HOUSTON MUNICIPAL EMPLOYEES PENSION SYSTEM

Actuarial Valuation Report

FOR THE YEAR BEGINNING JULY 1, 2017

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November 16, 2017

Board of Trustees
Houston Municipal Employees Pension System
1201 Louisiana
Suite 900
Houston, TX 77002

Subject: Actuarial Valuation as of July 1, 2017 with RSVS

Dear Members of the Board:

This actuarial valuation, which includes the Risk Sharing Valuation Study (RSVS, or sometimes referred to as the actuarial valuation or valuation in the report) describes the current actuarial condition of the Houston Municipal Employees Pension System (HMEPS), determines the City Contribution Rate, and analyzes changes in this contribution rate. The results presented herein may not be applicable for other purposes. Valuations are prepared annually, as of July 1, the first day of the HMEPS plan year. This report was prepared at the request of the Board and is intended for use by the HMEPS staff and those designated or approved by the Board. This report may be provided to parties other than HMEPS staff only in its entirety and only with the permission of the Board, or as required by law.

Based on the changes to the HMEPS statute (revised statute), the employer contribution is now comprised of two pieces. The first piece is the amortization of the Legacy Liability as of July 1, 2016 determined as part of the July 1, 2016 Initial Risk Sharing Valuation Study (Initial RSVS). The Legacy Liability is amortized over a 30-year period beginning on July 1, 2017. These amortization payments are fixed and grow at the assumed payroll growth rate of 2.75%. The second part of the contribution is the City Contribution Rate determined by the valuation. The City Contribution Rate becomes effective twelve months after the valuation date, i.e., the rate determined by this July 1, 2017 actuarial valuation will be used by the Board when establishing the City Contribution Rate for the year beginning July 1, 2018 and ending June 30, 2019.

The contribution rate for fiscal year 2017 was established under the Amended and Restated Meet & Confer Agreement (ARM&CA) between the Board and the City of Houston. The City contributed 29.36% of payroll in fiscal year 2017.

Based on the revised statute, the estimated City contribution rate for FY 2019 is 8.27% of pay, which is estimated to be $52.8 million based on an estimated payroll of $638.6 million.

FINANCING OBJECTIVES AND FUNDING POLICY

The Legacy Liability as of July 1, 2016 is established as part of the Initial RSVS. As specified by statute, the Legacy Liability is amortized over 30 years beginning on July 1, 2017. The Legacy Liability payments are fixed payments that grow at 2.75% per year. The City contribution amount for FY 2019 for the Legacy Liability amortization payment as determined in the Initial RSVS is $127.4 million.

Each future valuation will establish either a liability gain layer or a liability loss layer. These layers will represent unexpected increases/decreases in the unfunded actuarial accrued liability (after subtracting out any remaining Legacy Liability or any remaining prior years' liability layers). Liability loss bases will be amortized over a 30-year period beginning one year after the valuation date. Liability gain bases will be amortized over the same period as the largest liability loss base, or 30 years if there is no liability loss base. All bases are amortized using a level percentage of payroll amortization method. This year a liability gain layer of $389 thousand is being established. It will be amortized over the same remaining amortization period as the Legacy liability (twenty-nine years).

The contribution rate and liabilities are computed using the Entry Age Normal actuarial cost method. The employer contribution is the sum of two pieces: the Legacy Liability amortization payment (City Contribution Amount), and the City Contribution Rate. The City Contribution Rate is comprised of two pieces: (i) the employer normal cost rate and (ii) the amortization of the liability gain/loss layers. Both the normal cost rate and the amortization of the liability gain/loss layers are determined as a level percentage of pay. Except as discussed above, each liability gain/loss layer is amortized over a 30-year period beginning one year after the valuation date for which the layer was established. The amortization rate is adjusted for the one-year deferral in contribution rates.

PROGRESS TOWARD REALIZATION OF FINANCING OBJECTIVES

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) is a standard measure of a plan's funded status. In the absence of benefit improvements, it should increase over time, until it reaches 100%. The funded ratio as of July 1, 2017 is 56.4%. This is an increase from the 55.5% funded ratio from the prior year's valuation. The funded ratio includes recognition of $250 million in Pension Obligation Bonds proceeds as a receivable. These proceeds are expected to be received by December 31, 2017. The funded status alone is not appropriate for assessing the need for or the amount of future contributions and is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

The calculated City Contribution Rate for FY 2019 is 8.27% which is equal to the Corridor Midpoint. Therefore, the City will contribute the calculated City Contribution Rate in FY 2019. This rate is ten basis points greater than the prior year rate which was anticipated as established in the Initial RSVS. Please see Table 6 for a detailed analysis of the change in the calculated employer contribution rate from the prior year to this year. This rate does not include the separate contribution for the Legacy Liability amortization payment discussed above.

PLAN EXPERIENCE

As part of each valuation, we examine the System's experience relative to the assumptions. The aggregate results of these analyses are disclosed in Tables 5 & 6. This past fiscal year the System had an experience liability loss of approximately $24.9 million and an experience gain on the actuarial value of assets of approximately $25.5 million. The gain on the actuarial value of assets was due to the partial recognition of this year's investment performance. The liability loss was primarily due to the cost of living adjustment (COLA) being higher than assumed (2% versus the 1% assumption). This was also primarily due to this year's investment performance, which increased the 5-year average return on the market value of assets (the basis for the determination of the COLA).

Benefit provisions

The benefit provisions reflected in this valuation are those in effect following the passage and signing into law of SB 2190. These changes were reflected in the prior valuation and there have been no changes to the benefit provisions since the prior valuation. However, as a reminder we have listed the primary changes below:

- Modification of cost-of-living adjustment (COLA) to be 50% of the five-year average on investments less 5%; e.g. if five-year average is 7.0% the COLA is 1% [(7%-5%) x 50%], but not more than 2% or less than 0%
- Increases in the member contribution rates to 8.0%, 4.0% and 3.0% respectively for Groups A, B and D (the rate increases for Groups A and B are phased-in over a two year period)
- One third of the Group D 3.0% contribution (or 1.0%) will be a contribution to a notional cash-balance account
- Group D members receive a COLA (except those who terminated prior to the effective date of the 2017 legislation)
- Deferred Retirement Option Plan accounts and cash-balance accounts will be credited with half of the five-year average of the investment returns, but not more than 7.5% or less than 2.5%
- Survivor benefits were decreased from 100% to 80% or 50%, depending on date of termination of employment and marital status at termination of employment

The benefit provisions are summarized in Appendix B.

Assumptions and methods

Except as noted below, the actuarial assumptions and methods are set by the Board of Trustees, based upon recommendations made by the plan's actuary. Except as noted below, the current assumptions were adopted by the Board in 2016 following a regularly scheduled experience study. The rationale for the current assumptions is included in that report, dated February 25, 2016.

As part of the legislation enacting the benefit changes, the investment return assumption (7.0%) was set into the revised statute (Article 6243h, Vernon's Texas Civil Statutes). This assumption is now considered a prescribed assumption under the actuarial standards of practice. With the lowering of the investment return assumption from 8.0% to 7.0% we believed it was appropriate to make changes to other economic assumptions that are correlated with the investment return assumption. In particular, the inflation assumption was decreased from 2.50% to 2.25% and corresponding decreases in the salary increase assumptions and payroll growth assumptions were also made. These changes were all reflected in the prior actuarial valuation. There have been no changes to the actuarial assumptions since the prior valuation.

The actuarial assumptions represent estimates of future experience and are not market measures. The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results (and future measures) can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. The actuarial calculations are intended to provide information for rational decision making.

This report does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

All assumptions and methods are described in Appendix A.

GASB 67

The System was required to begin complying with Governmental Accounting Standards Board Statement No. 67 with the fiscal year ending June 30, 2014. The GASB No. 67 information for the fiscal year ending June 30, 2017 was provided to HMEPS in a separate report dated September 29, 2017 and is not contained in this report.

Data

Member data for retired, active and inactive members was supplied as of July 1, 2017 by the HMEPS staff. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent with the prior year's data.

Asset information as of July 1, 2017 was taken from the audited Financial Statements for the Year Ended June 30, 2017.

Certification

We were asked to determine if an unanticipated actuarial cost occurred in the administration of the Deferred Retirement Option Plan (DROP). It is our opinion that the administration of the DROP had no material unanticipated actuarial costs during the prior fiscal year.

All of the tables contained in this actuarial valuation report were prepared by Gabriel, Roeder, Smith & Company. The trend data schedules shown in the Notes section of the HMEPS Financial Statements are based on our valuation reports, but were prepared by HMEPS staff. We certify that the information presented herein is accurate and fairly portrays the actuarial position of HMEPS as of July 1, 2017.

All of our work conforms with generally accepted actuarial principles and practices, and the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of state law and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board. The undersigned are independent actuaries and consultants. Mr. Newton is an Enrolled Actuary and also a Member of the American Academy of Actuaries, and meets the Qualification Standards of the American Academy of Actuaries. Both of the undersigned are experienced in performing valuations for large public retirement systems.

Sincerely,
Gabriel, Roeder, Smith & Company

Joseph P. Newton, FSA, EA, MAAA
Pension Market Leader and Actuary

Lewis Ward
Consultant

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SECTION I

RISK SHARING VALUATION STUDY

RSVS Discussion

The purpose of the Risk Sharing Valuation Study (RSVS) is to determine the City Contribution Rate for the fiscal year beginning one year after the valuation date.

The first exhibit in this section shows the RSVS Corridor which was created from the Initial RSVS. Column 3 shows the Corridor Midpoint for each fiscal year. Columns 2 and 4 show the Corridor Minimum and Corridor Maximum respectively. Column 5 shows the actual City Contribution Rate for the fiscal year. As shown on the table the actual City Contribution Rate for FY 2019 is 8.27% of pay.

The next exhibit shows the individual pieces and total calculated City Contribution Rate. As shown on the table the calculated City Contribution Rate from this valuation is 8.27% of pay. Because this is equal to the Corridor Midpoint, the actual City Contribution Rate will be the calculated City Contribution Rate of 8.27% of pay.

The third exhibit shows the Liability Gain/Loss Layers established by each RSVS. Columns 2 and 3 show the original liability layer and any remaining liability layer respectively. Column 4 is the payment on that particular layer for the fiscal year beginning one year after the valuation date. The payment is determined using a level percentage of payroll and the remaining amortization period as shown in column 5. The payments reflect the one year delay between the determination of the payment and the beginning of the fiscal year in which the payment is made. The dollar amounts of the payments are summed and then converted to a percentage of payroll based on the projected payroll for the fiscal year beginning one year after the valuation date. While there is a liability gain layer being amortized for this valuation, the amortization payment is less than 1 basis point and rounded to zero.

The next exhibit is the Legacy Liability schedule. This table shows the amortization schedule of the Legacy Liability for each of the 30 years over which it is scheduled to be paid. Column 2 shows the remaining Legacy Liability as of that measurement date while Column 3 shows the payment on the Legacy Liability for the fiscal year beginning one year after the valuation date.

The unfunded actuarial accrued liability is equal to the sum of the Remaining Layer column on the Liability Gain/Loss Layers exhibit and the Remaining Legacy Liability column as of the valuation date.

