

# City of Detroit Employees Death Benefit Plan

Annual Actuarial Valuation Report  
June 30, 2016



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January 3, 2018

Governing Board  
City of Detroit  
Employees Death Benefit Plan  
Detroit, Michigan

Dear Board Members:

The results of the **Annual Actuarial Valuation** of the liabilities for benefits provided by the City of Detroit Employees Death Benefit Plan are presented in this report. The purpose of the valuation was to measure the Plan's funding progress for the year ending June 30, 2016 and to establish the employer contribution for the period ending June 30, 2018, based on the Board's funding policy. The results of the valuation may not be applicable for other purposes. In particular, information in this study is not suitable for reporting requirements under GASB Statement Nos. 45, 74 or 75.

Contribution determinations based on the Board's funding policy shown in this report are for the open group. The employer no longer has an obligation to fund benefits for the closed group. The Board previously bifurcated the assets between the two groups and then offered a cash-out option to closed group members. The window for the cash-out option took place before the valuation date. See comments for further details of the closed plan.

The date of the valuation was **June 30, 2016**.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as: Plan experience differing from that anticipated by the economic and demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the Plan's funded status); and changes in Plan provisions or applicable law. Due to the limited scope of the actuary's assignment, the actuary did not perform an analysis of the potential range of such future measurements.

The valuation was based upon records maintained and furnished by the Plan staff concerning active members, retirees and beneficiaries, and Trust assets as of the valuation date. We checked for year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by Plan staff.

**Your attention is directed particularly** to the Comments section starting on page A-5 and the contribution amounts on page A-2. The contribution amounts are the amounts determined based on the City Ordinance and Board Policy. Users of this report should be aware that such contributions do not guarantee benefit security. We suggest the Board consider benefit security when adopting contribution amounts and remind the Board that they are free to adopt higher contributions than presented herein.

This report has been prepared by individuals who have substantial experience valuing public sector benefit programs. To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board.

The signing individuals are independent of the Plan sponsor.

David T. Kausch and Judith A. Kermans are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

The assumptions used in the valuation concerning future experience are summarized in Section C of this report. The actuarial assumptions used for the valuation are set by the Board based upon advice of the actuary and other parties and are therefore a “prescribed assumption set by another party” as discussed in Actuarial Standards of Practice. In our judgement, all of the actuarial assumptions used for the valuation are reasonable for purposes of the measurement being taken.

As a result of the City’s Plan of Adjustment (POA) resulting from filing for bankruptcy, the Plan was amended as of 12/10/2014. The amendment resulted in the following changes:

The covered membership was divided into two subgroups:

- a) Closed group members (retired on or before 12/10/2014)
  - i. No further City contributions will be made towards funding benefits to be paid to these members; benefits will be paid to the extent that assets already in the fund (plus any future closed group member contributions and future investment earnings) are sufficient to cover them;
  - ii. The Board allocated \$30,423,997 to the Closed group as of December 31, 2014; and
  - iii. The Board offered a cash-out option to Closed group members during 2016 (before the valuation date of this report).



- a) Open group members (active on 12/10/2014, including members in the DROP or hired after 12/10/2014)
  - i. The City continues to make contributions towards funding benefits for these members; and
  - ii. The Board allocated \$3,569,761 to the Open group as of December 31, 2014.

Unfunded Accrued Liabilities shown in this report do not include any unfunded amounts for the Closed Plan, unless specifically labeled otherwise.

A determination regarding the ability of the plan sponsor to make contributions when due is outside the scope of the assignment, outside our area of expertise and was therefore not performed.

This report was prepared at the request of the Governing Board of the City of Detroit Employees Death Benefit Plan and their staff and is intended for their use. This report may be supplied to other parties but only with the permission of the Board and only in this entirety. GRS is not responsible for authorized use of this report. The authors of this report are available to answer questions from the Board and staff as needed.

Respectfully submitted,



David T. Kausch, FSA, EA, MAAA, FCA



Kenneth G. Alberts

DTK:rmn

## SECTION A

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### VALUATION RESULTS

## Executive Summary

Valuation Date:	6/30/2016	6/30/2015
Contributions for Fiscal Year Ending:	6/30/2018	6/30/2017

### Membership

#### Number of

Active Members (LSA and Fire Equivalent)	601	738
Active Members (Other)	6,117	6,727
Active Members	6,718	7,465
Retirees and Beneficiaries (Including DROP)	1,239	749
Inactive, Nonretired Members	-	-
Total	14,074	14,941
Covered Payroll	N/A	N/A

### Required Employer Contributions:

Ordinance Annual Employer Contribution (LSA and Fire Equivalents)	\$ 20.70	\$ 20.70
Ordinance Annual Employer Contribution (Other)	\$ 13.30	\$ 13.30
Average Annual Amount Per Active Member	\$ 13.96	\$ 14.02
Estimated Employer Contribution	\$ 93,797	\$ 104,659

### Assets

Market Value (without future retired/employee contributions)	\$ 3,701,238	\$ 3,706,850
Actuarial Value (without future retired/employee contributions)	\$ 3,952,922	\$ 3,758,746
Return on Market value - (net of investment and administrative expenses)	(0.2%)	N/A
Ratio - Actuarial Value to Market Value	106.8%	N/A

### Actuarial Information

Employer Normal Cost per Active Member \$	\$ 2.85	\$ 2.21
Actuarial Accrued Liability (AAL)	\$ 3,292,916	3,558,464
Unfunded Actuarial Accrued Liability (UAAL)	(709,477)	(249,841)
Funded Ratio	121.5%	107.0%

### Highlights/Changes

- No changes to benefit provisions
- No changes to actuarial assumption and methods
- The aggregate experience gain/loss was a gain of approximately \$373,000
- Liability gains due to reduction in the covered active members.

