$ (5,367)	$ (13,913)	$ (5,368)	$ (9,782)	$ 5,569
Non-Recurring Items	0	0	(2,700)	0	0	(2,179)
Composite Gain (or Loss) During Year	$ (1,219)	$ (5,367)	$ (16,613)	$ (5,368)	$ (9,782)	$ 3,390

Table V-4
Schedule of Funding Progress*
(expressed in thousands)

Valuation Date June 30,	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Funded Ratio	Unfunded AAL (UAAL)	Covered Payroll	UAAL as a Percentage of Covered Payroll
2013	$ 105,736	$ 175,594	60 %	$ 69,858	$ 13,484	518 %
2012	96,655	167,824	58 %	71,169	13,618	523 %
2011	95,274	155,742	61 %	60,468	12,472	485 %
2010	97,204	151,177	64 %	53,973	13,036	414 %
2009	99,652	137,815	72 %	38,163	11,425	334 %
2008	101,500	134,683	75 %	33,183	10,866	305 %

* Years prior to 2009 were taken from reports prepared by prior actuary.

SECTION V
ACCOUNTING STATEMENT INFORMATION

Table V-5
Solvency Test*
Aggregate Accrued Liabilities for
(expressed in thousands)

Valuation Date June 30,	Active Member Contributions (1)	Retirees & Beneficiaries (2)	Active Member Employer Financed Contributions (3)	Actuarial Value of Reported Assets	Portion of Accrued Liabilities Covered by Reported Assets (1)	(2)	(3)
2013	$ 11,339	117,914	$ 46,341	$ 105,736	100 %	80 %	0 %
2012	11,455	110,876	45,493	96,655	100 %	77 %	0 %
2011	10,795	107,035	37,911	95,274	100 %	79 %	0 %
2010	10,369	102,450	38,359	97,204	100 %	85 %	0 %
2009	9,571	97,087	31,157	99,652	100 %	93 %	0 %
2008	8,796	96,395	29,492	101,500	100 %	96 %	0 %

* Years prior to 2009 were taken from reports prepared by prior actuary.

APPENDIX A
MEMBERSHIP INFORMATION

Reconciliation of Participant Counts

	Active	Disabled	Retirees and Beneficiaries	Terminated Vested Members	Terminated Non-Vested Members	Total
Participant counts used for valuation	219	23	287	14	11	554
Disabled members having attained normal retirement age		(14)	14			-
Beneficiaries of Disabled Members						-
Beneficiaries with less than one year of certain payments remaining			-			-
Other Adjustments						-
Participant counts shown in Annual Financial Report	219	9	301	14	11	554

This chart is presented for informational purposes only. The counts shown in the valuation line were used for preparation of the liabilities disclosed within this report. The counts disclosed for the Annual Financial Report and the Board Summary (page 8) match the CAFR reports at the request of the Board. The differences between the counts, if any, have no material effect upon the liability calculation.

The salaries used in the tables and charts which follow are different than the salaries used for the Board Summary on page 8. For this Appendix A, the valuation projected salaries are to be paid for the following fiscal year, whereas for the Board Summary, salaries are applicable in the year ending on the valuation date.

The benefits for retirees and beneficiaries used for the tables and charts which follow are different than the benefits used for the Board Summary on page 8. For this Appendix A, the valuation projected benefits to be paid for the following fiscal year (including Guaranteed Annual Benefit Adjustment (GABA) where applicable), whereas for the Board Summary, annual benefits are as of the valuation date.

APPENDIX A
MEMBERSHIP INFORMATION

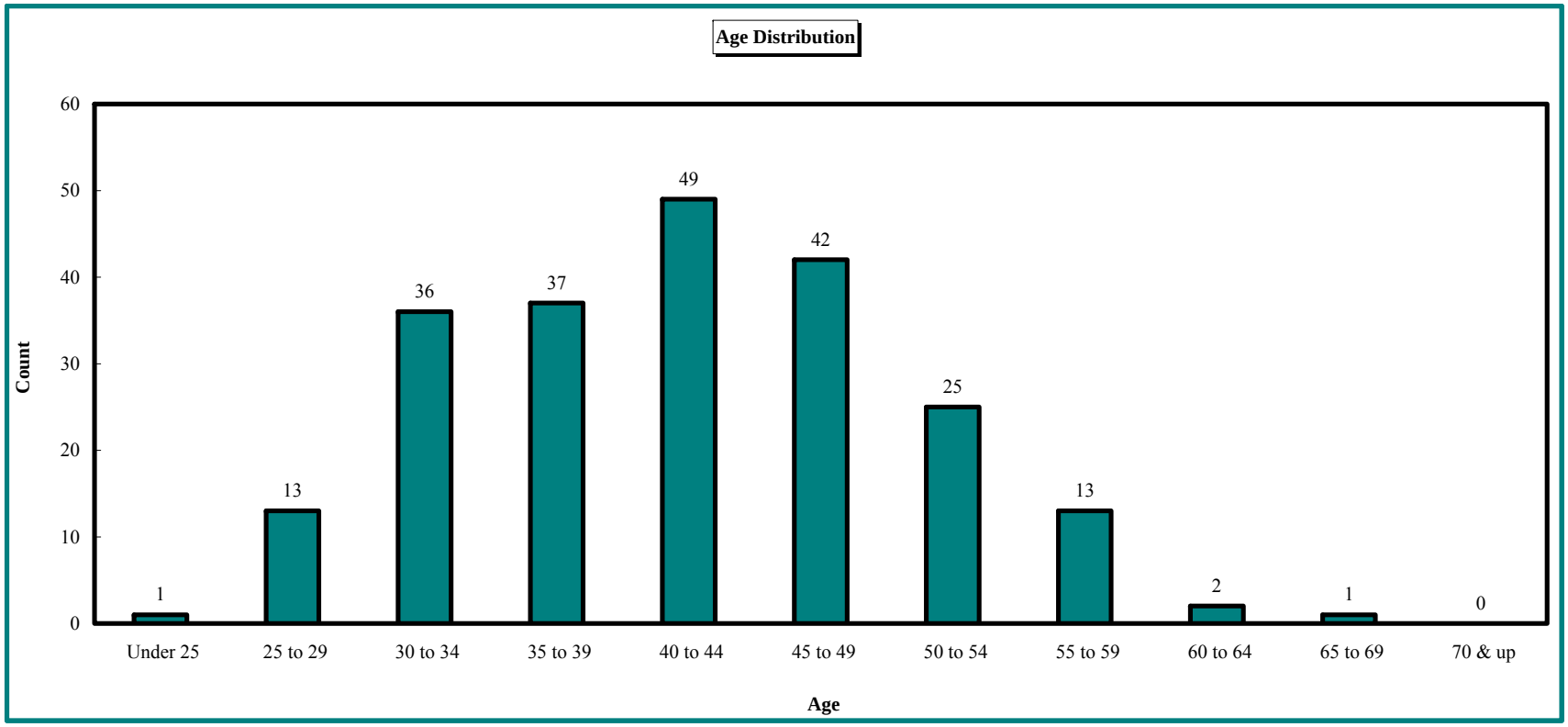
Montana Highway Patrol Officers' Retirement System Distribution of Active Members by Age and Service as of June 30, 2013

