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City of Memphis

City of Memphis Retirement System

Actuarial Valuation as of
July 1, 2013



November 8, 2013

Mr. Brian Collins
Director, Division of Finance
City of Memphis
125 North Main Street
Memphis, Tennessee 38103

Dear Mr. Collins,

We are pleased to present this report containing the results of the July 1, 2013 actuarial valuation of the City of Memphis Retirement System ("the Plan"), pursuant to our engagement letter with the City of Memphis ("the City") dated September 26, 2013.

The City of Memphis retained PricewaterhouseCoopers LLP to perform an actuarial valuation of the Retirement System for the purpose of calculating the necessary information for accounting and reporting requirements in accordance with Government Accounting Standards Board Statements No. 27 (GASB 27).

This valuation has been conducted in accordance with the required Actuarial Standards of Practice as issued by the American Academy of Actuaries.

Actuarial calculations under GASB 27 are for purposes of fulfilling the City's financial accounting requirements. The calculations reported herein have been made on a basis consistent with our understanding of GASB 27.

In preparing the results presented in this report, we have relied upon information the City of Memphis provided to us regarding plan provisions, plan participants, unaudited plan assets and benefit payments. The census data and plan asset information used in calculating the results herein were collected as of July 1, 2013. While the scope of our engagement did not call for us to perform an audit or independent verification of this information, we have reviewed this information for reasonableness. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying information.

GASB 27 requires that each significant assumption reflect the best estimate of the Plan's future experience solely with respect to that assumption. The City of Memphis has determined and taken responsibility for the actuarial assumptions and the accounting policies and methods employed in the valuation of obligations and costs.

A range of results, different from those presented in this report could be considered reasonable. Future actuarial measurements may differ significantly from the current measurement presented in this report due to a number of factors including but not limited to: plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methods used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status), rounding conventions and changes in plan provisions or applicable law. Due to the limited scope of this report, an analysis of the potential range of such future measurements has not been performed.

*PricewaterhouseCoopers LLP, 1075 Peachtree Street, Suite 2600, Atlanta, GA 30309
T: (678) 419 1000, F: (678) 419 1239, www.pwc.com/*



This report was prepared for the internal use of the City of Memphis in connection with our actuarial valuation of the Plan and not for reliance by any other person. PwC disclaims any contractual or other responsibility or duty of care to others based upon the services or deliverables provided in connection with this report.

This report does not purport to comply with any other purposes not stated herein. Significantly different results from what is presented in this report may be needed for other purposes.

This document was not intended or written to be used, and it cannot be used, for the purpose of avoiding U.S. federal, state or local tax penalties. This includes penalties that may apply if the transaction that is the subject of this document is found to lack economic substance or fails to satisfy any other similar rule of law.

The undersigned actuaries are each a member of the Society of Actuaries and the American Academy of Actuaries and meet the "Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States" relating to pension plans. To the best of our knowledge, the individuals involved in this engagement have no relationship that may impair, or appear to impair, the objectivity of our work.

We appreciate this opportunity to be of service to the City of Memphis. We are available to answer any questions with respect to our report.

Respectfully submitted,

A handwritten signature in black ink that reads "Jerrold Dubner".

Jerrold Dubner
jerrold.dubner@us.pwc.com
(678) 419-1320
Member, American Academy of Actuaries
Associate of the Society of Actuaries

A handwritten signature in black ink that reads "Shep Price".

Shepherd M. Price
shepherd.m.price@us.pwc.com
(312) 298-2457
Member, American Academy of Actuaries
Associate of the Society of Actuaries

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SECTION I - EXECUTIVE SUMMARY

HIGHLIGHTS OF THE ACTUARY'S REPORT

Annual Contribution Requirement

The City's annual required contribution (ARC) pursuant to GASB 27 for the 2013 - 2014 plan year is \$96,024,000, an increase of \$5,661,000 over the prior year. This amount is comprised of the normal cost (\$33,466,000), the amortization of unfunded actuarial accrued liability (\$55,859,000), and interest on both of these components (\$6,699,000). Details of this calculation can be found in Section II - Funding, Exhibit C.

As shown above, there are two main components that comprise the ARC. The first component is the normal cost, which is the cost of additional benefits accruing during the current year. The employer normal cost as a percentage of covered payroll decreased slightly compared to the prior year from about 11.2% to 11.0%. This relative stability in the employer normal cost as a percentage of covered payroll is to be expected under the Entry Age Normal Cost Method, which determines the normal cost as a fixed percentage of compensation of each active participant. The employer normal cost decreased by \$26,000 from \$33,492,000 in 2012 to \$33,466,000 in 2013, while covered payroll increased from \$298,250,000 in 2012 to \$304,686,000 in 2013. One of the factors for the decrease in employer normal cost is due to the changes in the plan provisions effective July 1, 2012, as described below.

The second component of the ARC is the amortization of the unfunded actuarial accrued liability (which is determined by the City of Memphis as the 30 year amortization of the excess of the liability over the actuarial value of assets). The unfunded actuarial accrued liability includes actuarial gains and losses in both the assets and the benefit obligation.

The asset value used to determine the ARC is an actuarial value that "smoothes" fluctuations in the market value from year to year, while ensuring that the actuarial value stays within a "10% corridor" of the market value of assets. If the actuarial value of assets remains within the corridor, then there is no actuarial gain or loss due to asset experience for the period. The return on the market value of assets for the period ending June 30, 2013 was approximately 11.1%. However, because the "gain" relative to the assumed 7.5% was within the corridor, there was no asset experience gain for the period ending June 30, 2013.

Regarding the benefit obligation, there was an aggregate liability loss of 0.8% or approximately \$20 million. The main components of the actuarial loss include:

- 1) A loss of approximately \$25 million (1.0%) due to experience and new entrants.
- 2) A gain of approximately \$5 million (0.2%) due to less than expected salary increases. The average salary increase was 4.9%, compared to the assumed 5.0% increase.

No cost-of-living adjustment (COLA) was granted during the prior year; therefore, there was no actuarial loss due to the granting of a COLA as there had been in prior years.

