Public Employees Retirement Association of Minnesota

Public Employees Police & Fire Plan
Actuarial Valuation Report as of July 1, 2017

GRS Retirement Consulting

P: 800.521.0498 | F: 763.432.5842 | www.grsconsulting.com

November 10, 2017

Public Employees Retirement Association of Minnesota
Trustees of the Public Employees Police & Fire Plan
St. Paul, Minnesota

Dear Trustees of the Public Employees Police & Fire Plan:

The results of the July 1, 2017 annual actuarial valuation of the Public Employees Police & Fire Plan are presented in this report. This report was prepared at the request of the Board and is intended for use by the Board and staff and those designated or approved by the Board. This report may be provided to parties other than the Plan only in its entirety. GRS is not responsible for the consequences of any unauthorized use of this report.

The purpose of the valuation is to measure the Plan's funding progress and to determine the required contribution rate for the fiscal year beginning July 1, 2017 according to the prescribed assumptions. Note that we have not attempted to quantify the impact of GASB Statements No. 67 and No. 68 in this report.

The required contribution rate shown on page one was designed to comply with Minnesota Statutes. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

Actuarial assumptions, including discount rates, mortality tables and others identified in this report, are prescribed by Minnesota Statutes Section 356.215, the Legislative Commission on Pensions and Retirement (LCPR), and the Trustees. These parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods, and assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in the Actuarial Basis of this report. PERA is solely responsible for communicating to GRS any changes required thereto.

In our professional judgement, the statutory discount rate of 8.0% used in this report deviates materially from the guidance set forth in Actuarial Standards of Practice No. 27 (ASOP No. 27). In a 2017 analysis of long-term rate of investment return and inflation assumptions, GRS suggested that an investment return assumption in the range of 6.85% to 7.68% would be reasonable. Please see our letter dated September 11, 2017 for additional information. If a discount rate within the reasonable range were used in this valuation instead of 8.0%, the unfunded liability and contribution deficiency would be higher than shown. Note that estimated results based on a 7.0% discount rate are shown on page five.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in the Actuarial Basis of this report. This report includes risk metrics on pages five and six, but does not include a more robust assessment of the risks of future experience differing materially from the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the plan's financial condition.

277 Coon Rapids Boulevard | Suite 212 | Coon Rapids, Minnesota 55433-2629

The valuation was based upon information furnished by the Public Employees Retirement Association of Minnesota (PERA), concerning benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by PERA.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of such future measurements.

This report should not be relied on for any purpose other than the purpose described herein. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

Brian B. Murphy and Bonita J. Wurst are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. In addition, Mr. Murphy meets the requirements of "approved actuary" under Minnesota Statutes Section 356.215, Subdivision 1, Paragraph (c).

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge and belief the information contained in this report is accurate and fairly presents the actuarial position of the Public Employees Police & Fire Plan as of the valuation date and was performed in accordance with the requirements of Minnesota Statutes Section 356.215, and the requirements of the Standards for Actuarial Work established by the LCPR. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

We are available to answer any questions or provide further details.

Respectfully submitted,

Brian B. Murphy

Brian B. Murphy, FSA, EA, FCA, MAAA

Bonita J. Wurst

Bonita J. Wurst, ASA, EA, FCA, MAAA

BBM/BJW:bd

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if there are no changes in benefits or contributions and all actuarial assumptions are met (including the assumption of the plan earning 8.00% on the actuarial value of assets), it is expected that:

(1) The normal cost of the plan is expected to remain approximately level as a percent of pay, and
(2) The funded status of the plan is expected to gradually improve but is not expected to be 100% funded within the next 50 years.

However, as noted elsewhere in this report, we do not expect the earnings assumption of 8% to be met. Unfunded liabilities based on a lower earnings assumption have the potential to grow indefinitely.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets.
(4) The funded status would appear lower if it were based upon an investment return assumption that meets the requirements of ASOP 27.

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

Contents

Summary of Valuation Results

Contributions

The following table summarizes important contribution information as described in the Development of Costs section.

Contributions	Actuarial Valuation as of July 1, 2017	July 1, 2016
Statutory Contributions - Chapter 353 (% of Payroll)	29.36%	29.48%
Required Contributions - Chapter 356 (% of Payroll)	30.58%	28.30%
Sufficiency / (Deficiency)	(1.22)%	1.18%

The contribution status changed from a sufficiency of 1.18% of payroll to a deficiency of 1.22% of payroll. The increased costs are primarily due to assumption changes described on page three, including earlier expectations for payment of the 2.50% postretirement benefit increase.

Based on the actuarial value of assets and scheduled contribution rates, statutory contributions are not sufficient to fully amortize the unfunded actuarial accrued liability over the statutory amortization period of 26 years. Based on current statutory contributions, the actuarial value of assets, and other methods and assumptions described in this report, the funded status of the plan is expected to gradually improve but is not expected to be 100% funded within the next 50 years.

The Plan Assets section provides detail on the plan assets used for the valuation including a development of the Actuarial Value of Assets (AVA). The Market Value of Assets (MVA) earned approximately 15.2% for the plan year ending June 30, 2017. The AVA earned approximately 9.5% for the plan year ending June 30, 2017 as compared to the assumed rate of 8.00%. The assumed rate is mandated by Minnesota Statutes, and is at the very upper end of the reasonable range. According to the NASRA survey, the most common assumption for statewide plans is currently 7.50%. Use of a 7.50% return assumption would produce a deficiency greater than shown above.

Participant reconciliation and statistics are detailed in the Membership Data section. The Actuarial Basis section includes a summary of plan provisions and actuarial methods and assumptions used for the calculations in this report.

Accounting information prepared according to the Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68 will be provided in a separate report.

Summary of Valuation Results

A summary of principal valuation results from the current valuation and the prior valuation follows. Any changes in plan provisions, actuarial assumptions or valuation methods and procedures between the two valuations are described after the summary.

	Actuarial Valuation as of	
	July 1, 2017	**July 1, 2016**
Contributions (*% of Payroll*)		
Statutory - Chapter 353	29.36%	29.48%
Required - Chapter 356	30.58%	28.30%
Sufficiency / (Deficiency)	(1.22)%	1.18%
Funding Ratios (*dollars in thousands*)		
Assets		
- Current assets (AVA)	$ 7,840,549	$ 7,385,777
- Current assets (MVA)	$ 7,918,879	$ 7,098,090
Accrued Benefit Funding Ratio		
- Current benefit obligations	$ 8,869,242	$ 8,148,749
- Funding ratio (AVA)	88.40%	90.64%
- Funding ratio (MVA)	89.28%	87.11%
Accrued Liability Funding Ratio		
- Actuarial accrued liability	$ 9,199,208	$ 8,417,621
- Funding ratio (AVA)	85.23%	87.74%
- Funding ratio (MVA)	86.08%	84.32%
Projected Benefit Funding Ratio		
- Current and expected future assets	$ 10,871,452	$ 10,314,416
- Current and expected future benefit obligations	$ 11,051,212	$ 10,152,134
- Projected benefit funding ratio (AVA)	98.37%	101.60%
Participant Data		
Active members		
- Number	11,522	11,398
- Annual valuation earnings *(000s)* *	$ 912,722	$ 867,808
- Projected annual earnings *(000s)* *	$ 960,210	$ 915,827
- Average projected annual earnings *	$ 83,373	$ 80,413
- Average age	40.4	40.4
- Average service	12.4	12.4
Service retirements	7,408	7,222
Survivors	1,861	1,873
Disability retirements	1,310	1,257
Deferred retirements	1,506	1,490
Terminated other non-vested	1,134	1,059
Total	**24,741**	**24,299**

** These values exclude 5 members (9 in 2016) who were merged into PERA P&F in 2012 from the Minneapolis Police and Minneapolis Fire Retirement Funds whose benefits are not pay related.*

Summary of Valuation Results

Effects of Changes

The following changes in plan provisions, actuarial assumptions, and methods were recognized as of July 1, 2017 (based on an experience study dated August 30, 2016 and an analysis of Combined Service Annuity assumptions completed by the LCPR actuary and documented in an October 2016 report):

- Assumed increases in member salaries were changed.
- Assumed rates of retirement and termination were changed.
- The percent married assumption for active female members was changed from 65% to 60%.
- The assumed age difference for married members was changed to 2 years (with males older than females).
- The base mortality table for annuitants and employees was changed from RP-2000 to RP-2014, fully generational, with age adjustments. The mortality improvement scale was change from Scale AA to Scale MP-2016.
- Form of payment assumptions were modified for active female members.
- The assumed post-retirement benefit increase rate was changed from 1.00% per year through 2050 and 2.50% per year thereafter to 1.00% per year through 2034 and 2.50% per year thereafter. See page four for additional detail about this assumption.
- Loading factors to account for members with Combined Service Annuities were updated as follows:
    - Deferred Vested Members: Increased from 30% of liabilities to 33% of liabilities
    - Non-Vested Terminated Members: Reduced from 30% of liabilities to 2% of liabilities
- As a result of the additional liability resulting from the changes described above, the amortization date was changed from June 30, 2041 to June 30, 2043 per Minnesota Statute 356.215, Subd. 11(c).

Refer to the Actuarial Basis section of this report for a complete description of these changes. The combined impact of the above change was to increase the accrued liability by $436.2 million and increase the required contribution by 3.2% of pay, as follows:

	Before Assumption Changes	Reflecting Assumption Changes	Reflecting Assumption Changes and Amortization Period Change
Normal Cost Rate, % of Pay	20.8%	21.3%	21.3%
Amortization of Unfunded Accrued Liability, % of pay	6.5%	9.6%	9.2%
Expenses (% of Pay)	0.1%	0.1%	0.1%
Total Required Contribution, % of Pay	27.4%	31.0%	30.6%
Accrued Liability Funding Ratio	89.5%	85.2%	85.2%
Projected Benefit Funding Ratio	102.6%	97.9%	98.4%
Unfunded Accrued Liability (in billions)	$0.9	$1.4	$1.4

Summary of Valuation Results

Valuation of Future Post-Retirement Benefit Increases

Benefit recipients receive a future annual compounding 1.00% post-retirement benefit increase. If the funding ratio reaches 90% (based on a 2.50% post-retirement benefit increase assumption) for two consecutive years, the benefit increase will revert to 2.50%. If, after reverting to a 2.50% benefit increase, the funding ratio declines to less than 80% for one year or less than 85% for two consecutive years, the benefit increase rate will decrease to 1.00%. Benefit increases already granted, however, will not be affected.