The executive summary gives an overview of the entire report. It cannot be used as a substitute for a thorough reading of the full report.

## Funding Objective

The funding objective of the Death Benefit Plan has been to establish and receive level dollar contributions which will accumulate sufficient reserves during each member's working lifetime to pay pre and post retirement death benefits.

## Contribution Rates

The Death Benefit Plan is supported by member contributions (active and retired), City contributions and investment income from Plan assets. Active member and City contributions are only used to fund Open group member benefits.

City contributions for the open plan which satisfy the funding objective are determined by the annual actuarial valuation and are sufficient to:

- (1) Cover the actuarial present value of benefits allocated to the current year by the actuarial cost method described in Section C (the normal cost); and
- (2) Finance over a period of future years the actuarial present value of benefits not covered by valuation assets and anticipated future normal costs (unfunded actuarial accrued liability).

We understand the Board funding policy is to set employer contributions equal to the greater of:

- 1) Normal cost plus a 30-year amortization of unfunded actuarial accrued liability on a per active person basis; and
- 2) The per active person rates specified in the ordinance.

**Computed contribution amounts** are shown on page A-3.



## Contributions to Provide Death Benefits Determined as of June 30, 2016 (Open Plan Only)

Annual Per Member Contributions for	Fiscal Year Ending June 30, 2018
Normal Cost of Benefits:	
A. Age & service retirement death benefits	\$ 6.47
B. Pre-retirement death benefits	5.75
C. Disability retirement death benefits	1.26
D. Total Normal Cost (A+B+C)	\$ 13.48
E. Average Employee Contributions	10.63
F. Employer Normal Cost (D-E)	\$ 2.85
G. Unfunded Actuarial Accrued Liabilities <sup>#</sup>	0.00
H. Total Computed Contributions (D+G)	13.48
<b>Total Computed Employer</b>	
I. <b>Contribution Per Member (H-E)</b>	\$ 2.85
J. <b>Average Contributions Per Ordinance</b>	\$ 13.96
K. <b>Additional Contributions Needed (I-J, not less than zero)</b>	\$ 0.00
L. <b>Number of Active Members</b>	6,718
M. <b>Estimated Total Employer Contribution Dollars (L times the Greater of I and J)</b>	\$93,797

<sup>#</sup> The open group is 122% funded as of June 30, 2016. Since the actuarially determined contributions are below the Ordinance Rate, the assets in excess of accrued liabilities were not used as a credit against future contribution requirements. This is based on our understanding of Board policy.

Amounts shown are for the open group only and are based on: 1) the Board's allocation of assets effective 12/31/2016, and 2) the Board's funding policy of amortizing any UAAL over a 30-year period, and setting the rates in the ordinance as a minimum. Ordinance states employer contributes \$13.30 annually per active member (\$20.70 for LSA), while active members each contribute and \$10.40 annually (\$13.00 for LSA).

A determination regarding the ability of the plan sponsor to make contributions when due is outside the scope of the assignment, outside our area of expertise and was therefore not performed.

# Summary Statement of System Resources and Obligations (Open Plan Only)

## *Present Resources and Expected Future Resources*

A. Present valuation assets:	
1. Net open plan assets from System financial statements (Market Value)	\$3,701,238
2. Market adjustment	251,684
3. Open Plan funding value of assets	3,952,922
4. Present value of future retiree contributions:	49,471
5. Open Plan valuation assets applied	4,002,393
B. Actuarial present value of expected future member and employer contributions:	
1. For normal costs	475,407
2. For unfunded actuarial accrued liability	(709,477)
3. Total	(234,070)
C. Total Present and Expected Future Resources: @	<b>\$3,768,323</b>

# Provided by the City.

## *Actuarial Present Value of Expected Future Death Benefit Payments*

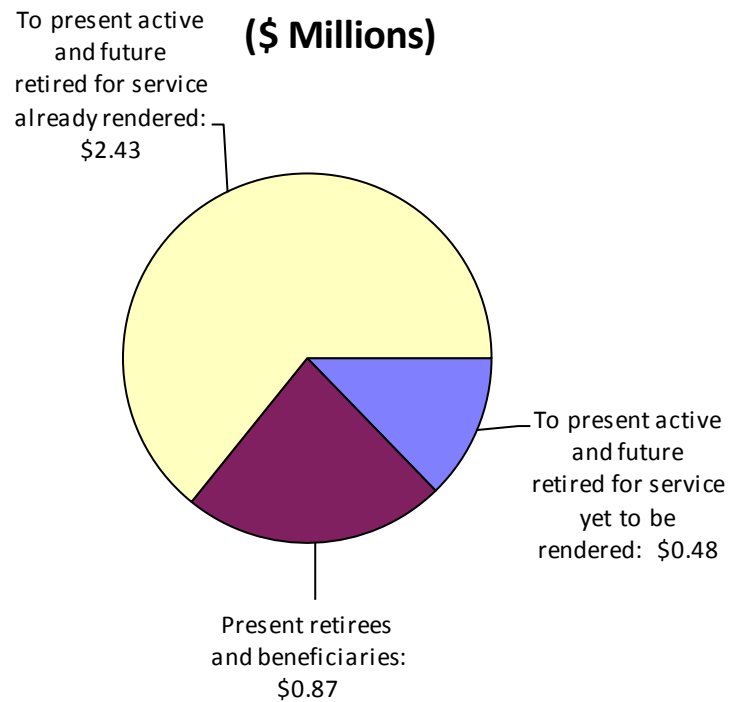
A. To retirees and beneficiaries:	
1. Death Benefits	\$867,661
2. Reserve	0
3. Total	867,661
B. To vested terminated members:	0
C. To present active members:	
1. Allocated to service rendered prior to valuation date - actuarial accrued liability	2,425,255
2. Allocated to service likely to be rendered after valuation date	475,407
3. Total	2,900,662
D. Total Actuarial Present Value of Expected Future Benefit Payments: @	<b>\$3,768,323</b>

@ Excludes accrued liabilities and assets for Closed group members.