The unfunded actuarial accrued liability increased from the prior year due to the small actuarial loss in the benefit obligation and the fact that employer contributions in the prior year were less than the sum of employer normal cost and amortization of the unfunded actuarial accrued liability in the prior year.

Changes since Last Year

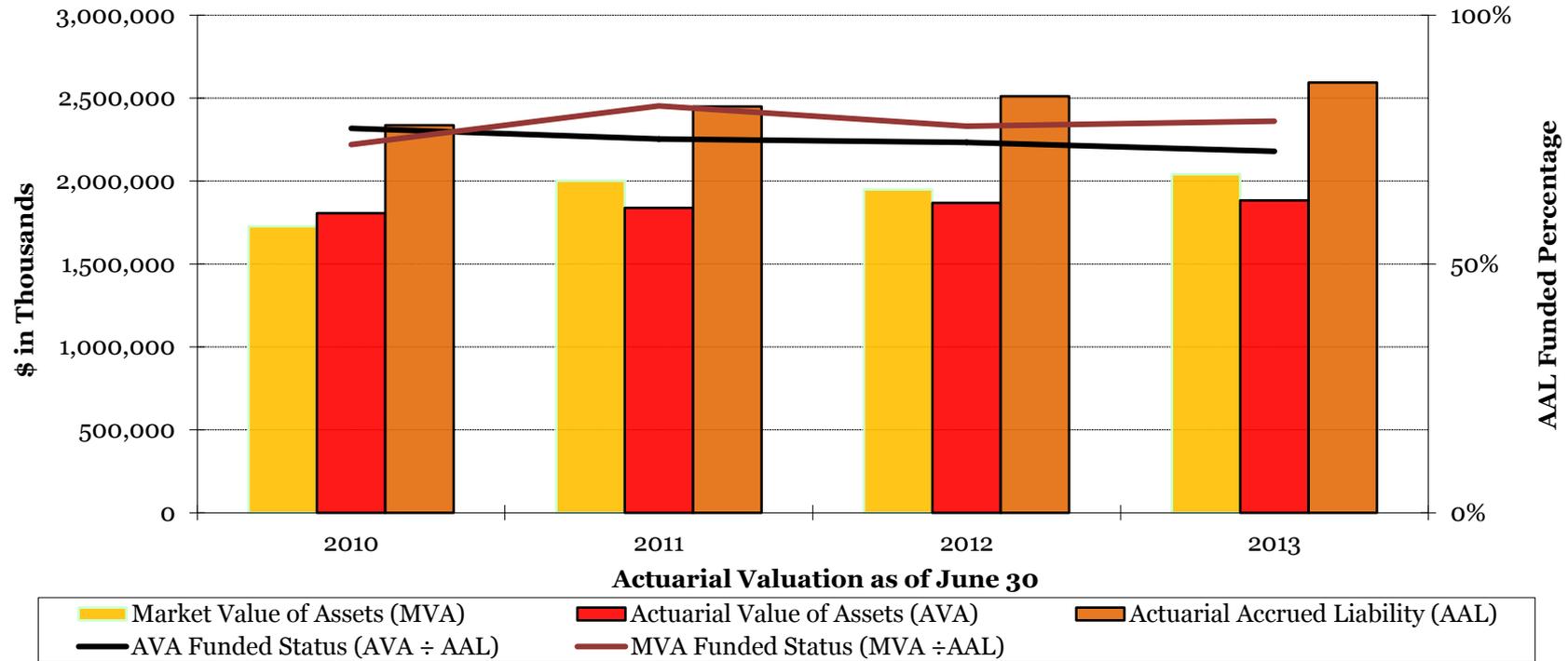
Effective July 1, 2012, an ordinance was adopted to change benefit levels for participant's hired after July 1, 2012. Changes in benefit levels include a reduction in the accrual rate, introduction of early commencement factors for early retirement, and the averaging period in determining average compensation. In addition, the employee contribution rate for Police and Fire was increased to 8.0%. Refer to Section VI for a summary of the 2012 Plan provisions.

As a result of the 2012 plan changes, the normal cost for new entrants during the 2012 plan year were approximately \$500,000 less than what it would have been had these new entrants entered the plan under the 1978 Plan provisions.

SECTION I - EXECUTIVE SUMMARY

HISTORICAL SUMMARY

4 Year History of Funded Status (in 000's)



Actuarial Valuation as of June 30:

	2010	2011	2012	2013
Actuarial Accrued Liability (AAL)	\$2,336,075	\$2,447,974	\$2,509,930	\$2,592,987
Actuarial Value of Assets (AVA)	\$1,805,071	\$1,838,424	\$1,867,934	\$1,883,786
Market Value of Assets (MVA)	\$1,727,794	\$2,001,504	\$1,949,085	\$2,040,069
Unfunded Liability (AAL - AVA)	\$531,004	\$609,550	\$641,996	\$709,201
AVA Funded Status (AVA ÷ AAL)	77.3%	75.1%	74.4%	72.6%
MVA Funded Status (MVA ÷ AAL)	74.0%	81.8%	77.7%	78.7%

SECTION I - EXECUTIVE SUMMARY

HISTORICAL SUMMARY (CONTINUED)

Summary of Valuation Results (Continued)

<u>Valuation Date</u>	<u>June 30, 2010</u>	<u>June 30, 2011</u>	<u>June 30, 2012</u>	<u>June 30, 2013</u>
1. Annual Funding:				
a. Annual Required Contribution	\$80,021,000	\$89,006,000	\$90,363,000	\$96,024,000
b. Percent of Covered Payroll	25.9%	28.1%	30.3%	31.5%
2. Participation at beginning of plan year:				
a. Covered payroll	\$308,889,000	\$316,434,000	\$298,250,000	\$304,686,000
b. Annual benefits in pay status	\$138,368,000	\$146,178,000	\$151,899,000	\$155,505,000
c. Average attained age for active participants	42.3	42.6	43.0	44.0
3. GASB 27 Information				
Fiscal Year Ending	<u>June 30, 2011</u>	<u>June 30, 2012</u>	<u>June 30, 2013</u>	<u>June 30, 2014</u>
a. Annual Pension Cost (APC)	79,883,000	88,291,000	88,988,000	93,972,000
b. Employer contribution	20,132,000	20,108,000	18,968,000	TBD
c. Percent of APC contributed	25.2%	22.8%	21.3%	TBD
d. End of Year Net Pension Obligation (Asset)	73,942,000	142,125,000	212,145,000	TBD