To determine an assumption regarding a future change in the post-retirement benefit increase, we performed a projection of liabilities and market value of assets based on the following methods and assumptions:

- Future investment returns and liability discount rates of 8.00%;
- Open group; stable active population (new member profile based on average new members hired in recent years);
- The post-retirement benefit increase rate is assumed to be 1.00% per year until the funding ratio threshold required to pay a 2.50% post-retirement benefit increase is reached; and
- Current statutory contribution levels (i.e., not including potential contribution increases under the contribution stabilizer statutes).

Based on these assumptions and methods, the projection indicates that this plan is expected to attain the funding ratio threshold required to pay a 2.50% post-retirement benefit increase in the year 2033, and that the plan would begin paying 2.50% benefit increases on January 1, 2034. This assumption is reflected in our calculations. This is only an assumption; actual timing will depend on actual experience.

As noted elsewhere in this report, we do not expect the earnings assumption of 8.00% to be met. The funding ratio threshold would be achieved later if it was based upon an investment return assumption that meets the requirements of ASOP No. 27.

Summary of Valuation Results

Sensitivity Tests

During the 2017 legislative session, the Legislative Commission on Pensions and Retirement (LCPR) enacted a new sensitivity disclosure requirement for PERA's 2017 valuations. Per the LCPR's requirement, we have calculated the liabilities associated with the following scenarios:

1) 7% interest rate assumption
2) 9% interest rate assumption
3) 1.0% post-retirement benefit increase for all future years
4) 2.5% post-retirement benefit increase for all future years

In each case, all other assumptions were unchanged from those used to develop the final valuation results in this report. Note that we believe the 9% interest rate assumption is an unrealistic assumption.

	Final Valuation Assumptions	Final Valuation Assumptions with 7% interest	Final Valuation Assumptions with 9% interest	Final Valuation Assumptions with 1.0% COLA for all future years	Final Valuation Assumptions with 2.5% COLA for all future years
Normal Cost Rate, % of Pay	21.3%	27.2%	16.9%	19.3%	22.2%
Amortization of Unfunded Accrued Liability, % of Pay	9.2%	15.8%	2.7%	6.6%	15.2%
Expenses (% of Pay)	0.1%	0.1%	0.1%	0.1%	0.1%
Total Required Contribution, % of Pay	30.6%	43.1%	19.7%	26.0%	37.5%
Contribution Sufficiency/(Deficiency), % of Pay	(1.2)%	(13.8)%	9.7 %	3.4 %	(8.1)%
Accrued Liability Funding Ratio	85.2%	75.2%	95.7%	89.3%	77.8%
Actuarial Accrued Liability (in billions)	$9.2	$10.4	$8.2	$8.8	$10.1
Unfunded Accrued Liability (in billions)	$1.4	$2.6	$0.4	$0.9	$2.2

Summary of Valuation Results

Risk Measures Summary *(Dollars in Thousands)*

Valuation Date (6/30)	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Market Value Unfunded AAL	(4) Valuation Payroll	(5) Market Value Funded Ratio (2)/(1)	(6) Retiree Liabilities	(7) RetLiab/ AAL (6)/(1)	(8) AAL/ Payroll (1)/(4)	(9) Assets/ Payroll (2)/(4)
2010	$ 5,963,672	$ 4,453,757	$ 1,509,915	$ 740,101	74.7%	$ 3,299,576	55.3%	805.8%	601.8%
2011	$ 6,363,546	$ 5,317,032	$ 1,046,514	$ 775,806	83.6%	$ 3,529,604	55.5%	820.2%	685.4%
2012	$ 7,403,295	$ 5,772,047	$ 1,631,248	$ 794,417	78.0%	$ 4,366,115	59.0%	931.9%	726.6%
2013	$ 7,304,032	$ 6,346,741	$ 957,291	$ 796,188	86.9%	$ 4,333,475	59.3%	917.4%	797.1%
2014	$ 8,151,328	$ 7,273,100	$ 878,228	$ 820,333	89.2%	$ 4,888,411	60.0%	993.7%	886.6%
2015	$ 8,460,477	$ 7,348,704	$ 1,111,773	$ 845,076	86.9%	$ 5,000,871	59.1%	1001.1%	869.6%
2016	$ 8,417,621	$ 7,098,090	$ 1,319,531	$ 881,222	84.3%	$ 5,066,605	60.2%	955.2%	805.5%
2017	$ 9,199,208	$ 7,918,879	$ 1,280,329	$ 944,296	86.1%	$ 5,532,560	60.1%	974.2%	838.6%

Valuation Date (6/30)	(10) Portfolio StdDev	(11) Std Dev % of Pay (9) x (10)	(12) Unfunded / Payroll	(13) Non-Investment Cash Flow (NICF)	(14) NICF/ Assets (13)/(2)	(15) Market Rate of Return	(16) 5-Year Trailing Average
2010			204.0%	$ (149,485)	-3.4%	15.7%	N/A
2011			134.9%	$ (161,687)	-3.0%	23.0%	N/A
2012			205.3%	$ (190,432)	-3.3%	2.3%	2.3%
2013			120.2%	$ (230,072)	-3.6%	14.2%	6.2%
2014			107.1%	$ (232,048)	-3.2%	18.5%	14.5%
2015	14.1%	122.6%	131.6%	$ (242,036)	-3.3%	4.4%	12.2%
2016	14.1%	113.6%	149.7%	$ (241,668)	-3.4%	-0.1%	7.6%
2017	14.1%	118.2%	135.6%	$ (238,177)	-3.0%	15.2%	10.2%

(5) The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.
(6) and (7) The ratio of Retiree liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the liquidity needs of the portfolio change. A ratio on the order of 50% indicates a maturing system.
(8) and (9) The ratios of liabilities and assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.
(10) and (11) The portfolio standard deviation measures the volatility of investment return. When multiplied by the ratio of assets to payroll it gives the effect of a one standard deviation asset move as a percent of payroll. This figure helps users understand the difficulty of dealing with investment volatility and the challenges volatility brings to sustainability.
(12) The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.
(13) and (14) The ratio of Non-Investment Cash Flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately -4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.
(15) and (16) Investment return is probably the largest single risk that most systems face. The year by year return and the 5-year geometric average give an indicator of the realism of the systems assumed return. Of course, past performance is not a guarantee of future results.

Supplemental Information

The remainder of the report includes information supporting the results presented in the previous sections.

- **Plan assets** presents information about the plan's assets as reported by the Public Employees Retirement Association of Minnesota. The assets represent the portion of total fund liabilities that has been funded.
- **Membership data** presents and describes the membership data used in the valuation.
- **Development of costs** shows the liabilities for plan benefits and the derivation of the contribution amount.
- **Actuarial basis** describes the plan provisions, as well as the methods and assumptions used to value the plan. The valuation is based on the premise that the plan is ongoing.
- **Additional schedules** shows the Schedule of Funding Progress and Schedule of Contributions.
- **Glossary** defines the terms used in this report.

Plan Assets

Statement of Fiduciary Net Position *(Dollars in Thousands)*

Assets in Trust	Market Value June 30, 2017		Market Value June 30, 2016	
Cash, equivalents, short term securities	$ 190,809		$ 145,521	
Fixed income	$ 1,535,288		$ 1,751,552	
Equity	$ 5,141,012		$ 4,282,601	
SBI alternative	$ 1,038,994		$ 908,179	
Other	$ -		$ -	
Total Assets in Trust	**$ 7,906,103**		**$ 7,087,853**	
Assets receivable	$ 18,348	*	$ 15,918	**
Amounts payable	$ (5,572)		$ (5,681)	
Net Assets Held in Trust for Pension Benefits	**$ 7,918,879**		**$ 7,098,090**	

* *Includes $13.648 million contribution from Minneapolis to be paid by July 15, 2017.*
** *Includes $13.648 million contribution from Minneapolis paid by July 15, 2016.*

Plan Assets

Reconciliation of Plan Assets *(Dollars in Thousands)*

The following exhibit shows the revenue, expenses and resulting assets of the Fund as reported by the Public Employees Retirement Association for the prior two fiscal years.

Change in Assets		**Market Value**			
Year Ending		**June 30, 2017**		**June 30, 2016**	
1.	Fund balance at market value at beginning of year	**$ 7,098,090**		**$ 7,348,704**	
2.	Contributions				
	a. Member	$ 101,984		$ 95,172	
	b. Employer	$ 166,329	*	$ 156,065	**
	c. Other sources (state contribution)	$ 9,000		$ 9,000	
	d. Total contributions	$ 277,313		$ 260,237	
3.	Investment income				
	a. Investment income/(loss)	$ 1,067,162		$ 549	
	b. Investment expenses	$ (8,220)		$ (9,498)	
	c. Net subtotal	$ 1,058,942		$ (8,949)	
4.	Other	$ 24		$ 3	
5.	**Total income:** *(2.d.) + (3.c.) + (4.)*	**$ 1,336,279**		**$ 251,291**	
6.	Benefits Paid				
	a. Annuity benefits	$ (512,379)		$ (498,608)	
	b. Refunds	$ (2,119)		$ (2,391)	
	c. Total benefits paid	$ (514,498)		$ (500,999)	
7.	Expenses				
	a. Other	$ -		$ -	
	b. Administrative	$ (992)		$ (906)	
	c. Total expenses	$ (992)		$ (906)	
8.	**Total disbursements:** *(6.c.) + (7.c.)*	**$ (515,490)**		**$ (501,905)**	
9.	**Fund balance at market value at end of year**	**$ 7,918,879**		**$ 7,098,090**	
10.	Approximate return on market value of assets	15.2%		-0.1%	

** Includes $13.648 million contribution from Minneapolis to be paid by July 15, 2017.*
*** Includes $13.648 million contribution from Minneapolis paid by July 15, 2016.*

