

VIA ELECTRONIC MAIL

February 5, 2018

Mr. Stephen G. Olish
Executive Director
Police Retirement System of St. Louis
2020 Market Street
St. Louis, Missouri 63103

Re: Cost Statement for Proposed Legislative Changes

Dear Steve:

As requested, we are providing a cost statement under Section 105.665 of the Missouri Revised Statutes relating to proposed legislative changes. These changes are described in our analysis entitled "Proposed Legislative Changes Analysis" presented to the Board of Trustees on January 24, 2018 (the "Analysis") and which is included with this letter. We are also including with this letter the Actuarial Valuation Report for the Police Retirement System as of October 1, 2017 (the "Valuation"), which includes some of the information required by Section 105.665.

The following is provided in support of the proposed changes to the Police Retirement System of St. Louis ("PRS"). Item numbers correspond to requirements of Section 105.665.

- (1) The level normal cost of plan benefits currently in effect is shown in Table IV-1 of the Valuation.
- (2) There is currently no contribution for unfunded liabilities since, under the Aggregate Cost Method, all such cost is included within normal cost.
- (3) The total contribution rate expressed in annual dollars and as percent of active employee payroll is shown in Table IV-1 of the Valuation.
- (4) It is our understanding that the City of St. Louis intends to pay the amount of contribution indicated in item (3) by September 30, 2018.
- (5) The plan's actuarial value of assets, the market value of assets, the actuarial accrued liability and the funded ratio is shown in Table I-1 of the Valuation.
- (6) The post change contribution rate is shown on pages 5 and 8 of the Analysis.
- (7) A 10-year projection of contributions, assets, actuarial liability and funded ratios is included at the end of this letter.
- (8) It is our understanding that the contributions shown in the projections would be required to be contributed by the City of St. Louis.
- (9) We do not believe that the proposed changes would impair the ability of the plan to meet its obligations currently in effect.
- (10) The actuarial assumptions are shown in Appendix B of the Valuation.
- (11) In our opinion, the actuarial assumptions in Appendix B are reasonable for purposes of the Valuation and the Analysis.

Mr. Stephen G. Olish
Police Retirement System of the City of St. Louis
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(12) The actuarial funding method used for the Valuation is the Aggregate Cost Method as described in Appendix B of the Valuation. For purposes of the Analysis, the following methods were used:

- (a) Actuarial Cost Method: Entry Age Normal
- (b) Amortization Method: The initial unfunded actuarial liability will be amortized as a level percentage of payroll over a 20-year period. Future changes in unfunded actuarial liability due to actuarial gains and losses and changes in actuarial assumptions will be amortized as a percentage of payroll over separate 20-year periods from the date of each such change.


This letter was prepared exclusively for the Police Retirement System for the purpose of providing information required under Section 105.665 of the Missouri Revised Statutes. This letter is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.


In preparing our report, we relied on information (some oral and some written) supplied by the System. This information includes, but is not limited to, the 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.

To the best of our knowledge, this letter 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 letter. This letter does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

Feel free to call Steve McElhaney at (703) 893-1456 ext. 1030 or Mike Noble at ext. 1209, should you have any questions.

Sincerely,
Cheiron


Stephen T. McElhaney, FSA, FCA, EA
Principal Consulting Actuary


Michael J. Noble, FSA, FCA, EA
Principal Consulting Actuary

Attachment



ATTACHMENT

Projection (Baseline, Aggregate)						
Year	Contribution %		Value of Assets		Accrued	Funded
	Dollars	Payroll	Actuarial	Market	Liability ¹	Ratio ¹
2017	33,103,540	40.96%	771,337,887	776,579,478	969,815,612	79.5%
2018	33,410,711	40.13%	787,526,667	798,739,343	986,979,871	79.8%
2019	33,543,910	39.12%	804,419,783	821,048,913	1,003,905,409	80.1%
2020	32,203,457	36.46%	834,123,304	843,803,720	1,020,954,483	81.7%
2021	30,937,387	34.01%	863,440,164	865,184,304	1,037,817,696	83.2%
2022	30,689,525	32.75%	882,359,519	883,566,850	1,052,953,045	83.8%
2023	30,436,423	31.54%	901,570,674	902,261,450	1,068,723,413	84.4%
2024	30,250,938	30.43%	920,942,978	921,236,285	1,085,067,687	84.9%
2025	30,182,693	29.48%	941,634,743	941,745,809	1,103,220,073	85.4%
2026	30,173,374	28.61%	960,772,872	960,831,568	1,120,203,581	85.8%

(1) Shows Entry Age Normal Accrued Liability and Funded Ratio

Projection (Baseline, Entry Age Normal)						
Year	Contribution %		Value of Assets		Accrued	Funded
	Dollars	Payroll	Actuarial	Market	Liability	Ratio
2017	29,153,191	36.07%	771,337,887	776,579,478	969,815,612	79.5%
2018	30,349,420	36.45%	783,576,317	794,788,994	986,979,871	79.4%
2019	31,416,139	36.64%	797,111,867	813,740,996	1,003,905,409	79.4%
2020	31,569,123	35.74%	824,139,523	833,819,939	1,020,954,483	80.7%
2021	31,748,976	34.90%	852,073,265	853,817,405	1,037,817,696	82.1%
2022	32,525,541	34.71%	870,951,692	872,159,024	1,052,953,045	82.7%
2023	33,261,827	34.46%	891,143,278	891,834,053	1,068,723,413	83.4%
2024	34,050,104	34.25%	912,558,931	912,852,238	1,085,067,687	84.1%
2025	34,950,851	34.14%	936,421,059	936,532,124	1,103,220,073	84.9%
2026	35,897,449	34.04%	959,936,320	959,995,015	1,120,203,581	85.7%

Projection (All Plan Changes, Entry Age Normal)						
Year	Contribution %		Value of Assets		Accrued	Funded
	Dollars	Payroll	Actuarial	Market	Liability	Ratio
2017	28,741,958	35.56%	776,579,478	771,337,887	972,024,402	79.4%
2018	29,802,790	35.80%	794,834,658	783,621,981	989,227,068	79.2%
2019	30,631,770	35.72%	813,742,852	797,113,722	1,006,095,808	79.2%
2020	30,601,332	34.65%	833,604,362	823,923,946	1,022,908,143	80.5%
2021	30,659,052	33.70%	853,239,281	851,495,141	1,039,382,550	81.9%
2022	31,270,874	33.37%	871,106,818	869,899,487	1,054,009,923	82.5%
2023	31,760,288	32.91%	890,160,616	889,469,840	1,069,116,782	83.2%
2024	32,314,369	32.51%	910,336,539	910,043,232	1,084,567,333	83.9%
2025	33,052,993	32.28%	932,949,192	932,838,127	1,101,590,971	84.7%
2026	33,841,420	32.09%	955,152,618	955,093,922	1,117,242,505	85.5%



The Police Retirement System of St. Louis

Actuarial Valuation Report as of October 1, 2017

Produced by Cheiron

January 2018

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LETTER OF TRANSMITTAL

January 19, 2018

Board of Trustees
The Police Retirement System of St. Louis
2020 Market Street
St. Louis, Missouri 63101

Dear Members of the Board:

At your request, we have conducted an actuarial valuation of The Police Retirement System of St. Louis as of October 1, 2017. The valuation is organized as follows:

- In Section I, **Board Summary**, we describe the purpose of an actuarial valuation and summarize the key results found in this valuation.
- The **Main Body** of the report presents details on the System's:
 - Section II - Assets
 - Section III - Liabilities
 - Section IV - Contributions
 - Section V - Financial Statement Information
- In the **Appendices**, we conclude our report with detailed information describing the System's membership (Appendix A), actuarial assumptions and methods employed (Appendix B), a summary of pertinent plan provisions (Appendix C), and the System's historical information (Appendix D).

Information required by GASB Statements No. 67 and No. 68 for the year ending September 30, 2016, has been provided in a separate report.

The results of this report rely on future System experience conforming to the underlying assumptions. To the extent that actual System experience deviates from the underlying assumptions, the results will vary accordingly.

In preparing our report, we relied on information (some oral and some written) supplied by The Police Retirement System of St. Louis staff. This information includes, but is not limited to the 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.


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 that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice as 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.


Board of Trustees
January 19, 2018
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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 report was prepared for The Police Retirement System of St. Louis for the purposes described herein and for the use by the Plan Auditor in completing an audit related to the matters 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, FCA, FSA, EA
Principal Consulting Actuary


Michael J. Noble, FCA, FSA, EA
Principal Consulting Actuary

**THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT**

SECTION I – BOARD SUMMARY

The primary purpose of the actuarial valuation and this report is to measure, describe, and identify as of the valuation date:

- The financial condition of the System,
- Past and expected trends in the financial progress of the System,
- The employer's contributions for Fiscal Year ending 2018, and
- Information required by the financial statements.

In the balance of this Board Summary, we present the basis upon which this year's valuation was completed, and the key findings of this valuation including a summary of all key financial results.

Valuation Basis

This October 1, 2017, valuation represents Cheiron's sixth valuation performed for The Police Retirement System of St. Louis. There were no changes to the actuarial methods, assumptions, or plan provisions since the October 1, 2016 valuation.

Key Findings of this Valuation

The key results of the October 1, 2017 actuarial valuation are as follows:

- The Funding Policy Contribution Requirement decreased from \$33,826,528 as of October 1, 2016 to \$33,104,561 as of October 1, 2017. This translates to a rate as a percent of total compensation decrease from 42.18% as of October 1, 2016 to 40.96% as of October 1, 2017.
- The unfunded Entry Age Normal (EAN) actuarial liability for The Police Retirement System of St. Louis (PRS) decreased from \$210 million on October 1, 2016 to \$198 million on October 1, 2017. This is the excess of the EAN actuarial liability over the actuarial value of assets.
- The System's funding ratio based on the Entry Age Normal actuarial liability, the ratio of actuarial asset value to the EAN actuarial liabilities increased from 78.0% as of October 1, 2016 to 79.5% as of October 1, 2017. The reasons for this change were as follows:
 - There was an expected decrease in the EAN unfunded actuarial liability of \$7.3 million from the employer and employee contributions made during the Plan Year.
 - During the year ended September 30, 2017, the System's assets earned 13.43% on a market value basis, but due to smoothing of prior investment gains, the return on the actuarial asset value was 7.08% (as compared to 7.50% assumed). This resulted in an actuarial loss on investments of \$0.4 million.
 - On the liability side, the System experienced a decrease in liability of \$4.6 million due to plan experience, primarily due to lower pay growth and cost-of-living increases than expected.

THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT

SECTION I – BOARD SUMMARY

Table I-1 below summarizes all the key results of the valuation with respect to the System's membership, assets and liabilities, and contributions. The results are presented and compared for both the current and prior plan year. For the current year, results are shown based upon actuarial assumptions before and after the changes.

