GRS Gabriel Roeder Smith & Company
Consultants & Actuaries

HOUSTON MUNICIPAL EMPLOYEES PENSION SYSTEM

ACTUARIAL VALUATION REPORT

FOR THE YEAR BEGINNING JULY 1, 2016

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June 19, 2017

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

Subject: Risk Sharing Valuation Study as of July 1, 2016

Dear Members of the Board:

This Risk Sharing Valuation Study (RSVS, or sometimes referred to as the actuarial 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, 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 Risk Sharing Valuation Study. 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 and implemented by the Board. The City Contribution Rate becomes effective twelve months after the valuation date, i.e., the rate determined by this July 1, 2016 actuarial valuation will be used by the Board when establishing the City Contribution Rate for the year beginning July 1, 2017 and ending June 30, 2018.

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 will contribute the greater of the 2016 fiscal year contribution increased by $10 million or 29.36% of payroll in fiscal year 2017. It is expected that the 29.36% of payroll will be the ultimate contribution for fiscal year 2017.

Based on the revised statutes that govern HMEPS, the estimated City contribution for FY 2018 is estimated to be $175.5 million. This is comprised $124.0 million for the Legacy Liability amortization payment and $51.5 million based on the City Contribution Rate of 8.17% of pay and an estimated payroll of $630.7 million.

Financing objectives and funding policy

The Legacy Liability as of July 1, 2016 is established as part of this 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.

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). These bases will be amortized over a 30-year period beginning one year after the valuation date using a level percentage of payroll amortization method. Because the Legacy Liability is equal to the UAAL as of July 1, 2016 there is no liability gain/loss layer established with this valuation.

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, 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. 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, 2016 is 55.5%. This is an increase from the 54.2% 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 2018 is 8.17%. This excludes the contribution for the Legacy Liability. When the amortization payment for the Legacy Liability is included, it is estimated that the FY 2018 rate will be approximately 27.84% of pay. This rate is less than the 31.81% rated calculated in the 2015 valuation for fiscal year 2017. This decrease is due to the change in the plan provisions and the inclusion of the Pension Obligation Bond proceeds as a receivable. Please see Table 6 for a detailed analysis of the change in the calculated employer contribution rate from the prior year to this year.

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 $7.5 million and an experience loss on the actuarial value of assets of approximately $76.1 million. Note, due to the magnitude of the changes to benefit provisions, funding policies, and actuarial assumptions, the fiscal year 2016 experience information is less meaningful. Thus we have provided less detail in this year's report.

Benefit provisions

The benefit provisions reflected in this valuation are those in effect following the passage and signing into law of SB 2190. There have been substantial changes in the benefit provisions since the prior valuation date that have a material financial impact on HMEPS. The primary changes are as follows:

- 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
- 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 all of 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 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 believe it is appropriate to make changes to other economic assumptions that are correlated with the investment return assumption. In particular, we are recommending the inflation assumption be decreased from 2.50% to 2.25% and that corresponding decreases in the salary increase assumptions and payroll growth assumptions also be made.

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, 2016 was provided to HMEPS in a separate report dated October 14, 2016 and is not contained in this report.

Data

Member data for retired, active and inactive members was supplied as of July 1, 2016 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, 2016 was taken from the Comprehensive Annual Financial Report (CAFR) for the Year Ended June 30, 2016.

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 CAFR 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, 2016.

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

Joe Newton

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

Lewis Ward

Lewis Ward
Consultant

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Risk Sharing Valuation Study

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. In addition, since this is the initial RSVS this study also determines two additional items.

- The initial RSVS determines the Corridor and Corridor midpoint to be used in all future RSVS
- The initial RSVS determines the Legacy Liability as well as the schedule of Legacy Liability payments for fiscal year 2018 – 2047 (contribution amounts are scheduled amounts unless revised per the state statute)

The first exhibit in this section shows the RSVS Corridor. Column 3 shows the Corridor Midpoint which for fiscal year 2018 is 8.17% of pay. Columns 2 and 4 show the Corridor Minimum and Corridor Maximum respectively. Column 5 shows the actual City Contribution Rate for the fiscal year.

The next exhibit shows the individual pieces and total City Contribution Rate. While only one year of information is shown, this table is intended to show historic information in the future.

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.

The final exhibit is the Legacy Liability schedule. This table shows the amortization schedule of the Legacy Liability for each of the next 30 years. 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%	
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 - City Contribution Rate

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

Risk Sharing Valuation - Liability (Gain)/Loss Layers

Valuation Year Base Established	Original Layer	Remaining Layer	Current Year's Payment [1]	Years Remaining From Date Established
(1)	(2)	(3)	(4)	(5)
July 1, 2016	$ -	$ -	$ -	N/A
July 1, 2015				
July 1, 2014				
July 1, 2013				
July 1, 2012				
July 1, 2011				
July 1, 2010				
July 1, 2009				
July 1, 2008				
July 1, 2007				
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July 1, 2000				
July 1, 1999				
July 1, 1998				
July 1, 1997				
July 1, 1996				
July 1, 1995				
July 1, 1994				
July 1, 1993				
July 1, 1992				
July 1, 1991				
July 1, 1990				
July 1, 1989				
July 1, 1988				
July 1, 1987				
Total		$ -	$ -	
Projected Payroll for Fiscal Year +1			$ 630,651,218	
Amortization Payments as % of Projected Pay			0.00%	

