
Texas Emergency Services Retirement System

**Actuarial Valuation
as of August 31, 2016**

December 12, 2016



Rudd and Wisdom, Inc.
CONSULTING ACTUARIES

Rudd and Wisdom, Inc.

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December 12, 2016

Board of Trustees
Texas Emergency Services
Retirement System
Post Office Box 12577
Austin, Texas 78711

Re: Actuarial Valuation as of August 31, 2016

Dear Board Members:

Enclosed is the report of the actuarial valuation of the Texas Emergency Services Retirement System (TESRS or the System) as of August 31, 2016.

Adequate Contribution Arrangement with Expected State Contributions and Part Two Contributions

Among financially strong public retirement systems, contributions are made which will both pay the current normal cost and amortize the existing unfunded actuarial accrued liability (UAAL) in 30 years or less. In Section 2 of the report, we have determined that without appropriations from the state, the System has an inadequate contribution arrangement because the UAAL will never be amortized but instead will increase every year. Section 2 also shows that with the expected state contributions for 30 years, the expected total Part One contributions to the System would not be enough to pay the current normal cost and to amortize the UAAL in 30 years. However, with the addition of Part Two contributions equal to 2% of the Part One contributions, the UAAL would be amortized in 30 years.

Therefore, assuming that the board will establish Part Two contributions equal to 2% of the Part One contributions, the System has an adequate contribution arrangement for the benefit provisions recognized in the valuation based on the expected total contributions. These contributions include the Part One and Part Two contributions from the governing body of each participating department and the expected contributions from the state. Contributions from the state are appropriations equal to (1) the maximum annual

contribution (one-third of all contributions to the System by governing bodies of participating departments in a year) as needed in accordance with state law governing the System, and (2) approximately \$725,000 each year to pay for part of the System's administrative expenses. Based on this August 31, 2016 actuarial valuation, we project that the maximum annual contributions from the state would be needed for 30 years in order for the System to have a 30-year amortization period for its UAAL. This valuation also determined that the board will need to establish Part Two contributions equal to 2% of the Part One contributions in order for the System to have a 30-year amortization period. Details of the determination are on page 2.6. **With these expected future contributions from the participating departments and from the state, the System has an adequate contribution arrangement to pay the normal cost and amortize the UAAL in 30 years.**

Comparison to Prior Actuarial Valuation

In the August 31, 2014 actuarial valuation, we determined that the System had an adequate contribution arrangement with a 30-year amortization period for the UAAL, relying on expected future annual contributions from the state for the full 30 years but with no Part Two contributions. Primarily as the result of (1) a reduction in the amount of Part One contributions available to amortize the UAAL due to a reduction in the number of actives and (2) a similar reduction in the expected maximum annual contribution from the state over the next 30 years, the actuarial condition of the System has changed enough so that the contribution arrangement is adequate only with the establishment of Part Two contributions.

Key Provisions of State Law Governing System

Three subsections from the state law governing the System (Title 8, Government Code, Subtitle H) are relevant to our assessment of the System's contribution arrangement and our evaluation of future contributions from the state, and they read as follows:

Section 861.001(1) "Actuarially sound pension system" means a system in which the amount of contributions is sufficient to cover the normal cost and amortize the unfunded actuarial accrued liability in a period that does not exceed 30 years.

Section 865.015 The state shall contribute the amount necessary to make the pension system actuarially sound each year, except that the state's contribution may not exceed one-third of the total of all contributions by governing bodies in a particular year.

Section 864.002(a)(2) A service retirement annuity is payable in monthly installments based on a formula adopted by the state board by rule that

allows the pension system, assuming maximum state contributions are provided under Section 865.015, to be maintained as actuarially sound.

Our interpretation of these three subsections is that the state law calls for the state to contribute the maximum amount, defined in Section 865.015, to the System each year as is necessary for the System to amortize its UAAL with the expected total contributions from the state and the governing bodies of the participating departments in a period that does not exceed 30 years. **With these expected future annual contributions from the state, the System has an adequate contribution arrangement.**

Key Board Rule

Even though there have not been any substantive changes in the provisions governing the System during the two years since the prior biennial actuarial valuation as of August 31, 2014, a relatively new board rule should be implemented for the first time. The board rule defining contributions by a participating department for each month a member performs emergency services for the department was amended effective July 27, 2014. The board rule now says that the board may establish Part Two contributions that would be applied to reduce the UAAL if the expected future annual contributions from the state are not enough with the Part One contributions to pay the normal cost and amortize the UAAL in 30 years. The new provisions for Part Two contributions are more thoroughly described in item 13 of Section 5. Section 5 outlines the eligibility, benefit and contribution provisions of the System. This valuation determined that the Part Two contributions should be established by the board for the first time.

Actuarial Methods and Assumptions

We reviewed the actuarial methods and assumptions used in the prior valuation as of August 31, 2014 as a part of this actuarial valuation as of August 31, 2016. The board of trustees received the June 7, 2016 report of that review prior to their June 27, 2016 meeting, and they adopted the actuarial methods and assumptions we recommended. The only change was to the mortality assumption. All actuarial methods and assumptions are described in Section 4 of this report.

Actuarial Value of Assets vs. Market Value of Assets

The actuarial valuation was based on a method to determine the actuarial value of assets (AVA) that dampens the volatility of the changes in the market value of assets (MVA) from year to year. This method phases in over a five-year period the investment gains or losses that the System has had in each of the previous four fiscal years. The AVA used in this valuation was \$98.65 million, while the MVA was \$93.96 million. The \$4.69 million difference between the MVA and the AVA is the deferred net investment loss that will be recognized in the next two biennial actuarial valuations.

The theory behind the AVA method is to allow time for annual investment gains and losses in the MVA to partially offset each other and thereby dampen the volatility associated with the progression of the MVA over time. In practice, the timing and amounts of investment gains and losses can result in irregular effects on the AVA in a given year. However, as intended, the pattern of the AVA is smoother over time than the pattern of the market value of assets, as seen on page 3.5.

Variability in Future Actuarial Measurements

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following:

- Plan experience differing from that anticipated by the current economic or demographic assumptions;
- Increases or decreases expected as part of the natural operation of the methodology used for these measurements;
- Changes in economic or demographic assumptions; and
- Changes in plan provisions.

Analysis of the potential range of such future measurements resulting from the possible sources of measurement variability is typically outside the scope of the biennial actuarial valuation. Sensitivity analysis could be performed in a subsequent report if desired by the board of trustees.

Summary

In our opinion, the Texas Emergency Services Retirement System has an adequate contribution arrangement, assuming that the state will appropriate (1) the maximum annual contribution in accordance with the state law governing the System and (2) approximately \$725,000 each year to pay for part of the System's administrative expenses. In addition to the Part One contributions from the participating departments, we have assumed that Part Two contributions equal to 2% of the Part One contributions will be established by the board beginning September 2017. **With these expected appropriations from the state and both Part One and Part Two contributions from the participating departments, the System has an adequate contribution arrangement to pay the normal cost and amortize the UAAL in 30 years.** The actuarial valuation of the System reported herein has been performed both in accordance with appropriate actuarial methodology and standards of practice and in accordance with

guidelines established by the Texas State Pension Review Board applicable to Texas public employee retirement systems.

Respectfully submitted,
RUDD AND WISDOM, INC.

Mark R. Fenlaw

Mark R. Fenlaw, F.S.A.

Rebecca B. Morris

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Enclosures

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Section 1

Certification of Actuarial Valuation as of August 31, 2016

At the request of the Board of Trustees of the Texas Emergency Services Retirement System, we have performed an actuarial valuation of the System as of August 31, 2016. The purpose of this report is to present the results of our valuation, including our assessment of the adequacy of the current contribution arrangement.

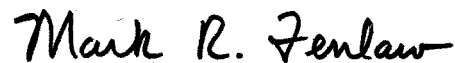
We have relied on and based our valuation on participant, retiree, and beneficiary data and asset information as of August 31, 2016 provided by Kevin Deiters, the Executive Director of the System. To the best of our knowledge, no material biases exist with respect to any imperfections in the data provided. We have not audited the data provided but have reviewed it for reasonableness and consistency relative to the data received for the August 31, 2014 actuarial valuation, considering the data review conducted by the System in the last two years.

