



Texas Pension Review Board

2017 – 2018 Biennial Report

Texas Pension Review Board
2017-2018
Biennial Report



Josh B. McGee, Chair

Term Expiration: January 31, 2021

Hometown: Houston

Keith Brainard, Vice Chair

Term Expiration: January 31, 2019

Hometown: Georgetown

Stephanie Leibe

Term Expiration: January 31, 2021

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Term Expiration: January 31, 2021

Hometown: Irving

Anumeha Kumar

Executive Director



PRB

Texas Pension Review Board

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November 30, 2018

The Texas Pension Review Board (PRB) is pleased to present this Biennial Report on its activities and findings for 2017 through 2018. During this biennium, the PRB has worked diligently to execute its mission to provide information and recommendations to help ensure that Texas public retirement systems are properly managed and actuarially sound.

The PRB service population consists of the members, administrators, and trustees of 100 Texas public retirement systems; state and local government officials; and the public. The total membership of actuarially funded Texas public retirement systems is over 2.6 million active and retired members and the total net assets of the plans are approximately \$271 billion.

The 85th Legislature passed major pension bills that overhauled the Dallas Police and Fire and the three City of Houston pension systems, and subsequently required additional responsibilities from the PRB. Through its limited staff and resources, the PRB has made great efforts to accomplish its new and existing mandates.

During the 2017-2018 biennium, the agency developed criteria for indicating potential system funding risks, and based on those factors, conducted and published 7 intensive actuarial reviews. The review process encouraged systems experiencing funding problems to work with their governmental sponsors to develop a plan to guide them towards stability in the future. After receiving appropriations from the 85th Legislature for an online data dashboard, the agency is finalizing the new data portal which will allow users to easily compare key indicators of pension health across time and across peer systems.

Over the last two years, the PRB has worked to develop legislative recommendations; update and develop key policies to advise and inform systems on pension plan funding and elements of plan design; provide technical support to systems, including comparative information for other systems and best practices; and make education available to systems' trustees and administrators.

The PRB is the sole on-going oversight mechanism for Texas public retirement systems. To fulfill its mission requires the combined effort of the systems, their sponsoring governmental entities, and other members of the Texas public pension plan community. The PRB remains focused to help ensure that retirement benefits are securely provided at the lowest cost to the taxpayers.

Sincerely,

Josh McGee
Chairman

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EXECUTIVE SUMMARY

The Texas Pension Review Board (the “Board” or the “PRB”) was established in 1979 as an oversight agency for Texas public retirement systems. Pursuant to Texas Government Code, Section 801.203, the PRB is pleased to summarize its work and findings for 2017-2018 in the following Biennial Report.

The mission of the PRB is to provide the State of Texas with the necessary information and recommendations to help ensure that Texas public retirement systems are properly managed and actuarially sound. The PRB provides consistent, long-term oversight to help ensure that retirement systems remain adequately funded into the future.

In February 2018, S&P Global cited PRB oversight as an opportunity for the State in facing pension-related risks. S&P noted that they “view the transparency provided by the PRB as elevating emerging national themes and standard practices to elected officials, plans, and the public, which is positive for plan disclosure and management. Furthermore, the annual filing requirements raise awareness and could allow the PRB to recommend stopgap measures before a plan deteriorates to levels seen in New Jersey or Illinois.”¹

While the majority of Texas’ public retirement systems remain well-funded, significant fiscal challenges face some Texas pension plans. In 2018, the PRB completed seven intensive actuarial reviews of systems showing serious funding challenges. The reviews highlighted risks that could threaten long-term funding stability and provided recommendations to put the systems on a path to solid financial footing. Those systems were invited, along with their associated governmental entities, to PRB meetings to discuss the issues raised in the intensive reviews. The PRB continues to provide technical assistance to those systems and other systems upon request.

Additionally, the first funding soundness restoration plans (FSRPs), which are required of retirement systems and their sponsors after several valuations showing amortization periods over 40 years, were due on November 1, 2016. Since then, the PRB has developed an internal process for FSRP review. At each PRB meeting, staff provides updates to the Board on newly added plans since the prior meeting and provides a summary of the FSRPs received from plans. The PRB has received and reviewed FSRPs from 15 systems since the requirement went into effect.

Over the past two years, the PRB has completed the update of the newly-named PRB Pension Funding Guidelines (formerly Guidelines for Actuarial Soundness) and has developed and adopted the PRB Principles of Retirement Plan Design. The updated Pension Funding Guidelines lowered the recommended amortization period to no more than 30 years, with a preferred target range of 10-25 years, among other changes.

¹ "Everything's Bigger in Texas, Including Potential Pressure to Fund Pension Benefits," S&P Global Market Intelligence, February 8, 2018.

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The PRB conducted research on two topics during the Interim: asset pooling for small pension systems and funding policies for fixed-rate pension plans. To study the possible benefits of asset pooling, the PRB analyzed investment return data from Texas public retirement systems and researched national and international models of systems or organizations that pool assets for investment purposes. As a result of this initial study, the PRB found potential benefits from pooling assets for investment purposes and recommended further analysis on how asset pooling could be implemented among Texas systems. For the funding policy study, the PRB compared Texas public retirement system funding levels and contribution structures and performed extensive research on funding policies in Texas and nationwide. The final study will be presented to the Board for adoption in January.

The 85th Legislature appropriated funds for the PRB to develop an online dashboard to provide lawmakers, taxpayers, pension systems and other stakeholders with an interactive, user-friendly database of public pension information. Since September of 2017, the agency has worked to develop the dashboard which includes key actuarial and financial indicators of retirement system health over time, as well as demographic, benefit and governance information.

The PRB provides education to trustees and system administrators of Texas public retirement systems and tracks compliance through the Minimum Educational Training (MET) Program. The PRB staff obtained copyright protection on its seven online courses in 2018, which system trustees and administrators continue to utilize in great numbers. Since the online courses were published in late 2016, there have been 1,587 course completions. The agency also presented at educational conferences to discuss the current pension underfunding challenges facing many Texas public retirement systems and the Board's oversight role and current activities.

Additionally, the agency's TLFFRA specialist has been working closely with TLFFRA systems to provide technical assistance and training. The PRB published its biennial Texas Local Firefighters Retirement Act (TLFFRA) Pension Report in February of 2018, which utilized data that TLFFRA systems are required to send to the PRB to provide general and comparative information on all paid/part-paid TLFFRA systems.

During the 85th Legislative Session, the agency conducted a pensions training session for legislative staff, published the Guide to Public Retirement Systems in Texas as a resource for policymakers, tracked and provided actuarial impact statements for bills pertaining to Texas public retirement systems, and testified at House Pensions and Senate State Affairs Committee hearings. During the Interim, the Board submitted reports to the House Pensions Committee on several occasions, including traveling to Dallas and Houston to provide information on their municipal systems since the passage of major reform bills. The PRB also provided testimony during the Interim to the Senate State Affairs Committee regarding actuarial assumptions.

To date, 7 pension-related bills have been filed since pre-filing began on November 12, 2018. As part of its mandate, the PRB will continue to work with the Legislature to provide thorough and accurate actuarial analysis of bills.

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PENSION REVIEW BOARD OVERVIEW

MISSION STATEMENT

The Pension Review Board (PRB) is mandated to oversee all Texas public retirement systems, both state and local, in regard to their actuarial soundness and compliance with state law. The mission of the PRB is to provide the State of Texas with the necessary information and recommendations to help ensure that its public retirement systems, whose combined assets total in the multi-billions, are actuarially sound; benefits are equitable; the systems are properly managed; tax expenditures for employee benefits are kept to a minimum while still providing for those employees; and to expand the knowledge and education of administrators, trustees, and members of Texas public retirement systems.

STATUTORY FUNCTIONS

The PRB was established in 1979 as an oversight agency for Texas public retirement systems. The general duties of the PRB outlined in Chapter 801 of the Government Code are to (1) conduct a continuing review of all public retirement systems, including compiling and comparing information about benefits, creditable service, financing and administration of systems; (2) conduct intensive studies of potential or existing problems that threaten the actuarial soundness of public retirement systems; (3) administer the Minimum Educational Training Program (MET) for public pension trustees and administrators, providing qualified training content on fundamental public pension topics; (4) provide information and technical assistance on pension planning to public retirement systems on request; (5) recommend policies, practices, and legislation to public retirement systems and appropriate governmental entities; and (6) prepare actuarial impact studies on proposed legislation. The Board can furnish other appropriate services such as actuarial studies or other requirements of systems and can establish appropriate fees for these activities and services.

BOARD COMPOSITION

The Board is composed of seven members appointed by the Governor with the advice and consent of the Senate. The PRB is composed of members with the following qualifications or experience: three persons who have experience in the fields of securities investment, pension administration, or pension law and are not members or retirees of a public retirement system; one active public retirement system member; one retired public retirement system member; one person who has experience in the field of governmental finance; and one actuary.

Since the publication of the 2015-2016 Biennial Report, the following changes have occurred in the Board's composition. On May 8, 2018, Governor Greg Abbott appointed Ms. Marcia Dush, replacing Mr. Robert May as Board Actuary. Also, on July 9, 2018, Governor Abbott appointed Ms. Rossy Fariña Strauss to replace J. Robert Massengale whose term expired.

ORGANIZATIONAL STRUCTURE

Currently, the PRB has 10 employees including the executive director and two vacant positions. The agency is authorized for 14 total full time equivalents (FTEs), but due to budgetary limitations operates

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at 12. Through its small staff size and limited resources, the PRB provides highly technical analysis of public pensions that corresponds to demographic shifts and changes in the complexity of pension fund investments. As issues related to public pensions grow more complex, the PRB staff strives to provide even higher quality service to the public, the Legislature, the Governor, public retirement systems, and their administrators, trustees, and members.

The executive director, selected by the Board, manages the day-to-day operations of the agency and provides oversight for all programs and activities. The agency is organized based on two main work areas: operational and analytical.

Operational

Administrative and Accounting Division

The administrative and accounting division handles all matters related to accounting and human resources including management of appropriated funds, purchasing and property control, personnel files, and coordinating board member travel. The division is also responsible for document management, records retention, stakeholder outreach, organizing board and committee meetings, and providing all necessary administrative support for the agency.

Analytical

Actuarial Services Division

The actuarial division provides actuarial expertise to the agency, public retirement systems, the Legislature, and the public. The division is responsible for evaluating compliance with the PRB's *Guidelines for Actuarial Soundness* and providing in-depth review of system actuarial reports including valuations, overseeing the intensive actuarial review of public retirement systems, and providing actuarial reviews during legislative sessions.

Research and Analysis Division

This division is responsible for reviewing public retirement system's financial condition, conducting research on pension-related topics, and developing agency policies. Responsibilities include examining retirement system reports, performing financial analysis, and providing technical assistance to retirement systems. The division is also responsible for ensuring retirement systems' compliance with state reporting requirements, tracking federal and state laws impacting Texas public retirement systems, and developing agency reports to the Legislature and other state agencies.

Training and Accreditation Division

This division is responsible for the agency's educational programs, including administering the agency's Minimum Educational Training (MET) Program for trustees and system administrators. The division develops the PRB's own training, including online offerings, accredits other training providers, and tracks reporting compliance with the MET requirements.

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MAJOR ACCOMPLISHMENTS & ACTIVITIES

PUBLIC RETIREMENT SYSTEM REVIEWS AND ANALYSIS

Public Retirement System Intensive Reviews

Following its mandate to conduct intensive studies of potential or existing problems that threaten the actuarial soundness of public retirement systems, the PRB conducted seven intensive actuarial reviews during the 2017-2018 Biennium. The intensive reviews analyzed particular risks facing the following public retirement systems.

January 2018	April 2018	October 2018
Galveston Employees' Retirement Plan for Police (see Appendix A1)	Beaumont Firemen's Relief and Retirement Fund (see Appendix A3)	Longview Firemen's Relief and Retirement Fund (see Appendix A5)
Greenville Firemen's Relief and Retirement Fund (see Appendix A2)	Marshall Firemen's Relief and Retirement Fund (see Appendix A4)	Orange Firemen's Relief and Retirement Fund (see Appendix A6)
		Irving Firemen's Relief and Retirement Fund (see Appendix A7)

The process for performing the reviews began with the Board publishing criteria for selecting systems for review. Staff then conducted in-depth analysis of the actuarial condition of the systems, including projections of future funded status under various investment return scenarios. Among other risks, the reviews highlighted specific risks such as asset-liability mismatch concerns related to two systems' deferred or post-retirement option programs (DROP/PROP) and investment expenses that greatly exceeded peer systems. The process provided multiple opportunities for input from both the system and sponsor, including inviting initial input into the review, written responses from the system and sponsoring city for inclusion in the final published report as well as inviting both parties to attend the PRB's Actuarial Committee meeting to discuss the review's findings and answer questions. Appendix A8 provides a summary of the various systems' progress after the review publication.

Key recommendations made through the intensive reviews included the following:

- ☐ Adopt a funding policy that requires payment of an actuarially determined contribution, or at minimum, that fully funds the plan over a finite period of 30 years or less
- ☐ Adopt a formal risk/cost-sharing framework with "guardrails" or trigger mechanisms that reduce uncertainty and guide stakeholders in how benefit and contribution levels will be modified under different economic conditions

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- ❑ Closely monitor investment performance including expenses and evaluate asset allocation decisions
- ❑ Conduct an in-depth asset-liability study of potential risks associated with existing asset mix and liabilities they support. Perform scenario testing of large DROP/PROP withdrawals coupled with potential adverse investment experience
- ❑ Regularly review actuarial assumptions against experience, making necessary changes

Interim Studies

Government Code Section 801.203 requires the PRB to submit a biennial report to the Legislature and Governor of the agency's work and findings of the Board, "including drafts or recommendations of any legislation relating to public retirement systems that the board finds advisable." At its November 16, 2017 meeting, the Board directed staff to perform the following two interim studies for the 2017-2018 biennium.

Asset Pooling for Small Pension Systems

Many public retirement systems across the country face ongoing challenges as unfunded liabilities continue to grow in an overall low interest rate environment. Smaller systems face additional challenges to meet or exceed their assumed rates of return over extended periods of time. Recognizing this, the Board directed staff to study the possible benefits for smaller pension systems of pooling trust funds for investment purposes as an interim study topic.

To study the possible benefits of pooling assets, the PRB analyzed investment return and fee data reported by retirement plans for fiscal years 2007 to 2016. The data analyzed included all Texas actuarially funded defined benefit plans that reported to the PRB during that period, except for the 4 largest statewide plans. Staff also identified two primary structures of pooled pension trusts: an Investment Management only model (IM) and an Investment Management and Administration (IMA) model. Under both models, the participating systems transfer all or a portion of their assets into the group investment trust, while maintaining the existing governance structures, including contribution, benefit, actuarial and asset allocation decision-making.

To objectively analyze the benefits of the IM and IMA structures, the PRB modeled the potential impact on small plans. Modeling suggested asset pooling could have resulted in an additional 29% increase (\$32M) in total assets for small plans between 2007 and 2016.

The study constituted a first step towards developing potential recommendations in this area. The evidence suggested smaller pension plans in Texas could benefit in several ways from pooling assets for investment purposes as well as pooling administrative functions. Further in-depth study of possible governance structures to provide asset pooling services including associated legal requirements is necessary and should include engaging small pension plans to provide input and explore viable options.

Funding Policies for Fixed-Rate Pension Plans

Since the 2008 market downturn, the unfunded liabilities of many public retirement systems both across the country and in Texas have been on the rise. In 2012, the Governmental Accounting Standards Board

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(GASB) issued statements 67 and 68, which required plan sponsors to report pension liabilities on their balance sheets. This change in conjunction with the rising unfunded liabilities has brought increased scrutiny from credit rating agencies, with pension debt and related costs now impacting bond ratings more directly.

Today, more volatile markets, dampened future market projections, and lower mortality rates are placing continuing pressure on retirement systems' ability to meet their actuarial assumptions. Given these pressures, strong funding policies are a necessity for public pensions to help ensure that over time unfunded liabilities do not continue to grow but rather are reduced or eliminated. In addition, solid funding policies can help assure rating agencies that pension liabilities are being proactively managed.

Recognizing the many challenges facing Texas plans and in accordance with the PRB's *Pension Funding Guidelines*, Texas Pension Review Board (PRB) at its November 16, 2017 meeting directed staff to research and identify the role that funding policies could play in helping plans meet their funding objectives while reassuring credit agencies. In particular, the Board tasked staff with focusing on how systems with fixed-rate contribution structures- which, unlike actuarially determined contributions, do not inherently adjust to address negative experience and make up nearly 75% of Texas systems- could benefit from adopting funding policies. The PRB conducted this interim study as part of the agency's mandate to include recommendations of any legislation relating to public retirement systems that the Board finds advisable through its Biennial Report to the Legislature and Governor.

Staff began by analyzing the contribution structures of Texas plans and comparing their average funded ratios over time. The average funded ratio of systems with actuarially determined contributions (ADCs) was higher overall than that of fixed-rate systems, and has reversed its decline after the 2008 financial crisis, while fixed-rate systems' average funded ratio has continued a downward trajectory. Staff then reviewed funding policies from Texas systems as well as systems in other states and evaluated the benefits of adopting those policies. Finally, staff worked to identify essential components that a sound funding policy should include as well as various approaches that could be provided as examples for Texas systems. The final study will be presented to the Board for adoption in January.

BOARD POLICY UPDATES

PRB Pension Funding Guidelines

The PRB *Guidelines for Actuarial Soundness (Guidelines)* were first adopted by the Board in 1984. The stated purpose of establishing guidelines was three-fold: to lend consistency to positions advocated in impact statements, to aid in providing technical assistance to registered plans, and to promote public disclosure. The PRB revisited the *Guidelines* in 1996, but took no action until the adoption of the updated *Guidelines* in 2011.

At its May 5, 2016, meeting, the Board directed staff and the PRB Actuarial Committee to begin the process of reviewing and updating the *Guidelines*. The PRB Actuarial Committee held meetings from June 2016 through January 2017. Steps taken to update the *Guidelines* include producing a survey to

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receive constituents' feelings on various aspects of the *Guidelines*, discussing survey responses as well as providing a comment period once the draft was completed.

The PRB solicited public comment on the draft Guidelines on November 22, 2016. The deadline for commenting was December 7, 2016. The PRB received 16 responses from funds, their actuaries, and other interested parties. The PRB Actuarial Committee discussed the comments and recommended a draft to the full Board at the January 26, 2017 PRB meeting. The draft was adopted at the January meeting, to include a preamble stating the purpose and changing the title of the policy document to PRB Pension Funding Guidelines, effective June 30, 2017. Based on public comment, a phase-in period of eight years for reducing amortization periods to 30 years or fewer was added to the document. (See Appendix C1)

PRB Principles of Retirement Plan Design

At its August 11, 2017 meeting, the PRB established the PRB Advisory Committee on Principles of Retirement Plan Design to develop a document to guide and inform public retirement systems and their associated governmental entities on how to structure retirement plans. The Advisory Committee held three meetings – October 13, 2017, March 1, 2018, and April 24, 2018 – where they discussed a draft principles document and took public comments and questions on each principle.

On April 2, 2018, the PRB solicited comments on the draft Principles of Retirement Plan Design from plans, their actuaries, and the public. The agency received 13 comments, which were discussed at the April 24, 2018 Advisory Committee meeting. The Committee incorporated changes into the document, agreed on a draft for recommendation to the full Board, and staff posted the committee draft on the agency's website. The Board adopted the Principles of Retirement Plan Design at its June 14, 2018 meeting. (See Appendix C2)

REPORTING REQUIREMENTS

Funding Soundness Restoration Plan

To date, 15 systems have submitted funding soundness restoration plans (FSRPs). Of those, two systems have successfully brought their amortization period below 40 years, ten systems are working towards 40 years, and three systems are developing a revised plan since the initial FSRP was not met. Five systems are currently required to submit FSRPs, one of which, the Fort Worth Employees Retirement Fund, has been subject to the FSRP requirement since January 2017 but has not yet submitted an FSRP. The remaining four are revised FSRPs, which means that in total, nearly half of the 15 systems that have submitted FSRPs did not make changes sufficient to keep them on track to have below-40 amortization periods within a decade. Six additional systems will be subject to the FSRP requirement if the next actuarial valuation shows an amortization period over 40 years. A list of systems' FSRP status can be found in Appendix D1, and Appendix D2 contains a summary of the FSRPs received in the current biennium.

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The FSRP is outlined in Chapters 802.2015 and 802.2016 of the Texas Government Code. The statutes state that a public retirement system is required to notify its associated governmental entity if it receives an actuarial valuation indicating the system's actual contributions are insufficient to achieve an amortization period of 40 years or less. Should the system's amortization period exceed 40 years over several valuations, the public retirement system and its associated governmental entity are required to formulate an FSRP. The FSRP must be designed to achieve an amortization period of 40 years or less within 10 years. The FSRP requirement varies for certain systems, including exemption from the requirement. A flowchart outlining the requirements may be found in Appendix D3.

Texas public retirement systems that are subject to the FSRP requirement have six months after the date on which the actuarial valuation that triggers the FSRP formulation requirement is adopted by the retirement system. The systems and their associated governmental entity must submit the FSRP and any changes to the plan to the PRB within 31 days after the FSRP is agreed to. Additionally, the PRB must be notified every two years of any updates to the progress made towards improved actuarial soundness. Texas Government Code Section 802.2015(d) requires plans to formulate a revised FSRP if the system conducts an actuarial valuation showing that the system's amortization period exceeds 40 years, and the previously formulated FSRP has not been adhered to. This means nearly half of the 15 systems that have submitted FSRPs did not make changes sufficient to keep them on track to have below-40 amortization periods within a decade.

Reporting Requirements Added During the 85th Legislature

Houston Systems - Risk Sharing Valuation Study

Senate Bill 2190 reformed the three Houston pension systems: Houston Firefighters Relief & Retirement Fund, Houston Police Officers Pension System, and Houston Municipal Employees Pension System. The bill added a requirement of the systems to jointly submit a risk sharing valuation study (RSVS) to the PRB for a determination that the pension systems and City are in compliance with the statute. The PRB has reviewed two RSVSs for the three plans since 2017, and the systems were found to be compliant with statute.

Dallas Police and Fire Pension System

Another major pension bill, House Bill 3158, overhauled the Dallas Police and Fire Pension System (DPFPS). Through that legislation, the PRB was given the following new responsibilities:

- Prohibitions on DROP distribution – the DPFPS board was required to send information to the PRB to determine whether DPFPS had violated the prohibition of certain distributions by August 31, 2017. The PRB staff reviewed the information and found there were no violations and sent correspondence to the City and System regarding the determination.
- DPFPS actuarial audit – the PRB has begun to research criteria for selecting an independent actuary to perform an analysis based on the January 1, 2024 actuarial valuation prepared by the pension system.

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- DPFPS funding plan – the system is required to adopt a funding plan in compliance with the funding and amortization period applicable requirement, as well as takes into consideration the independent actuary's recommendations. DPFPS is required to submit the actuarial audit and a summary of any rules adopted regarding the plan to the PRB. Not later than December 1, 2024, the PRB will submit a summary of these to the Legislature.
- DPFPS Alternative Benefit Plan – the plan may only be established by the City if the system's actuary determines that its implementation would allow the system to continue to comply with funding and amortization period requirements of Chapter 802 and if the PRB conducts a review of and validates this determination. The PRB will develop a review and validation process for determination.
- DPFPS rules increasing benefits – any rules to increase benefits must be reviewed by the PRB, and the PRB must find that the implementation of the rule complies with the amortization periods prescribed by the statute.

DATA/REPORTING

Online Dashboard

The 85th Legislature appropriated funds for the PRB to develop an online dashboard to provide lawmakers, taxpayers, pension systems, and other stakeholders with a searchable, user-friendly database of public pension information. Over the 2017-2018 biennium, the agency has worked to develop the dashboard which includes key actuarial and financial indicators of retirement system health over time, as well as demographic, benefit and governance information. The dashboard also offers the ability to compare those factors across multiple plans of similar size or type. After final testing, the dashboard will be made public in January 2019. Once the dashboard is live, the agency plans to add additional features including adding standardized links for raw data download and Minimum Educational Training compliance data.

In addition, the PRB provides the Comptroller's Office with the most recent financial and actuarial data received from Texas public retirement systems for the Public Pension Search Tool portal. The PRB sends the updated data to the Comptroller's Office every 4 months and sent the latest update in August 2018.

Agency Website

Since the PRB website redesign in 2016, PRB staff has strived to display to stakeholders in the most straightforward manner the most recent and relevant information produced by and related to the PRB. The agency does this by adding new reports, presentations, agendas, meeting packets and recordings to the "Recently Added" section on the homepage of its website. When meetings are held in the Capitol Annex, the homepage is updated to include a link to the meeting live stream broadcast.

The PRB places a high priority on enhancing its educational outreach through the use of its website to offer pension-related resources for PRB constituents, including public pension trustees, administrators,

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plan members, government officials, and taxpayers. Currently, information on the PRB website includes: board policies; information on board meetings including archived meeting videos, agendas, minutes and meeting packets; statutes and rules; Minimum Educational Training Program online courses; various agency publications and reports including total net assets, non-compliant plans and actuarial valuation reports (published in an accessible spreadsheet format); PRB research papers; and other resources. The agency utilizes the website as a tool to educate systems and to foster transparency through the publication of Board meeting packets, minutes, and recordings.

Guide to Public Retirement Systems in Texas

Every odd-numbered year, usually in January or February, the PRB publishes the *Guide to Public Retirement Systems in Texas*. This publication is timed to coincide with the beginning of each legislative session. Due to expected policy interest concerning public retirement systems, the PRB included information in the *Guide to Public Retirement Systems in Texas* to provide lawmakers with as much relevant and current information on the state's retirement systems as possible. The *Guide* was divided into three major sections. The first section contains summaries of the statewide and municipal retirement systems governed by state statute. The second section provided trends and key financial, actuarial, benefit, and governance data for retirement systems. The third section provided a summary of significant pension-related legislation passed in prior legislative sessions, benefit information for the pay-as-you-go volunteer firefighter and defined contribution retirement systems, a glossary of pension terminology, and a directory of all systems registered with the PRB. The February 2017 *Guide to Public Retirement Systems in Texas* can be found on the agency's website. The agency is currently working on publishing the 2019 *Guide* for the 86th Legislature.

PRB MINIMUM EDUCATIONAL TRAINING (MET) PROGRAM

Section 801.211 of the Government Code directs the PRB to develop and administer an educational training program for trustees and administrators of Texas public retirement systems. The PRB began the Minimum Educational Training (MET) Program on January 1, 2015. Program efforts include completing the online courses, reviewing sponsor and individual course applications, a survey of sponsor course evaluations, and MET online courses copyright.

Online Courses

The PRB has researched, written, designed, and published 7 online courses to assist trustees and system administrators to obtain required training. Each course covers one of the following core content areas: Fiduciary Matters, Governance, Actuarial Matters, Investments, Risk Management, Ethics and Benefits Administration. The online courses are available free of charge on the PRB website. As of November 16, 2018 there have been 1,587 course completions. On February 13, 2018 the PRB secured copyright protection on all seven courses, valid through 2112.

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Sponsor Accreditation

As of November 16, 2018, the PRB has accredited 17 MET sponsors, as well as 35 individual courses offered by non-accredited sponsors. Frequent providers of training activities, including public retirement systems conducting in-house training, may apply to become sponsors accredited by the PRB to conduct trainings for MET credit hours. Those sponsors who become accredited do not need to obtain approval for each course offered; sponsors may be accredited to offer Core instruction, Continuing Education, or both. A retirement system or training organization offering infrequent training activities, and/or which does not wish to become an accredited sponsor, may apply for approval of individual courses. A list of accredited sponsors can be found in Appendix E1.

During the March 1, 2018 PRB meeting, the Board requested performance evaluation information from Minimum Educational Training (MET) accredited sponsors. To provide this information, the PRB staff requested that sponsors submit course evaluation survey responses from their last two MET training activities. The PRB received 179 individual course evaluation surveys and 2 sponsors provided already compiled data. A total of 12 sponsors submitted survey data. The overall satisfaction for all PRB accredited sponsors was 99%.

MET Compliance and Reporting

The PRB has completed several reporting cycles for MET compliance. At each reporting deadline, systems report to the PRB the training completed by their trustees and administrator during the previous time period. The information submitted to the PRB has been compiled to create the *Public Retirement System Compliance with Minimum Educational Training Requirements* report. (See Appendix E2) The report in Appendix E2 contains data from the most recently completed training cycle reported to the PRB for Texas public retirement system trustees and system administrators.

The following table provides overall MET compliance information by retirement system type.

System Type	Percent of Systems Compliant
Statewide	100%
Municipal	98.80%
Local Fire Fighter	90.72%
Special District and Supplemental	84.27%

TECHNICAL ASSISTANCE

Technical Assistance

The PRB provides technical assistance for the Legislature, public retirement systems, state agencies, and the public. In 2017, the agency exceeded its performance measure target for unique technical assistance

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reports produced by staff, with 184% of the target attained. The performance measure target was raised for 2018, and the agency reached 92.67% of the target. The increase in technical assistance is not only because of the establishment of the Minimum Educational Training Program, but also due to systems requesting a large amount of comprehensive historical data to aid in making proposals and/or decisions regarding plan design changes. The PRB worked with systems to provide the most up-to-date and accurate data for statewide, municipal and other local pension systems in Texas, which involved preparing several large datasets. The PRB staff also completed numerous research requests from legislative offices, and recently, the PRB has received large data requests from national organizations. PRB staff has worked diligently to assist those parties in a timely manner.

Complaints

The PRB makes great effort to promptly respond to complaints regarding any registered Texas public retirement system. Staff researches the complaint by contacting the person who filed the complaint as well as representatives of the retirement system that is the subject of the complaint. The individuals contacted are given the opportunity to provide information regarding the complaint, and may be asked for additional information. After the research has been completed, the staff composes a document in which the facts of the issue are stated, as provided by the parties involved. The final complaint document includes the agency's research and suggestions that may be useful in preventing a recurrence of the problem. The conclusion of the document states whether policies and procedures of the retirement system were followed correctly. In the last biennium, the PRB has worked on three complaints concerning various systems.

News Clips

As part of the educational outreach program, the PRB provides electronic weekly news clips service to its constituents. In 2018 the PRB news clips were redesigned, and the content was streamlined to concentrate on the following topics relevant to subscribers: Texas pension plans, Texas economic indicators, and national pensions, investments, and legal.

