

OHIO PUBLIC EMPLOYEES RETIREMENT SYSTEM

ACTUARIAL VALUATION OF DEFINED BENEFIT ALLOWANCES –
TRADITIONAL, COMBINED AND MEMBER DIRECTED PLANS

DECEMBER 31, 2016

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August 30, 2017

The Retirement Board
Ohio Public Employees Retirement System
Columbus, Ohio

Ladies and Gentlemen:

The results of the *December 31, 2016 Annual Actuarial Valuation of Defined Benefit Allowances* of the Ohio Public Employees Retirement System (OPERS), based upon Chapter 145 of the Code as amended, are presented in this report. The gain/loss analysis of experience by division, the annual actuarial valuation of retiree health and Medicare benefits, projections of defined benefit allowances and projections of retiree health and Medicare benefits are covered in separate reports. The purposes of the valuation are as follows:

- Measure the financial position of OPERS,
- Assist the Board in establishing employer and employee contribution rates necessary to fund the pension defined benefits provided by OPERS,
- Determine the number of years required to amortize the unfunded actuarial accrued liabilities based upon established contribution rates,
- Provide actuarial reporting and disclosure information for the System's financial report, and
- Analyze the experience of the System over the past year.

This report should not be relied on for any purpose other than those described above. It was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

The signing actuaries are independent of the plan sponsor.

The individual member statistical data required for the valuations was furnished by your Executive Director and Staff, together with pertinent data on financial operations. Their cooperation in furnishing these materials is acknowledged with appreciation. 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 data.

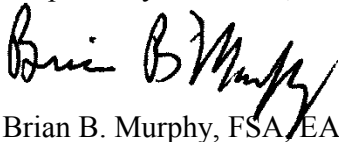
Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

The actuarial assumptions used in the valuations are summarized in Section X of this report. The assumptions are established by the Retirement Board after consulting with the actuary.

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 Ohio Public Employees Retirement System as of the 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.

Brian B. Murphy and Mita D. Drazilov are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,



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



Mita D. Drazilov, ASA, FCA, MAAA

BBM/MDD:rmn

SECTION I
EXECUTIVE SUMMARY

INTRODUCTION

Section 145.22 of the Revised Code of Ohio (ORC) provides in part as follows:

“(A) The public employees retirement board shall have prepared annually by or under the supervision of an actuary an actuarial valuation of the pension assets, liabilities, and funding requirements of the public employees retirement system as established pursuant to this chapter.”

This report presents the results of the December 31, 2016 annual actuarial valuation of the Ohio Public Employees Retirement System (OPERS) Defined Benefit Allowances of the Traditional, Combined and Member Directed Plans. In conjunction with Chapter 145 of the ORC, the purposes of performing the annual valuation are as follows:

- Measure the financial position of OPERS,
- Assist the Board in establishing employer and employee contribution rates necessary to fund the pension defined benefits provided by OPERS,
- Determine the number of years required to amortize the unfunded actuarial accrued liabilities based upon established contribution rates,
- Provide actuarial reporting and disclosure information for the System’s financial report, and
- Analyze the experience of the System over the past year.

The report is presented as follows:

| | | |
|--------------|---|---|
| Section I | - | Executive Summary |
| Section II | - | Financial Information |
| Section III | - | Benefits and Conditions Evaluated |
| Section IV | - | Recommendations for Reserve Transfers |
| Section V | - | Active and Inactive Vested Valuation Results for State |
| Section VI | - | Active and Inactive Vested Valuation Results for Local Government |
| Section VII | - | Active and Inactive Vested Valuation Results for Public Safety |
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| Section IX | - | Allowances Being Paid to Retirees and Beneficiaries |
| Section X | - | Actuarial Methods and Assumptions |
| Section XI | - | Financial Principles |
| Section XII | - | Governmental Accounting Standards Board (GASB) Reporting |

There have been no significant benefit changes since the last valuation. Please see Section III for a detailed description of the benefit provisions.

A summary of the primary valuation results as of December 31, 2016 are presented on the following pages.

SUMMARY OF PENSION DEFINED BENEFIT VALUATION RESULTS
TRADITIONAL, COMBINED, AND MEMBER DIRECTED PLANS
DECEMBER 31
(\$ IN MILLIONS)

| | 2016 | | | | | | 2015 | | |
|---|-----------|-----------|---------------|---------------|-----------------|-----------|-------------|-----------------|-----------------|
| | General | | | Law | | | Assumptions | | |
| | State | Local | Total General | Public Safety | Law Enforcement | Total Law | Grand Total | New Grand Total | Old Grand Total |
| A. Demographic Information | | | | | | | | | |
| 1. Active Number Counts | | | | | | | | | |
| a. Traditional Plan | 116,379 | 198,808 | 315,187 | 76 | 7,916 | 7,992 | 323,179 | 321,383 | 321,383 |
| b. Combined Plan | 2,844 | 4,959 | 7,803 | 0 | 0 | 0 | 7,803 | 7,626 | 7,626 |
| c. Total | 119,223 | 203,767 | 322,990 | 76 | 7,916 | 7,992 | 330,982 | 329,009 | 329,009 |
| 2. Active Payroll | | | | | | | | | |
| a. Traditional Plan | \$ 4,966 | \$ 7,565 | \$ 12,531 | \$ 3 | \$ 511 | \$ 515 | \$ 13,046 | \$ 12,576 | \$ 12,576 |
| b. Combined Plan | 165 | 235 | 400 | 0 | 0 | 0 | 400 | 375 | 375 |
| c. Total | \$ 5,131 | \$ 7,800 | \$ 12,931 | \$ 3 | \$ 511 | \$ 515 | \$ 13,446 | \$ 12,951 | \$ 12,951 |
| 3. Retired Number Counts | 73,348 | 135,621 | 208,969 | 178 | 5,020 | 5,198 | 214,167 | 211,301 | 211,301 |
| 4. Deferred/Inactive Number Counts | 232,095 | 291,301 | 523,396 | 43 | 1,000 | 1,043 | 524,439 | 502,888 | 502,888 |
| 5. Member Directed Active Number Counts | 4,103 | 7,394 | 11,497 | 0 | 0 | 0 | 11,497 | 11,281 | 11,281 |
| 6. Total Number Counts | 428,769 | 638,083 | 1,066,852 | 297 | 13,936 | 14,233 | 1,081,085 | 1,054,479 | 1,054,479 |
| B. Defined Benefit Assets | | | | | | | | | |
| 1. Market Value (MV) | \$ 29,838 | \$ 44,101 | \$ 73,940 | \$ 41 | \$ 3,534 | \$ 3,575 | \$ 77,514 | \$ 74,560 | \$ 74,560 |
| 2. Rate of Return on MV | | | | | | | 8.22 % | 0.31 % | 0.31 % |
| 3. Funding Value (FV) | \$ 30,903 | \$ 45,675 | \$ 76,577 | \$ 42 | \$ 3,660 | \$ 3,702 | \$ 80,280 | \$ 78,061 | \$ 78,061 |
| 4. Rate of Return on FV | | | | | | | 6.89 % | 8.36 % | 8.36 % |
| 5. Ratio of FV to MV | | | | | | | 103.6% | 104.7% | 104.7% |
| C. Defined Benefit Actuarial Results | | | | | | | | | |
| 1. Normal Cost as a % of Payroll | 13.64% | 13.50% | 13.57% | 17.45% | 19.75% | 19.74% | 13.80% | 13.86% | 12.99% |
| 2. Actuarial Accrued Liability (AAL) | | | | | | | | | |
| a. Active | \$ 12,997 | \$ 19,885 | \$ 32,883 | \$ 8 | \$ 1,783 | \$ 1,791 | \$ 34,673 | \$ 33,788 | \$ 32,406 |
| b. Retired | 25,316 | 34,977 | 60,293 | 49 | 2,488 | 2,537 | 62,830 | 60,808 | 56,839 |
| c. Deferred/Inactive | 1,093 | 1,536 | 2,628 | 1 | 35 | 36 | 2,664 | 2,581 | 2,588 |
| d. Total | \$ 39,406 | \$ 56,398 | \$ 95,804 | \$ 57 | \$ 4,306 | \$ 4,363 | \$100,167 | \$ 97,177 | \$ 91,832 |
| 3. Unfunded AAL (UAAL) (FV Basis) | \$ 8,503 | \$ 10,723 | \$ 19,226 | \$ 15 | \$ 646 | \$ 661 | \$ 19,887 | \$ 19,116 | \$ 13,771 |
| 4. Unfunded AAL (UAAL) (MV Basis) | \$ 9,568 | \$ 12,297 | \$ 21,864 | \$ 16 | \$ 772 | \$ 788 | \$ 22,653 | \$ 22,617 | \$ 17,272 |
| 5. Funded Ratio (FV Basis) | 78.4 % | 81.0 % | 79.9 % | 73.7 % | 85.0 % | 84.8 % | 80.1 % | 80.3 % | 85.0 % |
| D. Amortization Years to Fully Amortize UAAL * | 24 | 17 | 20 | N/A | 13 | 13 | 19 | 20 | 19 |
| E. Contribution Rates | | | | | | | | | |
| | CY 2019 | | | | | | CY 2018 | | |
| 1. Pension Contributions | | | | | | | | | |
| a. Employer Normal Cost | 4.03% | 3.85% | 3.93% | 5.45% | 6.75% | 6.75% | 4.04% | 4.09% | 3.22% |
| b. Member Contribution Rate # | 9.61% | 9.65% | 9.63% | 12.00% | 13.00% | 12.99% | 9.76% | 9.77% | 9.77% |
| c. UAAL Contribution Rate | 9.97% | 10.15% | 10.07% | 12.65% | 11.35% | 11.35% | 10.12% | 10.07% | 6.94% |
| d. Total | 23.61% | 23.65% | 23.63% | 30.10% | 31.10% | 31.09% | 23.92% | 23.93% | 19.93% |
| 2. Retiree Health Contribution Rate | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 4.00% |
| 3. Total Employer Contribution Rate | 14.00% | 14.00% | 14.00% | 18.10% | 18.10% | 18.10% | 14.16% | 14.16% | 14.16% |

* Based on i) schedule of employer and member contribution rates shown on page III-3. For the 2016 results, the amortization years shown are from December 31, 2017. For Actuarially Determined Employer Contribution (ADEC) purposes, amortization years are determined based upon scheduled contribution rate changes through 2019. See page XII-10 for additional explanation, and ii) Entry age actuarial cost method reflecting additional future normal cost savings anticipated to occur as Group A and Group B members are replaced by new hires subject to Group C benefit provisions.

2015 and 2016 results reflect 0% for Combined Plan members.

SUMMARY OF PENSION DEFINED BENEFIT VALUATION RESULTS
TRADITIONAL PLAN
DECEMBER 31
(\$ IN MILLIONS)

| | 2016 | | | | | | 2015 | | |
|---|-----------|-----------|---------------|---------------|-----------------|-----------|-------------|-----------------|-----------------|
| | General | | | Law | | | Assumptions | | |
| | State | Local | Total General | Public Safety | Law Enforcement | Total Law | Grand Total | New Grand Total | Old Grand Total |
| A. Demographic Information | | | | | | | | | |
| 1. Active Number Counts | 116,379 | 198,808 | 315,187 | 76 | 7,916 | 7,992 | 323,179 | 321,383 | 321,383 |
| 2. Active Payroll | \$ 4,966 | \$ 7,565 | \$ 12,531 | \$ 3 | \$ 511 | \$ 515 | \$ 13,046 | \$ 12,575 | \$ 12,575 |
| 3. Retired Number Counts | 73,173 | 135,179 | 208,352 | 178 | 5,020 | 5,198 | 213,550 | 210,792 | 210,792 |
| 4. Deferred/Inactive Number Counts | 231,360 | 290,310 | 521,670 | 43 | 1,000 | 1,043 | 522,713 | 500,904 | 500,904 |
| 5. Total Number Counts | 420,912 | 624,297 | 1,045,209 | 297 | 13,936 | 14,233 | 1,059,442 | 1,033,079 | 1,033,079 |
| B. Defined Benefit Assets | | | | | | | | | |
| 1. Market Value (MV) | \$ 29,674 | \$ 43,861 | \$ 73,535 | \$ 41 | \$ 3,534 | \$ 3,575 | \$ 77,110 | \$ 74,213 | \$ 74,213 |
| 2. Rate of Return on MV | | | | | | | 8.22 % | 0.31 % | 0.31 % |
| 3. Funding Value (FV) | \$ 30,734 | \$ 45,428 | \$ 76,162 | \$ 42 | \$ 3,660 | \$ 3,702 | \$ 79,865 | \$ 77,700 | \$ 77,700 |
| 4. Rate of Return on FV | | | | | | | 6.89 % | 8.36 % | 8.36 % |
| 5. Ratio of FV to MV | | | | | | | 103.6% | 104.7% | 104.7% |
| C. Defined Benefit Actuarial Results | | | | | | | | | |
| 1. Normal Cost as a % of Payroll | 13.87% | 13.71% | 13.77% | 17.45% | 19.75% | 19.74% | 14.01% | 14.06% | 13.16% |
| 2. Actuarial Accrued Liability (AAL) | | | | | | | | | |
| a. Active | \$ 12,867 | \$ 19,711 | \$ 32,579 | \$ 8 | \$ 1,783 | \$ 1,791 | \$ 34,370 | \$ 33,511 | \$ 32,144 |
| b. Retired | 25,305 | 34,956 | 60,261 | 49 | 2,488 | 2,537 | 62,798 | 60,784 | 56,816 |
| c. Deferred/Inactive | 1,087 | 1,528 | 2,614 | 1 | 35 | 36 | 2,650 | 2,568 | 2,575 |
| d. Total | \$ 39,259 | \$ 56,195 | \$ 95,454 | \$ 57 | \$ 4,306 | \$ 4,363 | \$ 99,818 | \$ 96,863 | \$ 91,535 |
| 3. Unfunded AAL (UAAL) (FV Basis) | \$ 8,525 | \$ 10,767 | \$ 19,292 | \$ 15 | \$ 646 | \$ 661 | \$ 19,953 | \$ 19,163 | \$ 13,835 |
| 4. Unfunded AAL (UAAL) (MV Basis) | \$ 9,585 | \$ 12,334 | \$ 21,919 | \$ 16 | \$ 772 | \$ 788 | \$ 22,708 | \$ 22,650 | \$ 17,322 |
| 5. Funded Ratio (FV Basis) | 78.3 % | 80.8 % | 79.8 % | 73.7 % | 85.0 % | 84.8 % | 80.0 % | 80.2 % | 84.9 % |
| D. Amortization Years to Fully Amortize UAAL * | 25 | 18 | 20 | N/A | 13 | 13 | 20 | 20 | 19 |
| E. Contribution Rates | | | | | | | | | |
| | CY 2019 | | | | | | CY 2018 | | |
| 1. Pension Contributions | | | | | | | | | |
| a. Employer Normal Cost | 3.87% | 3.71% | 3.77% | 5.45% | 6.75% | 6.75% | 3.89% | 3.94% | 3.04% |
| b. Member Contribution Rate | 10.00% | 10.00% | 10.00% | 12.00% | 13.00% | 12.99% | 10.12% | 10.12% | 10.12% |
| c. UAAL Contribution Rate | 10.13% | 10.29% | 10.23% | 12.65% | 11.35% | 11.35% | 10.28% | 10.22% | 7.12% |
| d. Total | 24.00% | 24.00% | 24.00% | 30.10% | 31.10% | 31.09% | 24.29% | 24.28% | 20.28% |
| 2. Retiree Health Contribution Rate | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 4.00% |
| 3. Total Employer Contribution Rate | 14.00% | 14.00% | 14.00% | 18.10% | 18.10% | 18.10% | 14.17% | 14.16% | 14.16% |

* Based on i) schedule of employer and member contribution rates shown on page III-3. For the 2016 results, the amortization years shown are from December 31, 2017. For Actuarially Determined Employer Contribution (ADEC) purposes, amortization years are determined based upon scheduled contribution rate changes through 2019. See page XII-10 for additional explanation, and ii) Entry age actuarial cost method reflecting additional future normal cost savings anticipated to occur as Group A and Group B members are replaced by new hires subject to Group C benefit provisions.

**SUMMARY OF PENSION DEFINED BENEFIT VALUATION RESULTS
COMBINED PLAN
DECEMBER 31
(\$ IN MILLIONS)**

| | 2016 | | | 2015 | |
|---|----------|----------|----------------|--------------------|--------------------|
| | General | | Grand Total | Assumptions | |
| | State | Local | | New Grand Total | Old Grand Total |
| A. Demographic Information | | | | | |
| 1. Active Number Counts | 2,844 | 4,959 | 7,803 | 7,626 | 7,626 |
| 2. Active Payroll | \$ 165 | \$ 235 | \$ 400 | \$ 375 | \$ 375 |
| 3. Retired Number Counts | 117 | 281 | 398 | 324 | 324 |
| 4. Deferred/Inactive Number Counts | 735 | 991 | 1,726 | 1,984 | 1,984 |
| 5. Total Number Counts | 3,696 | 6,231 | 9,927 | 9,934 | 9,934 |
| B. Defined Benefit Assets | | | | | |
| 1. Market Value (MV) | \$ 160 | \$ 232 | \$ 392 | \$ 337 | \$ 337 |
| 2. Rate of Return on MV | | | 8.23 % | 0.40 % | 0.40 % |
| 3. Funding Value (FV) | \$ 165 | \$ 238 | \$ 402 | \$ 350 | \$ 350 |
| 4. Rate of Return on FV | | | 6.94 % | 7.97 % | 7.97 % |
| 5. Ratio of FV to MV | | | 103% | 104% | 104% |
| C. Defined Benefit Actuarial Results | | | | | |
| 1. Normal Cost as a % of Payroll | 7.29% | 7.46% | 7.39% | 7.41% | 7.44% |
| 2. Actuarial Accrued Liability (AAL) | | | | | |
| a. Active | \$ 130 | \$ 174 | \$ 304 | \$ 276 | \$ 262 |
| b. Retired | 7 | 12 | 18 | 14 | 13 |
| c. Deferred/Inactive | 6 | 8 | 14 | 13 | 13 |
| d. Total | \$ 142 | \$ 194 | \$ 336 | \$ 303 | \$ 288 |
| 3. Unfunded AAL (UAAL) (FV Basis) | \$ (22) | \$ (44) | \$ (66) | \$ (47) | \$ (63) |
| 4. Unfunded AAL (UAAL) (MV Basis) | \$ (18) | \$ (38) | \$ (56) | \$ (34) | \$ (49) |
| 5. Funded Ratio (FV Basis) | 115.5 % | 122.6 % | 119.6 % | 115.6 % | 121.7 % |
| D. Amortization Years to Fully Amortize UAAL * | 0 | 0 | 0 | 0 | 0 |
| E. Contribution Rates | | | | | |
| | CY 2019 | | | CY 2018 | |
| 1. Total Normal Cost | 7.29% | 7.46% | 7.39% | 7.41% | 7.44% |
| 2. Member Contribution Rate | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| 3. Employer Normal Cost | 7.29% | 7.46% | 7.39% | 7.41% | 7.44% |
| 4. Other Contributions # | 6.71% | 6.54% | 6.61% | 6.59% | 6.56% |
| 5. Total Employer Contribution Rate | 14.00% | 14.00% | 14.00% | 14.00% | 14.00% |

* Based on i) schedule of employer and member contribution rates shown on page III-3. For the 2016 results, the amortization years shown are from December 31, 2017. For Actuarially Determined Employer Contribution (ADEC) purposes, amortization years are determined based upon scheduled contribution rate changes through 2019. See page XII-10 for additional explanation, and ii) Entry age actuarial cost method reflecting additional future normal cost savings anticipated to occur as Group A and Group B members are replaced by new hires subject to Group C benefit provisions.

Other contributions include: amortization payments for the pension UAAL, mitigating contributions, and contributions to the retiree health care fund.

SUMMARY OF PENSION DEFINED BENEFIT VALUATION RESULTS
MEMBER DIRECTED PLAN
DECEMBER 31

| | 2016 | | | 2015 | | |
|---|--------------|--------------|------------------|----------------|--------------------|--------------------|
| | General | | Total General | Grand Total | Assumptions | |
| | State | Local | | | New Grand Total | Old Grand Total |
| A. Demographic Information | | | | | | |
| 1. Active Number Counts | 4,103 | 7,394 | 11,497 | 11,497 | 11,281 | 11,281 |
| 2. Retired Number Counts | 58 | 161 | 219 | 219 | 185 | 185 |
| 3. Deferred / Inactive Number Counts | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| 4. Total Number Counts | 4,161 | 7,555 | 11,716 | 11,716 | 11,466 | 11,466 |
| B. Defined Benefit Assets | | | | | | |
| 1. Market Value (MV) | \$ 4,179,482 | \$ 8,485,797 | \$ 12,665,279 | \$ 12,665,279 | \$ 10,149,331 | \$ 10,149,331 |
| 2. Rate of Return on MV | | | | 8.57 % | 0.88 % | 0.88 % |
| 3. Funding Value (FV) | \$ 4,277,103 | \$ 8,684,002 | \$ 12,961,105 | \$ 12,961,105 | \$ 10,622,057 | \$ 10,622,057 |
| 4. Rate of Return on FV | | | | 6.67 % | 7.09 % | 7.09 % |
| 5. Ratio of FV to MV | | | | 102.3% | 104.7% | 104.7% |
| C. Defined Benefit Actuarial Results | | | | | | |
| 1. Normal Cost as a % of Payroll | | | | | | |
| 2. Actuarial Accrued Liability (AAL) | | | | | | |
| a. Active | \$ 0 | \$ 0 | \$ 0 | \$ 0 | \$ 0 | \$ 0 |
| b. Retired | 4,277,103 | 8,684,002 | 12,961,105 | 12,961,105 | 10,290,582 | 9,767,164 |
| c. Deferred/Inactive | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| d. Total | 4,277,103 | 8,684,002 | 12,961,105 | 12,961,105 | 10,290,582 | 9,767,164 |
| 3. Unfunded AAL (UAAL) (FV Basis) | \$ 0 | \$ 0 | \$ 0 | \$ 0 | \$ 0 | \$ 0 |
| 4. Unfunded AAL (UAAL) (MV Basis) | \$ 97,621 | \$ 198,205 | \$ 295,826 | \$ 295,826 | \$ 141,251 | \$ (382,167) |
| 5. Funded Ratio (FV Basis) | | | | 100.0 % | 103.2 % | 108.8 % |

COMMENTS AND CONCLUSION

The December 31, 2016 actuarial valuations of members indicate the following about the portion of employer contribution rates allocated to financing retirement allowances:

- The employer rates are sufficient to fully fund the cost of benefit commitments being made to members for service currently being rendered.
- After satisfying current cost requirements, the remaining portion of the employer rates provides sufficient funds to amortize unfunded actuarial accrued liabilities over a period of 19 years for the System in total.

Experience. The computed amortization period, taking into account all scheduled increases in contribution rates, is 19 years compared with the 20-year period that had been reported in the post-experience study December 31, 2015 valuation. In aggregate, experience was near expectations during the 2016 calendar year. Primary factors which typically would contribute to changes in the amortization years were:

- Measured on a funding value basis, investment return was 6.89%. This figure is based upon an actuarial calculation and may not agree with figures reported elsewhere. The return on the funding value was lower than 2016 market experience due to continued partial recognition of the overall net market loss during 2015. Since the return on funding value of assets was less than the 7.5% assumed return, there was an upward pressure to the amortization period.
- The number of members to leave active membership as a result of retirement, disability, and death-in-service were less than expected during calendar year 2016 resulting in a liability gain, placing downward pressure on the amortization period.

Information concerning 2016 experience including other sources of gains and losses is presented on pages I-15 through I-17.

Conclusion. Based on the results of the December 31, 2016 regular annual actuarial valuation, it is our opinion that the Ohio Public Employees Retirement System continues to operate in accordance with actuarial principles of level percent of payroll financing.

OTHER OBSERVATIONS

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

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.5% on the actuarial value of assets), it is expected that:

- (1) The employer normal cost as a percentage of pay will decrease to the level of the Group C normal cost as time passes as the majority of the active population is comprised of Group C members,
- (2) The unfunded actuarial accrued liabilities will be fully amortized after 19 years, and
- (3) The funded status of the plan will increase gradually towards a 100% funded ratio.

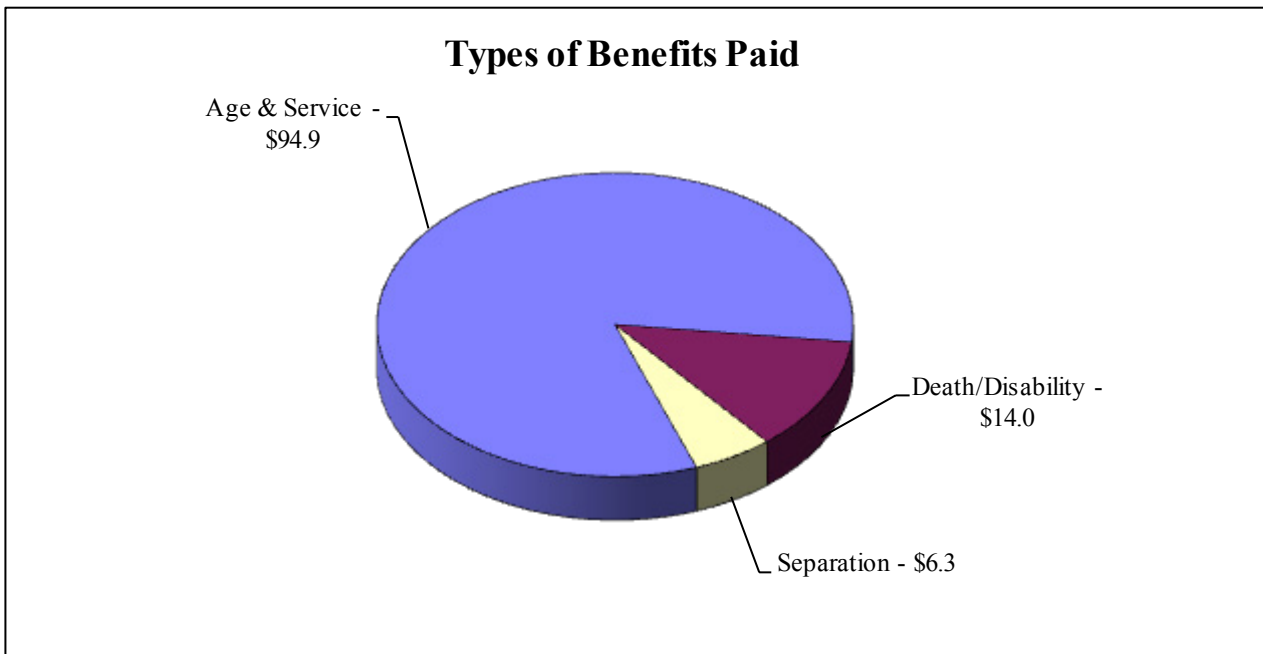
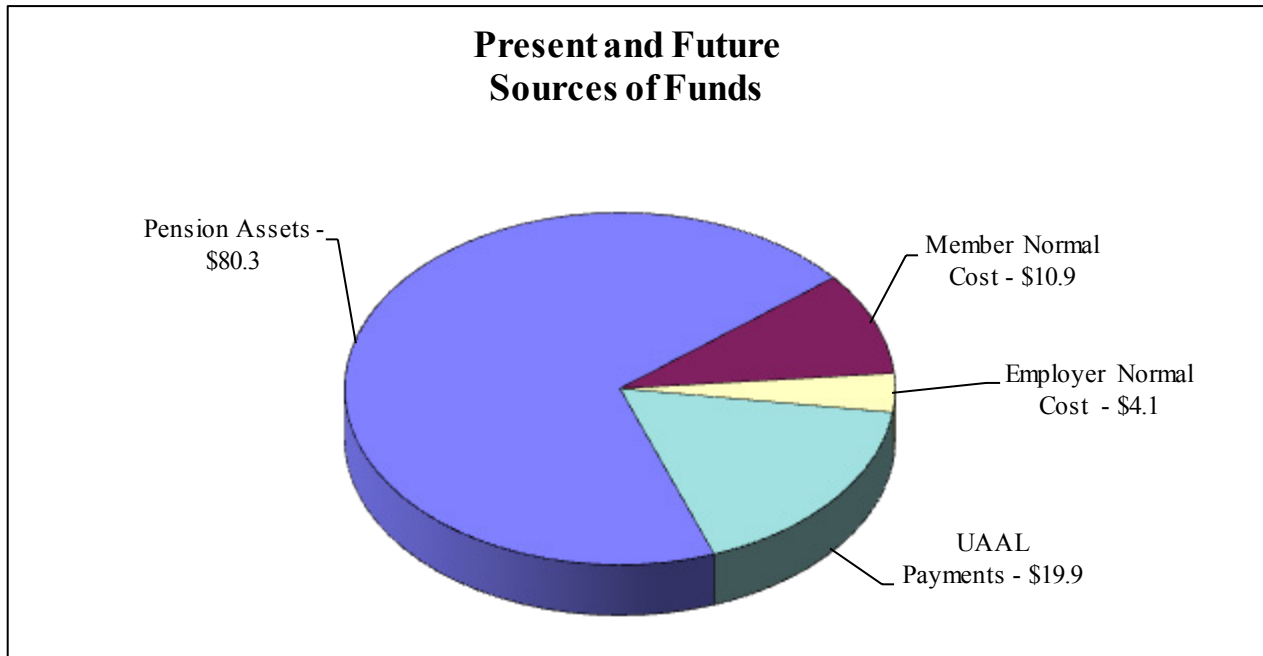
When selecting a contribution allocation procedure, the following three items should be considered, including the balance amongst the three items: (1) benefit security, (2) intergenerational equity, and (3) contribution stability and predictability. Generally, given the nature of public employee retirement systems (e.g., level contribution financing objective and perceived ongoing nature of the plan or plan sponsor), intergenerational equity and contribution stability and predictability have received more consideration than benefit security when contribution allocation procedures are selected. However, given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

Limitations of Funded Status Measurements

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

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

**FINANCING \$115.2 BILLION* OF DEFINED BENEFIT PROMISES
FOR PRESENT ACTIVE AND RETIRED MEMBERS
DECEMBER 31, 2016
(DOLLAR AMOUNTS IN BILLIONS)**



* Present value of future benefits – all divisions combined.

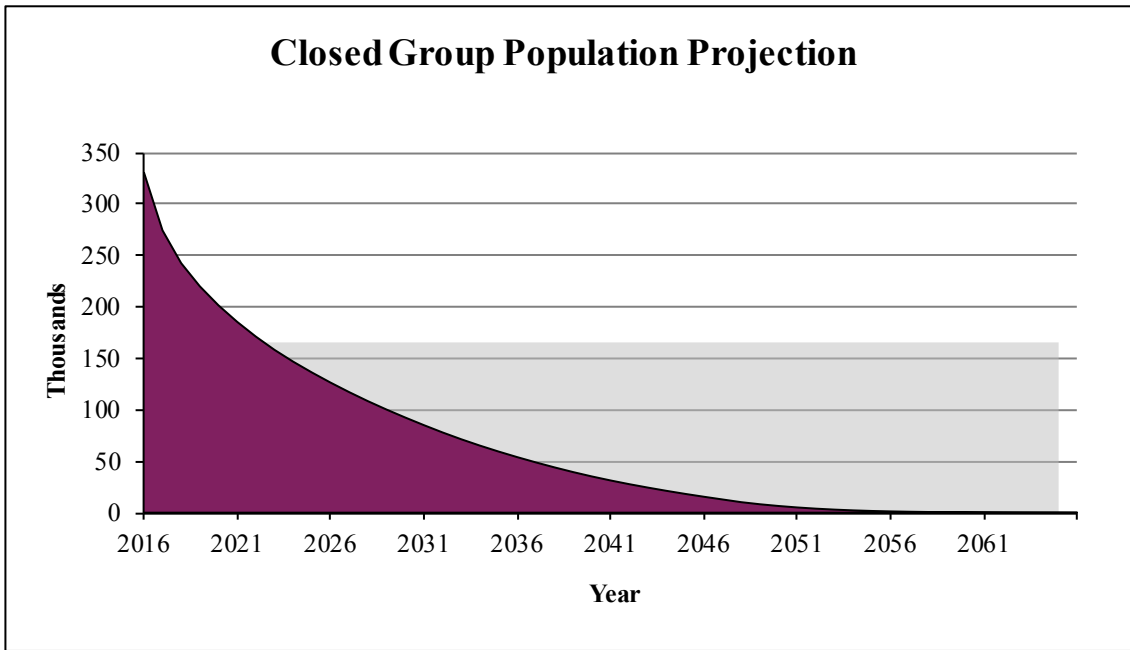
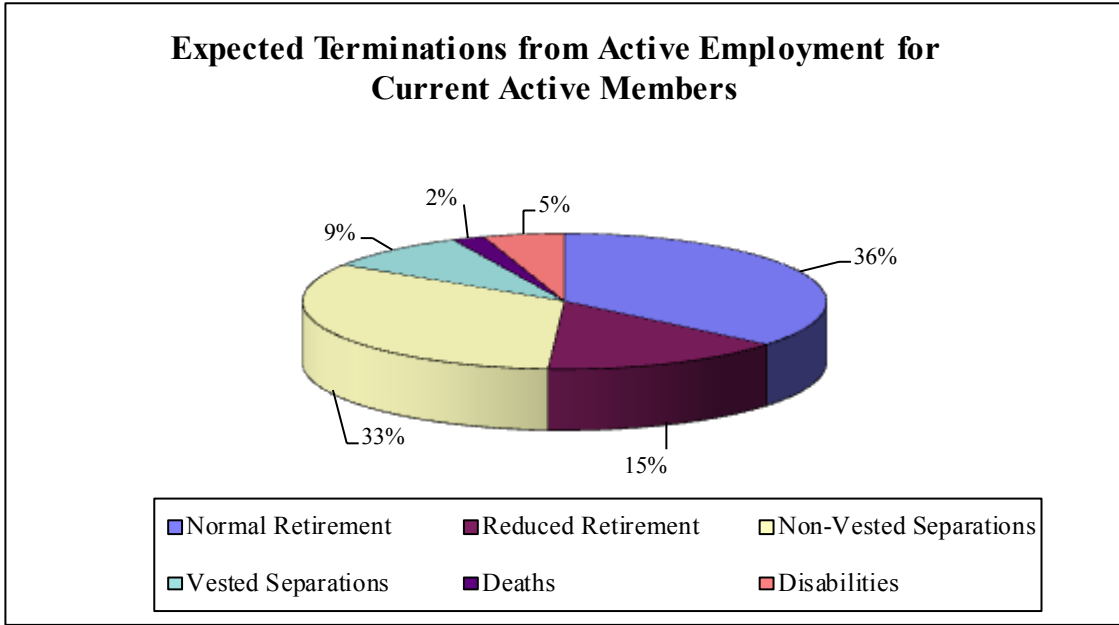
DEFINED BENEFIT ACTIVE MEMBERS IN VALUATION GROUP AVERAGES - COMPARATIVE STATEMENT

| Valuation Group | Dec. 31 | No. of Active Members | Group Averages | | | | |
|---|-------------|-----------------------------|------------------|-------------------------|----------------|--------------|---|
| | | | Attained Age | Accrued Service Yrs. | Annual Payroll | | |
| | | | | | Average | Increase | |
| STATE | 1975 | 83,220 | 40.6 yrs. | 6.5 yrs. | \$ 9,441 | 6.4 % | @ |
| | 1980 | 92,872 | 39.4 | 7.3 | 13,934 | 8.1 % | @ |
| | 1985 | 89,256 | 39.2 | 8.4 | 18,677 | 7.4 % | @ |
| | 1990 | 98,939 | 40.7 | 8.1 | 25,281 | 6.2 % | @ |
| | 1995 | 114,596 | 40.4 | 8.8 | 27,962 | 2.0 % | @ |
| | 2000 | 113,099 | 41.6 | 9.7 | 34,201 | 4.1 % | @ |
| | 2005 | 114,620 | 42.0 | 10.1 | 37,858 | 2.1 % | @ |
| | 2010 | 118,240 | 41.0 | 9.6 | 40,691 | 1.5 % | @ |
| | 2015 | 118,372 | 39.9 | 8.9 | 41,911 | 2.6 % | |
| | 2016 | 119,223 | 39.8 | 8.8 | 43,037 | 2.7 % | |
| LOCAL GOVT | 1975 | 149,557 | 40.8 yrs. | 6.1 yrs. | 8,771 | 4.3 % | @ |
| | 1980 | 160,797 | 40.7 | 7.4 | 13,035 | 8.2 % | @ |
| | 1985 | 158,285 | 40.1 | 8.3 | 15,983 | 6.2 % | @ |
| | 1990 | 173,220 | 41.5 | 7.9 | 19,506 | 4.1 % | @ |
| | 1995 | 223,431 | 41.2 | 7.6 | 20,384 | 0.9 % | @ |
| | 2000 | 245,831 | 41.8 | 8.1 | 24,401 | 3.7 % | @ |
| | 2005 | 236,073 | 43.3 | 9.2 | 29,933 | 4.2 % | @ |
| | 2010 | 215,144 | 44.6 | 10.1 | 33,447 | 2.2 % | @ |
| | 2015 | 202,779 | 44.4 | 10.0 | 37,008 | 2.6 % | |
| | 2016 | 203,767 | 44.4 | 9.9 | 38,279 | 3.4 % | |
| LAW * (Includes Public Safety and Law Enforcement) | 1975 | 2,111 | 35.0 yrs. | 4.9 yrs. | 10,467 | - | |
| | 1980 | 3,019 | 36.1 | 6.8 | 16,846 | 10.0 % | @ |
| | 1985 | 4,207 | 36.5 | 8.4 | 20,103 | 5.5 % | @ |
| | 1990 | 5,804 | 38.6 | 9.9 | 26,936 | 6.0 % | @ |
| | 1995 | 6,605 | 39.3 | 11.1 | 32,441 | 3.2 % | @ |
| | 2000 | 8,045 | 39.3 | 11.7 | 40,387 | 4.5 % | @ |
| | 2005 | 8,111 | 39.9 | 12.6 | 49,472 | 4.1 % | @ |
| | 2010 | 7,790 | 41.2 | 14.0 | 56,801 | 2.8 % | @ |
| | 2015 | 7,858 | 41.3 | 14.2 | 61,710 | 1.7 % | |
| | 2016 | 7,992 | 41.4 | 14.3 | 64,422 | 4.4 % | |
| TOTAL | 2005 | 358,804 | 42.8 yrs. | 9.5 yrs. | 32,906 | 2.1 % | |
| | 2010 | 341,174 | 43.3 | 10.0 | 36,491 | 1.2 % | |
| | 2015 | 329,009 | 42.7 | 9.7 | 39,362 | 2.6 % | |
| | 2016 | 330,982 | 42.7 | 9.6 | 40,624 | 3.2 % | |

@ 5-year annual compound rate.

* Beginning with the December 31, 2005 valuation report, valuation results for the Law division are shown separately for Public Safety and Law Enforcement.

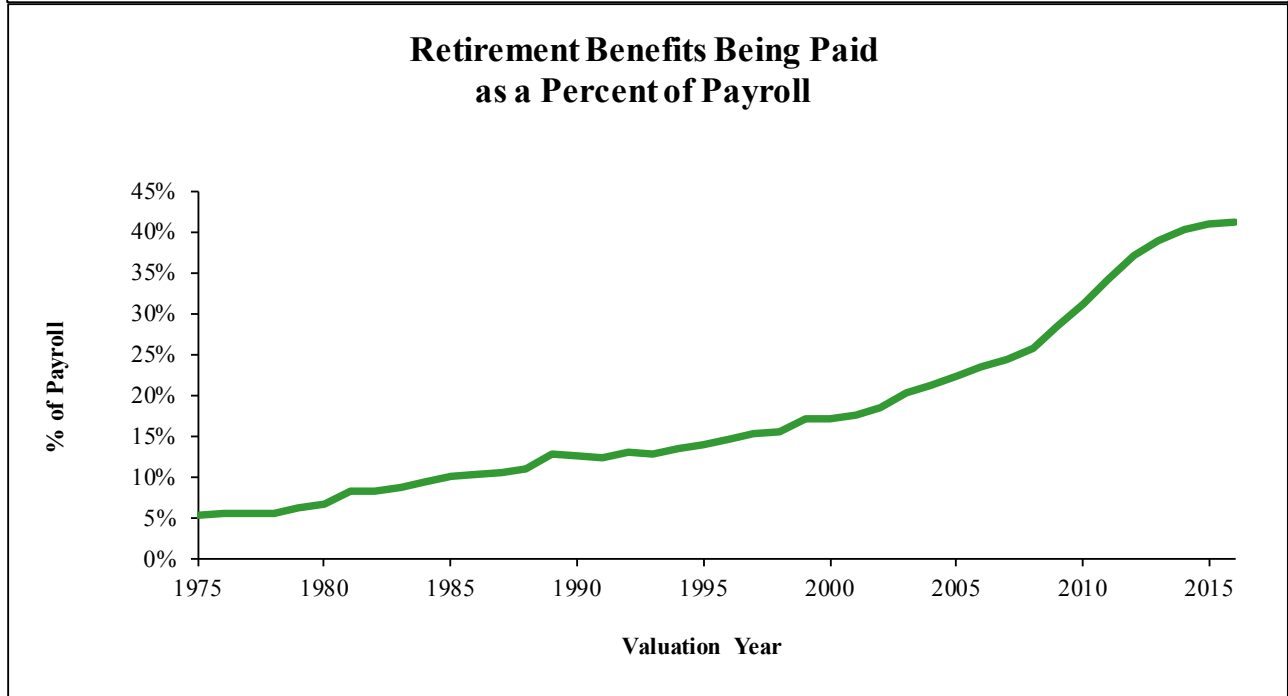
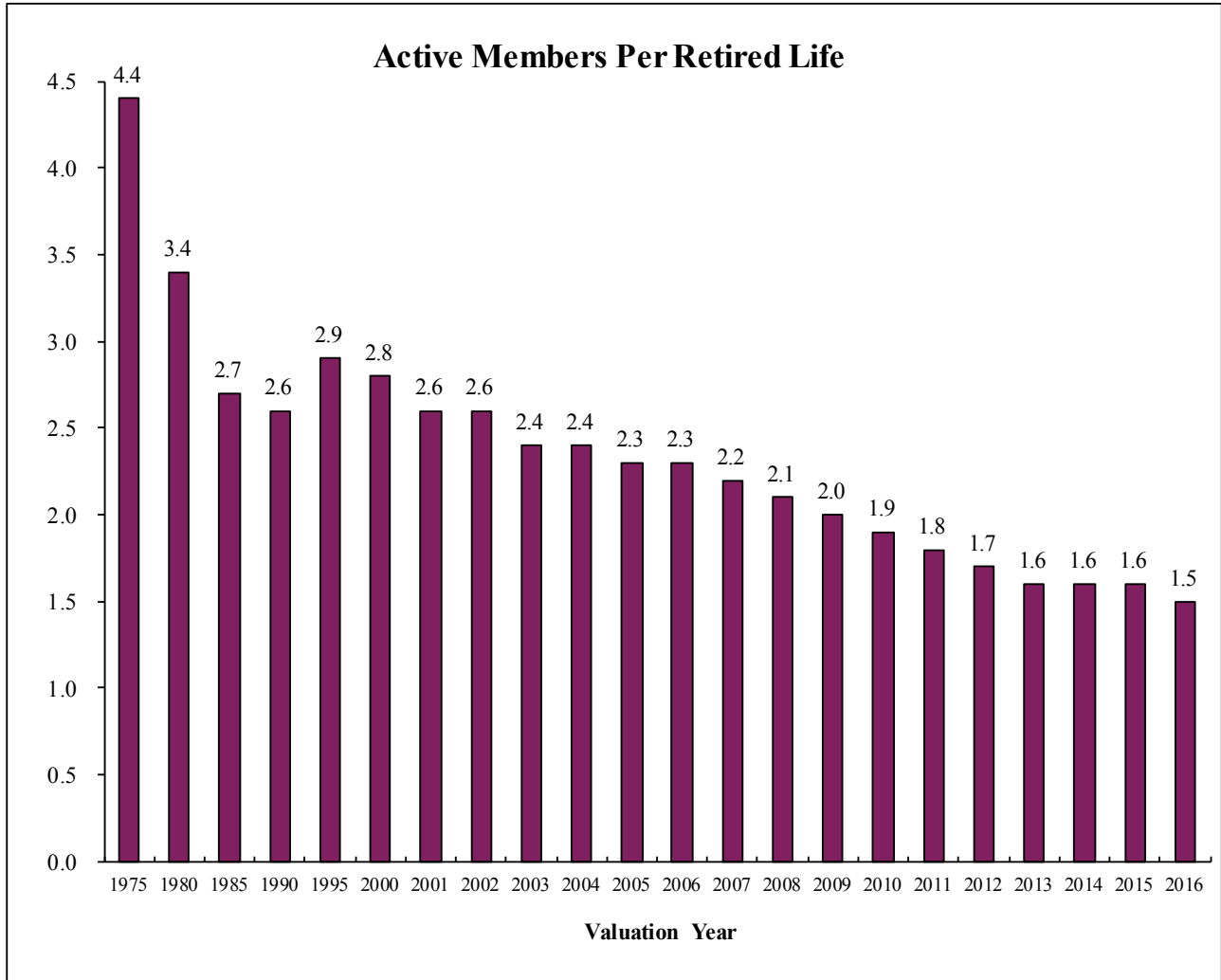
DEVELOPMENT OF PRESENT DEFINED BENEFIT POPULATION DECEMBER 31, 2016



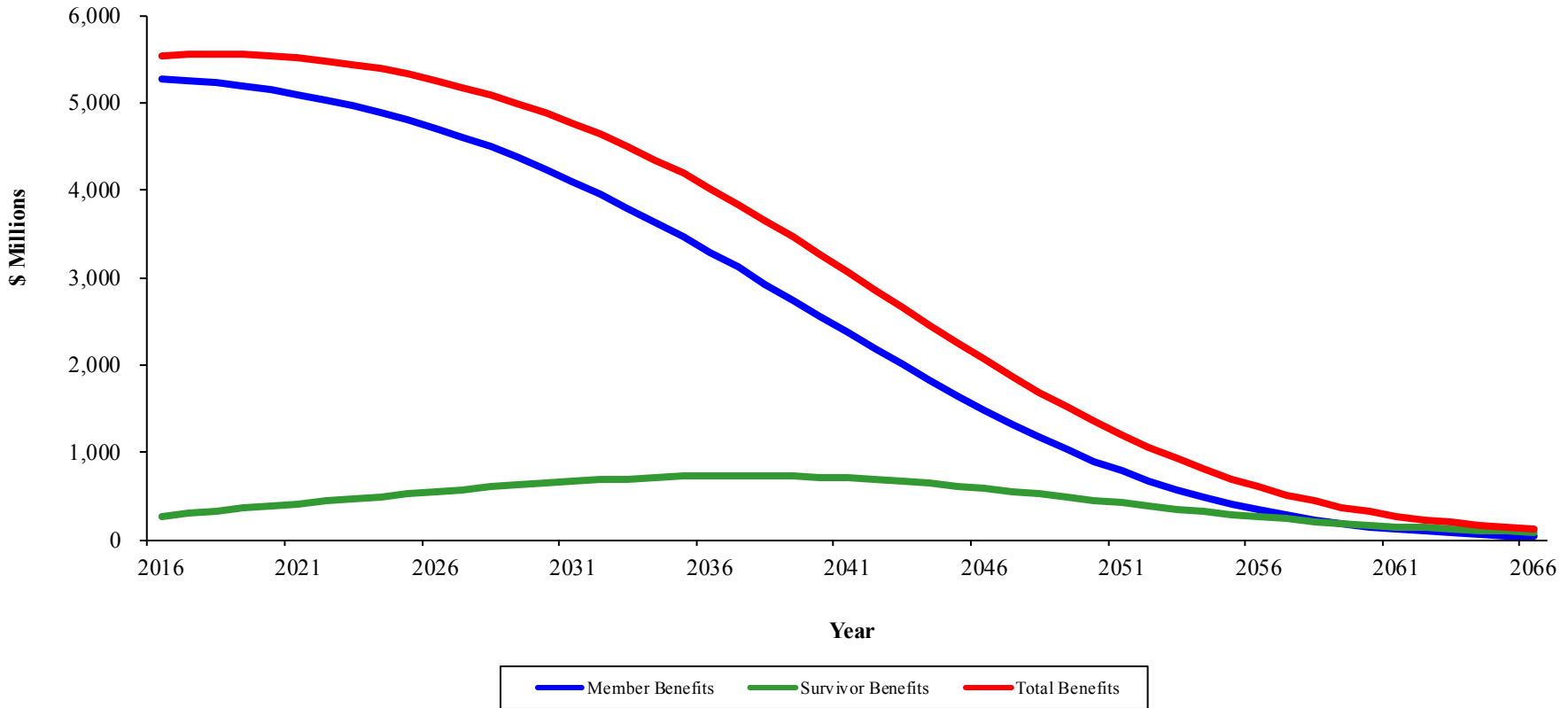
The charts above show the expected future development of the present population in simplified terms. The defined benefit portion of the Retirement System presently covers 330,982 active members. Eventually, 33% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for a monthly benefit. 60% of the present population is expected to receive monthly retirement benefits either by retiring directly from active service, or by separating from service without withdrawing contributions. 7% of the present population is expected to become eligible for death-in-service or disability benefits. Within 7 years, over half of the covered membership is expected to consist of new hires.