Risk Sharing Valuation - Corridor

Fiscal Year Ending	Corridor Minimum	Corridor Midpoint	Corridor Maximum	Actual City Contribution Rate
(1)	(2)	(3)	(4)	(5)
June 30, 2018	3.17%	8.17%	13.17%	8.17%
June 30, 2019	3.27%	8.27%	13.27%	8.27%
June 30, 2020	3.32%	8.32%	13.32%	
June 30, 2021	3.36%	8.36%	13.36%	
June 30, 2022	3.41%	8.41%	13.41%	
June 30, 2023	3.44%	8.44%	13.44%	
June 30, 2024	3.48%	8.48%	13.48%	
June 30, 2025	3.51%	8.51%	13.51%	
June 30, 2026	3.54%	8.54%	13.54%	
June 30, 2027	3.57%	8.57%	13.57%	
June 30, 2028	3.59%	8.59%	13.59%	
June 30, 2029	3.61%	8.61%	13.61%	
June 30, 2030	3.63%	8.63%	13.63%	
June 30, 2031	3.65%	8.65%	13.65%	
June 30, 2032	3.67%	8.67%	13.67%	
June 30, 2033	3.69%	8.69%	13.69%	
June 30, 2034	3.70%	8.70%	13.70%	
June 30, 2035	3.71%	8.71%	13.71%	
June 30, 2036	3.72%	8.72%	13.72%	
June 30, 2037	3.73%	8.73%	13.73%	
June 30, 2038	3.74%	8.74%	13.74%	
June 30, 2039	3.74%	8.74%	13.74%	
June 30, 2040	3.75%	8.75%	13.75%	
June 30, 2041	3.76%	8.76%	13.76%	
June 30, 2042	3.77%	8.77%	13.77%	
June 30, 2043	3.78%	8.78%	13.78%	
June 30, 2044	3.79%	8.79%	13.79%	
June 30, 2045	3.79%	8.79%	13.79%	
June 30, 2046	3.80%	8.80%	13.80%	
June 30, 2047	3.81%	8.81%	13.81%	

Risk Sharing Valuation – Calculated City Contribution Rate

Fiscal Year Ending	Employer Normal Cost	Amortization Payment	Calculated City Contribution Rate
(1)	(2)	(3)	(4)
June 30, 2018	8.17%	0.00%	8.17%
June 30, 2019	8.27%	0.00%	8.27%

Risk Sharing Valuation - Liability (Gain)/Loss Layers

Valuation Year Base Established	Original Layer	Remaining Layer	Year's Payment [1]	Remaining Payments
(1)	(2)	(3)	(4)	(5)
July 1, 2017	$ (388,530)	$ (388,530)	$ 24,708	29
Total		$ (388,530)	$ 24,708	
Projected Payroll for Fiscal Year +1			$ 638,621,956	
Amortization Payments as % of Projected Pay			0.00%	
Single Equivalent Amortization Period from the Valuation Date [2]			30.0	

[1] This is the payment to be made for the fiscal year beginning one year after the valuation date.

[2] The single equivalent amortization period includes all liability layers including the Legacy Liability.

Risk Sharing Valuation – Legacy Liability

Fiscal Year End	Remaining Legacy Liability	Current Year's Payment [1]
(1)	(2)	(3)
June 30, 2016	$ 2,109,103,348	Determined by M&C
June 30, 2017	2,123,880,499	$ 124,030,357
June 30, 2018	2,144,254,135	127,441,192
June 30, 2019	2,162,525,731	130,945,824
June 30, 2020	2,178,451,118	134,546,835
June 30, 2021	2,191,766,369	138,246,872
June 30, 2022	2,202,186,338	142,048,661
June 30, 2023	2,209,403,104	145,955,000
June 30, 2024	2,213,084,295	149,968,762
June 30, 2025	2,212,871,302	154,092,903
June 30, 2026	2,208,377,355	158,330,458
June 30, 2027	2,199,185,471	162,684,546
June 30, 2028	2,184,846,251	167,158,371
June 30, 2029	2,164,875,526	171,755,226
June 30, 2030	2,138,751,826	176,478,494
June 30, 2031	2,105,913,679	181,331,653
June 30, 2032	2,065,756,717	186,318,273
June 30, 2033	2,017,630,566	191,442,026
June 30, 2034	1,960,835,534	196,706,682
June 30, 2035	1,894,619,048	202,116,115
June 30, 2036	1,818,171,846	207,674,309
June 30, 2037	1,730,623,900	213,385,352
June 30, 2038	1,631,040,048	219,253,449
June 30, 2039	1,518,415,320	225,282,919
June 30, 2040	1,391,669,929	231,478,199
June 30, 2041	1,249,643,912	237,843,850
June 30, 2042	1,091,091,395	244,384,556
June 30, 2043	914,674,442	251,105,131
June 30, 2044	718,956,486	258,010,522
June 30, 2045	502,395,281	265,105,812
June 30, 2046	263,335,367	272,396,221
June 30, 2047	-	-

[1] Contribution amount for fiscal year that begins one year after valuation date

SECTION B

DISCUSSION

Executive Summary

Item	July 1, 2017	July 1, 2016
Membership		
• Number of:		
- Active members	12,066 [1]	12,103 [1]
- Retirees and beneficiaries	10,601	10,289
- Inactive members	5,576	5,606
- Total	28,243	27,998
• Covered payroll (annualized)	$ 623,577	$ 608,210
Calculated City Contribution rates	8.27% [2]	8.17% [2]
Assets		
• Market value	$ 2,602,665	$ 2,400,023
• Actuarial value	2,742,539 [4]	2,625,896 [3]
• Estimation of return on market value	12.4%	1.2%
• Estimation of return on actuarial value	8.1%	-3.8%
• Employer contribution	$ 182,557	$ 159,959
• Member contribution	$ 15,902	$ 15,874
• Ratio of actuarial value to market value	105.4%	109.4%
• External cash flow as % of market value assets	-3.4%	-3.6%
Actuarial Information		
• Unfunded actuarial accrued liability (UAAL)	$ 2,123,492	$ 2,109,103
• GASB funded ratio	56.4%	55.5%
• Employer normal cost %	8.27%	8.17%
• Amortization rate [5]	0.00%	0.00%
• Caclulated City Contribution Rate	8.27%	8.17%
Estimated Total City Contribution for Fiscal Year	2019	2018
• Estimated City Contribution Rate Payment	$ 52,814,036	$ 51,524,205
• Legacy Liability Payment (City Contribution Amount)	$ 127,441,192	$ 124,030,357
• Total	$ 180,255,228	$ 175,554,562

Note: Dollar amounts in $000, unless otherwise noted

[1] Counts include an additional 170 Group D members.

[2] This rate is the City Contribution Rate determined in accordance with the State statute.

[3] AVA was marked to market with a receivable of $250 million in POB proceeds discounted from December 31, 2017.

[4] AVA includes a receivable of $250 million in POB proceeds discounted from December 31, 2017.

[5] See Risk Sharing Valuation - Liability (Gain)/Loss Layers table for determination of rate.

Contribution Requirements

- The Executive Summary shows the estimated City contribution for fiscal year 2019
  - Comprised of the known Legacy Liability payment (City Contribution Amount) of $127.4 million, and
  - City Contribution Rate times estimated payroll of $638.6 million = $52.8 million
- The calculated City Contribution Rates shown on the Executive Summary are calculated rates for the twelve-month period beginning one year after the valuation date, based on statute
- Table 6 reconciles the calculated City Contribution Rates from the prior valuation to the current valuation
- Legacy Liability is $2,124 million as of July 1, 2017
  - Reflects $250 million receivable for Pension Obligation Bonds proceeds to be received by December 31, 2017
  - Schedule of Legacy Liability contribution amounts shown in RSVS section

Amortization of liability gain/loss layers are as follows

- Liability loss layers are amortized over a 30-year funding period beginning one year after the valuation date using level percentage of payroll amortization based on 2.75% payroll growth rate
- Liability gain layers are amortized over the remaining period of the largest liability loss layer (if no loss layer exists then over a 30-year funding period beginning one year after the valuation date) using level percentage of payroll amortization based on 2.75% payroll growth rate
- Amortization payment for layers is the sum of all payments divided by the projected payroll for the fiscal year beginning one year after the valuation date
- No future growth in the number of active members is taken into account

Calculation of Contribution Rates

The funds available to pay benefits come from two sources, contributions and investment income on those contributions (the majority of the funds available to pay benefits come from investment income). HMEPS receives contributions from two sources, employer contributions and member contributions. The employer contribution is comprised of two pieces. The first piece is a fixed dollar amount to amortize the Legacy Liability as of July 1, 2016 over a 30-year beginning on July 1, 2017. The second piece is the City Contribution Rate.

As shown in Table 1, the Calculated City Contribution Rate has two components:

- The employer normal cost percentage (NC%)
- The amortization percentage (Liability Layers%)

The NC% is the theoretical amount which would be required to pay the members' benefits, based on the plan provisions for new employees, if this amount had been contributed from each member's entry date and if the fund's experience exactly followed the actuarial assumptions. This is the amount it should cost to provide the benefits for an average new member. The employer NC% includes a provision for administrative expenses and is net of member contributions. The NC% is shown in Table 4.

The actuarial accrued liability (AAL) is the difference between (i) the actuarial present value of all future benefits for all current participants of the fund, including active, inactive and retired members, and (ii) the actuarial present value of future normal costs. Thus the AAL represents the liability associated with past years. The unfunded actuarial accrued liability (UAAL) is the difference between the AAL and the actuarial value of assets (AVA). It is the shortfall/excess between the liability associated with prior years (the AAL) and the assets actually accumulated (the AVA). This shortfall/excess can arise from several sources, including actuarial gains and losses which are caused by differences between actual experience and the plan's assumptions, changes to the plan's actuarial assumptions, and amendments to the benefit provisions.

As of July 1, 2016, the UAAL was partitioned off into the Legacy Liability which has its own amortization schedule. For all valuations after July 1, 2016, any unexpected gains or losses will be set up as new liability gain/loss layers. These layers will be amortized over 30 years (see previous discussion for liability gain layers) using level percentage of payroll amortization beginning on the July 1st one year after the valuation date the layer is determined. The sum of any such layers' payments will be aggregated and converted to a percentage of projected payroll for the fiscal year beginning one year after the valuation date. This percentage is the Liability Layers' %.

In addition to these two pieces, the City Contribution Rate also includes a provision for administrative expenses which is equal to 1.25% of payroll as of July 1, 2017. The maximum addition to the City Contribution Rate for administrative expenses is 1.25%, unless the City agrees to a higher rate.

Calculation of Contribution Rates (Continued)

If the addition to the City Contribution Rate for administrative expenses is capped at 1.25%, then administrative expenses in excess of 1.25% of payroll (if any) will become part of the next year's liability gain/loss layer.

The calculated City Contribution Rate necessary to meet the funding policy specified by statute for the twelve-month period beginning July 1, 2018 is 8.27%. This is equal to the Corridor Midpoint, hence, the City Contribution Rate will equal the calculated City Contribution Rate of 8.27% of projected payroll. Therefore, the FY 2019 City Contribution is estimated to be approximately $180.3 million. The contribution is comprised of the fixed Legacy Liability payment of $127.4 million and the estimated payment of $52.8 based on the City Contribution Rate of 8.27% and a projected FY 2018 payroll of $639 million.

It is important to note that the City Contribution Rate cannot be less than the Corridor Midpoint if the funded ratio is less than 90%.

Financial Data and Experience

As of July 1, 2017, HMEPS has a total market value of about $2.60 billion. Financial information was gathered from the audited financial statements as of June 30, 2017.

This report includes a number of exhibits related to plan assets. Table 8 shows how the total market value is distributed among the various classes of investments. Current investment policy allocates 52.5% of invested assets to equities, 15% of invested assets to fixed income, and 32.5% of invested assets to alternative investments including real estate.

Table 9 shows a reconciliation of the market values between the beginning and end of FY2017.

As shown on Table 11, the dollar-weighted return net of investment expenses for FY2017 was 12.41%.

In determining the contribution rates and funded status of the System, an actuarial value of assets (AVA) is used, rather than the market value of assets. This "smoothing method" is intended to help reduce the volatility of the contribution rates from year to year. The method used to compute the AVA takes the difference between the actual market value of assets and the expected actuarial value of assets (based on the prior year's assumed investment return rate), and establishes a base each year which is equal to this difference less any unrecognized bases from prior years. If the current year's base is of opposite sign from the prior years' bases then it is offset dollar for dollar against the prior years' bases (oldest bases first) until either the prior years' bases or the current year's base is reduced to zero. Any remaining bases are then recognized over the remaining period for the base (5 less the number of years between the base year and the valuation year) in equal dollar amounts.

However, as part of the legislation enacted by the 2017 Legislature, all prior years' bases have been fully recognized as of July 1, 2016. In other words, the actuarial value of assets has been "marked to market" as of that date. Therefore, there is only one "smoothing" base included in the determination of the actuarial value of assets in this valuation.

The development of the AVA is shown on Table 10. The AVA prior to the recognition of a receivable for the Pension Obligation Bonds (POB) is $2.50 billion. The AVA is 96.1% of the MVA, compared to 100.0% last year. For the Risk Sharing Valuation Study, a receivable equal to the discounted value of the POBs is recognized in the AVA bringing the final AVA to $2.74 billion.

In addition to the market return, Table 11 also shows the return on the actuarial value of assets for HMEPS. For FY2017, this return was 8.08%. Because this is greater than the assumed 7.0% investment return, an actuarial gain occurred decreasing the unfunded actuarial accrued liabilities of the plan. Table 12 shows a summary of market and actuarial return rates in recent years.