We have used the actuarial methods and assumptions described in Section 4 of this report. The actuarial valuation has been performed on the basis of the System eligibility, benefit, and contribution provisions described in Section 5.

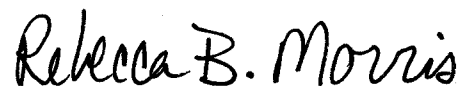
All emergency services personnel known to be eligible active participants in the System as of the valuation date and all other individuals who either were receiving a monthly benefit as of the valuation date or were known to be eligible to later receive a vested deferred monthly benefit from the System have been included in the valuation. Further, all System benefits have been considered in the valuation.

To the best of our knowledge, the actuarial information supplied in this report is complete and accurate. In our opinion the assumptions used, both in the aggregate and individually, are reasonably related to the experience of the System and to reasonable expectations. The assumptions represent a reasonable estimate of anticipated experience of the System over the long-term future, and their selection complies with the applicable actuarial standards of practice.

We certify that we are members of the American Academy of Actuaries who meet Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report.



Mark R. Fenlaw, F.S.A.
Member, American Academy of Actuaries



Rebecca B. Morris, A.S.A.
Member, American Academy of Actuaries

Section 2

Summary of Actuarial Valuation

	<u>August 31, 2014</u>	<u>August 31, 2016</u>
1. Actuarial Present Value of Future Benefits		
a. Active participants	\$ 63,826,532	\$ 67,586,932
b. Terminated Vested Participants	16,174,530	19,241,182
c. Retirees and Beneficiaries – Advance Funded	38,943,080	44,816,109
d. Retirees and Beneficiaries – Reimbursement Funded	<u>2,392,721</u>	<u>1,938,491</u>
e. Total	\$ 121,336,863	\$ 133,582,714
2. Actuarial Present Value of Future Normal Cost	\$ 9,089,343	\$ 8,552,112
3. Actuarial Present Value of Future Reimbursements for (1d)	<u>\$ 2,392,721</u>	<u>\$ 1,938,491</u>
4. Actuarial Accrued Liability [(1e) – (2) – (3)]	\$ 109,854,799	\$ 123,092,111
5. Actuarial Value of Assets	\$ 83,761,038	\$ 98,652,794
6. Unfunded Actuarial Accrued Liability (UAAL) [(4)-(5)]	\$ 26,093,761	\$ 24,439,317

Without State Appropriations

7. Required Annual Contributions without Appropriations from State ¹		
a. Normal Cost Contributions	\$ 2,734,489	\$ 2,654,643
b. 30-Year UAAL Contributions	<u>2,214,165</u>	<u>2,073,779</u>
c. Total	\$ 4,948,654	\$ 4,728,422
8. Expected Annual Part One Contributions	\$ 2,846,352	\$ 2,602,536
9. Amount Available to Amortize UAAL ¹ [(8)-(7a)]	\$ 111,863	\$ (52,107)
10. Years to Amortize UAAL ¹	infinity ²	infinity ²

With State Appropriations

11. Expected Annual Part One Contributions with Appropriations from State		
a. Normal Cost Contributions	\$ 2,075,698	\$ 1,890,445
b. UAAL Contributions	<u>770,654</u>	<u>712,091</u>
c. Total	\$ 2,846,352	\$ 2,602,536
12. Appropriations from State for Administrative Expenses		
a. Annual Appropriation	\$ 625,000	\$ 725,000
b. Number of Years Required	every year	every year
13. Present Value of (11b) for 30 Years	\$ 9,082,095	\$ 8,391,936
14. Appropriations from State for UAAL Amortization		
a. Annual Appropriation Amount	see page 2.4	see page 2.3
b. Present Value of Appropriations Necessary [(6)-(13)]	\$ 17,011,666	\$ 16,047,381
c. Years Maximum Contribution to be Paid ³	30 years	33 years
15. Years to Amortize UAAL ⁴	30 years	33 years
16. Funded Ratio [(5) ÷ (4)]	76.2%	80.1%
17. Part Two Contributions Required for 30-Year UAAL Amortization Period as a Percent of Part One Contributions	0%	2% ⁵

¹ Calculated assuming no appropriations from the state.

² “Infinity” means the UAAL will never be amortized but will increase every year.

³ See page 2.4 and 2.3, respectively.

⁴ Calculated assuming the appropriations from the state described in lines (12) and (14) and UAAL contributions from Part One contributions described in line 11(b).

⁵ See page 2.6.

Summary of Contributions Development

	<u>August 31, 2014</u>	<u>August 31, 2016</u>
1. Normal Cost Due September 1		
a. Retirement	\$ 1,029,998	\$ 995,063
b. Disability	33,159	29,998
c. Death	130,524	118,299
d. Vested Termination	<u>500,549</u>	<u>450,119</u>
e. Total for Benefits	1,694,230	1,593,479
f. Loading for Administrative Expenses		
i. Total	900,000	925,000
ii. Paid by State	<u>(625,000)</u>	<u>(725,000)</u>
iii. Net Paid by System	275,000	200,000
g. Total		
i. Without State Appropriations [(e)+(fi)]	\$ 2,594,230	\$ 2,518,479
ii. With State Appropriations [(e)+(fiii)]	\$ 1,969,230	\$ 1,793,479
2. Periodic Payment Normal Cost ¹		
a. Without State Appropriations	\$ 2,734,489	\$ 2,654,643
b. With State Appropriations	\$ 2,075,698	\$ 1,890,445
3. 30-Year UAAL Contributions Due September 1		
a. Without State Appropriations ²	\$ 2,100,595	\$ 1,967,409
b. With State Appropriations ³	\$ 731,125	\$ 675,566
4. Periodic Payment UAAL Contributions ¹		
a. Without State Appropriations	\$ 2,214,165	\$ 2,073,779
b. With State Appropriations	\$ 770,654	\$ 712,091
5. Expected Annual Part One Contributions ⁴	\$ 2,846,352	\$ 2,602,536

¹ The amount due September 1 is adjusted to an equivalent amount contributed quarterly with the first payment assumed to be received December 31.

² The UAAL contributions without state appropriations are calculated so that the UAAL would be amortized with a level annual dollar amount over a period of 30 years.

³ The UAAL contributions with state appropriations are the excess of line (5) adjusted to an equivalent amount due September 1 over line (1gii).

⁴ The expected contributions are based on the known rates of contributions as of the valuation date and on the census of active participants as of the valuation date, assuming that number will remain constant in future years. They are billed at the end of each quarter of the fiscal year for the three months ending on the billing date and generally are received one month after each billing.

Present Value of State Appropriations Necessary for a
30-Year UAAL Amortization Period as of August 31, 2016