SECTION I - EXECUTIVE SUMMARY

HISTORICAL SUMMARY (CONTINUED)

Summary of Valuation Results (Continued)

	<u>June 30, 2010</u>	<u>June 30, 2011</u>	<u>June 30, 2012</u>	<u>June 30, 2013</u>
Census Information				
Active				
Number	6,280	6,273	6,093	6,020
Average Age	42.3	42.6	42.4	44.0
Average Years of Service	11.0	11.0	11.3	11.2
Covered Payroll of Actives	\$ 308,889,000	\$ 316,434,000	\$ 298,250,000	\$ 304,686,000
Terminated Vested				
Number	120	81	173	168
Retiree/Beneficiary/Disabled				
Number	4,405	4,570	4,670	4,782
Annual Benefits Payable	\$ 138,368,000	\$ 146,178,000	\$ 151,860,000	\$ 155,505,000

SECTION I - EXECUTIVE SUMMARY

HISTORICAL SUMMARY (CONTINUED)

Summary of Valuation Results (Continued)

	<u>June 30, 2010</u>	<u>June 30, 2011</u>	<u>June 30, 2012</u>	<u>June 30, 2013</u>
Actuarial Accrued Liability (AAL)				
Terminated Vested Participants	\$ 3,700,000	\$ 1,600,000	\$ 5,301,000	\$ 3,526,000
Retiree/Beneficiary/Disabled Participants	1,357,961,000	1,450,069,000	1,522,424,000	1,565,495,000
Active Participants	<u>974,414,000</u>	<u>996,305,000</u>	<u>982,205,000</u>	<u>1,023,966,000</u>
Total	\$ 2,336,075,000	\$ 2,447,974,000	\$ 2,509,930,000	\$ 2,592,987,000
 Actuarial Value of Assets (AVA)	 \$ 1,805,071,000	 \$ 1,838,424,000	 \$ 1,867,934,000	 \$ 1,883,786,000
 Market Value of Assets (MVA)	 \$ 1,727,794,000	 \$ 2,001,504,000	 \$ 1,949,085,000	 \$ 2,040,069,000
 Unfunded Actuarial Accrued Liability: AAL - AVA	 \$ 531,004,000	 \$ 609,550,000	 \$ 641,996,000	 \$ 709,201,000
 Funded Percentage: AVA ÷ AAL	 77.3%	 75.1%	 74.4%	 72.6%
 Summary of Assumptions				
Valuation Interest Rate	7.50%	7.50%	7.50%	7.50%
Salary Scale	5.0%	5.0%	5.0%	5.0%
Cost-of-Living Assumption	N/A	N/A	N/A	N/A

SECTION II - FUNDING

FUNDING

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SECTION II - FUNDING

A. Development of Funded Status

	<u>General Employees</u>	<u>Police and Fire</u>	<u>Total</u>
1. Actuarial Accrued Liability			
a. Terminated Vested Participants	\$ 1,450,000	\$ 2,076,000	\$ 3,526,000
b. Retiree/Beneficiary/Disabled Participants	467,353,000	1,098,142,000	\$ 1,565,495,000
c. Active Participants	<u>297,984,000</u>	<u>725,982,000</u>	<u>1,023,966,000</u>
d. Total: (1)(a) + (1)(b) + (1)(c)	\$ 766,787,000	\$ 1,826,200,000	\$ 2,592,987,000
2. Actuarial Value of Assets	557,065,000	1,326,721,000	1,883,786,000
3. Unfunded Actuarial Accrued Liability	\$ 209,722,000	\$ 499,479,000	\$ 709,201,000
4. Funded Percentage	72.6%	72.6%	72.6%

SECTION II - FUNDING

B. Actuarial Accrued Liability Reconciliation

1. July 1, 2012 Actuarial Accrued Liability	\$ 2,509,930,000	
2. Normal Cost	54,320,000	
3. Expected Benefit Payments	176,994,000	
4. Interest of 7.5% on (1) + (2) - (3) ÷ 2	185,681,000	
5. Expected July 1, 2013 Actuarial Accrued Liability: (1) + (2) - (3) + (4)	\$ 2,572,937,000	
	<u>Dollar Change</u>	<u>Percent Change</u>
	<u>in Liability</u>	<u>in Liability</u>
6. (Gain)/Loss Components		
a. Census	\$ 25,118,000	1.0%
b. Salary Experience	(5,068,000)	(0.2%)
d. Total: (6)(a) + (6)(b)	\$ 20,050,000	0.8%
7. July 1, 2013 Actuarial Accrued Liability: (5) + (6)(d)	\$ 2,592,987,000	

SECTION II - FUNDING

C. Development of Annual Required Contribution

Development of annual required contribution for the plan year ending June 30, 2014 and the fiscal year ending June 30, 2014.