Member Data

Member data as of July 1, 2017 was supplied electronically by HMEPS staff. While we did not audit this data, we did perform various tests to ensure that it was internally consistent, consistent with the prior year's data, and was reasonable overall.

Tables 15 and 16 show the summaries of certain historical data, including membership statistics. Table 17 shows the number of members by category (active, inactive, retired, etc.). Tables 18(a-d) show the active member statistics by Group and in total.

The number of active members decreased from 12,103 to 12,066, a 0.3% decrease. Note that the active member count includes 170 employees of HFC, HFF and CCSI for which incomplete information has been provided. These members are all assumed to be in Group D and to have the average group D profile.

The total annualized salaries shown on Table 2 and on the statistical tables is the amount that was supplied by HMEPS, annualized or adjusted for number of hours reported if necessary. For the cost calculations, the pays were adjusted in accordance with the actuarial assumptions to reflect one year's salary increase. The annualized salaries for active members increased 2.5% over last year.

We also show the projected payroll in Item 2 of Table 2. This is the payroll used for determining the expected amortization payments (amortization percentage) on liability (gain)/loss layers. The projected pay is determined by summing all pensionable pay for the just ended fiscal year for anyone who received pensionable pay during the year (actives, terminated members, retirees, etc.) and increasing this sum by the payroll growth rate. We believe this provides a better expectation of the upcoming year's actual payroll than the annualized salaries described above.

The overall trend in payroll is less significant than in prior years due to the creation of the Legacy Liability. The payments to amortize the Legacy Liability were determined in a manner that is consistent with the payroll growth assumption, but those payment amounts are now fixed and will be contributed whether payroll grows slower or faster than assumed. The current and future liability gain/loss layers will be amortized using level percentage of payroll amortization. Because the methodology used in amortizing these layers assumes a growing payroll into the future, if the payroll does not grow at the assumed 2.75% a year on average, the amortization payments (as a percentage of pay) will need to increase in order to keep the contribution dollars that amortize the UAAL growing at 2.75%. However, these layers are expected to be much smaller in magnitude than the Legacy Liability and therefore, the impact of the payroll growing slower or faster than expected is anticipated to be much less for many years into the future.

Benefit Provisions

SB 2190 passed by the 2017 Legislature made a few but very significant changes to the benefit provisions of HMEPS. All of these changes were reflected in the July 1, 2016 valuation. However, the changes were significant enough that we have shown them again in this year's valuation as a reminder.

Prior to the legislation members hired prior to January 1, 2005 were eligible for a cost of living adjustment (COLA) each year equal to 3% of their base benefit. Members hired on or after January 1, 2005 and prior to January 1, 2008 were eligible for a COLA based on 2% of their base benefit. Group D members were not eligible for any COLA. Effective with the 2018 COLA, all current and future retirees (except as noted below) will be eligible for the same COLA. The COLA will be equal to 50% of the average five-year investment return rates less five percentage points, with a minimum of 0% and a maximum of 2%. Group D members who are entitled to an annuity but who terminated employment prior to the effective date of the 2017 legislation will not be eligible for any COLA.

Active members in DROP will not be eligible for a COLA on their DROP account until they have attained the age of 62 as of January 1 of the year in which the increase is made.

The member contributions for all groups have changed. The Group A member contribution rate increased from 5.0% of pay to 8.0% of pay. The Group B member contribution rate increased from no contributions to 4% of pay. The Group D member contribution rate increased from no contributions to 3% of pay. One-third of the Group D member contribution rate is attributed to a notional cash balance account. The contribution increases for Groups A and B are being phased-in over a two year period.

The interest credit rate on DROP accounts and the notional cash balance accounts will be based on 50% of the five-year average of the rate of return on the market value of assets, but not less than 2.5% or more than 7.5%.

Survivor benefits:

- Effective July 1, 2017, if an active Group A, Group B or Group D member with at least 5 years of credited service dies while still in service with the City (off-duty death), the spousal survivor benefit will be 80% of the normal accrued pension, payable immediately, provided that the spouse was married to the participant for at least one continuous year as of the date of death. If such spouse was married less than one continuous year as of the date of death, the survivor benefit is 50% of the normal accrued pension.
- Effective July 1, 2017, if a Group A or Group B retiree dies, the spousal survivor benefit will be 80% of the retirement benefit being received by the retiree at the time of death, payable immediately, provided that the spouse was married to the retiree at the time of death and for at least one continuous year as of the date of separation from service (the marriage requirement applies for separations from service on or after July 1, 2017). If such spouse was married less than one continuous year as of the date of separation from service (the marriage requirement applies for separations from service on or after July 1, 2017), the spousal survivor benefit is 50% of the retirement benefit being received by the retiree at the time of death.

Benefit Provisions (Continued)

- Effective July 1, 2017, if a Group A or Group B deferred participant (not yet receiving a pension benefit) dies, the spousal survivor benefit is 50% of the normal accrued pension, payable at the participant's eligibility date. However, the surviving spouse can elect an earlier actuarially equivalent benefit.
- Effective July 1, 2017, if an active Group A, Group B or Group D member dies from a service-related (on-duty) death, the spousal survivor benefit is 80% of the participant's final average salary, payable immediately.

This valuation reflects all benefits offered to members.

There have been no changes to the benefit provisions since the prior valuation.

Appendix B of our Report includes a summary of the benefit provisions for HMEPS.

Actuarial Methods and Assumptions

Except as noted below, the actuarial assumptions and methods are set by the Board of Trustees, based upon recommendations made by the plan's actuary. Except as noted below, the Board adopted the actuarial assumptions used in this valuation in connection with an actuarial experience study performed by GRS. Please see our report dated February 25, 2016 for a complete description of the changes in assumptions and for the rationale behind the current assumption set. These assumptions were used beginning with the July 1, 2015 valuation. It is anticipated that the next experience study will be conducted during the fall of 2021.

As part of the legislation enacting the benefit changes, the investment return assumption (7.0%) was set into statute (Article 6243h, Vernon's Texas Civil Statutes). In addition the actuarial cost method was also set into statute. This assumption and method are now considered prescribed assumptions and methods under the actuarial standards of practice.

Liabilities are determined using the Entry Age Normal actuarial cost method. The assumed investment return rate is 7.00%.

With the lowering of the investment return assumption from 8.0% to 7.0% we believed it was appropriate to make changes to other economic assumptions that are correlated with the investment return assumption. In particular, we recommended and the Board adopted a decrease in the inflation assumption from 2.50% to 2.25% and the corresponding decreases in the salary increase assumptions and payroll growth assumptions. These changes were reflected in the July 1, 2016 actuarial valuation.

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

Please see Appendix A of our Report for a complete description of these assumptions.

Funding Progress

As you are aware, the Governmental Accounting Standards Board Statements (GASB) that apply to the System have changed. In prior years, GASB Statement No. 25 applied to the System. Beginning with the 2014 fiscal year GASB Statement No. 67 applies to the System. The GASB No. 67 disclosure information has been provided in a separate report.

Although GASB No. 25 no longer applies to HMEPS, there are certain schedules from GASB No. 25 which we believe provide useful information and therefore we are continuing to include these in our report. In particular, we are continuing to show the Schedule of Funding Progress (Table 14).

Summary and Closing Comments

As a result of the legislation enacted in 2017, significant changes to the benefits and financing of HMEPS have occurred. These changes were reflected in the prior year's valuation. Compared to the prior year this valuation is very uneventful.

The System's funded status increased from 55.5% to 56.4%.

The calculated City Contribution Rate is equal to the Corridor Midpoint anticipated by the Initial RSVS at 8.27% of pay.

The actuarial liability experience loss, due primarily to a higher than assumed cost of living adjustment, was completely offset by the actuarial gain on assets. The liability gain layer established with this valuation was so small that the annual amortization payment is less than one basis point.

Given the plan's contribution policy, if all actuarial assumptions are met (including the assumption of the plan earning 7.00% on the actuarial valuation of assets), it is expected that:

a. The employer normal cost as a percentage of pay will remain relatively level over time (upward drift will occur due to generational mortality),

b. The funded ratio will increase slowly,

c. The UAAL will grow in nominal dollars until the amortization period on the Legacy Liability is reduced to approximately 20 years, at which point the UAAL will begin to decrease and be expected to be fully amortized by the July 1, 2047 valuation, or 30 years from the current July 1, 2017 valuation date.

SECTION III

SUPPORTING EXHIBITS

Table 1
Summary of Cost Items

	Valuation as of July 1, 2017		Valuation as of July 1, 2016	
	Cost Item	Cost as % of Pay	Cost Item	Cost as % of Pay
	(1)	(2)	(3)	(4)
1. Participants				
a. Actives	12,066		12,103	
b. Retirees	8,376		8,084	
c. Disabled retirees	323		336	
d. Beneficiaries	1,902		1,869	
e. Inactive, deferred vested	3,409		3,432	
f. Inactive, nonvested	2,167		2,174	
g. Total	28,243		27,998	
2. Covered payroll	$ 623,577		$ 608,210	
3. Averages for active members				
a. Average age	47.3		47.1	
b. Average years of service	11.1		11.1	
c. Average pay ($)	$ 51,681		$ 50,253	
4. Present value of future pay	$ 4,588,360		$ 4,482,435	
5. Employer normal cost rate	8.27%		8.17%	
6. Present value of future benefits	$ 5,400,319	866.0%	$ 5,256,414	864.2%
7. Present value of future normal costs	$ 534,288	85.7%	$ 521,414	85.7%
8. Actuarial accrued liability (6 - 7)	$ 4,866,031	780.3%	$ 4,734,999	778.5%
9. Present actuarial assets	$ 2,742,539	439.8%	$ 2,625,896	431.7%
10. Unfunded actuarial accrued liability (UAAL) (8 - 9)	$ 2,123,492	340.5%	$ 2,109,103	346.8%
11. Calculated City Contribution Rate				
a. Employer normal cost	8.27%		8.17%	
b. Amortization charge [1]	0.00%		0.00%	
c. Total	8.27%		8.17%	
12. Average estimated return				
a. Based on market value	12.41%		1.21%	
b. Based on actuarial value	8.08%		-3.81%	
13. Funded ratio (9 ÷ 8)	56.4%		55.5%	
14. Legacy Liability payment for fiscal year beginning one year after valuation date	$ 127,441		$ 124,030	

Note: Dollar amounts in $000

[1] This is the layered amortization payment excluding the Legacy Liability payment

Table 2
Calculation of Annual Required Contribution Rate

		July 1, 2017 (1)	July 1, 2016 (2)
1.	Annualized salaries on valuation date	$ 623,577	$ 608,210
2.	Projected payroll for upcoming fiscal year [1]	$ 621,530	$ 613,772
3.	Present value of future pay	$ 4,588,360	$ 4,482,435
4.	Employer normal cost rate	8.27%	8.17%
5.	Actuarial accrued liability for active members		
	a. Present value of future benefits for active members	$ 2,407,217	$ 2,361,925
	b. Less: present value of future normal costs	(437,302)	(426,297)
	c. Less: present value of additional employee contributions [2]	(96,986)	(95,117)
	d. Actuarial accrued liability	$ 1,872,929	$ 1,840,511
6.	Total actuarial accrued liability for:		
	a. Retirees and beneficiaries	$ 2,815,696	$ 2,704,998
	b. Inactive participants	$ 177,406	189,491
	c. Active members (Item 5d)	$ 1,872,929	1,840,511
	d. Total	$ 4,866,031	$ 4,734,999
7.	Actuarial value of assets	$ 2,742,539 [3]	$ 2,625,896 [3]
8.	Unfunded actuarial accrued liability (UAAL) (Item 6d - Item 7)	$ 2,123,492	$ 2,109,103

Note: Dollar amounts in $000

[1] The projected payroll is the actual pay received for the just completed fiscal year (including pay for any member who received pay during the year: i.e. active, terminated, retired, etc.). This pay is then increased by the payroll growth rate.

[2] Additional employee contributions in excess of the 3.00% employee rate used to determine the normal cost.

[3] Actuarial value of assets marked to market at July 1, 2016. Includes receivable of $250 million Pension Obligation Bonds proceeds to be received by December 31, 2017.