Plan Assets

Actuarial Asset Value *(Dollars in Thousands)*

	Original Amount	June 30, 2017	June 30, 2016
1. Market value of assets available for benefits		**$ 7,918,879**	**$ 7,098,090**
2. Determination of average balance			
a. Total assets available at beginning of year		$ 7,098,090	$ 7,348,704
b. Total assets available at end of year		$ 7,918,879	$ 7,098,090
c. Net investment income for fiscal year		$ 1,058,942	$ (8,949)
d. Average balance *[a. + b. - c.] / 2*		$ 6,979,014	$ 7,227,871
3. Expected return *[8.0% * 2.d.]*		$ 558,321	$ 578,230
4. Actual return		$ 1,058,942	$ (8,949)
5. Current year asset gain/(loss) *[4. - 3.]*		$ 500,621	$ (587,179)
6. Unrecognized asset returns			
	Original Amount	**Unrecognized Amount**	
a. Year ended June 30, 2017	$ 500,621	$ 400,497	N/A
b. Year ended June 30, 2016	$ (587,179)	$ (352,307)	$ (469,743)
c. Year ended June 30, 2015	$ (254,614)	$ (101,846)	$ (152,768)
d. Year ended June 30, 2014	$ 659,930	$ 131,986	$ 263,972
e. Year ended June 30, 2013	$ 354,260	N/A	$ 70,852
f. Unrecognized return adjustment		$ 78,330	$ (287,687)
7. **Actuarial value at end of year** *(1. - 6.f.)*		**$ 7,840,549**	**$ 7,385,777**
8. Approximate return on actuarial value of assets during fiscal year		9.5%	7.9%
9. Ratio of actuarial value of assets to market value of assets		0.99	1.04

Membership Data

Distribution of Active Members**

	Years of Service as of June 30, 2017									
Age	**<3***	**3 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35+**	**Total**
< 25	330	8								**338**
Avg. Earnings	$43,031	$64,898								**$ 43,549**
25 - 29	766	333	121							**1,220**
Avg. Earnings	$53,743	$67,692	$70,231							**$ 59,186**
30 - 34	457	355	760	281						**1,853**
Avg. Earnings	$54,806	$69,551	$75,869	$80,322						**$ 70,139**
35 - 39	242	202	447	881	207					**1,979**
Avg. Earnings	$54,823	$68,772	$77,868	$82,483	$ 87,242					**$ 77,157**
40 - 44	101	82	202	530	863	148	1			**1,927**
Avg. Earnings	$55,555	$69,131	$74,600	$82,853	$ 89,052	$90,276	$ 85,746			**$ 83,321**
45 - 49	43	62	131	284	700	789	131			**2,140**
Avg. Earnings	$62,046	$65,433	$70,002	$82,455	$ 89,156	$95,906	$ 99,666			**$ 88,994**
50 - 54	30	27	49	111	286	430	430	85		**1,448**
Avg. Earnings	$62,942	$72,794	$73,129	$81,424	$ 88,366	$96,044	$ 102,115	$ 99,864		**$ 93,539**
55 - 59	17	8	15	53	92	125	114	60	7	**491**
Avg. Earnings	$58,375	$56,887	$89,292	$87,494	$ 86,269	$93,833	$ 105,203	$ 101,971	$113,269	**$ 93,675**
60 - 64	1	1	6	17	19	18	18	12	7	**99**
Avg. Earnings	$17,919	$70,236	$58,969	$83,024	$ 90,247	$81,208	$ 104,756	$ 102,906	$115,809	**$ 90,515**
65 - 69			5	3	6	2	2	2	2	**22**
Avg. Earnings			$30,650	$80,728	$ 95,053	$85,981	$ 87,086	$ 104,766	$105,948	**$ 78,787**
70+										
Avg. Earnings										
Total	**1,987**	**1,078**	**1,736**	**2,160**	**2,173**	**1,512**	**696**	**159**	**16**	**11,517**
Avg. Earnings	**$52,772**	**$68,515**	**$75,250**	**$82,359**	**$ 88,732**	**$95,035**	**$ 102,161**	**$ 100,950**	**$113,465**	**$ 79,250**

* *This exhibit does not reflect service earned in other PERA or Combined Service Annuity benefits. It should not be relied upon as an indicator of non-vested status.*

** *This exhibit excludes five members who were merged into PERA P&F in 2012 from the Minneapolis Fire Retirement Fund whose benefits are not pay related.*

In each cell, the top number is the count of active participants for the age/service combination and the bottom number is average valuation earnings for the fiscal year ending on the valuation date.

Membership Data

Distribution of Service Retirements

	Years Retired as of June 30, 2017							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
<50								
Avg. Benefit								
50 - 54	93	318						**411**
Avg. Benefit	$ 49,265	$ 47,107						**$ 47,596**
55 - 59	177	605	372	1				**1,155**
Avg. Benefit	$ 64,822	$ 58,039	$ 50,131	$ 61,005				**$ 56,534**
60 - 64	44	318	615	420	5			**1,402**
Avg. Benefit	$ 59,573	$ 59,566	$ 57,453	$ 49,197	$ 62,371			**$ 55,543**
65 - 69	17	123	256	578	481	2	2	**1,459**
Avg. Benefit	$ 51,712	$ 48,021	$ 51,212	$ 54,328	$ 50,581	$ 54,043	$ 65,286	**$ 51,998**
70 - 74	1	15	99	175	771	122	2	**1,185**
Avg. Benefit	$ 27,053	$ 49,819	$ 40,546	$ 45,862	$ 55,912	$ 46,516	$ 65,286	**$ 52,091**
75 - 79	1	3	10	49	353	362	38	**816**
Avg. Benefit	$ 4,401	$ 40,086	$ 29,668	$ 38,555	$ 57,118	$ 62,770	$ 45,537	**$ 57,508**
80 - 84		1	4	4	147	233	132	**521**
Avg. Benefit		$ 67,597	$ 26,228	$ 50,909	$ 53,565	$ 60,795	$ 52,205	**$ 56,251**
85 - 89		1	2		33	111	155	**302**
Avg. Benefit		$ 21,048	$ 34,827		$ 56,108	$ 55,835	$ 57,454	**$ 56,441**
90+			1		23	57	76	**157**
Avg. Benefit			$ 22,977		$ 56,684	$ 58,252	$ 51,841	**$ 54,694**
Total	**333**	**1,384**	**1,359**	**1,227**	**1,813**	**887**	**405**	**7,408**
Avg. Benefit	**$ 58,820**	**$ 54,840**	**$ 52,686**	**$ 50,729**	**$ 54,573**	**$ 58,838**	**$ 53,649**	**$ 54,291**

In each cell, the top number is the count of retired participants for the age/years retired combination and the bottom number is the average annual benefit amount.

Membership Data

Distribution of Survivors

	Years Since Death as of June 30, 2017							
Age	<1	1 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25+	Total
<45	13	41	54	26	3	1		**138**
Avg. Benefit	$ 16,614	$ 14,858	$ 16,706	$ 17,823	$ 21,189	$ 6,296		**$ 16,311**
45 - 49	1	4	9	4	2	1		**21**
Avg. Benefit	$ 37,286	$ 39,559	$ 27,113	$ 41,459	$ 33,862	$ 31,477		**$ 33,551**
50 - 54	1	8	10	7	3	3	2	**34**
Avg. Benefit	$ 81,911	$ 46,649	$ 37,680	$ 30,506	$ 42,811	$ 46,011	$ 24,899	**$ 40,050**
55 - 59	3	11	19	8	3	3	5	**52**
Avg. Benefit	$ 19,274	$ 34,319	$ 40,120	$ 36,073	$ 26,906	$ 32,030	$ 37,331	**$ 35,570**
60 - 64	10	34	29	29	13	7	8	**130**
Avg. Benefit	$ 26,284	$ 32,547	$ 34,103	$ 34,084	$ 34,234	$ 43,009	$ 38,907	**$ 33,879**
65 - 69	13	48	29	27	26	14	17	**174**
Avg. Benefit	$ 30,745	$ 34,411	$ 34,211	$ 30,216	$ 32,945	$ 48,411	$ 34,904	**$ 34,408**
70 - 74	13	65	57	32	57	25	23	**272**
Avg. Benefit	$ 28,285	$ 34,841	$ 30,090	$ 34,111	$ 33,329	$ 36,775	$ 31,309	**$ 33,008**
75 - 79	14	56	49	25	55	19	23	**241**
Avg. Benefit	$ 30,228	$ 32,523	$ 33,585	$ 33,399	$ 36,039	$ 35,024	$ 34,397	**$ 33,875**
80 - 84	12	64	43	39	45	31	29	**263**
Avg. Benefit	$ 42,972	$ 31,152	$ 27,965	$ 36,945	$ 30,909	$ 33,078	$ 34,383	**$ 32,571**
85 - 89	8	42	53	37	64	57	31	**292**
Avg. Benefit	$ 33,468	$ 32,669	$ 32,630	$ 34,541	$ 31,118	$ 30,802	$ 26,433	**$ 31,555**
90+	8	17	30	30	66	49	44	**244**
Avg. Benefit	$ 32,489	$ 33,696	$ 28,429	$ 24,075	$ 31,548	$ 27,283	$ 24,629	**$ 28,322**
Total	**96**	**390**	**382**	**264**	**337**	**210**	**182**	**1,861**
Avg. Benefit	**$ 30,171**	**$ 31,541**	**$ 29,874**	**$ 31,452**	**$ 32,607**	**$ 33,112**	**$ 30,508**	**$ 31,385**

In each cell, the top number is the count of survivors for the age/years since death combination and the bottom number is the average annual benefit amount.

Membership Data

Distribution of Disability Retirements

	Years Disabled* as of June 30, 2017							
Age	**<1**	**1 - 4**	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25+**	**Total**
< 45	18	71	24	11				**124**
Avg. Benefit	$ 42,494	$ 39,688	$ 32,110	$ 30,024				**$ 37,771**
45 - 49	13	47	23	23	5	2		**113**
Avg. Benefit	$ 49,947	$ 45,018	$ 35,190	$ 33,858	$ 31,428	$ 27,272		**$ 40,398**
50 - 54	9	64	29	27	19	5		**153**
Avg. Benefit	$ 57,115	$ 49,325	$ 43,295	$ 38,840	$ 34,515	$ 35,476		**$ 44,498**
55 - 59	19	47	13	43	42	8		**172**
Avg. Benefit	$ 38,875	$ 46,577	$ 42,920	$ 41,056	$ 38,200	$ 42,421		**$ 41,831**
60 - 64	4	26	23	81	56	13		**203**
Avg. Benefit	$ 47,922	$ 44,748	$ 49,178	$ 48,851	$ 44,347	$ 46,946		**$ 46,980**
65 - 69	3	12	2	80	125	24		**246**
Avg. Benefit	$ 34,310	$ 46,706	$ 56,987	$ 47,948	$ 50,950	$ 49,610		**$ 49,404**
70 - 74		2	4	24	110	39		**179**
Avg. Benefit		$ 65,952	$ 57,066	$ 43,801	$ 53,131	$ 58,706		**$ 53,326**
75+			2	4	27	55	32	**120**
Avg. Benefit			$ 50,572	$ 62,612	$ 50,924	$ 52,117	$ 52,627	**$ 52,308**
Total	**66**	**269**	**120**	**293**	**384**	**146**	**32**	**1,310**
Avg. Benefit	**$ 44,871**	**$ 45,113**	**$ 41,400**	**$ 44,429**	**$ 48,148**	**$ 51,769**	**$ 52,627**	**$ 46,423**

** Based on effective date as provided by PERA; "Years Disabled" may reflect years since age 65 for members over age 65.*

In each cell, the top number is the count of disabled participants for the age/years disabled combination and the bottom number is the average annual benefit amount.