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

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

Risk Sharing Valuation - City Contribution Information

Fiscal Year of City Payment	City Contribution Rate	City Contribution Amount	City Contribution Amount as % of Expected Payroll	Estimated Total City Contribution ($)	Estimated Total City Contribution Amount as % of Expected Payroll
(1)	(2)	(3)	(4)	(5)	(6)
June 30, 2018	8.17%	$ 124,030,357	19.67%	$ 175,546,778	27.84%
June 30, 2019	8.27%	127,441,192	19.67%	181,046,673	27.94%
June 30, 2020	8.32%	130,945,824	19.67%	186,330,592	27.99%
June 30, 2021	8.36%	134,546,835	19.67%	191,726,607	28.03%
June 30, 2022	8.41%	138,246,872	19.67%	197,349,343	28.08%
June 30, 2023	8.44%	142,048,661	19.67%	202,992,116	28.11%
June 30, 2024	8.48%	145,955,000	19.67%	208,870,563	28.15%
June 30, 2025	8.51%	149,968,762	19.67%	214,842,569	28.18%
June 30, 2026	8.54%	154,092,903	19.67%	220,985,542	28.21%
June 30, 2027	8.57%	158,330,458	19.67%	227,301,329	28.24%
June 30, 2028	8.59%	162,684,546	19.67%	233,714,836	28.26%
June 30, 2029	8.61%	167,158,371	19.67%	240,309,433	28.28%
June 30, 2030	8.63%	171,755,226	19.67%	247,090,007	28.30%
June 30, 2031	8.65%	176,478,494	19.67%	254,061,943	28.32%
June 30, 2032	8.67%	181,331,653	19.67%	261,230,596	28.34%
June 30, 2033	8.69%	186,318,273	19.67%	268,601,525	28.36%
June 30, 2034	8.70%	191,442,026	19.67%	276,083,121	28.37%
June 30, 2035	8.71%	196,706,682	19.67%	283,773,345	28.38%
June 30, 2036	8.72%	202,116,115	19.67%	291,677,814	28.39%
June 30, 2037	8.73%	207,674,309	19.67%	299,802,585	28.40%
June 30, 2038	8.74%	213,385,352	19.67%	308,146,935	28.41%
June 30, 2039	8.74%	219,253,449	19.67%	316,723,730	28.41%
June 30, 2040	8.75%	225,282,919	19.67%	325,532,176	28.42%
June 30, 2041	8.76%	231,478,199	19.67%	334,585,805	28.43%
June 30, 2042	8.77%	237,843,850	19.67%	343,883,912	28.44%
June 30, 2043	8.78%	244,384,556	19.67%	353,440,601	28.45%
June 30, 2044	8.79%	251,105,131	19.67%	363,255,304	28.46%
June 30, 2045	8.79%	258,010,522	19.67%	373,342,814	28.46%
June 30, 2046	8.80%	265,105,812	19.67%	383,702,236	28.47%
June 30, 2047	8.81%	272,396,221	19.67%	394,349,585	28.48%

Executive Summary

Item	July 1, 2016	July 1, 2015
Membership		
• Number of:		
- Active members	12,103 [1]	11,827
- Retirees and beneficiaries	10,289	10,023
- Inactive members	5,606	5,495
- Total	27,998	27,345
• Covered payroll (annualized)	$ 608,210	$ 584,025
Calculated Employer Contribution rates	8.17% [2]	31.81%
Assets		
• Market value	$ 2,400,023	$ 2,456,544
• Actuarial value	2,625,896 [3]	2,582,510
• Estimation of return on market value	1.2%	2.8%
• Estimation of return on actuarial value	-3.8%	6.8%
• Employer contribution	$ 159,959	$ 145,007
• Member contribution	$ 15,874	$ 16,198
• Ratio of actuarial value to market value	109.4%	105.1%
• External cash flow as % of market value assets	-3.6%	-3.4%
Actuarial Information		
• Unfunded actuarial accrued liability (UAAL)	$ 2,109,103	$ 2,183,209
• GASB funded ratio	55.5%	54.2%
• Employer normal cost %	8.17%	8.11%
• Amortization rate [4]	0.00%	23.70%
• City Contribution Rate	8.17%	31.81%
Estimated Total City Contribution for Fiscal Year	2018	2017
• City Contribution Rate	$ 51,524,205	N/A
• Legacy Liability Payment	$ 124,030,357	N/A
• Total	$ 175,554,562	N/A

Note: Dollar amounts in $000, unless otherwise noted

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

[2] For 7-1-2015 column this rate is determined in accordance with the ARM&CA.
For 7-1-2016 column this rate is the City Contribution Rate determined in accordance with the State statute.

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

[4] 30 years for 7-1-2015, beginning July 1, 2016 amortization rate of liability layers, excluding Legacy Liability.

Contribution Requirements

- The Executive Summary shows the estimated contribution amount for fiscal year 2018
  - Comprised of the known Legacy Liability payment of $124.0 million, and
  - City Contribution Rate times estimated payroll of $631 million = $51.5 million
- 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 contribution rate from the prior valuation to the current valuation
- There were material changes to the benefit provisions reflected in this valuation:
  - 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
  - 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
  - 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
- There were material changes to the actuarial assumptions and methods reflected in this valuation:
  - The investment return assumption was decreased from 8.00% to 7.00%
  - The inflation assumption was decreased from 2.50% to 2.25%
  - All salary increase assumptions were decreased 0.25%
  - The payroll growth rate assumption was decreased from 3.00% to 2.75%
  - The Actuarial Value of Assets was marked to Market Value of Assets
- Legacy Liability was determined as $2,109 million as of July 1, 2016
  - Reflects $250 million receivable for Pension Obligation Bonds to be received by December 31, 2017
  - Schedule of Legacy Liability contribution amounts shown in RSVS section
- Amortization of liability gain/loss layers are based on

— 30-year funding period beginning one year after the valuation date the layer is established 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

- The Plan's calculated contribution rate, prior to the removal of the Legacy Liability, decreased from the prior year due to of the impact of the new plan provisions and recognition of the $250 million receivable for Pension Obligation Bonds

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 2, the 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 is partitioned off into the Legacy Liability which has its own amortization schedule. In future valuations, any unexpected gains or losses will be set up as new liability gain/loss layers. These layers will be amortized over 30 years 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 currently equal to 1.19% of payroll. It is anticipated that the administrative expenses provision will increase to 1.25% effective with the July 1, 2017 valuation due to higher administrative costs for implementing several of the items from the pension reform. The maximum addition to the City Contribution Rate for administrative expenses is 1.25%, unless the City agrees to a higher rate. 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 City Contribution Rate necessary to meet the funding policy specified by statute for the twelve-month period beginning July 1, 2017 is 8.17%. Based on projected payroll, the FY 2018 actuarially determined employer contribution is estimated to be approximately $175.5 million. The contribution is comprised of the fixed Legacy Liability payment of $124.0 million and the estimated payment of $51.5 based on the City Contribution Rate of 8.17% and a projected FY 2018 payroll of $631 million.

