

# North Dakota Public Employees Retirement System

Actuarial Valuation as of July 1, 2018



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October 29, 2018

Board Members  
North Dakota Public Employees Retirement System  
Bismarck, North Dakota

Members of the Board:

We are pleased to provide our formal annual Actuarial Valuation Report as of July 1, 2018, for the North Dakota Public Employees Retirement System (“NDPERS”). The actuarial valuation was performed at the request of the Board and is intended for use by the Board and NDPERS and those designated by the Board and NDPERS. This report may be provided to parties other than the Board and NDPERS only in its entirety and only with the permission of the Board and NDPERS. GRS is not responsible for unauthorized use of this report.

The purposes of the actuarial valuation are to measure the funding progress of NDPERS and to determine the actuarial employer contribution rate for the NDPERS for the Plan Year commencing July 1, 2018, and ending on June 30, 2019. This actuarial valuation also provides information required by GASB Statement No. 67. Information required by GASB Statement No. 68 and the employer allocation of the Net Pension Liability are provided in a separate report. This report should not be relied on for any purpose other than the purpose described herein. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

The actuarial employer contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Section E of this report. This report includes risk metrics on page A-6 but does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

This actuarial valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The actuarial valuation was based upon information furnished by the NDPERS Staff, concerning benefits provided by the North Dakota Public Employees Retirement System, financial transactions, plan provisions and census data for active members, terminated members, retirees and beneficiaries as of July 1, 2018. 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 the NDPERS Staff.

This report was prepared using actuarial assumptions adopted by the Board as authorized under North Dakota Administrative Code Section 71-02. All actuarial assumptions used in this report are reasonable for the purposes of this actuarial valuation. Additional information about the actuarial assumptions is included in the Section E of this report. The actuarial assumptions and the actuarial cost method are unchanged from the last actuarial valuation as of July 1, 2017.

**Contributions to PERS are based on fixed statutory contribution rates. Based on the current actuarial valuation and the current actuarial assumptions and methods and benefit provisions, the current total statutory contribution rate of 14.12% for the Main System is not expected to ever amortize the unfunded liability. The Main System funded ratio is projected to ultimately decrease from the current funded ratio of about 72 percent. We recommend an increase to the Main System total statutory contribution rate (to at least 16.69%) such that the unfunded liability is amortized over a period of no longer than 30 years and the Main System funded ratio will increase toward 100%.**

The plan provisions are unchanged from the last actuarial valuation as of July 1, 2017.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of the North Dakota Public Employees Retirement System as of the actuarial valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

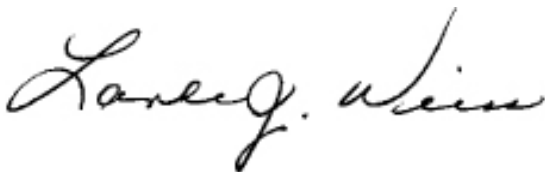
Lance J. Weiss and Amy Williams are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions herein.

The signing actuaries are independent of the plan sponsor.

Gabriel, Roeder, Smith & Company will be pleased to review this actuarial valuation and Report with the Board of Trustees and to answer any questions pertaining to the actuarial valuation.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



Lance J. Weiss, E.A., M.A.A.A., F.C.A.  
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Mr. Derrick Hohbein, NDPERS



## SECTION A

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### ACTUARIAL VALUATION RESULTS

# Comments on the Actuarial Valuation

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## Purpose

At your request, we have performed an actuarial valuation of the North Dakota Public Employees Retirement System as of July 1, 2018:

- To determine the funding status of the System as of the actuarial valuation date;
- To determine the actuarial employer contribution rate for the fiscal year beginning July 1, 2018; and
- To provide other data required by NDPERS.

Pension plan financial reporting under GASB Statement No. 67 is provided in Section D of this report. Employer financial reporting under GASB Statement No. 68 is provided in a separate report.

## Membership Data

We received the data from the North Dakota Public Employees Retirement System Staff. We performed certain checks for reasonableness and found the data to be complete and reliable for actuarial valuation purposes. However, we did not audit the data.

A total of 23,483 active members (including the Main System, Judges and Public Safety) were included in the actuarial valuation as of July 1, 2018. Between the 2017 and 2018 actuarial valuations, the number of active employees increased by 240 members, or 1.0 percent. The average annual actuarial valuation pay increased by 0.1 percent, from \$45,750 to \$45,819 between the 2017 and 2018 actuarial valuations. There were 6,532 active members who were eligible for retirement (normal, early or Rule of 85) as of July 1, 2018.

The number of benefit recipients increased from 11,103 to 11,704, or 5.4 percent, since the last actuarial valuation. The average monthly benefit increased by 5.0 percent, from \$1,181 to \$1,240. During the year ending July 1, 2018, there were 977 members awarded a benefit.

There were 5,998 inactive members as of July 1, 2018, who were vested and elected to receive a deferred benefit. The average monthly deferred benefit is \$496. There were 6,188 inactive members as of July 1, 2018, who were not vested or elected to receive a refund of contributions.

Section C summarizes the membership data.

## Plan Provisions

Section F outlines the principal benefit provisions of the System. There were no changes since the previous actuarial valuation.

# Comments on the Actuarial Valuation (Continued)

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## Actuarial Assumptions and Methods

This report was prepared using actuarial assumptions adopted by the Board as authorized under North Dakota Administrative Code Section 71-02. All actuarial assumptions used in this report are reasonable for the purposes of this actuarial valuation.

Beginning with the actuarial valuation as of July 1, 2017, the Board adopted changes to the economic actuarial assumptions (excluding the salary increase assumption) and asset valuation method. The actuarial assumptions were based on a review of the economic actuarial assumptions performed by GRS.

All other actuarial assumptions used in the actuarial valuation as of July 1, 2018, were based on an experience review for the five-year period ending July 1, 2014, which was performed by the prior actuary, and were first adopted for use commencing with the July 1, 2015, actuarial valuation.

We recommend that GRS perform an experience study covering the four-year period from July 1, 2014 through July 1, 2018 prior to the next actuarial valuation as of July 1, 2019.

Section E outlines the actuarial assumptions and methods used in the actuarial valuation. The actuarial assumptions and the actuarial cost method are unchanged from the last actuarial valuation as of July 1, 2017. The assumption for administrative expenses is equal to the prior years' administrative expenses, adjusted for inflation. In total, this amount has decreased from \$2,672,424 to \$2,534,580.

The actuarial contribution rate is calculated using a 20-year open period, level percentage of payroll amortization method. The remaining amortization period will be reset to 20 years in each future actuarial valuation.

## Plan Asset Return

On a market value basis, NDPERS assets had an investment return of approximately 9.15 percent (net of investment expenses). On an actuarial value of asset basis, NDPERS assets had an investment return of approximately 9.22 percent on an actuarial value of assets basis, which compares to the prior year assumed rate of return of 7.75 percent.

The actuarial value of assets is currently 96.6 percent of the market value of assets. There is \$101,391,547 in net asset gains currently being deferred that will be phased into the actuarial value of assets over the next four years.

## Gain/Loss Analysis

During the plan year ending July 1, 2018, the unfunded actuarial accrued liability ("UAAL") decreased from \$1,093,616,455 as of July 1, 2017, to \$1,090,306,247 as of July 1, 2018, which is a decrease of \$3,310,208. The key factors contributing to the decrease in the UAAL were favorable salary experience and recognition of deferred gains in the actuarial value of assets. This decrease was partially offset by statutory contributions that were lower than those under the actuarially determined contribution rate and unfavorable plan experience, including data changes and higher benefits than projected for new retirees. The unfunded actuarial accrued liability based on the market value of assets decreased from \$998,979,498 to \$988,914,700.

## Comments on the Actuarial Valuation (Continued)

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### Funded Ratio

The funded ratio measures the portion of the actuarial accrued liability (calculated based on the actuarial assumptions disclosed in this report) that is currently funded. The total PERS funded ratio is 72.5 percent on an actuarial value of assets basis and 75.0 percent on a market value of assets basis as of July 1, 2018.

The funded ratio for the Main System is 71.6 percent, the funded ratio for the Judges System is 124.4 percent, the funded ratio for the Public Safety with prior Main System service plan is 83.5 percent and the funded ratio for the Public Safety without prior Main System service plan is 105.3 percent as of July 1, 2018. The funded ratios based on the market value of assets are approximately 2 to 5 percentage points higher than the funded ratios based on the actuarial value of assets.

The funded ratio and unfunded actuarial accrued liability are appropriate for assessing the need for and the amount of future unfunded liability contributions (excludes normal cost contributions). They are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the System's benefit obligations.

### Employer Contributions

The actuarially determined contribution rate is calculated as the normal cost contribution (to fund benefits accruing during the year) plus a contribution to amortize the unfunded liability. The unfunded liability contribution rate is calculated using a 20-year open period, level percentage of payroll amortization method. The remaining amortization period will be reset to 20 years in each future actuarial valuation. If employers contributed the actuarial contribution rate, the contribution rate would be expected to gradually decrease using a 20-year open amortization period as the funded ratio gradually increased. An open amortization period is expected to gradually improve the funded ratio. However, the funded ratio is not expected to reach 100 percent under this method (assuming no actuarial gains or losses) because the remaining unfunded liability at each future actuarial valuation date is re-amortized over a new 20-year period.

The contributions that are made by employers are based on fixed contribution rates that are set by statute (and not based on the actuarially determined rate). The statutory contribution rate is significantly lower than the actuarial contribution rate for the Main System, significantly higher than the actuarial contribution rate for Judges and higher than the actuarial rate for the Public Safety Systems. Because the Main System comprises the majority of the liability and contribution requirement for the Combined System, the statutory contribution rate for the total PERS is also significantly lower than the actuarial contribution rate.

The portion of the statutory contribution that is applied toward the unfunded liability is the statutory contribution rate minus the employer normal cost rate. The unfunded liability contribution rate from the statutory contribution is significantly lower than the rate calculated using the 20-year level percentage of payroll amortization period. The unfunded liability contribution rate from the statutory contribution for the Main System rate is not high enough to amortize the unfunded liability over any period of time.



## Comments on the Actuarial Valuation (Continued)

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Because the statutory employer rate is higher than the actuarial employer rate (based on a 20-year amortization period) for the Judges and Public Safety Systems, the statutory employer rate amortizes the unfunded liability over a period shorter than 20 years.

**We recommend an increase to the statutory contribution rate such that the unfunded liability is amortized over a period of no longer than 30 years. Based on the current actuarial valuation and the current actuarial assumptions and methods and benefit provisions, the current total statutory contribution rate of 14.12% for the Main System is not expected to ever amortize the unfunded liability. The Main System funded ratio is projected to ultimately decrease from the current funded ratio of about 72 percent. We recommend an increase to the Main System total statutory contribution rate (to at least 16.69%) such that the unfunded liability is amortized over a period of no longer than 30 years and the Main System funded ratio will increase toward 100%.**

### Historical Trends

The funded ratio (based on the actuarial value of assets) for the total PERS declined during the past 10 years from a high of 85.1 percent in 2009, to a low of 62.0 percent in 2013, and increased to the current funded ratio of 72.5 percent.

## Risk Measures

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### Risks Associated with Measuring the Accrued Liability and Contributions

The determination of the accrued liability and the statutory and actuarially determined contribution requires the use of actuarial assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the actuarial assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the statutory and actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

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 actuarial assumptions; changes in economic or demographic actuarial assumptions due to changing conditions; 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. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

## Risk Measures

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The statutory contribution may be considered as a minimum contribution that complies with State statute. The timely receipt of contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made in accordance with the funding policy do not necessarily guarantee benefit security.

### Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2017	2018
Ratio of the Market Value of Assets to Total Payroll	2.57	2.76
Ratio of Actuarial Accrued Liability to Payroll	3.50	3.68
Ratio of Actives to Retirees and Beneficiaries	2.09	2.01
Ratio of Non-Investment Cash Flow to Market Value of Assets	0.05%	-0.23%

### Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

### Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time. The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

### Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

## Risk Measures

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### Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

### Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

## Summary of Actuarial Valuation Results (Total PERS)

		July 1, 2017 Results	July 1, 2018 Results
<b>Membership Data</b>			
	Active Members	23,243	23,483
	Inactive Vested and Non-Vested Members	11,654	12,186
	Retirees and Beneficiaries	11,103	11,704
	<b>TOTAL</b>	<b>46,000</b>	<b>47,373</b>
<b>Plan Liabilities</b>			
	Actuarial Accrued Liability:		
	Active Members	\$ 1,975,808,158	\$ 2,041,653,815
	Inactive Vested and Non-Vested Members	261,705,723	239,199,921
	Retirees and Beneficiaries	1,489,301,206	1,678,241,240
	<b>TOTAL</b>	<b>\$ 3,726,815,087</b>	<b>\$ 3,959,094,976</b>
	Actuarial Value of Assets at Valuation Date	\$ 2,633,198,632	\$ 2,868,788,729
	Unfunded (Overfunded) Actuarial Accrued Liability	\$ 1,093,616,455	\$ 1,090,306,247
	<b>Funded Position of Plan's Actuarial Accrued Liability <sup>1</sup></b>	<b>70.7 %</b>	<b>72.5 %</b>
<b>Actuarial Contribution Requirement</b>		<b>Fiscal Year 2018</b>	<b>Fiscal Year 2019</b>
	Annual Normal Cost as of Valuation Date	\$ 122,827,757	\$ 125,485,515
	Normal Cost Expense Load	2,672,424	2,534,580
	Amortization Payment	79,382,308	79,133,088
	<b>Total Actuarial Contribution Requirement</b>	<b>204,882,489</b>	<b>207,153,183</b>
	Expected Employee Contributions	79,168,391	80,024,258
	<b>Actuarial Employer Contribution Requirement</b>	<b>\$ 125,714,098</b>	<b>\$ 127,128,925</b>
	Projected Annual Compensation	\$ 1,137,707,702	\$ 1,151,347,122
<b>Actuarial Employer Contribution % of Projected Annual Compensation</b>			
	Main System	11.20%	11.25%
	Judges	4.81%	2.03%
	Public Safety with prior Main System service	8.25%	7.64%
	Public Safety without prior Main System service	6.77%	6.20%
	<b>Total PERS (Combined)</b>	<b>11.05%</b>	<b>11.04%</b>
<b>Statutory Employer Contribution % of Projected Annual Compensation</b>			
	Main System	7.12%	7.12%
	Judges	17.52%	17.52%
	Public Safety with prior Main System service	9.81%	9.81%
	Public Safety without prior Main System service	7.93%	7.93%
	<b>Total PERS (Combined)</b>	<b>7.27%</b>	<b>7.29%</b>

<sup>1</sup> Equals the ratio of the actuarial value of assets to the total actuarial accrued liability.

# Contribution Rate by Plan

## All PERS Plans

	Main System	%	Judges	%	Public Safety w/ Prior	%	Public Safety w/o Prior	%	Total	% of Payroll
<b>Actuarial Valuation as of July 1, 2018</b>										
Based on Actuarial Value of Assets										
Total Actuarial Accrued Liability	\$ 3,841,701,179		\$ 41,539,514		\$ 68,048,206		\$ 7,806,077		\$ 3,959,094,976	
Actuarial Value of Assets (AVA)	2,752,053,305		51,667,642		56,848,772		8,219,010		2,868,788,729	
Unfunded Actuarial Accrued Liability (UAAL)	1,089,647,874		(10,128,128)		11,199,434		(412,933)		1,090,306,247	
Funded Ratio (Actuarial Value of Assets)	71.6%		124.4%		83.5%		105.3%		72.5%	
Total Annual Gross Normal Cost	121,385,666	(11.05%)	1,599,921	(19.21%)	4,214,570	(11.06%)	819,938	(12.14%)	128,020,095	(11.12%)
Employee Contribution	76,869,790	(7.00%)	666,336	(8.00%)	2,116,521	(5.55%)	371,611	(5.50%)	80,024,258	(6.95%)
Annual Employer Normal Cost	44,515,876	(4.05%)	933,585	(11.21%)	2,098,049	(5.51%)	448,327	(6.64%)	47,995,837	(4.17%)
Amortization of Unfunded Liability <sup>1</sup>	79,114,913	(7.20%)	(764,989)	(-9.18%)	813,145	(2.13%)	(29,981)	(-0.44%)	79,133,088	(6.87%)
Actuarial Contribution	\$ 123,630,789	(11.25%)	\$ 168,596	(2.03%)	\$ 2,911,194	(7.64%)	\$ 418,346	(6.20%)	\$ 127,128,925	(11.04%)
Statutory Employer Contribution	78,187,558	(7.12%)	1,459,275	(17.52%)	3,739,720	(9.81%)	535,795	(7.93%)	83,922,348	(7.29%)
Statutory Contribution Deficit/(Surplus)	45,443,231	(4.13%)	(1,290,679)	(-15.49%)	(828,526)	(-2.17%)	(117,449)	(-1.73%)	43,206,577	(3.75%)
Employer UAAL Contribution from Statutory Rate	33,671,682	(3.07%)	525,690	(6.31%)	1,641,671	(4.30%)	87,468	(1.29%)	35,926,511	(3.12%)
Amortization Period from Statutory Rate (Years)	Infinite*		None		8.1		None		Infinite*	
Based on Market Value of Assets										
Market Value of Assets (MVA)	\$ 2,849,319,075		\$ 53,493,730		\$ 58,857,977		\$ 8,509,494		\$ 2,970,180,276	
Unfunded Actuarial Accrued Liability (UAAL)	992,382,104		(11,954,216)		9,190,229		(703,417)		988,914,700	
Funded Ratio (Market Value of Assets)	74.2%		128.8%		86.5%		109.0%		75.0%	
Actuarial Contribution		(10.61%)		(0.37%)		(7.26%)		(5.88%)		(10.40%)
Amortization Period from Statutory Rate (Years)	Infinite		None		6.4		None		Infinite	
<b>Actuarial Valuation as of July 1, 2017</b>										
Based on Actuarial Value of Assets										
Total Actuarial Accrued Liability	\$ 3,618,083,973		\$ 40,763,862		\$ 61,543,047		\$ 6,424,205		\$ 3,726,815,087	
Actuarial Value of Assets (AVA)	2,529,631,008		47,856,615		49,254,041		6,456,968		2,633,198,632	
Unfunded Actuarial Accrued Liability (UAAL)	1,088,452,965		(7,092,753)		12,289,006		(32,763)		1,093,616,455	
Funded Ratio (Actuarial Value of Assets)	69.9%		117.4%		80.0%		100.5%		70.7%	
Total Annual Gross Normal Cost	119,643,845	(10.96%)	1,584,087	(19.36%)	3,462,219	(10.98%)	810,030	(12.31%)	125,500,181	(11.03%)
Employee Contribution	76,399,789	(7.00%)	654,459	(8.00%)	1,752,229	(5.56%)	361,914	(5.50%)	79,168,391	(6.96%)
Annual Employer Normal Cost	43,244,056	(3.96%)	929,628	(11.36%)	1,709,990	(5.42%)	448,116	(6.81%)	46,331,790	(4.07%)
Amortization of Unfunded Liability <sup>1</sup>	79,028,156	(7.24%)	(535,724)	(-6.55%)	892,255	(2.83%)	(2,379)	(-0.04%)	79,382,308	(6.98%)
Actuarial Contribution	\$ 122,272,212	(11.20%)	\$ 393,904	(4.81%)	\$ 2,602,245	(8.25%)	\$ 445,737	(6.77%)	\$ 125,714,098	(11.05%)
Statutory Employer Contribution	77,709,500	(7.12%)	1,433,264	(17.52%)	3,092,226	(9.81%)	521,814	(7.93%)	82,756,804	(7.27%)
Statutory Contribution Deficit/(Surplus)	44,562,712	(4.08%)	(1,039,360)	(-12.71%)	(489,981)	(-1.56%)	(76,077)	(-1.16%)	42,957,294	(3.78%)
Employer UAAL Contribution from Statutory Rate	34,465,444	(3.16%)	503,636	(6.16%)	1,382,236	(4.39%)	73,698	(1.12%)	36,425,014	(3.20%)
Amortization Period from Statutory Rate (Years)	Infinite*		None		11.1		None		Infinite*	
Based on Market Value of Assets										
Market Value of Assets (MVA)	\$ 2,620,545,753		\$ 49,576,578		\$ 51,024,228		\$ 6,689,031		\$ 2,727,835,589	
Unfunded Actuarial Accrued Liability (UAAL)	997,538,220		(8,812,716)		10,518,819		(264,826)		998,979,498	
Funded Ratio (Market Value of Assets)	72.4%		121.6%		82.9%		104.1%		73.2%	
Actuarial Contribution		(10.60%)		(3.22%)		(7.84%)		(6.52%)		(10.44%)
Amortization Period from Statutory Rate (Years)	Infinite		None		9.2		None		Infinite	
<b>Changes from Actuarial Valuation as of July 1, 2017 to July 1, 2018</b>										
AVA Unfunded Actuarial Accrued Liability (UAAL)	\$ 1,194,909		\$ (3,035,375)		\$ (1,089,572)		\$ (380,170)		\$ (3,310,208)	
MVA Unfunded Actuarial Accrued Liability (UAAL)	(5,156,116)		(3,141,500)		(1,328,590)		(438,591)		(10,064,798)	
AVA Funded Ratio	1.7%		7.0%		3.5%		4.8%		1.8%	
MVA Funded Ratio	1.7%		7.2%		3.6%		4.9%		1.8%	
Actuarial Contribution Rate (AVA)		(0.05%)		(-2.78%)		(-0.61%)		(-0.57%)		(-0.01%)
Actuarial Contribution Rate (MVA)		(0.01%)		(-2.85%)		(-0.58%)		(-0.64%)		(-0.04%)

\* The unfunded liability contribution rate from the statutory employer contribution rate of 7.12% for the Main System is not high enough to amortize the unfunded liability over any period of time.

<sup>1</sup> Amortization as a level percentage of payroll over a 20-year open period. Total payroll assumed to increase 3.25% annually for the Judges and 3.75% for the Main System and Public Safety groups.