COUNTS BY AGE/SERVICE

	Service										
Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	Total
Under 25	1	0	0	0	0	0	0	0	0	0	1
25 to 29	4	7	2	0	0	0	0	0	0	0	13
30 to 34	7	11	17	1	0	0	0	0	0	0	36
35 to 39	3	5	18	11	0	0	0	0	0	0	37
40 to 44	0	2	9	20	17	1	0	0	0	0	49
45 to 49	2	3	4	10	13	9	1	0	0	0	42
50 to 54	0	0	7	5	6	4	3	0	0	0	25
55 to 59	0	2	2	2	3	2	1	1	0	0	13
60 to 64	0	0	0	0	0	1	1	0	0	0	2
65 to 69	0	0	0	0	0	1	0	0	0	0	1
70 & up	0	0	0	0	0	0	0	0	0	0	0
Total	17	30	59	49	39	18	6	1	0	0	219

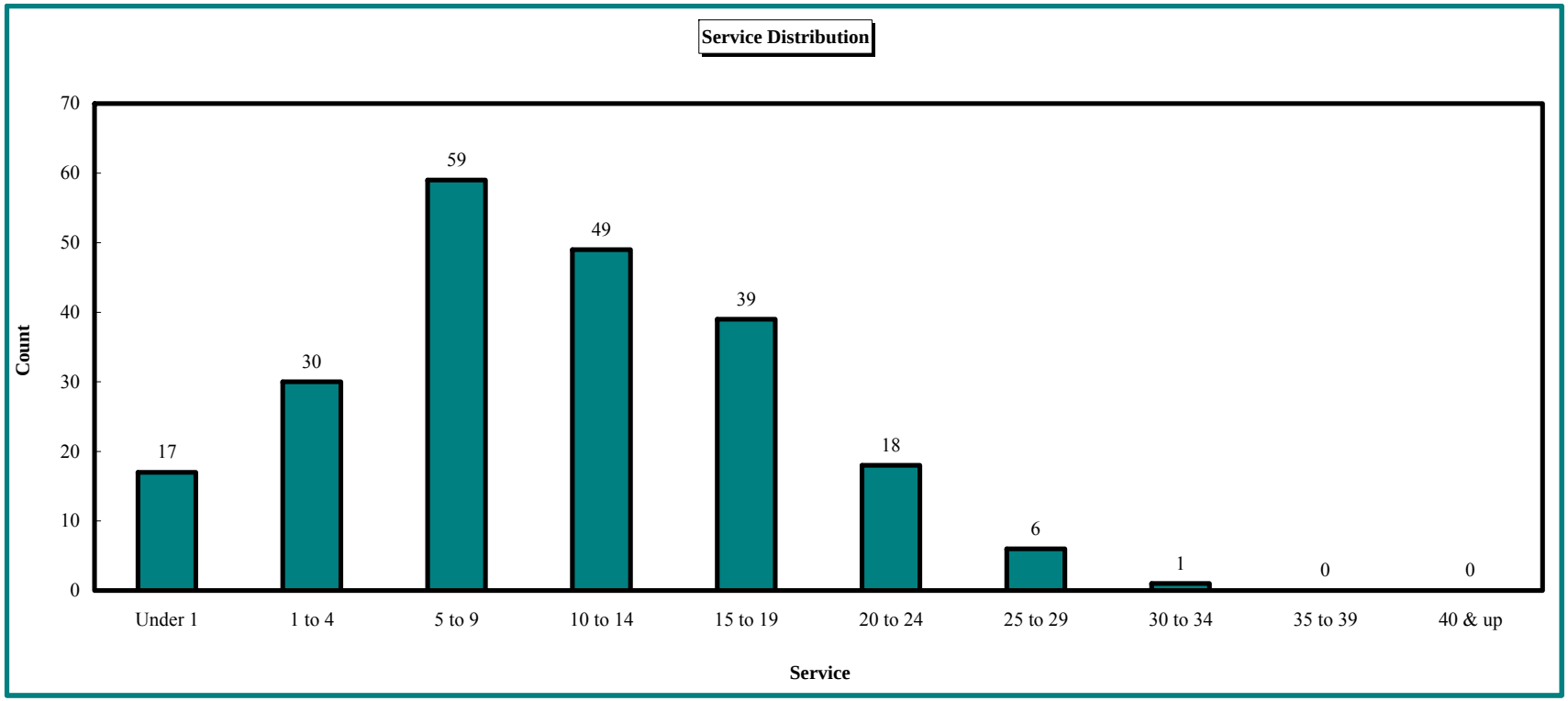
APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Active Members by Age as of June 30, 2013



APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Active Members by Service as of June 30, 2013



APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Active Members by Age and Service as of June 30, 2013

