

Actuarial Valuation Reports

Funding for Pension Plans Administered by ERS

As of August 31, 2019

Prepared by Gabriel Roeder Smith & Company

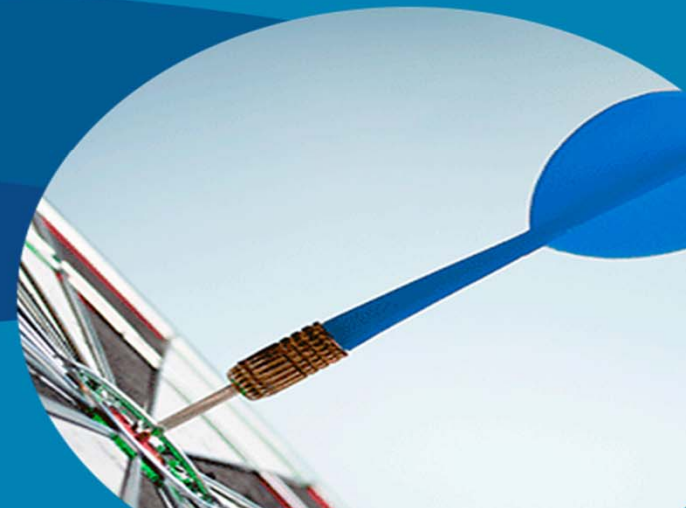


Actuarial Valuations of the ERS Retirement Funds as of August 31, 2019

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December 10, 2019

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Agenda

- Impact of Asset Returns
- Actuarially Determined Funding
- ERS Funding Valuation Results
- LECOSRF and JRS2 Funding Valuation Results
- Accounting Results at August 31, 2019

Purpose of Actuarial Valuation

- Snapshot as of August 31, 2019 using member data, financial data, benefit and contribution provisions, actuarial assumptions and methods as of that date
- Purposes:
 - Measure the actuarial liabilities and funding levels
 - Determine adequacy of current statutory contributions
 - Provide other information for reporting
 - GASB 67/68, Comprehensive Annual Financial Report
 - Explain changes in actuarial condition of the plans
 - Track changes over time
 - Analyze future outlook

Where are we headed now?

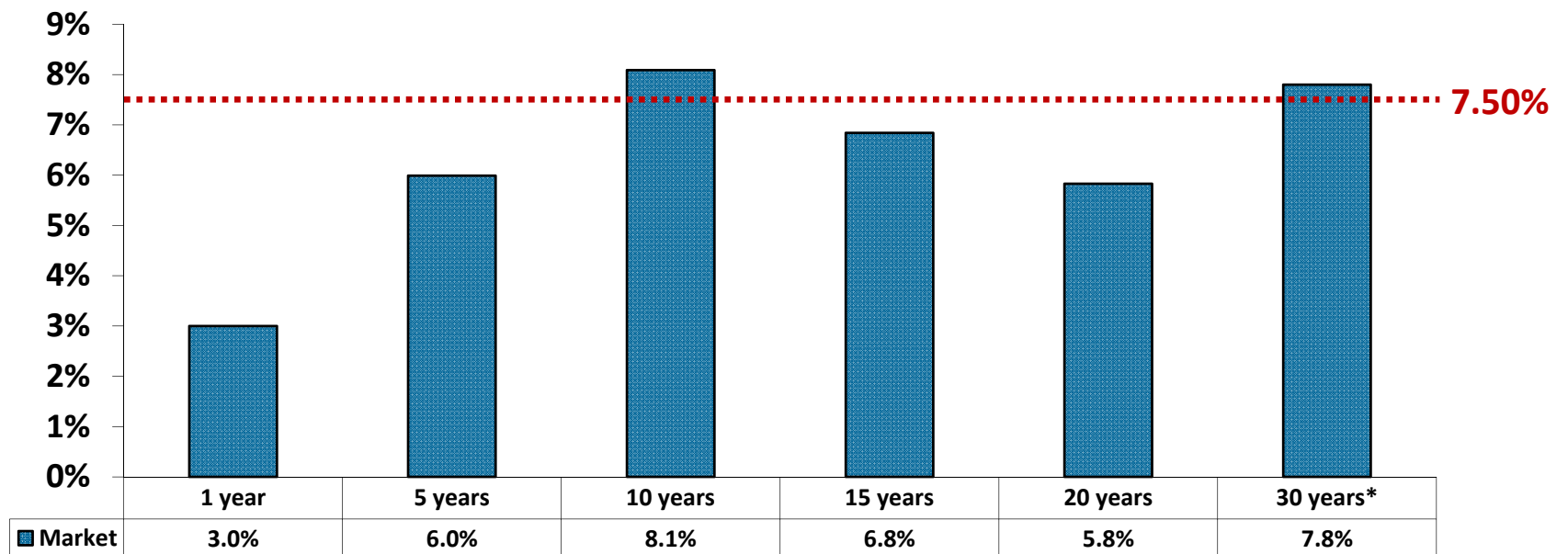
- Outlook is similar to last year as all three trust funds are projected to run out of money and the funds would not be able to pay earned benefits to current members during retirement
 - ERS trust is projected to run out of money in \approx 50 years
 - LECOSRF trust is projected to run out of money in \approx 25 years
 - JRS2 trust is projected to run out of money in \approx 50 years
- Changes are required to limit risks to benefit security
- Legislature missed opportunities to make necessary changes
 - Delay makes adjustments more costly

Impact of Asset Returns

Asset Experience

- Actual rate of return on market was $\approx 3.0\%$
- Actuarial metrics primarily based on smoothed value of assets (actuarial value, or AVA), not market value
- Actuarial value only reflects a portion of the actual market returns over the past five years
 - Recognize 20% of the unexpected asset gain/loss each year
- 5 year smoothed return on AVA was 6.9% in FY 2019
- \$709 million in net deferred losses, not yet recognized
 - \$393 million deferred gain from last year fully recognized
 - Will be recognized over next four years

Estimated Historical Yields Based on Market Value of Assets



* The 30-year return is provided as a gross return due to data limitations.

Assumptions vs Funding

- If the investment experience had met the current assumptions over the last 20 years, ERS would effectively be fully funded
 - Actual returns have not been available in the market to meet the assumption
- The assumption is supposed to be a starting point, useful for decision making
- For the successful program, contributions have to adapt as experience unfolds to make up shortfall
- While historical investment returns have been a significant source of the solvency issues facing ERS today, the actual cause is a funding strategy that has not reacted appropriately

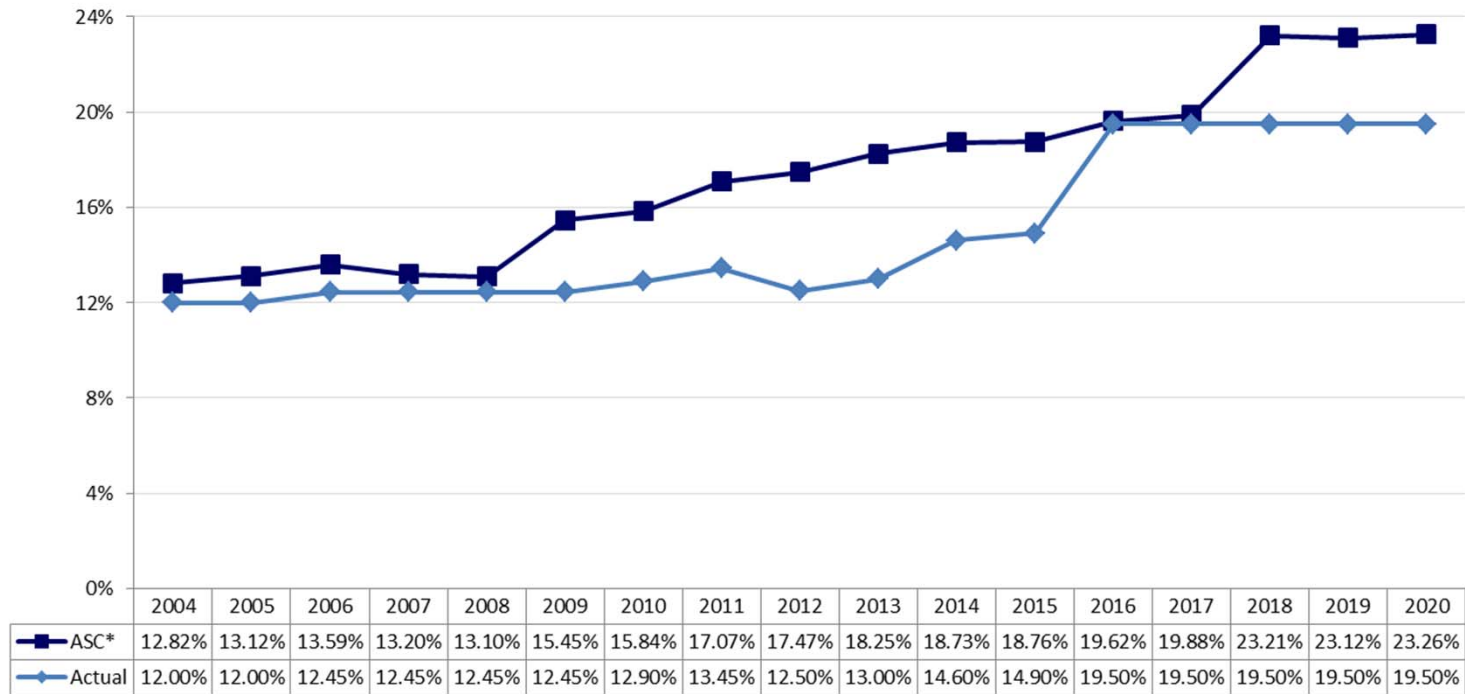
Actuarially Determined Funding

Plan Funding – Fixed Rate

- Pensions plans in Texas (including ERS) have traditionally been funded via a negotiated fixed contribution rate
- This rate can only change again in the future via another budget negotiation
 - For ERS, that can only occur every 2 years
 - With this setup, it is up to the membership and the retirement system to initiate the negotiation, with the status quo being an insufficient contribution amount
- With all current stakeholders wanting to maintain their current provisions, negotiations usually end up with inappropriate funding targets
- While the other systems in the State must now maintain a 40 year funding period, the legislature does not have that requirement for ERS and TRS

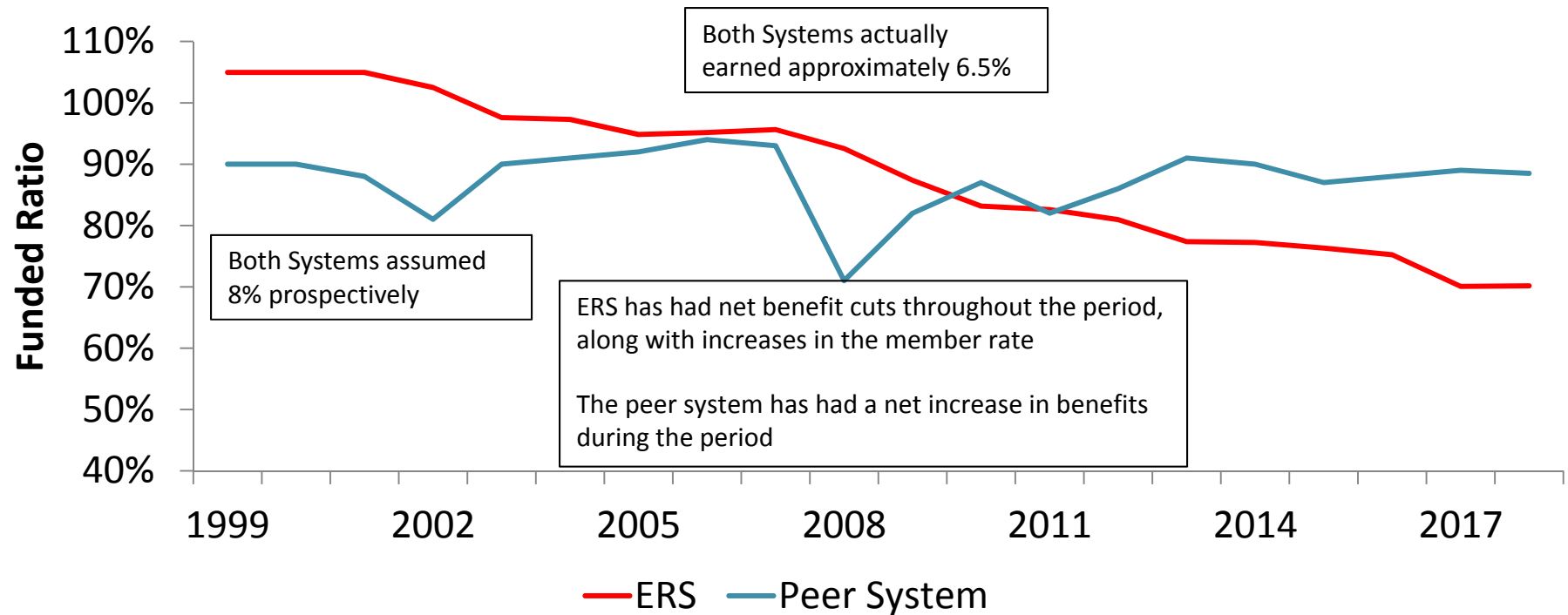
Actual vs. Actuarial Contributions* (ERS)

(% of Payroll, by Fiscal Year)

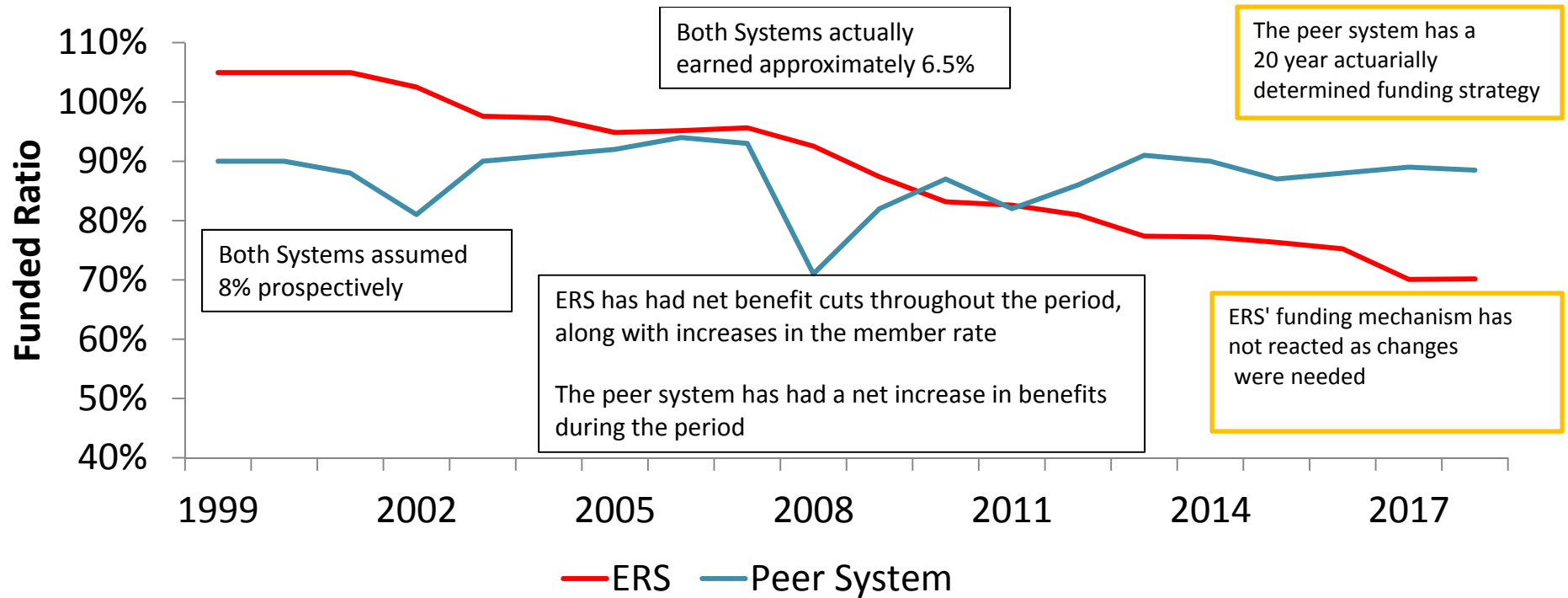


*Actuarially Sound Contribution defined as normal cost plus 31-year amortization of unfunded

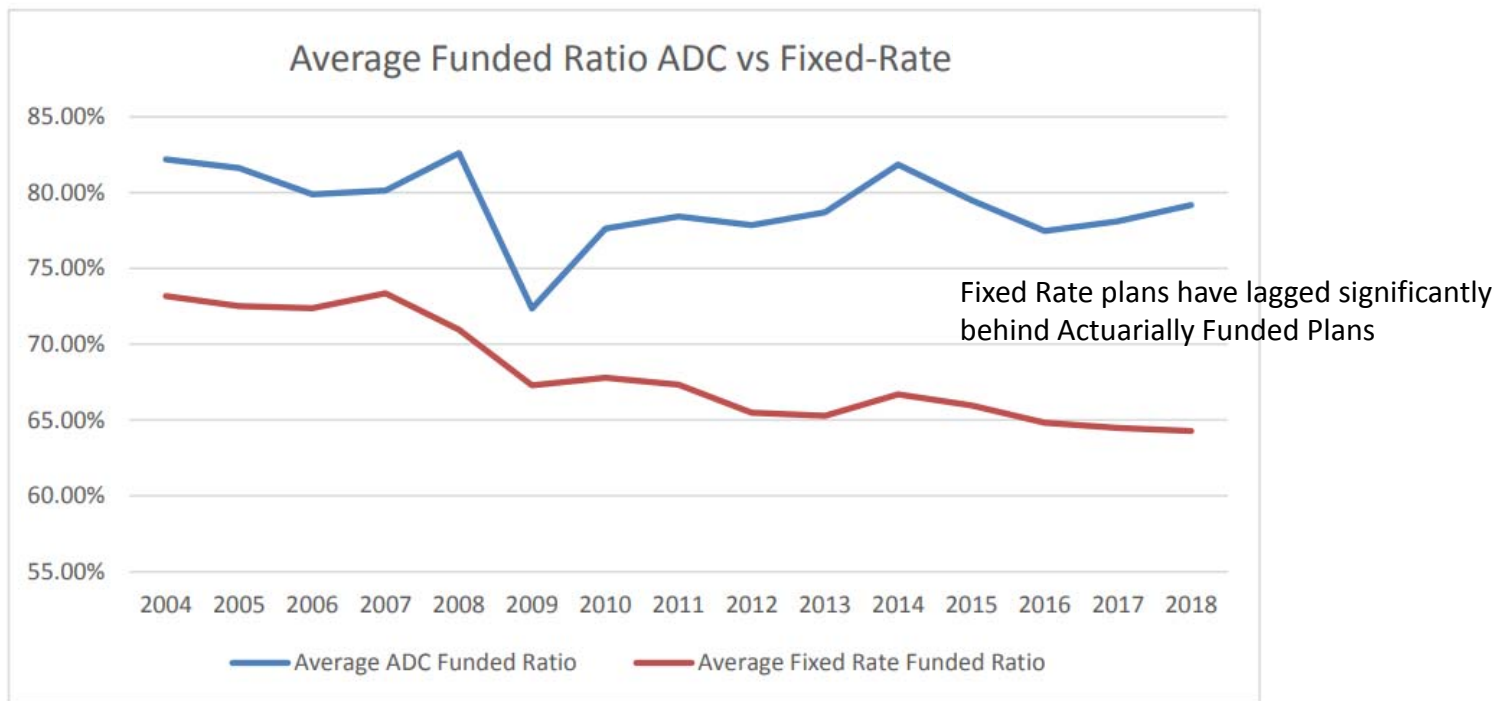
Peer Comparison



Peer Comparison



Funding Policies for Fixed-Rate Pension Plans Issued by the Texas Pension Review Board in 2019



Public Pension Plans in Texas

Plan Funding – Actuarially Determined

- Conversely, a funding policy that is actuarially determined will have a pre-defined formula that will calculate the contributions
- Does not necessarily have to change each year, but change has to occur when change is needed
 - Can be revenue and/or liabilities
- Successful programs generally have the formulas set by the Board, with consultation from their actuary
- The plan sponsor has no discretion
 - If the plan sponsor believes relief is needed, the burden is on the plan sponsor to initiate the negotiation, with the status quo being an appropriate contribution amount

Plan Funding – Actuarially Determined

- Many effective strategies are available to providing benefit security and support the funded status
- However, some strategies can provide substantial contribution rate volatility
- There are some rate stabilization techniques being utilized in the industry to provide relief, but they all force change when change is needed
 - Examples include the funding corridors in the City of Houston policies from the 2017 legislative session or floating approaches utilized by the States of Utah and South Carolina

Takeaway

- The more short term the decision making, meaning the more the decision impacts the decision maker, the worse the decisions are and the less sustainable the program
- There needs to be a pre-defined policy for automatic adjustments as experience unfolds
 - Can either be contributions or liabilities, but must occur automatically and without discretion
- Doing nothing cannot be an option

ERS

Funding Valuation Results

at August 31, 2019

Funded Status (ERS)

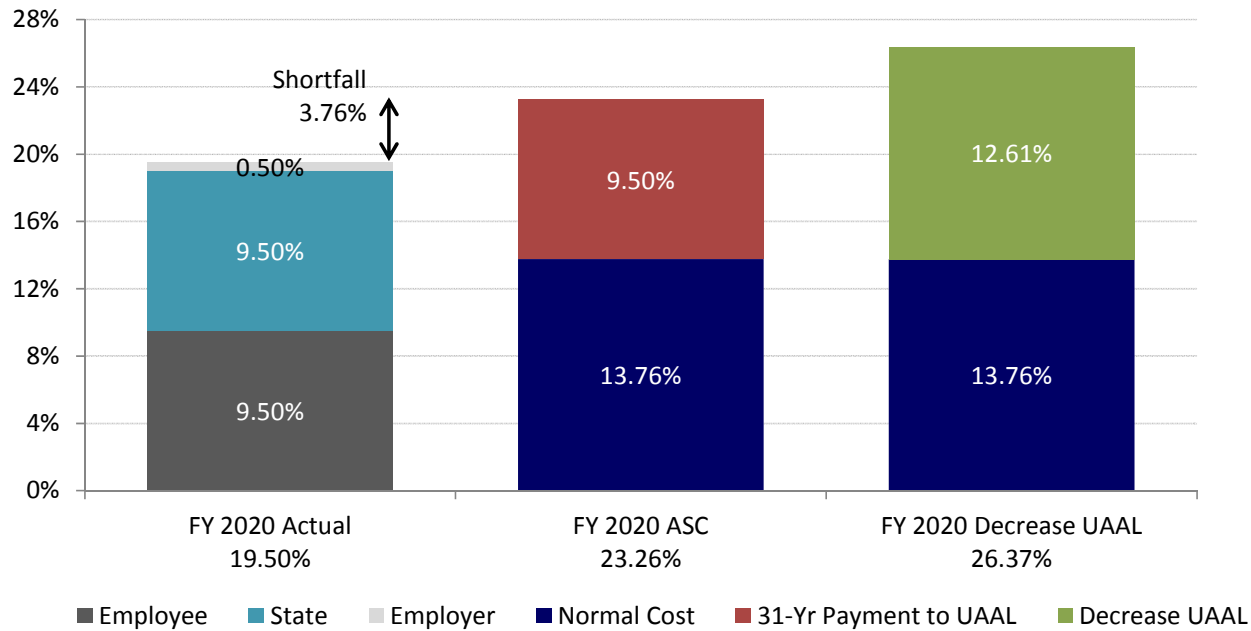
(\$ in millions)

Actuarial Valuation as of August 31, 2019		
	AVA	MVA
Actuarial Accrued Liability	\$39,801	\$39,801
AVA / MVA	<u>28,060</u>	<u>27,351</u>
Unfunded Accrued Liability	\$11,741	\$12,450
Funded Ratio	70.5%	68.7%
Funding Period	Never	Never
Actuarial Valuation as of August 31, 2018		
	AVA	MVA
Actuarial Accrued Liability	\$38,989	\$38,989
AVA / MVA	<u>27,360</u>	<u>27,753</u>
Unfunded Accrued Liability	\$11,629	\$11,236
Funded Ratio	70.2%	71.2%
Funding Period	Never	Never

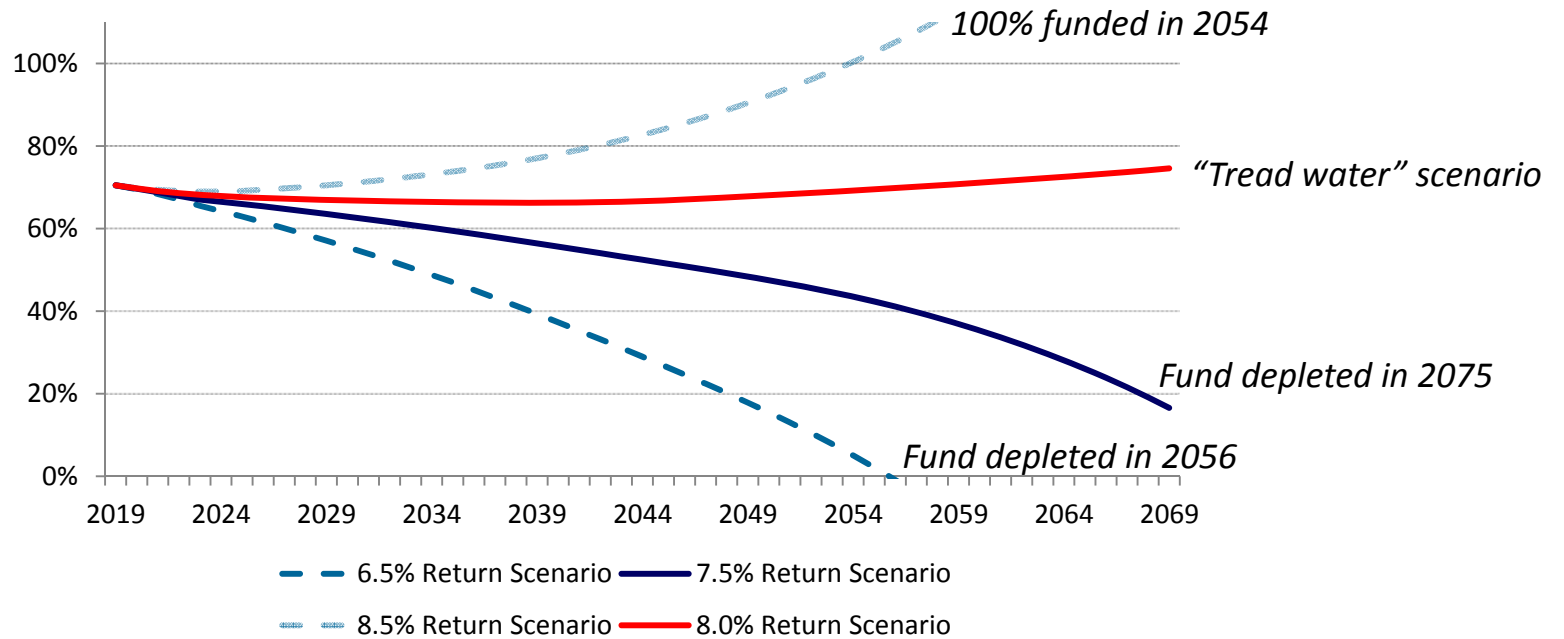
Funding Guidelines

- Board approved the Pension Funding Priorities and Guidelines on May 23, 2018
- Policy laid out a multi-level funding period goal to gradually achieve funding on sound actuarial principles
 1. Avoid trust fund depletion,
 2. Meet current statutory standard of a 31-year funding period, and
 3. Match funding period to the average years of service at retirement once a 31-year funding period is achieved, and closed.
- With projected depletion date in 56 years, none of the Board's funding period goals are being met

Actuarially Sound Contribution (ERS)

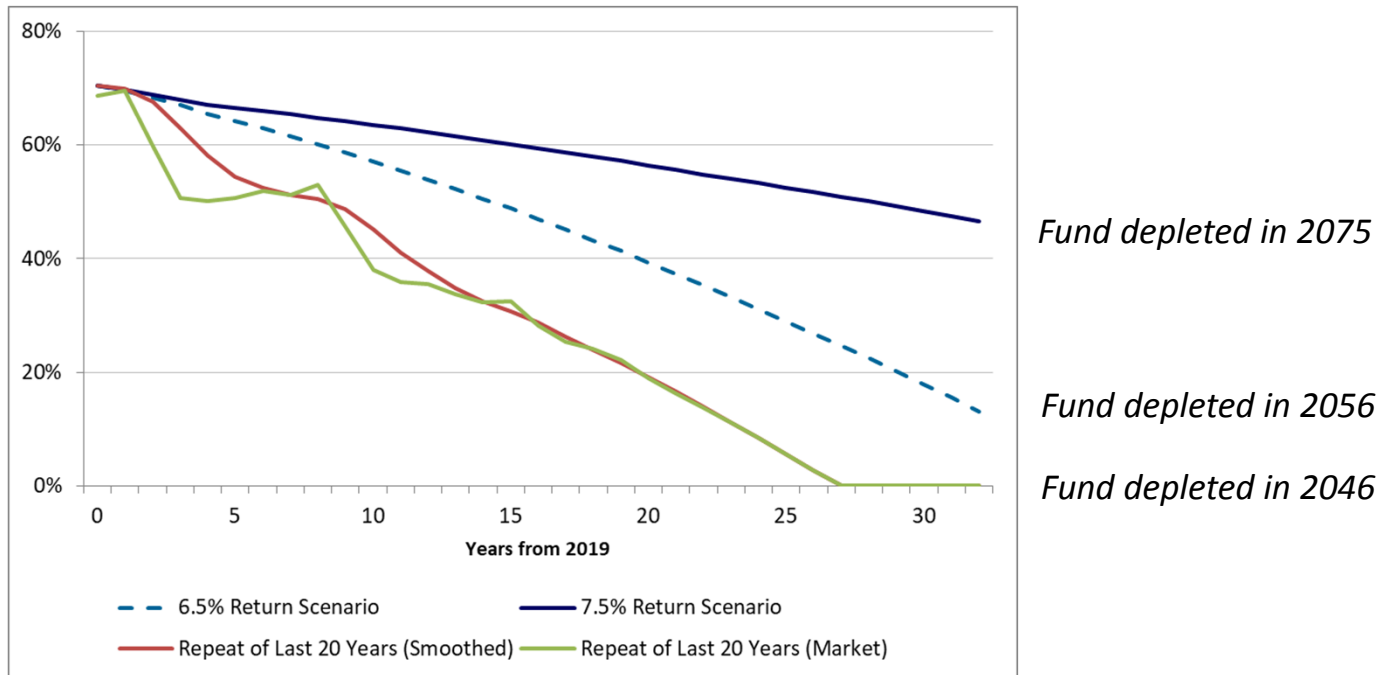


Funded Ratio Projections (ERS)



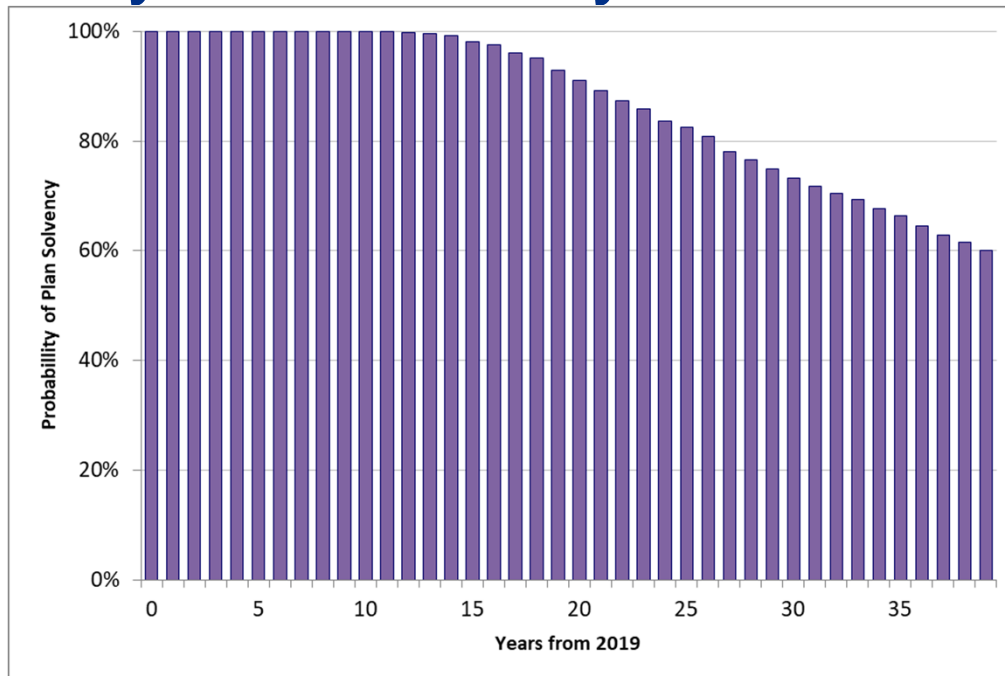
Projections assume no changes to current assumptions and except actual asset returns, as noted, all other assumptions are met and future contributions continue at current levels.