Educational Services Survey and Customer Service Survey

Educational Services Survey

In September 2017, the PRB developed a survey to assess constituents' satisfaction with PRB educational services, and to capture a performance measure. The survey was e-mailed to 732 retirement system trustees and administrators, government contacts, legislative staff, and news clips subscribers, and was posted on the PRB website. The agency received 76 responses to the survey. Overall, the respondents were 92.73% satisfied with the MET online courses; 97.78% satisfied with in-person PRB educational presentations at conferences; 97.92% satisfied with information presented by PRB staff during legislative session; 95.56% satisfied with the weekly news clips; and 95.52% satisfied with educational services overall.

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Customer Service Survey

In accordance with the requirements of the strategic planning process, the PRB conducted its customer service survey in April through May 2018. The survey included 10 questions regarding topic areas on staff, timeliness, website, communication/printed information, education/mission/transparency, and general/overall. A majority of respondents expressed satisfaction with each topic area, and each area also received various feedback and recommendations for improvement.

SPECIFIC ASSISTANCE FOR TLFFRA SYSTEMS

The agency's TLFFRA specialist is the agency's point person on TLFFRA issues and continues to work closely with TLFFRA systems to provide a substantial amount of technical assistance and information on various issues, including service verification, questions relating to the TLFFRA statute, and assisting the systems with reporting requirements. The PRB provided materials and taught a course at the 2017 Annual TLFFRA Conference in The Woodlands.

The Texas Local Fire Fighters Retirement Act Pension Report (TLFFRA Report) provides general and comparative pension-related data for paid and part-paid retirement plans organized under the TLFFRA statute. TLFFRA plans are statutorily required to report financial, actuarial, benefit, investment and contact information to the PRB. Based on the information received by the PRB, the report is organized into four sections: Financial, Actuarial, Benefits, and Directory. The Board approved the report at its March 1, 2018 meeting, and the report was published online and sent to TLFFRA systems in early March.

85th LEGISLATURE

Public Pension Legislation of the 85th Legislature

The 85th Session of the Texas Legislature convened in January of 2017 and adjourned on May 29, 2017. During the session, the PRB tracked 91 bills and companion bills pertaining to Texas public retirement systems. The PRB issued 68 actuarial impact statements to the Legislative Budget Board regarding the actuarial effect of these bills and substitutes on public retirement systems. The agency closely monitored these pension bills and published a weekly tracking report to provide information on the status of those bills for its constituents. Major pension-related legislation passed during the regular session can be found in Appendix F.

Presentations to the Legislature & Interim Hearings

On February 27, 2017, the PRB provided invited testimony before the House Committee on Pensions. The presentation covered information about the agency and its duties, the general landscape of Texas public retirement systems, and the pension challenges in Texas, such as issues facing the Dallas Police and Fire Pension System. The agency also testified as a resource witness and provided technical assistance to various legislative offices on pension-related bills during session.

On April 4, 2018, the PRB presented a report to the Senate Committee on State Affairs concerning the charge to: "Examine and assess public pension systems in Texas. Specifically, review and assess (1) the

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different types of retirement plans; (2) the actuarial assumptions used by retirement systems to value their liabilities and the consequences of amending those assumptions; (3) retirement systems' investment practices and performances; and (4) the adequacy of financial disclosures including asset returns and fees." The PRB's report on this charge focused on the Texas public retirement systems' assumed rates of return. *(See Appendix G1)*

On May 10, 2018, the PRB presented a report to the House Committee on Pensions in Dallas regarding Interim Charge #1: "Review the state's oversight of pension systems and study the effectiveness of corrective mechanisms, including the Funding Soundness Restoration Plan and Pension Review Board Funding Guidelines. Make recommendations to enhance state oversight and to maintain or achieve soundness among local pension systems" and Interim Charge #4: "Monitor the agencies and programs under the Committee's jurisdiction and oversee the implementation of relevant legislation passed by the 85th Legislature." The PRB's report provided information on the PRB's intensive actuarial review process, a general update on the Texas public pension outlook, including funding trends, assets and liabilities, investment return assumption trends, and a funding soundness restoration plan update. The agency also provided a summary of the legislation passed during the 85th Legislature concerning the Dallas Police and Fire Pension System, including a summary of the provisions, the impact of the legislation on system funding levels, and the PRB duties associated with the legislation. *(See Appendix G2)*

On October 12, 2018, the PRB presented to the House Committee on Pensions in Houston concerning Interim Charge #1: "Review the state's oversight of pension systems and study the effectiveness of corrective mechanisms, including the Funding Soundness Restoration Plan and Pension Review Board Funding Guidelines. Make recommendations to enhance state oversight and to maintain or achieve soundness among local pension systems" and Interim Charge #4: "Monitor the agencies and programs under the Committee's jurisdiction and oversee the implementation of relevant legislation passed by the 85th Legislature." The PRB's report provided information on the PRB's intensive actuarial review process, a general update on the Texas public pension outlook, including funding trends, assets and liabilities, investment return assumption trends, and funding soundness restoration plan update. The agency also provided a summary of the legislation passed during the 85th Legislature concerning the Houston Firefighter's Relief & Retirement Fund, Houston Police Officers Pension System, and Houston Municipal Employees Pension System; including a summary of the provisions within the bill, a description of the elements within the corridor mechanism created by the bill, the impact of the legislation on system funding levels, and the PRB duties associated with the legislation. *(See Appendix G3)*

2017 Legislative Session Training

In January 2017, the agency conducted a training session at the Texas Capitol for staff of the Legislature, Legislative Budget Board, Governor's Office, public retirement systems, and other interested parties. The training session covered basic actuarial methods, pension plan financing, and the actuarial impact statement process for pension-related bills. The staff also provided numerous public pension training sessions to legislative offices.

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APPENDICES

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APPENDIX A1 – INTENSIVE ACTUARIAL REVIEW – GALVESTON EMPLOYEES RETIREMENT PLAN FOR POLICE

Intensive Actuarial Review:

Galveston Employees' Retirement Plan for Police

January 2018



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Executive Summary

This intensive actuarial review of Galveston Employees' Retirement Plan for Police ("Galveston Police" or "the Plan") is intended to assist the Plan's board of trustees and the City of Galveston ("the City") in assessing the Plan's ability to meet its long-term pension obligation. Overall, the review shows that the Plan is facing significant financial stress and is taking considerable risks in its approach to funding the Plan. The review also highlights that Galveston Police and the City have waited too long to address these challenges, which has exacerbated the situation due to the compound nature of pension liabilities. The Pension Review Board (PRB) encourages the Plan and the City to review the findings and conclusions of this report carefully and jointly adopt a forward-looking funding plan to guide the Plan towards a path of long-term sustainability. The PRB can provide technical assistance in formulating such a plan.

The funded status of Galveston Police has been declining since 2000. Numerous factors have contributed to this deterioration, including inadequate contributions, insufficient investment returns, increased benefit payments, and a low active-to-annuitant ratio in the face of a large unfunded liability. Galveston Police and the City have made incremental plan changes, including contribution increases since 2006 in response to deteriorating conditions, but these changes have not been enough to put the Plan on a solid path to sustainability.

Currently, Galveston Police's ability to meet its long-term obligations, measured by a number of indicators in addition to amortization period, may be threatened and warrants closer scrutiny. **A few of the key indicators include:**

- Galveston Police's funded ratio (assets on hand to cover liabilities) fell from 99% in 2000 to less than 42% in 2017, which is one of the lowest funded ratios in the state.
- Galveston Police's actuarial accrued liability increased by nearly 103% between the end of 2000 and 2017. Conversely, the Plan's actuarial value of assets *declined* by nearly 14% over that same period.
- The single largest increase in unfunded liability over the past 10 years was due to investment returns lower than the assumed rate of return.
- Galveston Police's investment return assumption of 8.00% is one of the highest in the state. The Plan has not achieved an 8.00% return on assets over a consecutive 10-year period in any of the 10 periods ending December 31, 2007 through December 31, 2016. The Plan's board has lowered the return assumption to 7.50% beginning with the 1/1/2018 actuarial valuation, but the Plan's actual returns have not met this revised assumption over the same period.
- Galveston Police's non-investment cash flow, which shows how much the Plan is receiving through contributions in relation to its outflows— benefit payments, withdrawals and expenses— is one of the lowest in the state at -9.79%. If this trend continues, the Plan could face the potential risk of needing to liquidate a portion of existing assets to pay current benefits and/or expenses.
- At 48.7 years, Galveston Police currently has one of the highest amortization periods (the number of years required to pay off any unfunded liability) of all 94 defined benefit pension plans in Texas.¹
- According to its actuarial valuations, Galveston Police has not received the reported actuarially determined contribution (ADC) every year since 2002 with the exceptions of 2006 and 2008.²
- Current members are contributing to not only pay for their own benefit accruals; they are also paying for past benefit accruals of police officers hired before them, contrary to pension funding best practices.

¹ PRB's *Pension Funding Guidelines* recommend a maximum effective amortization period of 30 years, with 10-25 a more preferable target range.

² For a pension plan that receives a fixed contribution rate such as Galveston Police, the ADC is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

- As of 2017, the present value of benefits payable to inactive members (retirees and beneficiaries) were only 58% funded, and the liability associated with active members was completely unfunded. While not all inactive benefits are payable immediately, the intent of pre-funding a defined benefit plan is to pay the cost of the benefit as it is earned such that an individual's benefits are fully funded when they retire.

The review measures Galveston Police based on four main risk factors—investment, funding, assumption, and governance risk — and reveal a significant amount of risk being taken in each of these areas, increasing the probability of a continued period of severe financial stress for the Plan. This also raises the likelihood of deteriorating funding conditions in the coming years, further imperiling the Plan's ability to pay promised benefits. **Key findings related to these risks include:**

- The likelihood of Galveston Police *not* meeting or exceeding the 8.00% expected return on assets is significantly greater than the odds that they will do so for the near future. The PRB estimated the Plan would be more than two times as likely to earn less than or equal to a 7.00% return versus greater than or equal to a 9.00% return over the next 30-year period.
- The Plan, along with many public pension plans, could suffer from large losses in a down market year, given its overall portfolio risk.
- Several of the Plan's economic assumptions, including the expected return on assets, may cause liabilities to be understated. While the Plan's actual cost will always be the benefits actually paid, if the liabilities are understated, the contributions necessary to fund the actual costs could be larger than anticipated and could exacerbate the Plan's already precarious actuarial condition.
- The Plan's contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Plan's actuarial valuations. Given the Plan's inactive and active liabilities are not fully funded; contributions below expected levels will have serious consequences on the Plan's long-term solvency.
- Galveston Police's fixed-rate contribution structure may provide budgetary stability for the employer in the short term, but does not include any inherent mechanisms for reacting to changes in a plan's financial condition.
- Even though required by state law to jointly formulate a funding soundness restoration plan (FSRP), Galveston Police and the City have yet to work together to make difficult decisions on additional needed changes to benefit or contribution levels. Currently, the Plan and the City have not agreed upon an interpretation of the statutory contribution provision, which can be an important first step towards a collaborative approach.

Finally, the review draws conclusions regarding how these risks might be mitigated and the Plan's overall ability to meet its long-term obligations improved. **Conclusions include the following:**

- Galveston Police, in conjunction with the City, should consider utilizing the FSRP requirement to develop a long-term funding policy for the Plan.
- Galveston Police's board of trustees should work with their actuary to ensure actuarial assumptions are neither too aggressive nor too conservative.
- Galveston Police's board of trustees should closely monitor investment managers' performance against appropriate benchmarks, and should revisit investment manager selection periodically to ensure managers are providing the highest possible value at the lowest possible cost. Asset allocation should also be assessed from a risk perspective to evaluate how the Plan would weather a market correction.

Background

Plan Summary

The Galveston Employees' Retirement Plan for Police ("Galveston Police" or "the Plan") was initially created in 1980 by city ordinance. In 1997, the 75th Legislature enacted Article 6243p, Vernon's Texas Civil Statutes ("governing statute"), establishing the Plan independently in state statute. The Plan covers all police officers employed full-time by the City of Galveston ("the City"). Galveston Police is entirely locally funded.

Benefits

Eligible Members (Group B)*	Member as of 6/30/2008 with less than 15 Years of Credited Service (YCS) as of 1/1/2006 or hired on or after 7/1/2008
Unreduced Retirement Eligibility	50/20 or age 65
Reduced Early Retirement Eligibility	45/20
Vesting	5 YCS if hired before 4/15/2017; 5-year graded vesting beginning with 50% at 5 YCS up to 100% at 10 YCS if hired on or after 4/15/2017
Benefit Formula	YCS x 2.11% x Final Average Salary (FAS) (max 30 YCS)
Final Average Salary (FAS)	Final 60 months
Automatic COLA	No
Retirement Benefit Options	None
Social Security	Yes

*As of 1/1/2017, there were 4 active Group A members remaining, members as of 6/30/2008 with at least 15 YCS as of 1/1/2006, whose benefit formula and retirement eligibility differ from the benefits outlined here.

Contributions

Active members of the Plan contribute 12.00% of pay and the City contributes 12.83%. The Plan's governing statute states that the City, acting under the advice of the Plan's actuary, shall contribute an amount equal to the normal cost and any interest on the unfunded actuarially accrued liability (UAAL) at the rate of interest assumed in the actuarial valuation. The City shall also contribute a sufficient amount to pay the costs of administration of the Plan. The City should ensure that its contributions meet the statutory requirements.

Membership

Total Active Members	Terminated Vested	Total Annuitants	Total Members	Active-to-Annuitant Ratio
145	16	144	305	1.01

*Data from the Plan's 12/31/2016 financial audit

Board Structure

Active Members	1 - President of municipal police association, or next-highest ranked member if President is not a plan member. Term equal to President's term of office. 3 – Members of the Plan; elected by plan members. Three-year term.
Sponsor Government	1 – Municipal finance staff employee; designated by and serving at the pleasure of the city manager. No term Specified.
Taxpayer, Not Affiliated with Plan/Sponsor Govt.	1 – Legally qualified voter; designated by the mayor. Two-year term. 1 – Legally qualified voter; designated by city council. Two-year term.

Contribution and Benefit Decision-Making

Under the Plan's governing statute, the board may modify the following plan provisions with the approval of at least four board members:

- benefit changes to the Plan as long as any increase in benefit is approved by a majority vote of plan members;
- future membership qualifications and eligibility requirements for pension or benefits; and
- member contributions, with any increase being subject to a majority vote of plan members. If the Plan's actuary certifies that an increase is necessary to maintain an actuarially sound plan, member approval can be foregone.

Funding Soundness Restoration Plan (FSRP)

Texas Government Code §802.2015 requires the governing body of a public retirement system and its governmental sponsor formulate an FSRP if the system's actuarial valuation shows its amortization period exceeds 40 years for three consecutive annual actuarial valuations, or two consecutive actuarial valuations if the system conducts valuations less frequently.

The Plan was required to submit an FSRP in 2016, because the actuarial valuations prepared as of January 1, 2014, January 1, 2015, and January 1, 2016 reported amortization periods greater than 40 years. The FSRP consisted of an increase in the City's contribution from 12.00% to 12.83% and the following change to the vesting schedule for members hired on or after April 15, 2017: 0% vesting up to 5 years; 50% vesting after 5 years increasing 10% each subsequent year reaching full vesting after 10 years. These changes were expected to be sufficient to reduce the amortization period to approximately 40 years.

Key Metrics

Government Code Section 801.202(2) requires the PRB to conduct intensive studies of potential or existing problems that threaten the actuarial soundness of or inhibit an equitable distribution of benefits in one or more public retirement systems. The PRB identified the following key metrics, in addition to amortization period, to determine and prioritize retirement systems for intensive actuarial review. The PRB selected Galveston Police for review based on the 2017 actuarial valuation data shown below. Unless otherwise noted, the following metrics were calculated as of January 1, 2017.

Amort. Period	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
48.7	42.10%	278.91%	8.00%	3.50%	81.41%	N/A	-9.79%

*Contribution and Cash flow data from the Plan's 12/31/2016 financial audit

Metric	Amortization period (48.7 years)
What it measures	Approximately how long it would take to fully fund the unfunded actuarial accrued liability (UAAL) based on the current funding policy.
Why it is important	Given the Plan's current assumptions, an amortization period greater than 18 years indicates that contributions to the Plan in the coming year are less than the interest accumulated for that same period, and therefore the total UAAL is expected to grow over the near term. In addition, for a plan that contributes on a fixed-rate basis such as Galveston Police, the higher the amortization period, the more sensitive it is to small changes in the UAAL.
Peer Comparison	Galveston Police currently has one of the highest amortization periods of all defined benefit pension plans in Texas.

Metric	Funded ratio (42.10%)
What it measures	The percent of a fund's actuarially accrued liabilities covered by its actuarial value of assets.
Why it is important	The lower the funded ratio, the fewer assets a fund has to pay its current and future benefit payments. Further, the present value of benefits payable to members who are no longer working (i.e. retirees and their beneficiaries) is not fully funded. Only 58% of the inactive liability is funded on an actuarial basis, leaving over \$15 million in inactive liability. All of the nearly \$14 million of active liability was completely unfunded as of January 1, 2017 and therefore is dependent on future contributions and investment returns.
Peer Comparison	Galveston Police's 42.10% funded ratio is one of the lowest in the state.

Metric	UAAL as a percent of payroll (278.91%)
What it measures	The size of a plan's unfunded liability compared to the annual payroll of the active members.
Why it is important	Provides a way to compare plans of various sizes and expresses the outstanding "pension debt" relative to current personnel costs.
Peer Comparison	The Plan's UAAL as a percent of payroll is one of the highest among plans in its peer group of similar asset size on a market value basis, including the civilian and fire plans sponsored by the City, and is also one of the highest in the state.

Metric	Assumed rate of return (8.00%)
What it measures	The estimated annual rate of return on the Plan's assets.
Why it is important	If actual future returns are lower than the assumed rate of return, future contributions will need to increase significantly, especially for a poorly funded plan. Galveston Police's assumed rate of return is 8.00%, while its actual ten-year net investment rate of return for the period ending 12/31/2016 was only 3.64%.
Peer Comparison	Galveston Police's 8.00% assumed rate of return is one of the highest in the state and is above the national average of 7.52% (reported by NASRA's Public Pension Plan Investment Return Assumptions brief updated February 2017).

Metric	Payroll growth rate (3.50%)
What it measures	The estimated annual growth in the total payroll of active members contributing to the Plan.
Why it is important	Contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Plan's actuarial valuations. Given the Plan's inactive and active liabilities are not fully funded, contributions below expected levels will have serious consequences on the Plan's long-term solvency.
Peer Comparison	The Plan's payroll growth rate of 3.50% is the median payroll growth rate for Texas defined benefit plans.

Metric	Actual contributions as a percent of actuarially determined contributions (81.41%)
What it measures	Whether the current employer contributions have met a theoretical minimum threshold. ¹
Why it is important	The employer is currently contributing less than 82% of the amount needed to fund the Plan on a rolling 30-year amortization period. The PRB's 2014 Study of the Financial Health of Texas Public Retirement Systems found that plans that have consistently received adequate funding are in a better position to meet their long-term obligations.
Peer Comparison	This is one of the largest shortfall percentages in the state and the third largest in its peer group.

Metric	Non-investment cash flow as a percent of fiduciary net position (-9.79%)
What it measures	Non-investment cash flow shows how much the Plan is receiving through contributions in relation to its outflows: benefit payments, withdrawals and expenses.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)), in conjunction with the funded ratio and recognition of the relative maturity of the Plan, provides information about the stability of a plan's funding arrangement.
Peer Comparison	Galveston Police's non-investment cash flow as a percent of FNP is one of the lowest in the state. If this trend continues, the Plan could face the potential risk of needing to liquidate a portion of existing assets to pay current benefits and/or expenses.

Historical Trends

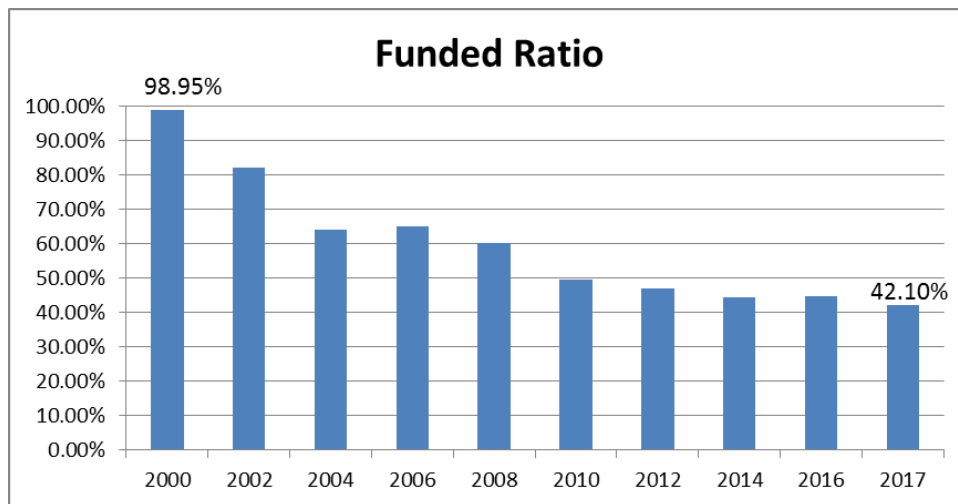
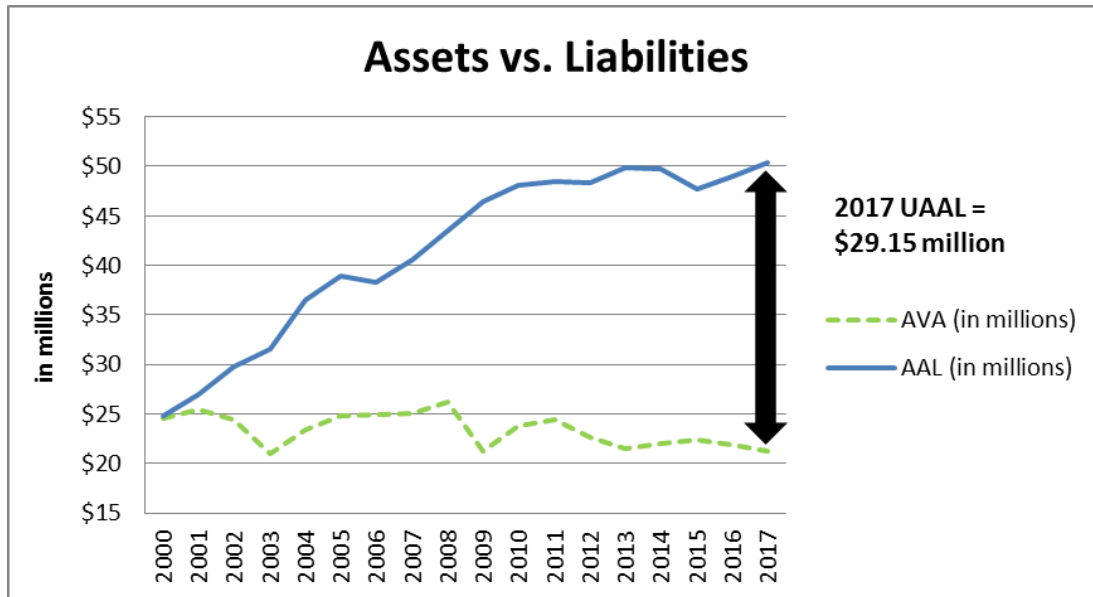
To conduct an intensive review of risks associated with the long-term funding of a pension plan, it is important to analyze trends in multiple metrics. A plan with an asset level lower than its accrued liability has insufficient funds to cover benefits. A plan can experience an increase in unfunded liability due to various factors, including insufficient investment returns, inadequate contributions and inaccurate or overly aggressive assumptions. Hence, a single metric cannot effectively capture the different drivers contributing to the increase of a plan's unfunded pension obligation. This section analyzes historical trends in various metrics identified by the PRB and makes comparisons to understand the sources of growth in unfunded liability for Galveston Police.

Galveston Police's funded status has been steadily declining since 2000. Numerous factors have contributed to this deterioration, including inadequate contributions, insufficient investment returns, increased benefit payments, and a low active-to-annuitant ratio in the face of a large unfunded liability. The following sections discuss these and other factors in detail.

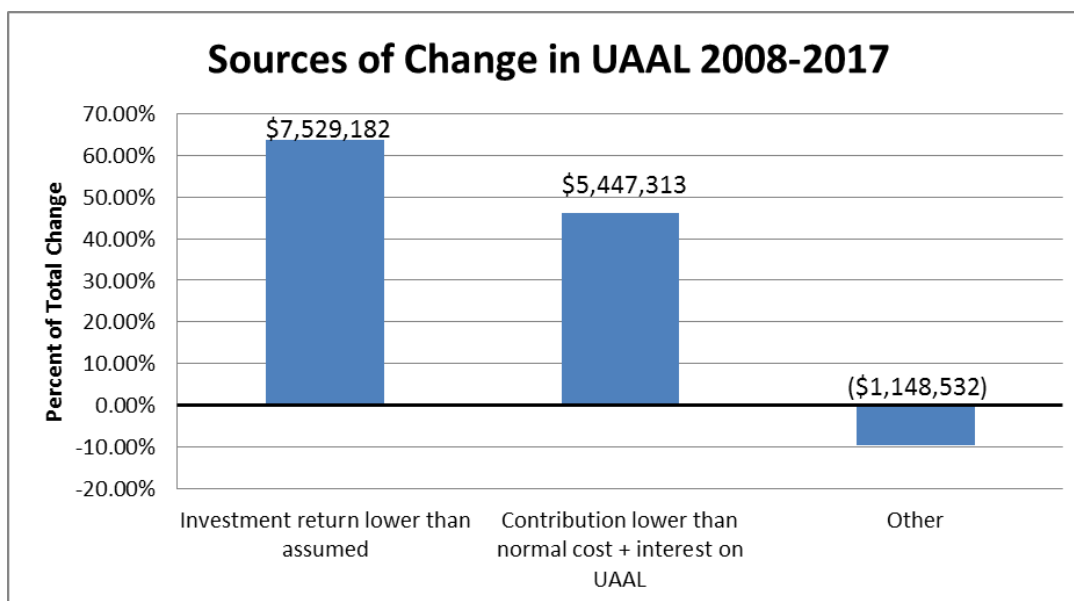
Assets and Liabilities

For a plan's funding level to improve, its assets should grow faster than liabilities, which can be achieved by contribution increases, benefit reductions, and/or consistently high investment returns over a long period of time.

Galveston Police's actuarial accrued liability (AAL) increased by nearly 103% between 2000 and 2017. Conversely, the Plan's actuarial value of assets (AVA) declined by nearly 14% over the same period. The Plan was nearly 99% funded in 2000 but fell to just above 42% in 2017, which is the third lowest of all defined benefit pension plans in Texas. The Plan has been under 50% funded since 2009.

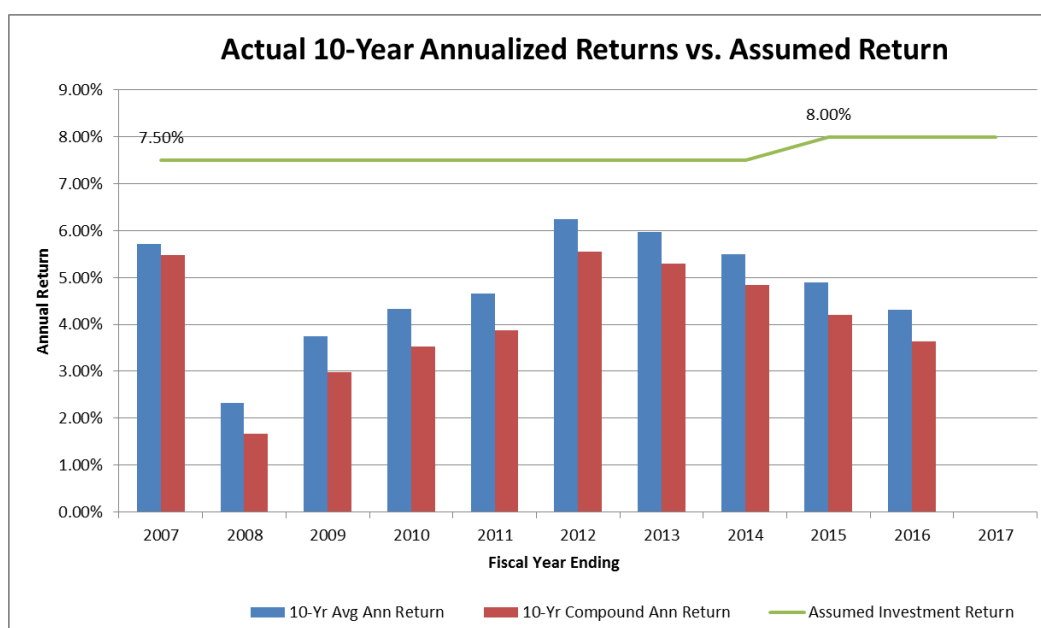


The graph below illustrates that the \$11.8 million increase in the UAAL (from \$17.3 million in 2008 to \$29.1 million in 2017) can be fully attributed to investment returns lower than the assumed rate of return (\$7.5 million increase in UAAL) and contributions lower than the normal cost plus interest accumulated on the UAAL (\$5.4 million increase in UAAL). The PRB did not have sufficient data to isolate the sources of changes for periods prior to 2008.



Investment Assumption and Returns

As illustrated in the Assets and Liabilities section, actual investment returns lower than the assumed return increased the Plan's UAAL by more than \$7.5 million between 2008 and 2017. The Plan currently assumes an 8.00% interest rate. Prior to 2015, the Plan assumed a 7.50% rate of return (net of all expenses), but in 2015 restated the rate to 8.00% (net of investment expenses only). The assumed rate of return of 8.00% still exceeds the 2017 national average of 7.52% (reported by NASRA) and most of its peer systems in Texas. In addition, the Plan has not achieved an 8% return on assets over a consecutive 10-year period in any of the 10 periods ending December 31, 2007 through December 31, 2016 as shown in the graph below.



The 10-year net return on investments in 2016 was 3.64%, which is almost 440 basis points below its assumed interest rate. While most plans have been experiencing a difficult 10-year period since the 2008-2009 market downturn, the Plan's returns further lag behind the 10-year average returns reported by its peer group (Texas defined benefit plans with asset size closest to the Plan's, including the civilian and fire plans sponsored by the City) over the same period, which is roughly 4.12%. PRB's AV Supplemental Report dated November 17, 2017 showed that out of 84 Texas plans that reported a 10-year net investment return, Galveston Police stood at 72nd.