TABLE I-1 The Police Retirement System of St. Louis Summary of Principal Results			
Valuation as of October 1:	2016	2017	Change
<u>Participant Counts</u>			
Active Participants	1,122	1,120	(0.18%)
DROP Participants (active)	147	141	(4.08%)
Retired and Disabled Participants	1,433	1,433	0.00%
Surviving Spouses and Children	<u>471</u>	<u>475</u>	0.85%
Total	3,173	3,169	(0.13%)
Total Valuation Compensation ¹	\$75,024,572	\$75,585,052	0.75%
Average Valuation Compensation ²	58,000	58,860	1.48%
Average Age ²	38.99	39.26	0.68%
Average Service ²	11.70	11.88	1.59%
<u>Assets and Liabilities</u>			
EAN Actuarial Liability	\$954,458,462	\$969,815,612	1.61%
Actuarial Value of Assets	744,511,885	<u>771,337,887</u>	3.60%
Unfunded Actuarial Liability	\$209,946,577	\$198,477,725	(5.46%)
Funded Ratio	78.0%	79.5%	
Market Value of Assets (MVA)	709,237,644	776,579,478	9.49%
Funded Ratio (MVA basis)	74.3%	80.1%	
Present Value of Future Benefits	1,060,469,723	1,075,932,180	1.46%
Present Value of Future Member Contributions	38,940,695	38,818,084	(0.31%)
<u>Summary of Costs</u>			
Total Expected Compensation	\$74,596,522	\$75,188,904	0.79%
Aggregate Normal Cost Rate	40.72%	39.37%	
Aggregate Normal Cost	\$30,375,704	\$29,601,872	(2.55%)
Expected Administrative Expenses	1,131,000	1,237,000	9.37%
Total Contribution Rate	42.18%	40.96%	
Funding Policy Contribution ³	\$33,826,528	\$33,104,561	(2.13%)

¹ Total Valuation Compensation is the total annual compensation in effect for all employees (including DROP participants) as of the valuation date.

² Average Valuation Compensation, Average Age, and Average Service do not include current DROP participants but do include former DROP participants who have returned to active service.

³ Funding Policy Contribution includes interest to the end of year.

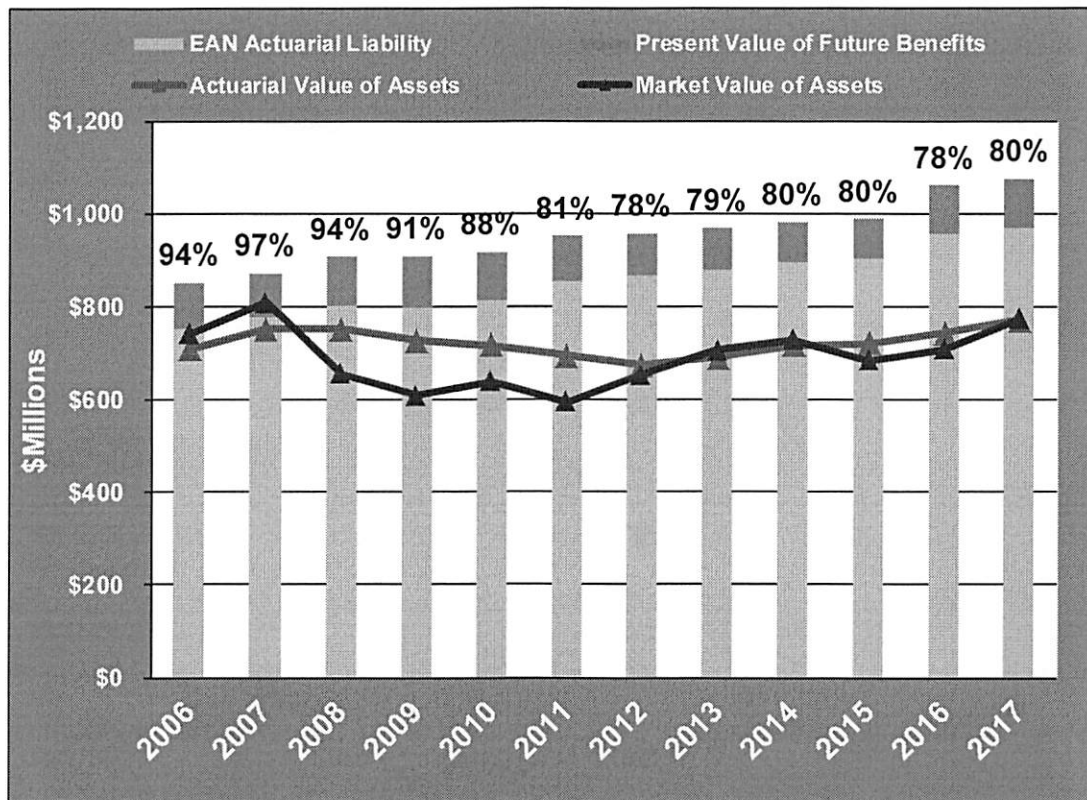
THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT

SECTION I – BOARD SUMMARY

A. Historical Trends

Despite the fact that for most retirement systems, the greatest attention is given to the current valuation results and in particular the size of the current unfunded actuarial liability and the employer's contribution, it is important to remember that each valuation is merely a snapshot in the long-term progress of a pension fund. It is more important to judge a current year's valuation result relative to historical trends, as well as trends expected into the future.

Assets and Liabilities



The above chart compares the Actuarial Value of Assets to the actuarial liabilities and shows the funded ratio, which is a comparison of the Actuarial Value of Assets and Entry Age Normal (EAN) Actuarial Liability. There was an increase in the Market Value of Assets from \$709 million to \$777 million, returning 13.43%. With the asset smoothing method in place, the actuarial value of assets has tracked a slightly smoother path through the volatility of the Market Value of Assets. As can be seen in the graph, the Actuarial Value of Assets increased from 2016 to 2017 returning 7.08%.

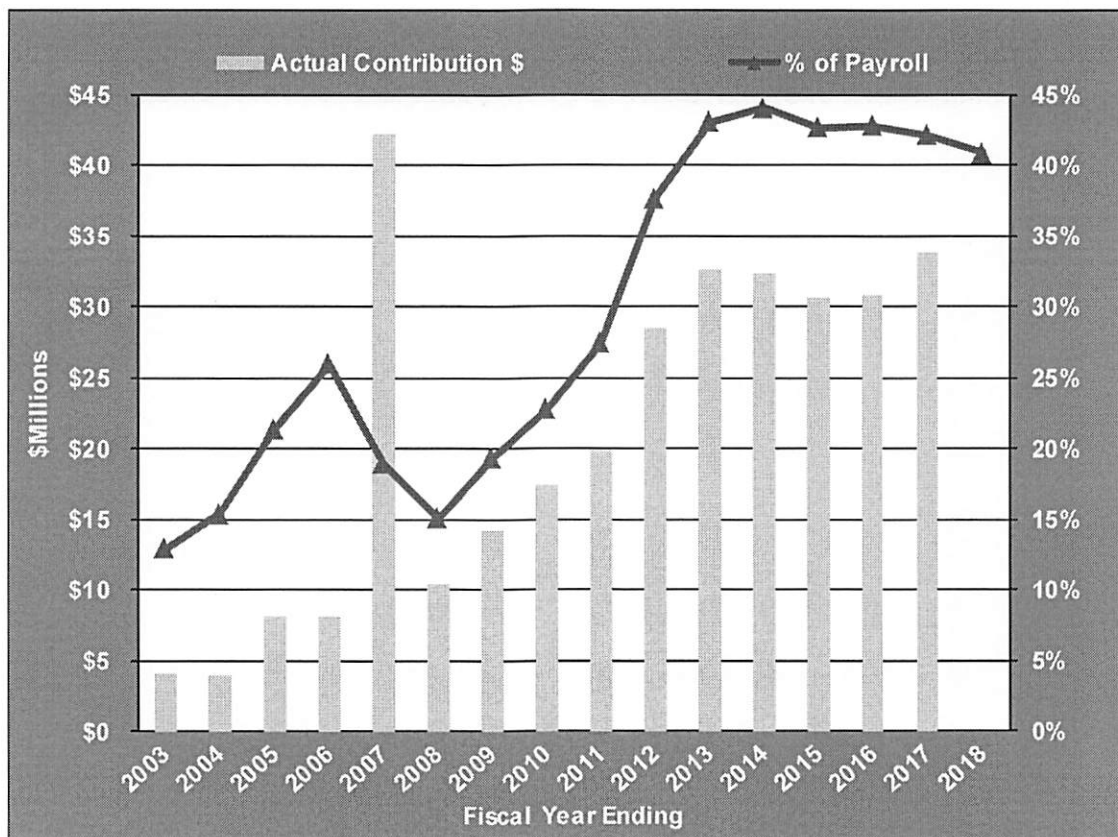
The top of the pink bar represents the Present Value of Future Benefits (PVFB), which is used in the calculation of the funding policy contribution under the Aggregate Cost Method.

THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT

SECTION I – BOARD SUMMARY

Contribution Rates

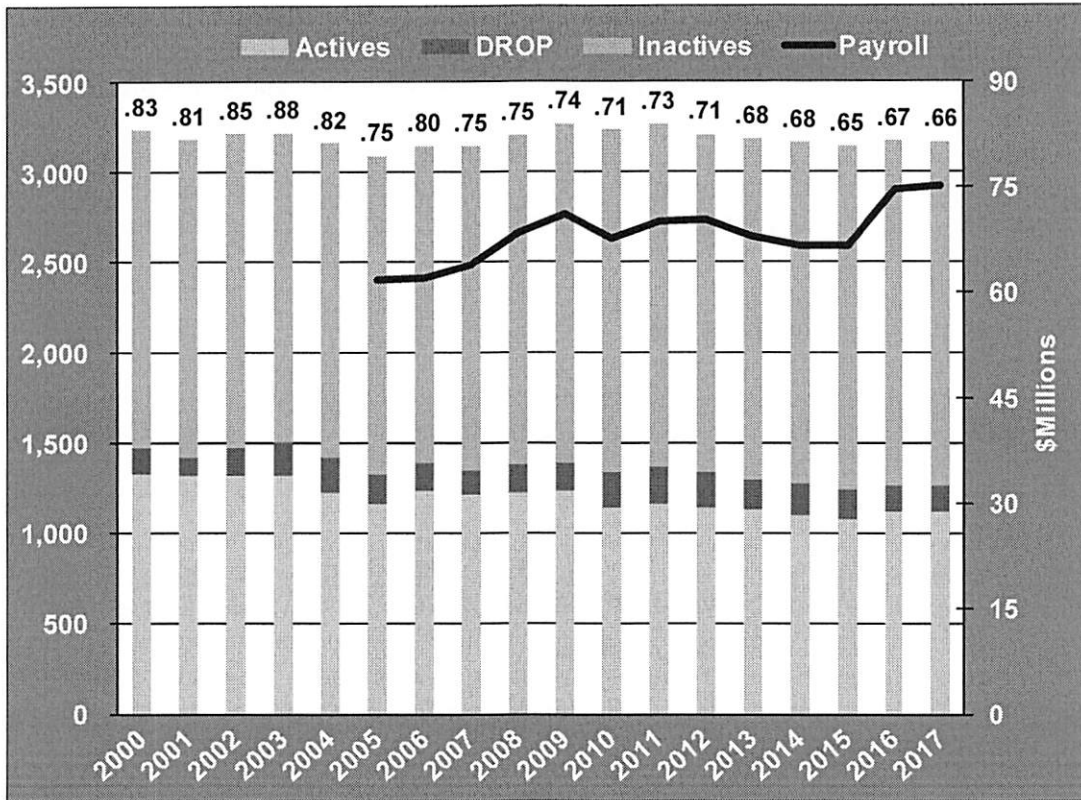
The yellow bars in this graph show the dollar amount of employer contributions made to the System (depicted on the left hand scale) since Fiscal Year Ending 2003. The green line shows the actuarial contribution rate as a percent of payroll (depicted on the right hand scale). The 2007 contribution amount reflects special contributions made by the City in excess of that year's actuarial contribution. The sharp increases in contributions from 2008 to 2013 reflect the large investment losses that occurred in 2008 and 2009. The actuarial employer contribution rate decreased from 42.18% of payroll in 2016 to 40.96% of payroll in 2017.



**THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT**

SECTION I – BOARD SUMMARY

Participant Trends



The above chart provides a measure for the maturity in the System, by comparing the ratio of active members (including current DROP participants) to inactive members (retirees and beneficiaries). The active-to-inactive ratio has declined since 2000 from 0.83 actives supporting each inactive member to 0.66 actives supporting each inactive member today, which indicates a more mature plan. The black line represents the total plan payroll since the 2006 valuation.

THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT

SECTION I – BOARD SUMMARY

B. Future Expected Financial Trends

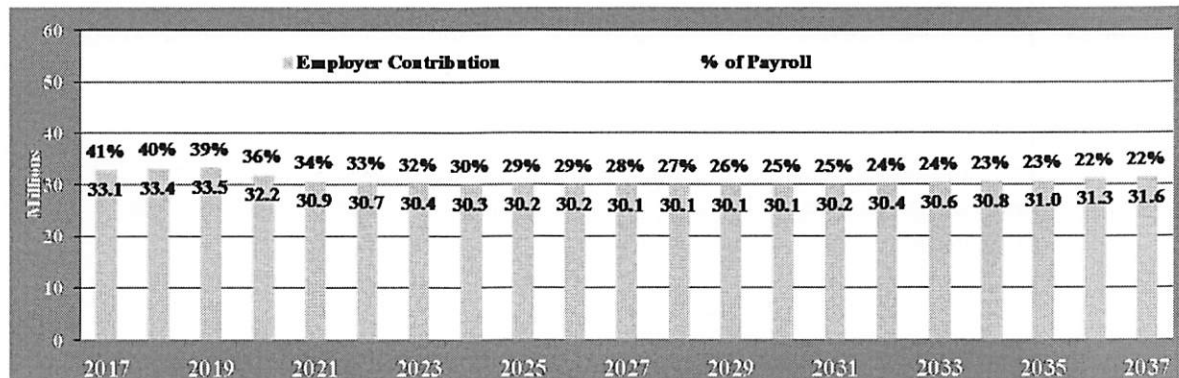
The analysis of projected financial trends is perhaps the most important component of this valuation. In this Section, we present the implications of the October 1, 2017 valuation results in terms of (1) the projected employer contributions, and (2) projected System's funded status (ratio of assets over liabilities). For each projection set, we assume three different future investment return scenarios: Baseline returns of 7.50%, optimistic returns of 9.00%, and pessimistic returns of 6.00%. The projections assume that the liabilities are calculated using a 7.50% liability interest rate and that there will be no future gains or losses on the liability.

1. Contribution Rate Projections

The first set of charts show the employer's projected actuarially determined contribution rates (gold bars). The years shown in the charts are plan years beginning October 1.

Baseline returns of 7.50%

The chart below shows that the actuarially determined contribution rate will slowly decline from 41% to a level of 22% of pay by 2037. These projections assume that the System earns the assumed investment rate of 7.50% on market value. The expected decrease in contribution is due to spreading the unfunded actuarial liability over the present value of future salaries, which has the effect of amortizing the unfunded liability over a relatively short period.

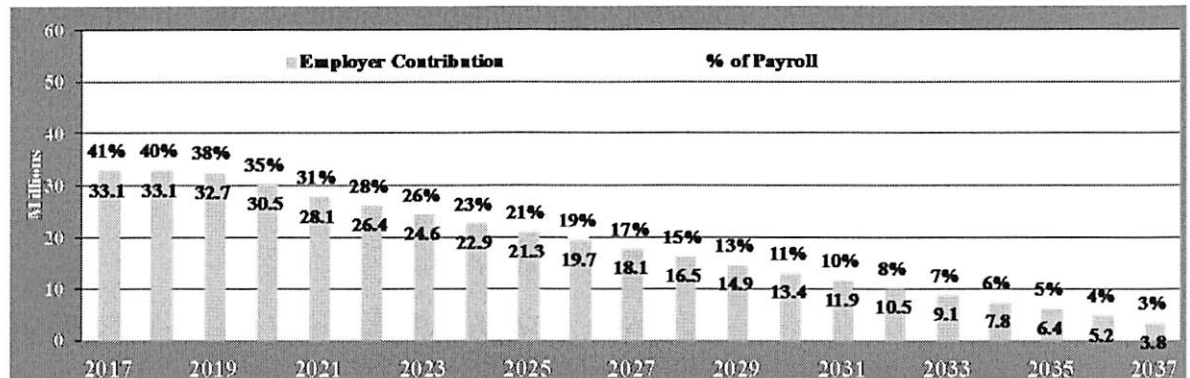


**THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT**

SECTION I – BOARD SUMMARY

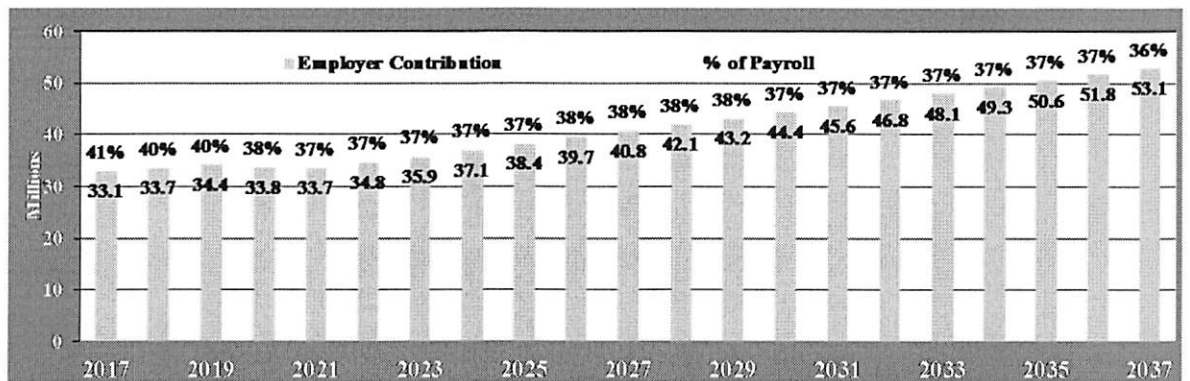
Optimistic returns of 9.00%

If the System earns 1.50% greater than the assumed rate in each year of the projection, the actuarially determined contribution rate will steadily decrease to 3% in 20 years.



Pessimistic returns 6.00%

If the System earns 1.50% less than the assumed rate in each year of the projection, the actuarially determined contribution rate decreases slightly for the next 20 years to about 36% of projected payroll as of 2037, while the dollar amount of the contribution slowly increases.



THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT

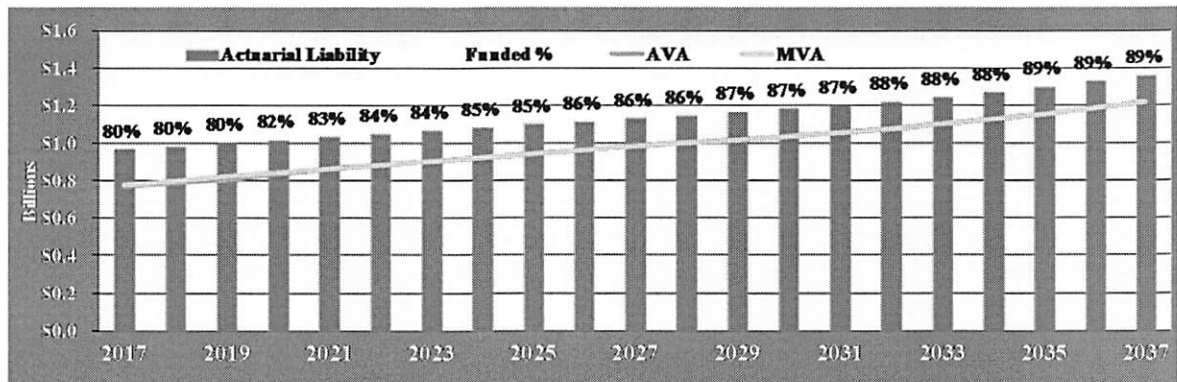
SECTION I – BOARD SUMMARY

2. Asset and Liability Projections

This next set of projection charts compare the Market Value of Assets (green line) and the actuarial or smoothed value of assets (gold line) to the System's Entry Age Normal actuarial liability (gray bars). In addition, at the top of each chart, we show the System's funded ratio (ratio of actuarial value of assets to actuarial liability). The projections assume that the actuarially determined contributions, as shown in the previous charts, are made each year. The years shown in the chart signify the valuation date as of October 1.

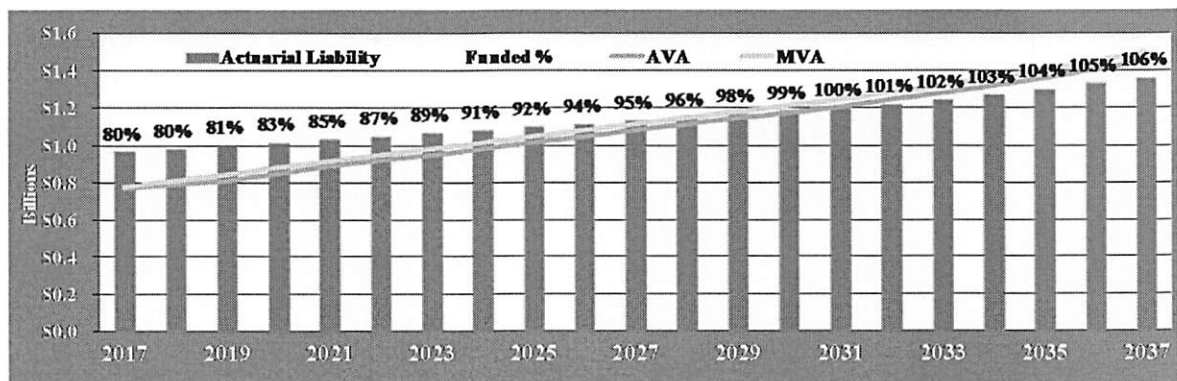
Baseline 7.50% return

Assuming that the System earns the assumed investment rate of 7.50%, the funded ratio will steadily increase from 80% to 89% during the 20-year period.



Optimistic Returns of 9.00%

If the System earns 1.50% greater than the assumed rate of return in each year of the projection, the funded ratio will increase to 106% by 2037.

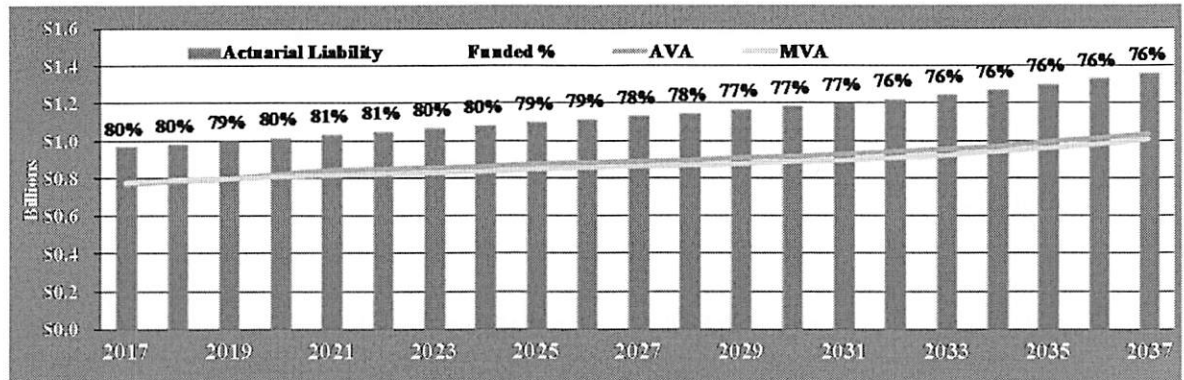


**THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT**

SECTION I – BOARD SUMMARY

Pessimistic Returns of 6.00%

If the System earns 1.50% less than the assumed rate of return in each year of the projection, the funded ratio will increase initially then decline to 76% during the 20-year period.



THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT

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 impact benefit levels, employer contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on the System's assets including:

- **Disclosure** of the System's assets as of October 1, 2016, and October 1, 2017;
- Statement of the **changes** in market values during the year;
- Development of the **Actuarial Value of Assets** and;
- An estimate of **investment return**.

Disclosure

There are two types of asset values disclosed in this valuation, the Market Value of Assets and the Actuarial Value of Assets. The market value represents a "snap-shot" or "cash-out" value that provides 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. As a result, actuarial value of assets that reflect smoothing of annual investment returns is more suitable for determining relatively stable contribution rates.

Table II-1 below discloses and compares each asset value as of September 30, 2016, and 2017.

TABLE II-1 Statement of Assets at Market Value as of September 30,			
Assets	2016	2017	% Change
Cash	\$ 6,939,857	\$ 7,738,903	11.51%
Money market funds	33,969,403	43,466,941	27.96%
Collective equity investment funds	136,083,551	194,136,187	42.66%
Corporate stocks	209,746,686	188,015,229	(10.36%)
Real estate securities fund	73,502,231	59,907,314	(18.50%)
Collective fixed income investment funds	15,129,984	15,338,624	1.38%
Corporate bonds	57,884,568	51,693,576	(10.70%)
Government securities	24,795,244	12,174,051	(50.90%)
Mortgage backed securities	16,792,300	20,157,533	20.04%
Hedge fund of funds	34,102,373	37,015,903	8.54%
Partnership interest	98,534,424	146,544,244	48.72%
Investment property	862,700	881,629	2.19%
Receivables	2,389,947	1,034,245	(56.73%)
Capital assets, net of depreciation	296,346	243,535	(17.82%)
Misc. Liabilities	(1,955,537)	(1,768,436)	(9.57%)
Market Value of Assets	\$ 709,237,644	\$ 776,579,478	9.49%

**THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT**

SECTION II – ASSETS

Changes in Market Value

Table II-2 below shows the components of change between the Market Value of Assets as of September 30, 2016, and September 30, 2017.

TABLE II-2 Changes in Market Values		
Value of assets --September 30, 2016		\$ 709,237,644
<u>Additions</u>		
Payments from Members	\$ 4,653,968	
Employer Contributions	33,826,528	
Interest and Dividends	9,120,698	
Investment Return	87,184,581	
Total Additions	134,785,775	
<u>Deductions</u>		
Investment Expenses	\$ 2,785,200	
Benefit Payments	59,959,184	
Refunds of Employee Contributions	3,493,396	
Administrative Expenses	1,206,161	
Total Deductions	67,443,941	
Value of assets --September 30, 2017		\$ 776,579,478

**THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
OCTOBER 1, 2017 ACTUARIAL VALUATION REPORT**

SECTION II – ASSETS

Actuarial Value of Assets

The next table, Table II-3 shows how the Actuarial Value of Assets is developed. The Actuarial Value of Assets method was initialized at market value as of October 1, 2005.

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 80% of the investment gain/(loss) during the preceding year, less 60% of the investment gain/(loss) during the second preceding year, less 40% of the investment gain/(loss) during the third preceding year, and less 20% of the investment gain/(loss) in the fourth preceding year. If the actuarial value of assets is less than 80% or more than 120% of the market value, an adjustment is made to the actuarial value to bring the value within this corridor. The table below illustrates the calculation of actuarial value of assets for the October 1, 2017, valuation.

Table II-3 Development of Actuarial Value of Assets		
1. Actuarial value of assets at September 30, 2016		\$ 744,511,885
2. Employer contributions		33,826,528
3. Payments from members		4,653,968
4. Benefit payments and administrative expenses		(64,658,741)
5. Expected return at 7.50%		<u>53,415,828</u>
6. Expected value at September 30, 2017		\$ 771,749,468
7. Actual return on assets at September 30, 2017		<u>93,520,079</u>
8. Investment (gain)/ loss [5. – 7.]		\$ (40,104,251)
	Total	
	Gain/(Loss)	Excluded Portion
Exclude 0% of 2013 gain/(loss)	\$ 26,225,042	\$ 0
Exclude 20% of 2014 gain/(loss)	(4,171,364)	(834,273)
Exclude 40% of 2015 gain/(loss)	(62,609,819)	(25,043,928)
Exclude 60% of 2016 gain/(loss)	(1,606,015)	(963,609)
Exclude 80% of 2017 gain/(loss)	40,104,251	<u>32,083,401</u>
Total excluded gain/(loss) for ACTUARIAL VALUE OF ASSETS calculation		\$ 5,241,591
Market value of assets at September 30, 2017		\$ 776,579,478
Total gain/(loss) excluded		<u>5,241,591</u>
9. Actuarial value of assets at September 30, 2017		771,337,887
10. Actuarial value of assets gain / (loss) [9. – 6.]		(411,581)

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SECTION II – ASSETS

Investment Performance

The market value of assets (MVA) returned 13.43% during plan year ending September 30, 2017, which is more than the assumed 7.50% return. A return of 7.08% was experienced on the actuarial value of assets (AVA), resulting in an actuarial loss for the year. Below we show additional historical returns.

	TABLE II-4 Historical Returns	
	MVA	AVA
2008	-14.10%	6.30%
2009	0.80%	4.30%
2010	11.70%	3.50%
2011	-1.87%	2.00%
2012	14.34%	0.13%
2013	12.02%	5.54%
2014	6.93%	7.17%
2015	-1.17%	5.41%
2016	7.89%	7.24%
2017	13.43%	7.08%

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SECTION III – LIABILITIES

In this section, we present detailed information on the System's liabilities including:

- **Disclosure** of the System's liabilities as of October 1, 2016, and October 1, 2017, and
- Statement of **changes** in these liabilities during the year.

Disclosure

Several types of measures of liability are calculated and presented in this report. Each type is distinguished by the purpose for which the measure is used.

- **Present Value of All Future Benefits:** This measure represents the amount of money needed today to fully fund all benefits of the System both earned as of the valuation date and those expected to be earned in the future by current plan participants, under the current plan provisions if all assumptions are met. This measure of liability is used under the Aggregate Cost Method in the calculation of the required contribution.
- **Entry Age Normal Actuarial Liability:** Calculated as of the valuation date as the present value of benefits allocated to service prior to that date. This liability is used for disclosure of the unfunded actuarial liability in financial statements.

These liabilities are for funding purposes and are not appropriate for measuring the cost of settling plan liabilities by purchasing annuities or paying lump sums.

Table III-1, which follows, discloses each of these measures of liability for the current and prior valuations.

TABLE III-1 Measures of Liability		
	October 1, 2016	October 1, 2017
<u>Present Value of Future Benefits</u>		
Active Participants	\$ 280,829,367	\$ 283,444,526
DROP and Re-entered Participants	177,794,575	185,881,330
Retired, Disabled, and Beneficiaries	601,845,781	606,606,324
Present Value of Future Benefits (PVB)	\$ 1,060,469,723	\$ 1,075,932,180
<u>Entry Age Normal Actuarial Liability</u>		
Active Participants	\$ 174,818,106	\$ 177,327,958
DROP and Re-entered Participants	177,794,575	185,881,330
Retired, Disabled, and Beneficiaries	601,845,781	606,606,324
Entry Age Normal Actuarial Liability (EAN AL)	\$ 954,458,462	\$ 969,815,612

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SECTION III – LIABILITIES

Changes in Entry Age Normal (EAN) Actuarial Liability

Each of the measures of liability disclosed in the prior table is 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 changing 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

The unfunded EAN actuarial liability will change because of all of the above, and also due to changes in plan assets resulting from:

- Employer contributions
- Investment earnings
- A change in the method used to measure plan assets

In each valuation, we report on those elements of change that 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.

In the table that follows, we show the components of change in the actuarial liability between October 1, 2016, and October 1, 2017.

TABLE III-2		EAN Actuarial Liability
Liabilities as of October 1, 2016	\$	954,458,462
Liabilities as of October 1, 2017		969,815,612
Liability Increase/(Decrease)		15,357,150
Change Due to:		
Plan Amendments	\$	0
Assumption Changes		0
Experience (Gain)/Loss		(4,558,216)
Benefits Accumulated and Other Sources		19,915,366

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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 **Aggregate Actuarial Cost Method**. This method is known as a spread-gain method. The chief characteristic of a spread-gain method is that the difference between the Actuarial Value of Assets and the present value of total benefit obligations is funded over the future working lifetime of current participants in the form of a continually resetting normal cost.

Table IV-1 below presents and compares the employer contribution rates for the System for this valuation and the prior one. The Funding Policy Contribution is the end of year value of the calculated Normal Cost.

TABLE IV-1 Employer Contribution Rate		
	October 1, 2016	October 1, 2017
1. Present Value of Future Benefits	\$ 1,060,469,723	\$ 1,075,932,180
2. Actuarial Value of Assets (AVA)	744,511,885	771,337,887
3. Present Value of Future Member Contributions	<u>38,940,695</u>	<u>38,818,084</u>
4. Total Assets (2. + 3.)	783,452,580	810,155,971
5. Present Value of Future Normal Contributions (1. – 4.)	277,017,143	265,776,209
6. Present Value of Future Salaries	680,321,883	675,079,510
7. Normal Cost Rate (5. ÷ 6.)	40.72%	39.37%
8. Expected Salaries of Active Participants	\$ 74,596,522	\$ 75,188,904
9. Normal Cost (7. × 8.)	30,375,704	29,601,872
10. Expected Administrative Expenses	1,131,000	1,237,000
11. Funding Policy Contribution Requirement (9. × 1.075 + 10. × 1.075 ^{0.5})	33,826,528	33,104,561

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SECTION V – FINANCIAL STATEMENT INFORMATION

The Government Finance Officers Association (GFOA) maintains a checklist of items to be included in a public retirement system's Comprehensive Annual Financial Report (CAFR) in order to receive recognition for excellence in financial reporting. Although the Police Retirement System does not issue a CAFR under GFOA guidelines, we have included certain schedules in this section for possible inclusion within the System's audited financial statements.

Table V-1 is a history of gains and losses in actuarial liability, Table V-2 shows the funding progress of EAN actuarial liability using Actuarial Value of Assets, and Table V-3 shows the funding progress using the Market Value of Assets.