Funded Ratio Projections (ERS) Historical Scenario



Projections assume no changes to current assumptions and except actual asset returns, as noted, all other assumptions are met and future contributions continue at current levels.

Funded Ratio Projections (ERS) Probability of Solvency



This represents the probability of the trust fund having assets at the beginning of each year

Stochastic Projections based on 7.5% median return expectation and 11.6% standard deviation

Projections assume no changes to current assumptions and except actual asset returns, as noted, all other assumptions are met and future contributions continue at current levels.

LECOSRF and JRS2 Funding Valuation Results at August 31, 2019

LECOSRF and JRS2 Results

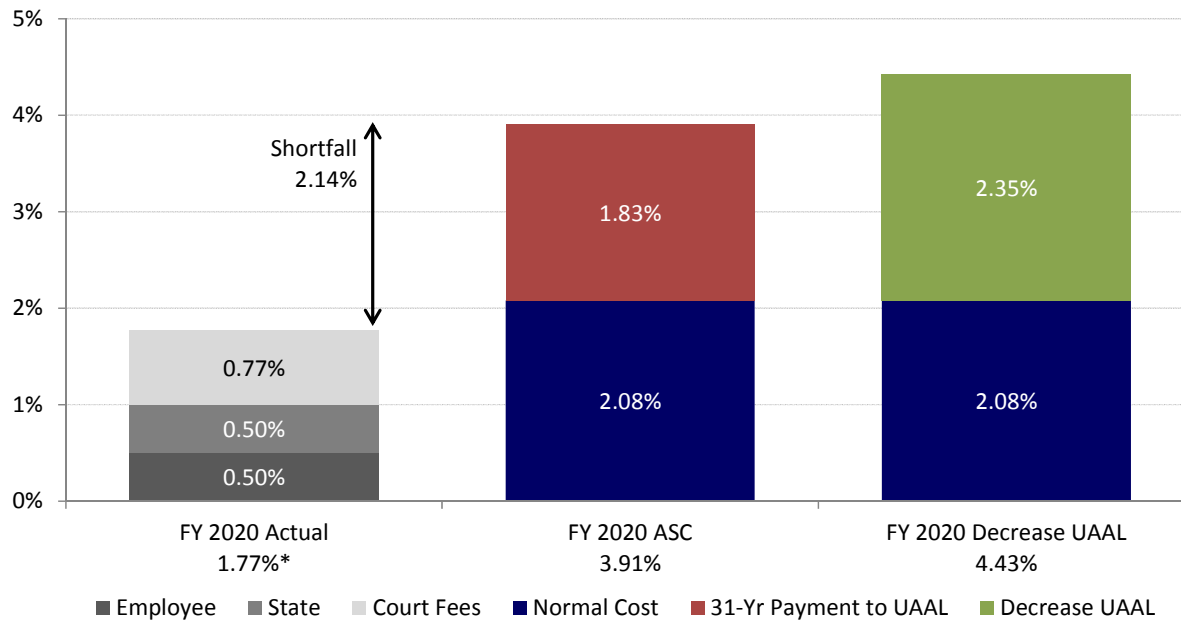
- LECOSRF had a reduction in funded status
 - Contributions are not sufficient to sustain the plan
 - Projected depletion date in 24 years
- JRS2 had a reduction in funded status
 - Judicial pay changes negatively impacted plan
 - Despite 2% increase in member contribution rate, contributions are not sufficient to sustain the plan
 - Projected depletion date in 57 years

Funded Status

(\$ in millions)

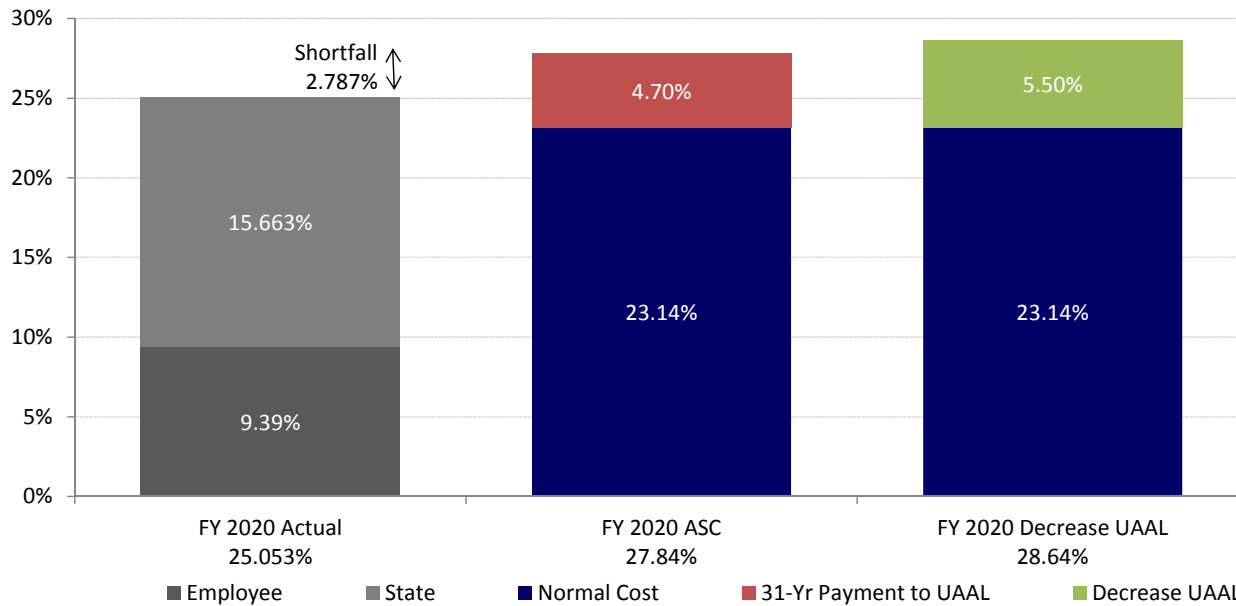
Actuarial Valuation as of August 31, 2019		
	LECOSRF	JRS2
Actuarial Accrued Liability	\$1,483	\$535
Actuarial Value of Assets	<u>968</u>	<u>468</u>
Unfunded Accrued Liability	\$515	\$67
Funded Ratio	65.3%	87.5%
Funding Period	Never	Never
Actuarial Valuation as of August 31, 2018		
	LECOSRF	JRS2
Actuarial Accrued Liability	\$1,453	\$488
Actuarial Value of Assets	<u>953</u>	<u>447</u>
Unfunded Accrued Liability	\$500	\$41
Funded Ratio	65.6%	91.7%
Funding Period	Never	69

Actuarially Sound Contribution (LECOSRF)



**Court fees received by LECOSRF are projected to be about \$17.1 million for FY2020 and beyond, based on actual FY19 amounts. This amount is equivalent to 0.77% of pay for the next 31 years.*

Actuarially Sound Contribution (JRS2)



Accounting Results as of August 31, 2019

Accounting Valuation Results

- ERS adopted GASB 67 for plan year ending August 31, 2014
- GASB 68 measures were included in Texas state reporting starting in fiscal year ending August 31, 2016
 - State has elected to utilize one year reporting lag
 - GASB 67/68 valuation as of August 31, 2018 used for August 31, 2019 reporting
- GASB 73 outlines reporting for JRS1

Determining Discount Rate

- Discount rate used in determining the Total Pension Liability (TPL) is a blend of two rates
 - Long-term expected rate of return on pension plan investments (7.50% based on current investment policy)
 - Can be used to discount plan obligations as long as there are projected assets sufficient to pay projected plan benefits
 - Yield or index rate for a 20-year, tax-exempt general obligation municipal bond (2.63% as of August 31, 2019)
 - Used to discount plan obligations after the projected assets have been extinguished
 - JRS1 uses municipal bond rate since there are no trust assets

Accounting Valuation Results

(\$ in millions)

August 31, 2019	ERS	LECOSRF	JRS2	JRS1
Single Discount Rate (SDR)	4.42%	3.29%	5.45%	2.63%
Total Pension Liability	\$57,336	\$2,609	\$648	\$245
Plan Fiduciary Net Position	<u>27,351</u>	<u>944</u>	<u>456</u>	<u>0</u>
Net Pension Liability (NPL)	29,985	1,665	192	245
August 31, 2018				
Single Discount Rate (SDR)	5.69%	4.48%	7.50%	3.69%
Total Pension Liability	\$47,944	\$2,150	\$487	\$255
Plan Fiduciary Net Position	<u>27,753</u>	<u>967</u>	<u>453</u>	<u>0</u>
Net Pension Liability (NPL)	20,191	1,183	34	255

With stronger funding strategy, NPL could immediately drop to:

*ERS: \$12.4 billion
LECOS: \$539 million
JRS2: \$78 million*

Summary

Summary

- For ERS, LECOSRF, and JRS-2, current contribution levels are not sufficient to sustain the system
 - Without an increase of contributions over the current schedules, or a reduction of benefits, the funded status will continue to decline

Summary

- Scheduled to review investment return assumption again before the next actuarial valuation
 - All current results currently based on 7.50% investment return assumption
 - Return expectations for peer systems and from investment professionals have continued to decline since the last ERS review in the summer of 2017
 - Current general guidance is that 2020 capital market expectations from investment professionals will be the lowest yet

Disclaimers

- This presentation is intended to be used in conjunction with the actuarial valuation reports issued in December 2019. This presentation should not be relied on for any purpose other than the purpose described in the valuation reports.
- This presentation shall not be construed to provide tax advice, legal advice or investment advice.

Employees Retirement System of Texas

Annual Actuarial Valuation - Funding
As of August 31, 2019



December 4, 2019

Board of Trustees
Employees Retirement System of Texas
200 East 18th Street
Austin, TX 78701

Re: Actuarial Valuation for Funding Purposes as of August 31, 2019

Members of the Board:

We certify that the information contained in this report is accurate and fairly presents the actuarial position of the Employees Retirement System of Texas (ERS) as of August 31, 2019. This report was prepared at the request of the Board and is intended for use by ERS staff and those designated or approved by the Board. This report may be provided to parties other than ERS only in its entirety and only with the permission of the Board.

Actuarial Valuation

The primary purposes of the actuarial valuation report are to determine the adequacy of the current State and employer contribution rates, describe the current financial condition of ERS, analyze changes in the condition of ERS, and provide various summaries of the data.

The current financial outlook for ERS is very poor. It is important to understand that the currently scheduled contributions are not expected to accumulate sufficient assets in order to pay all of the currently scheduled benefits when due. Based on current expectations and assumptions, ERS is projected to remain solvent until the year 2075. However, based on volatility in the financial markets, there is a strong possibility that ERS will become insolvent in a 30 to 40 year timeframe which is within the current generation of members. Contributions must materially increase in the next legislative session to secure the benefits for current members.

Plan Provisions

Our actuarial valuation as of August 31, 2019 reflects the benefit and contribution provisions set forth in Chapters 811 through 815 of the Texas Government Code. The current plan provisions are outlined in Section E of this report.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016. Additionally, this actuarial valuation incorporates the notable

across-the-board pay increases budgeted by the State Legislature when they are granted for the current biennium. The current actuarial assumptions and methods are outlined in Section F of this report.

Data

The valuation was based upon information as of August 31, 2019, furnished by ERS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ERS staff.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Internal Revenue Code and ERISA.

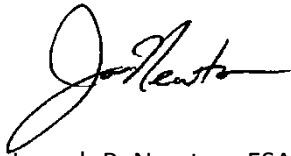
The signing actuaries are independent of the plan sponsor. Mr. Falls, Mr. Newton and Ms. Woolfrey are Enrolled Actuaries and Fellows of the Society of Actuaries, and all of the undersigned are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, each of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



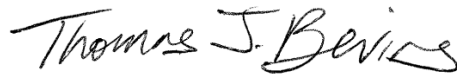
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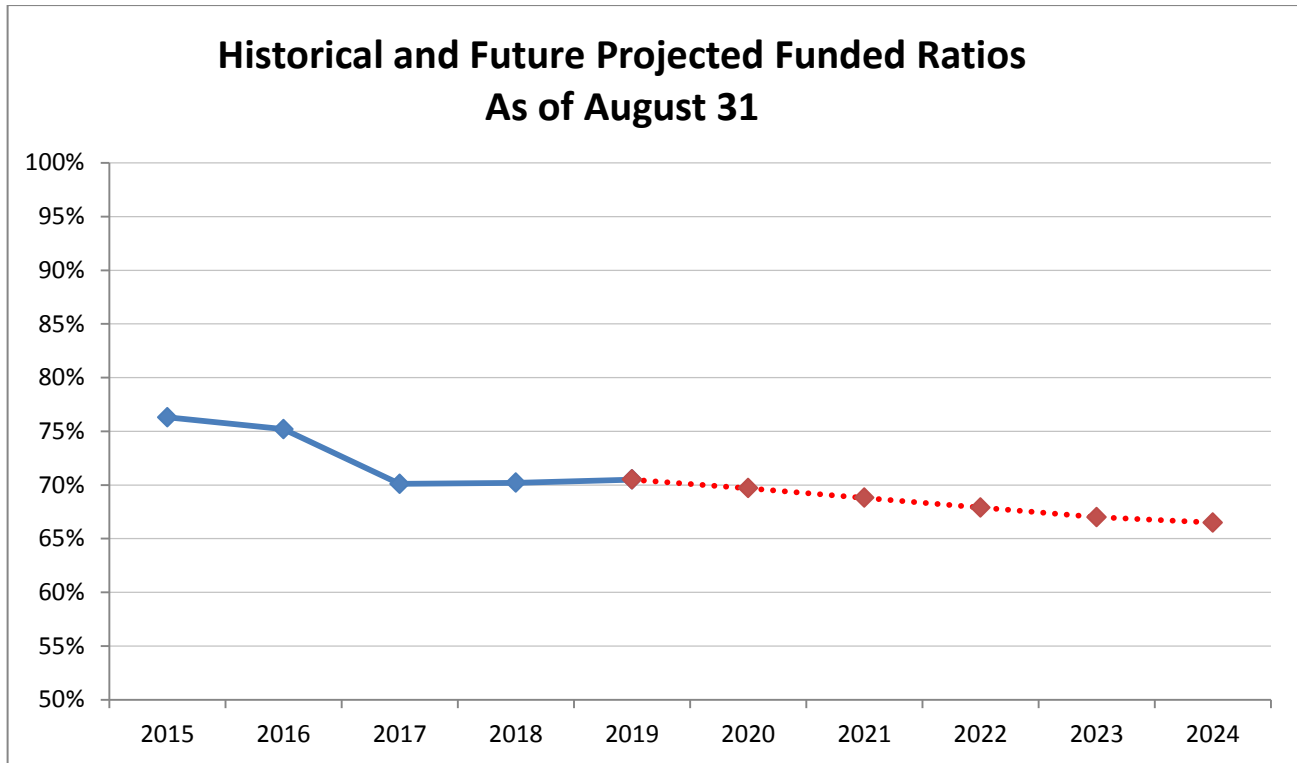
SECTION A

EXECUTIVE SUMMARY

Executive Summary

Item	2019	2018
Membership <ul style="list-style-type: none"> • Number of <ul style="list-style-type: none"> - Active members - Retirees and beneficiaries - Inactive, vested - Inactive, nonvested - Total • Valuation Payroll 	141,865 115,155 15,425 110,510 <hr/> 382,955 \$ 6,984,576,697	141,535 111,361 15,842 103,894 <hr/> 372,632 \$ 6,875,886,920
Statutory contribution rates <ul style="list-style-type: none"> • Members • Employers • State • Total <p>Actuarially Sound Rate (funds normal cost and amortizes unfunded accrued liability over 31 years, per Section 811.006 of the Texas Government Code)</p> <ul style="list-style-type: none"> • Current valuation date • Projected for 2022-23 Biennium 	FY 2020 9.50% 0.50% 9.50% <hr/> 19.50% 23.26% 23.97%	FY 2019 9.50% 0.50% 9.50% <hr/> 19.50% 23.12% 22.97%
Assets <ul style="list-style-type: none"> • Market value (MVA) • Actuarial value (AVA) • Return on market value (gross) • Return on market value (net) • Return on actuarial value 	\$ 27,351,224,157 \$ 28,060,120,223 3.04% 3.00% 6.9%	\$ 27,753,334,784 \$ 27,359,943,116 9.58% 9.54% 7.9%
Actuarial Information on AVA (smoothed) <ul style="list-style-type: none"> • Normal cost % • Total normal cost • Actuarial accrued liability • Unfunded actuarial accrued liability (UAAL) • Funded ratio • Funding period (years) 	13.76% \$ 961,077,754 \$ 39,801,358,678 \$ 11,741,238,455 70.5% Never	13.86% \$ 952,997,927 \$ 38,989,263,562 \$ 11,629,320,446 70.2% Never
Actuarial Information on MVA <ul style="list-style-type: none"> • Unfunded actuarial accrued liability (UAAL) • Funded ratio • Funding period (years) 	\$ 12,450,134,521 68.7% Never	\$ 11,235,928,778 71.2% Never

The following chart illustrates the recent history and outlook of the funded status of ERS over the next five years:



August 31,	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Funded Ratio	76.3%	75.2%	70.1%	70.2%	70.5%	69.7%	68.8%	67.9%	67.0%	66.5%
UAAL (in billions)	\$8.0	\$8.7	\$11.3	\$11.6	\$11.7	\$12.4	\$13.2	\$13.9	\$14.7	\$15.3
ASC	19.62%	19.88%	23.21%	23.12%	23.26%	23.51%	23.74%	23.97%	24.20%	24.29%

The projections beyond 2019 are based on the same assumptions, methods and provisions used for the August 31, 2019 valuation, which include the notable across-the-board pay increases budgeted by the State Legislature when they are granted. Additionally, the market value of assets is expected to earn 7.5% per year.

It is important to understand that the currently scheduled contributions are not expected to accumulate sufficient assets in order to pay all of the currently scheduled benefits when due. Based on current expectations and assumptions, ERS is projected to have money in the trust fund until the year 2075. After which, the funding would revert to a pay-as-you-go status. **When ERS reverts to a pay-as-you-go status, the required Legislative appropriation for ERS will immediately quadruple (i.e., increase by 4 times), and remain at that level, in order to ensure all retirees continue to receive their promised benefit.** This time could come even sooner. Based on volatility in the financial markets, there is a 40% probability of assets being depleted by 2060, which is only 40 years away, and a 25% probability of being depleted by 2050, which is only 30 years away. Both of these timeframes are within the current generation of members.

Given this outlook, we recommend the Legislature increase the contribution rates to ERS. Each successive biennium that ERS receives the currently scheduled contribution rates, the unfunded actuarial accrued liability (UAAL) is projected to increase by approximately \$1.0 billion and the ASC is projected to increase by approximately 0.20% of payroll resulting strictly from a deficiency in contributions.

SECTION B

DISCUSSION

Discussion

Introduction

The results of the August 31, 2019 actuarial valuation of the Employees Retirement System of Texas (ERS) are presented in this report.

The primary purposes of this actuarial valuation report are to determine the adequacy of the current State and employer contribution rates, describe the current financial condition of ERS, analyze the changes in the condition of ERS, and provide various summaries of the data.

The total contribution rate for the current fiscal year exceeds the normal cost by 5.74% of payroll, which, on both an actuarial and market value of assets basis, is not sufficient to amortize the unfunded liability over a finite period of time. Based on current expectations and assumptions, ERS is expected to remain solvent until the year 2075, after which the funding would revert to a pay-as-you-go status.

All of the tables referenced in the following discussion appear in Section C of this report.

Plan Provisions

House Bill 2384 restructured the compensation and retirement benefits for State judges. This restructuring impacted the compensation used to determine benefits upon retirement for Elected Class members. There were no other changes to the plan provisions during the past year. The current plan provisions are outlined in Section E of this report.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016. We believe the assumptions are internally consistent and are reasonable, based on the actual experience of ERS.

House Bill 2384 also prompted a change to the long term growth assumption for the State base salary of a district judge from 2.75% to 2.50%. All other assumptions and methods are the same as the prior valuation.

The actuarial valuation as of August 31, 2019 incorporates the notable across-the-board pay increases budgeted by the State Legislature when they are granted for the current biennium. Specifically, employees were assumed to receive no across-the-board increase on September 1, 2019 or September 1, 2020.

The results of the actuarial valuation are dependent upon 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. A review of the impact of a different set of assumptions on the funded status of ERS is outside the scope of this actuarial valuation.

The current actuarial assumptions and methods are outlined in Section F of this report.

Funding Adequacy

The Board of Trustees of ERS approved the Pension Funding Priorities and Guidelines on May 23, 2018. For the Board, adoption of this policy was intended to:

- enhance communications and provide transparency to the Legislature and plan members and retirees regarding Board of Trustees' positions on plan funding strategy;
- provide policy guidance to current and future Boards; and
- ensure that legislators, elected officials and other stakeholders have clear and accurate information about the Trust's funding goals and the needs of the Board in supporting sound fiduciary investment decisions in accordance with Texas Government Code Section 815.106.

This policy also stated that the main objective of ERS' retirement programs is to fully fund the long-term cost of benefits provided by statute, through disciplined and timely accumulation of contributions and prudent investment of assets to deliver earned benefits on a continuing basis. In support of this objective, the policy laid out a multi-level funding period goal to gradually achieve funding on sound actuarial principles:

1. Avoid trust fund depletion of the pre-funded plans,
2. Meet current statutory standard of a 31-year funding period for unfunded liabilities, per Texas Government Code Sections 811.006 and 840.106, and
3. Match funding period to the average years of service at retirement once a 31-year funding period is achieved, and closed.

The member contribution rates are established by State statute and the State contribution rate is set by State statute and legislative appropriation. Members contribute 9.50% of payroll, the State is scheduled to contribute 9.50% of payroll through direct appropriations, and state agencies contribute an additional 0.50% of payroll, resulting in total contributions of 19.50% of payroll for the current biennium. The long-term State contribution rates are subject to future legislative appropriations.

The unfunded actuarial accrued liability (UAAL) of ERS increased from \$11.6 billion as of August 31, 2018 to \$11.7 billion as of August 31, 2019. However, the funded ratio of ERS—actuarial value of assets divided by the actuarial accrued liability—increased from 70.2% to 70.5% as of August 31, 2019. This increase in the funded ratio was due to the absence of across-the-board pay increases budgeted by the State Legislature for the current biennium. The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

The valuation shows that the total normal cost for funding purposes is 13.76% of payroll. The total contribution rate is currently 19.50% of payroll. Thus, the total contribution rate for the current fiscal year exceeds the normal cost by 5.74% of payroll which will be available to amortize the unfunded liability. As the number of members eligible for the newest benefit provisions increases over time, the normal cost rate is expected to decrease, and the amount available to amortize the unfunded liability will increase as a percentage of payroll. However, the projected contributions are not expected to be sufficient to eliminate the unfunded liability over a finite period of time. Assuming the market value of assets earns 7.50% per year, ERS is projected to remain solvent until the year 2075, after which the funding would revert to a pay-

as-you-go status. **As a result, the first level of the Board's funding period goal is not currently being realized.**

The second level of the Board's funding period goal is to fund the sum of the normal cost and the amount necessary to amortize any unfunded actuarial accrued liability over a period that does not exceed 30 years by one or more years. Further, Section 811.006 of the Texas Government Code limits the modifications to ERS that would, essentially, increase benefits or lower contributions to the trust unless the current level of benefits and contributions are expected to amortize any unfunded actuarial accrued liability over a period that does not exceed 30 years by one or more years. In this context, the Actuarially Sound Contribution (ASC) rate is the contribution rate that meets this standard. Based on the actuarial valuation as of August 31, 2019, the ASC rate for ERS is 23.26% of payroll. **Based on the total contribution rate of 19.50% of payroll, the second level of the Board's funding period goal is also not currently being realized.**

The ASC is currently calculated based on a 31-year open amortization period. This means that the ASC will always be calculated with the same 31-year period and the UAAL would never completely be eliminated. We recommend that the Board seek a plan funding strategy that meets the third level of the Board's funding period goal or meets an ultimate goal of eliminating the UAAL by a certain date.

System Assets

This report contains several tables that summarize key information with respect to the ERS assets.

The total market value of assets decreased from \$27.8 billion to \$27.4 billion as of August 31, 2019. Table 5 reconciles the changes in the fund during the year. Total contributions increased slightly from \$1,381 million to \$1,407 million.

Table 6 shows the development of the Actuarial Value of Assets (AVA). The current AVA method recognizes each year's gain or loss over a closed five year period and allows for direct offsetting of gains and losses. The AVA increased from \$27.4 billion to \$28.1 billion as of August 31, 2019.

When measured on a market value, the approximate gross investment return for the fiscal year ending August 31, 2019 was 3.04%, and the return net of investment expenses was 3.00%. When measured on an actuarial value, the net investment return was 6.9%. Table 7 shows a history of return rates. The ERS ten-year average market return, gross of all expenses as reported by the ERS Master Trust Custodian, is 8.20%. The ten-year average return net of investment expenses is 8.09%.

Table 8 provides a history of the contributions paid into ERS and the administrative expenses and benefit payments that have been paid out of ERS. This table shows that ERS paid administrative expenses and benefit payments, in excess of contributions received, of \$1,049 million (or 3.8% of assets) in fiscal year 2018 and the amount was \$1,161 million (or 4.2% of assets) in fiscal year 2019. ERS should continue to monitor this deficit as it could impact the future liquidity needs of ERS. Table 11 provides a history of contribution rates, as a percent of payroll, paid into the trust by the State, agencies, and members. This table also shows a history of the total normal cost and the Actuarially Sound Contribution (ASC).

Data

The valuation was based upon information as of August 31, 2019, furnished by ERS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ERS staff.

The tables in Section G show key census statistics for the various groups included in the valuation.