Fiscal Year Ending 8/31	Expected Contributions ¹	Maximum State Contribution ²		Present Value of Column (2) as of 8/31/16 ⁵	Cumulative Present Value As of 8/31/16
		Assumed State Appropriations	Basis for Assumption		
	(1)	(2)	(3)	(4)	(5)
2017	\$3,450,000	\$1,583,825	Actually Paid ³	\$1,583,825	\$1,583,825
2018	3,500,000	1,329,224	LAR ⁴	1,233,618	2,817,443
2019	3,575,000	1,329,224	LAR ⁴	1,144,890	3,962,333
2020	3,600,000	1,200,000	1/3 of (1)	959,245	4,921,578
2021	3,600,000	1,200,000	1/3 of (1)	890,250	5,811,828
2022	3,600,000	1,200,000	1/3 of (1)	826,218	6,638,046
2023	3,600,000	1,200,000	1/3 of (1)	766,792	7,404,838
2024	3,600,000	1,200,000	1/3 of (1)	711,640	8,116,478
2025	3,600,000	1,200,000	1/3 of (1)	660,455	8,776,933
2026	3,600,000	1,200,000	1/3 of (1)	612,951	9,389,884
2027	3,600,000	1,200,000	1/3 of (1)	568,864	9,958,748
2028	3,600,000	1,200,000	1/3 of (1)	527,948	10,486,696
2029	3,600,000	1,200,000	1/3 of (1)	489,975	10,976,671
2030	3,600,000	1,200,000	1/3 of (1)	454,733	11,431,404
2031	3,600,000	1,200,000	1/3 of (1)	422,026	11,853,430
2032	3,600,000	1,200,000	1/3 of (1)	391,672	12,245,102
2033	3,600,000	1,200,000	1/3 of (1)	363,500	12,608,602
2034	3,600,000	1,200,000	1/3 of (1)	337,355	12,945,957
2035	3,600,000	1,200,000	1/3 of (1)	313,091	13,259,048
2036	3,600,000	1,200,000	1/3 of (1)	290,572	13,549,620
2037	3,600,000	1,200,000	1/3 of (1)	269,672	13,819,292
2038	3,600,000	1,200,000	1/3 of (1)	250,275	14,069,567
2039	3,600,000	1,200,000	1/3 of (1)	232,274	14,301,841
2040	3,600,000	1,200,000	1/3 of (1)	215,568	14,517,409
2041	3,600,000	1,200,000	1/3 of (1)	200,063	14,714,472
2042	3,600,000	1,200,000	1/3 of (1)	185,673	14,903,145
2043	3,600,000	1,200,000	1/3 of (1)	172,319	15,075,464
2044	3,600,000	1,200,000	1/3 of (1)	159,924	15,235,388
2045	3,600,000	1,200,000	1/3 of (1)	148,422	15,383,810
2046	3,600,000	1,200,000	1/3 of (1)	137,746	15,521,556

¹ The expected contributions are based on the Part One contributions in the fiscal year ending August 31, 2016 and on a conservative projection of (a) an increase in the number of departments and active members participating, (b) prior service contributions, and (c) reimbursement contributions.

² The maximum state contribution is "one-third of the total of all contributions by governing bodies in a particular year."

³ This amount was paid in early September 2016.

⁴ The amount in column (2) is the amount in the formal Legislative Appropriation Request submitted to the Legislative Budget Board in August 2016.

⁵ The present value is based on the assumption that each assumed appropriated amount is paid on the first day of the fiscal year, September 1, discounted at 7.75%.

Present Value of State Appropriations Necessary for a
30-Year UAAL Amortization Period as of August 31, 2014

Fiscal Year Ending 8/31	Expected Contributions ¹	Maximum State Contribution ²		Present Value of Column (2) as of 8/31/14 ⁵	Cumulative Present Value As of 8/31/14
		Assumed State Appropriations	Basis for Assumption		
	(1)	(2)	(3)	(4)	(5)
2015	\$3,450,000	\$1,637,308	Actually Paid ³	\$1,637,308	\$1,637,308
2016	3,575,000	1,583,825	LAR base ⁴	1,469,907	3,107,215
2017	3,750,000	1,583,825	LAR base ⁴	1,364,183	4,471,398
2018	3,900,000	1,300,000	1/3 of (1)	1,039,182	5,510,580
2019	3,900,000	1,300,000	1/3 of (1)	964,438	6,475,018
2020	3,900,000	1,300,000	1/3 of (1)	895,070	7,370,087
2021	3,900,000	1,300,000	1/3 of (1)	830,691	8,200,779
2022	3,900,000	1,300,000	1/3 of (1)	770,943	8,971,722
2023	3,900,000	1,300,000	1/3 of (1)	715,493	9,687,215
2024	3,900,000	1,300,000	1/3 of (1)	664,030	10,351,245
2025	3,900,000	1,300,000	1/3 of (1)	616,269	10,967,514
2026	3,900,000	1,300,000	1/3 of (1)	571,944	11,539,458
2027	3,900,000	1,300,000	1/3 of (1)	530,806	12,070,264
2028	3,900,000	1,300,000	1/3 of (1)	492,628	12,562,892
2029	3,900,000	1,300,000	1/3 of (1)	457,195	13,020,087
2030	3,900,000	1,300,000	1/3 of (1)	424,311	13,444,398
2031	3,900,000	1,300,000	1/3 of (1)	393,792	13,838,190
2032	3,900,000	1,300,000	1/3 of (1)	365,468	14,203,658
2033	3,900,000	1,300,000	1/3 of (1)	339,182	14,542,840
2034	3,900,000	1,300,000	1/3 of (1)	314,785	14,857,625
2035	3,900,000	1,300,000	1/3 of (1)	292,145	15,149,770
2036	3,900,000	1,300,000	1/3 of (1)	271,132	15,420,902
2037	3,900,000	1,300,000	1/3 of (1)	251,630	15,672,532
2038	3,900,000	1,300,000	1/3 of (1)	233,532	15,906,064
2039	3,900,000	1,300,000	1/3 of (1)	216,735	16,122,799
2040	3,900,000	1,300,000	1/3 of (1)	201,146	16,323,945
2041	3,900,000	1,300,000	1/3 of (1)	186,679	16,510,624
2042	3,900,000	1,300,000	1/3 of (1)	173,252	16,683,876
2043	3,900,000	1,300,000	1/3 of (1)	160,790	16,844,666
2044	3,900,000	1,300,000	1/3 of (1)	149,225	16,993,891
2045	3,900,000	166,850	Balance	17,775	17,011,666 ⁶

¹ The expected contributions are based on the known rates of Part One contributions and active members as of the valuation date and on a conservative projection of (a) an increase in the number of departments and active members participating, (b) prior service contributions, and (c) reimbursement contributions. Actual total contributions in 2014 were \$4,176,659.

² The maximum state contribution is "one-third of the total of all contributions by governing bodies in a particular year."

³ This amount was paid in early September 2014.

⁴ The amount in column (2) is the base amount in the formal Legislative Appropriation Request submitted to the Legislative Budget Board on August 11, 2014.

⁵ The present value is based on the assumption that each assumed appropriated amount is paid on the first day of the fiscal year, September 1.

⁶ The period of years of future maximum state contributions necessary for the System to have an amortization period of 30 years is approximately 30 years. The balancing amount of \$166,850 is assumed to be paid September 1, 2044. The cumulative present value of \$17,011,666 is the amount on line (14b) on page 2.1.

**Change in the Unfunded Actuarial Accrued Liability (UAAL)
From August 31, 2014 Valuation to August 31, 2016 Valuation**

1. August 31, 2014 UAAL	\$26,093,761 ¹
2. Normal cost for two years	3,938,460 ²
3. Actual Part One contributions for two years	(5,926,625) ³
4. State appropriated contributions for UAAL	
a. September 2014	(1,637,308)
b. September 2015	(1,583,825)
5. Expected 7.75% per year net increase on lines (1)-(4) during two years	<u>3,926,243</u>
6. Expected August 31, 2016 UAAL	\$24,810,706
7. Experience (gains)/losses and other changes since August 31, 2014	
a. Investment return on the actuarial value of assets	(716,669) ⁴
b. Increase due to change in mortality assumption	890,002
c. Increase due to changes in contribution rates	722,024 ⁵
d. Data corrections and demographic experience	<u>(1,266,746)⁶</u>
8. August 31, 2016 UAAL	\$24,439,317

¹ From the August 31, 2014 actuarial valuation, line 6 on page 2.1.

² The annual normal cost from the August 31, 2014 actuarial valuation was \$1,969,230 due on September 1, 2014 and 2015, line (1.g.ii.) on page 2.2.

³ The Part One contributions amount was \$2,904,394 in the year ending August 31, 2015 and was \$3,022,231 in the year ending August 31, 2016.

⁴ This is the difference between the actuarial value of assets as of August 31, 2016 and the amount expected as of that date if the actuarial value of assets as of August 31, 2014 had returned 7.75% per year net of investment expenses.

⁵ Changes in contribution rates since September 1, 2014 increased the actuarial accrued liability.

⁶ There were a number of data corrections since the prior actuarial valuation due to a review of the data. In addition, this amount also includes the results of actual rates of termination, mortality, disability, and retirement different from the actuarial assumptions used in the August 31, 2014 actuarial valuation.