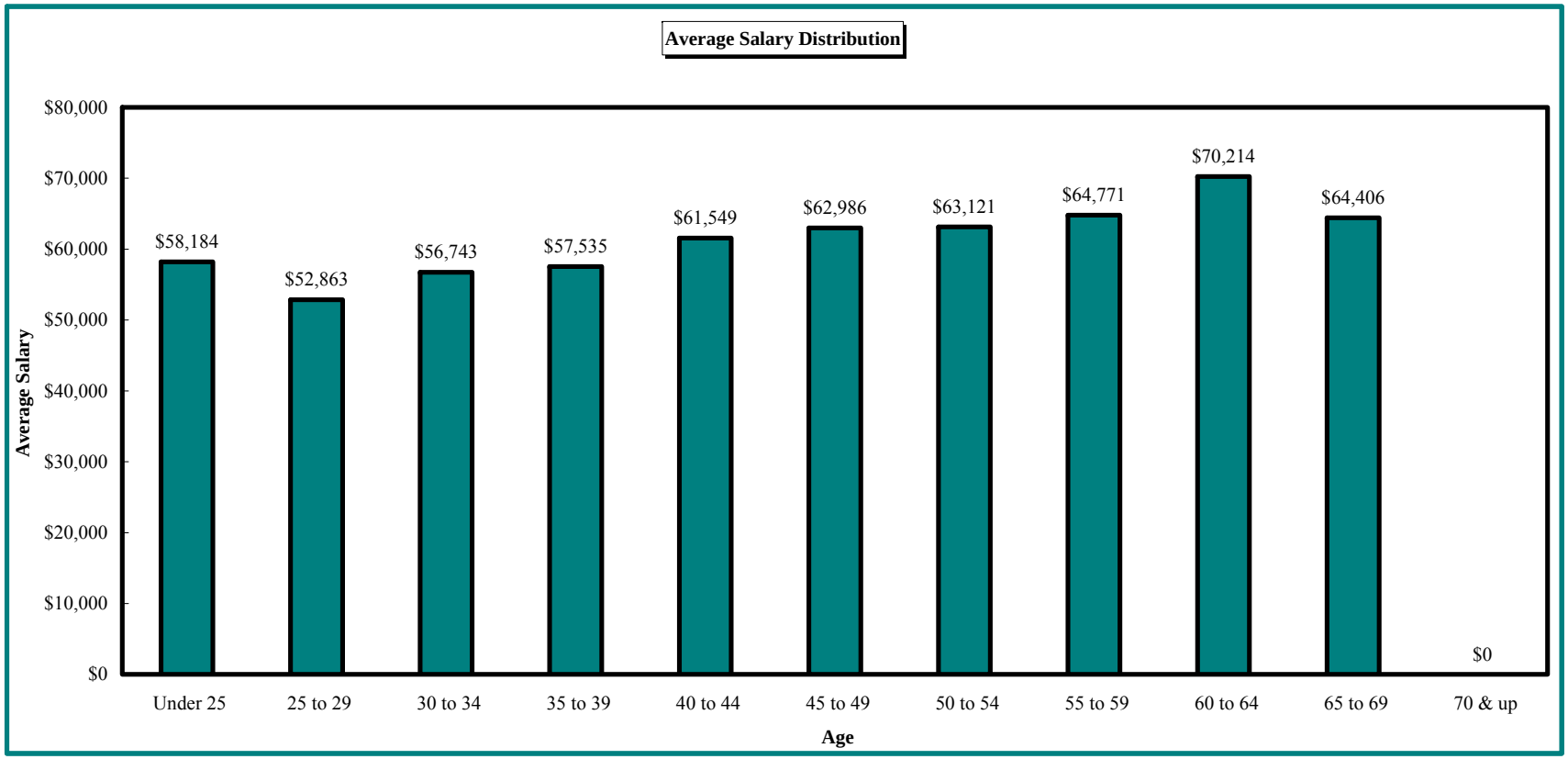
AVERAGE SALARY BY AGE/SERVICE

	Service										
Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	Total
Under 25	$58,184	$0	$0	$0	$0	$0	$0	$0	$0	$0	$58,184
25 to 29	$49,515	$51,032	$65,969	$0	$0	$0	$0	$0	$0	$0	$52,863
30 to 34	$54,110	$54,163	$59,735	$52,685	$0	$0	$0	$0	$0	$0	$56,743
35 to 39	$54,187	$54,782	$58,406	$58,275	$0	$0	$0	$0	$0	$0	$57,535
40 to 44	$0	$56,358	$57,963	$58,133	$66,927	$81,121	$0	$0	$0	$0	$61,549
45 to 49	$51,973	$53,216	$58,701	$58,439	$64,310	$72,279	$76,078	$0	$0	$0	$62,986
50 to 54	$0	$0	$59,103	$61,937	$61,587	$64,893	$75,178	$0	$0	$0	$63,121
55 to 59	$0	$57,123	$73,967	$62,481	$58,731	$66,151	$70,304	$76,078	$0	$0	$64,771
60 to 64	$0	$0	$0	$0	$0	$59,795	$80,633	$0	$0	$0	$70,214
65 to 69	$0	$0	$0	$0	$0	$64,406	$0	$0	$0	$0	$64,406
70 & up	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$53,030	$53,785	$59,608	$58,682	$64,602	$69,317	$75,425	$76,078	$0	$0	$60,288

The salary shown in the above chart was used for valuation purposes and assumes pay increases for the year.

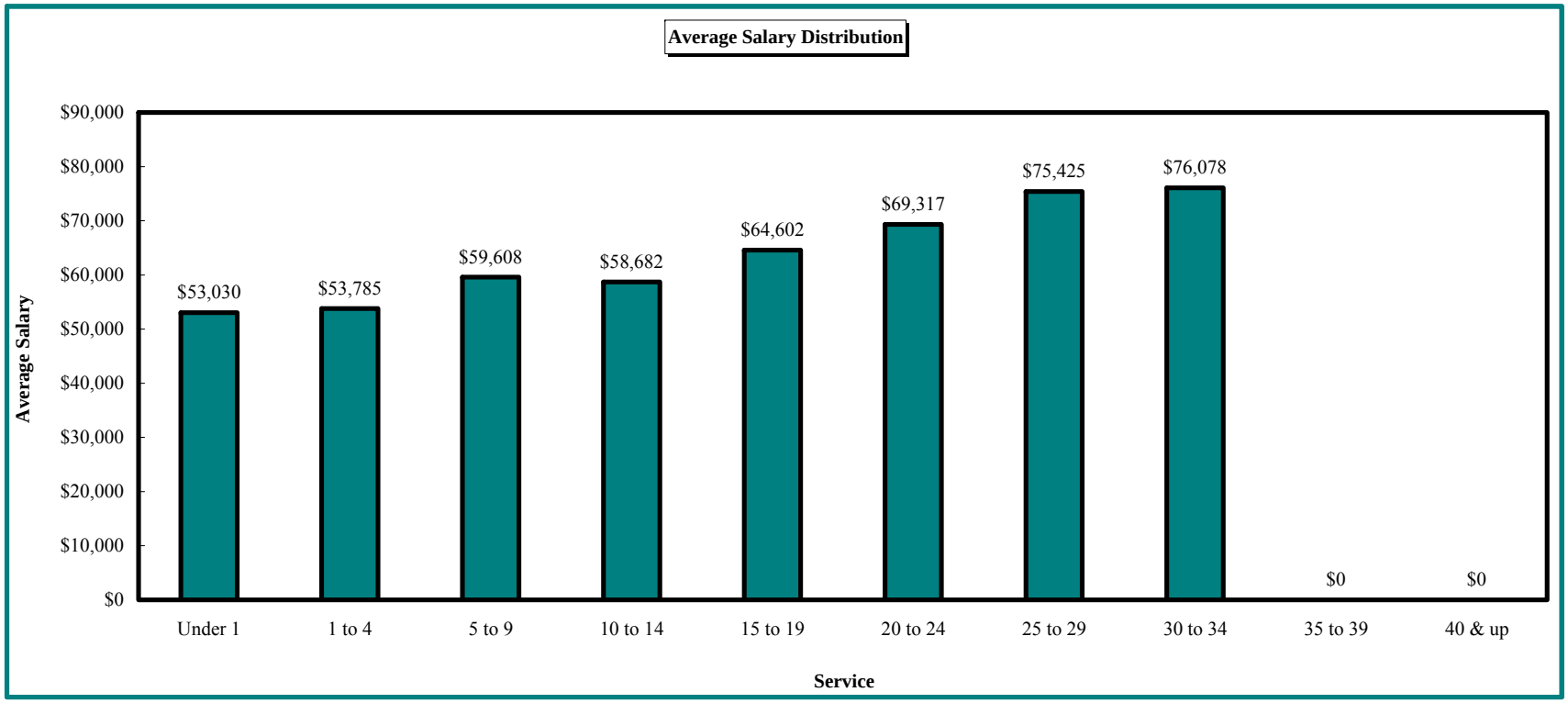
APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Active Members by Age as of June 30, 2013



APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Active Members by Service as of June 30, 2013



APPENDIX A
MEMBERSHIP INFORMATION

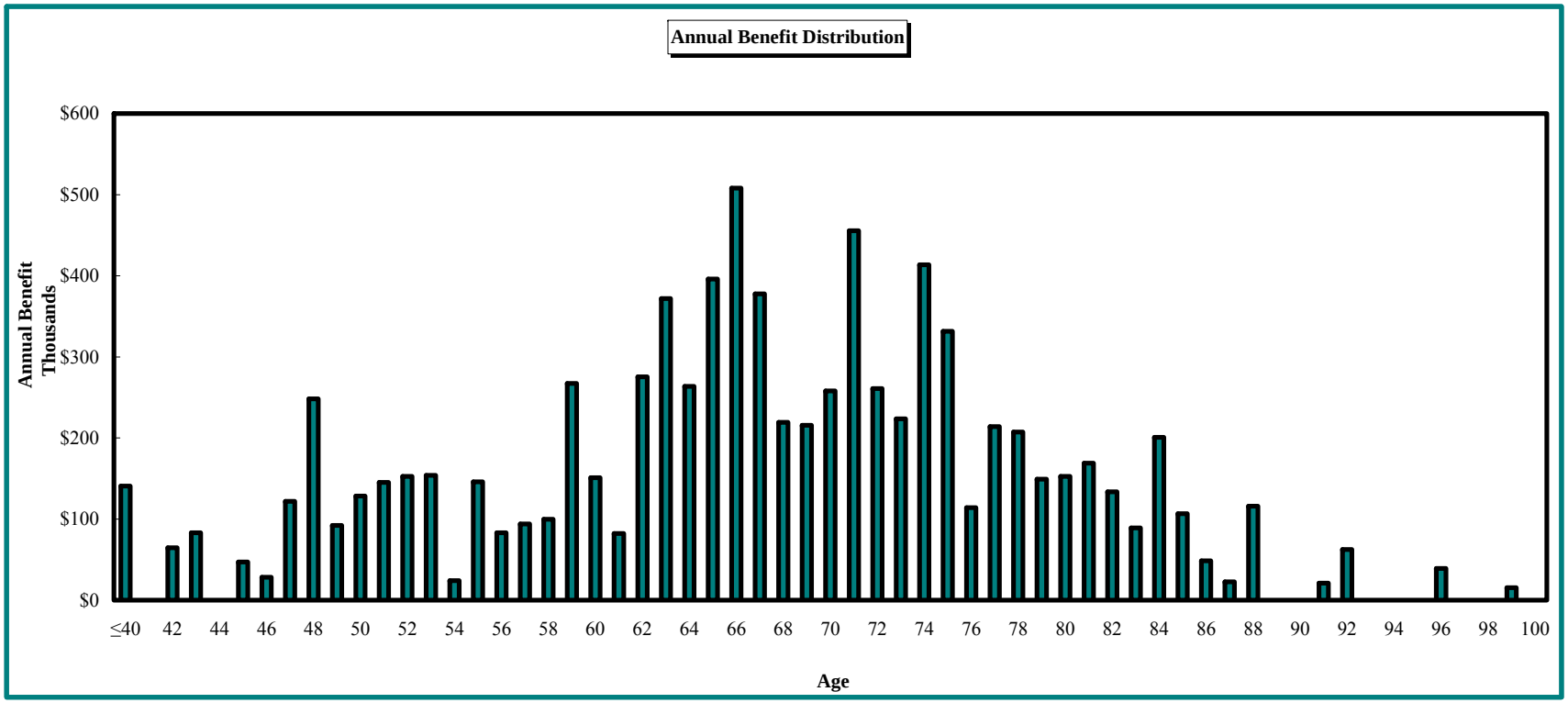
Montana Highway Patrol Officers' Retirement System Distribution of Retired Members, Survivors, and Disabled Members as of June 30, 2013