	<u>General Employees</u>	<u>Police and Fire</u>	<u>Total</u>
1. Annual Covered Payroll	\$ 97,563,000	\$ 207,123,000	\$ 304,686,000
2. Annual Required Contribution (ARC):			
a. Total Normal Cost as of July 1, 2013	\$ 17,333,000	\$ 38,076,000	\$ 55,409,000
b. Estimated Employee Contributions	7,220,000	14,723,000	21,943,000
c. Employer Normal Cost as of July 1, 2013	10,113,000	23,353,000	33,466,000
d. Unfunded Actuarial Liability (UAL)	209,722,000	499,479,000	709,201,000
e. Payment to amortize UAL over 30 years	16,519,000	39,341,000	55,859,000
f. Interest: [(c) + (e)] × 7.5%	1,997,000	4,702,000	6,699,000
g. Annual Required Contribution: (c) + (e) + (f)	28,629,000	67,396,000	96,024,000
h. Percent of Annual Covered Payroll: (g) ÷ (1)	29.34%	32.54%	31.52%

SECTION II - FUNDING

D. Market Value of Assets

	Market Value June 30, 2012	Market Value June 30, 2013
1607 Capital Partners	\$ 100,745,849	\$ 108,273,642
Acadian EM Equity II	81,208,955	87,751,316
Barrow, Hanley, et al	71,198,433	89,406,052
BlackRock Granite Property Fund	27,127,219	29,882,770
Cash Management Account (In-House)	24,368,381	6,529,944
Cornerstone	4,204,995	6,141,502
Fidelity Real Estate Growth III Fund	22,279,912	24,129,256
Herndon	81,015,844	97,662,669
Highland Capital Management	100,161,547	-
Mackay Shields	191,854,658	196,308,221
Marathon Asset Management	101,112,691	122,615,262
Navellier & Associate	-	86,495,334
Nicholas Investment Partners	20,932,498	28,014,435
NTGI S&P 400	76,678,845	85,518,509
Paradigm Small Cap	46,025,271	56,352,852
Platte River	20,554,958	24,557,275
Principal Global Investors	80,064,156	84,518,318
PIMCO	218,829,026	188,571,568
Prudential Core Conserv Bond	116,817,781	164,772,127
Rhumblin Russell 1000 Growth	41,079,759	-
Rhumblin S&P 500	187,113,654	189,714,510
Rowe Price Flemming	-	139
RReef REIT II	10,627,947	11,439,596
RReef Public REITs	35,877,650	29,612,437
Seix Investment Advisors	2,725,003	-
Smith Graham	100,583,032	151,928,244
SouthernSun	47,740,565	48,621,015
Strategic Global Advisors	20,177,961	24,227,606
Winslow Capital Management	117,978,314	97,024,725
Total	\$ 1,949,085,000	\$ 2,040,069,000

SECTION II - FUNDING

E. Development of Actuarial Value of Assets

1.	Actuarial Value of Assets at July 1, 2012	\$ 1,867,934,000
2.	Interest on (1) at 7.5%	\$ 140,095,000
3.	Actual Cash Flows	
a.	Employer Contributions	\$ 18,968,000
b.	Employee Contributions	22,564,000
c.	Benefit Payments in 2012-2013	<u>(161,284,000)</u>
d.	Total: (a)+(b)+(c)	\$ (119,752,000)
4.	Interest on (3)(d) at 7.5% assuming payments occur mid-year	\$ (4,491,000)
5.	Preliminary Actuarial Value of Assets at July 1, 2012: (1)+(2)+(3)(d)+(4)	\$ 1,883,786,000
6.	Market Value of Assets at July 1, 2013	\$ 2,040,069,000
7.	90% of Market Value of Assets: (6) × 90%	\$ 1,836,062,000
8.	110% of Market Value of Assets: (6) × 110%	\$ 2,244,076,000
9.	Actuarial Value of Assets at July 1, 2013:	\$ 1,883,786,000

SECTION III - ACCOUNTING

ACCOUNTING

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SECTION III - ACCOUNTING

REQUIRED SUPPLEMENTARY INFORMATION UNDER GASB 27

A. Assumptions and Methods Under GASB 27

Under the Governmental Accounting Standards Board (GASB) Statement No. 27, as amended by GASB No. 50, certain information about the plan is required to be disclosed. The information presented in the required supplementary schedules was determined as part of the actuarial valuations at the dates indicated. Additional information as of the latest actuarial valuation follows:

Valuation Date	July 1, 2013
Actuarial Cost Method	Entry Age Normal - Level Percent of Pay
Amortization Method	Level Dollar
Amortization Period	30 Years, Open
Actuarial Value of Assets	Rolling Actuarial Value subject to 10% Corridor around Market Value of Assets
Actuarial Assumptions:	
Investment Rate of Return	7.50%
Future Salary Increases	5.00%
Cost-of-Living Increases	N/A

B. Membership Data

The plan consisted of the following membership as of June 30, 2013, the date of the latest actuarial valuation:

Retired members, beneficiaries and disabled members receiving benefits:	4,782
Terminated vested plan members entitled to but not yet receiving benefits:	168
Active plan members:	<u>6,020</u>
Total membership:	10,970

SECTION III - ACCOUNTING

REQUIRED SUPPLEMENTARY INFORMATION UNDER GASB 27 (CONTINUED)

C. Schedule of Funding Progress under GASB 27 (in 000's)

(1) Actuarial Valuation Date July 1	(2) Actuarial Value of Assets	(3) Actuarial Accrued Liability (AAL)	(4) Unfunded Actuarial Accrued Liability (UAAL)	(5) AAL Funded Ratio	(6) Covered Payroll	(7) UAAL as a % of Payroll
			(3) - (2)	(2) ÷ (3)		(4) ÷ (6)
2008	\$ 2,184,255	\$ 2,090,088	\$ -	104.5%	\$ 281,040	0.0%
2009	1,773,457	2,222,984	449,527	79.8%	296,134	151.8%
2010	1,805,071	2,336,075	531,004	77.3%	308,889	171.9%
2011	1,838,424	2,447,974	609,550	75.1%	316,434	192.6%
2012	1,867,934	2,509,930	641,996	74.4%	298,250	215.3%
2013	1,883,786	2,592,987	709,201	72.6%	304,686	232.8%

D. Schedule of Employer Contributions under GASB 27 (in 000's)

(1) Year Ending June 30	(2) Annual Required Contribution (ARC)	(3) Actual Employer Contribution	(4) Percentage of ARC
			(3) ÷ (2)
2008	\$ 24,072	\$ 14,598	60.6%
2009	21,208	16,172	76.3%
2010	71,447	17,419	24.4%
2011	80,021	20,132	25.2%
2012	89,006	20,108	22.6%
2013	90,363	18,968	21.0%