Membership Data

Reconciliation of Members

		Terminated		Recipients			
	Actives	Deferred Retirement	Other Non-Vested	Service Retirement	Disability Retirement	Survivor	Total
Members on 7/1/2016	**11,398**	**1,490**	**1,059**	**7,222**	**1,257**	**1,873**	**24,299**
New members	656						656
Return to active	45	(24)	(21)	0	0	0	0
Terminated non-vested	(88)	0	88	0	0	0	0
Service retirements	(245)	(95)	0	340	0	0	0
Terminated deferred	(153)	153	0	0	0	0	0
Terminated refund/transfer	(30)	(28)	(14)	0	0	0	(72)
Deaths	(7)	(1)	(3)	(152)	(15)	(98)	(276)
New beneficiary	0	0	0	0	0	104	104
Disabled	(55)	0	0	0	55	0	0
Data adjustments	1	11	25	(2)	13	(18)	30
Net change	124	16	75	186	53	(12)	442
Members on 6/30/2017	**11,522**	**1,506**	**1,134**	**7,408**	**1,310**	**1,861**	**24,741**

Terminated Member Statistics	Deferred Retirement	Other Non-Vested	Total
Number	1,506	1,134	2,640
Average age	44.8	44.6	44.7
Average service	7.0	0.7	4.3
Average annual benefit, with augmentation to Normal Retirement Date and 33% Combined Service Annuity (CSA) load	$19,469	N/A	$19,469
Average refund value, with 33% CSA load (2% CSA load for Non-Vested)	$37,074	$2,371	$22,168

Development of Costs

Actuarial Valuation Balance Sheet *(Dollars in Thousands)*

The actuarial balance sheet is based on the principle that the long-term projected benefit obligations of the plan should be ideally equal to the long-term resources available to fund those obligations. **A Projected Benefit Funding Ratio less than 100% indicates that contributions are insufficient.** The resources available to meet projected obligations for current members consist of current Fund assets plus the present value of anticipated future contributions intended to fund benefits for current members. In the exhibit below, B.2 is the estimated present value of contributions to fund the normal cost rate for current members until their respective termination dates. Item B.1 is the present value of the total 29.36% statutory contribution net of normal cost and anticipated plan expenses during the period from the valuation date to the statutory unfunded amortization date.

The contributions made in excess of amounts required for current benefit payments are accumulated as a reserve to help meet benefit payments in later years. It is this reserve system which permits the establishment of a level rate of contribution each year.

			June 30, 2017
A. Actuarial Value of Assets			$ 7,840,549
B. Expected Future Assets			
1. Present value of expected future statutory supplemental contributions*			$ 1,178,899
2. Present value of future normal cost contributions			$ 1,852,004
3. Total expected future assets: *(1.) + (2.)*			$ 3,030,903
C. Total Current and Expected Future Assets *(A.+ B.3)*			$ 10,871,452
D. Current Benefit Obligations**			
1. Benefit recipients	**Non-Vested**	**Vested**	**Total**
a. Service retirements	$ -	$ 4,336,447	$ 4,336,447
b. Disability retirements	$ -	$ 729,385	$ 729,385
c. Survivors	$ -	$ 466,728	$ 466,728
2. Deferred retirements with augmentation	$ -	$ 210,569	$ 210,569
3. Former members without vested rights	$ 1,477	$ -	$ 1,477
4. Active members	$ 118,137	$ 3,006,499	$ 3,124,636
5. Total current benefit obligations	$ 119,614	$ 8,749,628	$ 8,869,242
E. Expected Future Benefit Obligations			$ 2,181,970
F. Total Current and Expected Future Benefit Obligations***			$ 11,051,212
G. Unfunded Current Benefit Obligations: *(D.5.) - (A.)*			$ 1,028,693
H. Unfunded Current and Future Benefit Obligations: *(F.) - (C.)*			$ 179,760
I. Accrued Benefit Funding Ratio: *(A.)/(D.5.)*			88.40%
J. Projected Benefit Funding Ratio: *(C.)/(F.)*			98.37%

* *Per the LCPR Standards for Actuarial Work, calculated assuming the current contribution toward the unfunded liability continues for the entire amortization period.*

** *Present value of credited projected benefits (projected compensation, current service).*

*** *Present value of projected benefits (projected compensation, projected service).*

Development of Costs

Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate (Dollars in Thousands)

	Actuarial Present Value of Projected Benefits	Actuarial Present Value of Future Normal Costs	Actuarial Accrued Liability
A. Determination of Actuarial Accrued Liability (AAL)			
1. Active members			
a. Retirement annuities	$ 4,518,736	$ 1,353,362	$ 3,165,374
b. Disability benefits	$ 511,554	$ 301,297	$ 210,257
c. Survivor's benefits	$ 94,826	$ 54,694	$ 40,132
d. Deferred retirements	$ 175,549	$ 133,301	$ 42,248
e. Refunds*	$ 5,941	$ 9,350	$ (3,409)
f. Total	$ 5,306,606	$ 1,852,004	$ 3,454,602
2. Deferred retirements with future augmentation	$ 210,569	$ -	$ 210,569
3. Former members without vested rights	$ 1,477	$ -	$ 1,477
4. Annuitants	$ 5,532,560	$ -	$ 5,532,560
5. Total	$ 11,051,212	$ 1,852,004	$ 9,199,208
B. Determination of Unfunded Actuarial Accrued Liability (UAAL)			
1. Actuarial accrued liability			$ 9,199,208
2. Current assets (AVA)			$ 7,840,549
3. Unfunded actuarial accrued liability			$ 1,358,659
C. Determination of Supplemental Contribution Rate**			
1. Present value of future payrolls through the amortization date of June 30, 2043			$ 14,791,706
2. Supplemental contribution rate: *(B.3.) / (C.1.)*			9.19% ***

* *Includes non-vested refunds and non-married survivor benefits only.*

** *The amortization of the Unfunded Actuarial Accrued Liability (UAAL) using the current amortization method results in initial payments less than the "interest only" payment on the UAAL. Payments less than the interest only amount will result in the UAAL increasing for an initial period of time.*

*** *The amortization factor as of July 1, 2017 is 15.40466.*

Development of Costs

Changes in Unfunded Actuarial Accrued Liability (UAAL) *(Dollars in Thousands)*

	Year Ending June 30, 2017		
	Actuarial Accrued Liability	Current Assets	Unfunded Actuarial Accrued Liability
A. Unfunded actuarial accrued liability at beginning of year	$ 8,417,621	$ 7,385,777	$ 1,031,844
B. Changes due to interest requirements and current rate of funding			
1. Normal cost, including expenses	$ 190,844	$ -	$ 190,844
2. Benefit payments	$ (514,498)	$ (514,498)	$ -
3. Contributions	$ -	$ 277,313	$ (277,313)
4. Interest on A., B.1., B.2. and B.3.	$ 660,464	$ 581,375	$ 79,089
5. Total *(B.1. + B.2. + B.3. + B.4.)*	$ 336,810	$ 344,190	$ (7,380)
C. Expected unfunded actuarial accrued liability at end of year *(A. + B.5.)*			$ 1,024,464
D. Increase (decrease) due to actuarial losses (gains) because of experience deviations from expected			
1. Age and service retirements			$ (1,565)
2. Disability retirements			$ 884
3. Death-in-service benefits			$ (598)
4. Withdrawals			$ (1,623)
5. Salary increases			$ 11,538
6. Investment income			$ (110,582)
7. Mortality of annuitants			$ 5,345
8. Other items			$ (5,430)
9. Total			$ (102,031)
E. Unfunded actuarial accrued liability at end of year before plan amendments and changes in actuarial assumptions *(C. + D.9.)*			$ 922,433
F. Change in unfunded actuarial accrued liability due to changes in plan provisions			$ -
G. Change in unfunded actuarial accrued liability due to changes in actuarial assumptions			$ 436,226
H. Change in unfunded actuarial accrued liability due to changes in decrement timing and miscellaneous methodology			$ -
I. Unfunded actuarial accrued liability at end of year *(E. + F. + G. + H.)**			$ 1,358,659

* *The unfunded actuarial accrued liability on a market value of assets basis is $1,280,329.*

Development of Costs

Determination of Contribution Sufficiency/(Deficiency) *(Dollars in Thousands)*

The required contribution is defined in Minnesota statutes as the sum of normal cost, a supplemental contribution to amortize the UAAL, and an allowance for expenses. The dollar amounts shown are for illustration purposes and equal percent of pay multiplied by projected annual payroll.

	Percent of Payroll		Dollar Amount
A. Statutory contributions - Chapter 353			
1. Employee contributions	10.80%	$	103,703
2. Employer contributions	16.20%	$	155,554
3. Minneapolis Police contributions***	0.93%	$	8,890
4. Minneapolis Fire contributions***	0.50%	$	4,757
5. Virginia Fire contributions	0.00%	$	30
6. State contributions****	0.93%	$	9,000
7. Total	29.36%	$	281,934
B. Required contributions - Chapter 356			
1. Normal cost			
a. Retirement benefits	15.59%	$	149,697
b. Disability benefits	3.47%	$	33,319
c. Survivors	0.66%	$	6,337
d. Deferred retirement benefits	1.46%	$	14,019
e. Refunds*	0.10%	$	960
f. Total	21.28%	$	204,332
2. Supplemental contribution amortization of Unfunded Actuarial Accrued Liability by June 30, 2043	9.19%	$	88,243
3. Allowance for expenses	0.11%	$	1,056
4. Total	30.58% **	$	293,631
C. Contribution Sufficiency/(Deficiency) *(A.7. - B.4.)*	(1.22)%	$	(11,697)

Note: Projected annual payroll for fiscal year beginning on the valuation date: $960,210.