ACTIVE/RETIRED MEMBER STATISTICS

DECEMBER 31, 2016



PROJECTED FUTURE BENEFIT PAYMENTS ON BEHALF OF PRESENT RETIRED LIVES



| | |
|------------------------|-----------------|
| Total future payments: | \$151.8 billion |
| From present assets: | \$ 62.8 billion |
| From future earnings: | \$ 89.0 billion |

ALL DIVISIONS
DEFINED BENEFIT ACTIVE MEMBERS IN VALUATION
DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|------------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | 11,694 | | | | | | | 11,694 |
| Tot. Pay | \$109,257,022 | | | | | | | \$109,257,022 |
| Avg. Pay | \$9,343 | | | | | | | \$9,343 |
| 20-24 | 37,063 | 212 | | | | | | 37,275 |
| Tot. Pay | \$533,939,365 | \$4,980,325 | | | | | | \$538,919,690 |
| Avg. Pay | \$14,406 | \$23,492 | | | | | | \$14,458 |
| 25-29 | 26,114 | 3,714 | 173 | | | | | 30,001 |
| Tot. Pay | \$783,254,376 | \$156,056,946 | \$6,431,234 | | | | | \$945,742,556 |
| Avg. Pay | \$29,994 | \$42,019 | \$37,175 | | | | | \$31,524 |
| 30-34 | 18,244 | 8,198 | 3,300 | 195 | | | | 29,937 |
| Tot. Pay | \$613,952,308 | \$392,893,800 | \$168,419,658 | \$9,474,244 | | | | \$1,184,740,010 |
| Avg. Pay | \$33,652 | \$47,926 | \$51,036 | \$48,586 | | | | \$39,574 |
| 35-39 | 12,568 | 6,477 | 7,463 | 3,391 | 137 | | | 30,036 |
| Tot. Pay | \$441,213,243 | \$316,990,825 | \$411,511,758 | \$188,621,889 | \$7,095,310 | | | \$1,365,433,025 |
| Avg. Pay | \$35,106 | \$48,941 | \$55,140 | \$55,624 | \$51,791 | | | \$45,460 |
| 40-44 | 10,132 | 5,379 | 5,842 | 7,325 | 2,498 | 109 | | 31,285 |
| Tot. Pay | \$350,126,382 | \$262,838,879 | \$325,859,017 | \$436,036,666 | \$150,787,831 | \$6,011,929 | | \$1,531,660,704 |
| Avg. Pay | \$34,556 | \$48,864 | \$55,779 | \$59,527 | \$60,363 | \$55,155 | | \$48,958 |
| 45-49 | 10,234 | 5,492 | 5,741 | 7,129 | 6,997 | 3,105 | 90 | 38,788 |
| Tot. Pay | \$340,806,715 | \$257,130,353 | \$308,888,799 | \$412,232,881 | \$450,438,800 | \$197,688,492 | \$5,748,155 | \$1,972,934,195 |
| Avg. Pay | \$33,301 | \$46,819 | \$53,804 | \$57,825 | \$64,376 | \$63,668 | \$63,868 | \$50,865 |
| 50-54 | 8,502 | 4,961 | 5,478 | 6,320 | 5,909 | 6,891 | 1,714 | 39,775 |
| Tot. Pay | \$269,110,028 | \$220,614,123 | \$279,025,263 | \$348,374,225 | \$359,968,934 | \$454,034,453 | \$116,600,606 | \$2,047,727,632 |
| Avg. Pay | \$31,653 | \$44,470 | \$50,936 | \$55,123 | \$60,919 | \$65,888 | \$68,028 | \$51,483 |
| 55-59 | 7,315 | 4,634 | 5,204 | 6,256 | 5,569 | 5,902 | 3,134 | 38,014 |
| Tot. Pay | \$217,529,102 | \$193,199,684 | \$248,722,092 | \$322,886,851 | \$315,322,548 | \$373,471,219 | \$215,902,610 | \$1,887,034,106 |
| Avg. Pay | \$29,737 | \$41,692 | \$47,794 | \$51,612 | \$56,621 | \$63,279 | \$68,890 | \$49,641 |
| 60-64 | 5,070 | 3,291 | 3,836 | 4,665 | 3,920 | 3,921 | 2,237 | 26,940 |
| Tot. Pay | \$126,588,436 | \$130,353,996 | \$180,903,807 | \$232,546,715 | \$213,199,843 | \$236,701,899 | \$153,919,257 | \$1,274,213,953 |
| Avg. Pay | \$24,968 | \$39,609 | \$47,159 | \$49,849 | \$54,388 | \$60,368 | \$68,806 | \$47,298 |
| 65-69 | 2,997 | 1,445 | 1,492 | 1,528 | 1,339 | 1,249 | 993 | 11,043 |
| Tot. Pay | \$48,364,294 | \$46,780,225 | \$63,233,880 | \$71,795,771 | \$71,304,236 | \$72,527,537 | \$68,964,854 | \$442,970,797 |
| Avg. Pay | \$16,138 | \$32,374 | \$42,382 | \$46,987 | \$53,252 | \$58,068 | \$69,451 | \$40,113 |
| 70 & Over | 2,531 | 1,019 | 803 | 598 | 444 | 401 | 398 | 6,194 |
| Tot. Pay | \$30,551,986 | \$17,258,402 | \$18,927,414 | \$19,283,641 | \$18,525,529 | \$19,879,153 | \$20,759,510 | \$145,185,635 |
| Avg. Pay | \$12,071 | \$16,937 | \$23,571 | \$32,247 | \$41,724 | \$49,574 | \$52,160 | \$23,440 |
| Totals | 152,464 | 44,822 | 39,332 | 37,407 | 26,813 | 21,578 | 8,566 | 330,982 |
| Tot. Pay | \$3,864,693,257 | \$1,999,097,558 | \$2,011,922,922 | \$2,041,252,883 | \$1,586,643,031 | \$1,360,314,682 | \$581,894,992 | \$13,445,819,325 |
| Avg. Pay | \$25,348 | \$44,601 | \$51,152 | \$54,569 | \$59,174 | \$63,042 | \$67,931 | \$40,624 |

**ALL DIVISIONS
DEFINED BENEFIT ACTIVE MEMBERS IN VALUATION
DECEMBER 31, 2016
BY GENDER AND YEARS OF SERVICE**

| Service Years | Active Member Count | | | Active Member Pays | |
|---------------|---------------------|----------------|----------------|--------------------------|-----------------|
| | Males | Females | Total | Total | Average |
| 0 | 33,715 | 39,146 | 72,861 | \$ 1,221,866,469 | \$16,770 |
| 1 | 13,453 | 16,416 | 29,869 | 827,319,708 | 27,698 |
| 2 | 9,162 | 10,753 | 19,915 | 664,707,296 | 33,377 |
| 3 | 7,638 | 8,747 | 16,385 | 606,854,366 | 37,037 |
| 4 | 6,085 | 7,349 | 13,434 | 543,945,418 | 40,490 |
| 5 | 5,075 | 5,479 | 10,554 | 441,770,677 | 41,858 |
| 6 | 4,234 | 4,798 | 9,032 | 399,065,376 | 44,184 |
| 7 | 3,676 | 3,625 | 7,301 | 323,890,038 | 44,362 |
| 8 | 3,752 | 4,701 | 8,453 | 386,572,141 | 45,732 |
| 9 | 4,380 | 5,102 | 9,482 | 447,799,326 | 47,226 |
| 10 | 4,242 | 5,025 | 9,267 | 462,025,370 | 49,857 |
| 11 | 3,803 | 4,583 | 8,386 | 416,375,214 | 49,651 |
| 12 | 3,529 | 4,185 | 7,714 | 395,274,514 | 51,241 |
| 13 | 3,368 | 3,653 | 7,021 | 368,153,528 | 52,436 |
| 14 | 3,177 | 3,767 | 6,944 | 370,094,296 | 53,297 |
| 15 & Up | 45,247 | 49,117 | 94,364 | 5,570,105,588 | 59,028 |
| Totals | 154,536 | 176,446 | 330,982 | \$ 13,445,819,325 | \$40,624 |

SUMMARY OF PENSION EXPERIENCE
TRADITIONAL, COMBINED, AND MEMBER DIRECTED PLANS
(\$ IN MILLIONS)

| | 2016 | | 2015 | |
|--|--------------------|--------------------------|------------------|--------------------------|
| | Total \$ | % of Accrued Liabilities | Total \$ | % of Accrued Liabilities |
| Beginning of Year | | | | |
| 1. Total Accrued Liabilities* | \$ 97,176.83 | 100.0 % | \$ 89,285.24 | 100.0 % |
| 2. Valuation Assets | 78,060.95 | 80.3 % | 74,864.75 | 83.8 % |
| 3. Unfunded Actuarial Accrued Liabilities | \$ 19,115.88 | 19.7 % | \$ 14,420.49 | 16.2 % |
| Experience Gains(Losses) | | | | |
| 4. Gains (losses) in economic risk areas | | | | |
| a. Pay increases | \$ (44.05) | 0.0 % | \$ 373.01 | 0.4 % |
| b. Investment return | (469.94) | (0.5)% | 261.38 | 0.3 % |
| c. Total | \$ (513.99) | (0.5)% | \$ 634.39 | 0.7 % |
| 5. Gains (losses) from decrement experience | | | | |
| a. Service retirement | 55.63 | 0.1 % | 71.63 | 0.1 % |
| b. Disability retirement | 65.03 | 0.1 % | 87.05 | 0.1 % |
| c. Death-in-service | 42.19 | 0.0 % | 41.37 | 0.0 % |
| d. Other separations | 4.80 | 0.0 % | 22.37 | 0.0 % |
| e. Total | \$ 167.65 | 0.2 % | \$ 222.42 | 0.2 % |
| 6. Gains (losses) from retiree mortality | \$ 31.78 | 0.0 % | \$ 74.73 | 0.1 % |
| 7. Total experience gains (losses): (4c) + (5e) + (6) | \$ (314.56) | (0.3)% | \$ 931.54 | 1.0 % |
| End of Year | | | | |
| 8. Total Actuarial Accrued Liabilities | \$ 100,167.12 | 100.0 % | \$ 91,832.27 | 100.0 % |
| 9. Valuation Assets | 80,279.74 | 80.1 % | 78,060.95 | 85.0 % |
| 10. Unfunded Actuarial Accrued Liabilities | \$ 19,887.38 | 19.9 % | \$ 13,771.32 | 15.0 % |

SUMMARY OF PENSION EXPERIENCE
TRADITIONAL PLAN
(\$ IN MILLIONS)

| | 2016 | | 2015 | |
|--|--------------------|--------------------------|------------------|--------------------------|
| | Total \$ | % of Accrued Liabilities | Total \$ | % of Accrued Liabilities |
| Beginning of Year | | | | |
| 1. Total Accrued Liabilities* | \$ 96,863.38 | 100.0 % | \$ 89,017.35 | 100.0 % |
| 2. Valuation Assets | 77,699.90 | 80.2 % | 74,567.26 | 83.8 % |
| 3. Unfunded Actuarial Accrued Liabilities | \$ 19,163.48 | 19.8 % | \$ 14,450.09 | 16.2 % |
| Experience Gains (Losses) | | | | |
| 4. Gains (losses) in economic risk areas | | | | |
| a. Pay increases | \$ (48.14) | 0.0 % | \$ 367.09 | 0.4 % |
| b. Investment return | (467.82) | (0.5)% | 261.55 | 0.3 % |
| c. Total | (515.96) | (0.5)% | 628.64 | 0.7 % |
| 5. Gains (losses) from decrement experience | | | | |
| a. Service retirement | 55.57 | 0.1 % | 71.57 | 0.1 % |
| b. Disability retirement | 61.20 | 0.1 % | 83.12 | 0.1 % |
| c. Death-in-service | 41.25 | 0.0 % | 40.96 | 0.0 % |
| d. Other separations | 5.24 | 0.0 % | 22.12 | 0.0 % |
| e. Total | \$ 163.26 | 0.2 % | \$ 217.77 | 0.2 % |
| 6. Gains (losses) from retiree mortality | \$ 31.91 | 0.0 % | \$ 74.44 | 0.1 % |
| 7. Total experience gains (losses): (4c) + (5e) + (6) | \$ (320.79) | (0.3)% | \$ 920.85 | 1.0 % |
| End of Year | | | | |
| 8. Total Actuarial Accrued Liabilities | \$ 99,817.93 | 100.0 % | \$ 91,534.58 | 100.0 % |
| 9. Valuation Assets | 79,864.58 | 80.0 % | 77,699.90 | 84.9 % |
| 10. Unfunded Actuarial Accrued Liabilities | \$ 19,953.35 | 20.0 % | \$ 13,834.68 | 15.1 % |

**SUMMARY OF PENSION EXPERIENCE
COMBINED PLAN
(\$ IN MILLIONS)**

| | 2016 | | 2015 | |
|--|----------------|--------------------------|-----------------|--------------------------|
| | Total \$ | % of Accrued Liabilities | Total \$ | % of Accrued Liabilities |
| Beginning of Year | | | | |
| 1. Total Accrued Liabilities* | \$ 303.16 | 100.0 % | \$ 259.60 | 100.0 % |
| 2. Valuation Assets | 350.43 | 115.6 % | 288.72 | 111.2 % |
| 3. Unfunded Actuarial Accrued Liabilities | \$ (47.27) | (15.6)% | \$ (29.12) | (11.2)% |
| Experience Gains (Losses) | | | | |
| 4. Gains (losses) in economic risk areas | | | | |
| a. Pay increases | \$ 4.09 | 1.3 % | \$ 5.92 | 2.3 % |
| b. Investment return | (2.02) | (0.7)% | (0.08) | 0.0 % |
| c. Total | 2.07 | 0.6 % | 5.84 | 2.3 % |
| 5. Gains (losses) from decrement experience | | | | |
| a. Service retirement | 0.06 | 0.0 % | 0.07 | 0.0 % |
| b. Disability retirement | 3.82 | 1.3 % | 3.93 | 1.5 % |
| c. Death-in-service | 0.94 | 0.3 % | 0.42 | 0.2 % |
| d. Other separations | (0.44) | (0.1)% | 0.23 | 0.1 % |
| e. Total | \$ 4.38 | 1.5 % | \$ 4.65 | 1.8 % |
| 6. Gains (losses) from retiree mortality | \$ (0.03) | 0.0 % | \$ 0.29 | 0.1 % |
| 7. Total experience gains (losses): (4c) + (5e) + (6) | \$ 6.42 | 2.1 % | \$ 10.78 | 4.1 % |
| End of Year | | | | |
| 8. Total Actuarial Accrued Liabilities | \$ 336.23 | 100.0 % | \$ 287.92 | 100.0 % |
| 9. Valuation Assets | 402.20 | 119.6 % | 350.43 | 121.7 % |
| 10. Unfunded Actuarial Accrued Liabilities | \$ (65.97) | (19.6)% | \$ (62.51) | (21.7)% |

SUMMARY OF RISK MEASURES

TRADITIONAL PLAN

| Valuation Year | Funded Ratio | | UAAL | Funding Value | | | Standard Deviation of |
|-------------------|-----------------|-----------------|------------------------|-------------------------|------------------------------|------------------------------|--------------------------------------|
| | Based on FVA | Based on MVA | Amortization Period | UAAL / Total Payroll | of Assets / Total Payroll | Total AAL / Total Payroll | Investment Return / Total Payroll |
| 2007 | 96 % | 100 % | 14 | 0.2 | 5.4 | 5.6 | 50 % |
| 2008 | 75 | 67 | 30 | 1.4 | 4.4 | 5.8 | 33 |
| 2009 | 75 | 75 | 30 | 1.5 | 4.7 | 6.2 | 47 |
| 2010 | 79 | 79 | 25 | 1.4 | 5.2 | 6.6 | 56 |
| 2011 | 77 | 73 | 30 | 1.6 | 5.4 | 7.0 | 57 |
| 2012 | 81 | 81 | 26 | 1.3 | 5.7 | 7.0 | 74 |
| 2013 | 82 | 86 | 25 | 1.3 | 5.9 | 7.2 | 80 |
| 2014 | 84 | 86 | 21 | 1.2 | 6.1 | 7.2 | 83 |
| 2015 | 80 | 77 | 20 | 1.5 | 6.2 | 7.7 | 83 |
| 2016 | 80 | 77 | 20 | 1.5 | 6.1 | 7.7 | 72 |

COMBINED PLAN

| Valuation Year | Funded Ratio | | UAAL | Funding Value | | | Standard Deviation of |
|-------------------|-----------------|-----------------|------------------------|-------------------------|------------------------------|------------------------------|--------------------------------------|
| | Based on FVA | Based on MVA | Amortization Period | UAAL / Total Payroll | of Assets / Total Payroll | Total AAL / Total Payroll | Investment Return / Total Payroll |
| 2007 | 88 % | 88 % | N/A | 0.0 | 0.4 | 0.4 | 3 % |
| 2008 | 71 | 63 | 4 | 0.1 | 0.3 | 0.5 | 2 |
| 2009 | 74 | 70 | 3 | 0.1 | 0.4 | 0.6 | 4 |
| 2010 | 76 | 75 | 3 | 0.2 | 0.5 | 0.6 | 5 |
| 2011 | 79 | 75 | 2 | 0.1 | 0.5 | 0.7 | 6 |
| 2012 | 86 | 87 | 1 | 0.1 | 0.6 | 0.7 | 8 |
| 2013 | 100 | 105 | 0 | 0.0 | 0.7 | 0.7 | 9 |
| 2014 | 111 | 115 | 0 | -0.1 | 0.8 | 0.7 | 11 |
| 2015 | 116 | 111 | 0 | -0.1 | 0.9 | 0.8 | 13 |
| 2016 | 120 | 117 | 0 | -0.2 | 1.0 | 0.8 | 12 |

MEMBER DIRECTED PLAN

| Valuation Year | Funded Ratio | | UAAL | Funding Value | | | Standard Deviation of |
|-------------------|-----------------|-----------------|------------------------|-------------------------|------------------------------|------------------------------|--------------------------------------|
| | Based on FVA | Based on MVA | Amortization Period | UAAL / Total Payroll | of Assets / Total Payroll | Total AAL / Total Payroll | Investment Return / Total Payroll |
| 2007 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2008 | 89 % | 79 % | N/A | 0.0 | 0.0 | 0.0 | N/A |
| 2009 | 81 | 82 | N/A | 0.0 | 0.0 | 0.0 | N/A |
| 2010 | 92 | 92 | N/A | 0.0 | 0.0 | 0.0 | N/A |
| 2011 | 99 | 95 | N/A | 0.0 | 0.0 | 0.0 | N/A |
| 2012 | 95 | 97 | N/A | 0.0 | 0.0 | 0.0 | N/A |
| 2013 | 99 | 103 | N/A | 0.0 | 0.0 | 0.0 | N/A |
| 2014 | 106 | 107 | N/A | 0.0 | 0.0 | 0.0 | N/A |
| 2015 | 103 | 99 | N/A | 0.0 | 0.0 | 0.0 | N/A |
| 2016 | 100 | 98 | N/A | 0.0 | 0.0 | 0.0 | N/A |

SECTION II
FINANCIAL INFORMATION

FINANCIAL DATA FOR CALENDAR YEAR 2016

CONSOLIDATED ASSET RECONCILIATION

ALL PLANS, ALL DIVISIONS

| | Traditional Pension Plan | DB Portion of Combined Pension Plan | DB Portion of Member-Directed Plan | Total Pension Defined Benefit | 401(h) Health Care | 115 Health Care Trust | Member Directed VEBA | Total Health Care | DC Portion of Combined Pension Plan | Member Directed | Total Defined Contribution | Total |
|--|--------------------------|-------------------------------------|------------------------------------|-------------------------------|--------------------|-----------------------|----------------------|--------------------|-------------------------------------|-----------------|----------------------------|--------------------|
| Beginning Market Value @ 12/31/15 | | | | | | | | | | | | |
| Assets Held in Trust for Benefits | \$ 74,081,709,936 | \$ 336,559,317 | \$ 10,148,736 | \$ 74,428,417,989 | \$ - | \$ - | \$ - | \$ 11,678,609,766 | \$ 364,328,338 | \$ 688,390,701 | \$ 1,052,719,039 | \$ 87,159,746,794 |
| Gain/Loss on Security Lending | 7,834,109 | 26,753 | 595 | 7,861,457 | - | - | - | - | - | - | - | 7,861,457 |
| Transfer of MD-RMA from VEBA to 115 Trust | - | - | - | - | - | - | - | (169,389,177) | - | - | - | (169,389,177) |
| Assets Held for Upcoming Year Budget | 123,776,306 | - | - | 123,776,306 | - | - | - | - | - | - | - | 123,776,306 |
| Total Beginning Market Value @ 12/31/15 | \$ 74,213,320,351 | \$ 336,586,070 | \$ 10,149,331 | \$ 74,560,055,752 | \$ - | \$ - | \$ - | \$ 11,509,220,589 | \$ 364,328,338 | \$ 688,390,701 | \$ 1,052,719,039 | \$ 87,121,995,380 |
| External Cash Flows: | | | | | | | | | | | | |
| Revenues: | | | | | | | | | | | | |
| Member Contributions / Deposits | \$ 1,294,853,664 | \$ - | \$ - | \$ 1,294,853,664 | \$ - | \$ - | \$ - | \$ - | \$ 39,232,690 | \$ 53,128,866 | \$ 92,361,556 | \$ 1,387,215,220 |
| Employer Contributions | 1,556,529,162 | 47,079,023 | - | 1,603,608,185 | - | - | - | 284,903,259 | - | 50,761,586 | 50,761,586 | 1,939,273,030 |
| Employer Contributions - Administrative Expenses | - | - | 2,359,294 | 2,359,294 | - | - | - | - | - | - | - | 2,359,294 |
| Contract and Other Receipts | 77,862,156 | 280,678 | - | 78,142,834 | - | - | - | 1,594,086 | 339,400 | 527,291 | 866,691 | 80,603,611 |
| Retiree-Paid Health Care Premiums | - | - | - | - | - | - | - | 184,368,783 | - | - | - | 184,368,783 |
| Refund from HC Vendors (Formulary & Guarantees) | - | - | - | - | - | - | - | 91,735,221 | - | - | - | 91,735,220.97 |
| Federal Subsidies (Med D, ERFP & Direct Subsidy) | - | - | - | - | - | - | - | 4,065,058 | - | - | - | 4,065,058.00 |
| Other Income / Cancelled Warrants | (2,560,081) | - | - | (2,560,081) | - | - | - | 2,433,173 | - | - | - | (126,908) |
| Total Revenues | \$ 2,926,684,901 | \$ 47,359,701 | \$ 2,359,294 | \$ 2,976,403,896 | \$ - | \$ - | \$ - | \$ 569,099,580 | \$ 39,572,090 | \$ 104,417,743 | \$ 143,989,833 | \$ 3,689,493,309 |
| Disbursements: | | | | | | | | | | | | |
| Refunds of Member Accounts | \$ (352,362,641) | \$ (3,605,271) | \$ - | \$ (355,967,912) | \$ - | \$ - | \$ - | \$ - | \$ (18,252,241) | \$ (55,570,988) | \$ (73,823,229) | \$ (429,791,141) |
| Retirement Benefits | (5,584,517,896) | (1,443,631) | (926,593) | (5,586,888,120) | - | - | - | - | (538,033) | (574,814) | (1,112,847) | (5,588,000,967) |
| Retiree-Paid Health Care | - | - | - | - | - | - | - | (184,368,783) | - | - | - | (184,368,783) |
| ER Paid Health Care | - | - | - | - | - | - | - | (677,764,071) | - | - | - | (677,764,071) |
| ER Paid PCORI | - | - | - | - | - | - | - | (160,816) | - | - | - | (160,816) |
| ER Paid Medicare | - | - | - | - | - | - | - | (50,520,187) | - | - | - | (50,520,187) |
| Wellness RMA Funding | - | - | - | - | - | - | - | (2,230,494) | - | - | - | (2,230,494) |
| MD-RMA Funding | - | - | - | - | - | - | - | (546,891,319) | - | - | - | (546,891,319) |
| HRA Funding | - | - | - | - | - | - | - | (13,206,299) | - | - | - | (13,206,299) |
| Administrative Expenses | (85,546,284) | - | - | (85,546,284) | - | - | - | (28,296,857) | (2,978,365) | (2,632,527) | (5,610,892) | (119,454,033) |
| Total Disbursements | \$ (6,022,426,821) | \$ (5,048,902) | \$ (926,593) | \$ (6,028,402,316) | \$ - | \$ - | \$ - | \$ (1,503,438,826) | \$ (21,768,639) | \$ (58,778,329) | \$ (80,546,968) | \$ (7,612,388,110) |
| Net External Cash Flow | \$ (3,095,741,920) | \$ 42,310,799 | \$ 1,432,701 | \$ (3,051,998,420) | \$ - | \$ - | \$ - | \$ (934,339,246) | \$ 17,803,451 | \$ 45,639,414 | \$ 63,442,865 | \$ (3,922,894,801) |
| Inter-Plan Activity | | | | | | | | | | | | |
| Member Balance Transfers & Plan Switches | \$ 7,016,203 | \$ (4,234,656) | \$ - | \$ 2,781,547 | \$ - | \$ - | \$ - | \$ - | \$ (978,723) | \$ (1,802,824) | \$ (2,781,547) | \$ - |
| DCP Fixed Assets Advanced by TP | (71,083) | - | - | (71,083) | - | - | - | (13,762) | (1,771,126) | 3,088,285 | 1,317,159 | 1,232,314 |
| Mitigation Rate | 9,233,063 | (3,922,913) | - | 5,310,150 | - | - | - | - | - | (5,310,150) | (5,310,150) | - |
| Interest on 12/31/15 Advance Balance | 357,049 | - | - | 357,049 | - | - | - | - | (219,103) | (137,946) | (357,049) | - |
| Income Applied to Advance (Loan) Balance | (5,366,675) | - | - | (5,366,675) | - | - | - | 5,323,351 | 1,836,190 | (3,025,180) | (1,188,990) | (1,232,314) |
| Intraplan Transfer (DC to DB) | - | (7,634,923) | 145,365 | (7,489,558) | - | - | - | - | 7,634,923 | (145,365) | 7,489,558 | - |
| 401(h) and VEBA Trust Closures | (21,414) | - | - | (21,414) | - | - | - | 21,414 | - | - | - | - |
| Total Inter-Plan Activity | \$ 11,147,143 | \$ (15,792,492) | \$ 145,365 | \$ (4,499,984) | \$ - | \$ - | \$ - | \$ 5,331,003 | \$ 6,502,161 | \$ (7,333,180) | \$ (831,019) | \$ - |
| Investment Income: | | | | | | | | | | | | |
| Interest and Dividends | \$ 6,453,478,463 | \$ 31,054,966 | \$ 1,012,095 | \$ 6,485,545,524 | \$ - | \$ - | \$ - | \$ 890,289,217 | \$ 35,612,252 | \$ 66,004,567 | \$ 101,616,819 | \$ 7,477,451,560 |
| Other Ordinary Investment Income | - | - | - | - | - | - | - | - | - | - | - | - |
| Realized Capital Value Changes | - | - | - | - | - | - | - | - | - | - | - | - |
| Unrealized Income on Security Lending | 3,056,008 | 9,860 | 321 | 3,066,189 | - | - | - | 4,152 | - | - | - | 3,070,341 |
| Soft Dollars | - | - | - | - | - | - | - | - | - | - | - | - |
| External Asset Management Fees | (475,626,560) | (2,287,007) | (74,534) | (477,988,101) | - | - | - | (34,774,458) | (276,381) | (515,921) | (792,302) | (513,554,861) |
| Rounding | - | - | - | - | - | - | - | - | - | - | - | - |
| Investment Return | \$ 5,980,907,911 | \$ 28,777,819 | \$ 937,882 | \$ 6,010,623,612 | \$ - | \$ - | \$ - | \$ 855,518,911 | \$ 35,335,871 | \$ 65,488,646 | \$ 100,824,517 | \$ 6,966,967,040 |
| Ending Market Value @ 12/31/16 | \$ 77,109,633,485 | \$ 391,882,196 | \$ 12,665,279 | \$ 77,514,180,960 | \$ - | \$ - | \$ - | \$ 11,435,731,257 | \$ 423,969,821 | \$ 792,185,581 | \$ 1,216,155,402 | \$ 90,166,067,619 |

DEVELOPMENT OF FUNDING VALUE OF PENSION DEFINED BENEFIT ASSETS TRADITIONAL, COMBINED, AND MEMBER DIRECTED PLANS

| Year Ended December 31 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|-------------------|-------------------|-----------------|-----------------|---------------|
| A. Funding Value Beginning of Year | \$ 74,864,744,525 | \$ 78,060,951,567 | | | |
| B. Market Value End of Year | 74,560,055,753 | 77,514,180,960 | | | |
| C. Market Value Beginning of Year | 77,263,212,244 | 74,560,055,753 | | | |
| D. Non-Investment/Administrative Net Cash Flow | | | | | |
| D1. Member Contributions | 1,246,732,014 | 1,294,853,664 | | | |
| D2. Employer and other Non-Member Contributions Net of Admin Expenses | 1,621,481,643 | 1,686,838,968 | | | |
| D3. Refund of Member Accounts | (407,742,276) | (355,967,912) | | | |
| D4. Retirement Benefits | (5,400,877,101) | (5,586,888,120) | | | |
| D5. Member Balance Transfers / Intraplan Transfers | 3,525,304 | (4,708,011) | | | |
| D6. Admin Expenses | Included in E1 | (85,546,284) | | | |
| D7. Total Net Cash Flow: D1+D2+D3+D4+D5+D6 | (2,936,880,416) | (3,051,417,695) | | | |
| E. Investment Return | | | | | |
| E1. Market Total: B-C-D7 | 233,723,925 | 6,005,542,902 | | | |
| E2. Assumed Rate of Return | 8.00% | 7.50% | | | |
| E3. Assumed Amount of Return | 5,871,704,345 | 5,740,143,204 | | | |
| E4. Amount Subject to Phase-In: E1-E3 | (5,637,980,420) | 265,399,698 | | | |
| F. Phased-In Recognition of Investment Return | | | | | |
| F1. Current Year: 0.25 x E4 | (1,409,495,105) | 66,349,925 | | | |
| F2. First Prior Year | (145,618,437) | (1,409,495,105) | \$ 66,349,925 | | |
| F3. Second Prior Year | 1,018,826,375 | (145,618,437) | (1,409,495,105) | \$ 66,349,925 | |
| F4. Third Prior Year | 797,670,280 | 1,018,826,373 | (145,618,435) | (1,409,495,105) | \$ 66,349,923 |
| F5. Total Phase-Ins | 261,383,113 | (469,937,244) | (1,488,763,615) | (1,343,145,180) | 66,349,923 |
| G. Funding Value End of Year | | | | | |
| G1. Preliminary Funding Value End of Year: A+D7+E3+F5 | \$ 78,060,951,567 | \$ 80,279,739,832 | | | |
| G2. Upper Corridor Limit: 112% x B | 83,507,262,443 | 86,815,882,675 | | | |
| G3. Lower Corridor Limit: 88% x B | 65,612,849,063 | 68,212,479,245 | | | |
| G4. Funding Value End of Year | \$ 78,060,951,567 | \$ 80,279,739,832 | | | |
| H. Difference Between Market and Funding Value | (3,500,895,814) | (2,765,558,872) | (1,276,795,257) | 66,349,923 | - |
| I. Recognized Rate of Return | 8.36 % | 6.89 % | | | |
| J. Market Rate of Return | 0.31 % | 8.22 % | | | |
| K. Ratio of Funding Value to Market Value | 105 % | 104 % | | | |

The Funding Value of Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment return (line E4) are phased in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for 3 consecutive years, funding value will become equal to market value.

DEVELOPMENT OF FUNDING VALUE OF PENSION DEFINED BENEFIT ASSETS TRADITIONAL PLAN

| Year Ended December 31 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|-------------------|-------------------|-----------------|-----------------|---------------|
| A. Funding Value Beginning of Year | \$ 74,567,256,413 | \$ 77,699,901,543 | | | |
| B. Market Value End of Year | 74,213,320,352 | 77,109,633,485 | | | |
| C. Market Value Beginning of Year | 76,956,230,642 | 74,213,320,352 | | | |
| D. Non-Investment/Administrative Net Cash Flow | | | | | |
| D1. Member Contributions | 1,246,732,014 | 1,294,853,664 | | | |
| D2. Employer and other Non-Member Contributions Net of Admin Expenses | 1,575,592,064 | 1,641,042,886 | | | |
| D3. Refund of Member Accounts | (405,320,800) | (352,362,641) | | | |
| D4. Retirement Benefits | (5,398,844,664) | (5,584,517,896) | | | |
| D5. Member Balance Transfers / Intraplan Transfers | 6,567,183 | 7,016,203 | | | |
| D6. Admin Expenses | Included in E1 | (85,546,284) | | | |
| D7. Total Net Cash Flow: D1+D2+D3+D4+D5+D6 | (2,975,274,203) | (3,079,514,068) | | | |
| E. Investment Return | | | | | |
| E1. Market Total: B-C-D7 | 232,363,913 | 5,975,827,201 | | | |
| E2. Assumed Rate of Return | 8.00% | 7.50% | | | |
| E3. Assumed Amount of Return | 5,846,369,544 | 5,712,010,838 | | | |
| E4. Amount Subject to Phase-In: E1-E3 | \$(5,614,005,631) | 263,816,363 | | | |
| F. Phased-In Recognition of Investment Return | | | | | |
| F1. Current Year: 0.25 x E4 | \$(1,403,501,407) | 65,954,091 | | | |
| F2. First Prior Year | (145,804,137) | (1,403,501,407) | \$ 65,954,091 | | |
| F3. Second Prior Year | 1,015,531,306 | (145,804,137) | (1,403,501,407) | \$ 65,954,091 | |
| F4. Third Prior Year | 795,324,027 | 1,015,531,307 | (145,804,137) | (1,403,501,410) | \$ 65,954,090 |
| F5. Total Phase-Ins | 261,549,789 | (467,820,146) | (1,483,351,453) | (1,337,547,319) | 65,954,090 |
| G. Funding Value End of Year | | | | | |
| G1. Preliminary Funding Value End of Year: A+D7+E3+F5 | \$ 77,699,901,543 | \$ 79,864,578,167 | | | |
| G2. Upper Corridor Limit: 112% x B | 83,118,918,794 | 86,362,789,503 | | | |
| G3. Lower Corridor Limit: 88% x B | 65,307,721,910 | 67,856,477,467 | | | |
| G4. Funding Value End of Year | \$ 77,699,901,543 | \$ 79,864,578,167 | | | |
| H. Difference Between Market and Funding Value | (3,486,581,191) | (2,754,944,682) | (1,271,593,229) | 65,954,090 | - |
| I. Recognized Rate of Return | 8.36 % | 6.89 % | | | |
| J. Market Rate of Return | 0.31 % | 8.22 % | | | |
| K. Ratio of Funding Value to Market Value | 105 % | 104 % | | | |

The Funding Value of Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment return (line E4) are phased in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for 3 consecutive years, funding value will become equal to market value.

DEVELOPMENT OF FUNDING VALUE OF PENSION DEFINED BENEFIT ASSETS COMBINED PLAN

| Year Ended December 31 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|----------------|----------------|-------------|-------------|------------|
| A. Funding Value Beginning of Year | \$ 288,716,400 | \$ 350,427,967 | | | |
| B. Market Value End of Year | 336,586,070 | 391,882,196 | | | |
| C. Market Value Beginning of Year | 298,101,771 | 336,586,070 | | | |
| D. Non-Investment/Administrative Net Cash Flow | | | | | |
| D1. Member Contributions | - | - | | | |
| D2. Employer and other Non-Member Contributions Net of Admin Expenses | 43,927,778 | 43,436,788 | | | |
| D3. Refund of Member Accounts | (2,421,476) | (3,605,271) | | | |
| D4. Retirement Benefits | (1,256,757) | (1,443,631) | | | |
| D5. Member Balance Transfers / Intraplan Transfers | (3,041,879) | (11,869,579) | | | |
| D6. Admin Expenses | Included in E1 | - | | | |
| D7. Total Net Cash Flow: D1+D2+D3+D4+D5+D6 | 37,207,666 | 26,518,307 | | | |
| E. Investment Return | | | | | |
| E1. Market Total: B-C-D7 | 1,276,633 | 28,777,819 | | | |
| E2. Assumed Rate of Return | 8.00% | 7.50% | | | |
| E3. Assumed Amount of Return | 24,585,619 | 27,276,534 | | | |
| E4. Amount Subject to Phase-In: E1-E3 | (23,308,986) | 1,501,285 | | | |
| F. Phased-In Recognition of Investment Return | | | | | |
| F1. Current Year: 0.25 x E4 | (5,827,247) | 375,321 | | | |
| F2. First Prior Year | 210,163 | (5,827,247) | \$ 375,321 | | |
| F3. Second Prior Year | 3,219,516 | 210,163 | (5,827,247) | \$ 375,321 | |
| F4. Third Prior Year | 2,315,850 | 3,219,515 | 210,164 | (5,827,245) | \$ 375,322 |
| F5. Total Phase-Ins | (81,718) | (2,022,248) | (5,241,762) | (5,451,924) | 375,322 |
| G. Funding Value End of Year | | | | | |
| G1. Preliminary Funding Value End of Year: A+D7+E3+F5 | \$ 350,427,967 | \$ 402,200,560 | | | |
| G2. Upper Corridor Limit: 112% x B | 376,976,398 | 438,908,060 | | | |
| G3. Lower Corridor Limit: 88% x B | 296,195,742 | 344,856,332 | | | |
| G4. Funding Value End of Year | \$ 350,427,967 | \$ 402,200,560 | | | |
| H. Difference Between Market and Funding Value | (13,841,897) | (10,318,364) | (5,076,602) | 375,322 | - |
| I. Recognized Rate of Return | 7.97 % | 6.94 % | | | |
| J. Market Rate of Return | 0.40 % | 8.23 % | | | |
| K. Ratio of Funding Value to Market Value | 104 % | 103 % | | | |

The Funding Value of Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment return (line E4) are phased in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for 3 consecutive years, funding value will become equal to market value.

DEVELOPMENT OF FUNDING VALUE OF PENSION DEFINED BENEFIT ASSETS MEMBER DIRECTED PLAN

| Year Ended December 31 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|----------------|---------------|-----------|-----------|-----------|
| A. Funding Value Beginning of Year | \$ 8,771,712 | \$ 10,622,057 | | | |
| B. Market Value End of Year | 10,149,331 | 12,665,279 | | | |
| C. Market Value Beginning of Year | 8,879,831 | 10,149,331 | | | |
| D. Non-Investment/Administrative Net Cash Flow | | | | | |
| D1. Member Contributions | - | - | | | |
| D2. Employer and other Non-Member Contributions Net of Admin Expenses | 1,961,801 | 2,359,294 | | | |
| D3. Refund of Member Accounts | - | - | | | |
| D4. Retirement Benefits | (775,680) | (926,593) | | | |
| D5. Member Balance Transfers / Intraplan Transfers | - | 145,365 | | | |
| D6. Admin Expenses | Included in E1 | - | | | |
| D7. Total Net Cash Flow: D1+D2+D3+D4+D5+D6 | 1,186,121 | 1,578,066 | | | |
| E. Investment Return | | | | | |
| E1. Market Total: B-C-D7 | 83,379 | 937,882 | | | |
| E2. Assumed Rate of Return | 8.00% | 7.50% | | | |
| E3. Assumed Amount of Return | 749,182 | 855,832 | | | |
| E4. Amount Subject to Phase-In: E1-E3 | (665,803) | 82,050 | | | |
| F. Phased-In Recognition of Investment Return | | | | | |
| F1. Current Year: 0.25 x E4 | (166,451) | 20,513 | | | |
| F2. First Prior Year | (24,463) | (166,451) | \$ 20,513 | | |
| F3. Second Prior Year | 75,553 | (24,463) | (166,451) | \$ 20,513 | |
| F4. Third Prior Year | 30,403 | 75,551 | (24,462) | (166,450) | \$ 20,511 |
| F5. Total Phase-Ins | (84,958) | (94,850) | (170,400) | (145,937) | 20,511 |
| G. Funding Value End of Year | | | | | |
| G1. Preliminary Funding Value End of Year: A+D7+E3+F5 | \$ 10,622,057 | \$ 12,961,105 | | | |
| G2. Upper Corridor Limit: 112% x B | 11,367,251 | 14,185,112 | | | |
| G3. Lower Corridor Limit: 88% x B | 8,931,411 | 11,145,446 | | | |
| G4. Funding Value End of Year | \$ 10,622,057 | \$ 12,961,105 | | | |
| H. Difference Between Market and Funding Value | (472,726) | (295,826) | (125,426) | 20,511 | - |
| I. Recognized Rate of Return | 7.09 % | 6.67 % | | | |
| J. Market Rate of Return | 0.88 % | 8.57 % | | | |
| K. Ratio of Funding Value to Market Value | 105 % | 102 % | | | |

The Funding Value of Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment return (line E4) are phased in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for 3 consecutive years, funding value will become equal to market value.