# Actuarial Valuation Results

## All PERS Plans

	Valuation as of July 1, 2018								July 1, 2017			
	Main System	%	Judges	%	Public Safety w/ Prior	%	Public Safety w/o Prior	%	Total	% of Payroll	Total	% of Payroll
<b>Active Members</b>												
Number	22,711		55		598		119		23,483		23,243	
Average Age	46.5		55.9		36.6		38.7		46.3		46.2	
Average Years of Benefit Service	9.8		9.0		6.1		5.1		9.7		9.6	
Average Years of Vesting Service	9.9		14.9		7.0		6.0		9.8		9.7	
Total Payroll	\$ 1,027,317,202		\$ 8,008,841		\$ 34,521,069		\$ 6,110,843		\$ 1,075,957,954		\$ 1,063,371,798	
Projected Annual Compensation	\$ 1,098,139,857		\$ 8,329,194		\$ 38,121,509		\$ 6,756,562		\$ 1,151,347,122		\$ 1,137,707,702	
<b>Inactive Vested and Non-Vested Members</b>												
Number	11,820		3		270		93		12,186		11,654	
Total Annualized Benefits (Vested)	\$ 34,615,627		\$ 180,043		\$ 728,429		\$ 160,073		\$ 35,684,172		\$ 37,591,661	
<b>Retired Members and Beneficiaries</b>												
Number	11,538		55		103		8		11,704		11,103	
Total Annualized Benefits	\$ 168,972,402		\$ 2,902,760		\$ 2,185,900		\$ 90,238		\$ 174,151,300		\$ 157,317,419	
Total Membership	46,069		113		971		220		47,373		46,000	
<b>Actuarial Accrued Liability</b>												
Active Members	\$ 1,979,404,793		\$ 16,554,468		\$ 39,878,444		\$ 5,816,110		\$ 2,041,653,815		\$ 1,975,808,158	
Inactive Vested and Non-Vested Members	231,778,222		1,247,513		5,164,518		1,009,668		239,199,921		261,705,723	
Retired Members and Beneficiaries	1,630,518,164		23,737,533		23,005,244		980,299		1,678,241,240		1,489,301,206	
Total	3,841,701,179		41,539,514		68,048,206		7,806,077		3,959,094,976		3,726,815,087	
Actuarial Value of Assets	\$ 2,752,053,305		\$ 51,667,642		\$ 56,848,772		\$ 8,219,010		\$ 2,868,788,729		\$ 2,633,198,632	
Unfunded Actuarial Accrued Liability	\$ 1,089,647,874		\$ (10,128,128)		\$ 11,199,434		\$ (412,933)		\$ 1,090,306,247		\$ 1,093,616,455	
Funded Ratio (Actuarial Value of Assets)	71.6%		124.4%		83.5%		105.3%		72.5%		70.7%	
<b>Annual Gross Normal Cost</b>												
Benefits	\$ 118,922,545	(10.83%)	\$ 1,588,576	(19.07%)	\$ 4,165,001	(10.93%)	\$ 809,393	(11.98%)	\$ 125,485,515	(10.90%)	\$ 122,827,757	(10.80%)
Expenses of Administration	2,463,121	(0.22%)	11,345	(0.14%)	49,569	(0.13%)	10,545	(0.16%)	2,534,580	(0.22%)	2,672,424	(0.23%)
Total	121,385,666	(11.05%)	1,599,921	(19.21%)	4,214,570	(11.06%)	819,938	(12.14%)	128,020,095	(11.12%)	125,500,181	(11.03%)
Amortization of Unfunded Liability <sup>1</sup>	\$ 79,114,913	(7.20%)	\$ (764,989)	(-9.18%)	\$ 813,145	(2.13%)	\$ (29,981)	(-0.44%)	\$ 79,133,088	(6.87%)	\$ 79,382,308	(6.98%)
<b>Actuarial Contribution Requirement</b>												
Employer Portion	\$ 123,630,789	(11.25%)	\$ 168,596	(2.03%)	\$ 2,911,194	(7.64%)	\$ 418,346	(6.20%)	\$ 127,128,925	(11.04%)	\$ 125,714,098	(11.05%)
Employee Portion	76,869,790	(7.00%)	666,336	(8.00%)	2,116,521	(5.55%)	371,611	(5.50%)	80,024,258	(6.95%)	79,168,391	(6.96%)
Total	200,500,579	(18.25%)	834,932	(10.03%)	5,027,715	(13.19%)	789,957	(11.70%)	207,153,183	(17.99%)	204,882,489	(18.01%)
Actuarial Contribution	\$ 123,630,789	(11.25%)	\$ 168,596	(2.03%)	\$ 2,911,194	(7.64%)	\$ 418,346	(6.20%)	\$ 127,128,925	(11.04%)	\$ 125,714,098	(11.05%)
Statutory Employer Contribution	78,187,558	(7.12%)	1,459,275	(17.52%)	3,739,720	(9.81%)	535,795	(7.93%)	83,922,348	(7.29%)	82,756,804	(7.27%)
Statutory Contribution Deficit/(Surplus)	45,443,231	(4.13%)	(1,290,679)	(-15.49%)	(828,526)	(-2.17%)	(117,449)	(-1.73%)	43,206,577	(3.75%)	42,957,294	(3.78%)

<sup>1</sup> Amortization as a level percentage of payroll over a 20-year open period. Total payroll assumed to increase 3.25% annually for the Judges and 3.75% for the Main System and Public Safety groups.

# Actuarial Valuation Results

## Gain/Loss Analysis

### RECONCILIATION OF UNFUNDED ACTUARIAL ACCRUED LIABILITY

	Main System	Judges	Law Enforcement with Prior Main System Service	Law Enforcement without Prior Main System Service	Total
Unfunded liability at previous valuation	\$ 1,088,452,965	\$ (7,092,753)	\$ 12,289,006	\$ (32,763)	\$ 1,093,616,455
<b>Expected unfunded liability at current valuation</b>					
Normal cost for plan year	119,643,845	1,584,087	3,462,219	810,030	125,500,181
Interest on unfunded liability and normal cost	88,904,798	(489,450)	1,084,056	28,264	89,527,668
Contributions using actuarial rate with interest to current valuation date	<u>206,226,896</u>	<u>1,088,229</u>	<u>4,520,061</u>	<u>838,364</u>	<u>212,673,550</u>
Total expected change in unfunded liability at current valuation	2,321,747	6,408	26,214	(70)	2,354,299
Total expected unfunded liability at current valuation	1,090,774,712	(7,086,345)	12,315,220	(32,833)	1,095,970,754
Change due to:					
Amount of contributions (based on statutory rate) <sup>1</sup>	50,117,031	(1,049,302)	(645,405)	21,452	48,443,776
Amount of administrative expenses	(219,388)	(944)	10,607	2,469	(207,256)
Recognition of asset (gains)/losses	(37,127,670)	(727,322)	(676,296)	(65,771)	(38,597,059)
Salary experience	(80,678,711)	(566,437)	(1,310,173)	(187,156)	(82,742,477)
Retirement experience	4,341,371	(351,238)	96,752	(23,163)	4,063,722
Withdrawal experience	7,897,170	(81,015)	254,697	(11,766)	8,059,086
Disability experience	298,974	(25,536)	1,431	(3,667)	271,202
Death in Service experience	235,998	(34,544)	2,945	486	204,885
Death After Retirement experience	(7,718,699)	(2,254,831)	(148,533)	166,440	(9,955,623)
New entrants <sup>2</sup>	12,642,343	448,378	345,028	44,257	13,480,006
Data changes and other experience	49,084,743	1,601,008	953,161	(323,681)	51,315,231
Change in actuarial assumptions	-	-	-	-	-
Changes in plan provisions	-	-	-	-	-
Total change	<u>(1,126,838)</u>	<u>(3,041,783)</u>	<u>(1,115,786)</u>	<u>(380,100)</u>	<u>(5,664,507)</u>
Unfunded liability at current valuation	\$ 1,089,647,874	\$ (10,128,128)	\$ 11,199,434	\$ (412,933)	\$ 1,090,306,247

### RECONCILIATION OF ACTUARIAL CONTRIBUTION RATE

	Main System	Judges	Law Enforcement with Prior Main System Service	Law Enforcement without Prior Main System Service
FY 2018 Actuarial Employer Contribution Rate	11.20%	4.81%	8.25%	6.77%
Expected FY 2019 Actuarial Employer Contribution Rate <sup>1</sup>	10.96%	5.06%	8.39%	6.81%
Change due to:				
Amount of contributions (based on statutory rate) <sup>1</sup>	0.32%	-0.94%	-0.14%	0.03%
Amount of administrative expenses	-0.02%	-0.01%	0.03%	0.04%
Recognition of asset (gains)/losses	-0.24%	-0.65%	-0.15%	-0.07%
Salary experience	-0.26%	-0.78%	-0.18%	-0.21%
Retirement experience	0.03%	-0.32%	0.02%	-0.02%
Withdrawal experience	0.05%	-0.08%	0.06%	-0.02%
Disability experience	0.00%	-0.02%	0.00%	0.00%
Death in Service experience	0.00%	-0.03%	0.00%	0.00%
Death After Retirement experience	-0.05%	-2.08%	-0.04%	0.19%
New entrants <sup>2</sup>	0.04%	0.60%	-0.40%	0.04%
Data changes and other experience	0.42%	1.28%	0.05%	-0.59%
Change in actuarial assumptions	0.00%	0.00%	0.00%	0.00%
Changes in plan provisions	<u>0.00%</u>	<u>0.00%</u>	<u>0.00%</u>	<u>0.00%</u>
Total change	0.29%	-3.03%	-0.75%	-0.61%
FY 2019 Actuarial Employer Contribution Rate	11.25%	2.03%	7.64%	6.20%
FY 2019 Statutory Employer Contribution Rate	7.12%	17.52%	9.81%	7.93%

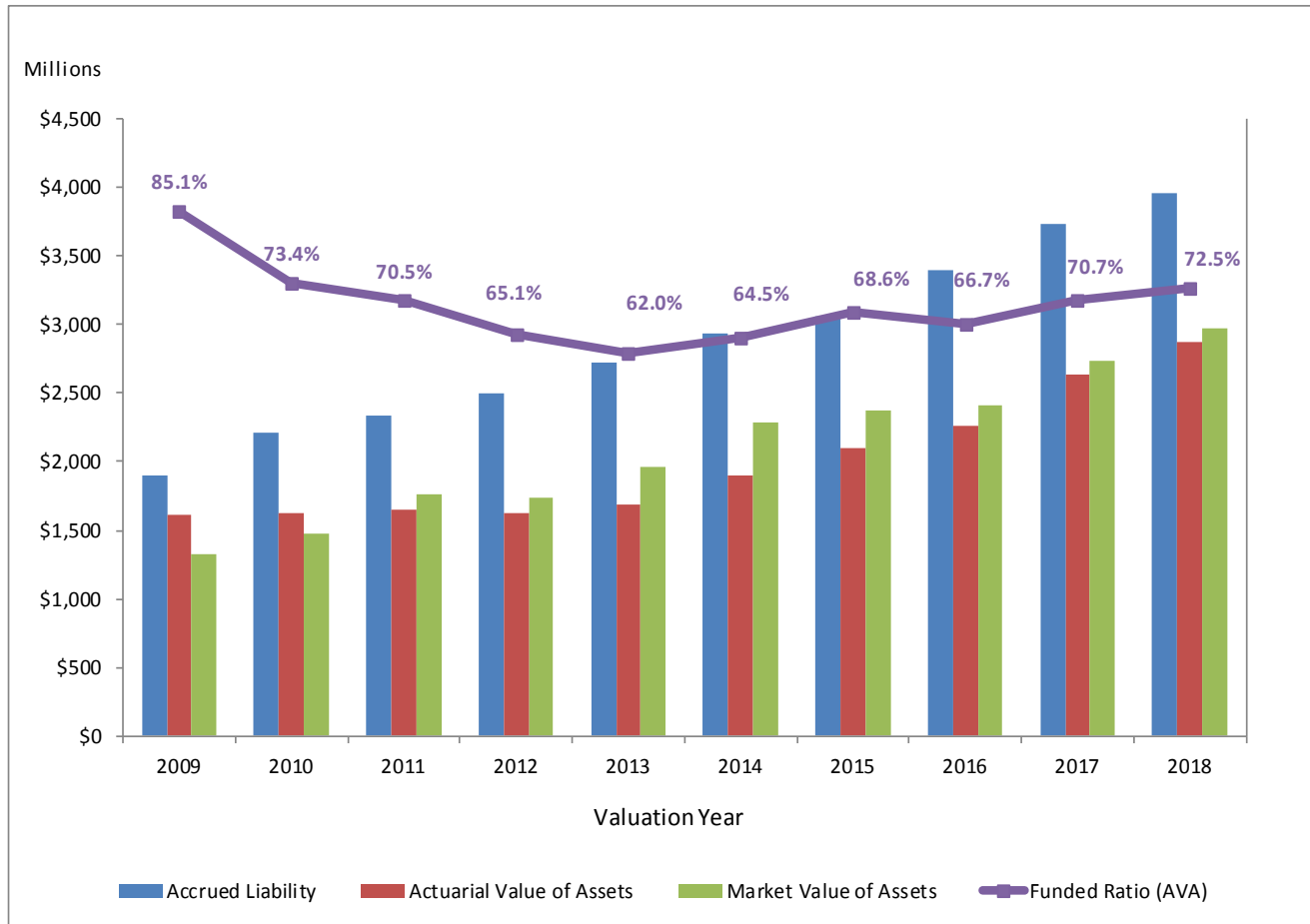
<sup>1</sup> Expected actuarial contribution rate is based on contributions using the actuarial rate. The change due to amount and timing of contributions is based on the statutory contributions that were made compared to the actuarial contributions.

<sup>2</sup> New entrants change includes the net impact of liability and asset transfers.

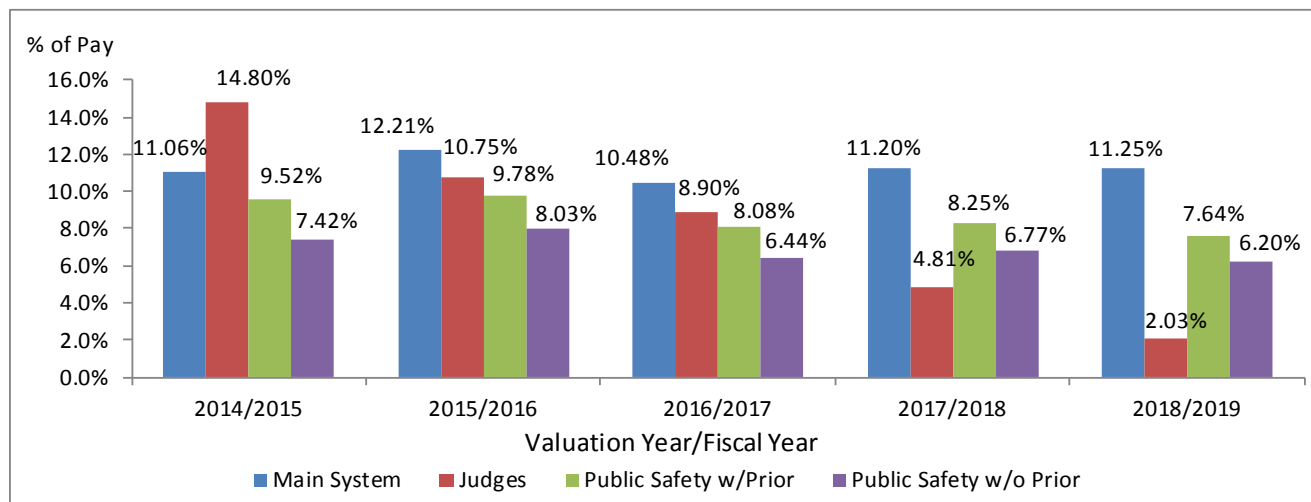


# Historical Trends of Funded Ratio and Employer Contributions

## Funded Ratio History



## Actuarial Employer Contribution Rate History



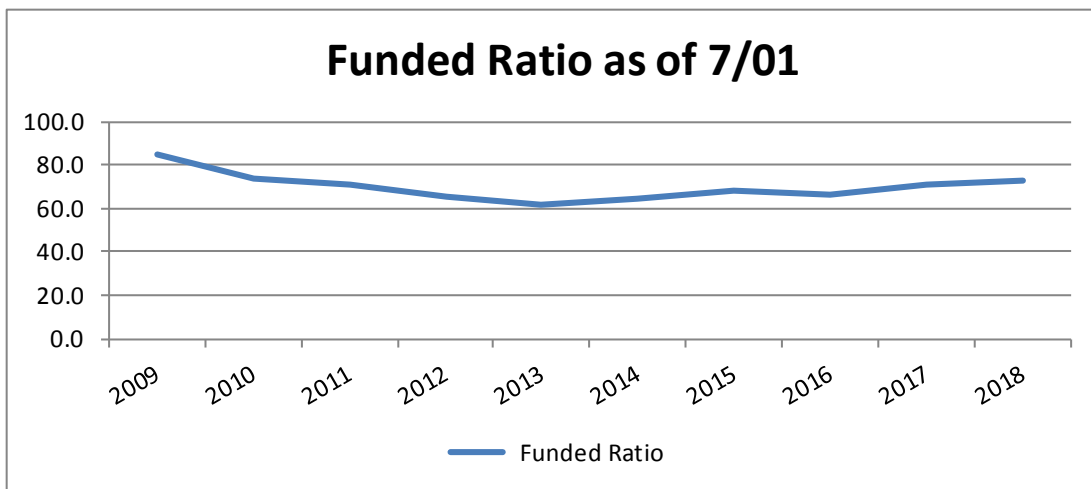
## Actuarial Valuation Results All PERS Plans (\$ in Millions)

Valuation Date 7/1	Total Actuarial Accrued Liability	(1)	(2)	(3)	Actuarial Value of Assets	Portion (%) of Actuarial Accrued Liability By Assets		
		Active Member Contributions*	Retirees, Beneficiaries, and Inactive Members	Active Members (Employer Financed Portion)		(1)	(2)	(3)
2009	\$1,901.2	\$507.6	\$728.1	\$665.5	\$1,617.1	100%	100%	57%
2010	2,208.4	600.5	822.2	785.7	1,621.7	100%	100%	25%
2011	2,339.8	588.3	908.3	843.2	1,650.5	100%	100%	18%
2012	2,501.3	626.2	1,070.7	804.4	1,627.4	100%	94%	0%
2013	2,716.5	687.9	1,126.0	902.6	1,683.0	100%	88%	0%
2014	2,938.8	746.5	1,255.4	936.9	1,895.8	100%	92%	0%
2015	3,052.4	788.3	1,437.0	827.1	2,094.3	100%	91%	0%
2016	3,396.6	879.3	1,559.5	957.8	2,265.3	100%	89%	0%
2017	3,726.8	943.0	1,751.0	1,032.8	2,633.2	100%	97%	0%
2018	3,959.1	1,027.6	1,917.4	1,014.0	2,868.8	100%	96%	0%

\*Includes vested employer contributions for members who have the Portability Enhancement Provision (PEP).

## Funded Ratio History

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)
7/1/2009	\$ 1,617,147,800	\$ 1,901,200,800	\$ 284,053,000	85.1 %
7/1/2010	1,621,723,100	2,208,386,100	586,663,000	73.4
7/1/2011	1,650,463,700	2,339,833,200	689,369,500	70.5
7/1/2012	1,627,395,600	2,501,331,500	873,935,900	65.1
7/1/2013	1,682,958,500	2,716,494,800	1,033,536,300	62.0
7/1/2014	1,895,837,700	2,938,752,200	1,042,914,500	64.5
7/1/2015	2,094,251,400	3,052,446,500	958,195,100	68.6
7/1/2016	2,265,277,641	3,396,565,467	1,131,287,826	66.7
7/1/2017	2,633,198,632	3,726,815,087	1,093,616,455	70.7
7/1/2018	2,868,788,729	3,959,094,976	1,090,306,247	72.5



## **SECTION B**

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### **ASSET EXHIBITS**

# Statement of Fiduciary Net Position (Total PERS)

	Fiscal Year Ending	
	June 30, 2017	June 30, 2018
<b>Assets</b>		
Cash	\$ 9,176,368	\$ 11,301,737
Receivables		
Contribution receivable	11,982,919	14,193,652
Interest receivable	5,163,165	6,296,252
Due from other fiduciary funds	190,306	34,500
Due from Uniform Group Insurance Plan	49,490	17,589
Due from other state agencies	2,320	100
Total receivables	<u>17,388,200</u>	<u>20,542,093</u>
Investments		
External Investment Pool	2,702,830,591	2,939,020,149
Equities	-	-
Fixed income	-	-
Real estate	-	-
Mutual funds	-	-
Annuities	-	-
Alternative investments	-	-
Invested cash	-	-
Total Investments	<u>2,702,830,591</u>	<u>2,939,020,149</u>
Prepaid expenses	-	-
Invested Securities Lending Collateral	15,515,708	8,669,464
Capital assets (net of depreciation/ amortization)	1,301,494	911,390
Total assets	<u>2,746,212,361</u>	<u>2,980,444,833</u>
<b>Liabilities</b>		
Salaries payable	108,984	103,777
Accounts payable	2,499,120	1,343,043
Due to other fiduciary funds	101,328	37,688
Due to Uniform Group Insurance Plan	27,316	-
Securities Lending Collateral	15,515,708	8,669,464
Due to other state agencies	9,527	14,053
Accrued compensated absences	114,789	96,532
Total liabilities	<u>18,376,772</u>	<u>10,264,557</u>
<b>Net position restricted for pensions</b>	<u>\$ 2,727,835,589</u>	<u>\$ 2,970,180,276</u>

# Statement of Changes in Fiduciary Net Position (Total PERS)

	Fiscal Year Ending	
	June 30, 2017	June 30, 2018
<b>Additions</b>		
Contributions:		
From employer	\$ 78,933,571	\$ 80,727,209
From employee	76,007,456	77,486,189
Transfer from general fund	-	-
Transfers from other plans	-	-
Total contributions	<u>154,941,027</u>	<u>158,213,398</u>
Investment income:		
Net change in fair value of investments	259,040,633	190,968,511
Interest and dividends	59,994,114	64,856,972
Less investment expense	<u>(7,492,083)</u>	<u>(6,881,838)</u>
Net investment income	311,542,664	248,943,645
Securities Lending Income	218,199	221,536
Repurchase service credit	11,805,070	19,984,972
Miscellaneous income	<u>32,183</u>	<u>(24,440)</u>
Total additions	<u>478,539,143</u>	<u>427,339,111</u>
<b>Deductions</b>		
Benefits paid to participants	153,811,029	171,171,449
Refunds	8,941,330	11,159,487
Transfers to other plans	<u>239,609</u>	<u>190,727</u>
Administrative expenses	162,991,968	182,521,663
Administrative expenses	<u>2,607,243</u>	<u>2,472,761</u>
Total deductions	<u>165,599,211</u>	<u>184,994,424</u>
Change in net position	312,939,932	242,344,687
<b>Net position restricted for pensions</b>		
Beginning of year	<u>2,414,895,657</u>	<u>2,727,835,589</u>
End of year	<u>\$ 2,727,835,589</u>	<u>\$ 2,970,180,276</u>

## Market Value of Assets by Plan (Total PERS)

	Fiscal Year Ending									
	June 30, 2017					June 30, 2018				
	Main System	Judges	Public Safety with Prior Main System Service	Public Safety without Prior Main System Service	Total PERS	Main System	Judges	Public Safety with Prior Main System Service	Public Safety without Prior Main System Service	Total PERS
<b>Additions</b>										
Contributions:										
From employer	\$ 74,023,555	\$ 1,407,326	\$ 3,005,338	\$ 497,352	\$ 78,933,571	\$ 75,666,300	\$ 1,413,703	\$ 3,175,608	\$ 471,598	\$ 80,727,209
From employee	73,287,125	642,611	1,698,637	379,083	76,007,456	74,724,651	645,523	1,800,628	315,387	77,486,189
Transfer from general fund	-	-	-	-	-	-	-	-	-	-
Transfers from other plans	-	-	-	-	-	(434,925)	-	434,925	-	-
Total contributions	147,310,680	2,049,937	4,703,975	876,435	154,941,027	149,956,026	2,059,226	5,411,161	786,985	158,213,398
Investment income	299,507,510	5,743,052	5,702,555	589,548	311,542,664	238,909,685	4,519,431	4,846,113	668,416	248,943,645
Securities Lending Income	218,199	-	-	-	218,199	221,536	-	-	-	221,536
Repurchase service credit	9,784,908	-	156,309	1,863,853	11,805,070	19,160,584	209,119	125,220	490,049	19,984,972
Miscellaneous income	32,183	-	-	-	32,183	(24,440)	-	-	-	(24,440)
Total additions	456,853,480	7,792,989	10,562,839	3,329,836	478,539,143	408,223,391	6,787,776	10,382,494	1,945,450	427,339,111
<b>Deductions</b>										
Total Benefits, Refunds and Transfers	158,544,085	2,474,960	1,906,070	66,853	162,991,968	177,047,022	2,859,557	2,500,385	114,699	182,521,663
Administrative expenses	2,547,265	11,067	39,235	9,676	2,607,243	2,403,046	11,067	48,360	10,288	2,472,761
Total deductions	161,091,350	2,486,027	1,945,305	76,529	165,599,211	179,450,068	2,870,624	2,548,745	124,987	184,994,424
Change in net position	295,762,130	5,306,962	8,617,534	3,253,307	312,939,932	228,773,323	3,917,152	7,833,749	1,820,463	242,344,687
<b>Net position restricted for pensions</b>										
Beginning of year	2,324,783,623	44,269,616	42,406,694	3,435,724	2,414,895,657	2,620,545,753	49,576,578	51,024,228	6,689,031	2,727,835,589
End of year	\$ 2,620,545,753	\$ 49,576,578	\$ 51,024,228	\$ 6,689,031	\$ 2,727,835,589	\$ 2,849,319,075	\$ 53,493,730	\$ 58,857,977	\$ 8,509,494	\$ 2,970,180,276

Numbers might not add due to rounding.