Financial Data and Experience

As of July 1, 2016, HMEPS has a total market value of about $2.40 billion. Financial information was gathered from the 2016 HMEPS Comprehensive Annual Financial Report.

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 and real estate.

Table 9 shows a reconciliation of the market values between the beginning and end of FY2016.

As shown on Table 11, the dollar-weighted return net of investment expenses for FY2016 was 1.21%.

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 “market to market”.

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 $2.40 billion. The AVA is 100.0% of the MVA, compared to 105.1 % last year. For the Risk Sharing Valuation Study, a receivable equal to the discounted value of the POBs is recognized in the AVA brining the final AVA to $2.63 billion.

In addition to the market return, Table 11 also shows the return on the actuarial value of assets for HMEPS. For FY2016, this return was -3.81%. The return was negative due to the AVA being marked to the market value of assets. All prior years’ deferred losses were recognized in this year’s AVA. Because this is less than the previously assumed 8.0% investment return, an actuarial loss occurred increasing 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, 2016 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 16 and 17 show the summaries of certain historical data, including membership statistics. Table 18 shows the number of members by category (active, inactive, retired, etc.). Tables 19(a-d) show the active member statistics by Group and in total.

The number of active members increased from 11,827 to 12,103, a 2.3 % increase. 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 1.8% over last year, compared with an increase of 3.7% the prior 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) towards the unfunded actuarial accrued liability. 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. The number is then adjusted by the ratio of the number of active members on the valuation date to the average of the number of active members at the current and prior year's valuation dates. 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 of 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 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 expected 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.

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. Group A member contribution rate increased from 5.0% of pay to 8.0% of pay. Group B member contribution rate increased from no contributions to 4% of pay. Group D member contribution rate increased from no contributions to 3% of pay. 1/3rd of the Group D member contribution rate is attributed to a notional cash balance account.

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.

- 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 are no ancillary benefits that might be deemed a liability if continued beyond the availability of funding by the current funding source.

The change in the benefit provisions decreased the liabilities of HMEPS by $816 million.

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 believe it is appropriate to make changes to other economic assumptions that are correlated with the investment return assumption. In particular, we are recommending the inflation assumption be decreased from 2.50% to 2.25% and that corresponding decreases in the salary increase assumptions and payroll growth assumptions also be made.

The changes in the actuarial assumptions increased the liabilities of HMEPS by $608 million.

While the actuarial asset smoothing method was not modified, as part of the legislation all prior years deferred investment losses were recognized as of July 1, 2016. This increased the total loss on the actuarial value of assets from a $76 million experience loss to $300 million including the loss for the method change.

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) and the Schedule of Employer Contributions (Table 15).

Summary and Closing Comments

As a result of the legislation enacted in 2017, significant changes to the benefits and financing of HMEPS have occurred. We believe these changes have significantly improved the financial outlook of HMEPS.

The System's funded status increased from 54.2% to 55.5% and the actuarially determined contribution rate decreased from 31.81% to an approximate rate of 27.84%.

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 funding 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 31 years after the July 1, 2016 valuation date.

Summary of Cost Items

	Valuation as of July 1, 2016		Valuation as of July 1, 2015	
	Cost Item	Cost as % of Pay	Cost Item	Cost as % of Pay
	(1)	(2)	(3)	(4)
1. Participants				
a. Actives	12,103		11,827	
b. Retirees	8,084		7,819	
c. Disabled retirees	336		350	
d. Beneficiaries	1,869		1,854	
e. Inactive, deferred vested	3,432		3,202	
f. Inactive, nonvested	2,174		2,293	
g. Total	27,998		27,345	
2. Covered payroll	$ 608,210		$ 584,025	
3. Averages for active members				
a. Average age	47.1		47.1	
b. Average years of service	11.1		11.2	
c. Average pay ($)	$ 50,253		$ 49,381	
4. Present value of future pay	$ 4,482,435		$ 4,141,116	
5. Employer normal cost rate	8.17%		6.92%	
6. Present value of future benefits	$ 5,256,414	864.2%	$ 5,147,907	881.5%
7. Present value of future normal costs	$ 521,414	85.7%	$ 382,188	65.4%
8. Actuarial accrued liability (6 - 7)	$ 4,734,999	778.5%	$ 4,765,719	816.0%
9. Present actuarial assets	$ 2,625,896	431.7%	$ 2,582,510	442.2%
10. Unfunded actuarial accrued liability (UAAL) (8 - 9)	$ 2,109,103	346.8%	$ 2,183,209	373.8%
11. Calculated employer contribution rate				
a. Employer normal cost	8.17%		8.11%	
b. Amortization charge [1]	0.00%		23.70%	
c. Total	8.17%		31.81%	
12. Average estimated return				
a. Based on market value	1.21%		2.78%	
b. Based on actuarial value	-3.81%		6.82%	
13. Funded ratio (9 ÷ 8)	55.5%		54.2%	
14. Legacy Liability payment for fiscal year beginning one year after valuation date	$ 124,030,357		N/A	

Note: Dollar amounts in $000

[1] For 7-1-2015 column this is 30-year amortization of UAAL
For 7-1-2016 column this is the layered amortization payment excluding Legacy Liability