# Financing Benefit Promises June 30, 2016 (Open Plan Only)

**(\$3.77 Million)**

## Uses of Funds\* (\$ Millions)



\* Totals may not add due to rounding.

## Historical Schedule of Open Plan Results June 30, 2016 (Open Plan Only)

	(1)	(2)	(3)	(4)	(5)	(6)	(7) Funded Status		(8)	(9)
				(1) + (2) + (3)		(5)-(4)	(4)/(5)	(1)/(5)		
Valuation Year June 30	MVA	Funding Valuation Adjustment	Present Value of Future Retiree	Funding Valuation Assets	Actuarial Accrued Liability	Unfunded Actuarial Accrued Liability	Funding Valuation Assets	Market Value of Assets	Fiscal Year June 30,	Per Active Employer Rate
2015	\$ 3,706,850	\$ 51,896	\$ 49,559	\$ 3,808,305	\$3,558,464	\$ (249,841)	107%	104%	2017	14.02
2016	3,701,238	251,684	49,471	4,002,393	3,292,916	(709,477)	122%	112%	2018	13.96

# Comments

## Comment A - Experience

Activity during the year for the Open Plan was more favorable than expected resulting in an experience gain of approximately \$373 thousand (or 11% of beginning of year liabilities) for the Open Plan. The primary source of the experience gain was liability gains related to a reduction in the covered active members due in part to the termination of a significant number of GLWA members.

## Comment B - Assumptions

There have been no assumption changes since the June 30, 2015 Employee's Death Benefit valuation.

## Comment C - Methods

This valuation was conducted assuming that the Open Plan would continue to receive employer contributions.

The contributions provided in the City Ordinance are currently greater than necessary to fund benefits for the Open Plan, based on the current assumptions.

## Comment D – Future Outlook

Both the Open and Closed Groups are over 100% funded (see comment E for a discussion of the Closed Plan Funded Status). Actual investment return during fiscal year 2016 was less than assumed. The Open Plan funding value of assets exceeds the market value of assets by \$252 thousand due to investment activity less than assumed over the past two years. As these losses are recognized over the next two years, there will be downward pressure on the funded status of the plan. Although not reflected in this valuation, we understand that investment performance during FY 2017 was more favorable than assumed. As a result, the investment gains during FY 2017 may partially or completely offset the investment losses scheduled to be recognized over the next couple of years.

This plan has seen gains related to the contraction of the active covered population over the past several years. As the City continues to recover from the Bankruptcy, the active population is expected to ultimately stabilize.

# Comments

## Comment E – Closed Plan

Based on the census data reported for the June 30, 2016 valuation, we have estimated the funded status of the closed plan as follows:

	<u>June 30, 2016</u>	<u>Closed Plan</u>
Return Assumption		<u>4.29%</u>
Actuarial Accrued Liabilities	\$	20,615,300
Expected Future Retiree Contributions		(132,420)
Reported Market Value of Assets	\$	<u>21,378,712</u>
Unfunded Actuarial Accrued Liabilities	\$	(895,832)
Funded Status		104.37%

An investment return assumption of 4.29% was used to develop the schedule above since it is the assumption adopted by the Board for purposes of the cash out option. If the Board would like to see the results based on a different rate, please let us know and we can perform such supplemental calculations. Assets reported as of June 30, 2016 indicate that approximately \$7.5 million was paid out to members exercising the cash out option, representing approximately 30% of the closed potential plan membership. The cash out is reflected in the calculations above.

## Comment F – Open Plan Funded Status

The Open Plan is currently 122% funded using the actuarial value of assets (and including the present value of future retired member contributions). The Open Plan is 112% funded using the market value of assets (excluding the present value of future retired member contributions). The funded status of the Plan is appropriate for assessing the need for future contributions for benefits attributable to past service if all assumptions are met. This funded status is not an appropriate measure of the Plan's future need for contributions attributable to service rendered after the valuation date or to measure the estimated settlement costs.

## Other Observations

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

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.0% on the actuarial value of assets), it is expected that:

- 1) The unfunded actuarial accrued liabilities will continue to be fully amortized; and
- 2) The funded status of the plan will remain above a 100% funded ratio.

### Limitations of Funded Status Measurements

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

- 1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
- 2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit). Board policy is to develop an employer contribution that is the larger of 1) the per active person rate in the ordinance; or 2) the per active person rate necessary to pay normal cost plus a UAAL payment based on a 30-year amortization period.

### Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entities to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

### Risks to Future Employer Contribution Requirements

There are ongoing risks to future employer contribution requirements to which the Retirement System is exposed, such as:

- Actual and Assumed Investment Rate of Return
- Actual and Assumed Mortality Rates
- Amortization Policy
- Changing Active Member Count

## Experience Gain (Loss) Analysis June 30, 2016

(1) UAAL* beginning of year	\$ (249,841)
(2) Normal cost	96,075
(3) Contributions made	163,140
(4) Interest accrual: $.07 \times [(1) + 1/2 [(2) - (3)]]$	(19,836)
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	(336,742)
(6) Effect of assumption/method changes	0
(7) Effect of plan changes	0
(8) Expected UAAL after changes: (5) + (6) + (7)	(336,742)
(9) Actual UAAL end of year	(709,477)
(10) Gain/(Loss): (8) - (9)	<b>\$ 372,735</b>
(10a) Portion of gain/(loss) due to investments	(75,743)
(10b) Portion of gain/(loss) due to liabilities	448,478
(11) Total Gain/(Loss) as a percent of beginning of year accrued liabilities	<b>10.5%</b>