## Development of Actuarial Value of Assets (Total PERS)

Fiscal Year Ending	2017	2018	2019	2020	2021	2022
Beginning of Year:						
(1) Market Value of Assets	\$ 2,414,895,657	\$ 2,727,835,589				
(2) Actuarial Value of Assets <sup>1</sup>	2,414,895,657	2,633,198,632				
End of Year:						
(3) Market Value of Assets	2,727,835,589	2,970,180,276				
(4a) Contributions (Incl. repurchase svc credit)	166,996,479	178,173,930				
(4b) Net Disbursements	165,599,211	184,994,424				
(5) Total Investment Income	311,542,664	249,165,181				
=(3)-(1)-(4a)+(4b)						
(6) Projected Rate of Return	8.00%	7.75%				
(7) Projected Investment Income						
=(1)x(6)+([1+(6)] <sup>5</sup> -1)x(4a-4b)	193,246,468	211,147,895				
(8) Asset Adjustment	-	-				
(9) Investment Income in Excess of Projected Income	118,296,196	38,017,286				
(10) Excess Investment Income Recognized						
This Year (5 year recognition)						
(10a) From This Year	\$ 23,659,239	\$ 7,603,457				
(10b) From One Year Ago	0	23,659,239	\$ 7,603,457			
(10c) From Two Years Ago	0	0	23,659,239	\$ 7,603,457		
(10d) From Three Years Ago	0	0	0	23,659,239	\$ 7,603,457	
(10e) From Four Years Ago	0	0	0	0	23,659,240	\$ 7,603,458
(10f) Total Recognized Investment Gain/(Loss)	23,659,239	31,262,696	31,262,696	31,262,696	31,262,697	7,603,458
(11) Change in Actuarial Value of Assets						
=(4a)-(4b)+(7)+(8)+(10f)	218,302,975	235,590,097				
End of Year:						
<b>(3) Market Value of Assets</b>	<b>\$ 2,727,835,589</b>	<b>\$ 2,970,180,276</b>				
<b>(12) Final Actuarial Value of Assets as of 6/30 = (2)+(11)</b>	<b>\$ 2,633,198,632</b>	<b>\$ 2,868,788,729</b>				
(13) Difference Between Market & Actuarial Values	94,636,957	101,391,547				
(14) Estimated Market Value Rate of Return on Total Plan Assets	12.90%	9.15%				
(15) Actuarial Value Rate of Return	8.98%	9.22%				
(16) Ratio of Actuarial Value to Market Value	96.5%	96.6%				

<sup>1</sup>Asset gains and losses in FY 2016 and prior were fully recognized as of July 1, 2017, and subsequent asset gains/losses from will be smoothed in over a five-year period.



## Actuarial Value of Assets by Plan (Total PERS)

Valuation as of July 1, 2018					
	Main System	Judges	Public Safety with Prior	Public Safety without Prior	Total
Market Value of Assets	\$ 2,849,319,075	\$ 53,493,730	\$ 58,857,977	\$ 8,509,494	\$ 2,970,180,276
% of Total	95.93%	1.80%	1.98%	0.29%	100.00%
Actuarial Value of Assets	\$ 2,752,053,305	\$ 51,667,642	\$ 56,848,772	\$ 8,219,010	\$ 2,868,788,729
% of Total	95.93%	1.80%	1.98%	0.29%	100.00%
Ratio of Actuarial Value to Market Value	96.59%	96.59%	96.59%	96.59%	96.59%
Difference between Market Value and Actuarial Value	\$ 97,265,770	\$ 1,826,088	\$ 2,009,205	\$ 290,484	\$ 101,391,547

Valuation as of July 1, 2017					
	Main System	Judges	Public Safety with Prior	Public Safety without Prior	Total
Market Value of Assets	\$ 2,620,545,753	\$ 49,576,578	\$ 51,024,228	\$ 6,689,031	\$ 2,727,835,589
% of Total	96.07%	1.82%	1.87%	0.25%	100.00%
Actuarial Value of Assets	\$ 2,529,631,008	\$ 47,856,615	\$ 49,254,041	\$ 6,456,968	\$ 2,633,198,632
% of Total	96.07%	1.82%	1.87%	0.25%	100.00%
Ratio of Actuarial Value to Market Value	96.53%	96.53%	96.53%	96.53%	96.53%
Difference between Market Value and Actuarial Value	\$ 90,914,745	\$ 1,719,963	\$ 1,770,187	\$ 232,063	\$ 94,636,957

*Market value of assets by plan provided by NDPERS Staff.*

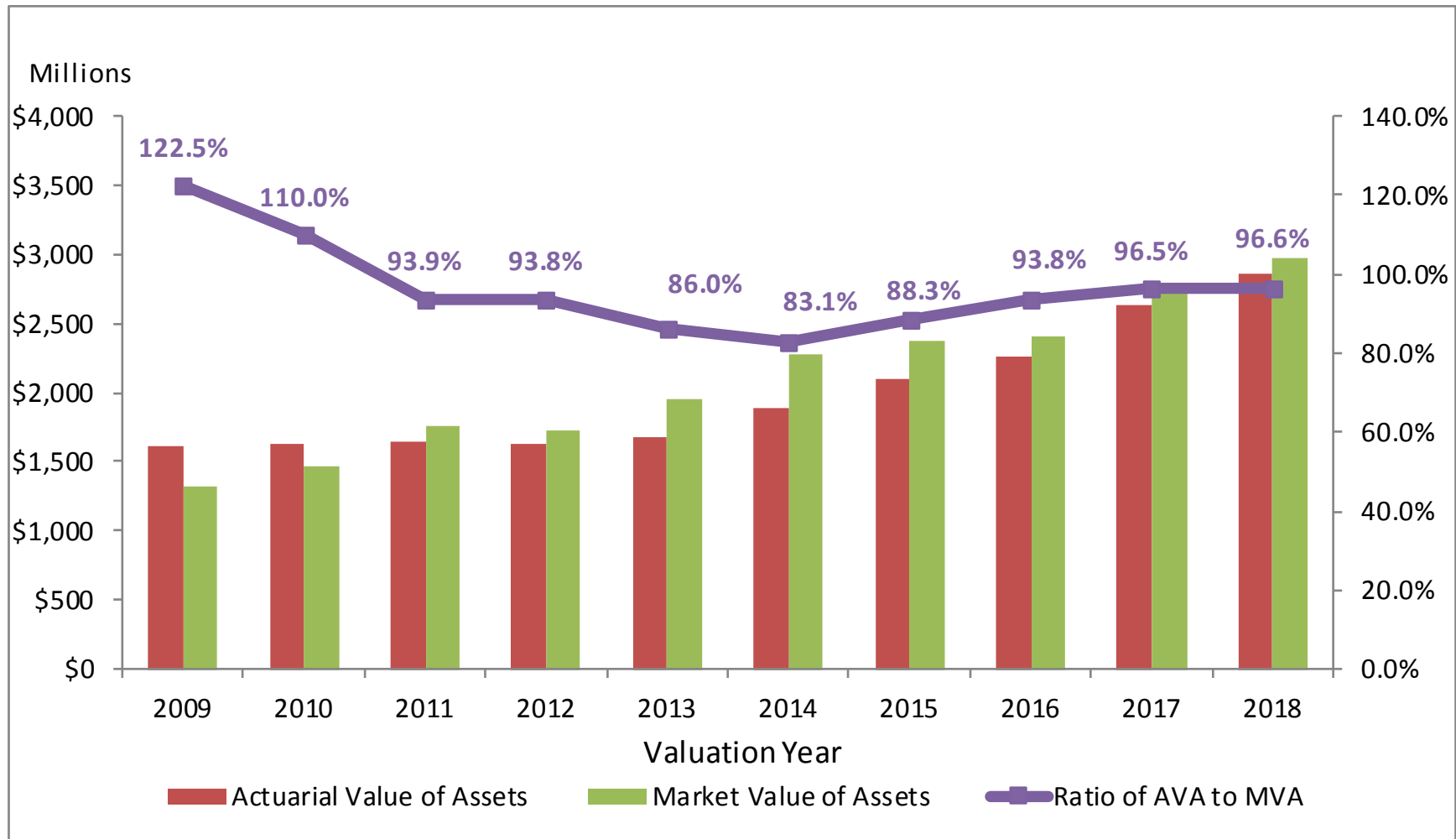
*Actuarial value of assets by plan allocated based on the proportion of the market value of assets as of the actuarial valuation date.*

## Changes in Actuarial Value of Assets (Total PERS)

Date	Employer Contributions	Member Contributions <sup>1</sup>	Transfers From/(To) Other Funds	Administrative Expenses	Benefit Payments and Refunds	Actuarial Value Investment Income	Actuarial Value of Assets at End of Year	Market Value of Assets at End of Year
7/1/2009	\$27,705,267	\$29,970,355	(\$496,073)	\$(1,260,812)	\$(76,090,737)	\$27,509,459	\$1,617,147,801	\$1,320,003,286
7/1/2010	30,253,093	32,584,909	(210,638)	(1,214,733)	(80,827,104)	23,989,771	1,621,723,099	1,474,184,982
7/1/2011	32,278,056	34,277,035	(264,686)	(1,797,287)	(88,976,102)	53,223,596	1,650,463,711	1,758,056,598
7/1/2012	38,005,854	42,587,266	(412,993)	(1,856,915)	(98,968,562)	(2,422,725)	1,627,395,636	1,734,039,896
7/1/2013	48,846,796	54,285,278	(212,500)	(2,059,315)	(109,079,601)	63,782,233	1,682,958,527	1,957,670,026
7/1/2014	61,661,050	67,719,340	(347,783)	(2,158,712)	(119,538,541)	205,543,853	1,895,837,734	2,281,582,863
7/1/2015	70,842,535	75,043,940	(584,727)	(2,365,357)	(134,397,090)	189,874,321	2,094,251,356	2,371,710,809
7/1/2016	77,080,576	83,397,439	23,176,288	(2,537,799)	(149,265,492)	139,175,273	2,265,277,641	2,414,895,657
7/1/2017	78,933,571	87,812,526	(239,609)	(2,607,243)	(162,752,359)	366,774,105	2,633,198,632	2,727,835,589
7/1/2018	80,727,209	97,471,161	(190,727)	(2,472,761)	(182,330,936)	242,386,151	2,868,788,729	2,970,180,276
10-Year Total	546,334,007	605,149,249	20,216,552	(20,330,934)	(1,202,226,524)	1,309,836,037		

<sup>1</sup> Includes repurchases of service credit.

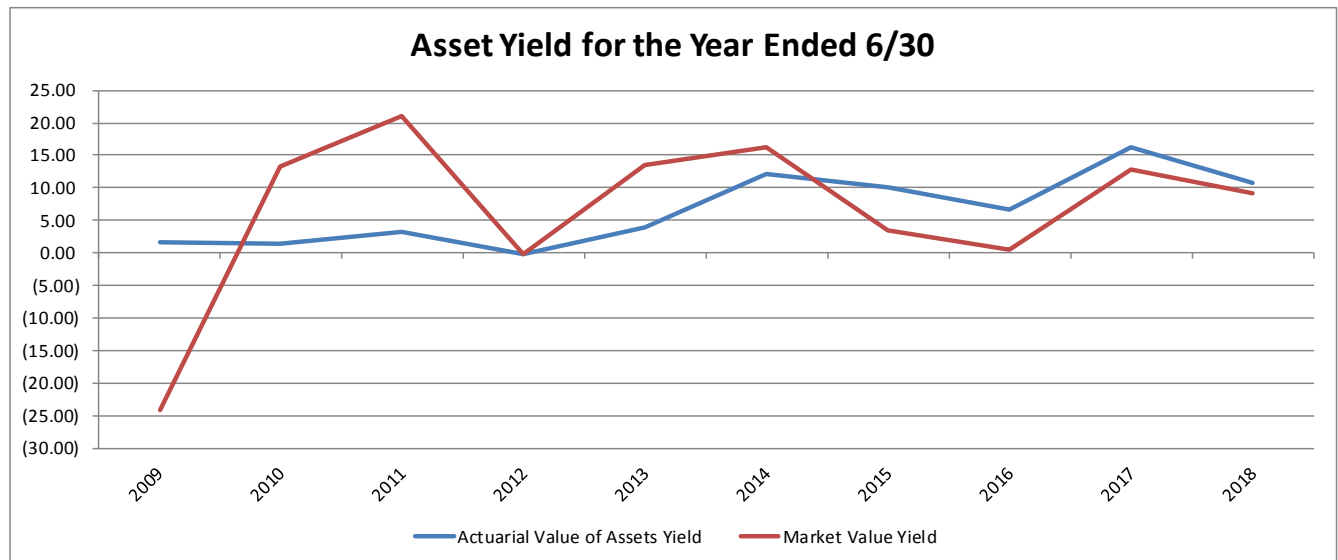
## Historical Comparison of Actuarial Value of Assets to Market Value of Assets (Total PERS)



Values prior to July 1, 2016, were calculated by the prior actuary.

# Historical Comparison of Total Investment Income (Total PERS)

Actuarial Valuation Date	Total Investment Income (Actuarial Assets Basis)				Total Investment Income (Market Assets Basis)			
	Non Investment Income Amount	Amount	Yield	Actuarial Value of Assets	Amount	Yield	Market Value of Assets	
7/1/2009	\$ (20,172,000)	\$ 27,509,459	1.72	\$ 1,617,147,801	\$ (421,047,745)	(24.04)	\$ 1,320,003,286	
7/1/2010	(19,414,473)	23,989,771	1.49	1,621,723,099	173,596,169	13.25	1,474,184,982	
7/1/2011	(24,482,984)	53,223,596	3.31	1,650,463,711	308,354,600	21.09	1,758,056,598	
7/1/2012	(20,645,350)	(2,422,725)	(0.15)	1,627,395,636	(3,371,352)	(0.19)	1,734,039,896	
7/1/2013	(8,219,342)	63,782,233	3.93	1,682,958,527	231,849,472	13.40	1,957,670,026	
7/1/2014	7,335,354	205,543,853	12.19	1,895,837,734	316,577,483	16.14	2,281,582,863	
7/1/2015	8,539,301	189,874,321	9.99	2,094,251,356	81,588,645	3.57	2,371,710,809	
7/1/2016	31,851,012	139,175,273	6.60	2,265,277,641	11,333,836	0.47	2,414,895,657	
7/1/2017	1,146,886	366,774,105	16.19	2,633,198,632	311,793,046	12.91	2,727,835,589	
7/1/2018	(6,796,054)	242,386,151	10.72	2,868,788,729	249,140,741	9.14	2,970,180,276	
10-Year Total	(50,857,650)	1,309,836,037	6.60		1,259,814,895	6.57		



Values prior to July 1, 2016, were calculated by the prior actuary.

## **SECTION C**

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### **ACTUARIAL VALUATION DATA**

# Summary of Participant Data (July 1, 2017, and July 1, 2018)

Valuation as of July 1, 2018					
	Main System	Judges	Public Safety w/ Prior Service	Public Safety w/o Prior Service	Total
<b>Active Members</b>					
Number	22,711	55	598	119	23,483
Average Age	46.5	55.9	36.6	38.7	46.3
Average Vesting Service	9.9	14.9	7.0	6.0	9.8
Total Payroll	\$ 1,027,317,202	\$ 8,008,841	\$ 34,521,069	\$ 6,110,843	\$ 1,075,957,954
<b>Inactive Members<sup>1</sup></b>					
Number	5,808	3	131	56	5,998
Total Benefits	\$ 34,615,627	\$ 180,043	\$ 728,429	\$ 160,073	\$ 35,684,172
<b>Inactive Members Elected Refunds<sup>1</sup></b>					
Number	6,012	-	139	37	6,188
Total Account Balance	\$ 21,555,813	\$ -	\$ 819,058	\$ 94,310	\$ 22,469,181
<b>Retired, Disabled, and Beneficiary Members</b>					
Number	11,538	55	103	8	11,704
Total Benefits	\$ 168,972,402	\$ 2,902,760	\$ 2,185,900	\$ 90,238	\$ 174,151,300
<b>Total Membership</b>	<b>46,069</b>	<b>113</b>	<b>971</b>	<b>220</b>	<b>47,373</b>

Valuation as of July 1, 2017					
	Main System	Judges	Public Safety w/ Prior Service	Public Safety w/o Prior Service	Total
<b>Active Members</b>					
Number	22,574	54	498	117	23,243
Average Age	46.4	56.8	37.4	38.9	46.2
Average Vesting Service	9.8	14.8	7.8	5.1	9.7
Total Payroll	\$ 1,020,843,253	\$ 7,866,090	\$ 28,765,678	\$ 5,896,777	\$ 1,063,371,798
<b>Inactive Members<sup>1</sup></b>					
Number	5,737	4	112	50	5,903
Total Benefits	\$ 36,642,516	\$ 172,408	\$ 643,783	\$ 132,955	\$ 37,591,661
<b>Inactive Members Elected Refunds<sup>1</sup></b>					
Number	5,599	-	117	35	5,751
Total Account Balance	\$ 17,575,754	\$ -	\$ 693,099	\$ 82,890	\$ 18,351,743
<b>Retired, Disabled, and Beneficiary Members</b>					
Number	10,957	50	90	6	11,103
Total Benefits	\$ 152,770,344	\$ 2,639,954	\$ 1,836,456	\$ 70,665	\$ 157,317,419
<b>Total Membership</b>	<b>44,867</b>	<b>108</b>	<b>817</b>	<b>208</b>	<b>46,000</b>

<sup>1</sup>Includes transferred members.

# Age/Service/Salary by Group as of July 1, 2018

## Main System

Current Age	Service as of Valuation Date								Totals	Valuation Payroll	Contribution Account Balance *
	Under 5	5-9	10-14	15-19	20-24	25-29	30-34	35 and Over			
Under 20	29	-	-	-	-	-	-	-	29	\$ 680,588	\$ 25,337
20-24	782	6	-	-	-	-	-	-	788	24,916,927	2,776,266
25-29	1,529	231	3	-	-	-	-	-	1,763	68,944,881	15,892,936
30-34	1,546	708	187	-	-	-	-	-	2,441	106,061,425	40,934,649
35-39	1,320	664	504	112	5	-	-	-	2,605	119,512,498	65,346,254
40-44	1,087	581	460	318	94	8	-	-	2,548	117,143,318	86,374,573
45-49	926	565	464	319	278	106	10	-	2,668	126,838,164	119,941,773
50-54	768	534	453	352	280	278	132	13	2,810	135,130,775	166,786,969
55-59	811	623	531	481	369	280	257	152	3,504	166,412,232	241,077,445
60-64	466	458	416	338	313	176	172	242	2,581	121,034,408	197,849,777
65-69	136	136	122	116	85	49	37	52	733	32,424,670	50,009,277
70-74	35	36	41	22	11	12	7	20	184	6,614,301	10,694,120
75 and Over	10	10	8	12	4	6	1	6	57	1,603,015	2,103,399
<b>Total</b>	<b>9,445</b>	<b>4,552</b>	<b>3,189</b>	<b>2,070</b>	<b>1,439</b>	<b>915</b>	<b>616</b>	<b>485</b>	<b>22,711</b>	<b>\$ 1,027,317,202</b>	<b>\$ 999,812,775</b>

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Previous Valuation		Current Valuation		Change
Average Age:	46.4	Average Age:	46.5	0.1
Average Vesting Service:	9.8	Average Vesting Service:	9.9	0.1
Average Annual Pay:	\$45,222	Average Annual Pay:	\$45,234	\$12
Average Account Balance:	\$40,656	Average Account Balance:	\$44,023	\$3,367
Vested Participants	15,927	Vested Participants	16,504	577
Nonvested Participants	6,647	Nonvested Participants	6,207	(440)
Total Participants	22,574	Total Participants	22,711	137

Current Age	Annualized Salary as of Valuation Date										Totals
	Less Than \$20,000	\$20,000-\$29,999	\$30,000-\$39,999	\$40,000-\$49,999	\$50,000-\$59,999	\$60,000-\$69,999	\$70,000-\$79,999	\$80,000-\$89,999	\$90,000-\$99,999	\$100,000 & Over	
Under 20	11	9	7	2	-	-	-	-	-	-	29
20-24	193	156	205	170	58	6	-	-	-	-	788
25-29	199	270	432	443	287	114	14	2	2	-	1,763
30-34	240	312	479	594	474	198	73	46	11	14	2,441
35-39	266	358	426	534	463	270	119	92	44	33	2,605
40-44	267	362	453	484	413	241	161	66	37	64	2,548
45-49	247	394	436	530	414	269	146	104	50	78	2,668
50-54	222	421	498	574	429	242	159	102	60	103	2,810
55-59	246	558	659	749	484	324	188	112	64	120	3,504
60-64	215	418	527	470	377	243	132	67	41	91	2,581
65-69	121	114	134	123	91	68	30	14	15	23	733
70-74	49	44	29	27	13	10	4	3	-	5	184
75 and Over	18	18	8	7	4	2	-	-	-	-	57
<b>Total</b>	<b>2,294</b>	<b>3,434</b>	<b>4,293</b>	<b>4,707</b>	<b>3,507</b>	<b>1,987</b>	<b>1,026</b>	<b>608</b>	<b>324</b>	<b>531</b>	<b>22,711</b>

\*Contribution account balance includes Portability Enhancement Provision (PEP) balance.