Calculation of Annual Required Contribution Rate

		July 1, 2016 (1)	July 1, 2015 (2)
1.	Annualized salaries on valuation date	$ 608,210	$ 584,025
2.	Projected payroll for upcoming fiscal year [1]	$ 613,772	$ 590,674
3.	Present value of future pay	$ 4,482,435	$ 4,141,116
4.	Employer normal cost rate	8.17%	6.92%
5.	Actuarial accrued liability for active members		
	a. Present value of future benefits for active members	$ 2,361,925	$ 2,315,047
	b. Less: present value of future employer normal costs	(426,297)	(270,476)
	c. Less: present value of future employee contributions	(95,117)	(111,712)
	d. Actuarial accrued liability	$ 1,840,511	$ 1,932,859
6.	Total actuarial accrued liability for:		
	a. Retirees and beneficiaries	$ 2,704,998	$ 2,638,305
	b. Inactive participants	$ 189,491	194,555
	c. Active members (Item 5d)	$ 1,840,511	1,932,859
	d. Total	$ 4,734,999	$ 4,765,719
7.	Actuarial value of assets	$ 2,625,896 [2]	$ 2,582,510
8.	Unfunded actuarial accrued liability (UAAL) (Item 6d - Item 7)	$ 2,109,103	$ 2,183,209
9.	Assumed payroll growth rate	2.75%	3.00%
10.	Estimated employer contribution requirement		
	a. UAAL amortization payment as % of projected pay	19.67%	23.70%
	b. Employer normal cost	8.17%	8.11%
	c. Contribution requirement (a + b)	27.84%	31.81%

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 and by the ratio of the current number of active members to the average number of active members during the prior fiscal year.

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

Actuarial Present Value of Future Benefits

		July 1, 2016 (1)	July 1, 2015 (2)
1.	Active members		
	a. Retirement benefits	$ 2,127,351	$ 2,093,301
	b. Deferred termination benefits	137,067	121,170
	c. Refunds	12,647	11,227
	d. Death benefits	72,880	77,388
	e. Disability benefits	11,980	11,961
	f. Total	$ 2,361,925	$ 2,315,047
2.	Members in Pay Status		
	a. Service retirements	$ 2,408,724	$ 2,354,163
	b. Disability retirements	36,248	40,160
	c. Beneficiaries	260,026	243,982
	d. Total	$ 2,704,998	$ 2,638,305
4.	Inactive members		
	a. Vested terminations	$ 185,737	$ 188,994
	b. Nonvested terminations	3,754	5,561
	c. Total	$ 189,491	$ 194,555
5.	Total actuarial present value of future benefits	$ 5,256,414	$ 5,147,907

Note: Dollar amounts in $000

Analysis of Normal Cost

		July 1, 2016	July 1, 2015
		(1)	(2)
1.	Gross normal cost rate		
	a. Retirement benefits	7.39%	5.59%
	b. Deferred termination benefits	1.41%	0.88%
	c. Refunds [1]	0.63%	0.00%
	d. Disability benefits	0.13%	0.08%
	e. Death benefits	0.42%	0.37%
	f. Administrative expenses	1.19%	1.19%
	g. Total	11.17%	8.11%
2.	Employee Contribution rate [1]	3.00%	0.00%
3.	Employer Normal Cost (including Administrative expenses)	8.17%	8.11%

[1] For the July 1, 2015 valuation, refund of employee contributions were excluded due to use of replacement life normal cost method for ongoing plan. New members (Group D) did not contribute to the plan at that time. Effective with July 1, 2016 valuation, refunds are included because new members now contribute 3% in total to the plan.

Calculation of Total Actuarial Gain or Loss

1.	Unfunded actuarial accrued liability (UAAL) as of July 1, 2015	$	2,183,209
2.	Employer normal cost and administrative expense for year [1]		41,987
3.	Employer Contributions during year ending June 30, 2016 [1]		(159,959)
4.	Interest on UAAL for one year		174,657
5.	Interest on Item 2 and Item 3 for one-half year		(4,628)
6.	Expected UAAL as of July 1, 2016 (1+2+3+4+5)	$	2,235,266
7.	Actual UAAL as of July 1, 2016	$	2,109,103
8.	Actuarial gain/(loss) for the period (6 - 7)	$	126,163
	SOURCE OF GAINS/(LOSSES)		
9.	Asset gain/(loss) (See Table 10)	$	(76,061)
10.	Plan changes	$	816,049
11.	Assumption changes	$	(608,392)
12.	Method change	$	(223,850)
13.	Receivable for Pension Obligation Bonds proceeds	$	225,873
14.	Total liability gain/(loss) for the period	$	(7,456)
15.	Actuarial gain/(loss) for the period	$	126,163

Note: Dollar amounts in $000

[1] Employee contributions excluded due to use of replacement life normal cost method for ongoing plan. New members (Group D) did not contribute to the plan for fiscal year 2016.

Change in Calculated Contribution Rate Since the Prior Valuation

1.	Calculated Contribution Rate as of July 1, 2015			31.81%
2.	Change in Contribution Rate During Year			
	a.	Change in Employer Normal Cost	N/A	
	b.	Addition of administrative expenses	N/A	
	c.	Recognition of prior years' asset losses	N/A	
	d.	Actuarial loss from current year asset performance	N/A	
	e.	Actuarial loss from liability sources	N/A	
	f.	Impact of City contributing less than actuarially determined rate	N/A	
	g.	Effect of projected payroll growing slower than expected	N/A	
	h.	Effect of resetting amortization period to 30 years	N/A	
	i.	Change in Actuarial Assumptions and Methods	N/A	
	j.	Impact of Pension Reforms	(3.97%)	
	k.	Total Change		(3.97%)
3.	Calculated Contribution Rate as of July 1, 2016			27.84%