**ALLOCATION OF FUNDING VALUE OF ASSETS AMONG DIVISIONS
DECEMBER 31, 2016
TRADITIONAL, COMBINED AND MEMBER DIRECTED PLANS**

| | Total DB System | | | | |
|--|-------------------|-------------------|------------------|--------------------|-------------------|
| | State | Local | Public Safety | Law Enforcement | Total |
| (1) Employer Accumulation Fund | | | | | |
| (a) Allocated Amounts | \$ 1,977,933,777 | \$ 4,687,571,025 | \$ (5,533,706) | \$ 657,731,427 | \$ 7,317,702,523 |
| (b) Unallocated Amounts Allocated by (1)(a) | 5,454,696 | 13,325,341 | (16,459) | 1,956,249 | 20,719,827 |
| (c) OPERS Directed Asset Reallocation | 0 | 0 | 0 | 0 | 0 |
| (d) Total EAF (1)(a) + (1)(b) + (1)(c) | \$ 1,983,388,473 | \$ 4,700,896,366 | \$ (5,550,165) | \$ 659,687,676 | \$ 7,338,422,350 |
| (2) Employee Savings Fund (ESF) | | | | | |
| (a) Total Member Deposits | \$ 5,588,716,708 | \$ 8,649,209,084 | \$ 3,674,315 | \$ 689,023,286 | \$ 14,930,623,392 |
| (b) ESF Allocated by (2)(a) | \$ 5,208,601,309 | \$ 8,060,861,074 | \$ 3,423,947 | \$ 642,073,207 | \$ 13,914,959,537 |
| (3) Retired Assets | | | | | |
| (a) Allocated Amounts | \$ 22,596,576,102 | \$ 31,212,312,494 | \$ 42,873,739 | \$ 2,226,136,480 | \$ 56,077,898,815 |
| (b) Additional and DC Annuities | 206,467 | 54,083,792 | 0 | 0 | 54,290,259 |
| (c) Total Retiree Assets | \$ 22,596,782,569 | \$ 31,266,396,286 | \$ 42,873,739 | \$ 2,226,136,480 | \$ 56,132,189,074 |
| (4) Subtotal: (1)(d) + (2)(b) + (3)(c) | \$ 29,788,772,351 | \$ 44,028,153,726 | \$ 40,747,521 | \$ 3,527,897,363 | \$ 77,385,570,961 |
| (5) Assets Held for Upcoming Year Budget Allocated According to (4) | 49,492,434 | 73,155,532 | 68,076 | 5,893,957 | 128,609,999 |
| (6) Total Employer + Employee Defined Benefit Assets: (4)+(5) | \$ 29,838,264,785 | \$ 44,101,309,258 | \$ 40,815,597 | \$ 3,533,791,320 | \$ 77,514,180,960 |
| (7) Market Value Adjustment Allocated According to (6) | 1,064,492,319 | 1,573,354,309 | 1,458,245 | 126,253,999 | 2,765,558,872 |
| (8) Funding Value of Defined Benefit Assets (6)+(7) | \$ 30,902,757,104 | \$ 45,674,663,567 | \$ 42,273,842 | \$ 3,660,045,319 | \$ 80,279,739,832 |

**ALLOCATION OF FUNDING VALUE OF ASSETS AMONG DIVISIONS
DECEMBER 31, 2016
TRADITIONAL PLAN**

| | Traditional Plan | | | | |
|--|--------------------------|--------------------------|--------------------------|----------------------------|--------------------------|
| | State | Local | Public Safety | Law Enforcement | Total |
| (1) Employer Accumulation Fund (EAF) | | | | | |
| (a) Allocated Amounts | \$ 1,824,581,405 | \$ 4,468,148,495 | \$ (5,533,706) | \$ 657,731,427 | \$ 6,944,927,621 |
| (b) Unallocated Amounts Allocated by (1)(a) | 5,426,737 | 13,289,331 | (16,459) | 1,956,249 | 20,655,858 |
| (c) OPERS Directed Asset Reallocation | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| (d) Total EAF (1)(a) + (1)(b) + (1)(c) | \$ 1,830,008,142 | \$ 4,481,437,826 | \$ (5,550,165) | \$ 659,687,676 | \$ 6,965,583,479 |
| (2) Employee Savings Fund (ESF) | | | | | |
| (a) Total Member Deposits | \$ 5,588,249,140 | \$ 8,648,633,074 | \$ 3,674,315 | \$ 689,023,286 | \$ 14,929,579,815 |
| (b) ESF Allocated by (2)(a) | \$ 5,207,465,580 | \$ 8,059,314,807 | \$ 3,423,947 | \$ 642,073,207 | \$ 13,912,277,541 |
| (3) Retired Assets | | | | | |
| (a) Allocated Amounts | \$ 22,586,596,285 | \$ 31,193,265,703 | \$ 42,873,739 | \$ 2,226,136,480 | \$ 56,048,872,207 |
| (b) Additional Annuities | <u>206,467</u> | <u>54,083,792</u> | <u>0</u> | <u>0</u> | <u>54,290,259</u> |
| (c) Total Retiree Assets | \$ 22,586,802,752 | \$ 31,247,349,495 | \$ 42,873,739 | \$ 2,226,136,480 | \$ 56,103,162,466 |
| (4) Subtotal: (1)(d) + (2)(b) + (3)(c) | \$ 29,624,276,474 | \$ 43,788,102,128 | \$ 40,747,521 | \$ 3,527,897,363 | \$ 76,981,023,486 |
| (5) Assets Held for Upcoming Year Budget Allocated According to (4) | <u>49,492,434</u> | <u>73,155,532</u> | <u>68,076</u> | <u>5,893,957</u> | <u>128,610,000</u> |
| (6) Total Employer + Employee Defined Benefit Assets: (4)+(5) | \$ 29,673,768,908 | \$ 43,861,257,660 | \$ 40,815,597 | \$ 3,533,791,320 | \$ 77,109,633,485 |
| (7) Market Value Adjustment Allocated According to (6) | <u>1,060,173,524</u> | <u>1,567,058,914</u> | <u>1,458,245</u> | <u>126,253,999</u> | <u>2,754,944,682</u> |
| (8) Funding Value of Defined Benefit Assets (6)+(7) | \$ 30,733,942,432 | \$ 45,428,316,574 | \$ 42,273,842 | \$ 3,660,045,319 | \$ 79,864,578,167 |

**ALLOCATION OF FUNDING VALUE OF ASSETS AMONG DIVISIONS
DECEMBER 31, 2016
COMBINED PLAN**

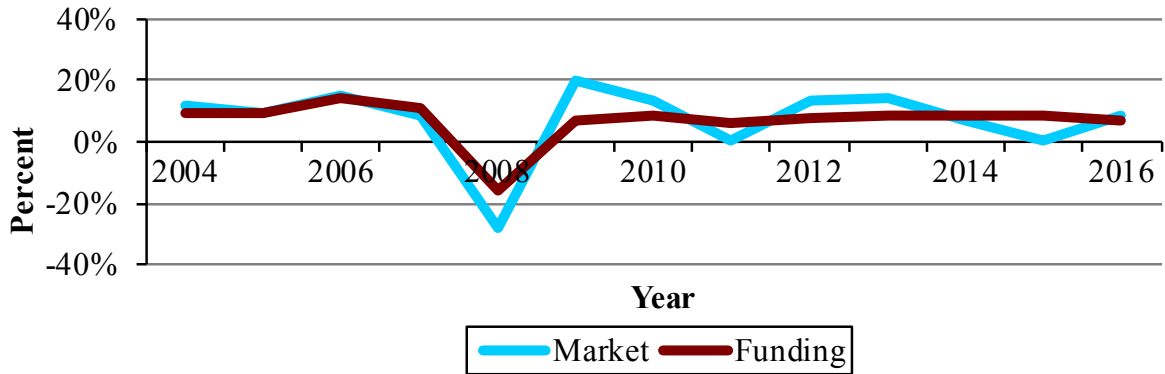
| | Combined Plan | | | | |
|--|-----------------------|-----------------------|------------------|--------------------|-----------------------|
| | State | Local | Public Safety | Law Enforcement | Total |
| (1) Employer Accumulation Fund | | | | | |
| (a) Allocated Amounts | \$ 152,956,374 | \$ 219,125,839 | \$0 | \$0 | \$ 372,082,213 |
| (b) Unallocated Amounts Allocated by (1)(a) | 22,042 | 31,578 | 0 | 0 | 53,620 |
| (c) OPERS Directed Asset Reallocation | 0 | 0 | 0 | 0 | 0 |
| (d) Total EAF (1)(a) + (1)(b) + (1)(c) | \$ 152,978,416 | \$ 219,157,417 | \$0 | \$0 | \$ 372,135,833 |
| (2) Employee Savings Fund | | | | | |
| (a) Total Member Deposits | \$ 401,675 | \$ 568,662 | \$0 | \$0 | \$ 970,336 |
| (b) ESF Allocated by (2)(a) | \$ 1,088,486 | \$ 1,540,999 | \$0 | \$0 | \$ 2,629,485 |
| (3) Retired Assets | | | | | |
| (a) Allocated Amounts | \$ 6,249,493 | \$ 10,867,385 | \$0 | \$0 | \$ 17,116,878 |
| (b) DC Annuities | 0 | 0 | 0 | 0 | 0 |
| (c) Total Retiree Assets | \$ 6,249,493 | \$ 10,867,385 | \$0 | \$0 | \$ 17,116,878 |
| (4) Subtotal: (1)(d) + (2)(b) + (3)(c) | \$ 160,316,395 | \$ 231,565,801 | \$0 | \$0 | \$ 391,882,196 |
| (5) Assets Held for Upcoming Year Budget Allocated According to (4) | 0 | 0 | 0 | 0 | 0 |
| (6) Total Employer + Employee Defined Benefit Assets: (4)+(5) | \$ 160,316,395 | \$ 231,565,801 | \$0 | \$0 | \$ 391,882,196 |
| (7) Market Value Adjustment Allocated According to (6) | 4,221,174 | 6,097,190 | 0 | 0 | 10,318,364 |
| (8) Funding Value of Defined Benefit Assets (6)+(7) | \$ 164,537,569 | \$ 237,662,991 | \$0 | \$0 | \$ 402,200,560 |

**ALLOCATION OF FUNDING VALUE OF ASSETS AMONG DIVISIONS
DECEMBER 31, 2016
MEMBER DIRECTED PLAN**

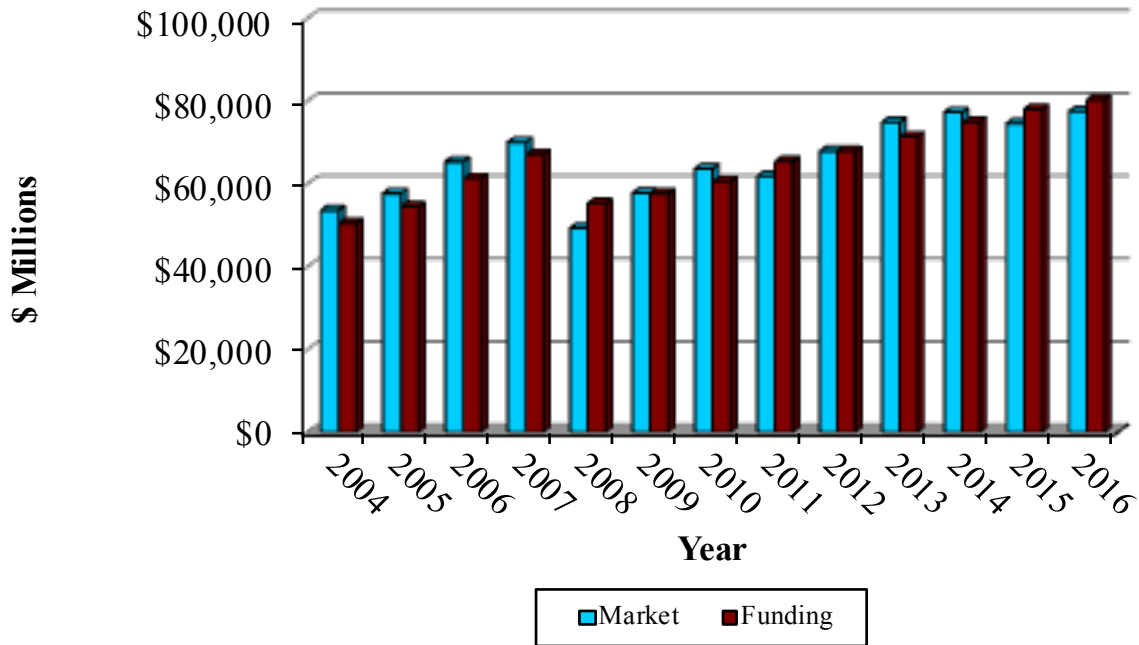
| | Member-Directed Plan | | | | |
|--|----------------------|--------------|------------------|--------------------|---------------|
| | State | Local | Public Safety | Law Enforcement | Total |
| (1) Employer Accumulation Fund | | | | | |
| (a) Allocated Amounts | \$ 395,998 | \$ 296,691 | \$0 | \$0 | \$ 692,689 |
| (b) Unallocated Amounts Allocated by 1(a) | 5,917 | 4,432 | 0 | 0 | 10,349 |
| (c) OPERS Directed Asset Reallocation | 0 | 0 | 0 | 0 | 0 |
| (d) Total EAF (1)(a) + (1)(b) + (1)(c) | \$ 401,915 | \$ 301,123 | \$0 | \$0 | \$ 703,038 |
| (2) Employee Savings Fund | | | | | |
| (a) Total Member Deposits | \$ 65,893 | \$ 7,348 | \$0 | \$0 | \$ 73,241 |
| (b) ESF Allocated by (2)(a) | \$ 47,243 | \$ 5,268 | \$0 | \$0 | \$ 52,511 |
| (3) Retired Assets | | | | | |
| (a) Allocated Amounts | \$ 3,730,324 | \$ 8,179,406 | \$0 | \$0 | \$ 11,909,730 |
| (b) No Division | 0 | 0 | 0 | 0 | 0 |
| (c) Total Retiree Assets | \$ 3,730,324 | \$ 8,179,406 | \$0 | \$0 | \$ 11,909,730 |
| (4) Subtotal: (1)(d) + (2)(b) + (3)(c) | \$ 4,179,482 | \$ 8,485,797 | \$0 | \$0 | \$ 12,665,279 |
| (5) Assets Held for Upcoming Year Budget Allocated According to (4) | 0 | 0 | 0 | 0 | 0 |
| (6) Total Employer + Employee Defined Benefit Assets: (4)+(5) | \$ 4,179,482 | \$ 8,485,797 | \$0 | \$0 | \$ 12,665,279 |

COMPARISON OF DEFINED BENEFIT PENSION ASSETS

Comparison of Rates of Return



Comparison of Defined Benefit Pension Asset Values



SECTION III

BENEFITS AND CONDITIONS EVALUATED

BENEFITS AND CONDITIONS EVALUATED

PLANS

Traditional Pension Plan. The Traditional Pension Plan is a defined benefit plan under which a member's retirement benefit is based on a formula. The formula is determined by years of contributing service and the average of the three (or five if a member of Group C as defined on page III-4) highest years of earnable salary (or final average salary). OPERS investment professionals manage the investment of employee and employer contributions to ensure that funds are available to pay the formula benefit.

Combined Plan. The Combined Plan is a retirement plan with both a defined benefit and a defined contribution component. Under the defined benefit portion of the Combined Plan, the member's benefit is determined by a reduced formula (similar to the Traditional Pension Plan). OPERS investment professionals manage the investment of employer contributions to ensure that funds are available to pay the reduced formula benefit. Under the defined contribution portion of the Combined Plan, employee contributions are deposited into the member's individual defined contribution account and invested as directed by the member. The member's retirement benefit under this portion of the Combined Plan is based on employee contributions and the gains and losses on those contributions. The member directs the investment by selecting from among the nine professionally-managed OPERS Investment Options.

Member-Directed Plan. The Member-Directed Plan is a defined contribution plan under which employee and employer contributions are deposited into a member's individual defined contribution account and invested as directed by the member. The member's retirement benefit is based on employee and employer contributions and the gains and losses on those contributions. Under the Member-Directed Plan, the member directs the investment by selecting from several professionally-managed OPERS Investment Options.

BENEFITS AND CONDITIONS EVALUATED

TERMS

Final Average Salary (“FAS”) means the average of the annual earnings for the 3 highest calendar years of compensation for Transition Group A and B members. The highest 5 calendar years is used for Transition Group C members.

Participant Contribution Account is the account for each Participant in the Combined or Member-Directed Plan to which shall be credited the employee contributions.

Miscellaneous Contribution Account is the account to which shall be credited any voluntary after-tax contributions for members in the Combined and Member-Directed Plans.

Rollover Account is the account to which shall be credited any rollover amounts for members in the Combined or Member-Directed Plans.

Employers’ Accumulation Fund is the fund to which shall be credited employer contributions for members in the Traditional or Combined Plan. There are separate accounts in the Employers’ Accumulation Fund for the Combined Plan and the Traditional Pension Plan.

Employer Contribution Account is the fund to which shall be credited a portion of the employer contributions for members in the Member-Directed Plan.

CONTRIBUTIONS

Member Contributions. Member contribution rates as a % of earnable salary are presented on page III-3.

Employer Contributions. Each employer contributes the remaining amounts necessary to finance OPERS benefits. Employer contributions are expressed as percents of member-covered payroll. The maximum statutory rate for state and local government employers is 14.0%. The maximum statutory rate for law enforcement employers is 18.1% (H.B. 416, effective 1/1/2001).

BENEFITS AND CONDITIONS EVALUATED

CONTRIBUTIONS (CONCLUDED)

Health Care Preservation Plan (HCPP). The following table shows total scheduled employer contribution rates (includes contributions for both the pension and retiree health programs):

| Year | State | Local Government | Law Enforcement | Public Safety |
|---------------------|--------------|-----------------------------|----------------------------|--------------------------|
| 2017 and Thereafter | 14.00% | 14.00% | 18.10% | 18.10% |

The portion of the above employer contribution rates scheduled to be allocated to the retiree health program are as follows:

| Year | All Divisions |
|---------------------|----------------------|
| 2017 | 1.0% |
| 2018 and Thereafter | 0.0% |

Health care funding portion of contribution rates are according to the Board adopted schedule.

Member contribution rates scheduled to be allocated to the pension program are as follows:

| Year | State | Local Government | Law Enforcement | Public Safety |
|----------------|--------------|-----------------------------|----------------------------|--------------------------|
| 2017 and Later | 10.00% | 10.00% | 13.00% | 12.00% |

SENATE BILL 343

Senate Bill 343. Senate Bill (SB) 343 became effective January 7, 2013. The benefit changes enacted by SB 343 do not apply to members who retired with an effective date of January 1, 2013 or earlier. The benefit provisions enumerated on pages III-9 through the end of Section III are the provisions that were applicable prior to the enactment of SB 343. Changes to the benefit provisions resulting from Senate Bill 343 are enumerated on pages III-4 through III-8.

Transition Groups. A transition plan was developed as part of the SB 343 benefit changes. The transition group to which a member belongs is dependent upon the date at which that member is first eligible to retire with a reduced or unreduced benefit.

A member is in Group A if the member is eligible to retire under the retirement eligibility conditions in place prior to the passage of SB 343 on or before January 7, 2018.

A member is in Group B if the member is not in Group A and satisfies either of the following conditions:

- (1) The member has 20 years of service credit as of January 7, 2013, or
- (2) The member is eligible to retire under the retirement eligibility conditions in place prior to the passage of SB 343 on or before January 7, 2023.

A member is in Group C if the member satisfies either of the following conditions:

- (1) The member was hired prior to January 7, 2013 but was not in Group A or Group B, or
- (2) The member was hired on or after January 7, 2013.

Key Benefit Changes. There are five key components that were affected by SB 343:

- (1) Age and service retirement eligibility conditions,
- (2) Benefit formula,
- (3) Cost-of-living Allowance (COLA),
- (4) Final Average Salary (FAS) period, and
- (5) Early retirement reduction factors

SENATE BILL 343

KEY BENEFIT CHANGES FOR TRANSITION GROUP A

COLAs. COLAs provided up to December 31, 2018 will be based upon a simple (i.e., not compound), 3 percent COLA. COLAs provided after December 31, 2018 continue to be simple, but the simple COLA percentage applicable in a year will be based upon the annual percentage change in the Consumer Price Index (CPI), but not greater than 3%.

KEY BENEFIT CHANGES FOR TRANSITION GROUP B

Retirement Eligibility. The table below shows retirement eligibility conditions for Group B members:

| <u>Valuation Group</u> | <u>Unreduced</u> | | <u>Reduced</u> | |
|--------------------------|------------------|----------------|----------------|----------------|
| | <u>Age</u> | <u>Service</u> | <u>Age</u> | <u>Service</u> |
| State / Local Government | 52 | 31 | 55 | 25 |
| | Any | 32 | | |
| | 66 | 5 | 60 | 5 |
| Law Enforcement | 50 | 25 | 48 | 25 |
| | 64 | 15 | 52 | 15 |
| Public Safety | 54 | 25 | 48 | 25 |
| | 64 | 15 | 52 | 15 |

Early Retirement Reduction Factors. Presented below are the reduction factors, expressed as a percentage of the base amount, applicable to a Group B member who retires with a reduced benefit:

State and Local Government:

| <u>Service</u> | <u>Ages</u> | | | | | | | | | | |
|----------------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | <u>55</u> | <u>56</u> | <u>57</u> | <u>58</u> | <u>59</u> | <u>60</u> | <u>61</u> | <u>62</u> | <u>63</u> | <u>64</u> | <u>65</u> |
| 30 | 75% | 76% | 78% | 79% | 80% | 82% | 83% | 85% | 86% | 88% | 89% |
| 29 | 69 | 70 | 72 | 73 | 74 | 75 | 76 | 78 | 79 | 80 | 89 |
| 28 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 80 | 89 |
| 27 | 59 | 60 | 61 | 62 | 62 | 63 | 64 | 65 | 72 | 80 | 89 |
| 26 | 55 | 55 | 56 | 57 | 57 | 58 | 59 | 65 | 72 | 80 | 89 |
| 25 | 50 | 51 | 51 | 52 | 52 | 53 | 59 | 65 | 72 | 80 | 89 |
| 24 & Under | | | | | | 53 | 59 | 65 | 72 | 80 | 89 |

SENATE BILL 343

Law Enforcement and Public Safety:

| Law Enforcement | | Public Safety | |
|-----------------|--------|---------------|--------|
| Age | Factor | Age | Factor |
| 48 | 84% | 48 | 58% |
| 49 | 92 | 49 | 64 |
| 50 | 100 | 50 | 70 |
| | | 51 | 76 |
| | | 52 | 83 |
| | | 53 | 91 |
| | | 54 | 100 |

COLAs. COLAs continue to be simple (i.e., not compound), but the simple COLA percentage applicable in a year will be based upon the annual percentage change in the Consumer Price Index (CPI), but not greater than 3%.

KEY BENEFIT CHANGES FOR TRANSITION GROUP C

Retirement Eligibility. The table below shows retirement eligibility conditions for Group C members:

| Valuation Group | Unreduced | | Reduced | |
|--------------------------|-----------|---------|---------|---------|
| | Age | Service | Age | Service |
| State / Local Government | 55 | 32 | 57 | 25 |
| | 67 | 5 | 62 | 5 |
| Law Enforcement | 52 | 25 | 48 | 25 |
| | 64 | 15 | 56 | 15 |
| Public Safety | 56 | 25 | 52 | 25 |
| | 64 | 15 | 56 | 15 |

SENATE BILL 343

Early Retirement Reduction Factors. Presented below are the reduction factors, expressed as a percentage of the base amount, applicable to a Group C member that retires with a reduced benefit:

State and Local Government:

| <u>Service</u> | <u>Ages</u> | | | | | | | | | |
|----------------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | <u>57</u> | <u>58</u> | <u>59</u> | <u>60</u> | <u>61</u> | <u>62</u> | <u>63</u> | <u>64</u> | <u>65</u> | <u>66</u> |
| 31 | 80% | 80% | 81% | 82% | 83% | 85% | 86% | 87% | 88% | 89% |
| 30 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 79 | 80 | 89 |
| 29 | 67 | 68 | 68 | 69 | 70 | 70 | 71 | 72 | 80 | 89 |
| 28 | 61 | 62 | 62 | 63 | 63 | 64 | 64 | 72 | 80 | 89 |
| 27 | 56 | 57 | 57 | 57 | 58 | 58 | 64 | 72 | 80 | 89 |
| 26 | 51 | 52 | 52 | 52 | 52 | 58 | 64 | 72 | 80 | 89 |
| 25 | 47 | 47 | 47 | 47 | 52 | 58 | 64 | 72 | 80 | 89 |
| 24 & Under | | | | | | 58 | 64 | 72 | 80 | 89 |

Law Enforcement and Public Safety:

| <u>Law Enforcement</u> | | <u>Public Safety</u> | |
|------------------------|---------------|----------------------|---------------|
| <u>Age</u> | <u>Factor</u> | <u>Age</u> | <u>Factor</u> |
| 48 | 70% | 52 | 69% |
| 49 | 76 | 53 | 76 |
| 50 | 84 | 54 | 83 |
| 51 | 91 | 55 | 91 |
| 52 | 100 | 56 | 100 |

COLAs. COLAs continue to be simple (i.e., not compound), but the simple COLA percentage applicable in a year will be based upon the annual percentage change in the Consumer Price Index (CPI), but not greater than 3%.

SENATE BILL 343

FAS Period. Final average salary is based on the average of the annual earnings for the 5 highest calendar years of compensation.

Benefit Formula. Service breakpoint for the 2.50% benefit multiplier in the Traditional Plan or 1.25% benefit multiplier in the Combined Plan for State and Local Government members increased from 30 years to 35 years.

OTHER BENEFIT CHANGES FOR ALL TRANSITION GROUPS

Minimum Benefit. The \$86 minimum benefit provision has been eliminated.

Long Interest Calculation. The minimum allowance calculation based upon twice the member's savings funding balance at retirement together with interest credits, annuitized with unisex factors that reflect plan interest and mortality assumptions, but not the plan's COLA, has been eliminated.

Disability Program. The definition of disability was changed to a more restrictive definition which is expected to result in a reduction in future disability cases.

TRADITIONAL PENSION PLAN – PRE SENATE BILL 343

AGE & SERVICE BENEFITS - STATE AND LOCAL GOVERNMENT MEMBERS

Age and service eligibility. A member who (i) has attained age 60 years and has 5 or more years of service credit or 60 contributing months, or (ii) has attained age 55 years and has 25 or more years of service credit, or (iii) has 30 or more years of service credit, may retire with an age and service retirement allowance.

Age and service allowance. A retiring member’s age and service allowance is equal to Ohio service credit times the greater of \$86, or 2.2% of FAS for the first 30 years of service plus 2.5% for years of service over 30 years (H.B. 628). The allowance is then adjusted by factors based on attained age or years of service (whichever yields the higher percentage) as determined in the following schedule:

| Attained Age | OR | Years of Service Credit | Percentage of Base Amount |
|-----------------|----|----------------------------|------------------------------|
| 58 | | 25 | 75% |
| 59 | | 26 | 80 |
| 60 | | 27 | 85 |
| 61 | | N/A | 88 |
| N/A | | 28 | 90 |
| 62 | | N/A | 91 |
| 63 | | N/A | 94 |
| N/A | | 29 | 95 |
| 64 | | N/A | 97 |
| 65 | | 30 or more | 100 |

Maximum allowance is 100% of FAS or the limits under IRC Section 415(b). Minimum allowance is based upon twice the member’s savings funding balance at retirement together with interest credits, annuitized with unisex factors that reflect plan interest and mortality assumptions, but not the plan’s COLA.

TRADITIONAL PENSION PLAN – PRE SENATE BILL 343

AGE & SERVICE BENEFITS – LAW MEMBERS (PUBLIC SAFETY) ELIGIBLE TO RETIRE UNDER OHIO REVISED CODE SECTION 145.33(B)(2)(B)

Age and service eligibility. A law member whose secondary duties are to preserve the peace, to protect life and property, and to enforce the laws of the state and who (i) has attained age 52 and has 25 or more years of credited service, or (ii) has attained age 62 and has 15 or more years of credited service, or (iii) has attained age 52 and has 15 or more years of credited service, may retire with an age and service allowance. A member covered by these provisions may retire early at age 48 with 25 or more years of service and receive the following percentage of the base benefit: 75%, 80%, 86%, or 93% at retirement ages 48, 49, 50 and 51 respectively.

Age and service allowance. A retiring member's age and service allowance under eligibility (i) or (ii) above is equal to 2.5% of FAS times the first 25 years of service credit plus 2.1% of FAS times service credit in excess of 25 years (H.B. 628). Maximum allowance is 90% of FAS or the limits under IRC Section 415(b). A retiring member's age and service allowance under eligibility (iii) above is equal to 1.5% of FAS times years of service credit. Minimum allowance for all law members is based upon twice the member's savings fund balance at retirement together with interest credits.

AGE & SERVICE BENEFITS - LAW MEMBERS (LAW ENFORCEMENT) ELIGIBLE TO RETIRE UNDER OHIO REVISED CODE SECTION 145.33(B)(2)(A)

Age and service eligibility. A law member whose primary duties are to preserve the peace, to protect life and property, and to enforce the laws of the state and who (i) has attained age 48 and has 25 or more years of credited service, or (ii) has attained age 62 and has 15 or more years of credited service, or (iii) has attained age 52 and has 15 or more years of credited service, may retire with an age and service allowance.

Age and service allowance. A retiring member's age and service allowance under eligibility (i) or (ii) above is equal to 2.5% of FAS times the first 25 years of service credit plus 2.1% of FAS times service credit in excess of 25 years (H.B. 628). Maximum allowance is 90% of FAS or the limits under IRC Section 415(b). A retiring member's age and service allowance under eligibility (iii) above is equal to 1.5% of FAS times years of service credit. Minimum allowance for all law members is based upon twice the member's savings fund balance at retirement together with interest credits.

TRADITIONAL PENSION PLAN – PRE SENATE BILL 343

DISABILITY RETIREMENT

The disability program was revised in 1992, in order to comply with the Older Workers Benefit Protection Act. Employees becoming members after July 29, 1992 are covered by the post July 29, 1992 program. Other members were able to elect coverage under the pre July 29, 1992 program (original plan) or elect to be covered by the post July 29, 1992 program (revised plan).

Features of the original plan are:

- a) Upon becoming permanently disabled after completion of at least 5 years or 60 contributing months of service but before attaining age 60, a member is eligible for a disability allowance. The service requirement is waived for Law Enforcement members with an on-duty illness or injury.
- b) The amount of the allowance is the service the member would have had if employment had continued to age 60 times (i) 2.2% of FAS (H.B. 628), or (ii) \$86, whichever produces the greater benefit.
- c) Maximum allowance is 75% of FAS, minimum allowance is 30% of FAS.

Features of the revised plan are:

- a) A member may apply at any age after completion of 5 years or 60 contributing months of service. The service requirement is waived for Law Enforcement members with an on-duty illness or injury.
- b) A disability benefit equal to the greater of 45% of FAS or the actual service credit times 2.2% of FAS (H.B. 628) with no early retirement reduction (maximum 60% of FAS). The disability benefit period is to age 65 if the member is disabled prior to age 60. The benefit period declines gradually from 60 months for members disabled at ages 60 and 61, to 12 months for members disabled at age 69 or older.
- c) After the disability benefit ends, a service retirement benefit equal to the greater of (i) the accrued benefit based on actual service, or (ii) 2.2% of FAS (H.B. 628) times service credit including the period of disability (maximum 45% of FAS). In addition, an amount equal to the cost-of-living increases the member would have received had the member retired on the basis of age and service is paid.

TRADITIONAL PENSION PLAN – PRE SENATE BILL 343

SURVIVOR BENEFITS

Death while eligible to retire. If a member dies in service after becoming eligible to retire with an age and service allowance and leaves a surviving spouse or other sole dependent beneficiary, the survivor receives the same amount that would have been paid had the member retired the last day of the month of death and elected the 100% joint and survivor form of payment.

Survivor (death-in-service) allowances. If a deceased member had at least 1-1/2 years of contributing service credit, with at least 1/4 year of such service occurring within the 2-1/2 years prior to death, or was receiving a disability benefit, qualified survivors may receive the following monthly benefits. The benefit paid will be the greater of the applicable benefits paid under the following two schedules (H.B. 628):

Schedule 1

| <u>Number of Qualified Survivors Affecting the Benefit</u> | <u>Annual Benefit as a % of Deceased Member's FAS</u> | <u>Minimum Monthly Benefit</u> |
|--|---|--------------------------------|
| 1 | 25% | \$250 |
| 2 | 40% | \$400 |
| 3 | 50% | \$500 |
| 4 | 55% | \$500 |
| 5 or more | 60% | \$500 |

Schedule 2

| <u>Years of Service</u> | <u>Annual Benefit as a % of Deceased Member's FAS</u> |
|-------------------------|---|
| 20 | 29% |
| 21 | 33% |
| 22 | 37% |
| 23 | 41% |
| 24 | 45% |
| 25 | 48% |
| 26 | 51% |
| 27 | 54% |
| 28 | 57% |
| 29 or more | 60% |

Qualifying survivors who are paid benefits under Schedule 2 share equally in the benefits, except that if there is a surviving spouse, the spouse receives the greater of 25% of FAS or \$250.

TRADITIONAL PENSION PLAN – PRE SENATE BILL 343

A *qualified spouse* is the surviving spouse of a deceased member who is age 62 or at any age if the deceased member had 10 or more years of Ohio service credit or if the surviving spouse is caring for a qualified child or is adjudged physically or mentally incompetent.

A *qualified child* is a child who has never been married and under the age of 18 (or 22 if attending an approved school), or regardless of age is adjudged physically or mentally incompetent at the time of the member's death.

A *qualified parent* is a dependent parent aged 65 or older (earlier if mentally or physically incompetent) who received at least one-half support from the member during the 12-month period immediately preceding the member's death.

Qualified *survivors of disability benefit recipients* have the FAS used in calculating their benefits adjusted for each year between the effective date of the disability benefit and the recipient's date of death. The FAS is adjusted by the lesser of (1) 3% or (2) the actual average percentage change in the CPI.

BENEFITS AT RETIREMENT

Optional Benefit Forms. Retiring members may elect to have benefits paid in straight life form, in a form that guarantees a minimum number of monthly payments, or in a form that provides a continuation of all or a portion of the monthly benefit to a beneficiary after the death of the retiree. If a retiring member elects benefits in other than straight life form, the monthly amount is adjusted. The adjustment is based upon interest, COLA, and mortality assumptions (with a blend of male and female mortality rates to produce unisex election factors consistent with the gender distribution of members electing optional forms of payment).

TRADITIONAL PENSION PLAN – PRE SENATE BILL 343

PLOP. Effective 01/01/2004, retiring members may also elect to receive a Partial Lump Sum Option Payment (PLOP) (S.B.247). The PLOP is an option that allows a retiree to initially receive a partial lump sum benefit payment along with a reduced monthly retirement allowance. The lump sum payment cannot be less than 6 times or more than 36 times the monthly amount that would be payable to the member under the plan of payment selected and shall not result in a monthly allowance that is less than 50% of the monthly benefit. The total amount paid as a lump sum and monthly benefit shall be the actuarial equivalent of the amount that would have been paid had the lump sum not been selected.

QEBA. Qualified Excess Benefit Arrangement was established 01/01/2004 (H.B.190). The QEBA is operated in accordance with Internal Revenue Code Section 415(m). Under this arrangement the recipient may be paid the portion of his/her retirement benefit that was previously limited due to IRC Section 415(b).

Post-retirement increases. Each July after June 30, 1971 or the annual anniversary established 12 months after the initial date of retirement, each allowance is increased by 3.0% of the corresponding base allowance, except that no allowance shall exceed the limits established by Section 415 of the Internal Revenue Code.

Post-retirement death benefit. Upon the death of an age and service or disability retiree, a death benefit in the following amount is payable:

| Service Credit at Retirement | Amount of Death Benefit |
|---|------------------------------------|
| 5 to 9 years | \$ 500 |
| 10 to 14 years | 1,000 |
| 15 to 19 years | 1,500 |
| 20 to 24 years | 2,000 |
| 25 or more years | 2,500 |

Deferred benefits. A member with at least 5 years of service credit who leaves service before being eligible for an immediate allowance and who does not withdraw accumulated contributions will be entitled to a deferred allowance at age 60. For law members, the age at which benefits commence depends on the amount of service credit. The amount of the allowance will be based on credited service and final average salary at time of leaving service.

TRADITIONAL PENSION PLAN – PRE SENATE BILL 343

REFUND OF MEMBERS ACCUMULATED CONTRIBUTIONS

In the event a member leaves service prior to retirement, the member may elect to receive a refund of contributions with interest and may be eligible to receive an additional amount as described below. These refund provisions are available to all members. If a member dies prior to retirement and survivor benefits are not payable, the member's contributions with interest are paid to a designated beneficiary or other survivor. Interest is credited annually to member contribution balances. The rate of interest credited is determined by the OPERS Board and will not be greater than 6%. At the present time, 1% interest is credited to member contribution balances.

If the member has, or had at the time of death, at least 5 years but less than 10 years of qualified service, an additional 33% of the member's eligible contributions will be paid to the member or survivor. If the member has, or had at the time of death, at least 10 years of qualified service credit, an additional 67% of the member's eligible contributions will be paid to the member or survivor. The additional amount is not paid if the member is a re-employed retiree, or in the case of a deceased member, was receiving disability benefits at the time of death.

SUPPLEMENTAL BENEFITS

Health Care Coverage. Health care coverage is available to persons meeting retiree health care eligibility requirements. Members retiring with a normal or early service retirement allowance after January 1, 2015 must have 20 or more years of qualified service credit to be eligible for this benefit.

TRADITIONAL PENSION PLAN – PRE SENATE BILL 343

ADDITIONAL ANNUITY PROGRAM

The additional annuity program provides Traditional Plan and re-employed retiree members the opportunity of supplementing their retirement income. Members make additional contributions (independent of the contributions described on page III-2) to an account that earns investment income based upon the return of the OPERS Stable Value Fund. At termination, the member may take the additional annuity account balance either as a lump sum or annuitized in monthly payments.

RE-EMPLOYED RETIREES

Re-employed age and service retirees contribute to the “Money Purchase Plan”. In most instances, re-employed retirees will continue to receive their retirement allowance during re-employment. Upon termination of re-employment, members are eligible to apply for either a refund of contributions prior to age 65 or a Money Purchase Plan benefit as a lump sum or annuity after age 65. The Money Purchase Plan benefit is equal to member contributions and allowable interest plus an additional 67% matching amount. If monthly benefits are elected, joint and survivor options are also available.

COMBINED PLAN – PRE SENATE BILL 343

AGE & SERVICE BENEFITS - STATE AND LOCAL GOVERNMENT MEMBERS*

Eligibility. A member who (i) has attained age 60 years and has 5 or more years of service credit in the Plan or 60 contributing months in the Plan, or (ii) has attained age 55 years and has 25 or more years of service credit, or (iii) has 30 or more years of service credit, may retire under the Combined Plan with an age and service retirement allowance under the defined benefit portion of the Plan and with a retirement benefit under the defined contribution portion of the Plan.

**Law Enforcement and Public Safety members must contribute to the Traditional Pension Plan only.*

Age and service retirement allowance (Defined Benefit portion of the Plan). A retiring member's age and service retirement allowance is equal to Ohio service credit in the Plan times 1.0% of FAS for the first 30 years of service plus 1.25% for years of service over 30 years. The allowance is then adjusted by factors based on attained age or years of service (whichever yields the higher percentage) as determined in the following schedule:

| Attained Age | OR | Years of Service Credit | Percentage of Base Amount |
|-----------------|----|----------------------------|------------------------------|
| 58 | | 25 | 75% |
| 59 | | 26 | 80 |
| 60 | | 27 | 85 |
| 61 | | N/A | 88 |
| N/A | | 28 | 90 |
| 62 | | N/A | 91 |
| 63 | | N/A | 94 |
| N/A | | 29 | 95 |
| 64 | | N/A | 97 |
| 65 | | 30 or more | 100 |

Maximum allowance is 100% of FAS or the limits under IRC Section 415(b).

Retirement benefit (Defined Contribution portion of the Plan). The member's retirement benefit under this portion of the Combined Plan is based on the amounts credited to the Participant Contribution Account, Rollover Account, and Miscellaneous Account and the gains and losses on the amounts in those Accounts.

COMBINED PLAN – PRE SENATE BILL 343

DISABILITY RETIREMENT

A Combined Plan member may apply after completion of 5 years in the Plan or 60 contributing months of service in the Plan. Combined Plan members may be covered under the original or revised disability plan. Combined Plan members who apply for disability may:

- 1) Take a lump sum distribution of the Participant Contribution Account, Rollover Account, and Miscellaneous Account and any additional amount they are entitled to from the Employers' Accumulation Fund, or
- 2) Transfer all service credit and the Participant's Accounts (as listed above) in the Combined Plan to the Traditional Pension Plan to be paid a disability benefit under the Traditional Pension Plan guidelines.

SURVIVOR BENEFITS

Combined Plan members are eligible for the same survivor benefits as those listed under the Traditional Pension Plan and must qualify for survivor benefits under the same guidelines as those members in the Traditional Pension Plan.

BENEFITS AT RETIREMENT

Optional Benefit Forms under the Defined Benefit portion of the Plan. Retiring members may elect to have their age and service retirement allowance in straight life form, in a form that guarantees a minimum number of monthly payments, or in a form that provides a continuation of all or a portion of the monthly benefit to a beneficiary after the death of the retiree. If a retiring member elects benefits in other than straight life form, the monthly amount is adjusted. The adjustment is based upon interest, COLA, and mortality assumptions (with a blend of male and female mortality rates to produce unisex election factors consistent with the gender distribution of members electing optional forms of payment).

COMBINED PLAN – PRE SENATE BILL 343

Optional Benefit Forms under the Defined Contribution portion of the Plan. Retiring members may elect to have retirement benefits paid in a partial lump sum, subject to any rules adopted by the Board; monthly annuity payments (with joint and survivor options) similar to those offered under the defined benefit portion of the Plan; periodic payments over a period certain; periodic payments of a specific monthly amount; payments with a deferred start date; or a combination of these options.

QEBA. Qualified Excess Benefit Arrangement was established 01/01/2004 (H.B.190). The QEBA is operated in accordance with Internal Revenue Code Section 415(m). Under this arrangement the recipient may be paid the portion of his/her retirement benefit that was previously limited due to IRC Section 415(b). The QEBA is available to Combined Plan members for the age and service retirement allowance under the defined benefit portion of the Plan.

Post-retirement increases. Each July after June 30, 1971 or the annual anniversary established 12 months after the initial date of retirement, each age and service retirement allowance under the defined benefit portion of the plan is increased by 3.0% of the corresponding base allowance, except that no allowance shall exceed the limits established by Section 415 of the Internal Revenue Code.

Post-retirement death benefit. Upon the death of an age and service retiree, a death benefit in the following amount is payable:

| Service Credit at Retirement | Amount of Death Benefit |
|---------------------------------|----------------------------|
| 5 to 9 years | \$ 500 |
| 10 to 14 years | 1,000 |
| 15 to 19 years | 1,500 |
| 20 to 24 years | 2,000 |
| 25 or more years | 2,500 |

COMBINED PLAN – PRE SENATE BILL 343

REFUNDS AND VESTING

A participant in the Combined Plan shall at all times be 100% vested in the Participant Contribution Account, Miscellaneous Contribution Account, and the Rollover Account.

If the member has at least 5 years but less than 10 years of qualified service credit in the Plan, an additional 33% of the member's eligible contributions will be paid from the Employers' Accumulation Fund. If the member has at least 10 years of qualified service credit in the Plan, an additional 67% of the member's eligible contributions will be paid to the member. Amounts paid to purchase service credit earn interest at the same rates as the Traditional Pension Plan and are payable as a refund.

In the event a member leaves service prior to retirement, the member may elect to receive a refund of their Participant Contribution Account, the Rollover Account, the Miscellaneous Account, and any additional amounts they are entitled to from the Employers' Accumulation Fund (as described above).

SUPPLEMENTAL BENEFITS

Health Care Coverage. Health care coverage is available to persons meeting retiree health care eligibility requirements. Members retiring with a normal or early service retirement allowance after January 1, 2015 must have 20 or more years of qualified service credit to be eligible for this benefit.

MEMBER-DIRECTED PLAN

AGE & SERVICE BENEFITS - STATE AND LOCAL GOVERNMENT MEMBERS. (Law Enforcement and Public Safety members must contribute to the Traditional Pension Plan Only.)

Eligibility. A participant who has attained age fifty-five (55) may retire under the Member-Directed Plan.

Retirement Benefits. The member's retirement benefit is based on the value of the Participant Contribution Account, the Rollover Account, the Miscellaneous Account, and any vested portion of the Employer Contribution Account.

DISABILITY RETIREMENT

Not available under the Member-Directed Plan. Members may:

- 1) If age fifty-five (55), terminate employment and begin receiving retirement benefits, or
- 2) Take a lump sum distribution of their Participant Contribution Account, Rollover Account, Miscellaneous Account and any vested portion of the Employer Contribution Account.

SURVIVOR BENEFITS

Not available under the Member-Directed Plan. Survivors must take a lump sum distribution of the member's Participant Contribution Account, Rollover Account, Miscellaneous Account and any vested portion of the Employer Contribution Account.

BENEFITS AT RETIREMENT

Optional Benefit Forms. Retiring members may elect to have retirement benefits paid in a partial lump sum, subject to any rules adopted by the Board; monthly annuity payments (with joint and survivor options) similar to those offered under the defined benefit portion of the Combined Plan; periodic payments over a period certain; periodic payments of a specific monthly amount; payments with a deferred start date; or a combination of these options.

MEMBER-DIRECTED PLAN

REFUNDS AND VESTING.

A participant shall at all times be 100% vested in the Participant Contribution Account, Miscellaneous Contribution Account, and the Rollover Account. A participant shall vest in the Employer Contribution Account according to the Participant's attained years of participation in the Plan as follows:

| | |
|------------------------------|------|
| One year of participation | 20% |
| Two years of participation | 40% |
| Three years of participation | 60% |
| Four years of participation | 80% |
| Five years of participation | 100% |

In the event a member leaves service prior to retirement, the member may elect to receive a refund of their Participant Contribution Account, Rollover Account, and Miscellaneous Account and any vested amounts in the Employer Contribution Account (as described above).

SUPPLEMENTAL BENEFITS

Health Care Coverage. A portion of the employer contribution for Member-Directed participants is credited to a Retiree Medical Account (RMA). Amounts contributed to the RMA may be used after separation from service and a refund or retirement distribution is made to pay qualified health, dental and vision care expenses. Beginning January 1, 2009, members vest in their RMA based on their attained years of participation in the Plan as follows:

| | |
|------------------|------|
| Less than 1 year | 0% |
| 1 year | 20% |
| 2 years | 40% |
| 3 years | 60% |
| 4 years | 80% |
| 5 years | 100% |

SAMPLE BENEFIT COMPUTATION – TRADITIONAL PLAN
STATE OR LOCAL MEMBER (TRANSITION GROUP A) - NORMAL RETIREMENT
RETIRING DECEMBER 31, 2016
UNDER BENEFIT PROVISIONS EVALUATED

Data:

| | | |
|----|-----------------|--|
| A. | <u>\$32,000</u> | Final Average Earnings |
| B. | <u>33</u> | Years of Credited Service |
| C. | <u>59</u> | Age of Retiree |
| D. | <u>56</u> | Age of Spouse |
| E. | <u>100%</u> | Percentage of Pension to Continue to Spouse after retiree's death (Retiree makes the choice of 100% Joint and Survivor with Pop-Up) |

Computations:

| | | |
|----|---|--------------|
| F. | Formula Benefit: $(0.022 \times 30 \text{ years} + 0.025 \times 3 \text{ years}) \times \$32,000 =$ | \$ 23,520 |
| G. | Reduction for Line E Election: $\# (1 - 0.85714) \times (F) =$ | <u>3,360</u> |
| H. | Benefit Payable to Retiree while Spouse is Alive: $(F) - (G) =$ | 20,160 |
| I. | Benefit Payable to Spouse after Retiree's Death | 20,160 |
| J. | Benefit Payable to Retiree after Spouse's Death | 23,520 |

Projected Benefits:*

| Year Ended December 31, | Retiree's Benefit (Both Alive) | Spouse's Benefit (After Retiree's Death) | Retiree's Benefit (After Spouse's Death) |
|----------------------------|-----------------------------------|---|---|
| 2017 | \$ 20,160 | \$ 20,160 | \$ 23,520 |
| 2018 | 20,765 | 20,765 | 24,226 |
| 2019 | 21,370 | 21,370 | 24,931 |
| 2020 | 21,974 | 21,974 | 25,637 |
| 2021 | 22,579 | 22,579 | 26,342 |
| 2022 | 23,184 | 23,184 | 27,048 |
| 2023 | 23,789 | 23,789 | 27,754 |
| 2024 | 24,394 | 24,394 | 28,459 |
| 2025 | 24,998 | 24,998 | 29,165 |
| 2026 | 25,603 | 25,603 | 29,870 |

* Assumes the annual percentage change in the Consumer Price Index (CPI) is 3% or greater in all future years.

Based on conversion factors for optional forms of payment in effect December 31, 2016.