\* *Unfunded Actuarial Accrued Liability.*



## **SECTION B**

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### **DATA USED IN VALUATION**

## Summary of Benefit Provisions and Contributions June 30, 2016 (Open Plan Only)

Group	Amounts
<b>Active Members</b>	
Lump Sum Death Benefit:	
While Active	
- Police & Fire (Lieutenants and Sergeants Association (LSA) & Fire equivalents)	\$10,000
- Police & Fire (All Others)	\$ 4,900
- Civilian members	\$10,000
After Retirement:	
With 8-10 years service	\$1,860
With 10 or more years service	\$1,860 plus \$93 per year of service in excess of 10 years
Contributions:	
Members (non-refundable)	\$10.40/year*
Employer	\$13.30/year*
<b>Retired Employees</b>	
Lump Sum Death Benefit:	\$1,860 plus \$93 per year of service in excess of 10 years
Contributions:	
Retired members	\$1.08/year
Employer	None
<b>Other</b>	
<p>People in the Deferred Retirement Option Plan (DROP) are treated like any other active member for purposes of this plan.</p> <p>People who terminate active service prior to retirement are not normally eligible for plan benefits. We understand that there are exceptions to this rule for former police officers and firefighters. We have made no adjustment to the valuation for exceptions.</p>	

\* Contributions for Police Lieutenants and Sergeants and Fire equivalents (approximately 601 members) are \$13.00/yr. for members and \$20.70/yr. for City.

# Comparative Statement

## Open Plan Only

June 30	Covered Members				Fiscal Year June 30	Active Member & Employer Contributions	
	Active			Retired		Greater of Ordinance or Computed	Actual@
	General	Police & Fire	Total				
2014#^	4,757	3,183	7,940	0	2016	24.83	21.85
2015#	4,981	2,484	7,465	749	2017	24.68!	
2016	4,235	2,483	6,718	1,239	2018	24.59!	

\* *New benefits.*

# *After revised actuarial assumptions or methods.*

@ *Weighted average based on actual contributions and beginning of fiscal year head count.*

^ *Excludes 174 actives retired by 12/31/2014 and 16,857 retirees transferred to Closed Plan. Plan is bifurcated effective 12/10/2014.*

# Demographic Information

## Open Plan Only

Attained Age	Active Age and Service Schedule Years of Service to Valuation Date							Totals
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.
Under 20	4							4
20-24	236	2						238
25-29	419	57	3					479
30-34	264	119	55	12				450
35-39	232	126	151	261	5			775
40-44	178	114	130	528	105	2		1,057
45-49	172	109	128	508	270	69	5	1,261
50-54	126	80	96	305	209	179	55	1,050
55-59	110	68	84	192	145	168	112	879
60-64	66	44	36	74	54	55	64	393
65-69	12	17	13	20	8	11	10	91
70-74	3	2	2	8	2	4	9	30
75-79	1	0	3	4	0	2	1	11
<b>Totals</b>	<b>1,823</b>	<b>738</b>	<b>701</b>	<b>1,912</b>	<b>798</b>	<b>490</b>	<b>256</b>	<b>6,718</b>

### Retiree information

Number of Retirees: 1,239  
 Average Present Age: 55.8  
 Average Age at Retirement: 53.5

# Data Adjustments

## Source of Data Used for This Valuation

The active member data used for this valuation is the same data that was used for the valuations of the General Retirement System and Police and Fire Retirement System pension plans. The retiree data used for this valuation is based on the data used for the General Retirement System and Police and Fire Retirement System pension plans with the following adjustments:

- Members in the retiree data listed as survivors or dependent children were not included in this valuation.
- Members that retired in 2014 or prior were valued in the closed plan only.
- A data file containing a list of closed plan members that elected to cash-out their death benefit was provided. The members in that data file were not valued in the closed plan.

## Concerns and Deficiencies of the Data Used

People who terminate active service prior to retirement are not normally eligible for plan benefits. We understand that there are exceptions to this rule for former police officers and firefighters. The exceptions are not explicitly identified and we assume that all terminated members are not eligible for the death benefit. Furthermore, in the retiree data we are unable to distinguish members that terminated prior to retirement we are therefore unable to exclude those members from this valuation.

We have been instructed by system staff to use bargaining unit information to determine membership in DPLSA and DPCOA. Historically, the class code was used for this purpose but it no longer applies under the new Component I pension plans. Class code information from the 2014 valuation is brought forward each year and is used to determine DPLSA and DPCOA (and Fire equivalents) membership as defined in Component II as of June 30, 2014 for purposes of the retirement assumption. In particular, for members older than 43 or with more than 17 years of service as of June 30, 2014, individuals with DPLSA and DPCOA (and Fire equivalent) class codes were assumed to be eligible for Component II 25 & Out retirement conditions and individuals with DPOA (and Fire equivalent) class codes were assumed to be eligible for Component II 20 & Out retirement conditions.

Retiree death benefits were estimated based on service. For those retirees with less than eight years of service reported we assumed 25 years of service for the benefit estimate.

## Membership

It was assumed that all active members and all retired members of the City of Detroit Retirement Systems would participate in this Plan going forward subject to the division of the Plan under the POA. It is further assumed that current vested former police officers and firefighters will decline to participate in the Plan at retirement. Beneficiaries of deceased retired and active members were excluded from this valuation.

If readers of this report have information to indicate that the data adjustments described above are not reasonable, they should immediately inform the authors and should not rely on results of the report.