Determination of Part Two Contributions¹

1.	Present value of state appropriations for UAAL amortization required to have a 30-year amortization period [line (14b) on page 2.1]	\$ 16,047,381
2.	Present value of projected state appropriations for UAAL for 30 years [page 2.3]	\$ 15,521,556
3.	Present value of Part Two contributions required to have a 30-year amortization period [(1) – (2)]	\$ 525,825
4.	Annual amount of Part Two contributions	
a.	Paid September 1 [(3) ÷ annuity factor ²]	\$ 46,036
b.	Paid quarterly [(4a) x adjustment factor ³]	\$ 48,525
5.	Expected annual Part One contributions paid quarterly [line (11c) on page 2.1]	\$ 2,602,536
6.	Part Two contributions as a percent of Part One contributions [(4b) ÷ (5)]	2%

- ¹ The board may establish Part Two contributions that would be applied to reduce the UAAL if the expected future annual contributions from the state are not enough with the Part One contributions to pay the normal cost and amortize the UAAL in 30 years.
- ² The annuity factor [11.422083] is for 29 equal payments beginning one year after August 31, 2016, discounted to that date at 7.75%.
- ³ The adjustment factor (1.054066) results in an annual amount paid quarterly, with the first payment assumed to be received December 31, that is equivalent to the \$46,036

Section 3

System Investment Information
Summary of Assets as of August 31, 2016¹

<u>Investment Category</u>	<u>Market Value</u>	<u>August 31, 2016 Allocation²</u>	<u>Target Allocation³</u>	<u>Allocation Range³</u>
1. Cash and equivalents	\$ 256,313	0.28%	0.0%	0.0 - 5.0%
2. Fixed income securities				
a. Domestic	24,323,807	26.11	26.0	21.0 - 31.0
b. International	0	0.00	0.0	0.0 - 0.0
3. Equities				
a. Domestic large cap	30,286,198	32.51	32.0	22.0 - 42.0
b. Domestic small cap	9,140,908	9.81	10.0	6.0 - 20.0
c. International developed	18,914,476	20.30	21.0	16.0 - 26.0
d. International emerging	5,995,460	6.44	6.0	3.0 - 11.0
4. Master limited partnerships	4,238,459	4.55	5.0	3.0 - 10.0
5. Other				
a. Payables	(682,850)	N/A	N/A	N/A
b. Receivables	1,491,237	N/A	N/A	N/A
c. Miscellaneous assets	<u>0</u>	<u>N/A</u>	<u>N/A</u>	N/A
6. Total assets as of August 31, 2016	\$93,964,008	100.00%	100.0%	

¹ Based on the unaudited Annual Financial Report for the year ended August 31, 2016.

² Based on the assets in lines (1) through (4) (\$93,155,621).

³ From the June 2016 "Texas Emergency Services Retirement System Investment Policy" adopted by the board of trustees.

System Income Statement

	Year Ending <u>August 31, 2015</u>	Year Ending <u>August 31, 2016</u>
A. Market Value		
1. Total assets as of beginning of year	\$ 91,683,156	\$ 88,828,460
2. Contributions for the year		
a. Part One contributions	2,904,394	3,022,231
b. Prior service	256,622	146,063
c. Reimbursement contributions	354,530	295,309
d. State appropriation toward UAAL	<u>1,637,308</u>	<u>1,583,825</u>
	\$ 5,152,854	\$ 5,047,428
3. Investment return for the year		
a. Investment income	1,718,907	1,589,053
b. Net unrealized and realized gains (losses)	(4,486,268)	3,969,707
c. Investment expenses	<u>(527,664)</u>	<u>(604,111)</u>
	\$ (3,295,025)	\$ 4,954,649
4. Voided checks	\$ 2,136	\$ 2,081
5. Distributions for the year		
a. Benefits	\$ 4,498,761	\$ 4,701,770
b. Administrative expenses		
i. Total	838,703	924,624
ii. Paid by State	<u>(622,803)</u>	<u>(757,784)</u>
iii. Paid by System	<u>215,900</u>	<u>166,840</u>
	\$ 4,714,661	\$ 4,868,610
6. Total assets as of end of year [(1) + (2) + (3) + (4) – (5)]	\$ 88,828,460	\$ 93,964,008
7. Investment rate of return ¹		
a. Net of investment expenses	(3.58%)	5.57%
b. Gross	(3.01%)	6.27%
B. Actuarial Value		
1. Total assets as of beginning of year	\$ 83,761,038	\$ 92,008,883
2. Contributions (same as A.2.)	\$ 5,152,854	\$ 5,047,428
3. Investment return (solved for)	\$ 7,809,652	\$ 6,465,093
4. Distributions (same as A.5.)	<u>\$ (4,714,661)</u>	<u>\$ (4,868,610)</u>
5. Total assets as of end of year	\$ 92,008,883 ²	\$ 98,652,794 ³
6. Investment rate of return net of investment expenses ¹	9.29%	7.01%

¹ Money-weighted rate of return calculated by Rudd and Wisdom, Inc. See footnote on page 3.4.

² This amount is developed on page 3.3.

³ This amount is developed on page 3.4.

Development of Actuarial Value of Assets as of August 31, 2015

Calculation of Actuarial Investment Gain/(Loss)

Based on Market Value for Fiscal Years	2014-2015	2013-2014	2012-2013	2011-2012
1. Market Value of Assets as of Beginning of Year	\$ 91,683,156	\$ 78,401,636	\$ 67,938,757	\$ 62,465,098
2. Contributions and Other Additions	5,152,854	5,707,002	5,020,980	3,517,455
3. Benefit Payments and Administrative Expenses	(4,714,661)	(4,333,803)	(3,949,128)	(3,241,625)
4. Expected Investment Return *	7,129,200	6,184,039	5,257,476	4,851,534
5. Expected Market Value of Assets as of End of Year	\$ 99,250,549	\$ 85,958,874	\$ 74,268,085	\$ 67,592,462
6. Actual Market Value of Assets as of End of Year	88,828,460	91,683,156	78,401,636	67,938,757
7. Actuarial Investment Gain/(Loss) [(6) – (5)]	\$ (10,422,089)	\$ 5,724,282	\$ 4,133,551	\$ 346,295
8. Market Value Rate of Return Net of Investment Expenses (Calculated by Rudd and Wisdom, Inc.)*	(3.58)%	14.92%	13.84%	8.30%
9. Rate of Actuarial Investment Gain/(Loss)	(11.33)%	7.17%	6.09%	0.55%

* Based on a money-weighted rate of return net of investment expenses, reflecting the effect of the timing of the contributions received and the benefits paid during the year. The expected rate of return was 7.75%.

Deferred Gain/(Loss) to be Recognized in Future Years

Fiscal Year	Investment Gain/(Loss)	Deferral Percentage	Deferred Gain/(Loss) Amount as of August 31, 2015
2014 - 2015	\$(10,422,089)	80%	\$ (8,337,671)
2013 - 2014	5,724,282	60	3,434,569
2012 - 2013	4,133,551	40	1,653,420
2011 - 2012	346,295	20	69,259
Total			\$ (3,180,423)

Actuarial Value of Assets as August 31, 2015

10. Market Value of Assets as of August 31, 2015	\$ 88,828,460
11. Deferred Gain/(Loss) to be Recognized in Future	(3,180,423)
12. Preliminary Value (Item 10 – Item 11)	\$ 92,008,883
13. Corridor for Actuarial Value of Assets	
a. 80% of Market Value as of August 31, 2015 (minimum)	\$ 71,062,768
b. 120% of Market Value as of August 31, 2015 (maximum)	\$ 106,594,152
14. Actuarial Value as of August 31, 2015	\$ 92,008,883
15. Write Up/(Down) of Assets (Item 14 – Item 10)	\$ 3,180,423

Development of Actuarial Value of Assets as of August 31, 2016

Calculation of Actuarial Investment Gain/(Loss)

Based on Market Value for Fiscal Years	2015-2016	2014-2015	2013-2014	2012-2013
1. Market Value of Assets as of Beginning of Year	\$ 88,828,460	\$ 91,683,156	\$ 78,401,636	\$ 67,938,757
2. Contributions and Other Additions	5,047,428	5,152,854	5,707,002	5,020,980
3. Benefit Payments and Administrative Expenses	(4,868,610)	(4,714,661)	(4,333,803)	(3,949,128)
4. Expected Investment Return *	6,896,675	7,129,200	6,184,039	5,257,476
5. Expected Market Value of Assets as of End of Year	\$ 95,903,953	\$ 99,250,549	\$ 85,958,874	\$ 74,268,085
6. Actual Market Value of Assets as of End of Year	93,964,008	88,828,460	91,683,156	78,401,636
7. Actuarial Investment Gain/(Loss) [(6) – (5)]	\$ (1,939,945)	\$ (10,422,089)	\$ 5,724,282	\$ 4,133,551
8. Market Value Rate of Return Net of Investment Expenses (Calculated by Rudd and Wisdom, Inc.)*	5.57%	(3.58)%	14.92%	13.84%
9. Rate of Actuarial Investment Gain/(Loss)	(2.18)%	(11.33)%	7.17%	6.09%

* Based on a money-weighted rate of return net of investment expenses, reflecting the effect of the timing of the contributions received and the benefits paid during the year. The expected rate of return was 7.75%.