**SAMPLE BENEFIT COMPUTATION – TRADITIONAL PLAN
STATE OR LOCAL MEMBER (TRANSITION GROUP A) - EARLY RETIREMENT
RETIRING DECEMBER 31, 2016
UNDER BENEFIT PROVISIONS EVALUATED**

Data:

| | | |
|----|-----------------|--|
| A. | <u>\$32,000</u> | Final Average Earnings |
| B. | <u>26</u> | Years of Credited Service |
| C. | <u>59</u> | Age of Retiree |
| D. | <u>56</u> | Age of Spouse |
| E. | <u>100%</u> | Percentage of Pension to Continue to Spouse after retiree's death (Retiree makes the choice of 100% Joint and Survivor with Pop-Up) |

Computations:

| | | |
|----|--|--------------|
| F. | Formula Benefit: $0.022 \times 26 \text{ years} \times \$32,000 =$ | \$ 18,304 |
| G. | Adjustment Factor for Early Retirement (from schedule) | 80% |
| H. | Adjusted Benefit: $(F) \times (G) =$ | 14,643 |
| I. | Reduction for Line E Election: $\# (1 - 0.85714) \times (H) =$ | <u>2,092</u> |
| J. | Benefit Payable to Retiree while Spouse is Alive: $(H) - (I)$ | 12,551 |
| K. | Benefit Payable to Spouse after Retiree's Death | 12,551 |
| L. | Benefit Payable to Retiree after Spouse's Death | 14,643 |

Projected Benefits:*

| Year Ended December 31, | Retiree's Benefit (Both Alive) | Spouse's Benefit (After Retiree's Death) | Retiree's Benefit (After Spouse's Death) |
|----------------------------|-----------------------------------|---|---|
| 2017 | \$ 12,551 | \$ 12,551 | \$ 14,643 |
| 2018 | 12,928 | 12,928 | 15,082 |
| 2019 | 13,304 | 13,304 | 15,522 |
| 2020 | 13,681 | 13,681 | 15,961 |
| 2021 | 14,057 | 14,057 | 16,400 |
| 2022 | 14,434 | 14,434 | 16,840 |
| 2023 | 14,810 | 14,810 | 17,279 |
| 2024 | 15,187 | 15,187 | 17,718 |
| 2025 | 15,563 | 15,563 | 18,158 |
| 2026 | 15,940 | 15,940 | 18,597 |

* Assumes the annual percentage change in the Consumer Price Index (CPI) is 3% or greater in all future years.
Based on conversion factors for optional forms of payment in effect December 31, 2016.

**SAMPLE BENEFIT COMPUTATION – TRADITIONAL PLAN
SECTION 145.33 (B)(2)(b) PUBLIC SAFETY
MEMBER (TRANSITION GROUP A) - NORMAL RETIREMENT
RETIRING DECEMBER 31, 2016
UNDER BENEFIT PROVISIONS EVALUATED**

Data:

| | | |
|----|-----------------|--|
| A. | <u>\$38,000</u> | Final Average Earnings |
| B. | <u>28</u> | Years of Credited Service |
| C. | <u>49</u> | Age of Retiree |
| D. | <u>46</u> | Age of Spouse |
| E. | <u>100%</u> | Percentage of Pension to Continue to Spouse after retiree's death (Retiree makes the choice of 100% Joint and Survivor with Pop-Up) |

Computations:

| | | |
|----|---|--------------|
| F. | Formula Benefit: $(0.025 \times 25 \text{ years} + 0.021 \times 3 \text{ years}) \times \$38,000 \times 80\% =$ | \$ 20,915 |
| G. | Reduction for Line E Election: $\# (1 - 0.91705) \times (F) =$ | <u>1,735</u> |
| H. | Benefit Payable to Retiree while Spouse is Alive: $(F) - (G) =$ | 19,180 |
| I. | Benefit Payable to Spouse after Retiree's Death | 19,180 |
| J. | Benefit Payable to Retiree after Spouse's Death | 20,915 |

Projected Benefits:*

| Year Ended December 31, | Retiree's Benefit (Both Alive) | Spouse's Benefit (After Retiree's Death) | Retiree's Benefit (After Spouse's Death) |
|----------------------------|-----------------------------------|---|---|
| 2017 | \$ 19,180 | \$ 19,180 | \$ 20,915 |
| 2018 | 19,755 | 19,755 | 21,542 |
| 2019 | 20,331 | 20,331 | 22,170 |
| 2020 | 20,906 | 20,906 | 22,797 |
| 2021 | 21,482 | 21,482 | 23,425 |
| 2022 | 22,057 | 22,057 | 24,052 |
| 2023 | 22,632 | 22,632 | 24,680 |
| 2024 | 23,208 | 23,208 | 25,307 |
| 2025 | 23,783 | 23,783 | 25,935 |
| 2026 | 24,359 | 24,359 | 26,562 |

* Assumes the annual percentage change in the Consumer Price Index (CPI) is 3% or greater in all future years.
Based on conversion factors for optional forms of payment in effect December 31, 2016.

**SAMPLE BENEFIT COMPUTATION – TRADITIONAL PLAN
SECTION 145.33 (B)(2)(a) LAW ENFORCEMENT
MEMBER (TRANSITION GROUP A) - NORMAL RETIREMENT
RETIRING DECEMBER 31, 2016
UNDER BENEFIT PROVISIONS EVALUATED**

Data:

| | | |
|----|-------------------------|--|
| A. | <u> \$38,000 </u> | Final Average Earnings |
| B. | <u> 28 </u> | Years of Credited Service |
| C. | <u> 49 </u> | Age of Retiree |
| D. | <u> 46 </u> | Age of Spouse |
| E. | <u> 100% </u> | Percentage of Pension to Continue to Spouse after retiree's death (Retiree makes the choice of 100% Joint and Survivor with Pop-Up) |

Computations:

| | | |
|----|---|------------------------|
| F. | Formula Benefit: $(0.025 \times 25 \text{ years} + 0.021 \times 3 \text{ years}) \times \$38,000 =$ | \$ 26,144 |
| G. | Reduction for Line E Election: $\# (1 - 0.91705) \times (F) =$ | <u> 2,169 </u> |
| H. | Benefit Payable to Retiree while Spouse is Alive: $(F) - (G) =$ | 23,975 |
| I. | Benefit Payable to Spouse after Retiree's Death | 23,975 |
| J. | Benefit Payable to Retiree after Spouse's Death | 26,144 |

Projected Benefits:*

| Year Ended December 31, | Retiree's Benefit (Both Alive) | Spouse's Benefit (After Retiree's Death) | Retiree's Benefit (After Spouse's Death) |
|----------------------------|-----------------------------------|---|---|
| 2017 | \$ 23,975 | \$ 23,975 | \$ 26,144 |
| 2018 | 24,694 | 24,694 | 26,928 |
| 2019 | 25,414 | 25,414 | 27,713 |
| 2020 | 26,133 | 26,133 | 28,497 |
| 2021 | 26,852 | 26,852 | 29,281 |
| 2022 | 27,571 | 27,571 | 30,066 |
| 2023 | 28,291 | 28,291 | 30,850 |
| 2024 | 29,010 | 29,010 | 31,634 |
| 2025 | 29,729 | 29,729 | 32,419 |
| 2026 | 30,448 | 30,448 | 33,203 |

* Assumes the annual percentage change in the Consumer Price Index (CPI) is 3% or greater in all future years.

Based on conversion factors for optional forms of payment in effect December 31, 2016.

**SAMPLE BENEFIT COMPUTATION – TRADITIONAL PLAN
STATE OR LOCAL MEMBER (TRANSITION GROUP A) – TERMINATION BENEFIT
RETIRING DECEMBER 31, 2016
UNDER BENEFIT PROVISIONS EVALUATED**

Data:

| | | |
|----|----------|--|
| A. | \$32,000 | Final Average Earnings |
| B. | 15 | Years of Credited Service |
| C. | 45 | Age of Member |
| D. | 42 | Age of Spouse |
| E. | 60:57 | Ages at Which Benefits are Payable |
| F. | 100% | Percentage of Pension to Continue to Spouse after retiree's death (Retiree makes the choice of 100% Joint and Survivor with Pop-Up) |
| G. | \$44,000 | Accumulated Contributions with Interest at Termination Date |

Computations:

| | | |
|----|---|--------------|
| H. | Formula Benefit: $(0.022 \times 15 \text{ years} + 0.025 \times 0 \text{ years}) \times \$32,000 =$ | \$ 10,560 |
| I. | Adjustment Factor for Early Retirement (from schedule) | 85% |
| J. | Adjusted Benefit: $(H) \times (I) =$ | 8,976 |
| K. | Reduction for Line E Election: $\# (1 - 0.84967) \times (J) =$ | <u>1,349</u> |
| L. | Benefit Payable to Retiree while Spouse is Alive: $(J) - (K) =$ | 7,627 |
| M. | Benefit Payable to Spouse after Retiree's Death | 7,627 |
| N. | Benefit Payable to Retiree after Spouse's Death | 8,976 |
| O. | In lieu of a lifetime benefit, terminatee may elect to receive a refund of accumulated contributions with interest plus an additional 67% of eligible accumulated contributions because terminatee had more than 10 years of service. | 73,480 |

Projected Benefits:*

| Year Ended December 31, | Retiree's Benefit (Both Alive) | Spouse's Benefit (After Retiree's Death) | Retiree's Benefit (After Spouse's Death) |
|----------------------------|-----------------------------------|---|---|
| 2032 | \$ 7,627 | \$ 7,627 | \$ 8,976 |
| 2033 | 7,856 | 7,856 | 9,245 |
| 2034 | 8,085 | 8,085 | 9,515 |
| 2035 | 8,313 | 8,313 | 9,784 |
| 2036 | 8,542 | 8,542 | 10,053 |
| 2037 | 8,771 | 8,771 | 10,322 |
| 2038 | 9,000 | 9,000 | 10,592 |
| 2039 | 9,229 | 9,229 | 10,861 |
| 2040 | 9,457 | 9,457 | 11,130 |
| 2041 | 9,686 | 9,686 | 11,400 |

* Assumes the annual percentage change in the Consumer Price Index (CPI) is 3% or greater in all future years.
Based on conversion factors for optional forms of payment in effect December 31, 2016.

SAMPLE BENEFIT COMPUTATION – TRADITIONAL PLAN
SECTION 145.33 (B)(2)(a) PUBLIC SAFETY/LAW ENFORCEMENT MEMBER
(TRANSITION GROUP A) – TERMINATION BENEFIT
RETIRING DECEMBER 31, 2016
UNDER BENEFIT PROVISIONS EVALUATED

Data:

| | | |
|----|-------------------------|--|
| A. | <u> \$38,000 </u> | Final Average Earnings |
| B. | <u> 15 </u> | Years of Credited Service |
| C. | <u> 37 </u> | Age of Retiree |
| D. | <u> 34 </u> | Age of Spouse |
| E. | <u> 52:49 </u> | Ages at Which Benefits are Payable |
| F. | <u> 100% </u> | Percentage of Pension to Continue to Spouse after retiree's death (Retiree makes the choice of 100% Joint and Survivor with Pop-Up) |
| G. | <u> \$46,000 </u> | Accumulated Contributions at Termination Date |

Computations:

| | | |
|----|---|------------|
| H. | Formula Benefit: $(0.015 \times 15 \text{ years}) \times \$38,000 =$ | \$ 8,550 |
| I. | Reduction for Line E Election: $\# (1 - 0.90207) \times (H) =$ | <u>837</u> |
| J. | Benefit Payable to Retiree while Spouse is Alive: $(H) - (I) =$ | 7,713 |
| K. | Benefit Payable to Spouse after Retiree's Death | 7,713 |
| L. | Benefit Payable to Retiree after Spouse's Death | 8,550 |
| M. | In lieu of a lifetime benefit, terminnee may elect to receive a refund of accumulated contributions with interest plus an additional 67% of eligible accumulated contributions because terminnee had more than 10 years of service. | 76,820 |

Projected Benefits:*

| Year Ended December 31, | Retiree's Benefit (Both Alive) | Spouse's Benefit (After Retiree's Death) | Retiree's Benefit (After Spouse's Death) |
|----------------------------|-----------------------------------|---|---|
| 2032 | \$ 7,713 | \$ 7,713 | \$ 8,550 |
| 2033 | 7,944 | 7,944 | 8,807 |
| 2034 | 8,176 | 8,176 | 9,063 |
| 2035 | 8,407 | 8,407 | 9,320 |
| 2036 | 8,639 | 8,639 | 9,576 |
| 2037 | 8,870 | 8,870 | 9,833 |
| 2038 | 9,101 | 9,101 | 10,089 |
| 2039 | 9,333 | 9,333 | 10,346 |
| 2040 | 9,564 | 9,564 | 10,602 |
| 2041 | 9,796 | 9,796 | 10,859 |

* Assumes the annual percentage change in the Consumer Price Index (CPI) is 3% or greater in all future years.

Based on conversion factors for optional forms of payment in effect December 31, 2016.

SECTION IV

RECOMMENDATIONS FOR RESERVE TRANSFERS

DECEMBER 31, 2016 RETIRED LIFE VALUATION RESERVE TRANSFERS

Reserve transfers from the Employer Accumulation Fund to the A & PR Fund and/or Survivor Benefit Funds are recommended in the following instances.

- Whenever the December 31 valuation shows unfunded accrued liabilities or assets in excess of computed liabilities in any of the retired life funds.
- To cover the cost of ad-hoc postretirement benefit increases.
- To adjust retired life reserves for any changes in computed liabilities resulting from assumption changes.

By making these annual adjustments in addition to the regular transfers when allowances are added to the rolls, the ratio of assets to liabilities for retired members and beneficiaries will stay at 100%. Year to year changes in this ratio before recommended transfers will normally be isolated to mortality experience within the retired life group.

In 1992, OPERS began making interim benefit payments for certain retirements to shorten the delay between the retirement effective date and receipt of the first monthly check. However, reserve transfers are not made until benefit amounts are final. Transfers for these cases have been accrued based upon supplemental information supplied by OPERS staff and are shown on the following page. The accruals, when added to other assets, are intended to put retired life reserves in the same position they would have been in if reserve transfers for the interim benefit cases had been coincident with benefit commencement.

It is recommended that the transfers shown on the following page be made from the Employer Accumulation Fund to the Annuity & Pension Reserve Fund and Survivor Benefit Funds as indicated. The Accrued Transfers is an estimate of pending future transfers for interim cases, and does not require a year end transfer. Any accrued transfers that have been made prior to OPERS' extract date and hence are not included in the "Accrued Transfers" column on pages IV-2 through IV-5 should be netted off the "Other" column on pages IV-2 through IV-5.

**TRADITIONAL PLAN
RESERVE TRANSFERS AFFECTING THE EMPLOYER ACCUMULATION FUND
DECEMBER 31, 2016**

| | Assets Before Transfers | Transfers | | Assets After Transfers | Liabilities | Ratio |
|--------------------|----------------------------|-----------------------|-------------------------|---------------------------|--------------------------|---------------|
| | | Accrued | Other | | | |
| State | | | | | | |
| A&PR FUND | | | | | | |
| SR | \$ 19,186,646,053 | \$ 116,430,932 | \$ 2,144,989,091 | \$ 21,448,066,076 | \$ 21,448,066,076 | |
| MP | 55,495,908 | 0 | 4,215,234 | 59,711,142 | 59,711,142 | |
| AA | 206,467 | 0 | 49,768 | 256,235 | 256,235 | |
| JR | 2,945 | 0 | (2,945) | 0 | 0 | |
| CR | 109,838,560 | 0 | 34,870,077 | 144,708,637 | 144,708,637 | |
| DR | 2,084,013,626 | 5,536,031 | 259,883,057 | 2,349,432,714 | 2,349,432,714 | |
| BD | 541,820,797 | 10,155,795 | 61,824,908 | 613,801,500 | 613,801,500 | |
| TOTAL A&PR | 21,978,024,356 | 132,122,758 | 2,505,829,190 | 24,615,976,304 | 24,615,976,304 | 100.0% |
| SBF | | | | | | |
| AA | 0 | 0 | 0 | 0 | 0 | |
| S-1 | 117,631,069 | 3,928,705 | 14,209,724 | 135,769,498 | 135,769,498 | |
| S-2 | 491,147,327 | 7,023,517 | 55,117,819 | 553,288,663 | 553,288,663 | |
| TOTAL SBF | 608,778,396 | 10,952,222 | 69,327,543 | 689,058,161 | 689,058,161 | 100.0% |
| TOTAL STATE | \$ 22,586,802,752 | \$ 143,074,980 | \$ 2,575,156,733 | \$ 25,305,034,465 | \$ 25,305,034,465 | 100.0% |
| Local | | | | | | |
| A&PR FUND | | | | | | |
| SR | \$ 26,666,604,924 | \$ 210,731,273 | \$ 2,882,406,325 | \$ 29,759,742,522 | \$ 29,759,742,522 | |
| MP | 141,717,128 | 105,866 | 10,082,212 | 151,905,206 | 151,905,206 | |
| AA | 54,083,793 | 229,098 | 9,032,554 | 63,345,445 | 63,345,445 | |
| JR | 9,846 | 0 | (9,846) | 0 | 0 | |
| CR | 149,264,253 | 0 | 44,309,439 | 193,573,692 | 193,573,692 | |
| DR | 2,560,474,107 | 4,384,478 | 329,043,109 | 2,893,901,694 | 2,893,901,694 | |
| BD | 681,242,119 | 14,289,697 | 81,781,697 | 777,313,513 | 777,313,513 | |
| TOTAL A&PR | 30,253,396,170 | 229,740,412 | 3,356,645,490 | 33,839,782,072 | 33,839,782,072 | 100.0% |
| SBF | | | | | | |
| AA | 0 | 0 | 0 | 0 | 0 | |
| S-1 | 176,591,883 | 4,476,315 | 18,770,232 | 199,838,430 | 199,838,430 | |
| S-2 | 817,361,442 | 8,527,290 | 90,800,346 | 916,689,078 | 916,689,078 | |
| TOTAL SBF | 993,953,325 | 13,003,605 | 109,570,578 | 1,116,527,508 | 1,116,527,508 | 100.0% |
| TOTAL LOCAL | \$ 31,247,349,495 | \$ 242,744,017 | \$ 3,466,216,068 | \$ 34,956,309,580 | \$ 34,956,309,580 | 100.0% |

TRADITIONAL PLAN
RESERVE TRANSFERS AFFECTING THE EMPLOYER ACCUMULATION FUND
DECEMBER 31, 2016

| | Assets Before Transfers | Transfers | | Assets After Transfers | Liabilities | Ratio |
|------------------------------|----------------------------|-----------------------|-------------------------|---------------------------|--------------------------|---------------|
| | | Accrued | Other | | | |
| Public Safety | | | | | | |
| A&PR FUND | | | | | | |
| SR | \$ 8,862,740 | \$ 0 | \$ 930,589 | \$ 9,793,329 | \$ 9,793,329 | |
| MP | 0 | 0 | 0 | 0 | 0 | |
| AA | 0 | 0 | 0 | 0 | 0 | |
| JR | 0 | 0 | 0 | 0 | 0 | |
| CR | 741 | 0 | (741) | 0 | 0 | |
| DR | 13,451,221 | 0 | 1,915,205 | 15,366,426 | 15,366,426 | |
| BD | 2,019,333 | 0 | 45,598 | 2,064,931 | 2,064,931 | |
| TOTAL A&PR | 24,334,035 | 0 | 2,890,651 | 27,224,686 | 27,224,686 | 100.0% |
| SBF | | | | | | |
| AA | 0 | 0 | 0 | 0 | 0 | |
| S-1 | 366,929 | 0 | 457,103 | 824,032 | 824,032 | |
| S-2 | 18,172,775 | 547,498 | 2,105,532 | 20,825,805 | 20,825,805 | |
| TOTAL SBF | 18,539,704 | 547,498 | 2,562,635 | 21,649,837 | 21,649,837 | 100.0% |
| TOTAL PUBLIC SAFETY | \$ 42,873,739 | \$ 547,498 | \$ 5,453,286 | \$ 48,874,523 | \$ 48,874,523 | 100.0% |
| Law Enforcement | | | | | | |
| A&PR FUND | | | | | | |
| SR | \$ 1,524,600,905 | \$ 12,575,067 | \$ 152,298,048 | \$ 1,689,474,020 | \$ 1,689,474,020 | |
| MP | 0 | 0 | 0 | 0 | 0 | |
| AA | 0 | 0 | 0 | 0 | 0 | |
| JR | 0 | 0 | 0 | 0 | 0 | |
| CR | 1,133,428 | 0 | 456,027 | 1,589,455 | 1,589,455 | |
| DR | 534,065,311 | 925,471 | 69,321,730 | 604,312,512 | 604,312,512 | |
| BD | 118,141,370 | 2,854,697 | 17,957,518 | 138,953,585 | 138,953,585 | |
| TOTAL A&PR | 2,177,941,014 | 16,355,235 | 240,033,323 | 2,434,329,572 | 2,434,329,572 | 100.0% |
| SBF | | | | | | |
| AA | 0 | 0 | 0 | 0 | 0 | |
| S-1 | 11,558,864 | 0 | 1,365,553 | 12,924,417 | 12,924,417 | |
| S-2 | 36,636,602 | 823,015 | 3,525,672 | 40,985,289 | 40,985,289 | |
| TOTAL SBF | 48,195,466 | 823,015 | 4,891,225 | 53,909,706 | 53,909,706 | 100.0% |
| TOTAL LAW ENFORCEMENT | \$ 2,226,136,480 | \$ 17,178,250 | \$ 244,924,548 | \$ 2,488,239,278 | \$ 2,488,239,278 | 100.0% |
| GRAND TOTAL | \$ 56,103,162,466 | \$ 403,544,745 | \$ 6,291,750,635 | \$ 62,798,457,846 | \$ 62,798,457,846 | 100.0% |

**COMBINED PLAN
RESERVE TRANSFERS AFFECTING THE EMPLOYER ACCUMULATION FUND
DECEMBER 31, 2016**

| | Assets Before Transfers | Transfers | | Assets After Transfers | Liabilities | Ratio |
|--------------------|----------------------------|-------------------|---------------------|---------------------------|----------------------|---------------|
| | | Accrued | Other | | | |
| State | | | | | | |
| A&PR FUND | | | | | | |
| CA | \$ 2,514,520 | \$ 243,696 | \$ (321,807) | \$ 2,436,409 | \$ 2,436,409 | |
| CB | 3,734,973 | 271,961 | 208,322 | 4,215,256 | 4,215,256 | |
| TOTAL A&PR | 6,249,493 | 515,656 | (113,484) | 6,651,665 | 6,651,665 | |
| TOTAL STATE | \$ 6,249,493 | \$ 515,656 | \$ (113,484) | \$ 6,651,665 | \$ 6,651,665 | |
| Local | | | | | | |
| A&PR FUND | | | | | | |
| CA | \$ 4,375,164 | \$ 45,617 | \$ 62,896 | \$ 4,483,677 | \$ 4,483,677 | |
| CB | 6,492,220 | 76,491 | 700,836 | 7,269,547 | 7,269,547 | |
| TOTAL A&PR | 10,867,384 | 122,107 | 763,733 | 11,753,224 | 11,753,224 | 100.0% |
| TOTAL LOCAL | \$ 10,867,384 | \$ 122,107 | \$ 763,733 | \$ 11,753,224 | \$ 11,753,224 | 100.0% |
| GRAND TOTAL | \$ 17,116,877 | \$ 637,764 | \$ 650,248 | \$ 18,404,889 | \$ 18,404,889 | 100.0% |

MEMBER DIRECTED PLAN
RESERVE TRANSFERS AFFECTING THE EMPLOYER ACCUMULATION FUND
DECEMBER 31, 2016

| | Assets Before Transfers | Transfers | | Assets After Transfers | Liabilities | Ratio |
|--|----------------------------|------------------|-------------------|---------------------------|---------------------|---------------|
| | | Accrued | Other | | | |
| State | | | | | | |
| A&PR FUND | | | | | | |
| MD | \$ 3,730,324 | \$ 164,303 | \$ (51,824) | \$ 3,842,803 | \$ 3,842,803 | |
| TOTAL A&PR | 3,730,324 | 164,303 | (51,824) | 3,842,803 | 3,842,803 | 100.0% |
| RESERVE FOR FUTURE ADVERSE EXPERIENCE | 0 | 0 | 434,300 | 434,300 | 434,300 | |
| TOTAL STATE | \$ 3,730,324 | \$164,303 | \$ 382,476 | \$4,277,103 | \$4,277,103 | 100.0% |
| Local | | | | | | |
| A&PR FUND | | | | | | |
| MD | \$ 8,179,406 | \$ 0 | \$ 226,534 | \$ 8,405,940 | \$ 8,405,940 | |
| TOTAL A&PR | 8,179,406 | 0 | 226,534 | 8,405,940 | 8,405,940 | 100.0% |
| RESERVE FOR FUTURE ADVERSE EXPERIENCE | 0 | 0 | 278,062 | 278,062 | 278,062 | |
| TOTAL LOCAL | \$ 8,179,406 | \$ 0 | \$ 504,596 | \$8,684,002 | \$8,684,002 | 100.0% |
| GRAND TOTAL | \$11,909,730 | \$164,303 | \$ 887,072 | \$12,961,105 | \$12,961,105 | 100.0% |

SECTION V
STATE DIVISION

STATE DIVISION

Data on active, inactive, retired and money purchase members that was used in the valuation is tabulated briefly below.

Defined Benefit Active Members in Valuation December 31, 2016

| Groups | Number | Annual Payroll | Average | | |
|-------------------------|----------------|-------------------------|------------------|------------------|-----------------|
| | | | Pay | Age | Service |
| Traditional Plan | | | | | |
| Men | 52,731 | \$ 2,303,422,949 | \$ 43,683 | 40.0 yrs. | 9.0 yrs. |
| Women | 63,648 | 2,662,635,071 | 41,834 | 39.6 | 8.6 |
| Traditional Plan Total | 116,379 | \$ 4,966,058,020 | \$ 42,671 | 39.8 yrs. | 8.8 yrs. |
| Combined Plan | | | | | |
| Men | 1,094 | \$ 64,507,702 | \$ 58,965 | 42.8 yrs. | 7.7 yrs. |
| Women | 1,750 | 100,440,799 | 57,395 | 42.6 | 7.1 |
| Combined Plan Total | 2,844 | \$ 164,948,501 | \$ 57,999 | 42.7 yrs. | 7.3 yrs. |
| Grand Total | 119,223 | \$ 5,131,006,521 | \$ 43,037 | 39.8 yrs. | 8.8 yrs. |

Also included in the valuation were 232,095 inactive members and 4,241 members active in the money purchase plan.

Retired Members in Valuation December 31, 2016

| Fund/Type of Allowance | Number | Current Monthly Benefits | Actuarial Liabilities |
|---------------------------------------|---------------|--------------------------|--------------------------|
| Traditional Plan | | | |
| A & PR Fund | | | |
| Superannuation Retirement | 59,396 | \$ 158,108,042 | \$ 21,593,030,948 |
| Disability Retirement | 8,366 | 21,289,211 | 2,963,234,214 |
| Money Purchase | 928 | 478,777 | 59,711,142 |
| Total A & PR Fund | 68,690 | 179,876,030 | 24,615,976,304 |
| Total SBF | 4,483 | 5,659,099 | 689,058,161 |
| Traditional Plan Total | 73,173 | \$ 185,535,129 | \$ 25,305,034,465 |
| Combined Plan | | | |
| A & PR Fund | | | |
| CMDB | 73 | \$ 28,793 | \$ 4,215,256 |
| CMDC | 44 | 16,664 | 2,436,409 |
| Total A & PR Fund | 117 | 45,457 | 6,651,665 |
| Combined Plan Total | 117 | \$ 45,457 | \$ 6,651,665 |
| Member Directed Plan | | | |
| A & PR Fund | 58 | 25,578 | 3,842,803 |
| Reserve for Future Adverse Experience | | | 434,300 |
| Member Directed Plan Total | 58 | \$ 25,578 | \$ 4,277,103 |
| Grand Total | 73,348 | \$ 185,606,164 | \$ 25,315,963,233 |

**STATE DIVISION
EMPLOYER CONTRIBUTIONS TO SUPPORT
DEFINED BENEFIT RETIREMENT ALLOWANCES
EXPRESSED AS PERCENTS OF ACTIVE MEMBER PAYROLL**

| Valuation Date December 31 | 2016 | | | 2015 |
|---|-------------------------|----------------------|---------------------------------------|---------------------------------------|
| Contributions for | 2019 | | | 2018 |
| Normal Cost | <u>Traditional Plan</u> | <u>Combined Plan</u> | <u>Traditional and Combined Plans</u> | <u>Traditional and Combined Plans</u> |
| Age and Service Allowances* | 7.83 % | 4.50 % | 7.72 % | 7.77 % |
| Disability Allowances | 1.60 % | 1.51 % | 1.59 % | 1.59 % |
| Survivor's Benefits | 0.32 % | 0.27 % | 0.32 % | 0.32 % |
| Separation Benefits | 4.12 % | 1.01 % | 4.01 % | 4.03 % |
| Total Normal Cost | 13.87 % | 7.29 % | 13.64 % | 13.71 % |
| (Member Contributions) | 10.00 % | 0.00 % | 9.61 % | 9.62 % |
| Employer Normal Cost | 3.87 % | 7.29 % | 4.03 % | 4.09 % |
| Unfunded Actuarial Accrued Liabilities | | | | |
| Total Available Contribution | 10.13 % | 6.71 % | 9.97 % | 9.91 % |
| Amortization Years | 25 | 0 | 24 | 25 |
| Total Pension Employer Contribution Rate | 14.00 % | 14.00 % | 14.00 % | 14.00 % |

*Includes contributions for administrative expenses.

The term "Amortization Years" refers to the period sufficient to produce the Total Employer Contribution Rate for retirement allowances and survivor benefits and incorporates all scheduled employer and member contribution rate increases and scheduled employer rate reallocations between the pension and retiree health programs.

**STATE DIVISION
COMPARATIVE STATEMENT**

| Valuation Date December 31 | Contribution Rate Effective January 1 | Defined Benefit Active Members in Valuation | | | | Computed Employer Contributions as % of Payroll | | | | |
|----------------------------------|--|---|----------------|-----------|----------|---|----------------------------------|------------------|-------------------|----------------|
| | | No. | Annual Payroll | | | Normal Cost | Unfunded Accrued Liability | Pension Total | Retiree Health | Grand Total |
| | | | Total | Average | Increase | | | | | |
| | | | (\$Millions) | | | | | | | |
| 2002 | 2005 | 110,017 | \$ 4,129 | \$ 37,531 | 2.6 % | 5.95 % | 3.36 % | 9.31 % | 4.00 % | 13.31 % |
| 2003## | 2006 | 108,249 | 4,079 | 37,679 | 0.4 % | 5.70 % | 3.34 % | 9.04 % | 4.50 % | 13.54 % |
| 2004 | 2007 | 110,207 | 4,165 | 37,794 | 0.3 % | 5.67 % | 2.60 % | 8.27 % | 5.50 % | 13.77 % |
| 2005@ | 2008 | 114,620 | 4,339 | 37,858 | 0.2 % | 5.43 % | 1.57 % | 7.00 % | 7.00 % | 14.00 % |
| 2006 | 2009 | 115,930 | 4,522 | 39,005 | 3.0 % | 4.97 % | 2.03 % | 7.00 % | 7.00 % | 14.00 % |
| 2007 | 2010 | 118,466 | 4,703 | 39,695 | 1.8 % | 5.44 % | 1.56 % | 7.00 % | 7.00 % | 14.00 % |
| 2008 | 2011 | 114,925 | 4,780 | 41,590 | 4.8 % | 5.44 % | 4.56 % | 10.00 % | 4.00 % | 14.00 % |
| 2009 | 2012 | 117,008 | 4,763 | 40,704 | (2.1)% | 5.45 % | 4.55 % | 10.00 % | 4.00 % | 14.00 % |
| 2010@ | 2013 | 118,240 | 4,811 | 40,691 | 0.0 % | 5.36 % | 7.64 % | 13.00 % | 1.00 % | 14.00 % |
| 2011 | 2014 | 118,273 | 4,844 | 40,952 | 0.6 % | 5.37 % | 8.63 % | 14.00 % | 0.00 % | 14.00 % |
| 2012# | 2015 | 117,430 | 4,690 | 39,938 | (2.5)% | 3.49 % | 7.51 % | 11.00 % | 3.00 % | 14.00 % |
| 2013 | 2016 | 117,370 | 4,746 | 40,433 | 1.2 % | 3.49 % | 6.51 % | 10.00 % | 4.00 % | 14.00 % |
| 2014 | 2017 | 118,114 | 4,826 | 40,862 | 1.1 % | 3.40 % | 6.60 % | 10.00 % | 4.00 % | 14.00 % |
| 2015@ | 2018 | 118,372 | 4,961 | 41,911 | 2.6 % | 4.09 % | 9.91 % | 14.00 % | 0.00 % | 14.00 % |
| 2016 | 2019 | 119,223 | 5,131 | 43,037 | 2.7 % | 4.03 % | 9.97 % | 14.00 % | 0.00 % | 14.00 % |

After benefit changes.

@ Revised actuarial assumptions.

Combined Plan members are included beginning with the December 31, 2003 valuation.

STATE DIVISION
DEVELOPMENT OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES
DECEMBER 31, 2016

| Actuarial Present Value | (1) Total Actuarial Present Value | Allocation by Entry Age | |
|---|---|---|---|
| | | (2) Portion Covered By Future Normal Cost Contributions | (3) Actuarial Accrued Liabilities (1)-(2) |
| Allowances currently being paid from the Annuity & Pension Reserve Fund | \$ 24,626,905,072 | \$ - | \$ 24,626,905,072 |
| Allowances currently being paid from the Survivors Benefit Fund | 689,058,161 | - | 689,058,161 |
| Age and service allowances based on service rendered before and likely to be rendered after valuation date* | 15,308,834,571 | 3,108,339,011 | 12,200,495,560 |
| Disability allowances likely to be paid present active members who become permanently disabled | 1,497,979,342 | 642,399,965 | 855,579,377 |
| Survivor benefits likely to be paid to spouses and children of present active members who die before retiring | 375,064,415 | 123,792,550 | 251,271,865 |
| Separation benefits (refunds of contributions and deferred allowances) likely to be paid to present active and inactive members | 2,454,760,887 | 1,672,360,907 | 782,399,980 |
| Total | \$ 44,952,602,448 | \$ 5,546,892,433 | \$ 39,405,710,015 |
| Actuarial Value of Assets | | | 30,902,757,104 |
| Unfunded Actuarial Accrued Liability | | | \$ 8,502,952,911 |

*Includes contributions for administrative expenses.

STATE DIVISION
DEVELOPMENT OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES
COMPARATIVE STATEMENT
(\$ IN MILLIONS EXCEPT AVERAGES)

| Dec. 31 | Defined Benefit Active Payroll | | Active and Inactive Member Accrued Liabilities for Retirement Allowances | | | | Unfunded /Payroll |
|---------|-----------------------------------|----------|---|---------------------|----------|-----------------------|----------------------|
| | Total | Average | Computed Total | Valuation Assets | Unfunded | Amortization Years | |
| | | | | | | | |
| 2002 | 4,129 | \$37,531 | \$ 11,822 | \$ 8,965 | \$ 2,857 | 38 | 0.69 |
| 2003## | 4,079 | 37,679 | 12,230 | 9,030 | 3,200 | 43 | 0.78 |
| 2004 | 4,165 | 37,794 | 12,441 | 9,664 | 2,777 | 34 | 0.67 |
| 2005@ | 4,339 | 37,858 | 13,326 | 10,296 | 3,030 | 39 | 0.70 |
| 2006 | 4,522 | 39,005 | 14,006 | 12,131 | 1,875 | 35 | 0.41 |
| 2007 | 4,703 | 39,695 | 14,526 | 13,442 | 1,084 | 20 | 0.23 |
| 2008 | 4,780 | 41,590 | 14,872 | 7,488 | 7,384 | N/A | 1.54 |
| 2009 | 4,763 | 40,704 | 14,843 | 6,648 | 8,195 | N/A | 1.71 |
| 2010@ | 4,811 | 40,691 | 14,903 | 7,113 | 7,790 | 48 | 1.62 |
| 2011 | 4,844 | 40,952 | 14,754 | 6,616 | 8,138 | 37 | 1.68 |
| 2012# | 4,690 | 39,938 | 13,135 | 5,270 | 7,865 | 37 | 1.68 |
| 2013 | 4,746 | 40,433 | 13,125 | 6,572 | 6,553 | 32 | 1.38 |
| 2014 | 4,826 | 40,862 | 12,951 | 5,631 | 7,320 | 40 | 1.52 |
| 2015@ | 4,961 | 41,911 | 13,788 | 5,550 | 8,238 | 24 | 1.66 |
| 2016 | 5,131 | 43,037 | 14,090 | 5,587 | 8,503 | 24 | 1.66 |

After benefit changes.

@ Revised actuarial assumptions.

Combined Plan members are included beginning with the December 31, 2003 valuation.

While no one or two numeric indices can fully describe the financial condition of a retirement plan, the ratio of unfunded actuarial accrued liabilities divided by active member payroll (“UNFUNDED/PAYROLL” above) is significant. Unfunded actuarial accrued liabilities represent plan debt, while active member payroll represents the plan’s capacity to collect contributions to pay toward debt --- thus the ratio is a relative index of condition. The lower the ratio, the greater the financial strength, and vice-versa.

STATE DIVISION
MALE ACTIVE MEMBERS IN DEFINED BENEFIT VALUATION
DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | 887 | | | | | | | 887 |
| Tot. Pay | \$8,148,446 | | | | | | | \$8,148,446 |
| Avg. Pay | \$9,187 | | | | | | | \$9,187 |
| 20-24 | 9,875 | 19 | | | | | | 9,894 |
| Tot. Pay | \$127,870,396 | \$463,093 | | | | | | \$128,333,489 |
| Avg. Pay | \$12,949 | \$24,373 | | | | | | \$12,971 |
| 25-29 | 5,467 | 645 | 13 | | | | | 6,125 |
| Tot. Pay | \$156,060,155 | \$28,957,973 | \$537,983 | | | | | \$185,556,111 |
| Avg. Pay | \$28,546 | \$44,896 | \$41,383 | | | | | \$30,295 |
| 30-34 | 3,274 | 1,479 | 531 | 22 | | | | 5,306 |
| Tot. Pay | \$117,012,596 | \$74,890,213 | \$29,254,537 | \$1,088,447 | | | | \$222,245,793 |
| Avg. Pay | \$35,740 | \$50,636 | \$55,093 | \$49,475 | | | | \$41,886 |
| 35-39 | 2,007 | 1,142 | 1,210 | 465 | 9 | | | 4,833 |
| Tot. Pay | \$78,042,071 | \$62,376,342 | \$72,280,196 | \$28,363,511 | \$480,223 | | | \$241,542,343 |
| Avg. Pay | \$38,885 | \$54,620 | \$59,736 | \$60,997 | \$53,358 | | | \$49,978 |
| 40-44 | 1,433 | 837 | 905 | 1,095 | 336 | 8 | | 4,614 |
| Tot. Pay | \$56,694,591 | \$46,724,912 | \$56,582,664 | \$71,455,435 | \$21,674,623 | \$586,868 | | \$253,719,093 |
| Avg. Pay | \$39,564 | \$55,824 | \$62,522 | \$65,256 | \$64,508 | \$73,359 | | \$54,989 |
| 45-49 | 1,318 | 797 | 860 | 1,050 | 1,232 | 517 | 6 | 5,780 |
| Tot. Pay | \$51,624,927 | \$44,548,254 | \$55,090,916 | \$66,707,448 | \$87,340,292 | \$38,200,880 | \$521,678 | \$344,034,395 |
| Avg. Pay | \$39,169 | \$55,895 | \$64,059 | \$63,531 | \$70,893 | \$73,890 | \$86,946 | \$59,522 |
| 50-54 | 1,066 | 681 | 739 | 818 | 1,010 | 1,316 | 334 | 5,964 |
| Tot. Pay | \$38,600,801 | \$37,110,745 | \$45,925,800 | \$51,049,790 | \$69,585,165 | \$96,579,357 | \$26,219,739 | \$365,071,397 |
| Avg. Pay | \$36,211 | \$54,494 | \$62,146 | \$62,408 | \$68,896 | \$73,389 | \$78,502 | \$61,213 |
| 55-59 | 878 | 534 | 574 | 765 | 796 | 987 | 621 | 5,155 |
| Tot. Pay | \$31,394,063 | \$28,739,663 | \$36,058,518 | \$47,135,366 | \$52,899,084 | \$71,274,884 | \$47,370,271 | \$314,871,849 |
| Avg. Pay | \$35,756 | \$53,820 | \$62,820 | \$61,615 | \$66,456 | \$72,214 | \$76,281 | \$61,081 |
| 60-64 | 566 | 368 | 503 | 508 | 518 | 551 | 437 | 3,451 |
| Tot. Pay | \$17,692,594 | \$20,540,312 | \$31,063,327 | \$31,882,671 | \$34,752,887 | \$38,469,285 | \$34,899,577 | \$209,300,653 |
| Avg. Pay | \$31,259 | \$55,816 | \$61,756 | \$62,761 | \$67,091 | \$69,817 | \$79,862 | \$60,649 |
| 65-69 | 275 | 145 | 165 | 149 | 167 | 161 | 201 | 1,263 |
| Tot. Pay | \$6,081,968 | \$7,600,982 | \$10,659,718 | \$9,703,232 | \$11,096,376 | \$11,771,806 | \$16,668,162 | \$73,582,244 |
| Avg. Pay | \$22,116 | \$52,421 | \$64,604 | \$65,122 | \$66,445 | \$73,117 | \$82,926 | \$58,260 |
| 70 & Over | 261 | 60 | 62 | 47 | 37 | 42 | 44 | 553 |
| Tot. Pay | \$4,140,238 | \$2,364,832 | \$2,418,409 | \$2,854,656 | \$2,571,477 | \$3,390,988 | \$3,784,238 | \$21,524,838 |
| Avg. Pay | \$15,863 | \$39,414 | \$39,007 | \$60,737 | \$69,499 | \$80,738 | \$86,005 | \$38,924 |
| Totals | 27,307 | 6,707 | 5,562 | 4,919 | 4,105 | 3,582 | 1,643 | 53,825 |
| Tot. Pay | \$693,362,846 | \$354,317,321 | \$339,872,068 | \$310,240,556 | \$280,400,127 | \$260,274,068 | \$129,463,665 | \$2,367,930,651 |
| Avg. Pay | \$25,391 | \$52,828 | \$61,106 | \$63,070 | \$68,307 | \$72,662 | \$78,797 | \$43,993 |

STATE DIVISION
FEMALE ACTIVE MEMBERS IN DEFINED BENEFIT VALUATION
DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | 1,162 | | | | | | | 1,162 |
| Tot. Pay | \$9,756,057 | | | | | | | \$9,756,057 |
| Avg. Pay | \$8,396 | | | | | | | \$8,396 |
| 20-24 | 12,397 | 25 | | | | | | 12,422 |
| Tot. Pay | \$154,914,168 | \$590,304 | | | | | | \$155,504,472 |
| Avg. Pay | \$12,496 | \$23,612 | | | | | | \$12,518 |
| 25-29 | 6,414 | 772 | 10 | | | | | 7,196 |
| Tot. Pay | \$199,600,833 | \$36,179,996 | \$546,007 | | | | | \$236,326,836 |
| Avg. Pay | \$31,120 | \$46,865 | \$54,601 | | | | | \$32,841 |
| 30-34 | 4,400 | 1,806 | 590 | 15 | | | | 6,811 |
| Tot. Pay | \$150,344,961 | \$93,192,063 | \$32,662,629 | \$781,999 | | | | \$276,981,652 |
| Avg. Pay | \$34,169 | \$51,601 | \$55,360 | \$52,133 | | | | \$40,667 |
| 35-39 | 2,522 | 1,377 | 1,476 | 484 | 10 | | | 5,869 |
| Tot. Pay | \$99,688,994 | \$72,862,158 | \$87,820,063 | \$28,267,718 | \$619,915 | | | \$289,258,848 |
| Avg. Pay | \$39,528 | \$52,914 | \$59,499 | \$58,404 | \$61,992 | | | \$49,286 |
| 40-44 | 1,909 | 1,053 | 1,120 | 1,123 | 349 | 14 | | 5,568 |
| Tot. Pay | \$76,971,487 | \$58,604,454 | \$70,527,001 | \$71,276,713 | \$22,285,719 | \$865,907 | | \$300,531,281 |
| Avg. Pay | \$40,320 | \$55,655 | \$62,971 | \$63,470 | \$63,856 | \$61,851 | | \$53,975 |
| 45-49 | 1,776 | 1,081 | 1,019 | 1,126 | 1,178 | 512 | 22 | 6,714 |
| Tot. Pay | \$73,116,207 | \$60,574,696 | \$61,749,490 | \$68,973,937 | \$79,465,817 | \$34,858,723 | \$1,375,035 | \$380,113,905 |
| Avg. Pay | \$41,169 | \$56,036 | \$60,598 | \$61,256 | \$67,458 | \$68,083 | \$62,502 | \$56,615 |
| 50-54 | 1,360 | 959 | 1,050 | 1,001 | 1,019 | 1,328 | 388 | 7,105 |
| Tot. Pay | \$55,386,493 | \$51,204,756 | \$62,717,484 | \$58,270,983 | \$65,598,346 | \$92,718,898 | \$28,444,780 | \$414,341,740 |
| Avg. Pay | \$40,725 | \$53,394 | \$59,731 | \$58,213 | \$64,375 | \$69,818 | \$73,311 | \$58,317 |
| 55-59 | 998 | 854 | 981 | 1,037 | 994 | 1,094 | 551 | 6,509 |
| Tot. Pay | \$39,231,429 | \$45,080,182 | \$53,887,111 | \$58,917,221 | \$60,091,041 | \$71,394,490 | \$40,430,962 | \$369,032,436 |
| Avg. Pay | \$39,310 | \$52,787 | \$54,931 | \$56,815 | \$60,454 | \$65,260 | \$73,377 | \$56,696 |
| 60-64 | 521 | 515 | 696 | 797 | 635 | 738 | 375 | 4,277 |
| Tot. Pay | \$17,279,643 | \$26,663,553 | \$40,480,320 | \$45,470,084 | \$38,755,506 | \$46,960,509 | \$25,651,038 | \$241,260,653 |
| Avg. Pay | \$33,166 | \$51,774 | \$58,161 | \$57,052 | \$61,032 | \$63,632 | \$68,403 | \$56,409 |
| 65-69 | 162 | 149 | 168 | 249 | 210 | 203 | 168 | 1,309 |
| Tot. Pay | \$3,687,394 | \$7,841,857 | \$8,890,833 | \$13,910,876 | \$12,991,602 | \$12,547,457 | \$11,255,343 | \$71,125,362 |
| Avg. Pay | \$22,762 | \$52,630 | \$52,922 | \$55,867 | \$61,865 | \$61,810 | \$66,996 | \$54,336 |
| 70 & Over | 120 | 41 | 51 | 56 | 48 | 66 | 74 | 456 |
| Tot. Pay | \$1,848,977 | \$1,374,276 | \$1,964,923 | \$2,790,895 | \$2,991,018 | \$3,791,968 | \$4,080,571 | \$18,842,628 |
| Avg. Pay | \$15,408 | \$33,519 | \$38,528 | \$49,837 | \$62,313 | \$57,454 | \$55,143 | \$41,322 |
| Totals | 33,741 | 8,632 | 7,161 | 5,888 | 4,443 | 3,955 | 1,578 | 65,398 |
| Tot. Pay | \$881,826,643 | \$454,168,295 | \$421,245,861 | \$348,660,426 | \$282,798,964 | \$263,137,952 | \$111,237,729 | \$2,763,075,870 |
| Avg. Pay | \$26,135 | \$52,614 | \$58,825 | \$59,215 | \$63,650 | \$66,533 | \$70,493 | \$42,250 |

**STATE DIVISION
INACTIVE MEMBERS IN DEFINED BENEFIT VALUATION
DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE**

| Attained Ages | Years of Service to Valuation Date | | | | | | | Total Number |
|------------------|------------------------------------|--------------|--------------|--------------|------------|------------|-----------|-----------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | | | | | | | | |
| 20-24 | 10,500 | | | | | | | 10,500 |
| 25-29 | 52,878 | 71 | | | | | | 52,949 |
| 30-34 | 58,860 | 906 | 10 | | | | | 59,776 |
| 35-39 | 32,623 | 1,033 | 280 | 13 | | | | 33,949 |
| 40-44 | 23,778 | 821 | 336 | 84 | 4 | | | 25,023 |
| 45-49 | 15,482 | 925 | 444 | 177 | 66 | 1 | | 17,095 |
| 50-54 | 9,196 | 996 | 608 | 262 | 137 | 46 | 1 | 11,246 |
| 55-59 | 7,636 | 997 | 727 | 395 | 188 | 38 | 2 | 9,983 |
| 60-64 | 5,650 | 682 | 416 | 201 | 89 | 15 | 4 | 7,057 |
| 65-69 | 3,061 | 243 | 85 | 32 | 14 | 5 | 4 | 3,444 |
| 70 & Over | 983 | 61 | 21 | 5 | 2 | 1 | | 1,073 |
| Totals | 220,647 | 6,735 | 2,927 | 1,169 | 500 | 106 | 11 | 232,095 |

SECTION VI

LOCAL GOVERNMENT DIVISION

LOCAL GOVERNMENT DIVISION

Data on active, inactive, retired and money purchase members that was used in the valuation is tabulated briefly below.