## Reconciliation of Raw Data

### Police and Fire Retirement System Active Data

Number used in the June 30, 2016 pension valuation	2,483
Excluded	-
Added	-
Number of records valued in the June 30, 2016 Employees Death Benefit report	<u>2,483</u>

### General Retirement System Active Data

Number used in the June 30, 2016 pension valuation	4,235
Excluded	-
Added	-
Number of records valued in the June 30, 2016 Employees Death Benefit report	<u>4,235</u>

### Police and Fire Retirement System Retiree Data

Number used in the June 30, 2016 pension valuation	8,835
Excluded (due to closed plan, survivor, etc.)	(8,112)
Added	-
Number of records valued in the June 30, 2016 Employees Death Benefit report	<u>723</u>

### General Retirement System Retiree Data

Number used in the June 30, 2016 pension valuation (including DROP)	11,926
Excluded (due to closed plan, survivor, etc.)	(11,410)
Added	-
Number of records valued in the June 30, 2016 Employees Death Benefit report	<u>516</u>

## Summary of Current Asset Information (Total Plan)

### Assets

	June 30, 2016 Market Value
Cash & Equivalents	\$ 1,386,833
Bonds	2,051,637
Equities	8,721,310
Mutual Funds	12,611,075
Fund Balance	\$ 24,770,855
Accounts Recievable	\$ 309,095
Total Fund Balance	\$ 25,079,950

### Receipts and Disbursements

	Funding Value	
	2015-16	2014-15
Adjustment	\$ 0	\$972,972
Balance beginning of year	34,533,014	\$33,885,507
Receipts		
Employer Contributions - Open	95,213	92,867
Member Contributions Active/Retired	82,314	96,989
Recognized Investment Income	1,641,644	1,890,146
Total	1,819,171	2,080,002
Disbursements		
Benefits Paid - Open	160,000	
Benefits Paid - Closed	9,306,657	1,390,513
Other Expenses	108,062	41,982
Total	9,574,719	1,432,495
<b>Total Plan Assets</b>	<b>\$26,777,466</b>	<b>\$34,533,014</b>
<b>Estimated Closed Plan Assets</b>	<b>\$22,824,544</b>	<b>\$30,774,268</b>
<b>Estimated Open Plan Assets</b>	<b>\$ 3,952,922</b>	<b>\$ 3,758,746</b>
Ratio of Investment Return to Mean Assets	5.1%	5.6%

## Summary of Current Asset Information (Total Plan)

### Development of Estimated Market Value of Assets

	Market Value		
	2015-16	2014-15	2013-14
Adjustment	\$ 0	\$ 972,972	
Balance beginning of year	34,061,083	35,497,019	32,498,491
Receipts			
Employer Contributions	95,213	92,867	104,051
Member Contributions	82,314	96,989	
Recognized Investment Income	416,059	(193,297)	3,812,634
Total	593,586	(3,441)	3,916,685
Disbursements			
Benefits paid - Active (open)	160,000	0	
Benefits Paid - Retired (open/closed)	9,306,657	1,390,513	1,838,845
Other Expenses	108,062	41,982	52,284
Total	9,574,719	1,432,495	1,891,129
<b>Total Plan Assets</b>	<b>\$25,079,950</b>	<b>\$34,061,083</b>	<b>\$34,524,047</b>
<b>Estimated Closed Plan Assets</b>	<b>\$21,378,712</b>	<b>\$30,354,233</b>	<b>\$31,041,012</b>
<b>Estimated Open Plan Assets</b>	<b>\$ 3,701,238</b>	<b>\$ 3,706,850</b>	<b>\$ 3,483,035</b>
Ratio of Investment Return to Mean Assets	1.0%	(0.7%)	11.9%

The calculation of the split of the market value of assets estimated as of 6/30/2015 is based on: 1) \$30.4 million as of 12/31/2014 allocation to the closed plan, 2) estimated contributions and benefit payments from 12/31/2014 to 6/30/2015, and 3) calculated six month investment return. Expenses were allocated evenly between the plans and member contributions were allocated to the open group. Different allocations of these two items would produce different results but would likely not have a significant impact on the valuation.

The City provided the open and closed asset reconciliation from June 30, 2015 to June 30, 2016.

The result is shown on the next page.



## Reported Allocation of Assets for Open and Closed Groups

Open Plan	Closed Plan	Total	
\$ 3,706,850	\$ 30,354,233	\$ 34,061,083	Allocation of Assets as of 06/30/2015 for Valuation
			Receipts
95,213	-	95,213	Employer Contributions
67,927	14,387	82,314	Employee and Retiree Contributions
45,279	370,780	416,059	Investment income
208,419	385,167	593,586	Total
			Disbursements
160,000	-	160,000	Estimated Benefits Paid Open
-	9,306,657	9,306,657	Estimated Benefits Paid Closed
54,031	54,031	108,062	Other expenses
214,031	9,360,688	9,574,719	Total
\$ 3,701,238	\$ 21,378,712	\$ 25,079,950	Allocation of Assets as of 06/30/2016 for Valuation

Asset information was provided by the City.