<p style="text-align: center;">Table V-1 Analysis of Financial Experience Gain and Loss in Unfunded Actuarial Liability During Years Ended September 30 Resulting from Differences Between Assumed Experience and Actual Experience <i>Gain (or Loss) for Year ending September 30.</i></p>					
Type of Activity	2013	2014	2015	2016	2017
Investment Income	\$ (9,537,515)	\$ (309,743)	\$ (15,009,015)	\$ (2,248,723)	\$ (411,581)
Combined Liability Experience	<u>1,552,852</u>	<u>1,615,731</u>	<u>3,094,431</u>	<u>(1,379,642)</u>	<u>4,558,216</u>
Gain (or Loss) During Year from Financial Experience	(7,984,663)	1,305,988	(11,914,584)	(3,628,365)	4,146,635
Non-Recurring Gain (or Loss) Items	<u>0</u>	<u>0</u>	<u>0</u>	<u>(34,511,183)</u>	<u>0</u>
Composite Gain (or Loss) During Year	(7,984,663)	1,305,988	(11,914,584)	(38,139,548)	4,146,635

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SECTION V – FINANCIAL STATEMENT INFORMATION

Table V-2
Schedule of Funding Progress under Entry Age Normal Method – AVA

Valuation Date October 1,	Actuarial Value of Assets (a)	Actuarial Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (c)	Funded Ratio (a) / (b)	Covered Payroll ¹ (c)	UAAL as a Percent of Covered Payroll [(b) – (a)] / (c)
2006	\$709,290,911	\$ 754,021,412	\$ 44,730,501	94.1%	\$ 62,178,772	71.9%
2007	752,501,900	775,668,726	23,166,826	97.0%	63,834,814	36.3%
2008	752,273,226	803,417,002	51,143,776	93.6%	68,572,905	74.6%
2009	727,139,060	799,587,050	72,447,990	90.9%	71,095,081	101.9%
2010	718,136,742	814,926,868	96,790,126	88.1%	67,593,989	143.2%
2011	695,421,570	855,617,994	160,196,424	81.3%	70,076,650	228.6%
2012	674,080,072	864,762,285	190,682,213	77.9%	70,327,982	271.1%
2013	690,731,190	879,906,781	189,175,591	78.5%	68,073,148	277.9%
2014	717,381,498	895,655,967	178,274,469	80.1%	66,555,276	267.9%
2015	720,811,717	901,758,011	180,946,294	79.9%	66,724,796	271.2%
2016	744,511,885	954,458,462	209,946,577	78.0%	74,596,522	281.4%
2017	771,337,887	969,815,612	198,477,725	79.5%	75,188,904	264.0%

Table V-3
Schedule of Funding Progress under Entry Age Normal Method – MVA

Valuation Date October 1,	Market Value of Assets (a)	Actuarial Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b) – (a)	Funded Ratio (a) / (b)	Covered Payroll ¹ (c)	UAAL as a Percent of Covered Payroll [(b) – (a)] / (c)
2006	\$ 741,695,643	\$ 754,021,412	\$ 12,325,769	98.4%	\$ 62,178,772	19.8%
2007	808,886,286	775,668,726	(33,217,560)	104.3%	63,834,814	-52.0%
2008	656,903,659	803,417,002	146,513,343	81.8%	68,572,905	213.7%
2009	608,956,042	799,587,050	190,631,008	76.2%	71,095,081	268.1%
2010	640,405,653	814,926,868	174,521,215	78.6%	67,593,989	258.2%
2011	596,324,758	855,617,994	259,293,236	69.7%	70,076,650	370.0%
2012	653,862,993	864,762,285	210,899,292	75.6%	70,327,982	299.9%
2013	706,276,668	879,906,781	173,630,113	80.3%	68,073,148	255.1%
2014	729,065,355	895,655,967	166,590,612	81.4%	66,555,276	250.3%
2015	684,894,768	901,758,011	216,863,243	76.0%	66,724,796	325.0%
2016	709,237,644	954,458,462	245,220,818	74.3%	74,596,522	328.7%
2017	776,579,478	969,815,612	193,236,134	80.1%	75,188,904	257.0%

¹ Covered payroll is the total compensation expected to be paid during the valuation year.

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APPENDIX A – MEMBERSHIP INFORMATION

Participant Data Reconciliation					
	Actives	DROP	Retirees	Surviving Spouses and Children	Total
Participants as of October 1, 2016	1,122	147	1,433	471	3,173
New Entrants	83				83
Return to Active	0				0
Nonvested terminations	(58)				(58)
Retired	(20)	(9)	29		0
Entered into DROP	(24)	24			0
Re-Entry from DROP	21	(21)			0
Deaths without beneficiary			(14)	(23)	(37)
Deaths with Beneficiary	(1)	0	(20)	24	3
Disabled	(3)	0	3	6	6
Benefits Expired				(4)	(4)
Data Correction			2	1	3
Net Change	(2)	(6)	0	4	(4)
Participants as of October 1, 2017	1,120	141	1,433	475	3,169

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APPENDIX A – MEMBERSHIP INFORMATION

Age	Distribution of Active Participants Years of Service								Total
	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 +	
Under 20									0
20 – 24	49 \$42,203								49 \$42,203
25 – 29	142 \$44,696	19 \$52,254							161 \$45,588
30 – 34	50 \$45,583	143 \$57,184	22 \$62,697						215 \$55,050
35 – 39	26 \$46,241	74 \$57,953	102 \$62,716	30 \$63,933					232 \$59,508
40 – 44	6 \$47,400	21 \$57,815	35 \$62,207	79 \$65,562	3 \$69,924				144 \$62,951
45 – 49	2 \$44,144	5 \$58,807	23 \$62,499	47 \$65,252	46 \$69,486	3 \$80,475			126 \$66,067
50 – 54	1 \$40,014		3 \$58,955	16 \$63,877	80 \$69,399	23 \$72,159			123 \$68,703
55 – 59			1 \$70,946	4 \$66,061	22 \$69,632	23 \$72,313	1 \$81,190		51 \$70,813
60 – 64		1 \$55,593	1 \$60,418		3 \$70,152	5 \$76,162	5 \$78,567	3 \$82,393	18 \$74,850
65 +								1 \$75,797	1 \$75,797
Total	276 \$44,598	263 \$57,120	187 \$62,563	176 \$65,059	154 \$69,483	54 \$73,057	6 \$79,004	4 \$80,744	1,120 \$58,860

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APPENDIX A – MEMBERSHIP INFORMATION

Statistics for Active Participants

	Count	Age	Average Service	Average Compensation
As of October 1, 2017				
Continuing	1,037	40.2	12.8	\$ 60,273
New	83	27.8	0.4	41,209
Total	1,120	39.3	11.9	58,860
As of October 1, 2016				
Continuing	1,013	40.2	12.9	\$ 59,840
New	109	27.7	0.5	40,901
Total	1,122	39.0	11.7	58,000

Statistics for DROP Participants

	Count	Age	Service	Average Compensation	DROP Account Balance	Monthly Benefit Amount
As of October 1, 2017	141	51.2	20.6	\$ 68,520	\$ 78,113	\$ 2,293
As of October 1, 2016	147	50.5	20.4	\$ 67,675	\$ 68,290	\$ 2,239

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APPENDIX A – MEMBERSHIP INFORMATION

Statistics for Inactive Participants

	Count	Total Monthly Benefits	Average Monthly Benefits
As of October 1, 2017			
Service Retirees	1,272	\$3,590,667	\$ 2,823
Ordinary Disabilities	20	21,732	1,087
Accidental Disabilities	141	359,451	2,549
Surviving Spouses	425	590,927	1,390
Children	50	29,549	591
Total	1,908	\$4,592,326	\$ 2,407
As of October 1, 2016			
Service Retirees	1,275	\$3,527,913	\$ 2,767
Ordinary Disabilities	17	16,578	975
Accidental Disabilities	141	362,915	2,574
Surviving Spouses	425	581,371	1,368
Children	46	27,186	591
Total	1,904	\$4,515,963	\$ 2,372

**THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
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APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions

1. Mortality Rates:

- Healthy Retirees: RP-2014 Blue Collar Healthy Annuitant Table, with a 1.15 adjustment to base tables for males and females, and fully generational mortality improvements using Scale MP-2015
- Disabled Retirees: RP-2014 Disabled Annuitant Table, with 0.90 adjustment to the base table for males and no adjustment to the base table for females, and fully generational mortality improvements using Scale MP-2015
- Actives, Ordinary: RP-2014 Blue Collar Healthy Annuitant Table, with no adjustment to base tables for males and females, and fully generational mortality improvements using Scale MP-2015
- Actives, Accidental: 0.0003 per year for all ages in addition to ordinary mortality rates.

2. Disability:

CCA 1985 Unisex Class 4 table; see table of sample rates

10% of disabilities are assumed ordinary and the remaining 90% are accidental disabilities.

Age	Disability (%)
25	0.0256
35	0.508
45	0.940
55	2.288
60	3.434

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APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

3. Withdrawal Rates before Retirement:

Years of Service	Withdrawal (%)
1-4	6.00
5-9	4.00
10-18	1.00
19+	0.00

4. DROP Rates:

Years of Service	DROP Rate (%)
20	60
21	30
22-27	5
28	5
29	5
30	80

5. Retirement Rates:

Years of Service	Retirement Rate (%)
20-21	12
22-24	6
25	5
26-29	2
30	20

DROP and retirement rates are additive, so at 30 years of service the chance of either entering DROP or retirement is 100%. All members are assumed to retire by age 65.

6. Marriage

75% of male active members and 25% of female active members are assumed to be married. The male spouse is assumed to be 3 years older than the female.

7. Children

Each member is assumed to have 1.5 children at retirement, disability or death; the child is assumed to be 30 years younger than the member and to receive benefits until he or she is 20 years old.

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APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

8. DROP Participation

Members participate in DROP based on their completed service; see table for rates

- No disability is assumed while in DROP
- One-third of participants are expected to retire from DROP after four years
- One-third of participants are expected to re-enter the plan after five years in DROP, remain active in the plan for two years, and then retire
- One-third of participants are expected to re-enter the plan after five years in DROP, remain active in the plan for eight years, and then retire

9. Special Advisor and Consultant Benefits

Assumed to be paid to all eligible members

10. Form of Payment

There are no optional forms of payment; automatic survivor benefits are paid to all members.

11. Net Investment Return

7.50% compounded annually for funding purposes

12. Salary Increases

Wage inflation is assumed to be 3.0%. Individual salaries are expected to increase according to the following table which includes wage inflation and promotion.

Service	Salary Increase (%)
0-9	6.25
10-19	3.50
20+	3.00

13. Cost of Living Adjustments

2.5% per year

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APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

14. Expenses

Prior year actual expenses increased by the assumed inflation rate (2.5%) rounded up to the nearest \$1,000.

15. Interest on Member Contributions

4% per year

16. Rationale for Actuarial Assumptions

The actuarial assumptions were adopted by the Board of Trustees based upon recommendations made in an actuarial experience study performed by Cheiron covering the years 2010 through 2015 subsequent to the October 1, 2015 valuation.

17. Changes in Actuarial Assumptions since last actuarial valuation

None

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APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. Actuarial Value of Assets

The Market Value of Assets less unrecognized returns in each of the last five years, but no earlier than October 1, 2005. Initial unrecognized return is equal to the difference between the actual market return and expected return on the Actuarial Value of Assets, and is recognized over a five-year period. The actuarial value is further adjusted, if necessary, to be within 20% of the market value. The actuarial asset value was initialized at the market value as of October 1, 2005.

2. Actuarial Cost Method

For determining contributions, the cost method used in this valuation is the Aggregate Cost method. Under this method, the difference between the present value of future benefits and the actuarial value of assets is allocated as a level percentage over the future salary of the participants.

There is no actuarial accrued liability with this method. For accounting purposes, the actuarial accrued liability is determined under the entry age normal method.

3. Changes in Actuarial Methods since last valuation

None

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

1. Effective Date and Plan Year

The Plan was established October 1, 1929, under the provisions of what are now Sections 86.010 to 86.193 inclusive, R.S. Mo. 1969. The Alternative Police Retirement System of St. Louis was established October 1, 1957, under the provisions of Sections 86.2000 to 86.366 inclusive, R.S. Mo. 1969.

2. Participation

All persons who become police officers in the City of St. Louis will become members as a condition of their employment.

3. Employer Contributions

The City makes annual contributions which, together with the contributions of the members, are sufficient to provide for the benefits payable by the System.

The City also contributes the amount needed, in addition to the existing assets of the former Police Pension Fund Association and Police Retirement System, to continue the benefits granted by the former system which were in force at the establishment of the new system and to pay certain additional pensions to surviving spouses of members who had belonged to the former systems and who were previously on the pension payroll of the former systems.