Defined Benefit Active Members in Valuation December 31, 2016

| Groups | Number | Annual Payroll | Average | | |
|-------------------------|----------------|-------------------------|------------------|------------------|-----------------|
| | | | Pay | Age | Service |
| Traditional Plan | | | | | |
| Men | 91,560 | \$ 3,681,016,262 | \$ 40,203 | 44.7 yrs. | 10.0 yrs. |
| Women | 107,248 | 3,883,941,955 | 36,215 | 44.2 | 9.9 |
| Traditional Plan Total | 198,808 | \$ 7,564,958,217 | \$ 38,052 | 44.4 yrs. | 10.0 yrs. |
| Combined Plan | | | | | |
| Men | 2,121 | \$ 109,373,926 | \$ 51,567 | 45.5 yrs. | 8.1 yrs. |
| Women | 2,838 | 125,622,984 | 44,265 | 44.5 | 7.6 |
| Combined Plan Total | 4,959 | \$ 234,996,910 | \$ 47,388 | 44.9 yrs. | 7.8 yrs. |
| Grand Total | 203,767 | \$ 7,799,955,127 | \$ 38,279 | 44.4 yrs. | 9.9 yrs. |

Also included in the valuation were 291,301 inactive members and 16,649 members active in the money purchase plan.

Retired Members in Valuation December 31, 2016

| Fund/Type of Allowance | Number | Current Monthly Benefits | Actuarial Liabilities |
|---------------------------------------|----------------|--------------------------|--------------------------|
| Traditional Plan | | | |
| A & PR Fund | | | |
| Superannuation Retirement | 110,786 | \$ 220,760,010 | \$ 30,016,661,659 |
| Disability Retirement | 11,845 | 26,990,653 | 3,671,215,207 |
| Money Purchase | 2,978 | 1,231,885 | 151,905,206 |
| Total A & PR Fund | 125,609 | 248,982,548 | 33,839,782,072 |
| Total SBF | 9,570 | 9,357,240 | 1,116,527,508 |
| Traditional Plan Total | 135,179 | \$ 258,339,788 | \$ 34,956,309,580 |
| Combined Plan | | | |
| A & PR Fund | | | |
| CMDB | 166 | \$ 50,000 | \$ 7,269,547 |
| CMDC | 115 | 31,277 | 4,483,677 |
| Total A & PR Fund | 281 | 81,277 | 11,753,224 |
| Combined Plan Total | 281 | \$ 81,277 | \$ 11,753,224 |
| Member Directed Plan | | | |
| A & PR Fund | 161 | 58,251 | 8,405,940 |
| Reserve for Future Adverse Experience | | | 278,062 |
| Member Directed Plan Total | 161 | \$ 58,251 | \$ 8,684,002 |
| Grand Total | 135,621 | \$ 258,479,316 | \$ 34,976,746,806 |

**LOCAL GOVERNMENT DIVISION
EMPLOYER CONTRIBUTIONS TO SUPPORT
DEFINED BENEFIT RETIREMENT ALLOWANCES
EXPRESSED AS PERCENTS OF ACTIVE MEMBER PAYROLL**

| Valuation Date December 31 | 2016 | | | 2015 |
|---|-------------------------|----------------------|---------------------------------------|---------------------------------------|
| Contributions for | 2019 | | | 2018 |
| Normal Cost | <u>Traditional Plan</u> | <u>Combined Plan</u> | <u>Traditional and Combined Plans</u> | <u>Traditional and Combined Plans</u> |
| Age and Service Allowances* | 8.28 % | 4.80 % | 8.16 % | 8.21 % |
| Disability Allowances | 1.31 % | 1.20 % | 1.30 % | 1.30 % |
| Survivor's Benefits | 0.40 % | 0.34 % | 0.40 % | 0.41 % |
| Separation Benefits | 3.72 % | 1.12 % | 3.64 % | 3.65 % |
| Total Normal Cost | 13.71 % | 7.46 % | 13.50 % | 13.57 % |
| (Member Contributions) | 10.00 % | 0.00 % | 9.65 % | 9.66 % |
| Employer Normal Cost | 3.71 % | 7.46 % | 3.85 % | 3.91 % |
| Unfunded Actuarial Accrued Liabilities | | | | |
| Total Available Contribution | 10.29 % | 6.54 % | 10.15 % | 10.09 % |
| Amortization Years | 18 | 0 | 17 | 17 |
| Total Pension Employer Contribution Rate | 14.00 % | 14.00 % | 14.00 % | 14.00 % |

*Includes contributions for administrative expenses.

The term "Amortization Years" refers to the period sufficient to produce the Total Employer Contribution Rate for retirement allowances and survivor benefits and incorporates all scheduled employer and member contribution rate increases and scheduled employer rate reallocations between the pension and retiree health programs.

**LOCAL GOVERNMENT DIVISION
COMPARATIVE STATEMENT**

| Valuation Date December 31 | Contribution Rate Effective January 1 | Defined Benefit Active Members in Valuation | | | | Computed Employer Contributions as % of Payroll | | | | |
|----------------------------------|--|---|-----------------------|-----------|----------|---|----------------------------------|------------------|-------------------|----------------|
| | | No. | Annual Payroll | | | Normal Cost | Unfunded Accrued Liability | Pension Total | Retiree Health | Grand Total |
| | | | Total (\$Millions) | Average | Increase | | | | | |
| 2002 | 2005 | 247,377 | \$ 6,721 | \$ 27,171 | 2.4 % | 5.92 % | 3.63 % | 9.55 % | 4.00 % | 13.55 % |
| 2003## | 2006 | 237,082 | 6,702 | 28,269 | 4.0 % | 5.66 % | 3.54 % | 9.20 % | 4.50 % | 13.70 % |
| 2004 | 2007 | 236,907 | 6,896 | 29,110 | 3.0 % | 5.57 % | 2.78 % | 8.35 % | 5.50 % | 13.85 % |
| 2005@ | 2008 | 236,073 | 7,066 | 29,933 | 2.8 % | 5.00 % | 2.00 % | 7.00 % | 7.00 % | 14.00 % |
| 2006 | 2009 | 237,981 | 7,234 | 30,399 | 1.6 % | 4.53 % | 2.47 % | 7.00 % | 7.00 % | 14.00 % |
| 2007 | 2010 | 237,225 | 7,438 | 31,354 | 3.1 % | 5.12 % | 1.88 % | 7.00 % | 7.00 % | 14.00 % |
| 2008 | 2011 | 233,163 | 7,566 | 32,451 | 3.5 % | 5.14 % | 4.86 % | 10.00 % | 4.00 % | 14.00 % |
| 2009 | 2012 | 223,004 | 7,334 | 32,889 | 1.3 % | 5.14 % | 4.86 % | 10.00 % | 4.00 % | 14.00 % |
| 2010@ | 2013 | 215,144 | 7,196 | 33,447 | 1.7 % | 5.12 % | 7.88 % | 13.00 % | 1.00 % | 14.00 % |
| 2011 | 2014 | 209,452 | 7,115 | 33,968 | 1.6 % | 5.14 % | 8.86 % | 14.00 % | 0.00 % | 14.00 % |
| 2012# | 2015 | 208,188 | 7,061 | 33,918 | (0.1)% | 3.13 % | 7.87 % | 11.00 % | 3.00 % | 14.00 % |
| 2013 | 2016 | 207,416 | 7,134 | 34,396 | 1.4 % | 3.16 % | 6.84 % | 10.00 % | 4.00 % | 14.00 % |
| 2014 | 2017 | 203,955 | 7,360 | 36,087 | 4.9 % | 3.06 % | 6.94 % | 10.00 % | 4.00 % | 14.00 % |
| 2015@ | 2018 | 202,779 | 7,505 | 37,008 | 2.6 % | 3.91 % | 10.09 % | 14.00 % | 0.00 % | 14.00 % |
| 2016 | 2019 | 203,767 | 7,800 | 38,279 | 3.4 % | 3.85 % | 10.15 % | 14.00 % | 0.00 % | 14.00 % |

After benefit changes.

@ Revised actuarial assumptions.

Combined Plan members are included beginning with the December 31, 2003 valuation.

LOCAL GOVERNMENT DIVISION
DEVELOPMENT OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES
DECEMBER 31, 2016

| Actuarial Present Value | (1) Total Actuarial Present Value | Allocation by Entry Age | |
|---|---|---|---|
| | | (2) Portion Covered By Future Normal Cost Contributions | (3) Actuarial Accrued Liabilities (1)-(2) |
| Allowances currently being paid from the Annuity & Pension Reserve Fund | \$ 33,860,219,298 | \$ - | \$ 33,860,219,298 |
| Allowances currently being paid from the Survivors Benefit Fund | 1,116,527,508 | - | 1,116,527,508 |
| Age and service allowances based on service rendered before and likely to be rendered after valuation date* | 23,835,241,078 | 5,117,304,406 | 18,717,936,672 |
| Disability allowances likely to be paid present active members who become permanently disabled | 1,775,896,553 | 813,264,803 | 962,631,750 |
| Survivor benefits likely to be paid to spouses and children of present active members who die before retiring | 688,242,859 | 237,021,076 | 451,221,783 |
| Separation benefits (refunds of contributions and deferred allowances) likely to be paid to present active and inactive members | 3,673,315,883 | 2,383,905,282 | 1,289,410,601 |
| Total | \$ 64,949,443,179 | \$ 8,551,495,567 | \$ 56,397,947,612 |
| Actuarial Value of Assets | | | 45,674,663,567 |
| Unfunded Actuarial Accrued Liability | | | \$ 10,723,284,045 |

*Includes contributions for administrative expenses.

LOCAL GOVERNMENT DIVISION
DEVELOPMENT OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES
COMPARATIVE STATEMENT
(\$ IN MILLIONS EXCEPT AVERAGES)

| Dec. 31 | Defined Benefit Active Payroll | | Active and Inactive Member Accrued Liabilities for Retirement Allowances | | | | Unfunded /Payroll |
|---------|-----------------------------------|----------|---|---------------------|----------|-----------------------|----------------------|
| | | | Computed Total | Valuation Assets | Unfunded | Amortization Years | |
| | Total | Average | | | | | |
| 2002 | \$ 6,721 | \$27,171 | \$ 16,710 | \$ 12,682 | \$4,028 | 25 | 0.60 |
| 2003## | 6,702 | 28,269 | 17,645 | 13,148 | 4,497 | 27 | 0.67 |
| 2004 | 6,896 | 29,110 | 18,269 | 14,223 | 4,046 | 23 | 0.59 |
| 2005@ | 7,066 | 29,933 | 19,484 | 14,921 | 4,563 | 25 | 0.65 |
| 2006 | 7,234 | 30,399 | 20,147 | 17,523 | 2,624 | 19 | 0.36 |
| 2007 | 7,438 | 31,354 | 20,838 | 19,656 | 1,182 | 9 | 0.16 |
| 2008 | 7,566 | 32,451 | 21,590 | 11,561 | 10,029 | N/A | 1.33 |
| 2009 | 7,334 | 32,889 | 21,620 | 11,599 | 10,021 | N/A | 1.37 |
| 2010@ | 7,196 | 33,447 | 21,668 | 13,212 | 8,456 | 22 | 1.18 |
| 2011 | 7,115 | 33,968 | 21,631 | 11,418 | 10,213 | 25 | 1.44 |
| 2012# | 7,061 | 33,918 | 19,583 | 11,981 | 7,602 | 15 | 1.08 |
| 2013 | 7,134 | 34,396 | 19,586 | 11,440 | 8,146 | 20 | 1.14 |
| 2014 | 7,360 | 36,087 | 19,656 | 13,066 | 6,590 | 13 | 0.90 |
| 2015@ | 7,505 | 37,008 | 20,867 | 10,620 | 10,247 | 16 | 1.37 |
| 2016 | 7,800 | 38,279 | 21,422 | 10,699 | 10,723 | 17 | 1.37 |

After benefit changes.

@ Revised actuarial assumptions.

Combined Plan members are included beginning with the December 31, 2003 valuation.

While no one or two numeric indices can fully describe the financial condition of a retirement plan, the ratio of unfunded actuarial accrued liabilities divided by active member payroll (“UNFUNDED/PAYROLL” above) is significant. Unfunded accrued liabilities represent plan debt, while active member payroll represents the plan’s capacity to collect contributions to pay toward debt --- thus the ratio is a relative index of condition. The lower the ratio, the greater the financial strength, and vice-versa.

LOCAL GOVERNMENT DIVISION
MALE ACTIVE MEMBERS IN DEFINED BENEFIT VALUATION
DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | 4,725 | | | | | | | 4,725 |
| Tot. Pay | \$46,934,181 | | | | | | | \$46,934,181 |
| Avg. Pay | \$9,933 | | | | | | | \$9,933 |
| 20-24 | 7,342 | 68 | | | | | | 7,410 |
| Tot. Pay | \$127,818,352 | \$1,996,573 | | | | | | \$129,814,925 |
| Avg. Pay | \$17,409 | \$29,361 | | | | | | \$17,519 |
| 25-29 | 5,963 | 1,025 | 57 | | | | | 7,045 |
| Tot. Pay | \$176,901,243 | \$42,329,699 | \$2,295,062 | | | | | \$221,526,004 |
| Avg. Pay | \$29,666 | \$41,297 | \$40,264 | | | | | \$31,444 |
| 30-34 | 4,366 | 2,020 | 985 | 73 | | | | 7,444 |
| Tot. Pay | \$145,379,257 | \$93,601,189 | \$49,976,641 | \$3,818,515 | | | | \$292,775,602 |
| Avg. Pay | \$33,298 | \$46,337 | \$50,738 | \$52,308 | | | | \$39,330 |
| 35-39 | 3,273 | 1,728 | 1,826 | 1,006 | 53 | | | 7,886 |
| Tot. Pay | \$111,348,475 | \$81,374,636 | \$100,181,619 | \$55,310,893 | \$2,994,104 | | | \$351,209,727 |
| Avg. Pay | \$34,020 | \$47,092 | \$54,864 | \$54,981 | \$56,493 | | | \$44,536 |
| 40-44 | 2,839 | 1,504 | 1,632 | 1,878 | 717 | 27 | | 8,597 |
| Tot. Pay | \$94,485,005 | \$71,333,377 | \$88,652,533 | \$112,270,002 | \$43,555,061 | \$1,595,503 | | \$411,891,481 |
| Avg. Pay | \$33,281 | \$47,429 | \$54,321 | \$59,782 | \$60,746 | \$59,093 | | \$47,911 |
| 45-49 | 2,960 | 1,591 | 1,643 | 2,027 | 1,779 | 835 | 27 | 10,862 |
| Tot. Pay | \$95,022,156 | \$70,851,989 | \$87,497,346 | \$121,296,540 | \$113,086,136 | \$53,418,725 | \$1,717,323 | \$542,890,215 |
| Avg. Pay | \$32,102 | \$44,533 | \$53,255 | \$59,840 | \$63,567 | \$63,975 | \$63,605 | \$49,981 |
| 50-54 | 2,467 | 1,457 | 1,567 | 1,948 | 1,756 | 1,891 | 456 | 11,542 |
| Tot. Pay | \$77,355,316 | \$62,155,555 | \$77,750,854 | \$112,184,028 | \$107,464,369 | \$125,806,306 | \$30,455,240 | \$593,171,668 |
| Avg. Pay | \$31,356 | \$42,660 | \$49,618 | \$57,589 | \$61,198 | \$66,529 | \$66,788 | \$51,392 |
| 55-59 | 2,308 | 1,446 | 1,544 | 1,792 | 1,606 | 1,838 | 955 | 11,489 |
| Tot. Pay | \$66,192,072 | \$57,726,517 | \$73,654,896 | \$96,035,037 | \$93,856,403 | \$118,796,150 | \$66,292,399 | \$572,553,474 |
| Avg. Pay | \$28,679 | \$39,922 | \$47,704 | \$53,591 | \$58,441 | \$64,633 | \$69,416 | \$49,835 |
| 60-64 | 2,101 | 1,186 | 1,118 | 1,351 | 1,198 | 1,208 | 790 | 8,952 |
| Tot. Pay | \$50,316,691 | \$44,081,501 | \$51,230,175 | \$67,425,272 | \$65,986,751 | \$76,231,634 | \$54,746,532 | \$410,018,556 |
| Avg. Pay | \$23,949 | \$37,168 | \$45,823 | \$49,908 | \$55,081 | \$63,106 | \$69,299 | \$45,802 |
| 65-69 | 1,611 | 672 | 591 | 493 | 399 | 376 | 328 | 4,470 |
| Tot. Pay | \$24,106,064 | \$18,673,480 | \$23,151,834 | \$21,885,485 | \$21,997,231 | \$22,870,268 | \$23,899,026 | \$156,583,388 |
| Avg. Pay | \$14,963 | \$27,788 | \$39,174 | \$44,392 | \$55,131 | \$60,825 | \$72,863 | \$35,030 |
| 70 & Over | 1,460 | 651 | 432 | 291 | 162 | 128 | 135 | 3,259 |
| Tot. Pay | \$16,662,580 | \$9,657,481 | \$9,266,781 | \$7,461,782 | \$6,029,259 | \$5,814,509 | \$6,128,575 | \$61,020,967 |
| Avg. Pay | \$11,413 | \$14,835 | \$21,451 | \$25,642 | \$37,218 | \$45,426 | \$45,397 | \$18,724 |
| Totals | 41,415 | 13,348 | 11,395 | 10,859 | 7,670 | 6,303 | 2,691 | 93,681 |
| Tot. Pay | \$1,032,521,392 | \$553,781,997 | \$563,657,741 | \$597,687,554 | \$454,969,314 | \$404,533,095 | \$183,239,095 | \$3,790,390,188 |
| Avg. Pay | \$24,931 | \$41,488 | \$49,465 | \$55,041 | \$59,318 | \$64,181 | \$68,093 | \$40,461 |

LOCAL GOVERNMENT DIVISION
FEMALE ACTIVE MEMBERS IN DEFINED BENEFIT VALUATION
DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | 4,920 | | | | | | | 4,920 |
| Tot. Pay | \$44,418,338 | | | | | | | \$44,418,338 |
| Avg. Pay | \$9,028 | | | | | | | \$9,028 |
| 20-24 | 7,259 | 99 | | | | | | 7,358 |
| Tot. Pay | \$115,571,157 | \$1,878,174 | | | | | | \$117,449,331 |
| Avg. Pay | \$15,921 | \$18,971 | | | | | | \$15,962 |
| 25-29 | 7,632 | 1,047 | 90 | | | | | 8,769 |
| Tot. Pay | \$219,224,613 | \$36,256,858 | \$2,877,524 | | | | | \$258,358,995 |
| Avg. Pay | \$28,724 | \$34,629 | \$31,972 | | | | | \$29,463 |
| 30-34 | 5,847 | 2,431 | 955 | 79 | | | | 9,312 |
| Tot. Pay | \$183,124,420 | \$102,608,449 | \$41,265,923 | \$3,358,850 | | | | \$330,357,642 |
| Avg. Pay | \$31,319 | \$42,208 | \$43,210 | \$42,517 | | | | \$35,477 |
| 35-39 | 4,605 | 2,014 | 2,455 | 1,112 | 60 | | | 10,246 |
| Tot. Pay | \$144,103,398 | \$87,256,292 | \$117,654,799 | \$53,910,954 | \$2,710,969 | | | \$405,636,412 |
| Avg. Pay | \$31,293 | \$43,325 | \$47,925 | \$48,481 | \$45,183 | | | \$39,590 |
| 40-44 | 3,868 | 1,833 | 1,909 | 2,515 | 821 | 56 | | 11,002 |
| Tot. Pay | \$117,792,344 | \$76,944,242 | \$91,703,579 | \$130,508,717 | \$43,051,738 | \$2,703,571 | | \$462,704,191 |
| Avg. Pay | \$30,453 | \$41,977 | \$48,037 | \$51,892 | \$52,438 | \$48,278 | | \$42,056 |
| 45-49 | 4,120 | 1,933 | 2,036 | 2,553 | 2,076 | 999 | 32 | 13,749 |
| Tot. Pay | \$117,976,558 | \$75,596,588 | \$92,628,685 | \$129,346,030 | \$117,353,997 | \$52,207,814 | \$1,905,858 | \$587,015,530 |
| Avg. Pay | \$28,635 | \$39,108 | \$45,495 | \$50,664 | \$56,529 | \$52,260 | \$59,558 | \$42,695 |
| 50-54 | 3,588 | 1,835 | 2,048 | 2,395 | 1,856 | 2,115 | 505 | 14,342 |
| Tot. Pay | \$96,893,122 | \$68,562,309 | \$88,169,538 | \$116,146,185 | \$98,771,345 | \$121,191,268 | \$28,880,413 | \$618,614,180 |
| Avg. Pay | \$27,005 | \$37,364 | \$43,052 | \$48,495 | \$53,217 | \$57,301 | \$57,189 | \$43,133 |
| 55-59 | 3,123 | 1,782 | 2,072 | 2,603 | 2,076 | 1,881 | 940 | 14,477 |
| Tot. Pay | \$80,361,833 | \$60,632,817 | \$83,184,771 | \$116,808,712 | \$101,706,943 | \$104,662,470 | \$56,375,017 | \$603,732,563 |
| Avg. Pay | \$25,732 | \$34,025 | \$40,147 | \$44,875 | \$48,992 | \$55,642 | \$59,973 | \$41,703 |
| 60-64 | 1,873 | 1,214 | 1,498 | 1,972 | 1,518 | 1,373 | 594 | 10,042 |
| Tot. Pay | \$40,766,650 | \$38,656,658 | \$56,814,308 | \$85,363,594 | \$70,395,775 | \$71,764,175 | \$35,414,313 | \$399,175,473 |
| Avg. Pay | \$21,765 | \$31,842 | \$37,927 | \$43,288 | \$46,374 | \$52,268 | \$59,620 | \$39,751 |
| 65-69 | 946 | 478 | 565 | 631 | 547 | 501 | 286 | 3,954 |
| Tot. Pay | \$14,364,449 | \$12,627,227 | \$20,393,159 | \$25,953,711 | \$24,255,461 | \$24,872,438 | \$16,418,412 | \$138,884,857 |
| Avg. Pay | \$15,184 | \$26,417 | \$36,094 | \$41,131 | \$44,343 | \$49,646 | \$57,407 | \$35,125 |
| 70 & Over | 688 | 267 | 254 | 201 | 197 | 163 | 145 | 1,915 |
| Tot. Pay | \$7,872,692 | \$3,861,813 | \$5,039,204 | \$5,982,138 | \$6,933,775 | \$6,761,679 | \$6,766,126 | \$43,217,427 |
| Avg. Pay | \$11,443 | \$14,464 | \$19,839 | \$29,762 | \$35,197 | \$41,483 | \$46,663 | \$22,568 |
| Totals | 48,469 | 14,933 | 13,882 | 14,061 | 9,151 | 7,088 | 2,502 | 110,086 |
| Tot. Pay | \$1,182,469,574 | \$564,881,427 | \$599,731,490 | \$667,378,891 | \$465,180,003 | \$384,163,415 | \$145,760,139 | \$4,009,564,939 |
| Avg. Pay | \$24,396 | \$37,828 | \$43,202 | \$47,463 | \$50,834 | \$54,199 | \$58,257 | \$36,422 |

**LOCAL GOVERNMENT DIVISION
INACTIVE MEMBERS IN DEFINED BENEFIT VALUATION
DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE**

| Attained Ages | Years of Service to Valuation Date | | | | | | | Total Number |
|------------------|------------------------------------|---------------|--------------|--------------|--------------|------------|-----------|-----------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | | | | | | | | |
| 20-24 | 13,269 | | | | | | | 13,269 |
| 25-29 | 52,795 | 115 | | | | | | 52,910 |
| 30-34 | 43,959 | 1,353 | 34 | | | | | 45,346 |
| 35-39 | 37,322 | 1,407 | 499 | 11 | | | | 39,239 |
| 40-44 | 30,831 | 1,443 | 613 | 268 | 7 | | | 33,162 |
| 45-49 | 24,746 | 1,790 | 882 | 368 | 179 | 5 | | 27,970 |
| 50-54 | 19,441 | 1,921 | 1,155 | 548 | 259 | 109 | 3 | 23,436 |
| 55-59 | 19,114 | 2,099 | 1,542 | 751 | 388 | 61 | 5 | 23,960 |
| 60-64 | 15,636 | 1,699 | 947 | 406 | 198 | 27 | 6 | 18,919 |
| 65-69 | 8,752 | 641 | 213 | 95 | 40 | 6 | 5 | 9,752 |
| 70 & Over | 2,996 | 216 | 76 | 29 | 15 | 5 | 1 | 3,338 |
| Totals | 268,861 | 12,684 | 5,961 | 2,476 | 1,086 | 213 | 20 | 291,301 |

SECTION VII
PUBLIC SAFETY DIVISION

PUBLIC SAFETY DIVISION

Data on active, inactive, retired and money purchase members that was used in the valuation is tabulated briefly below.

Active Members in Valuation December 31, 2016

| Groups | Number | Annual Payroll | Average | | |
|---------------|-----------|---------------------|------------------|------------------|-----------------|
| | | | Pay | Age | Service |
| Men | 65 | \$ 2,904,887 | \$ 44,691 | 40.5 yrs. | 9.3 yrs. |
| Women | 11 | 496,269 | 45,115 | 42.6 | 11.2 |
| Totals | 76 | \$ 3,401,156 | \$ 44,752 | 40.8 yrs. | 9.6 yrs. |

Also included in the valuation were 43 inactive members and 1 member active in the money purchase plan.

Retired Members in Valuation December 31, 2016

| Fund/Type of Allowance | Number | Current Monthly Benefits | Actuarial Liabilities |
|---------------------------|------------|--------------------------|-----------------------|
| A & PR Fund | | | |
| Superannuation Retirement | 33 | \$ 60,762 | \$ 9,793,329 |
| Disability Retirement | 36 | 116,767 | 17,431,357 |
| Money Purchase | 0 | 0 | 0 |
| Total A & PR Fund | 69 | \$ 177,529 | \$ 27,224,686 |
| Total SBF | 109 | 149,806 | 21,649,837 |
| Grand Total | 178 | \$ 327,335 | \$ 48,874,523 |

**PUBLIC SAFETY DIVISION
EMPLOYER CONTRIBUTIONS TO SUPPORT
RETIREMENT ALLOWANCES
EXPRESSED AS PERCENTS OF ACTIVE MEMBER PAYROLL**

| Valuation Date December 31 | 2016 | 2015 |
|---|----------------|----------------|
| Contributions for | 2019 | 2018 |
| Normal Cost | | |
| Age and Service Allowances* | 9.02 % | 8.87 % |
| Disability Allowances | 3.19 % | 3.05 % |
| Survivor's Benefits | 0.50 % | 0.47 % |
| Separation Benefits | 4.74 % | 4.85 % |
| Total Normal Cost | 17.45 % | 17.24 % |
| (Member Contributions) | 12.00 % | 12.00 % |
| Employer Normal Cost | 5.45 % | 5.24 % |
| Unfunded Actuarial Accrued Liabilities | | |
| Total Available Contribution | 12.65 % | 12.86 % |
| Amortization Years | N/A | 83 |
| Total Pension Employer Contribution Rate | 18.10 % | 18.10 % |

**Includes contributions for administrative expenses.*

N/A The unfunded actuarial accrued liabilities are unable to be amortized based upon the total pension contribution rate.

The term “Amortization Years” refers to the period sufficient to produce the Total Employer Contribution Rate for retirement allowances and survivor benefits and incorporates all scheduled employer and member contribution rate increases and scheduled employer rate reallocations between the pension and retiree health programs.

**PUBLIC SAFETY DIVISION
COMPARATIVE STATEMENT ***

| Valuation Date December 31 | Contribution Rate Effective January 1 | Active Members in Valuation | | | | Computed Employer Contributions as % of Payroll | | | | |
|----------------------------------|--|-----------------------------|----------------|-----------|----------|---|----------------------------------|------------------|-------------------|----------------|
| | | No. | Annual Payroll | | | Normal Cost | Unfunded Accrued Liability | Pension Total | Retiree Health | Grand Total |
| | | | Total | Average | Increase | | | | | |
| | | | (\$Thousands) | | | | | | | |
| 2007 | 2010 | 120 | \$ 5,638 | \$ 46,985 | 2.0 % | 8.95 % | 1.92 % | 10.87 % | 7.00 % | 17.87 % |
| 2008 | 2011 | 127 | 6,219 | 48,969 | 4.2 % | 8.32 % | 5.78 % | 14.10 % | 4.00 % | 18.10 % |
| 2009 | 2012 | 94 | 4,061 | 43,205 | (11.8)% | 7.77 % | 6.33 % | 14.10 % | 4.00 % | 18.10 % |
| 2010@ | 2013 | 88 | 3,650 | 41,480 | (4.0)% | 6.22 % | 10.88 % | 17.10 % | 1.00 % | 18.10 % |
| 2011 | 2014 | 84 | 3,629 | 43,202 | 4.2 % | 6.12 % | 11.98 % | 18.10 % | 0.00 % | 18.10 % |
| 2012# | 2015 | 87 | 3,751 | 43,119 | (0.2)% | 3.96 % | 11.14 % | 15.10 % | 3.00 % | 18.10 % |
| 2013 | 2016 | 85 | 3,684 | 43,338 | 0.5 % | 4.11 % | 9.99 % | 14.10 % | 4.00 % | 18.10 % |
| 2014 | 2017 | 86 | 3,823 | 44,452 | 2.6 % | 4.16 % | 9.94 % | 14.10 % | 4.00 % | 18.10 % |
| 2015@ | 2018 | 79 | 3,620 | 45,817 | 3.1 % | 5.24 % | 12.86 % | 18.10 % | 0.00 % | 18.10 % |
| 2016 | 2019 | 76 | 3,401 | 44,752 | (2.3)% | 5.45 % | 12.65 % | 18.10 % | 0.00 % | 18.10 % |

After benefit changes.

* Prior to 2005, Public Safety and Law Enforcement results were reported together. Historical information prior to 2005 may be found on page VIII-3.

@ Revised actuarial assumptions.

PUBLIC SAFETY DIVISION
DEVELOPMENT OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES
DECEMBER 31, 2016

| Actuarial Present Value | (1) Total Actuarial Present Value | Allocation by Entry Age | |
|---|---|---|---|
| | | (2) Portion Covered By Future Normal Cost Contributions | (3) Actuarial Accrued Liabilities (1)-(2) |
| Allowances currently being paid from the Annuity & Pension Reserve Fund | \$ 27,224,686 | \$ - | \$ 27,224,686 |
| Allowances currently being paid from the Survivors Benefit Fund | 21,649,837 | - | 21,649,837 |
| Age and service allowances based on service rendered before and likely to be rendered after valuation date* | 9,069,646 | 2,635,878 | 6,433,768 |
| Disability allowances likely to be paid present active members who become permanently disabled | 1,981,294 | 894,980 | 1,086,314 |
| Survivor benefits likely to be paid to spouses and children of present active members who die before retiring | 304,969 | 132,034 | 172,935 |
| Separation benefits (refunds of contributions and deferred allowances) likely to be paid to present active and inactive members | 2,200,896 | 1,426,595 | 774,301 |
| Total | \$ 62,431,328 | \$ 5,089,487 | \$ 57,341,841 |
| Actuarial Value of Assets | | | 42,273,842 |
| Unfunded Actuarial Accrued Liability | | | \$ 15,067,999 |

* Includes contributions for administrative expenses.

PUBLIC SAFETY DIVISION
DEVELOPMENT OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES
COMPARATIVE STATEMENT *
(\$ IN MILLIONS EXCEPT AVERAGES)

| Dec. 31 | Defined Benefit Active Payroll | | Active and Inactive Member Accrued Liabilities for Retirement Allowances | | | | Unfunded /Payroll |
|---------|-----------------------------------|----------|---|---------------------|----------|-----------------------|----------------------|
| | | | Computed Total | Valuation Assets | Unfunded | Amortization Years | |
| | Total | Average | | | | | |
| 2007 | \$6 | \$46,985 | \$18 | \$(82) | \$ 100 | N/A | 16.67 |
| 2008 | 6 | 48,969 | 18 | 9 | 9 | 79 | 1.50 |
| 2009 | 4 | 43,205 | 12 | 0 | 12 | N/A | 3.00 |
| 2010@ | 4 | 41,480 | 7 | (7) | 14 | N/A | 3.50 |
| 2011 | 4 | 43,202 | 8 | (1) | 9 | 45 | 2.25 |
| 2012# | 4 | 43,119 | 7 | (14) | 21 | N/A | 5.25 |
| 2013 | 4 | 43,338 | 7 | 1 | 6 | 19 | 1.50 |
| 2014 | 4 | 44,452 | 8 | (15) | 23 | N/A | 5.75 |
| 2015@ | 4 | 45,817 | 8 | (4) | 12 | 82 | 3.00 |
| 2016 | 3 | 44,752 | 8 | (7) | 15 | N/A | 5.00 |

After benefit changes.

N/A The unfunded actuarial accrued liabilities are unable to be amortized based upon the total pension contribution rate.

* Prior to 2005, Public Safety and Law Enforcement results were reported together. Historical information prior to 2005 may be found on page VIII-5.

@ Revised actuarial assumptions.

While no one or two numeric indices can fully describe the financial condition of a retirement plan, the ratio of unfunded actuarial accrued liabilities divided by active member payroll ("UNFUNDED/PAYROLL" above) is significant. Unfunded accrued liabilities represent plan debt, while active member payroll represents the plan's capacity to collect contributions to pay toward debt --- thus the ratio is a relative index of condition. The lower the ratio, the greater the financial strength, and vice-versa.

PUBLIC SAFETY DIVISION
MALE ACTIVE MEMBERS IN VALUATION DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|-----------|-----------|-----------|-----------|----------|-----|-------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 20-24 | 3 | | | | | | | 3 |
| Tot. Pay | \$110,170 | | | | | | | \$110,170 |
| Avg. Pay | \$36,723 | | | | | | | \$36,723 |
| 25-29 | 6 | 1 | | | | | | 7 |
| Tot. Pay | \$222,328 | \$55,685 | | | | | | \$278,013 |
| Avg. Pay | \$37,055 | \$55,685 | | | | | | \$39,716 |
| 30-34 | 9 | 3 | 1 | | | | | 13 |
| Tot. Pay | \$393,478 | \$128,652 | \$38,318 | | | | | \$560,448 |
| Avg. Pay | \$43,720 | \$42,884 | \$38,318 | | | | | \$43,111 |
| 35-39 | 3 | 4 | 2 | 2 | | | | 11 |
| Tot. Pay | \$102,980 | \$146,958 | \$116,446 | \$111,872 | | | | \$478,256 |
| Avg. Pay | \$34,327 | \$36,740 | \$58,223 | \$55,936 | | | | \$43,478 |
| 40-44 | 2 | 2 | 1 | 6 | | | | 11 |
| Tot. Pay | \$82,483 | \$91,891 | \$37,067 | \$316,671 | | | | \$528,112 |
| Avg. Pay | \$41,242 | \$45,946 | \$37,067 | \$52,779 | | | | \$48,010 |
| 45-49 | | 1 | 1 | 2 | 2 | | | 6 |
| Tot. Pay | | \$36,397 | \$40,505 | \$103,531 | \$99,620 | | | \$280,053 |
| Avg. Pay | | \$36,397 | \$40,505 | \$51,766 | \$49,810 | | | \$46,676 |
| 50-54 | | | 3 | | | 2 | | 5 |
| Tot. Pay | | | \$165,963 | | | \$89,839 | | \$255,802 |
| Avg. Pay | | | \$55,321 | | | \$44,920 | | \$51,160 |
| 55-59 | 1 | | 1 | | 1 | | | 3 |
| Tot. Pay | \$36,049 | | \$68,088 | | \$45,044 | | | \$149,181 |
| Avg. Pay | \$36,049 | | \$68,088 | | \$45,044 | | | \$49,727 |
| 60-64 | 1 | | | | 2 | | | 3 |
| Tot. Pay | \$34,847 | | | | \$106,450 | | | \$141,297 |
| Avg. Pay | \$34,847 | | | | \$53,225 | | | \$47,099 |
| 65-69 | 1 | 1 | 1 | | | | | 3 |
| Tot. Pay | \$20,612 | \$36,679 | \$66,264 | | | | | \$123,555 |
| Avg. Pay | \$20,612 | \$36,679 | \$66,264 | | | | | \$41,185 |
| 70 & Over | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| Totals | 26 | 12 | 10 | 10 | 5 | 2 | | 65 |
| Tot. Pay | \$1,002,947 | \$496,262 | \$532,651 | \$532,074 | \$251,114 | \$89,839 | | \$2,904,887 |
| Avg. Pay | \$38,575 | \$41,355 | \$53,265 | \$53,207 | \$50,223 | \$44,920 | | \$44,691 |

PUBLIC SAFETY DIVISION
FEMALE ACTIVE MEMBERS IN VALUATION DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|----------|----------|-------|----------|-----------|-----|-----------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 20-24 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 25-29 | 3 | 1 | | | | | | 4 |
| Tot. Pay | \$116,908 | \$55,472 | | | | | | \$172,380 |
| Avg. Pay | \$38,969 | \$55,472 | | | | | | \$43,095 |
| 30-34 | | | 1 | | | | | 1 |
| Tot. Pay | | | \$36,257 | | | | | \$36,257 |
| Avg. Pay | | | \$36,257 | | | | | \$36,257 |
| 35-39 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 40-44 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 45-49 | | | | | 1 | 1 | | 2 |
| Tot. Pay | | | | | \$56,445 | \$92,374 | | \$148,819 |
| Avg. Pay | | | | | \$56,445 | \$92,374 | | \$74,410 |
| 50-54 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 55-59 | 1 | | | | | 1 | | 2 |
| Tot. Pay | \$36,404 | | | | | \$36,675 | | \$73,079 |
| Avg. Pay | \$36,404 | | | | | \$36,675 | | \$36,540 |
| 60-64 | | 1 | 1 | | | | | 2 |
| Tot. Pay | | \$32,224 | \$33,510 | | | | | \$65,734 |
| Avg. Pay | | \$32,224 | \$33,510 | | | | | \$32,867 |
| 65-69 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 70 & Over | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| Totals | 4 | 2 | 2 | | 1 | 2 | | 11 |
| Tot. Pay | \$153,312 | \$87,696 | \$69,767 | | \$56,445 | \$129,049 | | \$496,269 |
| Avg. Pay | \$38,328 | \$43,848 | \$34,884 | | \$56,445 | \$64,525 | | \$45,115 |

PUBLIC SAFETY DIVISION
INACTIVE MEMBERS IN VALUATION DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service to Valuation Date | | | | | | | Total Number |
|------------------|------------------------------------|----------|----------|----------|-------|-------|-----|-----------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | | | | | | | | |
| 20-24 | | | | | | | | |
| 25-29 | 7 | | | | | | | 7 |
| 30-34 | 13 | 1 | | | | | | 14 |
| 35-39 | 8 | 1 | 1 | | | | | 10 |
| 40-44 | 5 | 1 | | | | | | 6 |
| 45-49 | 4 | | | | | | | 4 |
| 50-54 | | | | | | | | |
| 55-59 | 1 | | | | | | | 1 |
| 60-64 | | | | 1 | | | | 1 |
| 65-69 | | | | | | | | |
| 70 & Over | | | | | | | | |
| Totals | 38 | 3 | 1 | 1 | | | | 43 |

SECTION VIII

LAW ENFORCEMENT DIVISION

LAW ENFORCEMENT DIVISION

Data on active, inactive, retired and money purchase members that was used in the valuation is tabulated briefly below.

Active Members in Valuation December 31, 2016

| Groups | Number | Annual Payroll | Average | | |
|---------------|--------------|-----------------------|------------------|------------------|------------------|
| | | | Pay | Age | Service |
| Men | 6,965 | \$ 453,784,137 | \$ 65,152 | 41.4 yrs. | 14.4 yrs. |
| Women | 951 | 57,672,384 | 60,644 | 41.4 | 13.7 |
| Totals | 7,916 | \$ 511,456,521 | \$ 64,610 | 41.4 yrs. | 14.3 yrs. |

Also included in the valuation were 1000 inactive members and 19 members active in the money purchase plan.

Retired Members in Valuation December 31, 2016

| Fund/Type of Allowance | Number | Current Monthly Benefits | Actuarial Liabilities |
|---------------------------|--------------|--------------------------|-------------------------|
| A & PR Fund | | | |
| Superannuation Retirement | 3,076 | \$ 10,896,505 | \$ 1,691,063,475 |
| Disability Retirement | 1,601 | 5,196,515 | 743,266,097 |
| Money Purchase | 0 | 0 | 0 |
| Total A & PR Fund | 4,677 | \$ 16,093,020 | \$ 2,434,329,572 |
| Total SBF | 343 | 416,438 | 53,909,706 |
| Grand Total | 5,020 | \$ 16,509,458 | \$ 2,488,239,278 |

**LAW ENFORCEMENT DIVISION
 EMPLOYER CONTRIBUTIONS TO SUPPORT
 RETIREMENT ALLOWANCES
 EXPRESSED AS PERCENTS OF ACTIVE MEMBER PAYROLL**

| Valuation Date December 31 | 2016 | 2015 |
|---|----------------|----------------|
| Contributions for | 2019 | 2018 |
| Normal Cost | | |
| Age and Service Allowances* | 13.52 % | 13.46 % |
| Disability Allowances | 3.32 % | 3.30 % |
| Survivor's Benefits | 0.49 % | 0.49 % |
| Separation Benefits | 2.42 % | 2.45 % |
| Total Normal Cost | 19.75 % | 19.70 % |
| (Member Contributions) | 13.00 % | 13.00 % |
| Employer Normal Cost | 6.75 % | 6.70 % |
| Unfunded Actuarial Accrued Liabilities | | |
| Total Available Contribution | 11.35 % | 11.40 % |
| Amortization Years | 13 | 14 |
| Total Pension Employer Contribution Rate | 18.10 % | 18.10 % |

**Includes contributions for administrative expenses.*

The term "Amortization Years" refers to the period sufficient to produce the Total Employer Contribution Rate for retirement allowances and survivor benefits and incorporates all scheduled employer and member contribution rate increases and scheduled employer rate reallocations between the pension and retiree health programs.

**LAW ENFORCEMENT DIVISION
COMPARATIVE STATEMENT ***

| Valuation Date December 31 | Contribution Rate Effective January 1 | Active Members in Valuation | | | | Computed Employer Contributions as % of Payroll | | | | |
|----------------------------------|--|-----------------------------|----------------|-----------|----------|---|----------------------------------|------------------|-------------------|----------------|
| | | No. | Annual Payroll | | | Normal Cost | Unfunded Accrued Liability | Pension Total | Retiree Health | Grand Total |
| | | | Total | Average | Increase | | | | | |
| | | | (\$Thousands) | | | | | | | |
| 2002 | 2005 | 8,030 | \$ 356,694 | \$ 44,420 | 4.5 % | 8.77 % | 3.93 % | 12.70 % | 4.00 % | 16.70 % |
| 2003 | 2006 | 8,253 | 384,388 | 46,576 | 4.9 % | 8.65 % | 3.78 % | 12.43 % | 4.50 % | 16.93 % |
| 2004 | 2007 | 8,173 | 392,672 | 48,045 | 3.2 % | 8.63 % | 3.04 % | 11.67 % | 5.50 % | 17.17 % |
| 2005@ | 2008 | 7,976 | 395,189 | 49,547 | 3.0 % | 9.65 % | 0.75 % | 10.40 % | 7.00 % | 17.40 % |
| 2006 | 2009 | 8,092 | 413,182 | 51,061 | 3.1 % | 9.65 % | 0.98 % | 10.63 % | 7.00 % | 17.63 % |
| 2007 | 2010 | 8,265 | 437,223 | 52,901 | 3.6 % | 9.95 % | 0.92 % | 10.87 % | 7.00 % | 17.87 % |
| 2008 | 2011 | 8,173 | 448,694 | 54,900 | 3.8 % | 8.43 % | 5.67 % | 14.10 % | 4.00 % | 18.10 % |
| 2009 | 2012 | 8,006 | 447,232 | 55,862 | 1.8 % | 8.16 % | 5.94 % | 14.10 % | 4.00 % | 18.10 % |
| 2010@ | 2013 | 7,702 | 438,830 | 56,976 | 2.0 % | 7.56 % | 9.54 % | 17.10 % | 1.00 % | 18.10 % |
| 2011 | 2014 | 7,545 | 437,605 | 57,999 | 1.8 % | 7.18 % | 10.92 % | 18.10 % | 0.00 % | 18.10 % |
| 2012# | 2015 | 7,470 | 438,500 | 58,702 | 1.2 % | 5.43 % | 9.67 % | 15.10 % | 3.00 % | 18.10 % |
| 2013 | 2016 | 7,549 | 447,612 | 59,294 | 1.0 % | 5.44 % | 8.66 % | 14.10 % | 4.00 % | 18.10 % |
| 2014 | 2017 | 7,618 | 463,653 | 60,863 | 2.6 % | 5.34 % | 8.76 % | 14.10 % | 4.00 % | 18.10 % |
| 2015@ | 2018 | 7,779 | 481,296 | 61,871 | 1.7 % | 6.70 % | 11.40 % | 18.10 % | 0.00 % | 18.10 % |
| 2016 | 2019 | 7,916 | 511,457 | 64,610 | 4.4 % | 6.75 % | 11.35 % | 18.10 % | 0.00 % | 18.10 % |

After benefit changes.