The Plan has submitted a revised 2017 actuarial valuation, which includes recommendations to decrease the Plan's assumed investment return to 7.50%. These proposed changes were approved by the Plan's board at its May 12, 2017 meeting and will be effective for the 2018 actuarial valuation.

Contributions

Most Texas plans use a fixed percent of pay funding approach. Under a fixed-rate funding structure, no formal amortization policy (i.e. the expected time to fully fund the Plan) exists; therefore, the Plan's actuary estimates the amortization period at each valuation date based on the current financial condition of the Plan and the current contribution rates. This fixed-rate funding structure provides contribution stability for the plan sponsor in the short term, but does not include any inherent mechanisms for reacting to changes in a plan's financial condition.

As of January 2017, active members of the Plan contribute 12.00% of pay and the City contributes 12.83% of pay. Only 10.06% of the members' contribution is necessary to fund their current and future benefit accruals (normal cost), which means new officers hired tomorrow are not only paying for 100% of their own benefit, they are also paying for benefits of other officers hired before they started. The City's contribution rate reflects an increase from 12.00% in 2016. Despite the increase in the contribution rate in 2016, the Plan's UAAL increased by \$2.07 million. This increase in the UAAL was caused by total contributions that were not sufficient to cover both the new benefits being accrued (normal cost) and the interest accumulated on the unfunded benefits already earned (interest accumulated on the UAAL), or to start reducing the total UAAL. This result, a payment that is not expected to cover the interest that accrues during the year, is known as negative amortization.

The Conference of Consulting Actuaries' Public Plans Community White Paper *Actuarial Funding Policies and Practices for Public Pension Plans* suggests that an "amortization policy should reflect explicit consideration of the level and duration of negative amortization," and identifies a "rolling/open amortization of [the] entire UAAL as a single combined layer ... where the amortization period entails negative amortization," as an unacceptable practice.²

According to its actuarial valuations, Galveston Police has not received the reported actuarially determined contribution (ADC) every year since 2002, with the exceptions of 2006 and 2008. Even with contribution increases in 2006, 2008, and 2017, employer contributions have averaged less than 80% of the Plan's ADC since 2002. Furthermore, the reported ADC rate is calculated utilizing an "open amortization of [the] entire UAAL as a single combined layer." For the fiscal year ending December 31, 2017, the expected contributions are less than 81.5% of the reported ADC. This shortfall of \$306,173 is

equal to 0.67% of the City's total General Fund expenditures for the fiscal year ending December 31, 2016 and is greater than most other plans of similar asset size. Additionally, the City faces a contribution shortfall for the Galveston Firefighter's Relief & Retirement Fund of \$632,629, which is 1.38% of the City's total General Fund expenditure.

Contribution Levels vs. Actuarially Determined Contribution										
Date (1/1)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Employee Contribution	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%
Employer Contribution	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.83%
30 Year ADC	8.99%	14.35%	12.58%	14.56%	16.14%	16.30%	15.36%	14.71%	14.60%	15.76%
% of ADC funded	133.45%	83.63%	95.38%	82.40%	74.35%	73.64%	78.11%	81.60%	82.21%	81.41%
Covered Payroll (in millions)	\$9.96	\$9.08	\$9.99	\$8.57	\$8.23	\$9.02	\$9.31	\$9.38	\$10.14	\$10.45
Contribution Shortfall (in millions)	-	\$0.21	\$0.06	\$0.22	\$0.34	\$0.39	\$0.31	\$0.25	\$0.26	\$0.31

Under the Plan's 2017 assumptions (8.00% discount rate and 3.50% payroll growth rate), negative amortization occurs when the amortization period is more than approximately 18 years. This increases to 19 when reflecting the reduction in discount rate to 7.50% for 2018. While the Plan does not have an explicit amortization policy, continuing a fixed 12.83% employer contribution without any other changes to the Plan would result in an implicit amortization policy that entails negative amortization (i.e. intentionally increases the total UAAL) for the next 30 years.

As mentioned before, the Plan's governing statute states the City, acting under the advice of the actuary for the Plan, is required to contribute an amount equal to at least the normal cost plus interest on the UAAL at the rate of interest assumed in the valuation, as well as a sufficient amount to pay the cost of administration of the Plan. The Plan, based on its interpretation of the contribution provision contained in the governing statute, revised the 2017 actuarial valuation to recalculate the contribution rate for the City. As noted earlier, the current 12.00% member contribution is larger than the members' future benefit accruals, therefore, the employer normal cost is 0.00% and the revised actuarial valuation assumes the City will only contribute the interest on the UAAL plus expenses. The City's revised statutory 2017 contribution rate recommended by the Plan's actuary increased to 23.26%, and the estimated amortization period decreased by three years to 45.7. The City has not agreed to the updated contribution rate proposed in the revised 2017 actuarial valuation but should ensure that its contributions meet the statutory requirements.

Asset Allocation

The investment policy is not clear on target asset allocation for the various asset classes and only provides minimum and maximum allocations allowed. Current target allocation rates are based on comments provided from the Plan, which assume a target of 70.00% in equities and 30.00% in fixed income.

Asset Class	Equities	Asset Allocation		
		Fixed Income	Cash	Receivables
Current Allocation	71.06%	26.85%	1.09%	1.00%
Target Allocation	70.00%	30.00%	0.00%	0.00%

*Current allocation as of 12/31/2016 financial audit

Payroll Growth

Galveston Police lowered the annualized payroll growth assumption from 4.00% to 3.50% as of January 1, 2017. The Plan's total payroll growth has averaged 1.6% between 2000 and 2017.

While this assumption under the current fixed-rate funding policy does not directly affect actual contributions, the calculation of the amortization period is highly sensitive to it, especially when a plan's amortization period is over 40 years.

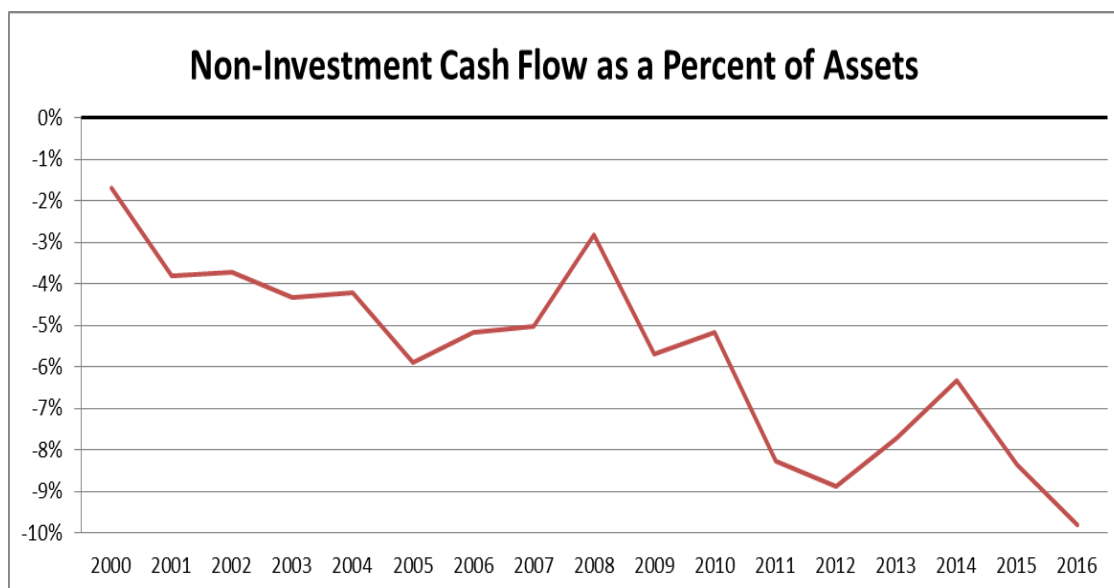
Sensitivity to Changes in Payroll Growth Assumption	
Assumed Payroll Growth	Amortization Period
3.50%	49
3.00%	75

*Based on 2017 UAAL and city contribution rate of 12.83%

Cash flow

Galveston Police has one of the lowest non-investment cash flows in the state. In 2016 the Plan's non-investment cash flow dipped to -9.79%, a large drop from before the market downturn in 2008 (-2.81%). The drop to -5.70% in 2009 was largely caused by a decrease in total contributions from \$2.6 million in 2008 to \$2.2 million in 2009. Total contributions have grown since 2009 (\$2.5 million in 2016), but the continued growth in yearly benefit disbursements and administrative expenses is still outpacing the funds received by the Plan through contributions.

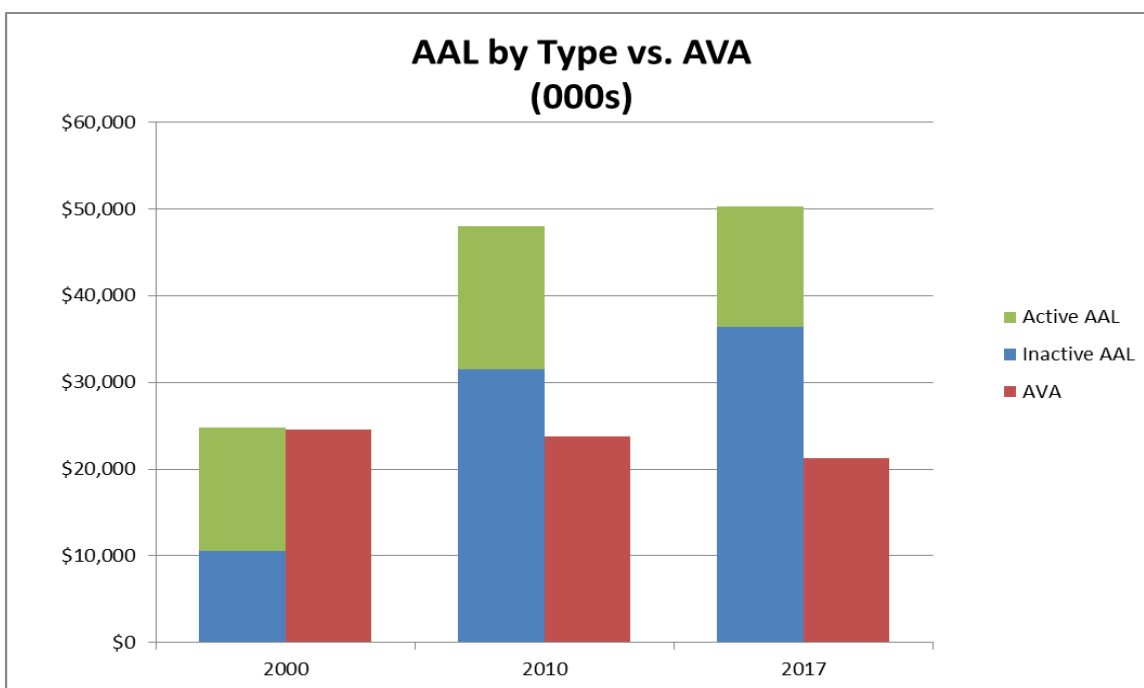
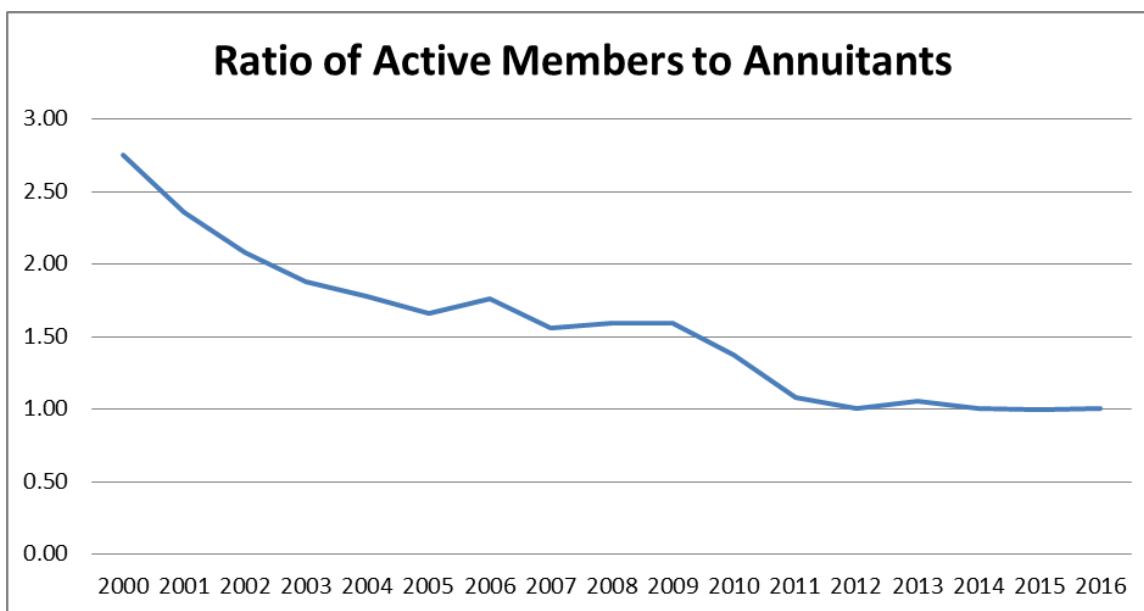
A negative non-investment cash flow is not abnormal for mature defined benefit pension plans. However, a cash flow percentage this low is likely to be a drag on potential investment returns because a plan must either invest in a higher proportion of income-producing investments, which traditionally provide lower returns, or must liquidate existing assets to pay out current benefits and/or expenses.



Demographics

As a pension plan matures, it will experience a shift in demographics with a declining ratio of active members to retirees. This demographic shift is expected and is taken into account in the long-term funding of a pension plan. However, for a plan with a large unfunded liability, a declining active to retiree ratio can exert financial stress from a contribution perspective. Contributions to the Plan are on a percent of pay basis, and assume an ever-growing contribution base (i.e. the total payroll is assumed to grow at a constant percentage so the dollar contributions into the Plan are also assumed to grow at the same rate). This percent-of-pay approach results in back-loaded contributions for fully funding any unfunded liability as compared to a level dollar approach. It is therefore helpful to compare the active member population, the basis on which contributions are calculated, to the annuitant population. A shrinking active member population, as compared to the annuitant population, indicates a smaller and smaller base available to fund any outstanding unfunded liability or to provide the needed support in times of distress.

As of December 31, 2016 the Plan's active-to-annuitant ratio was 1.01 with 145 active contributing members, and 144 annuitants (1 disabled, 129 Retirees, and 14 beneficiaries). This ratio is lower than the majority of similarly-sized plans in its peer group, and is one of the lowest of all defined benefit pension plans in Texas. The Plan's active-to-annuitant ratio has been around 1:1 since 2014 and barely above 1:1 since 2011. With increased longevity of members, the active-to-annuitant ratio is expected to continue to decline and put more pressure on the active members to fund the Plan. In addition, the City informed the PRB that it experienced officer attrition after Hurricane Ike in 2008 and has had difficulty hiring since then. This issue is exacerbated by the fact that the current assets are not sufficient to support the existing inactive population or future retirees and beneficiaries.



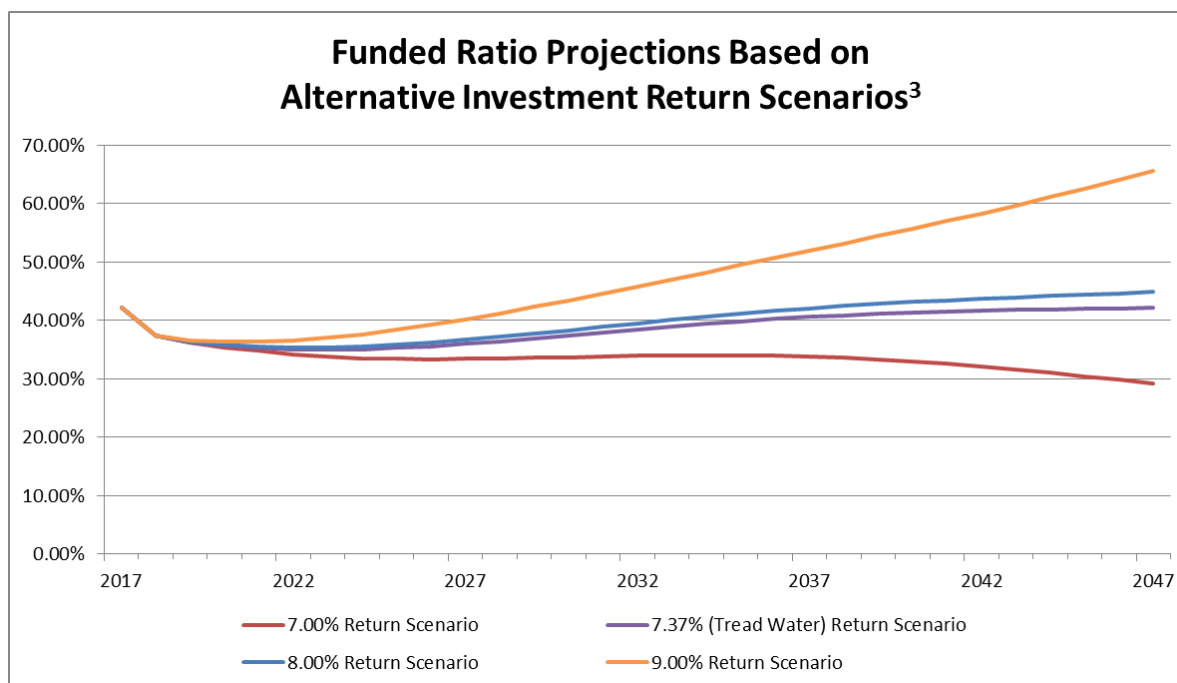
Risk Analysis

The various risks faced by a pension fund all boil down to one relatively simple question, “Will there be enough money to pay benefits when due?” This section discusses four main risk factors facing the Plan: investment, funding, assumption, and governance risks. Measuring Galveston Police based on these factors reveals a significant amount of risk being taken in each of these areas, increasing the probability of a continued period of severe financial stress for the Plan. This also raises the likelihood of deteriorating funding conditions in the coming years, further imperiling the Plan’s ability to pay promised benefits.

Investment Risk

Investment risk is the risk that actual future returns will be different from expected. Generally, some risk always exists associated with actual returns deviating significantly below or above the expected return on assets over the long term. However, the likelihood of Galveston Police *not* meeting or exceeding the 8.00% expected return on assets is significantly greater than the odds that they will do so for the near future.

The graph below projects the funded ratio for the next 30 years, assuming the member contribution rate remains 12.00% and the City contributes a fixed 12.83%, under the following four different actual investment return scenarios: the expected return on assets (EROA) or 8.00% for 2017 and 7.50% for all subsequent years; the EROA +1%; the EROA -1%; and the “tread-water” rate of return on assets, or rate of return on assets necessary to have the same funded ratio at the end of the 30-year period. The tread-water return on assets is 7.37%, meaning if the average return over the next 30 years is lower than the assumed return by just 63 basis points in 2017 and 13 basis points for all future years, *the Plan would find itself in essentially the same funded position in 30 years.*



In addition, as was illustrated in the Historical Trends section, the Plan has not achieved an 8.00% annualized return (or even a 7.50% return) over a consecutive 10-year period in any of the 10 periods ending December 31, 2007 through December 31, 2016. The impact of consistently earning less than the EROA *but even as high as 7.00% over the next 30 years results in the funded status sinking to 30%.* The graph also illustrates that better than average returns alone are not sufficient to fix the funded status of the Plan. Achieving an annualized 9.00% return over the next 30 years results in a funded ratio of only 65%. Based on the current asset allocation, the Plan’s assumed rate of return, and expected capital market assumptions published by organizations such as JP Morgan and Horizon Actuarial Services, the

PRB estimates the probability of earning less than or equal to a 7.00% annual return is approximately twice as likely as achieving a 9.00% or greater annual return over the next 30-year period.

The Plan's current asset allocation is not significantly different from other public pension plans. However, to maintain an expected return on assets of 8.00%, public pension plans have generally taken on significantly more risk than in the past. Public pension portfolios with an 8.00% expected return have increased risk by more than three-fold between 1995 and 2016.⁴ Generally, this is a result of shifting investments from more stable fixed income securities (with significantly lower returns in 2016 than in 1995) into equities and equity-like products. Galveston Police, however, has consistently held a significant portion of its assets in equities, with nearly 2/3 of total assets invested in equities in 1995. Taking on this level of investment risk over the long-term has not necessarily produced a better result in this case.

The approval by the board to reduce the assumed rate of return on investments to 7.50% for the 2018 valuation is a step in the right direction, but may not be sufficient.

Funding Risk

Funding or contribution risk is the risk that actual future contributions are less than expected future contributions. For purposes of this section, funding risk will also refer to the risk that future contributions are less than "needed" to maintain a financially stable pension fund.

There are two primary issues with fixed-rate, percent of pay plans that may result in long-term problems:

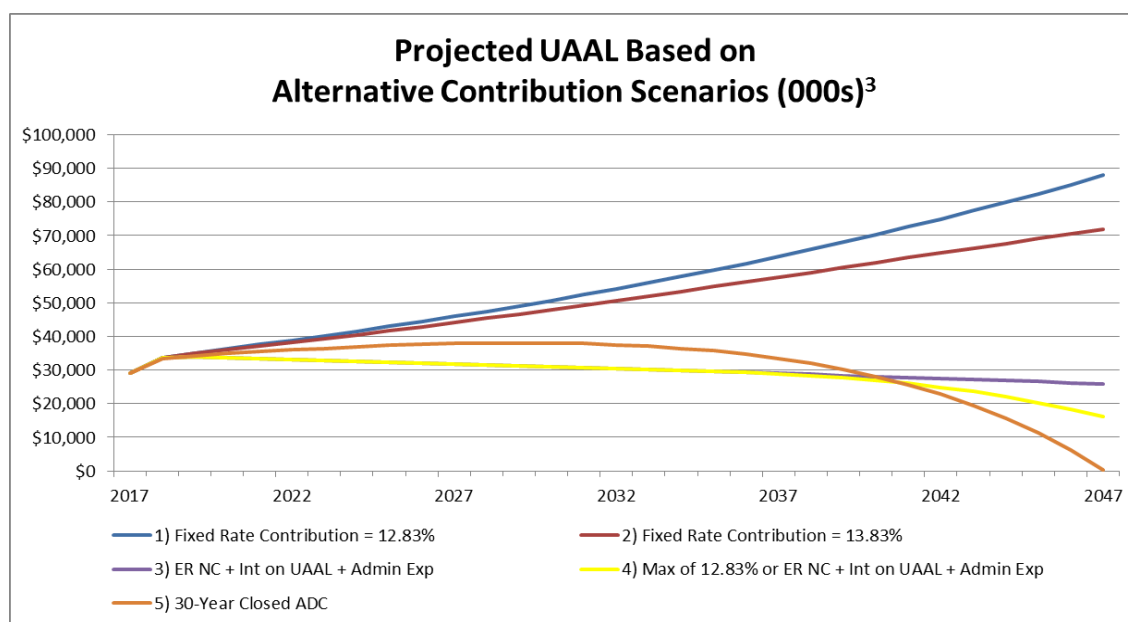
- 1) Contributions to percent of pay plans are inherently back-loaded because the expected contributions to a percent of pay plan grow on a nominal basis at the assumed rate of total payroll growth.
- 2) Fixed-rate plans provide budgetary stability for the employer in the short term, but do not include any inherent mechanisms for reacting to changes in a plan's financial condition.

Based on the Plan's current contribution rates and actuarial assumptions, the total UAAL is expected to increase for the next 30 years before it starts to decrease. The implication is that someone who is hired by the Police Department or someone who moves to the City 15 to 20 years in the future will still be paying for services received in the past. This raises the concern of intergenerational equity. Moreover, if actual investment returns and/or payroll growth are lower than expected, the UAAL will only continue to increase more.

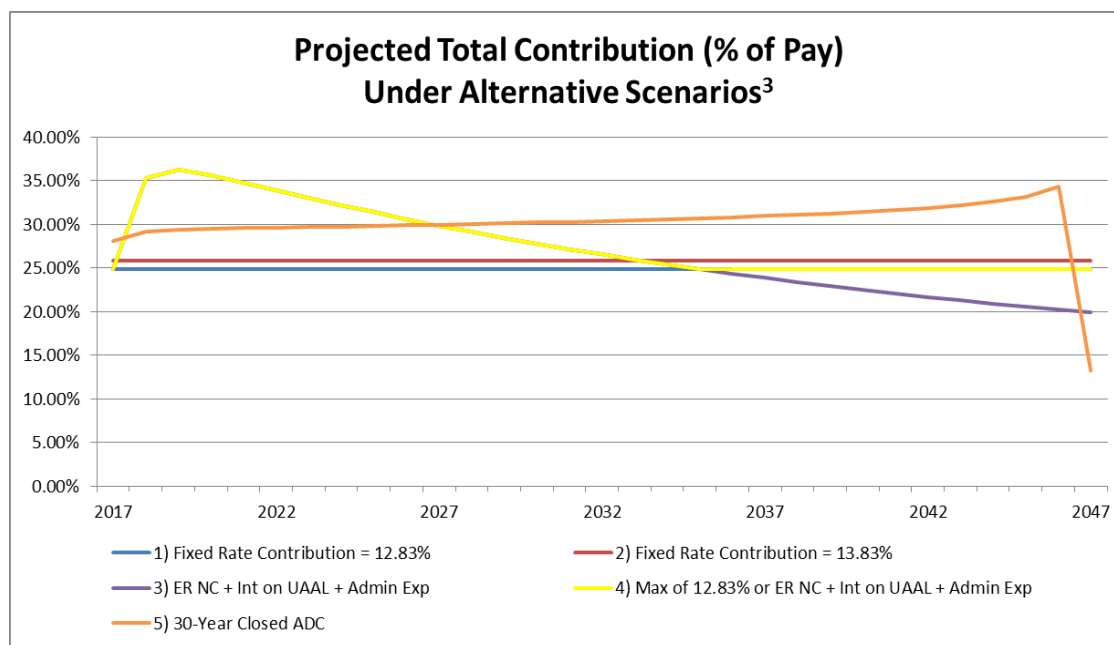
As was noted in the Historical Trends section, current member contributions exceed their normal cost (or the annual benefit accrual) based on the Plan's current actuarial assumptions. Given the inactive liability is not fully funded, the excess contribution is not being used to build up a reserve to address future adverse deviations, but to fund the benefits of current retirees.

To address these concerns, a plan can adopt a funding policy where member contributions are no more than the annual normal cost and employer contributions are designed with a target to fund actuarial

losses over a finite period. One approach is for the employer to contribute based on an actuarially determined contribution (ADC) that is designed to decrease contribution volatility, while addressing changing financial conditions. The projections below illustrate the expected UAAL and total contributions (both employer and employee) under a variety of potential contribution scenarios. The scenarios are 1) maintaining the current fixed contribution rates; 2) increasing the employer contribution by 1.00% but keeping it a fixed rate of 13.83%; 3) adopting a funding policy that follows the interpretation of the Plan's governing statute as outlined in Retirement Horizons' revised 2017 actuarial valuation (i.e. the City pays the employer normal cost (currently \$0) plus interest on the UAAL plus the administrative expenses); 4) a combination of scenarios 1 and 3 where the City pays a fixed rate of 12.83% but never less than the interest plus administrative expenses; and 5) adopting a funding policy that utilizes a single-layer 30-year closed amortization approach (i.e. will fully fund the Plan in 30 years).



The total contributions (both employer and employee) necessary for each funding policy are shown below.



Assumption Risk

Actuarial valuations and projections are by their nature simplifications of an extremely complex reality. As G.E.P. Box is famously quoted, “All models are wrong, but some are useful.” The actuarial valuation, like a map of the world, is not 100% accurate but is instead a useful tool to help guide decision making on the most effective way to get from point A to point B. For that reason, it is best not to rely too much on a single snapshot of any given metric, but rather examine the progression of multiple metrics over time. An important part of that process involves selecting the economic and demographic assumptions about future plan experience.

Actuarial Standards of Practice (ASOPs) 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, and 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, provide a framework for the selection of assumptions. They state that each assumption selected by an actuary must be “reasonable,” where reasonable is defined as being appropriate for the purpose, reflects the actuary’s professional judgement, takes into account historical and current data, as well as future expectations, and has no significant bias. The ASOPs also recognize that “different actuaries will apply different professional judgement” such that a “range of reasonable assumptions may develop.”

As was noted previously, for the Plan, the single largest increase in UAAL over the past 10 years was due to investment returns lower than the assumed rate of return, and the potential for this trend to continue is one of the largest concerns moving forward. In addition, the amortization period calculation for a fixed-rate plan is highly sensitive to the selection of an assumed rate of payroll growth. The development of both of these assumptions relies first on the selection of the inflation assumption. While there are approaches to selecting the investment return assumption other than the traditional “building block” approach, the Governmental Accounting Standards Board’s reporting requirements implicitly

assume the building block approach is used by requiring plans to report expected real rates of return (i.e. “after adjustment to eliminate inflation”) for each asset class.⁵

While the Plan’s 3.00% inflation assumption may not appear high for public pension plans (approximately 62% of Texas plans in the most recent information reported to the PRB and 58% of the plans in the Public Plans Database⁶ for the fiscal year ending in 2016, used a 3.00% or higher inflation assumption), other industry data indicates inflation could be significantly lower. The following table illustrates several published inflation rates for various mid- to long-term horizons:

Source	Time Horizon (Years)	Rate
Galveston Police 1/1/2017 Actuarial Valuation	N/A	3.00%
Treasury Inflation Protected Securities ⁷	30	2.01%
SSA 2017 Trustees Report – Intermediate Assumptions ⁸	75	2.60%
JP Morgan 2017 Long-Term Capital Market Assumptions ⁹	10	2.25%
Horizon Actuarial Services 2017 Survey of Capital Market Assumptions ¹⁰	20	2.44%

Based on projections in the Investment Risk section above, if the mean rate of return is reduced from 8.00% to 7.50% to reflect a 2.50% inflation rate rather than 3.00%, the PRB estimates the Plan would be more than three times as likely to earn less than or equal to a 7.00% return versus greater than or equal to a 9.00% return over the next 30-year period.