SECTION C

TABLES

Table 1

Development of Employer Cost

	<u>August 31, 2019</u>	<u>August 31, 2018</u>
1. Payroll		
a. Reported Payroll (August Payroll of Active Members)	\$ 6,982,529,997	\$ 6,875,886,920
b. Valuation Payroll (Expected Covered Payroll for Following Plan Year)	6,984,576,697	6,875,886,920
2. Total Normal Cost Rate		
a. Gross normal cost rate	13.43%	13.53%
b. Administrative expenses	0.33%	0.33%
c. Total (Item 2a + Item 2b)	13.76%	13.86%
3. Actuarial Accrued Liability for Active Members		
a. Present value of future benefits for active members	\$ 20,878,202,583	\$ 21,310,291,435
b. Less: present value of future normal costs	(6,487,065,490)	(6,505,985,620)
c. Actuarial accrued liability	\$ 14,391,137,093	\$ 14,804,305,815
4. Total Actuarial Accrued Liability for:		
a. Retirees and beneficiaries	\$ 23,686,007,554	\$ 22,527,977,524
b. Inactive members	1,724,214,031	1,656,980,223
c. Active members (Item 3c)	14,391,137,093	14,804,305,815
d. Total	\$ 39,801,358,678	\$ 38,989,263,562
5. Actuarial Value of Assets	\$ 28,060,120,223	\$ 27,359,943,116
6. Unfunded Actuarial Accrued Liability (UAAL) (Item 4d - Item 5)	\$ 11,741,238,455	\$ 11,629,320,446
7. Contribution Rate Needed to Fund Normal Cost Plus Amortize the UAAL Over 31 Years	23.26%	23.12%
8. Allocation of Contribution Rate		
a. Combined State and employer rates	10.00%	10.00%
b. Member rate	9.50%	9.50%
c. Total contribution rate	19.50%	19.50%
d. Total normal cost rate	13.76%	13.86%
e. Available contribution rate to amortize UAAL	5.74%	5.64%
f. Total contribution rate	19.50%	19.50%
9. Funding period based on statutory contribution rates and Actuarial Value of Assets (years)	Never	Never

Table 2
Actuarial Present Value of Future Benefits

	<u>August 31, 2019</u>	<u>August 31, 2018</u>
1. Active Members		
a. Service Retirement	\$ 18,826,885,220	\$ 19,275,714,515
b. Disability Benefits	164,793,909	165,410,881
c. Death Before Retirement	241,503,386	246,210,737
d. Termination	<u>1,645,020,068</u>	<u>1,622,955,302</u>
e. Total	\$ 20,878,202,583	\$ 21,310,291,435
2. Inactive Members	\$ 1,724,214,031	\$ 1,656,980,223
3. Annuitants	\$ 23,686,007,554	\$ 22,527,977,524
4. Total Actuarial Present Value of Future Benefits	\$ 46,288,424,168	\$ 45,495,249,182

Table 3

Analysis of Normal Cost

	August 31, 2019	August 31, 2018
1. Gross Normal Cost Rate		
a. Service Retirement	9.56%	9.64%
b. Disability Benefits	0.14%	0.14%
c. Death Before Retirement	0.18%	0.18%
d. Termination	3.55%	3.57%
e. Total	13.43%	13.53%
2. Administrative Expenses	0.33%	0.33%
3. Total Normal Cost	13.76%	13.86%
4. Less: Member Rate	9.50%	9.50%
5. Employer Normal Cost Rate	4.26%	4.36%

Table 4
Historical Summary of Active Member Data

Valuation as of August 31,	Active Members		Covered Payroll		Average Salary		Average Age	Average Service
	Number	Percent Increase	Amount in \$ Millions	Percent Increase	\$ Amount	Percent Increase		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2008	134,626	N/A	5,313	N/A	39,468	N/A	43.7	9.4
2009	141,223	4.9%	5,677	6.8%	40,202	1.9%	43.6	9.2
2010	142,490	0.9%	5,845	3.0%	41,022	2.0%	43.8	9.2
2011	137,293	-3.6%	5,714	-2.2%	41,620	1.5%	44.1	9.5
2012	132,669	-3.4%	5,597	-2.0%	42,188	1.4%	44.3	9.7
2013	133,669	0.8%	5,689	1.7%	42,564	0.9%	44.3	9.6
2014	134,162	0.4%	5,953	4.6%	44,374	4.3%	44.3	9.4
2015	142,409	6.1%	6,407	7.6%	44,990	1.4%	43.6	8.8
2016	146,390	2.8%	6,806	6.2%	46,495	3.3%	43.3	8.5
2017	141,629	-3.3%	6,796	-0.2%	47,986	3.2%	43.6	8.7
2018	141,535	-0.1%	6,876	1.2%	48,581	1.2%	43.6	8.6
2019	141,865	0.2%	6,983	1.6%	49,220	1.3%	43.5	8.4

Table 5 Reconciliation of Plan Net Assets

	Year Ending	
	August 31, 2019 (1)	August 31, 2018 (2)
1. Market value of assets at beginning of year	\$ 27,753,334,784	\$ 26,371,827,298
2. Revenue for the year		
a. Contributions for the year		
i. State (including membership fees)	\$ 712,647,639	\$ 697,189,414
ii. Member (including penalty interest)	694,788,598	683,932,829
iii. Total	<u>\$ 1,407,436,237</u>	<u>\$ 1,381,122,243</u>
b. Net investment income	\$ 758,466,709	\$ 2,430,297,025
c. Total revenue	\$ 2,165,902,946	\$ 3,811,419,268
3. Disbursements for the year		
a. Benefit payments and refunds	2,616,741,786	\$ 2,479,475,003
b. Net transfers from TRS	(76,479,829)	(73,113,185)
c. Administrative expenses	27,751,616	23,549,964
d. Total expenditures	<u>2,568,013,573</u>	<u>2,429,911,782</u>
4. Increase in net assets (Item 2c - Item 3d)	\$ (402,110,627)	\$ 1,381,507,486
5. Market value of assets at end of year (Item 1 + Item 4)	\$ 27,351,224,157	\$ 27,753,334,784

Table 6

Development of Actuarial Value of Assets

	Year Ending August 31, 2019
1. Market value of assets at beginning of year	\$ 27,753,334,784
2. Net new investments	
a. Contributions for the year (Table 5)	\$ 1,407,436,237
b. Disbursements for the year (Table 5)	(2,568,013,573)
c. Subtotal	(1,160,577,336)
3. Market value of assets at end of year	\$ 27,351,224,157
4. Net earnings (Item 3 - Item 1 - Item 2)	\$ 758,466,709
5. Assumed investment return rate for fiscal year	7.50%
6. Expected return	\$ 2,037,978,459
7. Excess return (Item 4 - Item 6)	\$ (1,279,511,750)
8. Development of amounts to be recognized as of August 31, 2019:	

Fiscal Year End	Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
	(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
2015	\$ 0	\$ 0	\$ 0	1	\$ 0	\$ 0
2016	0	0	0	2	0	0
2017	0	0	0	3	0	0
2018	393,391,668	(393,391,668)	0	4	0	0
2019	(1,279,511,750)	393,391,668	(886,120,082)	5	(177,224,016)	(708,896,066)
Total	\$ (886,120,082)	\$ 0	\$ (886,120,082)		\$ (177,224,016)	\$ (708,896,066)

9. Actuarial value of assets as of August 31, 2019 (Item 3 - Item 8, Column 6)	\$ 28,060,120,223
10. Ratio of actuarial value to market value	102.6%

Table 7
History of Investment Return Rates

Year Ending August 31 of	Market Returns (Gross)	Market Returns (Net)	Actuarial
(1)	(2)	(3)	(4)
1998	8.30%	8.23%	11.5%
1999	16.26%	16.46%	12.5%
2000	9.43%	9.40%	11.8%
2001	-6.91%	-6.93%	7.6%
2002	-7.17%	-7.21%	4.7%
2003	9.20%	9.14%	5.4%
2004	11.69%	11.64%	6.4%
2005	12.71%	12.62%	7.5%
2006	8.83%	8.76%	7.7%
2007	13.88%	13.76%	8.6%
2008	-4.58%	-4.69%	5.7%
2009	-6.60%	-6.71%	3.2%
2010	6.65%	6.48%	3.6%
2011	12.58%	12.36%	5.0%
2012	8.22%	8.04%	5.4%
2013	10.07%	9.87%	6.1%
2014	14.70%	14.58%	7.6%
2015	0.49%	0.44%	6.1%
2016	5.32%	5.28%	5.9%
2017	12.15%	12.11%	2.8%
2018	9.58%	9.54%	7.9%
2019	3.04%	3.00%	6.9%
Average Returns			
Last Five Years:	6.03%	5.99%	5.9%
Last Ten Years:	8.20%	8.09%	5.7%
Last Fifteen Years:	6.94%	6.84%	6.0%
Last Twenty Years:	5.92%	5.83%	6.3%

Market returns provided by ERS Master Trust Custodian.

Rates in Column (2) represent the market returns gross of all expenses.

Rates in Column (3) represent the market returns net of investment expenses.

Net returns may exceed gross returns in years where adjustments are made to fee expenses.

Table 8
History of Cash Flow

Year Ending August 31,	Distributions and Expenditures				External Cash Flow for the Year	Market Value of Assets	External Cash Flow as Percent of Market Value
	Contributions	Benefit Payments and Refunds	Administrative Expenses	Total			
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)
2007	\$ 657.7	\$ (1,333.2)	\$ (16.0)	\$ (1,349.2)	\$ (691.5)	\$ 23,480	-2.9%
2008	678.8	(1,383.9)	(16.2)	(1,400.1)	(721.3)	21,464	-3.4%
2009	716.1	(1,449.0)	(17.3)	(1,466.3)	(750.2)	19,098	-3.9%
2010	810.4	(1,512.4)	(19.0)	(1,531.4)	(721.0)	19,581	-3.7%
2011	839.9	(1,612.5)	(18.8)	(1,631.3)	(791.4)	21,204	-3.7%
2012	758.1	(1,733.7)	(17.8)	(1,751.5)	(993.4)	21,826	-4.6%
2013	798.3	(1,834.4)	(18.7)	(1,853.1)	(1,054.8)	22,869	-4.6%
2014	912.8	(1,963.5)	(20.2)	(1,983.7)	(1,070.9)	25,050	-4.3%
2015	962.6	(2,049.3)	(21.8)	(2,071.1)	(1,108.5)	23,998	-4.6%
2016	1,361.4	(2,147.3)	(20.4)	(2,167.7)	(806.3)	24,466	-3.3%
2017	1,385.5	(2,288.8)	(23.1)	(2,311.9)	(926.4)	26,372	-3.5%
2018	1,381.1	(2,406.4)	(23.5)	(2,429.9)	(1,048.8)	27,753	-3.8%
2019	1,407.4	(2,540.3)	(27.7)	(2,568.0)	(1,160.6)	27,351	-4.2%

Dollar amounts in millions

Table 9

Total Experience Gain or Loss

Item (1)	Year Ending August 31, 2019 (2)	Year Ending August 31, 2018 (3)
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	\$ 11,629,320,446	\$ 11,257,958,076
2. Normal cost for the year (excluding administrative expenses)	930,307,500	925,646,023
3. Actual administrative expenses	27,751,616	23,549,964
4. Contributions for the year (excluding service purchases)	(1,366,868,178)	(1,338,470,431)
5. Interest at 7.5%		
a. On UAAL	\$ 872,199,033	\$ 844,346,856
b. On normal cost and administrative expenses	35,927,217	35,594,850
c. On contributions	(51,257,557)	(50,192,641)
d. Total	<u>\$ 856,868,693</u>	<u>\$ 829,749,065</u>
6. Assumption change (Gains)/Losses	\$ (9,971,397)	\$ 0
7. Legislative changes*		
– Across-the-board pay increases budgeted for upcoming biennium by the State Legislature	(565,155,584)	0
8. Expected UAAL (Sum of Items 1 through 7)	11,502,253,096	11,698,432,697
9. Actual UAAL	11,741,238,455	11,629,320,446
10. Total (gain)/loss for the year (Item 9 - Item 8)	\$ 238,985,359	\$ (69,112,251)
B. Source of gains and losses		
	% of AAL	
11. Asset (Gain)/Loss for the year	0.37%	(98,347,917)
12. Pay Increases (Less)/Greater than Expected	0.25%	75,386,426
13. Non-Retired Demographic (Gains)/Losses	0.02%	10,285,236
14. Post-Retirement Mortality (Gains)/Losses	0.05%	(30,464,390)
15. Other Demographic (Gains)/Losses	0.00%	<u>(25,971,606)</u>
16. Total (Sum of Items 11 through 15)	0.60%	\$ (69,112,251)

* The plan experiences a (gain)/loss when across-the-board pay increases budgeted by the State Legislature are (less)/greater than assumed.

Table 10 Solvency Test

Actuarial Accrued Liability and Percent of Active Member Payroll for:

August 31,	Accumulated Member Contributions Including Interest		Retirees and Beneficiaries Currently Receiving Benefits		Employer Financed Portion of Vested and Nonvested Benefits		Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Assets		
	(1)	% of Payroll	(2)	% of Payroll	(3)	% of Payroll		(1)	(2)	(3)
2007	\$ 4,059.7	77%	\$ 11,519.9	219%	\$ 8,407.5	160%	\$ 22,938.9	100%	100%	88%
2008	4,256.2	79%	12,195.8	227%	8,951.2	166%	23,511.9	100%	100%	79%
2009	4,460.6	77%	12,648.2	218%	9,799.0	169%	23,509.6	100%	100%	65%
2010	4,719.7	80%	13,407.8	226%	10,284.3	173%	23,628.6	100%	100%	54%
2011	4,943.7	85%	14,325.2	247%	9,781.3	169%	23,997.4	100%	100%	48%
2012	5,075.2	89%	15,244.0	269%	9,658.0	170%	24,272.5	100%	100%	41%
2013	5,201.0	91%	16,148.2	284%	10,536.8	185%	24,667.6	100%	100%	31%
2014	5,213.6	88%	17,113.9	287%	10,597.2	178%	25,431.9	100%	100%	29%
2015	5,235.1	82%	18,080.0	282%	10,553.3	165%	25,850.5	100%	100%	24%
2016	5,509.4	81%	19,018.0	279%	10,775.8	158%	26,557.1	100%	100%	19%
2017	5,709.1	84%	21,378.8	315%	10,541.9	155%	26,371.8	100%	97%	0%
2018	5,897.5	86%	22,528.0	328%	10,563.8	154%	27,359.9	100%	95%	0%
2019	6,044.4	87%	23,686.0	339%	10,070.9	144%	28,060.1	100%	93%	0%

Note : Dollar amounts in millions

Table 11 Historical Contribution Rates

Actuarial Valuation as of August 31,	Contributions from:				Total Normal Cost Rate	ASC *
	State	Agency	Members	Total		
1998	6.00%	0.00%	6.00%	12.00%	11.86%	Not calculated
1999	6.00%	0.00%	6.00%	12.00%	12.33%	Not calculated
2000	6.00%	0.00%	6.00%	12.00%	12.41%	Not calculated
2001	6.00%	0.00%	6.00%	12.00%	12.67%	Not calculated
2002	6.00%	0.00%	6.00%	12.00%	12.71%	Not calculated
2003	6.00%	0.00%	6.00%	12.00%	12.26%	12.82%
2004	6.00%	0.00%	6.00%	12.00%	12.45%	13.12%
2005	6.45%	0.00%	6.00%	12.45%	12.28%	13.59%
2006	6.45%	0.00%	6.00%	12.45%	11.98%	13.20%
2007	6.45%	0.00%	6.00%	12.45%	11.98%	13.10%
2008	6.45%	0.00%	6.00%	12.45%	13.37%	15.45%
2009 **	6.78%	0.00%	6.48%	13.26%	12.38%	15.84%
2010	6.95%	0.00%	6.50%	13.45%	12.30%	17.07%
2011	6.00%	0.00%	6.50%	12.50%	12.31%	17.47%
2012	6.50%	0.00%	6.50%	13.00%	12.31%	18.25%
2013	7.50%	0.50%	6.60%	14.60%	11.57%	18.73%
2014	7.50%	0.50%	6.90%	14.90%	11.58%	18.76%
2015	9.50%	0.50%	9.50%	19.50%	12.27%	19.62%
2016	9.50%	0.50%	9.50%	19.50%	12.28%	19.88%
2017	9.50%	0.50%	9.50%	19.50%	13.95%	23.21%
2018	9.50%	0.50%	9.50%	19.50%	13.86%	23.12%
2019	9.50%	0.50%	9.50%	19.50%	13.76%	23.26%

* The Actuarially Sound Contribution Rate (ASC) is the rate determined as of the valuation date to fund the normal cost and amortize the UAAL over a 31 year period.

** For Fiscal Year 2010, members contributed 6.45% from September through December and 6.50% from January through August. Similarly, the State contributed 6.45% from September through December and 6.95% from January through August.

SECTION D

RISKS ASSOCIATED WITH MEASURING THE ACCRUED LIABILITY AND ACTUARIALLY DETERMINED CONTRIBUTION

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

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 economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. **Other demographic risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The actuarially sound contribution rate may be considered as a minimum contribution rate that complies with State statute. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Currently, this, and other Board funding policy objectives are not being met. Users of this report should be aware that even contributions made at the actuarially sound contribution rate do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Ratio of the market value of assets to total payroll	3.9	4.0	3.9	3.6	3.6	4.1	3.8	3.8	3.7	3.3
Ratio of actuarial accrued liability to payroll	5.7	5.7	5.5	5.2	5.1	5.3	5.4	5.3	5.0	4.8
Ratio of actives to retirees and beneficiaries	1.2	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.8
Ratio of net cash flow to market value of assets	-4.2%	-3.8%	-3.5%	-3.3%	-4.6%	-4.3%	-4.6%	-4.6%	-3.7%	-3.7%
Duration of the actuarial accrued liability*	11.6	11.7								

*Duration measure not available before 2018

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Duration of Actuarial Accrued Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the actuarial accrued liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

SECTION E

SUMMARY OF PLAN PROVISIONS

Summary of Plan Provisions for Employees Retirement System of Texas

Classes of Membership

1. Elected Class Membership:

- a. Membership is optional and limited to:
 - i. Elected State officials not covered by either of the Judicial Retirement Systems
 - ii. Members of the Legislature; and
 - iii. District and Criminal District Attorneys paid by the State general revenue fund.

2. Employee Class Membership:

- a. Membership is mandatory for all employees and appointed officers of every department, commission, board, agency, or institution of the State except for:
 - i. Independent contractors;
 - ii. Persons covered by the Teacher Retirement System or either of the Judicial Retirement Systems; and
 - iii. Employee Class Members already receiving retirement benefits under the System.
- b. Includes two types of Employee Class service:
 - i. CPO/CO: Certified Peace Officer / Custodial Officer – in general, service rendered while a law enforcement officer, custodial officer, parole officer or caseworker (collectively referred to as “LECOs”); and
 - ii. Regular: Non-CPO/CO service.
- c. Prior to September 1, 2015, membership begins after a 90-day waiting period. Effective September 1, 2015, membership begins immediately.

Member Contributions

1. Elected Class:

- a. *Legislators*:
 - i. *Fiscal year 2015*: 8.00% of compensation
 - ii. *Fiscal year 2016 and beyond*: 9.50% of compensation
- b. *Non-legislators*:
 - ii. *Fiscal year 2015*: 6.90% of compensation
 - iii. *Fiscal year 2016 and beyond*: 9.50% of compensation. Beginning in fiscal year 2018, the 9.50% will be reduced one-tenth of one percent for each one-tenth of one percent that the State contribution rate for the fiscal year to which the service relates is less than the State contribution rate established for the 2017 fiscal year.

2. Employee Class:

- a. *Fiscal year 2015:* 6.90% of compensation
 - b. *Fiscal year 2016 and beyond:* 9.50% of compensation. Beginning in fiscal year 2018, the 9.50% will be reduced one-tenth of one percent for each one-tenth of one percent that the State contribution rate for the fiscal year to which the service relates is less than the State contribution rate established for the 2017 fiscal year.
 - c. Additional member contributions may be allowable for service purchases.
3. Member contributions cease when a member's benefit accrual has reached 100% of Average Monthly Compensation.
4. Member contributions accumulate interest at 5.00% per year through December 31, 2013 and 2.00% interest per year, thereafter.

State of Texas and Employer Contributions

State and employer contributions are set biennially by the legislature. The current projected contribution rates, as a percentage of compensation, are shown below. In addition, the State makes contributions for lump-sum death benefits, establishing service not previously established, and annual membership fees. State payroll contributions cease when a member's benefit accrual has reached 100% of Average Monthly Compensation.

	FY2015	FY2016 and beyond
Employer (agency appropriations)	0.50%	0.50%
State (statewide appropriations)	7.50%	9.50%

State contributions after the 2021 fiscal year are subject to future legislative appropriations.

Return to Work Surcharge

For members who, on or after September 1, 2009, retire from the employee class and are rehired as a retiree into a position that would otherwise include membership in the employee class, the department or agency that employs the member must remit to the retirement system an amount equal to the amount of the State contribution that the department or agency would remit for an active member employed in the person's position.

Compensation

Compensation includes base salary, longevity and hazardous duty pay and excludes overtime pay. This amount is limited by Section 401(a)(17) of the Internal Revenue Code for members hired after August 31, 1996.

Average Monthly Compensation (AMC)

1. Elected Class Service:

- a. *Elected class members other than district attorneys or criminal district attorneys:* The State base salary, excluding longevity pay, of a district judge, as adjusted from time to time.
- b. *District attorneys and criminal district attorneys:* The State salary, excluding longevity pay, of a district judge of the same number of years of service credit as the member on the member's last day of service as a district or criminal district attorney, as adjusted from time to time.

2. Employee Class Service:

- a. *Members hired prior to September 1, 2009:* Average of the 36 highest months of compensation for service in the employee class of membership
- b. *Members hired on or after September 1, 2009 and prior to September 1, 2013:* Average of the 48 highest months of compensation for service in the employee class of membership
- c. *Members hired on or after September 1, 2013:* Average of the 60 highest months of compensation for service in the employee class of membership

Creditable Service

The types of service creditable in ERS are membership service, military service and equivalent membership service. Equivalent membership service includes: previously cancelled service, service not previously established, waiting period service, and Additional Service Credit.

Unused Sick and Annual Leave

In many cases, unused sick and annual leave can be used to establish Creditable Service. Members hired prior to September 1, 2009 can use unused sick and annual leave to satisfy service requirements for Retirement and Death Benefit Plan eligibility as well as to calculate plan benefits. Members hired on or after September 1, 2009 can only use unused sick and annual leave to calculate plan benefits. However, members hired on or after September 1, 2013 cannot use unused annual leave to calculate plan benefits if the member opts to receive the unused annual leave as a lump-sum payment. Creditable Service in the Elected Class is not granted for unused sick and annual leave.

Standard Service Retirement Annuity

1. Elected Class:

- a. *Eligibility:*
 - i. Age 60 and eight years of elected class service; or
 - ii. Age 50 and 12 years of elected class service.
- b. *Benefits:* 2.3% of AMC times years of Creditable Service, adjusted automatically based on the State base salary of a district judge. Alternatively, an elected class member may elect to transfer their elected class service to the employee class in order to have their AMC based on actual compensation. However, if the elected service is transferred to the employee class, the member forfeits increases based on changes in the State base salary of a district judge unless the service is transferred back to the elected class.

2. Employee Class:

a. *Eligibility:*

- i. Members hired prior to September 1, 2009: Age 60 with five years of employee class service;
- ii. Members hired on or after September 1, 2009: Age 65 with 10 years of employee class service;
- iii. Five years of service and age plus employee class service is at least 80 (Rule of 80)
- iv. Age 55 with 10 years of CPO/CO service
- v. Any age with 20 years of CPO/CO service

b. *Benefits:* 2.3% of AMC times years of Creditable Service

c. *Applicable Reductions for eligibilities 2.a.iii. and 2.a.iv.:*

- i. For members hired prior to September 1, 2009, none.
- ii. For members hired on or after September 1, 2009, but prior to September 1, 2013, reduced five percent for each year the member retires prior to age 60, with a maximum possible reduction of 25 percent.
- iii. For members hired on or after September 1, 2013, reduced five percent for each year the member retires prior to age 62, with no maximum possible reduction.

d. *Applicable Reductions for eligibility 2.a.v.:*

- i. For members hired prior to September 1, 2009, retiring after attaining age 50 or after attaining Rule of 80, there is no reduction. Otherwise, the member receives the percentage of the benefit stated in the following table:

Attained Age at Retirement	Reduction Percentage	Attained Age at Retirement	Reduction Percentage
36	31.2%	43	55.3%
37	33.9%	44	60.1%
38	36.7%	45	65.3%
39	39.8%	46	71.1%
40	43.2%	47	77.3%
41	46.9%	48	84.2%
42	50.9%	49	91.7%

- ii. For members hired after on or after September 1, 2009, but prior to September 1, 2013, reduced five percent for each year the member retires prior to age 55, with a maximum possible reduction of 25 percent.
- iii. For members hired on or after September 1, 2013, reduced five percent for each year the member retires prior to age 57, with no maximum possible reduction.

3. Normal Form of Payment: Payable for the life of the member with any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Standard Non-Occupational Disability Annuity

1. Elected Class:
 - a. *Eligibility*:
 - i. 8 years of elected class service; or
 - ii. 6 years of elected class service plus 2 years of pre-1978 military service; and
 - iii. Not eligible for a Standard Service Retirement Annuity.
 - b. *Benefits*: 2.3% of AMC times years of Creditable Service, adjusted automatically based on the State base salary of a district judge.
2. Employee Class:
 - a. *Eligibility*:
 - i. 10 years of employee class service; and
 - ii. Not eligible for a Standard Service Retirement Annuity on the basis of Rule of 80 or age 55 and 10 years of CPO/CO Service.
 - b. *Benefits*: 2.3% of AMC times years of Creditable Service
 - c. *Applicable Reductions*: Actuarially reduced from the age that the member would have been eligible for Standard Service Retirement Annuity
3. Normal Form of Payment: Annuity payable for life or until member is no longer incapacitated for the performance of duty. Any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Standard Occupational Disability Annuity

1. Elected Class:
 - a. *Eligibility*: Disability as a direct result of some risk or hazard inherent to employment
 - b. *Benefits*: 2.3% of AMC times years of Creditable Service, but not less than 18.4% of AMC, adjusted automatically based on the State base salary of a district judge
2. Employee Class (Regular State Employees):
 - a. *Eligibility*: Disability as a direct result of some risk or hazard inherent to employment
 - b. *Benefits*: 2.3% of AMC times years of Creditable Service, but not less than 35% of AMC

3. Employee Class (LECO Members):

a. *Eligibility:* Disability as a direct result of some risk or hazard inherent to law enforcement or custodial duties

i. Total: Incapable of substantial gainful activity and eligible for Social Security disability benefits

ii. Non-total: Does not satisfy definition of Total Disability

b. *Benefits:*

i. Non-total with less than 20 years of CPO/CO Service: 2.3% of AMC times years of Creditable Service, but not less than 50% of AMC. 15% of AMC payable from LECOSRF and the remaining 35% of AMC is payable from the ERS trust

ii. Non-total with 20 years of CPO/CO Service: 2.3% of AMC times years of Creditable Service

iii. Total: 2.3% of AMC times years of Creditable Service, but not less than 35% of AMC

4. Normal Form of Payment: Annuity payable for life or until member is no longer incapacitated for the performance of duty. Any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Occupational Disability Lump-Sum Death Benefit

If a member receiving an occupational disability retirement annuity dies and it is determined that the death was an occupational death, a lump-sum death benefit is payable in an amount equal to one year's salary, computed on the basis of the retiree's rate of compensation at the time of disability retirement, and payable to a surviving spouse or dependent minor child.

Death Benefit Plan (DBP) Annuity

1. Eligibility:
 - a. 10 years of employee class service; or
 - b. Eligible for Standard Service Retirement Annuity at time of death.
2. Benefits: Benefits are calculated as if the member had elected an optional form of payment, received a standard service retirement annuity, and died immediately thereafter. If the member dies before becoming eligible for the Standard Service Retirement Annuity, the benefit is reduced for early retirement as follows:
 - a. With 12 years of elected class service, the benefit is actuarially reduced from the member's age 50,
 - b. With 10 years of CPO/CO service, the benefit is actuarially reduced from the member's age 55,
 - c. With five years of employee class service for members hired before September 1, 2009 or eight years of elected class service, the benefit is actuarially reduced from the member's age 60, and
 - d. With 10 years of employee class service for members hired on or after September 1, 2009, the benefit is actuarially reduced from the member's age 65.

Pre-Retirement Death Refund Alternative

A refund of accumulated contributions is payable in cases of pre-retirement death where the member did not meet the eligibility requirements for a Death Benefit Plan Annuity, or the eligible beneficiary chooses to receive a refund of the member account balance in lieu of an annuity. This amount is increased by 5% of the member's account balance at death, times full years of service credit at death, to a maximum of 100%.

Occupational Death Lump-Sum Benefit

If an active member dies and it is determined that the death was an occupational death, a lump-sum death benefit is payable in an amount equal to one year's salary, computed on the basis of the member's rate of compensation at the time of death and payable to a surviving spouse or dependent minor child in addition to any other death benefits.

Post-Retirement Death General Lump-Sum Benefit

\$5,000 upon the death of a retired member. This amount is funded separately by the State and not reflected in this valuation.

Deferred Service Retirement Annuity

1. Elected Class:
 - a. *Eligibility*: Eight years of elected class service
 - b. *Benefits*: Standard Service Retirement Annuity payable at age 60 (or 50 with 12 years of elected class service)
2. Employee Class:
 - a. *Eligibility*:
 - i. Members hired prior to September 1, 2009: Five years of employee class service
 - ii. Members hired on or after September 1, 2009: 10 years of employee class service
 - b. *Benefits*:
 - i. For members hired prior to September 1, 2009: Standard Service Retirement Annuity payable at age 60
 - ii. For members hired on or after September 1, 2009: Standard Service Retirement Annuity payable at age 65
 - iii. For members with 10 years of CPO/CO service: Standard Service Retirement Annuity payable at age 55
3. Normal Form of Payment: Payable for the life of the member with any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Refund of Accumulated Contributions

A refund of accumulated contributions is payable in cases where a terminated member did not meet the eligibility requirements for an annuity, or a terminated member chooses to receive a refund of his or her account balance in lieu of an annuity.

Maximum Benefits

Annuity benefits are limited to 100% of Average Monthly Compensation. For members with CPO/CO service, this benefit limitation includes benefits from all sources (ERS and the Law Enforcement and Custodial Officer Supplemental Retirement Fund).

Limit on Plan Modifications

According to Section 811.006 of the Texas Government Code – a rate of member or State contributions to or a rate of interest required for the establishment of credit in the retirement system may not be reduced or eliminated, a type of service may not be made creditable in the retirement system, a limit on the maximum permissible amount of a type of creditable service may not be removed or raised, a new monetary benefit payable by the retirement system may not be established, and the determination of the amount of a monetary benefit from the system may not be increased, if, as a result of the particular action, the time, as determined by an actuarial valuation, required to amortize the UAAL of the retirement system would be increased to a period that exceeds 30 years by one or more years.