4. Participant Contributions

Members contribute at the rate of 7% of their compensation. The Board of Trustees shall annually determine the interest rate to be credited on members' contributions.

5. Service Considered

Creditable Service at retirement shall consist of service rendered by the member as a police officer since last becoming a member, plus any prior service certified on a prior service certificate. No service is included for periods that a member participates in DROP.

6. Compensation Considered

The annual salary that a member earns based on the member's rank or position as defined in the applicable salary matrix, plus additional compensation for academic work and shift differential. Earnable compensation shall not include overtime, standby time, court time, non-uniform time, or unused vacation time.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

7. Average Annual Compensation

The average earnable compensation of the member during the member's last two years of creditable service.

8. Normal Retirement Age

Effective August 1, 1979, a member may retire upon completion of 20 years of service, regardless of age, or upon attainment of age 55. Retirement is compulsory at age 65. Upon request of the Board of Police Commissioners, the Board of Trustees may permit a member to defer retirement up to one year at a time.

9. Normal Retirement Benefit (Service Retirement Allowance)

The monthly retirement allowance consists of 2% of the Average Annual Compensation for each year of service up to 25 years, plus 4% of such Average Annual Compensation for each additional year of service up to 5 additional years. Upon completion of at least 30 years of service, the monthly retirement allowance will be 75% of the Average Annual Compensation.

Allowances will be increased up to 3% annually. The annual increase is limited to the lesser of 3% or the increase in the Consumer Price Index City Average (CPI) for all urban consumers for the 12-month period ending in June (four months prior to beginning of the Plan Year). Historical cumulative increases in the CPI in excess of the 3% annual limit may be added to the current year increase when necessary to bring the current year increase up to the 3% limit. Cumulative increases for retirees and surviving spouses cannot exceed 30%.

10. Disability Benefit

Ordinary Causes

Upon the occurrence of a disability due to causes that are not the result of an accident in the actual performance of duty, a member who has completed five years of Creditable Service is eligible to receive a retirement allowance.

In the event of ordinary disability before being eligible for service retirement, a member receives a retirement allowance of 90% of his accrued service retirement allowance. The minimum allowance payable is 25% of his Average Annual Compensation. An additional 15% of his Average Annual Compensation is paid for each unmarried dependent child under age 18. If disabled after eligibility for service retirement, the service retirement is still payable.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

Accident in the Actual Performance of Duty

Upon the occurrence of disability due to causes resulting from an accident in the actual performance of duty, regardless of the age or length of service of the member, a member is eligible to receive a retirement allowance equal to 75% of his Average Annual Compensation. At the discretion of the Board of Trustees, if the member is unable to perform any work of any kind, he may receive an annual pension not to exceed his annual compensation at the date of disablement. In addition, an allowance may be granted to cover surgical, medical, and hospital expenses resulting from the accident.

11. Death Benefit

Ordinary Causes Prior to Retirement

Upon the death of a member in service which is not the result of an accident in the actual performance of duty, a benefit is paid to the member's dependents.

The surviving spouse receives an annuity after the member's death of 40% of the Average Annual Compensation of the deceased member plus 15% additional for each unmarried dependent child under age 18. If no surviving spouse, the benefit is shared by the dependent children, but not more than one-half of the surviving spouse's benefit shall be paid for one child. If no surviving spouse or dependent children, accumulated member contributions are returned to the designated beneficiary.

Accident in the Actual Performance of Duty Prior to Retirement

Upon the death of a member as a result of an accident in the actual performance of duty, a benefit is paid to the member's dependents. The surviving spouse receives an annuity after the member's death of 75% of the Average Annual Compensation of the deceased member plus 15% additional for each unmarried dependent child under age 18. If no surviving spouse, the benefit is shared by the dependent children, but not more than one-half of the surviving spouse's benefit shall be paid for one child. If no surviving spouse or dependent child, an amount equal to the surviving spouse's benefit is paid to a dependent father or mother of a deceased member until remarriage or death.

Death Benefit after Retirement

Upon the death of a member retired from service, ordinary disability or accidental disability, the surviving spouse receives an annuity after the member's death of 40% of the deceased member's Average Annual Compensation plus an additional 15% for each unmarried dependent child under age 18. If there is no surviving spouse, the entire death benefit is shared by the dependent children, but one child may not be paid more than one-half of the surviving spouse's benefit. The surviving spouse of a service retiree will receive an increase of up to 3% annually, subject to the same conditions as the increases to service retirees.

If a member, retired because of the accidental disability, dies before receiving benefits for five years, the surviving spouse receives an additional pension of 10% of the deceased member's Average Annual Compensation.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

12. Disabled Child Over Age 18

Whenever benefits are provided for an unmarried dependent child under age 18, such child who was disabled prior to age 18 will receive benefits after age 18 as long as disabled and not confined to a public institution.

13. Student Benefits Ages 18 to 22

Whenever benefits are provided for an unmarried dependent child under age 18, such child may receive benefits through age 22 as long as he or she remains a full-time student.

14. Special Consultant Benefits

Any retiree or any surviving spouse of a retiree or active member whose benefit is less than \$650 per month upon application will be employed by the Board of Trustees and paid a consultant's benefit such that his or her total benefit will equal \$650.

15. Special Advisor Benefits

Any retiree or any surviving spouse who is older than age 60 can become a special advisor and be eligible for an additional benefit equal to \$10 per month for each full year over age 60.

16. Return of Contributions

Upon service retirement or death while active or disability due to an accident in the actual performance of duty or ordinary disability, contributions without interest are refunded. Upon the withdrawal from service of a member prior to retirement, the entire amount of the member's contributions with interest accumulation is returned to the member. If, at the termination of all benefits with respect to a member, the total of all benefit payments to date is less than the member's accumulated contributions at retirement or prior to death, the difference is paid to his or her beneficiary, or if no such beneficiary is living, to the estate of the beneficiary last entitled to benefits. Upon death, member contributions are returned to the surviving spouse of the member who died prior to receiving a refund of their contributions.

17. Form of Payment

There are no optional forms of payment; automatic survivor benefits are paid to all members.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

18. Deferred Retirement Option Plan (DROP)

Any member who has at least 20 years of service or has attained the age of 55 may elect to participate in the DROP. A member electing to participate in the DROP will continue in active employment and will not receive any direct retirement allowance payments during participation in the DROP. No one may participate in the DROP for a period exceeding five years.

Upon the start of the participation in the DROP, the member's contributions will cease. During the period of participation in the DROP, the amount that the member would have received as a service retirement allowance, if the member had retired, is deposited monthly in the member's DROP account. A member's DROP account earns interest equal to the rate of return earned by the System's investment portfolio (net of investment expenses) during the prior plan year on a market value basis, beginning in the first plan year after the member begins DROP participation. The DROP account is paid in a lump sum or a series of 120 monthly installments when a member retires.

The member's service retirement allowance is not adjusted for any cost-of-living increases for any period prior to the member's retirement. Service earned during the period of participation in DROP is not creditable service and is not counted in the determination of any service retirement allowance or surviving spouse's or dependents' benefits. A member who has elected to participate in DROP may re-enter the System.

Upon re-entry, a member is no longer eligible to participate in the DROP and will be required to make contributions of 7% of compensation. If the member remains active for at least two years following re-entry and retires, or if the member terminates due to death or disability at any time following re-entry, the member's benefit upon retirement will be based on creditable service and Plan provisions in effect at retirement. If the member terminates other than due to death or disability within two years following re-entry, the member's benefit upon retirement will be equal to the member's benefit at the time of entry into DROP plus any benefit accruals since re-entry. Additional benefit accruals will be based on the member's Average Annual Compensation earned while in DROP and Plan provisions in effect at retirement.

The member's contributions without interest will be paid to the member upon retirement or to the member's surviving spouse if the member dies before retirement.

19. Changes Since Last Valuation

None

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APPENDIX D – HISTORICAL INFORMATION

The Police Retirement System of St. Louis became operative October 1, 1929, under the provisions of what are now Sections 86.010 to 86.193 inclusive, R.S. Mo. 1969. The Alternative Police Retirement System of St. Louis became operative October 1, 1957, under the provisions of Sections 86.200 to 86.366 inclusive, R.S. Mo. 1969.

The administration and operation of the Retirement System are under the direction of a ten-member Board of Trustees. There are two ex-officio members, three members appointed by the mayor, three members elected by the employees, and two members elected by the retirees. All applications for benefits are passed upon by the Board.

As of January 1994, Lt. Stephen G. Olish is employed as the Executive Director to the Board of Trustees. The Board of Trustees has appointed a Medical Board and has appointed Dr. Russell C. Cantrell as its chairman. This Medical Board passes on all medical examinations as required by law.

The Board of Trustees has employed Cheiron as actuaries for the System.

The Board of Trustees has employed Hochschild, Bloom & Company LLP, Certified Public Accountants, to audit the operation of the System.

The 69th General Assembly of the Missouri State Legislature adopted legislation which created the Alternative Police Retirement System of St. Louis, which began operation as of October 1, 1957. All police officers in service on that date became members of the alternative system unless they filed notice of election to remain under the old system.

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APPENDIX D – HISTORICAL INFORMATION

Subsequent changes in the System are outlined in the table below:

Session of General Assembly	Year	Change
73rd	1965	Increase in benefits by change in formula from 1/70 to 1/60 of average compensation for each year of service.
74th	1967	<ul style="list-style-type: none"> a) Increases in service retirement allowances based on increases in the Consumer Price Index (cap of 10%); b) Increases in ordinary disability allowances of members with dependent children; and c) Increases in allowances to survivors of retired members.
75th	1969	<ul style="list-style-type: none"> a) Lowering retirement age in steps until it reaches 55 in 1973; and b) Increase in benefits by gradual change in formula until it reaches 1/55 in 1973.
76th	1972	<ul style="list-style-type: none"> a) Benefits based on 3 year final average salary, rather than 5 year; and b) Increase in benefits to surviving spouses of service retirees, based on cost-of-living, on same basis as increase to service retirees.
77th	1973	Increase in cost-of-living adjustments to service retirees and their surviving spouses, from 1% to 3% (cap of 25%).
78th	1975	Increase in benefits to 1/50.
79th	1977	Allowing normal retirement after 25 years of service.
80th	1979	<ul style="list-style-type: none"> a) Increasing benefits by 2% for each year of service greater than 25 years with a 70% overall maximum; and b) Allowing normal retirement after 20 years of service.
81st	1981	<ul style="list-style-type: none"> a) Allowing refund of member contributions without interest upon service retirement, and b) Special consultant allowance for retirees added to provide a minimum monthly retirement income of \$350.
82nd	1983	<ul style="list-style-type: none"> a) Allowing refund of member contributions without interest upon death while active after completing 20 years of service; b) Special consultant allowance for surviving spouses added to

**THE POLICE RETIREMENT SYSTEM OF ST. LOUIS
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APPENDIX D – HISTORICAL INFORMATION

Session of General Assembly	Year	Change
		provide a minimum monthly surviving spouse's income of \$200, and
		c) Name changed to the Police Retirement System of St. Louis.
82nd	1984	Upon approval of the Board, allowing refund of member contributions without interest to those who are receiving a service retirement benefit and retired prior to September 28, 1981.
83rd	1986	Special consultant allowance for retirees to provide a minimum monthly retirement benefit of \$400. Special consultants for surviving spouses to provide a minimum monthly retirement benefit of \$250.
*	1989	Special consultant allowance for surviving spouses to provide a minimum monthly retirement benefit of \$400.
85th	1990	a) An additional monthly benefit to current and future retirees of \$10 per month for each year past age 60. The effective date for this improvement is July 1, 1994. b) Provides for the addition of two retirees to the Board of Trustees and an additional Board member appointed by the mayor. c) Provides for the refund of member contributions for retirees prior to September 28, 1981.
87th	1993	Special consultant allowance for retirees and surviving spouses to provide a minimum monthly retirement benefit of \$550.
87th	1994	Allows for the return of employee contributions to all surviving spouses of members who die prior to receiving a refund of their contributions.
88th	1995	Adoption of the Deferred Retirement Option Plan.
89th	1997	a) Maximum cumulative cost of living allowance for retirees and beneficiaries increased from 25% to 30% beginning with October 1, 1997 increases. b) Effective August 28, 1997, upon approval of the Board, allowing refund of member contributions without interest to retirees deemed to be 100% disabled due to an accident in the actual performance of duty.