@ Revised actuarial assumptions.

* Prior to 2005, Law Enforcement and Public Safety are combined for purposes of this schedule.

LAW ENFORCEMENT DIVISION
DEVELOPMENT OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES
DECEMBER 31, 2016

| Actuarial Present Value | (1) Total Actuarial Present Value | Allocation by Entry Age | |
|---|---|---|---|
| | | (2) Portion Covered By Future Normal Cost Contributions | (3) Actuarial Accrued Liabilities (1)-(2) |
| Allowances currently being paid from the Annuity & Pension Reserve Fund | \$ 2,434,329,572 | \$ - | \$ 2,434,329,572 |
| Allowances currently being paid from the Survivors Benefit Fund | 53,909,706 | - | 53,909,706 |
| Age and service allowances based on service rendered before and likely to be rendered after valuation date* | 2,236,472,088 | 652,641,809 | 1,583,830,279 |
| Disability allowances likely to be paid present active members who become permanently disabled | 336,753,889 | 157,610,697 | 179,143,192 |
| Survivor benefits likely to be paid to spouses and children of present active members who die before retiring | 51,492,057 | 22,112,105 | 29,379,952 |
| Separation benefits (refunds of contributions and deferred allowances) likely to be paid to present active and inactive members | 142,561,051 | 117,033,868 | 25,527,183 |
| Total | \$ 5,255,518,363 | \$ 949,398,479 | \$ 4,306,119,884 |
| Actuarial Value of Assets | | | 3,660,045,319 |
| Unfunded Actuarial Accrued Liability | | | \$ 646,074,565 |

*Includes contributions for administrative expenses.

LAW ENFORCEMENT DIVISION
DEVELOPMENT OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES
COMPARATIVE STATEMENT *
(\$ IN MILLIONS EXCEPT AVERAGES)

| Dec. 31 | Defined Benefit Active Payroll | | Active and Inactive Member Accrued Liabilities for Retirement Allowances | | | | Unfunded /Payroll |
|---------|-----------------------------------|----------|---|---------------------|----------|-----------------------|----------------------|
| | | | Computed Total | Valuation Assets | Unfunded | Amortization Years | |
| | Total | Average | | | | | |
| 2002 | \$357 | \$44,420 | \$ 1,135 | \$ 854 | \$ 281 | 36 | 0.79 |
| 2003 | 384 | 46,576 | 1,170 | 838 | 332 | 41 | 0.86 |
| 2004 | 393 | 48,045 | 1,197 | 868 | 329 | 43 | 0.84 |
| 2005@ | 395 | 49,547 | 1,298 | 926 | 372 | N/A | 0.94 |
| 2006 | 413 | 51,061 | 1,356 | 1,069 | 287 | N/A | 0.69 |
| 2007 | 437 | 52,901 | 1,430 | 1,214 | 216 | N/A | 0.49 |
| 2008 | 449 | 54,900 | 1,500 | 771 | 729 | N/A | 1.62 |
| 2009 | 447 | 55,862 | 1,534 | 807 | 727 | N/A | 1.63 |
| 2010@ | 439 | 56,976 | 1,542 | 966 | 576 | 19 | 1.31 |
| 2011 | 438 | 57,999 | 1,546 | 813 | 733 | 23 | 1.67 |
| 2012# | 439 | 58,702 | 1,480 | 945 | 535 | 14 | 1.22 |
| 2013 | 448 | 59,294 | 1,510 | 981 | 529 | 15 | 1.18 |
| 2014 | 464 | 60,863 | 1,550 | 1,062 | 488 | 13 | 1.05 |
| 2015@ | 481 | 61,871 | 1,706 | 1,087 | 619 | 13 | 1.29 |
| 2016 | 511 | 64,610 | 1,818 | 1,172 | 646 | 13 | 1.26 |

After benefit changes.

@ Revised actuarial assumptions.

* Prior to 2005, Law Enforcement and Public Safety are combined for purposes of this schedule.

While no one or two numeric indices can fully describe the financial condition of a retirement plan, the ratio of unfunded actuarial accrued liabilities divided by active member payroll ("UNFUNDED/PAYROLL" above) is significant. Unfunded accrued liabilities represent plan debt, while active member payroll represents the plan's capacity to collect contributions to pay toward debt --- thus the ratio is a relative index of condition. The lower the ratio, the greater the financial strength, and vice-versa.

LAW ENFORCEMENT DIVISION
MALE ACTIVE MEMBERS IN VALUATION DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|--------------|--------------|---------------|--------------|--------------|--------------|---------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 20-24 | 164 | 1 | | | | | | 165 |
| Tot. Pay | \$6,788,351 | \$52,181 | | | | | | \$6,840,532 |
| Avg. Pay | \$41,392 | \$52,181 | | | | | | \$41,458 |
| 25-29 | 547 | 195 | 3 | | | | | 745 |
| Tot. Pay | \$27,142,411 | \$10,762,323 | \$174,658 | | | | | \$38,079,392 |
| Avg. Pay | \$49,620 | \$55,191 | \$58,219 | | | | | \$51,113 |
| 30-34 | 307 | 405 | 213 | 5 | | | | 930 |
| Tot. Pay | \$15,850,535 | \$25,086,959 | \$13,668,628 | \$386,638 | | | | \$54,992,760 |
| Avg. Pay | \$51,630 | \$61,943 | \$64,172 | \$77,328 | | | | \$59,132 |
| 35-39 | 128 | 191 | 435 | 276 | 5 | | | 1,035 |
| Tot. Pay | \$6,482,961 | \$11,680,638 | \$29,791,491 | \$19,641,653 | \$290,099 | | | \$67,886,842 |
| Avg. Pay | \$50,648 | \$61,155 | \$68,486 | \$71,165 | \$58,020 | | | \$65,591 |
| 40-44 | 70 | 129 | 242 | 631 | 246 | 2 | | 1,320 |
| Tot. Pay | \$3,555,113 | \$7,898,790 | \$16,179,499 | \$45,082,807 | \$18,163,110 | \$145,192 | | \$91,024,511 |
| Avg. Pay | \$50,787 | \$61,231 | \$66,857 | \$71,447 | \$73,834 | \$72,596 | | \$68,958 |
| 45-49 | 53 | 80 | 156 | 328 | 656 | 223 | 3 | 1,499 |
| Tot. Pay | \$2,666,274 | \$4,980,615 | \$10,216,591 | \$23,023,051 | \$48,020,750 | \$17,598,714 | \$228,261 | \$106,734,256 |
| Avg. Pay | \$50,307 | \$62,258 | \$65,491 | \$70,192 | \$73,202 | \$78,918 | \$76,087 | \$71,204 |
| 50-54 | 20 | 25 | 59 | 138 | 234 | 215 | 29 | 720 |
| Tot. Pay | \$853,646 | \$1,375,302 | \$3,618,424 | \$9,513,568 | \$16,402,068 | \$15,893,015 | \$2,437,622 | \$50,093,645 |
| Avg. Pay | \$42,682 | \$55,012 | \$61,329 | \$68,939 | \$70,094 | \$73,921 | \$84,056 | \$69,575 |
| 55-59 | 4 | 17 | 22 | 49 | 77 | 85 | 64 | 318 |
| Tot. Pay | \$185,957 | \$961,469 | \$1,414,345 | \$3,383,218 | \$5,334,646 | \$6,341,412 | \$5,212,804 | \$22,833,851 |
| Avg. Pay | \$46,489 | \$56,557 | \$64,288 | \$69,045 | \$69,281 | \$74,605 | \$81,450 | \$71,805 |
| 60-64 | 8 | 7 | 16 | 31 | 41 | 44 | 38 | 185 |
| Tot. Pay | \$498,011 | \$379,748 | \$1,058,320 | \$2,026,324 | \$2,664,636 | \$2,887,066 | \$2,943,772 | \$12,457,877 |
| Avg. Pay | \$62,251 | \$54,250 | \$66,145 | \$65,365 | \$64,991 | \$65,615 | \$77,468 | \$67,340 |
| 65-69 | 2 | | 2 | 5 | 13 | 7 | 8 | 37 |
| Tot. Pay | \$103,807 | | \$72,072 | \$266,438 | \$795,827 | \$422,296 | \$600,256 | \$2,260,696 |
| Avg. Pay | \$51,904 | | \$36,036 | \$53,288 | \$61,217 | \$60,328 | \$75,032 | \$61,100 |
| 70 & Over | 2 | | 4 | 3 | | 2 | | 11 |
| Tot. Pay | \$27,499 | | \$238,097 | \$194,170 | | \$120,009 | | \$579,775 |
| Avg. Pay | \$13,750 | | \$59,524 | \$64,723 | | \$60,005 | | \$52,707 |
| Totals | 1,305 | 1,050 | 1,152 | 1,466 | 1,272 | 578 | 142 | 6,965 |
| Tot. Pay | \$64,154,565 | \$63,178,025 | \$76,432,125 | \$103,517,867 | \$91,671,136 | \$43,407,704 | \$11,422,715 | \$453,784,137 |
| Avg. Pay | \$49,161 | \$60,170 | \$66,347 | \$70,612 | \$72,069 | \$75,100 | \$80,442 | \$65,152 |

LAW ENFORCEMENT DIVISION
FEMALE ACTIVE MEMBERS IN VALUATION DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service To Valuation Date | | | | | | | Total |
|------------------|------------------------------------|-------------|--------------|--------------|--------------|-------------|-----------|--------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| 20-24 | 23 | | | | | | | 23 |
| Tot. Pay | \$866,771 | | | | | | | \$866,771 |
| Avg. Pay | \$37,686 | | | | | | | \$37,686 |
| 25-29 | 82 | 28 | | | | | | 110 |
| Tot. Pay | \$3,985,885 | \$1,458,940 | | | | | | \$5,444,825 |
| Avg. Pay | \$48,608 | \$52,105 | | | | | | \$49,498 |
| 30-34 | 41 | 54 | 24 | 1 | | | | 120 |
| Tot. Pay | \$1,847,061 | \$3,386,275 | \$1,516,725 | \$39,795 | | | | \$6,789,856 |
| Avg. Pay | \$45,050 | \$62,709 | \$63,197 | \$39,795 | | | | \$56,582 |
| 35-39 | 30 | 21 | 59 | 46 | | | | 156 |
| Tot. Pay | \$1,444,364 | \$1,293,801 | \$3,667,144 | \$3,015,288 | | | | \$9,420,597 |
| Avg. Pay | \$48,145 | \$61,610 | \$62,155 | \$65,550 | | | | \$60,388 |
| 40-44 | 11 | 21 | 33 | 77 | 29 | 2 | | 173 |
| Tot. Pay | \$545,359 | \$1,241,213 | \$2,176,674 | \$5,126,321 | \$2,057,580 | \$114,888 | | \$11,262,035 |
| Avg. Pay | \$49,578 | \$59,105 | \$65,960 | \$66,576 | \$70,951 | \$57,444 | | \$65,098 |
| 45-49 | 7 | 9 | 26 | 43 | 73 | 18 | | 176 |
| Tot. Pay | \$400,593 | \$541,814 | \$1,665,266 | \$2,782,344 | \$5,015,743 | \$1,311,262 | | \$11,717,022 |
| Avg. Pay | \$57,228 | \$60,202 | \$64,049 | \$64,706 | \$68,709 | \$72,848 | | \$66,574 |
| 50-54 | 1 | 4 | 12 | 20 | 34 | 24 | 2 | 97 |
| Tot. Pay | \$20,650 | \$205,456 | \$677,200 | \$1,209,671 | \$2,147,641 | \$1,755,770 | \$162,812 | \$6,179,200 |
| Avg. Pay | \$20,650 | \$51,364 | \$56,433 | \$60,484 | \$63,166 | \$73,157 | \$81,406 | \$63,703 |
| 55-59 | 2 | 1 | 10 | 10 | 19 | 16 | 3 | 61 |
| Tot. Pay | \$91,295 | \$59,036 | \$454,363 | \$607,297 | \$1,389,387 | \$965,138 | \$221,157 | \$3,787,673 |
| Avg. Pay | \$45,648 | \$59,036 | \$45,436 | \$60,730 | \$73,126 | \$60,321 | \$73,719 | \$62,093 |
| 60-64 | | | 4 | 6 | 8 | 7 | 3 | 28 |
| Tot. Pay | | | \$223,847 | \$378,770 | \$537,838 | \$389,230 | \$264,025 | \$1,793,710 |
| Avg. Pay | | | \$55,962 | \$63,128 | \$67,230 | \$55,604 | \$88,008 | \$64,061 |
| 65-69 | | | | 1 | 3 | 1 | 2 | 7 |
| Tot. Pay | | | | \$76,029 | \$167,739 | \$43,272 | \$123,655 | \$410,695 |
| Avg. Pay | | | | \$76,029 | \$55,913 | \$43,272 | \$61,828 | \$58,671 |
| 70 & Over | | | | | | | | |
| Tot. Pay | | | | | | | | |
| Avg. Pay | | | | | | | | |
| Totals | 197 | 138 | 168 | 204 | 166 | 68 | 10 | 951 |
| Tot. Pay | \$9,201,978 | \$8,186,535 | \$10,381,219 | \$13,235,515 | \$11,315,928 | \$4,579,560 | \$771,649 | \$57,672,384 |
| Avg. Pay | \$46,711 | \$59,323 | \$61,793 | \$64,880 | \$68,168 | \$67,346 | \$77,165 | \$60,644 |

LAW ENFORCEMENT DIVISION
INACTIVE MEMBERS IN VALUATION DECEMBER 31, 2016
BY ATTAINED AGE AND YEARS OF SERVICE

| Attained Ages | Years of Service to Valuation Date | | | | | | | Total Number |
|------------------|------------------------------------|------------|-----------|-----------|-----------|----------|----------|-----------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | |
| 15-19 | | | | | | | | |
| 20-24 | 6 | | | | | | | 6 |
| 25-29 | 93 | 1 | | | | | | 94 |
| 30-34 | 97 | 27 | 1 | | | | | 125 |
| 35-39 | 89 | 29 | 16 | 2 | | | | 136 |
| 40-44 | 114 | 25 | 19 | 19 | 3 | | | 180 |
| 45-49 | 114 | 28 | 21 | 13 | 14 | 2 | | 192 |
| 50-54 | 72 | 5 | 14 | 13 | 6 | 6 | | 116 |
| 55-59 | 46 | 11 | 9 | 7 | 6 | | 1 | 80 |
| 60-64 | 26 | 4 | 3 | 3 | | | | 36 |
| 65-69 | 24 | | | 2 | 1 | | 1 | 28 |
| 70 & Over | 7 | | | | | | | 7 |
| Totals | 688 | 130 | 83 | 59 | 30 | 8 | 2 | 1,000 |

SECTION IX

ALLOWANCES BEING PAID TO
RETIREES AND BENEFICIARIES

**MONTHLY ALLOWANCES OF RETIRED LIVES
BY YEAR OF RETIREMENT
AS OF DECEMBER 31, 2016**

| Year of Retirement | No. | Initial | Post-Ret. Increase | Total | Average |
|---------------------------|----------------|----------------------|---------------------------|----------------------|----------------|
| 2016 | 8,799 | \$18,907,772 | \$ 61,985 | \$ 18,969,757 | \$ 2,156 |
| 2015 | 7,600 | 15,520,129 | 511,313 | 16,031,442 | 2,109 |
| 2014 | 12,119 | 21,912,512 | 1,372,752 | 23,285,264 | 1,921 |
| 2013 | 11,944 | 23,385,154 | 2,391,013 | 25,776,167 | 2,158 |
| 2012 | 10,905 | 22,442,368 | 2,768,103 | 25,210,471 | 2,312 |
| 2011 | 12,001 | 26,748,865 | 4,107,082 | 30,855,947 | 2,571 |
| 2010 | 10,767 | 21,935,232 | 4,020,654 | 25,955,886 | 2,411 |
| 2009 | 10,540 | 22,025,805 | 4,659,497 | 26,685,302 | 2,532 |
| 2008 | 9,174 | 17,508,358 | 4,228,428 | 21,736,786 | 2,369 |
| 2007 | 8,747 | 16,145,311 | 4,389,718 | 20,535,029 | 2,348 |
| 2006 | 9,248 | 16,231,431 | 4,881,333 | 21,112,764 | 2,283 |
| 2005 | 8,546 | 15,483,122 | 5,116,994 | 20,600,116 | 2,410 |
| 2004 | 8,040 | 13,672,410 | 4,922,623 | 18,595,033 | 2,313 |
| 2003 | 7,506 | 12,920,631 | 5,022,083 | 17,942,714 | 2,390 |
| 2002 | 8,259 | 13,892,083 | 5,824,951 | 19,717,034 | 2,387 |
| 2001 | 6,686 | 10,578,291 | 4,728,781 | 15,307,072 | 2,289 |
| 2000 | 6,331 | 9,395,695 | 4,438,879 | 13,834,574 | 2,185 |
| 1995-1999 | 24,737 | 32,033,121 | 16,944,325 | 48,977,446 | 1,980 |
| 1990-1994 | 15,068 | 15,347,643 | 10,256,777 | 25,604,420 | 1,699 |
| 1985-1989 | 10,247 | 8,997,710 | 7,482,737 | 16,480,447 | 1,608 |
| 1980-1984 | 4,395 | 2,558,991 | 2,657,513 | 5,216,504 | 1,187 |
| 1975-1979 | 1,823 | 752,429 | 1,147,687 | 1,900,116 | 1,042 |
| 1970-1974 | 478 | 125,307 | 254,161 | 379,468 | 794 |
| 1965-1969 | 141 | 32,876 | 112,105 | 144,981 | 1,028 |
| Before 1965 | 66 | 14,357 | 53,176 | 67,533 | 1,023 |
| TOTAL | 214,167 | \$358,567,603 | \$102,354,670 | \$460,922,273 | \$2,152 |

**MONTHLY ALLOWANCES OF RETIRED LIVES
BY YEARS OF SERVICE
AS OF DECEMBER 31, 2016**

| Years of Service | No. | Initial | Post-Ret. Increase | Total | Average |
|-------------------------|----------------|----------------------|---------------------------|----------------------|----------------|
| <5 or n/a | 8,531 | \$ 3,106,226 | \$ 471,399 | \$ 3,577,625 | \$ 419 |
| 5 | 4,159 | 1,617,934 | 501,689 | 2,119,623 | 510 |
| 6 | 3,431 | 1,495,433 | 440,880 | 1,936,313 | 564 |
| 7 | 3,273 | 1,555,999 | 444,777 | 2,000,776 | 611 |
| 8 | 3,191 | 1,684,099 | 449,146 | 2,133,245 | 669 |
| 9 | 2,451 | 1,468,276 | 361,368 | 1,829,644 | 746 |
| 10 | 9,513 | 4,845,633 | 1,499,784 | 6,345,417 | 667 |
| 11 | 5,857 | 3,578,320 | 1,026,919 | 4,605,239 | 786 |
| 12 | 5,846 | 3,811,426 | 1,079,005 | 4,890,431 | 837 |
| 13 | 5,501 | 4,078,887 | 1,131,109 | 5,209,996 | 947 |
| 14 | 5,271 | 4,134,517 | 1,141,485 | 5,276,002 | 1,001 |
| 15 | 5,688 | 4,794,302 | 1,355,186 | 6,149,488 | 1,081 |
| 16 | 5,454 | 4,815,002 | 1,396,554 | 6,211,556 | 1,139 |
| 17 | 4,992 | 4,910,155 | 1,424,100 | 6,334,255 | 1,269 |
| 18 | 4,968 | 5,082,764 | 1,508,516 | 6,591,280 | 1,327 |
| 19 | 4,748 | 5,136,316 | 1,538,696 | 6,675,012 | 1,406 |
| 20 | 6,229 | 7,416,471 | 2,105,717 | 9,522,188 | 1,529 |
| 21 | 5,211 | 6,630,934 | 1,976,595 | 8,607,529 | 1,652 |
| 22 | 5,035 | 6,916,610 | 2,039,723 | 8,956,333 | 1,779 |
| 23 | 4,934 | 7,175,579 | 2,084,325 | 9,259,904 | 1,877 |
| 24 | 4,682 | 7,313,578 | 2,125,533 | 9,439,111 | 2,016 |
| 25 | 10,150 | 17,515,301 | 5,038,682 | 22,553,983 | 2,222 |
| 26 | 6,048 | 11,147,490 | 3,407,985 | 14,555,475 | 2,407 |
| 27 | 5,993 | 11,793,128 | 3,727,184 | 15,520,312 | 2,590 |
| 28 | 6,591 | 14,562,372 | 4,648,469 | 19,210,841 | 2,915 |
| 29 | 6,282 | 15,004,016 | 4,522,627 | 19,526,643 | 3,108 |
| 30 | 31,260 | 81,743,813 | 21,176,644 | 102,920,457 | 3,292 |
| 31 | 8,942 | 24,254,443 | 6,823,838 | 31,078,281 | 3,476 |
| 32 | 6,839 | 19,236,489 | 5,553,694 | 24,790,183 | 3,625 |
| 33 | 5,236 | 15,375,735 | 4,373,034 | 19,748,769 | 3,772 |
| 34 | 4,131 | 12,532,656 | 3,679,183 | 16,211,839 | 3,924 |
| 35 | 3,747 | 11,574,773 | 3,430,333 | 15,005,106 | 4,005 |
| 36 | 2,656 | 8,238,936 | 2,445,408 | 10,684,344 | 4,023 |
| 37 | 2,122 | 6,718,273 | 1,988,610 | 8,706,883 | 4,103 |
| 38 | 1,495 | 4,700,673 | 1,424,603 | 6,125,276 | 4,097 |
| 39 | 1,164 | 3,572,364 | 1,215,877 | 4,788,241 | 4,114 |
| 40 & Over | 2,546 | 9,028,680 | 2,795,993 | 11,824,673 | 4,644 |
| TOTAL | 214,167 | \$358,567,603 | \$102,354,670 | \$460,922,273 | \$2,152 |

ANNUITY AND PENSION RESERVE FUND
ANNUAL ALLOWANCE, REPORTED ASSETS AND ACTUARIAL LIABILITIES
COMPARATIVE STATEMENT
(\$ MILLIONS)

| Valuation Date | Annual Allowances | | | Reported Assets* | Actuarial Liabilities | Ratio of Assets to Liabilities | Ratio of DB Active to Retired |
|----------------|-------------------|-------------|-----------------|------------------|-----------------------|--------------------------------|-------------------------------|
| | No. | \$ Millions | % of DB Payroll | | | | |
| 12/31/1987 | 86,924 | \$ 518 | 10.6 % ** | \$ 5,485 | \$ 5,437 | 100.9 % | 3.0 |
| 12/31/1988 | 89,972 | 581 | 10.9 % ** | 6,182 | 6,173 | 100.1 % | 2.9 |
| 12/31/1989@ | 92,504 | 661 | 12.4 % ** | 6,985 | 6,911 | 101.1 % | 2.9 |
| 12/31/1990 | 94,088 | 706 | 11.7 % ** | 7,438 | 7,338 | 101.4 % | 3.0 |
| 12/31/1991 | 95,843 | 762 | 11.5 % ** | 8,014 | 7,904 | 101.4 % | 3.4 |
| 12/31/1992 | 98,609 | 835 | 12.1 % ** | 8,814 | 8,692 | 101.4 % | 3.4 |
| 12/31/1993 | 100,651 | 901 | 12.5 % ** | 9,390 | 9,356 | 100.4 % | 3.4 |
| 12/31/1994 | 102,587 | 958 | 12.6 % ** | 9,964 | 9,893 | 100.7 % | 3.3 |
| 12/31/1995 | 104,806 | 1,036 | 13.0 % ** | 10,808 | 10,737 | 100.7 % | 3.3 |
| 12/31/1996@ | 107,617 | 1,141 | 13.7 % ** | 11,819 | 11,762 | 100.5 % | 3.3 |
| 12/31/1997 | 110,470 | 1,233 | 14.3 % ** | 12,843 | 12,755 | 100.7 % | 3.2 |
| 12/13/1998 | 113,000 | 1,327 | 14.7 % ** | 13,885 | 13,751 | 101.0 % | 3.1 |
| 12/31/1999+ | 115,431 | 1,530 | 16.1 % ** | 14,978 | 16,139 | 92.8 % | 3.1 |
| 12/31/2000 | 118,620 | 1,641 | 16.1 % ** | 16,980 | 16,980 | 100.0 % | 3.1 |
| 12/31/2001@ | 121,875 | 1,775 | 16.5 % ** | 18,001 | 18,001 | 100.0 % | 3.0 |
| 12/31/2002 | 126,409 | 1,958 | 17.5 % ** | 20,085 | 20,085 | 100.0 % | 2.9 |
| 12/31/2003 | 130,433 | 2,136 | 19.1 % ** | 22,535 | 22,535 | 100.0 % | 2.7 |
| 12/31/2004 | 134,535 | 2,311 | 20.2 % ** | 24,470 | 24,470 | 100.0 % | 2.6 |
| 12/31/2005@ | 138,996 | 2,508 | 21.2 % ** | 27,084 | 27,084 | 100.0 % | 2.6 |
| 12/31/2006 | 144,037 | 2,710 | 22.3 % ** | 29,304 | 29,304 | 100.0 % | 2.5 |
| 12/31/2007 | 148,493 | 2,916 | 23.2 % ** | 31,547 | 31,547 | 100.0 % | 2.5 |
| 12/31/2008 | 153,931 | 3,148 | 24.6 % ** | 34,060 | 34,060 | 100.0 % | 2.3 |
| 12/31/2009 | 159,518 | 3,419 | 27.2 % ** | 37,098 | 37,098 | 100.0 % | 2.2 |
| 12/31/2010@ | 166,247 | 3,705 | 29.8 % ** | 40,184 | 40,818 | 100.0 % | 2.1 |
| 12/31/2011 | 174,679 | 4,065 | 32.8 % ** | 45,001 | 45,001 | 100.0 % | 1.9 |
| 12/31/2012 | 180,759 | 4,352 | 35.7 % ** | 48,044 | 48,044 | 100.0 % | 1.8 |
| 12/31/2013 | 187,198 | 4,629 | 37.5 % ** | 50,754 | 50,754 | 100.0 % | 1.8 |
| 12/31/2014 | 194,096 | 4,908 | 38.8 % ** | 53,432 | 53,432 | 100.0 % | 1.7 |
| 12/31/2015@ | 196,709 | 5,115 | 39.5 % ** | 55,117 | 55,117 | 100.0 % | 1.7 |
| 12/31/2016 | 199,662 | 5,344 | 39.7 % ** | 60,949 | 60,949 | 100.0 % | 1.7 |

* Including certain recommended transfers and accrued transfers.

@ Revised actuarial assumptions.

** Excluding health insurance and Medicare payments.

+ Including estimated effect of legislated benefit changes.

ANNUITY AND PENSION RESERVE FUND
RETIREES AND BENEFICIARIES DECEMBER 31, 2016
TYPE OF BENEFIT, MONTHLY AMOUNT AND ACTUARIAL LIABILITIES

| Type of Allowance | Number | Current Total | Actuarial Liabilities |
|---|----------------|-----------------------|--------------------------|
| Superannuation Retirement | | | |
| Plan A - Joint & 50% | 20,029 | \$ 53,257,804 | \$ 7,508,591,632 |
| Plan B - Straight Life / Straight Life Plan | 84,420 | 178,403,940 | 22,329,498,690 |
| Plan C - Special Joint & Survivor* | 27,429 | 73,291,871 | 11,034,016,468 |
| Plan D - Joint & 100% | 22,301 | 57,828,464 | 9,452,903,401 |
| Plan E - Life & 0 to 5 Years Guaranteed | 323 | 646,037 | 81,256,550 |
| - Life & 6 to 10 Years Guaranteed | 469 | 939,209 | 116,512,074 |
| - Life & 11 to 15 Years Guaranteed | 652 | 1,111,434 | 142,409,358 |
| - Life & 16 to 20 Years Guaranteed | 66 | 158,735 | 24,533,407 |
| Plan F - Multiple Continuing Beneficiaries (Includes Multiple Life Plan) | 1,107 | 2,888,543 | 553,495,031 |
| Reserve for Member Directed Future Adverse Experience | | | 712,362 |
| Money Purchase | 3,906 | 1,710,662 | 211,616,348 |
| Survivor Beneficiary - Life Benefit | 17,028 | 21,388,448 | 2,091,391,916 |
| Survivor Beneficiary - Temporary Benefit | 84 | 121,397 | 6,594,516 |
| Total Superannuation | 177,814 | \$ 391,746,544 | \$ 53,553,531,753 |
| Disability Retirement | 21,848 | \$ 53,593,146 | \$ 7,395,146,876 |
| Total from A & PR | 199,662 | \$ 445,339,690 | \$ 60,948,678,629 |

**Includes post September 1, 2013 retirements that elected the Joint Life Plan.*

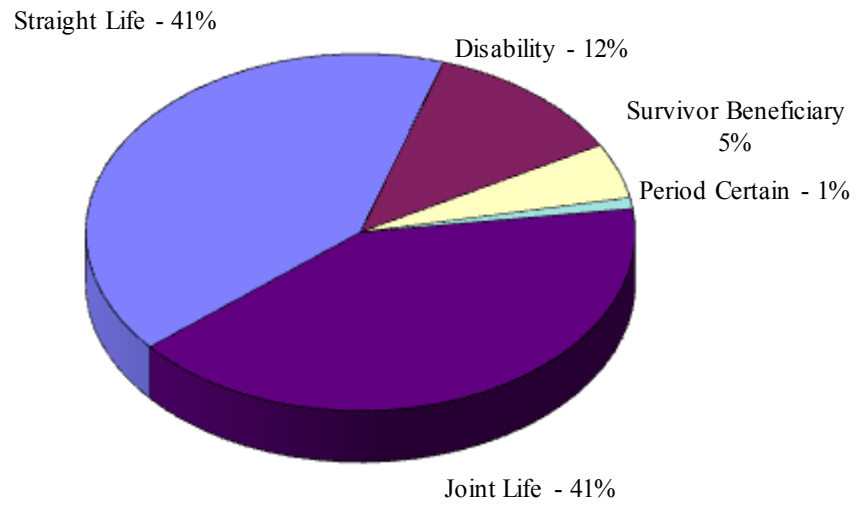
ANNUITY AND PENSION RESERVE FUND
RETIREES AND BENEFICIARIES DECEMBER 31, 2016
TYPE OF BENEFIT AND AMOUNT BY GENDER OF RECIPIENT

| Type of Allowance | Men | | Women | | Total | |
|---|---------------|-----------------------|----------------|-----------------------|----------------|-----------------------|
| | Number | Monthly Allowances | Number | Monthly Allowances | Number | Monthly Allowances |
| Superannuation Retirement | | | | | | |
| Plan A - Joint & 50% | 13,130 | \$ 37,263,334 | 6,899 | \$ 15,994,470 | 20,029 | \$ 53,257,804 |
| Plan B - Straight Life / Straight Life Plan | 26,130 | 62,531,628 | 58,290 | 115,872,312 | 84,420 | 178,403,940 |
| Plan C - Special Joint & Survivor* | 14,081 | 41,895,428 | 13,348 | 31,396,443 | 27,429 | 73,291,871 |
| Plan D - Joint & 100% | 17,763 | 48,154,253 | 4,538 | 9,674,211 | 22,301 | 57,828,464 |
| Plan E - Life & 0 to 5 Years Guaranteed | 129 | 285,410 | 194 | 360,627 | 323 | 646,037 |
| - Life & 6 to 10 Years Guaranteed | 231 | 469,425 | 238 | 469,784 | 469 | 939,209 |
| - Life & 11 to 15 Years Guaranteed | 351 | 589,802 | 301 | 521,632 | 652 | 1,111,434 |
| - Life & 16 to 20 Years Guaranteed | 44 | 97,641 | 22 | 61,094 | 66 | 158,735 |
| Plan F - Multiple Continuing Beneficiaries (Includes Multiple Life Plan) | 411 | 1,304,915 | 696 | 1,583,628 | 1,107 | 2,888,543 |
| Money Purchase | 2,490 | 1,313,215 | 1,416 | 397,447 | 3,906 | 1,710,662 |
| Survivor Beneficiary - Life Benefit | 2,137 | 1,720,933 | 14,891 | 19,667,515 | 17,028 | 21,388,448 |
| Survivor Beneficiary - Temporary Benefit | 23 | 42,353 | 61 | 49,044 | 84 | 91,397 |
| Total Superannuation | 76,920 | \$ 195,668,337 | 100,894 | \$ 196,048,207 | 177,814 | \$ 391,716,544 |
| Disability Retirement | 11,106 | \$ 29,940,053 | 10,742 | \$ 23,653,093 | 21,848 | \$ 53,593,146 |
| Total from A & PR | 88,026 | \$ 225,608,390 | 111,636 | \$ 219,701,300 | 199,662 | \$ 445,309,690 |

*Includes post September 1, 2013 retirements that elected the Joint Life Plan.

ANNUITIES BEING PAID BY TYPE
DECEMBER 31, 2016

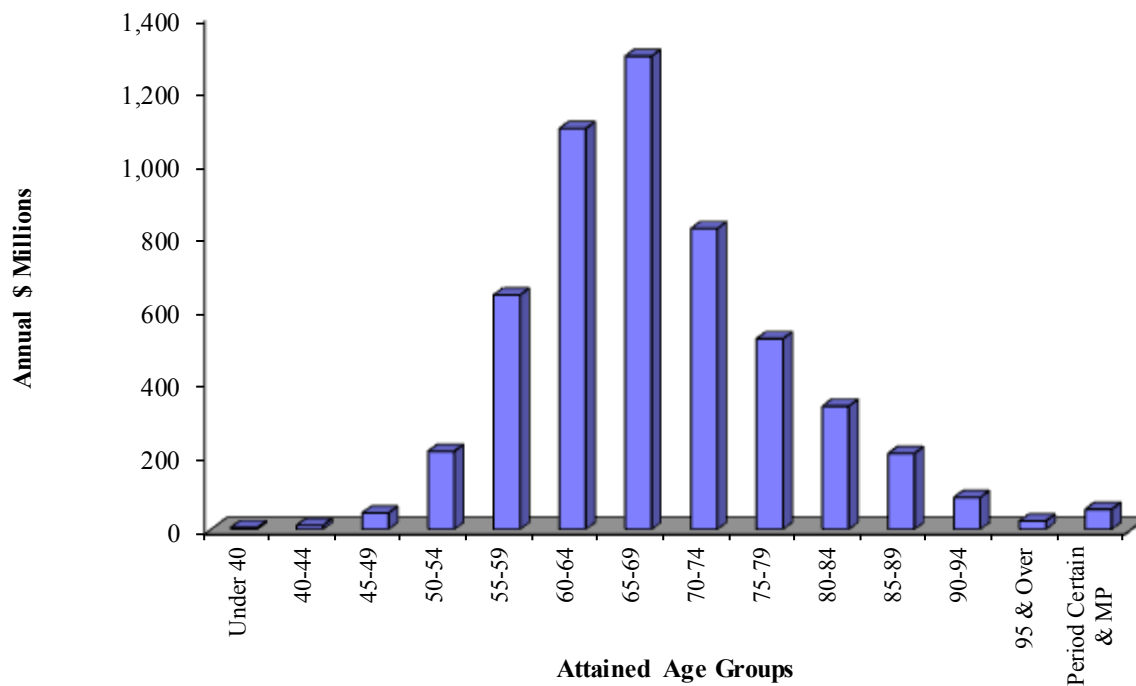
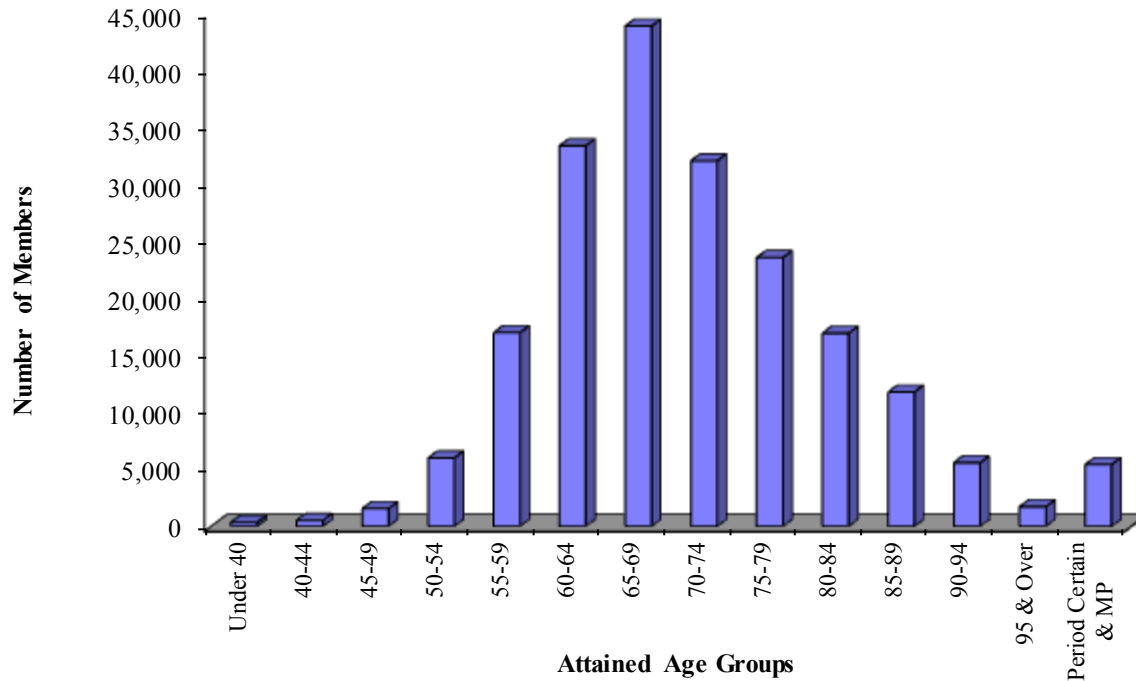
Annuity and Pension Reserve Fund



ANNUITY AND PENSION RESERVE FUND
RETIREES AND BENEFICIARIES DECEMBER 31, 2016
CURRENT MONTHLY TOTAL \$ BY ATTAINED AGES

| Attained Ages | Superannuation | | Disability | | Totals | |
|---------------------------------|----------------|----------------------|---------------|---------------------|----------------|----------------------|
| | No. | Monthly Total | No. | Monthly Total | No. | Monthly Total |
| Under 20 | 12 | \$ 13,425 | | | 12 | \$ 13,425 |
| 20-24 | 28 | 18,079 | | | 28 | 18,079 |
| 25-29 | 32 | 27,197 | 1 | \$ 1,245 | 33 | 28,442 |
| 30-34 | 35 | 30,662 | 31 | 48,475 | 66 | 79,137 |
| 35-39 | 51 | 33,369 | 163 | 282,387 | 214 | 315,756 |
| 40-44 | 56 | 40,033 | 476 | 916,665 | 532 | 956,698 |
| 45-49 | 261 | 559,785 | 1,304 | 3,195,611 | 1,565 | 3,755,396 |
| 50-54 | 3,297 | 10,344,489 | 2,700 | 7,375,629 | 5,997 | 17,720,118 |
| 55-59 | 12,462 | 41,151,709 | 4,525 | 12,092,415 | 16,987 | 53,244,124 |
| 60-64 | 27,964 | 77,492,165 | 5,395 | 13,581,636 | 33,359 | 91,073,801 |
| 65-69 | 40,339 | 98,658,924 | 3,503 | 8,802,895 | 43,842 | 107,461,819 |
| 70-74 | 30,092 | 63,990,460 | 1,944 | 4,302,989 | 32,036 | 68,293,449 |
| 75-79 | 22,549 | 41,472,735 | 1,012 | 1,877,760 | 23,561 | 43,350,495 |
| 80-84 | 16,482 | 27,337,779 | 450 | 701,855 | 16,932 | 28,039,634 |
| 85-89 | 11,535 | 16,992,321 | 234 | 298,649 | 11,769 | 17,290,970 |
| 90-94 | 5,495 | 7,155,955 | 90 | 94,414 | 5,585 | 7,250,369 |
| 95 & Over | 1,708 | 1,861,380 | 20 | 20,521 | 1,728 | 1,881,901 |
| Period Certain & Money Purchase | 5,416 | 4,566,077 | | | 5,416 | 4,566,077 |
| Totals | 177,814 | \$391,746,544 | 21,848 | \$53,593,146 | 199,662 | \$445,339,690 |

**ANNUITY AND PENSION RESERVE FUND
BENEFITS BEING PAID BY ATTAINED AGES
DECEMBER 31, 2016**



**ANNUITY AND PENSION RESERVE FUND
PERCENT OF RECIPIENTS
BY AGE GROUPS
AND YEAR**

| Attained Age Group | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 |
|---------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Under 30 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 30-39 | 0.1% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.3% | 0.3% | 0.4% | 0.4% | 0.5% | 0.5% | 0.5% | 0.5% | 0.6% |
| 40-49 | 1.1% | 1.1% | 1.3% | 1.5% | 1.8% | 2.0% | 2.2% | 2.5% | 2.7% | 2.9% | 3.1% | 3.3% | 3.4% | 3.5% | 3.5% |
| 50-59 | 11.5% | 12.5% | 13.7% | 14.6% | 15.4% | 15.9% | 15.9% | 16.0% | 15.9% | 15.9% | 16.1% | 15.8% | 14.7% | 13.7% | 12.9% |
| 60-69 | 38.6% | 38.8% | 37.9% | 36.5% | 35.5% | 34.8% | 33.5% | 32.6% | 31.4% | 30.7% | 29.6% | 28.9% | 28.8% | 28.6% | 28.3% |
| 70-79 | 27.9% | 26.7% | 26.2% | 26.1% | 25.8% | 25.4% | 25.7% | 26.2% | 26.7% | 27.2% | 27.7% | 28.5% | 29.4% | 30.4% | 31.5% |
| 80-89 | 14.4% | 14.4% | 14.4% | 14.8% | 15.3% | 15.8% | 16.6% | 16.9% | 17.4% | 17.7% | 17.9% | 18.0% | 18.2% | 18.3% | 18.4% |
| 90 & Over | 3.7% | 3.6% | 3.6% | 3.6% | 3.6% | 3.6% | 3.6% | 3.4% | 3.4% | 3.3% | 3.2% | 3.2% | 3.2% | 3.2% | 3.1% |
| Period Certain & MP | 2.7% | 2.7% | 2.7% | 2.7% | 2.4% | 2.3% | 2.2% | 2.1% | 2.1% | 1.9% | 1.9% | 1.8% | 1.8% | 1.8% | 1.7% |
| TOTALS | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Average Age | 70.6 | 70.4 | 70.2 | 70.0 | 69.9 | 69.9 | 70.0 | 70.0 | 70.1 | 70.1 | 70.2 | 70.2 | 70.4 | 70.6 | 70.7 |

STATE DIVISION
SURVIVOR BENEFIT FUND TABULATED BY
TYPE OF BENEFIT BEING PAID AND MONTHLY AMOUNT
DECEMBER 31, 2016

| Group | Number | Current Total | Actuarial Liabilities |
|--|--------------|---------------------|--------------------------|
| S-1 - Survivor Benefit to Beneficiary of Deceased Member Joint and Survivor Computation | | | |
| Men | 186 | \$ 214,356 | \$ 23,403,190 |
| Women | 627 | 1,012,990 | 112,366,307 |
| Totals | 813 | \$ 1,227,346 | \$ 135,769,497 |
| S-2 - Survivor Benefit to Beneficiary of Deceased Member Fixed Rate Amount | | | |
| Males | | | |
| Widower | 734 | \$ 926,792 | \$ 120,372,116 |
| Parent | 0 | 0 | 0 |
| Other | 0 | 0 | 0 |
| Child | 252 | 198,122 | 12,603,854 |
| Subtotals - Male | 986 | \$ 1,124,914 | \$ 132,975,970 |
| Females | | | |
| Widow | 2,187 | \$ 2,914,428 | \$ 389,161,968 |
| Parent | 0 | 0 | 0 |
| Other | 2 | 1,773 | 282,020 |
| Child | 272 | 223,408 | 13,955,795 |
| Subtotals - Female | 2,461 | \$ 3,139,609 | \$ 403,399,783 |
| Totals | 3,447 | \$ 4,264,523 | \$ 536,375,753 |
| Total Benefits Being Paid from Survivor Benefit Fund | | | |
| Men | 1,172 | \$ 1,339,270 | \$ 156,379,160 |
| Women | 3,088 | 4,152,599 | 515,766,090 |
| Totals | 4,260 | \$ 5,491,869 | \$ 672,145,250 |

**LOCAL GOVERNMENT DIVISION
SURVIVOR BENEFIT FUND TABULATED BY
TYPE OF BENEFIT BEING PAID AND MONTHLY AMOUNT
DECEMBER 31, 2016**

| Group | Number | Current Total | Actuarial Liabilities |
|--|--------------|---------------------|--------------------------|
| S-1 - Survivor Benefit to Beneficiary of Deceased Member Joint and Survivor Computation | | | |
| Men | 271 | \$ 252,711 | \$ 26,531,901 |
| Women | 1,296 | 1,602,503 | 173,306,528 |
| Totals | 1,567 | \$ 1,855,214 | \$ 199,838,429 |
| S-2 - Survivor Benefit to Beneficiary of Deceased Member Fixed Rate Amount | | | |
| Males | | | |
| Widower | 1,216 | \$ 1,102,415 | \$ 139,366,035 |
| Parent | 0 | 0 | 0 |
| Other | 2 | 1,318 | 143,731 |
| Child | 520 | 356,585 | 25,547,067 |
| Subtotals - Male | 1,738 | \$ 1,460,318 | \$ 165,056,833 |
| Females | | | |
| Widow | 5,272 | \$ 5,399,058 | \$ 700,017,692 |
| Parent | 2 | 2,060 | 184,603 |
| Other | 4 | 2,513 | 311,312 |
| Child | 503 | 349,506 | 20,996,341 |
| Subtotals - Female | 5,781 | \$ 5,753,137 | \$ 721,509,948 |
| Totals | 7,519 | \$ 7,213,455 | \$ 886,566,781 |
| Total Benefits Being Paid from Survivor Benefit Fund | | | |
| Men | 2,009 | \$ 1,713,029 | \$ 191,588,734 |
| Women | 7,077 | 7,355,640 | 894,816,476 |
| Totals | 9,086 | \$ 9,068,669 | \$ 1,086,405,210 |