SECTION F

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016.

I. Valuation Date

The valuation date is August 31 of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

The actuarial valuation is used to determine the adequacy of the State contribution rate (established by Legislative appropriation) and employer contribution rate (established by statute) and to describe the current financial condition of ERS.

The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the first step is to determine the contribution rate (level as a percentage of pay) required to provide the benefits to each member, or the normal cost rate. The normal cost rate consists of two pieces: (i) the member's contribution rate, and (ii) the remaining portion of the normal cost rate which is the employer's normal cost rate. The total normal cost rate is based on the benefits payable to each individual active member.

The Unfunded Actuarial Accrued Liability (UAAL) is the liability for future benefits which is in excess of (i) the actuarial value of assets, and (ii) the present value of future normal costs. The employer contribution provided in excess of the employer normal cost is applied to amortize the UAAL.

The funding period is calculated as the number of years required to fully amortize the UAAL, and is calculated with the use of an open group projection that takes into account: (a) future market earnings, net of investment-related expenses, will equal 7.50% per year, (b) there will be no changes in assumptions, (c) the number of active members will remain unchanged, (d) active members who leave employment will be replaced by new entrants each year, and (e) State and employer contributions will remain the same percentage of payroll as described in Section E of the valuation report.

The Entry Age actuarial cost method is an "immediate gain" method (i.e., experience gains and losses are separately identified as part of the UAAL). However, they are amortized over the same period applied to all other components of the UAAL.

III. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continue to be recognized on their original timeframe. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of investment-related expenses. The actuarial value of assets was reset to be equal to the market value of assets as of August 31, 2017 and the new method will be applied prospectively.

IV. Actuarial Assumptions

Investment Return: 7.50% per year, net of investment-related expenses (composed of an assumed 2.50% inflation rate and a 5.00% real rate of return)

Administrative Expenses: 0.33% of valuation payroll per year

Salary Increases: Inflationary pay increases are assumed to occur at the beginning of the year and the remaining pay increases associated with merit, promotion and longevity are assumed to occur at the middle of the valuation year and vary by employee group. The components of the annual increases are:

Employee Group	Inflation ***	Real Wage Growth (Productivity)	Merit, Promotion and Longevity
Elected Class: Legislators	0%	0%	0%
Elected Class: District Attorneys	2.50%	0%	See salary structure below
Elected Class: Other than Legislators and District Attorneys	2.50%	0%	0%
Employee Class	2.50%	included in Merit, Promotion and Longevity Increases	See sample rates
State Base Salary of a District Judge*	2.50%	0%	0%
Inactive members who transfer to TRS**	2.50%	0%	2.50%

- * Retirees from the Elected Class are assumed to receive post-retirement increases in accordance with changes in the State base salary of a district judge.
- ** Assumed in estimating benefits of former members who transfer to the Teacher Retirement System of Texas (TRS).
- *** Total liabilities for this valuation reflect the notable across-the-board pay increases appropriated by the State legislature for the current biennium compared to the assumed rate of inflation.

Sample Rates:

Annual Salary Increases for Merit, Promotion and Longevity Male and Female Regular State Employees							
Age	Years of Eligibility Service						
	0	1	2 - 4	5 - 9	10 - 14	15 - 19	20+
20	6.80 %	5.25 %	4.75 %	4.30 %			
25	6.40	5.25	4.75	3.50	2.50 %		
30	5.90	5.25	4.75	3.00	2.50	2.00 %	
35	5.40	4.75	4.00	3.00	2.50	2.00	1.90 %
40	4.90	4.75	4.00	3.00	2.50	1.90	1.80
45	4.40	4.25	3.75	3.00	2.40	1.90	1.70
50	3.90	3.70	3.20	2.70	2.20	1.70	1.60
55	3.40	3.20	2.80	2.40	1.90	1.60	1.50
60+	2.90	2.70	2.30	2.00	1.60	1.40	1.30

Annual Salary Increases for Merit, Promotion and Longevity Male and Female LECO Members						
Age	Years of Eligibility Service					
	0	1	2 - 4	5 - 8	9 - 17	18+
All	7.00 %	5.00 %	3.50 %	2.50 %	2.25 %	2.00 %

District attorneys in the Elected Class are assumed to follow the judicial salary schedule of a district judge as prescribed in Section 659.012 of the Texas Government Code. The salary structure is illustrated below:

Annual Salary Increases for Merit, Promotion and Longevity Male and Female District Attorneys in the Elected Class			
Age	Years of Eligibility Service as a District Attorney		
	Less than 4	4 or more, but less than 8	8 or more
All	State base salary of a district judge	110% of base salary	120% of base salary

New Entrant Wage Growth: 3.00% per year, compounded annually (for increasing new hire salary in open group projection).

New Entrant Profile: The average new hire is determined based on a new entrant profile, which is created from the valuation data by determining the entry age and entry pay for anyone with greater than or equal to three but less than eight years of service as of the valuation date. Each group of new hires' salaries is assumed to grow at the New Entrant Wage Growth of 3.00% over the salaries of the previous year's group.

Post-Retirement Increases for Elected Class Members: If benefits are based on the State base salary of a district judge, the benefits are assumed to increase 2.50% per year during retirement (each September 1), compounded annually, consistent with the assumed salary increase for a district judge. Increases are assumed to also occur during deferral periods (if any). Otherwise, no increases are assumed.

Age and Service Assumptions and Methods:

Eligibility Service:

Eligibility Service is considered to be all service eligible for vesting purposes, which includes service earned as a regular State employee, a LECO member, a member of the Elected Class, as State Judge, and service earned in the Teacher Retirement System of Texas (“TRS”).

Benefit Service:

Current Benefit Service in years and months as of the valuation date was provided by ERS. This service plus Future Earned Service, Service Credit at Retirement, and Eligibility Service at Retirement were used to project benefit amounts.

Future Earned Service:

Active members were assumed to earn one additional year of service credit in each future year employed based on their current class of membership (but not beyond the amount of credit needed to provide a 100% of average monthly compensation standard service retirement annuity).

Service Credit at Retirement:

For regular State employees, Benefit Service when eligible for service retirement is assumed to be increased by:

- 1.0 years if age plus service, prior to adjustment, is greater than or equal to 80; and
 - 0.5 years if age plus service, prior to adjustment, is less than 80.
- (but not beyond the amount of credit needed to provide a 100% of average monthly compensation standard service retirement annuity).

For LECO members, Benefit Service when eligible for service retirement is assumed to be increased by:

- 1.0 years if CPO/CO service, prior to adjustment, is at least 20 years; and
- 0.5 years if CPO/CO service, prior to adjustment, is less than 20 years.

(but not beyond the amount of credit needed to provide a 100% of average monthly compensation standard service retirement annuity).

For the Elected Class members, there is no assumed increase in service credit when eligible for service retirement.

Entry Age:

Entry age is calculated as the age at the valuation date minus Eligibility Service (excluding TRS service).

Decrement Timing: All decrements – mortality, service retirement, disability retirement, and termination of employment for reasons other than death or retirement – are assumed to occur at the middle of the valuation year.

Mortality Decrements:

Service Retirees, Beneficiaries, and Inactive Members

2017 State Retirees of Texas (SRT) mortality table. Generational mortality improvements in accordance with the ultimate rates from the scale most recently published by Retirement Plans Experience Committee of the Society of Actuaries ("Scale U-MP") and projected from the year 2017. Rates for male LECO members are set forward one year. Sample rates for the base mortality table included below.

Annual Mortality Rates per 100 Individuals		
Age	Males	Females
40	0.0603	0.0380
45	0.1059	0.0687
50	0.1825	0.1215
55	0.3145	0.2150
60	0.5421	0.3804
65	0.9344	0.6730
70	1.6105	1.1908
75	2.7757	2.1069
80	4.7842	3.7277
85	8.2459	6.5956
90	14.2527	11.7028

Active Members

RP-2014 Active Member Mortality table. Generational mortality improvements in accordance with Scale U-MP are projected from the year 2014.

Disability Retirees

RP-2014 Disabled Retiree Mortality. Generational mortality improvements in accordance with Scale U-MP are projected from the year 2014.

Occupational Death

1.0% of male and female active member deaths are assumed to be occupational.

Service Retirement Decrements: Graded tables based on ERS experience.

Active Regular State Employees

Service retirement rates are determined by the first set of eligibility requirements satisfied:

- Eligibility A: Age plus eligibility service is greater than or equal to 80 (“Rule of 80”)
- Eligibility B: Retirement eligibility other than Rule of 80

Adjustments to the base rates are made to account for age at first eligibility or reduced retirement benefits, based on date of hire (described below sample table).

Base rates for eligible members:

Annual Service Retirement Rates Regular State Employees (Males & Females)		
Age	Eligibility A	Eligibility B
	Rule of 80	Other Age/Service
<50	0.50	
50	0.40	
51	0.35	
52	0.30	
53	0.28	
54	0.27	
55	0.26	
56	0.25	
57	0.24	
58	0.23	
59	0.22	
60	0.21	0.18
61	0.20	0.12
62	0.33	0.20
63	0.27	0.18
64	0.27	0.18
65 - 74	0.27	0.27
75	1.00	1.00

Adjustments for members hired before September 1, 2009:

- Eligibility A: Add 0.30 at age of 1st eligibility

Adjustments for members hired on or after September 1, 2009, but before September 1, 2013:

- Eligibility A: Add 0.30 at age 60

Adjustments for members hired on or after September 1, 2013:

- Eligibility A: If age of 1st eligibility is before age 62, then
 - rates prior to age 62 are multiplied by 75% for each year prior to age 62
 - the rate at age 62 is the base table rate plus 0.20 plus 0.06 times the number of years the age at 1st eligibility was before age 62

Active LECO Members

Service retirement rates are determined by the first set of eligibility requirements satisfied:

- Eligibility A: 20 years of CPO/CO service
- Eligibility B: Age 55 and 10 years of CPO/CO service
- Eligibility C: Any eligibility pertaining to regular State employees (see rates and adjustments for regular State employees)

Adjustments to the base rates are made to account for age at first eligibility or reduced retirement benefits, based on date of hire (described below sample table).

Base rates for eligible members:

Annual Service Retirement Rates LECO Members (Males & Females)			
Eligibility A		Eligibility B	
Age	20 yrs CPO/CO	Age	Age 55 & 10 yrs CPO/CO
<48	0.03		
48	0.04	55	0.20
49	0.05	56	0.18
50	0.60	57	0.16
51 - 61	0.33	58 - 61	0.14
62 - 74	0.50	62 - 74	0.27
75	1.00	75	1.00

Adjustments for members hired before September 1, 2013:

- Eligibility A and B: Rate set to zero if member has 18 or 19 years of CPO/CO service. Rate is doubled if member has 20 years of CPO/CO service. Adjustments only apply to members that attain 20 years of CPO/CO service prior to age 65.

Adjustments for members hired on or after September 1, 2013:

- Eligibility A: If age of 1st eligibility is before age 57, then
 - rates prior to age 57 are multiplied by 75% for each year prior to age 57
 - the rate at age 57 is 100%
- Eligibility B: If member will attain 20 years of CPO/CO service at or before age 62, rates are zero prior to age 62 and 100% when member attains 20 years of CPO/CO service.
- Eligibility B: If member will attain 20 years of CPO/CO service after age 62, then
 - rates prior to age 62 are multiplied by 75% for each year prior to age 62
 - the rate at age 62 is the base table rate plus 0.20 plus 0.06 times the number of years the age at 1st eligibility was before age 62

Active Elected Class Members

Annual Service Retirement Rates Elected Class Members	
Age	Male and Female
50 - 61	0.10
62 - 74	0.20
75+	1.00

Disability Retirement Decrements: Graded Tables Based on ERS Experience

Active Regular State Employees

- The rates do not apply before someone is eligible for the benefit.
- 10 years of service is required for non-occupational disability retirement.
- Non-occupational disability rates are assumed to be zero once the sum of the member's age and eligibility service is greater than or equal to 80.

Active Elected Class Members

- The rates do not apply before someone is eligible for the benefit.
- No occupational disabilities are assumed for the elected class or judges.
- Eight years of service is required for non-occupational disability retirement.
- Non-occupational disability rates are assumed to be zero once the member has attained service retirement eligibility.

Sample rates for eligible regular State employees and elected class members:

Annual Disability Rates per 100 Participants		
Age	Regular State Employees and Elected Class	
	Males	Females
30	0.0275	0.0135
35	0.0650	0.0442
40	0.0749	0.0896
45	0.1027	0.1455
50	0.1484	0.2072
55	0.2477	0.3488
60	0.3740	0.5583

99% of the disability rates stated above are assumed to be attributable to non-occupational disabilities and 1% are assumed to be attributable to occupational disabilities. No occupational disabilities are assumed for the elected class.

Active LECO Members

- The rates do not apply before a member is eligible for the benefit.
- Service greater than zero is required for occupational disability retirement.
- 10 years of service is required for non-occupational disability retirement.
- Non-occupational disability rates are assumed to be zero once the sum of the member's age and eligibility service is greater than or equal to 80, or the member has attained age 55 with 10 or more years of CPO/CO service.

Sample rates for members:

Annual Disability Rates per 100 Participants LECO Members	
Age	Males and Females
30	0.0092
35	0.0314
40	0.0586
45	0.0980
50	0.1774
55	0.2460
60	0.3150

95% of the disability rates stated above are assumed to be attributable to non-occupational disabilities, 4.5% are assumed to be attributable to non-total occupational disabilities, and 0.5% are assumed to be attributable to total occupational disabilities.

Termination Decrements for Reasons Other Than Death or Retirement: Graded Tables Based on ERS Experience.

Rates of termination are zero for members eligible for service retirement. To account for active regular State employees and LECO members that accumulate additional eligibility service at retirement through converting sick/annual leave or other types of service purchases, termination rates are also set to zero in the year prior to first retirement eligibility.

Rates for members not eligible for service retirement:

Active Regular State Employees

Annual Rates of Termination per 100 Participants Regular State Employees		
Eligibility Service	Male and Female	
	Entry age 35 or younger	Entry age over 35
0	25.25	19.63
1	21.24	16.07
2	17.88	13.26
3	15.07	11.08
4	12.76	9.42
5	10.86	8.16
6	9.33	7.21
7	8.09	6.49
8	7.10	5.94
9	6.31	5.50
10	5.67	5.11
11	5.15	4.75
12	4.71	4.39
13	4.32	4.03
14	3.97	3.66
15	3.64	3.29
16	3.30	2.95
17	2.97	2.69
18	2.62	2.53
19	2.27	1.00
20	1.92	1.00
21	1.59	1.00
22	1.29	1.00
23	1.05	1.00
24	0.89	1.00
25+	0.85	1.00

Active LECO Members

Annual Rates of Termination per 100 Participants LECO Members	
Eligibility Service	Male and Female
0	23.00
1	19.22
2	15.36
3	12.48
4	10.36
5	8.81
6	7.67
7	6.81
8	6.11
9	5.52
10	4.96
11	4.42
12	3.90
13	3.43
14	3.07
15	2.90
16	2.50
17	1.00
18	1.00
19+	0.00

Elected Class Members: 4 per 100 participants for members not eligible for service retirement

Withdrawal of Employee Contributions: Members that terminate with a vested benefit are assumed to choose the most valuable option available to them at the time of termination: withdrawal of contributions or deferred annuity.

Percentage of Members Electing Various Benefit Options:

Sex / Benefit	Standard Life Annuity	Option 1	Option 4
Male Member			
Disability	50%	50%	0%
Service Retirement			
Non-LECO	100%	0%	0%
LECO	60%	40%	0%
Death Benefit Plan	0%	85%	15%
Female Member			
Disability	75%	25%	0%
Service Retirement	100%	0%	0%
Death Benefit Plan	0%	70%	30%

The value of the Standard Service Retirement Life Annuity reflects the return of excess contributions payable as a lump sum death benefit in cases the annuity benefits paid are less than the member account balance at the time of retirement.

Beneficiary Characteristics: Males are assumed to be two years older than females.

Transfers from ERS to TRS:

Contributing ERS members:

It is assumed that 10% of regular State employees and LECO members who cease contributing to ERS and do not withdraw employee contributions will transfer ERS service credit to TRS at retirement.

Noncontributing ERS Members:

Records of ERS and TRS are matched by ERS staff to determine former ERS members who are currently contributing under TRS.

TRS Retirement Age:

Former ERS members who are, or are assumed to become, contributing TRS members are assumed to continue to earn service credit under TRS until first eligible for unreduced service retirement benefits, retire at that time, and transfer ERS service credit to TRS.

Census Data and Assets

- The valuation was based on members of ERS as of August 31, 2019 and does not take into account future members, with the exception of determining the funding period.
- All census data was supplied by ERS and was subject to reasonable consistency checks.
- There were data elements that were modified for some members as part of the valuation in order to make the data complete. However, the number of missing data items was immaterial.
- Asset data was supplied by ERS.

Other Actuarial Valuation Procedures

- No provision was made in this actuarial valuation for the limitations of Internal Revenue Code Sections 415 or 401(a)17.
- Valuation payroll (earnings applied to the current valuation year) is the expected payroll for the fiscal year following the valuation date. It is based on reported payroll determined from August member contributions increased to reflect the across-the-board salary increases appropriated by the State legislature, effective on or after September 1, and projected according to the actuarial assumptions for the upcoming fiscal year.
- No liability was included for benefits which are funded by special State appropriations.
- State appropriations for membership fees are currently immaterial in relation to the overall payroll contributions and have been ignored.

SECTION G

DETAILED SUMMARIES OF MEMBERSHIP DATA

Detailed Summaries of Membership Data

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B	G-3	Active Members: Distribution by Age and Service (All Members)
C	G-4	Active Members: Distribution by Age and Service (Regular State Employees)
D	G-5	Active Members: Distribution by Age and Service (LECO Members)
E	G-6	Active Members: Distribution by Age and Service (Elected Class Members)
F	G-7	Retired and Beneficiary Members: Distribution by Age and Category (Excluding Deferred LECOSRF and ERS Reimbursing TRS Annuitants)
G	G-8	Retired and Beneficiary Members: Distribution by Age and Category (LECOSRF Annuitants Deferred in ERS)
H	G-9	Retired and Beneficiary Members: Distribution by Age and Category (Annuitants where ERS is Reimbursing TRS)

Table A

Summary of Membership Data

Active Members

Item	Male	Female	Regular State Employees	Elected Class	LECO Members	Total
Number of Members	60,160	81,705	105,242	327	36,296	141,865
Average Annual Salaries	\$ 52,628	\$ 46,710	\$ 50,510	\$ 68,245	\$ 45,305	\$ 49,220
Average Age	43.6	43.5	44.4	53.3	41.0	43.5
Average Entry Age	35.0	35.3	35.8	44.8	33.2	35.1
Average Service	8.6	8.2	8.6	8.5	7.8	8.4

Annuitants

Item	Number	Annual Annuities	Average Annuities	Average Age
Service Retirees*	103,934	\$ 2,220,477,648	\$ 21,364	69.1
Beneficiaries	8,984	\$ 136,091,676	\$ 15,148	74.1
Disability Retirees	2,237	\$ 20,832,936	\$ 9,313	67.4
Total	115,155	\$ 2,377,402,260	\$ 20,645	69.4

* Average Age and Service at Retirement for Service Retirees are 58.3 and 22.1, respectively

Inactive Members Assumed Eligible for Deferred Annuities

Item	Number	Annual Annuities	Average Annuities	Average Age
Vested Members who are not Active at TRS	12,683	\$ 146,067,252	\$ 11,517	50.2
Vested Members who are Active at TRS	2,742	\$ 54,031,428	\$ 19,705	51.2
Total	15,425	\$ 200,098,680	\$ 12,972	50.4
Non-vested Members who are Active at TRS	11,220	\$ 36,011,016	\$ 3,210	44.8

Non-vested Inactive Members

Item	Number	Account Balances	Average Account Balance	Average Age
Non-vested Members who are not Active at TRS	99,290	\$ 310,227,503	\$ 3,124	40.8
Non-vested Members who are Active at TRS (this group assumed eligible for deferred annuities)	11,220	\$ 48,135,801	\$ 4,290	44.8
Total	110,510	\$ 358,363,305	\$ 3,243	41.2

Updated 1/7/2020

Table B
Active Members – All Members
Distribution by Age and Service

Age	Years of Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
Under 25	9,086 \$ 30,874	54 \$ 38,250								9,140 \$ 30,918
25 - 29	12,344 \$ 39,725	1,854 \$ 44,981	39 \$ 41,924							14,237 \$ 40,415
30 - 34	10,335 \$ 42,324	4,879 \$ 51,739	1,409 \$ 51,592	29 \$ 50,863						16,652 \$ 45,882
35 - 39	8,393 \$ 43,391	4,505 \$ 52,847	3,847 \$ 58,743	976 \$ 59,632	77 \$ 56,979					17,798 \$ 50,052
40 - 44	7,012 \$ 43,394	3,533 \$ 52,249	3,338 \$ 58,358	2,335 \$ 64,076	1,210 \$ 62,590	72 \$ 73,009				17,500 \$ 52,244
45 - 49	6,407 \$ 43,422	3,453 \$ 51,152	3,115 \$ 55,528	2,577 \$ 61,856	2,975 \$ 65,107	1,434 \$ 65,890	56 \$ 77,076			20,017 \$ 53,939
50 - 54	5,130 \$ 43,301	3,149 \$ 49,944	2,936 \$ 52,788	2,186 \$ 58,173	2,307 \$ 64,018	1,830 \$ 69,675	443 \$ 78,132	15 \$ 70,713		17,996 \$ 54,036
55 - 59	4,221 \$ 42,721	2,931 \$ 48,814	2,620 \$ 51,130	2,027 \$ 56,886	1,514 \$ 60,705	982 \$ 69,228	508 \$ 81,025	135 \$ 80,321	7 \$ 56,390	14,945 \$ 52,523
60 - 64	2,213 \$ 43,706	2,119 \$ 49,157	1,984 \$ 51,800	1,222 \$ 55,091	747 \$ 62,009	563 \$ 68,913	312 \$ 72,327	134 \$ 76,560	35 \$ 63,115	9,329 \$ 52,645
Over 64	904 \$ 45,680	1,132 \$ 49,094	845 \$ 53,320	538 \$ 55,671	367 \$ 61,221	254 \$ 69,475	121 \$ 71,386	55 \$ 74,425	35 \$ 70,717	4,251 \$ 53,446
Total	66,045 \$ 40,812	27,609 \$ 50,610	20,133 \$ 54,878	11,890 \$ 59,583	9,197 \$ 63,304	5,135 \$ 68,486	1,440 \$ 77,287	339 \$ 77,452	77 \$ 65,959	141,865 \$ 49,220

Table C
Active Members – Regular State Employees
Distribution by Age and Service

Age	Years of Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
Under 25	5,086	36								5,122
	\$ 28,291	\$ 35,309								\$ 28,340
25 - 29	8,704	1,057	19							9,780
	\$ 39,631	\$ 43,709	\$ 38,535							\$ 40,070
30 - 34	7,837	3,543	842	9						12,231
	\$ 43,011	\$ 51,994	\$ 51,563	\$ 39,399						\$ 46,200
35 - 39	6,379	3,496	2,813	570	54					13,312
	\$ 44,736	\$ 54,238	\$ 59,582	\$ 58,618	\$ 56,426					\$ 51,010
40 - 44	5,355	2,757	2,510	1,586	687	44				12,939
	\$ 44,781	\$ 53,874	\$ 60,186	\$ 64,771	\$ 64,144	\$ 74,519				\$ 53,287
45 - 49	4,948	2,671	2,365	1,811	1,923	873	42			14,633
	\$ 44,677	\$ 52,656	\$ 57,241	\$ 63,321	\$ 66,496	\$ 66,976	\$ 74,220			\$ 54,754
50 - 54	3,919	2,455	2,177	1,675	1,884	1,573	367	15		14,065
	\$ 44,659	\$ 51,491	\$ 54,238	\$ 60,267	\$ 64,080	\$ 68,766	\$ 74,589	\$ 70,713		\$ 55,299
55 - 59	3,296	2,276	2,053	1,605	1,307	899	466	129	7	12,038
	\$ 44,233	\$ 50,401	\$ 52,712	\$ 58,827	\$ 61,988	\$ 69,577	\$ 80,428	\$ 78,939	\$ 56,390	\$ 54,391
60 - 64	1,743	1,667	1,620	1,005	650	528	299	130	35	7,677
	\$ 45,035	\$ 51,115	\$ 53,032	\$ 56,988	\$ 63,887	\$ 69,835	\$ 71,668	\$ 76,897	\$ 63,115	\$ 54,569
Over 64	671	865	692	450	328	236	115	54	34	3,445
	\$ 48,660	\$ 50,517	\$ 55,048	\$ 57,577	\$ 62,924	\$ 69,709	\$ 74,004	\$ 75,669	\$ 72,585	\$ 55,880
Total	47,938	20,823	15,091	8,711	6,833	4,153	1,289	328	76	105,242
	\$ 41,806	\$ 51,890	\$ 56,225	\$ 60,810	\$ 64,232	\$ 68,816	\$ 75,958	\$ 77,215	\$ 66,732	\$ 50,510

Table D
Active Members – LECO Members
Distribution by Age and Service

Age	Years of Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
Under 25	4,000	18								4,018
	\$ 34,159	\$ 44,132								\$ 34,203
25 - 29	3,640	797	20							4,457
	\$ 39,949	\$ 46,669	\$ 45,144							\$ 41,174
30 - 34	2,491	1,336	567	20						4,414
	\$ 40,049	\$ 51,062	\$ 51,634	\$ 56,022						\$ 44,943
35 - 39	1,999	996	1,033	406	23					4,457
	\$ 38,974	\$ 48,026	\$ 56,382	\$ 61,057	\$ 58,278					\$ 47,143
40 - 44	1,638	764	822	748	523	28				4,523
	\$ 38,632	\$ 45,873	\$ 52,825	\$ 62,677	\$ 60,550	\$ 70,637				\$ 49,143
45 - 49	1,436	760	743	763	1,049	561	14			5,326
	\$ 38,477	\$ 45,225	\$ 49,817	\$ 58,400	\$ 62,727	\$ 64,201	\$ 85,644			\$ 51,486
50 - 54	1,190	679	743	502	421	257	76			3,868
	\$ 38,353	\$ 43,925	\$ 47,199	\$ 50,779	\$ 63,697	\$ 75,236	\$ 95,240			\$ 48,970
55 - 59	908	642	560	417	206	82	42	6		2,863
	\$ 37,049	\$ 42,994	\$ 44,742	\$ 48,707	\$ 52,828	\$ 66,161	\$ 87,647	\$ 110,036		\$ 44,449
60 - 64	455	447	355	216	96	34	12	4		1,619
	\$ 37,191	\$ 42,024	\$ 45,854	\$ 45,865	\$ 49,863	\$ 56,405	\$ 83,120	\$ 65,588		\$ 43,148
Over 64	223	255	141	80	35	15	2			751
	\$ 37,375	\$ 43,114	\$ 43,116	\$ 46,565	\$ 47,643	\$ 69,390	\$ 49,224			\$ 42,530
Total	17,980	6,694	4,984	3,152	2,353	977	146	10		36,296
	\$ 37,975	\$ 46,410	\$ 50,429	\$ 56,087	\$ 60,757	\$ 67,261	\$ 90,509	\$ 92,257		\$ 45,305

Table E
Active Members – Elected Class Members
Distribution by Age and Service

Age	Years of Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
Under 25										
25 - 29										
30 - 34	7 \$ 83,086									7 \$ 83,086
35 - 39	15 \$ 60,320	13 \$ 48,062	1 \$140,000							29 \$ 57,572
40 - 44	19 \$ 62,786	12 \$ 84,667	6 \$ 51,467	1 \$ 7,200						38 \$ 66,446
45 - 49	23 \$ 82,261	22 \$ 73,273	7 \$ 83,086	3 \$ 56,050	3 \$ 7,200					58 \$ 73,713
50 - 54	21 \$ 70,438	15 \$ 69,173	16 \$115,100	9 \$ 80,978	2 \$ 73,600					63 \$ 83,086
55 - 59	17 \$ 52,424	13 \$ 58,277	7 \$ 98,057	5 \$ 116,190	1 \$ 7,200	1 \$ 7,200				44 \$ 66,603
60 - 64	15 \$ 86,880	5 \$ 33,760	9 \$ 64,583	1 \$ 140,938	1 \$ 7,200	1 \$ 7,200	1 \$ 140,000			33 \$ 71,169
Over 64	10 \$ 30,960	12 \$ 73,600	12 \$ 73,600	8 \$ 39,500	4 \$ 40,400	3 \$ 51,467	4 \$ 7,200	1 \$ 7,200	1 \$ 7,200	55 \$ 50,022
Total	127 \$ 67,359	92 \$ 66,304	58 \$ 86,601	27 \$ 71,927	11 \$ 31,345	5 \$ 33,760	5 \$ 33,760	1 \$ 7,200	1 \$ 7,200	327 \$ 68,245

Table F

**Retired and Beneficiary Members – Excluding Deferred
LECOSRF and ERS Reimbursing TRS Annuitants
Distribution by Age and Category**

Age Last Birthday	Number	Annual Benefit	Average Annual Benefit
Service Retirees			
Under 60	15,465	485,370,804	31,385
60 - 64	17,781	450,287,496	25,324
65 - 69	22,594	481,304,676	21,302
70 - 74	19,508	375,292,932	19,238
75 - 79	11,848	203,789,208	17,200
Over 79	11,505	199,971,216	17,381
Total	98,701	2,196,016,332	22,249
Beneficiaries			
Under 60	1,028	13,076,448	12,720
60 - 64	667	9,658,284	14,480
65 - 69	1,058	16,180,932	15,294
70 - 74	1,415	20,941,860	14,800
75 - 79	1,463	22,005,792	15,042
Over 79	3,102	53,178,684	17,143
Total	8,733	135,042,000	15,463
Disabled Retirees			
Under 60	464	3,855,048	8,308
60 - 64	362	3,609,768	9,972
65 - 69	416	4,306,932	10,353
70 - 74	394	4,059,552	10,303
75 - 79	228	2,338,992	10,259
Over 79	208	2,130,096	10,241
Total	2,072	20,300,388	9,797
Grand Total	109,506	2,351,358,720	21,472

Table G

Retired and Beneficiary Members – LECOSRF Annuitants Deferred in ERS Distribution by Age and Category

Age Last Birthday	Number	Annual Benefit	Average Annual Benefit
All Participants			
Under 45	0	0	0
45 - 49	4	75,180	18,795
Total	4	75,180	18,795
Grand Total	4	75,180	18,795

Table H
Retired and Beneficiary Members –
Annuitants where ERS is Reimbursing TRS
Distribution by Age and Category

Age Last Birthday	Number	Annual Benefit	Average Annual Benefit
Service Retirees and Beneficiaries			
Under 60	441	2,954,388	6,699
60 - 64	888	4,919,724	5,540
65 - 69	1,595	7,999,164	5,015
70 - 74	1,308	5,497,248	4,203
75 - 79	817	2,803,452	3,431
Over 79	431	1,261,836	2,928
Total	5,480	25,435,812	4,642
Disabled Retirees			
Under 60	50	232,212	4,644
60 - 64	37	113,976	3,080
65 - 69	34	75,768	2,228
70 - 74	30	91,152	3,038
75 - 79	13	17,220	1,325
Over 79	1	2,220	2,220
Total	165	532,548	3,228
Grand Total	5,645	25,968,360	4,600

SECTION H

GLOSSARY

Glossary

Actuarial Accrued Liability (AAL): That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

Actuarial Assumptions: Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

Actuarial Cost Method or Funding Method: A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

Actuarial Gain or Actuarial Loss: A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the Fund's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

- a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.),
- b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
- c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.