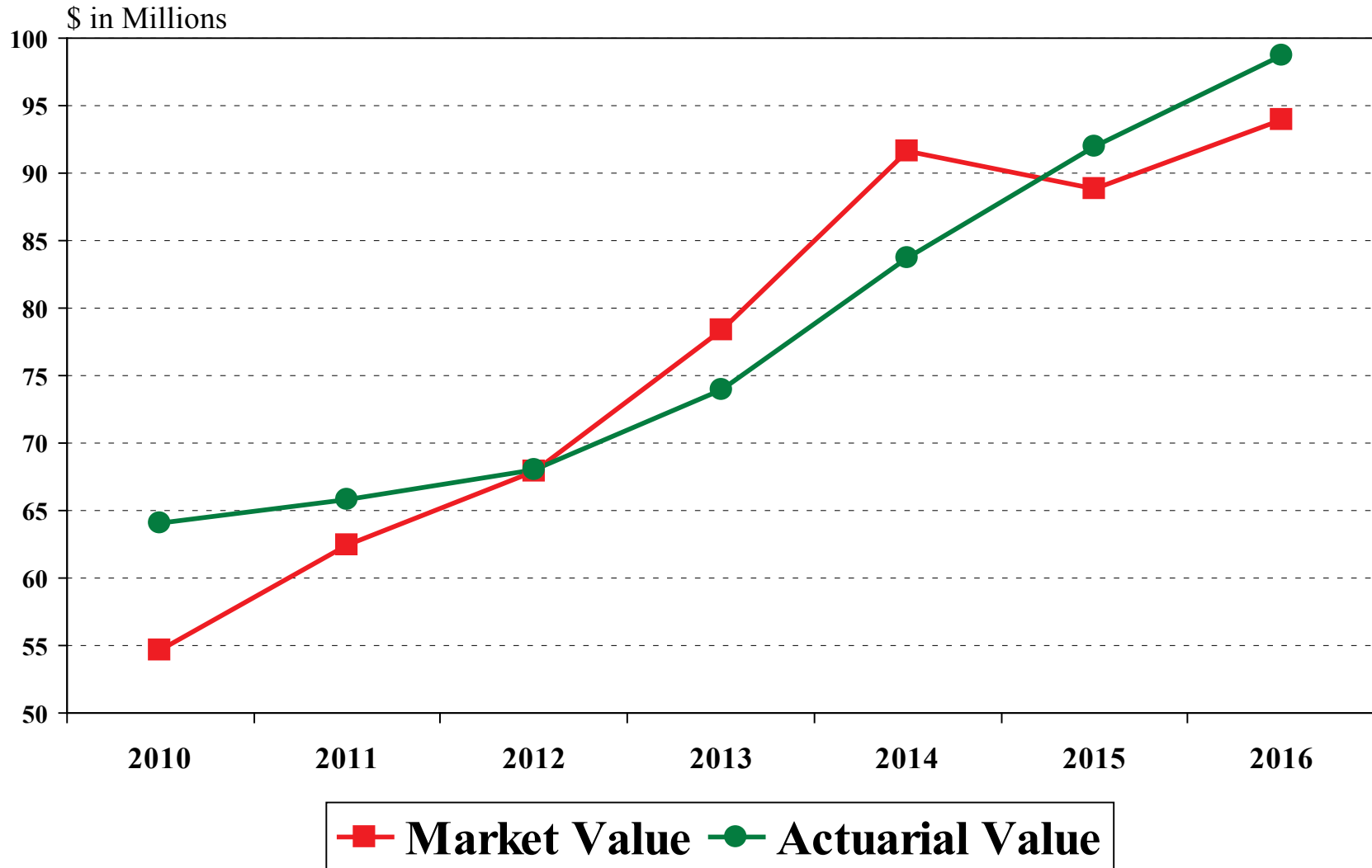
Deferred Gain/(Loss) to be Recognized in Future Years

Fiscal Year	Investment Gain/(Loss)	Deferral Percentage	Deferred Gain/(Loss) Amount as of August 31, 2014
2015 - 2016	\$ (1,939,945)	80%	\$ (1,551,956)
2014 - 2015	(10,422,089)	60	(6,253,253)
2013 - 2014	5,724,282	40	2,289,713
2012 - 2013	4,133,551	60	826,710
Total			\$ (4,688,786)

Actuarial Value of Assets as August 31, 2016

10. Market Value of Assets as of August 31, 2016	\$ 93,964,008
11. Deferred Gain/(Loss) to be Recognized in Future	(4,688,786)
12. Preliminary Value (Item 10 – Item 11)	\$ 98,652,794
13. Corridor for Actuarial Value of Assets	
a. 80% of Market Value as of August 31, 2016 (minimum)	\$ 75,171,206
b. 120% of Market Value as of August 31, 2016 (maximum)	\$ 112,756,810
14. Actuarial Value as of August 31, 2016	\$ 98,652,794
15. Write Up/(Down) of Assets (Item 14 – Item 10)	\$ 4,688,786

**Texas Emergency Services Retirement System
Historical Market Value and Actuarial Value of Assets
(Values as of August 31)**



Section 4

Actuarial Methods and Assumptions

The following actuarial methods and assumptions were recommended by Rudd and Wisdom, Inc. in a report dated June 7, 2016 and were adopted by the Board of Trustees of the System at their meeting on June 27, 2016.

1. Actuarial Cost Method

The entry age actuarial cost method is used in determining the contribution requirements for the System. The actuarial cost method is the procedure by which the actuary annually identifies a series of annual contributions which, along with current assets and future investment earnings, will fund the expected benefits. The entry age cost method compares the excess of the present value of expected future benefits over the current value of assets. This difference represents the expected present value of current and future contributions that will be paid into the System. The contributions are divided into two components: an annual normal cost (or current cost) and an annual amortization cost for the unfunded actuarial accrued liability.

The System's normal cost is the current contribution in a series of annual contributions determined as a level dollar amount. The normal cost is the portion of the cost which is allocated to a plan year by the entry age actuarial cost method. The normal cost is determined as a level dollar amount for each active participant as the actuarial present value at entry of projected benefits divided by the actuarial present value at entry of anticipated future service. These individual normal cost contribution amounts are the level dollar amounts which, if contributed throughout a participant's qualified service career, would fund his projected qualified service benefits.

The System's current actuarial accrued liability is the excess of the present value of expected future benefits over the present value of all future remaining normal cost contributions. The unfunded actuarial accrued liability is the amount by which the actuarial accrued liability exceeds the current actuarial value of assets. The unfunded actuarial accrued liability is recalculated each time a valuation is performed. Experience gains and losses, which represent deviations of the unfunded actuarial accrued liability from its expected value based on the prior valuation, are determined at each valuation and are amortized as part of the newly calculated unfunded actuarial accrued liability.

Since the contributions are determined by the governing bodies of the participating departments and by the state law and Board rules governing the System, the unfunded actuarial accrued liability is expected to be amortized with level dollar contributions each year equal to the excess of the total contributions over the normal cost contributions. The period required to amortize the unfunded actuarial accrued liability is determined each time a valuation is performed.