## Development of Funding Value of Assets (Total Plan)

Year Ended June 30:	2014	2015	2016	2017	2018
A. Funding Value Beginning of Year	\$31,264,848	\$32,912,535	\$34,533,014		
B. Market Value End of Year	34,524,047	34,061,083	25,079,950		
C. Market Value Beginning of Year	32,498,491	34,524,047	34,061,083		
D. Non-Investment Net Cash Flow	(1,734,794)	(1,200,657)	(9,289,130)		
E. Investment Income					
E1. Market Total: B - C - D	3,760,350	737,693	307,997		
E2. Amount for Immediate Recognition (7.0%)	2,127,822	2,261,854	2,092,191		
E3. Amount for Phased-In Recognition: E1-E2	1,632,528	(1,524,161)	(1,784,194)		
F. Phased-In Recognition of Investment Income					
F1. Current Year: E3 / 3	544,176	(508,054)	(594,731)		
F2. First Prior Year	523,159	544,176	(508,054)	\$(594,731)	
F3. Second Prior Year	187,324	523,160	544,176	(508,053)	\$(594,732)
F4. Total Recognized Investment Gain	1,254,659	559,282	(558,609)	(1,102,784)	(594,732)
G. Funding Value End of Year: A + D + E2 + F4	32,912,535	34,533,014	26,777,466		
H. Difference between Market & Funding Value	1,611,512	(471,931)	(1,697,516)		
<b>I. Recognized Rate of Return</b>	<b>11.13%</b>	<b>8.73%</b>	<b>5.13%</b>		
J. Market Value Rate of Return*	11.89%	2.17%	1.05%		
K. Ratio of Funding Value to Market Value: G / B	95.0%	101.4%	106.8%		
L. Estimated June 30 Market Value of Open Plan	3,483,035	3,706,850	3,701,238		
M. Funding Value of Open Plan: K * L	3,308,883	3,758,746	3,952,922		
N. Difference in Open Plan Market & Funding Value: L - M	174,152	(51,896)	(251,684)		

\* Treats 6/30/2015 beginning of year adjustment of \$972,972 as 2015 plan year investment income. The market rate of return would be (0.7)%, if the beginning of year adjustment was treated as a prior period adjustment.

The Funding Value of Assets recognizes assumed investment income (line E2) fully each year. Differences between actual and assumed investment income (line E3) are phased-in over a closed three-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than Market Value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than Market Value. The Funding Value of Assets is unbiased with respect to Market Value. At any time, it may be either greater or less than Market Value. If actual and assumed rates of retirement income are exactly equal for two consecutive years, the Funding Value will become equal to Market Value.

## SECTION C

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### SUMMARY OF VALUATION METHODS AND ASSUMPTIONS

## Actuarial Cost Method

Normal cost and the allocation of benefit values between service rendered before and after the valuation date was determined using an individual **entry-age normal cost** valuation method having the following characteristics:

- (i) the annual normal costs for each individual active member, payable from the date of employment to the earlier of date of DROP or date of retirement, are sufficient to accumulate the value of the employer provided benefit at the time of retirement or death-in-service; and
- (ii) each annual normal cost is a level dollar amount.

**Financing of Unfunded Actuarial Accrued Liabilities.** Unfunded actuarial accrued liabilities were amortized as a level dollar amount (see page A-3) over a 30-year period.

A reserve for claims incurred but not reported (IBNR) of \$6,600 was added to the computed accrued liabilities for the Open Plan. This reserve is approximately three months of expected claims.

A reserve for claims incurred but not reported (IBNR) of \$0 was added to the computed accrued liabilities for the Closed Plan.

The present value of future retiree contributions includes all retiree contributions expected to be paid in the future on behalf of the current retirees and current active members.

## Actuarial Assumptions Used for the Valuation

The actuary calculates the contribution requirements and benefit values of the Plan by applying actuarial assumptions adopted by the Board to the benefit provisions and people information furnished, using the actuarial cost methods described on the previous page.

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

- long-term rates of investment return
- rates of mortality among members, retirees and beneficiaries
- rates of withdrawal from active membership
- rates of disability among members
- the age patterns of service retirements

In a valuation, the actuary calculates the monetary effect of each assumption for as long as a present covered person survives - - a period of time which can be as long as a century.

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Actual experience of the Plan will not coincide exactly with assumed experience, regardless of the wisdom of the assumptions, or the skill of the actuary and the precision of the many calculations made. Each valuation provides a complete recalculation of assumed future experience and takes into account all past differences between assumed and actual experience. The result is a continual series of adjustments (usually small) to the computed contribution rate.

From time to time it becomes appropriate to modify one or more of the assumptions to reflect experience trends (but not random year to year fluctuations). Methods and assumptions were last updated for the June 30, 2015 actuarial valuation.

All assumptions are adopted by the Board. The rationale for the mortality base table assumptions is the 2008-2013 Retired Mortality Experience Study issued to the respective Pension Boards. There is no assumption for future mortality improvement in this valuation for conservatism. The rationale for the other demographic assumptions is the 2002-2007 Experience Study issued to the respective Pension Boards unless otherwise stated. Based on our capital market assumption modeler, we believe the 7.00% investment return assumptions reasonable. All assumptions are expectations of future experience, not market measures.

**The rate of investment return** was 7.0% a year, net of expenses, compounded annually. This assumption is used to make money payable at one point in time equal in value to a different amount of money payable at another point in time.

**The mortality table** used in evaluating death benefits to be paid to retired members in the General Retirement System was 100% of the RP-2014 Blue Collar Annuitant Table set-forward 1 year for males and 100% of the RP-2014 Blue Collar Annuitant Table set-forward 1 year for females. For Police and Fire, the mortality tables used in evaluating death benefits to be paid to retired members was 100% of the RP-2014 Blue Collar Annuitant Table with no set-forward for males or females. Tables were extended below age 50 with a cubic spline to the published Juvenile rates. This table contains no margin for future improvements in life expectancies for conservatism in this valuation. Sample values are shown below:

Sample Attained Ages	General, EMS, & DOT % Dying within Next Year				Police & Fire % Dying within Next Year			
	Healthy		Disabled		Healthy		Disabled	
	Men	Women	Men	Women	Men	Women	Men	Women
50	0.44%	0.30%	0.44%	0.30%	0.41%	0.28%	0.41%	0.28%
55	0.64%	0.43%	0.64%	0.43%	0.60%	0.40%	0.60%	0.40%
60	0.91%	0.62%	0.91%	0.62%	0.85%	0.57%	0.85%	0.57%
65	1.38%	0.96%	1.38%	0.96%	1.26%	0.87%	1.26%	0.87%
70	2.16%	1.54%	2.16%	1.54%	1.97%	1.40%	1.97%	1.40%
75	3.47%	2.54%	3.47%	2.54%	3.15%	2.30%	3.15%	2.30%
80	5.74%	4.24%	5.74%	4.24%	5.19%	3.82%	5.19%	3.82%
Ref:	1310 x 1.00	1311 x 1.00	1310 x 1.00	1311 x 1.00	1310 x 1.00	1311 x 1.00	1310 x 1.00	1311 x 1.00
Setback:	-1	-1	-1	-1	0	0	0	0

Pre-retirement mortality is based on the corresponding Employee tables. Sample values are shown below:

Sample Attained Ages	General, EMS, & DOT % of Active Members Dying within Next Year				Police & Fire % of Active Members Dying within Next Year			
	Non-Duty Death		Duty Death		Non-Duty Death		Duty Death	
	Men	Women	Men	Women	Men	Women	Men	Women
20	0.04%	0.01%	0.01%	0.00%	0.03%	0.01%	0.03%	0.01%
25	0.04%	0.02%	0.01%	0.01%	0.03%	0.01%	0.03%	0.01%
30	0.04%	0.02%	0.01%	0.01%	0.03%	0.01%	0.03%	0.01%
35	0.05%	0.03%	0.02%	0.01%	0.03%	0.02%	0.03%	0.02%
40	0.07%	0.04%	0.02%	0.01%	0.04%	0.02%	0.04%	0.02%
45	0.11%	0.06%	0.04%	0.02%	0.06%	0.04%	0.06%	0.04%
50	0.18%	0.10%	0.06%	0.03%	0.11%	0.06%	0.11%	0.06%
Ref:	1308 x 0.75	1309 x 0.75	1308 x 0.25	1309 x 0.25	1308 x 0.500	1309 x 0.500	1308 x 0.500	1309 x 0.500
Setback:	-1	-1	-1	-1	0	0	0	0

For General, EMS, and DOT, it is assumed that 25% of deaths before retirement are duty related. For Police and Fire, it is assumed that 50% of deaths before retirement are duty related.

**The rates of retirement** used to measure the probability of eligible members retiring during the next year were as follows:

**Probabilities of Age/Service Retirement for General Members with More Than 20 Years of Eligibility Service and Eligible to Retire in Component II Before Age 60 on June 30, 2014**

Retirement Ages	Percent of Eligible Active Members Retiring within Next Year		
	EMS	General	DOT
45	25%		
46	25%		
47	25%		
48	22%		
49	20%		
50	18%	50%	55%
51	15%	50%	50%
52	15%	45%	50%
53	15%	45%	50%
54	15%	40%	55%
55	15%	30%	50%
56	15%	30%	50%
57	15%	30%	50%
58	15%	30%	50%
59	15%	40%	55%
60	40%	25%	40%
61	30%	25%	30%
62	30%	25%	30%
63	30%	25%	30%
64	30%	25%	30%
65	30%	35%	30%
66	30%	30%	30%
67	30%	25%	30%
68	30%	25%	50%
69	30%	25%	50%
70	100%	20%	100%
71		20%	
72		20%	
73		20%	
74		20%	
75		20%	
76		20%	
77		20%	
78		20%	
79		20%	
80		100%	
Ref	537	1647	1648

Members eligible to retire under Component II as described above are assumed to defer any Component I vested benefits until normal retirement age.

Note that the groups detailed above have different eligibility conditions under Component II.

The rationale for the retirement probabilities is the 2002-2007 Experience Study modified to account for the different eligibility in Component I and split to estimate which eligibility (Component I or Component II) would influence members based on the relative service under each component.

*Rates of Retirement (Continued)*

**Probabilities of Age/Service Retirement for General Members With Less Than 20 Years of Eligibility Service or not Eligible to Retire in Component II Before age 60 on June 30, 2014**

Retirement Ages	Percent of Eligible Active Members Retiring within Next Year	
	EMS/DOT	General
62	40%	30%
63	40%	30%
64	40%	30%
65	40%	30%
66	40%	30%
67	40%	30%
68	40%	30%
69	40%	30%
70	100%	30%
71		30%
72		30%
73		30%
74		30%
75		30%
76		30%
77		30%
78		30%
79		30%
80		100%
Ref	851	1292

The rationale for the retirement probabilities is the 2002-2007 Experience Study modified to account for the different eligibility in Component I and split to estimate which eligibility (Component I or Component II) would influence members based on the relative service under each component.



**Rates of Retirement (Continued)**

**Rates of Early Retirement for General Employees**

Percent of Eligible Active Members Retiring Early within Next Year	
Retirement Ages	General
55	7%
56	8%
57	9%
58	10%
59	12%
60	12%
61	12%
62	12%
63	12%
64	12%
Ref	1649

**Probabilities of Service Retirement for Police and Fire Members Older Than Age 43 or with 17 or More Years of Credited Service (Including Prior Service) as of June 30, 2014**

**25 & Out Retirement Eligibility**

Percent of Eligible Active Members Entering DROP within Next Year		
Years of Service	Police	Fire
24	40%	40%
25	40%	40%
26	40%	40%
27	40%	40%
28	40%	40%
29	100%	100%
Ref	922	922

**20 & Out Retirement Eligibility (DPOA & Fire Equivalent)**

Percent of Eligible Active Members Entering DROP within Next Year		
Years of Service	Police	Fire
19	40%	40%
20	40%	40%
21	40%	40%
22	40%	40%
23	40%	40%
24	100%	100%
Ref	922	922

The rationale for the retirement probabilities is the 2002-2007 Experience Study modified to account for the different eligibility in Component I and split to estimate which eligibility (Component I or Component II) would influence members based on the relative service under each component.