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,	Projected Compensation	Employer Contributions	Employee Contributions	Benefit Payments[2]	Net External Cash Flow
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2016	$ 2,109,103	55.5%	8.17%	8.17%	$ 2,625,896	2017	$ 613,772	$ 180,204	$ 15,785	$ 297,508	$ (101,519)
2017	2,123,880	56.0%	8.27%	8.27%	2,705,541	2018	630,651	175,547	34,167	313,329	(103,615)
2018	2,144,254	56.5%	8.32%	8.32%	2,788,645	2019	647,994	181,047	33,707	331,163	(116,409)
2019	2,162,526	57.0%	8.36%	8.36%	2,864,385	2020	665,814	186,331	33,283	349,427	(129,814)
2020	2,178,451	57.4%	8.41%	8.41%	2,931,614	2021	684,124	191,727	32,897	367,533	(142,910)
2021	2,191,766	57.7%	8.44%	8.44%	2,990,054	2022	702,937	197,349	32,539	385,900	(156,012)
2022	2,202,186	58.0%	8.48%	8.48%	3,039,085	2023	722,268	202,992	32,208	404,229	(169,028)
2023	2,209,403	58.2%	8.51%	8.51%	3,078,138	2024	742,130	208,871	31,917	422,292	(181,504)
2024	2,213,084	58.4%	8.54%	8.54%	3,107,070	2025	762,539	214,843	31,670	397,556	(151,044)
2025	2,212,871	58.9%	8.57%	8.57%	3,169,464	2026	783,509	220,986	31,467	408,377	(155,925)
2026	2,208,377	59.4%	8.59%	8.59%	3,231,207	2027	805,055	227,301	31,321	417,117	(158,494)

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.

Statement of Plan Net Assets

		July 1, 2016 (1)		July 1, 2015 (2)
A. ASSETS				
1. Current Assets				
a. Cash and short term investments				
1) Cash on hand	$	7,551	$	622
2) Short term investments		79,292		78,699
b. Accounts Receivable				
1) Sale of investments		6,048		19,724
2) Other		7,330		5,156
c. Total Current Assets	$	100,221	$	104,201
2. Long Term Investments				
a. US. Government securities	$	92,417	$	85,623
b. Corporate bonds		200,401		225,280
c. Capital stocks		664,796		768,811
d. Commingled Funds		364,165		393,973
e. LP's, real estate trusts, loans and mortgages		995,727		914,954
f. Total long term investments	$	2,317,506	$	2,388,641
3. Other Assets				
a Collateral on securities lending	$	73,941	$	101,533
b. Furniture, fixtures and equipment, net		298		395
c. Total other assets	$	74,239	$	101,928
4. Total Assets	$	2,491,966	$	2,594,770
B. LIABILITIES				
1. Current Liabilities				
a. Amounts due on asset purchases	$	12,133	$	30,782
b. Accrued liabilities		5,869		5,911
c. Collateral on securities lending		73,941		101,533
2. Total Liabilities		91,943		138,226
3. Net Assets Held in Trust	$	2,400,023	$	2,456,544
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 Equities		17.5%		17.5%
5. Global Equities		35.0%		35.0%
6. Alternative Investments		22.5%		22.5%
7. Total		100.0%		100.0%

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

Reconciliation of Plan Net Assets

				Year Ending			
				June 30, 2016		June 30, 2015	
				(1)		(2)	
1.	Market value of assets at beginning of year			$	2,456,544	$	2,464,439
2.	Revenue for the year						
	a.	Contributions					
		i.	Member contributions	$	15,874	$	16,198
		ii.	Employer contributions (see note)		159,959		145,007
		iii.	Total	$	175,833	$	161,205
	b.	Net investment income					
		i.	Interest	$	17,753	$	17,417
		ii.	Dividends		18,843		19,323
		iii.	Earnings from LP's and real estate trusts		1,034		8,679
		iv.	Net appreciation (depreciation) on investments		(2,454)		36,335
		v.	Net proceeds from lending securities		349		484
		vi.	Less investment expenses		(7,538)		(8,384)
		vii.	Other		1,303		557
	c.	Total revenue		$	205,123	$	235,616
3.	Expenditures for the year						
	a.	Refunds		$	1,105	$	1,549
	b.	Benefit payments			253,179		234,955
	c.	Administrative and miscellaneous expenses			7,360		7,007
	d.	Total expenditures		$	261,644	$	243,511
4.	Increase in net assets (Item 2c - Item 3d)			$	(56,521)	$	(7,895)
5.	Market value of assets at end of year (Item 1 + Item 4)			$	2,400,023	$	2,456,544

Note: Dollar amounts in $000

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

Columns may not add due to rounding

Development of Actuarial Value of Assets

		July 1, 2016
1. Actuarial value of assets at beginning of year	$	2,582,510
2. Net new investments		
a. Contributions	$	175,833
b. Benefits and refunds paid		(261,644)
c. Subtotal		(85,811)
3. Assumed investment return rate for fiscal year		8.00%
4. Assumed investment income for fiscal year	$	203,235
5. Expected Actuarial Value at end of year (1+ 2 + 4)	$	2,699,934
6. Market value of assets at end of year	$	2,400,023
7. Difference (6 - 5)	$	(299,911)

8. Development of amounts to be recognized as of July 1, 2016:

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)
2012	$ (13,041)	$ 0	$ (13,041)	1	$ (13,041)	$ (0)
2013	0	0	0	2	0	0
2014	0	0	0	3	0	0
2015	(112,925)	0	(112,925)	4	(28,231)	(84,694)
2016	(173,945)	0	(173,945)	5	(34,789)	(139,156)
Total	$ (299,911)	$ 0	$ (299,911)		$ (76,061)	$ (223,850)

9. Preliminary actuarial value of plan net assets, end of year (Item 6 - Item 8 Column 6)	$	2,623,873
10. Asset gain (loss) for year (Item 9 - Item 5)	$	(76,061)
11. Asset gain (loss) as % of actual actuarial assets		(2.90%)
12. Ratio of actuarial value to market value		109.4%
13. Final Actuarial value of plan net assets		
a. Change to mark actuarial value of assets to market	$	(223,850)
b. Estimated 2016 POB proceeds discounted to valuation date		225,873
c. Final actuarial value of assets (Item 9 + Item 13a + Item 13b)	$	2,625,896

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.