The payroll growth assumption is also frequently calculated using a building block approach with inflation as the base and an adjustment for general productivity growth. Therefore, any reduction to the inflation assumption is likely to impact the payroll growth assumption as well. Also, as noted previously, the amortization period calculation is highly sensitive to the payroll growth assumption. The amortization period is used as the primary metric for decision-making by many Texas public pension plans, as well as the trigger for requirements under the Texas Government Code, so any assumption that has a significant impact on the amortization period should be scrutinized very closely.

For the Plan, while the actual cost will always be the benefits actually paid, if the liabilities are understated, the contributions necessary to fund the actual costs could be larger than anticipated and could exacerbate the Plan’s already precarious actuarial condition. It is sometimes useful to incorporate a level of conservatism in a plan’s assumptions to help avoid the difficulties associated with significant underfunding.

Governance Risk

Governance is essentially decision-making, and decision-making for public pension plans must balance the competing interests of plans and their sponsors and should feature collaboration between the two. One primary source of governance risk is the lack of involvement of key parties or stakeholders in important areas of decision-making for a pension plan including plan design (benefits) and funding (contributions). When a key party, such as the board of trustees or the plan sponsor, is not engaged in important decisions, the risk increases that benefit levels and the contributions required to fund them will diverge, potentially putting the Plan’s funding stability at risk.

For example, under the Plan's governing statute, the board has power to make decisions to modify plan benefits with the approval of at least four board members as long as any benefit increase is also approved by a majority vote of plan members. Although jointly responsible for funding the retirement plan along with plan members, the sponsoring city may have limited involvement in benefit decision-making, a structure which generates the risk that benefit levels adopted could be unsustainable. While Galveston Police has not made any benefit increases and instead has made a minor benefit reduction for future employees, this potential risk remains in the future, given the statutory structure.

Benefit increases are not the only potential risk related to a potential lack of sponsor involvement under the Plan's governing law; unwillingness to reduce benefits prospectively when necessary to address funding challenges can be an obstacle to getting things back on track. It should be noted that even plans with very engaged boards and sponsors can be susceptible to increasing benefits to unsustainable levels in good times or failing to lower them when necessary in bad times. Governance risk related to an imbalance in decision-making can only exacerbate these risks. Governance risk must also be managed on the contribution side, with both parties working together to provide sufficient contributions and to avoid lowering contributions in good times.

State law recognizes these risks and imposes cooperation between the system and sponsoring governmental entity by requiring retirement systems having trouble meeting their long-term obligations to work with their sponsors to develop a restoration plan for addressing those issues.¹¹ This framework helps ensure that both the system and its sponsoring employer are involved in pension plan reform decisions, but it comes at a point when actuarial health is already threatened. Through the FSRP process, the City made a contribution increase and Galveston Police made a change to plan vesting in response to deteriorating conditions, but these changes have not been enough to put the Plan on a solid path to sustainability.

Conclusions

Funding and Governance Risk

When retirement systems and their sponsors wait too long to address them, the funding challenges compounding over time can reach a point where small, incremental improvements such as those made for Galveston Police simply do not have enough effect to achieve sustainability. Even though required by state law to jointly formulate an FSRP, Galveston Police and the City have yet to make difficult decisions on needed changes to benefit or contribution levels. If necessary changes are ultimately made, they will certainly right the ship, but they will be made under less than ideal conditions.

Thus, another model is called for. Plans and their sponsors can develop policies that proactively manage risk in the future by laying out a formal risk-sharing plan in advance. To proactively manage governance and funding risk, retirement plans and their sponsors should work together to adopt written policies far in advance, before they incur adverse experience, that can guide them through both good and bad years and to shield against the risk of either party's exclusion or disengagement from decision-making. Funding and benefit policies can be adopted that provide a framework for how benefit and contribution levels may be modified under different conditions. An advantage of such policies is that changes to plan

benefits and costs are known and understood by all parties in advance, rather than negotiated under difficult circumstances.

A strong funding policy that ensures a healthy amortization period is maintained by requiring payment of an actuarially determined contribution is encouraged. Numerous actuarial methods can be utilized to help mitigate contribution volatility, including directly smoothing contribution rates or adding “guardrails” that require the stakeholders to come back to the table if the contribution rate falls outside a specified range. If funding according to an actuarially determined contribution is not adopted, a funding and benefit policy should, at a minimum, codify how adverse experience will be addressed and how future changes will be made.

For example, a funding policy might state that future benefit enhancements, cost of living adjustments, and/or contribution rate reductions can only be considered or made if the system’s funded ratio remains greater than a particular threshold. A funding policy can also state that if the funded ratio falls below a certain threshold, the stakeholders would be required to come back to the table to make necessary contribution and benefit adjustments. Galveston Police in conjunction with the City can consider utilizing the FSRP requirement to develop a long-term funding policy for the Plan.

Assumption Risk

Public retirement systems must monitor actuarial assumptions continually through their actuarial valuations and make appropriate adjustments to mitigate bias in the assumptions that result in consistent actuarial gains or losses. Actuarial gains and losses occur when the Plan’s actual experience does not match expected experience. Over time, without required changes, pension funds such as Galveston Police whose assumptions consistently diverge from actual experience in the same direction (i.e. consistently seeing actuarial gains or consistently seeing actuarial losses) can exacerbate the issue of intergenerational inequity, causing one group of members and taxpayers to over- or under-pay. Boards of trustees should work with their actuaries to ensure assumptions are neither too aggressive nor too conservative, while striving to maintain (or achieve) sound fiscal health to secure existing accrued benefits. PRB’s *Pension Funding Guidelines* recommend systems to monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

Investment Risk

Whatever the investment return assumption used, investment returns should be closely monitored, and investment managers’ performance should be assessed regularly and compared to appropriate asset class benchmarks. Benchmarks should be reviewed to see if they have been met or exceeded, and should be viewed in light of the risk taken to achieve those returns. Best practices also include revisiting investment manager selection periodically, with boards of trustees evaluating managers’ performance, fees, and whether their current managers are providing the highest possible value at the lowest possible cost. The asset allocation should also be assessed from a risk perspective to provide insight into whether the Plan could weather a market correction.

¹ The theoretical minimum threshold, or actuarially determined contribution (ADC), is a target or recommended contribution “to the plan as determined by the actuary using a contribution allocation procedure,” as defined in Actuarial Standards of Practice No 4. If contributions to the plan are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

² https://www.ccactuaries.org/Portals/0/pdf/CCA_PPC_White_Paper_on_Public_Pension_Funding_Policy.pdf

³ 1/1/2017 assets and liabilities reflect the actuarial accrued liabilities, actuarial value of assets, plan provisions, and actuarial assumptions and methods as reported in the 1/1/2017 Actuarial Valuation prepared by Retirement Horizons, Inc. (RHI). Projected liabilities and assets beginning 1/1/2018 reflect the same plan provisions and actuarial assumptions and methods except for a reduction in discount rate to 7.50% and an update to the mortality assumption to the RP-2014 Blue Collar Mortality tables adjusted backward to 2006 with Scale MP-2014 and projected with Scale MP-2016, to reflect changes adopted for the 1/1/2018 actuarial valuation. RHI estimates these changes will increase total normal cost to 11.09% and actuarial accrued liability by 4.8%. Total projected benefit payments were provided by RHI taking into account the updated assumptions.

⁴ http://www.rockinst.org/pdf/government_finance/2017-02-01-Risk_Taking_Appropriateness.pdf

⁵ Governmental Accounting Standards Board Statement No. 67, Financial Reporting for Pension Plans, p. 30.

⁶ <http://publicplansdata.org/>

⁷ <https://fred.stlouisfed.org/>

⁸ https://www.ssa.gov/oact/TR/2017/2017_Long-Range_Economic_Assumptions.pdf

⁹ <https://am.ipmorgan.com/us/institutional/our-thinking/ltcma-2017>

¹⁰ <http://www.horizonactuarial.com/blog/2017-survey-of-capital-market-assumptions>

¹¹ Texas Government Code 802.2015 and 802.2016 require public retirement systems whose amortization period exceeds 40 years for 2 or 3 consecutive actuarial valuations to develop, with their sponsor, a funding soundness restoration plan designed to bring their amortization period within 40 years over 10 or fewer years.

Appendix A – Peer Comparison Tables

Galveston Police - Peer Comparison Tables

Peer Group Plans	MVA	Assumed Interest	Payroll Growth	10-year return (Net)	Active/ Annuitants	UAAL % of Payroll	Average Benefit	30-year Shortfall % of GFE	30-year Shortfall % of ADC	NPL	Total Expenses	Expenses as % of Assets
Big Spring Fire	\$ 11,157,022	8.00%	5.00%	4.26%	1.27	248.61%	\$ 37,713	N/A	N/A	\$ 9,713,127	\$ 100,927	0.90%
Greenville Fire	\$ 12,728,162	8.00%	4.00%	4.23%	0.79	387.00%	\$ 24,101	0.97%	22.04%	\$16,709,548	\$ 125,356	0.98%
Waxahachie Fire	\$ 14,201,159	7.00%	4.00%	4.90%	1.77	164.84%	\$ 43,297	N/A	N/A	\$ 7,039,421	\$ 164,077	1.16%
Lufkin Fire	\$ 14,264,481	7.50%	3.00%	3.30%	1.23	371.24%	\$ 35,666	0.29%	7.99%	\$20,444,874	\$ 124,925	0.88%
Denison Fire	\$ 15,214,736	7.75%	4.00%	3.87%	1.04	182.33%	\$ 25,498	N/A	N/A	\$ 7,048,420	\$ 107,168	0.70%
Texas City Fire	\$ 15,837,081	7.75%	3.00%	3.56%	1.27	289.35%	\$ 35,686	N/A	N/A	\$17,061,992	\$ 182,033	1.15%
Galveston Police	\$ 19,784,817	8.00%	3.50%	3.64%	1.01	278.19%	\$ 27,018	0.67%	18.59%	\$30,568,642	\$ 204,875	1.04%
Conroe Fire	\$ 20,275,833	7.75%	4.00%	2.84%	3.83	167.60%	\$ 40,585	0.16%*	7.86%	\$19,202,262	\$ 196,542	0.97%
Cleburne Fire	\$ 21,323,149	7.25%	3.25%	5.64%	1.89	277.79%	\$ 36,625	N/A	N/A	\$ 12,363,227	\$ 127,066	0.60%
Harlingen Fire	\$ 27,704,447	8.00%	3.50%	5.46%	1.43	246.71%	\$ 25,706	1.35%	38.07%	\$38,003,230	\$ 168,246	0.61%
Texarkana Fire	\$ 31,777,180	7.75%	3.25%	5.27%	1.15	118.93%	\$ 26,740	N/A	N/A	\$ 7,275,575	\$ 267,783	0.84%
Killeen Fire	\$ 35,342,830	7.75%	3.25%	4.01%	3.35	114.49%	\$ 26,930	N/A	N/A	\$21,110,703	\$ 144,782	0.41%
Galveston Fire	\$ 40,155,474	7.75%	3.00%	3.74%	1.26	257.06%	\$ 28,238	1.38%	36.33%	\$25,178,930	\$ 266,065	0.66%
Galveston Employee	\$ 45,640,194	7.25%	3.00%	4.62%	1.53	56.65%	\$ 7,683	N/A	N/A	\$15,449,446	\$ 285,202	0.62%

Peer Group Plans*	Sponsor	GF Expend	EOY GF Bal	General Obligation Debt	UAAL	Expected Employer Contributions	ADC	30-year Shortfall	30-year Shortfall % of ADC	30-year Shortfall % of GFE
Lufkin Fire	Lufkin	\$32,591,960	\$10,480,400	\$56,600,000	\$17,317,158	\$1,100,728	\$1,196,291	\$95,563	7.99%	0.29%
Galveston Police	Galveston	\$45,814,068	\$20,659,210	\$28,005,000	\$27,075,738	\$1,340,681	\$1,646,853	\$306,172	18.59%	0.67%
Conroe Fire**	Conroe	\$64,298,794	\$28,651,695	\$40,365,000	\$13,667,395	\$1,223,183	\$1,327,561	\$104,378	7.86%	0.16%
Harlingen Fire	Harlingen	\$38,946,292	\$16,715,032	\$28,875,000	\$16,187,406	\$852,970	\$1,377,219	\$524,249	38.07%	1.35%
Galveston Fire	Galveston	\$45,814,068	\$20,659,210	\$28,005,000	\$20,353,268	\$1,108,487	\$1,741,116	\$632,629	36.33%	1.38%

*Only includes plans with 30-year contribution shortfalls

**Based on a 25-year amortization period shortfall, not a 30-year

Appendix B – Comments from Galveston Employees' Retirement Plan for Police

CITY OF GALVESTON EMPLOYEES' RETIREMENT PLAN FOR POLICE

January 22, 2018

Ms. Anumeha Kumar
Executive Director
Texas Pension Review Board
P.O. Box 13498
Austin, Texas 78711-3498

Dear Ms. Kumar:

Thank you for providing your preliminary draft of the Actuarial Review of the City of Galveston Employees' Retirement Plan for Police (the "Fund") that was completed by the Texas Pension Review Board ("PRB"). As you requested, in advance of your meeting on January 25th, the Fund's Board of Trustees (the "Board") wishes to provide a response to some of the areas considered in the PRB preliminary report. In addition, the Board has authorized David Sawyer, Fund Actuary and a principal with the actuarial firm of Retirement Horizons, and Stefan Smith, Fund Attorney and a partner with the law firm of Locke Lord LLP, to attend the meeting on January 25 to represent the Fund.

Active to Annuitant Ratio

At the bottom of page 1, there is a table showing the active to annuitant ratio equal to 0.88 based on 129 active members and 146 annuitants. The source of your information was the 2016 audit. We now recognize that this was transposed in the audit and consequently stated incorrectly. Based on the correct member counts from the January 1, 2017 valuation (145 actives and 144 annuitants), the ratio would be 1.00, which is in line with the prior two years.

Key Metrics in the PRB Report

The PRB states that the UAAL as a percentage of payroll (278.91%) is one of the highest among the Texas public sector plans with similar market values. While this may be true, we believe that using this peer group implies that the other plans in the peer group are similar in nature to the Fund. The PRB's survey of Texas Firefighters might provide a better peer group comparison to the Fund. A comparison to that survey would likely show the Fund's UAAL as a percent of payroll to be higher than average, but comparable to a number of other funds.

The assumed rate of return of 8.00% was lowered to 7.50% for the January 1, 2018 valuation. We agree with the comments stating that 8.00% rate of return is too high, and wish to reiterate that the Board agreed at its May, 2017 meeting to lower the rate to 7.50% for future valuations.

Asset Allocation/Investment Risk

The Board recently approved the selection of a new Investment Manager for the Fund, and will work with this manager to update the Fund's Investment Policy. Currently the allocation is a balanced 70/30 mix. The style of the new investment manager focusses on downside protection to reduce volatility by not exceeding investment of 15% in any one sector. The Fund now has strategic diversification with exposure to all sectors and market caps. The fixed income portion of the Fund is invested in high quality corporate and municipal bonds with an A or above rating with 3-5-year durations.

Funding Risk

The Board and its recently contracted Investment Manager will continue working on fee reduction. The Investment Manager will also assist the Board in a cash flow analysis to project timing of future needs.

Board Governance

The Board and its advisors are working together to formulate processes to better assist the Board with pension fund administration. Creation of a two-year calendar of events and duties will better assist all members in the review of vendors and operations of the Fund. The Board has also assessed the role of the Fund's outside counsel and has increased the involvement of counsel in the day to day governance of the Fund. Counsel is in the process of reviewing the practices and procedures of the Fund and Board in an effort to ensure that the Fund's governance is consistent with recognized best practices.

Thank you for considering this response. As mentioned above, David Sawyer and Stefan Smith will be attending your meeting in Austin on January 25 to represent the Fund. Both David and Stefan are available for any questions you may have.

Please contact us if you need more clarification.

Sincerely,



Geoff Gainer
Interim Board Chairman
City of Galveston Employees' Retirement Plan for Police

Appendix C – Comments from the City of Galveston



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January 22, 2018

Ms. Anumeha Kumar
Executive Director
Texas Pension Review Board
P.O. Box 13498
Austin, TX 78711-3498

Dear Ms. Kumar:

The City of Galveston received the draft actuarial review prepared by your staff on the Galveston Employees' Retirement Plan for Police on Tuesday, January 16, 2018. City management responds with the following comments for your review and consideration prior to release of your final report.

Recent Pension Reform History

For the last three years, the city's management team has made pension reform one of its highest priorities. The subject has been discussed in numerous public forums, televised on the city's municipal channel, addressed in annual budgets and financial reports, and discussed with the three pension boards themselves. ***The city and its leaders recognize that our three pension funds must be financially sound.***

While the causes are slightly different in each case, every one of the city's three pension plans began this period with challenges. The administration's position has been consistent throughout this period. That is to say the problems with each fund must be fixed, with financial stability and sustainability as the goal. It remains clear that any solution depends on a shared responsibility on the part of the members of each plan and the city's taxpayers. This shared responsibility necessarily includes changes in plan benefits.

Thanks to a combination of factors, the non-civil service employees plan is now in financially sound position with an amortization period for its UAAL of 13.4 years. We expect to continue to monitor the fund and work with the board to keep it that way.





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The challenges faced by the firefighters and police officers plan are more daunting, but can be solved given an approach of shared sacrifice. Currently, the Trustees of the Firefighters plan are preparing a vote for its members to modify plan benefits and requirements that in combination with increases in contributions by active plan participants and the City, resulting in a material immediate reduction in the plans unfunded liability and its UAAL to approximately 25 years. It is through the cooperative efforts of the Trustees and the City that this reform will restore the plan to a sound financial footing.

The Municipal Police Retirement Trustees are insistent that the City is fiscally responsible for the financial soundness of the plan; that the City may not even suggest changes to the benefit structure of the Plan. The City does not agree with their assessment; but has in fact increased funds going into the plan. That Board is referred to in this letter as the "Police Board".

Funding Measures - In 2015, the city dissolved its Tax Increment Revitalization Zone Eleven, and received \$2.3 million as its proportional share of the operating cash balance held by the TIRZ. This unusual one-time revenue was reserved in a Special Revenue Fund approved by the City Council for pension reform in the FY 2017 Budget. Additionally, the current FY 2018 Budget includes an additional reserve of \$393,000 taken from recurring revenues for potential increases to the City's contribution to the fire and police pension funds. Such an action was approved by the City Council with the expectation that an increased funding by the City in combination with prudent changes by the plan Trustees/members would be needed to address these long standing financial problems. More specific to the Police plan, the FY 2018 Budget included funding that increases police personnel and salaries resultant in an increase the city's pension fund contribution to approximately \$1.5 million for the fiscal year.

Discussion with the police pension board have been challenging at best. The Financial Soundness Restoration Plan (FSRP) provided an opportunity to do more than a quick fix to get the UAAL amortization period under forty years, but the minor change discussed in your report was all that could be agreed upon. The increase in the city's contribution from 12.00 to 12.83 percent was based on a recommendation by the plan's actuary and accepted by the City. The change to the vesting provision modifying it from hundred percent at five years to fifty percent at five years then increasing 10 percent over the next five years to fully vest at ten years was made consistent with terms that already existed in the City's plan for non-civil service employees. The impact of these changes were calculated by the actuary and served to guide the acceptance of this compromise as detailed in the FSRP.





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Discussions subsequent to submission of the FSRP have been less productive, culminating in the actuary's unprecedented presentation of a revised actuarial report. In the original report delivered in May 2017, the actuary determined that a combined contribution rate of 27.76 percent of payroll would be required to reduce the amortization period for the UAAL to thirty years. Also, the actuary provided an estimate based on likely changes in assumptions for next year's valuation. Under this approach, a total contribution rate of 29.96 percent of payroll would be required. Based on the adopted FY 2018 Budget, the difference in cost given these two approaches would have been \$342,337 (27.76 percent of payroll) and \$599,382 (29.96 percent of payroll).

In the middle of our discussions, the revised actuarial report was delivered to the Trustees at the request of a board majority but absent full board approval. It proposed a funding scenario applying a previously unused approach to a section of the state law. This approach could increase the city's contribution from \$1.5 million in the current fiscal year to over \$2.7 million, a potential \$1.2 million increase in recurring cost. If implemented for FY 2018, it would require offsetting reductions in this year's budget with eight months remaining to make such cuts.

The City is not willing to cut expenditures, suspend programs, and lay off municipal employees in response to revised report, nor does it believe there is a legal obligation to do so.

Governance and Legal Provisions

The Police Pension Plan was created pursuant to VATS Art. 6243p. The statute applies to municipalities with a population between 50,000 and 400,000¹ and will simply be referred to herein as the statutes.

The governance of the Police Board makes for an uneven distribution of power over pension matters. Plan members, including the president of the local police association, comprise the majority of the Board membership (four of seven seats) with the Board having the authority to:

1. Define and set benefits for plan members,

¹ The population is determined using the last Decennial census. The population of the City of Galveston in the last Decennial census was below the required threshold; there is an open question whether this statute remains operative.





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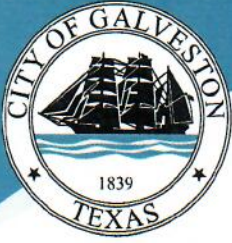
2. Determine the contribution level of each active member,
3. Retain professional investment managers to manage and direct the plan's liquid assets,
4. Retain actuaries to perform analyses of long-term funding requirements, and
5. Power to accept or potentially redirect the actuary's most important assumptions used to produce long-term projections.

Given the new interpretation embodied in the revised actuarial study for 2016, it now appears that the Board believes it is empowered to determine the City's contribution rate as well. If this were true, the Board could basically do whatever it wants in the way of benefits and member contributions and hand the bill to the taxpayers for whatever subsidy is required to completely fund the unfunded liability.

We neither believe that such a one-sided interpretation is healthy; nor, what was the legislative intent when the statute was passed twenty years ago.

1. This disempowers the elected Mayor and City Council and removes their ability to effectively set policy and allocate resources to meet local needs as is required of them under state law and the City Charter.
2. The concerns for equity between plan members raised in the PRB review (see the "Contributions" section at the bottom of page 8), appears to endorse an approach that would absolve trustees and active members from assuming any responsibility for prior board and membership decisions, actions, or inactions that contributed to the current financial situation. This narrow interpretation ignores other equity considerations and appears to remove the Independent Authority of a Home Rule City's elected leadership in favor of an unelected group with vested interests. Allowing a small group carte blanche to vote itself any piece of the public treasury they see fit cannot be the intent of the legislature
 - a. If virtually unlimited funding for the Police pension plan is the goal of the Police Board's latest actuarial initiative, other city services will suffer, including all General Fund departments (including the Police department). Active members and retirees of the City of Galveston's firefighter and non-civil service employee retirement plans will now be expected to share in the financial situation created by the Police Board and its membership. The City does not believe such an inequitable result is supported by the legislation creating the plan.





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Under the Police Board's approach, there is no consequence for the failure to manage the fund by making adjustments to plan benefits and pursue fiscal prudence.

- b. The City does not believe the Legislature intended to remove a municipality's authority to manage its budget by empowering an unelected group who is administering their own benefits when it passed the statute.

The Police Board's position is that such a result is required by Section 6.03 of the statute. Its belated interpretation has not been suggested in the twenty years since the statute was passed. The legislative record includes little recorded testimony that would help to enlighten us as to the original legislative intent. We do not believe it included disenfranchisement of Galveston voters and their elected officials.

Collective bargaining plays a role

The City of Galveston enters into a collective bargaining agreement with the Galveston Municipal Police Association (GMPA). The length of each term is typically two to three years. Although the Police Pension Board is not technically a party to that agreement; the Police Pension Board is comprised of a majority of GMPA members. The Police and City have provided a level of contributions to the Police pension in the collective bargaining agreement.

Never in that collective bargaining agreement has the Pension Board's belated interpretation of the statute even been suggested.

Financial Conditions

The review presents accurate but incomplete information regarding the recent history of key plan financial indicators, including:

1. Contributions,
2. Investment earnings performance versus assumed earnings,
3. Plan assets and liabilities, and
4. The Police plan's Unfunded Actuarial Accrued Liability (UAAL).

The chart on page 7 allocates the change in the UAAL for the last ten years to three financial areas:

1. Investments have been \$7.5 million lower than assumed,





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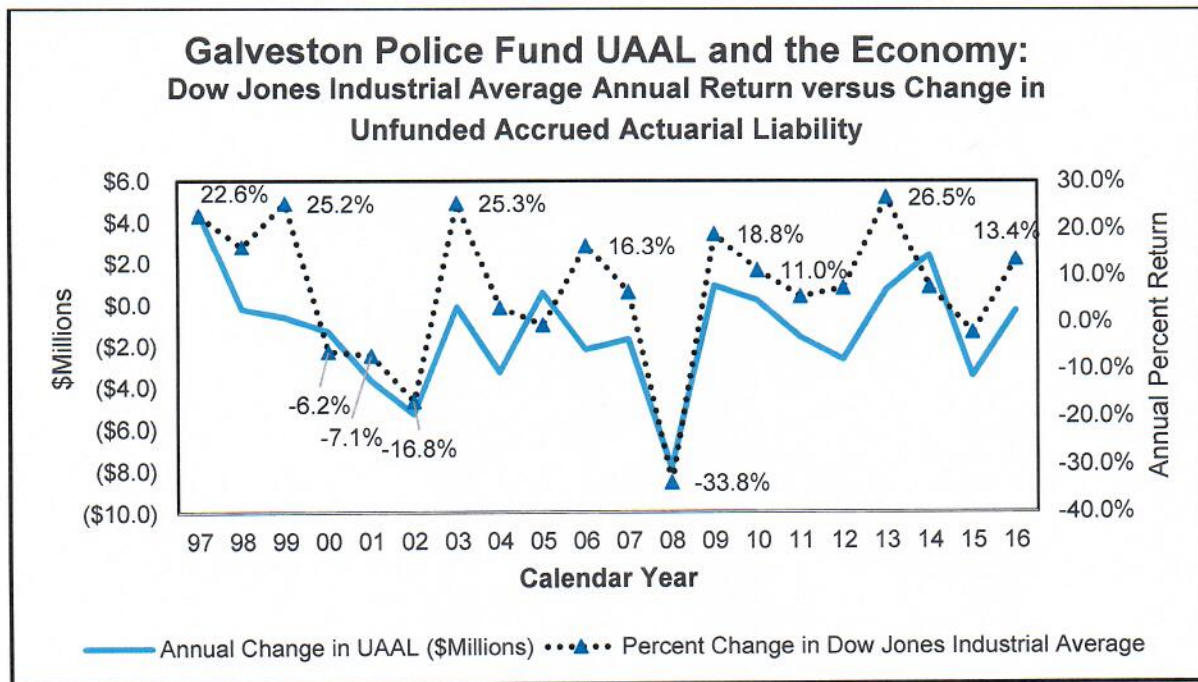
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- Contributions have been \$5.4 million less than were needed, and
- Other extant unidentified factors produced a total of \$1.1 million more income and/or less expense than previously assumed.

The analysis then suggest that multiyear solutions are needed to plan for and prevent financial situations like the current situation of the Galveston Police plan. We do not disagree, but that approach must be enlightened by an understanding of the conditions that cause such a result.

Economic Downturns

The U.S. stock market is a major repository for institutional investment in this country and the Dow Jones Industrial average is the most widely accepted measure of its performance. The chart below tracks the annual percent change in the Dow Jones Industrial Average (found at www.Forecast-Chart.com) and the annual percent change in the Galveston Police Plan UAAL for a twenty year period. The correlation between the severe downswings in the stock market and the Police Plan UAAL are striking.





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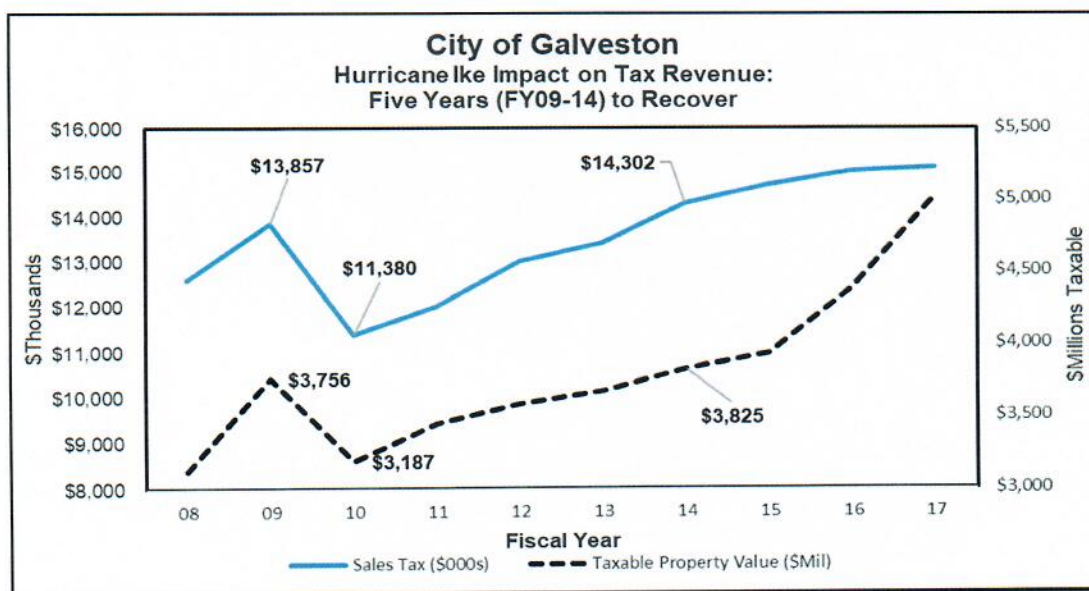
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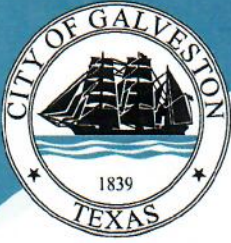
The U.S. economy had been strong in the late 1990s and the Galveston Police fund financial condition was strong during that time. The first of two major stock market reversals in the last twenty years occurred between 2000 and 2002, during which time the Dow Jones Industrial Average dropped about thirty percent. In that same time period, the Police Fund UAAL went from \$261,000 in 2000 to \$10,589,000 in 2002, a two year drop of \$10.85 million. The other major downturn in the market took place in 2008, when the DJIA dropped 33.8%. The Police fund UAAL went from \$17,317,000 in 2007 to \$25,197,000 in 2008, a \$7,880,000 increase.

These two major national economic downturns account for \$18,469,000 or 63.4 percent of the \$29,145,000 UAAL at January 1, 2017.