# Age/Service/Salary by Group as of July 1, 2018

## Judges

Current Age	Service as of Valuation Date								Totals	Valuation Payroll	Contribution Account Balance
	Under 5	5-9	10-14	15-19	20-24	25-29	30-34	35 and Over			
Under 20	-	-	-	-	-	-	-	-	0	\$ -	\$ -
20-24	-	-	-	-	-	-	-	-	0	-	-
25-29	-	-	-	-	-	-	-	-	0	-	-
30-34	-	-	-	-	-	-	-	-	0	-	-
35-39	1	3	-	-	-	-	-	-	4	577,035	96,139
40-44	4	1	1	-	-	-	-	-	6	883,264	202,545
45-49	1	-	1	2	2	1	-	-	7	1,011,894	814,971
50-54	1	1	2	3	-	-	-	-	7	1,020,395	415,741
55-59	-	1	1	2	1	1	-	-	6	876,348	705,029
60-64	3	1	6	1	-	2	3	-	16	2,323,288	2,676,885
65-69	2	2	1	-	2	-	-	1	8	1,155,096	1,101,742
70-74	-	-	-	-	-	-	-	-	0	-	-
75 and Over	-	-	-	-	-	-	-	1	1	161,520	897,815
<b>Total</b>	<b>12</b>	<b>9</b>	<b>12</b>	<b>8</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>55</b>	<b>\$ 8,008,841</b>	<b>\$ 6,910,866</b>

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

	Previous Valuation	Current Valuation	Change
Average Age:	56.8	55.9	(0.9)
Average Vesting Service:	14.8	14.9	0.1
Average Annual Pay:	\$145,668	\$145,615	(\$53)
Average Account Balance:	\$119,913	\$125,652	\$5,739
Vested Participants	47	51	4
Nonvested Participants	7	4	(3)
Total Participants	54	55	1

Current Age	Annualized Salary as of Valuation Date										Totals
	Less Than \$20,000	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	\$50,000- \$59,999	\$60,000- \$69,999	\$70,000- \$79,999	\$80,000- \$89,999	\$90,000- \$99,999	\$100,000 & Over	
Under 20	-	-	-	-	-	-	-	-	-	-	0
20-24	-	-	-	-	-	-	-	-	-	-	0
25-29	-	-	-	-	-	-	-	-	-	-	0
30-34	-	-	-	-	-	-	-	-	-	-	0
35-39	-	-	-	-	-	-	-	-	-	4	4
40-44	-	-	-	-	-	-	-	-	-	6	6
45-49	-	-	-	-	-	-	-	-	-	7	7
50-54	-	-	-	-	-	-	-	-	-	7	7
55-59	-	-	-	-	-	-	-	-	-	6	6
60-64	-	-	-	-	-	-	-	-	-	16	16
65-69	-	-	-	-	-	-	-	-	-	8	8
70-74	-	-	-	-	-	-	-	-	-	-	0
75 and Over	-	-	-	-	-	-	-	-	-	1	1
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>55</b>	<b>55</b>



# Age/Service/Salary by Group as of July 1, 2018

## Public Safety with Prior Main System Service

### Service as of Valuation Date

Current Age	Service as of Valuation Date								Totals	Valuation Payroll	Contribution Account Balance *
	Under 5	5-9	10-14	15-19	20-24	25-29	30-34	35 and Over			
Under 20	1	-	-	-	-	-	-	-	1	\$ 44,957	\$ 3,959
20-24	63	-	-	-	-	-	-	-	63	3,097,711	209,107
25-29	98	17	-	-	-	-	-	-	115	5,844,058	971,133
30-34	82	52	10	1	-	-	-	-	145	8,056,383	2,219,580
35-39	28	34	18	3	-	-	-	-	83	4,891,253	2,105,790
40-44	24	8	12	14	3	-	-	-	61	4,054,207	2,309,603
45-49	14	10	9	12	4	2	-	-	51	3,173,920	2,567,273
50-54	5	7	8	2	1	9	1	-	33	2,162,257	2,338,331
55-59	8	4	3	-	7	5	-	1	28	1,888,121	2,184,147
60-64	2	3	3	1	-	1	3	2	15	1,162,068	1,869,433
65-69	-	-	-	-	1	-	-	-	1	96,336	183,197
70-74	-	-	1	-	-	-	-	-	1	29,342	16,783
75 and Over	-	-	1	-	-	-	-	-	1	20,455	7,368
<b>Total</b>	<b>325</b>	<b>135</b>	<b>65</b>	<b>33</b>	<b>16</b>	<b>17</b>	<b>4</b>	<b>3</b>	<b>598</b>	<b>\$ 34,521,069</b>	<b>\$ 16,985,703</b>

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

	Previous Valuation	Current Valuation	Change
Average Age:	37.4	36.6	(0.8)
Average Vesting Service:	7.8	7.0	(0.8)
Average Annual Pay:	\$57,762	\$57,728	(\$34)
Average Account Balance:	\$31,163	\$28,404	(\$2,759)
Vested Participants	353	386	33
Nonvested Participants	145	212	67
Total Participants	498	598	100

### Annualized Salary as of Valuation Date

Current Age	Annualized Salary as of Valuation Date										Totals
	Less Than \$20,000	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	\$50,000- \$59,999	\$60,000- \$69,999	\$70,000- \$79,999	\$80,000- \$89,999	\$90,000- \$99,999	\$100,000 & Over	
Under 20	-	-	-	1	-	-	-	-	-	-	1
20-24	1	3	6	21	20	12	-	-	-	-	63
25-29	1	2	10	48	26	24	4	-	-	-	115
30-34	1	4	6	42	33	45	11	1	2	-	145
35-39	-	-	6	13	23	28	8	3	2	-	83
40-44	1	-	2	8	10	20	10	3	2	5	61
45-49	-	2	-	10	11	12	9	4	3	-	51
50-54	-	-	1	6	5	10	6	2	2	1	33
55-59	-	-	-	4	5	9	4	1	5	-	28
60-64	-	-	-	1	3	4	2	-	3	2	15
65-69	-	-	-	-	-	-	-	-	1	-	1
70-74	-	1	-	-	-	-	-	-	-	-	1
75 and Over	-	1	-	-	-	-	-	-	-	-	1
<b>Total</b>	<b>4</b>	<b>13</b>	<b>31</b>	<b>154</b>	<b>136</b>	<b>164</b>	<b>54</b>	<b>14</b>	<b>20</b>	<b>8</b>	<b>598</b>

\*Contribution account balance includes Portability Enhancement Provision (PEP) balance.

# Age/Service/Salary by Group as of July 1, 2018

## Public Safety without Prior Main System Service

Service as of Valuation Date										Valuation	Contribution
Current Age	Under 5	5-9	10-14	15-19	20-24	25-29	30-34	35 and Over	Totals	Payroll	Account Balance *
Under 20	-	-	-	-	-	-	-	-	0	\$ -	\$ -
20-24	15	-	-	-	-	-	-	-	15	571,167	43,881
25-29	13	2	-	-	-	-	-	-	15	687,797	98,693
30-34	10	7	1	-	-	-	-	-	18	843,165	312,260
35-39	10	6	3	-	-	-	-	-	19	966,509	421,462
40-44	7	4	4	-	-	-	-	-	15	758,092	300,419
45-49	2	9	2	1	1	-	-	-	15	803,202	678,624
50-54	3	4	2	2	-	-	-	-	11	727,056	914,607
55-59	3	1	3	-	-	1	-	-	8	532,783	524,278
60-64	1	-	-	1	1	-	-	-	3	221,071	633,723
65-69	-	-	-	-	-	-	-	-	0	-	-
70-74	-	-	-	-	-	-	-	-	0	-	-
75 and Over	-	-	-	-	-	-	-	-	0	-	-
<b>Total</b>	<b>64</b>	<b>33</b>	<b>15</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>119</b>	<b>\$ 6,110,843</b>	<b>\$ 3,927,948</b>

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Previous Valuation		Current Valuation		Change
Average Age:	38.9	Average Age:	38.7	(0.2)
Average Vesting Service:	5.1	Average Vesting Service:	6.0	0.9
Average Annual Pay:	\$50,400	Average Annual Pay:	\$51,352	\$952
Average Account Balance:	\$27,663	Average Account Balance:	\$33,008	\$5,345
Vested Participants	70	Vested Participants	82	12
Nonvested Participants	47	Nonvested Participants	37	(10)
Total Participants	117	Total Participants	119	2

Annualized Salary as of Valuation Date											
Current Age	Less Than \$20,000	\$20,000-\$29,999	\$30,000-\$39,999	\$40,000-\$49,999	\$50,000-\$59,999	\$60,000-\$69,999	\$70,000-\$79,999	\$80,000-\$89,999	\$90,000-\$99,999	\$100,000 & Over	Totals
Under 20	-	-	-	-	-	-	-	-	-	-	0
20-24	1	1	5	8	-	-	-	-	-	-	15
25-29	-	-	2	12	1	-	-	-	-	-	15
30-34	-	-	3	11	3	1	-	-	-	-	18
35-39	-	-	3	5	7	4	-	-	-	-	19
40-44	-	1	2	4	6	1	-	1	-	-	15
45-49	-	-	1	5	5	3	1	-	-	-	15
50-54	-	-	1	-	3	2	3	2	-	-	11
55-59	-	-	-	1	3	1	1	2	-	-	8
60-64	-	-	-	-	-	1	1	1	-	-	3
65-69	-	-	-	-	-	-	-	-	-	-	0
70-74	-	-	-	-	-	-	-	-	-	-	0
75 and Over	-	-	-	-	-	-	-	-	-	-	0
<b>Total</b>	<b>1</b>	<b>2</b>	<b>17</b>	<b>46</b>	<b>28</b>	<b>13</b>	<b>6</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>119</b>

\*Contribution account balance includes Portability Enhancement Provision (PEP) balance.

# Age/Service/Salary by Group as of July 1, 2018

## Combined Main System, Judges and Public Safety

Service as of Valuation Date											
Current Age	Under 5	5-9	10-14	15-19	20-24	25-29	30-34	35 and Over	Totals	Contribution	
										Valuation Payroll	Account Balance *
Under 20	30	-	-	-	-	-	-	-	30	\$ 725,545	\$ 29,296
20-24	860	6	-	-	-	-	-	-	866	28,585,804	3,029,255
25-29	1,640	250	3	-	-	-	-	-	1,893	75,476,737	16,962,762
30-34	1,638	767	198	1	-	-	-	-	2,604	114,960,974	43,466,489
35-39	1,359	707	525	115	5	-	-	-	2,711	125,947,296	67,969,644
40-44	1,122	594	477	332	97	8	-	-	2,630	122,838,882	89,187,141
45-49	943	584	476	334	285	109	10	-	2,741	131,827,181	124,002,642
50-54	777	546	465	359	281	287	133	13	2,861	139,040,482	170,455,648
55-59	822	629	538	483	377	287	257	153	3,546	169,709,484	244,490,899
60-64	472	462	425	341	314	179	178	244	2,615	124,740,834	203,029,818
65-69	138	138	123	116	88	49	37	53	742	33,676,102	51,294,216
70-74	35	36	42	22	11	12	7	20	185	6,643,643	10,710,903
75 and Over	10	10	9	12	4	6	1	7	59	1,784,990	3,008,581
<b>Total</b>	<b>9,846</b>	<b>4,729</b>	<b>3,281</b>	<b>2,115</b>	<b>1,462</b>	<b>937</b>	<b>623</b>	<b>490</b>	<b>23,483</b>	<b>\$ 1,075,957,954</b>	<b>\$ 1,027,637,293</b>

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Previous Valuation		Current Valuation		Change
Average Age:	46.2	Average Age:	46.3	0.1
Average Vesting Service:	9.7	Average Vesting Service:	9.8	0.1
Average Annual Pay:	\$45,750	Average Annual Pay:	\$45,819	\$69
Average Account Balance:	\$40,572	Average Account Balance:	\$43,761	\$3,189
Vested Participants	16,397	Vested Participants	17,023	626
Nonvested Participants	6,846	Nonvested Participants	6,460	(386)
Total Participants	23,243	Total Participants	23,483	240

Current Age	Annualized Salary as of Valuation Date										Totals
	Less Than \$20,000	\$20,000-\$29,999	\$30,000-\$39,999	\$40,000-\$49,999	\$50,000-\$59,999	\$60,000-\$69,999	\$70,000-\$79,999	\$80,000-\$89,999	\$90,000-\$99,999	\$100,000 & Over	
Under 20	11	9	7	3	-	-	-	-	-	-	30
20-24	195	160	216	199	78	18	-	-	-	-	866
25-29	200	272	444	503	314	138	18	2	2	-	1,893
30-34	241	316	488	647	510	244	84	47	13	14	2,604
35-39	266	358	435	552	493	302	127	95	46	37	2,711
40-44	268	363	457	496	429	262	171	70	39	75	2,630
45-49	247	396	437	545	430	284	156	108	53	85	2,741
50-54	222	421	500	580	437	254	168	106	62	111	2,861
55-59	246	558	659	754	492	334	193	115	69	126	3,546
60-64	215	418	527	471	380	248	135	68	44	109	2,615
65-69	121	114	134	123	91	68	30	14	16	31	742
70-74	49	45	29	27	13	10	4	3	-	5	185
75 and Over	18	19	8	7	4	2	-	-	-	1	59
<b>Total</b>	<b>2,299</b>	<b>3,449</b>	<b>4,341</b>	<b>4,907</b>	<b>3,671</b>	<b>2,164</b>	<b>1,086</b>	<b>628</b>	<b>344</b>	<b>594</b>	<b>23,483</b>

\*Contribution account balance includes Portability Enhancement Provision (PEP) balance.

# Historical Schedule of Active Member Data through July 1, 2018

Main System				
Valuation Date 7/1	Number	Annual Payroll (\$ in Millions)	Average Annual Pay <sup>1</sup>	% Increase in Avg Pay
2009	19,686	\$684.3	\$34,762	5.5%
2010	20,372	751.1	36,868	6.1%
2011	20,359	785.4	38,577	4.6%
2012	20,738	781.6	37,690	(2.3)%
2013	21,201	865.9	40,841	8.4%
2014	21,814	946.2	43,376	9.3%
2015	22,381	993.6	43,395	0.0%
2016	22,762	1,007.8	44,274	2.0%
2017	22,574	1,020.8	45,222	2.1%
2018	22,711	1,027.3	45,234	0.0%

Judges				
Valuation Date 7/1	Number	Annual Payroll (\$ in Millions)	Average Annual Pay <sup>1</sup>	% Increase in Avg Pay
2009	47	\$5.4	\$115,741	3.9%
2010	47	5.7	120,962	4.5%
2011	49	6.2	126,474	4.6%
2012	49	6.1	124,645	(1.4)%
2013	49	6.6	134,673	8.0%
2014	50	7.0	139,290	3.4%
2015	51	7.3	142,636	2.4%
2016	56	7.9	141,733	(0.6)%
2017	54	7.9	145,668	2.8%
2018	55	8.0	145,615	(0.0)%

<sup>1</sup> Prior to the actuarial valuation as of July 1, 2016, annual payroll is based on projected annual compensation for the upcoming year. Beginning with the actuarial valuation as of July 1, 2016, annual payroll and average annual pay are based on annualized payroll as of the actuarial valuation date.

Values prior to July 1, 2016, were calculated by the prior actuary.

# Historical Schedule of Active Member Data through July 1, 2018

Public Safety with Prior Main System Service				
Valuation Date 7/1	Number	Annual Payroll (\$ in Millions)	Average Annual Pay <sup>1</sup>	% Increase in Avg Pay
2009	180	\$7.0	\$38,965	(1.8)%
2010	217	11.9	54,467	39.8%
2011	226	10.1	44,908	(17.6)%
2012	239	10.8	45,074	0.4%
2013	268	13.4	49,981	10.9%
2014	315	16.7	53,121	6.3%
2015	318	18.7	58,781	10.7%
2016	498	28.2	56,678	(3.6)%
2017	498	28.8	57,762	1.9%
2018	598	34.5	57,728	(0.1)%

Public Safety without Prior Main System Service				
Valuation Date 7/1	Number	Annual Payroll (\$ in Millions)	Average Annual Pay <sup>1</sup>	% Increase in Avg Pay
2009	30	\$0.9	\$31,660	15.2%
2010	32	1.1	35,572	12.4%
2011	61	2.4	39,911	12.2%
2012	65	2.4	36,588	(8.3)%
2013	70	2.6	36,998	1.1%
2014	83	3.6	43,872	18.6%
2015	95	4.6	48,204	9.9%
2016	100	4.6	46,217	(4.1)%
2017	117	5.9	50,400	9.0%
2018	119	6.1	51,352	1.9%

<sup>1</sup>Prior to the actuarial valuation as of July 1, 2016, annual payroll is based on projected annual compensation for the upcoming year. Beginning with the actuarial valuation as of July 1, 2016, annual payroll and average annual pay are based on annualized payroll as of the actuarial valuation date.

Values prior to July 1, 2016, were calculated by the prior actuary.

## Summary of Active Member Data as of July 1, 2018

Active Members Eligible For:	Main System	Judges	Public Safety with Prior Main Service	Public Safety without Prior Main Service	Total
Retirement					
Normal	974	9	38	10	1,031
Rule of 85	1,347	5	1	0	1,353
Early Retirement	<u>4,092</u>	<u>17</u>	<u>30</u>	<u>9</u>	<u>4,148</u>
Total Retirement	6,413	31	69	19	6,532
Deferred Retirement	<u>10,091</u>	<u>20</u>	<u>317</u>	<u>63</u>	<u>10,491</u>
Total Vested	16,504	51	386	82	17,023
Non-Vested	6,207	4	212	37	6,460
<b>Grand Total</b>	<b>22,711</b>	<b>55</b>	<b>598</b>	<b>119</b>	<b>23,483</b>

# Schedule of Members in Pay Status as of July 1, 2018

Main System							
Monthly Amount	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under \$200	593	536	2	33	187	1,351	1,164
\$200 - \$400	622	855	29	52	241	1,799	1,558
\$400 - \$600	508	634	39	63	187	1,431	1,244
\$600 - \$800	378	328	39	127	118	990	872
\$800 - \$1,000	325	159	20	257	54	815	761
\$1,000 - \$1,200	229	127	5	350	51	762	711
\$1,200 - \$1,400	186	60	2	366	39	653	614
\$1,400 - \$1,600	136	33	1	327	24	521	497
\$1,600 - \$1,800	118	17	0	337	21	493	472
\$1,800 - \$2,000	100	12	0	300	21	433	412
\$2,000 - \$2,200	71	6	0	260	11	348	337
\$2,200 - \$2,400	70	8	0	244	13	335	322
\$2,400 - \$2,600	50	2	0	208	5	265	260
\$2,600 - \$2,800	42	2	0	183	5	232	227
\$2,800 - \$3,000	31	2	0	133	5	171	166
\$3,000 and Over	190	2	0	724	23	939	916
<b>Total</b>	<b>3,649</b>	<b>2,783</b>	<b>137</b>	<b>3,964</b>	<b>1,005</b>	<b>11,538</b>	<b>10,533</b>
Payment Option	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Life	2,342	1,992	117	1,912	211	6,574	6,363
Life 1% Graduated Benefits	4	0	0	1	0	5	5
Life 2% Graduated Benefits	8	0	0	6	0	14	14
Level Social Security Payment	1	22	0	97	0	120	120
Joint & 100% Survivor	849	489	14	1,167	522	3,041	2,519
Joint & 100% Survivor 1% Graduated Benefits	1	0	0	2	0	3	3
Joint & 100% Survivor 2% Graduated Benefits	6	0	0	7	0	13	13
Joint & 50% Survivor	360	187	6	700	234	1,487	1,253
Joint & 50% Survivor 1% Graduated Benefits	3	0	0	2	0	5	5
Joint & 50% Survivor 2% Graduated Benefits	0	0	0	1	0	1	1
20 Year C & L	33	21	0	13	21	88	67
10 Year C & L	39	63	0	45	11	158	147
10 Year C & L 1% Graduated Benefits	0	0	0	1	0	1	1
5 Year C & L	3	9	0	10	6	28	22
<b>Total</b>	<b>3,649</b>	<b>2,783</b>	<b>137</b>	<b>3,964</b>	<b>1,005</b>	<b>11,538</b>	<b>10,533</b>
Age	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under 50	0	0	16	0	31	47	16
50 - 54	0	0	19	24	17	60	43
55 - 59	0	40	37	298	37	412	375
60 - 64	0	372	64	825	91	1,352	1,261
65 - 69	1,069	777	1	1,200	133	3,180	3,047
70 - 74	1,065	572	0	725	169	2,531	2,362
75 and Over	1,515	1,022	0	892	527	3,956	3,429
<b>Total</b>	<b>3,649</b>	<b>2,783</b>	<b>137</b>	<b>3,964</b>	<b>1,005</b>	<b>11,538</b>	<b>10,533</b>

	Previous Valuation	Current Valuation	Change
Average Age	72.4	72.1	-0.3
Average Monthly Benefit	\$1,162	\$1,220	\$58
Total Members in Pay Status	10,957	11,538	581

\* Includes Rule of 85, Rule of 88 and Rule of 90.

\*\* Includes alternate payees.

\*\*\* Total excluding beneficiaries.

# Schedule of Members in Pay Status as of July 1, 2018

## Judges

Monthly Amount	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under \$400	0	0	0	0	0	0	0
\$400 - \$800	0	0	0	0	1	1	0
\$800 - \$1,200	2	0	0	0	0	2	2
\$1,200 - \$1,600	0	0	0	2	1	3	2
\$1,600 - \$2,000	1	2	0	0	3	6	3
\$2,000 - \$2,400	0	0	0	0	0	0	0
\$2,400 - \$2,800	1	0	0	0	1	2	1
\$2,800 - \$3,200	2	0	0	0	3	5	2
\$3,200 - \$3,600	1	1	0	0	1	3	2
\$3,600 - \$4,000	3	1	0	0	0	4	4
\$4,000 - \$4,400	0	0	0	0	1	1	0
\$4,400 - \$4,800	3	0	0	2	1	6	5
\$4,800 - \$5,200	0	0	0	1	2	3	1
\$5,200 - \$5,600	1	0	0	1	0	2	2
\$5,600 - \$6,000	1	0	0	1	0	2	2
\$6,000 and Over	9	0	1	4	1	15	14
<b>Total</b>	<b>24</b>	<b>4</b>	<b>1</b>	<b>11</b>	<b>15</b>	<b>55</b>	<b>40</b>
Payment Option	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Life	1	0	0	1	4	6	2
Level Social Security Payment	0	0	0	0	0	0	0
Joint & 100% Survivor	17	2	0	5	9	33	24
Joint & 50% Survivor	6	2	1	5	2	16	14
10 Year C & L	0	0	0	0	0	0	0
5 Year C & L	0	0	0	0	0	0	0
<b>Total</b>	<b>24</b>	<b>4</b>	<b>1</b>	<b>11</b>	<b>15</b>	<b>55</b>	<b>40</b>
Age	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under 50	0	0	0	0	0	0	0
50 - 54	0	0	0	0	0	0	0
55 - 59	0	0	1	0	0	1	1
60 - 64	0	0	0	0	0	0	0
65 - 69	10	1	0	6	3	20	17
70 - 74	3	1	0	2	5	11	6
75 and Over	11	2	0	3	7	23	16
<b>Total</b>	<b>24</b>	<b>4</b>	<b>1</b>	<b>11</b>	<b>15</b>	<b>55</b>	<b>40</b>

	Previous Valuation	Current Valuation	Change
Average Age	73.4	73.8	0.4
Average Monthly Benefit	\$4,400	\$4,398	(\$2)
Total Members in Pay Status	50	55	5

\* Includes Rule of 85, Rule of 88 and Rule of 90.

\*\* Includes alternate payees.

\*\*\* Total excluding beneficiaries.



# Schedule of Members in Pay Status as of July 1, 2018

## Public Safety with prior Main System Service

Monthly Amount	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under \$200	4	1	0	0	3	8	5
\$200 - \$400	1	2	0	0	2	5	3
\$400 - \$600	6	2	0	0	1	9	8
\$600 - \$800	4	1	0	0	3	8	5
\$800 - \$1,000	5	1	0	0	0	6	6
\$1,000 - \$1,200	8	0	1	0	0	9	9
\$1,200 - \$1,400	3	0	0	0	0	3	3
\$1,400 - \$1,600	8	1	0	1	0	10	10
\$1,600 - \$1,800	4	0	0	0	0	4	4
\$1,800 - \$2,000	3	1	0	0	0	4	4
\$2,000 - \$2,200	5	0	0	1	0	6	6
\$2,200 - \$2,400	4	0	0	1	0	5	5
\$2,400 - \$2,600	1	1	0	0	0	2	2
\$2,600 - \$2,800	2	0	0	0	0	2	2
\$2,800 - \$3,000	1	0	0	0	0	1	1
\$3,000 and Over	16	0	0	5	0	21	21
<b>Total</b>	<b>75</b>	<b>10</b>	<b>1</b>	<b>8</b>	<b>9</b>	<b>103</b>	<b>94</b>
Payment Option	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Life	36	5	1	0	0	42	42
Level Social Security Payment	2	2	0	2	0	6	6
Joint & 100% Survivor	21	3	0	6	3	33	30
Joint & 100% Survivor 1% Graduated Benefits	0	0	0	0	0	0	0
Joint & 50% Survivor	15	0	0	0	0	15	15
20 Year C & L	0	0	0	0	6	6	0
10 Year C & L	0	0	0	0	0	0	0
5 Year C & L	0	0	0	0	0	0	0
20 Year Certain	0	0	0	0	0	0	0
<b>Total</b>	<b>75</b>	<b>10</b>	<b>1</b>	<b>8</b>	<b>9</b>	<b>103</b>	<b>94</b>
Age	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under 50	0	0	0	0	5	5	0
50 - 54	0	2	0	0	0	2	2
55 - 59	8	0	1	3	0	12	12
60 - 64	22	5	0	3	0	30	30
65 - 69	28	0	0	1	4	33	29
70 - 74	14	1	0	1	0	16	16
75 and Over	3	2	0	0	0	5	5
<b>Total</b>	<b>75</b>	<b>10</b>	<b>1</b>	<b>8</b>	<b>9</b>	<b>103</b>	<b>94</b>

	Previous Valuation	Current Valuation	Change
Average Age	63.8	64.3	0.5
Average Monthly Benefit	\$1,700	\$1,769	\$69
Total Members in Pay Status	90	103	13

\* Includes Rule of 85, Rule of 88 and Rule of 90.