Estimation of Investment Return Yield (Net of Expenses)

Item	July 1, 2016	July 01, 2015
(1)	(2)	(3)
A. Market value yield		
1. Beginning of year net market assets	$ 2,456,544	$ 2,464,439
2. Net Investment income (net of investment expenses) [1]	29,290	67,404
3. End of year market assets	2,400,023	2,456,544
4. Estimated market value yield	1.21%	2.78%
B. Actuarial value yield		
1. Beginning of year actuarial assets	$ 2,582,510	$ 2,490,521
2. Net Investment income (net of investment expenses) [1]	(96,676)	167,288
3. End of year actuarial assets	2,400,023 [2]	2,582,510
4. Estimated actuarial value yield	-3.81%	6.82%

[1] Net investment income for 2015 is net of investment and administrative expenses
[2] Reflects actuarial value of assets being marked to market but is prior to recognition of POB receivable

Note: Dollar amounts in $000

History of Investment Returns

For Fiscal Year Ending (1)	Market Value (2)	Actuarial Value (3)
June 30, 2003	2.34%	1.69%
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%)
Average Compound Return - last 5 years	6.22%	4.08%
Average Compound Return - last 10 years	5.55%	6.20%

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.

Historical Solvency Test

Valuation Date	Aggregated Accrued Liabilities for: Active Members Contributions	Retirees Beneficiaries and Vested Terminations[1]	Members (City Financed Portion)	Actuarial Value of Assets	Portions of Accrued Liabilities Covered by Reported Assets: (5)/(2)	[(5)-(2)]/(3)	[(5)-(2)-(3)]/(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
July 1, 1996	$ 45,819	$ 438,486	$ 558,154	$ 857,332	100.0%	100.0%	67%
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	2,400,023	100.0%	77.9%	0%

Note: Dollar amounts in $000

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

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, 1996	$ 857,332	$ 1,042,459	$ 185,127	82.2%	$ 367,610	50.4%
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%

Note: Dollar amounts in $000

Historical City Contribution Rates

Valuation Date	Calculated Contribution Rate[1]	Time Period for Contribution Rate	Actual Contribution Rate
(1)	(2)	(3)	(4)
July 1, 1987	5.83%	January 1, 1988 through December 31, 1988	5.15%
July 1, 1988	6.27	January 1, 1989 through December 31, 1989	5.15
July 1, 1989	6.88	January 1, 1990 through December 31, 1990	6.27
July 1, 1990	6.23	January 1, 1991 through December 31, 1991	6.27
July 1, 1991	8.77	January 1, 1992 through June 30, 1993	6.27
July 1, 1992	9.11	July 1, 1993 through June 30, 1994	9.11
July 1, 1993	9.30	July 1, 1994 through June 30, 1995	9.30
July 1, 1994	8.80	July 1, 1995 through June 30, 1996	8.80
July 1, 1995	9.20	July 1, 1996 through June 30, 1997	9.20
July 1, 1996	9.10	July 1, 1997 through June 30, 1998	9.10
		July 1, 1998 through June 30, 1999	9.10
July 1, 1998	9.30	July 1, 1999 through June 30, 2000	9.30
July 1, 1999	9.80	July 1, 2000 through June 30, 2001	10.00
July 1, 2000	9.50	July 1, 2001 through June 30, 2002	10.00
July 1, 2001	17.70	July 1, 2002 through June 30, 2003	10.00
July 1, 2002	31.80	July 1, 2003 through June 30, 2004	14.70
July 1, 2003	52.89	July 1, 2004 through June 30, 2005	92.55[2,3]
July 1, 2004	29.43	July 1, 2005 through June 30, 2006	15.49[3]
July 1, 2005	24.10	July 1, 2006 through June 30, 2007	15.89[3]
July 1, 2006	24.63	July 1, 2007 through June 30, 2008	15.52[4]
July 1, 2007	19.47	July 1, 2008 through June 30, 2009	14.63[4]
July 1, 2008	19.20	July 1, 2009 through June 30, 2010	14.65[4]
July 1, 2009	20.07	July 1, 2010 through June 30, 2011	16.30[4]
July 1, 2010	22.36	July 1, 2011 through June 30, 2012	17.74[5]
July 1, 2011	23.45	July 1, 2012 through June 30, 2013	21.10[5]
July 1, 2012	26.10	July 1, 2013 through June 30, 2014	23.70[5]
July 1, 2013	27.50	July 1, 2014 through June 30, 2015	25.11[5]
July 1, 2014	27.38	July 1, 2015 through June 30, 2016	27.09[5]
July 1, 2015	31.81	July 1, 2016 through June 30, 2017	N/A
July 1, 2016	27.84	July 1, 2017 through June 30, 2018	N/A

[1] Rate determined by the actuarial valuation is for the fiscal year beginning on the July 1st next following the valuation date.

[2] Includes $300 million note.

[3] As pursuant to the funding schedule from the 2004 Meet and Confer Agreement.

[4] As pursuant to the funding schedule from the Fourth Amendment.

[5] As pursuant to the funding schedule from the ARM&CA.

Note: beginning with the July 1, 2016 valuation, the caclualted contribution rate is comprised of the fixed Legacy Liability contribution amount and the City Contribution Rate. The rate shown is an estimate based on the conversion of the fixed Legacy Liability contribution amount to a percentage of projected payroll.

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)
1989	11,356	N/A	N/A	$235,400	$20,729	3.2%
1990	12,037	40.0	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%

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.