Hurricane Ike's Impact

On the morning of September 13, 2008, the eye of Hurricane Ike approached the upper Texas coast, making landfall at 2:10 am CDT over the east end of Galveston Island, with a high storm surge, and travelled north up Galveston Bay the east side of Houston. As a result, the resident population of the Island, which is virtually contiguous with the City of Galveston, dropped by 10,000 from approximately 57,000 to 47,000. The impact of this storm on private lives and property was immense, and the recovery was prolonged and difficult. The effect on the City's revenue base is shown below.





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After Ike, sales tax revenue staged a rally in FY 2009 as the result of goods and service purchases in the rebuilding effort. Then, sales tax revenue dropped \$2,477,000 or 17.8 percent in FY 2010. Taxable property value dropped \$569 million or 15.1 percent in tax year 2009 which became a reduction also for FY 2010 property tax revenue. This amounted to a \$2.8 million drop in potential revenue, which was addressed by a six cent tax rate increase approved by the City Council, which served to offset \$1.91 million of the \$2.8 million in property tax revenue lost to Ike. It took five fiscal years for sales tax revenue and taxable property value to return to their pre-Ike levels.

General Fund revenue dropped \$5.9 million overall in FY 2010, or 14.6 percent. This was offset by the six cent tax increase that generated \$1.1 million, making the final revenue total \$36.6 million for FY 2010. The overall drop in revenue without the property tax rate increase included \$700,000 loss from other sources. In order to balance the FY 2011 Budget, the year after Ike's impact was fully understood, approximately 125 positions were eliminated from the City budget. These reductions included 27 police officer positions (158 in FY 2010 reduced in FY 2011 to 131). This reduction was unavoidable but it had a direct effect on contributions by members and the City to the Galveston Police Retirement Fund. Most importantly, it led to a shortage of active members as compared with retirees.

The FY 2018 Budget includes sixteen new police officer positions which will bring the total police staffing level up to 168. This will exceed the pre-Ike staffing level. It is important to note that the Galveston Island population is estimated to have recovered half of its losses to Hurricane Ike.

Retiree Benefits

While the PRB review includes significant information on contributions and financial condition, it is short on providing similar information on benefits. This is somewhat understandable because there are few if any true peer pension plans in Texas to the Galveston Police plan. Looking at the history of benefit spending by the plan, such comparative information would be extremely useful in your final report.

Contributions have been impacted as previously described by Hurricane Ike since 2008 when the high water mark for contributions occurred, \$2,638,000. Currently, we estimate that the final total for 2017 contributions will be over \$2.7 million and FY 2018 will be close to \$2.9 million at the current contribution rates of 12 percent from active members and 12.83 percent from the City.

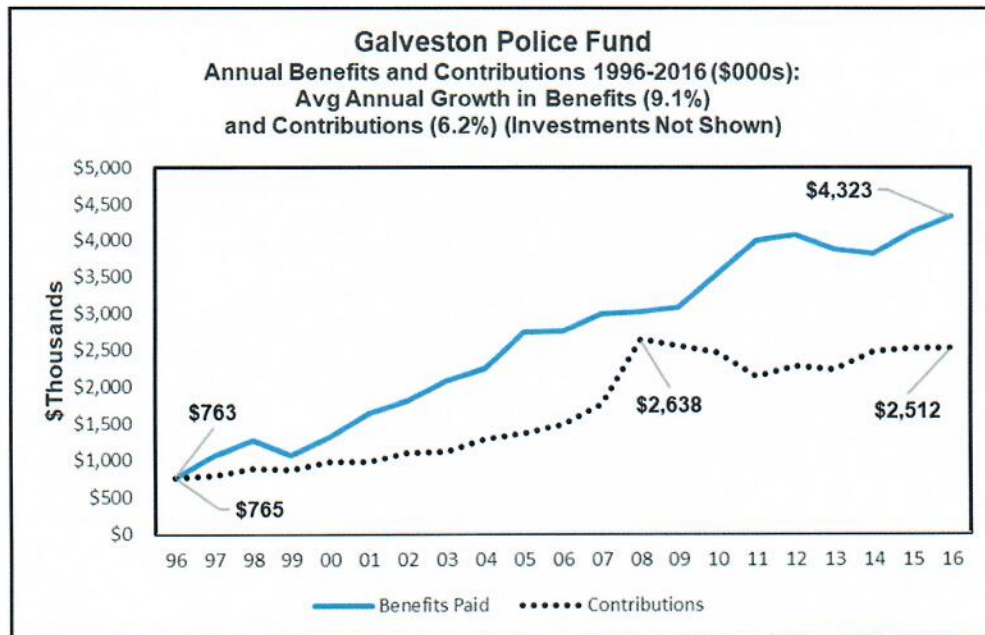




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Contributions have grown at an annual average 6.2 percent since 1996, benefits have outstripped this completely, growing at an average annual rate of 9.1 percent. In 1996, benefits and contributions were equal. In 2016, benefit payments exceeded contributions by \$1.8 million annually. What is driving this growth in retiree benefits? How does it compare with actuarial assumptions? It is clear that the growth in benefits should be slowed to make the cost of benefits affordable to plan members and the taxpayers.

Conclusion

We believe the review should point out some possible steps that could be taken to mitigate risk beyond those already suggested in the review.

1. Mitigate governance risk by providing that plan members will be represented by three board members, equal to that for its elected and appointed officials. By requiring the Board be disproportionately weighted to interested parties, on its face creates the appearance of conflict of interest if not a direct conflict. The seventh member (if that position exists) could be chosen by the majority of the board or an independent objective source, removed from the politics associated with City resource allocations and budgeting and the potential conflict of being a plan





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participant. This check prevents one group from controlling benefits and contribution levels using untested interpretations of state law as a shield to do so.

2. Require that actuarial reports must be completed within a shorter time frame (e.g. ninety to 120 days) after the end of the plan year. This can provide city councils and governing boards with greater time to review and consider the impact of economic or other natural calamities on pension fund financial health.
3. Support legislation that would allow smaller pension plans such as the Galveston Police plan to more easily be merged into larger plans, such as the Texas Municipal Retirement System, without compromising the financial health of the plans involved or the affected members.
4. Review the implementation of the Financial Soundness Restoration Plan to encourage multiyear pension restoration efforts.

Thank you for this opportunity to comment on the Draft Review.

Brian Maxwell
City Manager
City of Galveston



Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX A2 – INTENSIVE ACTUARIAL REVIEW – GREENVILLE FIREMEN'S RELIEF AND RETIREMENT FUND

Intensive Actuarial Review:

Greenville Firemen's Relief and Retirement Fund

January 2018



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Executive Summary

This intensive actuarial review of Greenville Firemen's Relief and Retirement Fund ("Greenville Fire" or "the Fund") is intended to assist the Fund's board of trustees and the City of Greenville (the City) in assessing the Fund's ability to meet its long-term pension obligation. Overall, the review shows that the Fund is facing significant financial stress and is taking considerable risks in its approach to funding the plan. The review also highlights that Greenville Fire and the City have waited too long to address these challenges, which has exacerbated the situation due to the compound nature of pension liabilities.

Since the start of this review in October 2017, City has agreed to increase its contribution rate by 2% beginning in October 2018. The Fund's actuary estimates that this increase in contribution would lower the Fund's amortization period to 38 years as of the 12/31/2016. The PRB's Actuarial Committee expressed ongoing concern regarding the likelihood of the Fund meeting the assumptions used to fund the plan. The Pension Review Board (PRB) encourages the Fund and the City to review the findings and conclusions of this report carefully and jointly adopt a forward-looking funding plan to guide the Fund towards a path of long-term sustainability. The PRB can provide technical assistance in formulating such a plan.

The health of Greenville Fire has been deteriorating since the early 2000s. Numerous factors have contributed to this deterioration, including inadequate contributions, insufficient investment returns, increased benefit payments, and a low active-to-annuitant ratio in the face of a large unfunded liability. Greenville Fire and the City have made incremental contribution increases since 2006 in response to deteriorating conditions, but these changes have not been enough to put the plan on a solid path to sustainability.

Currently, Greenville Fire's ability to meet its long-term obligations, measured by a number of indicators in addition to amortization period, may be threatened and warrants closer scrutiny. **A few of the key indicators include:**

- At 55 years, Greenville Fire currently has one of the highest amortization periods (the number of years required to pay off any unfunded liability) of all 94 defined benefit pension plans in Texas.¹
- Greenville Fire's funded ratio (assets on hand to cover liabilities) fell from 77% in 2000 to less than 48% in 2016, which is one of the lowest funded ratios in the state.
- Greenville Fire's actuarial accrued liability increased by nearly 90% between the end of 2000 and 2016. Conversely, the Fund's actuarial value of assets grew by less than 18% over that same period, resulting in the unfunded liability more than quadrupling.
- The single largest increase in unfunded liability over the past 15 years was due to investment returns lower than the assumed rate of return.
- While Greenville Fire lowered its assumed rate of return from 8.25% to 8.00% in 2016, 8.00% is one of the highest return assumptions currently used by plans in Texas. The Fund has not achieved an 8.00% return on assets over a consecutive 10-year period in any of the 13 periods ending December 31, 2004 through December 31, 2016.
- According to its actuarial valuations, Greenville Fire has underpaid its reported actuarially determined contribution (ADC) every year since 2004.²

¹ PRB's *Pension Funding Guidelines* recommend a maximum effective amortization period of 30 years, with 10-25 a more preferable target range.

- Greenville Fire's unfunded liability as a percent of payroll, which measures pension debt relative to overall personnel costs and provides information on the employer's fiscal burden, is the highest among TLFRA firefighter plans of similar asset size at 387.00%.

As of 2016, the present value of benefits payable to inactive members (retirees and beneficiaries) were only 74% funded and the liability associated with active members was completely unfunded. While not all inactive benefits are payable immediately, the intent of pre-funding a defined benefit plan is to pay the cost of the benefit as it is earned such that an individual's benefits are fully funded when they retire. The review measures Greenville Fire based on four main risk factors—investment, funding, assumption, and governance risk— and reveal a significant amount of risk being taken in each of these areas, increasing the probability of a continued period of severe financial stress for the Fund. This also raises the likelihood of deteriorating funding conditions in the coming years, further imperiling the Fund's ability to pay promised benefits. **Key findings related to these risks include:**

- The likelihood of Greenville Fire *not* meeting or exceeding the 8.00% expected return on assets is significantly greater than the odds that they will do so for the near future. The PRB estimated the Fund would be more than twice as likely to earn less than or equal to a 7.00% return versus greater than or equal to a 9.00% return over the next 30-year period.
- The Fund, along with many public pension plans, could suffer from large losses in a down market year, given its overall portfolio risk.
- Several of the Fund's economic and demographic assumptions, including the expected return on assets, may cause liabilities to be understated. While the Fund's actual cost will always be the benefits actually paid, if the liabilities are understated, the contributions necessary to fund the actual costs could be larger than anticipated and could exacerbate the Fund's already precarious actuarial condition. The Fund's contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Fund's actuarial valuations. Given the plan's inactive and active liabilities are not fully funded; contributions below expected levels will have serious consequences on the Fund's long-term solvency.
- Greenville Fire's fixed-rate contribution structure may provide budgetary stability for the employer in the short term, but does not include any inherent mechanisms for reacting to changes in a plan's financial condition.
- As required by state law to jointly formulate a funding soundness restoration plan, the City has agreed to increase its contribution rate to 19.30% beginning in October 2018; however, Greenville Fire and the City have yet to make difficult decisions on additional needed changes to benefit or contribution levels to address potential investment and funding risks in the future.

Finally, the review draws conclusions regarding how these risks might be mitigated and the Fund's overall ability to meet its long-term obligations improved. **Conclusions include the following:**

- Greenville Fire, in conjunction with the City, should consider utilizing the funding soundness restoration plan (FSRP) requirement to develop a long-term funding policy for the Fund.

² For a pension plan that receives a fixed contribution rate such as Greenville Fire, the ADC is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

- Greenville Fire's board of trustees should work with their actuary to ensure actuarial assumptions are neither too aggressive nor too conservative.
- Greenville Fire's board of trustees should closely monitor investment managers' performance against appropriate benchmarks, and should revisit investment manager selection periodically to ensure managers are providing the highest possible value at the lowest possible cost. Asset allocation should also be assessed from a risk perspective to evaluate how the fund would weather a market correction.

Background

Plan Summary

The Greenville Firemen's Relief and Retirement Fund ("Greenville Fire" or "the Fund") was established in 1941 under what is now entitled the Texas Local Fire Fighter's Retirement Act (TLFFRA). TLFFRA provides general guidelines for fund management, but leaves administration, plan design, contributions, and specific investments to the discretion of the board of trustees. Greenville Fire, as with all TLFFRA systems, is entirely locally funded.

Benefits

Retirement Eligibility	Age: 50 years; Years of Credited Service (YCS): 20 years
Vesting	20 YCS
Benefit Formula	YCS (up to 20 years) x 3.15% x Final Average Salary +\$63 per month for each year > 20 YCS
Final Average Salary (FAS)	Highest 36-Month Average Salary
Automatic COLA	No
Retirement Benefit Options	RETRO DROP: 2-year maximum. Employee contributions credited; no interest. Eligible at 53 years of age and 23 years of service.
Social Security	No

Contributions

Currently, active members of Greenville Fire contribute 16.30% of pay while the City of Greenville (the City) contributes 17.30% of pay. The City's contribution will increase to 19.30% in October 2018.

Membership

Total Active Members	Retired Members	Beneficiaries	Total Annuitants	Total Members	Active-to-Annuitant Ratio
59	60	14	74	133	0.8

TLFFRA Board Structure

Active Members	3 - Members of the retirement system; elected by fund members. Three-year terms.
Sponsor Government	1 - Mayor or designated representative, or the political subdivision's Chief Operating Officer or designated representative. 1 - Chief Financial Officer of the political subdivision, or designated representative. Terms correspond to term of office.
Taxpayer, Not Affiliated With Fund/Sponsor Govt.	2 - Residents of the State of Texas, must not be officers/employees of the political subdivision; elected by other Board of Trustee members. Two-year terms.

Contribution and Benefit Decision-Making

TLFFRA authorizes members of the retirement systems to determine their contribution rates by voting. The statute requires cities to contribute 12% of pay or the rate at which the active members contribute,

whichever is the smaller rate. TLFFRA also allows a city to contribute at a higher rate than employees do through a change in city ordinance.

TLFFRA gives the board the power to make decisions to modify the benefits (increases and reductions). However, a proposed addition or change must be approved by the actuary and a majority of participating plan members. Benefit changes cannot deprive a member, retiree or beneficiary of the right to receive vested accrued benefits.

Funding Soundness Restoration Plan (FSRP)

Texas Government Code §802.2015 requires the governing body of a public retirement system and its governmental sponsor formulate an FSRP if the system's actuarial valuation shows its amortization period exceeds 40 years for three consecutive annual actuarial valuations, or two consecutive actuarial valuations if the system conducts valuations less frequently.

Greenville Fire was required to submit an FSRP to the PRB in 2016 because the actuarial valuations prepared as of December 31, 2012 and December 31, 2014 reported amortization periods greater than 40 years. The FSRP consisted of increases in both the active members' and the City's contribution rates from 15.30% to 16.30% and 15.30% to 16.80%, respectively. This was expected to be sufficient to reduce the amortization period to 40 years or less by November 2026. However, the latest actuarial valuation, prepared as of December 31, 2016, indicated the Fund's amortization period was higher than the FSRP projection; therefore, the Fund and the City must prepare an updated FSRP by June 12, 2018. To fulfill this mandate, the City has agreed to increase its contribution rate to 19.30% beginning in October 2018. The Fund's actuary estimates that this increase in contribution would lower the Fund's amortization period to 38 years as of the 12/31/2016 valuation and satisfy the updated FSRP requirements.

Key Metrics

Government Code Section 801.202(2) requires the PRB to conduct intensive studies of potential or existing problems that threaten the actuarial soundness of or inhibit an equitable distribution of benefits in one or more public retirement systems. The PRB identified the following key metrics, in addition to amortization period, to determine and prioritize retirement systems for intensive actuarial review. The PRB selected Greenville Fire for review based on the 2014 actuarial valuation data shown below. Unless otherwise noted, the following metrics were calculated as of December 31, 2014.

Amort. Period	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
70.4	48.94%	368.49%	8.25%	4.25%	73.99%	N/A	-5.86%

*Contribution, DROP and cash flow data are from the Fund's 12/31/2016 financial audit

Since selecting Greenville Fire, the PRB received the Fund's 2016 actuarial valuation. The 2016 data was used for this review and is summarized in the table below.

Amort. Period	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
55.0	47.69%	387.00%	8.00%	4.00%	73.99%	N/A	-5.86%

*Contribution, DROP and cash flow data are from the Fund's 12/31/2016 financial audit

Metric	Amortization period (55 years)
What it measures	Approximately how long it would take to fully fund the unfunded actuarial accrued liability (UAAL) based on the current funding policy.
Why it is important	Given the Fund's current assumptions, an amortization period above 17 indicates the contributions to the fund in the coming year are less than the interest accumulated for that same period and therefore the total UAAL is expected to grow over the near term. In addition, for a plan that contributes on a fixed-rate basis such as Greenville Fire, the higher the amortization period, the more sensitive it is to small changes in the UAAL.
Peer Comparison	Greenville Fire currently has one of the highest amortization periods of all defined benefit pension plans in Texas.

Metric	Funded ratio (47.69%)
What it measures	The percent of a fund's actuarially accrued liabilities covered by its actuarial value of assets.
Why it is important	The lower the funded ratio, the fewer assets a fund has to pay its current and future benefit payments. Also, the present value of benefits payable to members who are no longer working (i.e. retirees and their beneficiaries) are not fully funded. Only 74% of the inactive liability is funded on an actuarial basis, leaving almost \$5 million in inactive liability. All of the more than \$10 million of active liability was completely unfunded as of December 31, 2016 and therefore is dependent on future contributions and investment returns.
Peer Comparison	Greenville Fire's funded ratio is one of the lowest in the state.

Metric	UAAL as a percent of payroll (387.00%)
What it measures	The size of a plan's unfunded liability compared to the annual payroll of its active members.
Why it is important	Provides a way to compare plans of various sizes and expresses the outstanding "pension debt" relative to current personnel costs.
Peer comparison	The Fund's UAAL as a percent of payroll is the highest among TLFFRA plans of similar asset size and one of the highest in the state.

Metric	Assumed rate of return (8.00%)
What it measures	The estimated annual rate of return on the Fund's assets.
Why it is important	If actual future returns are lower than the assumed rate of return, future contributions will need to increase significantly, especially for a poorly funded plan. Greenville Fire's assumed rate of return is 8.00%, while its actual ten-year investment rate of return for the period ending December 31, 2016 was only 4.23%.
Peer comparison	Greenville Fire and one other fund have the highest assumed rate of return in its peer group of TLFFRA plans with similar asset size.

Metric	Payroll growth rate (4.00%)
What it measures	The estimated annual growth in the total payroll of active members contributing into the Fund.
Why it is important	Contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Fund's actuarial valuations. Given the plan's inactive and active liabilities are not fully funded; contributions below expected levels will have serious consequences on the Fund's long-term solvency.
Peer comparison	The Fund's payroll growth rate of four percent is tied for the third most aggressive in its peer group.

Metric	Actual contributions as a percent of actuarially determined contributions (73.99%)
What it measures	Whether the current employer contributions have met a theoretical minimum threshold. ¹
Why it is important	The employer's portion of the contribution is less than 75% of the amount needed to fund the plan on a rolling 30-year amortization period. The PRB's 2014 Study of the Financial Health of Texas Public Retirement Systems found that plans that have consistently received adequate funding are in a better position to meet their long-term obligations.
Peer comparison	This is one of the largest shortfall percentages in the state and the second largest in its peer group.

Metric	Non-investment cash flow as a percent of fiduciary net position (-5.86%)
What it measures	Non-investment cash flow shows how much the plan is receiving through contributions in relation to its outflows: benefit payments, withdrawals and expenses.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)), in conjunction with the funded ratio and recognition of the relative maturity of a plan, provides information about the stability of a plan's funding arrangement.
Peer comparison	Greenville Fire's non-investment cash flow as a percent of FNP is one of the lowest in the state. If this trend continues, the Fund could face the potential risk of needing to liquidate a portion of existing assets to pay current benefits and/or expenses.

Historical Trends

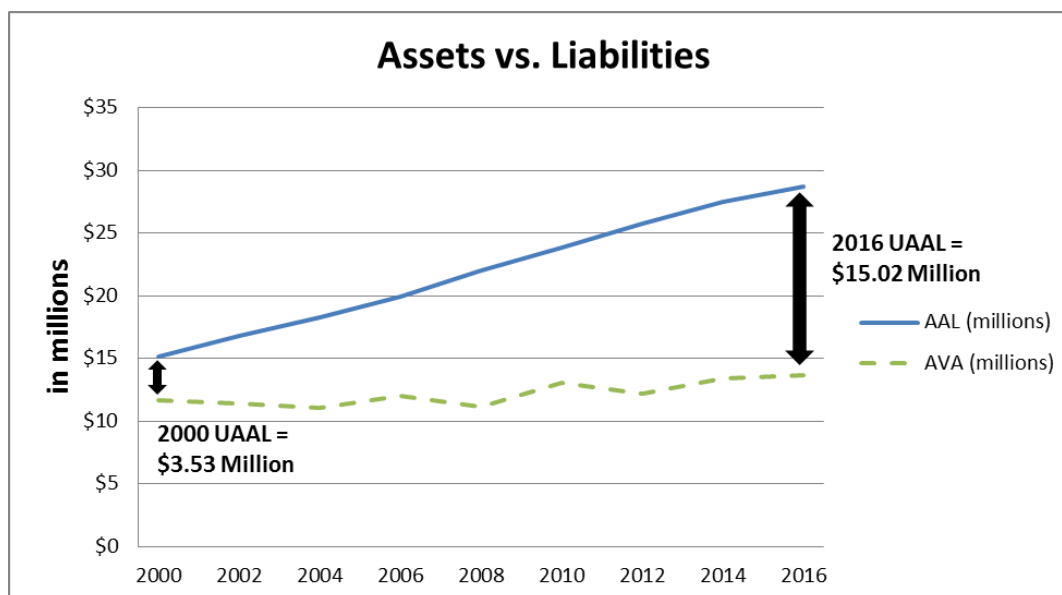
To conduct an intensive review of risks associated with the long-term funding of a pension plan, it is important to analyze trends in multiple metrics. A plan with an asset level lower than its accrued liability has insufficient funds to cover benefits. A plan can experience an increase in unfunded liability due to various factors, including insufficient investment returns, inadequate contributions and inaccurate or overly aggressive assumptions. Hence, a single metric cannot effectively capture the different drivers contributing to the increase of a plan's unfunded pension obligation. This section analyzes historical trends in various metrics identified by the PRB and makes comparisons to understand the sources of growth in unfunded liability for Greenville Fire.

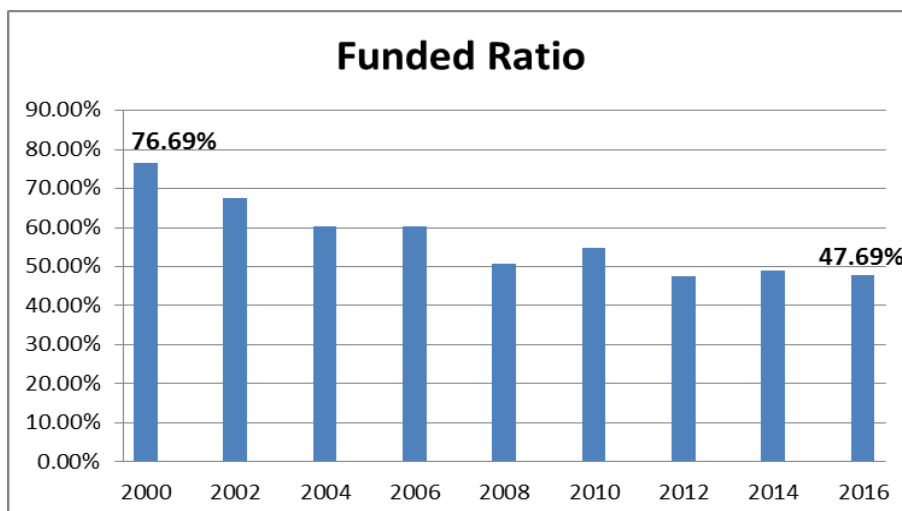
The health of Greenville Fire has been deteriorating since the early 2000s. Numerous factors have contributed to this deterioration, including inadequate contributions, insufficient investment returns, increased benefit payments, and a low active-to-annuitant ratio in the face of a large unfunded liability. The following sections discuss these and other factors in detail.

Assets and Liabilities

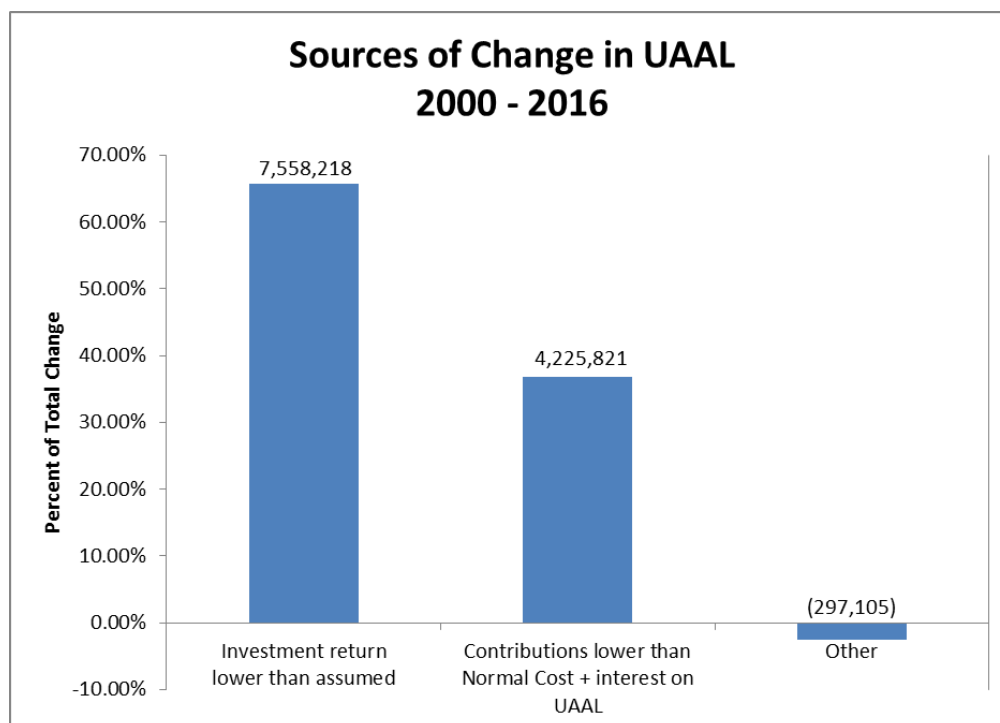
For a plan's funding level to improve, its assets should grow faster than liabilities, which can be achieved by contribution increases, benefit reductions, and/or consistently high investment returns over a long period of time.

Greenville Fire's actuarial accrued liability (AAL) increased by nearly 90% between the end of 2000 and 2016. Conversely, the Fund's actuarial value of assets (AVA) grew by less than 18% over that same period resulting in the unfunded actuarial accrued liability (UAAL) more than quadrupling. The funded ratio (AVA/AAL) also fell from 77% in 2000 to less than 48% in 2016.





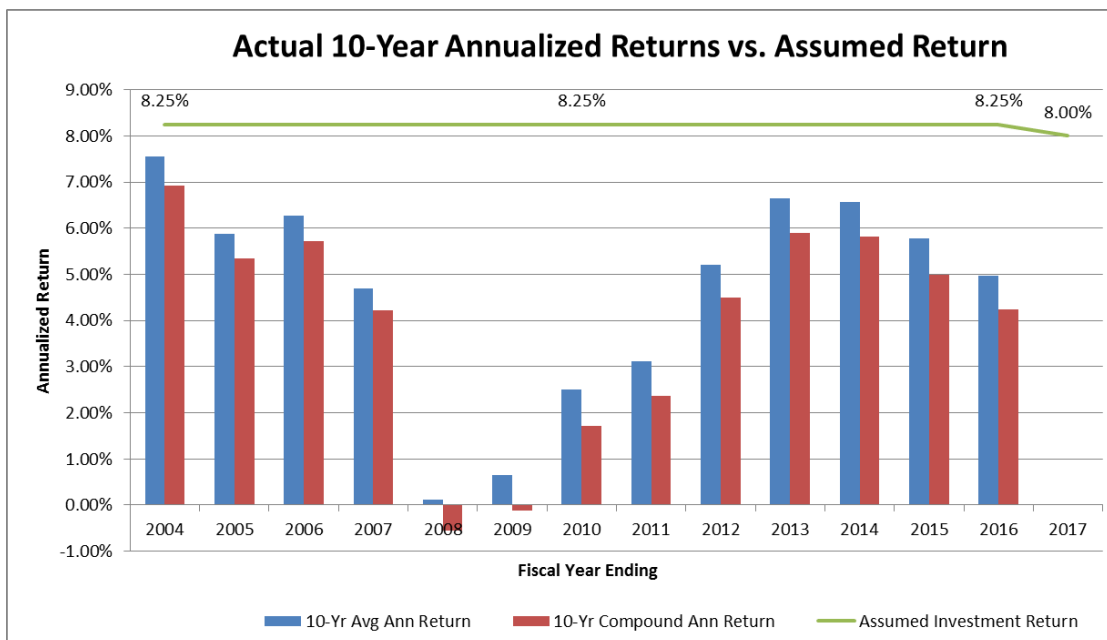
The graph below illustrates that the \$11.5 million increase in UAAL (from \$3.5 million in 2000 to \$15 million in 2016) can be fully attributed to investment returns lower than the assumed rate of return (\$7.5 million increase in UAAL) and the annual contribution being lower than the normal cost plus the interest accumulated on the UAAL (\$4.2 million increase in UAAL).



Investment Assumption and Returns

As illustrated above, actual investment returns lower than the assumed investment returns increased the UAAL by more than \$7.5 million between 2000 and 2016. While Greenville Fire lowered its assumed rate of return from 8.25% to 8.00% in 2016, it still exceeds the 2017 national average of 7.52% (reported by NASRA) and is one of the highest return assumptions used by plans in Texas. In addition, the Fund has

not achieved an 8.00% return on assets over a consecutive 10-year period in any of the 13 periods ending December 31, 2004 through December 31, 2016 as shown in the graph below.