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 plan. An Actuarial valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB.

Actuarial Value of Assets or Valuation Assets: The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: That portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Actuarially Determined Contribution (ADC) or Annual Required Contribution (ARC): A calculated contribution for a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically the calculated contribution has a normal cost payment and an amortization payment.

Closed Amortization Period: A specific number of years that is counted down by one each year and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decremets: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: An employer-sponsored retirement benefit that provides workers, upon attainment of designated age and service thresholds, with a monthly benefit based on the employee's salary and length of service. The value of a benefit from a defined benefit plan is generally not affected by the return on the assets that are invested to fund the benefit.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Experience Study: A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Funding Period or Amortization Period: The term "Funding Period" is used in two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period is chosen by the Board of Trustees. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: The Governmental Accounting Standards Board is an organization that exists in order to promulgate accounting standards for governmental entities.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.

Unfunded Actuarial Accrued Liability: The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or Actuarial Valuation Date: The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

SECTION I

LAW ENFORCEMENT AND CUSTODIAL OFFICER (LECO) PLAN ACCOUNTING

Law Enforcement and Custodial Officer (LECO) Plan Accounting

Executive Summary

Senate Bill 1459 passed by the 83rd Legislature of the State of Texas (SB1459) included a mandate that assets and liabilities attributable to members and retirees of the LECOSRF be measured and accounted for in aggregate and separately from ERS main fund for the subsequent biennium. Even though the mandate has passed, the contents of this Section outline the measurement of the potential separate accounting for the stand-alone retirement plan for LECO members. The two populations can either have separate accounting for assets and liabilities or be fully separated.

Summary of Results

Item	Regular Class	Law Enforcement and Custodial Officers
Membership		
• Number of		
- Active members	105,569	36,296
- Retirees and beneficiaries*	95,443	19,712
- Inactive, vested*	13,842	1,583
- Inactive, nonvested*	91,854	18,656
- Total	306,708	76,247
• Valuation Payroll	\$ 5,340,184,997	\$ 1,644,391,700
Statutory contribution rates		
• Members	9.50%	10.00%
• Employers	0.50%	0.50%
• State	9.50%	10.00%
Total Payroll Contribution Rate	19.50%	20.50%
• Expected contributions from court fees	N/A	\$17.1 million per year
Actuarially Sound Rate (funds normal cost and amortizes unfunded accrued liability over 31 years, per Section 811.006 of the Texas Government Code)		
- Total Contribution Rate	22.55%	29.19%
- In addition to Court Fees	22.55%	28.44%
Contribution Rate Sufficiency (Negative figures indicates contribution shortfall)		
	-3.05%	-7.94%
Assets		
• Market value (MVA)	\$ 22,593,263,608	\$ 5,701,583,194
• Actuarial value (AVA)	\$ 23,178,841,628	\$ 5,849,408,346
Actuarial Information on AVA (smoothed)		
• Normal cost %	13.49%	16.71%
• Total normal cost	\$ 720,390,956	\$ 274,777,853
• Actuarial accrued liability	\$ 31,775,861,102	\$ 9,508,132,778
• Unfunded actuarial accrued liability (UAAL)	\$ 8,597,019,474	\$ 3,658,724,432
• Funded ratio	72.9%	61.5%
• Funding period (years)	Never	Never
Actuarial Information on MVA		
• Unfunded actuarial accrued liability (UAAL)	\$ 9,182,597,494	\$ 3,806,549,584
• Funded ratio	71.1%	60.0%
• Funding period (years)	Never	Never

* Annuitants with at least 10 years of CPO service are identified as LECO annuitants. Inactive members with at least three-fourths of total service certified as CPO service are identified as LECO inactive members. These headcounts are shown for illustration purposes and do not directly relate to the methods used to allocate individual liabilities to the two resulting plans.

Methodology for the LECO Plan

The goal was to re-assemble these plans for LECO members and regular State (non-LECO) employees as if they had been separate plans from the beginning. In broad terms, the methodology for structuring the proposed stand-alone retirement plan for LECO members can be described as: allocation of ERS liabilities, allocation of ERS assets, and addition of LECOSRF.

Allocation of ERS Liabilities

The first step is to determine the plan liabilities for each resulting plan. ERS plan liabilities for currently contributing LECO members were attributed to the new LECO plan. Liabilities for individual annuitants and non-contributing members were attributed to the new LECO plan based on the proportion of their CPO-service relative to their total ERS plan service. The remaining ERS plan liabilities would remain in the regular State (non-LECO) employees plan.

Adjusted Plan Liability for Purposes of Allocating Assets

LECO members are eligible for enhanced benefits at earlier ages with less reduction for early retirement; therefore, these benefits are more valuable than the benefits available to regular State (non-LECO) employees. Even though LECO members received more valuable benefits from the ERS plan, contributions for these members (State contributions and member contributions) to the ERS plan have historically been the same percentage of payroll as the contributions for regular State (non-LECO) employees.

Solely for the purpose of allocating the plan assets, current ERS plan liabilities for LECO members were re-cast, or adjusted, to approximate the plan liabilities as if LECO members received the same benefits as regular State (non-LECO) employees.

Allocation of Assets

Adjusted ERS plan liabilities of annuitants and non-contributing members in both of the resulting plans were fully funded with ERS assets at market value. There is precedence for first allocating assets to retiree liabilities in corporate plan spinoffs. In a sense, retiree liabilities have the highest “demand” for assets since benefit payments are already being made. The remaining assets were allocated evenly across the adjusted ERS plan liabilities for contributing members in both of the resulting plans.

The ratio of actuarial to market value of assets was applied to the market-value asset allocation to arrive at the final actuarial value asset allocation.

Impact of LECOSRF

The final step in allocating the liabilities and assets for a stand-alone plan for LECO members is to combine the allocated LECO liabilities and assets from the ERS plan with the liabilities and assets of the Law Enforcement and Custodial Officer Supplemental Retirement Fund (LECOSRF).

Financing of Restructured Plans

Based on the results of the August 31, 2019 actuarial valuations of the ERS plan and LECOSRF, neither plan was considered actuarially sound. In this context, an actuarially sound retirement plan receives a total contribution rate sufficient to cover the normal cost, administrative expenses, and amortize the unfunded actuarial accrued liability over a period of 31 years, or less.

Based on the allocation of liabilities and assets outlined in this Section, neither the stand-alone LECO plan nor the regular State (non-LECO) employees plan would be considered actuarially sound as of August 31, 2019.

Administrative Considerations

The asset allocation outlined in this Section is only one of many “reasonable” asset allocations. Actuarial standards of practice give guidance on how to assess the actuarial soundness of a proposed allocation, but they do not prescribe a particular methodology for allocation of the assets in a situation such as this. As previously noted, there are detailed rules regarding the allocation of assets in corporate plan spinoffs, but there is very little precedent for public pension plans. There is supporting rationale for this allocation method, but there are other methods which could also be supported.

Law Enforcement and Custodial Officer Supplemental Retirement Fund of the Employees Retirement System of Texas

Annual Actuarial Valuation - Funding
As of August 31, 2019



December 4, 2019

Board of Trustees
Employees Retirement System of Texas
200 East 18th Street
Austin, TX 78701

Re: Actuarial Valuation for Funding Purposes as of August 31, 2019

Members of the Board:

We certify that the information contained in this report is accurate and fairly presents the actuarial position of the Law Enforcement and Custodial Officer Supplemental Retirement Fund (LECOSRF) of the Employees Retirement System of Texas as of August 31, 2019. This report was prepared at the request of the Board and is intended for use by ERS staff and those designated or approved by the Board. This report may be provided to parties other than ERS only in its entirety and only with the permission of the Board.

Actuarial Valuation

The primary purposes of the actuarial valuation report are to determine the adequacy of the current State and employer contribution rates, describe the current financial condition of LECOSRF, analyze changes in the condition of LECOSRF, and provide various summaries of the data.

The current financial outlook for LECOSRF is very poor. It is important to understand that the currently scheduled contributions are not expected to accumulate sufficient assets in order to pay all of the currently scheduled benefits when due. Based on current expectations and assumptions, LECOSRF is projected to remain solvent until the year 2043.

Plan Provisions

Our actuarial valuation as of August 31, 2019 reflects the benefit and contribution provisions set forth in Chapters 811 through 815 of the Texas Government Code with respect to the amounts payable from the Law Enforcement and Custodial Officer Supplemental Retirement Fund. The current plan provisions are outlined in Section E of this report.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016. Additionally, this actuarial valuation incorporates the notable across-the-board pay increases budgeted by the State Legislature when they are granted for the current biennium. The current actuarial assumptions and methods are outlined in Section F of this report.

Data

The valuation was based upon information as of August 31, 2019, furnished by ERS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ERS staff.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Internal Revenue Code and ERISA.

The signing actuaries are independent of the plan sponsor. Mr. Falls, Mr. Newton and Ms. Woolfrey are Enrolled Actuaries and Fellows of the Society of Actuaries, and all of the undersigned are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, each of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



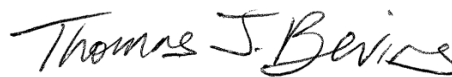
R. Ryan Falls, FSA, EA, MAAA
Senior Consultant & Actuary



Dana Woolfrey, FSA, EA, MAAA
Consultant & Actuary



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



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Actuary

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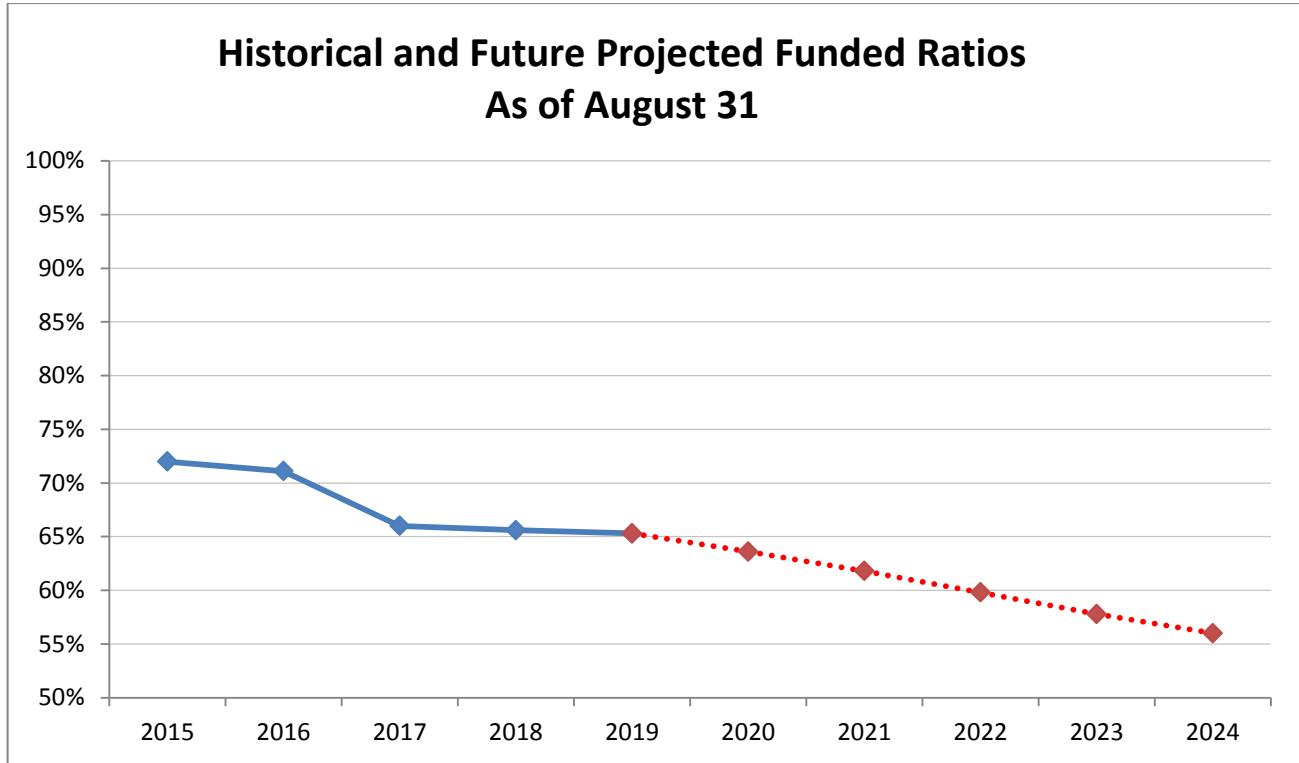
SECTION A

EXECUTIVE SUMMARY

Executive Summary

Item	2019	2018
Membership <ul style="list-style-type: none"> • Number of <ul style="list-style-type: none"> - Active members - Retirees and beneficiaries - Inactive, vested - Inactive, nonvested - Total • Valuation Payroll 	36,296 13,981 111 22,096 <hr style="width: 100%;"/> 72,484 \$ 1,644,391,700	37,167 13,080 104 19,738 <hr style="width: 100%;"/> 70,089 \$ 1,684,457,747
Statutory contribution rates <ul style="list-style-type: none"> • Members • State • Expected annual contributions from court fees <p>Actuarially Sound Rate (funds normal cost and amortizes unfunded accrued liability over 31 years, per Section 811.006 of the Texas Government Code)</p> <ul style="list-style-type: none"> - Total Contribution Rate - In addition to Court Fees 	FY 2020 0.50% 0.50% \$17.1 million 3.91% 3.14%	FY 2019 0.50% 0.50% \$18.1 million 3.76% 2.99%
Assets <ul style="list-style-type: none"> • Market value (MVA) • Actuarial value (AVA) • Return on market value (gross) • Return on market value (net) • Return on actuarial value 	\$ 943,622,645 \$ 968,129,751 3.04% 3.00% 7.0%	\$ 966,827,735 \$ 953,054,283 9.58% 9.54% 7.9%
Actuarial Information on AVA - smoothed <ul style="list-style-type: none"> • Normal cost % • Total normal cost • Actuarial accrued liability • Unfunded actuarial accrued liability (UAAL) • Funded ratio • Funding period (years) 	2.08% \$ 34,203,347 \$ 1,482,635,202 \$ 514,505,451 65.3% Never	2.09% \$ 35,205,167 \$ 1,452,657,797 \$ 499,603,514 65.6% Never
Actuarial Information on MVA <ul style="list-style-type: none"> • Unfunded actuarial accrued liability (UAAL) • Funded ratio 	\$ 539,012,557 63.6%	\$ 485,830,062 66.6%

The following chart illustrates the recent history and outlook of the funded status of LECOSRF over the next five years:



August 31,	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Funded Ratio	72.0%	71.1%	66.0%	65.6%	65.3%	63.6%	61.8%	59.8%	57.8%	56.0%
UAAL (in millions)	\$353	\$379	\$476	\$500	\$515	\$562	\$612	\$666	\$724	\$780
ASC*	3.01%	2.33%	2.87%	2.99%	3.14%	3.28%	3.41%	3.54%	3.68%	3.81%

* For 2016 and thereafter, the stated Actuarially Sound Contribution rate is the contribution necessary to be actuarially sound based on the 31-year standard in addition to expected annual contribution from court fees. Prior to 2016, the expected court fees were included in the ASC as 1.20% of pay.

The projections beyond 2019 are based on the same assumptions, methods and provisions used for the August 31, 2019 valuation, which include the notable across-the-board pay increases budgeted by the State Legislature when they are granted and the assumptions adopted by the Board in August 2017. Additionally, the market value of assets is expected to earn 7.5% per year.

It is important to understand that the currently scheduled contributions are not expected to accumulate sufficient assets in order to pay all of the currently scheduled benefits when due. Based on current expectations and assumptions, LECOSRF is projected to have money in the trust fund until the year 2043. After which, the funding would revert to a pay-as-you-go status. **When LECOSRF reverts to a pay-as-you-go status, the required Legislative appropriation for LECOSRF will immediately increase to 11 times the current State contribution rate, not including contributions from court fees, in order to ensure all retirees continue to receive their promised benefit.**

Given this outlook, we recommend the Legislature increase the contribution rates to LECOSRF.

SECTION B

DISCUSSION

Discussion

Introduction

The results of the August 31, 2019 actuarial valuation of the Law Enforcement and Custodial Officer Supplemental Retirement Fund (LECOSRF) of the Employees Retirement System (ERS) of Texas are presented in this report.

The primary purposes of this actuarial valuation report are to determine the adequacy of the current State and employer contribution rates, describe the current financial condition of LECOSRF, analyze the changes in the condition of LECOSRF, and provide various summaries of the data.

The total contribution rate for the current fiscal year is less than the normal cost by 0.04% of payroll, which, on both an actuarial and market value of assets basis, is not sufficient to amortize the unfunded liability over a finite period of time. As a result, the UAAL is expected to grow indefinitely and the funding objective is not currently being realized. Based on current expectations and assumptions, LECOSRF is expected to remain solvent until the year 2043, after which the funding would revert to a pay-as-you-go status.

All of the tables referenced in the following discussion appear in Section C of this report.

Plan Provisions

There were no changes to the plan provisions during the past year. The current plan provisions are outlined in Section E of this report.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016. We believe the assumptions are internally consistent and are reasonable, based on the actual experience of LECOSRF.

The actuarial valuation as of August 31, 2019 incorporates the notable across-the-board pay increases budgeted by the State Legislature when they are granted for the current biennium. Specifically, employees were assumed to receive no across-the-board increase on September 1, 2019 or September 1, 2020.

The results of the actuarial valuation are dependent upon 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. A review of the impact of a different set of assumptions on the funded status of LECOSRF is outside the scope of this actuarial valuation.

The current actuarial assumptions and methods are outlined in Section F of this report.

Funding Adequacy

The Board of Trustees of ERS approved the Pension Funding Priorities and Guidelines on May 23, 2018. For the Board, adoption of this policy was intended to:

- enhance communications and provide transparency to the Legislature and plan members and retirees regarding Board of Trustees' positions on plan funding strategy;
- provide policy guidance to current and future Boards; and
- ensure that legislators, elected officials and other stakeholders have clear and accurate information about the Trust's funding goals and the needs of the Board in supporting sound fiduciary investment decisions in accordance with Texas Government Code Section 815.106.

This policy also stated that the main objective of ERS' retirement programs is to fully fund the long-term cost of benefits provided by statute, through disciplined and timely accumulation of contributions and prudent investment of assets to deliver earned benefits on a continuing basis. In support of this objective, the policy laid out a multi-level funding period goal to gradually achieve funding on sound actuarial principles:

1. Avoid trust fund depletion of the pre-funded plans,
2. Meet current statutory standard of a 31-year funding period for unfunded liabilities, per Texas Government Code Sections 811.006 and 840.106, and
3. Match funding period to the average years of service at retirement once a 31-year funding period is achieved, and closed.

The member contribution rates are established by State statute and the State contribution rate is set by State statute and legislative appropriation. For the fiscal year beginning September 1, 2019, members contribute 0.50% of payroll and the State contributes 0.50% of payroll. LECOSRF also receives a portion of the court fees collected under Section 133.102 of the Local Government Code. The contribution from this source is expected to be approximately \$17.1 million for fiscal year 2020 and all subsequent years. It should be noted that level dollar contributions from court fees in future years will result in total contributions that are not expected to remain level as a percent of payroll over time. For fiscal year 2020, the contribution from court fees is expected to be approximately 1.04% of payroll.

The unfunded actuarial accrued liability (UAAL) of LECOSRF increased from \$500 million as of August 31, 2018 to \$515 million as of August 31, 2019. Additionally, the funded ratio of LECOSRF—actuarial value of assets divided by the actuarial accrued liability—decreased from 65.6% to 65.3% as of August 31, 2019. This decrease was smaller than expected due to liability gains. The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

The valuation shows that the total normal cost for funding purposes is 2.08% of payroll. The approximate total contribution rate is currently 2.04% of payroll. Thus, the total contribution rate for the current fiscal year is less than the normal cost by 0.04% of payroll and no payment will be available to amortize the unfunded liability. As the number of members eligible for the newest benefit provisions increases over time, the normal cost rate is expected to decrease. However, the projected contributions are not expected to exceed the normal cost in any year and will not be sufficient to eliminate the unfunded liability over a

finite period of time. Assuming the market value of assets earns 7.50% per year, LECOSRF is projected to remain solvent until the year 2043, after which the funding would revert to a pay-as-you-go status. **As a result, the first level of the Board's funding period goal is not currently being realized.**

The second level of the Board's funding period goal is to fund the sum of the normal cost and the amount necessary to amortize any unfunded actuarial accrued liability over a period that does not exceed 30 years by one or more years. Further, Section 811.006 of the Texas Government Code limits the modifications to LECOSRF that would, essentially, increase benefits or lower contributions to the trust unless the current level of benefits and contributions are expected to amortize any unfunded actuarial accrued liability over a period that does not exceed 30 years by one or more years. In this context, the Actuarially Sound Contribution (ASC) rate is the contribution rate that meets this standard. Based on the actuarial valuation as of August 31, 2019, the ASC rate for LECOSRF is 3.14% of payroll in addition to the expected annual contributions from court fees of \$17.1 million. **Based on the current approximate total contribution rate of 2.04% of payroll, the second level of the Board's funding period goal is also not currently being realized.**

The ASC is currently calculated based on a 31-year open amortization period. This means that the ASC will always be calculated with the same 31-year period and the UAAL would never completely be eliminated. We recommend that the Board seek a plan funding strategy that meets the third level of the Board's funding period goal or meets an ultimate goal of eliminating the UAAL by a certain date.

System Assets

This report contains several tables that summarize key information with respect to the LECOSRF assets.

The total market value of assets decreased from \$967 million to \$944 million as of August 31, 2019. Table 5 reconciles the changes in the fund during the year. Total contributions decreased slightly from \$35.4 million to \$35.0 million. Contributions for fiscal year 2020 are anticipated to be approximately 2.04% of pay. Contributions in subsequent years are expected to increase in dollar amount, but at a declining percentage of pay since contributions from court fees are expected to remain level.

Table 6 shows the development of the Actuarial Value of Assets (AVA). The current AVA method recognizes each year's gain or loss over a closed five year period and allows for direct offsetting of gains and losses. The AVA increased from \$953 million to \$968 million as of August 31, 2019.

When measured on a market value, the approximate gross investment return for the fiscal year ending August 31, 2019 was 3.04%, and the return net of investment expenses was 3.00%. When measured on an actuarial value, the net investment return was 7.0%. Table 7 shows a history of return rates. The LECOSRF ten-year average market return, gross of all expenses as reported by the ERS Master Trust Custodian, is 8.20%. The ten-year average return net of investment expenses is 8.09%.

Table 8 provides a history of the contributions paid into LECOSRF and the administrative expenses and benefit payments that have been paid out of LECOSRF. This table shows that LECOSRF paid administrative expenses and benefit payments, in excess of contributions received, of \$42.1 million (or 4.4% of assets) in fiscal year 2018 and that amount was \$49.5 million (or 5.2% of assets) in fiscal year 2019. ERS should continue to monitor this deficit as it could impact the future liquidity needs of LECOSRF. Table 11 provides a history of contribution rates, as a percent of payroll, paid into the trust by the state, agencies, and members. This table also shows a history of the total normal cost and the Actuarially Sound Contribution rate (ASC).

Data

The valuation was based upon information as of August 31, 2019, furnished by ERS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ERS staff.

The tables in Section G show key census statistics for the various groups included in the valuation.

SECTION C

TABLES

Table 1

Development of Employer Cost

	<u>August 31, 2019</u>	<u>August 31, 2018</u>
1. Payroll		
a. Reported Payroll (August Payroll of Active Members)	\$ 1,644,391,700	\$ 1,684,457,747
b. Valuation Payroll (Expected Covered Payroll for Following Plan Year)	1,644,391,700	1,684,457,747
2. Total Normal Cost Rate		
a. Gross normal cost rate	2.00%	2.01%
b. Administrative expenses	0.08%	0.08%
c. Total (Item 2a + Item 2b)	<u>2.08%</u>	<u>2.09%</u>
3. Actuarial Accrued Liability for Active Members		
a. Present value of future benefits for active members	\$ 875,578,522	\$ 925,458,206
b. Less: present value of future normal costs	<u>(238,344,568)</u>	<u>(248,827,732)</u>
c. Actuarial accrued liability	\$ 637,233,954	\$ 676,630,474
4. Total Actuarial Accrued Liability for:		
a. Retirees and beneficiaries	\$ 829,115,833	\$ 762,668,410
b. Inactive members	16,285,415	13,358,913
c. Active members (Item 3c)	<u>637,233,954</u>	<u>676,630,474</u>
d. Total	\$ 1,482,635,202	\$ 1,452,657,797
5. Actuarial Value of Assets	\$ 968,129,751	\$ 953,054,283
6. Unfunded Actuarial Accrued Liability (UAAL) (Item 4d - Item 5)	\$ 514,505,451	\$ 499,603,514
7. Total Contribution Rate Needed to Fund Normal Cost Plus Amortize the UAAL Over 31 Years	3.91%	3.76%
8. Expected Contribution from Court Fees		
a. Expected future contributions	\$ 17,100,000	\$ 18,100,000
b. Equivalent contribution rate for fiscal year	1.04%	1.07%
9. Contribution Rate In Addition to Expected Court Fees Needed to Fund Normal Cost Plus Amortize the UAAL Over 31 Years	3.14%	2.99%
10. Allocation of Contribution Rate for the Current Fiscal Year		
a. Equivalent employer rate for fiscal year*	1.54%	1.57%
b. Member rate	<u>0.50%</u>	<u>0.50%</u>
c. Total contribution rate for fiscal year*	2.04%	2.07%
d. Total normal cost rate	2.08%	2.09%
e. Available contribution rate to amortize UAAL*	<u>-0.04%</u>	<u>-0.02%</u>
f. Total contribution rate for fiscal year*	2.04%	2.07%
11. Funding period based on statutory contribution rates, expected court fees, and Actuarial Value of Assets (years)	Never	Never

* The annual court fees contributed to LECOSRF are expected to remain level in the future. As a result, the equivalent contribution rate is expected to decrease over time as the payroll increases.