* *Includes non-vested refunds and non-married survivor benefits only.*
** *The required contribution on a market value of assets basis is 30.05% of payroll.*
*** *Contributions due July 15, 2018. 2017 contributions are included in assets as receivable contributions.*
**** *Contributions paid until both PERA P&F and MSRS State Patrol reach 90% funding (on a Market Value of Assets basis).*

Development of Costs

Special Groups – Minneapolis Police Relief Association (000s)

The Minneapolis Police Relief Association was consolidated with the P&F Plan on December 30, 2011, per 2011 legislation. The annual employer contribution after consolidation is defined as the amount necessary to amortize on a level dollar basis the estimated unfunded present value of benefits at consolidation by December 31, 2031. Contributions are payable annually on July 15th.

The employer contribution to be made annually on July 15th beginning in 2013 and ending in 2015 is $7,612,423 (previously calculated). Due to the change in P&F's statutory discount rate, the contribution amount was recalculated. The employer contribution to be made annually on July 15th beginning in 2016 and ending in 2031 is $8,890,272 (previously calculated).

Year Ending June 30, 2017

Group	Number	Annual Benefits	Average Age	Present Value of Projected Benefits
Active Members	0	N/A	N/A	$ -
Service Retirements	429	$ 26,885	75.5	$ 251,613
Disability Retirements	17	$ 959	72.1	$ 9,905
Survivors	206	$ 7,173	80.3	$ 50,262
Total	**652**	**$ 35,017**	**76.9**	**$ 311,780**

Development of Costs

Special Groups – Minneapolis Firefighters' Relief Association (000s)

The Minneapolis Firefighters' Relief Association was consolidated with the P&F Plan on December 30, 2011, per 2011 legislation. The annual employer contribution after consolidation is defined as the amount necessary to amortize on a level dollar basis the estimated unfunded present value of benefits at consolidation by December 31, 2031. Contributions are payable annually on July 15th.

The employer contribution to be made annually on July 15th beginning in 2013 and ending in 2015 is $3,921,787 (previously calculated). Due to the change in P&F's statutory discount rate, the contribution amount was recalculated. The employer contribution to be made annually on July 15th beginning in 2016 and ending in 2031 is $4,757,457 (previously calculated).

Year Ending June 30, 2017

Group	Number	Annual Benefits	Average Age	Present Value of Projected Benefits
Active Members	5	N/A	61.6	$ 3,262
Service Retirements	261	$ 16,780	75.9	$ 150,926
Disability Retirements	37	$ 2,303	74.4	$ 21,865
Survivors	155	$ 5,523	80.5	$ 38,161
Total	**458**	**$ 24,606**	**77.2**	**$ 214,214**

Development of Costs

Special Groups – Virginia Fire Department Relief Association (000s)

The Virginia Fire Department Relief Association was consolidated with the P&F Plan on June 29, 2012. The annual employer contribution after consolidation is defined as the amount necessary to amortize on a level dollar basis the estimated unfunded present value of benefits at consolidation by December 31, 2020.

The employer contribution to be made annually beginning in 2012 and ending in 2014 is $25,431 (previously calculated). Due to the change in P&F's statutory discount rate, the contribution amount was recalculated. The employer contribution to be made annually beginning in 2015 and ending in 2020 is $29,611 (previously calculated).

Year Ending June 30, 2017

Group	Number	Annual Benefits*	Average Age	Present Value of Projected Benefits
Service Retirements	5	$ 139	83.7	$ 900
Survivors	3	$ 46	88.2	$ 217
Total	**8**	**$ 185**	**85.4**	**$ 1,117**

* *Benefit amounts were provided by PERA for all members. Surviving spouses will receive a benefit equal to 50% of the annuitant benefit amount.*

Development of Costs

Special Groups – Fairmont Police Department Relief Association (000s)

The Fairmont Police Department Relief Association was consolidated with the P&F Plan on June 29, 2012. The assets exceeded the present value of future benefits at consolidation by $462,639 (previously calculated). PERA credited these assets to an interest bearing suspense account within the P&F Fund and the account will be used to offset any increase in liability for this group of members due to any changes in P&F's statutory discount rate until June 30, 2015. **It is our understanding that this account has been paid to the City of Fairmont.**

Year Ending June 30, 2017

Group	Number	Annual Benefits*	Average Age	Present Value of Projected Benefits
Service Retirements	8	$ 523	73.8	$ 5,072
Survivors	3	$ 118	86.8	$ 614
Total	**11**	**$ 641**	**77.3**	**$ 5,686**

* *Benefit amounts were provided by PERA for all members. Surviving spouses will receive an annual benefit equal to 35 times the unit value.*

Actuarial Basis

Actuarial Methods

All actuarial methods are prescribed by Minnesota Statutes, the Legislative Commission on Pensions and Retirement, or the Board of Trustees. Different methodologies may also be reasonable and results based on other methodologies would produce different results.

Actuarial Cost Method

An actuarial cost method is a set of techniques used by the actuary to develop contribution levels under a retirement plan. The actuarial cost method used in this valuation for all purposes is the Entry Age Actuarial Cost Method. Under this method, a normal cost is developed by amortizing the actuarial value of benefits expected to be received by each active participant (as a level percentage of pay) over the total working lifetime of that participant, from hire to termination. Age as of the valuation date was calculated based on the dates of birth provided by the Fund. Entry age for valuation purposes was calculated as the age on the valuation date minus the provided years of service on the valuation date.

To the extent that current assets and future normal costs do not support participants' expected future benefits, an unfunded actuarial accrued liability ("UAAL") develops. The UAAL is amortized over the statutory amortization period using level percent-of-payroll assuming payroll increases. The total contribution developed under this method is the sum of normal cost, expenses, and the payment toward the UAAL.

Valuation of Future Post-Retirement Benefit Increases

If the plan has reached the funding ratio threshold required to pay a 2.50% benefit increase, Minnesota Statutes require the 2.50% benefit increase rate to be reflected in the liability calculations. If the plan has not yet reached the funding ratio threshold required to pay a 2.50% benefit increase, Minnesota Statutes require a projection to be performed to determine the expected attainment of the funding ratio threshold, and the expected reversion to a 2.50% benefit increase rate must be reflected in the liability calculations.

Funding Objective

The fundamental financing objective of the Plan is to establish contribution rates which, when expressed as a percentage of active member payroll, will remain approximately level from generation to generation and meet the required deadline for full funding.

Actuarial Methods (Concluded)

Asset Valuation Method

The assets are valued based on a five-year moving average of expected and market values (five-year average actuarial value) determined as follows:

- At the end of each plan year, an average asset value is calculated as the average of the market asset value at the beginning and end of the fiscal year net of investment income for the fiscal year;
- The investment gain or (loss) is taken as the excess of actual investment income over the expected investment income based on the average asset value as calculated above;
- The investment gain or (loss) so determined is recognized over five years at 20% per year; and
- The asset value is the sum of the market asset value plus the scheduled recognition of investment gains or (losses) during the current and the preceding four fiscal years.

Payment on the Unfunded Actuarial Accrued Liability

Payment equals a level percentage of payroll each year to the statutory amortization date of June 30, 2043 assuming payroll increases of 3.50% per annum. If there is a negative Unfunded Actuarial Accrued Liability, the surplus amount is amortized over 30 years as a level percentage of payroll. If the unfunded liability increases due to changes in benefits, assumptions, or methods, the statutory amortization date will be re-determined. Projected payroll is multiplied by 0.959 in the determination of the present value of future payroll to account for timing differences (as required by the Standards for Actuarial Work).

Changes in Methods Since Prior Valuation

There have been no changes in actuarial methods since the prior valuation.

Actuarial Basis

Summary of Actuarial Assumptions

The following assumptions were used in valuing the liabilities and benefits under the plan. All actuarial assumptions are prescribed by Minnesota Statutes, the Legislative Commission on Pensions and Retirement (LCPR), or the Board of Trustees. These parties are responsible for selecting the assumptions used for this valuation. Unless noted otherwise, the assumptions prescribed are based on the last experience study, dated August 30, 2016. The Allowance for Combined Service Annuity assumptions are based on an analysis completed by the LCPR actuary and documented in a report dated October 2016.

Investment return	8.00% per annum.
Benefit increases after retirement	1.00% per annum through 2033 and 2.50% per annum thereafter.
Salary increases	Reported salary at valuation date increased according to the rate table, to current fiscal year and annually for each future year. Prior fiscal year salary is annualized for members with less than one year of service earned during the year.
Inflation	2.75% per year.
Payroll growth	3.50% per year.
Mortality rates	
Healthy pre-retirement	RP-2014 employee generational mortality table projected with mortality improvement scale MP-2016, from a base year of 2006.
Healthy post-retirement	RP-2014 annuitant generational mortality table projected with mortality improvement scale MP-2016 from a base year of 2006. Male rates are adjusted by a factor of 0.96.
Disabled	RP-2014 annuitant generational mortality table projected with mortality improvement scale MP-2016 from a base year of 2006. Male rates are adjusted by a factor of 0.96. The RP-2014 employee mortality table as published by the Society of Actuaries (SOA) contains mortality rates for ages 18 to 80 and the annuitant mortality table contains mortality rates for ages 50 to 120. We have extended the annuitant mortality table as needed for members younger than age 50 who are receiving a benefit by deriving rates based on the employee table and the juvenile table. Similarly, we have extended the employee table as needed for members older than age 80 by deriving rates based on the annuitant table.
Retirement	Members retiring from active status are assumed to retire according to the age related rates shown in the rate table. Members who have attained the highest assumed retirement age are assumed to retire in one year.
Withdrawal	Select and Ultimate rates based on actual experience. Ultimate rates after the third year are shown in rate table. Select rates in the first three years are:

Year	Select Withdrawal Rates
1	3.00%
2	3.00%
3	3.00%

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

Disability	Age-related rates based on experience; see table of sample rates. All incidences are assumed to be duty-related.
Allowance for combined service annuity	Liabilities for former members are increased by 33.0% for vested members and 2.0% for non-vested members to account for the effect of some participants having eligibility for a Combined Service Annuity.
Administrative expenses	Prior year administrative expenses expressed as percentage of prior year projected payroll.
Refund of contributions	Account balances accumulate interest until normal retirement date and are discounted back to the valuation date. All employees withdrawing after becoming eligible for a deferred benefit take the larger of their contributions accumulated with interest or the value of their deferred benefit.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 55.
Percentage married	85% of male and 60% of female active members are assumed to be married. Actual marital status is used for members in payment status.
Age of spouse	Males are assumed to be two years older than females. For members in payment status, actual spouse date of birth is used, if provided.
Eligible children	Retiring members are assumed to have no dependent children.
Form of payment	Married members retiring from active status are assumed to elect subsidized joint and survivor form of annuity as follows: Males: 10% elect 25% Joint & Survivor option 20% elect 50% Joint & Survivor option 20% elect 75% Joint & Survivor option 35% elect 100% Joint & Survivor option Females: 20% elect 25% Joint & Survivor option 20% elect 50% Joint & Survivor option 10% elect 75% Joint & Survivor option 20% elect 100% Joint & Survivor option Remaining married members and unmarried members are assumed to elect the Straight Life option. Members receiving deferred annuities (including current terminated deferred members) are assumed to elect a straight life annuity.
Eligibility testing	Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.
Decrement operation	Withdrawal decrements do not operate during retirement eligibility. Decrements are assumed to occur mid-fiscal year.
Service credit accruals	It is assumed that members accrue one year of service credit per year.