\*\* Includes alternate payees.

\*\*\* Total excluding beneficiaries.

# Schedule of Members in Pay Status as of July 1, 2018

## Public Safety without prior Main System Service

Monthly Amount	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under \$200	1	0	0	0	0	1	1
\$200 - \$400	1	0	0	0	0	1	1
\$400 - \$600	2	0	0	0	0	2	2
\$600 - \$800	0	0	0	0	0	0	0
\$800 - \$1,000	0	0	1	0	0	1	1
\$1,000 - \$1,200	0	0	0	0	1	1	0
\$1,200 - \$1,400	1	0	0	0	0	1	1
\$1,400 - \$1,600	0	0	0	0	0	0	0
\$1,600 - \$1,800	0	0	0	0	0	0	0
\$1,800 - \$2,000	0	0	0	0	0	0	0
\$2,000 - \$2,200	0	0	0	0	0	0	0
\$2,200 - \$2,400	0	0	0	0	0	0	0
\$2,400 - \$2,600	0	0	0	0	0	0	0
\$2,600 - \$2,800	0	0	0	0	0	0	0
\$2,800 - \$3,000	0	0	0	0	0	0	0
\$3,000 and Over	1	0	0	0	0	1	1
<b>Total</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>7</b>
Payment Option	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Life	1	0	1	0	1	3	2
Level Social Security Payment	0	0	0	0	0	0	0
Joint & 100% Survivor	3	0	0	0	0	3	3
Joint & 50% Survivor	2	0	0	0	0	2	2
10 Year C & L	0	0	0	0	0	0	0
5 Year C & L	0	0	0	0	0	0	0
<b>Total</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>7</b>
Age	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under 50	0	0	1	0	0	1	1
50 - 54	0	0	0	0	1	1	0
55 - 59	0	0	0	0	0	0	0
60 - 64	4	0	0	0	0	4	4
65 - 69	2	0	0	0	0	2	2
70 - 74	0	0	0	0	0	0	0
75 and Over	0	0	0	0	0	0	0
<b>Total</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>7</b>

	<b>Previous Valuation</b>	<b>Current Valuation</b>	<b>Change</b>
Average Age	59.2	59.5	0.3
Average Monthly Benefit	\$981	\$940	(\$41)
Total Members in Pay Status	6	8	2

\* Includes Rule of 85, Rule of 88 and Rule of 90.

\*\* Includes alternate payees.

\*\*\* Total excluding beneficiaries.

# Schedule of New Pensions Awarded During the Year as of July 1, 2018

## Main System, Judges, Public Safety

Monthly Amount	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under \$200	61	13	0	2	11	87	76
\$200 - \$400	59	24	0	7	18	108	90
\$400 - \$600	51	27	6	3	20	107	87
\$600 - \$800	38	13	4	4	8	67	59
\$800 - \$1,000	40	14	1	2	8	65	57
\$1,000 - \$1,200	31	11	1	10	5	58	53
\$1,200 - \$1,400	25	7	1	6	9	48	39
\$1,400 - \$1,600	17	5	0	9	3	34	31
\$1,600 - \$1,800	19	0	0	24	2	45	43
\$1,800 - \$2,000	10	2	0	23	2	37	35
\$2,000 - \$2,200	9	1	0	19	2	31	29
\$2,200 - \$2,400	13	1	0	12	1	27	26
\$2,400 - \$2,600	6	0	0	15	1	22	21
\$2,600 - \$2,800	6	1	0	15	1	23	22
\$2,800 - \$3,000	8	0	0	13	2	23	21
\$3,000 and Over	52	1	0	139	3	195	192
<b>Total</b>	<b>445</b>	<b>120</b>	<b>13</b>	<b>303</b>	<b>96</b>	<b>977</b>	<b>881</b>
Payment Option	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Life	248	59	9	109	11	436	425
Life 1% Graduated Benefits	1	0	0	0	0	1	1
Life 2% Graduated Benefits	2	0	0	3	0	5	5
Level Social Security Payment	0	0	0	0	0	0	0
Joint & 100% Survivor	133	46	3	124	46	352	306
Joint & 100% Survivor 1% Graduated Benefits	1	0	0	0	0	1	1
Joint & 100% Survivor 2% Graduated Benefits	1	0	0	1	0	2	2
Joint & 50% Survivor	50	7	1	63	36	157	121
Joint & 50% Survivor 1% Graduated Benefits	1	0	0	0	0	1	1
Joint & 50% Survivor 2% Graduated Benefits	0	0	0	0	0	0	0
20 Year C & L	5	4	0	3	2	14	12
10 Year C & L	3	4	0	0	1	8	7
10 Year C & L 1% Graduated Benefits	0	0	0	0	0	0	0
5 Year C & L	0	0	0	0	0	0	0
5 Year Certain	0	0	0	0	0	0	0
10 Year Certain	0	0	0	0	0	0	0
10 Year Certain 1% Graduated Benefits	0	0	0	0	0	0	0
20 Year Certain	0	0	0	0	0	0	0
<b>Total</b>	<b>445</b>	<b>120</b>	<b>13</b>	<b>303</b>	<b>96</b>	<b>977</b>	<b>881</b>
Age	Normal	Early	Disability	Service*	Beneficiary**	Total	Total***
Under 50	0	0	3	0	5	8	3
50 - 54	0	1	1	14	4	20	16
55 - 59	3	14	3	82	0	102	102
60 - 64	8	85	6	161	11	271	260
65 - 69	353	18	0	45	14	430	416
70 - 74	66	2	0	1	21	90	69
75 and Over	15	0	0	0	41	56	15
<b>Total</b>	<b>445</b>	<b>120</b>	<b>13</b>	<b>303</b>	<b>96</b>	<b>977</b>	<b>881</b>

	Previous Valuation	Current Valuation	Change
New Pensions Awarded	904	977	73
Average Age	66.3	66.8	0.5
Average Monthly Benefit	\$1,531	\$1,566	\$35

\* Includes Rule of 85, Rule of 88 and Rule of 90.

\*\* Includes alternate payees.

\*\*\* Total excluding beneficiaries.

# Schedule of Average Benefit Payments as of July 1, 2018

Main System	Years of Vesting Service						Total	
	<10	10-14	15-19	20-24	25-29	>=30		
2014	Number of Retirees	1,760	1,330	1,193	1,191	1,252	1,662	8,388
	Average Monthly Benefit	\$248	\$440	\$647	\$1,068	\$1,547	\$2,345	\$1,061
	Average Years of Service	6.07	12.32	17.33	22.53	27.25	35.07	19.91
2015	Number of Retirees	1,957	1,418	1,231	1,273	1,352	1,863	9,094
	Average Monthly Benefit	\$290	\$462	\$674	\$1,123	\$1,616	\$2,462	\$1,128
	Average Years of Service	5.90	12.32	17.30	22.55	27.27	35.08	19.93
2016	Number of Retirees	1,848	1,471	1,268	1,336	1,470	2,095	9,488
	Average Monthly Benefit	\$255	\$469	\$684	\$1,151	\$1,613	\$2,432	\$1,163
	Average Years of Service	6.25	12.33	17.29	22.57	27.27	35.17	20.61
2017	Number of Retirees	1,940	1,529	1,324	1,395	1,557	2,252	9,997
	Average Monthly Benefit	\$260	\$484	\$714	\$1,184	\$1,657	\$2,507	\$1,207
	Average Years of Service	6.26	12.33	17.28	22.57	27.29	35.33	20.75
2018	Number of Retirees	2,052	1,577	1,388	1,451	1,629	2,436	10,533
	Average Monthly Benefit	\$267	\$506	\$747	\$1,223	\$1,709	\$2,637	\$1,269
	Average Years of Service	6.27	12.33	17.29	22.57	27.31	35.45	20.88
<b>Judges</b>								
2014	Number of Retirees	1	5	8	5	7	3	29
	Average Monthly Benefit	\$1,057	\$2,445	\$4,124	\$5,303	\$4,404	\$5,258	\$4,117
	Average Years of Service	3.33	11.92	17.54	23.78	26.56	31.86	20.82
2015	Number of Retirees	1	6	8	5	9	4	33
	Average Monthly Benefit	\$1,057	\$2,817	\$4,288	\$5,303	\$5,097	\$5,887	\$4,491
	Average Years of Service	3.33	12.25	17.73	23.78	26.82	32.27	21.46
2016	Number of Retirees	1	6	8	5	9	4	33
	Average Monthly Benefit	\$1,057	\$2,817	\$4,288	\$5,303	\$5,097	\$5,887	\$4,491
	Average Years of Service	3.33	12.25	17.73	23.78	26.82	32.27	21.46
2017	Number of Retirees	3	3	5	10	8	8	37
	Average Monthly Benefit	\$2,467	\$2,773	\$3,545	\$5,380	\$4,598	\$6,644	\$4,789
	Average Years of Service	6.92	11.58	17.62	23.07	26.92	36.77	23.89
2018	Number of Retirees	4	2	6	11	7	10	40
	Average Monthly Benefit	\$2,274	\$2,739	\$4,123	\$5,452	\$4,845	\$6,141	\$4,865
	Average Years of Service	6.29	10.54	17.81	23.17	26.80	35.81	23.84

*Includes retired and disabled members.*

*Values prior to July 1, 2016, were calculated by the prior actuary.*

# Schedule of Average Benefit Payments as of July 1, 2018

		Years of Vesting Service						Total
		<10	10-14	15-19	20-24	25-29	>=30	
<b>Public Safety with Main Service</b>								
2014	Number of Retirees	6	5	3	10	12	10	46
	Average Monthly Benefit	\$500	\$939	\$1,161	\$1,437	\$1,960	\$3,129	\$1,747
	Average Years of Service	7.10	12.70	18.64	21.64	27.18	33.00	22.55
2015	Number of Retirees	10	9	5	13	15	13	65
	Average Monthly Benefit	\$981	\$865	\$1,158	\$1,554	\$1,958	\$3,141	\$1,751
	Average Years of Service	5.10	12.45	18.56	21.94	27.12	32.78	21.14
2016	Number of Retirees	10	10	6	16	15	14	71
	Average Monthly Benefit	\$455	\$795	\$1,239	\$1,635	\$1,958	\$2,992	\$1,653
	Average Years of Service	5.84	12.63	18.43	22.08	27.12	32.89	21.35
2017	Number of Retirees	12	11	7	17	17	18	82
	Average Monthly Benefit	\$528	\$790	\$1,291	\$1,770	\$2,180	\$3,261	\$1,828
	Average Years of Service	6.22	12.58	18.13	22.09	27.38	33.03	21.65
2018	Number of Retirees	15	11	10	18	17	23	94
	Average Monthly Benefit	\$481	\$915	\$1,452	\$1,839	\$2,180	\$3,317	\$1,896
	Average Years of Service	6.18	12.47	17.25	22.19	27.38	33.29	21.63
<b>Public Safety without Main Service</b>								
2014	Number of Retirees	1	0	0	0	0	0	1
	Average Monthly Benefit	\$816	\$0	\$0	\$0	\$0	\$0	\$816
	Average Years of Service	0.58	0.00	0.00	0.00	0.00	0.00	0.58
2015	Number of Retirees	1	0	0	0	0	0	1
	Average Monthly Benefit	\$816	\$0	\$0	\$0	\$0	\$0	\$816
	Average Years of Service	0.58	0.00	0.00	0.00	0.00	0.00	0.58
2016	Number of Retirees	2	0	0	0	0	0	2
	Average Monthly Benefit	\$544	\$0	\$0	\$0	\$0	\$0	\$544
	Average Years of Service	2.29	0.00	0.00	0.00	0.00	0.00	2.29
2017	Number of Retirees	4	1	0	0	1	0	6
	Average Monthly Benefit	\$390	\$1,204	\$0	\$0	\$3,126	\$0	\$981
	Average Years of Service	4.12	12.58	0.00	0.00	26.17	0.00	9.21
2018	Number of Retirees	5	1	0	0	1	0	7
	Average Monthly Benefit	\$401	\$1,204	\$0	\$0	\$3,126	\$0	\$905
	Average Years of Service	4.01	12.58	0.00	0.00	26.17	0.00	8.40

*Includes retired and disabled members.*

*Values prior to July 1, 2016, were calculated by the prior actuary.*

# Schedule of Retirees and Beneficiaries Added to and Removed from the Rolls

## Main System

Plan Year	Beg of Year		Added to Rolls		Removed from Rolls		End of Year Balance		Average Annual Benefit	% Increase in Annual Benefit
	No.	Ann. Benefits*	No.	Ann. Benefits*	No.	Ann. Benefits*	No.**	Ann. Benefits*		
<b>Retirement</b>										
2009	6,813	\$ 67.2	567	\$ 7.1	(222)	\$ (1.9)	7,158	\$ 72.4	\$ 10,120	7.7%
2010	7,158	72.4	468	6.5	(254)	(1.9)	7,372	77.0	10,451	6.4%
2011	7,372	77.0	618	9.4	(230)	(1.8)	7,760	84.6	10,904	9.9%
2012	7,760	84.6	698	12.5	(216)	(1.8)	8,242	95.3	11,566	12.6%
2013	8,242	95.3	708	10.9	(284)	(4.0)	8,666	102.2	11,798	7.2%
2014	8,666	102.2	855	13.2	(291)	(2.4)	9,230	113.0	12,243	10.6%
2015	9,230	113.0	992	19.3	(243)	(2.4)	9,979	129.9	13,017	15.0%
2016	9,979	129.9	703	12.3	(288)	(2.6)	10,394	139.6	13,435	7.5%
2017	10,394	139.6	870	16.1	(307)	(3.0)	10,957	152.8	13,943	9.4%
2018	10,957	152.8	953	19.7	(372)	(3.6)	11,538	169.0	14,645	10.6%

\*\$ in millions

\*\* Excludes 24 pensioners as of June 30, 2014, 28 pensioners as of June 30, 2015, 35 pensioners as of June 30, 2016, 41 pensioners as of June 30, 2017, and 37 pensioners as of June 30, 2018 in suspended status.

## Judges

Plan Year	Beg of Year		Added to Rolls		Removed from Rolls		End of Year Balance		Average Annual Benefit	% Increase in Annual Benefit
	No.	Ann. Benefits	No.	Ann. Benefits	No.	Ann. Benefits	No.	Ann. Benefits		
<b>Retirement</b>										
2009	30	\$ 1,093,219	1	\$ 69,931	(3)	(\$92,038)	28	\$ 1,071,112	\$ 38,254	-2.0%
2010	28	1,071,112	4	194,159	(2)	(47,106)	30	1,218,165	40,605	13.7%
2011	30	1,218,165	5	273,928	(1)	(20,861)	34	1,471,232	43,272	20.8%
2012	34	1,471,232	0	0	0	(648)	34	1,470,584	43,252	0.0%
2013	34	1,470,584	2	60,181	0	0	36	1,530,765	42,521	4.1%
2014	36	1,530,765	2	190,156	0	0	38	1,720,921	45,287	12.4%
2015	38	1,720,921	6	462,888	0	0	44	2,183,809	49,632	26.9%
2016	44	2,183,809	2	85,597	(3)	(147,638)	43	2,121,768	49,343	-2.8%
2017	43	2,121,768	10	674,619	(3)	(156,433)	50	2,639,954	52,799	24.4%
2018	50	2,639,954	7	331,377	(2)	(68,572)	55	2,902,760	52,777	10.0%

Values prior to July 1, 2016, were calculated by the prior actuary.

# Schedule of Retirees and Beneficiaries Added to and Removed from the Rolls

## Public Safety with prior Main System Service

Plan Year	Beg of Year		Added to Rolls		Removed from Rolls		End of Year Balance		Average Annual	% Increase in Annual
	No.	Ann. Benefits	No.	Ann. Benefits	No.	Ann. Benefits	No.	Ann. Benefits	Benefit	Benefit
<b>Retirement</b>										
2009	21	\$ 335,688	4	\$ 78,938	(1)	(\$23,246)	24	\$ 391,380	\$ 16,307	16.6%
2010	24	391,380	10	176,285	(2)	(26,749)	32	540,916	16,904	38.2%
2011	32	540,916	9	217,899	0	0	41	758,815	18,508	40.3%
2012	41	758,815	6	105,606	0	0	47	864,421	18,392	13.9%
2013	47	864,421	9	225,057	0	(13,776)	56	1,075,702	19,209	24.4%
2014	56	1,075,702	7	83,168	(1)	(57,253)	62	1,101,617	17,768	2.4%
2015	62	1,101,617	11	301,041	0	0	73	1,402,658	19,215	27.3%
2016	73	1,402,658	7	53,522	(1)	(10,529)	79	1,445,651	18,299	3.1%
2017	79	1,445,651	11	390,805	0	0	90	1,836,456	20,405	27.0%
2018	90	1,836,456	15	371,954	(2)	(22,510)	103	2,185,900	21,222	19.0%

## Public Safety without prior Main System Service

Plan Year	Beg of Year		Added to Rolls		Removed from Rolls		End of Year Balance		Average Annual	% Increase in Annual
	No.	Ann. Benefits	No.	Ann. Benefits	No.	Ann. Benefits	No.	Ann. Benefits	Benefit	Benefit
<b>Retirement</b>										
2009	0	\$ 0	0	\$ 0	0	\$ 0	0	\$ 0	\$ 0	NA
2010	0	0	0	0	0	0	0	0	0	NA
2011	0	0	0	0	0	0	0	0	0	NA
2012	0	0	0	0	0	0	0	0	0	NA
2013	0	0	1	9,792	0	0	1	9,792	9,792	100.0%
2014	1	9,792	0	0	0	0	1	9,792	9,792	0.0%
2015	1	9,792	0	0	0	0	1	9,792	9,792	0.0%
2016	1	9,792	1	3,264	0	0	2	13,056	6,528	33.3%
2017	2	13,056	4	57,609	0	0	6	70,665	11,778	441.2%
2018	6	70,665	2	19,573	0	0	8	90,238	11,280	27.7%

Values prior to July 1, 2016, were calculated by the prior actuary.

## SECTION D

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### **GASB STATEMENT No. 67 SCHEDULES**



## Discussion

### Accounting Standard

For pension plans that are administered through trusts or equivalent arrangements, Governmental Accounting Standards Board (GASB) Statement No. 67 establishes standards of financial reporting for separately issued financial reports and specifies the required approach for measuring the pension liability. Similarly, GASB Statement No. 68 establishes standards for state and local government employers (as well as non-employer contributing entities) to account for and disclose the net pension liability, pension expense and other information associated with providing retirement benefits to their employees (and former employees) on their basic financial statements.

The following discussion provides a summary of the information that is required to be disclosed under these accounting standards. A number of these disclosure items are provided in this report. However, certain non-actuarial information, such as notes regarding accounting policies and investments, is not included in this report and the retirement system and/or plan sponsor will be responsible for preparing and disclosing that information to comply with these accounting standards.

### Financial Statements

Pension plans that prepare their own, stand-alone financial statements are required to present two financial statements – a statement of fiduciary net position and a statement of changes in fiduciary net position in accordance with GASB Statement No. 67. The *statement of fiduciary net position* presents the assets and liabilities of the pension plan at the end of the pension plan's reporting period. The *statement of changes in fiduciary net position* presents the additions, such as contributions and investment income, and deductions, such as benefit payments and expenses, and net increase or decrease in the fiduciary net position.

### Notes to Financial Statements

GASB Statement No. 68 requires the notes of the employer's financial statements to disclose the total pension expense, the pension plan's liabilities and assets, and deferred outflows and inflows of resources related to pensions.

GASB Statement Nos. 67 and 68 require the notes of the financial statements for the employers and pension plans to include certain additional information. The list of disclosure items should include:

- A description of benefits provided by the plan;
- The type of employees and number of members covered by the pension plan;
- A description of the plan's funding policy, which includes member and employer contribution requirements;
- The pension plan's investment policies;
- The pension plan's fiduciary net position, net pension liability and the pension plan's fiduciary net position as a percentage of the total pension liability;
- The net pension liability using a discount rate that is 1% higher and 1% lower than used to calculate the total pension liability and net pension liability for financial reporting purposes;
- Significant assumptions and methods used to calculate the total pension liability;
- Inputs to the discount rates; and
- Certain information about mortality assumptions and the dates of experience studies.

## **GASB Statement No. 67 (Continued)**

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Retirement systems that issue stand-alone financial statements are required to disclose additional information in accordance with GASB Statement No. 67. This information includes:

- The composition of the pension plan's board and the authority under which benefit terms may be amended;
- A description of how fair value is determined;
- Information regarding certain reserves and investments, which include concentrations of investments greater than or equal to 5%, receivables and insurance contracts excluded from plan assets; and
- Annual money-weighted rate of return.

### **Required Supplementary Information**

GASB Statement No. 67 requires a 10-year fiscal history of:

- Sources of changes in the net pension liability;
- Information about the components of the net pension liability and related ratios, including the pension plan's fiduciary net position as a percentage of the total pension liability, and the net pension liability as a percent of covered-employee payroll; and
- A comparison of the actual employer contributions to the actuarially determined contributions based on the plan's funding policy.

### **Timing of the Actuarial Valuation**

An actuarial valuation to determine the total pension liability is required to be performed at least every two years. The net pension liability and pension expense should be measured as of the pension plan's fiscal year end (measurement date) on a date that is within the employer's prior fiscal year. If the actuarial valuation used to determine the total pension liability is not calculated as of the measurement date, the total pension liability is required to be rolled forward from the actuarial valuation date to the measurement date.

The total pension liability shown in this report is based on an actuarial valuation performed as of July 1, 2018, and a measurement date of July 1, 2018.

### **Single Discount Rate**

Projected benefit payments are required to be discounted to their actuarial present values using a Single Discount Rate that reflects (1) a long-term expected rate of return on pension plan investments (to the extent that the plan's fiduciary net position is projected to be sufficient to pay benefits) and (2) a tax-exempt municipal bond rate based on an index of 20-year mixed maturity general obligation bonds with an average Standard & Poor's Corp.'s AA credit rating (which is published by Fidelity) as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

## **GASB Statement No. 67 (Continued)**

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For the purpose of this actuarial valuation, the expected rate of return on pension plan investments is 7.75%; the municipal bond rate is 3.62% (based on the most recent date available on or before the measurement date of the “20-year Municipal GO Index” from Fidelity); and the resulting Single Discount Rate is 6.32%.

### **Effective Date and Transition**

GASB Statement Nos. 67 and 68 are effective for fiscal years beginning after June 15, 2013, and June 15, 2014, respectively.