PUBLIC SAFETY DIVISION
SURVIVOR BENEFIT FUND TABULATED BY
TYPE OF BENEFIT BEING PAID AND MONTHLY AMOUNT
DECEMBER 31, 2016

| Group | Number | Current Total | Actuarial Liabilities |
|--|------------|-------------------|--------------------------|
| S-1 - Survivor Benefit to Beneficiary of Deceased Member Joint and Survivor Computation | | | |
| Men | 0 | \$ 0 | \$ 0 |
| Women | 4 | 5,612 | 824,032 |
| Totals | 4 | \$ 5,612 | \$ 824,032 |
| S-2 - Survivor Benefit to Beneficiary of Deceased Member Fixed Rate Amount | | | |
| Males | | | |
| Widower | 4 | \$ 4,879 | \$ 423,372 |
| Other | 0 | 0 | 0 |
| Child | 5 | 3,745 | 266,403 |
| Subtotals - Male | 9 | \$ 8,624 | \$ 689,775 |
| Females | | | |
| Widow | 90 | \$ 130,885 | \$ 19,551,267 |
| Other | 4 | 3,732 | 523,287 |
| Child | 0 | 0 | 0 |
| Subtotals - Female | 94 | \$ 134,617 | \$ 20,074,554 |
| Totals | 103 | \$ 143,241 | \$ 20,764,329 |
| Total Benefits Being Paid from Survivor Benefit Fund | | | |
| Men | 9 | \$ 8,624 | \$ 689,775 |
| Women | 98 | 140,229 | 20,898,586 |
| Totals | 107 | \$ 148,853 | \$ 21,588,361 |

LAW ENFORCEMENT DIVISION
SURVIVOR BENEFIT FUND TABULATED BY
TYPE OF BENEFIT BEING PAID AND MONTHLY AMOUNT
DECEMBER 31, 2016

| Group | Number | Current Total | Actuarial Liabilities |
|--|------------|-------------------|--------------------------|
| S-1 - Survivor Benefit to Beneficiary of Deceased Member Joint and Survivor Computation | | | |
| Men | 1 | \$ 1,300 | \$ 168,732 |
| Women | 52 | 102,192 | 12,755,685 |
| Totals | 53 | \$ 103,492 | \$ 12,924,417 |
| S-2 - Survivor Benefit to Beneficiary of Deceased Member Fixed Rate Amount | | | |
| Males | | | |
| Widower | 8 | \$ 7,875 | \$ 1,230,794 |
| Other | 0 | 0 | 0 |
| Child | 45 | 38,252 | 2,178,833 |
| Subtotals - Male | 53 | \$ 46,127 | \$ 3,409,627 |
| Females | | | |
| Widow | 184 | \$ 225,635 | \$ 35,228,647 |
| Other | 47 | 35,042 | 1,764,137 |
| Child | 0 | 0 | 0 |
| Subtotals - Female | 231 | \$ 260,677 | \$ 36,992,784 |
| Totals | 284 | \$ 306,804 | \$ 40,402,411 |
| Total Benefits Being Paid from Survivor Benefit Fund | | | |
| Men | 54 | \$ 47,427 | \$ 3,578,359 |
| Women | 283 | 362,869 | 49,748,469 |
| Totals | 337 | \$ 410,296 | \$ 53,326,828 |

**STATE DIVISION
DEFERRED SURVIVOR BENEFICIARIES
TABULATED BY GENDER AND DEFERRED AGE
DECEMBER 31, 2016**

| Group | Number | Current Total | Actuarial Liabilities |
|------------------------|---------------|--------------------------|----------------------------------|
| Widowers - Male | | | |
| Deferred to age 50 | 0 | \$ 0 | \$ 0 |
| Deferred to age 62 | 53 | 41,386 | 3,799,327 |
| Deferred to age 65 | 0 | 0 | 0 |
| Total - Male | 53 | \$ 41,386 | \$ 3,799,327 |
| Widows - Female | | | |
| Deferred to age 50 | 1 | \$ 887 | \$ 124,699 |
| Deferred to age 62 | 169 | 124,957 | 12,988,885 |
| Deferred to age 65 | 0 | 0 | 0 |
| Total - Female | 170 | \$ 125,844 | \$ 13,113,584 |
| Totals | 223 | \$ 167,230 | \$ 16,912,911 |

**LOCAL GOVERNMENT DIVISION
DEFERRED SURVIVOR BENEFICIARIES
TABULATED BY GENDER AND DEFERRED AGE
DECEMBER 31, 2016**

| Group | Number | Current Total | Actuarial Liabilities |
|-------------------------|---------------|--------------------------|----------------------------------|
| Widowers - Males | | | |
| Deferred to age 50 | 0 | \$ 0 | \$ 0 |
| Deferred to age 62 | 119 | 60,077 | 5,639,380 |
| Deferred to age 65 | 0 | 0 | 0 |
| Total - Male | 119 | \$ 60,077 | \$ 5,639,380 |
| Widows - Female | | | |
| Deferred to age 50 | 1 | \$ 1,042 | \$ 175,217 |
| Deferred to age 62 | 364 | 227,452 | 24,307,701 |
| Deferred to age 65 | 0 | 0 | 0 |
| Total - Female | 365 | \$ 228,494 | \$ 24,482,918 |
| Totals | 484 | \$ 288,571 | \$ 30,122,298 |

**PUBLIC SAFETY DIVISION
 DEFERRED SURVIVOR BENEFICIARIES
 TABULATED BY GENDER AND DEFERRED AGE
 DECEMBER 31, 2016**

| Group | Number | Current Total | Actuarial Liabilities |
|--------------------|----------|---------------|-----------------------|
| Widowers - Males | | | |
| Deferred to age 50 | 0 | \$ 0 | \$ 0 |
| Total - Male | 0 | \$ 0 | \$ 0 |
| Widows - Females | | | |
| Deferred to age 50 | 0 | \$ 0 | \$ 0 |
| Deferred to age 62 | 2 | 953 | 61,476 |
| Total - Female | 2 | \$ 953 | \$ 61,476 |
| Totals | 2 | \$ 953 | \$ 61,476 |

**LAW ENFORCEMENT DIVISION
 DEFERRED SURVIVOR BENEFICIARIES
 TABULATED BY GENDER AND DEFERRED AGE
 DECEMBER 31, 2016**

| Group | Number | Current Total | Actuarial Liabilities |
|--------------------|---------------|----------------------|------------------------------|
| Widowers - Males | | | |
| Deferred to age 50 | 0 | \$ 0 | \$ 0 |
| Deferred to age 62 | 0 | 0 | 0 |
| Total - Male | 0 | \$ 0 | \$ 0 |
| Widows - Females | | | |
| Deferred to age 50 | 0 | \$ 0 | \$ 0 |
| Deferred to age 62 | 6 | 6,142 | 582,878 |
| Total - Female | 6 | \$ 6,142 | \$ 582,878 |
| Totals | 6 | \$ 6,142 | \$ 582,878 |

SURVIVOR BENEFIT FUND
REPORTED ASSETS AND LIABILITIES
DIVISIONS COMBINED

| Valuation Date | Monthly Allowances | | | | \$ Millions | | Ratio of Assets to Liabilities |
|----------------|--------------------|--------------|----------|------------|------------------|-----------------------|--------------------------------|
| | Current | | Deferred | | Reported Assets+ | Actuarial Liabilities | |
| | No. | Amount | No. | Amount | | | |
| 12/31/1982@ | 9,913 | \$ 2,654,686 | 1,006 | \$ 199,239 | \$ 499.7 | \$ 330.6 | 151 % |
| 12/31/1983 | 10,132 | 2,812,639 | 1,020 | 225,475 | 454.7 | 352.8 | 129 % |
| 12/31/1984* | 11,819 | 3,119,531 | 990 | 248,373 | 492.2 | 451.1 | 109 % |
| 12/31/1985 | 11,889 | 3,278,253 | 979 | 259,842 | 532.8 | 469.6 | 113 % |
| 12/31/1986 | 12,054 | 3,489,915 | 960 | 268,931 | 575.5 | 451.2 | 128 % |
| 12/31/1987 | 12,153 | 3,656,420 | 933 | 279,327 | 626.1 | 472.9 | 132 % |
| 12/31/1988 | 12,237 | 3,822,085 | 941 | 283,026 | 490.8 | 490.8 | 100 % |
| 12/31/1989@ | 12,198 | 4,177,540 | 941 | 320,792 | 525.3 | 522.1 | 101 % |
| 12/31/1990 | 12,182 | 4,330,622 | 907 | 321,218 | 542.5 | 537.1 | 101 % |
| 12/31/1991 | 12,268 | 4,528,326 | 860 | 314,414 | 567.9 | 557.1 | 102 % |
| 12/31/1992 | 12,318 | 4,750,848 | 852 | 329,509 | 589.8 | 583.3 | 101 % |
| 12/31/1993 | 12,437 | 4,985,681 | 862 | 345,937 | 620.7 | 607.7 | 102 % |
| 12/31/1994 | 12,569 | 5,207,186 | 845 | 347,178 | 641.5 | 628.5 | 102 % |
| 12/31/1995 | 12,608 | 5,408,577 | 866 | 376,573 | 668.9 | 652.4 | 103 % |
| 12/31/1996@ | 12,724 | 5,822,113 | 878 | 395,594 | 711.6 | 710.6 | 100 % |
| 12/31/1997 | 12,856 | 6,074,566 | 932 | 433,430 | 743.0 | 740.5 | 100 % |
| 12/13/1998 | 13,079 | 6,337,739 | 1,060 | 500,514 | 780.2 | 779.6 | 100 % |
| 12/31/1999# | 13,236 | 7,345,740 | 989 | 550,153 | 801.4 | 910.9 | 88 % |
| 12/31/2000 | 13,317 | 9,026,315 | 666 | 348,886 | 1,037.4 | 1,037.4 | 100 % |
| 12/31/2001@ | 13,588 | 9,449,543 | 993 | 490,441 | 1,086.4 | 1,086.4 | 100 % |
| 12/31/2002 | 13,708 | 9,764,826 | 902 | 470,284 | 1,120.2 | 1,120.2 | 100 % |
| 12/31/2003 | 13,988 | 10,246,174 | 842 | 493,329 | 1,193.1 | 1,193.1 | 100 % |
| 12/31/2004 | 13,903 | 10,503,169 | 858 | 524,733 | 1,227.1 | 1,227.1 | 100 % |
| 12/31/2005@ | 14,108 | 10,948,727 | 831 | 528,162 | 1,289.3 | 1,289.3 | 100 % |
| 12/31/2006 | 14,172 | 11,333,735 | 832 | 508,430 | 1,332.6 | 1,332.6 | 100 % |
| 12/31/2007 | 14,186 | 11,714,551 | 832 | 510,846 | 1,375.9 | 1,375.9 | 100 % |
| 12/31/2008 | 14,238 | 12,122,501 | 847 | 526,623 | 1,425.6 | 1,425.6 | 100 % |
| 12/31/2009 | 14,301 | 12,576,956 | 840 | 527,032 | 1,479.4 | 1,479.4 | 100 % |
| 12/31/2010@ | 14,407 | 13,047,857 | 829 | 524,242 | 1,545.7 | 1,545.7 | 100 % |
| 12/31/2011 | 14,370 | 13,424,237 | 800 | 505,111 | 1,589.7 | 1,589.7 | 100 % |
| 12/31/2012# | 14,224 | 13,769,795 | 796 | 519,459 | 1,629.3 | 1,629.3 | 100 % |
| 12/31/2013 | 14,187 | 14,152,417 | 751 | 480,335 | 1,663.5 | 1,663.5 | 100 % |
| 12/31/2014 | 13,974 | 14,406,311 | 739 | 474,837 | 1,688.7 | 1,688.7 | 100 % |
| 12/31/2015@ | 13,842 | 14,728,606 | 750 | 479,666 | 1,838.1 | 1,838.1 | 100 % |
| 12/31/2016 | 13,790 | 15,119,687 | 715 | 462,896 | 1,881.1 | 1,881.1 | 100 % |

@ Revised actuarial assumptions.

* Benefits increased.

After benefit changes.

+ Includes certain recommended transfers and accrued transfers.

RETIREES AND BENEFICIARIES DECEMBER 31, 2016

HISTORICAL AVERAGES

| All Retirees | | | | | | | | |
|----------------------|--------------|---------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------------------------|----------------------------------|---------------------------|
| December 31 | Number Count | Average Age at Retirement | Average Service at Retirement | Average Pension at Retirement | Average Age on Valuation Date | Average Pension on Valuation Date | Median Pension on Valuation Date | Average FAS at Retirement |
| 2016 | 214,167 | 57.6 | 22.9 | \$20,526 | 70.2 | \$26,370 | \$22,848 | \$41,524 |
| 2015 | 211,301 | 57.6 | 22.8 | 20,076 | 69.9 | 25,579 | 22,056 | 40,604 |
| 2014 | 208,809 | 57.6 | 22.8 | 19,673 | 69.7 | 24,833 | 21,348 | 39,753 |
| 2013 | 202,136 | 57.4 | 22.8 | 19,290 | 69.5 | 24,209 | 20,784 | 38,763 |
| 2012 | 195,779 | 57.4 | 22.7 | 18,827 | 69.3 | 23,461 | 20,088 | 37,743 |
| 2011 | 189,849 | 57.3 | 22.6 | 18,218 | 69.3 | 22,611 | 19,212 | 36,552 |
| 2010 | 181,483 | 57.2 | 22.4 | 17,379 | 69.3 | 21,598 | 18,144 | 35,025 |
| 2009 | 174,659 | 57.2 | 22.2 | 16,724 | 69.3 | 20,730 | 17,256 | 33,808 |
| 2008 | 169,016 | 57.2 | 22.0 | 15,942 | 69.4 | 19,750 | 16,284 | 32,401 |
| 2007 | 163,511 | 57.2 | 21.9 | 15,318 | 69.4 | 18,917 | 15,480 | 31,214 |
| 2006 | 159,041 | 57.3 | 21.7 | 14,711 | 69.4 | 18,096 | 14,700 | 29,975 |
| Traditional Plan | | | | | | | | |
| December 31 | Number Count | Average Age at Retirement | Average Service at Retirement | Average Pension at Retirement | Average Age on Valuation Date | Average Pension on Valuation Date | Median Pension on Valuation Date | Average FAS at Retirement |
| 2016 | 213,550 | 57.6 | 23.0 | \$20,545 | 70.2 | \$26,396 | \$22,884 | \$41,519 |
| 2015 | 210,792 | 57.6 | 22.9 | 20,092 | 69.9 | 25,600 | 22,080 | 40,600 |
| 2014 | 208,395 | 57.6 | 22.8 | 19,686 | 69.7 | 24,849 | 21,372 | 39,749 |
| 2013 | 201,841 | 57.4 | 22.8 | 19,299 | 69.5 | 24,220 | 20,796 | 38,760 |
| 2012 | 195,622 | 57.4 | 22.7 | 18,832 | 69.3 | 23,468 | 20,088 | 37,741 |
| 2011 | 189,753 | 57.3 | 22.6 | 18,221 | 69.3 | 22,614 | 19,224 | 36,549 |
| 2010 | 181,433 | 57.2 | 22.4 | 17,380 | 69.3 | 21,600 | 18,144 | 35,025 |
| 2009 | 174,637 | 57.2 | 22.2 | 16,725 | 69.3 | 20,731 | 17,256 | 33,808 |
| 2008 | 169,000 | 57.2 | 22.0 | 15,942 | 69.4 | 19,751 | 16,284 | 32,401 |
| 2007 | 163,505 | 57.2 | 21.9 | 15,318 | 69.4 | 18,917 | 15,480 | 31,214 |
| 2006 | 159,039 | 57.3 | 21.7 | 14,711 | 69.4 | 18,096 | 14,700 | 29,974 |
| Combined Plan | | | | | | | | |
| December 31 | Number Count | Average Age at Retirement | Average Service at Retirement | Average Pension at Retirement | Average Age on Valuation Date | Average Pension on Valuation Date | Median Pension on Valuation Date | Average FAS at Retirement |
| 2016 | 398 | 64.8 | 10.0 | \$3,709 | 67.9 | \$3,956 | \$3,528 | \$46,614 |
| 2015 | 324 | 64.6 | 9.8 | 3,401 | 67.3 | 3,596 | 3,186 | 45,141 |
| 2014 | 259 | 64.7 | 9.7 | 3,284 | 66.8 | 3,421 | 3,030 | 44,349 |
| 2013 | 164 | 64.9 | 8.7 | 2,839 | 67.0 | 2,962 | 2,682 | 43,403 |
| 2012 | 95 | 64.2 | 8.5 | 2,785 | 66.2 | 2,891 | 2,556 | 45,218 |
| 2011 | 58 | 64.2 | 7.9 | 2,757 | 66.0 | 2,828 | 2,202 | 49,751 |
| 2010 | 32 | 64.3 | 7.9 | 2,158 | 65.9 | 2,219 | 1,962 | 40,548 |
| 2009 | 12 | 65.0 | 7.6 | 1,590 | 66.6 | 1,635 | 1,740 | 35,139 |
| 2008 | 12 | 64.0 | 7.4 | 1,239 | 64.8 | 1,260 | 1,092 | 29,454 |
| 2007 | 4 | 61.1 | 4.8 | 1,620 | 62.0 | 1,644 | 1,644 | 43,743 |
| 2006 | 2 | 62.1 | 3.8 | 1,656 | 62.3 | 1,656 | 1,656 | 50,116 |
| Member Directed Plan | | | | | | | | |
| December 31 | Number Count | Average Age at Retirement | Average Service at Retirement | Average Pension at Retirement | Average Age on Valuation Date | Average Pension on Valuation Date | Median Pension on Valuation Date | Average FAS at Retirement |
| 2016 | 219 | NA | NA | NA | NA | NA | NA | NA |
| 2015 | 185 | NA | NA | NA | NA | NA | NA | NA |
| 2014 | 155 | NA | NA | NA | NA | NA | NA | NA |
| 2013 | 131 | NA | NA | NA | NA | NA | NA | NA |
| 2012 | 62 | NA | NA | NA | NA | NA | NA | NA |
| 2011 | 38 | NA | NA | NA | NA | NA | NA | NA |
| 2010 | 18 | NA | NA | NA | NA | NA | NA | NA |
| 2009 | 10 | NA | NA | NA | NA | NA | NA | NA |
| 2008 | 4 | NA | NA | NA | NA | NA | NA | NA |
| 2007 | 2 | NA | NA | NA | NA | NA | NA | NA |
| 2006 | NA | | | | | | | |

SECTION X

ACTUARIAL METHODS AND ASSUMPTIONS

**SUMMARY OF
ACTUARIAL METHODS AND ASSUMPTIONS USED FOR OPERS
ACTUARIAL VALUATIONS
ASSUMPTIONS ADOPTED BY THE RETIREMENT BOARD
AFTER CONSULTING WITH THE ACTUARY**

The individual entry age actuarial cost method of valuation was used in determining liabilities and normal cost. Differences in the past between assumed experience and actual experience (“actuarial gains and losses”) become part of actuarial accrued liabilities.

Unfunded actuarial accrued liabilities are amortized to produce payments (principal & interest) which are level percent of payroll contributions.

The actuarial assumptions used in the valuation are shown in this Section. Assumptions were established following the December 31, 2015 actuarial valuation based upon an Experience Study covering the period January 1, 2011 through December 31, 2015. The actuarial assumptions represent estimates of future experience.

ECONOMIC ASSUMPTIONS

The investment return rate assumed in the valuations was 7.50% per year, compounded annually (net after investment expenses).

The wage inflation rate assumed in this valuation was 3.25% per year. The wage inflation rate is defined to be the portion of total pay increases for an individual that are due to macroeconomic forces including productivity, price inflation, and labor market conditions. The wage inflation rate does not include pay changes related to individual merit and seniority effects.

The price inflation component of the investment return rate and the wage inflation rate is assumed to be 2.50%.

The assumed real rate of return over wage inflation is defined to be the portion of total investment return that is more than the assumed total wage growth rate. Considering other economic assumptions, the 7.50% investment return rate translates to an assumed real rate of return over wage inflation of 4.25%. The assumed real rate of return over price inflation is 5.00%.

The active member population (the sum of the Traditional and Combined Plan active members) is assumed to remain constant. For purposes of financing the unfunded actuarial accrued liabilities, total payroll (the sum of the Traditional and Combined Plan active payroll) is assumed to grow at the wage inflation rate – 3.25% per year.

Pay increase assumptions for individual active members are shown for sample ages on pages X-8 through X-11. Part of the assumption for each age is for merit and/or seniority increase, and the other 3.25% recognizes wage inflation, including price inflation, productivity increases, and other macroeconomic forces.

NON-ECONOMIC ASSUMPTIONS

The pre-retirement mortality tables, for pre-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Employees mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010 respectively. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables.

The healthy retiree mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Healthy Annuitant mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010 respectively. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables.

The disabled retiree mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Disabled mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010 respectively. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables.

The probabilities of unreduced and reduced age and service retirement are shown on pages X-3 through X-7. For State and Local Government members that satisfy the 30-year (31 & 32 years for Transition Groups B & C) unreduced retirement condition prior to age 65 (66 & 67 for Transition Groups B & C), the service-based unreduced retirement probabilities are used. For State and Local Government members that satisfy the 30-year (31 & 32 years for Transition Groups B & C) unreduced retirement condition on or after age 65 (66 & 67 for Transition Groups B & C), the age-based unreduced retirement probabilities are used.

The probabilities of withdrawal from service, disability and death-in-service are shown for sample ages on pages X-8 through X-11. For withdrawal from service it was assumed that members terminating before age 35, members terminating with less than 5 years of service, and a percentage of all other members would withdraw their contributions and forfeit their entitlement to an employer financed benefit. The percentage is 100% at age 35 and is reduced for each year of age after 35, becoming 0% at age 55 (age 45 for law members).

For purposes of death-in-service and disability benefits, it is assumed that Combined Plan members will take a benefit from the Traditional Plan, unless a lump sum distribution from the Combined Plan would have a greater value. It is assumed death-in-service members have 2 qualified survivor beneficiaries.

The funding value of defined benefit assets recognizes assumed investment return fully each year. Differences between actual and assumed investment return are phased-in over a closed 4-year period. Funding value is not permitted to deviate from market value by more than 12%. Traditional and Combined Plan retiree health funding values of assets are developed independently beginning with the December 31, 2004 valuation.

Present assets (cash & investments) at funding value are shown on pages II-2 through II-9.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA). Great care was taken in the production of this report, but there may be cases where schedules do not add, or where they do not exactly balance to other related schedules due to rounding.

PROBABILITIES OF UNREDUCED AGE AND SERVICE RETIREMENT

Transition Group A

| Ages | Percent of Eligible Active Members Retiring Within Next Year | | | |
|-----------|---|-------|------------------|-------|
| | State | | Local Government | |
| | Men | Women | Men | Women |
| 65 | 22% | 22% | 20% | 20% |
| 66 | 22% | 22% | 20% | 20% |
| 67 | 20% | 20% | 15% | 20% |
| 68 | 20% | 20% | 15% | 17% |
| 69 | 20% | 20% | 15% | 17% |
| 70 | 20% | 20% | 15% | 17% |
| 71 | 20% | 20% | 15% | 17% |
| 72 | 15% | 20% | 15% | 17% |
| 73 | 15% | 20% | 15% | 17% |
| 74 | 15% | 20% | 15% | 17% |
| 75 | 15% | 20% | 15% | 17% |
| 76 | 15% | 20% | 15% | 17% |
| 77 | 15% | 25% | 15% | 17% |
| 78 | 15% | 25% | 15% | 17% |
| 79 | 15% | 25% | 15% | 22% |
| 80 | 25% | 25% | 20% | 22% |
| 81 | 25% | 25% | 20% | 22% |
| 82 | 25% | 25% | 20% | 22% |
| 83 | 25% | 25% | 20% | 22% |
| 84 | 25% | 25% | 20% | 22% |
| 85 & Over | 100% | 100% | 100% | 100% |
| Ref | 2094 | 2095 | 2096 | 2097 |

| Ages | Percent of Eligible Active Members Retiring Within Next Year | |
|-----------|---|-----------------|
| | Public Safety | Law Enforcement |
| | 48 | |
| 49 | | 20% |
| 50 | | 20% |
| 51 | | 20% |
| 52 | 30% | 20% |
| 53 | 30% | 20% |
| 54 | 25% | 20% |
| 55 | 25% | 20% |
| 56 | 25% | 23% |
| 57 | 25% | 23% |
| 58 | 20% | 25% |
| 59 | 20% | 25% |
| 60 | 35% | 30% |
| 61 | 35% | 25% |
| 62 | 35% | 25% |
| 63 | 35% | 25% |
| 64 | 35% | 25% |
| 65 | 35% | 25% |
| 66 | 35% | 25% |
| 67 | 35% | 25% |
| 68 | 35% | 25% |
| 69 | 35% | 25% |
| 70 & Over | 100% | 100% |
| Ref | 1334 | 2084 |

| Service | Percent of Eligible Active Members Retiring Within Next Year | | | |
|-----------|---|-------|------------------|-------|
| | State | | Local Government | |
| | Men | Women | Men | Women |
| 30 | 37% | 40% | 35% | 35% |
| 31 | 28% | 33% | 26% | 30% |
| 32-39 | 24% | 26% | 23% | 24% |
| 40 | 35% | 33% | 32% | 24% |
| 41 | 35% | 33% | 32% | 24% |
| 42 | 35% | 33% | 32% | 24% |
| 43 | 35% | 33% | 32% | 20% |
| 44 | 35% | 33% | 32% | 20% |
| 45 | 25% | 25% | 32% | 20% |
| 46 | 25% | 25% | 25% | 20% |
| 47 | 25% | 25% | 25% | 20% |
| 48 | 25% | 25% | 25% | 20% |
| 49 | 25% | 25% | 25% | 20% |
| 50 & Over | 100% | 100% | 100% | 100% |
| Ref | 2091 | 2093 | 2098 | 2099 |

PROBABILITIES OF UNREDUCED AGE AND SERVICE RETIREMENT

Transition Group B

| Ages | Percent of Eligible Active Members Retiring Within Next Year | | | |
|-----------|---|-------|------------------|-------|
| | State | | Local Government | |
| | Men | Women | Men | Women |
| 66 | 22% | 22% | 20% | 20% |
| 67 | 22% | 22% | 20% | 20% |
| 68 | 20% | 20% | 15% | 20% |
| 69 | 20% | 20% | 15% | 17% |
| 70 | 20% | 20% | 15% | 17% |
| 71 | 20% | 20% | 15% | 17% |
| 72 | 20% | 20% | 15% | 17% |
| 73 | 15% | 20% | 15% | 17% |
| 74 | 15% | 20% | 15% | 17% |
| 75 | 15% | 20% | 15% | 17% |
| 76 | 15% | 20% | 15% | 17% |
| 77 | 15% | 20% | 15% | 17% |
| 78 | 15% | 25% | 15% | 17% |
| 79 | 15% | 25% | 15% | 17% |
| 80 | 15% | 25% | 15% | 22% |
| 81 | 25% | 25% | 20% | 22% |
| 82 | 25% | 25% | 20% | 22% |
| 83 | 25% | 25% | 20% | 22% |
| 84 | 25% | 25% | 20% | 22% |
| 85 & Over | 100% | 100% | 100% | 100% |
| Ref | 2094 | 2095 | 2096 | 2097 |

| Ages | Percent of Eligible Active Members Retiring Within Next Year | |
|-----------|---|-----------------|
| | Public Safety | Law Enforcement |
| | 50 | |
| 51 | | 20% |
| 52 | | 20% |
| 53 | | 20% |
| 54 | 25% | 20% |
| 55 | 25% | 20% |
| 56 | 25% | 20% |
| 57 | 25% | 20% |
| 58 | 20% | 23% |
| 59 | 20% | 23% |
| 60 | 35% | 25% |
| 61 | 35% | 25% |
| 62 | 35% | 30% |
| 63 | 35% | 25% |
| 64 | 35% | 25% |
| 65 | 35% | 25% |
| 66 | 35% | 25% |
| 67 | 35% | 25% |
| 68 | 35% | 25% |
| 69 | 35% | 25% |
| 70 | 100% | 25% |
| 71 | 100% | 25% |
| 72 & Over | 100% | 100% |
| Ref | 1334 | 2084 |

| Service | Percent of Eligible Active Members Retiring Within Next Year | | | |
|-----------|---|-------|------------------|-------|
| | State | | Local Government | |
| | Men | Women | Men | Women |
| 31 | 37% | 40% | 35% | 35% |
| 32 | 28% | 33% | 26% | 30% |
| 33-40 | 24% | 26% | 23% | 24% |
| 41 | 35% | 33% | 32% | 24% |
| 42 | 35% | 33% | 32% | 24% |
| 43 | 35% | 33% | 32% | 24% |
| 44 | 35% | 33% | 32% | 20% |
| 45 | 35% | 33% | 32% | 20% |
| 46 | 25% | 25% | 32% | 20% |
| 47 | 25% | 25% | 25% | 20% |
| 48 | 25% | 25% | 25% | 20% |
| 49 | 25% | 25% | 25% | 20% |
| 50 | 25% | 25% | 25% | 20% |
| 51 & Over | 100% | 100% | 100% | 100% |
| Ref | 2091 | 2093 | 2098 | 2099 |

PROBABILITIES OF UNREDUCED AGE AND SERVICE RETIREMENT

Transition Group C

| 67 & 5 Condition | Percent of Eligible Active Members Retiring Within Next Year | | | |
|---------------------|---|-------|------------------|-------|
| | State | | Local Government | |
| | Men | Women | Men | Women |
| Age | | | | |
| 67 | 22% | 22% | 20% | 20% |
| 68 | 22% | 22% | 20% | 20% |
| 69 | 20% | 20% | 15% | 20% |
| 70 | 20% | 20% | 15% | 17% |
| 71 | 20% | 20% | 15% | 17% |
| 72 | 20% | 20% | 15% | 17% |
| 73 | 20% | 20% | 15% | 17% |
| 74 | 15% | 20% | 15% | 17% |
| 75 | 15% | 20% | 15% | 17% |
| 76 | 15% | 20% | 15% | 17% |
| 77 | 15% | 20% | 15% | 17% |
| 78 | 15% | 20% | 15% | 17% |
| 79 | 15% | 25% | 15% | 17% |
| 80 | 15% | 25% | 15% | 17% |
| 81 | 15% | 25% | 15% | 22% |
| 82 | 25% | 25% | 20% | 22% |
| 83 | 25% | 25% | 20% | 22% |
| 84 | 25% | 25% | 20% | 22% |
| 85 & Over | 100% | 100% | 100% | 100% |
| Ref | 2094 | 2095 | 2096 | 2097 |

| Ages | Percent of Eligible Active Members Retiring Within Next Year | |
|-----------|---|--------------------|
| | Public Safety | Law Enforcement |
| | 52 | |
| 53 | | 20% |
| 54 | | 20% |
| 55 | | 20% |
| 56 | 25% | 20% |
| 57 | 25% | 20% |
| 58 | 20% | 20% |
| 59 | 20% | 20% |
| 60 | 35% | 23% |
| 61 | 35% | 23% |
| 62 | 35% | 25% |
| 63 | 35% | 25% |
| 64 | 35% | 30% |
| 65 | 35% | 25% |
| 66 | 35% | 25% |
| 67 | 35% | 25% |
| 68 | 35% | 25% |
| 69 | 35% | 25% |
| 70 | 100% | 25% |
| 71 | 100% | 25% |
| 72 | 100% | 25% |
| 73 | 100% | 25% |
| 74 & Over | 100% | 100% |
| Ref | 1334 | 2084 |

| 55 & 32 Condition | Percent of Eligible Active Members Retiring Within Next Year | | | | |
|----------------------|---|-------|-------|------------------|-------|
| | Year of Eligibility | State | | Local Government | |
| | | Men | Women | Men | Women |
| 1 | 37% | 40% | 35% | 35% | |
| 2 | 28% | 33% | 26% | 30% | |
| 3-10 | 24% | 26% | 23% | 24% | |
| 11 | 35% | 33% | 32% | 24% | |
| 12 | 35% | 33% | 32% | 24% | |
| 13 | 35% | 33% | 32% | 24% | |
| 14 | 35% | 33% | 32% | 20% | |
| 15 | 35% | 33% | 32% | 20% | |
| 16 | 25% | 25% | 32% | 20% | |
| 17 | 25% | 25% | 25% | 20% | |
| 18 | 25% | 25% | 25% | 20% | |
| 19 | 25% | 25% | 25% | 20% | |
| 20 | 25% | 25% | 25% | 20% | |
| 21 & over | 100% | 100% | 100% | 100% | |
| Ref | 2091 | 2093 | 2098 | 2099 | |

PROBABILITIES OF REDUCED RETIREMENT

Transition Group A

| Ages | Percent of Eligible Active Members Retiring Within Next Year | | | | |
|------|---|-------|------------------|-------|------------------|
| | State | | Local Government | | Public Safety |
| | Men | Women | Men | Women | |
| 48 | | | | | 8% |
| 49 | | | | | 8% |
| 50 | | | | | 8% |
| 51 | | | | | 8% |
| 52 | | | | | |
| 53 | | | | | |
| 54 | | | | | |
| 55 | 10% | 10% | 9% | 11% | |
| 56 | 10% | 10% | 9% | 11% | |
| 57 | 10% | 10% | 9% | 11% | |
| 58 | 10% | 10% | 9% | 11% | |
| 59 | 10% | 11% | 9% | 11% | |
| 60 | 10% | 12% | 9% | 11% | |
| 61 | 10% | 13% | 9% | 12% | |
| 62 | 15% | 15% | 13% | 13% | |
| 63 | 15% | 15% | 14% | 14% | |
| 64 | 15% | 15% | 12% | 15% | |
| Ref | 2085 | 2086 | 2087 | 2088 | 1496 |

Transition Group B

| Ages | Percent of Eligible Active Members Retiring Within Next Year | | | | | |
|------|---|-------|------------------|-------|------------------|--------------------|
| | State | | Local Government | | Public Safety | Law Enforcement |
| | Men | Women | Men | Women | | |
| 48 | | | | | 8% | 8% |
| 49 | | | | | 8% | 8% |
| 50 | | | | | 8% | |
| 51 | | | | | 8% | |
| 52 | | | | | 8% | |
| 53 | | | | | 8% | |
| 54 | | | | | | |
| 55 | 10% | 10% | 9% | 11% | | |
| 56 | 10% | 10% | 9% | 11% | | |
| 57 | 10% | 10% | 9% | 11% | | |
| 58 | 10% | 10% | 9% | 11% | | |
| 59 | 10% | 11% | 9% | 11% | | |
| 60 | 10% | 12% | 9% | 11% | | |
| 61 | 10% | 13% | 9% | 12% | | |
| 62 | 15% | 15% | 13% | 13% | | |
| 63 | 15% | 15% | 14% | 14% | | |
| 64 | 15% | 15% | 12% | 15% | | |
| 65 | 15% | 15% | 12% | 15% | | |
| Ref | 2085 | 2086 | 2087 | 2088 | 469 | 1496 |

PROBABILITIES OF REDUCED RETIREMENT

Transition Group C

| Ages | Percent of Eligible Active Members Retiring Within Next Year | | | | | |
|------|---|-------|------------------|-------|------------------|--------------------|
| | State | | Local Government | | Public Safety | Law Enforcement |
| | Men | Women | Men | Women | | |
| 48 | | | | | | 8% |
| 49 | | | | | | 8% |
| 50 | | | | | | 8% |
| 51 | | | | | | 8% |
| 52 | | | | | 8% | |
| 53 | | | | | 8% | |
| 54 | | | | | 8% | |
| 55 | | | | | 8% | |
| 56 | | | | | | |
| 57 | 10% | 10% | 9% | 11% | | |
| 58 | 10% | 10% | 9% | 11% | | |
| 59 | 10% | 10% | 9% | 11% | | |
| 60 | 10% | 10% | 9% | 11% | | |
| 61 | 10% | 11% | 9% | 11% | | |
| 62 | 10% | 12% | 9% | 11% | | |
| 63 | 10% | 13% | 9% | 12% | | |
| 64 | 15% | 15% | 13% | 13% | | |
| 65 | 15% | 15% | 14% | 14% | | |
| 66 | 15% | 15% | 12% | 15% | | |
| Ref | 2085 | 2086 | 2087 | 2088 | 1496 | 1496 |

STATE
SEPARATIONS FROM ACTIVE EMPLOYMENT BEFORE AGE & SERVICE RETIREMENT
& INDIVIDUAL PAY INCREASE ASSUMPTIONS

| Sample Ages | Years of Service | Percent of Active Members Separating Within the Next Year | | | | | | Pay Increase Assumptions for an Individual Employee | | |
|-------------|------------------|---|------------|-----------------|-----------------|------------|---------|---|----------------|--------------------|
| | | Death* | | Withdrawal | | Disability | | Merit & Seniority | Base (Economy) | Increase Next Year |
| | | Men | Women | Men | Women | Men | Women | | | |
| | 0 | | | 50.00% | 50.00% | | | | | |
| | 1 | | | 35.00% | 35.00% | | | | | |
| | 2 | | | 20.00% | 20.00% | | | | | |
| | 3 | | | 15.00% | 15.00% | | | | | |
| | 4 | | | 12.00% | 12.00% | | | | | |
| 20 | 5 & Over | 0.0489% | 0.0161% | 10.00% | 10.00% | 0.10% | 0.10% | 5.00% | 3.25% | 8.25% |
| 25 | | 0.0527% | 0.0164% | 8.20% | 9.28% | 0.10% | 0.10% | 4.64% | 3.25% | 7.89% |
| 30 | | 0.0459% | 0.0209% | 5.80% | 7.30% | 0.10% | 0.10% | 3.38% | 3.25% | 6.63% |
| 35 | | 0.0547% | 0.0307% | 4.28% | 5.10% | 0.16% | 0.16% | 2.40% | 3.25% | 5.65% |
| 40 | | 0.0733% | 0.0435% | 3.14% | 3.46% | 0.29% | 0.29% | 1.90% | 3.25% | 5.15% |
| 45 | | 0.1172% | 0.0659% | 2.22% | 2.42% | 0.47% | 0.47% | 1.34% | 3.25% | 4.59% |
| 50 | | 0.1923% | 0.1064% | 1.84% | 2.10% | 0.67% | 0.67% | 0.92% | 3.25% | 4.17% |
| 55 | | 0.2924% | 0.1724% | 1.80% | 2.10% | 1.05% | 1.05% | 0.68% | 3.25% | 3.93% |
| 60 | | 0.4923% | 0.2668% | 1.80% | 2.10% | 1.25% | 1.25% | 0.42% | 3.25% | 3.67% |
| 65 | | 0.9398% | 0.4017% | 1.80% | 2.10% | 1.25% | 1.25% | 0.12% | 3.25% | 3.37% |
| 70 | 1.6516% | 0.6832% | 1.80% | 2.10% | 1.25% | 1.25% | 0.00% | 3.25% | 3.25% | |
| Ref | | #2133x1sb0 | #2134x1sb0 | 1034 #1387x1 | 1034 #1389x1 | #1092x1 | #1092x1 | 476 | | |

**Applicable rates during the 2016 Calendar Year. Rates in future years are determined by the above rates and the MP-2015 projection scale.*

The pay increase assumptions are age based only, and not service based.

**LOCAL GOVERNMENT
SEPARATIONS FROM ACTIVE EMPLOYMENT BEFORE AGE & SERVICE RETIREMENT
& INDIVIDUAL PAY INCREASE ASSUMPTIONS**

| Sample Ages | Years of Service | Percent of Active Members Separating Within the Next Year | | | | | | Pay Increase Assumptions for an Individual Employee | | |
|-------------|------------------|---|------------|-----------------|-----------------|------------|---------|---|----------------|--------------------|
| | | Death* | | Withdrawal | | Disability | | Merit & Seniority | Base (Economy) | Increase Next Year |
| | | Men | Women | Men | Women | Men | Women | | | |
| | 0 | | | 40.00% | 40.00% | | | | | |
| | 1 | | | 27.00% | 27.00% | | | | | |
| | 2 | | | 18.00% | 18.00% | | | | | |
| | 3 | | | 13.00% | 13.00% | | | | | |
| | 4 | | | 11.00% | 11.00% | | | | | |
| 20 | 5 & Over | 0.0489% | 0.0161% | 10.00% | 11.00% | 0.10% | 0.10% | 5.00% | 3.25% | 8.25% |
| 25 | | 0.0527% | 0.0164% | 7.78% | 9.32% | 0.10% | 0.10% | 4.64% | 3.25% | 7.89% |
| 30 | | 0.0459% | 0.0209% | 5.34% | 6.94% | 0.10% | 0.10% | 3.38% | 3.25% | 6.63% |
| 35 | | 0.0547% | 0.0307% | 3.86% | 5.02% | 0.13% | 0.10% | 2.34% | 3.25% | 5.59% |
| 40 | | 0.0733% | 0.0435% | 2.82% | 3.52% | 0.21% | 0.16% | 1.77% | 3.25% | 5.02% |
| 45 | | 0.1172% | 0.0659% | 2.26% | 2.70% | 0.37% | 0.26% | 1.28% | 3.25% | 4.53% |
| 50 | | 0.1923% | 0.1064% | 2.04% | 2.50% | 0.63% | 0.42% | 0.92% | 3.25% | 4.17% |
| 55 | | 0.2924% | 0.1724% | 2.00% | 2.50% | 0.90% | 0.71% | 0.68% | 3.25% | 3.93% |
| 60 | | 0.4923% | 0.2668% | 2.00% | 2.50% | 1.00% | 0.85% | 0.42% | 3.25% | 3.67% |
| 65 | | 0.9398% | 0.4017% | 2.00% | 2.50% | 1.00% | 0.85% | 0.12% | 3.25% | 3.37% |
| 70 | | 1.6516% | 0.6832% | 2.00% | 2.50% | 1.00% | 0.85% | 0.00% | 3.25% | 3.25% |
| Ref | | #2133x1sb0 | #2134x1sb0 | 1035 #1391x1 | 1035 #1393x1 | #1093x1 | #1094x1 | 477 | | |

*Applicable rates during the 2016 Calendar Year. Rates in future years are determined by the above rates and the MP-2015 projection scale.

The pay increase assumptions are age based only, and not service based.

PUBLIC SAFETY
SEPARATIONS FROM ACTIVE EMPLOYMENT BEFORE AGE & SERVICE RETIREMENT
& INDIVIDUAL PAY INCREASE ASSUMPTIONS

| Sample Ages | Years of Service | Percent of Active Members Separating Within the Next Year | | | | | | Pay Increase Assumptions for an Individual Employee | | |
|-------------|------------------|---|------------|-----------------|-----------------|------------|---------|---|----------------|--------------------|
| | | Death* | | Withdrawal | | Disability | | Merit & Seniority | Base (Economy) | Increase Next Year |
| | | Men | Women | Men | Women | Men | Women | | | |
| | 0 | | | 20.00% | 20.00% | | | | | |
| | 1 | | | 19.00% | 19.00% | | | | | |
| | 2 | | | 15.00% | 15.00% | | | | | |
| | 3 | | | 15.00% | 15.00% | | | | | |
| | 4 | | | 10.00% | 10.00% | | | | | |
| 20 | 5 & Over | 0.0489% | 0.0161% | 10.00% | 10.00% | 0.20% | 0.60% | 7.50% | 3.25% | 10.75% |
| 25 | | 0.0527% | 0.0164% | 10.00% | 10.00% | 0.20% | 0.60% | 6.30% | 3.25% | 9.55% |
| 30 | | 0.0459% | 0.0209% | 8.80% | 8.80% | 0.23% | 0.60% | 3.70% | 3.25% | 6.95% |
| 35 | | 0.0547% | 0.0307% | 6.20% | 6.20% | 0.34% | 0.60% | 2.02% | 3.25% | 5.27% |
| 40 | | 0.0733% | 0.0435% | 3.50% | 3.50% | 0.52% | 0.87% | 1.46% | 3.25% | 4.71% |
| 45 | | 0.1172% | 0.0659% | 2.20% | 2.20% | 0.78% | 1.38% | 1.12% | 3.25% | 4.37% |
| 50 | | 0.1923% | 0.1064% | 2.00% | 2.00% | 1.50% | 2.14% | 0.94% | 3.25% | 4.19% |
| 55 | | 0.2924% | 0.1724% | 2.00% | 2.00% | 2.32% | 2.65% | 0.60% | 3.25% | 3.85% |
| 60 | | 0.4923% | 0.2668% | 2.00% | 2.00% | 2.60% | 2.75% | 0.40% | 3.25% | 3.65% |
| 65 | | 0.9398% | 0.4017% | 2.00% | 2.00% | 2.60% | 2.75% | 0.16% | 3.25% | 3.41% |
| 70 | 1.6516% | 0.6832% | 2.00% | 2.00% | 2.60% | 2.75% | 0.00% | 3.25% | 3.25% | |
| Ref | | #2133x1sb0 | #2134x1sb0 | 1036 #1211x1 | 1036 #1211x1 | #1095x1 | #1096x1 | 485 | | |

*Applicable rates during the 2016 Calendar Year. Rates in future years are determined by the above rates and the MP-2015 projection scale.

The pay increase assumptions are age based only, and not service based.

LAW ENFORCEMENT
SEPARATIONS FROM ACTIVE EMPLOYMENT BEFORE AGE & SERVICE RETIREMENT
& INDIVIDUAL PAY INCREASE ASSUMPTIONS

| Sample Ages | Years of Service | Percent of Active Members Separating Within the Next Year | | | | | | Pay Increase Assumptions for an Individual Employee | | |
|-------------|------------------|---|------------|---------------|----------------|------------|---------|---|----------------|--------------------|
| | | Death* | | Withdrawal | | Disability | | Merit & Seniority | Base (Economy) | Increase Next Year |
| | | Men | Women | Men | Women | Men | Women | | | |
| | 0 | | | 16.00% | 20.00% | | | | | |
| | 1 | | | 10.00% | 12.00% | | | | | |
| | 2 | | | 8.00% | 9.00% | | | | | |
| | 3 | | | 6.00% | 6.00% | | | | | |
| | 4 | | | 5.00% | 6.00% | | | | | |
| 20 | 5 & Over | 0.0489% | 0.0161% | 4.50% | 5.00% | 0.20% | 0.60% | 7.50% | 3.25% | 10.75% |
| 25 | | 0.0527% | 0.0164% | 3.54% | 3.80% | 0.20% | 0.60% | 6.30% | 3.25% | 9.55% |
| 30 | | 0.0459% | 0.0209% | 2.66% | 2.90% | 0.23% | 0.60% | 3.70% | 3.25% | 6.95% |
| 35 | | 0.0547% | 0.0307% | 2.14% | 2.30% | 0.34% | 0.60% | 2.02% | 3.25% | 5.27% |
| 40 | | 0.0733% | 0.0435% | 1.48% | 1.50% | 0.52% | 0.87% | 1.46% | 3.25% | 4.71% |
| 45 | | 0.1172% | 0.0659% | 1.20% | 1.30% | 0.78% | 1.38% | 1.12% | 3.25% | 4.37% |
| 50 | | 0.1923% | 0.1064% | 1.20% | 1.20% | 1.50% | 2.14% | 0.94% | 3.25% | 4.19% |
| 55 | | 0.2924% | 0.1724% | 1.20% | 1.20% | 2.32% | 2.65% | 0.60% | 3.25% | 3.85% |
| 60 | | 0.4923% | 0.2668% | 1.20% | 1.20% | 2.60% | 2.75% | 0.40% | 3.25% | 3.65% |
| 65 | | 0.9398% | 0.4017% | 1.20% | 1.20% | 2.60% | 2.75% | 0.16% | 3.25% | 3.41% |
| 70 | 1.6516% | 0.6832% | 1.20% | 1.20% | 2.60% | 2.75% | 0.00% | 3.25% | 3.25% | |
| Ref | | #2133x1sb0 | #2134x1sb0 | 753 #876x1 | 1037 #575x1 | #1095x1 | #1096x1 | 485 | | |

*Applicable rates during the 2016 Calendar Year. Rates in future years are determined by the above rates and the MP-2015 projection scale.