Table 2
Actuarial Present Value of Future Benefits

	<u>August 31, 2019</u>	<u>August 31, 2018</u>
1. Active Members		
a. Service Retirement	\$ 850,915,208	\$ 899,980,280
b. Disability Benefits	4,852,577	5,081,802
c. Death Before Retirement	6,227,199	6,673,095
d. Termination	<u>13,583,538</u>	<u>13,723,029</u>
e. Total	\$ 875,578,522	\$ 925,458,206
2. Inactive Members	\$ 16,285,415	\$ 13,358,913
3. Annuitants	\$ 829,115,833	\$ 762,668,410
4. Total Actuarial Present Value of Future Benefits	\$ 1,720,979,770	\$ 1,701,485,529

Table 3 Analysis of Normal Cost

	<u>August 31, 2019</u>	<u>August 31, 2018</u>
1. Gross Normal Cost Rate		
a. Service Retirement	1.82%	1.83%
b. Disability Benefits	0.02%	0.02%
c. Death Before Retirement	0.01%	0.01%
d. Termination	0.15%	0.15%
e. Total	2.00%	2.01%
2. Administrative Expenses	0.08%	0.08%
3. Total Normal Cost	2.08%	2.09%
4. Less: Member Rate	0.50%	0.50%
5. Employer Normal Cost Rate	1.58%	1.59%

Table 4
Historical Summary of Active Member Data

Valuation as of August 31, (1)	Active Members		Covered Payroll		Average Salary		Average Age (8)	Average Service (9)
	Number (2)	Percent Increase (3)	Amount in \$ Millions (4)	Percent Increase (5)	\$ Amount (6)	Percent Increase (7)		
2008	33,642	N/A	1,245	N/A	37,021	N/A	42.7	9.6
2009	37,819	12.4%	1,387	11.4%	36,687	-0.9%	42.0	8.6
2010	39,052	3.3%	1,483	6.9%	37,979	3.5%	41.9	8.5
2011	36,806	-5.8%	1,452	-2.1%	39,454	3.9%	42.2	8.9
2012	37,404	1.6%	1,475	1.6%	39,444	0.0%	42.5	9.1
2013	37,415	0.0%	1,477	0.1%	39,469	0.1%	42.4	9.1
2014	37,084	-0.9%	1,542	4.4%	41,584	5.4%	42.3	8.9
2015	38,526	3.9%	1,616	4.8%	41,957	0.9%	41.7	8.4
2016	39,066	1.4%	1,744	7.9%	44,634	6.4%	41.0	8.0
2017	38,206	-2.2%	1,720	-1.3%	45,029	0.9%	41.1	8.0
2018	37,167	-2.7%	1,684	-2.1%	45,321	0.7%	41.0	8.0
2019	36,296	-2.3%	1,644	-2.4%	45,305	0.0%	41.0	7.8

Table 5 Reconciliation of Plan Net Assets

	Year Ending	
	August 31, 2019 (1)	August 31, 2018 (2)
1. Market value of assets at beginning of year	\$ 966,827,735	\$ 923,989,580
2. Revenue for the year		
a. Contributions for the year		
i. State (including membership fees)	\$ 25,864,146	\$ 26,109,655
ii. Member (including penalty interest)	9,098,121	9,274,814
iii. Total	<u>\$ 34,962,267</u>	<u>\$ 35,384,469</u>
b. Net investment income	\$ 26,250,173	\$ 84,937,315
c. Total revenue	\$ 61,212,440	\$ 120,321,784
3. Disbursements for the year		
a. Benefit payments and refunds	82,250,048	\$ 75,632,867
b. Net transfers from TRS	0	0
c. Administrative expenses	2,167,482	1,850,762
d. Total expenditures	<u>84,417,530</u>	<u>77,483,629</u>
4. Increase in net assets (Item 2c - Item 3d)	\$ (23,205,090)	\$ 42,838,155
5. Market value of assets at end of year (Item 1 + Item 4)	\$ 943,622,645	\$ 966,827,735

Table 6 Development of Actuarial Value of Assets

	Year Ending August 31, 2019
1. Market value of assets at beginning of year	\$ 966,827,735
2. Net new investments	
a. Contributions for the year (Table 5)	\$ 34,962,267
b. Disbursements for the year (Table 5)	(84,417,530)
c. Subtotal	(49,455,263)
3. Market value of assets at end of year	\$ 943,622,645
4. Net earnings (Item 3 - Item 1 - Item 2)	\$ 26,250,173
5. Assumed investment return rate for fiscal year	7.50%
6. Expected return	\$ 70,657,508
7. Excess return (Item 4 - Item 6)	\$ (44,407,335)
8. Development of amounts to be recognized as of August 31, 2019:	

Fiscal Year End	Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
	(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
2015	\$ 0	\$ 0	\$ 0	1	\$ 0	\$ 0
2016	0	0	0	2	0	0
2017	0	0	0	3	0	0
2018	13,773,452	(13,773,452)	0	4	0	0
2019	(44,407,335)	13,773,452	(30,633,883)	5	(6,126,777)	(24,507,106)
Total	\$ (30,633,883)	\$ 0	\$ (30,633,883)		\$ (6,126,777)	\$ (24,507,106)

9. Actuarial value of assets as of August 31, 2019 (Item 3 - Item 8, Column 6)	\$ 968,129,751
10. Ratio of actuarial value to market value	102.6%

Table 7
History of Investment Return Rates

Year Ending August 31 of	Market Returns (Gross)	Market Returns (Net)	Actuarial
(1)	(2)	(3)	(4)
1998	8.30%	8.23%	N/A
1999	16.26%	16.46%	N/A
2000	9.43%	9.40%	N/A
2001	-6.91%	-6.93%	N/A
2002	-7.17%	-7.21%	N/A
2003	9.20%	9.14%	5.2%
2004	11.69%	11.64%	6.3%
2005	12.71%	12.62%	7.4%
2006	8.83%	8.76%	7.6%
2007	13.88%	13.76%	8.5%
2008	-4.58%	-4.69%	5.7%
2009	-6.60%	-6.71%	3.2%
2010	6.65%	6.48%	3.7%
2011	12.58%	12.36%	5.1%
2012	8.22%	8.04%	5.4%
2013	10.07%	9.87%	6.1%
2014	14.70%	14.58%	7.6%
2015	0.49%	0.44%	6.1%
2016	5.32%	5.28%	5.9%
2017	12.15%	12.11%	2.8%
2018	9.58%	9.54%	7.9%
2019	3.04%	3.00%	7.0%

Average Returns

Last Five Years:	6.03%	5.99%	5.9%
Last Ten Years:	8.20%	8.09%	5.7%
Last Fifteen Years:	6.94%	6.84%	6.0%
Last Twenty Years:	5.92%	5.83%	N/A

Market returns provided by ERS Master Trust Custodian.

Rates in Column (2) represent the market returns gross of all expenses.

Rates in Column (3) represent the market returns net of investment expenses.

Net returns may exceed gross returns in years where adjustments are made to fee expenses.

Table 8
History of Cash Flow

Year Ending August 31, (1)	Contributions (2)	Distributions and Expenditures			External Cash Flow for the Year (7)	Market Value of Assets (8)	External Cash Flow as Percent of Market Value (9)
		Benefit Payments and Refunds (3)	Administrative Expenses (5)	Total (6)			
2007	\$ 0.0	\$ (32.1)	\$ (0.5)	\$ (32.6)	\$ (32.6)	\$ 762.9	-4.3%
2008	20.2	(34.9)	(0.4)	(35.3)	(15.1)	704.9	-2.1%
2009	20.7	(38.7)	(0.4)	(39.1)	(18.4)	634.8	-2.9%
2010	35.3	(41.2)	(0.6)	(41.8)	(6.5)	668.4	-1.0%
2011	31.8	(43.7)	(0.9)	(44.6)	(12.8)	737.4	-1.7%
2012	7.3	(48.1)	(0.8)	(48.9)	(41.6)	747.7	-5.6%
2013	14.3	(52.4)	(0.8)	(53.2)	(38.9)	780.7	-5.0%
2014	35.9	(57.1)	(1.3)	(58.4)	(22.5)	869.9	-2.6%
2015	35.1	(61.3)	(1.4)	(62.7)	(27.6)	844.1	-3.3%
2016	37.0	(64.5)	(1.4)	(65.9)	(28.9)	860.0	-3.4%
2017	36.2	(69.8)	(1.8)	(71.6)	(35.4)	924.0	-3.8%
2018	35.4	(75.6)	(1.9)	(77.5)	(42.1)	966.8	-4.4%
2019	35.0	(82.3)	(2.2)	(84.5)	(49.5)	943.6	-5.2%

Dollar amounts in millions

Column (7) = Column (2) + Column (6).

Table 9 Total Experience Gain or Loss

Item (1)	Year Ending August 31, 2019 (2)	Year Ending August 31, 2018 (3)
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	\$ 499,603,514	\$ 475,887,077
2. Normal cost for the year (excluding administrative expenses)	33,857,601	34,923,358
3. Actual administrative expenses	2,167,482	1,850,762
4. Contributions for the year (excluding service purchases)	(34,149,251)	(34,494,780)
5. Interest at 7.5%		
a. On UAAL	\$ 37,470,264	\$ 35,691,531
b. On normal cost and administrative expenses	1,350,941	1,379,030
c. On contributions	(1,280,597)	(1,293,554)
d. Total	\$ 37,540,608	\$ 35,777,007
6. Assumption change (Gains)/Losses	\$ 0	\$ 0
7. Legislative changes*		
– Across-the-board pay increases budgeted for upcoming biennium by the State Legislature	(24,502,374)	0
8. Expected UAAL (Sum of Items 1 through 7)	514,517,580	513,943,424
9. Actual UAAL	514,505,451	499,603,514
10. Total (gain)/loss for the year (Item 9 - Item 8)	\$ (12,129)	\$ (14,339,910)
B. Source of gains and losses		
	% of AAL	
11. Asset (Gain)/Loss for the year	0.34%	\$ 5,093,768
12. Pay Increases (Less)/Greater than Expected	0.24%	(3,596,314)
13. Non-Retired Demographic (Gains)/Losses	0.56%	(8,278,040)
14. Post-Retirement Mortality (Gains)/Losses	0.00%	55,396
15. Other Demographic (Gains)/Losses	0.45%	6,713,061
16. Total (Sum of Items 11 through 15)	0.00%	\$ (12,129)

* The plan experiences a (gain)/loss when across-the-board pay increases budgeted by the State Legislature are (less)/greater than assumed.

Table 10 Solvency Test

Actuarial Accrued Liability and Percent of Active Member Payroll for:

August 31,	<u>Accumulated Member Contributions Including Interest</u>		<u>Retirees and Beneficiaries Currently Receiving Benefits</u>		<u>Employer Financed Portion of Vested and Nonvested Benefits</u>		Actuarial Value of Assets	<u>Portion of Accrued Liabilities Covered by Assets</u>		
	(1)	% of Payroll	(2)	% of Payroll	(3)	% of Payroll		(1)	(2)	(3)
2007	\$ 0.0	0%	\$ 278.1	22%	\$ 484.6	9%	\$ 747.8	100%	100%	97%
2008	0.0	0%	314.6	25%	527.5	42%	774.5	100%	100%	87%
2009	0.0	0%	334.6	24%	572.5	41%	780.8	100%	100%	78%
2010	7.3	0%	368.0	25%	591.3	40%	802.9	100%	100%	72%
2011	13.9	1%	400.9	28%	578.0	40%	830.5	100%	100%	72%
2012	19.5	1%	447.5	30%	577.3	39%	832.5	100%	100%	63%
2013	24.4	2%	482.7	33%	690.0	47%	843.0	100%	100%	49%
2014	29.5	2%	533.3	35%	644.0	42%	883.6	100%	100%	50%
2015	34.5	2%	578.9	36%	648.9	40%	909.2	100%	100%	46%
2016	41.5	2%	619.0	35%	651.9	37%	933.5	100%	100%	42%
2017	47.0	3%	702.9	41%	649.9	38%	924.0	100%	100%	27%
2018	51.5	3%	762.7	45%	638.5	38%	953.1	100%	100%	22%
2019	54.7	3%	829.1	50%	598.8	36%	968.1	100%	100%	14%

Note: Dollar amounts in millions

Table 11 Historical Contribution Rates

Actuarial Valuation as of August 31,	Contributions from:				Total Normal Cost Rate	ASC**
	State	Court Fees*	Members	Total		
1998	0.00%	0.00%	0.00%	0.00%	1.70%	Not calculated
1999	0.00%	0.00%	0.00%	0.00%	1.98%	Not calculated
2000	0.00%	0.00%	0.00%	0.00%	1.95%	Not calculated
2001	0.00%	0.00%	0.00%	0.00%	1.76%	Not calculated
2002	0.00%	0.00%	0.00%	0.00%	1.75%	Not calculated
2003	0.00%	0.00%	0.00%	0.00%	1.61%	Not calculated
2004	0.00%	0.00%	0.00%	0.00%	1.62%	Not calculated
2005	0.00%	0.00%	0.00%	0.00%	1.63%	1.54%
2006	0.00%	0.00%	0.00%	0.00%	1.55%	1.50%
2007	1.59%	0.00%	0.00%	1.59%	1.54%	1.61%
2008	1.59%	0.00%	0.00%	1.59%	2.18%	2.51%
2009	1.59%	0.00%	0.50%	2.09%	2.07%	2.58%
2010	1.59%	0.00%	0.50%	2.09%	2.07%	2.72%
2011	0.00%	0.00%	0.50%	0.50%	2.07%	2.72%
2012	0.50%	0.00%	0.50%	1.00%	2.02%	2.86%
2013	0.50%	1.20%	0.50%	2.20%	1.80%	3.09%
2014	0.50%	1.20%	0.50%	2.20%	1.77%	2.96%
2015	0.50%	1.20%	0.50%	2.20%	1.77%	3.01%
2016	0.50%	1.10%	0.50%	2.10%	1.81%	3.10%
2017	0.50%	1.09%	0.50%	2.09%	2.11%	3.67%
2018	0.50%	1.07%	0.50%	2.07%	2.09%	3.76%
2019	0.50%	1.04%	0.50%	2.04%	2.08%	3.91%

* From 2013 to 2015, it was assumed that contributions from court fees would remain level as a percentage of pay. Beginning in 2016 and thereafter, the amount shown is the assumed level dollar amount as a percentage of valuation payroll which is expected to go down over time.

** The Actuarially Sound Contribution (ASC) rate is the rate determined as of the valuation date to fund the normal cost and amortize the UAAL over a 31 year period. In all cases, the ASC is calculated as the total contribution necessary to meet the objective, including any expected contributions from court fees.

***LECOSRF did not receive any contributions for 14 years, from fiscal years 1994 through 2007.

SECTION D

RISKS ASSOCIATED WITH MEASURING THE ACCRUED LIABILITY AND ACTUARIALLY DETERMINED CONTRIBUTION

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

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 economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. **Other demographic risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The actuarially sound contribution rate may be considered as a minimum contribution rate that complies with State statute. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Currently, this, and other Board funding policy objectives are not being met. Users of this report should be aware that even contributions made at the actuarially sound contribution rate do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Ratio of the market value of assets to total payroll	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4
Ratio of actuarial accrued liability to payroll	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6
Ratio of actives to retirees and beneficiaries	2.6	2.8	3.1	3.4	3.6	3.7	4.1	4.4	4.8	5.4
Ratio of net cash flow to market value of assets	-5.2%	-4.4%	-3.8%	-3.4%	-3.3%	-2.6%	-5.0%	-5.6%	-1.7%	-1.0%
Duration of the actuarial accrued liability*	12.5	12.8								

*Duration measure not available before 2018

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally

expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Duration of Actuarial Accrued Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the actuarial accrued liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

SECTION E

SUMMARY OF PLAN PROVISIONS

Summary of Plan Provisions for Law Enforcement and Custodial Officer Supplemental Retirement Fund of the Employees Retirement System of Texas

Classes of Membership

1. Employee Class Membership:

- a. Membership is mandatory for all employees and appointed officers of every department, commission, board, agency, or institution of the State except for:
 - i. Independent contractors;
 - ii. Persons covered by the Teacher Retirement System or either of the Judicial Retirement Systems; and
 - iii. Employee Class Members already receiving retirement benefits under the System.
- b. Includes two types of Employee Class service:
 - i. CPO/CO: Certified Peace Officer / Custodial Officer – in general, service rendered while a law enforcement officer, custodial officer, parole officer or caseworker (collectively referred to as “LECOs”); and
 - ii. Regular: Non-CPO/CO service.
- c. Prior to September 1, 2015, membership begins after a 90-day waiting period. Effective September 1, 2015, membership begins immediately.

The benefits payable by the Law Enforcement and Custodial Officer Supplemental Retirement Fund (LECOSRF) only apply to members that have accrued CPO/CO service.

Member Contributions

1. 0.5% of compensation to LECOSRF in addition to contributions payable to ERS. Additional member contributions may be allowable for service purchases.
2. Member contributions cease when a member’s benefit accrual has reached 100% of Average Monthly Compensation.
3. Member contributions accumulate interest at 2.00% per year.

State of Texas and Employer Contributions

State contributions are set biennially by the legislature. The current sources of contributions are shown below.

1. *Payroll Contributions:* The current projected contribution rate for the State is 0.50% of compensation for the 2020 and 2021 fiscal years. State payroll contributions cease when a member’s benefit accrual has reached 100% of Average Monthly Compensation.
2. *Court Fees:* LECOSRF also receives a portion of the court fees collected under Section 133.102 of the Local Government Code. Based on historical information, the contribution from this source is expected to be approximately \$17.1 million for fiscal year 2020.

State contributions after the 2021 fiscal year are subject to future legislative appropriations.

Return to Work Surcharge

For members who, on or after September 1, 2009, retire from the employee class and are rehired as a retiree into a position that would otherwise include membership in the employee class, the department or agency that employs the member must remit to the retirement system an amount equal to the amount of the State contribution that the department or agency would remit for an active member employed in the person's position.

Compensation

Compensation includes base salary, longevity and hazardous duty pay and excludes overtime pay. This amount is limited by Section 401(a)(17) of the Internal Revenue Code for members hired after August 31, 1996.

Average Monthly Compensation (AMC)

1. *Members hired prior to September 1, 2009: Average of the 36 highest months of compensation for service in the employee class of membership*
2. *Members hired on or after September 1, 2009 and prior to September 1, 2013: Average of the 48 highest months of compensation for service in the employee class of membership*
3. *Members hired on or after September 1, 2013: Average of the 60 highest months of compensation for service in the employee class of membership.*

Creditable Service

The types of service creditable in LECOSRF are membership service, military service and equivalent membership service. Equivalent membership service includes: previously cancelled service, service not previously established, waiting period service, and Additional Service Credit.

Unused Sick and Annual Leave

In many cases, unused sick and annual leave can be used to establish Creditable Service. Members hired prior to September 1, 2009 can use unused sick and annual leave to satisfy service requirements for Retirement and Death Benefit Plan eligibility as well as to calculate plan benefits. Members hired on or after September 1, 2009 can only use unused sick and annual leave to calculate plan benefits. However, members hired on or after September 1, 2013 cannot use unused annual leave to calculate plan benefits if the member opts to receive the unused annual leave as a lump-sum payment.

Standard Service Retirement Annuity

1. Employee Class:

a. *Eligibility:*

- i. Any age with 20 years of CPO/CO service

b. *Benefits:* 0.5% of AMC times years of CPO/CO Service

d. *Applicable Reductions:*

- i. For members hired prior to September 1, 2009, retiring after attaining age 50 or after attaining Rule of 80, there is no reduction. Otherwise, the member receives the percentage of the benefit stated in the following table:

Attained Age at Retirement	Reduction Percentage	Attained Age at Retirement	Reduction Percentage
36	31.2%	43	55.3%
37	33.9%	44	60.1%
38	36.7%	45	65.3%
39	39.8%	46	71.1%
40	43.2%	47	77.3%
41	46.9%	48	84.2%
42	50.9%	49	91.7%

- ii. For members hired after on or after September 1, 2009, but prior to September 1, 2013, reduced five percent for each year the member retires prior to age 55, with a maximum possible reduction of 25 percent.
- iii. For members hired on or after September 1, 2013, reduced five percent for each year the member retires prior to age 57, with no maximum possible reduction.

- ### 2. Normal Form of Payment: Payable for the life of the member with any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Standard Non-Occupational Disability Annuity: None

Standard Occupational Disability Annuity

1. Employee Class (LECO Members):

a. *Eligibility:* Disability as a direct result of some risk or hazard inherent to law enforcement or custodial duties

i. Total: Incapable of substantial gainful activity and eligible for Social Security disability benefits

ii. Non-total: Does not satisfy definition of Total Disability

b. *Benefits:*

i. Non-total with less than 20 years of CPO/CO Service: 15% of AMC payable from LECOSRF

ii. Non-total with 20 years of CPO/CO Service: Benefit defined in the Service Retirement Supplement Section

iii. Total: 100% of AMC offset by the amount paid by ERS (ERS pays 2.3% of AMC times years of Creditable Service, but not less than 35% of AMC)

2. Normal Form of Payment: Annuity payable for life or until member is no longer incapacitated for the performance of duty. Any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Death Benefit Plan (DBP) Annuity Supplement

1. Eligibility:

a. 20 years of CPO/CO Service; and

i. Death occurs while an active member; or

ii. Death occurs while an inactive member, and the member either:

1. Filed a DBP prior to September 1, 2006; or

2. Was eligible for service retirement when the member became inactive.

2. Benefits: Benefits are calculated as if the member had elected to receive a Service Retirement Supplement under an optional form of payment, received a Service Retirement Supplement, and died immediately thereafter.

Deferred Service Retirement Annuity

1. Employee Class:

a. *Eligibility:*

- i. 20 years of CPO/CO service at termination of CPO/CO employment, and either;
 1. The member transfers to and retires from active regular class service; or
 2. The member terminates all employee class service, and the regular employee class account balance is not withdrawn from the ERS trust.

b. *Benefits:*

- i. Service Retirement Supplement, based on the member's age at benefit commencement. AMC used in calculating the benefit payable from the ERS trust and the LECOSRF will both be based on all employee class service.
- ii. Payments may commence at any age, provided that the member has terminated all employee class service. The member must retire simultaneously from the ERS trust and the LECOSRF.

2. Normal Form of Payment: Payable for the life of the member with any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Refund of Accumulated Contributions

A refund of accumulated contributions is payable in cases where a terminated member did not meet the eligibility requirements for an annuity, or a terminated member chooses to receive a refund of his or her account balance in lieu of an annuity.

Maximum Benefits

Annuity benefits are limited to 100% of Average Monthly Compensation. For members with CPO/CO service, this benefit limitation includes benefits from all sources (ERS and the Law Enforcement and Custodial Officer Supplemental Retirement Fund).

Limit on Plan Modifications

According to Section 811.006 of the Texas Government Code – a rate of member or State contributions to or a rate of interest required for the establishment of credit in the retirement system may not be reduced or eliminated, a type of service may not be made creditable in the retirement system, a limit on the maximum permissible amount of a type of creditable service may not be removed or raised, a new monetary benefit payable by the retirement system may not be established, and the determination of the amount of a monetary benefit from the system may not be increased, if, as a result of the particular action, the time, as determined by an actuarial valuation, required to amortize the UAAL of the retirement system would be increased to a period that exceeds 30 years by one or more years.

SECTION F

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016.

I. Valuation Date

The valuation date is August 31 of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

The actuarial valuation is used to determine the adequacy of the State contribution rate (established by Legislative appropriation) and employer contribution rate (established by statute) and to describe the current financial condition of LECOSRF.

The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the first step is to determine the contribution rate (level as a percentage of pay) required to provide the benefits to each member, or the normal cost rate. The normal cost rate consists of two pieces: (i) the member's contribution rate, and (ii) the remaining portion of the normal cost rate which is the employer's normal cost rate. The total normal cost rate is based on the benefits payable to each individual active member.

The Unfunded Actuarial Accrued Liability (UAAL) is the liability for future benefits which is in excess of (i) the actuarial value of assets, and (ii) the present value of future normal costs. The employer contribution provided in excess of the employer normal cost is applied to amortize the UAAL.

The funding period is calculated as the number of years required to fully amortize the UAAL, and is calculated with the use of an open group projection that takes into account: (a) future market earnings, net of investment-related expenses, will equal 7.50% per year, (b) there will be no changes in assumptions, (c) the number of active members will remain unchanged, (d) active members who leave employment will be replaced by new entrants each year, and (e) State and employer contributions will remain the same percentage of payroll as described in Section D of the valuation report.

The Entry Age actuarial cost method is an "immediate gain" method (i.e., experience gains and losses are separately identified as part of the UAAL). However, they are amortized over the same period applied to all other components of the UAAL.

III. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continue to be recognized on their original timeframe. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of investment-related expenses. The actuarial value of assets was reset to be equal to the market value of assets as of August 31, 2017 and the new method has been applied since that time.

IV. Actuarial Assumptions

Investment Return: 7.50% per year, net of investment-related expenses (composed of an assumed 2.50% inflation rate and a 5.00% real rate of return)

Administrative Expenses: 0.08% of valuation payroll per year

Salary Increases: Inflationary pay increases are assumed to occur at the beginning of the year and the remaining pay increases associated with merit, promotion and longevity are assumed to occur at the middle of the valuation year and vary by employee group. The components of the annual increases are:

Employee Group	Inflation *	Real Wage Growth (Productivity)	Merit, Promotion and Longevity
Employee Class	2.50%	included in Merit, Promotion and Longevity Increases	See sample rates

* Total liabilities for this valuation reflect the notable across-the-board pay increases appropriated by the State legislature for the current biennium compared to the assumed rate of inflation.

Annual Salary Increases for Merit, Promotion and Longevity Male and Female LECO Members						
Age	Years of Eligibility Service					
	0	1	2-4	5-8	9-17	18+
All	7.00 %	5.00 %	3.50 %	2.50 %	2.25 %	2.00 %

New Entrant Wage Growth: 3.00% per year, compounded annually (for increasing new hire salary in open group projection).

New Entrant Profile: The average new hire is determined based on a new entrant profile, which is created from the valuation data by determining the entry age and entry pay for anyone with greater than or equal to three but less than eight years of service as of the valuation date. Each group of new hires' salaries is assumed to grow at the New Entrant Wage Growth of 3.00% over the salaries of the previous year's group.

Age and Service Assumptions and Methods:

Eligibility Service:

Eligibility Service is considered to be all service eligible for vesting purposes, which includes service earned as a regular State employee, a LECO member, a member of the Elected Class, as State Judge, and service earned in the Teacher Retirement System of Texas ("TRS").

Benefit Service:

Current Benefit Service in years and months as of the valuation date was provided by ERS. This service plus Future Earned Service, Service Credit at Retirement, and Eligibility Service at Retirement were used to project benefit amounts.

Future Earned Service:

Active members were assumed to earn one additional year of service credit in each future year employed based on their current class of membership (but not beyond the amount of credit needed to provide a 100% of average monthly compensation standard service retirement annuity).

Service Credit at Retirement:

For LECO members, Benefit Service when eligible for service retirement is assumed to be increased by:

- 1.0 years if CPO/CO service, prior to adjustment, is at least 20 years; and
 - 0.5 years if CPO/CO service, prior to adjustment, is less than 20 years.
- (but not beyond the amount of credit needed to provide a 100% of average monthly compensation standard service retirement annuity).

Entry Age:

Entry age is calculated as the age at the valuation date minus Eligibility Service (excluding TRS service).

Decrement Timing: All decrements – mortality, service retirement, disability retirement, and termination of employment for reasons other than death or retirement – are assumed to occur at the middle of the valuation year.

Mortality Decrements:

Service Retirees, Beneficiaries, and Inactive Members

2017 State Retirees of Texas (SRT) mortality table. Generational mortality improvements in accordance with the ultimate rates from the scale most recently published by Retirement Plans Experience Committee of the Society of Actuaries ("Scale U-MP") and projected from the year 2017. Rates for male LECO members are set forward one year. Sample rates for the base mortality table included below.

Annual Mortality Rates per 100 Individuals		
Age	Males	Females
40	0.0603	0.0380
45	0.1059	0.0687
50	0.1825	0.1215
55	0.3145	0.2150
60	0.5421	0.3804
65	0.9344	0.6730
70	1.6105	1.1908
75	2.7757	2.1069
80	4.7842	3.7277
85	8.2459	6.5956
90	14.2527	11.7028

Active Members

RP-2014 Active Member Mortality table. Generational mortality improvements in accordance with Scale U-MP are projected from the year 2014.

Disability Retirees

RP-2014 Disabled Retiree Mortality. Generational mortality improvements in accordance with Scale U-MP are projected from the year 2014.

Occupational Death

1.0% of male and female active member deaths are assumed to be occupational.

Service Retirement Decrements: Graded tables based on ERS experience.

Active LECO Members

Service retirement rates are determined by the first set of eligibility requirements satisfied:

- Eligibility A: 20 years of CPO/CO service
- Eligibility B: Age 55 and 10 years of CPO/CO service
- Eligibility C: Any eligibility pertaining to regular State employees (see rates and adjustments for regular State employees)

Adjustments to the base rates are made to account for age at first eligibility or reduced retirement benefits, based on date of hire (described below sample table).

Base rates for eligible members:

Annual Service Retirement Rates LECO Members (Males & Females)			
Eligibility A		Eligibility B	
Age	20 yrs CPO/CO	Age	Age 55 & 10 yrs CPO/CO
<48	0.03		
48	0.04	55	0.20
49	0.05	56	0.18
50	0.60	57	0.16
51 - 61	0.33	58 - 61	0.14
62 - 74	0.50	62 - 74	0.27
75	1.00	75	1.00

Adjustments for members hired before September 1, 2013:

- Eligibility A and B: Rate set to zero if member has 18 or 19 years of CPO/CO service. Rate is doubled if member has 20 years of CPO/CO service. Adjustments only apply to members that attain 20 years of CPO/CO service prior to age 65.

Adjustments for members hired on or after September 1, 2013:

- Eligibility A: If age of 1st eligibility is before age 57, then
 - rates prior to age 57 are multiplied by 75% for each year prior to age 57
 - the rate at age 57 is 100%
- Eligibility B: If member will attain 20 years of CPO/CO service at or before age 62, rates are zero prior to age 62 and 100% when member attains 20 years of CPO/CO service.
- Eligibility B: If member will attain 20 years of CPO/CO service after age 62, then
 - rates prior to age 62 are multiplied by 75% for each year prior to age 62
 - the rate at age 62 is the base table rate plus 0.20 plus 0.06 times the number of years the age at 1st eligibility was before age 62

Disability Retirement Decrements: Graded Tables Based on ERS Experience

Active LECO Members

- The rates do not apply before a member is eligible for the benefit.
- Service greater than zero is required for occupational disability retirement.

- 10 years of service is required for non-occupational disability retirement.
- Non-occupational disability rates are assumed to be zero once the sum of the member's age and eligibility service is greater than or equal to 80, or the member has attained age 55 with 10 or more years of CPO/CO service.

Sample rates for members:

Annual Disability Rates per 100 Participants LECO Members	
Age	Males and Females
30	0.0092
35	0.0314
40	0.0586
45	0.0980
50	0.1774
55	0.2460
60	0.3150

95% of the disability rates stated above are assumed to be attributable to non-occupational disabilities, 4.5% are assumed to be attributable to non-total occupational disabilities, and 0.5% are assumed to be attributable to total occupational disabilities.

Termination Decrements for Reasons Other Than Death or Retirement: Graded Tables Based on ERS Experience.

Rates of termination are zero for members eligible for service retirement. To account for active members that accumulate additional eligibility service at retirement through converting sick/annual leave or other types of service purchases, termination rates are also set to zero in the year prior to first retirement eligibility.

Rates for members not eligible for service retirement:

Active LECO Members

Annual Rates of Termination per 100 Participants LECO Members	
Eligibility Service	Male and Female
0	23.00
1	19.22
2	15.36
3	12.48
4	10.36
5	8.81
6	7.67
7	6.81
8	6.11
9	5.52
10	4.96
11	4.42
12	3.90
13	3.43
14	3.07
15	2.90
16	2.50
17	1.00
18	1.00
19+	0.00

Withdrawal of Employee Contributions: Every member that terminates employment and does not have a benefit payable from this plan is assumed to withdraw their employee contributions.