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

Pay Increases	Pay increases are assumed to happen at the beginning of the fiscal year. This is equivalent to assuming that reported earnings are pensionable earnings for the year ending on the valuation date.
Unknown data for certain members	To prepare this report, GRS has used and relied on participant data supplied by the Fund. Although GRS has reviewed the data in accordance with Actuarial Standards of Practice No. 23, GRS has not verified or audited any of the data or information provided. In cases where submitted data was missing or incomplete, the following assumptions were applied: <u>Data for active members:</u> There were 33 members reported with a salary less than $100. We used prior year salary (19 members), if available; otherwise high five salary with a 10% load to account for salary increases (14 members). If neither prior year salary nor high five salary was available, we assumed a value of $35,000. Note former members of either Minneapolis Police or Minneapolis Fire are excluded from these salary counts as salary is not used to calculate the benefit. There were also 123 members reported without a gender. We assumed male gender. There were 2 members reported without a date of birth. We assumed a date of birth of July 1, 1985. <u>Data for terminated members:</u> We calculated benefits for these members using the reported Average Salary and credited service. If Average Salary was not reported (2 members), we assumed a value of $24,000. If credited service was not reported (15 members), we used elapsed time from hire date to termination date (6 members); otherwise we assumed nine years of service. If termination date was invalid or not reported (8 members), we assumed the termination date was equal to the hire date plus credited service, otherwise the valuation date. If the reported termination date occurs prior to the reported hire date, the two dates were swapped. There were 6 members reported without a gender; male was assumed. There were no members reported without a date of birth. <u>Data for retired members:</u> There were no members with missing or invalid dates of birth. There were 20 members reported without a gender. We assumed retirees are male and beneficiaries are female. There were 20 members that were active last year and retirement eligible and no on the retiree data file this year. At the direction of PERA, we included these members in the 2017 valuation as retirees with an estimated life only monthly benefit.

Summary of Actuarial Assumptions (Continued)

Unknown data for certain members (Continued)	Data for retired members (Continued): Because PERA reclassifies disabled members as retirees once the member reaches Normal Retirement Age, we compare the members that PERA reports as retirees to our disabled group from the last valuation. If a member was disabled in the valuation, we reclassify that member as a disabled retiree in this year's valuation. We reclassified 192 retirees as disabled retirees in this valuation.
Changes in actuarial assumptions	Assumed salary increases were changed as recommended in the June 30, 2016 experience study. The net effect is proposed rates that average 0.34% lower than the previous rates. Assumed rates of retirement were changed, resulting in fewer retirements. The Combined Service Annuity (CSA) load was 30% for vested and non-vested, deferred members. The CSA has been changed to 33% for vested members and 2% for non-vested members. The base mortality table for healthy annuitants was changed from the RP-2000 fully generational table to the RP-2014 fully generational table (with a base year of 2006), with male rates adjusted by a factor of 0.96. The mortality improvement scale was changed from Scale AA to Scale MP-2016. The base mortality table for disabled annuitants was changed from the RP-2000 disabled mortality table to the mortality tables assumed for healthy retirees. Assumed termination rates were decreased to 3.0% for the first three years of service. Rates beyond the select period of three years were adjusted, resulting in more expected terminations overall. Assumed percentage of married female members was decreased from 65% to 60%. Assumed age difference was changed from separate assumptions for male members (wives assumed to be three years younger) and female members (husbands assumed to be four years older) to the assumption that males are two years older than females. The assumed percentage of female members electing Joint and Survivor annuities was increased. The assumed post-retirement benefit increase rate was changed from 1.00% per year through 2050 and 2.50% thereafter to 1.00% per year through 2033 and 2.50% thereafter. See page 4 for additional detail about this assumption.

Actuarial Basis

Summary of Actuarial Assumptions (Continued)

	Percentage of Members Dying Each Year*					
	Healthy Post-Retirement Mortality		Healthy Pre-Retirement Mortality		Disability Mortality	
Age in 2017	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
20	0.03%	0.02%	0.04%	0.02%	0.03%	0.02%
25	0.05	0.03	0.05	0.02	0.05	0.03
30	0.08	0.06	0.05	0.02	0.08	0.06
35	0.12	0.11	0.06	0.03	0.12	0.11
40	0.18	0.17	0.07	0.04	0.18	0.17
45	0.26	0.21	0.10	0.07	0.26	0.21
50	0.39	0.27	0.17	0.11	0.39	0.27
55	0.55	0.38	0.28	0.17	0.55	0.38
60	0.77	0.56	0.48	0.26	0.77	0.56
65	1.10	0.84	0.86	0.39	1.10	0.84
70	1.65	1.31	1.42	0.64	1.65	1.31

* *Generally, mortality rates are expected to increase as age increases. These standard mortality rates have been adjusted slightly to prevent decreasing mortality rates. If the rates were not adjusted as described, we would not expect the valuation results to be materially different.*

	Withdrawal Rates After Third Year		Disability Retirement	
Age	**Males**	**Females**	**Males**	**Females**
20	3.00%	3.00%	0.11%	0.11%
25	2.60	2.60	0.13	0.13
30	2.10	2.10	0.16	0.16
35	1.60	1.60	0.19	0.19
40	1.25	1.25	0.29	0.29
45	1.25	1.25	0.54	0.54
50	0.00	0.00	1.04	1.04
55	0.00	0.00	2.03	2.03
60	0.00	0.00	0.00	0.00

Actuarial Basis

Summary of Actuarial Assumptions (Concluded)

Age	Retirement Rate
50	10.00%
51	7.00
52	7.00
53	10.00
54	10.00
55	25.00
56	22.50
57	22.50
58	22.50
59	20.00
60	22.50
61	25.00
62	30.00
63	30.00
64	30.00
65	50.00
66	50.00
67	50.00
68	50.00
69	50.00
70+	100.00

Salary Scale	
Year	Increase
1	12.50%
2	10.75%
3	9.00%
4	8.00%
5	6.50%
6	6.00%
7	5.50%
8	5.25%
9	5.00%
10	4.75%
11	4.50%
12	4.40%
13	4.30%
14	4.20%
15	4.10%
16	4.00%
17	4.00%
18	4.00%
19	4.00%
20	4.00%
21	3.90%
22	3.80%
23	3.70%
24	3.60%
25+	3.50%

Actuarial Basis

Summary of Plan Provisions – Police & Fire Plan

Following is a summary of the major plan provisions used in the valuation of this report. PERA is solely responsible for the validity, accuracy and comprehensiveness of this information. If any of the plan provisions shown below are not accurate and complete, the valuation results may differ significantly from those shown in this report and may require a revision of this report.

Plan year	July 1 through June 30
Eligibility	All full-time and certain part-time police officers and fire fighters, and certain paramedics, who are not contributing to any other local retirement fund.
Contributions	<u>**Member**</u> / <u>**Employer**</u> Percent of Salary January 1, 2015 & later: Member 10.80, Employer 16.20 Member contributions are "picked up" according to the provisions of Internal Revenue Code 414(h).
State contributions	$9 million paid annually on October 1 until both PERA P&F and MSRS State Patrol become 90% funded (on a Market Value of Assets basis).
Allowable service	Police and Fire service during which member contributions were made. May also include certain leaves of absence and military service.
Salary	Includes amounts deducted for deferred compensation or supplemental retirement plans, net income from fees and sick leave payments funded by the employer. Excludes unused annual leaves and sick leave payments, severance payments, Workers' Compensation benefits and employer-paid flexible spending accounts, cafeteria plans, healthcare expense accounts, day-care expenses, fringe benefits and the cost of insurance coverage.
Average salary	Average of the five highest successive years of salary. Average Salary is based on all Allowable Service if less than five years.
Vesting	

	Vesting Percent if First Hired		
Years of Service	**Before 7/1/2010**	**After 6/30/2010 & before 7/1/2014**	**After 6/30/2014**
<3	0%	0%	0%
3 – 4	100	0	0
5	100	50	0
6	100	60	0
7	100	70	0
8	100	80	0
9	100	90	0
10	100	100	50
11	100	100	55
12	100	100	60
13	100	100	65
14	100	100	70
15	100	100	75
16	100	100	80
17	100	100	85
18	100	100	90
19	100	100	95
20+	100	100	100

Summary of Plan Provisions – Police & Fire Plan (Continued)

Retirement	
Normal retirement benefit	
Age/service requirement	Age 55 and at least partially vested. Proportionate Retirement Annuity is available at age 65 and one year of Allowable Service.
Amount	3.00% of Average Salary for each year of Allowable Service (up to 33 years if hired after June 30, 2014), pro-rata for completed months. A pro-rata share of member contributions will be refunded at retirement for excess service.
Early retirement	
Age/service requirement	Age 50 and at least partially vested.
Amount	Normal Retirement Benefit based on Allowable Service and Average Salary at retirement date and 0.10% (0.20% for members enrolled in the plan after June 30, 2007) reduction for each month the member is under age 55. If the effective date of retirement is after June 30, 2019, the reduction is 5/12% for each month that the member is under age 55 at the time of retirement. The change in early retirement factors will be phased-in over a five-year period for retirements occurring between July 1, 2014 and June 30, 2019.
Form of payment	Life annuity with return on death of any balance of contributions over aggregate monthly payments. Actuarially equivalent options are: 25%, 50%, 75% or 100% Joint and Survivor with bounce back feature. The Joint and Survivor options are determined on an actuarially equivalent basis, but with no actuarial reduction for the bounce back feature.
Benefit Increases	Benefit recipients receive a future annual 1.00% post-retirement benefit increase. The annual adjustment will equal 2.50% any time the Fund exceeds a 90% funded ratio for two consecutive years. If the adjustment is increased to 2.50% and the funded ratio falls below 80% for one year or 85% for two consecutive years the post-retirement benefit increase will be lowered to 1.00%. A benefit recipient who has been receiving a benefit for at least 12 full months as of June 30 will receive a full increase. Members receiving benefits for at least one month but less than 12 full months as of June 30 will receive a pro rata increase. For retirements after May 31, 2014, the first increase will be delayed two years. Members retired under laws in effect before July 1, 1973 receive an additional lump sum payment each year. In 1989, this lump sum payment is the greater of \$25 times each full year of Allowable Service or the difference between \$400 times each full year of Allowable Service and the sum of benefits paid from any Minnesota public pension plan plus cash payments from the Social Security Administration for the preceding fiscal year July 1, 1988 through June 30, 1989. In each following year, the lump sum payment will increase by the same percentage increase that is applied to regular annuities paid from the Fund. Effective January 1, 2002, annual lump sum payment is divided by 12 and paid as a monthly life annuity in the annuity form elected.