Table 3
Actuarial Present Value of Future Benefits

		July 1, 2017 (1)	July 1, 2016 (2)
1.	Active members		
	a. Retirement benefits	$ 2,171,049	$ 2,127,351
	b. Deferred termination benefits	136,208	137,067
	c. Refunds	12,973	12,647
	d. Death benefits	75,283	72,880
	e. Disability benefits	11,704	11,980
	f. Total	$ 2,407,217	$ 2,361,925
2.	Members in Pay Status		
	a. Service retirements	$ 2,502,522	$ 2,408,724
	b. Disability retirements	36,073	36,248
	c. Beneficiaries	277,101	260,026
	d. Total	$ 2,815,696	$ 2,704,998
4.	Inactive members		
	a. Vested terminations	$ 173,698	$ 185,737
	b. Nonvested terminations	3,708	3,754
	c. Total	$ 177,406	$ 189,491
5.	Total actuarial present value of future benefits	$ 5,400,319	$ 5,256,414

Note: Dollar amounts in $000

Table 4
Analysis of Normal Cost

		July 1, 2017 (1)	July 1, 2016 (2)
1.	Gross normal cost rate		
	a. Retirement benefits	7.44%	7.39%
	b. Deferred termination benefits	1.41%	1.41%
	c. Refunds	0.61%	0.63%
	d. Disability benefits	0.13%	0.13%
	e. Death benefits	0.43%	0.42%
	f. Administrative expenses	1.25%	1.19%
	g. Total	11.27%	11.17%
2.	Employee Contribution rate [1]	3.00%	3.00%
3.	Employer Normal Cost (including Administrative expenses)	8.27%	8.17%

[1] Normal cost is determined using Ultimate Entry Age method. Therefore, Employee Contribution rate is the rate for a Group D new hire.

Table 5
Calculation of Total Actuarial Gain or Loss

1.	Unfunded actuarial accrued liability (UAAL) as of July 1, 2016	$	2,109,103
2.	Total normal cost and administrative expense for year		70,166
3.	Employer and Employee Contributions during year ending June 30, 2017		(198,459)
4.	Interest on UAAL for one year		147,637
5.	Interest on Item 2 and Item 3 for one-half year		(4,414)
6.	Expected UAAL as of July 1, 2017 (1+2+3+4+5)	$	2,124,033
7.	Actual UAAL as of July 1, 2017	$	2,123,491
8.	Actuarial gain/(loss) for the period (6 - 7)	$	542
	SOURCE OF GAINS/(LOSSES)		
9.	Asset gain/(loss) (See Table 10)	$	25,453
10.	Plan changes		0
11.	Assumption changes		0
12.	Method change		0
13.	Receivable for Pension Obligation Bonds proceeds		0
14.	Total liability gain/(loss) for the period	$	(24,911)
15.	Actuarial gain/(loss) for the period	$	542

Note: Dollar amounts in $000

Table 6

Change in Calculated Contribution Rate Since the Prior Valuation

1.	Calculated City Contribution Rate as of July 1, 2016			8.17%
2.	Change in Contribution Rate During Year			
	a.	Change in Employer Normal Cost	0.10%	
	b.	Recognition of prior years' asset losses	N/A	
	c.	Actuarial loss from current year asset performance	N/A	
	d.	Actuarial gain from liability sources	(0.04%)	
	e.	Actuarial loss from liability sources	0.04%	
	f.	Effect of projected payroll growing slower than expected	N/A	
	g.	Change in Actuarial Assumptions and Methods	0.00%	
	h.	Total Change		0.10%
3.	Calculated City Contribution Rate as of July 1, 2017			8.27%

Table 7
Near Term Outlook

Valuation as of July 1,	Unfunded Actuarial Accrued Liability (UAAL, in 000s)	Funded Ratio	City Contribution Rate[1]	Corridor Midpoint	Market Value of Fund (in 000s)	For Fiscal Year Ending June 30,	Estimated Payroll	Employer Contributions	Employee Contributions	Benefit Payments[2]	Net External Cash Flow
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2017	$ 2,123,492	56.4%	8.27%	8.27%	$ 2,742,539	2018	$ 621,530	$ 174,809	$ 26,962	$ 307,679	$ (105,908)
2018	2,144,481	56.8%	8.31%	8.32%	2,824,965	2019	638,622	180,255	33,206	327,188	(113,726)
2019	2,163,033	57.3%	8.35%	8.36%	2,905,073	2020	656,184	185,540	32,815	345,826	(127,471)
2020	2,179,197	57.7%	8.40%	8.41%	2,976,570	2021	674,229	190,912	32,464	364,375	(140,999)
2021	2,192,774	58.1%	8.44%	8.44%	3,039,080	2022	692,770	196,509	32,134	382,959	(154,316)
2022	2,203,408	58.4%	8.48%	8.48%	3,092,190	2023	711,822	202,126	31,830	401,760	(167,803)
2023	2,210,931	58.6%	8.51%	8.51%	3,135,066	2024	731,397	207,977	31,561	420,032	(180,493)
2024	2,214,869	58.8%	8.54%	8.54%	3,167,817	2025	751,510	213,922	31,334	438,068	(192,812)
2025	2,214,916	59.0%	8.57%	8.57%	3,190,118	2026	772,177	220,037	31,150	411,196	(160,009)
2026	2,210,689	59.5%	8.59%	8.59%	3,247,912	2027	793,411	226,326	31,022	421,387	(164,039)
2027	2,201,771	60.0%	8.61%	8.61%	3,305,583	2028	815,230	232,713	30,931	429,133	(165,489)

These projections are based on the HMEPS statute as amended by SB 2190 of the 2017 Legislature.

[1] Contribution rate goes into effect 12 months after the valuation date

[2] Includes refunds taken by terminating members and plan administrative expenses

Note: Dollar amounts in $000.

Table 8
Statement of Plan Net Assets

	July 1, 2017 (1)	July 1, 2016 (2)
A. ASSETS		
1. Current Assets		
a. Cash and short term investments		
1) Cash on hand	$ 7,917	$ 7,551
2) Short term investments	54,126	79,292
b. Accounts Receivable		
1) Sale of investments	4,303	6,048
2) Other	11,472	7,330
c. Total Current Assets	$ 77,818	$ 100,221
2. Long Term Investments		
a. US. Government securities	$ 72,675	$ 92,417
b. Corporate bonds	202,121	200,401
c. Capital stocks	629,846	664,796
d. Commingled Funds	564,659	364,165
e. LP's, real estate trusts, loans and mortgages	1,071,415	995,727
f. Total long term investments	$ 2,540,718	$ 2,317,506
3. Other Assets		
a Collateral on securities lending	$ 47,371	$ 73,941
b. Furniture, fixtures and equipment, net	178	298
c. Total other assets	$ 47,549	$ 74,239
4. Total Assets	$ 2,666,084	$ 2,491,966
B. LIABILITIES		
1. Current Liabilities		
a. Amounts due on asset purchases	$ 9,784	$ 12,133
b. Accrued liabilities	6,265	5,869
c. Collateral on securities lending	47,371	73,941
2. Total Liabilities	63,420	91,943
3. Net Assets Held in Trust	$ 2,602,665	$ 2,400,023
C. TARGET ASSET ALLOCATION FOR CASH & LONG TERM INVESTMENTS		
1. Cash	0.0%	0.0%
2. Fixed Income	15.0%	15.0%
3. Real Estate	10.0%	10.0%
4. Private Equity	17.5%	17.5%
5. Global Equity	35.0%	35.0%
6. Inflation-Linked Asset Class	12.5%	12.5%
7. Absolute Return	10.0%	10.0%
8. Total	100.0%	100.0%

Note: Dollar amounts in $000
Columns may not add due to rounding

Table 9
Reconciliation of Plan Net Assets

			Year Ending	
			June 30, 2017	June 30, 2016
			(1)	(2)
1.	Market value of assets at beginning of year		$ 2,400,023	$ 2,456,544
2.	Revenue for the year			
	a.	Contributions		
		i. Member contributions	$ 15,902	$ 15,874
		ii. Employer contributions (see note)	182,557	159,959
		iii. Total	$ 198,459	$ 175,833
	b.	Net investment income		
		i. Interest	$ 21,741	$ 17,753
		ii. Dividends	19,455	18,843
		iii. Earnings from LP's and real estate trusts	5,102	1,034
		iv. Net appreciation (depreciation) on investments	251,652	(2,454)
		v. Net proceeds from lending securities	353	349
		vi. Less investment expenses	(7,391)	(7,538)
		vii. Other	1,272	1,303
	c.	Total revenue	$ 490,643	$ 205,123
3.	Expenditures for the year			
	a.	Refunds	$ 718	$ 1,105
	b.	Benefit payments	280,456	253,179
	c.	Administrative and miscellaneous expenses	6,827	7,360
	d.	Total expenditures	$ 288,001	$ 261,644
4.	Increase in net assets (Item 2c - Item 3d)		$ 202,642	$ (56,521)
5.	Market value of assets at end of year (Item 1 + Item 4)		$ 2,602,665	$ 2,400,023

Note: Dollar amounts in $000

Employer contribution does not include amounts contributed to the replacement benefit plan.

Columns may not add due to rounding

Table 10
Development of Actuarial Value of Assets

		July 1, 2017
1. Actuarial value of assets at beginning of year [1]	$	2,400,023
2. Net new investments		
a. Contributions	$	198,459
b. Benefits and refunds paid		(281,174)
c. Administrative Expenses		(6,827)
d. Subtotal		(89,542)
3. Assumed investment return rate for fiscal year		7.00%
4. Assumed investment income for fiscal year	$	164,921
5. Expected actuarial value at end of year (1+ 2 + 4) [1]	$	2,475,402
6. Market value of assets at end of year	$	2,602,665
7. Difference (6 - 5)	$	127,263

8. Development of amounts to be recognized as of July 1, 2017:

Fiscal Year End	Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
	(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
2013	$ 0	$ 0	$ 0	1	$ 0	$ 0
2014	0	0	0	2	0	0
2015	0	0	0	3	0	0
2016	0	0	0	4	0	0
2017	127,263	0	127,263	5	25,453	101,810
Total	$ 127,263	$ 0	$ 127,263		$ 25,453	$ 101,810

9. Preliminary actuarial value of plan net assets, end of year (Item 6 - Item 8 Column 6)	$	2,500,855
10. Asset gain (loss) for year (Item 9 - Item 5)	$	25,453
11. Asset gain (loss) as % of actual actuarial assets		1.02%
12. Ratio of actuarial value to market value [1]		96.1%
13. Final actuarial value of plan net assets		
a. Estimated 2017 POB proceeds discounted to valuation date		241,684
b. Final actuarial value of assets (Item 9 + Item 13a)	$	2,742,539

Notes: Remaining deferrals in Column (1) for prior years are from last year's report column (6) of Table 10. The number in the current year is the difference between the remaining deferrals for prior years and the total Excess/(Shortfall) return shown in Item 7. Column 2 is a direct offset of the current year's excess/(shortfall) return against prior years' excess/(shortfall) of the opposite type.

[1] Actuarial value of assets excluding discounted pension obligation bonds proceeds

Table 11
Estimation of Investment Return Yield (Net of Expenses)

Item	July 1, 2017	July 1, 2016
(1)	(2)	(3)
A. Market value yield		
1. Beginning of year net market assets	$ 2,400,023	$ 2,456,544
2. Net Investment income (net of investment expenses)	292,184	29,290
3. End of year market assets	2,602,665	2,400,023
4. Estimated market value yield	12.41%	1.21%
B. Actuarial value yield		
1. Beginning of year actuarial assets	$ 2,400,023	$ 2,582,510
2. Net Investment income (net of investment expenses)	190,374	(96,676)
3. End of year actuarial assets	2,500,855 [1]	2,400,023 [1,2]
4. Estimated actuarial value yield	8.08%	-3.81%

[1] Reflects actuarial value of assets prior to recognition of Pension Obligation Bond receivable
[2] Reflects actuarial value of assets being marked to market

Note: Dollar amounts in $000

Table 12
History of Investment Returns

For Fiscal Year Ending (1)	Market Value (2)	Actuarial Value (3)
June 30, 2004	18.10%	4.16%
June 30, 2005	12.85%	4.12%
June 30, 2006	16.41%	8.95%
June 30, 2007	17.85%	21.51%
June 30, 2008	(0.25%)	8.97%
June 30, 2009	(20.14%)	2.60%
June 30, 2010	11.21%	3.54%
June 30, 2011	21.56%	6.27%
June 30, 2012	(0.89%)	4.46%
June 30, 2013	13.02%	5.39%
June 30, 2014	16.04%	7.95%
June 30, 2015	2.78%	6.82%
June 30, 2016	1.21%	(3.81%)
June 30, 2017	12.41%	8.08%
Average Compound Return - last 5 years	8.93%	4.79%
Average Compound Return - last 10 years	5.05%	4.97%

Note: Investment returns are estimations made by the actuary. Prior to June 30, 2016 these are dollar-weighted returns net of administrative and investment expenses. Beginning with June 30, 2016 the returns are net of investment expenses only.