Percentage of Members Electing Various Benefit Options:

Sex / Benefit	Standard Life Annuity	Option 1	Option 4
Male Member			
Disability	50%	50%	0%
Service Retirement	60%	40%	0%
Death Benefit Plan	0%	85%	15%
Female Member			
Disability	75%	25%	0%
Service Retirement	100%	0%	0%
Death Benefit Plan	0%	70%	30%

The value of the Standard Service Retirement Life Annuity reflects the return of excess contributions payable as a lump sum death benefit in cases the annuity benefits paid are less than the member account balance at the time of retirement.

Beneficiary Characteristics: Males are assumed to be two years older than females.

Transfers from ERS to TRS:

Contributing ERS members:

It is assumed that 10% of regular State employees and LECO members who cease contributing to ERS and do not withdraw employee contributions will transfer ERS service credit to TRS at retirement.

Noncontributing ERS Members:

Records of ERS and TRS are matched by ERS staff to determine former ERS members who are currently contributing under TRS.

TRS Retirement Age:

Former ERS members who are, or are assumed to become, contributing TRS members are assumed to continue to earn service credit under TRS until first eligible for unreduced service retirement benefits, retire at that time, and transfer ERS service credit to TRS.

Census Data and Assets

- The valuation was based on members of LECOSRF as of August 31, 2019 and does not take into account future members, with the exception of determining the funding period.
- All census data was supplied by ERS and was subject to reasonable consistency checks.
- There were data elements that were modified for some members as part of the valuation in order to make the data complete. However, the number of missing data items was immaterial.
- Asset data was supplied by ERS.

Other Actuarial Valuation Procedures

- No provision was made in this actuarial valuation for the limitations of Internal Revenue Code Sections 415 or 401(a)17.

- Valuation payroll (earnings applied to the current valuation year) is the expected payroll for the fiscal year following the valuation date. It is based on reported payroll determined from August member contributions increased to reflect the across-the-board salary increases appropriated by the State legislature, effective on or after September 1, and projected according to the actuarial assumptions for the upcoming fiscal year.
- No liability was included for benefits which are funded by special State appropriations.
- State appropriations for membership fees are currently immaterial in relation to the overall payroll contributions and have been ignored.

SECTION G

DETAILED SUMMARIES OF MEMBERSHIP DATA

Detailed Summaries of Membership Data

<u>Table</u>	<u>Page</u>	
A	G-2	Summary of Membership Data
B	G-3	Active Members: Distribution by Age and Service
C	G-4	Retired and Beneficiary Members: Distribution by Age and Category

Table A

Summary of Membership Data

Active Members

Item	Male	Female	Total
Number of Members	21,983	14,313	36,296
Average Annual Salaries	\$ 48,534	\$ 40,346	\$ 45,305
Average Age	41.0	40.9	41.0
Average Entry Age	32.7	33.8	33.2
Average Service	8.3	7.1	7.8

Annuitants

Item	Number	Annual Annuities	Average Annuities	Average Age
Service Retirees*	13,111	\$ 72,901,872	\$ 5,560	62.8
Beneficiaries	779	\$ 3,076,764	\$ 3,950	72.8
Disability Retirees	91	\$ 807,828	\$ 8,877	68.8
Total	13,981	\$ 76,786,464	\$ 5,492	63.4

* Average Age and Service at Retirement for Service Retirees are 54.0 and 23.6, respectively

Inactive Members Assumed Eligible for Deferred Annuities

Item	Number	Annual Annuities	Average Annuities	Average Age
Participants with Deferred Benefits	111	\$ 1,151,028	\$ 10,370	48.8

Non-vested Inactive Members

Item	Number	Account Balances	Average Account Balances	Average Age
Non-vested Members	22,096	\$ 6,157,911	\$ 279	35.9

Table B
Active Members
Distribution by Age and Service

Age	Years of Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
Under 25	4,000 \$ 34,159	18 \$ 44,132								4,018 \$ 34,203
25 - 29	3,640 \$ 39,949	797 \$ 46,669	20 \$ 45,144							4,457 \$ 41,174
30 - 34	2,491 \$ 40,049	1,336 \$ 51,062	567 \$ 51,634	20 \$ 56,022						4,414 \$ 44,943
35 - 39	1,999 \$ 38,974	996 \$ 48,026	1,033 \$ 56,382	406 \$ 61,057	23 \$ 58,278					4,457 \$ 47,143
40 - 44	1,638 \$ 38,632	764 \$ 45,873	822 \$ 52,825	748 \$ 62,677	523 \$ 60,550	28 \$ 70,637				4,523 \$ 49,143
45 - 49	1,436 \$ 38,477	760 \$ 45,225	743 \$ 49,817	763 \$ 58,400	1,049 \$ 62,727	561 \$ 64,201	14 \$ 85,644			5,326 \$ 51,486
50 - 54	1,190 \$ 38,353	679 \$ 43,925	743 \$ 47,199	502 \$ 50,779	421 \$ 63,697	257 \$ 75,236	76 \$ 95,240			3,868 \$ 48,970
55 - 59	908 \$ 37,049	642 \$ 42,994	560 \$ 44,742	417 \$ 48,707	206 \$ 52,828	82 \$ 66,161	42 \$ 87,647	6 \$ 110,036		2,863 \$ 44,449
60 - 64	455 \$ 37,191	447 \$ 42,024	355 \$ 45,854	216 \$ 45,865	96 \$ 49,863	34 \$ 56,405	12 \$ 83,120	4 \$ 65,588		1,619 \$ 43,148
Over 64	223 \$ 37,375	255 \$ 43,114	141 \$ 43,116	80 \$ 46,565	35 \$ 47,643	15 \$ 69,390	2 \$ 49,224			751 \$ 42,530
Total	17,980 \$ 37,975	6,694 \$ 46,410	4,984 \$ 50,429	3,152 \$ 56,087	2,353 \$ 60,757	977 \$ 67,261	146 \$ 90,509	10 \$ 92,257		36,296 \$ 45,305

Table C
Retired and Beneficiary Members
Distribution by Age and Category

Age Last Birthday	Number	Annual Benefit	Average Annual Benefit
Service Retirees			
Under 60	5,456	31,932,156	5,853
60 - 64	2,785	15,723,480	5,646
65 - 69	2,324	11,813,652	5,083
70 - 74	1,459	7,515,852	5,151
75 - 79	637	3,295,128	5,173
Over 79	450	2,621,604	5,826
Total	13,111	72,901,872	5,560
Beneficiaries			
Under 60	102	436,644	4,281
60 - 64	77	341,916	4,440
65 - 69	116	403,956	3,482
70 - 74	133	484,548	3,643
75 - 79	116	449,484	3,875
Over 79	235	960,216	4,086
Total	779	3,076,764	3,950
Disabled Retirees			
Under 60	23	173,016	7,522
60 - 64	15	106,272	7,085
65 - 69	8	47,544	5,943
70 - 74	17	224,340	13,196
75 - 79	13	112,152	8,627
Over 79	15	144,504	9,634
Total	91	807,828	8,877
Grand Total	13,981	76,786,464	5,492

SECTION H

GLOSSARY

Glossary

Actuarial Accrued Liability (AAL): That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

Actuarial Assumptions: Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

Actuarial Cost Method or Funding Method: A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

Actuarial Gain or Actuarial Loss: A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the Fund's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

- a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.),
- b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
- c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.

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 plan. An Actuarial valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB.

Actuarial Value of Assets or Valuation Assets: The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: That portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Actuarially Determined Contribution (ADC) or Annual Required Contribution (ARC): A calculated contribution for a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically the calculated contribution has a normal cost payment and an amortization payment.

Closed Amortization Period: A specific number of years that is counted down by one each year and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decrements: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: An employer-sponsored retirement benefit that provides workers, upon attainment of designated age and service thresholds, with a monthly benefit based on the employee's salary and

length of service. The value of a benefit from a defined benefit plan is generally not affected by the return on the assets that are invested to fund the benefit.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Experience Study: A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Funding Period or Amortization Period: The term "Funding Period" is used in two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period is chosen by the Board of Trustees. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: The Governmental Accounting Standards Board is an organization that exists in order to promulgate accounting standards for governmental entities.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.

Unfunded Actuarial Accrued Liability: The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or Actuarial Valuation Date: The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

Judicial Retirement System of Texas, Plan 2

Annual Actuarial Valuation - Funding
As of August 31, 2019



December 4, 2019

Board of Trustees
Employees Retirement System of Texas
200 East 18th Street
Austin, TX 78701

Re: Actuarial Valuation for Funding Purposes as of August 31, 2019

Members of the Board:

We certify that the information contained in this report is accurate and fairly presents the actuarial position of the Judicial Retirement System of Texas, Plan 2 (JRS-2) as of August 31, 2019. This report was prepared at the request of the Board and is intended for use by ERS staff and those designated or approved by the Board. This report may be provided to parties other than ERS only in its entirety and only with the permission of the Board.

Actuarial Valuation

The primary purposes of the actuarial valuation report are to determine the adequacy of the current State and employer contribution rates, describe the current financial condition of JRS-2, analyze changes in the condition of JRS-2, and provide various summaries of the data.

The current financial outlook for JRS-2 is very poor. It is important to understand that the currently scheduled contributions are not expected to accumulate sufficient assets in order to pay all of the currently scheduled benefits when due. Based on current expectations and assumptions, JRS-2 is projected to remain solvent until the year 2076. Contributions must materially increase in the next legislative session to secure the benefits for current members.

Plan Provisions

Our actuarial valuation as of August 31, 2019 reflects the benefit and contribution provisions set forth in Chapters 836 through 840 of the Texas Government Code. The current plan provisions are outlined in Section E of this report.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016. Additionally, this actuarial valuation incorporates the notable across-the-board pay increases budgeted by the State Legislature when they are granted for the current biennium. The current actuarial assumptions and methods are outlined in Section F of this report.

Data

The valuation was based upon information as of August 31, 2019, furnished by ERS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ERS staff.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Internal Revenue Code and ERISA.

The signing actuaries are independent of the plan sponsor. Mr. Falls, Mr. Newton and Ms. Woolfrey are Enrolled Actuaries and Fellows of the Society of Actuaries, and all of the undersigned are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, each of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



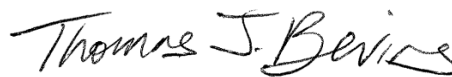
R. Ryan Falls, FSA, EA, MAAA
Senior Consultant & Actuary



Dana Woolfrey, FSA, EA, MAAA
Consultant & Actuary



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



Thomas J. Bevins, ASA, MAAA
Actuary

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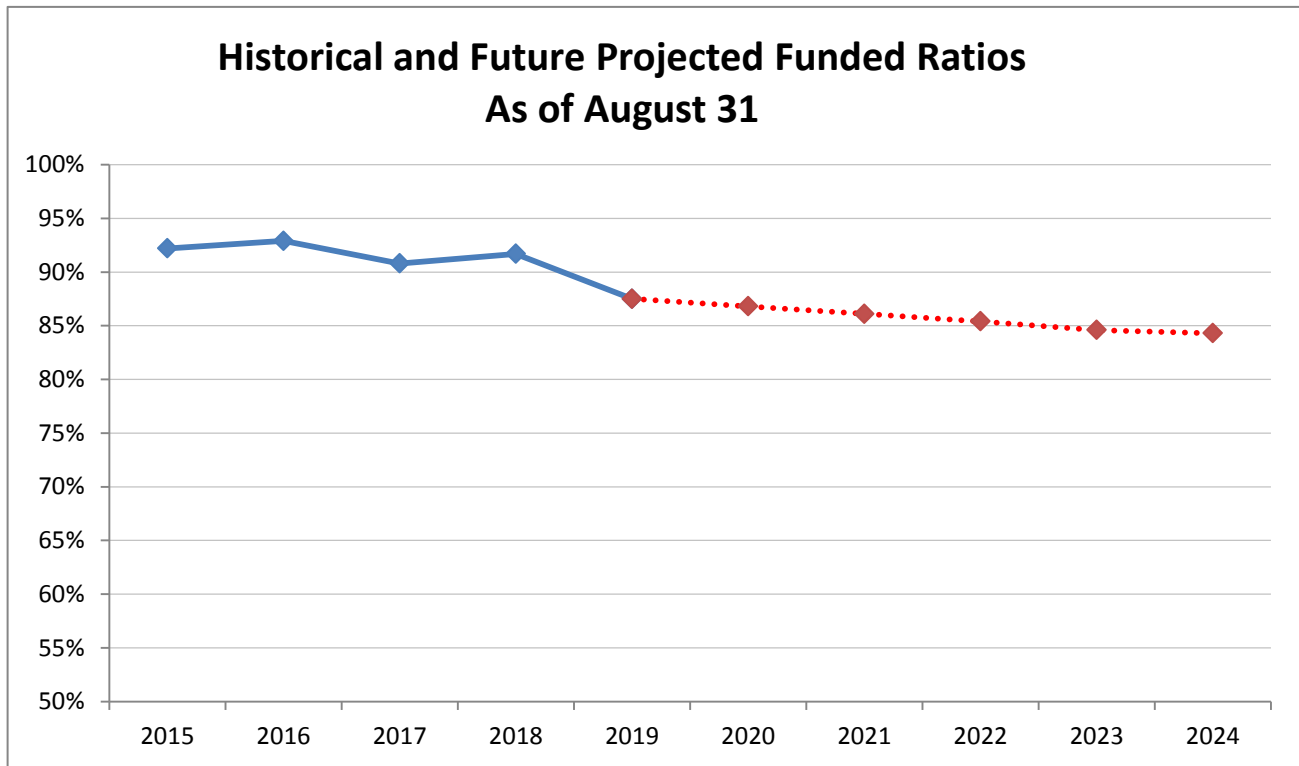
SECTION A

EXECUTIVE SUMMARY

Executive Summary

Item	2019	2018
Membership <ul style="list-style-type: none"> • Number of <ul style="list-style-type: none"> - Active members 573 - Retirees and beneficiaries 472 - Inactive, vested 16 - Inactive, nonvested 171 - Total 1,232 • Valuation Payroll \$ 91,026,600 		561 393 12 141 1,107 \$ 80,072,000
Statutory contribution rates <ul style="list-style-type: none"> • Members FY 2020 9.39% • State 15.663% 		FY 2019 7.46% 15.663%
Actuarially Sound Rate (funds normal cost and amortizes unfunded accrued liability over 31 years, per Section 840.106 of the Texas Government Code)	27.84%	23.84%
Assets <ul style="list-style-type: none"> • Market value (MVA) \$ 456,192,249 • Actuarial value (AVA) \$ 467,787,034 • Return on market value (gross) 3.04% • Return on market value (net) 3.00% • Return on actuarial value 7.0% 		\$ 453,379,786 \$ 447,077,710 9.58% 9.54% 7.9%
Actuarial Information on AVA (smoothed) <ul style="list-style-type: none"> • Normal cost % 23.14% • Total normal cost \$ 21,063,555 • Actuarial accrued liability \$ 534,563,746 • Unfunded actuarial accrued liability (UAAL) \$ 66,776,712 • Funded ratio 87.5% • Funding period (years) Never 		20.83% \$ 16,678,998 \$ 487,771,546 \$ 40,693,836 91.7% 69
Actuarial Information on MVA <ul style="list-style-type: none"> • Unfunded actuarial accrued liability (UAAL) \$ 78,371,497 • Funded ratio 85.3% 		\$ 34,391,760 92.9%

The following chart illustrates the recent history and outlook of the funded status of JRS-2 over the next five years:



August 31,	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Funded Ratio	92.2%	92.9%	90.8%	91.7%	87.5%	86.8%	86.1%	85.4%	84.6%	84.3%
UAAL (in millions)	\$31.4	\$30.4	\$42.8	\$40.7	\$66.8	\$73.7	\$81.0	\$88.6	\$96.5	\$101.7
ASC	23.79%	23.48%	23.85%	23.84%	27.84%	28.21%	28.57%	28.94%	29.30%	29.48%

The projections beyond 2019 are based on the same assumptions, methods and provisions used for the August 31, 2019 valuation, which include the notable across-the-board pay increases budgeted by the State Legislature when they are granted and the assumptions adopted by the Board in August 2017. Additionally, the market value of assets is expected to earn 7.5% per year.

Currently scheduled member and State contributions are not expected to accumulate sufficient assets in order to pay all of the currently scheduled benefits when due. Based on current expectations and assumptions, JRS-2 is projected to have money in the trust fund until the year 2076. After which, the funding would revert to a pay-as-you-go status. **When JRS-2 reverts to a pay-as-you-go status, the required Legislative appropriation for JRS-2 will immediately almost quadruple (i.e., increase by approximately 3.5 times), and remain at that level, in order to ensure all retirees continue to receive their promised benefit.** Therefore, for the current benefit structure to be sustainable, the contribution levels will need to be increased.

SECTION B

DISCUSSION

Discussion

Introduction

The results of the August 31, 2019 actuarial valuation of the Judicial Retirement System of Texas, Plan 2 (JRS-2) are presented in this report.

The primary purposes of this actuarial valuation report are to determine the adequacy of the current State and employer contribution rates, describe the current financial condition of JRS-2, analyze the changes in the condition of JRS-2, and provide various summaries of the data.

The total contribution rate for the current fiscal year exceeds the normal cost by 1.913% of payroll, which, on both an actuarial and market value of assets basis, is not sufficient to amortize the unfunded liability over a finite period of time. Based on current expectations and assumptions, JRS-2 is expected to remain solvent until 2076, after which the funding would revert to a pay-as-you-go status.

All of the tables referenced in the following discussion appear in Section C of this report.

Plan Provisions

During the most recent legislative session, the Texas Legislature enacted House Bill 2384. House Bill 2384 increases the member contribution rate to 9.50% of member's compensation for service after August 31, 2019. Additionally, House Bill 2384 clarifies that the retirement annuity for visiting judges who earn additional service credit will be based on their last salary while actively serving in office, not the salary earned while a visiting judge.

Although not considered a plan change, House Bill 2384 also restructured the compensation and resulting retirement benefits for State judges, prompting a change to the assumption for long term salary increases, as noted in the subsection below.

The current plan provisions are outlined in Section E of this report.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016. We believe the assumptions are internally consistent and are reasonable, based on the actual experience of JRS-2.

The actuarial valuation as of August 31, 2019 incorporates the notable across-the-board pay increases budgeted by the State Legislature when they are granted for the current biennium. Specifically, judges were assumed to begin receiving salaries based on the new judicial salary schedule, as enacted by House Bill 2384, on September 1, 2019. This resulted in significant salary increases for many judges, specifically for those with longer service tenures.

The recent changes in the judicial salary structure prompted a change to the long term growth assumption for judicial salaries from 2.75% to 2.50%. The assumed salary progression for a State judge was also updated to incorporate the scheduled service-based increases according to the State judicial salary

schedule, as enacted by House Bill 2384. All other assumptions and methods are the same as the prior valuation.

The results of the actuarial valuation are dependent upon 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. A review of the impact of a different set of assumptions on the funded status of JRS-2 is outside the scope of this actuarial valuation.

The current actuarial assumptions and methods are outlined in Section F of this report.

Funding Adequacy

The Board of Trustees of ERS approved the Pension Funding Priorities and Guidelines on May 23, 2018. For the Board, adoption of this policy was intended to:

- enhance communications and provide transparency to the Legislature and plan members and retirees regarding Board of Trustees' positions on plan funding strategy;
- provide policy guidance to current and future Boards; and
- ensure that legislators, elected officials and other stakeholders have clear and accurate information about the Trust's funding goals and the needs of the Board in supporting sound fiduciary investment decisions in accordance with Texas Government Code Section 815.106.

This policy also stated that the main objective of ERS' retirement programs is to fully fund the long-term cost of benefits provided by statute, through disciplined and timely accumulation of contributions and prudent investment of assets to deliver earned benefits on a continuing basis. In support of this objective, the policy laid out a multi-level funding period goal to gradually achieve funding on sound actuarial principles:

1. Avoid trust fund depletion of the pre-funded plans,
2. Meet current statutory standard of a 31-year funding period for unfunded liabilities, per Texas Government Code Sections 811.006 and 840.106, and
3. Match funding period to the average years of service at retirement once a 31-year funding period is achieved, and closed.

The member contribution rates are established by State statute and the State contribution rate is set by State statute and legislative appropriation. For the fiscal year beginning September 1, 2019, members accruing benefits contribute 9.50% of payroll and the State contributes 15.663% of payroll. Since some active JRS-2 members have elected to cease contributing to the plan as well as cease accruing additional benefits, the effective member contribution rate for the fiscal year beginning September 1, 2019 is 9.39% of payroll. This State contribution rate is subject to future legislative appropriations.

The unfunded actuarial accrued liability (UAAL) of JRS-2 increased from \$40.7 million as of August 31, 2018 to \$66.8 million as of August 31, 2019. Additionally, the funded ratio of JRS-2—actuarial value of assets divided by the actuarial accrued liability—decreased from 91.7% to 87.5% as of August 31, 2019. This deterioration in plan funding levels was primarily due to the new judicial salary schedule, as enacted by House Bill 2384. The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit

obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

The valuation shows that the total normal cost for funding purposes is 23.14% of payroll. The total contribution rate is 25.053% of payroll for the current fiscal year. The total contribution rate for the current fiscal year exceeds the normal cost by 1.913% of payroll, which is not sufficient to amortize the UAAL over a finite period of time. As assuming the market value of assets earns 7.50% per year, JRS-2 is projected to remain solvent until the year 2076, after which the funding would revert to a pay-as-you-go status. **As a result, the first level of the Board's funding period goal is not currently being realized.**

The second level of the Board's funding period goal is to fund the sum of the normal cost and the amount necessary to amortize any unfunded actuarial accrued liability over a period that does not exceed 30 years by one or more years. Further, Section 840.106 of the Texas Government Code also limits the modifications to JRS-2 that would, essentially, increase benefits or lower contributions to the trust unless the current level of benefits and contributions are expected to amortize any unfunded actuarial accrued liability over a period that does not exceed 30 years by one or more years. In this context, the Actuarially Sound Contribution (ASC) rate is the contribution rate that meets this standard. Based on the actuarial valuation as of August 31, 2019, the ASC rate for JRS-2 is 27.84% of payroll. **Based on the total contribution rate of 25.053% of payroll, the second level of the Board's funding period goal is not currently being realized.**

The ASC is currently calculated based on a 31-year open amortization period. This means that the ASC will always be calculated with the same 31-year period and the UAAL would never completely be eliminated. We recommend that the Board seek a plan funding strategy that meets the third level of the Board's funding period goal or meets an ultimate goal of eliminating the UAAL by a certain date.

System Assets

This report contains several tables that summarize key information with respect to the JRS-2 assets.

The total market value of assets increased from \$453.4 million to \$456.2 million as of August 31, 2019. Table 5 reconciles the changes in the fund during the year. Total contributions increased from \$18.5 million in fiscal year 2018 to \$19.6 million in fiscal year 2019.

Table 6 shows the development of the Actuarial Value of Assets (AVA). The current AVA method recognizes each year's gain or loss over a closed five year period and allows for direct offsetting of gains and losses. The AVA increased from \$447 million to \$468 million as of August 31, 2019.

When measured on a market value, the approximate gross investment return for the fiscal year ending August 31, 2019 was 3.04%, and the return net of investment expenses was 3.00%. When measured on an actuarial value, the net investment return was 7.0%. Table 7 shows a history of return rates. The JRS-2 ten-year average market return, gross of all expenses as reported by the ERS Master Trust Custodian, is 8.20%. The ten-year average return net of investment expenses is 8.09%.

Table 8 provides a history of the contributions paid into JRS-2 and the administrative expenses and benefit payments that have been paid out of JRS-2. This table shows that JRS-2 paid administrative expenses and benefit payments, in excess of contributions received, of \$6.7 million (or 1.5% of assets) in fiscal year 2018 and the amount was \$10.0 million (or 2.2% of assets) in fiscal year 2019. ERS should continue to monitor this deficit as it could impact the future liquidity needs of JRS-2. Table 11 provides a history of contribution

rates, as a percent of payroll, paid into the trust by the State, agencies, and members. This table also shows a history of the total normal cost and the Actuarially Sound Contribution (ASC).

Data

The valuation was based upon information as of August 31, 2019, furnished by ERS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ERS staff.

The tables in Section G show key census statistics for the various groups included in the valuation.

SECTION C

TABLES

Table 1 Development of Employer Cost

	<u>August 31, 2019</u>	<u>August 31, 2018</u>
1. Payroll		
a. Reported Payroll (August Payroll of Active Members)	\$ 81,710,000	\$ 80,072,000
b. Valuation Payroll (Expected Covered Payroll for Following Plan Year)	91,026,600	80,072,000
2. Total Normal Cost Rate		
a. Gross normal cost rate	22.81%	20.50%
b. Administrative expenses	0.33%	0.33%
c. Total (Item 2a + Item 2b)	<u>23.14%</u>	<u>20.83%</u>
3. Actuarial Accrued Liability for Active Members		
a. Present value of future benefits for active members	\$ 335,516,196	\$ 314,011,342
b. Less: present value of future normal costs	<u>(123,298,533)</u>	<u>(83,398,816)</u>
c. Actuarial accrued liability	\$ 212,217,663	\$ 230,612,526
4. Total Actuarial Accrued Liability for:		
a. Retirees and beneficiaries	\$ 308,068,547	\$ 246,496,810
b. Inactive members	14,277,536	10,662,210
c. Active members (Item 3c)	<u>212,217,663</u>	<u>230,612,526</u>
d. Total	\$ 534,563,746	\$ 487,771,546
5. Actuarial Value of Assets	\$ 467,787,034	\$ 447,077,710
6. Unfunded Actuarial Accrued Liability (UAAL) (Item 4d - Item 5)	\$ 66,776,712	\$ 40,693,836
7. Contribution Rate Needed to Fund Normal Cost Plus Amortize the UAAL Over 31 Years	27.84%	23.84%
8. Allocation of Contribution Rate		
a. Employer rate	15.663%	15.663%
b. Member rate	9.39%	7.46%
c. Total contribution rate	<u>25.053%</u>	<u>23.123%</u>
d. Total normal cost rate	23.14%	20.83%
e. Available contribution rate to amortize UAAL	<u>1.913%</u>	<u>2.293%</u>
f. Total contribution rate	25.053%	23.123%
9. Funding period based on statutory contribution rates and Actuarial Value of Assets (years)	Never	69

Table 2
Actuarial Present Value of Future Benefits

	<u>August 31, 2019</u>	<u>August 31, 2018</u>
1. Active Members		
a. Service Retirement	\$ 306,898,474	\$ 267,690,585
b. Disability Benefits	3,693,678	2,891,604
c. Death Before Retirement	8,636,983	31,290,493
d. Termination	<u>16,287,061</u>	<u>12,138,660</u>
e. Total	\$ 335,516,196	\$ 314,011,342
2. Inactive Members	\$ 14,277,536	\$ 10,662,210
3. Annuitants	\$ 308,068,547	\$ 246,496,810
4. Total Actuarial Present Value of Future Benefits	\$ 657,862,279	\$ 571,170,362

Table 3

Analysis of Normal Cost

	<u>August 31, 2019</u>	<u>August 31, 2018</u>
1. Gross Normal Cost Rate		
a. Service Retirement	19.42%	15.51%
b. Disability Benefits	0.43%	0.40%
c. Death Before Retirement	0.68%	2.66%
d. Termination	2.28%	1.93%
e. Total	22.81%	20.50%
2. Administrative Expenses	0.33%	0.33%
3. Total Normal Cost	23.14%	20.83%
4. Less: Member Rate	9.39%	7.46%
5. Employer Normal Cost Rate	13.75%	13.37%

Table 4
Historical Summary of Active Member Data

Valuation as of August 31, (1)	Active Members		Covered Payroll		Average Salary		Average Age (8)	Average Service (9)
	Number (2)	Percent Increase (3)	Annual Payroll (\$) (4)	Percent Increase (5)	\$ Amount (6)	Percent Increase (7)		
2008	518	N/A	66,110,000	N/A	127,625	N/A	54.9	9.4
2009	533	2.9%	67,967,500	2.8%	127,519	-0.1%	55.2	9.0
2010	539	1.1%	68,755,000	1.2%	127,560	0.0%	55.8	9.5
2011	546	1.3%	69,655,000	1.3%	127,573	0.0%	55.7	9.2
2012	541	-0.9%	68,777,500	-1.3%	127,130	-0.3%	56.5	10.0
2013	545	0.7%	69,515,000	1.1%	127,550	0.3%	56.5	9.6
2014	554	1.7%	79,122,500	13.8%	142,820	12.0%	57.3	10.2
2015	563	1.6%	80,352,000	1.6%	142,721	-0.1%	56.9	9.3
2016	548	-2.7%	78,238,000	-2.6%	142,770	0.0%	57.4	10.1
2017	557	1.6%	79,330,000	1.4%	142,424	-0.2%	57.2	9.8
2018	561	0.7%	80,072,000	0.9%	142,731	0.2%	57.8	10.4
2019	573	2.1%	81,710,000	2.0%	142,600	-0.1%	56.4	8.5

Table 5 Reconciliation of Plan Net Assets

	Year Ending	
	August 31, 2019 (1)	August 31, 2018 (2)
1. Market value of assets at beginning of year	\$ 453,379,786	\$ 420,850,181
2. Revenue for the year		
a. Contributions for the year		
i. State (including membership fees)	\$ 13,100,263	\$ 12,559,722
ii. Member (including penalty interest)	6,462,797	5,939,830
iii. Total	<u>\$ 19,563,060</u>	<u>\$ 18,499,552</u>
b. Net investment income	\$ 12,832,187	\$ 39,191,536
c. Total revenue	\$ 32,395,247	\$ 57,691,088
3. Disbursements for the year		
a. Benefit payments and refunds	29,220,121	\$ 24,865,580
b. Administrative expenses	362,663	295,903
c. Total expenditures	<u>29,582,784</u>	<u>25,161,483</u>
4. Increase in net assets (Item 2c - Item 3c)	\$ 2,812,463	\$ 32,529,605
5. Market value of assets at end of year (Item 1 + Item 4)	\$ 456,192,249	\$ 453,379,786

Table 6 Development of Actuarial Value of Assets

	Year Ending August 31, 2019					
1. Market value of assets at beginning of year	\$ 453,379,786					
2. Net new investments						
a. Contributions for the year (Table 5)	\$ 19,563,060					
b. Disbursements for the year (Table 5)	(29,582,784)					
c. Subtotal	(10,019,724)					
3. Market value of assets at end of year	\$ 456,192,249					
4. Net earnings (Item 3 - Item 1 - Item 2)	\$ 12,832,187					
5. Assumed investment return rate for fiscal year	7.50%					
6. Expected return	\$ 33,627,744					
7. Excess return (Item 4 - Item 6)	\$ (20,795,557)					
8. Development of amounts to be recognized as of August 31, 2019:						
Fiscal Year End	Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
	(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
2015	\$ 0	\$ 0	\$ 0	1	\$ 0	\$ 0
2016	0	0	0	2	0	0
2017	0	0	0	3	0	0
2018	6,302,076	(6,302,076)	0	4	0	0
2019	(20,795,557)	6,302,076	(14,493,481)	5	(2,898,696)	(11,594,785)
Total	\$ (14,493,481)	\$ 0	\$ (14,493,481)		\$ (2,898,696)	\$ (11,594,785)
9. Actuarial value of assets as of August 31, 2019 (Item 3 - Item 8, Column 6)	\$ 467,787,034					
10. Ratio of actuarial value to market value	102.5%					

Table 7
History of Investment Return Rates

Year Ending August 31 of	Market Returns (Gross)	Market Returns (Net)	Actuarial
(1)	(2)	(3)	(4)
1998	8.30%	8.23%	N/A
1999	16.26%	16.46%	N/A
2000	9.43%	9.40%	N/A
2001	-6.91%	-6.93%	N/A
2002	-7.17%	-7.21%	N/A
2003	9.20%	9.14%	5.2%
2004	11.69%	11.64%	6.2%
2005	12.71%	12.62%	7.5%
2006	8.83%	8.76%	7.7%
2007	13.88%	13.76%	8.8%
2008	-4.58%	-4.69%	5.9%
2009	-6.60%	-6.71%	3.5%
2010	6.65%	6.48%	4.1%
2011	12.58%	12.36%	5.7%
2012	8.22%	8.04%	7.6%
2013	10.07%	9.87%	8.0%
2014	14.70%	14.58%	9.3%
2015	0.49%	0.44%	7.4%
2016	5.32%	5.28%	7.0%
2017	12.15%	12.11%	7.8%
2018	9.58%	9.54%	7.9%
2019	3.04%	3.00%	7.0%
Average Returns			
Last Five Years:	6.03%	5.99%	7.4%
Last Ten Years:	8.20%	8.09%	7.2%
Last Fifteen Years:	6.94%	6.84%	7.0%
Last Twenty Years:	5.92%	5.83%	N/A

Market returns provided by ERS Master Trust Custodian.