# GASB Statement No. 67 (Continued)

## Executive Summary as of June 30, 2018

	Main System	Judges	Public Safety with Prior Main Service	Public Safety without Prior Main Service	Total
Actuarial Valuation Date	7/1/2018	7/1/2018	7/1/2018	7/1/2018	7/1/2018
Measurement Date of the Net Pension Liability	7/1/2018	7/1/2018	7/1/2018	7/1/2018	7/1/2018
Plan's Fiscal Year Ending Date (Reporting Date) for GASB 67	6/30/2018	6/30/2018	6/30/2018	6/30/2018	6/30/2018
<b>Membership</b>					
Number of					
- Retirees and Beneficiaries	11,538	55	103	8	11,704
- Inactive, Nonretired Members	11,820	3	270	93	12,186
- Active Members	22,711	55	598	119	23,483
- Total	46,069	113	971	220	47,373
Covered Payroll	\$ 1,027,317,202	\$ 8,008,841	\$ 34,521,069	\$ 6,110,843	\$ 1,075,957,954
<b>Net Pension Liability</b>					
Total Pension Liability	\$ 4,536,928,161	\$ 47,011,600	\$ 82,162,213	\$ 9,479,781	\$ 4,675,581,755
Plan Fiduciary Net Position	2,849,319,075	53,493,730	58,857,977	8,509,494	2,970,180,276
Net Pension Liability	\$ 1,687,609,086	\$ (6,482,130)	\$ 23,304,236	\$ 970,287	\$ 1,705,401,479
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	62.80 %	113.79 %	71.64 %	89.76 %	63.53 %
Net Pension Liability as a Percentage of Covered Payroll	164.27 %	(80.94)%	67.51 %	15.88 %	158.50 %
<b>Development of the Single Discount Rate</b>					
Single Discount Rate	6.32 %	6.32 %	6.32 %	6.32 %	6.32 %
Long-Term Expected Rate of Investment Return	7.75 %	7.75 %	7.75 %	7.75 %	7.75 %
Long-Term Municipal Bond Rate*	3.62 %	3.62 %	3.62 %	3.62 %	3.62 %
Last year ending June 30 in the 2019 to 2118 projection period for which projected benefit payments are fully funded	2061	2061	2061	2061	2061

\*Source: *Fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's "20-Year Municipal GO AA Index" as of June 30, 2018. In describing this index, Fidelity notes that the municipal curves are constructed using option-adjusted analytics of a diverse population of over 10,000 tax exempt securities.*

## GASB Statement No. 67 (Continued)

### Schedules of Required Supplementary Information Schedule of Net Pension Liability and Related Ratios Multiyear

Last 10 Fiscal Years (which may be built prospectively)

FY Ending 30-Jun	System	Total Pension Liability <sup>1</sup>	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered Payroll <sup>2</sup>	Net Pension Liability as a % of Covered Payroll
2014	Main	\$ 2,846,579,777	\$ 2,211,858,402	\$ 634,721,375	77.70 %	\$ 865,868,265	73.30 %
2014	Judges	38,989,792	42,713,635	(3,723,843)	109.55 %	6,598,981	(56.43)%
2014	Public Safety with prior Main System service	30,791,599	24,806,508	5,985,091	80.56 %	13,394,927	44.68 %
2014	Public Safety without prior Main System service	2,190,975	2,204,318	(13,343)	100.61 %	2,589,887	(0.52)%
2014	Total PERS	2,918,552,143	2,281,582,863	636,969,280	78.18 %	888,452,060	71.69 %
2015	Main	\$ 2,976,071,808	\$ 2,296,088,880	\$ 679,982,928	77.15 %	\$ 946,197,522	71.86 %
2015	Judges	39,381,443	44,137,412	(4,755,969)	112.08 %	6,964,502	(68.29)%
2015	Public Safety with prior Main System service	34,317,782	28,691,976	5,625,806	83.61 %	16,732,974	33.62 %
2015	Public Safety without prior Main System service	2,675,506	2,792,541	(117,035)	104.37 %	3,641,404	(3.21)%
2015	Total PERS	3,052,446,539	2,371,710,809	680,735,730	77.70 %	973,536,402	69.92 %
2016	Main	\$ 3,299,381,100	\$ 2,324,783,623	\$ 974,597,477	70.46 %	\$ 1,007,764,043	96.71 %
2016	Judges	39,819,443	44,269,616	(4,450,173)	111.18 %	7,937,062	(56.07)%
2016	Public Safety with prior Main System service	53,865,148	42,406,694	11,458,454	78.73 %	28,225,868	40.60 %
2016	Public Safety without prior Main System service	3,499,776	3,435,724	64,052	98.17 %	4,621,494	1.39 %
2016	Total PERS	3,396,565,467	2,414,895,657	981,669,810	71.10 %	1,048,548,467	93.62 %
2017	Main	4,227,873,933	2,620,545,753	1,607,328,180	61.98 %	1,020,843,253	157.45 %
2017	Judges	45,789,468	49,576,578	(3,787,110)	108.27 %	7,866,090	(48.14)%
2017	Public Safety with prior Main System service	73,040,417	51,024,228	22,016,189	69.86 %	28,765,678	76.54 %
2017	Public Safety without prior Main System service	7,667,872	6,689,031	978,841	87.23 %	5,896,777	16.60 %
2017	Total PERS	4,354,371,690	2,727,835,589	1,626,536,101	62.65 %	1,063,371,798	152.96 %
2018	Main	\$ 4,536,928,161	\$ 2,849,319,075	\$ 1,687,609,086	62.80 %	\$ 1,027,317,202	164.27 %
2018	Judges	47,011,600	53,493,730	(6,482,130)	113.79 %	8,008,841	(80.94)%
2018	Public Safety with prior Main System service	82,162,213	58,857,977	23,304,236	71.64 %	34,521,069	67.51 %
2018	Public Safety without prior Main System service	9,479,781	8,509,494	970,287	89.76 %	6,110,843	15.88 %
2018	Total PERS	4,675,581,755	2,970,180,276	1,705,401,479	63.53 %	1,075,957,954	158.50 %

<sup>1</sup>The total pension liability is based on a single discount rate of 8.00% for fiscal years prior to 2017, 6.44% for fiscal year 2017, and 6.32% for fiscal year 2018.

<sup>2</sup>Prior to the actuarial valuation as of July 1, 2016, annual payroll is based on projected annual compensation for the upcoming year. Beginning with the actuarial valuation as of July 1, 2016, annual payroll and average annual pay are based on annualized payroll as of the actuarial valuation date.

Values prior to July 1, 2016, were calculated by the prior actuary.

## GASB Statement No. 67 (Continued)

### Schedule of Changes in Net Pension Liability and Related Ratios Current Report Period Fiscal Year Ended June 30, 2018

Fiscal Year Ending June 30, 2018	Public Safety				
	Main System	Judges	with Prior Main System Service	without Prior Main System Service	Total PERS
<b>Total pension liability</b>					
Service cost	\$ 156,470,845	\$ 1,956,436	\$ 4,563,769	\$ 1,027,021	\$ 164,018,071
Interest on the total pension liability	271,622,865	2,920,215	4,769,207	522,729	279,835,016
Changes of benefit terms	0	0	0	0	0
Difference between expected and actual experience <sup>1</sup>	(63,290,278)	(1,556,919)	(308,824)	(189,775)	(65,345,796)
Changes of assumptions <sup>2</sup>	121,297,818	761,957	2,598,029	566,633	125,224,437
Benefit payments and refunds	(177,047,022)	(2,859,557)	(2,500,385)	(114,699)	(182,521,663)
<b>Net change in total pension liability</b>	<b>309,054,228</b>	<b>1,222,132</b>	<b>9,121,796</b>	<b>1,811,909</b>	<b>321,210,065</b>
<b>Total pension liability - beginning<sup>3</sup></b>	<b>4,227,873,933</b>	<b>45,789,468</b>	<b>73,040,417</b>	<b>7,667,872</b>	<b>4,354,371,690</b>
<b>Total pension liability - ending (a)<sup>3</sup></b>	<b>\$ 4,536,928,161</b>	<b>\$ 47,011,600</b>	<b>\$ 82,162,213</b>	<b>\$ 9,479,781</b>	<b>\$ 4,675,581,755</b>
<b>Plan fiduciary net position</b>					
Contributions - Employer	\$ 75,666,300	\$ 1,413,703	\$ 3,175,608	\$ 471,598	\$ 80,727,209
Contributions - Employee	74,724,651	645,523	1,800,628	315,387	77,486,189
Contributions - Service credit repurchases	19,160,584	209,119	125,220	490,049	19,984,972
Pension plan net investment income	239,131,221	4,519,431	4,846,113	668,416	249,165,181
Benefit payments and refunds	(177,047,022)	(2,859,557)	(2,500,385)	(114,699)	(182,521,663)
Pension plan administrative expense	(2,403,046)	(11,067)	(48,360)	(10,288)	(2,472,761)
Transfers and Other Income	(459,365)	-	434,925	-	(24,440)
<b>Net change in plan fiduciary net position</b>	<b>228,773,323</b>	<b>3,917,152</b>	<b>7,833,749</b>	<b>1,820,463</b>	<b>242,344,687</b>
<b>Plan fiduciary net position - beginning</b>	<b>2,620,545,753</b>	<b>49,576,578</b>	<b>51,024,228</b>	<b>6,689,031</b>	<b>2,727,835,589</b>
<b>Plan fiduciary net position - ending (b)</b>	<b>\$ 2,849,319,075</b>	<b>\$ 53,493,730</b>	<b>\$ 58,857,977</b>	<b>\$ 8,509,494</b>	<b>\$ 2,970,180,276</b>
<b>Net pension liability - ending (a) - (b)</b>	<b>\$ 1,687,609,086</b>	<b>\$ (6,482,130)</b>	<b>\$ 23,304,236</b>	<b>\$ 970,287</b>	<b>\$ 1,705,401,479</b>
<b>Plan fiduciary net position as a percentage of total pension liability</b>	62.80 %	113.79 %	71.64 %	89.76 %	63.53 %
<b>Covered-employee payroll</b>	\$ 1,027,317,202	\$ 8,008,841	\$ 34,521,069	\$ 6,110,843	\$ 1,075,957,954
<b>Net pension liability as a percentage of covered-employee payroll</b>	164.27 %	(80.94)%	67.51 %	15.88 %	158.50 %

<sup>1</sup> Includes liability attributable to transfer of members.

<sup>2</sup> Includes difference in liability due to changes in the single discount rate assumption.

<sup>3</sup> The total pension liability is based on a single discount rate of 6.44% for the beginning of the fiscal year and 6.32% for the end of the fiscal year.

Numbers might not add due to rounding.

## GASB Statement No. 67 (Continued)

### Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

The following presents the net pension liability/(asset) of the PERS, calculated using the current discount rate of 6.32%, as well as what the PERS' net pension liability/(asset) would be if it were calculated using a discount rate that is 1-percentage point lower (5.32%) or is 1-percentage point higher (7.32%) than the current rate.

System	Current Single Discount		
	1% Decrease 5.32%	Rate Assumption 6.32%	1% Increase 7.32%
<b>Main System</b>	\$2,293,147,011	\$1,687,609,086	\$1,182,307,187
<b>Judges</b>	(1,845,958)	(6,482,130)	(10,428,256)
<b>Law Enforcement</b>			
<b>With Main System Service</b>	35,966,135	23,304,236	13,016,890
<b>Without Main System Service</b>	2,511,984	970,287	(264,012)
<b>Total PERS</b>	2,329,779,172	1,705,401,479	1,184,631,808

## GASB Statement No. 67 (Continued)

### System Asset Allocation

<u>Asset Class</u>	<u>Target Allocation</u>	<u>Long-Term Expected Real Rate of Return</u>	<u>Allocation-Weighted Long-Term Expected Real Rate of Return</u>
Domestic Equities	30.00 %	6.05 %	1.82 %
International Equities	21.00 %	6.71 %	1.41 %
Private Equity	7.00 %	10.20 %	0.71 %
Domestic Fixed Income	23.00 %	1.45 %	0.33 %
Global Real Assets	19.00 %	5.11 %	0.97 %
Cash Equivalents	0.00 %	0.00 %	0.00 %
<b>Total</b>	<b>100.00 %</b>		<b>5.24 %</b>

*Expected return by asset class and target allocation provided by investment consultant.*

The discount rate used to measure the total pension liability was 6.32%. The projection of cash flows used to determine the discount rate assumed plan member and statutory/Board approved employer contributions will be made at rates equal to those based on the July 1, 2018, and July 1, 2017, PERS actuarial valuation reports. For this purpose, only employer contributions that are intended to fund benefits of current plan members and their beneficiaries are included. Projected employer contributions that are intended to fund the service costs of future plan members and their beneficiaries are not included. Based on those assumptions, the pension plan's fiduciary net position was projected to be sufficient to make all projected future benefit payments through the year of 2061. Therefore, the long-term expected rate of return on pension plan investments was applied to projected benefit payments through the year 2061, and the municipal bond rate was applied to all benefit payments after that date.



# GASB Statement No. 67 (Continued)

## Schedule of Contributions Multiyear

FY Ending 30-Jun	System	Actuarially Determined Contribution <sup>1</sup>	Actual Contribution	Contribution Deficiency (Excess)	Covered Payroll <sup>2</sup>	Actual Contribution as a % of Covered Payroll
2014	Main	\$ 105,092,504	\$ 58,872,974	\$ 46,219,530	\$ 865,868,265	6.80%
2014	Judges	1,099,249	1,159,604	(60,355)	6,598,981	17.57%
2014	Public Safety with prior Main System service	1,449,458	1,385,958	63,500	13,394,927	10.35%
2014	Public Safety without prior Main System service	210,115	242,514	(32,399)	2,589,887	9.36%
2014	Total PERS	107,851,326	61,661,050	46,190,276	888,452,060	6.94%
2015	Main	\$ 104,636,238	\$ 67,669,374	\$ 36,966,864	\$ 946,197,522	7.15%
2015	Judges	1,030,705	1,225,358	(194,653)	6,964,502	17.59%
2015	Public Safety with prior Main System service	1,577,004	1,638,384	(61,380)	16,732,974	9.79%
2015	Public Safety without prior Main System service	270,026	309,419	(39,393)	3,641,404	8.50%
2015	Total PERS	107,513,973	70,842,535	36,671,438	973,536,402	7.28%
2016	Main	\$ 121,358,455	\$ 72,960,487	\$ 48,397,968	\$ 1,007,764,043	7.24%
2016	Judges	781,713	1,364,327	(582,614)	7,937,062	17.19%
2016	Public Safety with prior Main System service	1,828,196	2,384,097	(555,901)	28,225,868	8.45%
2016	Public Safety without prior Main System service	367,803	371,664	(3,861)	4,621,494	8.04%
2016	Total PERS	124,336,167	77,080,576	47,255,591	1,048,548,467	7.35%
2017	Main	112,981,892	74,023,555	38,958,337	\$ 1,020,843,253	7.25%
2017	Judges	734,399	1,407,326	(672,927)	7,866,090	17.89%
2017	Public Safety with prior Main System service	2,514,672	3,005,338	(490,666)	28,765,678	10.45%
2017	Public Safety without prior Main System service	333,237	497,352	(164,115)	5,896,777	8.43%
2017	Total PERS	116,564,200	78,933,571	37,630,629	1,063,371,798	7.42%
2018	Main	\$ 122,272,212	\$ 75,666,300	\$ 46,605,912	\$ 1,027,317,202	7.37%
2018	Judges	393,904	1,413,703	(1,019,799)	8,008,841	17.65%
2018	Public Safety with prior Main System service	2,602,245	3,175,608	(573,363)	34,521,069	9.20%
2018	Public Safety without prior Main System service	445,737	471,598	(25,861)	6,110,843	7.72%
2018	Total PERS	125,714,098	80,727,209	44,986,889	1,075,957,954	7.50%

<sup>1</sup> The actuarially determined contribution was based on an investment return assumption of 8.00% and a payroll growth assumption of 4.50% (4.00% for Judges) for fiscal years ending 2014 through 2017 and an investment return assumption of 7.75% and a payroll growth assumption of 3.75% (3.25% for Judges) for fiscal year ending 2018.

<sup>2</sup> Prior to the actuarial valuation as of July 1, 2016, annual payroll is based on projected annual compensation for the upcoming year. Beginning with the actuarial valuation as of July 1, 2016, annual payroll and average annual pay are based on annualized payroll as of the actuarial valuation date. Values prior to July 1, 2016, were calculated by the prior actuary.

# GASB Statement No. 67 (Continued)

**Valuation Date:** July 1, 2018  
**Notes** The actuarially determined contribution amount is calculated as of June 30, 12 months prior to the end of the fiscal year in which the contributions are reported.

**Methods and Assumptions Used to Determine Actuarially Determined Contribution Rates:**

Actuarial Cost Method Entry Age Normal  
Amortization Method Level Percentage of Payroll, Open Period  
Assumed annual payroll growth of 3.75% (3.25% for Judges)  
Remaining Amortization Period 20 years  
Asset Valuation Method 5-Year smoothed market  
Inflation 2.50%  
Salary Increases 4.00% to 20.00% including inflation  
Investment Rate of Return 7.75%  
Retirement Age Age-based table of rates that are specific to the type of eligibility condition.  
Mortality RP 2000 Combined Healthy Mortality table, sex-distinct, with rates set back 2 years for males and 3 years for females. RP 2000 Disabled Mortality table, sex-distinct, with rates set back 1 year for males (no setback for females), with rates multiplied by 125% for post-retirement disabled mortality. Mortality rates are projected from 2014 using the Social Security Administration (SSA) Intermediate Cost scale.

**Other Information:**

**Notes** There were no benefit changes during the year.  
The economic assumptions (excluding salary increases) and the asset smoothing method were updated beginning with the actuarial valuation as of July 1, 2017 based on a review performed by GRS. All other actuarial assumptions were adopted by the Board based on an experience study covering the period July 1, 2009, through June 30, 2014.  
The employer rates to the System are the statutory/Board approved contribution rates of 7.12% of payroll for the Main System, 17.52% for the Judges System, 9.81% for Law Enforcement with prior Main System service System, and 7.93% for Law Enforcement without prior Main System service System.

**Methods and Assumptions Used to Determine GASB 67/68 Net Pension Liability:**

Actuarial Cost Method Entry Age Normal  
Asset Valuation Method Plan Fiduciary Net Position (Market value of assets, no asset smoothing)  
Inflation 2.50%  
Salary Increases 4.00% to 20.00% including inflation  
Single Discount Rate 6.32% (Based on an investment return assumption of 7.75% and a municipal bond rate of 3.62%)  
Retirement Age Age-based table of rates that are specific to the type of eligibility condition.  
Mortality RP 2000 Combined Healthy Mortality table, sex-distinct, with rates set back 2 years for males and 3 years for females. RP 2000 Disabled Mortality table, sex-distinct, with rates set back 1 year for males (no setback for females), with rates multiplied by 125% for post-retirement disabled mortality. Mortality rates are projected from 2014 using the Social Security Administration (SSA) Intermediate Cost scale.

**Other Information:**

**Notes** There were no benefit changes during the year.  
The economic assumptions (excluding salary increases) were updated beginning with the actuarial valuation as of July 1, 2017 based on a review performed by GRS. All other actuarial assumptions were adopted by the Board based on an experience study covering the period July 1, 2009, through June 30, 2014.  
The employer rates to the System are the statutory/Board approved contribution rates of 7.12% of payroll for the Main System, 17.52% for the Judges System, 9.81% for Law Enforcement with prior Main System service System, and 7.93% for Law Enforcement without prior Main System service System.

## SECTION E

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### ACTUARIAL VALUATION PROCEDURES

# Actuarial Assumptions in the Actuarial Valuation Process

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**Normal cost and the allocation of benefit values** between service rendered before and after the actuarial valuation date were determined using the **Individual Entry Age Normal** actuarial cost method having the following characteristics:

- The normal cost for each individual active member, payable from the date of employment to the date of retirement, is sufficient to accumulate the value of the member's benefit at the time of retirement; and
- Each annual normal cost is a constant percentage of the member's year by year projected covered pay.

**Financing of Unfunded Actuarial Accrued Liabilities.** The unfunded actuarial accrued liability is amortized using 20-year open level-percentage of pay amortization of the unfunded liability as of the actuarial valuation date for purposes of calculating the actuarial contribution rate.

**Actuarial Value of Pension Plan Assets.** The calculated value is determined by adjusting the market value of assets to reflect the investment gains and losses (the difference between the actual investment return and the expected investment return) during each of the last five years at the rate of 20 percent per year. This asset smoothing method was adopted by the Board for use beginning with the July, 1 2017, actuarial valuation. Net deferred asset gains attributable to fiscal years 2016 and prior were fully recognized as of July 1, 2017.

**Actuarial Valuation Assumptions.** The contribution and benefit values of the System are calculated by applying actuarial assumptions to the benefit provisions and census information furnished, using the actuarial cost method described above.

The principal areas of financial risk which require assumptions about future experiences are:

- Long-term rates of investment return to be generated by the assets of the Plan;
- Patterns of pay increases to members;
- Rates of mortality among members, retirees and beneficiaries;
- Rates of withdrawal of active members;
- Rates of disability among members; and
- The age patterns of actual retirement.

In an actuarial valuation, the monetary effect of each assumption is calculated for as long as a present covered person survives; a period of time which can be as long as a century.

Actual experience of the Plan will not coincide exactly with assumed experience. Each actuarial valuation provides a complete recalculation of assumed future experience and takes into account all past differences between assumed and actual experience. The result is a continual series of adjustments (usually small) to the computed contribution rate.

## Actuarial Assumptions in the Actuarial Valuation Process (Continued)

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From time-to-time it becomes appropriate to modify one or more of the assumptions, to reflect experience trends (but not random year-to-year fluctuations). Thus, an experience review of the North Dakota Public Employees Retirement System for the period July 1, 2009 to July 1, 2014, was performed by the prior actuary to compare the demographic and economic experience against the actuarial assumptions used in the actuarial valuations. Most of the actuarial assumptions described in this section were adopted by the Board for use beginning with the July 1, 2015, actuarial valuation.

Additional information regarding the rationale for the assumptions based on the **prior actuary's experience study** may be found in the 2015 experience review report. All actuarial assumptions are expectations of future experience, not current market measures.

Prior to the July 1, 2017, actuarial valuation, GRS performed an economic study to review the key economic actuarial assumptions and the asset valuation method. Additional information regarding the rationale for the assumptions based on the GRS economic study may be found in the report dated February 20, 2017.

Except where noted, most actuarial assumptions described in this section were adopted by the Board for use beginning with the July 1, 2015, actuarial valuation.

The actuarial assumptions were provided by, and are the responsibility of, the NDPERS Board. GRS was unable to judge the reasonableness of some of the assumptions and methods without performing a substantial amount of additional work beyond the scope of the assignment, and did not do so.

# Actuarial Valuation Assumptions

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## Current Actuarial Valuation Assumptions and Methods

The assumed rate of investment return used was 7.75 percent, net of investment expenses, annually. This assumption was adopted by the Board for use beginning with the July 1, 2017, actuarial valuation.

The assumed rate of price inflation is 2.50 percent. This assumption was adopted by the Board for use beginning with the July 1, 2017, actuarial valuation.

No Cost of Living Adjustments (COLA) are provided to benefits recipients. Therefore, there is no COLA assumption for this actuarial valuation.

The rates of annual salary increase used for individual members are in accordance with the following table. This assumption is used to project a member's current salary to the salaries upon which benefit amounts will be based.

Service At Beginning of Year	Main System			
	State Employee	Non-State Employee	Public Safety	Judges
0	12.00%	15.00%	20.00%	
1	9.50%	10.00%	20.00%	
2	7.25%	8.00%	20.00%	
3			10.00%	
4			10.00%	
<b>Age*</b>				
Under 30	7.25%	10.00%	7.25%	4.00%
30-39	6.50%	7.50%	6.50%	4.00%
40-49	6.25%	6.75%	6.25%	4.00%
50-59	5.75%	6.50%	5.75%	4.00%
60+	5.00%	5.25%	5.00%	4.00%

*\*Age-based salary increase rates apply for employees with three or more years of service in the Main System, five or more years of service in the Public Safety Systems and for all employees in the Judges System.*

The assumed rate of total payroll growth used in amortizing the unfunded liability as a level percentage of pay is:

Main System and Public Safety: 3.75 percent

Judges: 3.25 percent

This assumption was adopted by the Board for use beginning with the July 1, 2017, actuarial valuation.