Table 13
Historical Solvency Test

	Aggregated Accrued Liabilities for				Portions of Accrued Liabilities Covered by Reported Assets		
Valuation Date	Active Members Contributions	Retirees Beneficiaries and Vested Terminations[1]	Members (City Financed Portion)	Actuarial Value of Assets	(5)/(2)	[(5)-(2)]/(3)	[(5)-(2)-(3)]/(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
July 1, 1998	$ 34,781	$ 502,335	$ 703,025	$ 1,095,617	100.0%	100.0%	79%
July 1, 1999	33,985	599,270	706,678	1,222,240	100.0%	100.0%	83%
July 1, 2000	38,292	646,611	824,470	1,376,020	100.0%	100.0%	84%
July 1, 2001	36,449	804,901	1,114,456	1,490,179	100.0%	100.0%	58%
July 1, 2002	35,888	893,568	1,585,733	1,519,717	100.0%	100.0%	37%
July 1, 2003	44,388	1,115,801	2,118,063	1,510,264	100.0%	100.0%	17%
July 1, 2004	62,062	1,355,157	1,216,599	1,501,235	100.0%	100.0%	7%
July 1, 2005	48,150	1,577,345	1,099,777	1,777,656	100.0%	100.0%	14%
July 1, 2006	58,043	1,729,863	1,106,389	1,867,293	100.0%	100.0%	7%
July 1, 2007	69,544	1,824,992	1,234,178	2,193,745	100.0%	100.0%	24%
July 1, 2008	81,182	1,904,333	1,310,855	2,310,384	100.0%	100.0%	25%
July 1, 2009	95,268	1,974,714	1,381,428	2,284,442	100.0%	100.0%	16%
July 1, 2010	107,421	2,058,813	1,466,236	2,273,142	100.0%	100.0%	7%
July 1, 2011	118,202	2,154,959	1,517,167	2,328,804	100.0%	100.0%	4%
July 1, 2012	124,848	2,312,548	1,529,468	2,344,128	100.0%	96.0%	0%
July 1, 2013	132,238	2,431,950	1,565,395	2,382,585	100.0%	92.5%	0%
July 1, 2014	139,203	2,538,225	1,611,151	2,490,521	100.0%	92.6%	0%
July 1, 2015	143,097	2,832,860	1,789,762	2,582,510	100.0%	86.1%	0%
July 1, 2016	146,407	2,894,489	1,694,103	2,625,896 [2]	100.0%	85.7%	0%
July 1, 2017	149,190	2,993,101	1,723,740	2,742,539 [2]	100.0%	86.6%	0%

Note: Dollar amounts in $000

[1] Column (3) included AAL for DROP participants until 2003, thereafter in Column (4)

[2] Actuarial value of assets includes $250 million in future pension obligation bond proceeds as a receivable.

Table 14
Schedule of Funding Progress

Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annualized Salaries	UAAL as % of Salaries (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
July 1, 1998	$ 1,095,617	$ 1,240,141	$ 144,524	88.3%	$ 397,698	36.3%
July 1, 1999	1,222,240	1,339,933	117,693	91.2%	407,733	28.9%
July 1, 2000	1,376,020	1,509,373	133,353	91.2%	432,604	30.8%
July 1, 2001	1,490,179	1,955,806	465,627	76.2%	418,234	111.3%
July 1, 2002	1,519,717	2,515,189	995,472	60.4%	399,794	249.0%
July 1, 2003	1,510,264	3,278,251	1,767,987	46.1%	390,314	453.0%
July 1, 2004	1,501,235	2,633,817	1,132,582	57.0%	366,190	309.3%
July 1, 2005	1,777,656	2,725,272	947,616	65.2%	404,565	234.2%
July 1, 2006	1,867,293	2,894,295	1,027,002	64.5%	422,496	243.1%
July 1, 2007	2,193,745	3,128,713	934,968	70.1%	448,925	208.3%
July 1, 2008	2,310,384	3,296,370	985,986	70.1%	483,815	203.8%
July 1, 2009	2,284,442	3,451,410	1,166,968	66.2%	539,023	216.5%
July 1, 2010	2,273,142	3,632,470	1,359,328	62.6%	550,709	246.8%
July 1, 2011	2,328,804	3,790,328	1,461,524	61.4%	544,665	268.3%
July 1, 2012	2,344,128	3,966,864	1,622,736	59.1%	534,394	303.7%
July 1, 2013	2,382,585	4,129,583	1,746,998	57.7%	549,971	317.7%
July 1, 2014	2,490,521	4,288,579	1,798,058	58.1%	568,992	316.0%
July 1, 2015	2,582,510	4,765,719	2,183,209	54.2%	584,025	373.8%
July 1, 2016	2,625,896	4,734,999	2,109,103	55.5%	608,210	346.8%
July 1, 2017	2,742,539	4,866,031	2,123,492	56.4%	623,577	340.5%

Note: Dollar amounts in $000

Table 15
Historical Active Participant Data

Valuation Date	Active Count	Average Age	Average Svc	Annualized Salaries	Average Salary	Percent Changes
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1990	12,037	40	N/A	$258,556	$21,480	3.6%
1991	12,488	40.3	N/A	$284,914	$22,815	6.2%
1992	12,913	40.5	N/A	$314,686	$24,370	6.8%
1993	13,112	40.9	N/A	$340,249	$25,949	6.5%
1994	14,027	40.9	N/A	$366,561	$26,133	0.7%
1995	14,364	41.3	N/A	$378,511	$26,351	0.8%
1996	14,067	41.8	N/A	$367,610	$26,133	(0.8%)
1998 [1]	13,764	42.8	9.8	$394,919	$28,692	9.8%
1999 [1]	13,286	42.9	9.8	$396,617	$29,852	4.0%
2000 [1]	13,126	43.7	10.3	$421,591	$32,119	7.6%
2001 [1]	12,928	43.9	10.3	$413,021	$31,948	(0.5%)
2002	12,527	44.7	11	$399,794	$31,915	(0.1%)
2003	12,120	45.2	11.2	$390,314	$32,204	0.9%
2004	11,856	45.1	10.3	$366,190	$30,886	(4.1%)
2005 [2]	11,974	44.8	9.6	$404,565	$33,787	9.4%
2006	12,145	44.8	9.3	$422,496	$34,788	3.0%
2007	12,376	45.2	9.3	$448,925	$36,274	4.3%
2008	12,653	45.2	9.3	$483,815	$38,237	5.4%
2009	13,333	45.1	9.2	$539,023	$40,428	5.7%
2010	12,913	45.8	10.0	$550,709	$42,648	5.5%
2011	12,345	46.5	10.6	$544,665	$44,120	3.5%
2012	11,670	46.8	11.1	$534,394	$45,792	3.8%
2013	11,781	46.9	11.1	$549,971	$46,683	1.9%
2014	11,949	46.9	11.1	$568,992	$47,618	2.0%
2015	11,827	47.1	11.2	$584,025	$49,381	3.7%
2016	12,103	47.1	11.1	$608,210	$50,253	1.8%
2017	12,066	47.3	11.1	$623,577	$51,681	2.8%

Note: Dollar amounts in $000

[1] Excludes DROP participants

[2] Beginning with the 2005 valuation, a change in methodology now annualizes payroll for new entrants. If the methodology had not been changed, the covered payroll for 2005 would have been $376,208,345 and the average payroll would have been $31,419.

Table 16

Retirees, Beneficiaries, and Disabled Participants Added to and Removed from Rolls

	Added to Rolls		Removed from Rolls		Rolls-End of Year			
Valuation July 1,	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowances	% Increase in Annual Allowances	Average Annual Allowances
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1998	693	$ 5,840	441	$ 3,212	4,870	$ 43,394	11.8%	$ 8,910
1999	432	2,131	303	1,515	4,999	46,732	7.7%	9,348
2000	360	3,412	255	1,380	5,104	49,970	6.9%	9,790
2001	652	8,937	299	1,030	5,457	57,877	15.8%	10,606
2002	777	15,061	306	2,476	5,928	72,256	24.8%	12,189
2003	598	11,497	311	1,873	6,215	84,519	17.0%	13,599
2004	942	25,189	279	2,624	6,878	107,084	26.7%	15,569
2005	861	18,054	216	1,926	7,523	123,212	15.1%	16,378
2006	654	14,722	397	2,246	7,780	135,688	10.1%	17,441
2007	440	10,280	249	3,007	7,971	142,961	5.4%	17,935
2008	464	11,052	280	3,420	8,155	150,592	5.3%	18,466
2009	474	11,430	289	3,667	8,340	158,356	5.2%	18,988
2010	476	12,040	290	3,938	8,526	166,458	5.1%	19,524
2011	502	13,202	311	4,451	8,717	175,210	5.3%	20,100
2012	654	16,299	293	3,993	9,078	187,515	7.0%	20,656
2013	695	15,566	346	5,051	9,427	198,030	5.6%	21,007
2014	619	15,370	361	5,717	9,685	207,683	4.9%	21,444
2015	771	17,334	433	5,534	10,023	219,484	5.7%	21,898
2016	590	17,295	324	5,842	10,289	230,937	5.2%	22,445
2017	659	19,402	347	6,285	10,601	244,054	5.7%	23,022

Note: Dollar amounts in $000

Table 17

Membership Data

	July 1, 2017 (1)	July 1, 2016 (2)	July 1, 2015 (3)
1. Active members			
a. Number	12,066 *	12,103 *	11,827
b. Number vested	7,791	7,966	8,352
c. Annualized salaries	$ 623,577,000	$ 608,210,000	$ 584,025,000
d. Average salary	51,681	50,253	49,381
e. Average age	47.3	47.1	47.1
f. Average service	11.1	11.1	11.2
2. Inactive participants			
a. Vested	3,409	3,432	3,202
b. Total annual benefits (deferred)	$ 23,476,620	$ 24,273,639	$ 22,450,520
c. Average annual benefit	6,887	7,073	7,011
d. Nonvested	2,167	2,174	2,293
3. Service retirees			
a. Number	8,376	8,084	7,819
b. Total annual benefits	$ 209,754,055	$ 198,363,966	$ 188,491,161
c. Average annual benefit	25,042	24,538	24,107
d. Average age	69.5	68.5	68.5
4. Disabled retirees			
a. Number	323	336	350
b. Total annual benefits	$ 3,533,621	$ 3,560,156	$ 3,643,233
c. Average annual benefit	10,940	10,596	10,409
d. Average age	66.8	64.8	64.8
5. Beneficiaries and spouses			
a. Number	1,902	1,869	1,854
b. Total annual benefits	$ 30,766,682	$ 29,012,963	$ 27,349,358
c. Average annual benefit	16,176	15,523	14,752
d. Average age	69.7	67.8	68.3

* Counts include the additional 170 Group D members.

Table 18a

Distribution of Group A Active Members by Age and by Years of Service

Attained Age	0 No. & Avg. Comp.	1 No. & Avg. Comp.	2 No. & Avg. Comp.	3 No. & Avg. Comp.	4 No. & Avg. Comp.	5-9 No. & Avg. Comp.	10-14 No. & Avg. Comp.	15-19 No. & Avg. Comp.	20-24 No. & Avg. Comp.	25-29 No. & Avg. Comp.	30-34 No. & Avg. Comp.	35 & Over No. & Avg. Comp.	Total No. & Avg. Comp.
Under 25													
25-29						4 $47,851	2 $49,359						6 $48,353
30-34	3 $52,534	6 $43,385	4 $44,075	3 $68,002	7 $41,139	37 $44,312	102 $43,897	2 $44,283					164 $44,463
35-39	9 $31,667	9 $50,576	4 $57,954	6 $48,190	8 $48,225	79 $51,032	279 $54,038	51 $51,493	1 $67,454				446 $52,575
40-44	6 $48,083	4 $66,487	8 $45,846	3 $49,469	11 $60,638	61 $50,089	276 $54,920	102 $52,607	33 $57,522				504 $53,996
45-49	7 $51,041	10 $36,311	2 $48,891	6 $41,035	10 $51,796	75 $52,690	352 $56,942	171 $52,971	119 $58,689	41 $60,184			793 $55,596
50-54	7 $45,003	8 $47,369	7 $39,957	6 $50,138	11 $60,019	70 $50,070	358 $54,194	186 $55,692	161 $59,917	139 $57,359	36 $60,599	5 $65,358	994 $55,662
55-59	1 $32,282	10 $51,921	3 $37,620	10 $40,261	5 $54,808	62 $59,764	357 $53,186	198 $53,994	169 $58,771	146 $65,526	68 $63,219	35 $63,152	1,064 $57,080
60-64	5 $76,432	2 $36,442	3 $52,215	3 $45,566	5 $45,352	46 $55,572	283 $54,739	146 $51,396	124 $59,315	102 $68,659	42 $67,733	33 $73,277	794 $58,120
65 & Over			2 $48,163			23 $58,974	162 $58,561	76 $65,874	62 $64,127	43 $67,238	20 $74,617	12 $84,379	400 $63,295
Total	38 $47,838	49 $47,257	33 $46,006	37 $46,700	57 $52,978	457 $52,500	2,171 $54,455	932 $54,397	669 $59,581	471 $63,485	166 $65,166	85 $70,209	5,165 $56,120

Average:	Age:	52.14	Number of participants:	Fully vested:	4,951	Males:	2,826
	Service:	16.16		Not Vested:	214	Females:	2,339

Note: A former Group A employee who is rehired on or after January 1, 2008 is still a Group A employee.