2. Actuarial Value of Assets Method

All assets are valued at market value as determined by the System Board of Trustees, with an adjustment made to uniformly spread the recognition of actuarial gains or losses (as measured by actual market value investment return vs. assumed market value investment return) over a five-year period. The total adjustment amount shall be limited as necessary such that the actuarial value of assets shall not be less than 80% of market value nor greater than 120% of market value.

3. Maximum State Contributions Methodology

The state law governing the System calls for the state to “contribute the amount necessary to make the pension system actuarially sound each year, except that the state’s contribution may not exceed one-third of the total of all contributions by governing bodies in a particular year.” The state law defines “actuarially sound pension system” to be a system in which the amount of contributions is sufficient to pay the normal cost and amortize the UAAL in a period that does not exceed 30 years. The state law also says that the service retirement annuity is based on “a formula adopted by the state board by rule that allows the pension system, assuming maximum state contributions are provided, to be maintained as actuarially sound.” The methodology for recognizing maximum state contributions is (1) to project the maximum state contributions equal to one-third of a conservative projection of total contributions to the System year by year, then (2) to calculate the present value of projected maximum state contributions for up to 30 years as is necessary for the System to have a 30-year amortization period, and then (3) to subtract this present value from the UAAL for determining the System’s amortization period.

4. Reimbursement Funded Benefits Methodology

There are a number of participating departments in the System that previously had Texas Local Fire Fighters’ Retirement Act (TLFFRA) plans that had been financed primarily or totally on a pay-as-you-go basis. When those departments entered the System, there evidently were no plan assets or insufficient plan assets to merge into the System to fully fund the present value of future benefits for their annuitants. The System’s history was to agree to take over the administration and payment of those annuitants’ monthly benefits in exchange for the agreement of the governing body of the department to reimburse the System for these benefits on a pay-as-you-go basis.

A separate account within the System had been used for a number of years to reflect both the payment of the annuities associated with former TLFFRA plans and the pay-as-you-go revenue from the governing bodies of the departments now participating in the System. The annuities paid through this separate account are sometimes referred to as “pass-throughs”. This separate account and its activity had historically been excluded from the biennial actuarial valuations of the System. Beginning with the August 31, 2012 actuarial valuation, the board of trustees

decided that it would be appropriate to reflect the actuarial present value of the future monthly benefits (PVFB) for the “pass-throughs” associated with former TLFFRA plans as a liability of the System in the biennial actuarial valuations.

The actuarial present value of the pay-as-you-go reimbursement payments is virtually identical to the PVFB for the “pass-throughs” at any point in time. Therefore, it was decided to also show the actuarial present value of the pay-as-you-go reimbursement payments equal to the PVFB for the “pass-throughs”. Since these two actuarial present values offset each other, the System’s funded ratio is unaffected and the present value of future appropriations from the state necessary to amortize the UAAL is unaffected.

5. Actuarial Assumptions

As a part of each actuarial valuation, we review the reasonableness of the actuarial assumptions used in the prior actuarial valuation. The investment return assumption is reviewed using the building block approach that includes several asset allocations, assumed real rates of return for each asset class, an assumed rate of investment-related expenses, and an assumed rate of inflation, with all assumptions for the long-term future. Our economic assumptions are influenced both by long-term historical experience and by future expectations of investment consultants and economists, but we select the economic assumptions and discuss them with the board of trustees before completing the actuarial valuation.

We review the termination, disability, and retirement assumptions in a more rigorous way periodically in experience studies, the most recent of which was completed in 2008. For the mortality assumptions, we use an appropriate published mortality table with projections for improvement beyond the valuation date. We are guided in our review and selection of assumptions by the relevant actuarial standards of practice. As a result of our review, we have selected actuarial assumptions we consider to be reasonable and appropriate for the System for the long-term future.

- a. Investment Return: Current and future System assets are assumed to yield an annual investment return of 7.75% net of investment expenses, 4.75% net real rate of return plus 3.00% inflation.
- b. Salary Increase Rates: Not applicable.

- c. Termination: The active members are assumed to terminate their membership for causes other than death, disability or retirement in accordance with annual rates per 1,000 members as illustrated in the rates shown below. The termination rates stop at the later of attaining age 55 or 10 years of qualified service.

Years of Service	Entry Age Group					
	20	25	30	35	40	45, 50, 55
0 - 4	260	230	200	190	150	130
5 - 9	100	95	90	85	85	80
10 - 14	80	80	80	80	65	0
15 - 19	55	55	55	55	0	0
20 - 24	55	55	55	0	0	0
25 - 29	55	55	0	0	0	0
30 - 34	55	0	0	0	0	0
35+	0	0	0	0	0	0

- d. Mortality: The active and terminated members and the retirees and surviving spouses of the System are assumed to exhibit mortality in accordance with the following:

i. Pre-retirement Mortality:

- off duty RP-2000 Combined Healthy Mortality Tables for males and females projected to 2024 by Scale AA
- on duty additional annual mortality rate of 0.2 per 1,000 actives

ii. Post-retirement Mortality: RP-2000 Combined Healthy Mortality Tables for males and females projected to 2024 by Scale AA

iii. Post-disability Mortality: RP-2000 Combined Healthy Mortality Tables for males and females projected to 2024 by Scale AA

- e. Retirement: Active members eligible for early or normal retirement are assumed to retire based on rates that vary by age as shown below.

<u>Age</u>	<u>Rates per 1,000 Members</u>
55	300
56	130
57	130
58	130
59	130
60	130
61	130
62	250
63	100
64	100
65	100
66	100
67	100
68	100
69	100
70	1,000

Terminated members entitled to deferred benefits are assumed to begin their benefits at age 56 or their age on the valuation date, if older.

- f. Disability: Active members are assumed to become disabled as defined by the System provisions during the performance of emergency service duties based on rates that vary by age as illustrated below:

<u>Age</u>	<u>Rates per 1,000 Members</u>
20	0.036
25	0.044
30	0.068
35	0.090
40	0.125
45	0.159
50	0.217
55	0.314
60	0.463
65	0.508

- g. Marital Status: 92% of all active male members and 67% of all active female members are assumed to be married at the time benefits commence. Males are assumed to be three years older than female spouses.

- h. Administrative Expenses: The normal cost under the actuarial cost method is increased by an assumed amount to reflect the average annual administrative expenses expected to be incurred and paid by the System in the years following the valuation date. The assumed amount is based on the average of (1) the budgeted administrative expenses for the year following the valuation date and (2) the estimated administrative expenses for the second year following the valuation date, reduced by the amount appropriated by the State of Texas for the System to pay part of the administrative expenses for the year following the valuation date.
 - i. Contributions: The total annual contributions to be paid by all governing bodies for the participating departments for qualified service as it is earned is assumed to be the total contributions based on the number of active members in the valuation and known monthly contribution rates for each department as of the valuation date.
 - j. Pensioner Data: If the marital status field provided in the data was “married”, “unknown”, or was missing, then the annuity payment form was assumed to be a joint and two-thirds to spouse annuity. For all other marital status codes, the payment form was assumed to be a life annuity. Missing spouse date of birth was assumed to be three years from the retiree’s date of birth, with females three years younger.
 6. Changes in Methods and Assumptions Since the August 31, 2014 Valuation
 - a. Mortality

The date for projecting mortality improvement was changed from 2018 to 2024. The base mortality tables are the same as shown in item 5.d. The scale used for projecting mortality improvement is the same as shown in item 5.d.

Section 5

Outline of Principal Eligibility, Benefit, and Contribution Provisions Reflected in the Actuarial Valuation as of August 31, 2014

1. Effective Date

The **Texas Statewide Emergency Services Retirement Act (TSESRA)** was established effective November 1, 1977 under Senate Bill No. 411 (“SB411”). It has been amended several times, with the most significant changes in a recodification by the 79th Legislature, Regular Session, 2005. In the recodification, the pension system was renamed the **Texas Emergency Services Retirement System (System)**. In the 2013 Regular Session, the System was made a state agency with an Executive Director hired by the System Board of Trustees.