SECTION III - ACCOUNTING

REQUIRED SUPPLEMENTARY INFORMATION UNDER GASB 27 (CONTINUED)

E. Development of Net Pension Obligation (NPO) under GASB 27 (in 000's)

Fiscal Year Ending June 30	2012	2013	2014
1. Annual required contribution	89,006	90,363	96,024
2. Net pension obligation (asset) beginning of year	73,942	142,125	212,145
3. Interest on net pension obligation (asset): (2) × 7.5%	5,546	10,659	15,911
4. Amortization period	30	30	30
5. Amortization factor	11.81039	11.81039	11.81039
6. Adjustment to annual required contribution: (2) ÷ (5)	6,261	12,034	17,963
7. Annual Pension Cost (APC): (1) + (3) -(6)	88,291	88,988	93,972
8. Employer contribution made	(20,108)	(18,968)	
9. Increase (decrease) in net pension obligation: (7) + (8)	68,183	70,020	
10. Net pension obligation(asset) end of year: (2) + (9)	142,125	212,145	

F. Three-Year Trend Information under GASB 27 (in 000's)

(1) Year Ending June 30	(2) Annual Pension Cost (APC)	(3) Actual Employer Contribution	(4) Percent of APC (3) ÷ (2)	(5) Net Pension Obligation (Asset)
2011	79,883	20,132	25.2%	73,942
2012	88,291	20,108	22.8%	142,125
2013	88,988	18,968	21.3%	212,145

SECTION IV - CENSUS DATA

CENSUS DATA

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SECTION IV - CENSUS DATA

A. Census Information

	<u>June 30, 2012</u>	<u>June 30, 2013</u>
1. Active		
a. Number	6,093	6,020
b. Average Age	42.4	44.0
c. Average Years of Service	11.3	11.2
d. Covered Payroll of Actives	\$ 298,250,000	\$ 304,686,000
2. Inactive - Vested		
a. Number	173	168
4. Retiree and Beneficiary		
a. Number	4,036	4,147
b. Annual Benefits Payable	\$ 135,251,000	\$ 138,892,000
5. Disabled		
a. Number	633	635
b. Annual Benefits Payable	\$ 16,609,000	\$ 16,613,000

SECTION IV - CENSUS DATA

B. Distribution of Active Members by Age and Service

Attained Age	Distribution of Active Members by Age and Service as of June 30, 2013										
	Under 1 year	1 to 4 years	5 to 9 years	10 to 14 years	15 to 19 years	20 to 24 years	25 to 29 years	30 to 34 years	35 to 39 years	Over 40 years	Total
<25	45	50	4								99
25-29	78	315	147	6							546
30-34	73	277	290	106	3						749
35-39	24	172	284	278	78	3					839
40-44	32	116	227	341	412	85	1				1,214
45-49	23	70	137	212	284	258	45	1			1,030
50-54	20	70	85	153	166	186	95	23	1		799
55-59	20	44	70	102	88	68	38	17	7		454
60-64	6	32	39	48	39	32	6	5	3	1	211
65-69		10	16	15	14	11	1	2			69
70&Up		2	1		3	4					10
Total	321	1,158	1,300	1,261	1,087	647	186	48	11	1	6,020

SECTION IV - CENSUS DATA

C. Distribution of Terminated Vested Members by Age and Service

Attained Age	Distribution of Terminated Vested Members by Age and Service as of June 30, 2013							Total
	Under 5 years	5 to 9 years	10 to 14 years	15 to 19 years	20 to 24 years	25 to 29 years	Over 30 years	
<25	3							3
25-29	19	13						32
30-34	25	11	4					40
35-39	8	9	5	1				23
40-44	9	7	7	5				28
45-49	7	3	3	1	1			15
50-54	3	2	3	1	1			10
55-59	4	1	1	1				7
60-64	5	2	2					9
65-69				1				1
70&Up								
Total	83	48	25	10	2			168

SECTION IV - CENSUS DATA

D. Distribution of Retired Members, Beneficiaries, and Disabled Members by Age and Number of Years Retired

Attained Age	Distribution of Retired Members, Beneficiaries, and Disabled Members by Age and Number of Years Retired as of June 30, 2013							Total
	Under 5 years	5 to 9 years	10 to 14 years	15 to 19 years	20 to 24 years	25 to 29 years	Over 30 years	
<40	1	5	23	6	3	3	4	45
40-44		1	17	19	7	3	1	48
45-49		3	9	21	32	76	5	146
50-54		5	11	14	21	166	91	308
55-59	2	3	6	18	27	130	370	556
60-64		5	19	25	43	97	615	804
65-69		4	11	19	29	51	831	945
70-74		1	9	13	21	36	634	714
75-79			2	7	14	19	498	540
80-84			1	1	6	11	361	380
85-89						6	196	202
90&Up							94	94
Total	3	27	108	143	203	598	3,700	4,782

SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

ACTUARIAL ASSUMPTIONS AND METHODS

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SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions

The assumptions used in the valuation were selected and approved by the City of Memphis. The actuary and other economic and investment professionals provide advice for selecting the economic and demographic assumptions. In our opinion, the assumptions are reasonable for purposes of this valuation.