Rates in Column (2) represent the market returns gross of all expenses.

Rates in Column (3) represent the market returns net of investment expenses.

Net returns may exceed gross returns in years where adjustments are made to fee expenses.

Table 8
History of Cash Flow

Year Ending August 31, (1)	Contributions (2)	Distributions and Expenditures			External Cash Flow for the Year (7)	Market Value of Assets (8)	External Cash Flow as Percent of Market Value (9)
		Benefit Payments and Refunds (3)	Administrative Expenses (5)	Total (6)			
2007	15,034	(5,805)	(395)	(6,200)	8,834	217,665	4.1%
2008	15,102	(6,717)	(244)	(6,962)	8,141	215,041	3.8%
2009	15,579	(8,229)	(240)	(8,469)	7,110	205,730	3.5%
2010	15,632	(9,407)	(277)	(9,684)	5,948	225,265	2.6%
2011	16,224	(11,768)	(286)	(12,054)	4,170	259,624	1.6%
2012	8,321	(12,982)	(230)	(13,212)	(4,891)	295,913	-1.7%
2013	8,817	(14,869)	(228)	(15,098)	(6,281)	318,385	-2.0%
2014	17,406	(16,420)	(267)	(16,687)	719	365,290	0.2%
2015	17,922	(19,238)	(284)	(19,522)	(1,600)	364,510	-0.4%
2016	18,129	(21,155)	(226)	(21,381)	(3,252)	381,120	-0.9%
2017	18,511	(23,361)	(295)	(23,656)	(5,145)	420,850	-1.2%
2018	18,500	(24,866)	(296)	(25,162)	(6,662)	453,380	-1.5%
2019	19,563	(29,220)	(363)	(29,583)	(10,020)	456,192	-2.2%

Dollar amounts in thousands

Table 9 Total Experience Gain or Loss

Item (1)	Year Ending August 31, 2019 (2)	Year Ending August 31, 2018 (3)
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	\$ 40,693,836	\$ 42,753,509
2. Normal cost for the year (excluding administrative expenses)	16,414,760	16,056,392
3. Actual administrative expenses	362,663	295,903
4. Contributions for the year (excluding service purchases)	(19,093,012)	(18,425,579)
5. Interest at 7.5%		
a. On UAAL	\$ 3,052,038	\$ 3,206,513
b. On normal cost and administrative expenses	629,153	613,211
c. On contributions	(715,988)	(690,959)
d. Total	\$ 2,965,203	\$ 3,128,765
6. Assumption change (Gains)/Losses	\$ (1,930,114)	\$ 0
7. Legislative changes*		
a. Plan Changes due to HB2384	(1,802,177)	0
b. Legislated Pay Changes due to HB2384	24,932,680	0
c. Total	\$ 23,130,503	\$ 0
8. Expected UAAL (Sum of Items 3 through 8)	62,543,839	43,808,990
9. Actual UAAL	66,776,712	40,693,836
10. Total (gain)/loss for the year (Item 10 - Item 9)	\$ 4,232,873	\$ (3,115,154)
B. Source of gains and losses		
	% of AAL	
11. Asset (Gain)/Loss for the year	0.45%	\$ (1,575,519)
12. Pay Increases (Less)/Greater than Expected	0.12%	426,758
13. Non-Retired Demographic (Gains)/Losses	0.42%	(2,609,238)
14. Post-Retirement Mortality (Gains)/Losses	0.02%	145,441
15. Other Demographic (Gains)/Losses	0.19%	497,404
16. Total (Sum of Items 12 through 16)	0.79%	\$ (3,115,154)

* The plan experiences a (gain)/loss when across-the-board pay increases budgeted by the State Legislature are (less)/greater than assumed.

Table 10 Solvency Test

Actuarial Accrued Liability and Percent of Active Member Payroll for:

August 31,	Accumulated Member Contributions Including Interest		Retirees and Beneficiaries Currently Receiving Benefits		Employer Financed Portion of Vested and Nonvested Benefits		Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Assets		
	(1)	% of Payroll	(2)	% of Payroll	(3)	% of Payroll		(1)	(2)	(3)
2007	\$ 44,615	69%	\$ 62,008	96%	\$ 114,261	177%	\$ 211,933	100%	100%	92%
2008	50,408	76%	63,792	96%	124,898	189%	232,891	100%	100%	95%
2009	51,733	76%	85,845	126%	117,991	174%	248,279	100%	100%	94%
2010	57,347	83%	92,253	134%	132,160	192%	264,515	100%	100%	87%
2011	57,769	83%	120,798	173%	121,596	175%	283,935	100%	100%	87%
2012	63,678	93%	122,571	178%	128,950	187%	300,433	100%	100%	89%
2013	64,435	93%	147,052	212%	147,571	212%	318,026	100%	100%	72%
2014	69,364	88%	153,383	194%	163,539	207%	348,431	100%	100%	77%
2015	67,428	84%	194,524	242%	142,059	177%	372,615	100%	100%	78%
2016	73,450	94%	196,779	252%	155,636	199%	395,457	100%	100%	80%
2017	72,977	92%	241,314	304%	149,313	188%	420,850	100%	100%	71%
2018	78,283	98%	246,497	308%	162,992	204%	447,078	100%	100%	75%
2019	70,243	86%	308,069	377%	156,252	191%	467,787	100%	100%	57%

Note : Dollar amounts in thousands

Table 11
Historical Contribution Rates

Actuarial Valuation as of August 31,	Contributions from:			Total Normal Cost Rate	ASC**
	State	Members*	Total		
1998	16.830%	6.00%*	22.830%	21.43%	Not calculated
1999	16.830%	6.00%*	22.830%	21.82%	Not calculated
2000	16.830%	6.00%*	22.830%	22.01%	Not calculated
2001	16.830%	6.00%*	22.830%	22.37%	Not calculated
2002	16.830%	6.00%*	22.830%	22.88%	Not calculated
2003	16.830%	6.00%*	22.830%	19.58%	Not calculated
2004	16.830%	6.00%*	22.830%	19.58%	Not calculated
2005	16.830%	5.98%	22.810%	20.98%	22.64%
2006	16.830%	5.95%	22.780%	20.59%	21.70%
2007	16.830%	5.98%	22.810%	20.83%	21.60%
2008	16.830%	5.99%	22.820%	19.26%	19.81%
2009	16.830%	5.99%	22.820%	20.30%	20.94%
2010	16.830%	5.98%	22.810%	20.19%	21.68%
2011	6.000%	5.97%	11.970%	20.38%	21.76%
2012	6.500%	5.98%	12.480%	20.25%	21.52%
2013	15.663%	6.57%	22.233%	20.96%	24.08%
2014	15.663%	6.87%	22.533%	21.03%	23.86%
2015	15.663%	7.16%	22.823%	21.40%	23.79%
2016	15.663%	7.44%	23.103%	21.18%	23.48%
2017	15.663%	7.43%	23.093%	20.57%	23.85%
2018	15.663%	7.46%	23.123%	20.83%	23.84%
2019	15.663%	9.39%	25.053%	23.14%	27.84%

* Effective member contribution rate due to the active JRS-2 members that have elected to cease contributing to the plan as well as cease accruing additional benefits. FY 1998-2004 shows the rate members contributed if they chose to continue contributions. FY 2005 and forward reflects the effective rate that accounts for some JRS 2 members choosing not to participate after 20 years (or 12 years, if member is an appellate court justice).

** The Actuarially Sound Contribution Rate (ASC) is the rate determined as of the valuation date to fund the normal cost and amortize the UAAL over a 31 year period.

SECTION D

RISKS ASSOCIATED WITH MEASURING THE ACCRUED LIABILITY AND ACTUARIALLY DETERMINED CONTRIBUTION

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

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 economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. **Other demographic risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The actuarially sound contribution rate may be considered as a minimum contribution rate that complies with State statute. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Currently, this, and other Board funding policy objectives are not being met. Users of this report should be aware that even contributions made at the actuarially sound contribution rate do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Ratio of the market value of assets to total payroll	5.0	5.7	5.3	4.9	4.5	4.6	4.1	4.3	3.7	3.3
Ratio of actuarial accrued liability to payroll	5.9	6.1	5.8	5.4	5.0	4.9	4.6	4.6	4.3	4.1
Ratio of actives to retirees and beneficiaries	1.2	1.4	1.5	1.7	1.7	2.1	2.1	2.5	2.6	3.3
Ratio of net cash flow to market value of assets	-2.2%	-1.5%	-1.2%	-0.9%	-0.4%	0.2%	-2.0%	-1.7%	1.6%	2.6%
Duration of the actuarial accrued liability*	9.5	9.7								

*Duration measure not available before 2018

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Duration of Actuarial Accrued Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the actuarial accrued liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

SECTION E

SUMMARY OF PLAN PROVISIONS

Summary of Plan Provisions for Judicial Retirement System, Plan 2

Membership

Membership is mandatory at the first day of employment for eligible persons who, after August 31, 1985, became a judge, justice, or commissioner of:

- (1) The Supreme Court;
- (2) The Court of Criminal Appeals;
- (3) Courts of Appeals;
- (4) District Courts; or
- (5) Specified commissioners to a court.

Member Contributions

Judicial officers contribute a percentage of their compensation based on the following schedule:

- a. Fiscal year 2014: 6.60%
- b. Fiscal year 2015: 6.90%
- c. Fiscal year 2016: 7.20%
- d. Fiscal years 2017 through 2019: 7.50%
- e. Fiscal year 2020 and beyond: 9.50%

Contributions cease after member has accrued 20 years of service credit or has served 12 years on an appellate court and attained the Rule of 70. However, these members may elect to make contributions for each subsequent year of service credit and receive the additional benefit accruals.

Member contributions accumulate interest at 5.00% per year through December 31, 2013 and 2.00% interest per year, thereafter.

State of Texas Contributions

State contributions are set biennially by the legislature. For fiscal years 2020 and 2021, the State will contribute 15.663% of payroll.

Final Compensation

The State salary being paid at the time the member retires to a judge of a court of the same classification as the last court to which the member was elected or appointed. The final judicial pay tier for benefit determination is based on service excluding service as a statutory county court judge. The Final Compensation for a visiting judge is based on the final salary received while holding judicial office.

Creditable Service

The types of service creditable in JRS-2 are membership service, military service and equivalent membership service. Equivalent membership service includes: previously cancelled service, service not previously established, waiting period service, and Additional Service Credit.

Standard Service Retirement Annuity

1. Eligibility:
 - a. Age 65 and ten years of service if currently holding judicial office; or
 - b. Age 65 and twelve years of service; or
 - c. Twenty years of service, regardless of age; or
 - d. Member's age plus service credited in the retirement system equals 70 (Rule of 70), if the member has served at least twelve years on an appellate court.
2. Benefits: Monthly annuity payable for life, equal to 50% of Final Compensation at retirement, increased by 10% of Final Compensation at retirement if the member has not been out of judicial office for one year or the member has served as a visiting judge within one year of benefit commencement.

Members who elect to continue their contributions after 20 years of service credit, or after serving 12 years on an appellate court and attaining the Rule of 70, can earn up to a maximum total benefit of 90% of Final Compensation. For each such year, the service retirement annuity would be increased by 2.3% of the Final Compensation at retirement.
3. Normal Form of Payment: Payable for the life of the member with any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Early Commencement of Standard Service Retirement Annuity

1. Eligibility:
 - a. Age 60 and ten years of service if currently holding judicial office; or
 - b. Age 60 and twelve years of service.
2. Benefits: Standard Service Retirement Annuity with the 50% replaced by the following percentages based on age at retirement:

<u>Attained Age</u>	<u>Percent of Final Compensation</u>
60	40.0%
61	41.7
62	43.6
63	45.6
64	47.7

3. Normal Form of Payment: Payable for the life of the member with any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Standard Non-Occupational Disability Annuity

1. **Eligibility**: Seven years of service and Chief Justice of the Supreme Court and the medical board must certify that the member is mentally or physically incapacitated for the further performance of regular judicial duties.
2. **Benefits**: Unreduced Standard Service Retirement Annuity.
3. **Normal Form of Payment**: Payable for the life of the member with any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Death Benefit Plan (DBP) Annuity

1. **Eligibility**: Death of an active member with 10 years of service.
2. **Benefits**: Benefits are calculated as if the member had elected an optional form of payment, received a Standard Service Retirement Annuity, and died immediately thereafter. If the member dies before becoming eligible for a Standard Service Retirement Annuity, the benefit is reduced for early retirement from age 65.

Pre-Retirement Death Refund Alternative

A refund of accumulated contributions is payable in cases of pre-retirement death where the member did not meet the eligibility requirements for a Death Benefit Plan Annuity, or the eligible beneficiary chooses to receive a refund of the member account balance in lieu of an annuity. This amount is increased by 5% of the member's account balance at death, times full years of service credit at death, to a maximum of 100%.

Deferred Service Retirement Annuity

1. **Eligibility**: Twelve or more years of service and Member Contributions have not been refunded.
2. **Benefits**: The Standard Service Retirement Annuity earned as of the date of termination; provided that the annuity may be increased under the provisions of the proportionate retirement program if the member becomes a contributing member of another system that participates in the program.
3. **Payments may commence at**: Age 65; or a reduced amount as early as age 60.
4. **Normal Form of Payment**: Payable for the life of the member with any remaining member account balance paid at time of death. Survivorship options and partial lump-sum option are available on an actuarially equivalent basis.

Refund of Accumulated Contributions

A refund of accumulated contributions is payable in cases where a terminated member did not meet the eligibility requirements for an annuity, or a terminated member chooses to receive a refund of his or her account balance in lieu of an annuity.

Limit on Plan Modifications

According to Section 840.106 of the Texas Government Code – a rate of member or State contributions to or a rate of interest required for the establishment of credit in the retirement system may not be reduced or eliminated, a type of service may not be made creditable in the retirement system, a limit on the maximum permissible amount of a type of creditable service may not be removed or raised, a new monetary benefit payable by the retirement system may not be established, and the determination of the amount of a monetary benefit from the system may not be increased, if, as a result of the particular action, the time, as determined by an actuarial valuation, required to amortize the UAAL of the retirement system would be increased to a period that exceeds 30 years by one or more years.

SECTION F

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on August 23, 2017 based on the experience investigation that covered the five-year period from September 1, 2011 through August 31, 2016.

I. Valuation Date

The valuation date is August 31 of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

Because the employer contribution rate is set by statute, the actuarial valuation is used to determine the adequacy of the current State contribution rate and describe the current financial condition of JRS-2.

The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the first step is to determine the contribution rate (level as a percentage of pay) required to provide the benefits to each member, or the normal cost rate. The normal cost rate consists of two pieces: (i) the member's contribution rate, and (ii) the remaining portion of the normal cost rate which is the employer's normal cost rate. The total normal cost rate is based on the benefits payable to each individual active member.

The Unfunded Actuarial Accrued Liability (UAAL) is the liability for future benefits which is in excess of (i) the actuarial value of assets, and (ii) the present value of future normal costs. The employer contribution provided in excess of the employer normal cost is applied to amortize the UAAL.

The funding period is calculated as the number of years required to fully amortize the UAAL, assuming that: (a) future market earnings, net of investment-related expenses, will equal 7.50% per year, (b) there will be no liability gains/losses or changes in assumptions, (c) the number of active members will remain unchanged, (d) active members who leave employment will be replaced by new entrants each year, and (e) State contributions will remain the same percentage of payroll as the current fiscal year.

The Entry Age actuarial cost method is an "immediate gain" method (i.e., experience gains and losses are separately identified as part of the UAAL). However, they are amortized over the same period applied to all other components of the UAAL.

III. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continue to be recognized on their original timeframe. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of investment-related expenses. The actuarial value of assets was reset to be equal to the market value of assets as of August 31, 2017 and the new method has been applied since that time.

IV. Actuarial Assumptions

Investment Return: 7.50% per year, net of investment-related expenses (composed of an assumed 2.50% inflation rate and a 5.00% real rate of return)

Administrative Expenses: 0.33% of valuation payroll per year

Salary Increases: Inflationary pay increases are assumed to occur at the beginning of the year and the remaining pay increases associated with merit, promotion and longevity are assumed to occur at the middle of the valuation year. The components of the annual increases are:

Inflation	Real Wage Growth (Productivity)	Merit, Promotion and Longevity
2.50%	0.00%	See table below

Judges are assumed to follow the current statutory State judicial tiered salary schedule based on years of service and the type of judicial position held, as prescribed in Section 659.012 of the Texas Government Code, in addition to the inflation assumption. Each judicial position type has a defined State base salary with service based tiers, as follows:

Annual Salary Increases for Merit, Promotion and Longevity Male and Female Judges			
Age	Years of Eligibility Service*		
	Less than 4	4 or more, but less than 8	8 or more
All	State base salary	110% of base salary	120% of base salary

*Past service as a statutory county court judge is included in eligibility service for salary purposes. However, county court service is not applicable to JRS-2 benefits or retirement eligibility.

Payroll Growth: 2.50% per year, compounded annually (for projecting valuation payroll).

Post-Retirement Increases: None

Age and Service Assumptions and Methods:

Eligibility Service:

Eligibility Service is considered to be all service eligible for vesting purposes, which includes contributory and non-contributory service.

Benefit Service:

Current Benefit Service in years and months as of the valuation date was provided by ERS. This service plus Future Earned Service, and Eligibility Service at Retirement were used to project benefit amounts.

Future Earned Service:

Active members were assumed to earn one additional year of service credit in each future year employed based on their current class of membership (but not beyond the amount of credit needed to provide a 100% of average monthly compensation standard service retirement annuity).

Entry Age:

Entry age is calculated as the age at the valuation date minus Eligibility Service.

Decrement Timing: All decrements – mortality, service retirement, disability retirement, and termination of employment for reasons other than death or retirement – are assumed to occur at the middle of the valuation year.

Mortality Decrements:

Service Retirees, Beneficiaries, and Inactive Members

2017 State Retirees of Texas (SRT) mortality table. Generational mortality improvements in accordance with the ultimate rates from the scale most recently published by Retirement Plans Experience Committee of the Society of Actuaries ("Scale U-MP") and projected from the year 2017. Sample rates for the base mortality table included below.

Annual Mortality Rates per 100 Individuals		
Age	Males	Females
40	0.0603	0.0380
45	0.1059	0.0687
50	0.1825	0.1215
55	0.3145	0.2150
60	0.5421	0.3804
65	0.9344	0.6730
70	1.6105	1.1908
75	2.7757	2.1069
80	4.7842	3.7277
85	8.2459	6.5956
90	14.2527	11.7028

Active Members

RP-2014 Active Member Mortality table. Generational mortality improvements in accordance with Scale U-MP are projected from the year 2014.

Disability Retirees

RP-2014 Disabled Retiree Mortality. Generational mortality improvements in accordance with Scale U-MP are projected from the year 2014.

Service Retirement Decrements: Graded tables based on JRS-1 and JRS-2 experience.

Eligibility Service is used to determine when the rates apply:

- Age 65 with ten years of service, if member currently holding judicial office
- Age 65 with twelve years of service
- Twenty years of service
- Age plus service equal to or greater than 70, if member has at least twelve years of service on an appellate court

Annual Service Retirement Rates State Judges		
Age	Male and Female	
	Unreduced	Reduced
50 - 64	0.20	0.10
65 - 69	0.20	N/A
70 - 74	0.25	N/A
75+	1.00	N/A

Members are assumed to retire when they are projected to have accrued the maximum benefit of 90% of applicable salary, regardless of whether the member elects to continue contributing.

Disability Retirement Decrements: Graded Tables Based on ERS Experience

- The rates do not apply before someone is eligible for the benefit.
- No occupational disabilities are assumed for the elected class or judges.
- Eight years of service is required for non-occupational disability retirement.
- Non-occupational disability rates are assumed to be zero once the member has attained service retirement eligibility.

Sample rates for eligible members:

Annual Disability Rates per 100 Participants		
Age	Males	Females
30	0.0275	0.0135
35	0.0650	0.0442
40	0.0749	0.0896
45	0.1027	0.1455
50	0.1484	0.2072
55	0.2477	0.3488
60	0.3740	0.5583

99% of the disability rates stated above are assumed to be attributable to nonoccupational disabilities and 1% are assumed to be attributable to occupational disabilities. No occupational disabilities are assumed for judges.

Termination Decrements for Reasons Other Than Death or Retirement: Graded Tables Based on JRS-1 and JRS-2 Experience.

Four per 100 participants for members not eligible for service retirement.

Withdrawal of Employee Contributions: Members that terminate with a vested benefit are assumed to choose the most valuable option available to them at the time of termination: withdrawal of contributions or deferred annuity.

Percentage of Members Electing Various Benefit Options:

Sex / Benefit	Standard Life Annuity	Option 1	Option 4
Male Member			
Disability	50%	50%	0%
Service Retirement	100%	0%	0%
Death Benefit Plan	0%	85%	15%
Female Member			
Disability	75%	25%	0%
Service Retirement	100%	0%	0%
Death Benefit Plan	0%	70%	30%

The value of the Standard Service Retirement Life Annuity reflects the return of excess contributions payable as a lump sum death benefit in cases the annuity benefits paid are less than the member account balance at the time of retirement.

Beneficiary Characteristics: Males are assumed to be two years older than females.

Census Data and Assets

- The valuation was based on members of JRS-2 as of August 31, 2019 and does not take into account future members, with the exception of determining the funding period.
- All census data was supplied by ERS and was subject to reasonable consistency checks.
- There were data elements that were modified for some members as part of the valuation in order to make the data complete. However, the number of missing data items was immaterial.
- Asset data was supplied by ERS.

Other Actuarial Valuation Procedures

- No provision was made in this actuarial valuation for the limitations of Internal Revenue Code Sections 415 or 401(a)17.
- Valuation payroll (earnings applied to the current valuation year) is the expected payroll for the fiscal year following the valuation date. It is based on reported payroll determined from August member contributions increased to reflect the across-the-board salary increases appropriated by the State legislature, effective on or after September 1, and projected according to the actuarial assumptions for the upcoming fiscal year.
- No liability was included for benefits which are funded by special State appropriations.

SECTION G

DETAILED SUMMARIES OF MEMBERSHIP DATA

Detailed Summaries of Membership Data

<u>Table</u>	<u>Page</u>	
A	G-2	Summary of Membership Data
B	G-3	Active Members: Distribution by Age and Service
C	G-4	Retired and Beneficiary Members: Distribution by Age and Category

Table A

Summary of Membership Data

Active Members

Item	Male	Female	Total
Number of Members	349	224	573
Average Annual Salaries	\$ 142,289	\$ 143,085	\$ 142,600
Average Age	58.5	53.2	56.4
Average Entry Age	49.1	46.1	47.9
Average Service	9.4	7.1	8.5

Inactive Members

Item	Number	Annual Annuities	Average Annuities	Average Age
Participants with Deferred Benefits	16	\$ 1,199,472	\$ 74,967	59.4
Service Retirees*	424	\$ 28,438,404	\$ 67,072	69.8
Beneficiaries	47	\$ 2,618,880	\$ 55,721	73.6
Disability Retirees	1	\$ 75,000	\$ 75,000	63.8
Total	488	\$ 32,331,756	\$ 66,254	69.8

* Average Age and Service at Retirement for Service Retirees are 63.2 and 15.2, respectively

Non-vested Members

Item	Number	Account Balances	Average Account Balance	Average Age
Non-vested Participants	171	\$ 6,056,502	\$ 35,418	61.8

Table B
Active Members
Distribution by Age and Service

Age	Years of Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
Under 25										
25 - 29										
30 - 34	2 \$ 140,000									2 \$ 140,000
35 - 39	21 \$ 141,333									21 \$ 141,333
40 - 44	49 \$ 142,857	6 \$ 147,000	4 \$ 140,000							59 \$ 143,085
45 - 49	46 \$ 141,826	14 \$ 143,000	12 \$ 141,167	1 \$ 168,000						73 \$ 142,301
50 - 54	36 \$ 142,333	27 \$ 142,074	17 \$ 141,647	7 \$ 142,000	1 \$ 140,000					88 \$ 142,068
55 - 59	43 \$ 141,302	20 \$ 143,500	26 \$ 141,173	13 \$ 141,077	11 \$ 146,364					113 \$ 142,128
60 - 64	29 \$ 144,828	19 \$ 144,421	18 \$ 141,556	14 \$ 144,000	14 \$ 145,357					94 \$ 144,074
Over 64	24 \$ 141,750	22 \$ 140,000	28 \$ 140,500	22 \$ 145,318	19 \$ 145,553	5 \$ 140,000	3 \$ 149,333			123 \$ 142,492
Total	250 \$ 142,296	108 \$ 142,722	105 \$ 141,090	57 \$ 144,018	45 \$ 145,567	5 \$ 140,000	3 \$ 149,333			573 \$ 142,600

Table C

Retired and Beneficiary Membership Data

Distribution by Age and Category

Age Last Birthday	Number	Annual Benefit	Average Annual Benefit
Service Retirees			
Under 60	33	1,855,464	56,226
60 - 64	61	4,145,244	67,955
65 - 69	131	9,067,848	69,220
70 - 74	97	6,698,460	69,056
75 - 79	75	4,999,836	66,664
Over 79	27	1,671,552	61,909
Total	424	28,438,404	67,072
Beneficiaries			
Under 60	4	171,456	42,864
60 - 64	6	411,516	68,586
65 - 69	8	486,696	60,837
70 - 74	8	429,840	53,730
75 - 79	6	336,516	56,086
Over 79	15	782,856	52,190
Total	47	2,618,880	55,721
Disabled Retirees			
Under 60	0	0	0
60 - 64	1	75,000	75,000
65 - 69	0	0	0
70 - 74	0	0	0
75 - 79	0	0	0
Over 79	0	0	0
Total	1	75,000	75,000
Grand Total	472	31,132,284	65,958

SECTION H

GLOSSARY

Glossary

Actuarial Accrued Liability (AAL): That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

Actuarial Assumptions: Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

Actuarial Cost Method or Funding Method: A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

Actuarial Gain or Actuarial Loss: A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the Fund's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

- a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.),
- b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
- c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.

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 plan. An Actuarial valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB.

Actuarial Value of Assets or Valuation Assets: The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: That portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Actuarially Determined Contribution (ADC) or Annual Required Contribution (ARC): A calculated contribution for a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically the calculated contribution has a normal cost payment and an amortization payment.

Closed Amortization Period: A specific number of years that is counted down by one each year and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decrements: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: An employer-sponsored retirement benefit that provides workers, upon attainment of designated age and service thresholds, with a monthly benefit based on the employee's salary and

length of service. The value of a benefit from a defined benefit plan is generally not affected by the return on the assets that are invested to fund the benefit.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Experience Study: A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Funding Period or Amortization Period: The term "Funding Period" is used in two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period is chosen by the Board of Trustees. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: The Governmental Accounting Standards Board is an organization that exists in order to promulgate accounting standards for governmental entities.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.

Unfunded Actuarial Accrued Liability: The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or Actuarial Valuation Date: The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.



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