# Retirement Plan for the Employees' Retirement Fund of the City of Dallas

## Actuarial Valuation Report
## as of December 31, 2017

GRS Retirement Consulting

P: 469.524.0000 | F: 469.524.0003 | www.grsconsulting.com

May 24, 2018

Board of Trustees
Employees' Retirement Fund of the City of Dallas
1920 McKinney Avenue
10th Floor
Dallas, Texas 75201

Dear Members of the Board:

We are pleased to present our report of the actuarial valuation of the Employees' Retirement Fund of the City of Dallas, Texas ("ERF" or the "Fund") as of December 31, 2017.

This valuation provides information on the funding status of ERF. It includes a determination of the actuarially calculated contribution rates for the 2018 calendar year. In addition, it also contains the information necessary to determine the current total obligation rate and the current adjusted total obligation rate for the fiscal year beginning October 1, 2018 per City Ordinance. This rate is a function of the previous year's adjusted total obligation rate, this year's actuarially calculated contribution rate, and the rate necessary to make the debt service payment on the previously issued pension obligation bonds for fiscal year 2019.

In addition, the report provides various summaries of the data. A separate report is issued with regard to valuation results determined in accordance with Governmental Accounting Standards Board (GASB) Statements 67 and 68. Results of this report should not be used for any other purpose without consultation with the undersigned. Valuations are prepared annually as of December 31st, the last day of the ERF plan year. This report was prepared at the request of the Board and is intended for use by the ERF staff and those designated or approved by the Board. This report may be provided to parties other than ERF staff only in its entirety and only with the permission of the Board.

As authorized in Chapter 40A-4(a)(16) of the Dallas City Code, the actuarial assumptions and methods are set by the Board of Trustees, based upon recommendations made by the plan's actuary. An experience investigation was performed for the five year period ending December 31, 2014. As a result of that study, revised assumptions were adopted by the Board effective with the valuation as of December 31, 2014. These assumptions were further modified effective December 31, 2016. We believe the assumptions are internally consistent, reasonable, and, where appropriate, based on the actual experience of the ERF. All of the assumptions and methods used in this valuation were selected in compliance with the Actuarial Standards of Practice. All actuarial assumptions and methods are described under Section O of this report.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions.

Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. Due to the limited scope of this assignment, GRS did not perform an analysis of the potential range of such possible future differences. The actuarial calculations are intended to provide information for rational decision making.

This valuation is based on the provisions of ERF in effect as of the valuation date, data on the ERF membership and information on the asset values of the Fund as of December 31, 2017. The member, annuitant and asset data used in the valuation were all prepared and furnished by ERF staff. While certain checks for reasonableness were performed, the data used was not audited.

To the best of our knowledge, this report is complete and accurate and was conducted in accordance with the Actuarial Standards of Practice as set forth by the Actuarial Standards Board and in compliance with the provisions of the Dallas City Code. The undersigned are independent actuaries and consultants. Mr. Randall is an Enrolled Actuary and a Member of the American Academy of Actuaries and he meets the Qualification Standards of the American Academy of Actuaries. Both Mr. Randall and Mr. Ward have significant experience in performing valuations for large public retirement systems.

We would like to thank the ERF staff for their assistance in providing all necessary information to complete this valuation. Their courteous help is very much appreciated. We look forward to discussing this actuarial valuation report with you at your convenience. Please do not hesitate to let us know if you have any questions or need additional information.

Respectfully submitted,

Lewis Ward
Consultant

Mark R. Randall, MAAA, FCA, EA
Chief Executive Officer

GRS Retirement Consulting

# Table of Contents

# EXECUTIVE SUMMARY

## ($ in 000s)

The key results from the actuarial valuation of the Employees' Retirement Fund of the City of Dallas as of December 31, 2017 may be summarized as follows:

| | December 31, 2016 | December 31, 2017 |
|---|---|---|
| · Members | | |
| - Actives | 7,619 | 7,838 |
| - Benefit recipients | 6,903 | 7,042 |
| - Deferred vested* | 768 | 793 |
| - Other terminated* | 447 | 455 |
| - Total | 15,737 | 16,128 |
| · Covered payroll (including overtime) | $ 409,433 | $ 421,269 |
| · Normal cost | $ 83,387 | $ 82,871 |
| as % of expected payroll | 20.75% | 20.04% |
| · Actuarial accrued liability | $ 4,291,802 | $ 4,377,844 |
| · Actuarial value of assets | $ 3,451,463 | $ 3,601,612 |
| · Market value of assets | $ 3,327,681 | $ 3,601,612 |
| · Unfunded actuarial accrued liability (UAAL) | $ 840,339 | $ 776,232 |
| · Estimated yield on assets (market value basis) | 8.65% | 12.34% |
| · Estimated yield on assets (actuarial value basis) | 8.51% | 8.99% |
| · Contribution Rates | | |
| - Prior Adjusted Total Obligation Rate | 36.00% | 36.00% |
| - Current Total Obligation Rate | 43.46% | 41.41% |
| - Current Adjusted Total Obligation Rate | 36.00% | 36.00% |
| · Actuarial gains/(losses) | | |
| - Assets | $ 16,405 | $ 19,847 |
| - Actuarial liability experience | $ 32,351 | $ 61,019 |
| - Assumption and method changes | $ (41,157) | $ 21,916 |
| · 30-year level % of pay funding cost | $ 144,114 | $ 139,484 |
| as % of payroll (Employee + City) | 35.18% | 33.12% |
| · Funded ratio | | |
| - Based on actuarial value of assets | 80.4% | 82.3% |
| - Based on market value of assets | 77.5% | 82.3% |

** Deferred vested are members who have applied for a deferred pension. Other terminations are other members who have terminated and still have contribution balances in the Fund.*

# PURPOSES OF THE ACTUARIAL VALUATION

At your request, we have performed the actuarial valuation of the Employees' Retirement Fund of the City of Dallas ("ERF" or the "Fund") as of December 31, 2017.

The purposes of an actuarial valuation are as follows:

- To determine the funding status of ERF as of the valuation date;
- To develop the actuarially determined level of contributions for ERF for the 2018 calendar year; and
- To develop the current total obligation rate and the current adjusted total obligation rate for the fiscal year beginning October 1, 2018.

# REPORT HIGHLIGHTS

The following is a set of key actuarial results from the prior year's valuation as compared to the current year:

| | Valuation Date | |
|---|---|---|
| | **December 31, 2016** | **December 31, 2017** |
| **Contribution Rates (% of Payroll)** | | |
| Normal Cost (including administrative expense) | 22.05% | 21.40% |
| Total Actuarial Contribution Rate | 35.18% | 33.12% |
| Total Projected Actuarial Contribution | $144,114 | $139,484 |

| **Funded Status (on AVA basis)** | **December 31, 2016** | **December 31, 2017** |
|---|---|---|
| Actuarial Accrued Liability | $4,291,802 | $4,377,844 |
| Actuarial Value of Assets | 3,451,463 | 3,601,612 |
| Unfunded Actuarial Accrued Liability | $840,339 | $776,232 |
| Funded Ratio | 80.42% | 82.27% |

# FUNDING PROCESS

Based on the previous work of the Employees' Retirement Fund Study Committee, which was ratified by the ERF Board, the Dallas City Council and the voters of Dallas, a new funding process commenced October 1, 2005. From this date forward, a new "current adjusted total obligation rate" will be contributed jointly by the City (63%) and the Membership (37%). This current adjusted total obligation rate will cover both the debt service tied to the pension obligation bonds issued in 2005 and the contributions to the ERF. In subsequent years, the contribution rate changes only if the actuarial valuation develops a "current total obligation rate" which differs from the "prior adjusted total obligation rate" by more than 3.00%.

As shown in Table 3 (under Section M) and discussed later in this report, the "current total obligation rate" (Item 4 in Table 3) exceeds the "prior adjusted total obligation rate" (Item 1 in Table 3) as of December 31, 2017. This means that the "current adjusted total obligation rate" will remain at 36.00% of active member payroll for the fiscal year beginning October 1, 2018. It should be noted that under the contribution corridor methodology, the "current adjusted total obligation rate" would have been higher if not for the maximum rate of 36.00% allowed under Chapter 40A of the Dallas City Code.

# ACTUARIAL CONTRIBUTIONS

The Actuarially Required Contribution Rate developed in this actuarial valuation is 33.12% of active member payroll. This rate excludes the amount needed to make the City's debt service payment on the pension obligation bonds in fiscal year 2019. As shown in Section M -Table 3 of this report, the debt service payment is determined to be 8.29% of projected payroll. The sum of these rates is 41.41% (the Current Total Obligation Rate), which is 5.41% more than the Prior Adjusted Total Obligation Rate of 36.00%. Because the total contribution rate cannot exceed 36.00%, the total contribution rate in fiscal year 2019 (the Current Adjusted Total Obligation Rate) to fund the ERF and make the debt service payment on the pension obligation bonds will be 36.00%, which is the maximum rate allowed under Chapter 40A of the Dallas City Code.