## Actuarial Valuation Assumptions (Continued)

The mortality assumptions are as follows:

	<b>Male Setback</b>	<b>Female Setback</b>
RP-2000 Combined Healthy Mortality Table (healthy mortality)	2 years	3 years
RP-2000 Disabled Retiree Mortality Table (disabled post retirement)*	1 year	0 years

*\*Rates multiplied by 125 percent.*

To provide a margin for future mortality improvements, generational mortality improvements from the year 2014 using the Social Security Administration (SSA) 2014 Intermediate Cost scale were assumed.

Following is a table with the life expectancies by age as of the actuarial valuation date.

<b>Age</b>	<b>Healthy Mortality</b>		<b>Disabled Mortality</b>	
	<b>Future Life</b>		<b>Future Life</b>	
	<b>Expectancy (years) in 2018</b>		<b>Expectancy (years) in 2018</b>	
	<b>Male</b>	<b>Female</b>	<b>Male</b>	<b>Female</b>
20	67.85	72.25	32.77	50.17
25	62.45	66.83	30.81	46.28
30	57.06	61.42	28.76	42.33
35	51.69	56.01	26.57	38.29
40	46.37	50.64	24.18	34.13
45	41.10	45.30	21.45	29.80
50	35.89	40.03	18.56	25.55
55	30.76	34.82	16.00	21.76
60	25.81	29.74	13.78	18.44
65	21.14	24.89	11.72	15.41
70	16.90	20.40	9.75	12.63
75	13.08	16.28	7.89	10.12
80	9.74	12.61	6.26	7.95
85	6.98	9.42	4.93	6.11
90	4.88	6.81	3.73	4.60
95	3.48	4.98	2.62	3.48
100	2.64	3.91	1.97	2.81
105	2.18	3.16	1.63	2.17

## Actuarial Valuation Assumptions (Continued)

**Rates of separation from active membership** are represented by the following table (rates do not apply to members eligible to retire and do not include separation on account of death or disability). This assumption measures the probabilities of members terminating employment.

Service Beginning of Year	Service and Age-Based Rates For First Five Years of Service					
	Main System			Public Safety		
	Age					
	Under 30	30-39	40+	Under 30	30-39	40+
0	22.00%	16.00%	12.00%	25.00%	20.00%	17.00%
1	18.00%	14.00%	10.00%	23.00%	17.00%	15.00%
2	16.00%	12.00%	10.00%	20.00%	15.00%	12.00%
3	14.00%	12.00%	8.00%	17.00%	13.00%	10.00%
4	14.00%	11.00%	7.00%	15.00%	11.00%	7.00%

Age	Age-Based Rates Only After First Five Years of Service	
	Main System	Public Safety
20-24	8.80%	8.80%
25-29	8.80%	8.80%
30-34	5.50%	5.50%
35-39	4.70%	4.70%
40-44	3.90%	3.90%
45-49	3.70%	3.70%
50-54	3.40%	3.40%
55-59	0.10%	0.10%
60+	0.20%	0.20%

No pre-retirement termination is assumed for Judges.

*Vested participants who terminate are assumed to elect the option with the greater present value:*

- 1) *A refund of their accumulated contributions with interest or*
- 2) *A deferred benefit.*

Withdrawal rates end upon eligibility for early retirement.

Early retirement eligibility is as follows:

**Main System:** Earlier of (i) age 55 and 3 years of service, and (ii) eligibility for Rule of 85. For members hired on or after 1/1/2016, earlier of (i) age 60 and 3 years of service, and (ii) eligibility for Rule of 90.

**Public Safety:** Age 50 and 3 years of service.

**Account Balance Due to Vested Employer Contribution (PEP):** Participation Under Chapter 54-52.2: If not elected: None. If elected: 100% of active members of the Main System and Public Safety. Contribution: Maximum allowed, based on service at the beginning of the Plan year.



## Actuarial Valuation Assumptions (Continued)

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### Rates of disability:

Before age 65: Males: 20% of OASDI disability incidence rates.  
Females: 10% of OASDI disability incidence rates.

Age 65 and later: 0.25% per year.

Rates of disability were as follows:

Age	All Plans	
	Male	Female
20	0.0120%	0.0060%
25	0.0171%	0.0085%
30	0.0220%	0.0110%
35	0.0295%	0.0147%
40	0.0440%	0.0220%
45	0.0719%	0.0360%
50	0.1212%	0.0606%
55	0.2018%	0.1009%
60	0.3254%	0.1627%
65	0.2500%	0.2500%

### Social Security Disability (for Judges' disability benefit offset):

Eligibility: 50%  
Consumer Price Index Increases: 2.5% per annum  
Wage Base Increases: 3.25% per annum

### Workers' Compensation (for Judges' disability benefit offset):

None assumed.

## Actuarial Valuation Assumptions (Continued)

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Rates of retirement for members eligible to retire during the next year were as follows:

Age	Main System		Public Safety	Judges
	Reduced	Unreduced	Unreduced	Unreduced
50		30.00%	25.00%	
51		10.00%	25.00%	
52		10.00%	25.00%	
53		10.00%	25.00%	
54		10.00%	25.00%	
55	1.00%	10.00%	10.00%	10.00%
56	1.00%	8.00%	10.00%	10.00%
57	1.00%	8.00%	10.00%	10.00%
58	1.00%	8.00%	10.00%	10.00%
59	1.00%	8.00%	10.00%	10.00%
60	2.00%	8.00%	10.00%	10.00%
61	5.00%	15.00%	10.00%	10.00%
62	10.00%	30.00%	50.00%	10.00%
63	10.00%	30.00%	50.00%	10.00%
64	10.00%	20.00%	50.00%	10.00%
65		30.00%	50.00%	20.00%
66		20.00%	20.00%	20.00%
67		15.00%	20.00%	20.00%
68		15.00%	20.00%	20.00%
69		15.00%	20.00%	20.00%
70		15.00%	20.00%	20.00%
71		15.00%	20.00%	20.00%
72		15.00%	20.00%	20.00%
73		15.00%	20.00%	20.00%
74		15.00%	20.00%	20.00%
75+		100.00%	100.00%	100.00%

## Actuarial Valuation Assumptions (Continued)

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**Assumed Service**

**Credit:** All active members (full time and part time) are assumed to earn one full year of service for each assumed future year of service.

**Marital Status:**

It is assumed that 75 percent of participants in the Main System and Public Safety and 100 percent of Judges have an eligible spouse at the time of retirement or pre-retirement death. The male spouse is assumed to be three years older than the female spouse.

Spouses are assumed to be the opposite sex of the employees and retirees. The relatively low rate of same-sex spouses does not have a material actuarial impact on the actuarial valuation results.

Form of Payment Election Assumption:	Form of Payment	Main System and Public Safety	Judges
	Life Annuity	50%	0%
	50% Joint and Survivor	45%	100%
	Refund of Member Contributions	5%	0%

**Benefit Service:**

Exact fractional years of service are used to determine the amount of benefit payable.

**Decrement Timing:**

Retirement is assumed to occur at the beginning of the year. All other decrements are assumed to occur at the middle of the year.

**Decrement Operation:**

Turnover decrements do not operate after the member reaches retirement eligibility (early or normal).

**Eligibility Testing:**

Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.

**Pay Increase Timing:**

Beginning of (fiscal) year.

## Actuarial Valuation Assumptions (Continued)

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**Expenses:** Assumed administrative expenses were added to the Normal Cost and are based on the prior year's expenses, adjusted for inflation. The assumed amount added to the Normal Cost is:

Expenses	Main System	Judges	Public Safety		Total
			With Prior	Without	
Assumed FY 2018	\$ 2,614,397	\$ 11,977	\$ 38,141	\$ 7,909	\$ 2,672,424
Actual FY 2018	2,403,045	11,068	48,360	10,288	2,472,761
Assumed FY 2019	2,463,121	11,345	49,569	10,545	2,534,580

**Assumptions for Missing or Incomplete Data:** Pay was annualized for active members who have an entry date after the last actuarial valuation date of July 1, 2017. Pay was annualized by dividing the provided pay by the maximum of one month and calculated service (based on entry date). A minimum pay amount of \$10,000 was assumed for all members. Active members in the Main System with \$0 pay provided were assumed to have pay of \$31,478, the average of non-zero annualized salary of newly hired members.

### Changes in Actuarial Valuation Assumptions and Methods Since the Previous Actuarial Valuation

All actuarial assumptions and the actuarial cost method are unchanged from the last actuarial valuation as of July 1, 2017.

## SECTION F

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### **BENEFIT PROVISIONS**

# Benefit Provisions

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This Section summarizes the major benefit provisions of the North Dakota Public Employees Retirement System as included in the actuarial valuation. It is not intended to be, nor should it be, interpreted as a complete statement of all plan provisions.

## 1. Normal Service Retirement:

### ➤ Eligibility:

#### *Main System and Judges:*

Attainment of age 65, or at any age with age plus service equal to at least 85 (Rule of 85).

For members enrolled after December 31, 2015, into the Main System, attainment of age 65, or at age 60 with age plus service equal to at least 90 (Rule of 90).

#### *Public Safety:*

Attainment of age 55 and three consecutive years of service, or if not former National Guard, at any age with age plus service equal to at least 85 (Rule of 85). Former National Guard is eligible for Rule of 85 on August 1, 2015.

### ➤ Benefit:

#### *Main System and Public Safety:*

2.00% of final average salary multiplied by service.

#### *Judges:*

3.50% of final average salary for each of the first ten years of service, 2.80% for each of the next ten years of service and 1.25% for service in excess of twenty years.

## 2. Early Retirement:

### ➤ Eligibility:

#### *Main System:*

Attainment of age 55 with three years of service. (Age 60 for members enrolled after December 31, 2015.)

#### *Judges:*

Attainment of age 55 with five years of service.

#### *Public Safety:*

Attainment of age 50 with three years of service.

## Benefit Provisions (Continued)

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➤ Benefit:

*Main System:*

The Normal Service Retirement Benefit as determined in the preceding section. A benefit that begins before age 65 (or Rule of 85, if earlier) is reduced by one-half of one percent for each month before the earlier of age 65 or the age at which the Rule of 85 is met.

For members enrolled after December 31, 2015, into the Main System, a benefit that begins before age 65 (or Rule of 90, if earlier) is reduced by 2/3% of one percent for each month before the earlier of age 65 or the age at which the Rule of 90 is met.

*Judges:*

The Normal Service Retirement Benefit as determined in the preceding section. A benefit that begins before age 65 (or Rule of 85, if earlier) is reduced by one-half of one percent for each month before age 65 or the age at which the Rule of 85 is met.

*Public Safety:*

The Normal Service Retirement Benefit as determined in the preceding section. A benefit that begins before age 55 (or Rule of 85, if earlier) is reduced by one-half of one percent for each month before age 55 or the age at which the Rule of 85 is met.

### 3. Disability Benefit:

➤ Eligibility:

Six months of service and inability to engage in any substantial gainful activity.

➤ Benefit:

*Main System and Public Safety:*

25% of the member's final average salary at disability minus workers' compensation benefits, with a minimum of \$100 per month.

*Judges:*

70% of the member's final average salary at disability minus Social Security and Workers' Compensation benefits paid.

## Benefit Provisions (Continued)

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### 4. Deferred Vested Retirement:

➤ Eligibility:

*Main System and Public Safety:*

Three years of service.

*Judges:*

Five years of service.

➤ Benefit:

*Main System and Judges:*

The Normal Service Retirement Benefit payable at age 65 or the Rule of 85 (Rule of 90 for members enrolled after December 31, 2015), if earlier. Reduced early retirement benefits can be elected upon attainment of age 55 (age 60 for members enrolled after December 31, 2015).

*Public Safety:*

The Normal Service Retirement Benefit payable at age 55 or the Rule of 85, if earlier. Reduced early retirement benefit can be selected upon attainment of age 50.

### 5. Pre-Retirement Death Benefits:

(a) Vested participants with a surviving spouse

➤ Eligibility:

*Main System and Public Safety:*

Three years of service.

*Judges:*

Five years of service.



## Benefit Provisions (Continued)

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➤ Benefit:

*Main System and Public Safety:*

One of the following options:

- Lump sum payment of member's accumulated contributions with interest.
- 50% of the member's accrued benefit (not reduced on account of age) payable for the surviving spouse's lifetime.
- Continuation portion of 100% joint and survivor annuity (only if participant was eligible for normal retirement).
- A partial lump sum payment in addition to the one of the annuity options above.

*Judges:*

One of the following options:

- Lump sum payment of member's accumulated contributions with interest.
- 100% of the member's accrued benefit (not reduced on account of age) payable for the spouse's lifetime.

(b) Non-vested members or vested members without a surviving spouse

➤ Eligibility:

*Main System, Judges and Public Safety:*

Non-vested or no surviving spouse.

➤ Benefit:

*Main System, Judges and Public Safety:*

Lump sum payment of member's accumulated contributions with interest.

6. Refund of Member Contributions:

Paid to terminated non-vested members and terminated vested members who choose a refund of employee contributions in lieu of a monthly retirement benefit.

## Benefit Provisions (Continued)

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### 7. Accumulated Member Contributions:

Member contributions accumulate with interest at the following rates:

<u>Time Period</u>	<u>Per Annum Interest Rate</u>
Through June 30, 1981	5.0%
July 1, 1981, to June 30, 1986	6.0%
After June 30, 1986	0.5% less than the actuarial interest rate assumption

### 8. Standard and Optional Forms of Payment:

Standard form of payment:

*Main System and Public Safety:*

Monthly benefit for life with a refund to beneficiary at death of the remaining balance (if any) of accumulated member contributions.

*Judges:*

Monthly benefit for life, with 50% payable to an eligible survivor.

Optional forms of payment:

- Life annuity (for Judges).
- 50% joint and survivor annuity with pop-up (for Main System and Public Safety).
- 100% joint and survivor annuity with pop-up.
- Twenty-year certain and life annuity.
- Ten-year certain and life annuity.
- Social Security level income annuity.
- A partial lump sum payment in addition to one of the annuity options above.
- An actuarially equivalent graduated benefit option with either a one percent or two percent increase to be applied the first day of January of each year. Not available for disability or early retirements or in combination with a partial lump sum option, a deferred normal retirement option, or a Social Security level income annuity.

## Benefit Provisions (Continued)

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**9. Final Average Salary:**

Average of the highest salary received by the member for any 36 months employed during the last 180 months of employment.

**10. Contributions:**

Contribution rates specified in the Century Code (except employer rate for Public Safety); differ between permanent employees and temporary employees. Rates are as follows:

	<u>Rates Set by Statute</u>		<u>Rates Determined by the Board of Retirement</u>
	<u>Member</u>	<u>Employer</u>	<u>Employer</u>
Main System Permanent Employees	7.00%	7.12%	
Main System Temporary Employees	14.12%	0.00%	
Judges	8.00%	17.52%	
Public Safety with prior Main System service	5.50%		9.81%
➤ BCI Employees	6.00%		9.81%
➤ National Guard members	5.50%		9.81%
Public Safety without prior Main System service	5.50%		7.93%

Effective January 1, 2000:

A member's account balance includes vested employer contributions equal to the member's contributions to the deferred compensation Plan under chapter 54-52.2. The vested employer contribution may not exceed:

1. For months one through 12 of service credit, \$25 or 1% of the member's monthly salary, whichever is greater.
2. For months 13 through 24 of service credit, \$25 or 2% of the member's monthly salary, whichever is greater.
3. For months 25 through 36 of service credit, \$25 or 3% of the member's monthly salary, whichever is greater.
4. For service exceeding 36 months, \$25 or 4% of the member's monthly salary, whichever is greater.

Vested employer contributions are credited monthly to the member's account balance.

## Benefit Provisions (Continued)

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### 11. Rollovers:

The fund may accept rollovers from other qualified plans under rules adopted by the Board for the purchase of additional service credit.

### Changes in Plan Provisions Since the Previous Actuarial Valuation

There have been no changes in plan provisions since the previous actuarial valuation as of July 1, 2017.

## **SECTION G**

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### **CALCULATION OF THE SINGLE DISCOUNT RATE**

# Calculation of the Single Discount Rate

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GASB Statement No. 67 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the System to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The current employer and employee fixed rate contributions are assumed to be made in each future year. The Plan Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the assumed actuarial valuation discount rate is used. In years where assets are not projected to be sufficient to meet benefit payments, the use of a municipal bond rate is required, as described in the following paragraph.

The Single Discount Rate (SDR) is equivalent to applying these two rates to the benefits that are projected to be paid during the different time periods. The SDR reflects (1) the long-term expected rate of return on pension plan investments (during the period in which the fiduciary net position is projected to be sufficient to pay benefits) and (2) a tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this actuarial valuation, the expected rate of return on pension plan investments is 7.75%; the municipal bond rate is 3.62%; and the resulting Single Discount Rate is 6.32%.

The tables in this section provide detailed information on the development of the Single Discount Rate.

The **Projection of Contributions** table shows the development of expected contributions in future years. Normal Cost contributions for future hires are not included (nor are their liabilities).

The **Projection of Plan Fiduciary Net Position** table shows the development of expected asset levels in future years.

The **Present Values of Projected Benefit Payments** table shows the development of the Single Discount Rate (SDR). It breaks down the benefit payments into present values for funded and unfunded portions and shows the equivalent total at the SDR.

As shown on Page G-7, the sum of the present value of (1) the funded portion of projected benefit payments using the expected 7.75% rate of return on assets plus (2) the present value of the unfunded projected benefit payments using a tax-exempt municipal bond rate of 3.62% is equal to the present value of all projected benefit payments using a single equivalent discount rate of 6.32%.



# Projection of Benefit Payments and Administrative Expenses by Plan

Year	Main System		Judges		Public Safety with Prior Service		Public Safety without Prior Service		Total	
	Projected Benefit Payments	Projected Administrative Expenses	Projected Benefit Payments	Projected Administrative Expenses	Projected Benefit Payments	Projected Administrative Expenses	Projected Benefit Payments	Projected Administrative Expenses	Projected Benefit Payments	Projected Administrative Expenses
2019	\$ 190,457,794	\$ 2,303,658	\$ 3,216,751	\$ 10,307	\$ 2,858,142	\$ 45,313	\$ 201,127	\$ 9,657	\$ 196,733,815	\$ 2,368,935
2020	203,622,416	2,216,729	3,339,749	9,736	3,186,499	42,812	286,165	9,117	210,434,829	2,278,395
2021	215,710,968	2,140,238	3,484,344	9,104	3,428,252	40,628	318,387	8,628	222,941,951	2,198,598
2022	230,711,108	2,070,814	3,633,115	8,514	3,723,649	38,611	374,738	8,166	238,442,609	2,126,104
2023	246,110,784	2,008,048	3,789,825	7,960	4,035,435	36,906	443,300	7,727	254,379,344	2,060,640
2024	262,615,182	1,948,109	3,939,963	7,440	4,382,066	35,390	514,226	7,310	271,451,437	1,998,249
2025	279,967,551	1,886,112	4,086,527	6,943	4,720,686	33,937	581,052	6,907	289,355,816	1,933,900
2026	297,756,405	1,823,964	4,208,446	6,529	5,123,299	32,463	647,556	6,533	307,735,706	1,869,489
2027	316,020,673	1,761,616	4,289,986	6,187	5,507,194	31,134	701,604	6,244	326,519,457	1,805,181
2028	335,041,104	1,698,655	4,397,696	5,752	5,923,993	29,812	780,078	5,918	346,142,872	1,740,137
2029	354,443,380	1,636,098	4,480,748	5,377	6,331,119	28,608	871,149	5,571	366,126,395	1,675,655
2030	373,629,920	1,575,136	4,542,646	5,042	6,678,093	27,556	969,150	5,213	385,819,810	1,612,947
2031	392,684,349	1,515,424	4,627,522	4,652	7,058,593	26,556	1,063,932	4,840	405,434,396	1,551,472
2032	412,244,113	1,455,242	4,685,826	4,292	7,508,353	25,492	1,150,663	4,510	425,588,955	1,489,536
2033	432,063,758	1,395,182	4,728,378	3,980	8,018,579	24,365	1,259,720	4,182	446,070,434	1,427,709
2034	447,522,960	1,335,366	4,726,169	3,737	8,410,066	23,175	1,340,705	3,897	461,999,899	1,366,174
2035	468,512,199	1,274,236	4,725,614	3,473	9,077,331	21,894	1,457,498	3,618	483,772,642	1,303,221
2036	489,463,195	1,213,138	4,732,095	3,214	9,888,737	20,438	1,571,570	3,363	505,655,597	1,240,152
2037	510,507,077	1,151,826	4,748,294	2,916	10,833,678	18,798	1,688,105	3,089	527,777,154	1,176,630
2038	532,655,157	1,088,205	4,788,943	2,574	11,802,459	17,164	1,806,133	2,843	551,052,692	1,110,785
2039	555,081,339	1,023,810	4,806,278	2,281	12,815,255	15,461	1,908,207	2,633	574,611,078	1,044,185
2040	577,724,824	960,185	4,814,146	2,016	13,766,544	13,823	2,013,889	2,411	598,319,404	978,435
2041	599,996,418	897,419	4,811,923	1,770	14,681,695	12,347	2,148,974	2,157	621,639,010	913,693
2042	622,291,292	834,233	4,793,294	1,550	15,547,264	10,946	2,284,585	1,923	644,916,435	848,652
2043	644,033,857	771,741	4,753,306	1,361	16,364,221	9,675	2,401,074	1,685	667,552,458	784,462
2044	665,479,604	708,482	4,709,956	1,174	17,181,096	8,458	2,519,351	1,458	689,890,008	719,572
2045	686,745,584	644,410	4,663,752	992	17,983,768	7,283	2,643,325	1,237	712,036,430	653,921
2046	706,655,931	581,686	4,599,218	839	18,694,942	6,173	2,753,956	1,035	732,704,046	589,732
2047	724,957,251	520,578	4,528,259	689	19,234,550	5,236	2,856,542	843	751,576,602	527,346
2048	740,724,861	462,439	4,458,520	539	19,771,807	4,334	2,925,911	691	767,881,099	468,004
2049	753,911,376	407,544	4,362,994	426	20,217,524	3,529	2,972,510	563	781,464,405	412,064
2050	763,748,577	357,542	4,253,022	335	20,482,507	2,900	3,003,734	468	791,487,840	361,245
2051	771,213,316	311,513	4,133,604	259	20,700,569	2,341	3,012,394	399	799,059,883	314,513
2052	776,170,164	269,612	4,015,615	185	20,812,824	1,889	3,011,795	343	804,010,397	272,029
2053	779,269,746	231,282	3,869,364	149	20,841,079	1,533	3,014,159	285	806,994,348	233,250
2054	780,656,869	195,583	3,731,714	107	20,844,614	1,205	3,007,377	234	808,240,574	197,129
2055	779,810,509	163,288	3,589,649	73	20,763,220	948	2,995,708	186	807,159,086	164,496
2056	776,301,030	134,379	3,434,604	59	20,656,041	716	2,979,072	141	803,370,748	135,294
2057	769,781,304	108,450	3,304,838	18	20,505,720	514	2,955,778	101	796,547,640	109,083
2058	759,893,003	86,628	3,157,706	-	20,304,802	350	2,925,214	67	786,280,725	87,044
2059	746,791,671	68,798	2,997,152	-	20,035,348	239	2,889,102	38	772,713,273	69,075
2060	731,225,552	54,156	2,839,029	-	19,733,692	154	2,837,715	23	756,635,989	54,333
2061	713,495,990	42,288	2,683,176	-	19,385,812	97	2,779,379	15	738,344,356	42,401
2062	693,908,849	32,949	2,529,440	-	18,996,910	66	2,716,378	10	718,151,577	33,025
2063	672,836,551	25,639	2,377,670	-	18,579,372	47	2,649,374	8	696,442,967	25,695
2064	650,633,921	19,799	2,227,750	-	18,140,460	34	2,579,320	7	673,581,451	19,839
2065	627,316,023	15,227	2,079,586	-	17,678,693	25	2,506,579	5	649,580,880	15,257
2066	603,447,148	11,369	1,933,140	-	17,197,108	19	2,431,147	4	625,008,543	11,391
2067	578,969,912	8,089	1,788,600	-	16,695,490	13	2,352,496	3	599,806,498	8,105
2068	553,528,325	5,755	1,646,399	-	16,170,352	9	2,271,088	2	573,616,164	5,766