Age	Count	Annual Benefit	Age	Count	Annual Benefit
<25	4	$45,443	73	8	$223,478
25	0	$0	74	13	$413,359
26	0	$0	75	12	$331,503
27	0	$0	76	4	$114,096
28	0	$0	77	9	$214,071
29	0	$0	78	9	$207,261
30	0	$0	79	7	$149,136
31	0	$0	80	7	$152,628
32	0	$0	81	8	$168,935
33	0	$0	82	6	$133,661
34	1	$24,361	83	5	$89,134
35	1	$23,259	84	7	$200,615
36	0	$0	85	3	$106,710
37	0	$0	86	2	$48,292
38	1	$24,407	87	1	$22,668
39	0	$0	88	5	$115,771
40	1	$23,149	89	0	$0
41	0	$0	90	0	$0
42	3	$64,619	91	1	$20,945
43	3	$83,069	92	3	$62,229
44	0	$0	93	0	$0
45	2	$46,854	94	0	$0
46	1	$28,046	95	0	$0
47	4	$121,873	96	2	$39,099
48	8	$248,199	97	0	$0
49	4	$92,157	98	0	$0
50	5	$128,214	99	1	$15,318
51	4	$145,103	100	0	$0
52	4	$152,534	101	0	$0
53	7	$153,885	102	0	$0
54	1	$23,953	103	0	$0
55	5	$145,737	104	0	$0
56	2	$83,023	105	0	$0
57	3	$93,890	106	0	$0
58	3	$99,738	107	0	$0
59	8	$267,116	108	0	$0
60	6	$150,979	109	0	$0
61	3	$82,063	110	0	$0
62	8	$275,397	111	0	$0
63	11	$371,860	112	0	$0
64	9	$263,657	113	0	$0
65	11	$395,928	114	0	$0
66	18	$508,001	115	0	$0
67	10	$377,572	116	0	$0
68	5	$219,243	117	0	$0
69	8	$215,622	118	0	$0
70	9	$257,883	119	0	$0
71	15	$455,708	120	0	$0
72	9	$260,904			
			Totals	310	$8,782,354

The chart above reflects the counts and benefits used for valuation purposes as a result of data processing. The benefit amounts shown have been projected using a half year COLA assumption.

APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Retired Members, Survivors, and Disabled Members as of June 30, 2013



APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Terminated Vested Members as of June 30, 2013

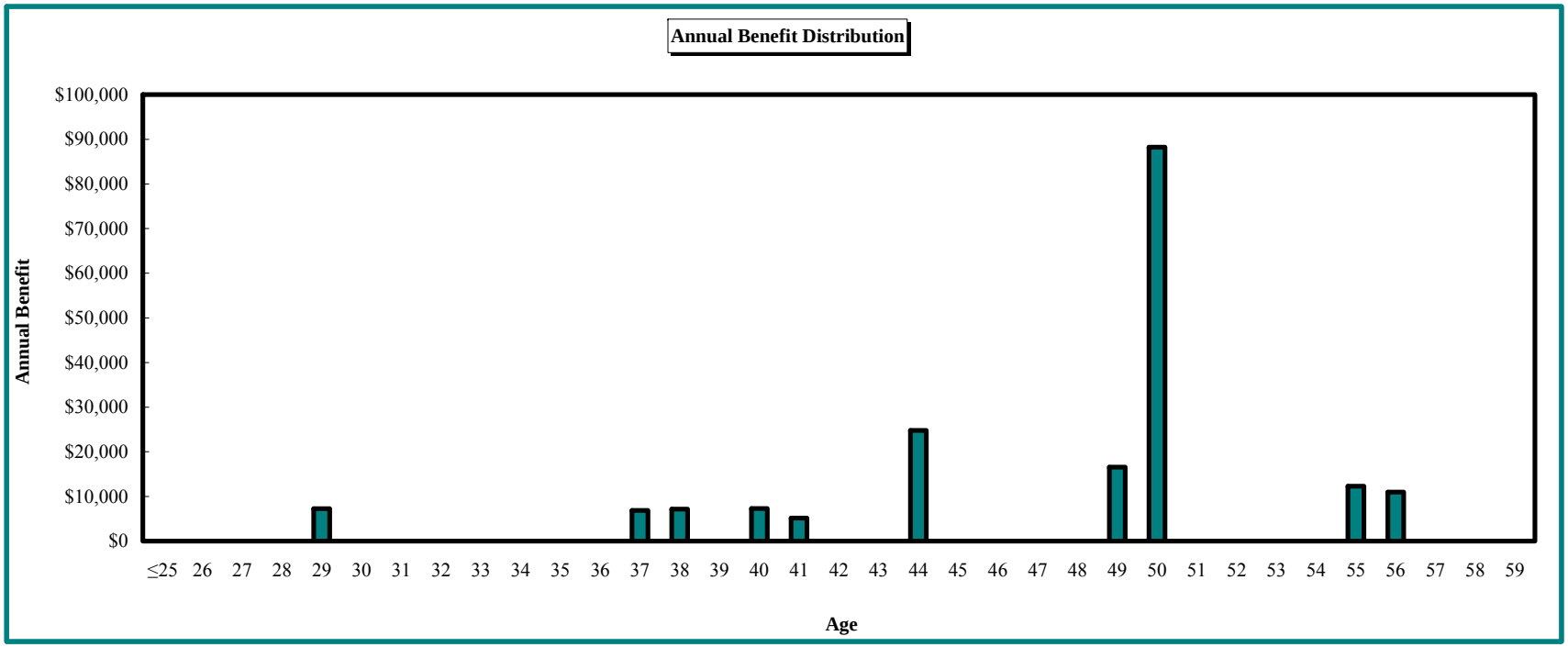
Age	Count	Annual Benefit*	Account Balance*	Age	Count	Annual Benefit*	Account Balance*
<25	0	$0	$0	73	0	$0	$0
25	0	$0	$0	74	0	$0	$0
26	0	$0	$0	75	0	$0	$0
27	0	$0	$0	76	0	$0	$0
28	0	$0	$0	77	0	$0	$0
29	1	$7,251	$0	78	0	$0	$0
30	0	$0	$0	79	0	$0	$0
31	0	$0	$0	80	0	$0	$0
32	0	$0	$0	81	0	$0	$0
33	0	$0	$0	82	0	$0	$0
34	0	$0	$0	83	0	$0	$0
35	0	$0	$0	84	0	$0	$0
36	0	$0	$0	85	0	$0	$0
37	1	$6,864	$0	86	0	$0	$0
38	1	$7,172	$0	87	0	$0	$0
39	0	$0	$0	88	0	$0	$0
40	1	$7,296	$0	89	0	$0	$0
41	1	$5,161	$0	90	0	$0	$0
42	0	$0	$0	91	0	$0	$0
43	0	$0	$0	92	0	$0	$0
44	1	$24,771	$0	93	0	$0	$0
45	1	$0	$12,472	94	0	$0	$0
46	0	$0	$0	95	0	$0	$0
47	0	$0	$0	96	0	$0	$0
48	0	$0	$0	97	0	$0	$0
49	1	$16,558	$0	98	0	$0	$0
50	3	$88,239	$0	99	0	$0	$0
51	0	$0	$0	100	0	$0	$0
52	0	$0	$0	101	0	$0	$0
53	1	$0	$10,583	102	0	$0	$0
54	0	$0	$0	103	0	$0	$0
55	1	$12,301	$0	104	0	$0	$0
56	1	$10,961	$0	105	0	$0	$0
57	0	$0	$0	106	0	$0	$0
58	0	$0	$0	107	0	$0	$0
59	0	$0	$0	108	0	$0	$0
60	0	$0	$0	109	0	$0	$0
61	0	$0	$0	110	0	$0	$0
62	0	$0	$0	111	0	$0	$0
63	0	$0	$0	112	0	$0	$0
64	0	$0	$0	113	0	$0	$0
65	0	$0	$0	114	0	$0	$0
66	0	$0	$0	115	0	$0	$0
67	0	$0	$0	116	0	$0	$0
68	0	$0	$0	117	0	$0	$0
69	0	$0	$0	118	0	$0	$0
70	0	$0	$0	119	0	$0	$0
71	0	$0	$0	120	0	$0	$0
72	0	$0	$0				
				Totals	14	$186,573	$23,055