The members contribute 37% of the Current Adjusted Total Obligation Rate and the City contributes 63%. Hence, the members portion of the 36.00% total contribution rate will be 13.32% and the City portion will be 22.68%. All of the member contribution rate will be contributed to the ERF. As noted above, 8.29% of the City's contribution rate will go towards the debt service on the pension obligation bonds and the remaining 14.39% will be contributed towards the ERF. This means a total contribution rate of 27.71% will be contributed to the ERF, which compares to the actuarially calculated rate of 33.12%.

# ACTUARIAL ASSUMPTIONS

Section O of this report includes a summary of the actuarial assumptions and methods used in this valuation. In short, costs are determined using the Entry Age Normal actuarial cost method. The assumed annual investment return rate is 7.75% and includes an annual assumed rate of inflation of 2.75%.

The Board approved a new method for determining the actuarial value of assets. As part of this change, the actuarial value of assets was reset to the market value of assets as of December 31, 2017. All other actuarial assumptions and methods are the same as in the prior valuation report. Please see Section O for a complete description of these assumptions and methods.

# ERF BENEFITS

As the reader may be aware, City of Dallas voters elected a new tier of benefits for City of Dallas municipal employees hired after December 31, 2016. Therefore, this is the first valuation to include members of the new tier.

There were no changes in the benefit provisions of ERF since the prior valuation. Please see Section P for a summary description of the ERF benefits.

# EXPERIENCE DURING PREVIOUS YEARS

An Actuarial (Gain)/Loss Analysis [(G)/L] reviews the effects of the actual experience that differs from the assumed experience based on the actual results for the year. If any difference increases assets or reduces liabilities, we have an actuarial gain. The reverse is an actuarial loss.

On a market value return basis, the Fund returned approximately 12.34% (calculated on a dollar-weighted basis, net of investment expenses). Given this return, the actual investment income was greater than the expected investment income on the actuarial value of assets; therefore, an investment income gain occurred. Normally this gain would be partially recognized this year (1/5) and partially deferred into the near future (4/5). However, the method for determining the actuarial value of assets is being modified in a two-step process. The first step is to set the actuarial value of assets to the market value of assets (as of December 31, 2017) by fully recognizing all prior years deferred gains and losses (the assets are being marked to market). The second step will be the implementation of the new asset method. This will first be observed as part of the next valuation. Please see page 41 for a description of the new method. There was a $20 million gain on the actuarial value of assets as of December 31, 2017 (prior to the asset method change). The method change produced another $22 million gain. The rate of return on the actuarial value of assets for 2017 was 8.99% (calculated on a dollar-weighted basis, net of investment expenses). This result was greater than the prior year's investment return assumption of 7.75%.

During 2017, there was a liability actuarial gain of about $61 million derived from demographic assumptions and non-investment economic assumptions (cost-of-living-adjustment). As seen below, ERF experienced an overall actuarial gain in calendar year 2017 in the amount of $80.9 million.

The total (G)/L for the prior 5 years is broken down as follows ($ in millions):

| | | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| 1) | Actuarial (Gain)/Loss on Assets | ($144.95) | ($61.00) | $31.24 | ($16.41) | ($19.85) |
| 2) | Actuarial (Gain)/Loss on Liabilities | (19.70) | (21.97) | (26.83) | (32.35) | (61.02) |
| 3) | Total Actuarial (Gain) or Loss (1+2) | ($164.65) | ($82.97) | $4.41 | ($48.76) | ($80.87) |

The unfunded actuarial accrued liability (UAAL) also increased $30.9 million due to the difference between the calculated contribution rate and the actual contributions during 2017.

# ASSET INFORMATION

The assets of the Fund (on a market value basis) increased from $3,328 million as of December 31, 2016 to $3,602 million as of December 31, 2017.

The assets recognized for actuarial valuation purposes (known as "the actuarial value of assets") were equal to the market value of assets. A new smoothing method will be used to recognize future asset gains and losses, beginning with the December 31, 2018 valuation. The purpose of such a smoothing method is to allow the use of market values, but to dampen the effect of the typical year-to-year market fluctuations. Please see page 42 of this report for a description of the new smoothing method (actuarial value of asset method). See Table 6 in Section M of this report for the determination of the actuarial value of assets as of December 31, 2017.

The actuarial value of assets has increased from $3,451 million to $3,602 million during 2017. The assets are greater than the expected assets, $3,560 million, due to investment gains during the year and the "marking to market" of the actuarial value of assets.

The rate of return on investments for 2017 on the actuarial value of assets was 8.99%, compared to 8.51% in 2016. The detailed determinations of asset values utilized in this valuation and the change in assets in the last year are exhibited in Tables 4 and 5 of Section M of this report.

# FUNDED STATUS

The funded status of ERF is measured by the Funded Ratio and the Unfunded Actuarial Accrued Liability (UAAL). The Funded Ratio is the ratio of the actuarial value of assets available for benefits to the actuarial accrued liability (AAL) of the Fund on the valuation date. Therefore, it reflects the portion of the AAL that is covered by ERF assets. The UAAL is the difference between these two amounts.

A Funded Ratio of 100% means that the funding of ERF is precisely on schedule as of the particular valuation date. In addition, an increasing funded ratio from year-to-year may also mean that the funding of ERF is on schedule. By monitoring changes in the Funding Ratio each year, we can determine whether or not funding progress is being made.

Based on the actuarial value of assets, the Funded Ratio of ERF increased from 80.4% as of December 31, 2016 to 82.3% as of December 31, 2017.

The UAAL decreased from $840.3 million as of December 31, 2016 to $776.2 million as of December 31, 2017. Since the UAAL is positive, this implies the actuarial accrued liabilities exceed the actuarial assets of the Fund as of December 31, 2017.

# GASB DISCLOSURE

Governmental Accounting Standards Board (GASB) Statement Numbers 67 and 68 detail the current accounting standards for ERF and the Fund's sponsor, the City of Dallas, TX. These new standards were effective with the plan year ending December 31, 2014 for the Fund and the fiscal year ending September 30, 2015 for the City. The new standards created a clear distinction between the funding requirements of a pension plan and the accounting requirements. Because of these changes, the GASB disclosure information will no longer be included in the actuarial valuation report, but will instead be provided under separate cover.

# CLOSING COMMENTS

The unfunded actuarial accrued liability of the Fund has decreased since the prior valuation due to a smaller than expected cost of living adjustment for retirees, smaller than expected salary increases, and gains on the actuarial value of assets.

The calculated contribution rate necessary to pay the Fund's normal cost and amortize the UAAL over 30 years is 33.12% of pay. When the debt service payment on the Pension Obligation Bonds is considered, the total contribution rate is 41.41% of payroll. However, Chapter 40A of the Dallas City Code limits the contribution rate to 36.00% of payroll, therefore, the total rate to be contributed by the employees and the City for fiscal year 2019 will be 36.00% of pay.

Additionally, the calculated contribution rate is above the 36.00% of pay maximum. When the Pension Obligation Bond debt is repaid, the calculated contribution rate is expected to drop between 8.50% - 9.00% of pay. However, that is not expected to happen until fiscal year 2035.

Following adoption of the proposed changes by the ERF Board, the Dallas City Council, and approval by the City of Dallas voters, the new tier of benefits became effective for employees hired after December 31, 2016 and the outlook for the ERF has since substantially improved. Based upon our projections, reflecting the new tier of benefits and assuming the actuarial assumptions are exactly met, the ERF is expected to be fully funded in approximately 47 years.