# Projection of Contributions

Year	Projected Contributions from Current Employees	Projected Service Cost and Expense Contributions	Projected UAL Contributions	Projected Total Contributions
2019	\$ 80,026,872	\$ 47,827,577	\$ 35,929,125	\$ 163,783,575
2020	77,869,385	46,515,666	45,986,740	170,371,791
2021	76,257,010	45,499,751	46,151,951	167,908,712
2022	75,002,073	44,679,380	48,350,368	168,031,821
2023	73,875,402	43,919,190	49,693,209	167,487,801
2024	72,915,233	43,235,574	51,196,687	167,347,494
2025	71,957,321	42,538,424	52,986,141	167,481,885
2026	70,820,091	41,716,933	55,027,490	167,564,515
2027	69,610,131	40,847,772	57,045,563	167,503,466
2028	68,339,372	39,952,878	59,101,215	167,393,465
2029	66,940,353	38,970,442	61,215,552	167,126,347
2030	65,483,072	37,963,372	63,274,282	166,720,725
2031	64,047,739	36,983,492	65,381,502	166,412,733
2032	62,593,880	35,989,921	67,534,924	166,118,726
2033	61,031,264	34,924,746	69,771,848	165,727,857
2034	59,398,613	33,819,577	72,026,182	165,244,372
2035	57,701,965	32,682,276	74,313,308	164,697,550
2036	55,844,232	31,444,313	76,686,018	163,974,564
2037	53,904,096	30,160,295	79,003,662	163,068,053
2038	51,859,228	28,815,807	81,357,716	162,032,751
2039	49,611,906	27,353,454	83,703,526	160,668,887
2040	47,245,862	25,833,272	85,958,670	159,037,804
2041	44,848,813	24,317,172	88,116,320	157,282,304
2042	42,422,639	22,816,081	90,167,812	155,406,532
2043	39,901,042	21,290,371	92,171,664	153,363,077
2044	37,348,144	19,775,844	94,154,298	151,278,286
2045	34,680,456	18,213,031	96,116,004	149,009,491
2046	31,892,703	16,596,753	97,752,936	146,242,393
2047	29,104,534	14,996,719	98,868,583	142,969,836
2048	26,334,658	13,419,944	99,511,201	139,265,804
2049	23,646,096	11,900,260	99,873,731	135,420,086
2050	21,065,085	10,457,684	100,021,594	131,544,363
2051	18,687,520	9,141,085	100,115,854	127,944,459
2052	16,461,825	7,923,172	100,157,151	124,542,149
2053	14,408,496	6,822,004	100,111,657	121,342,158
2054	12,500,872	5,823,025	100,133,385	118,457,283
2055	10,687,031	4,897,515	99,965,765	115,550,312
2056	9,021,099	4,077,729	99,514,944	112,613,773
2057	7,506,367	3,354,279	99,182,766	110,043,412
2058	6,120,743	2,710,411	99,002,887	107,834,041
2059	4,940,144	2,173,844	99,418,674	106,532,662
2060	3,966,351	1,736,431	100,366,013	106,068,795
2061	3,156,384	1,374,551	102,172,151	106,703,086
2062	2,492,290	1,075,941	104,564,300	108,132,530
2063	1,964,404	837,728	107,555,946	110,358,077
2064	1,546,747	648,656	111,127,069	113,322,472
2065	1,208,707	495,650	115,089,385	116,793,741
2066	940,836	377,640	119,474,329	120,792,805
2067	710,942	277,072	124,287,072	125,275,086
2068	511,969	192,395	129,441,343	130,145,707

# Projection of Plan Fiduciary Net Position

Year	Projected Beginning Plan Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.750%	Projected Ending Plan Fiduciary Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2019	\$ 2,970,180,276	\$ 163,783,575	\$ 196,733,815	\$ 2,368,935	\$ 228,845,890	\$ 3,163,706,992
2020	3,163,706,992	170,371,791	210,434,829	2,278,395	243,577,175	3,364,942,734
2021	3,364,942,734	167,908,712	222,941,951	2,198,598	258,606,708	3,566,317,606
2022	3,566,317,606	168,031,821	238,442,609	2,126,104	273,631,256	3,767,411,969
2023	3,767,411,969	167,487,801	254,379,344	2,060,640	288,591,845	3,967,051,632
2024	3,967,051,632	167,347,494	271,451,437	1,998,249	303,411,756	4,164,361,194
2025	4,164,361,194	167,481,885	289,355,816	1,933,900	318,029,955	4,358,583,319
2026	4,358,583,319	167,564,515	307,735,706	1,869,489	332,388,830	4,548,931,469
2027	4,548,931,469	167,503,466	326,519,457	1,805,181	346,426,646	4,734,536,943
2028	4,734,536,943	167,393,465	346,142,872	1,740,137	360,063,142	4,914,110,541
2029	4,914,110,541	167,126,347	366,126,395	1,675,655	373,212,477	5,086,647,314
2030	5,086,647,314	166,720,725	385,819,810	1,612,947	385,822,156	5,251,757,438
2031	5,251,757,438	166,412,733	405,434,396	1,551,472	397,862,933	5,409,047,236
2032	5,409,047,236	166,118,726	425,588,955	1,489,536	409,277,650	5,557,365,121
2033	5,557,365,121	165,727,857	446,070,434	1,427,709	419,980,925	5,695,575,761
2034	5,695,575,761	165,244,372	461,999,899	1,366,174	430,070,455	5,827,524,515
2035	5,827,524,515	164,697,550	483,772,642	1,303,221	439,450,132	5,946,596,334
2036	5,946,596,334	163,974,564	505,655,597	1,240,152	447,820,961	6,051,496,109
2037	6,051,496,109	163,068,053	527,777,154	1,176,630	455,077,421	6,140,687,800
2038	6,140,687,800	162,032,751	551,052,692	1,110,785	461,067,813	6,211,624,887
2039	6,211,624,887	160,668,887	574,611,078	1,044,185	465,620,252	6,262,258,764
2040	6,262,258,764	159,037,804	598,319,404	978,435	468,583,297	6,290,582,026
2041	6,290,582,026	157,282,304	621,639,010	913,693	469,827,281	6,295,138,908
2042	6,295,138,908	155,406,532	644,916,435	848,652	469,226,413	6,274,006,766
2043	6,274,006,766	153,363,077	667,552,458	784,462	466,652,627	6,225,685,549
2044	6,225,685,549	151,278,286	689,890,008	719,572	461,981,493	6,148,335,748
2045	6,148,335,748	149,009,491	712,036,430	653,921	455,060,943	6,039,715,832
2046	6,039,715,832	146,242,393	732,704,046	589,732	445,754,189	5,898,418,635
2047	5,898,418,635	142,969,836	751,576,602	527,346	433,963,917	5,723,248,440
2048	5,723,248,440	139,265,804	767,881,099	468,004	419,629,619	5,513,794,760
2049	5,513,794,760	135,420,086	781,464,405	412,064	402,736,314	5,270,074,692
2050	5,270,074,692	131,544,363	791,487,840	361,245	383,321,398	4,993,091,368
2051	4,993,091,368	127,944,459	799,059,883	314,513	361,432,132	4,683,093,563
2052	4,683,093,563	124,542,149	804,010,397	272,029	337,091,285	4,340,444,571
2053	4,340,444,571	121,342,158	806,994,348	233,250	310,302,306	3,964,861,436
2054	3,964,861,436	118,457,283	808,240,574	197,129	281,038,893	3,555,919,910
2055	3,555,919,910	115,550,312	807,159,086	164,496	249,277,748	3,113,424,388
2056	3,113,424,388	112,613,773	803,370,748	135,294	215,017,847	2,637,549,966
2057	2,637,549,966	110,043,412	796,547,640	109,083	178,300,295	2,129,236,951
2058	2,129,236,951	107,834,041	786,280,725	87,044	139,213,279	1,589,916,502
2059	1,589,916,502	106,532,662	772,713,273	69,075	97,883,069	1,021,549,885
2060	1,021,549,885	106,068,795	756,635,989	54,333	54,428,948	425,357,307
2061	425,357,307	106,703,086	738,344,356	42,401	8,944,172	0
2062	0	108,132,530	718,151,577	33,025	0	0
2063	0	110,358,077	696,442,967	25,695	0	0
2064	0	113,322,472	673,581,451	19,839	0	0
2065	0	116,793,741	649,580,880	15,257	0	0
2066	0	120,792,805	625,008,543	11,391	0	0
2067	0	125,275,086	599,806,498	8,105	0	0
2068	0	130,145,707	573,616,164	5,766	0	0

# Discount Rate Development

## Present Values of Projected Benefits Ending June 30 for 2019 to 2068

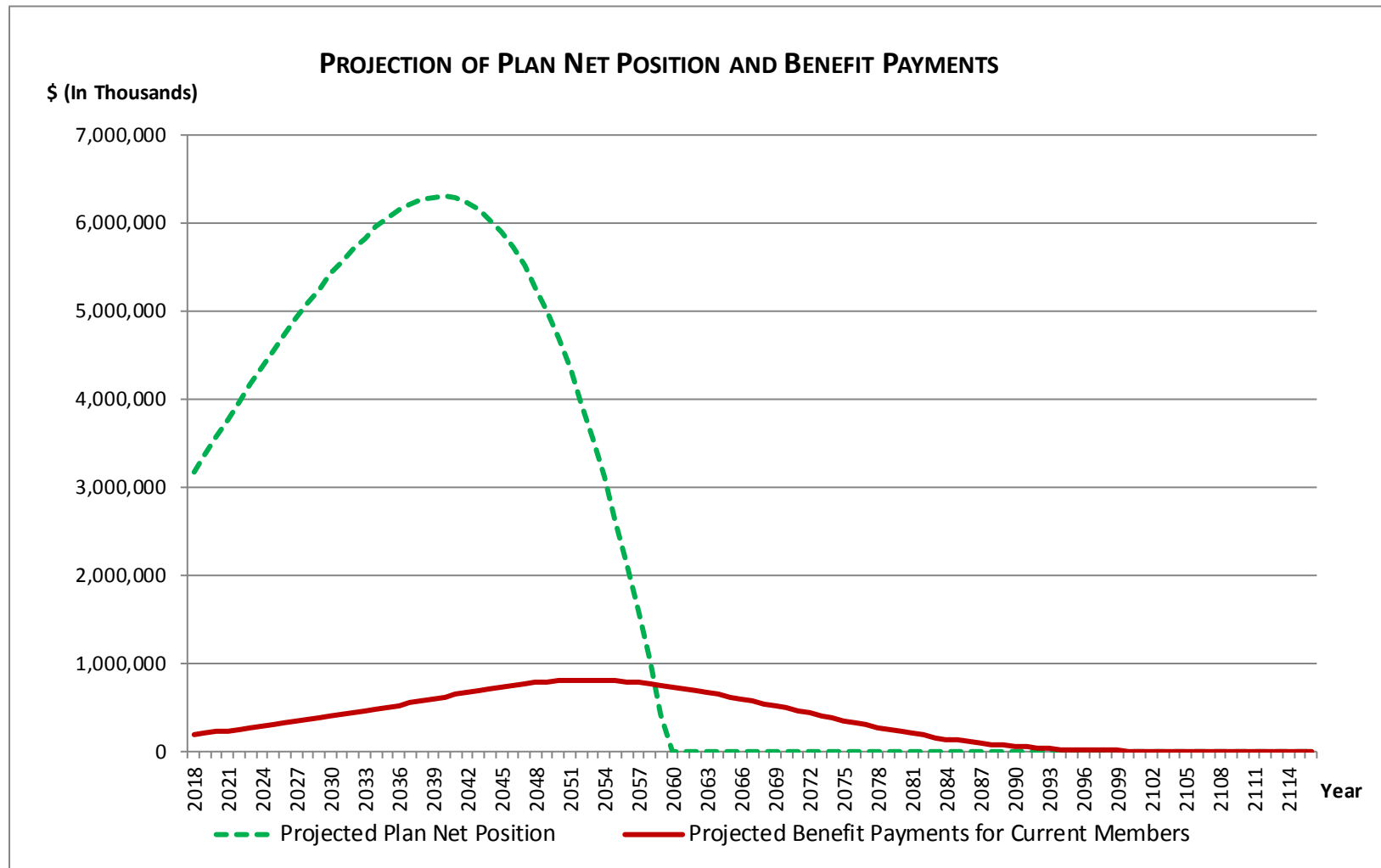
Year	Projected Beginning Plan Fiduciary Net Position	Projected Benefit Payments	Funded Portion of Projected Benefit Payments	Unfunded Portion of Projected Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate of 7.75% (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate of 3.62% (vf)	Present Value of All Benefit Payments using Single Discount Rate (SDR) of 6.32% (h)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v <sup>^(a)-.5)</sup>	(g)=(e)*vf <sup>^(a)-.5)</sup>	(h)=(c)/((1+SDR) <sup>^(a)-.5)</sup>
2019	\$ 2,970,180,276	\$ 196,733,815	\$ 196,733,815	\$ 0	\$ 189,526,688	\$ 0	\$ 190,797,182
2020	3,163,706,992	210,434,829	210,434,829	0	188,144,577	0	191,953,685
2021	3,364,942,734	222,941,951	222,941,951	0	184,990,148	0	191,274,254
2022	3,566,317,606	238,442,609	238,442,609	0	183,621,440	0	192,413,027
2023	3,767,411,969	254,379,344	254,379,344	0	181,804,274	0	193,071,574
2024	3,967,051,632	271,451,437	271,451,437	0	180,051,653	0	193,782,488
2025	4,164,361,194	289,355,816	289,355,816	0	178,122,960	0	194,285,543
2026	4,358,583,319	307,735,706	307,735,706	0	175,811,912	0	194,344,407
2027	4,548,931,469	326,519,457	326,519,457	0	173,125,960	0	193,949,700
2028	4,734,536,943	346,142,872	346,142,872	0	170,330,038	0	193,384,350
2029	4,914,110,541	366,126,395	366,126,395	0	167,205,136	0	192,390,162
2030	5,086,647,314	385,819,810	385,819,810	0	163,525,625	0	190,687,503
2031	5,251,757,438	405,434,396	405,434,396	0	159,479,405	0	188,470,849
2032	5,409,047,236	425,588,955	425,588,955	0	155,366,394	0	186,080,058
2033	5,557,365,121	446,070,434	446,070,434	0	151,130,770	0	183,442,014
2034	5,695,575,761	461,999,899	461,999,899	0	145,269,372	0	178,699,419
2035	5,827,524,515	483,772,642	483,772,642	0	141,174,482	0	175,998,291
2036	5,946,596,334	505,655,597	505,655,597	0	136,946,973	0	173,024,600
2037	6,051,496,109	527,777,154	527,777,154	0	132,657,231	0	169,859,370
2038	6,140,687,800	551,052,692	551,052,692	0	128,545,297	0	166,808,408
2039	6,211,624,887	574,611,078	574,611,078	0	124,399,828	0	163,600,525
2040	6,262,258,764	598,319,404	598,319,404	0	120,215,812	0	160,224,776
2041	6,290,582,026	621,639,010	621,639,010	0	115,917,628	0	156,574,392
2042	6,295,138,908	644,916,435	644,916,435	0	111,608,531	0	152,781,864
2043	6,274,006,766	667,552,458	667,552,458	0	107,216,609	0	148,744,066
2044	6,225,685,549	689,890,008	689,890,008	0	102,834,596	0	144,583,919
2045	6,148,335,748	712,036,430	712,036,430	0	98,501,836	0	140,355,113
2046	6,039,715,832	732,704,046	732,704,046	0	94,070,493	0	135,844,013
2047	5,898,418,635	751,576,602	751,576,602	0	89,553,137	0	131,060,268
2048	5,723,248,440	767,881,099	767,881,099	0	84,914,968	0	125,944,053
2049	5,513,794,760	781,464,405	781,464,405	0	80,201,446	0	120,553,209
2050	5,270,074,692	791,487,840	791,487,840	0	75,387,608	0	114,841,726
2051	4,993,091,368	799,059,883	799,059,883	0	70,634,645	0	109,048,746
2052	4,683,093,563	804,010,397	804,010,397	0	65,960,331	0	103,202,187
2053	4,340,444,571	806,994,348	806,994,348	0	61,443,277	0	97,427,962
2054	3,964,861,436	808,240,574	808,240,574	0	57,111,984	0	91,778,227
2055	3,555,919,910	807,159,086	807,159,086	0	52,933,238	0	86,207,300
2056	3,113,424,388	803,370,748	803,370,748	0	48,895,406	0	80,702,465
2057	2,637,549,966	796,547,640	796,547,640	0	44,993,163	0	75,260,731
2058	2,129,236,951	786,280,725	786,280,725	0	41,218,778	0	69,874,738
2059	1,589,916,502	772,713,273	772,713,273	0	37,594,004	0	64,587,254
2060	1,021,549,885	756,635,989	756,635,989	0	34,164,095	0	59,484,160
2061	425,357,307	738,344,356	532,060,393	206,283,963	22,295,981	45,510,644	54,595,794
2062	(197,382,191)	718,151,577	0	718,151,577	0	152,904,421	49,946,175
2063	0	696,442,967	0	696,442,967	0	143,102,063	45,557,256
2064	0	673,581,451	0	673,581,451	0	133,569,367	41,442,697
2065	0	649,580,880	0	649,580,880	0	124,310,094	37,590,406
2066	0	625,008,543	0	625,008,543	0	115,429,157	34,018,536
2067	0	599,806,498	0	599,806,498	0	106,904,786	30,706,246
2068	0	573,616,164	0	573,616,164	0	98,665,149	27,619,946

# Discount Rate Development

## Present Values of Projected Benefits Ending June 30 for 2069 to 2117

Year	Projected Beginning Plan Fiduciary Net Position	Projected Benefit Payments	Funded Portion of Projected Benefit Payments	Unfunded Portion of Projected Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate of 3.62% (vf)	Present Value of All Benefit Payments using Single Discount Rate (SDR) of 6.32% (h)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v <sup>(a)-5</sup>	(g)=(e)*vf <sup>(a)-5</sup>	(h)=(c)/(1+SDR) <sup>(a)-5</sup>
2069	\$ 0	\$ 547,182,231	\$ 0	\$ 547,182,231	\$ 0	\$ 90,830,310	\$ 24,781,028
2070	0	520,317,819	0	520,317,819	0	83,353,515	22,163,682
2071	0	492,913,822	0	492,913,822	0	76,204,853	19,748,317
2072	0	465,124,531	0	465,124,531	0	69,396,456	17,527,268
2073	0	437,381,524	0	437,381,524	0	62,977,424	15,502,128
2074	0	409,589,155	0	409,589,155	0	56,915,338	13,654,167
2075	0	382,008,321	0	382,008,321	0	51,228,319	11,977,756
2076	0	354,800,202	0	354,800,202	0	45,917,428	10,463,390
2077	0	328,058,853	0	328,058,853	0	40,973,387	9,099,682
2078	0	301,905,648	0	301,905,648	0	36,389,640	7,876,469
2079	0	276,453,541	0	276,453,541	0	32,157,708	6,783,727
2080	0	251,820,254	0	251,820,254	0	28,268,971	5,811,962
2081	0	228,103,151	0	228,103,151	0	24,711,951	4,951,642
2082	0	205,465,444	0	205,465,444	0	21,481,814	4,195,103
2083	0	183,984,620	0	183,984,620	0	18,563,937	3,533,225
2084	0	163,754,467	0	163,754,467	0	15,945,500	2,957,800
2085	0	144,844,317	0	144,844,317	0	13,611,402	2,460,724
2086	0	127,305,685	0	127,305,685	0	11,545,310	2,034,207
2087	0	111,167,247	0	111,167,247	0	9,729,512	1,670,745
2088	0	96,438,700	0	96,438,700	0	8,145,579	1,363,234
2089	0	83,107,073	0	83,107,073	0	6,774,310	1,104,951
2090	0	71,142,007	0	71,142,007	0	5,596,411	889,646
2091	0	60,495,516	0	60,495,516	0	4,592,647	711,541
2092	0	51,103,009	0	51,103,009	0	3,744,060	565,339
2093	0	42,888,865	0	42,888,865	0	3,032,475	446,265
2094	0	35,765,634	0	35,765,634	0	2,440,479	350,026
2095	0	29,639,813	0	29,639,813	0	1,951,826	272,832
2096	0	24,414,795	0	24,414,795	0	1,551,583	211,378
2097	0	19,990,552	0	19,990,552	0	1,226,036	162,786
2098	0	16,272,367	0	16,272,367	0	963,131	124,632
2099	0	13,168,593	0	13,168,593	0	752,195	94,864
2100	0	10,593,835	0	10,593,835	0	583,984	71,780
2101	0	8,470,578	0	8,470,578	0	450,627	53,982
2102	0	6,729,288	0	6,729,288	0	345,485	40,336
2103	0	5,308,318	0	5,308,318	0	263,011	29,927
2104	0	4,157,589	0	4,157,589	0	198,799	22,046
2105	0	3,228,814	0	3,228,814	0	148,995	16,104
2106	0	2,482,809	0	2,482,809	0	110,568	11,647
2107	0	1,888,264	0	1,888,264	0	81,153	8,331
2108	0	1,421,627	0	1,421,627	0	58,964	5,900
2109	0	1,056,824	0	1,056,824	0	42,302	4,125
2110	0	776,971	0	776,971	0	30,013	2,852
2111	0	560,233	0	560,233	0	20,885	1,934
2112	0	394,109	0	394,109	0	14,179	1,280
2113	0	273,600	0	273,600	0	9,499	836
2114	0	182,001	0	182,001	0	6,098	523
2115	0	113,698	0	113,698	0	3,677	307
2116	0	65,891	0	65,891	0	2,056	167
2117	0	36,737	0	36,737	0	1,106	88
					\$ 5,028,897,729	\$ 1,753,740,589	\$ 6,782,638,318

# Projection of Plan Net Position and Benefit Payments



## **SECTION H**

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### **GLOSSARY OF TERMS**

## Glossary of Terms

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

**Actuarial Assumptions.** Estimates of future plan experience such as investment return, expected lifetimes and the likelihood of receiving a pension from the Pension Plan. Demographic, or “people” assumptions, include rates of mortality, retirement and separation. Economic, or “money” assumptions, include expected investment return, inflation and salary increases.

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

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

**Actuarial Value of Assets (AVA).** Smoothed value of assets that recognizes the difference between the expected investment return using the actuarial valuation assumption of 7.50 percent and the actual investment return over a five-year period. Dampens volatility of asset value over time.

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

**Annual Required Contribution.** The sum of the normal cost and amortization of the unfunded actuarial accrued liability.

**Asset Return.** The net investment return for the asset divided by the mean asset value. Example: if \$1.00 is invested and yields \$1.0775 after a year, the asset return is 7.75 percent.

**Funded Ratio.** The actuarial value of assets divided by the actuarial accrued liability. Measures the portion of the actuarial accrued liability that is currently funded.

**Market Value of Assets (MVA).** The value of assets currently held in the trust available to pay for benefits of the Pension Plan. Each of the investments in the trust is valued at market price which is the price at which buyers and sellers trade similar items in the open market.

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

**Unfunded Actuarial Accrued Liability (UAAL).** The difference between the actuarial accrued liability and actuarial valuation assets. Sometimes referred to as “unfunded accrued liability.”