Contributions

Most Texas plans use a fixed percent of pay funding approach. This is especially true for plans governed by the TLFRRRA statute. Under a fixed-rate funding structure, no formal amortization policy (i.e. the expected time to fully fund the plan) exists; therefore, the plan's actuary estimates the amortization period at each valuation date based on the current financial condition of the plan and the current contribution rates. This fixed-rate funding structure provides contribution stability for the plan sponsor in the short term, but does not include any inherent mechanisms for reacting to changes in a plan's financial condition.

As of October 2017, active members of the Fund contributed 16.30% and the City contributed 17.30% of pay. This reflects multiple increases in both the active members' and the City's contribution rates over the past 15 years. Despite the increases in contribution rates, during this period, the Fund's UAAL increased by \$4.2 million. This increase in the UAAL was caused by total contributions that were not sufficient to cover both the new benefits being accrued (normal cost) and the interest accumulated on the unfunded benefits already earned (interest accumulated on the UAAL), or to start reducing the total UAAL. This result, a payment that is not expected to cover the interest that accrues during the year, is known as negative amortization.

The Conference of Consulting Actuaries' Public Plans Community White Paper *Actuarial Funding Policies and Practices for Public Pension Plans* suggests that an "amortization policy should reflect explicit consideration of the level and duration of negative amortization," and identifies a "rolling/open amortization of [the] entire UAAL as a single combined layer ... where the amortization period entails negative amortization" as an unacceptable practice.²

According to its actuarial valuations, Greenville Fire has not received the reported actuarially determined contribution (ADC) every year since 2004. Even with contribution increases in 2006, 2014, and 2016, employer contributions have averaged less than 80% of the Fund's ADC over that period. Furthermore, the reported ADC rate is calculated utilizing an "open amortization of [the] entire UAAL as a single combined layer". For the fiscal year ending December 31, 2017, the expected contributions are less than 78 percent of the reported ADC. This shortfall of \$184,379 is equal to 0.97% of the City's total General Fund expenditures for the fiscal year ending December 31, 2016 and is greater than most other TLFRA plans of similar size. The City has agreed to increase its contribution rate to 19.30% beginning in October 2018; however, this is still less than the most recently calculated ADC.

Contribution Levels vs. Actuarially Determined Contribution									
Date (12/31)	2000	2002	2004	2006	2008	2010	2012	2014	2016
Employee Contribution	13.20%	13.20%	13.20%	15.30%	15.30%	15.30%	15.30%	15.30%	16.30%
Employer Contribution	13.20%	13.20%	13.20%	15.30%	15.30%	15.30%	15.30%	16.30%	16.80%
30-Year ADC*	N/A	13.12%	16.08%	17.58%	19.55%	18.57%	22.66%	22.20%	21.55%
% of ADC funded	> 100.00%	100.61%	82.09%	87.03%	78.26%	82.39%	67.52%	73.42%	77.96%
Covered Payroll	\$1,992,655	\$2,350,430	\$2,486,757	\$2,554,102	\$3,170,813	\$3,414,694	\$3,576,528	\$3,805,174	\$3,881,665
Contribution Shortfall	-	-	\$71,619	\$58,234	\$134,760	\$111,660	\$263,232	\$224,505	\$184,379

*The ADC rate referenced a 40-year amortization period through 2006, after which it changed to 30 years.

Under the Fund's assumptions both before 2016 (8.25% discount rate and 4.25% payroll growth rate) and as of the end of 2016 (8.00% discount rate and 4.00% payroll growth rate), negative amortization occurs when the amortization period is more than approximately 16 or 17 years. While the plan does not have an explicit amortization policy, the effect of its current funding structure results in an implicit amortization policy that includes negative amortization (i.e. intentionally increases the total UAAL even under the best of scenarios) for the next 30 or more years.

Asset Allocation

As shown in the chart below, the Fund's actual asset allocation is fairly close to its target allocations in all but one asset class, alternatives. However, the PRB's asset classification breaks out real estate as a separate asset class, which the Fund may consider to be an alternative investment.

Asset Allocation					
Asset Class	Equities	Fixed Income	Alternatives	Real Estate	Cash
Current Allocation	54.2%	31.2%	4.1%	5.5%	5.0%
Target Allocation	50%	30%	20%	-	-

*Current allocation as of 12/31/2016 financial audit

Payroll Growth

Greenville Fire lowered its annualized payroll growth assumption from 4.25% to 4.00% as of December 31, 2016. Even with this decrease, the Fund still has one of the highest payroll growth rate assumptions when compared to other TLFRA plans of similar size. Although the Fund's overall actual payroll growth average exceeded that target from 2000 to 2014, it has decreased in recent years to around 3.00%.

While this assumption under a fixed-rate funding policy does not directly affect actual contributions, the calculation of the amortization period is highly sensitive to it, especially when a plan's amortization period is as high as the Fund's.

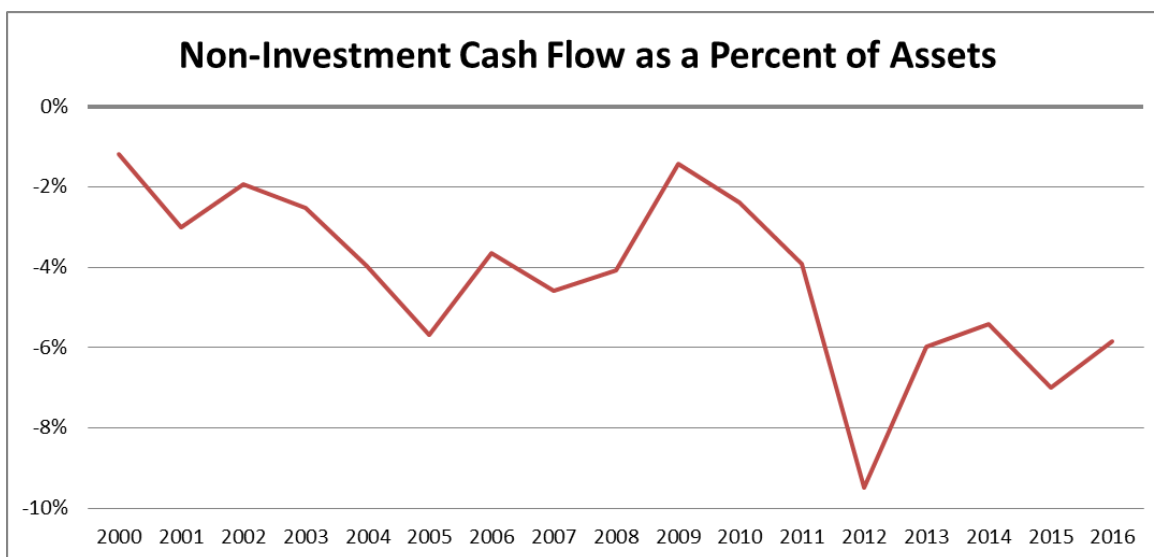
<u>Sensitivity to Changes in Payroll Growth Assumption</u>	
Assumed Payroll Growth	Amortization Period
4.00%	50
3.50%	76

*Based on UAAL as of December 31, 2016 and an employer contribution of 17.30%

It should be noted that the Fund's actuary has been recommending lowering the payroll growth rate and the discount rate since 2012.

Cash Flow

Greenville Fire's non-investment cash flow dipped from -3.9% in 2011 to -9.5% in 2012 and has averaged around -6.0% thereafter. A negative non-investment cash flow is not abnormal for mature defined benefit pension plans. However, a cash flow percentage this low is likely to be a drag on potential investment returns because a fund must either invest in a higher proportion of income-producing investments, which traditionally provide lower returns, or must liquidate existing assets to pay out current benefits and/or expenses.

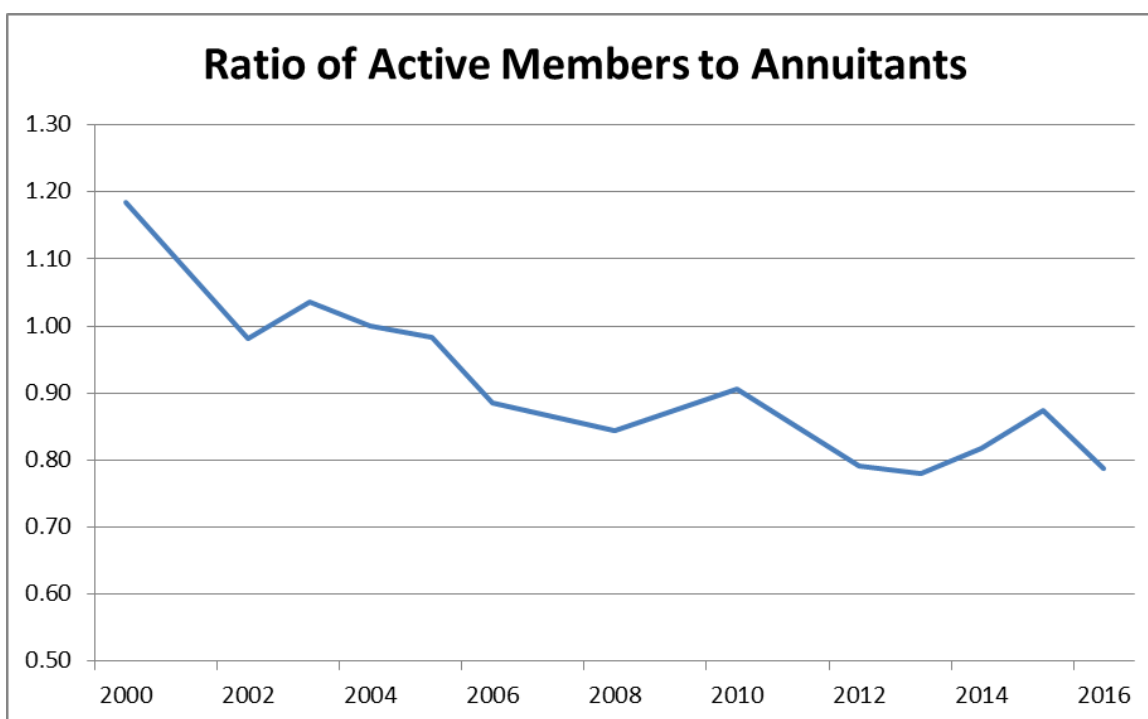


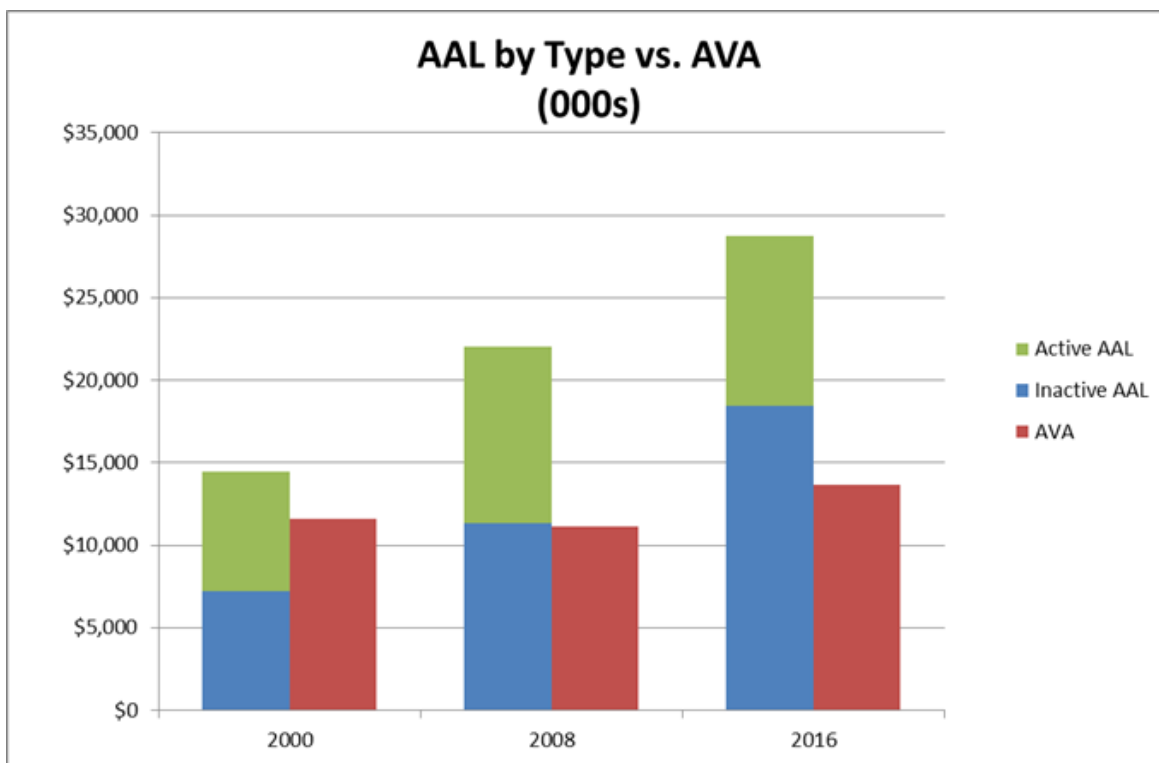
Demographics

As a pension plan matures, it will experience a shift in demographics with a declining ratio of active members to retirees. This demographic shift is expected and is taken into account in the long-term funding of a pension plan. However, for a plan with a large unfunded liability, a declining active to retiree ratio can exert financial stress from a contribution perspective. Contributions to the Fund are on a percent of pay basis, and assume an ever-growing contribution base (i.e. the total payroll is assumed to grow at a constant percentage so the dollar contributions into the plan are also assumed to grow at the same rate). This percent-of-pay approach results in back-loaded contributions for fully funding any

unfunded liability as compared to a level dollar approach. It is therefore helpful to compare the active member population, the basis on which contributions are calculated, to the annuitant population. A shrinking active member population, as compared to the annuitant population, indicates a smaller and smaller base available to fund any outstanding unfunded liability or to provide the needed support in times of distress.

Since 2012, the Fund's active-to-annuitant ratio has been hovering around 0.80, or four active members for every five retirees. This ratio is lower than all but one similarly-sized TLFFRA system, and is one of the lowest of all defined benefit public pension plans in Texas. With increased longevity of members, this ratio is expected to continue to decline and put more pressure on the active members to fund the plan. In addition, the fact that the current assets are not sufficient to support the existing inactive population, much less future retirees and beneficiaries, exacerbates this issue.





Retroactive DROP

Greenville Fire has a Retroactive Deferred Retirement Option Program (RETRO DROP) provision that allows members to retroactively end their years of service up to two years before their actual retirement date and receive a lump sum payment equal to the total retirement benefits the member would have received plus the amount of contributions, with no interest, the member made into the Fund over that time.

However, due to the Fund's relatively small size and poor funded status, it could experience liquidity issues that significantly impact investment returns if several of these RETRO DROP lump-sum payouts occur in a short period. For example in 2012, there were five retirements from the Fund, compared with an average of just one per year over the four previous years. That year, the Fund experienced a large increase in benefit payments and a dip in non-investment cash flow to -9.5%.

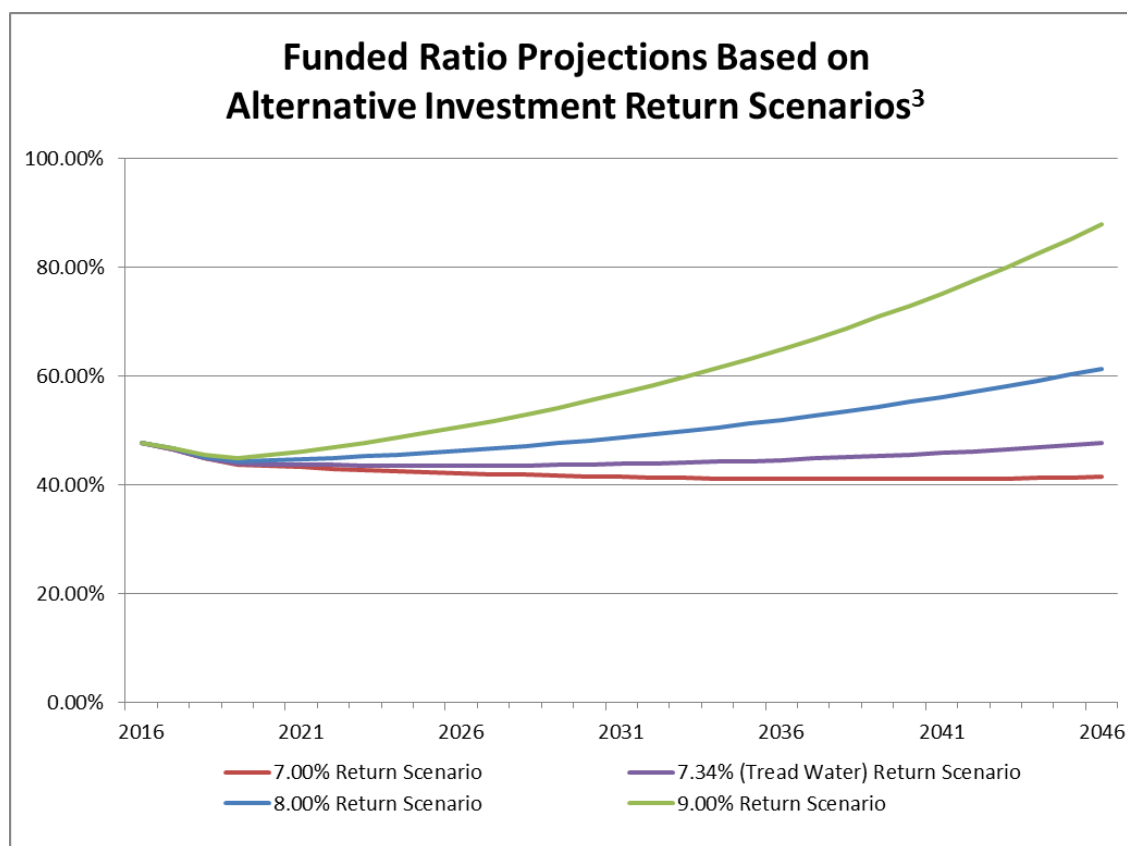
Risk Analysis

The various risks faced by a pension fund all boil down to one relatively simple question, "Will there be enough money to pay benefits when due?" This section discusses four main risk factors facing the Fund: investment, funding, assumption, and governance risks. Measuring Greenville Fire based on these factors reveals a significant amount of risk being taken in each of these areas, increasing the probability of a continued period of severe financial stress for the Fund. This also raises the likelihood of deteriorating funding conditions in the coming years, further imperiling the Fund's ability to pay promised benefits.

Investment Risk

Investment risk is the risk that actual future returns will be different from expected. Generally, some risk always exists associated with actual returns deviating significantly below or above the expected return on assets over the long term. However, the likelihood of Greenville Fire *not* meeting or exceeding the 8.00% expected return on assets is significantly greater than the odds that they will do so for the near future.

The graph below projects the funded ratio for the next 30 years under the following four different actual investment return scenarios: the expected return on assets (EROA) or 8.00%; the EROA +1%; the EROA - 1%; and the “tread-water” rate of return on assets, or rate of return on assets necessary to have the same funded ratio at the end of the 30-year period. As illustrated below, the tread-water return on assets is 7.93%, only slightly below the EROA. Given no changes in plan benefits or contribution rates, *the Fund barely passes 60% funded status in 30 years even if all assumptions are met, including if the Fund meets the EROA.*



In addition, as was illustrated in the Historical Trends section, the Fund has not achieved an 8.00% annualized return over a consecutive 10-year period in any of the 13 periods ending December 31, 2004 through December 31, 2016. The impact of consistently earning less than the EROA *but even as high as 7.00% over* on the current asset allocation, the Fund's 8.00% assumed rate of return, and expected capital market assumptions published by organizations such as JP Morgan and Horizon Actuarial

Services, the PRB estimates the probability of earning less than or equal to a 7.00% annual return is approximately twice as likely as achieving a 9.00% or greater annual return over the next 30-year period.

The Fund's current asset allocation is not significantly different from other public pension plans. However, to maintain an expected return on assets of 8.00%, public pension plans have generally taken on significantly more risk than in the past. Public pension portfolios with an 8.00% expected return have increased risk by more than 3-fold between 1995 and 2016.⁴ Generally, this is a result of shifting investments from more stable fixed income securities (with significantly lower returns in 2016 than in 1995) into equities and equity-like products. The Fund has followed a similar trend holding closer to a 40% equity/60% fixed income asset allocation in 1995 and over time shifting to a 60% equity/40% fixed income split at the end of 2016. This results in a higher likelihood of large losses in any given year. Thus, even if an 8.00% return assumption in any given year is reasonable, one year with large losses reduces the actual long-term expected return, which is what we see in the 10-year returns graphed above.

Funding Risk

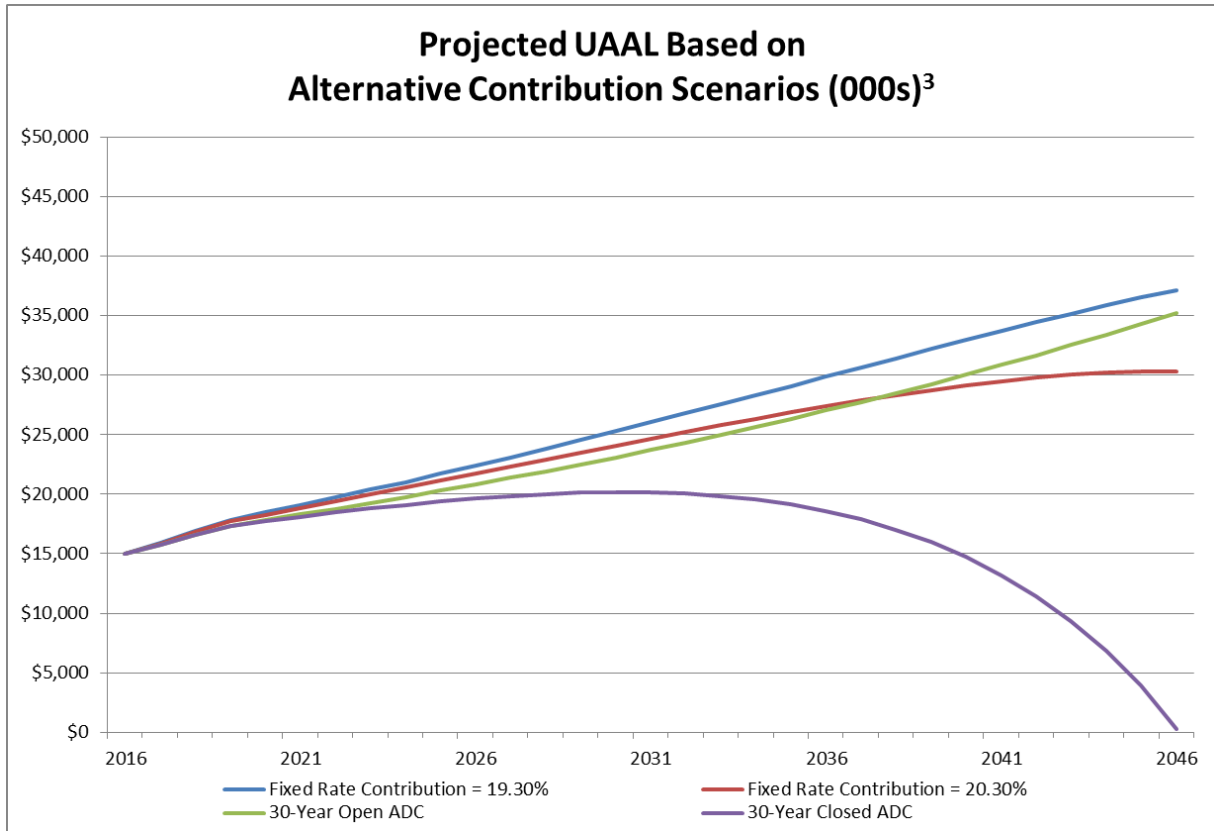
Funding or contribution risk is the risk that actual future contributions will be less than expected future contributions. For purposes of this section, funding risk will also refer to the risk that future contributions are less than "needed" to maintain a financially stable pension fund.

There are two primary issues with fixed-rate, percent of pay plans that may result in long-term problems:

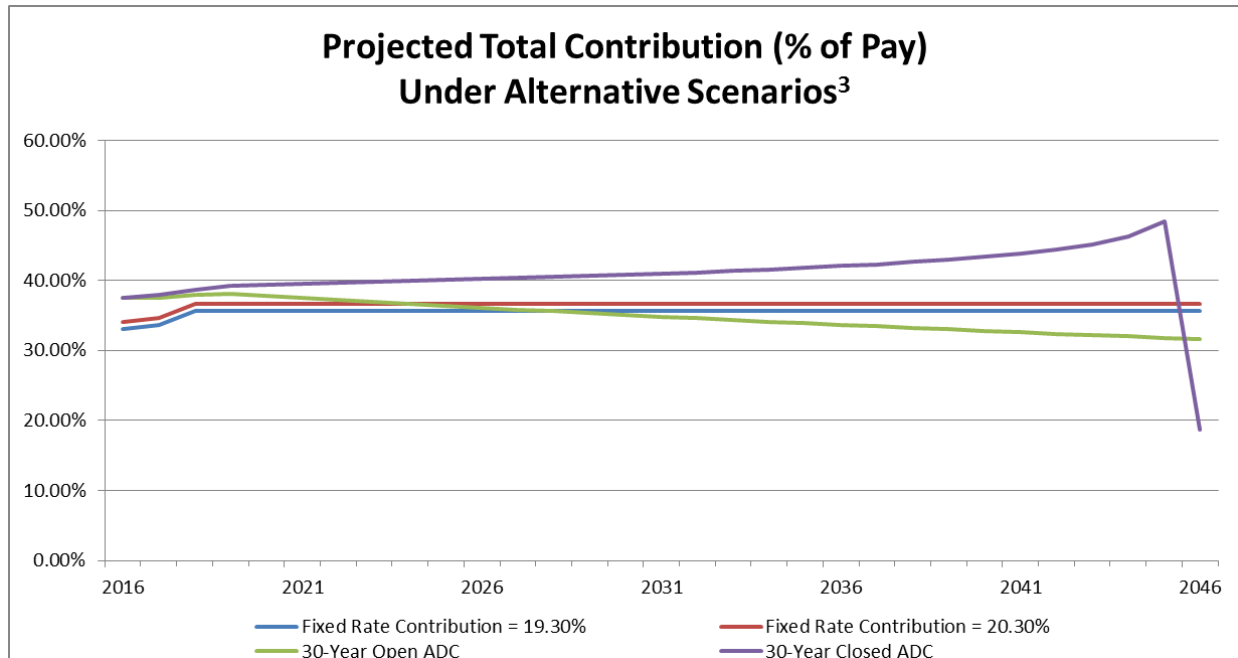
- 1) Contributions to percent of pay plans are inherently back-loaded because the expected contributions to a percent of pay plan grow on a nominal basis at the assumed rate of total payroll growth.
- 2) Fixed rate plans provide budgetary stability for the employer in the short term, but do not include any inherent mechanisms for reacting to changes in a plan's financial condition.

Based on the Fund's current contribution rates, including the planned contribution rate increase in October 2018, on an open group projection basis the total UAAL is expected to increase for the next 30 years before it starts to decrease. The implication is that someone who is hired by the Fire Department or someone who moves to the City 30 to 50 years in the future will still be paying for services received in the past. This raises the concern of intergenerational equity. Moreover, if actual investment returns and/or payroll growth are lower than expected, the UAAL will only continue to increase more.

To address these concerns, a plan can adopt a funding policy with a target to fully fund the plan. One approach is for the employer to contribute based on an actuarially determined contribution (ADC) that is designed to decrease contribution volatility, while addressing changing financial conditions. The impact on the UAAL of adopting a simple funding policy designed to fully fund the plan in 30 years is shown below. The projected UAAL is shown for each of the scenarios: maintaining the current fixed rate contribution schedule (17.30% increasing to 19.30% in October 2018); increasing the employer contribution by 1.00% above the current plan; adopting a funding policy that pays the rolling 30-year actuarially determined contribution; and adopting a funding policy that utilizes a single layer 30-year closed amortization approach (i.e. will fully fund the plan in 30 years).



The total contributions (both employer and employee) necessary for each funding policy are shown below.



Assumption Risk

Actuarial valuations and projections are by their nature simplifications of an extremely complex reality. As G.E.P. Box is famously quoted, "All models are wrong, but some are useful." The actuarial valuation, like a map of the world, is not 100% accurate but is instead a useful tool to help guide decision making on the most effective way to get from point A to point B. For that reason, it is best not to rely too much on a single snapshot of any given metric, but rather examine the progression of multiple metrics over time. An important part of that process involves selecting the economic and demographic assumptions about future plan experience.

Actuarial Standards of Practice (ASOPs) 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, and 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, provide a framework for the selection of assumptions. They state that each assumption selected by an actuary must be "reasonable," where reasonable is defined as being appropriate for the purpose, reflects the actuary's professional judgement, takes into account historical and current data, as well as future expectations, and has no significant bias. The ASOPs also recognize that "different actuaries will apply different professional judgement" such that a "range of reasonable assumptions may develop."

As was noted previously, for the Fund, the single largest increase in UAAL over the past 15 years was due to investment returns lower than the assumed rate of return, and the potential for this trend to continue is one of the largest concerns moving forward. In addition, the amortization period calculation is highly sensitive to the selection of an assumed rate of payroll growth. The development of both of these assumptions relies first on the selection of the inflation assumption. While there are approaches to selecting the investment return assumption other than the traditional "building block" approach, the Governmental Accounting Standards Board's reporting requirements implicitly assume the building block approach is used by requiring plans to report expected real rates of return (i.e. "after adjustment to eliminate inflation") for each asset class.⁵

While the Fund's 3.00% inflation assumption may not appear high for public pension plans (approximately 62% of Texas plans in the most recent information reported to the PRB and 58% of the plans in the Public Plans Database for the fiscal year ending in 2016 used a 3.00% or higher inflation assumption), other industry data indicates inflation could be significantly lower. The following table illustrates several published inflation rates for various mid- to long-term horizons:

Source	Time Horizon (Years)	Rate
Greenville Fire 12/31/2016 Actuarial Valuation	N/A	3.00%
Treasury Inflation Protected Securities ⁶	30	2.01%
SSA 2017 Trustees Report – Intermediate Assumptions ⁷	75	2.60%
JP Morgan 2017 Long-Term Capital Market Assumptions ⁸	10	2.25%
Horizon Actuarial Services 2017 Survey of Capital Market Assumptions ⁹	20	2.44%

Based on projections in the Investment Risk section above, if the mean rate of return is reduced from 8.00% to 7.50% to reflect a 2.50% inflation rate rather than 3.00%, the PRB estimates the Fund would be

more than three times as likely to earn less than or equal to a 7.00% return versus greater than or equal to a 9.00% return over the next 30-year period.