Interest Rate / Investment Return 7.5% per year

Future Salary Increases 5.0% per year

Cost of Living Increases N/A

Mortality General: Fully Generational RP-2000 Combined Mortality Table

Police and Fire: Fully Generational RP-2000 Combined Mortality Table with Blue Collar adjustment

Disability 1968 Social Security Experience Table. Sample rates are shown below:

<u>Age</u>	<u>Male</u>	<u>Female</u>
20	0.10%	0.10%
25	0.10%	0.10%
30	0.10%	0.10%
35	0.10%	0.10%
40	0.17%	0.17%
45	0.28%	0.28%
50	0.63%	0.63%
55+	1.33%	1.33%

SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions (continued)

Termination

Sample rates are shown below:

<u>Age</u>	<u>Male - Police & Fire</u>	<u>Male - General</u>	<u>Females - All</u>
20	7.0%	14.0%	49.0%
25	5.3%	10.6%	37.1%
30	3.9%	7.8%	27.3%
35	2.8%	5.6%	19.6%
40	1.8%	3.6%	12.6%
45	1.2%	2.4%	8.4%
50	0.8%	1.6%	5.6%
55	0.4%	0.8%	2.8%

Retirement Age

1948 Plan: General - Earlier of age 60 and 10 years of service or 25 years of service
 Police and Fire - Earlier of Age 60 and 10 years of service or 30 years of service

1978 Plan: General - Earliest of 25 years of service, age 60 and 10 years of service,
 or age 65 and 5 years of service
 Police and Fire - Earlier of 25 years of service or age 65 and 5 years of service

2012 Plan: For both General employees and Police and Fire employees, the rates vary by age

<u>Age</u>	<u>Police and Fire</u>
45 - 49	5%
50 - 54	10%
55 - 59	15%
60 - 64	20%
65 - 69	30%
70	100%

SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions (continued)

Marriage	80% of male General Employees, 50% of female General Employees, and 90% of Police and Fire Employees are assumed to be married. Wives are assumed to be five years younger than their husbands.
Death/Disability	Deaths and disabilities for active General Employees are assumed to be other than line-of-duty. Deaths and disabilities for active Police and Fire Employees are assumed to be line-of-duty.
Form of Payment	It has been assumed that benefits will be paid in the normal annuity form applicable to the particular benefit. It has also been assumed that the General Employees who withdraw prior to retirement age will elect to receive their employee contributions time the applicable return multiple. Police and Fire Employees who withdraw prior to ten years of service will receive their employee contributions, and those who withdraw after ten years of service will receive their accrued benefit.
Expense Load	None.

B. Actuarial Methods

1. Actuarial Cost Method

The actuarial cost method is the Entry Age Normal Actuarial Cost Method. This method determines a normal cost rate as a fixed percentage of compensation for each active participant. The current year's normal cost is the participant's compensation multiplied by the normal cost rate. Annual contributions in this amount, from the date the participant entered the plan (or would have entered, if the plan had always been in effect and the participant had entered at the earliest possible date) until retirement, would be sufficient to provide for the actuarial present value of the participant's plan benefits. The total normal cost is the sum of the normal costs for all active participants.

The actuarial accrued liability is the present value of future benefits, for both active and inactive participants, less the present value of future normal costs.

2. Asset Valuation Method

An expected actuarial value of assets is developed by increasing the prior year's actuarial value, plus any net cash flow, by the assumed interest rate of 7.5%. If the resulting value is between 90% and 110% of actual market value, no further adjustment is made. If the resulting value is outside the 90% to 110% range, the amount is further adjusted to be a maximum of 110% of market value or a minimum of 90% of market value. The asset valuation method is designed to smooth out fluctuations in market value that arise from year to year, while ensuring that the actuarial value of assets is reasonably related to the market value of assets.

3. Changes in Actuarial Methods

No changes from the prior year.

SECTION VI - SUMMARY OF PLAN PROVISIONS

SUMMARY OF PLAN PROVISIONS

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SECTION VI - SUMMARY OF PLAN PROVISIONS

A. Summary of Plan Provisions: General Employees

Effective Date	Originally effective October 1, 1948. Revised July 1, 1978, January 1, 1990, December 1, 2000, and July 1, 2012.
Participation	All regular salaried employees become plan participants on their date of hire. To participate in the 1948 Plan an employee must have been hired before July 1, 1978. To participate in the 1978 Plan an employee must be hired after June 30, 1978. To participate in the 2012 Plan an employee must be hired after June 30, 2012.
Compensation	Basic salary, excluding overtime, but including shift premium, hazardous pay, longevity pay and incentive pay.
Average Monthly Compensation	<p>The highest average monthly Compensation received for any five consecutive years of service, or the most recent year's earnings, if greater.</p> <p>For participants hired after June 30, 2012, highest average monthly Compensation received for any three consecutive years of service.</p>
Year of Service	One year of service is earned for each 12-month period beginning at date of employment. Fractional periods (months and days) are also credited.

SECTION VI - SUMMARY OF PLAN PROVISIONS

A. Summary of Plan Provisions: General Employees (continued)

Accrued Benefit

An employee may choose between (1) and (2):

- (1) The sum of (a) and (b):
 - (a) For the 1948 Plan and 1978 Plan: $2\frac{1}{4}\%$ of Average Monthly Compensation times Years of Service before 1/1/90 plus $2\frac{1}{2}\%$ of Average Monthly Compensation times Years of Service after 1/1/90.

For the 2012 Plan: $2\frac{1}{4}\%$ of Average Monthly Compensation times Years of Service

Total Years of Service in part (a) must not exceed 25 years.
 - (b) 1% of Average Monthly Compensation times Years of Service in excess of 25, up to a maximum. maximum total retirement benefit of $72\frac{1}{2}\%$.
- (2) Return of Employee Contributions in accordance with the following schedule:

<u>Years of Service</u>	<u>Return Multiple</u>
less than 5	1.0
5 to 14	1.5 - 2.9
15 or more	3.0

Minimum Accrued Benefit

<u>Years of Service</u>	<u>At Age</u>	<u>Minimum</u>
25 or more	No Restriction	\$525 plus \$21 times the lesser of 10 or Years of Service in excess of 25
15 or more	65 or after	\$500 plus \$1 times the lesser of 25 or Years of Service
less than 25	Before 65	The greater of \$262.50 or \$21 times Years of Service

SECTION VI - SUMMARY OF PLAN PROVISIONS

A. Summary of Plan Provisions: General Employees (continued)

Normal Form of Annuity If single, an annuity for the life of the participant. A married participant will receive this annuity during his lifetime with a 75% continuation to his spouse upon his death. For 1948 Plan participants, 100% of the annuity is payable to the spouse upon the death of the participant.

Normal Retirement For 1948 Plan participants, first day of the month coincident with or next following the earlier of the following dates:

- (a) Age 60 and completion of 10 Years of Service; or
- (b) Completion of 25 Years of Service.