** payable at the greater of age 60 or current age (use current age if member has 20 years of service)*

The chart above reflects the counts and benefits used for valuation purposes as a result of data processing.

APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Terminated Vested Members as of June 30, 2013



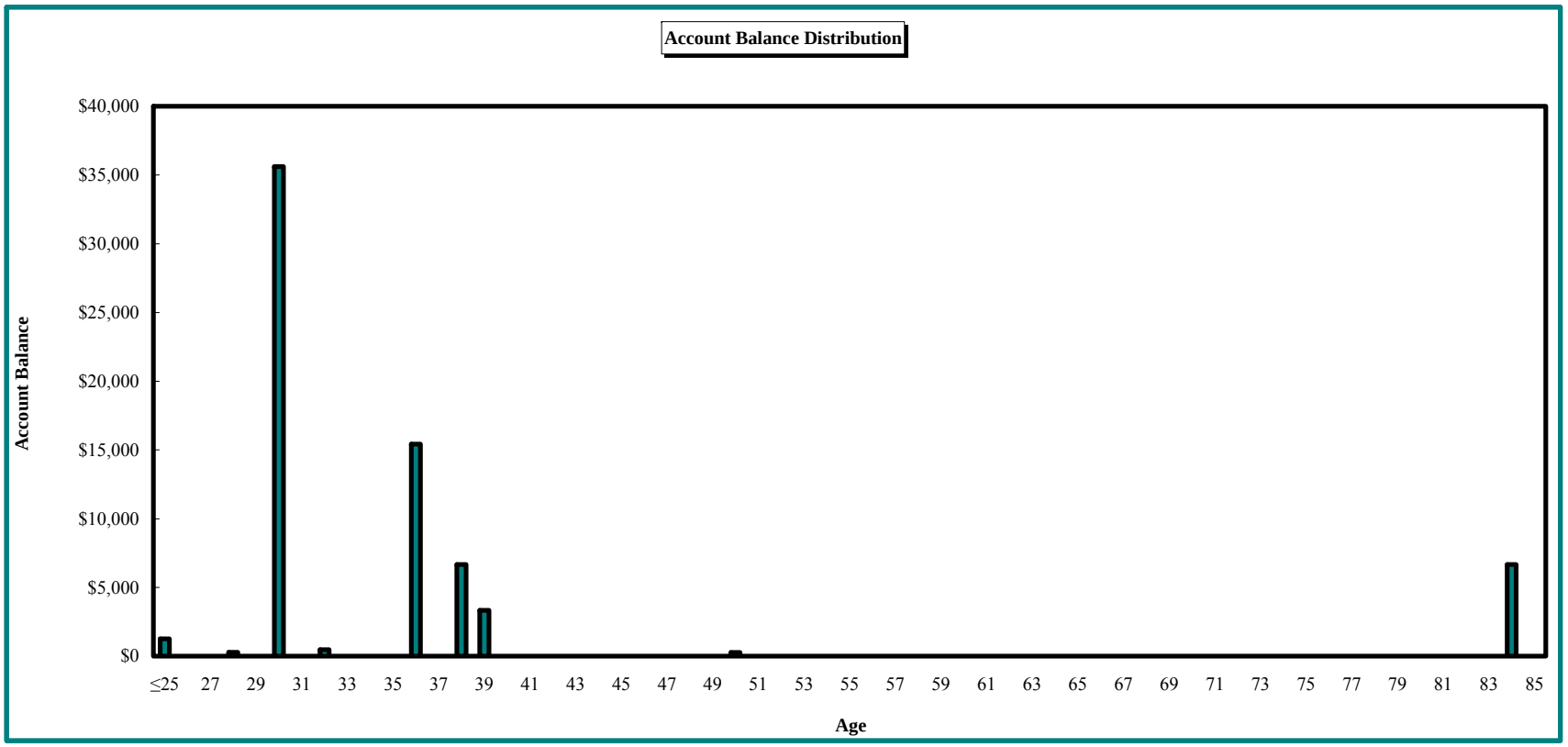
APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Terminated Non-Vested Members as of June 30, 2013

Age	Count	Account Balance	Age	Count	Account Balance
<25	1	$1,269	73	0	$0
25	0	$0	74	0	$0
26	0	$0	75	0	$0
27	0	$0	76	0	$0
28	1	$286	77	0	$0
29	0	$0	78	0	$0
30	2	$35,608	79	0	$0
31	0	$0	80	0	$0
32	1	$471	81	0	$0
33	0	$0	82	0	$0
34	0	$0	83	0	$0
35	0	$0	84	1	$6,676
36	1	$15,429	85	0	$0
37	0	$0	86	0	$0
38	2	$6,670	87	0	$0
39	1	$3,329	88	0	$0
40	0	$0	89	0	$0
41	0	$0	90	0	$0
42	0	$0	91	0	$0
43	0	$0	92	0	$0
44	0	$0	93	0	$0
45	0	$0	94	0	$0
46	0	$0	95	0	$0
47	0	$0	96	0	$0
48	0	$0	97	0	$0
49	0	$0	98	0	$0
50	1	$266	99	0	$0
51	0	$0	100	0	$0
52	0	$0	101	0	$0
53	0	$0	102	0	$0
54	0	$0	103	0	$0
55	0	$0	104	0	$0
56	0	$0	105	0	$0
57	0	$0	106	0	$0
58	0	$0	107	0	$0
59	0	$0	108	0	$0
60	0	$0	109	0	$0
61	0	$0	110	0	$0
62	0	$0	111	0	$0
63	0	$0	112	0	$0
64	0	$0	113	0	$0
65	0	$0	114	0	$0
66	0	$0	115	0	$0
67	0	$0	116	0	$0
68	0	$0	117	0	$0
69	0	$0	118	0	$0
70	0	$0	119	0	$0
71	0	$0	120	0	$0
72	0	$0			
			Totals	11	$70,004

APPENDIX A
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Terminated Non-Vested Members as of June 30, 2013



APPENDIX B
ACTUARIAL ASSUMPTIONS AND METHODS

A. Long-Term Assumptions Used to Determine Plan Costs and Liabilities

1. Demographic Assumptions

a. Healthy Retirees, Beneficiaries and Non-Retired Members

Male and Female RP-2000 Combined Employee and Annuitant Mortality Tables. To reflect mortality improvements since the date of the table and to project future mortality improvements, the tables are projected to 2015 using scale AA.