Table 18b

Distribution of Group B Active Members by Age and by Years of Service

Attained Age	0 No. & Avg. Comp.	1 No. & Avg. Comp.	2 No. & Avg. Comp.	3 No. & Avg. Comp.	4 No. & Avg. Comp.	5-9 No. & Avg. Comp.	10-14 No. & Avg. Comp.	15-19 No. & Avg. Comp.	20-24 No. & Avg. Comp.	25-29 No. & Avg. Comp.	30-34 No. & Avg. Comp.	35 & Over No. & Avg. Comp.	Total No. & Avg. Comp.
Under 25													
25-29						3	1						4
						$30,978	$27,227						$30,041
30-34						3	8						11
						$32,441	$38,561						$36,892
35-39			2			2	5	13	2				24
			$35,454			$58,209	$31,092	$51,470	$58,053				$47,000
40-44		3	1	1	2	6	3	33	35				84
		$57,262	$35,651	$67,205	$70,273	$41,205	$41,212	$46,121	$47,650				$47,331
45-49	4	3	1	4	1	12	1	54	124	35			239
	$32,760	$39,374	$41,226	$32,370	$37,253	$44,318	$27,373	$45,867	$52,502	$50,977			$49,320
50-54	4	2	2	3	4	15		50	113	119	30	1	343
	$69,852	$50,055	$59,873	$49,982	$35,121	$52,967		$49,136	$49,635	$54,575	$52,567	$62,379	$51,847
55-59	1	2	5	1	3	20	2	55	84	83	27	21	304
	$32,656	$36,286	$47,441	$91,749	$94,321	$55,572	$43,234	$44,988	$48,634	$52,806	$53,344	$55,056	$50,836
60-64	1	1	1	2	4	8		31	65	55	20	12	200
	$32,614	$47,299	$53,206	$42,890	$41,647	$68,554		$54,868	$50,871	$59,428	$60,731	$61,072	$55,787
65 & Over				4		2	3	16	41	30	5	2	103
				$49,842		$47,580	$76,523	$50,057	$55,428	$49,931	$86,748	$61,350	$54,873
Total	10	11	12	15	14	71	23	252	464	322	82	36	1,312
	$47,572	$46,354	$46,495	$48,235	$54,845	$51,201	$41,662	$48,020	$50,791	$54,124	$56,898	$57,614	$51,421

Average:	Age:	53.90	Number of participants:	Fully vested:	1,250	Males:	626
	Service:	22.05		Not Vested:	62	Females:	686

Note: A former Group B employee who is rehired on or after January 1, 2008 is still a Group B employee.

Table 18c

Distribution of Group D Active Members by Age and by Years of Service

Attained Age	0 No. & Avg. Comp.	1 No. & Avg. Comp.	2 No. & Avg. Comp.	3 No. & Avg. Comp.	4 No. & Avg. Comp.	5-9 No. & Avg. Comp.	10-14 No. & Avg. Comp.	15-19 No. & Avg. Comp.	20-24 No. & Avg. Comp.	25-29 No. & Avg. Comp.	30-34 No. & Avg. Comp.	35 & Over No. & Avg. Comp.	Total No. & Avg. Comp.
Under 25	105	43	22	17	5	6							198
	$33,014	$33,011	$32,922	$33,821	$32,103	$36,480							$33,155
25-29	183	178	125	123	73	86							768
	$37,939	$37,210	$39,618	$39,753	$38,923	$39,685							$38,623
30-34	173	181	125	121	92	278							970
	$41,830	$42,221	$45,348	$45,784	$47,498	$46,334							$44,678
35-39	135	122	111	107	80	241							796
	$48,001	$46,457	$49,031	$49,325	$47,525	$51,091							$48,974
40-44	97	101	93	82	68	196							637
	$46,351	$47,792	$53,751	$48,394	$53,657	$56,085							$51,698
45-49	100	91	80	66	55	220							612
	$48,513	$45,547	$49,875	$49,463	$54,876	$51,855							$50,126
50-54	87	81	60	68	52	200							548
	$42,520	$46,908	$55,532	$48,039	$48,402	$54,052							$50,045
55-59	62	77	60	52	56	152							459
	$53,364	$48,923	$54,231	$46,396	$51,428	$57,088							$52,940
60-64	21	31	32	31	44	135							294
	$55,927	$51,523	$45,680	$58,349	$57,116	$58,676							$56,043
65 & Over	11	5	12	17	16	76							137
	$60,381	$46,238	$44,600	$67,753	$54,734	$57,119							$56,928
Total	974	910	720	684	541	1,590							5,419
	$43,449	$43,648	$47,721	$47,010	$49,217	$52,186							$47,639

Average:	Age:	41.18	Number of participants:	Fully vested:	1,590	Males:	3,035
	Service:	3.81		Not Vested:	3,829	Females:	2,384

Note: An additional 170 Group D members are not shown in this table because we did not receive sufficient data to categorize the members.

Table 18d

Distribution of All Active Members by Age and by Years of Service

Attained Age	0 No. & Avg. Comp.	1 No. & Avg. Comp.	2 No. & Avg. Comp.	3 No. & Avg. Comp.	4 No. & Avg. Comp.	5-9 No. & Avg. Comp.	10-14 No. & Avg. Comp.	15-19 No. & Avg. Comp.	20-24 No. & Avg. Comp.	25-29 No. & Avg. Comp.	30-34 No. & Avg. Comp.	35 & Over No. & Avg. Comp.	Total No. & Avg. Comp.
Under 25	105	43	22	17	5	6							198
	$33,014	$33,011	$32,922	$33,821	$32,103	$36,480							$33,155
25-29	183	178	125	123	73	93	3						778
	$37,939	$37,210	$39,618	$39,753	$38,923	$39,756	$41,981						$38,654
30-34	176	187	129	124	99	318	110	2					1,145
	$42,012	$42,258	$45,308	$46,321	$47,049	$45,968	$43,509	$44,283					$44,572
35-39	144	131	117	113	88	322	284	64	3				1,266
	$46,980	$46,740	$49,104	$49,265	$47,589	$51,121	$53,634	$51,489	$61,187				$50,205
40-44	103	108	102	86	81	263	279	135	68				1,225
	$46,451	$48,748	$52,953	$48,650	$55,015	$54,355	$54,773	$51,022	$52,441				$52,344
45-49	111	104	83	76	66	307	353	225	243	76			1,644
	$48,105	$44,480	$49,747	$47,898	$54,143	$51,765	$56,858	$51,266	$55,531	$55,944			$52,647
50-54	98	91	69	77	67	285	358	236	274	258	66	6	1,885
	$43,813	$47,017	$54,078	$48,278	$49,516	$53,017	$54,194	$54,303	$55,677	$56,075	$56,948	$64,861	$53,335
55-59	64	89	68	63	64	234	359	253	253	229	95	56	1,827
	$52,711	$48,976	$52,999	$46,142	$53,702	$57,667	$53,130	$52,036	$55,406	$60,916	$60,413	$60,116	$55,001
60-64	27	34	36	36	53	189	283	177	189	157	62	45	1,288
	$58,861	$50,512	$46,434	$56,425	$54,839	$58,338	$54,739	$52,004	$56,411	$65,425	$65,474	$70,022	$57,284
65 & Over	11	5	14	21	16	101	165	92	103	73	25	14	640
	$60,381	$46,238	$45,109	$64,341	$54,734	$57,353	$58,888	$63,123	$60,664	$60,125	$77,043	$81,089	$60,577
Total	1,022	970	765	736	612	2,118	2,194	1,184	1,133	793	248	121	11,896
	$43,653	$43,861	$47,628	$47,019	$49,696	$52,221	$54,321	$53,040	$55,981	$59,684	$62,433	$66,462	$51,738

Average:	Age:	47.25	Number of participants:	Fully vested:	7,791	Males:	6,487
	Service:	11.08		Not Vested:	4,105	Females:	5,409

Note: An additional 170 Group D members are not shown in this table because we did not receive sufficient data to categorize the members.

APPENDIX A

SUMMARY OF ACTUARIAL ASSUMPTIONS AND METHODS

APPENDIX A

Summary of Actuarial Assumptions and Methods

The following methods and assumptions were used in preparing the July 1, 2017, actuarial valuation. These assumptions were adopted by the Board effective for the July 1, 2016 valuation.

1. Valuation Date

   The valuation date is July 1st of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

2. Actuarial Cost Method (Prescribed Method under Actuarial Standards of Practice)

   The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the employer contribution rate is the sum of (i) the employer normal cost rate, and (ii) a rate that will amortize the unfunded actuarial liability.

   a. The valuation is prepared on the projected benefit basis, under which the present value, at the investment return rate assumed to be earned in the future (7.0 percent), of each participant's expected benefit payable at retirement or death is determined, based on his/her age, service, sex and compensation. The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his/her terminating with a service, disability, or survivor's benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.

   b. The employer contributions required to support the benefits of the Plan are determined using a level funding approach, and consist of a normal cost contribution and an accrued liability contribution.

   c. The normal contribution is determined using the "entry age normal" method. Under this cost method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution which, if applied to the compensation of each participant during the entire period of his/her anticipated covered service, would be required to meet the cost of all benefits payable on his behalf based on the benefits provisions for new employees hired on or after January 1, 2008.

d. The actuarial accrued liability (AAL) for each member is the difference between their present value of future benefits (PVFB), based on the tier of benefits that apply to the member, and their present value of future normal costs determined using the normal cost rate described in item c above. For inactive and retired members their AAL is equal to their PVFB.

e. The Legacy Liability payments were established in the Initial RSVS valuation. Each subsequent valuation a liability (gain)/loss layer is established that is the difference between the sum of (i) the remaining Legacy Liability and (ii) the remaining liability (gain)/loss layers, and the unfunded accrued liability. The amortization payment for each liability (gain)/loss layer is determined by amortizing the layer over 30 years with the first payment made one year after the valuation in which the layer was established.

The contribution rate determined by this valuation will not be effective until one year later and the determination of the rate reflects this deferral. It is assumed that there will be no change in the employer normal cost rate due to the deferral, and it is assumed that payments are made uniformly throughout the year.

3. Actuarial Value of Assets

The actuarial value of assets is equal to the market value of assets less a five-year phase in of the excess (shortfall) between expected investment return and actual income. The actual calculation is based on the difference between actual market value and the expected actuarial value of assets each year, and recognizes the cumulative excess return (or shortfall) at a minimum rate of 20% per year. Each year a base is set up to reflect this difference. If the current year's base is of opposite sign to the deferred bases then it is offset dollar for dollar against the deferred bases. Any remaining bases are then recognized over the remaining period for the base (5 less the number of years between the base year and the valuation year). This is intended to ensure the smoothed value of assets will converge towards the market value in a reasonable amount of time.

Expected earnings are determined using the assumed investment return rate and the beginning of year actuarial value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of investment expenses.

The actuarial value of assets was marked to market value as of July 1, 2016 by recognizing all deferred investment shortfalls on that date. The method described above will begin again with the 2017 valuation. In addition, the actuarial value of assets includes an expected $250 million in Pension Obligation Bonds (POBs) proceeds, discounted from December 31, 2017 to the valuation date at 7%.