* Revised interpretation of state statutes by System's Legal Advisor.

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APPENDIX D – HISTORICAL INFORMATION

Session of General Assembly	Year	Change
90th	1999	<p>a) Special consultant allowance for current and future retirees and surviving spouses to provide a minimum monthly retirement benefit of \$650 effective August 18, 1999.</p> <p>b) An additional monthly benefit to current and future surviving spouses of \$10 per month for each year past age 60 effective August 12, 1999.</p> <p>c) Increase benefit to future surviving spouses of service and disability retirees to 40% of Average Annual Compensation effective October 1, 1999. Special consultant allowance to current surviving spouses of service and disability retirees to increase benefit to 40% of Average Annual Compensation effective October 1, 1999.</p> <p>d) Increase benefit to future dependent children of members to 15% of Average Annual Compensation effective October 1, 1999. Special consultant allowance to current dependent children of members equal to the greater of \$100 per month or 5% of Average Annual Compensation effective October 1, 1999.</p> <p>e) Increase service retirement allowance to 75% of Average Annual Compensation for members with at least 30 years of service effective August 12, 1999.</p> <p>f) Increase benefit to future accidental death surviving spouses to 75% of Average Annual Compensation effective October 1, 1999. Special consultant allowance to current accidental death surviving spouses to increase benefit to 75% of Average Annual Compensation.</p>
91st	2001	<p>a) Benefits based on 2-year Average Annual Compensation effective October 1, 2001.</p> <p>b) Allow for a refund of member contributions without interest for any member who becomes disabled in the line of duty effective October 1, 2001.</p> <p>c) Allow one-time re-entry into the System from DROP effective October 1, 2001.</p>
91st	2002	Allow retiree organizations to request information and internal administration change regarding rulemaking by the Plan.
92nd	2003	Technical corrections to DROP.

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APPENDIX D – HISTORICAL INFORMATION

Session of General Assembly	Year	Change
92nd	2004	Redefine quorum.
93rd	2005	Remove limit of three children for disability and death benefits.
93rd	2006	Add required compliance language for minimum distributions and direct rollovers.
94th	2007	Add fiduciary education requirement.
96th	2011	Update required compliance language for minimum distributions, limit on benefits, direct rollovers and death while on military leave. Permit System to accept rollovers of after-tax amounts from other plans.
98th	2013	Reduce service requirement for ordinary disability to five years upon reaching 80% funded ratio (this provision was triggered October 1, 2014).



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The Police Retirement System of St. Louis



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Proposed Legislative Changes Analysis

January 24, 2018

Steve McElhaney, FSA, EA, FCA, MAAA
Mike Noble, FSA, EA, FCA, MAAA

Discussion Topics



- Proposed Legislative Changes
 - Change to Entry Age Normal funding method
 - Changes to current participant plan provisions
 - Changes to new entrant plan provisions
- Cost impact of changes
- Stress Testing the Fund

Baseline Valuation Results



Police Retirement System of St. Louis as of 10/1/2017 (\$ in thousands)

Present Value of Future Benefits	\$1,075,932
Actuarial Value of Assets	\$771,338
Present Value of Future Member Contributions	\$38,818
Total Assets	\$810,156
Present Value of Future Normal Cost	\$265,776
Normal Cost Rate	39.37%
– Admin. Expense BOY	\$1,237
Total Contribution Rate	40.96%
Funding Policy Contribution Requirement EOY	\$33,104



Proposed Legislative Changes



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Change in Funding Method



- Change to Entry Age Normal funding method
 - Currently plan uses Aggregate funding method
- Amortization of Unfunded Actuarial Liability
 - Initial base amortized as 20 year level percent of pay
 - Amortization of future bases to be set the board

Baseline Valuation Results



Aggregate Method	
Aggregate Contribution Requirement	\$33,104
Total Contribution Rate	40.96%
Entry Age Normal Method	
Entry Age Normal Actuarial Liability	\$969,816
Actuarial Value of Assets	\$771,338
Unfunded Actuarial Liability	\$198,478
EAN Employer Normal Cost	\$11,485
20 Year Amortization on UAL	\$14,986
Expense	\$1,193
Funding Policy Contribution Requirement BOY	\$27,664
Total Contribution Rate	36.79%

Changes for All Employees



- Change employee contribution rate to 8%
 - Increases return of contribution amount
 - Larger offset to employer Normal Cost
- Changes not affecting valuation results
 - Remove mandatory retirement age
 - Disability benefit offset in excess of 125% of member's annual salary at retirement

Impact on Actuarial Liability



(\$ in thousands)	Accrued Liability	Percent Change	Funded Ratio
10/1/2017 Valuation Results	\$969,816		79.53%
Change due to			
8% EE Contribution	1351	0.14%	(0.11%)
All Employee Proposed Changes – 10/1/2016 Valuation Results	\$971,166	0.14%	79.42%

Impact on Annual Contribution



(\$ in thousands)	EAN NC	UAL Pmt	Admin Exp	Total BOY	% of Pay
10/1/2017 Valuation Results	\$11,485	\$14,986	\$1,193	\$27,664	36.79%
Change due to					
8% EE Contribution	(543)	102		(441)	(0.58%)
All Employee Proposed Changes – 10/1/2017 Valuation Results	\$10,942	\$15,088	\$1,193	\$27,223	36.21%

Changes for New Entrants



- Change to 10 year vesting
 - Early retirement is deferred to age 55
 - DROP still available at 20 years of service
 - No re-entry of DROP
 - Change in DROP interest rate to 10 year T-Bill plus 1%
- No interest on return of contributions
- Increase final average compensation to 3 years
- No return of contribution at retirement
- Cap on service retirement at 70%
- Cap on COLA at 25%
- No special advisor benefit / “\$10 bill”
- Change employee contribution rate to 9%

Impact on Normal Cost



(\$ in thousands)	EAN NC*	% of Pay*
10/1/2017 Valuation Results	\$11,485	15.28%
Change due to		
10 year vesting, deferred retirement to 55, DROP	457	0.61%
No interest on contributions	(59)	(0.08%)
3 year final average pay	(193)	(0.26%)
No return of contribution at retirement	(1,185)	(1.58%)
Retirement capped at 70%	(39)	(0.05%)
COLA capped at 25%	(117)	(0.16%)
No special advisor benefit / "\$10 bill"	(105)	(0.14%)
9% member contribution rate	(1,118)	(1.49%)
All New Entrant Changes Combined (includes interactions between changes, so not equal to the sum)	(2,916)	(3.88%)
Result All New Entrant Changes Combined	\$8,569	11.40%