Sample Rates of Healthy Mortality		
Age	**Male**	**Female**
50	0.163%	0.130%
55	0.272%	0.241%
60	0.530%	0.469%
65	1.031%	0.900%
70	1.770%	1.553%
75	3.062%	2.492%
80	5.536%	4.129%
85	9.968%	7.076%
90	17.271%	12.588%

70% of deaths from active service are assumed to be duty related.

b. Disabled Inactive Mortality

Male and Female RP-2000 Combined Employee and Annuitant Mortality Tables with no projections. No future mortality improvement is assumed.

Sample Rates of Disabled Inactive Mortality		
Age	**Male**	**Female**
50	0.214%	0.168%
55	0.362%	0.272%
60	0.675%	0.506%
65	1.274%	0.971%
70	2.221%	1.674%
75	3.783%	2.811%
80	6.437%	4.588%
85	11.076%	7.745%
90	18.341%	13.168%

APPENDIX B
ACTUARIAL ASSUMPTIONS AND METHODS

c. Rates of Active Disability

Sample Rates of Active Disability	
Age	Rate
22	0.00%
27	0.10%
32	0.10%
37	0.10%
42	0.40%
47	0.40%
52	0.40%
57	0.40%
62	0.00%

75% of all disabilities are assumed to be duty related, and all disabilities are assumed to be permanent and without recovery.

d. Termination of Employment (Prior to Normal Retirement Eligibility)

Service	Rate
0	12.0%
1 – 4	7.5%
5 – 9	5.0%
10 – 14	3.0%
15 & over	1.0%

e. Probability of Electing a Refund of Member Contributions upon Termination

Probability of Electing Refund		
Age at Term.	Non-Vested	Vested
Under 35	100%	40%
35-39	100%	40%
40-44	100%	40%
45-49	100%	30%
50 & Over	100%	0%

APPENDIX B
ACTUARIAL ASSUMPTIONS AND METHODS

f. Retirement

Annual Retirement Rates	
Age	20 years or more
<50	12.00%
50 – 54	16.00%
55 – 59	20.00%
60 & over	100.00%

Vested terminations are assumed to retire at their earliest unreduced eligibility.

g. Merit/Seniority Salary Increase (in addition to across-the-board increase)

Service based table plus an annual inflation rate of 4.00% (rates shown below exclude amount for inflation).

Service	Annual Increase
1	7.3%
2	5.6%
3	4.4%
4	3.5%
5	2.8%
6	2.2%
7	1.7%
8	1.3%
9	1.0%
10	0.7%
11-15	0.4%
16-20	0.2%
21 & over	0.0%

h. Family Composition

Female spouses are assumed to be three years younger than males.

100% of non-retired employees are assumed married for both male and female employees.

Actual marital characteristics are used for pensioners.

APPENDIX B
ACTUARIAL ASSUMPTIONS AND METHODS

i. Vested Benefits for Terminated Members

Vested benefits for members who terminated during the years ending June 30, 2009 and later were estimated based upon compensation and service information in the census data. For members who terminated prior to June 30, 2008, vested benefits valued were the same as had been calculated by the prior actuary for the June 30, 2008 actuarial valuation.

2. Economic Assumptions

a. Rate of Investment Return:	7.75% (net of expenses)
b. Rate of Wage Inflation:	4.00% (3.00% inflation plus 1.00% real wage growth)
c. Interest on Member Contributions:	3.50%
d. Rate of Increase in Total Payroll (for Amortization):	4.00%

3. Changes since Last Valuation

None.

APPENDIX B
ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. Funding Method

The Entry Age Normal Actuarial Cost method is used to determine costs. Under this funding method, a normal cost is determined as a level percent of pay individually for each active employee.

The actuarial liability is that portion of the present value of projected benefits that will not be paid by future normal costs. The difference between this liability and funds accumulated as of the same date is referred to as the unfunded actuarial liability.

The portion of the actuarial liability in excess of Plan assets is amortized to develop an additional cost or savings which is added to each year's employer normal cost. Under this cost method, actuarial gains and losses are directly reflected in the size of the unfunded actuarial liability.

2. Actuarial Value of Assets

For purposes of determining the unfunded actuarial liability, we use an actuarial value of assets. The asset adjustment method dampens the volatility in asset values that could occur because of fluctuations in market conditions. Use of an asset smoothing method is consistent with the long-term nature of the actuarial valuation process.

The actuarial value of assets is the current market value, adjusted by a four-year smoothing of gains and losses on a market value basis. Each year's gain or loss is determined as the difference between the actual market return and the expected market return using the assumed rate of investment return.

3. Amortization Method

The unfunded actuarial liability is amortized as a level percentage of future payroll. The valuation determines the period over which the statutory contributions will fully amortize the unfunded actuarial liability.

4. Changes since Last Valuation

None.

APPENDIX C
SUMMARY OF PLAN PROVISIONS

1. Membership

The plan is a single employer defined benefit plan that covers all members of the Montana Highway Patrol including supervisors and assistant supervisors.

2. Contributions

For members not covered by GABA, members contribute 9% of their compensation. For members covered by GABA, members contribute 9.05% of their compensation. Interest is credited at rates determined by the Board.

Member contributions are made through an "employer pick-up" arrangement which results in deferral of taxes on the contributions.

The Employer contributes 36.33% of each member's compensation.

3. Service Credit

Service used to determine the amount of retirement benefit. One month of service credit is earned for each month where the member is paid for 160 hours. This includes certain transferred and purchased service.