# ACTUARIAL TABLES

**Summary of Actuarial Values**
**As of December 31, 2017**
**($ in 000s)**

| | | Entry Age Actuarial Values | | |
|---|---|---|---|---|
| | APV* of Projected Benefits | Actuarial Accrued Liability (AAL) | Normal Cost $ | Normal Cost % of Pay** |
| **1 Active Members** | | | | |
| a. Retirement | $ 1,716,765 | $ 1,340,438 | $ 56,403 | 13.65% |
| b. Death | 38,623 | 23,710 | 2,295 | 0.55% |
| c. Disability | 21,587 | 8,354 | 2,020 | 0.49% |
| d. Termination | 147,042 | 12,036 | 19,325 | 4.68% |
| e. Health Subsidy | 51,795 | 36,007 | 2,828 | 0.67% |
| **Total** | $ 1,975,812 | $ 1,420,545 | $ 82,871 | 20.04% |
| **2 Benefit Recipients** | 2,854,818 | 2,854,818 | | |
| **3 Other Inactive** | 102,481 | 102,481 | | |
| **4 Total Actuarial Values of Benefits** | $ 4,933,111 | $ 4,377,844 | $ 82,871 | 20.04% |
| **5 Actuarial Value of Assets** | | $ 3,601,612 | | |
| **6 Unfunded Actuarial Accrued Liability (4 - 5)** | | $ 776,232 | | |
| **7 Funding Ratio** | | 82.27% | | |
| **8 Market Value Measurements** | | | | |
| UAAL on market value | | $ 776,232 | | |
| Funded Ratio on market value | | 82.27% | | |

* *APV – Actuarial Present Value*

** *Percentage of expected payroll for continuing active members.*

## Development of Actuarially Required Contribution for FY 2019

## ($ in 000s)

| | $ | % of Pay |
|---|---|---|
| **Actuarial Requirement** | | |
| a. Payment to Amortize UAAL over 30 years* | $ 50,730 | 11.72% |
| b. Normal Cost | 82,871 | 20.04% |
| c. Administrative Expense | 5,883 | 1.36% |
| **Total** | $ 139,484 | 33.12% |

** Amortization is determined as a level percentage of projected payroll*

**Information for Ordinance 25695**

**For the Fiscal Year Commencing October 1, 2018**

| | | |
|---|---|---|
| **1** | **Prior Adjusted Total Obligation Rate** | 36.00% |
| **2** | **Actuarially Required Contribution Rate** | 33.12% |
| **3** | **Debt Service** | |
| | **a Scheduled Debt Service Payment for FY 2019** | $ 35,879,400 |
| | **b Projected Payroll** | $ 432,853,607 |
| | **c Pension Obligation Bond Credit Rate (a/b)** | 8.29% |
| **4** | **Current Total Obligation Rate (2 + 3c)** | 41.41% |
| **5** | **Current Adjusted Total Obligation Rate** | 36.00% * |
| **6** | **Allocation of Contribution Rates for FY 2018** | |
| | **a Employee (5 x .37)** | 13.32% |
| | **b City (5 x .63)** | 22.68% |

* If the absolute value of the difference between the Prior Adjusted Total Obligation Rate (PATOR) and the Current Total Obligation Rate (CTOR) is less than or equal to 3.0% then:

Current Adjusted Total Obligation Rate (CATOR) = PATOR

otherwise:

1) If PATOR - CTOR > 3.00% then the CATOR is set equal to the greater of:
   a) the average of the Prior Adjusted Total Obligation Rate and the Current Total Obligation Rate; or
   b) 90% of the Prior Adjusted Total Obligation Rate

or

2) If PATOR - CTOR < -3.00% then the CATOR is set equal to the lesser of:
   a) the average of the Prior Adjusted Total Obligation Rate and the Current Total Obligation Rate; or
   b) 110% of the Prior Adjusted Total Obligation Rate

Additionally, the CATOR cannot exceed 36.00%.

# Excerpts from City Ordinance 25695

**ACTUARIALLY REQUIRED CONTRIBUTION RATE** – means, for any fiscal year, a rate of contribution to the fund, expressed as a percentage of members' projected wages for such fiscal year, which is the sum of the following as determined in the actuarial valuation report for the preceding plan year:

(A) the actuarial present value of the pension plan benefits and expenses that are allocated to a valuation period by the actuarial cost method; and

(B) the contribution that will amortize the difference between the actuarial accrued liability of the fund and the actuarial value of the assets of the fund over the period of years required by generally accepted accounting principles.

**CITY CONTRIBUTIONS** – means, for each pay period ending during a transition year, the city shall contribute to the retirement fund an amount equal to:

(A) 63% times the current total obligation rate for that fiscal year times the members' wages for the pay period, minus

(B) The pension obligation bond credit rate for that fiscal year times the members' wages for the pay period;

and, for each pay period ending during each fiscal year, except for a transition year, the city shall contribute to the retirement fund an amount equal to:

(C) 63% times the current adjusted total obligation rate for that fiscal year times the members' wages for the pay period, minus

(D) The pension obligation bond credit rate for that fiscal year times the members' wages for the pay period.

**EMPLOYEE CONTRIBUTIONS** – means, for each pay period ending during a transition year, each member shall contribute to the retirement fund an amount equal to:

(A) 37% times the current total obligation rate for that fiscal year times the member's wages for the pay period;

and, for each pay period ending during each fiscal year, except for a transition year, the member shall contribute to the retirement fund an amount equal to:

(B) 37% times the current adjusted total obligation rate for that fiscal year times the member's wages for the pay period.

**CURRENT ADJUSTED TOTAL OBLIGATION RATE** – means, for any fiscal year, the rate determined by the board as follows, using whichever formula is applicable:

(A) If the current total obligation rate minus the prior adjusted total obligation rate is greater than three, then the current adjusted total obligation rate for such fiscal year is equal to the lesser of:

(i) the prior adjusted total obligation rate plus one-half times the difference of the current total obligation rate minus the prior adjusted total obligation rate; or

(ii) 110 percent times the prior adjusted total obligation rate; or

(iii) 36 percent.

(B) If the difference between the current total obligation rate and the prior adjusted total obligation rate is less than three, then the current adjusted total obligation rate for such fiscal year is equal to the prior adjusted total obligation rate.

(C) If the prior adjusted total obligation rate minus the current total obligation rate is greater than three, then the current adjusted total obligation rate for such fiscal year is equal to the greater of:

(i) the prior adjusted total obligation rate minus one-half times the difference of the prior adjusted total obligation rate minus the current total obligation rate; or

(ii) 90 percent times the prior adjusted total obligation rate.

**CURRENT TOTAL OBLIGATION RATE** – means, for any fiscal year, the rate adopted by the board that is equal to the sum of the pension obligation bond credit rate for such fiscal year plus the actuarially required contribution rate for such fiscal year.

**PENSION OBLIGATION BOND CREDIT RATE** – means, for any fiscal year, the rate adopted by the board that is a percentage calculated by dividing:

(A) the debt service due during such fiscal year on any pension obligation bonds, the proceeds of which have been deposited in the fund, by:

(B) the total members' projected wages for such fiscal year, as reported in the relevant actuarial valuation report.

**PRIOR ADJUSTED TOTAL OBLIGATION RATE** – means:

(A) for the fiscal year commencing October 1, 2006, the current total obligation rate that was effective for the prior fiscal year; and

(B) for each fiscal year commencing on or after October 1, 2007, the current adjusted total obligation rate that was effective for the prior fiscal year.

**PROJECTED PAYROLL** – means the covered payroll for the valuation proceeding the fiscal year multiplied by the payroll growth assumption.

**TRANSITION YEAR** – means each of the following:

(A) the first fiscal year in which debt service payments related to pension obligation bonds are due from the city;

(B) the first fiscal year in which no debt service payments related to pension obligation bonds are due from the city; and

(C) the fiscal year beginning October 1, 2005.

## Net Assets Available for Benefits

## ($ in 000s)

| | December 31, 2016 | December 31, 2017 |
|---|---|---|
| **1 Assets** | | |
| a. Cash & Short-Term | $ 123,539 | $ 117,468 |
| **2 Receivables** | | |
| a. Accrued Investment Income | $ 12,242 | $ 12,773 |
| b. Securities Sold | 3,152 | 7,499 |
| c. Employer Contribution | 1,779 | 1,788 |
| d. Employee Contribution | 1,654 | 1,656 |
| e. Pending Contracts | 694 | 247 |
| | $ 19,521 | $ 23,963 |
| **3 Investments** | | |
| a. Index Funds | $ 219,247 | $ 163,761 |
| b. Fixed Income | 873,730 | 930,414 |
| c. Equities | 1,739,555 | 1,885,899 |
| d. Real Estate | 205,361 | 307,854 |
| e. Private Equity | 161,948 | 195,068 |
| | $ 3,199,841 | $ 3,482,996 |
| **4 Total Assets** | $ 3,342,901 | $ 3,624,427 |
| **5 Liabilities** | | |
| a. Accounts Payable | $ 7,877 | $ 6,420 |
| b. Investment Transactions | 7,343 | 16,395 |
| | $ 15,220 | $ 22,815 |
| **6 Net Assets Available For Benefits** | $ 3,327,681 | $ 3,601,612 |