For 1978 Plan participants, first day of the month coincident with or next following the earliest of the following dates:

- (a) Age 60 and completion of 10 Years of Service;
- (b) Age 65 and completion of 5 Years of Service; or
- (c) Completion of 25 Years of Service.

For elected and appointed participants hired before November 1, 2004, first day of month coincident with or next following completion of 12 Years of Service.

For 2012 Plan participants, first day of the month coincident with or next following the earliest of the following dates:

- (a) Age 55 and completion of 10 Years of Service
- (b) Age 65 and the completion of 5 Years of Service; or
- (c) Completion of 25 Years of Service

A reduction of 5% per year for each year that the commencement date precedes the date the participant will attain age 62.

Benefit Amount: Accrued Benefit determined as of Normal Retirement Date.

SECTION VI - SUMMARY OF PLAN PROVISIONS

A. Summary of Plan Provisions: General Employees (continued)

Disability

Eligibility: No service requirement for line-of-duty; five years of service for non line-of-duty.

Line-of-Duty: A participant who becomes disabled while performing City duties is entitled to receive the greater of:

- (1) 60% of Average Monthly Compensation as of date of disability; or
- (2) Accrued Benefit as of date of disability.

Other: For 1948 Plan participants, disabled employees while actively employed for reasons other than line-of-duty is entitled to receive the greater of:

- (1) 25% of Average Monthly Compensation as of date of disability; or
- (2) Accrued Benefit as of date of disability, but not greater than 56¼% of Average Monthly Compensation

For 1978 Plan participants, disabled employees while actively employed for reasons other than line-of-duty is entitled to receive the Accrued Benefit as of date of disability.

For 2012 Plan participants, disabled employees while actively employed for reasons other than line-of-duty is entitled to receive the Accrued Benefit as of date of disability.

Termination

Eligibility: Termination of employment after completion of 10 Years of Service.

Benefit Amount: Accrued Benefit determined as of termination date becomes payable at age 65. At the option of the participant, the benefit may become payable earlier, but is reduced to reflect early commencement. An employee terminating before completing 10 Years of Service is only eligible to receive the return of Employee Contributions times the appropriate multiple.

SECTION VI - SUMMARY OF PLAN PROVISIONS

A. Summary of Plan Provisions: General Employees (continued)

Involuntary Retirement

Eligibility:	Completion of 15 years of service
Benefit Amount:	For 1948 Plan participants, Accrued Benefit determined as of involuntary retirement date becomes payable on date of retirement. For 1978 Plan participants, Accrued Benefit determined as of date of involuntary retirement becomes payable when age plus service equals 75. For 2012 Plan participants, Accrued Benefit determined as of date of involuntary retirement becomes payable when age plus service equals 75.

Pre-Retirement Death Benefit

Eligibility:	No service requirement for Line-of-Duty; 5 years of service for non line-of-duty.
Line-of-Duty	The surviving spouse (or children) of a participant who dies while performing City duties is entitled to receive the greater of: (1) 60% of Average Monthly Compensation as of date of death; or (2) Accrued Benefit as of date of death.
Other:	The surviving spouse (or children) of a participant who dies while actively employed will receive 75% (100% for 1948 Plan) of the participant's Accrued Benefit as of date of the participant's death.

Employee Contributions

Employees in the 1948 Plan must contribute five percent (5%) of Compensation. Employees in the 1978 Plan and 2012 Plan must contribute eight percent (8%) of Compensation (changed effective July 1, 2001).

SECTION VI - SUMMARY OF PLAN PROVISIONS

A. Summary of Plan Provisions: General Employees (continued)

**Changes From Prior
Valuation**

Effective with the July 1, 2013 valuation, the plan provisions were updated to be consistent with plan amendments adopted by the City Council in December 2012. A summary of the new plan provisions, which applies to participants hired after June 30, 2012, is as follows:

- (1) The minimum age requirement (in addition to 25 years of service) for an unreduced benefit is age 62.
- (2) Employees who commence benefits before reaching the minimum age requirement are subject to a 5% per year reduction in pension benefit for each year the employee is below the minimum age requirement.
- (3) The accrual rate for the first 25 Years of Service will be 2¼%.
- (4) Final Average Compensation is the average of the 3 highest consecutive Years of Compensation.
- (5) The age for deferred retirement eligibility is 62.

SECTION VI - SUMMARY OF PLAN PROVISIONS

B. Summary of Plan Provisions: Police and Fire Employees

Effective Date	Originally effective October 1, 1948. Revised July 1, 1978, January 1, 1990, December 1, 2000, and July 1, 2012.
Participation	All regular salaried employees become plan participants on their date of hire. To participate in the 1948 Plan an employee must have been hired before July 1, 1978. To participate in the 1978 Plan an employee must be hired after June 30, 1978. To participate in the 2012 Plan an employee must be hired after June 30, 2012.
Compensation	Basic salary, excluding overtime, but including shift premium, hazardous pay, longevity pay and incentive pay.
Average Monthly Compensation	For 1948 Plan participants, the highest average monthly Compensation received for any five consecutive years of service, or the most recent year's earnings, if greater. For 1978 and 2012 Plan participants, the highest average monthly Compensation received for any three consecutive years of service preceding the participant's date of termination. Police officers hired prior to January 31, 1979 who retire with thirty years of service have their accrued benefit determined based on Captain's compensation if greater than their actual compensation, regardless of their rank.
Year of Service	One year of service is earned for each 12-month period beginning at date of employment. Fractional periods (months and days) are also credited.

SECTION VI - SUMMARY OF PLAN PROVISIONS

B. Summary of Plan Provisions: Police and Fire Employees (continued)

Accrued Benefit

An employee may choose between (1) and (2):

(1) The sum of (a) and (b):

(a) For the 1948 Plan and 1978 Plan: $2\frac{1}{4}\%$ of Average Monthly Compensation times Years of Service before 1/1/90 plus $2\frac{1}{2}\%$ of Average Monthly Compensation times Years of Service after 1/1/90.