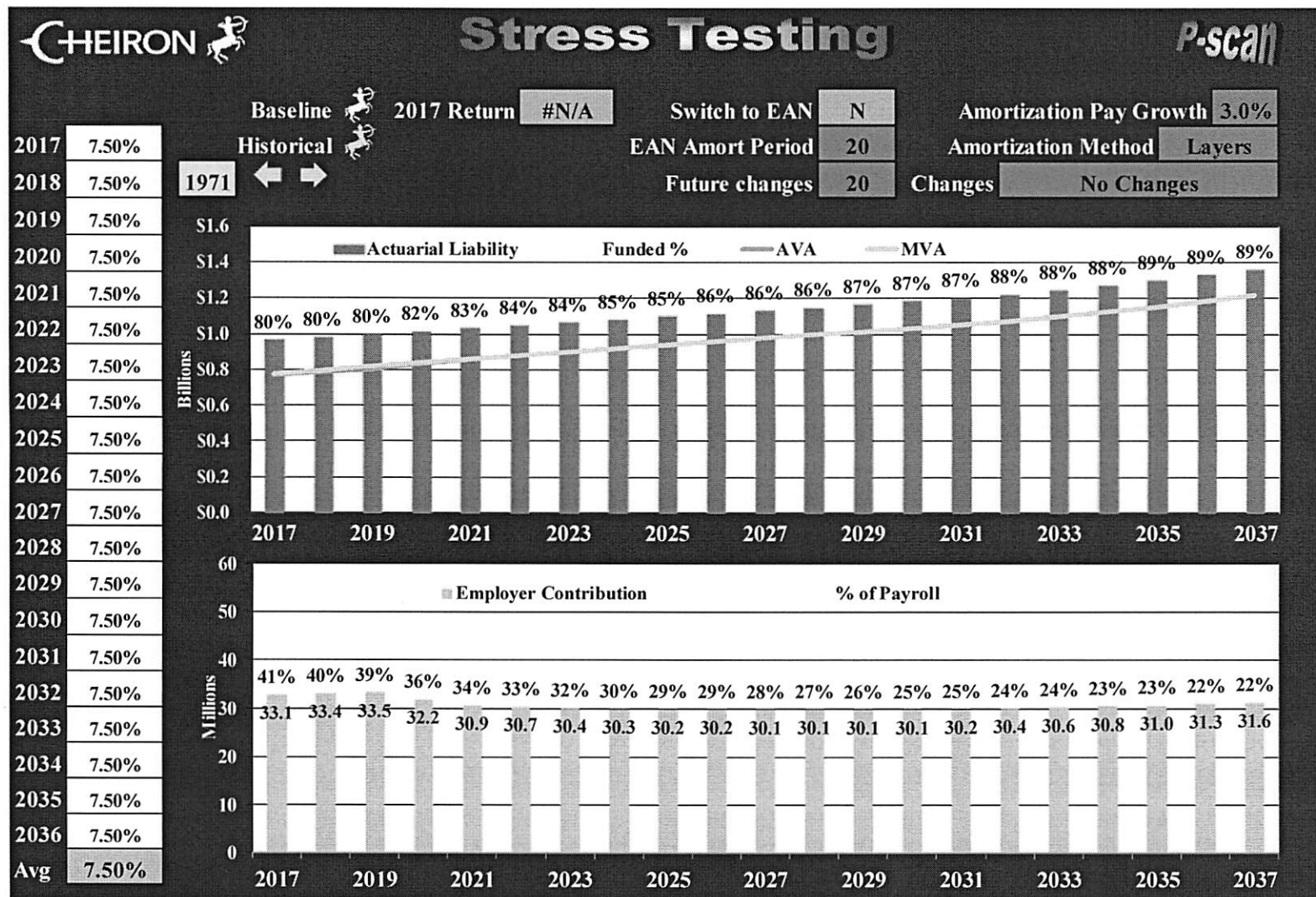
January 24, 2018



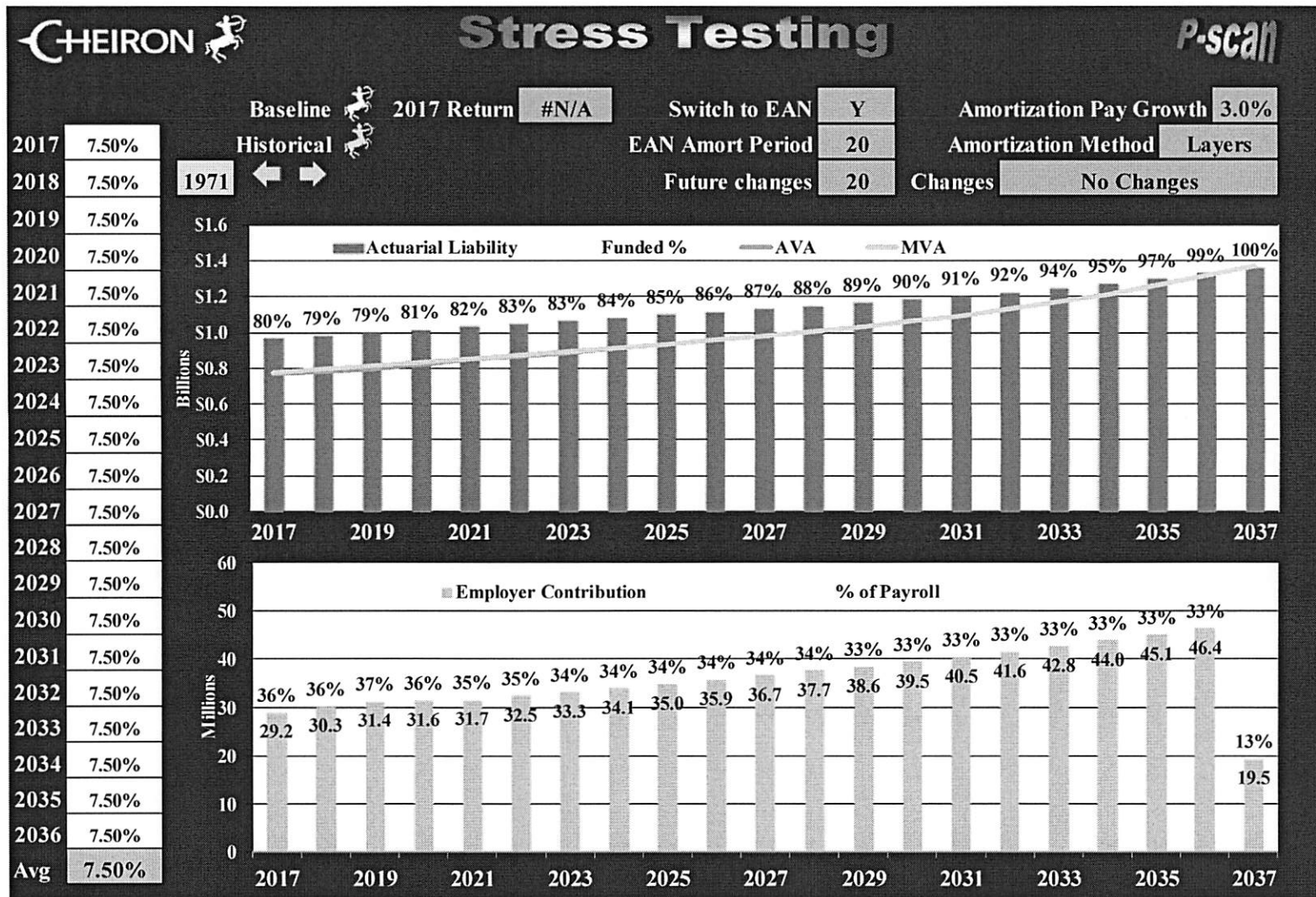
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*Based on current total plan payroll

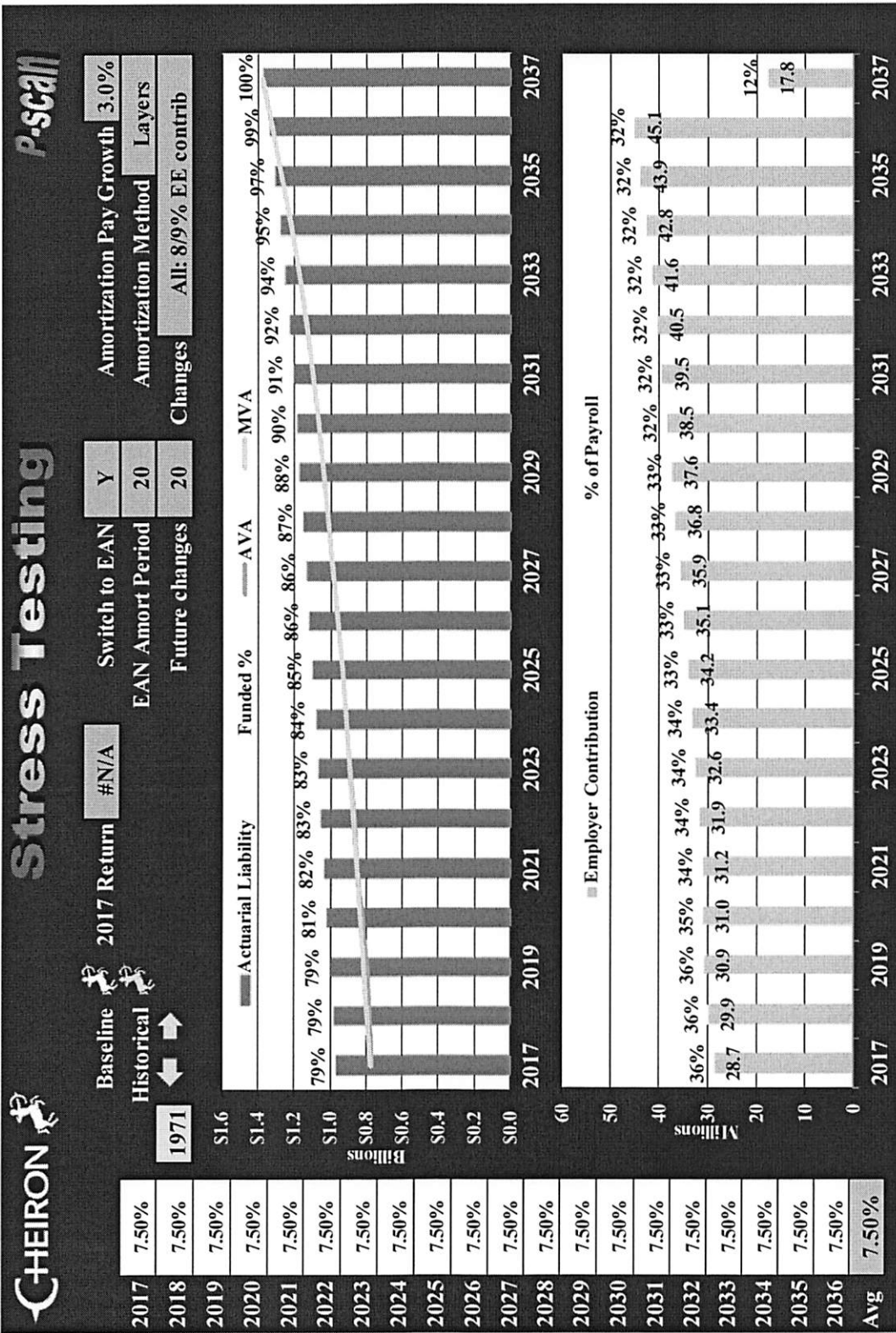
Projections – Baseline Aggregate



Projections – Entry Age Normal



Projections – All Employee Changes



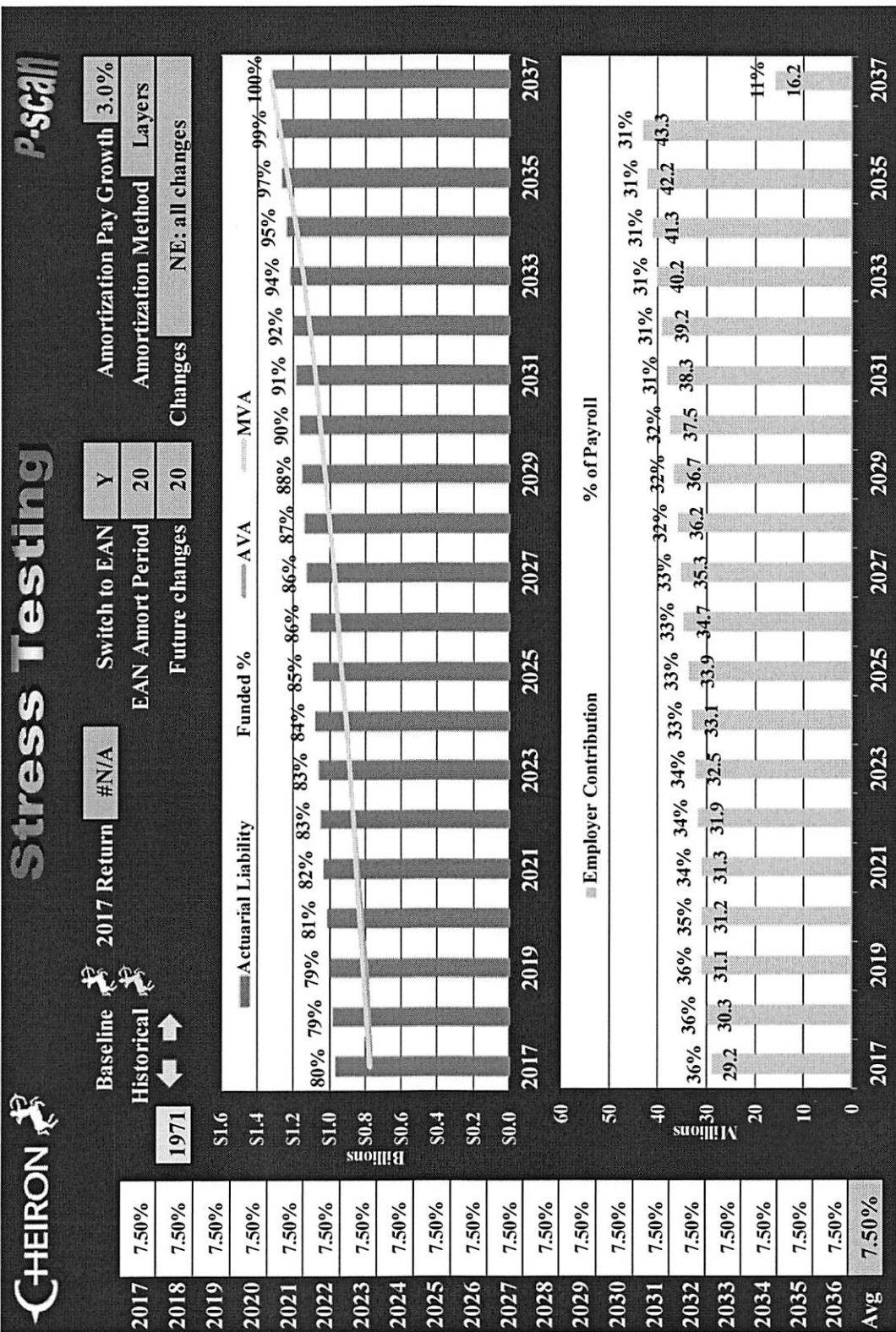
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Projections – New Entrant Changes





Reliance



In preparing this presentation, we relied without audit, on information supplied by the Police Retirement System of St. Louis.

The actuarial assumptions, data and methods are those used in the preparation of the Actuarial Valuation report prepared for this System are as of October 1, 2017.

The 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 true cost of the plan could vary from our results.

To the best of our knowledge, this presentation and its contents, which are work products of Cheiron, Inc., 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 presentation does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

Cheiron's presentation was prepared solely for the Police Retirement System of St. Louis for the purposes described herein. It is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.

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