**Change in Assets Available for Benefits**

**Fiscal Year Ending December 31, 2017**

**($ in 000s)**

| | | 2016 | | 2017 |
|---|---|---|---|---|
| **1 Assets Available at Beginning of Year** | $ | 3,194,582 | $ | 3,327,681 |
| Adjustment * | | 7,626 | | 24,361 |
| | $ | 3,202,208 | $ | 3,352,042 |
| **2 Revenues** | | | | |
| a. Employer Contributions | $ | 56,130 | $ | 58,966 |
| b. Employee Contributions | | 53,436 | | 55,175 |
| c. Investment Income | | 91,980 | | 101,352 |
| d. Investment Expense | | (15,223) | | (14,334) |
| e. Realized and Unrealized Gains (Losses) | | 192,579 | | 314,318 |
| f. Other (Security Lending) | | 1,398 | | 1,508 |
| Total Revenues | $ | 380,300 | $ | 516,985 |
| **3 Expenses** | | | | |
| a. Benefits | $ | 243,684 | $ | 253,534 |
| b. Refunds | | 5,800 | | 8,156 |
| c. Administration Expense | | 5,343 | | 5,725 |
| Total Expense | $ | 254,827 | $ | 267,415 |
| **4 Assets Available at End of Year (1 + 2 - 3)** | $ | 3,327,681 | $ | 3,601,612 |

** Change due to difference between unaudited asset value used for prior valuation and audited asset value reported the following year.*

**Development of Actuarial Value of Assets**

**As of December 31, 2017**

**($ in 000s)**

| | Market Value | Actuarial Value |
|---|---|---|
| **1 Value of Assets @ 12-31-2016** | $ 3,327,681 | $ 3,451,463 |
| **2 Non-Investment Cash Flows during 2017** | | |
| a. Employer Contributions | $ 58,966 | $ 58,966 |
| b. Employee Contributions | 55,175 | 55,175 |
| c. Benefits (including refunds) | (261,690) | (261,690) |
| d. Administrative Expenses | (5,725) | (5,725) |
| Total | $ (153,274) | $ (153,274) |
| **3 Expected Investment Returns @ 7.75%** | $ 261,660 | $ 261,660 |
| **4 Expected Assets @ 12-31-2017 (1 + 2 + 3)** | $ 3,436,067 | $ 3,559,849 |
| **5 Actual Assets Available for Benefits** | $ 3,601,612 | |
| **6 Gain/ (Loss) From Investment Returns (5 - 4)** | $ 165,545 | |
| **7 Recognition of Gains / (Losses)** | | |
| a. One-fifth of Current Year Gain/(Loss) (one-fifth of 6) | | $ 33,109 |
| b. One-fifth of 2016 Gain/(Loss) | | 3,686 |
| c. One-fifth of 2015 Gain/(Loss) | | (61,315) |
| d. One-fifth of 2014 Gain/(Loss) | | (8,126) |
| e. One-fifth of 2013 Gain/(Loss) | | 52,493 |
| Total | | $ 19,847 |
| **8 Actuarial Value of Assets @ 12-31-2017 (4 + 7) prior to method change** | | $ 3,579,696 |
| **9 Actuarial Value of Assets @ 12-31-2017 after method change*** | | $ 3,601,612 |

*As part of the methodology change for the Actuarial Value of Assets, the Actuarial Value was reset to equal the Market Value as of 12/31/2017.

## Historical Investment Performance
## Dollar Weighted Basis Net of Investment Expenses

| Calendar Year | On Market Value | On Actuarial Value |
|---|---|---|
| 2000 | -3.45% | 9.59% |
| 2001 | -5.46% | 2.76% |
| 2002 | -9.81% | -5.37% |
| 2003 | 27.05% | 2.03% |
| 2004 | 15.22% | 9.38% |
| 2005 | 7.93% | 13.71% |
| 2006 | 16.90% | 13.03% |
| 2007 | 3.56% | 9.58% |
| 2008 | -31.31% | -3.76% |
| 2009 | 30.35% | 6.79% |
| 2010 | 15.77% | 4.30% |
| 2011 | 0.86% | 1.15% |
| 2012 | 14.29% | 2.82% |
| 2013 | 16.75% | 10.65% |
| 2014 | 6.14% | 10.29% |
| 2015 | -1.83% | 7.02% |
| 2016 | 8.65% | 8.51% |
| 2017* | 12.34% | 8.99% |
| 5-year average ending in 2017 | 8.23% | 9.08% |
| 10-year average ending in 2017 | 5.90% | 5.59% |

*The yield on the actuarial value of assets for 2017 includes the impact of the method change for the Actuarial Value of Assets.

**Analysis of Change in Unfunded**
**Actuarial Accrued Liability**
**For the Year Ending December 31, 2017**
**($ in 000s)**

| | | | |
|---|---|---|---|
| **1** | **UAAL as of December 31, 2016** | | $ 840,339 |
| **2** | **Expected Change in UAAL during 2017** | | |
| | a. Expected Amortization Payment for CY 2017 | (55,237) | |
| | b. Interest adjustments on 1 & 2a to Year End @ 7.75% | 62,986 | |
| | c. Expected change in UAAL | | 7,749 |
| **3** | **Increase/(Decrease) in UAAL Due to Difference Between Calculated Contribution Rate and Actual Contribution** | | 30,926 |
| **4** | **Net Actuarial Experience (Gains) & Losses** | | (80,866) |
| **5** | **Assumption and Method Changes** | | (21,916) |
| **6** | **UAAL as of December 31, 2017** | | $ 776,232 |

## Analysis of Actuarial (Gains) and Losses
## For 2017
## ($ in 000s)

| | 2017 |
|---|---|
| **Investment Return** | $ (19,847) |
| **Salary Increase** | (20,424) |
| **Age and Service Retirement** | (7,608) |
| **General Employment Termination** | (1,457) |
| **Disability Incidence** | (317) |
| **Active Mortality** | (202) |
| **Benefit Recipient Mortality** | (9,273) |
| **Actual vs. Expected Cost of Living Adjustment (COLA)*** | (12,980) |
| **Other** | (8,758) |
| **Total Actuarial (Gain)/ Loss** | $ (80,866) |

* Actual COLA of 2.05% versus expected COLA of 2.75%

## Schedule of Funding Status

**($ in 000s)**

| End of Year | Actuarial Value of Assets (a) | AAL (b) | UAAL (b-a) | Funding Ratio (a/b) | Payroll* (c) | UAAL as % of Payroll ((b-a)/c) |
|---|---|---|---|---|---|---|
| **1998** | $1,617,468 | $1,750,430 | $132,962 | 92.40% | $275,547 | 48.30% |
| **1999** | 1,862,644 | 1,873,998 | 11,353 | 99.39% | 282,127 | 4.00% |
| **2000** | 1,997,828 | 2,038,078 | 40,250 | 98.03% | 298,355 | 13.50% |
| **2001** | 2,017,041 | 2,276,488 | 259,447 | 88.60% | 332,842 | 77.90% |
| **2002** | 1,863,701 | 2,399,569 | 535,868 | 77.67% | 324,615 | 165.08% |
| **2003** | 1,843,099 | 2,489,071 | 645,972 | 74.05% | 318,492 | 202.82% |
| **2004** | 2,482,082 | 2,488,270 | 6,188 | 99.75% | 331,201 | 1.87% |
| **2005** | 2,739,269 | 2,606,173 | (133,096) | 105.11% | 332,446 | -40.04% |
| **2006** | 2,998,099 | 2,761,404 | (236,695) | 108.57% | 344,997 | -68.61% |
| **2007** | 3,183,260 | 2,915,164 | (268,096) | 109.20% | 370,150 | -72.43% |
| **2008** | 2,957,506 | 3,075,385 | 117,879 | 96.17% | 389,362 | 30.27% |
| **2009** | 3,031,652 | 3,192,120 | 160,468 | 94.97% | 375,164 | 42.77% |
| **2010** | 3,027,439 | 3,282,126 | 254,687 | 92.24% | 332,045 | 76.70% |
| **2011** | 2,916,746 | 3,391,652 | 474,906 | 86.00% | 318,972 | 148.89% |
| **2012** | 2,846,124 | 3,518,356 | 672,232 | 80.89% | 340,452 | 197.45% |
| **2013** | 3,074,284 | 3,610,845 | 362,477 | 85.14% | 352,486 | 102.83% |
| **2014** | 3,241,053 | 4,004,055 | 763,002 | 80.94% | 374,002 | 204.01% |
| **2015** | 3,320,387 | 4,129,133 | 808,746 | 80.41% | 404,981 | 199.70% |
| **2016** | 3,451,463 | 4,291,802 | 840,339 | 80.42% | 420,693 | 199.75% |
| **2017** | 3,601,612 | 4,377,844 | 776,232 | 82.27% | 432,854 | 179.33% |

* *Projected to following year.*

## Summary of Data Characteristics

| | December 31, 2015 | December 31, 2016 | December 31, 2017 |
|---|---|---|---|
| **Active Members** | | | |
| Number | 7,477 | 7,619 | 7,838 |
| Total Annualized Earnings of Members as of 12/31 (000s) | $ 393,186 | $ 409,433 | $ 421,269 |
| Average Earnings | 52,586 | 53,738 | 53,747 |
| **Benefit Recipients** | | | |
| Number | 6,756 | 6,903 | 7,042 |
| Total Annual Retirement Income (000s) | $ 226,019 | $ 237,993 | $ 244,768 |
| Total Annual Health Supplement (000s) | 9,924 | 10,061 | 10,220 |
| Average Total Annual Benefit | 34,945 | 35,542 | 36,223 |
| **Inactive Members*** | | | |
| Deferred Vested | 748 | 768 | 793 |
| Deferred Nonvested | 415 | 447 | 455 |
| Total | 1,163 | 1,215 | 1,248 |