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)
1996	416	$ 3,119	239	$ 1,438	4,618	$ 38,815	6.4%	$ 8,405
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	928	29,096	324	5,842	10,289	230,937	11.2%	22,445

Note: Dollar amounts in $000

Membership Data

	July 1, 2016 (1)		July 1, 2015 (2)	July 1, 2014 (3)
1. Active members				
a. Number	12,103	*	11,827	11,949
b. Number vested	7,966		8,352	8,818
c. Annualized salaries	$ 608,210,000		$ 584,025,000	$ 568,992,000
d. Average salary	50,253		49,381	47,618
e. Average age	47.1		47.1	46.9
f. Average service	11.1		11.2	11.1
2. Inactive participants				
a. Vested	3,432		3,202	3,313
b. Total annual benefits (deferred)	$ 24,273,639		$ 22,450,520	$ 23,048,675
c. Average annual benefit	7,073		7,011	6,957
d. NonVested	2,174		2,293	2,219
3. Service retirees				
a. Number	8,084		7,819	7,498
b. Total annual benefits	$ 198,363,966		$ 188,491,161	$ 178,109,613
c. Average annual benefit	24,538		24,107	23,754
d. Average age	68.5		68.5	68.5
4. Disabled retirees				
a. Number	336		350	371
b. Total annual benefits	$ 3,560,156		$ 3,643,233	$ 3,749,983
c. Average annual benefit	10,596		10,409	10,108
d. Average age	64.8		64.8	64.8
5. Beneficiaries and spouses				
a. Number	1,869		1,854	1,816
b. Total annual benefits	$ 29,012,963		$ 27,349,358	$ 25,823,664
c. Average annual benefit	15,523		14,752	14,220
d. Average age	67.8		68.3	69.7

* Counts include an additional 170 Group D members.

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				1		15	5						21
				$35,000		$36,560	$49,731						$39,621
30-34	1	5	5	8	3	111	102	1					236
	$31,512	$46,491	$54,078	$37,967	$45,430	$45,402	$42,529	$77,434					$44,193
35-39	4	4	6	9	9	167	238	44	1				482
	$55,468	$55,202	$42,581	$47,342	$35,606	$51,029	$51,252	$49,433	$66,240				$50,635
40-44	3	9	7	12	6	136	249	109	36	2			569
	$36,254	$40,760	$51,882	$58,212	$47,109	$50,891	$52,904	$48,703	$54,235	$75,639			$51,540
45-49	6	2	7	9	4	154	307	158	116	48	2		813
	$30,425	$37,373	$43,414	$44,105	$38,898	$51,552	$54,146	$53,511	$58,633	$53,607	$44,105		$53,620
50-54	6	7	4	10	17	172	322	200	161	150	53	4	1,106
	$45,808	$37,856	$48,416	$54,191	$42,879	$52,501	$53,116	$52,889	$59,825	$57,387	$52,367	$58,967	$54,220
55-59	5	4	10	7	10	135	308	198	177	131	92	34	1,111
	$49,966	$31,141	$37,744	$60,789	$75,761	$50,496	$52,913	$53,923	$60,147	$62,307	$61,247	$66,827	$56,203
60-64	2	3	5	5	5	98	248	147	127	98	39	27	804
	$36,379	$51,824	$51,625	$40,059	$41,281	$50,801	$54,083	$54,264	$59,983	$69,763	$69,189	$68,228	$57,532
65 & Over		1		1	2	64	132	68	66	27	20	14	395
		$54,612		$69,795	$66,896	$54,501	$57,962	$58,291	$62,346	$71,540	$65,390	$81,547	$60,397
Total	27	35	44	62	56	1,052	1,911	925	684	456	206	79	5,537
	$42,301	$42,700	$45,958	$49,965	$48,603	$50,650	$52,875	$53,201	$59,694	$61,980	$60,701	$69,516	$54,381

Average:	Age:	51.58	Number of participants:	Fully vested:	5,313	Males:	3,008
	Service:	15.53		Not Vested:	224	Females:	2,529

Note: A former Group A employee who is rehired on or after January 1, 2008 is still a Group A employee.
Note: The chart includes four employees who were formerly members of Group C. The chart also includes employees who switch from Group B to Group A.

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	2	1		3		3							9
	$28,704	$34,478		$25,807		$31,897							$29,444
30-34	1					5	5						11
	$27,165					$36,923	$39,183						$37,063
35-39	1	2				2	2	20	2				29
	$36,317	$34,626				$56,791	$25,714	$49,222	$51,550				$46,832
40-44	1		4	4	2	8	1	57	39				116
	$24,394		$42,074	$48,159	$45,497	$46,827	$27,435	$46,006	$46,049				$45,661
45-49	3	1	2	1	2	10	1	81	122	43			266
	$36,081	$41,163	$30,230	$35,501	$36,153	$38,747	$25,367	$45,254	$49,457	$50,089			$47,307
50-54	3	4	3	4	7	11		72	109	99	41	1	354
	$75,559	$46,987	$42,425	$32,050	$50,582	$50,609		$45,240	$48,194	$51,804	$47,887	$61,140	$48,713
55-59	3	5	2	5	4	13	1	63	113	73	37	12	331
	$52,293	$46,872	$54,337	$73,096	$47,317	$55,760	$170,324	$48,831	$48,770	$49,398	$54,088	$50,395	$50,602
60-64	1	2	1	4	2	6	1	46	68	58	19	9	217
	$47,258	$40,606	$44,283	$51,840	$65,903	$62,241	$88,613	$49,397	$48,462	$55,200	$51,771	$73,137	$52,466
65 & Over			4	1	1	1	1	14	38	19	4	1	84
			$45,686	$25,398	$41,949	$38,341	$104,742	$46,535	$55,495	$51,402	$68,568	$58,084	$53,125
Total	15	15	16	22	18	59	12	353	491	292	101	23	1,417
	$45,623	$43,228	$43,233	$46,909	$48,911	$48,294	$55,319	$46,826	$49,086	$51,599	$51,708	$60,096	$49,225

Average:	Age:	53.33	Number of participants:	Fully vested:	1,331	Males:	680
	Service:	21.28		Not Vested:	86	Females:	737