Summary of Plan Provisions – Police & Fire Plan (Continued)

Disability	
Duty disability benefit	
Age/service requirement	Physically or mentally unable to perform normal duties as a police officer or fire fighter as a direct result of an act of duty specific to protecting property and personal safety of others. Members age 55 or older with 20 or more years of Allowable Service are not eligible to apply for duty disability benefits.
Amount	60.0%, plus an additional 3.00% for each year of service in excess of 20 years, of Average Salary paid until Normal Retirement Age, or for 60 months, whichever is later. The retirement benefit is then recalculated but is never lower than the disability benefit. If a member became disabled prior to July 1, 1997 but did not commence their benefit before July 1, 1997, the benefit is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in post-retirement interest rates from 5.00% to 6.00%.
Regular disability benefit	
Age/service requirement	Physically or mentally unable to perform normal duties as a police officer or fire fighter with one year of Allowable Service. Members age 55 or older with 15 or more years of Allowable Service are not eligible to apply for regular disability benefits.
Amount	45.00% of Average Salary, paid until Normal Retirement Age, or for 60 months, whichever is later. The retirement benefit is then recalculated but is never lower than the disability benefit. Benefits for total and permanent regular disability are calculated as 3.00% of Average Salary for each year of Allowable Service, with a minimum of 45.00% of Average Salary. If a member became disabled prior to July 1, 1997 but did not commence his or her benefit before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement.
Retirement benefit	
Age/service requirement	Upon cessation of disability benefits.
Amount	Any optional annuity continues. Otherwise, the larger of the disability benefit paid before age 55 or the normal retirement benefit available at age 55, or an actuarially equivalent optional annuity.
Form of payment	Same as for retirement.
Benefit increases	Same as for retirement.

Actuarial Basis

Summary of Plan Provisions – Police & Fire Plan (Continued)

Death

Surviving spouse benefit

Age/service requirement	Death of active member or regular disabled member with surviving spouse whose disability benefit accrued before July 1, 2007, who is vested at death (service requirement is waived if death occurs in the line of duty).
Amount	50.00% of salary (60.00% if death occurs in the line of duty after June 30, 2007) averaged over last six months. Benefit paid until spouse's death but no payments while spouse is remarried prior to July 1, 1991. If a member becomes deceased prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefits before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement.

Surviving dependent children's benefit

Age/service requirement	Non-duty related death of active member or regular disabled member with eligible dependent child.
Amount	10.00% of salary averaged over last six months for each child. Family benefit minimum (including spouse's benefit) of 50.00% of salary and maximum of 70.00% of salary. Benefits paid until child marries, dies, or attains age 18 (age 23 if full-time student).

Duty disability surviving spouse benefit

Age/service requirement	Member who is totally and permanently disabled who dies before age 55 or within five years of the effective date of the disability benefit, whichever is later.
Amount	60.00% of salary averaged over last six months. Benefits paid until spouse's death but no payments while spouse is remarried prior to July 1, 1991.
Benefit increases	Same as for retirement.

Summary of Plan Provisions – Police & Fire Plan (Continued)

Death (Continued)

Duty disability surviving dependent children's benefit

Age/service requirement	Death of a member with an eligible dependent child who was disabled in the line of duty and died as a direct result of the disability.
Amount	10.00% of salary averaged over last six months for each child. Family benefit minimum (including spouse's benefit) of 60.00% of salary and maximum of 80.00% of salary. Benefits paid until child marries, dies, or attains age 18 (age 23 if full-time student). If a member became deceased prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefits before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.

Surviving spouse optional annuity

Age/service requirement	Active member dies before age 55. Benefits commence when member would have been age 55 or as early as age 50 if qualified for early retirement, benefits commence immediately if member had 30 years of service.
Amount	Survivor's payment of the 100% joint and survivor benefit the member could have elected if terminated. Alternatively, spouse may elect refund of deceased's contributions with interest if there are no dependent children. If a member became deceased prior to July 1, 1997 and the beneficiary was not eligible to commence their survivor benefits before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997, and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Benefit increases	Same as for retirement.

Summary of Plan Provisions – Police & Fire Plan (Continued)

Termination	
Refund of contributions	
Age/service requirement	Termination of public service.
Amount	If member terminated before July 1, 2011, member's contributions credited with 6% interest compounded annually prior to July 1, 2011 and 4% interest thereafter. If member terminated after June 30, 2011, member's contributions credited with 4% interest compounded annually. A deferred annuity may be elected in lieu of a refund if vested.
Deferred benefit	
Age/service requirement	Partially or fully vested.
Amount	Benefit computed under law in effect at termination and increased by the following percentage (augmentation) compounded annually for terminations prior to 2012: (a.) 0.00% before July 1, 1971; (b.) 5.00% from July 1, 1971 to January 1, 1981; (c.) 3.00% (2.50% if hired after June 30, 2006) thereafter until the earlier of January 1 of the year following attainment of age 55 and January 1, 2012; (d.) 5.00% (2.50% if hired after June 30, 2006) thereafter until the earlier of the date the annuity begins and January 1, 2012; and (e.) 1.00% from January 1, 2012 thereafter. Members who terminate after 2011 will receive no future augmentation. If a member terminated employment prior to July 1, 1997 but was not eligible to commence their pension before July 1, 1997, the benefit payable is calculated under the laws in effect before July 1, 1997 and an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.
Form of payment	Same as for retirement.
Optional form conversion factors	Actuarially equivalent factors based on RP-2000 for healthy annuitants, white collar adjustment, projected to 2027 using scale AA, no setbacks, blended 90% males, and 7.00% post-retirement interest. The post-retirement interest rate assumption will change to 6.5% on the earlier of the effective date of the next mortality adjustment or July 1, 2017.

Summary of Plan Provisions – Police & Fire Plan (Concluded)

Combined service annuity	Members are eligible for combined service benefits if they: (a.) Meet minimum retirement age for each plan participated in and total public service meets the vesting requirements of each plan; or (b.) Have three or more years of service under PERA and the covered fund(s) (if hired prior to July 1, 2010). Other requirements for combined service include: (a.) Member must have at least six months of allowable service credit in each plan worked under; and (b.) Member may not be in receipt of a benefit from another plan. Members who meet the above requirements must have their benefit based on the following: (a.) Allowable service in all covered plans is combined in order to determine eligibility for early retirement. (b.) Average salary is based on the high five consecutive years during their entire service in all covered plans.
Changes in plan provisions	There have been no changes in plan provisions since the previous valuation.

Actuarial Basis

Summary of Plan Provisions – Minneapolis Police Relief Association

Normal retirement benefit

Monthly benefits are equal to the number of units multiplied by the unit values described herein. Units are based on service, as follows:

Service	Units
20	35.0 units
21	36.6 units
22	38.2 units
23	39.8 units
24	41.4 units
25 or more	43.0 units

Members must be at least age 50 with 5 years of service to receive this benefit.

Unit values

Calendar Year	Unit Value
2012	$ 104.651
2013	109.011
2014	114.825
2015	124.031

Unit values after 2015 are assumed to increase the same percentage as the post-retirement benefit increase.

Surviving spouse's benefit

Annual benefit based on 23 units for the surviving spouse of an active or retired member. Upon retirement, members may choose an alternative form of payment that provides 50%, 75%, or 100% of their benefit to their spouse after their death. The units are adjusted if one of these alternate forms is selected.

Surviving children's benefit

Annual benefit based on 8 units for each surviving child of an active or retired member. Benefits continue to age 18 or if the child is a full-time student, to age 22. The total benefit for surviving children and spouse combined is limited to 41 units.

Contributions

Member and employer contributions equal to 8.00% of the monthly unit value multiplied by 80 are required for each member. After 25 years of service, member contributions are paid to a separate health insurance account.

Benefit increases

Benefit recipients receive a future annual 1.00% post-retirement benefit increase. The annual adjustment will equal 2.50% any time the Fund exceeds a 90% funded ratio for two consecutive years. If the adjustment is increased to 2.50% and the funded ratio falls below 80% for one year or 85% for two consecutive years the post-retirement benefit increase will be lowered to 1.00%.

Actuarial Basis

Summary of Plan Provisions – Minneapolis Firefighters' Relief Association

Normal retirement benefit	Monthly benefits are equal to the number of units multiplied by the unit values described herein. Units are based on service, as follows: **Service** / **Units** 15 — 25.0 units 16 — 26.6 units 17 — 28.2 units 18 — 29.8 units 19 — 31.4 units 20 — 35.0 units 21 — 36.6 units 22 — 38.2 units 23 — 39.8 units 24 — 41.4 units 25 or more — 43.0 units Members must be at least age 50 with 5 years of service to receive this benefit. Members may choose among alternative survivor payment forms which modify the number of units payable to the member and their spouse. A member who is single at the time of retirement and who has at least 25 years of service may choose to receive 43.3 units on the condition of a reduced survivor payment to any future spouse.
Unit values	**Calendar Year** / **Unit Value** 2013 — 100.775 2014 — 104.264 2015 — 124.031 Unit values after 2015 are assumed to increase the same percentage as the post-retirement benefit increase.
Disability benefit	Annual benefit based on 41 units for the disabled member.
Surviving spouse's benefit	Annual benefit based on 23 units for the surviving spouse of an active or retired member and 22 units for the surviving spouse of a disabled member. Upon retirement, members may choose an alternative form of payment that provides 50%, 75% or 100% of their benefit to their spouse after their death. The units are adjusted if one of these alternate forms is selected.
Surviving children's benefit	Annual benefit based on 8 units for each surviving child of an active or retired member. Benefits continue to age 18 or if the child is a full-time student, to age 22. The total benefit for surviving children and spouse combined is limited to 43 units.
Contributions	Member and employer contributions equal to 8.00% of the monthly unit value multiplied by 80 are required for each member. After 25 years of service, member contributions are paid to a separate health insurance account.
Benefit increases	Benefit recipients receive a future annual 1.00% post-retirement benefit increase. The annual adjustment will equal 2.50% any time the Fund exceeds a 90% funded ratio for two consecutive years. If the adjustment is increased to 2.50% and the funded ratio falls below 80% for one year or 85% for two consecutive years the post-retirement benefit increase will be lowered to 1.00%.