The pay increase assumptions are age based only, and not service based.

SINGLE LIFE RETIREMENT VALUES

| Sample Attained Ages* | Present Value of \$1 Monthly for Life Increasing 3.0% Annually (First Increase After 1 Year) | | Future Life Expectancy (Years) | |
|-----------------------------|---|-------------|-----------------------------------|---------|
| | Males | Females | Males | Females |
| 50 | \$185.93 | \$194.35 | 33.52 | 37.01 |
| 55 | 174.22 | 183.65 | 28.81 | 32.07 |
| 60 | 159.90 | 170.57 | 24.24 | 27.29 |
| 65 | 142.97 | 154.96 | 19.89 | 22.71 |
| 70 | 123.80 | 136.66 | 15.84 | 18.37 |
| 75 | 103.04 | 116.20 | 12.18 | 14.37 |
| 80 | 81.85 | 94.45 | 8.99 | 10.81 |
| Ref: | :#2135x1sb0 | :#2136x1sb0 | | |

**Attained Age during the 2016 Calendar Year.*

MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

DECEMBER 31, 2016

| | |
|---------------------------------|---|
| Marriage Assumption: | 70% of males and 60% of females are assumed to be married for purposes of death-in-service benefits for State and Local members. 90% of males and 90% of females are assumed to be married for purposes of death-in-service benefits for Law members. Male spouses are assumed to be three years older than female spouses for active member valuation purposes. In retired or inactive cases where spouse information is needed, but not available, the three year age difference is also assumed. |
| Pay Increase Timing: | Beginning of year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date. |
| Final Average Salary: | For present value of future benefit purposes, final average salary was calculated in accordance with pay increase assumptions, but was not permitted to fall below the final average salary reported in the data. |
| Decrement Timing: | Decrements are assumed to occur mid-year. |
| Eligibility Testing: | Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur. |
| Decrement Relativity: | Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects. |
| Decrement Operation: | Disability and mortality decrements do not operate during the first 5 years of service. |
| Death after Disability: | Death after disability benefits were approximated by assuming that the disability benefit would be paid as a joint and 35% survivor benefit for people in the original disability plan and as a joint and 20% survivor benefit for people in the post 1992 plan. |
| Service Credit Accruals: | It is assumed that members accrue one year of service credit per year. A (0.80)% factor is applied to State active member liabilities (other than for refunds) and a (1.00)% factor is applied to Local active member liabilities (other than for refunds) to recognize that a portion of the membership is part time. |

MISCELLANEOUS AND TECHNICAL ASSUMPTIONS
DECEMBER 31, 2016 (CONCLUDED)

| | |
|---|--|
| Miscellaneous Loads: | <ul style="list-style-type: none">• A load of approximately 0.31% of payroll is included in the computed normal cost to recognize subsidized service purchases.• Law active accrued liabilities for retirement are reduced by 10% to recognize that total service reported is not entirely Law service, and that non-Law service cannot be used to satisfy Law eligibility conditions.• A load of approximately 1% of Combined Plan payroll is included in the Combined Plan computed normal cost to recognize expected administrative expenses.• Approximately \$3 million was added to the Combined Plan actuarial accrued liability to reflect assumed future transfers out of Combined Plan assets to repay start-up loans. |
| Transition Groups Under Senate Bill #343: | A member's transition group (i.e., Group A, Group B, or Group C) was determined as of the valuation date based upon the assumption (for transition group determination only) that active members would continue in active service. |
| Cost-of-Living Adjustments: | For individuals retiring after January 7, 2013, cost-of-living adjustments were assumed to be 3% for calendar years 2013 through 2018 and 2.15% thereafter. |
| Incidence of Contributions: | Contributions are assumed to be received continuously throughout the year based upon contribution rates presented in the Summary of Benefits, and the actual payroll payable at the time contributions are made. |
| Benefit Service: | Exact fractional service is used to determine the amount of benefit payable. |
| Normal Form of Benefit: | The assumed normal form of benefit is a straight life benefit, except where otherwise noted. |
| Missing Member Data and Member Data Adjustments: | Active and inactive records with missing dates of birth, if any, were given dates of birth that resulted in an entry age of 30 based upon the reported service. Active and inactive records with missing gender codes, if any, were assumed to be female. For active members with less than 6 months of service credit and a reported annualized salary greater than \$200,000, the annual salary used for valuation purposes was the greater of the member's reported FAS and non-annualized gross salary. |

SECTION XI
FINANCIAL PRINCIPLES

FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES OF OPERS

Promises Made, and To Be Paid For. As each year is completed, OPERS in effect hands an “IOU” to each member then acquiring a year of service credit --- the “IOU” says: “The Ohio Public Employees Retirement System owes you one year’s worth of retirement benefits, payments in cash commencing when you qualify for retirement.”

The related ***key financial questions*** are:

Which generation of taxpayers contributes the money to cover the IOU?

The present taxpayers, who receive the benefit of the member’s present year of service? ***Or the future taxpayers***, who happen to be in Ohio at the time the IOU becomes a cash demand, years and often decades later?

The law governing OPERS financing intends that this year’s taxpayers contribute the money to cover the IOUs being handed out this year. With this financial objective, ***the employer contribution rate is expected to remain approximately level from generation to generation of taxpayers.***

There are systems which have a design for deferring contributions to future taxpayers. Lured by a lower contribution rate now, they put aside the consequence that the contribution rate must then relentlessly grow to a level much higher than would be required if a level contribution pattern were followed.

An inevitable by-product of the level-cost design is the accumulation of reserve assets, for decades, and the income produced when the assets are invested. ***Investment income*** becomes ***the 3rd and largest contributor*** for benefits to employees, and is interlocked with the contribution amounts required from employees and employers.

Translated to actuarial terminology, this level-cost objective means that the contribution rates must total at least the following:

Normal Cost (the cost of members' service being rendered this year)

... plus ...

Interest on Unfunded Actuarial Accrued Liabilities (unfunded actuarial accrued liabilities are the difference between: liabilities for service already rendered; and the accrued assets of OPERS).

Computing Contributions to Support Fund Benefits. From a given schedule of benefits and from employee and asset data, the actuary calculates the contribution rates to support the benefits by means of ***an actuarial valuation and a funding method.***

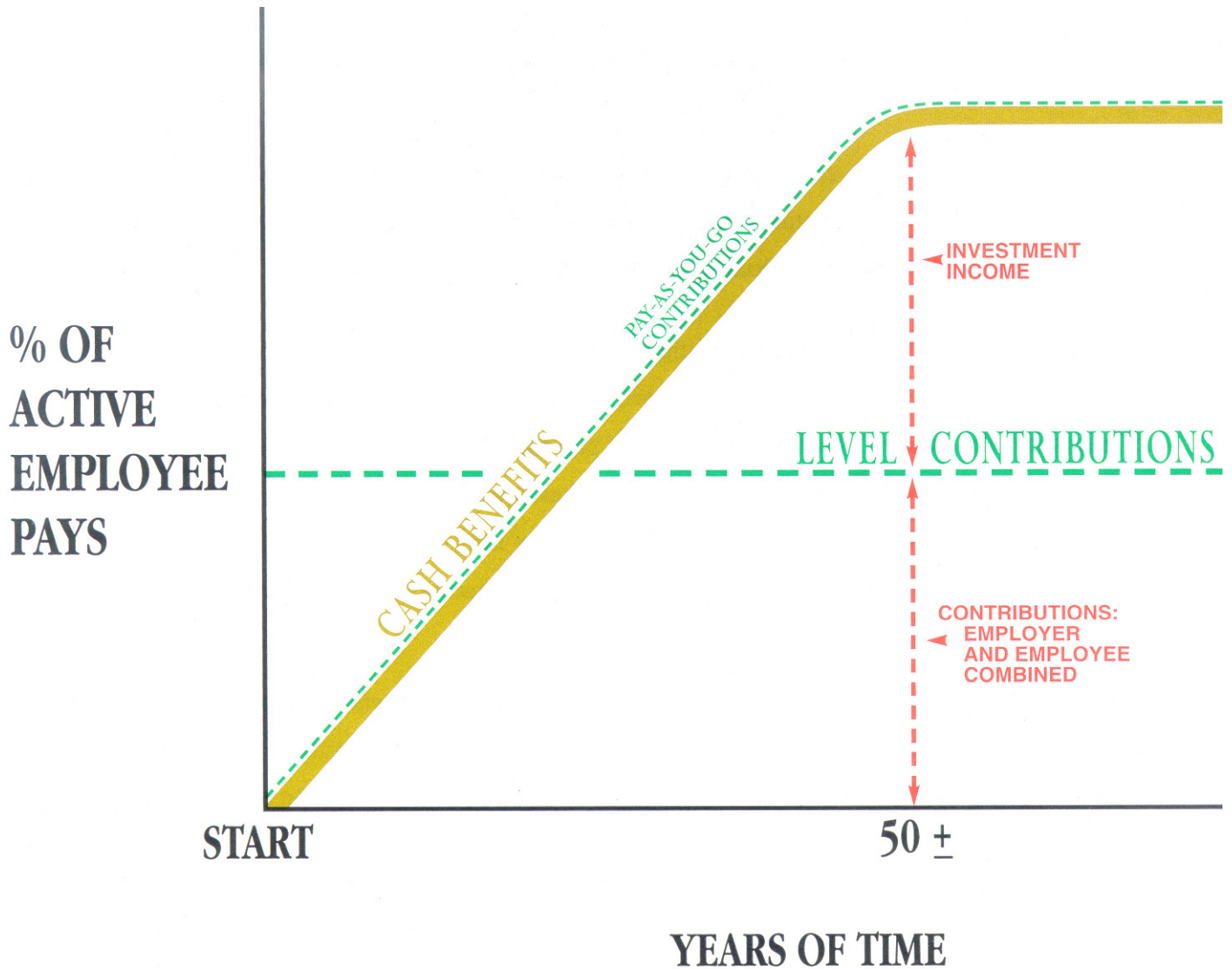
An actuarial valuation has a number of ingredients such as: the rate of investment return which plan assets will earn; the rates of withdrawal of active members who leave covered employment; the rates of mortality; the rates of disability; the rates of pay increases; and the assumed age or ages at actual retirement.

In an actuarial valuation, assumptions must be made as to what the above rates will be for the next year and for decades in the future. The assumptions are established by the Retirement Board after receiving the advice of the actuary.

Reconciling Differences Between Assumed Experience and Actual Experience. Once actual experience has occurred and has been observed, it will not coincide exactly with assumed experience, regardless of the skill of the actuary and the many calculations made. The future can not be predicted with 100% precision.

OPERS copes with these continually changing differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is ***continuing adjustments in financial position.***

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CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

Economic Risk Areas

- Rates of investment return
- Rates of pay increase
- Changes in active member group size

Non-Economic Risk Areas

- Ages at actual retirement
- Rates of mortality
- Rates of withdrawal of active members (turnover)
- Rates of disability

THE ACTUARIAL VALUATION PROCESS

The financing diagram on the opposite page shows the relationship between *the two fundamentally different philosophies of paying* for retirement benefits: the method where contributions match cash benefit payments (or barely exceed cash benefit payments, as in the Federal Social Security program) which is thus an *increasing contribution method*; and, the *level contribution method* which attempts to equalize contributions between the generations.

The actuarial valuation is the mathematical process by which the level contribution rate is determined. The activity constituting the valuation may be summarized as follows:

- A. **Census Data**, including:
 - Retired lives now receiving benefits
 - Former employees with vested benefits not yet payable
 - Active employees

- B. + **Asset data** (cash & investments)

- C. + **Benefit provisions** that establish eligibility and amounts of payments to members

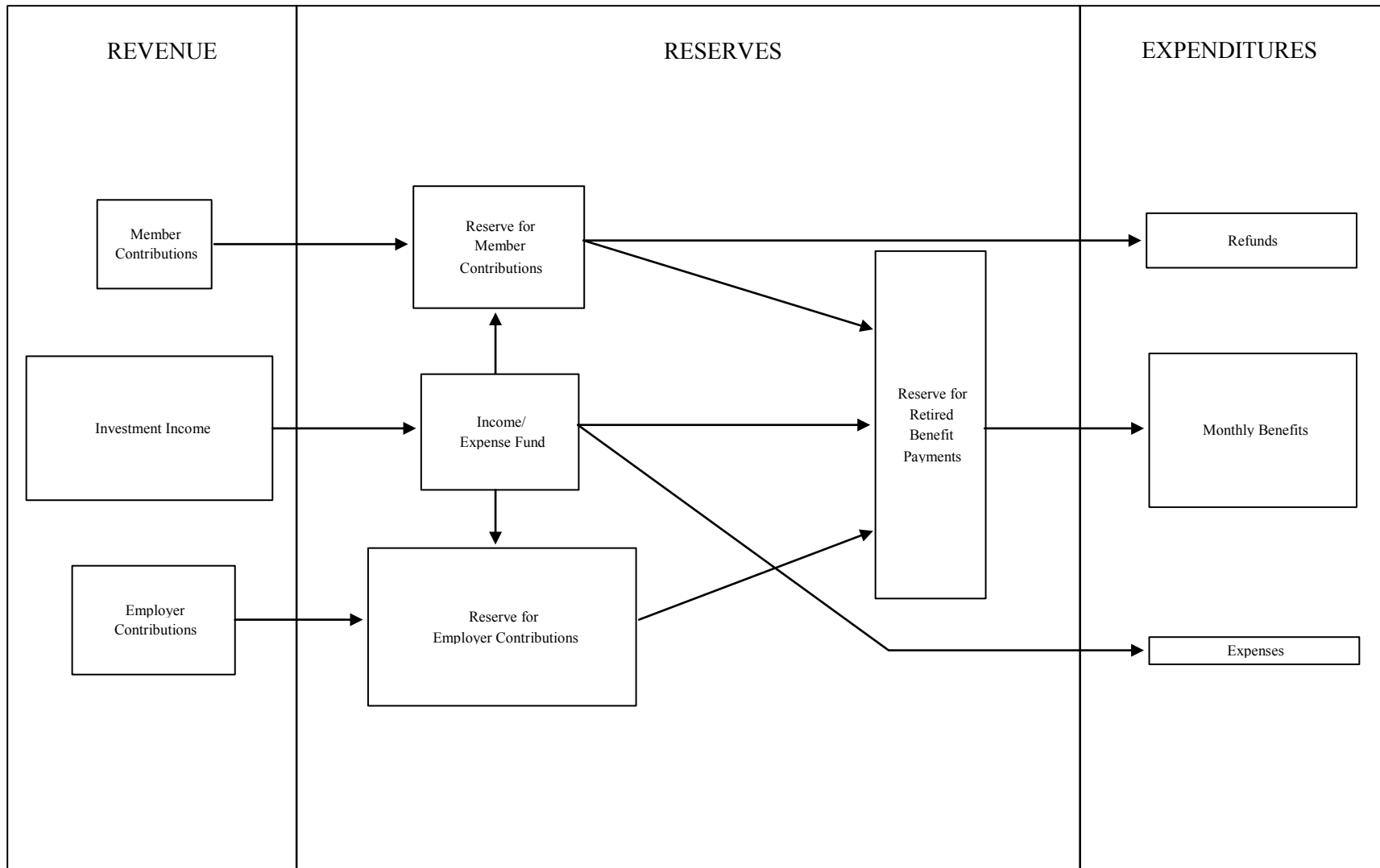
- D. + **Assumptions concerning future experience** in various risk areas

- E. + **The funding method** for employer contributions (the long-term, planned pattern for employer contributions)

- F. + **Mathematically combining the assumptions, the funding method, and the data**

- G. = Determination of:
 - Plan Financial Position; and/or
 - New Employer Contribution Rate

FLOW OF MONEY THROUGH THE RETIREMENT SYSTEM



GLOSSARY

Accrued Service. The service credited under the plan which was rendered before the date of the actuarial valuation.

Accumulated Benefit Obligation. The actuarial present value of vested and non-vested benefits based on service to date and past and current salary levels.

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

Actuarial Assumptions. Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

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

Actuarial Equivalent. A single amount or series of amounts of equal value to another single amount or series of amounts, computed on the basis of the rate(s) of interest and mortality tables used by the plan.

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

Actuary. A person who is trained in the applications of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries (MAAA). The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation ASA and ultimately to Fellowship with the designation FSA.

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

Experience Gain (Loss). A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.

Funding Value of Assets. The value of current plan assets recognized for valuation purposes. Generally based on a phased-in recognition of all or a portion of market related investment return. Sometimes referred to as Actuarial Value of Assets.

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

Plan Termination Liability. The actuarial present value of future plan benefits based on the assumption that there will be no further accruals for future service and salary. The termination liability will generally be less than the liabilities computed on a “going concern” basis and is not normally determined in a routine actuarial valuation.

Reserve Account. An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.

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

MEANING OF “UNFUNDED ACTUARIAL ACCRUED LIABILITIES”

“*Actuarial accrued liabilities*” are *the present value of the portions of promised benefits that are not covered by future normal cost contributions* --- a liability has been established (“accrued”) because the service has been rendered but the resulting monthly cash benefit may not be payable until years in the future.

If “actuarial accrued liabilities” at any time exceed the plan’s accrued assets (cash & investments), the difference is “*unfunded actuarial accrued liabilities*.” This is the common condition. If the plan’s assets equaled the plan’s “actuarial accrued liabilities”, the plan would be termed “fully funded.” This is an unusual condition.

Each time a plan adds a new benefit which applies to service already rendered, an “actuarial accrued liability” is created, which is also an “unfunded actuarial accrued liability” because the plan can’t print instant cash to cover the value of the new benefit promises. Payment for such unfunded actuarial accrued liabilities is spread over a period of years, commonly in the 15-30 year range.

Unfunded actuarial accrued liabilities can occur in another way: if actual plan experience is less favorable than assumed, the difference is added to unfunded actuarial accrued liabilities. For example, in plans where benefits are directly related to an employee’s pay near time of retirement, unfunded actuarial accrued liabilities increased rapidly during the 1970’s because unexpected rates of pay increase created additional actuarial accrued liabilities which could not be matched by reasonable investment results. Most of the unexpected pay increases were the direct result of inflation, which is a very destructive force on financial stability.

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

Nor are unfunded actuarial accrued liabilities a bill payable immediately, but it is important that policy-makers prevent the amount from becoming unreasonably high and *it is vital for plans to have a sound method for making payments toward them* so that they are controlled.

SECTION XII

GASB REPORTING

This information is presented in draft form for review by the System's auditor. Please let us know if there are any items that the auditor changes so that we may maintain consistency with the System's financial statements.

**SCHEDULE OF DEFINED BENEFIT FUNDING PROGRESS
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS
(\$ AMOUNTS IN MILLIONS)
TRADITIONAL, COMBINED, AND MEMBER DIRECTED PLANS**

The schedule below measures the funding progress with respect to the *retirement allowance* portion of OPERS benefits for compliance with applicable GASB Statements. Assets and liabilities related to post-employment health care benefits are specifically excluded from the schedule. Assets do, however, include market value adjustments.

| Valuation Year | Actuarial Accrued Liabilities (AAL) @ | Valuation Assets | Unfunded Actuarial Accrued Liabilities (UAAL) | Ratio of Assets to AAL | Covered Payroll^ | UAAL as a % of Covered Payroll |
|-----------------------|--|-------------------------|--|-------------------------------|-------------------------|---------------------------------------|
| 1996 | \$32,631 | \$30,534 | \$ 2,097 | 94 % | \$ 8,340 | 25 % |
| 1997 | 34,971 | 33,846 | 1,125 | 97 % | 8,640 | 13 % |
| 1998 | 37,714 | 38,360 | (646) | 102 % | 9,017 | 0 % |
| 1999 | 43,070 | 43,060 | 10 | 100 % | 9,477 | 0 % |
| 2000 | 46,347 | 46,844 | (497) | 101 % | 10,192 | 0 % |
| 2001 | 49,095 | 48,748 | 347 | 99 % | 10,782 | 3 % |
| 2001* | 47,492 | 48,748 | (1,256) | 103 % | 10,782 | 0 % |
| 2002 | 50,872 | 43,706 | 7,166 | 86 % | 11,207 | 64 % |
| 2003 | 54,774 | 46,746 | 8,028 | 85 % | 11,165 | 72 % |
| 2004 | 57,604 | 50,452 | 7,152 | 88 % | 11,454 | 62 % |
| 2005 | 61,146 | 54,473 | 6,673 | 89 % | 11,807 | 57 % |
| 2005* | 62,498 | 54,473 | 8,025 | 87 % | 11,807 | 68 % |
| 2006 | 66,161 | 61,296 | 4,865 | 93 % | 12,175 | 40 % |
| 2007 | 69,734 | 67,151 | 2,583 | 96 % | 12,583 | 21 % |
| 2008 | 73,466 | 55,315 | 18,150 | 75 % | 12,801 | 142 % |
| 2009 | 76,555 | 57,629 | 18,926 | 75 % | 12,548 | 151 % |
| 2010 | 79,630 | 60,600 | 19,031 | 76 % | 12,450 | 153 % |
| 2010* | 80,485 | 63,649 | 16,836 | 79 % | 12,450 | 135 % |
| 2011 | 84,530 | 65,436 | 19,094 | 77 % | 12,399 | 154 % |
| 2012 | 87,105 | 67,855 | 19,250 | 78 % | 12,193 | 158 % |
| 2012# | 83,878 | 67,855 | 16,023 | 81 % | 12,193 | 131 % |
| 2013 | 86,645 | 71,411 | 15,234 | 82 % | 12,331 | 124 % |
| 2014 | 89,285 | 74,865 | 14,420 | 84 % | 12,486 | 114 % |
| 2015 | 91,832 | 78,061 | 13,771 | 85 % | 12,688 | 106 % |
| 2015* | 97,177 | 78,061 | 19,116 | 80 % | 12,688 | 148 % |
| 2016 | 100,167 | 80,280 | 19,887 | 80 % | 13,186 | 151 % |

@ Excludes reserve for Member Directed future adverse experience.

^ In 2014 and thereafter reported by the OPERS Staff to GRS. Prior to 2014, valuation payroll is presented. The payroll amounts exclude Member Directed payroll.

* Revised actuarial assumptions.

After benefit changes.

**SCHEDULE OF DEFINED BENEFIT FUNDING PROGRESS
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS
(\$ AMOUNTS IN MILLIONS)
TRADITIONAL PLAN**

The schedule below measures the funding progress with respect to the *retirement allowance* portion of OPERS benefits for compliance with applicable GASB Statements. Assets and liabilities related to post-employment health care benefits are specifically excluded from the schedule. Assets do, however, include market value adjustments.

| Valuation Year | Actuarial Accrued Liabilities (AAL) | Valuation Assets | Unfunded Actuarial Accrued Liabilities (UAAL) | Ratio of Assets to AAL | Covered Payroll[^] | UAAL as a % of Covered Payroll |
|-----------------------|--|-------------------------|--|-------------------------------|------------------------------------|---------------------------------------|
| 1996 | \$32,631 | \$30,534 | \$ 2,097 | 94 % | \$ 8,340 | 25 % |
| 1997 | 34,971 | 33,846 | 1,125 | 97 % | 8,640 | 13 % |
| 1998 | 37,714 | 38,360 | (646) | 102 % | 9,017 | 0 % |
| 1999 | 43,070 | 43,060 | 10 | 100 % | 9,477 | 0 % |
| 2000 | 46,347 | 46,844 | (497) | 101 % | 10,192 | 0 % |
| 2001 | 49,095 | 48,748 | 347 | 99 % | 10,782 | 3 % |
| 2001* | 47,492 | 48,748 | (1,256) | 103 % | 10,782 | 0 % |
| 2002 | 50,872 | 43,706 | 7,166 | 86 % | 11,207 | 64 % |
| 2003 | 54,756 | 46,737 | 8,019 | 85 % | 11,056 | 73 % |
| 2004 | 57,573 | 50,430 | 7,143 | 88 % | 11,313 | 63 % |
| 2005 | 61,099 | 54,433 | 6,666 | 89 % | 11,633 | 57 % |
| 2005* | 62,447 | 54,433 | 8,014 | 87 % | 11,633 | 69 % |
| 2006 | 66,089 | 61,235 | 4,854 | 93 % | 11,971 | 41 % |
| 2007 | 69,639 | 67,067 | 2,572 | 96 % | 12,347 | 21 % |
| 2008 | 73,346 | 55,230 | 18,116 | 75 % | 12,546 | 144 % |
| 2009 | 76,407 | 57,519 | 18,888 | 75 % | 12,290 | 154 % |
| 2010 | 79,459 | 60,461 | 18,997 | 76 % | 12,165 | 156 % |
| 2010* | 80,307 | 63,515 | 16,792 | 79 % | 12,165 | 138 % |
| 2011 | 84,325 | 65,274 | 19,052 | 77 % | 12,103 | 157 % |
| 2012 | 86,876 | 67,670 | 19,206 | 78 % | 11,884 | 162 % |
| 2012# | 83,664 | 67,670 | 15,994 | 81 % | 11,884 | 135 % |
| 2013 | 86,407 | 71,175 | 15,232 | 82 % | 12,000 | 127 % |
| 2014 | 89,017 | 74,567 | 14,450 | 84 % | 12,140 | 117 % |
| 2015 | 91,535 | 77,700 | 13,835 | 85 % | 12,321 | 110 % |
| 2015* | 96,863 | 77,700 | 19,163 | 80 % | 12,321 | 152 % |
| 2016 | 99,818 | 79,865 | 19,953 | 80 % | 12,794 | 156 % |

[^] In 2014 and thereafter reported by the OPERS Staff to GRS. Prior to 2014, valuation payroll is presented.

* Revised actuarial assumptions.

After benefit changes.

**SCHEDULE OF DEFINED BENEFIT FUNDING PROGRESS
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS
(\$ AMOUNTS IN MILLIONS)
COMBINED PLAN**

The schedule below measures the funding progress with respect to the *retirement allowance* portion of OPERS benefits for compliance with applicable GASB Statements. Assets and liabilities related to post-employment health care benefits are specifically excluded from the schedule. Assets do, however, include market value adjustments.

| Valuation Year | Actuarial Accrued Liabilities (AAL) | Valuation Assets | Unfunded Actuarial Accrued Liabilities (UAAL) | Ratio of Assets to AAL | Covered Payroll[^] | UAAL as a % of Covered Payroll |
|-----------------------|--|-------------------------|--|-------------------------------|------------------------------------|---------------------------------------|
| 1996 | | | | | | |
| 1997 | | | | | | |
| 1998 | | | | | | |
| 1999 | | | | | | |
| 2000 | | | | | | |
| 2001 | | | | | | |
| 2001 | | | | | | |
| 2002 | | | | | | |
| 2003 | \$ 18 | \$ 9 | \$ 9 | 50 % | \$109 | 8 % |
| 2004 | 31 | 22 | 9 | 71 % | 141 | 6 % |
| 2005 | 47 | 40 | 7 | 85 % | 174 | 4 % |
| 2005* | 51 | 40 | 11 | 78 % | 174 | 6 % |
| 2006 | 72 | 61 | 11 | 85 % | 205 | 5 % |
| 2007 | 95 | 84 | 11 | 88 % | 236 | 5 % |
| 2008 | 120 | 85 | 35 | 71 % | 255 | 14 % |
| 2009 | 148 | 110 | 38 | 74 % | 258 | 15 % |
| 2010 | 171 | 138 | 33 | 81 % | 284 | 12 % |
| 2010* | 177 | 134 | 43 | 76 % | 284 | 15 % |
| 2011 | 203 | 161 | 42 | 79 % | 296 | 14 % |
| 2012 | 226 | 183 | 43 | 81 % | 310 | 14 % |
| 2012# | 212 | 183 | 29 | 86 % | 310 | 9 % |
| 2013 | 230 | 229 | 1 | 100 % | 331 | 0 % |
| 2014 | 260 | 289 | (29) | 111 % | 346 | 0 % |
| 2015 | 288 | 350 | (62) | 122 % | 367 | 0 % |
| 2015* | 303 | 350 | (47) | 116 % | 367 | 0 % |
| 2016 | 336 | 402 | (66) | 120 % | 392 | 0 % |

[^] In 2014 and thereafter reported by the OPERS Staff to GRS. Prior to 2014, valuation payroll is presented.

* Revised actuarial assumptions.

After benefit changes.

**SCHEDULE OF DEFINED BENEFIT FUNDING PROGRESS
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS
(\$ AMOUNTS)
MEMBER DIRECTED PLAN**

The schedule below measures the funding progress with respect to the *retirement allowance* portion of OPERS benefits for compliance with applicable GASB Statements. Assets and liabilities related to post-employment health care benefits are specifically excluded from the schedule. Assets do, however, include market value adjustments.

| Valuation Year | Actuarial Accrued Liabilities (AAL) @ | Valuation Assets | Unfunded Actuarial Accrued Liabilities (UAAL) | Ratio of Assets to AAL | Covered Payroll | UAAL as a % of Covered Payroll |
|-----------------------|--|-------------------------|--|-------------------------------|------------------------|---------------------------------------|
| 1996 | | | | | | |
| 1997 | | | | | | |
| 1998 | | | | | | |
| 1999 | | | | | | |
| 2000 | | | | | | |
| 2001 | | | | | | |
| 2001 | | | | | | |
| 2002 | | | | | | |
| 2003 | | | | | | |
| 2004 | | | | | | |
| 2005 | | | | | | |
| 2005* | | | | | | |
| 2006 | | | | | | |
| 2007 | | | | | | |
| 2008 | \$ 166,354 | \$ 147,976 | \$ 18,378 | 89 % | NA | NA |
| 2009 | 252,670 | 205,639 | 47,031 | 81 % | NA | NA |
| 2010 | 489,792 | 438,982 | 50,810 | 90 % | NA | NA |
| 2010* | 496,004 | 454,025 | 41,979 | 92 % | NA | NA |
| 2011 | 1,172,900 | 1,156,151 | 16,749 | 99 % | NA | NA |
| 2012 | 2,665,552 | 2,523,879 | 141,673 | 95 % | NA | NA |
| 2013 | 6,884,231 | 6,826,536 | 57,695 | 99 % | NA | NA |
| 2014 | 8,291,077 | 8,771,712 | (480,635) | 106 % | NA | NA |
| 2015 | 9,767,164 | 10,622,057 | (854,893) | 109 % | NA | NA |
| 2015* | 10,290,582 | 10,622,057 | (331,475) | 103 % | NA | NA |
| 2016 | 12,248,743 | 12,961,105 | (712,362) | 106 % | NA | NA |

@ Excludes reserve for future adverse experience.

* Revised actuarial assumptions.

SCHEDULE OF EMPLOYER CONTRIBUTIONS*
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS

| Traditional Plan | | |
|---------------------------------------|-----------------------------------|--|
| Valuation Date December 31 | Year Ended December 31 | Annual Required Contributions |
| 2004 | 2006 | 8.44% |
| 2005 | 2008 | 7.12% |
| 2006 | 2009 | 7.13% |
| 2007 | 2010 | 7.14% |
| 2008 | 2011 | 13.33% |
| 2009 | 2012 | 13.64% |
| 2010 | 2013 | 13.52% |
| 2011 | 2014 | 14.15% |
| 2012 | 2015 | 11.16% |
| 2013 | 2016 | 10.16% |
| 2014 | 2017 | 10.16% |
| 2015 | 2018 | 14.16% |
| 2016 | 2019 | 14.17% |

| Combined Plan | | |
|---------------------------------------|-----------------------------------|--|
| Valuation Date December 31 | Year Ended December 31 | Annual Required Contributions |
| 2004 | 2006 | 8.33% |
| 2005 | 2008 | 7.29% |
| 2006 | 2009 | 7.33% |
| 2007 | 2010 | 7.22% |
| 2008 | 2011 | 10.00% |
| 2009 | 2012 | 10.00% |
| 2010 | 2013 | 13.00% |
| 2011 | 2014 | 14.00% |
| 2012 | 2015 | 11.00% |
| 2013 | 2016 | 10.00% |
| 2014 | 2017 | 10.00% |
| 2015 | 2018 | 14.00% |
| 2016 | 2019 | 14.00% |

| Member Directed Plan | | |
|---------------------------------------|-----------------------------------|--|
| Valuation Date December 31 | Year Ended December 31 | Annual Required Contributions |
| 2008 | 2011 | \$ 1,570 |
| 2009 | 2012 | 4,019 |
| 2010 | 2013 | 4,342 |
| 2011 | 2014 | 1,669 |
| 2012 | 2015 | 14,121 |
| 2013 | 2016 | 5,751 |
| 2014 | 2017 | 0 |
| 2015 | 2018 | 0 |
| 2016 | 2019 | 0 |

* The amounts reported in this schedule do not include contributions for post-employment healthcare benefits.

**SCHEDULE OF UNFUNDED ACTUARIAL ACCRUED LIABILITY@
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS
TRADITIONAL, COMBINED AND MEMBER DIRECTED PLANS**

| | December 31, 2016 | | | | | |
|--|-------------------|-------------------|-------------------|------------------|--------------------|--------------------|
| | General | | | Public Safety | Law Enforcement | Grand Total |
| | State | Local | Total | | | |
| Accrued Liabilities | | | | | | |
| Active and Inactive Members | \$ 14,089,746,782 | \$ 21,421,200,806 | \$ 35,510,947,588 | \$ 8,467,318 | \$ 1,817,880,606 | \$ 37,337,295,512 |
| Retirees and Beneficiaries# | 25,315,963,233 | 34,976,746,806 | 60,292,710,039 | 48,874,523 | 2,488,239,278 | 62,829,823,840 |
| Total Accrued Liabilities | \$ 39,405,710,015 | \$ 56,397,947,612 | \$ 95,803,657,627 | \$ 57,341,841 | \$ 4,306,119,884 | \$ 100,167,119,352 |
| Assets | | | | | | |
| Active and Inactive Members | | | | | | |
| EAF* | \$ (735,792,191) | \$ 990,545,846 | \$ 254,753,655 | \$ (11,550,949) | \$ 397,584,878 | \$ 640,787,584 |
| ESF | 5,208,601,309 | 8,060,861,074 | 13,269,462,383 | 3,423,947 | 642,073,207 | 13,914,959,537 |
| Unallocated | 49,492,434 | 73,155,532 | 122,647,966 | 68,076 | 5,893,957 | 128,609,999 |
| Market Value Adjustment | 1,064,492,319 | 1,573,354,309 | 2,637,846,628 | 1,458,245 | 126,253,999 | 2,765,558,872 |
| Total Active and Inactive Assets | \$ 5,586,793,871 | \$ 10,697,916,761 | \$ 16,284,710,632 | \$ (6,600,681) | \$ 1,171,806,041 | \$ 17,449,915,992 |
| Retirees and Beneficiaries | | | | | | |
| A & PR Fund* | \$ 24,626,470,772 | \$ 33,859,941,236 | \$ 58,486,412,008 | \$ 27,224,686 | \$ 2,434,329,572 | \$ 60,947,966,266 |
| SBF Fund* | 689,058,161 | 1,116,527,508 | 1,805,585,669 | 21,649,837 | 53,909,706 | 1,881,145,212 |
| Reserve for Future Adverse Experience | 434,300 | 278,062 | 712,362 | 0 | 0 | 712,362 |
| Total R&B Assets | \$ 25,315,963,233 | \$ 34,976,746,806 | \$ 60,292,710,039 | \$ 48,874,523 | \$ 2,488,239,278 | \$ 62,829,823,840 |
| Total Assets | \$ 30,902,757,104 | \$ 45,674,663,567 | \$ 76,577,420,671 | \$ 42,273,842 | \$ 3,660,045,319 | \$ 80,279,739,832 |
| Unfunded Actuarial Accrued Liability | \$ 8,502,952,911 | \$ 10,723,284,045 | \$ 19,226,236,956 | \$ 15,067,999 | \$ 646,074,565 | \$ 19,887,379,520 |

@ The amounts reported in this schedule do not include contributions for post-employment healthcare benefits.

Excludes reserve for Member Directed future adverse experience.

* After reserve transfers.

**SCHEDULE OF UNFUNDED ACTUARIAL ACCRUED LIABILITY@
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS
TRADITIONAL PLAN**

| | December 31, 2016 | | | | | |
|--|-------------------|-------------------|------------------|------------------|--------------------|------------------|
| | General | | | Public Safety | Law Enforcement | Grand Total |
| | State | Local | Total | | | |
| Accrued Liabilities | | | | | | |
| Active and Inactive Members | \$ 13,953,971,373 | \$21,239,155,811 | \$35,193,127,184 | \$ 8,467,318 | \$1,817,880,606 | \$37,019,475,108 |
| Retirees and Beneficiaries | 25,305,034,465 | 34,956,309,580 | 60,261,344,045 | 48,874,523 | 2,488,239,278 | 62,798,457,846 |
| Total Accrued Liabilities | \$ 39,259,005,838 | \$56,195,465,391 | \$95,454,471,229 | \$ 57,341,841 | \$4,306,119,884 | \$99,817,932,954 |
| Assets | | | | | | |
| Active and Inactive Members | | | | | | |
| EAF* | \$ (888,223,571) | \$ 772,477,741 | \$ (115,745,830) | \$ (11,550,949) | \$ 397,584,878 | \$ 270,288,099 |
| ESF | 5,207,465,580 | 8,059,314,807 | 13,266,780,387 | 3,423,947 | 642,073,207 | 13,912,277,541 |
| Unallocated | 49,492,434 | 73,155,532 | 122,647,966 | 68,076 | 5,893,957 | 128,609,999 |
| Market Value Adjustment | 1,060,173,524 | 1,567,058,914 | 2,627,232,438 | 1,458,245 | 126,253,999 | 2,754,944,682 |
| Total Active and Inactive Assets | \$ 5,428,907,967 | \$10,472,006,994 | \$15,900,914,961 | \$ (6,600,681) | \$ 1,171,806,041 | \$17,066,120,321 |
| Retirees and Beneficiaries | | | | | | |
| A & PR Fund* | \$24,615,976,304 | \$33,839,782,072 | \$58,455,758,376 | \$ 27,224,686 | \$2,434,329,572 | \$60,917,312,634 |
| SBF Fund* | 689,058,161 | 1,116,527,508 | 1,805,585,669 | 21,649,837 | 53,909,706 | 1,881,145,212 |
| Reserve for Future Adverse Experience | 0 | 0 | 0 | 0 | 0 | 0 |
| Total R&B Assets | \$25,305,034,465 | \$34,956,309,580 | \$60,261,344,045 | \$ 48,874,523 | \$2,488,239,278 | \$62,798,457,846 |
| Total Assets | \$30,733,942,432 | \$45,428,316,574 | \$76,162,259,006 | \$ 42,273,842 | \$3,660,045,319 | \$79,864,578,167 |
| Unfunded Actuarial Accrued Liability | \$ 8,525,063,406 | \$ 10,767,148,817 | \$19,292,212,223 | \$ 15,067,999 | \$ 646,074,565 | \$19,953,354,787 |

@ The amounts reported in this schedule do not include contributions for post-employment healthcare benefits.

* After reserve transfers.

**SCHEDULE OF UNFUNDED ACTUARIAL ACCRUED LIABILITY@
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS
COMBINED PLAN**

| | December 31, 2016 | | | | | |
|--|-------------------|-----------------|----------------|------------------|--------------------|-----------------|
| | General | | | Public Safety | Law Enforcement | Grand Total |
| | State | Local | Total | | | |
| Accrued Liabilities | | | | | | |
| Active and Inactive Members | \$135,775,409 | \$182,044,995 | \$317,820,404 | | | \$317,820,404 |
| Retirees and Beneficiaries | 6,651,665 | 11,753,224 | 18,404,889 | | | 18,404,889 |
| Total Accrued Liabilities | \$142,427,074 | \$193,798,219 | \$336,225,293 | | | \$336,225,293 |
| Assets | | | | | | |
| Active and Inactive Members | | | | | | |
| EAF* | \$152,576,244 | \$218,271,578 | \$370,847,822 | | | \$370,847,822 |
| ESF | 1,088,486 | 1,540,999 | 2,629,485 | | | 2,629,485 |
| Unallocated | 0 | 0 | 0 | | | 0 |
| Market Value Adjustment | 4,221,174 | 6,097,190 | 10,318,364 | | | 10,318,364 |
| Total Active and Inactive Assets | \$157,885,904 | \$225,909,767 | \$383,795,671 | | | \$383,795,671 |
| Retirees and Beneficiaries | | | | | | |
| A & PR Fund* | \$ 6,651,665 | \$ 11,753,224 | \$ 18,404,889 | | | \$ 18,404,889 |
| SBF Fund* | 0 | 0 | 0 | | | 0 |
| Reserve for Future Adverse Experience | 0 | 0 | 0 | | | 0 |
| Total R&B Assets | \$ 6,651,665 | \$ 11,753,224 | \$ 18,404,889 | | | \$ 18,404,889 |
| Total Assets | \$164,537,569 | \$237,662,991 | \$402,200,560 | | | \$402,200,560 |
| Unfunded Actuarial Accrued Liability | \$ (22,110,495) | \$ (43,864,772) | \$(65,975,267) | | | \$ (65,975,267) |

@ The amounts reported in this schedule do not include contributions for post-employment healthcare benefits.

* After reserve transfers.

**SCHEDULE OF UNFUNDED ACTUARIAL ACCRUED LIABILITY@
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS
MEMBER DIRECTED PLAN**

| | December 31, 2016 | | | | | |
|---|---------------------|---------------------|----------------------|------------------|--------------------|----------------------|
| | General | | | Public Safety | Law Enforcement | Grand Total |
| | State | Local | Total | | | |
| Accrued Liabilities | | | | | | |
| Active and Inactive Members | \$ - | \$ - | \$ - | | | \$ - |
| Retirees and Beneficiaries# | 4,277,103 | 8,684,002 | 12,961,105 | | | 12,961,105 |
| Total Accrued Liabilities | \$ 4,277,103 | \$ 8,684,002 | \$ 12,961,105 | | | \$ 12,961,105 |
| Assets | | | | | | |
| Active and Inactive Members | | | | | | |
| EAF* | \$ (144,864) | \$ (203,473) | \$ (348,337) | | | \$ (348,337) |
| ESF | 47,243 | 5,268 | 52,511 | | | 52,511 |
| Unallocated | 0 | 0 | 0 | | | 0 |
| Market Value Adjustment | 97,621 | 198,205 | 295,826 | | | 295,826 |
| Total Active and Inactive Assets | \$ - | \$ - | \$ - | | | \$ - |
| Retirees and Beneficiaries | | | | | | |
| A & PR Fund* | \$ 3,842,803 | \$ 8,405,940 | \$ 12,248,743 | | | \$ 12,248,743 |
| SBF Fund* | 0 | 0 | 0 | | | 0 |
| Reserve for Future Adverse Experience | 434,300 | 278,062 | 712,362 | 0 | 0 | 712,362 |
| Total R&B Assets | \$ 4,277,103 | \$ 8,684,002 | \$ 12,961,105 | | | \$ 12,961,105 |
| Total Assets | \$ 4,277,103 | \$ 8,684,002 | \$ 12,961,105 | | | \$ 12,961,105 |
| Unfunded Actuarial Accrued Liability | \$ - | \$ - | \$ - | | | \$ - |

@ The amounts reported in this schedule do not include contributions for post-employment healthcare benefits.

Excludes reserve for future adverse experience.

* After reserve transfers.

**REQUIRED SUPPLEMENTARY INFORMATION
FOR COMPLIANCE WITH APPLICABLE GASB STATEMENTS**

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

| | | | |
|---|---|--|--|
| Valuation date | December 31, 2016 | | |
| Actuarial cost method | Individual entry age | | |
| Amortization method for unfunded actuarial accrued liabilities | Level percent closed - Traditional and Combined Level dollar closed - Member-Directed | | |
| Equivalent Single Amortization Period (Years from December 31, 2018) | | | |
| Traditional Plan | 19 | | |
| Combined Plan | N/A | (Plan has funded ratio of at least 100%) | |
| Member-Directed Plan | N/A | (Plan has funded ratio of at least 100%) | |
| Asset valuation method | 4-year smoothed market | | |
| Actuarial assumptions: | | | |
| Investment rate of return | 7.50% | | |
| Projected salary increases including wage inflation at 3.25% | 3.25% - 10.75% | | |
| Cost-of-living adjustments | Pre 1/7/2013 Retirees: 3.0% simple Post 1/7/2013 Retirees: 3.0% simple through 2018, then 2.15% simple | | |

| | Traditional | Combined | Member Directed | Total |
|--|--------------------|-----------------|----------------------------|--------------|
| Retirees and beneficiaries receiving benefits | 213,550 | 398 | 219 | 214,167 |
| Terminated plan members entitled to but not yet receiving benefits | | | | |
| Less than 5 years of service | 489,198 | 1,065 | 0 | 490,263 |
| 5 or more years of service | 33,515 | 661 | 0 | 34,176 |
| Total | 522,713 | 1,726 | 0 | 524,439 |
| Active plan members | | | | |
| Less than 5 years of service | 149,312 | 3,152 | 0 | 152,464 |
| 5 or more years of service | 173,867 | 4,651 | 0 | 178,518 |
| Total | 323,179 | 7,803 | 0 | 330,982 |
| Total | | | | |
| Less than 5 years of service | 638,510 | 4,217 | 0 | 642,727 |
| 5 or more years of service | 420,932 | 5,710 | 219 | 426,861 |
| Total | 1,059,442 | 9,927 | 219 | 1,069,588 |



August 30, 2017

Ms. Karen E. Carraher
Executive Director
Ohio Public Employees Retirement System
277 East Town Street
Columbus, Ohio 43215

Re: Report of December 31, 2016 Actuarial Valuation

Dear Karen:

Enclosed are three bound copies of the final report via Federal Express, 17 additional copies will follow.

Sincerely,

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

MD:rmn
Enclosures

cc: Mr. Tom Heseltine
Clifton Larson Allen