** The number of inactives on 12/31/2017 includes 793 members who have applied for a deferred pension and 455 other members who have terminated and still have contribution balances in the Fund.*

## Distribution of Active Members and Payroll by Age and Years of Service

| | Years of Service | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Age** | **Under 1** | **1-4** | **5-9** | **10-14** | **15-19** | **20-24** | **25-29** | **30 & Over** | **Totals** |
| **Under 20** | 3 | | | | | | | | 3 |
| | $77,994 | | | | | | | | $77,994 |
| **20-24** | 116 | 91 | 2 | | | | | | 209 |
| | $3,596,069 | $3,084,437 | $88,830 | | | | | | $6,769,336 |
| **25-29** | 188 | 388 | 49 | 2 | | | | | 627 |
| | $7,247,745 | $15,814,316 | $2,365,723 | $80,125 | | | | | $25,507,909 |
| **30-34** | 175 | 381 | 165 | 71 | | | | | 792 |
| | 7,354,716 | 17,554,500 | 8,768,489 | 3,991,583 | | | | | 37,669,288 |
| **35-39** | $129 | $358 | $186 | $144 | $29 | | | | $846 |
| | 5,689,779 | 17,607,639 | 10,605,587 | 8,278,721 | 1,864,378 | | | | 44,046,104 |
| **40-44** | $120 | $282 | $169 | $188 | $138 | $47 | $1 | | $945 |
| | 5,740,126 | 14,319,555 | 9,953,167 | 11,075,618 | 7,851,567 | 2,942,699 | 61,061 | | 51,943,793 |
| **45-49** | $112 | $281 | $140 | $192 | $143 | $156 | $48 | $1 | $1,073 |
| | 5,861,005 | 13,940,701 | 7,564,923 | 11,313,840 | 8,428,706 | 9,800,278 | 3,319,017 | 61,200 | 60,289,670 |
| **50-54** | 89 | 245 | 169 | 233 | 192 | 189 | 84 | 42 | 1,243 |
| | $4,187,079 | $11,765,148 | $9,279,679 | $14,228,252 | $11,671,581 | $11,923,914 | $6,191,437 | $2,952,352 | $72,199,442 |
| **55-59** | 75 | 217 | 170 | 206 | 202 | 143 | 68 | 60 | 1,141 |
| | $3,057,492 | $10,762,192 | $9,522,985 | $11,346,544 | $11,943,314 | $8,845,367 | $4,887,584 | $4,639,836 | $65,005,314 |
| **60-64** | 28 | 91 | 102 | 143 | 112 | 89 | 34 | 49 | 648 |
| | $1,181,854 | $4,643,860 | $6,084,310 | $7,922,065 | $6,606,450 | $5,975,184 | $2,397,442 | $3,599,745 | $38,410,910 |
| **65&Over** | 11 | 29 | 51 | 75 | 52 | 37 | 25 | 31 | 311 |
| | $426,392 | $1,503,101 | $3,077,895 | $4,717,659 | $3,234,299 | $2,242,253 | $1,838,011 | $2,309,347 | $19,348,957 |
| **Totals** | 1,046 | 2,363 | 1,203 | 1,254 | 868 | 661 | 260 | 183 | 7,838 |
| | $44,420,251 | $110,995,449 | $67,311,588 | $72,954,407 | $51,600,295 | $41,729,695 | $18,694,552 | $13,562,480 | $421,268,717 |

## Distribution of Benefit Recipients
## as of December 31, 2017

| Age | Number | Annual Benefit* | Annual Average Benefit* |
|---|---|---|---|
| **Under 50** | 51 | $ 808,547 | $ 15,854 |
| **50-54** | 226 | 9,909,036 | 43,845 |
| **55-59** | 691 | 30,828,279 | 44,614 |
| **60-64** | 1,326 | 49,017,984 | 36,967 |
| **65-69** | 1,725 | 64,568,067 | 37,431 |
| **70-74** | 1,231 | 42,432,041 | 34,470 |
| **75-79** | 763 | 22,019,729 | 28,859 |
| **80-84** | 508 | 13,800,099 | 27,166 |
| **85-89** | 328 | 7,488,594 | 22,831 |
| **90 & Over** | 193 | 3,895,767 | 20,185 |
| **Total** | 7,042 | $ 244,768,143 | $ 34,758 |

** Does not include Health Benefit Supplement.*

# Schedule of Active Member Valuation Data

| Year Ending December 31, | Active Participants | Percent Change | Covered Payroll | Percent Change | Average Salary | Percent Change |
|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| 2007 | 8,117 | - | $ 359,369,000 | - | $ 44,274 | - |
| 2008 | 8,371 | 3.1% | 378,021,000 | 5.2% | 45,158 | 2.0% |
| 2009 | 7,654 | -8.6% | 364,237,000 | -3.6% | 47,588 | 5.4% |
| 2010 | 7,034 | -8.1% | 322,374,000 | -11.5% | 45,831 | -3.7% |
| 2011 | 6,745 | -4.1% | 309,682,000 | -3.9% | 45,913 | 0.2% |
| 2012 | 6,864 | 1.8% | 330,536,000 | 6.7% | 48,155 | 4.9% |
| 2013 | 6,993 | 1.9% | 342,219,000 | 3.5% | 48,937 | 1.6% |
| 2014 | 7,180 | 2.7% | 363,109,000 | 6.1% | 50,572 | 3.3% |
| 2015 | 7,477 | 4.1% | 393,186,000 | 8.3% | 52,586 | 4.0% |
| 2016 | 7,619 | 1.9% | 409,433,000 | 4.1% | 53,738 | 2.2% |
| 2017 | 7,838 | 2.9% | 421,269,000 | 2.9% | 53,747 | 0.0% |

## Schedule of Retirees and Beneficiaries Added to and Removed from Rolls

| | Added to Rolls | | Removed from Rolls | | Rolls-End of Year | | | |
|---|---|---|---|---|---|---|---|---|
| Year Ending December 31, | Number | Annual Allowances | Number | Annual Allowances | Number | Annual Allowances | % Increase in Annual Allowances | Average Annual Allowances |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| 2007 | 239 | $ 7,250,468 | 205 | $ 4,551,742 | 5,304 | $142,267,609 | - | $ 26,823 |
| 2008 | 383 | 8,905,680 | 211 | 4,684,964 | 5,476 | 154,692,846 | 8.7% | 28,249 |
| 2009 | 446 | 9,268,740 | 216 | 4,795,982 | 5,706 | 165,826,328 | 7.2% | 29,062 |
| 2010 | 508 | 12,798,268 | 221 | 4,907,000 | 5,993 | 179,730,384 | 8.4% | 29,990 |
| 2011 | 404 | 10,012,165 | 198 | 4,396,317 | 6,199 | 193,851,170 | 7.9% | 31,271 |
| 2012 | 325 | 9,795,464 | 204 | 4,529,539 | 6,320 | 202,120,582 | 4.3% | 31,981 |
| 2013 | 324 | 11,246,955 | 197 | 4,327,990 | 6,447 | 210,027,512 | 3.9% | 32,578 |
| 2014 | 370 | 12,415,771 | 219 | 4,821,713 | 6,598 | 219,150,070 | 4.3% | 33,215 |
| 2015 | 476 | 13,777,204 | 318 | 6,847,464 | 6,756 | 226,019,290 | 3.1% | 33,455 |
| 2016 | 384 | 12,746,549 | 237 | 5,562,549 | 6,903 | 237,992,528 | 5.3% | 34,477 |
| 2017 | 383 | 9,893,931 | 244 | 6,375,641 | 7,042 | 244,768,143 | 2.8% | 34,758 |