4. Membership Service

Service used to determine eligibility for vesting, retirement, or other HPORS benefits. One month of membership service is earned for any month member contributions are made to HPORS regardless of hours worked.

5. Highest Average Compensation (HAC)

Highest Average Compensation (HAC) is the average of the highest 36 consecutive months (or shorter period of total service) of compensation paid to the member. Compensation is specifically defined in law.

6. Service Retirement

Eligibility: 20 years of membership service.

Benefit: 2.5% of highest average compensation times years of service credit.

APPENDIX C
SUMMARY OF PLAN PROVISIONS

7. Early Retirement

Eligibility: Age 50 with five years of membership service; if discontinued from service other than for cause.

Benefit: Normal retirement benefit calculated using highest average compensation and service credit at early retirement, and reduced to the actuarial equivalent based on a retirement age of 60.

8. Disability Benefit

Eligibility: Any active member.

Benefit: (i) For duty-related disability, (a) If less than 20 years of membership service: 50% of highest average compensation (b) If 20 years or more of membership service: 2.5% of highest average compensation multiplied by years of service credit.

(ii) For regular disability, the actuarial equivalent of the normal retirement benefit based on retirement age of 60.

9. Survivor's Benefit

Eligibility: Active or retired member.

Benefit: For duty-related deaths, a monthly survivor benefit to the surviving spouse or dependent child equal to 50% of highest average compensation of the member.

For non-duty-related deaths, the member's spouse will receive (or, if there is no surviving spouse or after the surviving spouse dies, each dependent child for as long as they remain dependent children will equally receive) a benefit that is the actuarial equivalent of the early retirement benefit.

A beneficiary may elect to receive the present value of a monthly benefit as a single lump sum.

For retired members without a surviving spouse or dependent child, the member's designated beneficiary will receive a payment equal to the retired member's accumulated contributions reduced by any retirement benefits already paid.

APPENDIX C
SUMMARY OF PLAN PROVISIONS

10. Vesting

Eligibility: Five years of membership service.

Benefit: Accrued normal retirement benefit, payable at normal or early retirement date. In lieu of a pension, a member may receive a refund of accumulated contributions. Upon receipt of a refund of contributions, a member's vested right to a monthly benefit shall be forfeited.

11. Withdrawal of Employee Contributions

Eligibility: Terminates service and is not eligible for other benefits.

Benefit: Accumulated member contributions. Upon receipt of a refund of contributions, a member's vested right to a monthly annuity is forfeited.

12. Form of Payment

The retirement benefit is paid for the retired member's life. Upon the death of the retired member, the benefit is paid to the surviving spouse. If there is no surviving spouse, or after the death of a surviving spouse, benefits are paid to the dependent children, if any, for as long as they remain dependent children.

13. Post Retirement Benefit Increases

For retired members who became active members on or after July 1, 1997 and those who elected to be covered under this provision, and who have been retired at least 12 months, a Guaranteed Annual Benefit Adjustment (GABA) will be paid each year in January equal to 3%.

For retired members who were hired prior to July 1, 1997 and who did not elect GABA, the minimum monthly benefit is provided equal to 2% times service credit multiplied by the current base compensation of a probationary highway patrol officer. Such benefit may not exceed 60% of the current base compensation of a probationary highway patrol office, and the annual increase may not exceed 5% of the current benefit.

For non-GABA members who retired prior to July 1, 1991 and meet eligibility requirements, a lump sum payment will be made each year based on the increase in the Consumer Price Index.

APPENDIX C
SUMMARY OF PLAN PROVISIONS

14. Changes since Last Valuation

Highest Average Compensation (HAC) CAP - House Bill 97, effective July 1, 2013:

- For members hired on or after July 1, 2013, establishes a 110% annual cap on compensation considered as part of a member's highest or final average compensation, with the excess compensation, if any, divided by the member's total months of service credit and added to the compensation for each month considered part of the member's highest or final average compensation.
- Bonuses paid on or after July 1, 2013 to any member will not be treated as compensation for retirement purposes. Employer and member contributions will no longer be paid on bonuses.

Revisions under House Bill 336, effective July 1, 2013:

- All HPORS members regardless of hire date:
  - State employer contributions increase from 36.33% to 38.33%,
  - Member contributions increase 1% annually for four years commencing in the fiscal year ended 2013, and
  - Benefit multiplier increases from 2.5% to 2.6%.
- HPORS members hired on or after July 1, 2013:
  - GABA is reduced from 3.0% to 1.5%,
  - GABA waiting period is increased from 1 year to 3 years, and
  - The vesting period is increased from 5 years to 10 years.

APPENDIX D
GLOSSARY

1. Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disability, and retirement; changes in compensation; inflation; rates of investment earnings, and asset appreciation or depreciation; and other relevant items.

2. Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a Normal Cost and an Actuarial Liability.

3. Actuarial 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, as determined in accordance with a particular Actuarial Cost Method.

4. Actuarial Liability

The portion of the Actuarial Present Value of Projected Benefits which will not be paid by future Normal Costs. It represents the value of the past Normal Costs with interest to the valuation date.

5. Actuarial Present Value (Present Value)

The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made. As a simple example: assume you owe $100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you won't be obligated to pay him. If the assumed investment return is 10%, the actuarial present value is as follows:

Amount		Probability of Payment	1/(1+Investment Return)		
$100	x	(1 - .01)	1/(1+.1)	=	$90

6. Actuarial Valuation

The determination, as of a specified date, of the Normal Cost, Actuarial Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

APPENDIX D
GLOSSARY

7. Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan as used by the actuary for the purpose of an Actuarial Valuation. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values. This way, long-term costs are not distorted by short-term fluctuations in the market.

8. Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of actuarial assumptions.

9. Amortization Payment

The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

10. Entry Age Normal Actuarial Cost Method

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages.

11. Funded Percentage

The ratio of the Actuarial Value of Assets to the Actuarial Liabilities.

12. Inflation (CPI)

The assumed increase in dollar related values in the future due to the general increase in the cost-of-living. The usual measure for inflation is the Consumer Price Index (CPI).

13. Investment Return Assumption

The assumed interest rate used for projecting dollar related values in the future.

14. Mortality Table

A set of percentages which estimates the probability of death at a particular point in time. Typically, the rates are annual and based on age and gender.

APPENDIX D
GLOSSARY

15. Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

16. Projected Benefits

Those pension plan benefit amounts which are expected to be paid in the future under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and increases in future compensation and service credits.

17. Unfunded Actuarial Liability

The excess of the Actuarial Liability over the Actuarial Value of Assets.