**Rates of Retirement (Continued)**

**Probabilities of Service Retirement for Police and Fire Members Age 43 or Younger and with Less Than 17 Years of Credited Service as of June 30, 2014**

<b>Percent of Eligible Active Members Entering DROP within Next Year</b>		
<b>Retirement Ages</b>	<b>Police</b>	<b>Fire</b>
50-54	30%	20%
55-59	30%	20%
60	100%	100%

The rationale for the retirement probabilities is the 2002-2007 Experience Study modified to account for the different eligibility in Component I and split to estimate which eligibility (Component I or Component II) would influence members based on the relative service under each component.

**Police & Fire**

<b>Percent of Eligible Active Members Retiring or Entering DROP within Next Year</b>		
<b>Retirement Ages</b>	<b>Police</b>	<b>Fire</b>
60-64	40%	100%
65	100%	

Members eligible for 20 & Out are assumed to be first eligible for normal retirement after 19 years of service due to their ability to purchase service. Members eligible for 25 & Out are assumed to be eligible for normal retirement after 24 years of service due to their ability to purchase service. Members are also eligible to retire at age 60 with no service requirement.

**Rates of separation from active membership** were as shown below (rates do not apply to members eligible to retire and do not include separation on account of death or disability). This assumption measures the probabilities of members remaining in employment.

Sample Ages	Years of Service	% of Active Members Withdrawing within the Next Year					
		General		EMS	DOT	Police	Fire
		Men	Women				
ALL	0	18.00%	20.00%	11.00%	18.00%	8.50%	5.00%
	1	15.00%	16.00%	10.00%	16.00%	7.50%	4.00%
	2	13.00%	14.00%	8.00%	14.00%	6.00%	3.00%
	3	11.00%	12.00%	8.00%	11.00%	5.00%	2.00%
	4	10.00%	10.00%	7.00%	9.00%	4.50%	2.00%
25	5 & Over	7.60%	7.60%	6.70%	8.00%	4.50%	1.96%
30		7.22%	7.22%	5.90%	7.60%	3.30%	1.62%
35		5.28%	5.28%	5.20%	5.56%	2.30%	1.11%
40		4.05%	4.05%	4.40%	4.26%	1.70%	0.77%
45		3.51%	3.51%	3.40%	3.69%	1.50%	0.60%
50		3.33%	3.33%	2.40%	3.50%	1.10%	0.51%
55		3.33%	3.33%	2.00%	3.50%	0.80%	0.51%
60		3.33%	3.33%	0.00%	3.50%	0.80%	0.51%
Ref		584	188	338	143	566	230
		212 x 0.95	212 x 0.95	1068	212	207	113 x 0.85

Sample Ages	% of Active Members Becoming Disabled within Next Year							
	General		DOT		Police		Fire	
	Ordinary	Duty	Ordinary	Duty	Ordinary	Duty	Ordinary	Duty
25	0.01%	0.25%	0.02%	0.03%	0.06%	0.13%	0.07%	0.34%
30	0.04%	0.29%	0.05%	0.08%	0.07%	0.19%	0.08%	0.52%
35	0.11%	0.34%	0.14%	0.21%	0.08%	0.34%	0.09%	0.90%
40	0.21%	0.39%	0.27%	0.42%	0.11%	0.49%	0.12%	1.30%
45	0.40%	0.45%	0.51%	0.79%	0.16%	0.73%	0.18%	1.92%
50	0.51%	0.52%	0.66%	1.03%	0.47%	1.16%	0.53%	3.06%
55	0.59%	0.60%	0.76%	1.18%	0.73%	1.96%	0.82%	5.18%
60	0.67%	0.70%	0.86%	1.34%	0.83%	2.82%	0.94%	7.47%
Ref	23 x 0.35	423 x 0.90	23 x 0.45	23 x 0.70	105 x 0.75	90 x 0.85	105 x 0.85	90 x 2.25

## **APPENDIX**

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### **GLOSSARY**

## Glossary

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

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

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

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

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

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

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

**DFFA.** Detroit Fire Fighters Association.

**DOT.** Department of Transportation.

**DPCOA.** Detroit Police Command Officers Association.

**DPLSA.** See LSA.

**DPOA.** Detroit Police Officers Association.

**DROP.** Deferred Retirement Option Plan.

**EMS.** Emergency Medical Service.

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

## Glossary

**GASB.** The Governmental Accounting Standards Board.

**GLWA.** Great Lakes Water Authority.

**LSA.** Lieutenants and Sergeants Association.

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

**POA.** The 8<sup>th</sup> Amended Plan for the Adjustment of the Debt of the City of Detroit.

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

**Solvency Liability.** A market-based measure of the present value of accrued benefits at a municipal bond discount rate unadjusted for the credit quality of the plan sponsor.

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

**Valuation Assets.** The value of current plan assets recognized for valuation purposes.



January 3, 2018

Ms. Marilyn Berdijo  
City of Detroit Employees Death Benefit Plan  
500 Woodward Avenue, Suite 3000  
Detroit, Michigan 48226

Dear Marilyn:

Enclosed are 30 copies of the June 30, 2016 annual actuarial valuation of the City of Detroit Employees Death Benefit Plan.

We would be happy to meet with the Governing Board to review the results of the valuation.

Sincerely,

A handwritten signature in black ink that reads "Kenneth G. Alberts".

Kenneth G. Alberts

KGA:rmn  
Enclosures

cc: Ms. Cynthia Thomas, City of Detroit  
Mr. David Cetlinski, City of Detroit  
Ms. Lamonica Arrington-Cabeau