# Solvency Test

| Valuation Date | Aggregated Accrued Liabilities for: Active and Inactive Members Contributions | Aggregated Accrued Liabilities for: Retirees and Beneficiaries | Aggregated Accrued Liabilities for: Active and Inactive Members (Employer Financed Portion) | Reported Assets | Portions of Accrued Liabilities Covered by Reported Assets: (5)/(2) | Portions of Accrued Liabilities Covered by Reported Assets: [(5)-(2)]/3 | Portions of Accrued Liabilities Covered by Reported Assets: [(5)-(2)-(3)]/(4) |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| December 31, 2007 | $ 206,090 | $ 1,591,731 | $ 1,117,343 | $ 3,183,260 | 100.0% | 100.0% | 100.0% |
| December 31, 2008 | 221,667 | 1,707,599 | 1,146,119 | 2,957,506 | 100.0% | 100.0% | 89.7% |
| December 31, 2009 | 228,666 | 1,834,491 | 1,128,963 | 3,031,652 | 100.0% | 100.0% | 85.8% |
| December 31, 2010 | 232,727 | 2,041,322 | 1,008,077 | 3,027,439 | 100.0% | 100.0% | 74.7% |
| December 31, 2011 | 240,821 | 2,181,731 | 969,100 | 2,916,746 | 100.0% | 100.0% | 51.0% |
| December 31, 2012 | 257,716 | 2,250,533 | 1,010,107 | 2,846,124 | 100.0% | 100.0% | 33.4% |
| December 31, 2013 | 278,892 | 2,319,424 | 1,012,529 | 3,074,284 | 100.0% | 100.0% | 47.0% |
| December 31, 2014 | 301,567 | 2,578,071 | 1,124,417 | 3,241,053 | 100.0% | 100.0% | 32.1% |
| December 31, 2015 | 325,607 | 2,650,638 | 1,152,888 | 3,320,387 | 100.0% | 100.0% | 29.9% |
| December 31, 2016 | 350,646 | 2,770,533 | 1,170,623 | 3,451,463 | 100.0% | 100.0% | 28.2% |
| December 31, 2017 | 373,193 | 2,854,818 | 1,149,833 | 3,601,612 | 100.0% | 100.0% | 32.5% |

# EXPERIENCE TABLES

## Pay Experience for Employees who are Active at Beginning and End of Year
## Valuation Pay Analysis
## Analyzed by Years of Service

| Service Beginning of Year | Experience for 2017 | | | |
|---|---|---|---|---|
| | Number | Expected Pay | Actual Pay | Ratio A/E |
| Under 5 | 2,145 | $ 100,256,714 | $ 99,462,238 | 99.21% |
| 5-9 | 1,282 | 71,775,108 | 70,542,809 | 98.28% |
| 10-14 | 1,327 | 77,952,000 | 76,498,726 | 98.14% |
| 15-19 | 847 | 51,624,740 | 50,539,238 | 97.90% |
| 20-24 | 706 | 44,808,325 | 44,168,509 | 98.57% |
| 25-29 | 289 | 20,436,096 | 20,339,298 | 99.53% |
| 30 & Over | 198 | 15,113,681 | 14,878,577 | 98.44% |
| Total | 6,794 | $ 381,966,664 | $ 376,429,395 | 98.55% |
| Over 10 Years | 3,367 | $ 209,934,842 | $ 206,424,348 | 98.33% |

| Service Beginning of Year | Experience for 2015-2017 | | | |
|---|---|---|---|---|
| | Number | Expected Pay | Actual Pay | Ratio A/E |
| Under 5 | 5,996 | $ 277,793,383 | $ 281,818,238 | 101.45% |
| 5-9 | 3,956 | 212,563,326 | 213,718,724 | 100.54% |
| 10-14 | 3,524 | 201,675,090 | 201,813,410 | 100.07% |
| 15-19 | 2,946 | 170,418,017 | 171,260,555 | 100.49% |
| 20-24 | 1,976 | 123,540,350 | 124,109,273 | 100.46% |
| 25-29 | 893 | 61,878,662 | 62,311,634 | 100.70% |
| 30 & Over | 632 | 45,655,669 | 45,748,570 | 100.20% |
| Total | 19,923 | $ 1,093,524,497 | $ 1,100,780,404 | 100.66% |
| Over 10 Years | 9,971 | $ 603,167,788 | $ 605,243,442 | 100.34% |

## Analysis of Retirement Experience

## Each Age

| Age | 2017 Retirement | | | 2015-2017 Retirement | | |
|---|---|---|---|---|---|---|
| | Actual | Expected | Ratio A/E | Actual | Expected | Ratio A/E |
| **46** | - | - | N/A | - | - | N/A |
| **47** | - | - | N/A | - | - | N/A |
| **48** | - | - | N/A | 1 | 0.90 | 111.11% |
| **49** | - | 0.30 | 0.00% | 3 | 2.30 | 130.43% |
| **50** | 5 | 7.20 | 69.44% | 32 | 36.40 | 87.91% |
| **51** | 5 | 8.65 | 57.80% | 26 | 34.75 | 74.82% |
| **52** | 5 | 10.38 | 48.17% | 27 | 37.56 | 71.88% |
| **53** | 10 | 12.55 | 79.68% | 34 | 40.30 | 84.37% |
| **54** | 11 | 9.45 | 116.40% | 29 | 33.93 | 85.47% |
| **55** | 7 | 11.68 | 59.93% | 28 | 37.42 | 74.83% |
| **56** | 6 | 9.26 | 64.79% | 27 | 40.63 | 66.45% |
| **57** | 17 | 18.23 | 93.25% | 34 | 47.96 | 70.89% |
| **58** | 13 | 17.63 | 73.74% | 31 | 43.66 | 71.00% |
| **59** | 7 | 14.41 | 48.58% | 26 | 47.99 | 54.18% |
| **60** | 18 | 26.38 | 68.23% | 67 | 79.29 | 84.50% |
| **61** | 16 | 23.81 | 67.20% | 43 | 68.05 | 63.19% |
| **62** | 15 | 21.95 | 68.34% | 50 | 62.00 | 80.65% |
| **63** | 9 | 19.05 | 47.24% | 37 | 54.95 | 67.33% |
| **64** | 13 | 14.70 | 88.44% | 30 | 40.45 | 74.17% |
| **65** | 10 | 17.17 | 58.24% | 40 | 50.42 | 79.33% |
| **66** | 19 | 12.75 | 149.02% | 47 | 42.05 | 111.77% |
| **67** | 12 | 13.70 | 87.59% | 30 | 33.65 | 89.15% |
| **68** | 5 | 6.50 | 76.92% | 16 | 20.50 | 78.05% |
| **69** | 6 | 7.30 | 82.19% | 13 | 16.50 | 78.79% |
| **70 & Over** | 13 | 78.00 | 16.67% | 32 | 199.00 | 16.08% |
| **Total** | 222 | 361.05 | 61.49% | 703 | 1,070.66 | 65.66% |
| **Total Under 70** | 209 | 283.05 | 73.84% | 671 | 871.66 | 76.98% |

## Analysis of Retirement Experience

### Age Groups

| Age Group | 2017 Retirements | | | 2015-2017 Retirements | | |
|---|---|---|---|---|---|---|
| | Actual | Expected | Ratio A/E | Actual | Expected | Ratio A/E |
| **Under 55** | 36 | 48.53 | 74.18% | 152 | 186.14 | 81.66% |
| **55-59** | 50 | 71.21 | 70.21% | 146 | 217.66 | 67.08% |
| **60-64** | 71 | 105.89 | 67.05% | 227 | 304.74 | 74.49% |
| **65-69** | 52 | 57.42 | 90.56% | 146 | 163.12 | 89.50% |
| **70 & Over** | 13 | 78.00 | 16.67% | 32 | 199.00 | 16.08% |
| **Total** | 222 | 361.05 | 61.49% | 703 | 1,070.66 | 65.66% |
| **Total Under 70** | 209 | 283.05 | 73.84% | 671 | 871.66 | 76.98% |

## Analysis of Turnover Experience

| Years of Service | 2017 Quits | | | 2015-2017 Quits | | |
|---|---|---|---|---|---|---|
| | Actual | Expected | Ratio A/E | Actual | Expected | Ratio A/E |
| **0-4** | 354 | 368.10 | 96.17% | 1,040 | 1,035.58 | 100.43% |
| **5-9** | 116 | 86.68 | 133.82% | 306 | 248.31 | 123.23% |
| **10-14** | 66 | 46.01 | 143.43% | 138 | 123.78 | 111.49% |
| **15-19** | 22 | 17.53 | 125.49% | 58 | 60.74 | 95.50% |
| **20-24** | 10 | 8.36 | 119.67% | 28 | 23.97 | 116.79% |
| **25-29** | - | 0.67 | 0.00% | 1 | 1.75 | 57.14% |
| **Total** | 568 | 527.35 | 107.71% | 1,571 | 1,494.12 | 105.15% |

## Analysis of Active Mortality Experience

| Age | 2017 Deaths | | | 2015-2017 Deaths* | | |
|---|---|---|---|---|---|---|
| | Actual | Expected | Ratio A/E | Actual | Expected | Ratio A/E |
| 20-24 | 1 | 0.04 | 2327.04% | 1 | 0.13 | 768.69% |
| 25-29 | - | 0.21 | 0.00% | 1 | 0.58 | 173.81% |
| 30-34 | - | 0.41 | 0.00% | - | 1.13 | 0.00% |
| 35-39 | 1 | 0.66 | 152.62% | 2 | 1.91 | 104.56% |
| 40-44 | - | 1.07 | 0.00% | 6 | 3.14 | 190.83% |
| 45-49 | 2 | 1.86 | 107.32% | 3 | 5.80 | 51.70% |
| 50-54 | 3 | 3.35 | 89.51% | 8 | 10.23 | 78.18% |
| 55-59 | 1 | 4.73 | 21.12% | 8 | 13.62 | 58.75% |
| 60 and Over | 6 | 7.62 | 78.73% | 16 | 21.49 | 74.46% |
| Total | 14 | 19.96 | 70.15% | 45 | 58.03 | 77.54% |