For the 2012 Plan: $2\frac{1}{4}\%$ of Average Monthly Compensation times Years of Service

Total Years of Service in part (a) must not exceed 25 years.

(b) 1% of Average Monthly Compensation times Years of Service in excess of 25, up to a maximum. maximum total retirement benefit of $72\frac{1}{2}\%$.

(2) Return of Employee Contributions in accordance with the following schedule:

<u>Years of Service</u>	<u>Return Multiple</u>
less than 5	1.0
5 to 14	1.5 - 2.9
15 or more	3.0

Minimum Accrued Benefit

<u>Years of Service</u>	<u>At Age</u>	<u>Minimum</u>
25 or more	No Restriction	\$525 plus \$21 times the lesser of 10 or Years of Service in excess of 25
15 or more	65 or after	\$500 plus \$1 times the lesser of 25 or Years of Service
less than 25	Before 65	The greater of \$262.50 or \$21 times Years of Service

SECTION VI - SUMMARY OF PLAN PROVISIONS

B. Summary of Plan Provisions: Police and Fire Employees (continued)

Normal Form of Annuity

If single, an annuity for the life of the participant. A married participant will receive this annuity during his lifetime with a 75% continuation to his spouse upon his death. For 1948 plan participants, 100% of the annuity is payable to the spouse upon the death of the participant.

Normal Retirement

For 1948 Plan participants, first day of the month coincident with or next following the earlier of the following dates:

- (a) Age 60 and completion of 10 Years of Service; or
- (b) Completion of 25 Years of Service.

For 1978 Plan participants, first day of the month coincident with or next following the earliest of the following dates:

- (a) Age 60 and completion of 10 Years of Service;
- (b) Completion of 25 Years of Service.

For 2012 Plan participants, first day of the month coincident with or next following the earliest of the following dates:

- (a) Age 55 and completion of 10 Years of Service
- (b) Completion of 25 Years of Service

A reduction of 5% per year for each year that the commencement date precedes the date the participant will attain age 52.

Benefit Amount: Accrued Benefit determined as of Normal Retirement Date.

SECTION VI - SUMMARY OF PLAN PROVISIONS

B. Summary of Plan Provisions: Police and Fire Employees (continued)

Disability

Eligibility: No service requirement for line-of-duty; five years of service for non line-of-duty.

Line-of-Duty: A participant who becomes disabled while performing City duties is entitled to receive the greater of:

- (1) 60% of Average Monthly Compensation as of date of disability; or
- (2) Accrued Benefit as of date of disability.

Other: For 1948 Plan participants, an employee who becomes disabled while actively employed for reasons other than line-of-duty is entitled to receive the greater of:

- (1) 25% of Average Monthly Compensation as of date of disability; or
- (2) Accrued Benefit as of date of disability, but not greater than 56¼% of Average Monthly Compensation

For 1978 Plan participants, an employee who becomes disabled while actively employed for reasons other than line-of-duty is entitled to receive the Accrued Benefit as of date of disability.

For 2012 Plan participants, an employee who becomes disabled while actively employed for reasons other than line-of-duty is entitled to receive the Accrued Benefit as of date of disability.

Termination

Eligibility: Termination of employment after completion of 10 Years of Service.

Benefit Amount: Accrued Benefit determined as of termination date becomes payable at age 60. At the option of the participant, the benefit may become payable earlier, but is reduced to reflect early commencement. An employee terminating before completing 10 Years of Service is only eligible to receive the return of Employee Contributions times the appropriate multiple.

SECTION VI - SUMMARY OF PLAN PROVISIONS

B. Summary of Plan Provisions: Police and Fire Employees (continued)

Pre-Retirement Death Benefit

Eligibility:	No service requirement for line-of-duty; 5 years of service for non line-of-duty.
Line-of-Duty	The surviving spouse (or children) of a participant who dies while performing City duties is entitled to receive the greater of: (1) 60% of Average Monthly Compensation as of date of death; or (2) Accrued Benefit as of date of death.
Other:	The surviving spouse (or children) of a participant who dies while actively employed will receive 75% (100% for 1948 Plan) of the participant's Accrued Benefit as of date of the participant's death.

SECTION VI - SUMMARY OF PLAN PROVISIONS

B. Summary of Plan Provisions: Police and Fire Employees (continued)

Employee Contributions

Employees are required to contribute a percentage of Compensation in accordance with the following schedule:

	Years of Service	
1948 Plan:	<u>at 1/1/90</u>	Percentage
	up to 15 years	5.50%
	15-19 years	5.25%
	20 years or more	5.00%
1978 Plan:	<u>Date of Hire</u>	Percentage
	After 6/30/83	6.50%
	Before 7/1/83	6.25%

The contribution rate for current non-vested employees will increase annually in 0.5% increments beginning July 1, 2012 until the contribution rate reaches 8.0%.

2012 Plan:	<u>Date of Hire</u>	Percentage
	After 6/30/2012	8.00%

SECTION VI - SUMMARY OF PLAN PROVISIONS

B. Summary of Plan Provisions: Police and Fire Employees (continued)

**Changes From Prior
Valuation**

Effective from the July 1, 2013 valuation, the plan provisions were changed to be consistent with plan amendments adopted by the City Council in December 2012. A summary of the new plan provisions, which applies to participants hired after June 30, 2012 (with the exception of item 6), are as follows:

- (1) The minimum age requirement (in addition to 25 years of service) for an unreduced benefit is age 52.
- (2) Employees who commence benefits before reaching the minimum age requirement are subject to a 5% per year reduction in pension benefit for each year the employee is below the minimum age requirement.
- (3) The accrual rate for the first 25 Years of Service is 2¼%.
- (4) The age for deferred retirement eligibility is 52.
- (5) Police and Fire will contribute 8.0% of Compensation.
- (6) The contribution rate for current non-vested employees as of July 1, 2012 will increase annually in 0.5% increments beginning July 1, 2012 until the contribution rate reaches 8.0%.