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

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	93	48	36	11	8	3							199
	$32,997	$31,979	$31,433	$32,169	$36,173	$41,366							$32,676
25-29	239	135	158	95	63	83							773
	$36,739	$36,919	$37,511	$37,695	$38,455	$38,168							$37,339
30-34	208	139	158	109	77	253							944
	$40,471	$42,970	$43,534	$44,728	$43,954	$44,877							$43,308
35-39	142	109	107	78	52	192							680
	$46,378	$47,591	$45,993	$45,599	$49,630	$50,017							$47,699
40-44	118	100	87	68	44	169							586
	$43,933	$50,788	$48,991	$51,406	$53,296	$52,392							$49,863
45-49	109	80	62	61	53	163							528
	$44,535	$49,760	$46,367	$53,712	$52,547	$50,167							$49,145
50-54	100	62	72	51	43	161							489
	$44,234	$51,017	$46,154	$44,757	$47,208	$54,903							$49,205
55-59	78	63	58	64	31	137							431
	$48,572	$55,433	$44,246	$51,732	$62,649	$52,825							$51,826
60-64	27	28	34	35	18	106							248
	$48,975	$38,705	$64,205	$46,986	$58,293	$58,011							$54,161
65 & Over	3	10	11	12	10	55							101
	$48,887	$43,205	$62,073	$58,785	$50,577	$61,072							$57,739
Total	1,117	774	783	584	399	1,322							4,979
	$41,694	$45,103	$44,381	$46,374	$48,457	$50,579							$46,096

Average:	Age:	40.63	Number of participants:	Fully vested:	1,322		Males:	2,779
	Service:	3.45		Not Vested:	3,657		Females:	2,200

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

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

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	93	48	36	11	8	3							199
	$32,997	$31,979	$31,433	$32,169	$36,173	$41,366							$32,676
25-29	241	136	158	99	63	101	5						803
	$36,673	$36,901	$37,511	$37,308	$38,455	$37,743	$49,731						$37,310
30-34	210	144	163	117	80	369	107	1					1,191
	$40,365	$43,093	$43,858	$44,266	$44,010	$44,927	$42,373	$77,434					$43,426
35-39	147	115	113	87	61	361	240	64	3				1,191
	$46,557	$47,630	$45,812	$45,779	$47,561	$50,523	$51,039	$49,367	$56,446				$48,866
40-44	122	109	98	84	52	313	250	166	75	2			1,271
	$43,584	$49,960	$48,915	$52,224	$52,282	$51,597	$52,802	$47,777	$49,978	$75,639			$50,231
45-49	118	83	71	71	59	327	308	239	238	91	2		1,607
	$43,602	$49,358	$45,621	$52,237	$51,066	$50,470	$54,052	$50,712	$53,929	$51,944	$44,105		$51,105
50-54	109	73	79	65	67	344	322	272	270	249	94	5	1,949
	$45,183	$49,534	$46,127	$45,426	$46,462	$53,565	$53,116	$50,864	$55,130	$55,168	$50,413	$59,401	$51,961
55-59	86	72	70	76	45	285	309	261	290	204	129	46	1,873
	$48,783	$53,489	$43,605	$53,972	$64,200	$51,856	$53,293	$52,694	$55,714	$57,688	$59,194	$62,540	$54,206
60-64	30	33	40	44	25	210	249	193	195	156	58	36	1,269
	$48,078	$40,012	$62,134	$46,640	$55,499	$54,767	$54,222	$53,104	$55,965	$64,348	$63,483	$69,455	$56,007
65 & Over	3	11	15	14	13	120	133	82	104	46	24	15	580
	$48,887	$44,242	$57,703	$57,187	$52,424	$57,378	$58,313	$56,284	$59,843	$63,222	$65,919	$79,983	$58,881
Total	1,159	824	843	668	473	2,433	1,923	1,278	1,175	748	307	102	11,933
	$41,759	$44,967	$44,441	$46,725	$48,492	$50,554	$52,890	$51,440	$55,261	$57,928	$57,743	$67,392	$50,312

Average: Age: 47.13 Number of participants: Fully vested: 7,966 Males: 6,467
Service: 11.06 Not Vested: 3,967 Females: 5,466

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

Summary of Actuarial Assumptions and Methods

The following methods and assumptions were used in preparing the July 1, 2016, 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 unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability and amortizing the result over 30 years from the valuation date.

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. <u>Actuarial Value of Assets</u>

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), 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 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

Interests are 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.

All healthy and disabled retirees are assumed to have 100% joint and survivor, 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. Group Transfers

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

9. Change in Assumptions Since Prior Valuation

- The actuarial assumptions were modified since the prior valuation. In particular the investment return assumption was decreased from 8.00% to 7.00%.
- The inflation assumption was lowered to 2.25%.
- The ultimate salary scale assumption was changed to 3.00%.
- The payroll growth rate assumptions were changed to 2.75%.
- The Actuarial Value of Assets was marked to Market Value, plus an expected $250 million in Pension Obligation Bonds (POBs), discounted from December 31, 2017 at 7%.
- COLAs are assumed to be 1.00% per year for all members
- DROP crediting rate is 4.00% per year

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.

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 credited service are rehired they will regain a year of forfeited 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

All accruals after January 1, 2005:

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. Early Retirement (Group D only)

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 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. Postretirement Survivor Benefits

All Groups except Option-Eligible Participants Prior to June 30, 2017:

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.

All Groups except Option-Eligible Participants On or After July 1, 2017:

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.

Option-Eligible Participants:

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. Benefit Adjustments

Prior to June 30, 2017:

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

1. Prospective Cost of Living Adjustments (COLAs) are calculated as 50% of the average five-year investment return less five percentage points, with a minimum of 0% and a maximum of 2%. COLAs will be delayed until age 62 for participants while actively employed in the DROP.
2. The DROP Interest Credit formula is 50% of the average five-year investment return, with a minimum of 2.50% and a maximum of 7.50%.
3. The prospective employee contribution rate will be 8% for employees in Group A, 4% for employees in Group B, and 2% for employees in Group D. For Group D, in addition to the 2% employee contribution, employees contribute 1% to a notional account that will be credited with the DROP interest crediting rate.
4. For all new survivors of Group A/B members after 6/30/2017, 80% or 50% of the benefit is payable, depending on date of termination of employment and marital status at termination of employment.