## Analysis of Disability Experience

| Age | 2017 Disabilities | | | 2015-2017 Disabilities | | |
|---|---|---|---|---|---|---|
| | Actual | Expected | Ratio A/E | Actual | Expected | Ratio A/E |
| 20-24 | - | 0.02 | 0.00% | - | 0.07 | 0.00% |
| 25-29 | - | 0.14 | 0.00% | - | 0.38 | 0.00% |
| 30-34 | - | 0.24 | 0.00% | - | 0.68 | 0.00% |
| 35-39 | - | 0.39 | 0.00% | - | 1.14 | 0.00% |
| 40-44 | - | 0.77 | 0.00% | 2 | 2.26 | 88.33% |
| 45-49 | - | 1.83 | 0.00% | 2 | 5.59 | 35.79% |
| 50-54 | 3 | 3.57 | 83.97% | 9 | 10.61 | 84.80% |
| 55-59 | 1 | 4.14 | 24.17% | 4 | 11.70 | 34.20% |
| 60 and Over | 1 | 1.18 | 84.95% | 2 | 3.65 | 54.81% |
| Total | 5 | 12.28 | 40.73% | 19 | 36.07 | 52.68% |

## Analysis of Retiree Mortality Experience*

| Age | 2017 Experience | | | 2015-2017 Experience | | |
|---|---|---|---|---|---|---|
| | Actual | Expected | Ratio A/E | Actual | Expected | Ratio A/E |
| **Under 60** | 4 | 3.15 | 126.99% | 19 | 9.85 | 192.87% |
| **60-64** | 9 | 9.60 | 93.76% | 32 | 29.45 | 108.64% |
| **65-69** | 24 | 21.52 | 111.54% | 64 | 63.14 | 101.37% |
| **70-74** | 24 | 23.50 | 102.11% | 72 | 66.21 | 108.75% |
| **75-79** | 21 | 23.64 | 88.84% | 64 | 67.31 | 95.08% |
| **80-84** | 17 | 21.92 | 77.56% | 76 | 65.78 | 115.54% |
| **85-89** | 22 | 22.69 | 96.94% | 79 | 69.66 | 113.41% |
| **90 & over** | 20 | 19.32 | 103.53% | 72 | 60.38 | 119.25% |
| **Total** | 141 | 145.34 | 97.02% | 478 | 431.77 | 110.71% |

**This analysis does not include beneficiary, QDRO, or disabled deaths.*

# ACTUARIAL METHODS AND ASSUMPTIONS

***Entry Age Normal Method.***

The Entry Age Normal actuarial cost method is the actuarial valuation method used for all purposes under ERF.

The concept of this method is that funding of benefits for each member should be effected as a, theoretically, level contribution (as a level percentage of pay) from entry into ERF to termination of active status.

The Normal Cost (NC) for a fiscal year under this method is determined as described in the prior paragraph for each member. The ERF NC for the year is the total of individual normal costs determined for each active member. The Actuarial Accrued Liability (AAL) under this method is the theoretical asset balance of the normal costs that would have accumulated to date based upon current actuarial assumptions. To the extent that the assets of the fund are insufficient to cover the AAL, an Unfunded Actuarial Accrued Liability (UAAL) develops.

The actuarially calculated contribution for a year is the Normal Cost for that year plus an amount to amortize the UAAL over 30 years as a level percentage of pay.

***Actuarial Value of Asset Method.***

The actuarial value of assets was reset to equal the market value of assets as of December 31, 2017.

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

# ACTUARIAL METHODS AND ASSUMPTIONS

## (as of December 31, 2017)

***Annual Rate of Investment Return:*** For all purposes under the Fund, the rate of investment return is assumed to be 7.75% per annum, net of investment expenses. This rate includes an annual assumed rate of inflation of 2.75%. In addition, annual cost-of-living adjustments are assumed to occur on average at the rate of 2.75% per annum for Tier A members and 2.35% for Tier B members (due to the lower maximum on cost-of-living-adjustments).

***Annual Compensation Increases:*** Each member's compensation is assumed to increase in accordance with a table based on actual ERF experience. Sample rates follow:

| Years of Service | Merit, Promotion, Longevity | General | Total |
|---|---|---|---|
| **0** | 3.00 % | 3.25 % | 6.25 % |
| **1** | 3.00 | 3.25 | 6.25 |
| **2** | 2.75 | 3.25 | 6.00 |
| **3** | 2.00 | 3.25 | 5.25 |
| **4** | 1.50 | 3.25 | 4.75 |
| **5** | 1.50 | 3.25 | 4.75 |
| **6** | 1.50 | 3.25 | 4.75 |
| **7** | 1.00 | 3.25 | 4.25 |
| **8** | 1.00 | 3.25 | 4.25 |
| **9** | 0.75 | 3.25 | 4.00 |
| **10** | 0.75 | 3.25 | 4.00 |
| **11** | 0.75 | 3.25 | 4.00 |
| **12** | 0.50 | 3.25 | 3.75 |
| **13** | 0.50 | 3.25 | 3.75 |
| **14** | 0.50 | 3.25 | 3.75 |
| **15** | 0.50 | 3.25 | 3.75 |
| **16** | 0.50 | 3.25 | 3.75 |
| **17** | 0.50 | 3.25 | 3.75 |
| **18** | 0.25 | 3.25 | 3.50 |
| **19 & Over** | 0.00 | 3.25 | 3.25 |

# ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

***Mortality:***

Disabled Lives: RP-2000 Disabled Mortality Table for male annuitants**,** set forward one year.

Sample rates follow (rate per 1,000):

| | Disability Mortality Rate | |
|---|---|---|
| **Age** | **Male** | **Female** |
| **20** | 23 | 23 |
| **30** | 23 | 23 |
| **40** | 23 | 23 |
| **50** | 30 | 30 |
| **60** | 43 | 43 |
| **70** | 66 | 66 |
| **80** | 116 | 116 |
| **90** | 200 | 200 |

Other Benefit Recipients:

a. Males – RP-2000 Blue Collar Healthy Mortality Table for male annuitants, with a 109% multiplier and fully generational mortality using improvement Scale BB.

b. Females – RP-2000 Blue Collar Healthy Mortality Table for female annuitants, with a 103% multiplier and fully generational mortality using improvement Scale BB.

Sample rates follow (rate per 1,000), with projected mortality applied:

| | Mortality Rate | |
|---|---|---|
| **Age** | **Male** | **Female** |
| **30** | 0.8 | 0.3 |
| **40** | 1.4 | 0.9 |
| **50** | 2.5 | 1.9 |
| **60** | 8.0 | 4.3 |
| **70** | 22.6 | 15.6 |
| **80** | 59.5 | 41.1 |
| **90** | 164.2 | 116.7 |

# ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

***Mortality:***

Active Members:

a. Males – RP2000 Healthy Mortality Table for male employees, set forward 4 years.

b. Females – RP2000 Healthy Mortality Table for female employees, set back 5 years.

Sample rates follow (rate per 1,000):

| | Mortality Rate | |
|---|---|---|
| **Age** | **Male** | **Female** |
| **30** | 0.7 | 0.2 |
| **40** | 1.4 | 0.5 |
| **50** | 2.8 | 1.1 |
| **60** | 7.0 | 2.5 |
| **70** | 33.9 | 5.8 |
| **80** | 99.8 | 28.1 |
| **90** | 250.7 | 77.4 |

10% of active deaths are assumed to be service related.

***Disability:*** A client-specific table of disability incidence with sample rates follows (rate per 1,000):

| **Age** | **Disability Rate** |
|---|---|
| **30** | 0.3 |
| **40** | 0.6 |
| **50** | 2.4 |
| **60** | 6.0 |

20% of disabilities are assumed to be service related. There is a 0% assumption of disability for members who have over 10 years of service and are eligible for retirement.

# ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

***Retirement:*** Upon eligibility, active members are assumed to retire as follows (rate per 1,000):

**Tier A:**

| Age | Male | | Female | |
|---|---|---|---|---|
| | First Year Eligible | Thereafter | First Year Eligible | Thereafter |
| **48-49** | 100 | 100 | 100 | 100 |
| **50** | 600 | 550 | 400 | 350 |
| **51** | 500 | 450 | 400 | 350 |
| **52** | 500 | 330 | 400 | 350 |
| **53** | 450 | 300 | 400 | 300 |
| **54** | 400 | 280 | 400 | 250 |
| **55** | 350 | 280 | 300 | 250 |
| **56** | 350 | 280 | 300 | 250 |
| **57** | 350 | 280 | 300 | 220 |
| **58-59** | 350 | 280 | 300 | 220 |
| | Service < 18 yrs. | Service 18 yrs.+ | Service < 18 yrs. | Service 18 yrs. + |
| **60** | 80 | 250 | 100 | 300 |
| **61** | 90 | 250 | 150 | 220 |
| **62** | 100 | 250 | 150 | 200 |
| **63** | 150 | 250 | 150 | 150 |
| **64** | 150 | 250 | 100 | 100 |
| **65** | 180 | 250 | 200 | 200 |
| **66** | 200 | 250 | 250 | 250 |
| **67** | 200 | 250 | 250 | 250 |
| **68** | 200 | 250 | 150 | 250 |
| **69** | 200 | 250 | 150 | 250 |
| **70** | 1,000 | 1,000 | 1,000 | 1,000 |

# ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

***Retirement, Continued:***

Upon eligibility, active members are assumed to retire as follows (rate per 1,000):

**Tier B:**

| Age | Male | | Female | |
|---|---|---|---|---|
| | Service < 40 yrs. | Service 40 yrs. + | Service < 40 yrs. | Service 40 yrs. + |
| **<55** | 10 | 350 | 10 | 350 |
| **55-56** | 20 | 350 | 20 | 350 |
| **57-58** | 30 | 350 | 30 | 350 |
| **59-60** | 40 | 350 | 40 | 350 |
| **61-62** | 50 | 350 | 50 | 350 |
| **63-64** | 60 | 350 | 60 | 350 |
| **65** | 180 | 600 | 200 | 450 |
| **66** | 200 | 250 | 250 | 250 |
| **67** | 200 | 250 | 250 | 250 |
| **68** | 200 | 250 | 150 | 250 |
| **69** | 200 | 250 | 150 | 250 |
| **70** | 1,000 | 1,000 | 1,000 | 1,000 |

*For service < 40 yrs, rates shown are for those who met the rule of 80.

# ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

***General Turnover:*** A table of termination rates based on ERF experience. A sample of the ultimate rates follows:

| Years of Service | Terminations (per 1,000) |
|---|---|
| **0** | 210.0 |
| **1** | 160.0 |
| **2** | 130.0 |
| **3** | 105.0 |
| **4** | 85.0 |
| **5** | 67.5 |
| **6** | 62.5 |
| **7** | 57.5 |
| **8** | 49.0 |
| **9** | 46.0 |
| **10-14** | 37.0 |
| **15-19** | 22.0 |
| **20 & Over** | 14.0 |

There is 0% assumption of termination for members eligible for retirement.

***Mortality Improvement:*** Scale BB is used to project mortality improvements for Healthy Retirees on a fully generational basis. There is no projection of mortality improvement before or after the measurement date for disabled lives or active employees.

***Refunds of Contributions:*** Members are assumed to choose the most valuable termination benefit.

***Operational Expenses:*** The amount of estimated administrative expenses expected in the next year is assumed to be equal to the prior year's expenses and is incorporated in the Normal Cost.

***Marital Status:*** 75% of active male members and 50% of active female employees are assumed to be married.

# ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

***Vacation Leave Conversions:*** Members with 20 or more years of service are assumed to convert unused vacation leave to 1.5 months of service. Other members are assumed to convert unused vacation leave to 1 month of service. No vacation leave conversion is assumed for disability retirement.

***Spouse Age:*** The female spouse is assumed to be 3 years younger than the male spouse.

***Payroll Growth Rate:*** In determining the level percent amortization of UAAL rate, the payroll of the entire system is assumed to increase at 2.75% each year.

***Member's Pay:*** In determining the member's valuation salary, the greater of the prior calendar year's gross pay and the member's rate of compensation is used.

***Form of Payment:*** For Tier A it is assumed that 60% of married active male members and 84% of married active female employees will elect a Joint & 50% Survivor form of payment. Taking into consideration the marriage assumption and the inherent subsidy in the System's Joint & 100% Survivor factors, the male employees are valued with Joint and 29.0% Survivor annuities and the female employees are valued with Joint and 16.5% Survivor annuities. It is also assumed that 100% of Tier B employees will elect the normal form of payment under Tier B.

***Changes in Assumptions and Methods Since Prior Valuation:*** As described in Section F, the Board of Trustees adopted a new method for determining the actuarial value of assets. As part of the method change, the actuarial value of assets was set equal to the market value of assets of December 31, 2017.

# SUMMARY OF BENEFIT PROVISIONS

## Employees' Retirement Fund of the City of Dallas

## as of December 31, 2017

**Membership**

An employee becomes a member upon permanent employment and contributes to the Fund.

**Contributions**

Member: 37% of the current adjusted total obligation rate. New rates effective October 1 after the valuation date.

City: 63% of the current adjusted total obligation rate. New rates effective October 1 after the valuation date.

**Definitions**

Final Average Salary:

**Tier A**

Average monthly salary over the member's highest three years (or 36 months) of service.

**Tier B**

Average monthly salary over the member's highest five years (or 60 months) of service.

Credited Service: Length of time as an employee of the City of Dallas and while making contributions to the Fund.

**Retirement Pension**

Eligibility:

**Tier A**

a. Attainment of age 60; or

b. Attainment of age 55 (if credited service began before May 9, 1972); or

c. At any age after completion of 30 years of credited service with a reduced benefit before age 50; or

d. Attainment of age 50, if the sum of an active member's age and credited service is at least equal to 78.

**Tier B**

a. Attainment of age 65 and 5 years of service; or

b. At any age after completion of 40 years of credited service; or

c. At any age if the sum of an active member's age and credited service is at least equal to 80 (under this eligibility the member's pension will be actuarially reduced for each year prior to the age of 65 that the member retires)

# SUMMARY OF BENEFIT PROVISIONS (cont.)

Retirement Benefits:

**Tier A**

The retirement benefit equals 2-3/4% multiplied by average monthly earnings multiplied by credited service limited to a maximum of 36.3636 years plus a monthly $125 health supplement (prorated for service less than 5 years).

**Tier B**

The retirement benefit equals 2-1/2% multiplied by average monthly earnings multiplied by credited service limited to a maximum of 40 years (no monthly health supplement).

Form of Payment:

**Tier A**

An unreduced pension benefit under a joint and one-half survivor option with 10 years guaranteed or a ten-year certain and life option. An actuarially equivalent joint and full survivor option is also available.

**Tier B**

An unreduced pension payable for life with 10 years guaranteed. Actuarially equivalent joint and survivor options (50% and 100%) are also available.

**Deferred Retirement**

Eligibility: Deferred retirement pension benefit commencing at age 60 for Tier A members or at age 65 for Tier B members, with at least five (5) years of credited service, and accumulated contributions are left on deposit with the Fund.

Monthly Benefit: The deferred retirement benefit is equal to the retirement pension based on earnings and credited service at the time of termination.

**Disability Retirement Pension**

Non-Service Disability:

1. Eligibility: Five (5) years of service and totally and permanently incapacitated for duty.
2. Monthly Benefit: Computed based on average monthly earnings and credited service at time of disability but not less than 10 times the percentage multiplier multiplied by the average monthly earnings.

# SUMMARY OF BENEFIT PROVISIONS (cont.)

Service Disability:

1. Eligibility: Totally and permanently incapacitated from the further performance of duty as a result of injury while in the course of employment for the City.

2. Monthly Benefit: Calculated as a non-service disability pension but not less than $1,000 per month.

**Death Benefits**

Form: Benefit paid in accordance with the option on file, or the eligible option, or if no eligible beneficiary, a lump sum equivalent of 10 years of benefit payments to the member's estate.

Monthly Benefit: Based on average monthly earnings and credited service at death but not less than 10 times the percentage multiplier multiplied by the average monthly earnings.

Minimum Service Death Benefit: Not less than $1,000 per month if death resulted from a service related injury.

**Return of Accumulated Contributions**

A member at the time of termination is entitled to be paid accumulated contributions without interest.

**Cost-of-Living Adjustments**

An annual cost-of-living adjustment to the base pension benefit shall be made based on the greater of:

**Tier A**

a. The percentage of change in the price index for October of the current year over October of the previous year, up to 5%, or

b. The percentage of annual average change in the price index for the 12-month period ending with the effective date of the adjustment, up to 5%.

**Tier B**

c. The percentage of change in the price index for October of the current year over October of the previous year, up to 3%, or

d. The percentage of annual average change in the price index for the 12-month period ending with the effective date of the adjustment, up to 5%.