2. Fund

The **Texas Emergency Services Retirement Fund (Fund)** was created by TSESRA and is a trust fund for providing retirement, disability and death benefits to eligible members and their surviving spouses.

3. Eligibility Requirements

All emergency services personnel who provide services related to fire, rescue and emergency medical services and who serve without monetary remuneration while members in good standing of a participating department are eligible. In addition, auxiliary employees who receive limited compensation from a political subdivision of Texas and who are certified by the political subdivision as being regularly engaged in the performance of duties for a participating department are eligible.

4. Qualified Service

A member is credited with a year of qualified service for each year following the member’s date of entry into the System in which the member is present for at least 20 hours of annual training and 25% of the department’s emergencies in a calendar year. The participating department must conduct a minimum of 48 hours of training in a calendar year.

In addition, the governing body may purchase additional qualified service for a member who becomes covered by the System and who has service with the participating department before the department began participating in the System. These “buy-back” years of qualified service are determined as the number of years of service (satisfying the qualified service requirements mentioned above) from the member’s date of entry in the department but not more than 10 years prior to the date the department began participating in the System.

5. Vesting of Benefits

A member became vested upon completing at least five years of qualified service through December 31, 2006. The vesting percent was determined in accordance with the table below. A member whose retirement benefit met a partial vesting requirement as it existed on December 31, 2006, retains the eligibility for that benefit as it existed on that date. Effective January 1, 2007, a member must have at least ten years of qualified service to become vested. The vesting percent is determined in accordance with the right half of the table below. The monthly benefit payable to the vested terminated member upon attainment of age 55 is computed in the same manner as for retirement except that the benefit and vesting percent are based upon the years of qualified service at the date of termination of service.

<u>Years of Qualified Service</u>	<u>Vesting Percent</u>		<u>Years of Qualified Service</u>	<u>Vesting Percent</u>
	<u>12/31/2006 and earlier</u>	<u>1/1/2007 and later</u>		
less than 5	0%	0%	10	50%
5	25%	0%	11	60%
6	30%	0%	12	70%
7	35%	0%	13	80%
8	40%	0%	14	90%
9	45%	0%	15 or more	100%

6. Retirement Benefits

A member is eligible to retire at age 55 or above. Early retirement requires the completion of at least five years of qualified service through December 31, 2006 and ten years thereafter, while normal retirement requires the completion of at least 15 years of qualified service. The only reduction for early retirement is the vesting percent. The monthly retirement benefit payable to the member is equal to the vesting percent multiplied by six times the governing body's average monthly contribution over the member's years of qualified service. For each year of qualified service in excess of 15 years, the monthly retirement benefit is increased at the rate of 6.2% compounded annually. (The rate was 7% per year before December 31, 2006.)

In addition, the governing body may have purchased prior service credit for service with the participating department before the department began participating in the System that is not buy-back service and that does not count as qualified service. There is a separate benefit formula for this prior service, referred to as accrued time, and the member is assumed to be 100% vested in the accrued time benefit. The maximum amount of accrued time is 20 years, and the monthly benefit is usually \$1.25 per year of accrued time.

A member electing to retire and receive a monthly retirement benefit from the System may continue to serve as a volunteer fire fighter for his governing body. However, the

member is no longer considered an active member of the System; so he is not credited with any additional qualified service or contributions.

7. Disability Benefits

A member who becomes disabled **during the performance of emergency service duties** is considered 100% vested. A disability benefit is payable during each month that the member is unable to perform his duties for the member's participating department or the duties of any other occupation for which the member is reasonably suited by education, training, and experience.

The monthly disability benefit payable to the member is equal to at least \$300. The monthly disability benefit increases \$50 for every \$12 in monthly contributions above the first \$12 in monthly contributions being paid to the System by the governing body at the time of the disability. A member must elect between retirement or disability benefits if eligible for both.

A member whose service terminates as a result of becoming disabled while **not performing emergency service duties** shall not be eligible for a disability benefit. Instead, the member is eligible to receive an immediate or deferred benefit based on his age, years of qualified service and vesting percent. The monthly benefit payable to the member beginning on the later of the date of disability or the date the member attains age 55 is computed in the same manner as for retirement.

8. On-Duty Death Benefits Prior to Retirement

A member whose death **is the result of performance of emergency service duties** is considered 100% vested. A lump sum death benefit as well as a monthly death benefit are payable to the member's spouse (a lifetime benefit) and dependent children (payable until age 19 unless disabled) beginning in the month after the member's death.

The lump sum benefit is equal to \$60,000.

The monthly death benefit is equal to $\frac{2}{3}$ of the retirement benefit the member would have been entitled to receive based on the greater of 15 years or actual years of qualified service and is payable to the member's spouse and dependent children. An additional amount of $\frac{1}{3}$ of the member's retirement pension is payable to the member's dependents as long as both the spouse and at least one dependent child survives.

9. Off-Duty Death Benefits Prior to Retirement

A member **eligible to retire** whose death is **not the result of performance of emergency service duties** shall be treated as if the member had retired on the date of death. The surviving spouse shall be entitled to a monthly benefit provided the member qualified by both age and service for retirement benefits at the time of death.

The monthly death benefit is equal to $\frac{2}{3}$ of the member's retirement benefit and is payable to the member's spouse beginning in the month after the member's death.

Alternatively, the surviving spouse may elect to receive a lump sum death benefit. The lump sum benefit is equal to the greater of the sum contributed to the System on behalf of the member or the sum that would have been contributed to the System after 15 years if the member had not completed 15 years at the time of death. If there is no surviving spouse, the beneficiary would receive the lump sum death benefit.

If a member whose death is **not the result of performance of emergency service duties** was **not eligible to retire** at the time of death, his beneficiary shall receive a lump sum benefit. The amount of the lump sum benefit is the same as that described above for a member who dies while eligible to retire.

If a member whose death is not the result of performance of emergency service duties was under age 55 at the time of death but had a vested benefit, then the surviving spouse may elect, in lieu of the lump sum death benefit, a deferred monthly death benefit beginning the month after the decedent would have turned 55. The monthly benefit would be equal to $\frac{2}{3}$ of the monthly retirement benefit to which the decedent would have been entitled on that date if he had lived to 55.

10. Death During Permanent Disability

If a member dies while receiving a disability benefit, his surviving spouse shall receive a monthly benefit equal to $\frac{2}{3}$ of the monthly disability benefit which the disabled member was receiving at the time of death.

11. Death After Retirement

The surviving spouse of a retired member who dies shall receive a monthly benefit equal to $\frac{2}{3}$ of the monthly benefit which the retiree was receiving at time of death.

12. Death While a Vested Terminated Participant

The surviving spouse of a deceased member who dies after terminating service with a vested benefit but before attaining age 55 is entitled to a monthly benefit, beginning on the date the decedent would have attained 55, that is $\frac{2}{3}$ of the monthly benefit to which the decedent would have been entitled.

13. Contributions by Governing Bodies

Contributions are made by the governing body for the participating department. No contributions are required from the individuals who are members of the System. Each participating department shall make a contribution for each month a member performs emergency services for the department. The monthly contribution is composed of two parts. The Part One contribution directly impacts future retiree annuities and reflects a

minimum amount set by the state board. The Part Two contribution may be established by the System Board of Trustees to help amortize the UAAL if the expected future annual contributions from the state are not enough with the Part One contributions to provide an adequate contribution arrangement to pay the normal cost and amortize the UAAL in 30 years. If Part Two contributions are needed for the System to have an adequate contribution arrangement, the Part Two contributions are actuarially determined based on the most recent biennial actuarial valuation to be effective beginning on September 1 following the board's approval for the remainder of the 30-year amortization period. The Part Two portion, which is determined as a percent of the Part One portion (not to exceed 15%), may subsequently may be modified based on the then-most recent actuarial valuation.