4. Economic Assumptions

a. Investment return: 7.00% per year, compounded annually, composed of an assumed 2.25% inflation rate and a 4.75% net real rate of return. This rate represents the assumed return, net of all investment expenses.

b. Salary increase rate: A 2.25% inflation component, plus a 0.75% general increase, plus a service-related component as follows:

Years of Service	Service-related Component	Total Annual Rate of Increase Including 2.25% Inflation Component and 0.75% General Increase Rate
(1)	(2)	(3)
1	2.25%	5.25%
2	2.25	5.25
3	2.75	5.75
4	2.25	5.25
5	1.75	4.75
6	1.50	4.50
7	1.25	4.25
8	1.00	4.00
9	0.75	3.75
10-24	0.50	3.50
25+	0.00	3.00

c. Payroll growth rate: In the amortization of the unfunded actuarial accrued liability, payroll is assumed to increase 2.75% per year. This increase rate is solely due to the effect of inflation on salaries, with no allowance for future membership growth.

The investment return assumption is established in statute at 7.0% and therefore is considered a prescribed assumption under the Actuarial Standards of Practice.

5. Demographic Assumptions

a. Retirement Rates

	Expected Retirements per 100 Lives			
	Group A & B Members		Group D Members	
Age	Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)
45-49	15	12	0	0
50-54	10	11	3	3
55	10	11	4	4
56	10	11	5	5
57	10	11	6	6
58	10	11	7	7
59	10	11	8	8
60	12	11	10	10
61	14	11	13	13
62	16	20	35	35
63	18	18	25	18
64	20	12	18	20
65	20	22	20	20
66-69	20	20	20	19
70-74	20	25	20	19
75+	100	100	100	100

b. DROP Participation

65% of eligible members are assumed to enter DROP.

c. DROP Entry Date

Those active members (not already in DROP) are assumed to enter DROP when first eligible. For members who have already entered DROP, the actual DROP entry date supplied in the data is used.

d. DROP Interest Credit

Interest is credited as 50% of the average five-year investment return, with a minimum of 2.5% and a maximum of 7.5%. Assumed to be 4.00% per year.

e. Mortality rates (active members)

Based on the Retired Pensioners 2000 Mortality Table (combined). Rates are scaled by 90% for male and 80% for female. 90% of the rates are assumed to be for non-service related deaths and 10% for service related deaths.

Sample rates are shown below:

	Rates			
Age	Non-service related Male	Non-service related Female	Service related Male	Service related Female
20	0.000279	0.000138	0.000031	0.000015
25	0.000305	0.000149	0.000034	0.000017
30	0.000360	0.000190	0.000040	0.000021
35	0.000626	0.000342	0.000070	0.000038
40	0.000874	0.000508	0.000097	0.000056
45	0.001221	0.000809	0.000136	0.000090
50	0.001732	0.001207	0.000192	0.000134
55	0.002935	0.001956	0.000326	0.000217
60	0.005465	0.003640	0.000607	0.000404
65	0.010317	0.006988	0.001146	0.000776
70	0.017987	0.012054	0.001999	0.001339
75	0.030646	0.020236	0.003405	0.002248

Mortality rates (retired members and beneficiaries):

Healthy Retirees and beneficiaries: Gender-distinct RP2000 Combined Healthy Mortality Tables with Blue Collar Adjustment. Male rates are multiplied by 125% and female rates are multiplied by 112%. The rates are projected on a fully generational basis by scale BB to account for future mortality improvements.

Disabled Retirees: Gender-distinct RP2000 Combined Healthy Mortality Tables with Blue Collar Adjustment. Male rates are multiplied by 125% and female rates are multiplied by 112%. The rates are projected on a fully generational basis by scale BB to account for future mortality improvements. Rates are set-forward five years. A minimum rate of 0.04 is applied to male and 0.03 to female.

Sample rates are shown below:

Attained Age in 2014	Rates			
	Healthy Male	Healthy Female	Disabled Male	Disabled Female
45	0.002149	0.001489	0.040000	0.030000
50	0.002891	0.002108	0.040000	0.030000
55	0.005029	0.002918	0.040000	0.030000
60	0.009369	0.004815	0.040000	0.030000
65	0.016403	0.009835	0.040000	0.030000
70	0.027069	0.017625	0.043632	0.030000
75	0.043632	0.029215	0.071367	0.046301
80	0.071367	0.046301	0.116414	0.078599
85	0.116414	0.078599	0.194603	0.131126
90	0.194603	0.131126	0.298126	0.198245
95	0.298126	0.198245	0.412954	0.255008
100	0.412954	0.255008	0.497358	0.328290

f. Termination Rates and Disability Rates

Termination rates (for causes other than death, disability or retirement):

Termination rates are a function of the member's age and service. Termination rates are not applied after a member becomes eligible for a retirement benefit. Rates at selected ages are shown below.

Probability of Decrement Due to Withdrawal – Male Members

Years of Service

Age	0	1	2	3	4	5	6	7	8	9	10+
20	0.3244	0.2682	0.2300	0.2060	0.1926	0.1824	0.1617	0.1507	0.1400	0.1278	0.0541
30	0.2585	0.2146	0.1808	0.1563	0.1396	0.1275	0.1143	0.1057	0.0985	0.0919	0.0449
40	0.2003	0.1645	0.1351	0.1124	0.0954	0.0832	0.0750	0.0683	0.0634	0.0603	0.0357
50	0.1559	0.1258	0.1013	0.0824	0.0681	0.0577	0.0510	0.0454	0.0411	0.0383	0.0265
60	0.1341	0.1083	0.0887	0.0740	0.0634	0.0557	0.0469	0.0407	0.0344	0.0277	0.0173

Probability of Decrement Due to Withdrawal – Female Members

Years of Service

Age	0	1	2	3	4	5	6	7	8	9	10+
20	0.2811	0.2574	0.2344	0.2123	0.1912	0.1711	0.1506	0.1282	0.1040	0.0784	0.1385
30	0.2155	0.1943	0.1736	0.1539	0.1356	0.1188	0.1032	0.0879	0.0730	0.0585	0.0795
40	0.1688	0.1460	0.1250	0.1063	0.0903	0.0770	0.0664	0.0581	0.0517	0.0472	0.0367
50	0.1510	0.1223	0.0984	0.0791	0.0645	0.0544	0.0481	0.0452	0.0453	0.0481	0.0339
60	0.1794	0.1373	0.1049	0.0812	0.0653	0.0570	0.0540	0.0552	0.0601	0.0682	0.0339

Rates of Decrement Due to Disability

Age	Males	Females	Service-related Males	Service-related Females
20	0.000004	0.000006	0.000000	0.000001
25	0.000009	0.000013	0.000001	0.000002
30	0.000073	0.000065	0.000005	0.000008
35	0.000318	0.000102	0.000022	0.000013
40	0.000650	0.000234	0.000045	0.000029
45	0.001259	0.000528	0.000087	0.000066
50	0.002195	0.001256	0.000151	0.000157
55	0.003171	0.002021	0.000219	0.000253
60	0.004188	0.002436	0.000289	0.000305

Rates of disability are reduced to zero once a member becomes eligible for retirement.

6. <u>Other Assumptions</u>

a. Projected payroll for contribution purposes: The aggregate projected payroll for the fiscal year following the valuation date is calculated by increasing the actual payroll paid during the previous fiscal year to all members (actives, terminated and retired) by the payroll growth rate and multiplying by the ratio of current active members to the average number of active members during the previous fiscal year.

b. Percent married: 70% of employees are assumed to be married. (No beneficiaries other than the spouse assumed). The 70% assumption is intended to provide sufficient margin to cover the costs of any surviving children benefits.

c. Age difference: Male members are assumed to be three years older than their spouses, and female members are assumed to be three years younger than their spouses.

d. Percent electing annuity on death (when eligible): All of the spouses of vested, married participants are assumed to elect an annuity.

e. Percent electing deferred termination benefit: Vested terminating members are assumed to elect a refund or a deferred benefit, whichever is more valuable at the time of termination.

f. There will be no recoveries once disabled.

g. No surviving spouse will remarry.

h. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt at the first age at which unreduced benefits are available.

i. Administrative expenses: The administrative expenses of the plan are added into the employer contribution rate as a percentage of payroll.

j. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.

k. Decrement timing: Decrements of all types are assumed to occur mid-year.

l. 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.

m. Decrement relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

n. Incidence of Contributions**:** Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.

o. Benefit Service: All members are assumed to accrue 1 year of service each year. Fractional service is used to determine the amount of benefit payable.

p. Retiree DROP Balances Payout Duration: It is assumed that retirees will receive their DROP balances in equal installments over the eight years following retirement.

q. COLA is assumed to be 1.00% per year for almost all members effective 7/1/2017. Group D members who terminated prior to the effective date of the 2017 legislation are not eligible for a COLA.

7. Participant Data

Participant data was supplied on electronic files. There were separate files for (i) active members, (ii) inactive members, and (ii) members and beneficiaries receiving benefits.

The data for active members included birth date, sex, most recent hire date, salary paid during last fiscal year, hours worked by the employee, and employee contribution amounts. For retired members and beneficiaries, the data included date of birth, sex, amount of monthly benefit, and date of retirement. Also included was the member's Group and for members participating in DROP, their account balances and monthly DROP income.

Most healthy and disabled retirees are assumed to have an 80% joint and survivor form of payment (a small group of retirees is only eligible for a 50% joint and survivor annuity), prorated by the 70% marriage assumption and reflecting the 3 year spousal age differential. All non-children beneficiaries are assumed to have life only benefits and all children beneficiaries' annuities are assumed to stop at age 21.

Salary for the prior fiscal year as well as an annualized rate of pay is provided in the data. The annualized rate increased by one-year's salary increase is the rate of pay the member is assumed to earn in the upcoming fiscal year.

Except as noted below, assumptions were made to correct for missing, or inconsistent data. These had no material impact on the results presented.

We received salary information on City of Houston employees employed by HFC, HFF, and CCSI. Where we had additional information because of prior HMEPS service, we added the salary information and treated the records as active employees. For the 170 records where we had no additional information, we assumed these records were Group D members and we grossed up the Group D liabilities and payroll to reflect these additions.

8. <u>Group Transfers</u>

We assume no current Group B members will transfer to Group A.

9. <u>Change in Assumptions Since Prior Valuation</u>

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

APPENDIX B

SUMMARY OF PLAN PROVISIONS

APPENDIX B

Summary of Plan Provisions

The provisions summarized in this section apply to persons who are members (active employees). Former members may have been covered under different plan provisions, depending on their dates of separation from service.

1. Covered Members

   Any person who is a participant of Group A, under the original act.

   Persons who became employees of the City of Houston after September 1, 1981 and prior to September 1, 1999, and elected officials of the City of Houston who assumed office after September 1, 1981 and prior to September 1, 1999, participate in Group B, but may make an irrevocable election to participate in Group A instead.

   Persons who become employees of the City and persons who are elected as City officials after September 1, 1999 and prior to January 1, 2008 become members of Group A. Certain persons who were or became a Director of a City Department, Chief Administrative Officer, or Executive Director of HMEPS on or after September 1, 1999 and prior to January 1, 2005 participate in Group C. Effective January 1, 2005, all Group C participation ceased and all Group C participants became Group A participants. Accruals earned by Group C participants prior to January 1, 2005 are retained, but all future accruals are based on the Group A formulas.

   All future references to Group C participants in this appendix are intended to reflect this change in the Group C status.

   Covered employees newly hired on or after January 1, 2008 will be members of Group D.

   A former employee who is rehired on or after January 1, 2008 is a member of the group in which such employee participated at the time of his/her immediately preceding separation from service.

2. Monthly Final Average Salary (FAS)

   The sum of the seventy-eight highest biweekly salaries paid to a member during his period of credited service, divided by thirty-six. Salary includes base pay, longevity pay, and any shift differential pay. If there are fewer than seventy-eight biweekly salaries, the FAS is determined by multiplying the average of all biweekly salaries paid to the member during the period of credited service by 26 and dividing the product by 12.

3. Credited Service

All services and work performed by an employee, including prior service. For members of Group A and former Group C, all services and work performed after September 1, 1943 must have been accompanied by corresponding contributions to HMEPS by the employee or legally authorized repayments must have been made. The contribution requirement applies to all Group B and Group D members effective with the first full pay period on or after July 1, 2017.

Credited service for former participants in Group C means the number of years of eligible service after the executive official's effective date of participation in Group C. A former Group C member receives two times the number of actual years of credited service in Group C solely for the purpose of fulfilling the eligibility requirements in Group C.