The payroll growth assumption is also frequently calculated using a building block approach with inflation as the base and an adjustment for general productivity growth. Therefore, any reduction to the inflation assumption is likely to impact the payroll growth assumption as well. Also, as noted previously, the amortization period calculation is highly sensitive to the payroll growth assumption. The amortization period is used as the primary metric for decision-making by many Texas public pension plans, as well as the trigger for requirements under the Texas Government Code, so any assumption that has a significant impact on the amortization period should be scrutinized very closely.

The inflation, payroll growth and investment return assumptions are all economic assumptions that have a significant impact on valuation of the liabilities and the anticipated cost of the plan. The demographic assumption with the largest impact is the mortality table.

Greenville Fire currently uses the RP-2000 Mortality Table, projected to 2024 with Scale AA. In December 2014, the Organization for Economic Co-operation and Development (OECD) published *Mortality Assumptions and Longevity Risk: Implications for Pension Funds and Annuity Providers*, in which they examined “the mortality tables commonly used by pension funds and annuity providers against several well-known mortality projection models with the purpose of assessing the potential shortfall in provisions.”¹⁰ Specifically, the OECD examined the RP-2000 Mortality Table as well as projected mortality improvements using Scale AA. The OECD concluded that scale AA does not “sufficiently reflect the fact that mortality improvements have been increasing”, and the use of the RP-2000 Mortality Table with a fully generational projection utilizing Scale AA is likely to result in a shortfall of around 4-5%. While this impact is more pronounced for women and white-collar workers, it illustrates the importance of continually monitoring, and regularly updating, all assumptions.

For the Fund, while the actual cost will always be the benefits actually paid, if the liabilities are understated, the contributions necessary to fund the actual costs could be larger than anticipated and could exacerbate the Fund's already precarious actuarial condition. It is sometimes useful to incorporate a level of conservatism in a plan's assumptions to help avoid the difficulties associated with significant underfunding.

Governance Risk

Governance is essentially decision-making, and decision-making for public pension plans must balance the competing interests of plans and their sponsors and should feature collaboration between the two. One primary source of governance risk is the lack of involvement of key parties or stakeholders in important areas of decision-making for a pension plan including plan design (benefits) and funding (contributions). When a key party, such as the board of trustees or the plan sponsor, is not engaged in important decisions, the risk increases that benefit levels and the contributions required to fund them will diverge, potentially putting the plan's funding stability at risk.

For example, TLFFRA allows boards of trustees to make prospective benefit modifications, both increases and reductions. These changes must be approved by an actuary and a majority of participating

members and may not deprive an eligible participant of vested accrued benefits. Although jointly responsible for funding the retirement plan along with plan members, the sponsoring city may have limited involvement in benefit decision-making, a structure which generates the risk that benefit levels adopted could be unsustainable. While Greenville Fire has not increased benefits to speak of in recent years, this potential risk remains in the future, given the statutory structure.

Benefit increases are not the only potential risk related to a potential lack of sponsor involvement under TLFFRA; unwillingness to reduce benefits prospectively when necessary to address funding challenges can be an obstacle to getting things back on track. It should be noted that even plans with very engaged boards and sponsors can be susceptible to increasing benefits to unsustainable levels in good times or failing to lower them when necessary in bad times. Governance risk related to an imbalance in decision-making can only exacerbate these risks. Governance risk must also be managed on the contribution side, with both parties working together to provide sufficient contributions and to avoid lowering contributions in good times.

State law recognizes these risks and imposes cooperation between the system and sponsoring governmental entity by requiring retirement systems having trouble meeting their long-term obligations to work with their sponsors to develop a restoration plan for addressing those issues.¹¹ This framework helps ensure that both the system and its sponsoring employer are involved in pension plan reform decisions, but it comes at a point when actuarial health is already threatened. Prior to and throughout the funding soundness restoration plan process, Greenville Fire and the City have made incremental contribution increases since 2006 in response to deteriorating conditions, but these changes have not been enough to put the plan on a solid path to sustainability.

Conclusions

Funding and Governance Risk

When retirement systems and their sponsors wait too long to address them, the funding challenges compounding over time can reach a point where small, incremental improvements such as those made for Greenville Fire simply do not have enough effect to achieve sustainability. As required by state law to jointly formulate a funding soundness restoration plan, the City increased its contribution rate to 19.30% beginning in October 2018; however, Greenville Fire and the City have yet to make difficult decisions on additional needed changes to benefit or contribution levels to address potential investment and funding risks in the future. If necessary changes are ultimately made, they will certainly right the ship, but they will be made under less than ideal conditions.

Thus, another model is called for. Plans and their sponsors can develop policies that proactively manage risk in the future by laying out a formal risk-sharing plan in advance. To proactively manage governance and funding risk, retirement plans and their sponsors should work together to adopt written policies far in advance, before they incur adverse experience, that can guide them through both good and bad years and shield against the risk of either party's exclusion or disengagement from decision-making. Funding and benefit policies can be adopted that provide a framework for how benefit and contribution levels may be modified under different conditions. An advantage of such policies is that changes to plan

benefits and costs are known and understood by all parties in advance, rather than negotiated under difficult circumstances.

A strong funding policy that ensures a healthy amortization period is maintained by requiring payment of an actuarially determined contribution is encouraged. Numerous actuarial methods can be utilized to help mitigate contribution volatility, including directly smoothing contribution rates or adding “guardrails” that require the stakeholders to come back to the table if the contribution rate falls outside a specified range. If funding according to an actuarially determined contribution is not adopted, a funding and benefit policy should, at a minimum, codify how adverse experience will be addressed and how future changes will be made.

For example, a funding policy might state that future benefit enhancements, cost of living adjustments, and/or contribution rate reductions can only be considered or made if the system's funded ratio remains greater than a particular threshold. A funding policy can also state that if the funded ratio falls below a certain threshold, the stakeholders would be required to come back to the table to make necessary contribution and benefit adjustments. Greenville Fire in conjunction with the City can consider utilizing the FSRP requirement to develop a long-term funding policy for the Plan.

Assumption Risk

Public retirement systems must monitor actuarial assumptions continually through their actuarial valuations and make appropriate adjustments to mitigate bias in the assumptions that result in consistent actuarial gains or losses. Actuarial gains and losses occur when the plan's actual experience does not match expected experience. Over time, without required changes, pension funds such as Greenville Fire whose assumptions consistently diverge from actual experience in the same direction (i.e. consistently seeing actuarial gains or consistently seeing actuarial losses) can exacerbate the issue of intergenerational inequity, causing one group of members and taxpayers to over- or under-pay. Boards of trustees should work with their actuaries to ensure assumptions are neither too aggressive nor too conservative, while striving to maintain (or achieve) sound fiscal health to secure existing accrued benefits. PRB's *Pension Funding Guidelines* recommend systems to monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

Investment Risk

Whatever the investment return assumption used, investment returns should be closely monitored, and investment managers' performance should be assessed regularly and compared to appropriate asset class benchmarks. Benchmarks should be reviewed to see if they have been met or exceeded, and should be viewed in light of the risk taken to achieve those returns. Best practices also include revisiting investment manager selection periodically, with boards of trustees evaluating managers' performance, fees, and whether their current managers are providing the highest possible value at the lowest possible cost. The asset allocation should also be assessed from a risk perspective to provide insight into how the fund would weather a market correction.

¹ The theoretical minimum threshold, or actuarially determined contribution (ADC), is a target or recommended contribution "to the plan as determined by the actuary using a contribution allocation procedure," as defined in Actuarial Standards of Practice No 4. If contributions to the plan are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

² https://www.ccactuaries.org/Portals/0/pdf/CCA_PPC_White_Paper_on_Public_Pension_Funding_Policy.pdf

³ Unless otherwise specified, employer contributions are assumed to increase to 17.30% as of January 1, 2018 and 19.30% as of October 1, 2018. Total benefit payments are assumed to grow at 3.50%, as provided by John M. Crider, Jr. Consulting Actuary. All other current and projected assets and liabilities reflect the actuarial accrued liabilities, actuarial value of assets, plan provisions, and actuarial assumptions and methods as reported in the 12/31/2016 Actuarial Valuation prepared by John M. Crider, Jr. Consulting Actuary.

⁴ http://www.rockinst.org/pdf/government_finance/2017-02-01-Risk_Taking_Appropriateness.pdf

⁵ Governmental Accounting Standards Board Statement No. 67, Financial Reporting for Pension Plans, p. 30.

⁶ <https://fred.stlouisfed.org/>

⁷ https://www.ssa.gov/oact/TR/2017/2017_Long-Range_Economic_Assumptions.pdf

⁸ <https://am.ipmorgan.com/us/institutional/our-thinking/lcma-2017>

⁹ <http://www.horizonactuarial.com/blog/2017-survey-of-capital-market-assumptions>

¹⁰ http://www.oecd-ilibrary.org/finance-and-investment/mortality-assumptions-and-longevity-risk_9789264222748-en

¹¹ Texas Government Code 802.2015 and 802.2016 require public retirement systems whose amortization period exceeds 40 years for 2 or 3 consecutive actuarial valuations to develop, with their sponsor, a funding soundness restoration plan designed to bring their amortization period within 40 years over 10 or fewer years.

Appendix A – Peer Comparison Tables

Greenville Fire - Peer Comparison Tables

Peer Group Plans*	MVA	Assumed Interest	Payroll Growth	10-year Return (Net)	Active/ Annuitants	UAAL % of Payroll	Average Benefit	30-Y Shortfall % of GFE	30-Y Shortfall % of ADC	NPL	Total Expenses	Expenses as % of Assets
Orange Fire	\$ 8,154,674	7.75%	4.00%	3.72%	0.88	336.03%	\$ 25,230	0.71%	27.27%	\$ 8,946,685	\$ 112,378	1.38%
Sweetwater Fire	\$ 8,264,183	8.00%	4.50%	4.38%	1.04	246.28%	\$ 28,599	0.67%	19.03%	\$ 4,965,694	\$ 104,278	1.26%
Corsicana Fire	\$ 8,344,317	7.00%	3.00%	3.40%	1.70	211.44%	\$ 30,864	N/A	N/A	\$ 8,837,348	\$ 114,627	1.37%
Weslaco Fire	\$ 9,186,148	7.25%	3.25%	2.71%	2.21	111.07%	\$ 18,578	N/A	N/A	\$ 4,588,953	\$ 97,998	1.07%
University Park Fire	\$ 9,515,461	8.00%	4.00%	3.29%	0.76	358.48%	\$ 26,628	0.42%	16.16%	\$ 13,199,959	\$ 89,676	0.94%
Big Spring Fire	\$ 11,157,022	8.00%	5.00%	4.26%	1.27	248.61%	\$ 37,713	N/A	N/A	\$ 9,713,127	\$ 100,927	0.90%
Greenville Fire	\$ 12,728,162	8.00%	4.00%	4.23%	0.79	387.00%	\$ 24,101	0.97%	22.04%	\$ 16,709,548	\$ 125,356	0.98%
Waxahachie Fire	\$ 14,201,159	7.00%	4.00%	4.90%	1.77	164.84%	\$ 43,297	N/A	N/A	\$ 7,039,421	\$ 164,077	1.16%
Lufkin Fire	\$ 14,264,481	7.50%	3.00%	3.30%	1.23	371.24%	\$ 35,666	0.29%	7.99%	\$ 20,444,874	\$ 124,925	0.88%
Denison Fire	\$ 15,214,736	7.75%	4.00%	3.87%	1.04	182.33%	\$ 25,498	N/A	N/A	\$ 7,048,420	\$ 107,168	0.70%
Texas City Fire	\$ 15,837,081	7.75%	3.00%	3.56%	1.27	289.35%	\$ 35,686	N/A	N/A	\$ 17,061,992	\$ 182,033	1.26%
Conroe Fire	\$ 20,275,833	7.75%	4.00%	2.84%	3.83	167.60%	\$ 40,585	0.16%**	7.86%	\$ 19,202,262	\$ 196,542	0.97%
Cleburne Fire	\$ 21,323,149	7.25%	3.25%	5.64%	1.89	277.79%	\$ 36,625	N/A	N/A	\$ 12,363,227	\$ 127,066	0.60%

*The Woodlands Fire and Travis County ESD Fire were not included due to their lack of actuarial experience.

**Based on a 25-year amortization period shortfall, not a 30-year.

Peer Group Plans*	Sponsor	GF Expend	EOY GF Bal	General Obligation Debt	UAAL	Expected Employer Contributions	ADC	30-year Shortfall	30-year Shortfall % of ADC	30-year Shortfall % of GFE
Orange Fire	Orange	\$17,985,946	\$8,272,029	\$6,445,000	\$8,199,175	\$341,606	\$469,709	\$128,103	27.27%	0.71%
Sweetwater Fire	Sweetwater	\$8,345,574	\$4,729,719	\$0	\$3,674,028	\$238,689	\$294,781	\$56,092	19.03%	0.67%
University Park Fire	University Park	\$24,901,680	\$28,793,761	\$0	\$11,158,279	\$545,968	\$651,177	\$105,209	16.16%	0.42%
Greenville Fire	Greenville	\$19,089,359	\$6,271,335	\$41,071,000	\$15,021,872	\$652,120	\$836,499	\$184,379	22.04%	0.97%
Lufkin Fire	Lufkin	\$32,591,960	\$10,480,400	\$56,600,000	\$17,317,158	\$1,100,728	\$1,196,291	\$95,563	7.99%	0.29%
Conroe Fire**	Conroe	\$64,298,794	\$28,651,695	\$40,365,000	\$13,667,395	\$1,223,183	\$1,327,561	\$104,378	7.86%	0.16%

*Only includes plans with 30-year contribution shortfalls

**Based on a 25-year amortization period shortfall, not a 30-year.

Appendix B – Comments from the City of Greenville



David L. Dreiling
Mayor

January 19, 2018

Ms. Anumeha Kumar
Executive Director, Texas Pension Review Board
P.O. Box 13498
Austin, TX 78711-3498

Dear Ms. Kumar,

Years ago, the State Pension Review Board (PRB) had a plan to analyze the anticipated amortization of the unfunded actuarial accrued liability of Fire Pension plans. Their plan wanted the amortization period to always be at or below 40 years, but not later than within the 10th anniversary of the date on which the final version of the City's Restoration Plan was reported.

- On December 31, 2012, the actuarial valuation for the Greenville Firemen's Relief and Retirement Fund was infinite. The State PRB actuaries were concerned about the fund's ability to provide the benefits which were being promised to members of the plan. It was recommended by our actuary, Mr. John Crider Jr., that both the City and the fund members increase their contribution rate by at least one percent of pay. This was not done by either party.
- By December 31, 2014, the actuarial valuation was recalculated to be 70.4 years. This new valuation was based on the City's increased contribution rate since 2012 to become 16.30 percent of pay and the member's increased contribution rate of 15.30 percent of pay.
- Since December 31, 2014, the City had increased its contribution rate further, to 16.80 percent and members of the fund had increased their contribution rate to 16.30 percent. These increases caused the best estimate of the current amortization period to be approximately 49.4 years. It was believed the fund's amortization period would decrease by one year for each passing year. Thus, the amortization period of the Greenville Firemen's Relief and Retirement Fund was expected to be below 40 years in less than the 10 years required by the state PRB.
- On Jan 17th, 2017, the Texas Pension Review board sent Greenville a letter saying we were in compliance with the requirement.

- In mid-2017 Greenville received notice from the State PRB that they had changed the 40 years plan to amortize the unfunded actuarial period to 30 years. To work toward that, in October 2017 the City increase its contribution an additional ½ percent, marking a 2% increase having been accomplished over the past 3 years.
- The new ruling from the State PRB stated that those plans with amortization periods that exceeded 30 years as of 6/30/17, need to seek to reduce their amortization period to 30 years or less as soon as practicable, but not later than 6/30/25.
- There appears to be two major reasons why Greenville is being reviewed,
 - First, our amortization period exceeds the new goal of 30 years;
 - Second, our plan has been using an expected rate of return in stocks to be 8.25%. It seems there are only 3 cities out of 90 that are using rates of return greater than 8%. There are currently 24 of the 90 who use 8% rate of return.
- A subsequent analysis by our consulting actuary and by Greenville's Finance Director, Summer Spurlock, was conducted and the following is Greenville's plan to achieve the 30-year period;
 - Reduce our expected rate of return from 8.25% to 8.0%. This has already been done and by using 8% has caused our amortization period to change from the 49.4 to 55 years, but does reflect more realism.
 - Greenville will increase the City's contribution by \$80,479 in its budget in October 2018, which should move our initial amortization period to 37.7 years, and should get us to the 30-year goal by 2025.
- Exhibit A attached shows Greenville's summary plan that shows by increasing the City's contribution an additional 2% (\$80,479) will result in an initial actuarial valuation period of 37.7 years.
- Exhibit B shows a year-by-year analysis of the impact of Greenville's increased contribution and our expected period of reaching below 30 years.

Please let me know if you have any additional questions.

Sincerely,

David L. Dreiling

David L. Dreiling
Mayor, City of Greenville
2821 Washington Street
Greenville, TX 75403-1049

ddreiling@ci.greenville.tx.us

EXHIBIT A

Greenville Firemen's Relief and Retirement Fund

Valuation as of December 31, 2016

Schematic Diagram of Plan Funding (with Increases in City Contribution Rate)

Percentage of Pay
Contributed by the
City of Greenville

19.30%*

* October 1, 2018

Percentage of Pay
Contributed by the
Fire Fighters

16.30%

The cost of the additional increase
from 17.3% October 2017, to 19.3%
would be approximately \$80,479.

*Staff will budget and add on October 1,
2018, 2%=\$80,479 to the fund which will
bring the amortization period to 37.7
years and we will target and intend to
reach 30 years amortization goal by 2025.

35.60%*

Normal
Cost

16.71%

\$648,439

Amortization
Payments

18.89%

\$733,247

Projected Pay for 2017 = \$3,881,665

Present Value of All Future Benefits =

\$35,539,659

AAL = Difference

Less Present Value of Future Normal Costs =

6,822,261

= \$28,717,398

Less Actuarial Value of Assets =

13,695,526

MV = 12,728,162

Benefits to be Funded by

Amortization Payments (UAAL) =

\$15,021,872

Length of Time Needed, at 8.00% Interest, to
Amortize \$15,021,872, with Payments Starting
at \$733,247 and increasing 4.00% annually =

37.7 years

Funded Ratio =

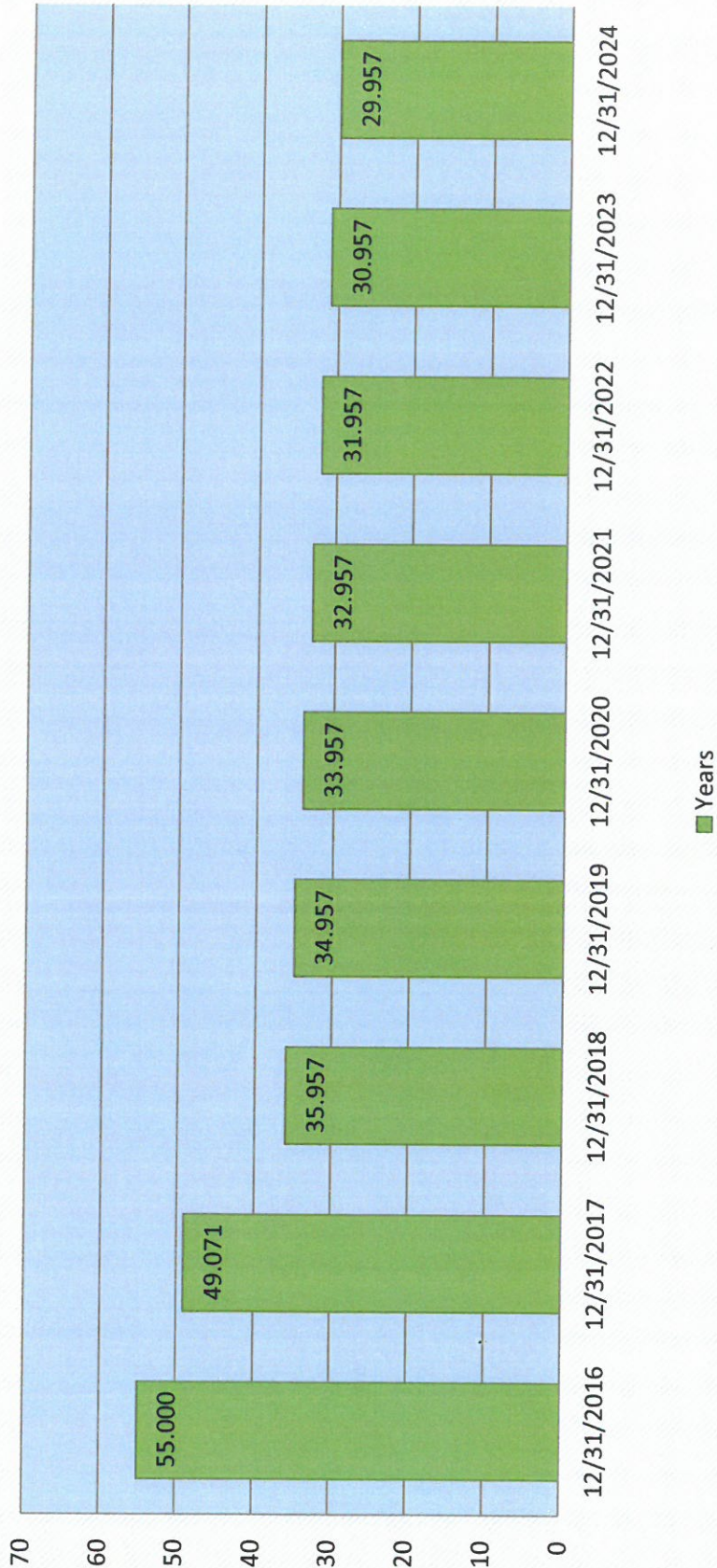
Mkt Val ÷ AAL

= 44.32%

Note: The present value of future normal costs is being funded by the normal cost over a period of 13.1 years. The normal cost does not exactly equal the normal cost percentage times projected pay, due to rounding.

John M. Crider, Jr. - Consulting Actuary

Greenville Firemen's Relief and Retirement Fund Amortization
(City Contribution increase to 19.3% as of 10/1/2018)



Appendix C – Comments from Greenville Firemen's Relief and Retirement Fund

JOHN M. CRIDER, JR.
CONSULTING ACTUARY
1701 GATEWAY BOULEVARD, SUITE 461
RICHARDSON, TEXAS 75080-3627

P.O. Box 832066
RICHARDSON, TEXAS 75083-2066

TELEPHONE (972) 690-5390
FAX (972) 690-5398

January 21, 2018

Via E-mail

Actuarial Committee
Texas Pension Review Board
P.O. Box 13498
Austin, Texas 78711-3498

Re: Actuarial Review: Greenville Firemen's Relief and Retirement Fund

Dear Actuarial Committee Members:

The City of Greenville and members of the Greenville Firemen's Relief and Retirement Fund have raised their contribution rates to the fund. At the same time, the actuarial assumptions used in the valuation have been made more conservative. Taking into account the pending two percent of pay increase in the City of Greenville contribution rate, the fund's amortization period stands at 37.7 years. Projections have also been made which adjust the amortization period for transition from the contribution rate used in the valuation to the ultimate contribution rate, 19.3 percent of pay. Those projections indicate that the amortization will first fall below 30 years as of December 31, 2024. The projected amortization period as of June 30, 2025, is 29.457 years. June 30, 2025, is the deadline set in Pension Review Board Pension Funding Guidelines for reaching a 30-year amortization period.

It is hoped that Actuarial Committee and the Pension Review Board (PRB) will recognize the cooperation which the City, the fund, and the actuary have demonstrated in connection with the Actuarial Review. The fund's valuation reports and accounting disclosures have been provided to the PRB for many years. The most recent actuarial valuation and accounting disclosure reports were provided to the PRB upon completion. In connection with the Actuarial Review, a table of Pension Review Board Metrics from the last two valuations was prepared and forwarded to the PRB on December 12, 2017. At the PRB's request, a 40-year cash flow projection was developed and sent to the PRB on December 20, 2017. The letter which Mayor David L. Dreiling sent to the PRB on January 19, 2018, traced the amortization period of the fund and the contribution rates under the plan since the completion of the December 31, 2012 actuarial valuation. Mayor Dreiling's letter also included a schematic diagram which shows the effect of the two-percent-of-pay contribution increase which the City of Greenville will place in its budget for the upcoming fiscal year. (It should be noted that the City of Greenville also increased its contribution rate by one-half of one percent of pay effective October 1, 2017.) In addition, a graph, which plots the projected decreases in the fund's amortization period over the next eight years, was attached to Mayor Dreiling's letter.

The City of Greenville, the Board of Trustees of the Greenville Firemen's Relief and Retirement Fund, and the actuary believe that the City's and the fund's efforts should be acknowledged by the Pension Review Board. Recognizing Greenville's efforts will encourage other funds—funds with even higher amortization periods and funds with infinite amortization periods—to undertake the efforts and sacrifices necessary in order to make their funds stronger and to bring their plans into compliance with Pension Review Board Pension Funding Guidelines.

Actuary's Comments Concerning Specific Issues Discussed in the Draft Actuarial Review

The draft Actuarial Review contains a number of comments about the Greenville Firemen's Relief and Retirement Fund. Below are the actuary's observations concerning some of those comments. Not all points of disagreement have been addressed. The observations are limited to the most important differences of opinion. The page numbers listed come from the draft Actuarial Review.

The following comments address specific Metrics:

Amortization Period, Page Three

The Actuarial Review lists the amortization period as given prior to the City's one-half of one percent of pay contribution increase in October 2017 and without the City's two percent of pay increase which will become effective in October 2018. Taking those increases into account the amortization period is 37.7 years. The figures in the graph included with Mayor Dreiling's January 19th letter show amortization periods which have been adjusted for the fact that the final contribution rate of 19.30 percent of pay will not be in force until October 2018.

The PRB draft Review states, "Greenville Fire currently has one of the highest amortization periods of all defined benefit pension plans in Texas." The Board Packet prepared for the Pension Review Board's January 26, 2017 meeting contained a table on page 60 of the Acrobat copy. There were six plans with amortization periods higher than the 70.4-year period of the Greenville fund. Five of those plans had infinite amortization periods.

Taking into account the 37.7-year amortization period which will result from the increases in City of Greenville contribution rate, there are 20 defined benefit plans on the table with amortization periods greater than that of the Greenville fund. Under the new contribution rate, the plan satisfies PRB Pension Funding Guidelines.

Funded Ratio, Page Three

Of the six plans with higher amortization periods than the Greenville fund, mentioned above, all have funded ratios higher than the 47.7% listed for the Greenville fund. There is little correlation between amortization period and funded ratio. The Pension Review Board's use of amortization period as the primary measure of plan soundness is a wise and sound choice.

Assumed Rate of Return (8.00%), Page Four

The Pension Review Board's 2017 Guide to Public Retirement Systems in Texas contains a table on Page 39 which lists the assumed rates of return for Texas Public Plans. The most commonly-used assumed rate of return was 8.00 percent, which was employed by 27 percent of plans. The Greenville fund lowered its assumed rate of return in connection with the most recent valuation. As the amortization period decreases, it will be possible to make this assumption more conservative. Exhibit 2 of the fund's Governmental Standards Board (GASB) Statement No. 68 disclosures, sent to the PRB in December, shows the development of the expected rate of return using the building block rate of return method. Exhibit 2 indicates that there is approximately a one-half of one percent margin in the fund's assumed rate of return.

The draft Review states, "Greenville Fire's assumed rate of return is 8.00%, while its actual ten-year rate of return for the period ending December 31, 2016 was only 4.23%." Included with this letter are two graphs which show one-year, five-year, ten-year, and twenty-two year rates of return for Texas Local Fire Fighters' Retirement Act (TLFFRA) funds. The first graph is for the Greenville Firemen's Relief and Retirement Fund. The second graph shows averages for the TLFFRA funds which, like the Greenville fund, close their years on December 31st. The Greenville fund's December 31, 2016 ten-year average is shown as 4.23%, as stated in the draft Actuarial Review. The average for all calendar year TLFFRA funds, however, is only 4.07%. Thus, Greenville fund's rate is above the TLFFRA average. Low ten-year average rates of return have been experienced nationwide due to the substandard rates of return produced by the financial markets as a result of the 2008 financial crisis and the low returns for 2014, 2015, and 2016. Other periods show higher average rates.

Of the 20 rates of return listed on the graphs, only three bars show the Greenville fund's rate as being less than the TLFFRA average. The 2015 one-year rate is only four one hundredths of a percent lower than the TLFFRA average.

The Greenville fund changed investment managers in 2007. The fund's investment performance improved after the change. One of the sources of the fund's high amortization periods has been the investment returns under the prior manager. The two recent increases in contribution rate are working to compensate for the fund's low returns prior to the manager change.

Payroll Growth Rate (4.00%), Page Four

The PRB draft Review states, “The Fund’s payroll growth rate of four percent is tied for the third most aggressive in its peer group.”

The Actuarial Standards of Practice (ASOPs) call for assumptions to be based on a fund’s experience and to fall within a reasonable range. Use of peer groups is not a recognized practice under the ASOPs. Exhibit 8 of the December 31, 2016 valuation report shows the fund’s experience with respect to payroll growth rate starting with the December 31, 2008 valuation. Payroll growth reached 9.00 percent in 2010 and has decreased since that time. Experience has shown that payroll growth rates change in cycles. The Greenville fund has had a study of fund experience, including payroll growth rate, as a part of nearly every valuation. If future experience studies do not show a return to the assumed rate of payroll growth, the rate will be lowered.

Actual Contributions as a Percent of Actuarially Determined Contributions, Page Four

The PRB draft Review states, “This is one of the largest shortfalls percentages in the State and the second largest in its peer group.”