A Part One contribution of at least the minimum amount per month of service is payable on behalf of each active member. The minimum monthly contribution rate per member for a department participating in the System on September 1, 2005 was increased from \$12 to \$36 in \$4 annual increments, beginning September 1, 2006 and became \$36 September 1, 2011. The minimum monthly contribution rate for a department that began participation in the System after September 1, 2005 is \$36. Contributions higher than the minimum Part One contribution rate may be made at the discretion of the governing body in order to provide higher monthly benefits.

The total required contributions by the governing body are equal to the sum of the Part One and Part Two contributions and any special contributions made in order to purchase buy-back years of qualified service and other prior service benefits. The special contributions to purchase buy-back years of qualified service and other prior service benefits shall be determined before the second anniversary of a department's entry into the System. These special contributions (referred to as prior service contributions) shall be payable either in a lump sum or at least annually for a period not to exceed 10 years.

14. Contributions by State of Texas

The State shall contribute the amount necessary to make the System "actuarially sound" each year. However, the State's contribution may not exceed one-third of the total of all contributions by governing bodies in a particular year. The state law governing the System defines an "actuarially sound pension system" as one in which the amount of contributions is sufficient to cover the normal cost and to amortize the unfunded actuarial accrued liability in a period that does not exceed 30 years.

15. Minimum Benefit

Effective January 1, 2007, the TESRS Board of Trustees by board rule reduced the benefit formula for years of qualified service above 15 and eliminated partial vesting for members with less than 10 years of qualified service. The Board protected vested members by "grandfathering" accrued benefits as of December 31, 2006 for each

vested active member for retirement, termination or death. The System calculated the amount of every member's vested accrued benefit as of December 31, 2006 and keeps a record of this amount as each person's minimum benefit. Upon termination, death, or retirement, the System will pay the larger of the benefit under the new reduced benefit formula and the minimum benefit. Vested terminated members at the effective date of the changes were not affected.

Section 6

Summary of Participant Data

**Distribution of Active Participants
by Age and Service as of August 31, 2016**

Current Age	Current Years of Qualified Service						Total	Percent of Total
	0-4	5-9	10-14	15-19	20-24	25 & Over		
Under 25	264	12	0	0	0	0	276	7.6%
25-29	278	159	11	0	0	0	448	12.3
30-34	207	183	78	3	0	0	471	13.0
35-39	170	151	85	43	4	0	453	12.5
40-44	122	143	91	79	33	0	468	12.9
45-49	96	100	97	80	45	26	444	12.2
50-54	54	82	79	91	71	80	457	12.6
55-59	28	50	60	51	33	71	293	8.0
60-64	32	32	35	24	27	38	188	5.2
65 & Over	<u>20</u>	<u>30</u>	<u>27</u>	<u>15</u>	<u>16</u>	<u>28</u>	<u>136</u>	<u>3.7</u>
Total	1,271	942	563	386	229	243	3,634	100.0%
Percent of Total	35.0%	25.9%	15.5%	10.6%	6.3%	6.7%	100.0%	

Summary of Participant Data (Continued)

	8/31/2010	8/31/2012	8/31/2014	8/31/2016
Active Participants				
Number	4,371	4,446	4,036	3,634
Average age	39.5	40.1	40.7	41.8
Average qualified service	7.5	8.1	8.7	9.5
Percent male	94%	94%	93%	93%
Terminated Vested Participants				
Number	2,106	2,252	2,161	2,200
Average age	47.4	49.2	49.7	51.0
Total annual deferred benefit	\$1,872,981	\$2,237,364	\$2,202,984	\$2,505,659
Average annual deferred benefit	\$889	\$994	\$1,019	\$1,139
Retirees and Beneficiaries (TESRS)				
Number				
Service retirees	1,728	1,865	2,122	2,223
Spouses	424	458	540	599
Disability retirees	8	8	9	10
Children	<u>7</u>	<u>9</u>	<u>8</u>	<u>8</u>
	2,167	2,340	2,679	2,840
Average age				
Service retirees	67.0	67.4	67.9	68.0
Spouses	73.8	73.9	76.2	77.4
Disability retirees	60.7	62.7	63.2	64.6
Total annual benefit	\$2,676,032	\$3,198,479	\$4,024,974	\$4,589,959
Average annual benefit	\$1,235	\$1,367	\$1,502	\$1,616
Retirees and Beneficiaries (TLFFRA)				
Number				
Service retirees		185	181	129
Spouses		<u>225</u>	<u>213</u>	<u>198</u>
		410	394	327
Average age				
Service retirees		79.2	80.7	81.6
Spouses		81.7	83.6	85.6
Total annual benefit		\$350,233	\$337,581	\$278,931
Average annual benefit		\$854	\$857	\$853

Summary of Participant Data (Continued)
Participant Data Reconciliation

	Active Participants	Current Payment Status	Terminated Vested Participants	Total
1. As of August 31, 2014	4,036	3,073	2,161	9,270
2. Change of status				
a. retirement	(95)	231	(136)	0
b. disability	0	0	0	0
c. death	(7)	(190)	0	(197)
d. survivor payment begins	0	77	0	77
e. nonvested termination	(779)	0	0	(779)
f. vested termination	(191)	0	191	0
g. completion of payment	0	0	0	0
h. data correction	<u>0</u>	<u>(24)</u>	<u>10</u>	<u>(14)</u>
i. net changes	(1,072)	94	65	(913)
3. New participants (or return)	<u>670</u>	<u>0</u>	<u>(26)</u>	<u>644</u>
4. As of August 31, 2016	3,634	3,167	2,200	9,001

Section 7

Glossary of Actuarial Terms

Actuarial Accrued Liability	That portion, as determined by the particular actuarial cost method used, of the Actuarial Present Value of future pension plan benefits as of the Valuation Date that is not provided for by the Actuarial Present Value of future Normal Costs.
Actuarial Assumptions	Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, termination, disablement and retirement; changes in compensation; rates of investment earnings and asset appreciation; and other relevant items.
Actuarial Gain (Loss)	A measure of the difference between actual experience and that expected based on the Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with the particular actuarial cost method used.
Actuarial Present Value	The value of an amount or series of amounts payable or receivable at various times, determined as of a given date (the Valuation Date) by the application of the Actuarial Assumptions.
Actuarial Valuation	The determination, as of a Valuation Date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets and related Actuarial Present Values for a pension plan.
Actuarial Value of Assets	The value of cash, investments and other property belonging to a pension plan, as determined by a method and used by the actuary for the purpose of an Actuarial Valuation.
Entry Age Actuarial Cost Method	An actuarial cost method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a Valuation Date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability. Under this method, Actuarial Gains (Losses), as they occur, reduce (increase) the Unfunded Actuarial Accrued Liability.
Fiscal Year	A 12-month period beginning September 1 and ending August 31.

Glossary of Actuarial Terms, (Continued)

Normal Cost	That portion of the Actuarial Present Value of pension plan benefits that is allocated to a valuation year by the actuarial cost method.
Prior Service Contributions	Contributions for a department for purchasing credit for service before that department began participating in the System.
Projected Benefits	Those pension plan benefit amounts that are expected to be paid at various future times according to the Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future qualified service.
Overfunded Actuarial Accrued Liability	The excess, if any, of the Actuarial Value of Assets over the Actuarial Accrued Liability.
Unfunded Actuarial Accrued Liability	The excess, if any, of the Actuarial Accrued Liability over the Actuarial Value of Assets.
Unfunded Actuarial Accrued Liability Contributions	The level annual dollar amount to amortize the Unfunded Actuarial Accrued Liability.
Valuation Date	The date upon which the Normal Cost, Actuarial Accrued Liability and Actuarial Value of Assets are determined. Generally, the Valuation Date will coincide with the ending of a Fiscal Year.
Years to Amortize the Unfunded Actuarial Accrued Liability	The period is determined in each Actuarial Valuation as the number of years, beginning with the Valuation Date, to amortize the Unfunded Actuarial Accrued Liability with a level annual dollar amount that is the difference between the expected Part One contributions and the Normal Cost. The determination may also reflect the present value of maximum state contributions as needed to have an amortization period of 30 years. If the Part One contributions and 30 years of the maximum state contributions are not adequate for a 30-year amortization period, then the actuarial valuation will include the determination of Part Two contributions required to have a 30-year amortization period.