If former Group D and pre-1997 Group B members who forfeited their previous non-contributory credited service are rehired they will regain a year of forfeited non-contributory credited service for each year of service earned upon reemployment.

4. Normal Retirement

a. Eligibility For participants in Group A or Group B, or, a former Group C member who became a Group A member as of January 1, 2005, the earliest of:

(i) age 62 and 5 years of Credited Service

(ii) 5 years of Credited Service, and age plus years of Credited Service equal 70 or more, provided that, prior to January 1, 2005, the participant had at least five years of credited service and the combination of age and years of credited service was equal to or greater than 68.

(iii) 5 years of Credited Service, and age plus years of Credited Service equal 75 or more with minimum age 50.

For participants in Group D
Age 62 and 5 years of Credited Service

b. Benefit Prior to January 1, 2005:

Group A: 3.25% of FAS for each of the first 10 years of Credited Service plus 3.50% of FAS for Credited Service greater than 10 years but less than 20 years plus 4.25% of FAS for each year of Credited Service greater than 20 years (excludes period of DROP participation). Maximum benefit is 90% of FAS for all future retirees.

Group B: 1.75% of FAS for each of the first 10 years of Credited Service plus 2.00% of FAS for Credited Service greater than 10 years but less than 20 years, plus 2.75% of FAS for each year of Credited Service greater than 20 years (excludes period of DROP participation). Maximum benefit is 90% of FAS for all future retirees.

Group C: Double the rate for Group A

<u>All accruals after January 1, 2005</u>:

All accruals under the prior multipliers were frozen as of January 1, 2005 and the following benefit multipliers apply to service on or after that date:

Group A: 2.50% of FAS for each of the first 20 years of Credited Service plus 3.25% of FAS for each year of Credited Service greater than 20 years (excludes period of DROP participation). Maximum benefit is 90% of FAS for all future retirees.

Group B: 1.75% of FAS for each of the first 10 years of Credited Service plus 2.00% of FAS for Credited Service greater than 10 years but less than 20 years, plus 2.50% of FAS for each year of Credited Service greater than 20 years (excludes period of DROP participation). Maximum benefit is 90% of FAS for all future retirees.

Group D: 1.80% of FAS for each of the first 25 years of Credited Service, plus 1.00% of FAS for each year of Credited Service greater than 25 years. Maximum benefit is 90% of FAS for all future retirees.

5. <u>Early Retirement (Group D only)</u>

a. Eligibility (i) at least ten years of Credited Service; or

(ii) at least five years of Credited Service and a combination of age and service equals or is greater than 75.

b. Benefit Accrued normal retirement benefit reduced by 0.25% for each month you are less than age 62.

6. Vested Pension

a. Eligibility 5 years of Credited Service.

b. Benefit Group A and Group C: Either the accrued normal retirement benefit with payments beginning at the normal retirement eligibility date or a refund of employee contributions, if any, without interest.

Group B and Group D: Accrued normal retirement benefit payable at the normal retirement eligibility date.

If the actuarial present value of a pension is less than $20,000, a terminated participant who is not eligible to begin receiving a pension may request an early lump sum distribution of the pension. Such early lump sum distribution is irrevocable. Credited Service associated therewith can be reinstated after reemployment and pursuant to the rules of the plan.

7. Withdrawal Benefit

If a nonvested contributory member withdraws from service with less than 5 years, a refund of the member's contributions is made without interest, upon request.

8. Service-Connected Disability Retirement

a. Eligibility Any age

b. Benefit Current:

Group A: Accrued normal retirement benefit, but not less than 20% of final monthly salary at time of disability plus 1% of final monthly salary per year of Credited Service, to a maximum of 40% of final monthly salary.

Group B and Group D: Accrued normal retirement benefit, but not less than 20% of final monthly salary at time of disability.

After July 1, 2017:

Accrued normal retirement benefit, but not less than 20% of final monthly salary at time of disability plus 1% of final monthly salary per year of Credited Service, to a maximum of 40% of final monthly salary.

9. Non-service-Connected Disability Retirement

a. Eligibility 5 years of Credited Service.

b. Benefit Accrued normal retirement benefit payable immediately.

10. Pre-retirement Survivor Benefits

A. Service-connected

a. Eligibility Any age or Credited Service

b. Benefit Current:

If there is a surviving spouse, 100% of FAS payable to the spouse. 10% of FAS is payable to each qualifying dependent to a maximum of 20% for all dependents. Surviving spouse's benefit will be reduced by the amount of dependent benefits. If no surviving spouse, dependent benefits are 50% of the amount a surviving spouse would have received for each dependent to a maximum of 100% for all dependents in the aggregate.

Effective July 1, 2017:

If there is a surviving spouse, the spousal survivor benefit is 80% of the participant's final average salary, payable immediately.

B. Non service-connected

a. Eligibility 5 years of Credited Service

b. Benefit Current:

Benefits for survivorship of vested Group D members after January 1, 2008:

Death of active employee: If there is a surviving spouse, 100% of accrued pension is payable to the spouse. 10% of accrued pension is payable to each qualifying dependent to a maximum of 20% for all dependents. Surviving spouse's benefit will be reduced by the amount of dependent benefits. If no surviving spouse, dependent benefits are 50% of the amount a surviving spouse would have received for each dependent to a maximum of 100% for all dependents in the aggregate.

Death of terminated vested employee (not yet retired): If participant selected Optional Annuity then benefit will be paid based on selected option. If the participant did not select an optional annuity then if there is a surviving spouse the participant will be deemed to have selected the 50% J&S Optional Annuity. If the participant did not select an Optional Annuity and there is no surviving spouse then no benefit is payable.

<u>For all other Groups on or after August 1, 2001</u>:

If there is a surviving spouse, 100% of accrued normal retirement benefit payable to the spouse and 10% of accrued normal retirement benefit to each qualifying dependent to a maximum of 20% for all dependents in the aggregate. The surviving spouse's benefit will be reduced by dependent benefits, if any. If there is no surviving spouse, each dependent will receive 50% of the benefit a surviving spouse would have received subject to a maximum of 100% of a surviving spouse's benefit for all dependents in the aggregate.

Effective July 1, 2017:

If an active Group A, Group B or Group D member with at least 5 years of credited service dies while still in service with the City (off-duty death), the spousal survivor benefit will be 80% of the normal accrued pension, payable immediately, provided that the spouse was married to the participant for at least one continuous year as of the date of death. If such spouse was married less than one continuous year as of the date of death, the survivor benefit is 50% of the normal accrued pension.

If a Group A or Group B deferred participant (not yet receiving a pension benefit) dies, the spousal survivor benefit is 50% of the normal accrued pension, payable at the participant’s eligibility date. However, the surviving spouse can elect an earlier actuarially equivalent benefit.

11. <u>Postretirement Survivor Benefits</u>

<u>All Groups except Option-Eligible Participants Prior to June 30, 2017</u>:

If there is a surviving spouse, 100% of the retirement benefit the deceased retiree was receiving at the time of death payable to the spouse and 10% of that retirement benefit payable to each qualifying dependent to a maximum of 20% for all dependents. The surviving spouse's benefit will be reduced by dependent benefits, if any. If there is no surviving spouse, each dependent will receive 50% of the benefit a surviving spouse would have received subject to 100% of a surviving spouse's benefit for all dependents in the aggregate.

<u>All Groups except Option-Eligible Participants On or After July 1, 2017</u>:

If there is a surviving spouse, 80% of the retirement benefit the deceased retiree was receiving at the time of death payable immediately, provided that the spouse was married to the retiree at the time of death and for at least one continuous year as of the date of separation from service (the marriage requirement applies for separations from service on or after July 1, 2017). If such spouse was married less than one continuous year as of the date of separation from service (the marriage requirement applies for separations from service on or after July 1, 2017), the spousal survivor benefit is 50% of the retirement benefit being received by the retiree at the time of death.

<u>Option-Eligible Participants</u>:

Life only to the retiree. Option-Eligible Participants may elect other options based on actuarial factors.

All Group D members, Group A & B members who terminate after June 30, 2011 eligible for a normal retirement benefits and who are not married at their termination of service, and Group B members who terminated prior to September 1, 1997 and who are eligible for a normal retirement benefit are Option-Eligible Participants.

12. <u>Benefit Adjustments</u>

<u>Prior to June 30, 2017:</u>

Each year, effective February 1, monthly benefits will be increased 3.0%, not compounded, for all retirees and survivors. This will affect all members currently in payment status and members who enter payment status in the future. For members hired on or after January 1, 2005 future increases will be 2.0%, not compounded. However, pre-2005 retirees who are rehired will receive a 3% COLA on their subsequent benefit instead. No COLA for Group D members.

On or after July 1, 2017:

COLAs are calculated as half of the average five-year investment return less five percentage points, with a minimum of 0% and a maximum of 2%, not compounded. Group D retirees, who terminated after the effective date of the 2017 Legislation, will receive COLAs in the future. For employees who are participating in DROP, COLAs will be delayed until the earlier of their age at retirement or age 62 as of January 1 of the year in which the increase is made.

13. Contribution Rates. (all rates occur as of the first full pay period on or after the applicable effective date)

    a. Members Effective July 1, 2017, 7% of salary for Group A members, 2% of salary for Group B members and 2% of salary for Group D members. For Group D, beginning January 1, 2018, in addition to the 2%, employees contribute 1% to a notional account that will be credited with the DROP Credit interest. Effective July 1, 2018, the total contribution increases to 8% of salary for Group A members and 4% of salary for Group B members.

    b. City Beginning in 1993, the rate required to fund the Retirement Fund on an actuarial reserve basis. However, effective September 1, 1999, the minimum contribution rate is equal to the greater of 10% of covered payroll or twice the contribution rate a Group A member is required to make by statute. Under the ARM&CA between the Board and the City of Houston, the City will contribute the greater of $108.5 million or 21.36% of payroll in fiscal year 2013. Contributions in future fiscal years increase by the greater of $10 million or 2% of payroll over the prior year's rate until such time that the City's contribution rate equals the actuarially determined contribution rate.

       Effective July 1, 2017, the City's contribution obligation is set by state statute as described in the RSVS Section.

14. Deferred Retirement Option

    a. Eligibility Participants (other than Group D) who are eligible to retire but who have not retired and who remain in service with the City may participate in the DROP.

    b. Monthly DROP Credit

       An amount equal to the accrued normal retirement benefit as of the effective date of DROP participation. The Monthly DROP Credit is credited to a notional account (DROP Account) on the last calendar day each month.

c. DROP Credit Interest

Interest is credited to the DROP Account at the beginning of each day based on the DROP Account balance at the end of the previous day and posted monthly on the last calendar day of each month. Effective July 1, 2017, the annual interest rate effective beginning January 1 each year is half of the average five-year investment return, not less than 2.50% and not greater than 7.5%. The assumed DROP Credit interest is 4.00%.

d. DROP Credits-COLA

On or after July 1, 2017:

COLAs will not be given if the DROP participant is younger than age 62. When the DROP participant attains at least age 62 as of January 1 of the year of the increase, COLAs are calculated as half of the average five-year investment return less five percentage points, with a minimum of 0% and a maximum of 2%, not compounded.

Between January 1, 2005 and December 31, 2016

The Monthly DROP Credit for participants who entered the DROP effective on or before January 1 of the then current year will be increased effective February 1 each year by 3.0%, not compounded.

The Monthly DROP Credit for Group A and Group B participants who were first hired on or after January 1, 2005 who entered the DROP effective on or before January 1 of the then current year will be increased effective February 1 each year by 2.0%, not compounded.

e. DROP Account Balance

The sum of a participant's Monthly DROP (DROP Benefit) Credits, Monthly DROP Credit Adjustments, applicable interest, and employee contributions as applicable.

15. DROP Benefit Pay-out

A terminated DROP participant may elect to:

a. Receive the entire DROP Account Balance in a lump sum.
b. Receive the DROP Account Balance in periodic payments as approved by the Pension Board.
c. Receive a portion of the DROP Account balance in a lump sum and the remainder in periodic payments as approved by the Pension Board.
d. Receive a partial payment of not less than $1,000, no more than once each ninety (90) days.

e. Defer election of a payout option until a future date.

16. Post DROP Retirement: The Final Pension is the accrued normal retirement benefit as of the effective date of DROP participation, increased with COLAs since DROP entry.

Changes in Plan Provisions Since Prior Year

There have been no changes to the benefit provisions of the System since the prior valuation.