Additional Schedules

Schedule of Funding Progress[1] *(Dollars in Thousands)*

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (a)/(b)	Actual Covered Payroll (Previous FY) (c)	UAAL as a Percentage of Covered Payroll [(b)-(a)]/(c)
7-1-1995	$ 1,385,901	$ 1,196,795	$ (189,106)	115.80 %	$ 293,919	(64.34) %
7-1-1996	$ 1,633,010	$ 1,334,202	$ (298,808)	122.40	$ 316,189	(94.50)
7-1-1997	$ 1,974,635	$ 1,556,483	$ (418,152)	126.87	$ 346,319	(120.74)
7-1-1998	$ 2,337,313	$ 1,741,344	$ (595,969)	134.22	$ 375,131	(158.87)
7-1-1999	$ 3,679,551	$ 3,004,637	$ (674,914)	122.46	$ 352,066	(191.70)
7-1-2000	$ 4,145,351	$ 3,383,187	$ (762,164)	122.53	$ 392,796	(194.04)
7-1-2001	$ 4,472,041	$ 3,712,360	$ (759,681)	120.46	$ 500,839	(151.68)
7-1-2002	$ 4,672,679	$ 3,886,311	$ (786,368)	120.23	$ 522,153	(150.60)
7-1-2003	$ 4,683,115	$ 4,390,953	$ (292,162)	106.65	$ 560,503	(52.12)
7-1-2004	$ 4,746,834	$ 4,692,190	$ (54,644)	101.16	$ 551,266	(9.91)
7-1-2005	$ 4,814,961	$ 4,956,340	$ 141,379	97.15	$ 580,723	24.35
7-1-2006	$ 5,017,951	$ 5,260,564	$ 242,613	95.39	$ 618,435	39.23
7-1-2007	$ 5,198,922	$ 5,669,347	$ 470,425	91.70	$ 648,342	72.56
7-1-2008	$ 5,233,015	$ 5,918,061	$ 685,046	88.42	$ 703,701	97.35
7-1-2009	$ 5,239,855	$ 6,296,274	$ 1,056,419	83.22	$ 733,164	144.09
7-1-2010	$ 5,188,339	$ 5,963,672	$ 775,333	87.00	$ 740,101	104.76
7-1-2011	$ 5,274,602	$ 6,363,546	$ 1,088,944	82.89	$ 775,806	140.36
7-1-2012	$ 5,797,868	$ 7,403,295	$ 1,605,427	78.31	$ 794,417 [2]	202.09
7-1-2013	$ 5,932,945	$ 7,304,032	$ 1,371,087	81.23	$ 796,188 [2]	172.21
7-1-2014	$ 6,525,019	$ 8,151,328	$ 1,626,309	80.05	$ 820,333 [3]	198.25
7-1-2015	$ 7,076,271	$ 8,460,477	$ 1,384,206	83.64	$ 845,076 [4]	163.80
7-1-2016	$ 7,385,777	$ 8,417,621	$ 1,031,844	87.74	$ 881,222 [5]	117.09
7-1-2017	$ 7,840,549	$ 9,199,208	$ 1,358,659	85.23	$ 944,296 [5]	143.88

[1] *Information prior to 2012 provided by prior actuary. See prior reports for additional detail.*
[2] *Assumed equal to actual member contributions divided by 9.60%.*
[3] *Assumed equal to actual member contributions divided by 9.90%.*
[4] *Assumed equal to actual member contributions divided by 10.50%.*
[5] *Assumed equal to actual member contributions divided by 10.80%.*

Additional Schedules

Schedule of Contributions from the Employer and Other Contributing Entities[1]
(Dollars in Thousands)

Plan Year Ended June 30	Actuarially Required Contribution Rate (a)	Actual Covered Payroll (b)	Actual Member Contributions (c)	Annual Required Contributions [(a)x(b)] - (c) = (d)	Actual Employer Contributions[5] (e)	Percentage Contributed (e)/(d)
1995	17.28%	$ 293,919	$ 22,356	$ 28,433	$ 33,548	117.99%
1996	16.49	$ 316,189	$ 24,065	$ 28,075	$ 36,066	128.46
1997	15.11	$ 346,319	$ 26,354	$ 25,975	$ 39,508	152.10
1998	15.69	$ 375,131	$ 28,552	$ 30,306	$ 42,786	141.18
1999	12.32	$ 352,066	$ 30,897	$ 12,478	$ 46,280	370.89
2000	12.87	$ 392,796	$ 31,214	$ 19,339	$ 53,178	274.98
2001	12.21	$ 500,839	$ 31,341	$ 29,811	$ 52,960	177.65
2002	12.61	$ 522,153	$ 33,801	$ 32,042	$ 90,664	282.95
2003	15.52	$ 560,503	$ 34,751	$ 35,424	$ 50,917	143.74
2004	19.47	$ 551,266	$ 36,313	$ 71,019	$ 52,770	74.30
2005	21.99	$ 580,723	$ 37,873	$ 89,828	$ 55,802	62.12
2006	24.36	$ 618,435	$ 42,970	$ 107,681	$ 63,603	59.07
2007	25.76	$ 648,342	$ 50,688	$ 116,325	$ 74,707	64.22
2008	28.82	$ 703,701	$ 58,259	$ 144,548	$ 87,023	60.20
2009	28.41	$ 733,164	$ 67,701	$ 140,591	$ 101,548	72.23
2010	29.99	$ 740,101	$ 71,736	$ 150,220	$ 107,066	71.27
2011	25.52	$ 775,806	$ 73,702	$ 124,284	$ 109,604	88.19
2012	28.78	$ 794,417 [2]	$ 76,264	$ 152,369	$ 121,891	80.00
2013	33.37	$ 796,188 [2]	$ 76,434	$ 189,254	$ 125,995	66.57
2014	29.89	$ 820,333 [3]	$ 81,213	$ 163,985	$ 141,632	86.37
2015	33.85	$ 845,076 [4]	$ 88,733	$ 197,325	$ 153,317	77.70
2016	32.29	$ 881,222 [6]	$ 95,172	$ 189,375	$ 165,065	87.16
2017	28.30	$ 944,296 [6]	$ 101,984	$ 165,252	$ 175,329	106.10
2018	30.58					

[1] *Information prior to 2012 provided by prior actuary. See prior reports for additional detail.*
[2] *Assumed equal to actual member contributions divided by 9.60%.*
[3] *Assumed equal to actual member contributions divided by 9.90%.*
[4] *Assumed equal to actual member contributions divided by 10.50%.*
[5] *Includes contributions from other sources (if applicable).*
[6] *Assumed equal to actual member contributions divided by 10.80%*

Glossary of Terms

Accrued Benefit Funding Ratio	The ratio of assets to Current Benefit Obligations.
Accrued Liability Funding Ratio	The ratio of assets to Actuarial Accrued Liability.
Actuarial Accrued Liability (AAL)	The difference between the Actuarial Present Value of Future Benefits, and the Actuarial Present Value of Future Normal Costs.
Actuarial Assumptions	Assumptions about future plan experience that affect costs or liabilities, such as: mortality, withdrawal, disablement, and retirement; future increases in salary; future rates of investment earnings; future investment and administrative expenses; characteristics of members not specified in the data, such as marital status; characteristics of future members; future elections made by members; and other items.
Actuarial Cost Method	A procedure for allocating the Actuarial Present Value of Future Benefits between the Actuarial Present Value of Future Normal Costs and the Actuarial Accrued Liability.
Actuarial Equivalent	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV)	The amount of funds required to provide a payment or series of payments in the future. It is determined by discounting the future payments with an assumed interest rate and with the assumed probability each payment will be made.
Actuarial Present Value of Projected Benefits	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB No. 25, such as the Funded Ratio and the Annual Required Contribution (ARC).
Actuarial Value of Assets	The value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the actuarially required contribution (ARC).

Glossary of Terms (Continued)

Amortization Method	A method for determining the Amortization Payment. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. The stream of payments increases at the rate at which total covered payroll of all active members is assumed to increase.
Amortization Payment	That portion of the plan contribution or ARC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Amortization Period	The period used in calculating the Amortization Payment.
Annual Required Contribution (ARC)	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under GASB No. 25. The ARC consists of the Employer Normal Cost and Amortization Payment.
Augmentation	Annual increases to deferred benefits.
Closed Amortization Period	A specific number of years that is reduced by one each year, and declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc.
Current Benefit Obligations	The present value of benefits earned to the valuation date, based on current service and including future salary increases to retirement (comparable to a Projected Unit Credit measurement).
Employer Normal Cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Expected Assets	The present value of anticipated future contributions intended to fund benefits for current members.
Experience Gain/Loss	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuations. To the extent that actual experience differs from that assumed, Unfunded Actuarial Accrued Liabilities emerge which may be larger or smaller than projected. Gains are due to favorable experience, e.g., the assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, losses are the result of unfavorable experience, i.e., actual results that produce Unfunded Actuarial Accrued Liabilities which are larger than projected.

Glossary of Terms (Concluded)

GASB	Governmental Accounting Standards Board.
GASB No. 25 and GASB No. 27	These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 27 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 25 sets the rules for the systems themselves.
GASB No. 50	The accounting standard governing a state or local governmental employer's accounting for pensions.
GASB No. 67 and GASB No. 68	Statements No. 67 and No. 68, issued in June 2012, replace the requirements of Statements No. 25 and No. 27, respectively. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves. Accounting information prepared according to Statements No. 67 and No. 68 will be provided in a separate report.
Normal Cost	The annual cost assigned, under the Actuarial Cost Method, to the current plan year.
Projected Benefit Funding Ratio	The ratio of the sum of Actuarial Value of Assets and Expected Assets to the Actuarial Present Value of Projected Benefits. A Ratio less than 100% indicates that contributions are insufficient.
Unfunded Actuarial Accrued Liability	The difference between the Actuarial Accrued Liability and Actuarial Value of Assets.
Valuation Date	The date as of which the Actuarial Present Value of Future Benefits are determined. The benefits expected to be paid in the future are discounted to this date.