With the 2.50 percent of pay increase in the City of Greenville contribution rate since the most recent valuation, the difference between the rate needed to produce a rolling 30-year amortization period and the actual contribution rate has decreased from 4.75 percent to 2.25 percent. As noted in Mayor Dreiling’s letter and on page one of this letter, the fund’s amortization period is projected to decrease to 30 years by December of 2024. With a thirty-year amortization period, the difference between the 30-year rate and the actual rate will be zero.

Non-investment Cash Flow, Page Four

The PRB draft Review states, “Greenville Fire’s non-investment cash flow as a percentage of FNP (“Fiduciary Net Position”, or fair value of assets) is one of the lowest in the State. If this trend continues, the Fund could face the potential risk of needing to liquidate a portion of existing assets to pay current benefits and/or expenses.”

Like the majority of TLFFRA funds, the Greenville Firemen’s Relief and Retirement Fund was created in the Fall of 1941. Actuarially speaking, it is a “mature plan,” meaning that both the active and nonactive membership are approximately stationary populations. Line 5 of Exhibit 3 of the December 31, 2016 valuation report shows the year-end market value of plan assets for 2012 through 2016. The value of assets has increased each year except for 2015. As the draft Review points out, the fund’s *ten-year* average rate of return was 4.23 percent. (This period includes both the 2008 financial crisis and the three, low-return years 2014, 2015, and 2016.) However, the fund’s assets increased by \$351,908 over that period. Furthermore, the fund’s DROP provision is a reverse DROP and is limited to two years. Line 28 of Exhibit 3 of the fund’s December 31, 2016 GASB Statement No. 68 disclosures shows that there have been zero outstanding DROP distributions for the last three years.

The Greenville fund has shown no signs of a cash flow problem. The fund's investment manager serves a number of TLFFRA funds and is experienced in managing the cash flows and investment portfolios for fire fighter plans. The increases in City contribution rate since September 30, 2016, have further diminished the fund's cash flow risk.

Historical Trends

Assets and Liabilities

On page five, the draft Review states that the unfunded actuarial accrued liability has more than quadrupled since 2000. No comparison with other funds is given. The period from 2000 to the end of 2016 includes the 2000-to-2002 financial downturn, the 2008 financial crisis, and the three low-return years of 2014, 2015, and 2016. Over the same period, the fund has also strengthen its methods and assumptions by changing from the aggregate to the individual entry age cost method, twice adopted a new mortality table, as well as lowered its assumed rate of return and payroll growth assumptions.

Under the fund's new contribution rate, the unfunded actuarial accrued liability (UAAL) is projected to be less than 30 years prior to June 30, 2025. The UAAL is projected to be zero in 38 years.

Investment Assumption and Returns

As noted on page three, above, the Greenville fund's assumed rate of return is still the most widely used rate of return, according to the Pension Review Board's February 2017 *Guide to Public Retirement Systems in Texas*. The Greenville fund monitors its investment experience annually and reports its investment experience to the PRB on Form PRB-1000. The fund will lower its assumed rate of return if experience studies indicate such a change is necessary.

Contributions, Payroll Growth, and Cash Flow

These items are discussed on pages two through four, above.

Demographics, Retro Drop, Payroll Growth, and Risk Analysis and Assumption Risk

These items are discussed on pages two through four, above. In addition, with respect to risk analysis, it should be noted that nearly all Greenville Firemen's Relief and Retirement Fund valuation reports contain experience studies of rate of return, age at retirement, individual salary increases, and aggregate pay increases. These meet the requirements of Section 802.1014(b-1) of the Texas Government Code and PRB Pension Funding Guidelines.

Actuarial Committee
January 21, 2018
Page Six

I will attend the Actuarial Committee meeting on Thursday, January 25th in order to go over this response and to answer questions about the actuarial status of the Greenville fund. If Committee members or Pension Review Board staff members have questions in the mean time, please feel free to contact me.

Sincerely,

John M. Crider, Jr., ASA, MAA, EA

Attachments

cc: Board of Trustees
Greenville Firemen's Relief and
Retirement Fund

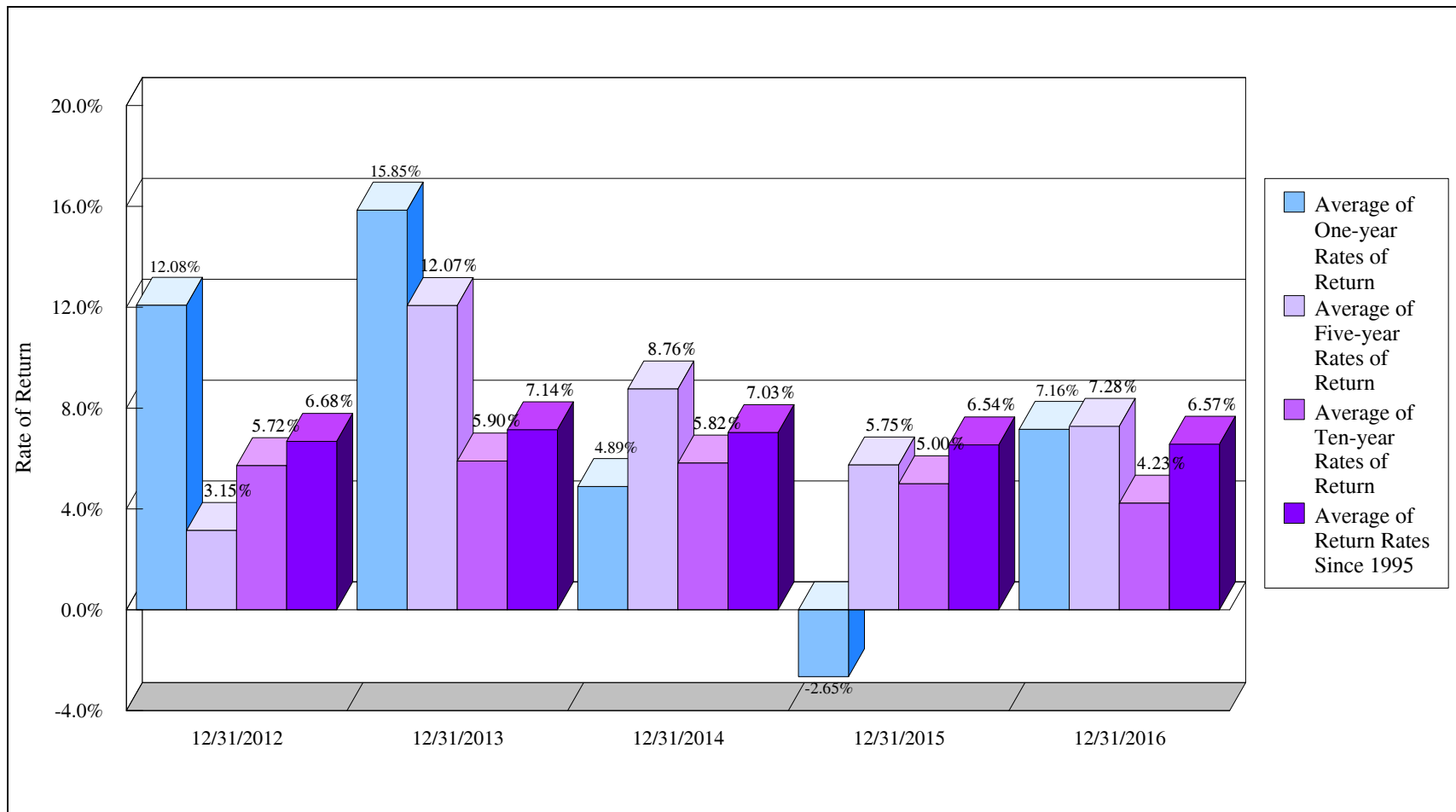
Mr. Kenneth Herbold, FSA
Actuary
State Pension Review Board

Mr. Joey Evans
Program Specialist
State Pension Review Board

Greenville Firemen's Relief and Retirement Fund

Investment Experience through 2016

Average Annual Rates of Return - Plan Years Ending December 31st

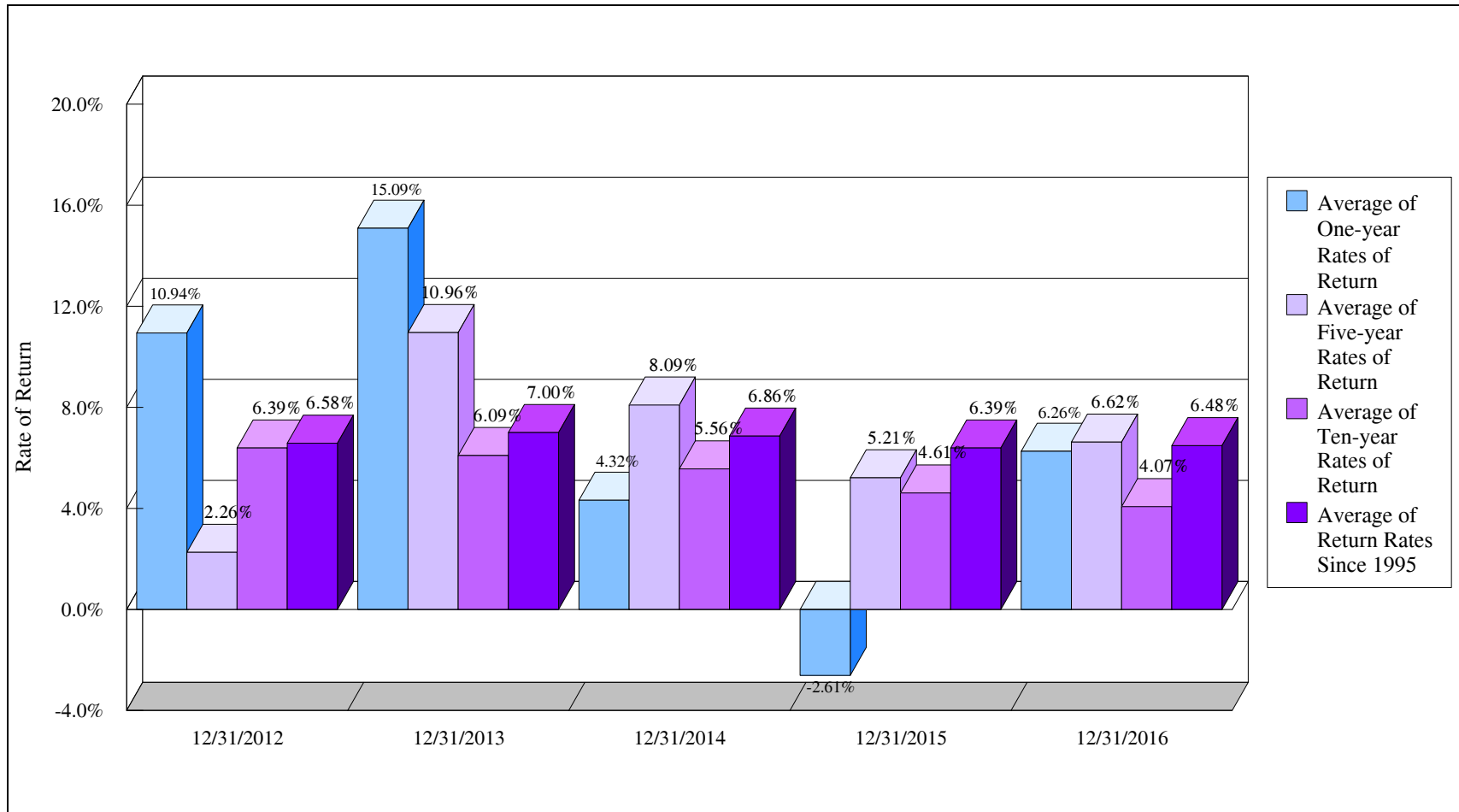


John M. Crider, Jr. - Consulting Actuary

Rates of Return of Texas Local Fire Fighters' Retirement Act Funds

A Survey of Investment Experience through 2016

Average Annual Rates of Return - Plan Years Ending December 31st



John M. Crider, Jr. - Consulting Actuary

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From: Himes, Craig <chimes@ci.greenville.tx.us>
Sent: Sunday, January 21, 2018 8:55 PM
To: Anumeha
Subject: Greenville Firemen's Relief and Retirement Fund
Attachments: 20180121ActuarialCommittee.pdf

Follow Up Flag: Flag for follow up
Flag Status: Completed

1/21/18

Anu,

As Chairman of the Greenville Firemen's Relief and Retirement Fund I agree with the responses of Mr. Crider and Mayor Dreiling regarding the upcoming review. I am forwarding Mr. Crider's response to make sure you received it. This is a list of individuals that will be attending the PRB meeting on 1/25/18 to answer any questions the PRB might have. We look forward to seeing you Thursday and thank you for all of your help. As always feel free to contact me if you have any questions.

Craig Himes
(903) 259-4564
Chairman

Bryan Ausmus
Vice Chairman

Mayor Dreiling
Greenville Mayor

John Crider
Actuary

Derek Sheets (Newest member of our Pension Board will be attending to observe)
Secretary

Thanks,
Craig Himes
Greenville Fire - Rescue
C- Shift/ Station 3/ Captain
Office 903-457-2952
Cell 903-259-4564
chimes@ci.greenville.tx.us

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Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX A3 – INTENSIVE ACTUARIAL REVIEW – BEAUMONT FIREMEN'S RELIEF AND RETIREMENT FUND

Intensive Actuarial Review:

Beaumont Firemen's Relief and Retirement Fund

April 2018



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Executive Summary

Introduction

This intensive actuarial review of Beaumont Firemen's Relief and Retirement Fund ("Beaumont Fire" or "the Fund") is intended to assist the Fund's board of trustees and the City of Beaumont ("the City") in assessing the Fund's ability to meet its long-term pension obligation. Overall, the review shows the Fund is taking considerable risks in its approach to funding the system, as well as with respect to its asset-liability profile. The Pension Review Board encourages the Fund and the City to review the findings and conclusions of this report carefully and jointly adopt a forward-looking plan to address these risks and guide the Fund towards a path of long-term sustainability. The Pension Review Board can provide technical assistance in formulating such a plan.

Overview

Beaumont Fire faces significant risk associated with its post-retirement option plan (PROP) because it offers: a guaranteed 6.00% annual rate of return, which is calculated as 2.0% less than the actuarial investment return assumption; a virtually unlimited amount of time to accrue this guaranteed return; and the ability to withdraw these funds with little to no restriction. In an era of extremely low interest rates, offering a guaranteed 6% rate of return on accounts that can be withdrawn on short notice is virtually unheard of and presents great risk. It is impossible for the Fund to back these liabilities with assets with a similar investment horizon while providing a similar return. The Fund's PROP balance has grown from less than 3% of total plan assets in 2007 to nearly 1/3 of total assets in 2016.

The expansion of Beaumont Fire's DROP/PROP over time, particularly in more recent years as interest rates plummeted worldwide, provides some insight into the risks associated with the Fund's decision-making processes. The Fund did not have the benefit of written funding or benefit policies to guide its consideration of DROP/PROP enhancements over time and may have benefitted from more formal involvement of the City.

In addition, the Fund's amortization period spiked from 39 years as of December 31, 2014 to 104 years as of December 31, 2016. This jump in expected funding period highlights certain funding risks associated with contributions that are a fixed rate of pay set through statute or negotiation, including the lack of any built-in mechanisms to adjust to changes in a plan's financial condition.

Conclusion

To address the immediate risks posed by the PROP, the board should consider performing an in-depth asset-liability study to better understand the potential risks associated with its existing asset mix and the liabilities they support and seriously consider the risk a guaranteed rate of return places on all the Fund's stakeholders while considering the impact changes could have on PROP participant behavior.

To address the funding and governance risks, the Fund and the City should develop written funding, benefit, and investment policies that are linked to provide a formal risk-/cost-sharing arrangement. A strong funding policy that requires payment of an actuarially determined contribution (ADC) is encouraged. In addition to helping maintain a sound plan funding level, putting such forward-looking policies into place can help reduce uncertainty for stakeholders who would know, in advance, how adverse experience will be managed.

Background

Texas Government Code Section 801.202(2) requires the Pension Review Board (PRB) to conduct intensive studies of potential or existing problems that threaten the actuarial soundness of or inhibit an equitable distribution of benefits in one or more public retirement systems. The PRB identified the following key metrics, in addition to amortization period, to determine and prioritize retirement systems for intensive actuarial review. The PRB selected Beaumont Firemen's Relief and Retirement Fund ("Beaumont Fire" or "the Fund") for review based on the 2016 actuarial valuation data shown below. Unless otherwise noted, the following metrics were calculated as of December 31, 2016.

Amort. Period (Years)	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC ¹	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
104	67.53%	274.69%	8.00%	3.50%	74.37%	27.95%	-4.27%

Contribution, DROP, and cash flow data are from the Fund's 12/31/2016 financial audit.

Plan Profile

Actuarial Accrued Liability: \$162,841,573

Market Value of Assets: \$102,435,664

Normal Cost: 18.93% of payroll

Contributions: 15.50% employee
15.50% employer

Membership: 232 active
217 annuitants

Social Security Participation: No

At the time the Fund was selected for review:

- Its amortization period was the highest finite period of all defined benefit pension plans in Texas and was the highest amongst Texas Local Fire Fighter's Retirement Act (TLFFRA) plans with assets of more than \$50 million.
- Its unfunded actuarial accrued liability (UAAL or "unfunded liability") as a percent of payroll was the third highest amongst TLFFRA plans with assets of more than \$50 million.
- It was one of only 17 plans in Texas with an assumed rate of return of 8.00% or above, which is more than half a percent above both the Texas and national averages for

public pension plans.

- Actual contribution as a percent of its actuarially determined contribution (ADC) was the lowest amongst TLFFRA plans with assets of more than \$50 million.
- Members' deferred retirement option plan (DROP) balances accounted for nearly one third of the Fund's total assets.
- Its non-investment cash flow as a percent of assets ((fiduciary net position (FNP) was the lowest amongst TLFFRA plans with assets of more than \$50 million.

¹ For plans whose contributions are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Risk Analysis

The various risks faced by a pension fund all boil down to one relatively simple question, "Will there be enough money to pay benefits when due?" This section discusses three main risk factors facing the Fund: asset-liability mismatch, governance, and funding risks. Measuring Beaumont Fire based on these factors reveals a significant amount of risk being taken in each of these areas, increasing the probability of a continued period of severe financial stress for the Fund. This also raises the likelihood of deteriorating funding conditions in the coming years, further imperiling the Fund's ability to pay promised benefits.

Asset-Liability Mismatch Risk

Beaumont Fire faces significant asset-liability mismatch risk associated with its post-retirement option plan (PROP) because it offers:

- a guaranteed 6.00% annual rate of return;²
- a virtually unlimited amount of time to accrue this guaranteed return; and
- the ability to withdraw these funds with little to no restriction.

Background

Most of the benefits expected to be distributed from a public defined benefit pension plan are not expected to be paid in the short, or even medium, term. Thus, many believe investments such as equities that are more likely to provide a higher return over a longer time horizon provide a superior risk-return profile to support these long-term liabilities. This has led public pension plans to allocate a large proportion of assets to riskier and longer-term investments. Beaumont Fire is no exception. However, Beaumont Fire has unique plan design features that present additional risks which must be examined when considering the reasonableness of this common asset allocation.

The Fund offers two versions of its retroactive deferred retirement option plan (Retro DROP) based on achieving various age and service requirements. The Retro DROP benefits can simply be viewed as an additional benefit payment option like any other option but allowing a portion of the total benefit to be taken as a lump sum in exchange for a smaller annuity. Actuarially, these distributions are reasonably

Deferred Retirement Option Plan Examples*

Regular/Forward DROP -

Active employee retires on paper and continues working. DROP account is credited with monthly pension benefit plus contributions and interest.

Back/Retro DROP - At

retirement the employee can elect to retire on paper as of a previous date and receive the monthly pension benefits that would have been paid had the employee truly retired at the elected date plus contributions.

PROP - After retirement a retiree can elect to credit their DROP account balance and/or their pension benefit into a PROP account with interest.

*DROP features vary.

² The annual rate of return is defined as 2.0% less than the actuarial investment return assumption.

predictable given sufficient plan experience, and do not include accumulated interest but only provide the hypothetical "missed" distributions plus a return of employee contributions. Therefore, the Retro DROP does not appear to present significant risk to the Fund.

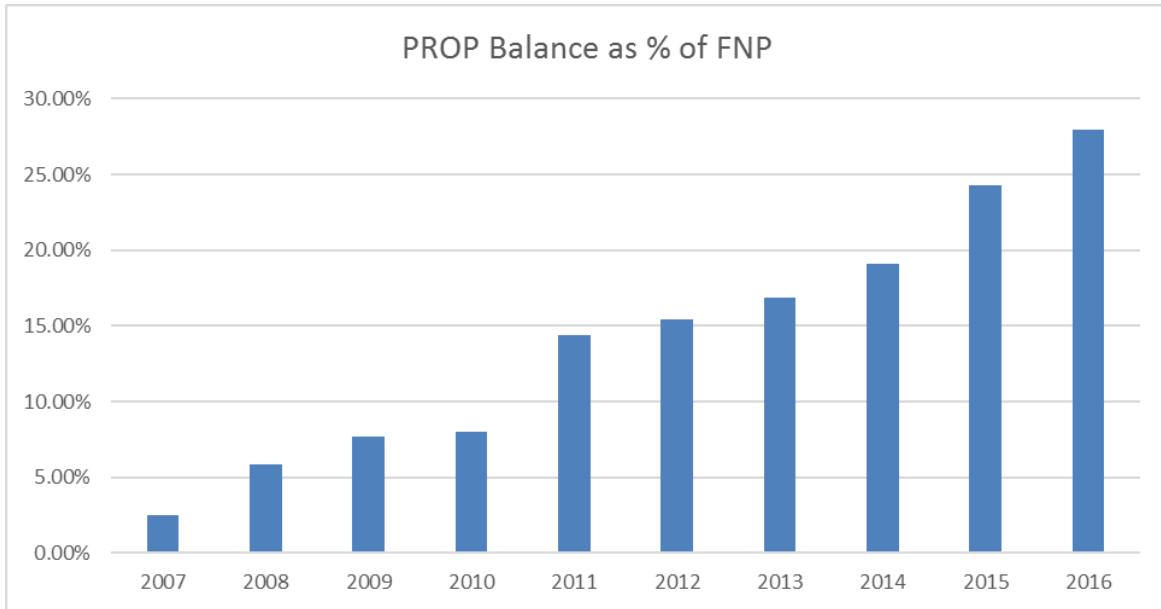
In contrast, the plan feature that presents unique challenges for Beaumont Fire is its PROP. The PROP allows the DROP lump sum distributions to remain in the plan, as well as allows *any* retiree the option to redirect annuity distributions back to the plan. The PROP account earns a guaranteed 6.00% annual rate of return and can be withdrawn in virtually any manner and at any time. The only limit to this option is that distributions must begin in accordance with Internal Revenue Service Required Minimum Distribution rules³.

Risks Associated with Beaumont Fire's PROP

In an era of extremely low interest rates, offering a guaranteed 6% rate of return on accounts that can be withdrawn on short notice is virtually unheard of and presents great risk. It is impossible for the Fund to back these liabilities with assets with a similar investment horizon while providing a similar return. In fact, the Fund has struggled to earn a 6% annual rate of return on its entire portfolio, much less its short-term assets. In the past 10 years, Beaumont Fire has surpassed a 6% return five times, but three times saw negative returns resulting in an average annual return of less than 4% for this period.

A major concern is the lack of a trigger mechanism to lower or cease the guaranteed interest rate for years with sub-par returns. Participants are incentivized by the nature of this program to treat it like a risk-free savings account – one that earns roughly 6 times more than even the best savings accounts on the market, while the active plan members and taxpayers absorb all the risk. The combined effect of the 6% guaranteed return on PROP accounts, the average actual return on assets lower than the interest rate paid, and the option for all participants to place their entire retirement benefit in the PROP for up to 20 years explains why the Fund's PROP balance has grown from less than 3% of total plan assets in 2007 to nearly 1/3 of total assets in 2016.

³ The PROP balance must remain with the fund for 90 days before members may elect PROP distributions. Should the PROP participant fail to file a PROP Benefit Distribution Form before age 70 ½, distributions will automatically be in the form of annual payments over three years and will begin at age 70 ½.



Beaumont Fire has amended the plan design to decrease the guaranteed PROP return for a calendar year following a year in which actual returns are lower than 6%, but only for members hired on or after January 1, 2017. Thus, this specific amendment will not impact the Fund for decades. The PROP account balance for Beaumont Fire is currently just below 28% of its net plan assets based on market value (fiduciary net position (FNP)) and can only be expected to continue to increase exponentially absent any intervention from the Fund's board.

While it makes economic sense for members to continue to participate in the PROP as it currently exists, any attempt to modify future interest accruals may change this calculation, potentially causing the Fund significant issues. Currently, less than 3% of the Fund's net assets are in short-term investments, leaving the Fund at risk of needing to sell off assets, potentially with less than ideal market timing, if a larger than expected number of PROP members decide to withdraw their funds.

Conclusion/Recommendation

The Fund's board should consider performing an in-depth asset-liability study to better understand the potential risks associated with its existing asset mix and the liabilities they support. This should include scenario testing large PROP withdrawals coupled with potential adverse investment experience. In addition, the board should seriously consider the risk a guaranteed rate of return places on all the Fund's stakeholders while considering the impact changes could have on PROP participant behavior.

Governance Risk

The expansion of Beaumont Fire's DROP/PROP over time, particularly in more recent years as interest rates plummeted, provides some insight into risks associated with the Fund's decision-making processes. The Fund did not have the benefit of written funding or benefit policies to guide its consideration of DROP/PROP enhancements over time and may have benefitted from more formal involvement of the City.

Background

Governance is essentially decision-making, and decision-making for public pension plans must balance the competing interests of plans and their sponsors and should feature collaboration between the two. The primary source of governance risk is the potential lack of involvement of key parties or stakeholders (members, the sponsor government, and taxpayers) in important areas of decision-making for a pension plan including plan design (benefits) and funding (contributions). When a key party is not engaged in important decisions, the risk increases that benefit levels and the contributions required to fund them will diverge, potentially putting the Fund's funding stability at risk.

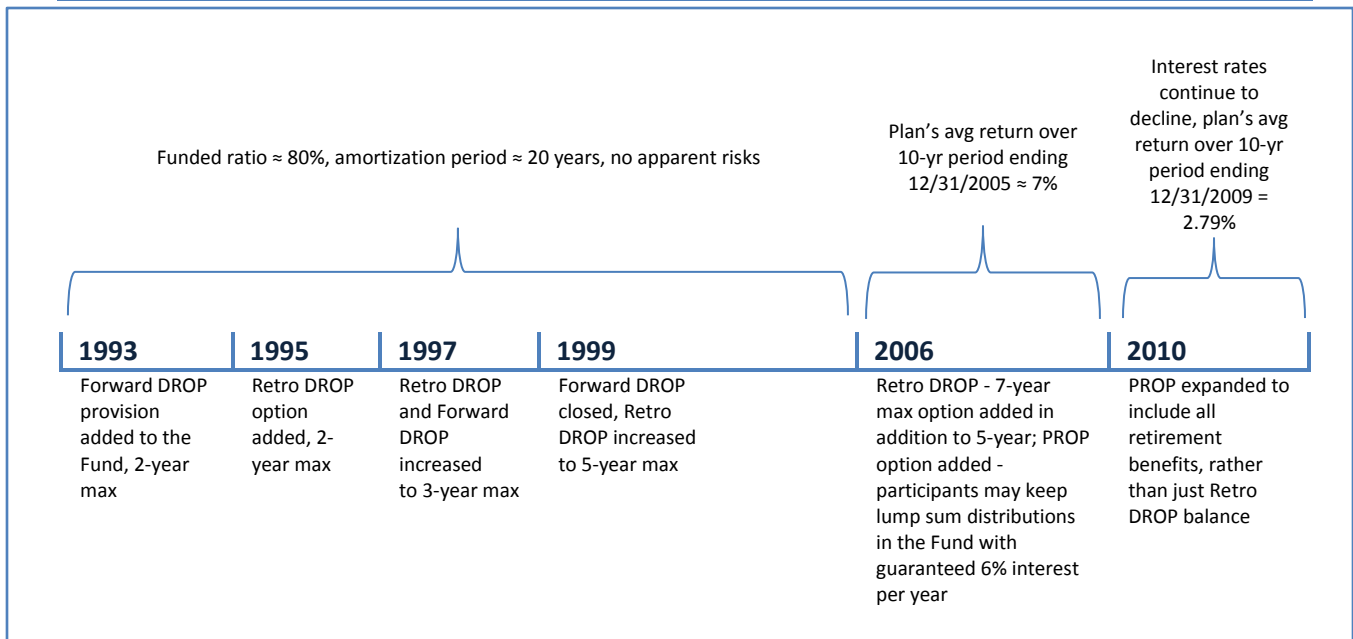
For example, TLFFRA allows boards of trustees to make prospective benefit modifications, both increases and reductions. These changes must be approved by an actuary and a majority of participating members and may not deprive an eligible participant of vested accrued benefits. Although jointly responsible for funding the retirement plan along with plan members, the sponsoring city may have limited involvement in benefit decision-making, a structure which generates the risk that benefit levels adopted could be unsustainable.

Benefit increases are not the only potential risk related to a potential lack of sponsor involvement under TLFFRA; unwillingness to reduce benefits prospectively when necessary to address funding challenges can be an obstacle to getting things back on track. It should be noted that even plans with very engaged boards and sponsors can be susceptible to increasing benefits to unsustainable levels in good times or failing to lower them when necessary in bad times. Governance risk related to an imbalance in decision-making can only exacerbate these risks. The history of the Fund's DROP/PROP accounts illustrates this point.

Governance Risk Case Study: Beaumont Fire's DROP/PROP

In 1993, a provision for a simple 2-year forward DROP account was added to the Fund. By 2006, the provision was changed to a Retro DROP only, and expanded to allow up to 7 years of participation. In 2006, the PROP provision was also introduced, allowing DROP participants to keep their lump sum DROP distributions in the Fund and accrue interest at a guaranteed 6% per year, which is calculated as 2.0% less than the actuarial investment return assumption. Up until this point, the Fund remained reasonably well-funded with a funded ratio hovering just under 80% and an amortization period in the 20s, within the PRB's then-preferred 15-25-year range per the *Guidelines for Actuarial Soundness*, and the DROP provisions did not appear to pose significant risks.

Intensive Actuarial Review: Beaumont Firemen's Relief and Retirement Fund



However, in 2006 savings accounts returned a little more than 1% per year, 10-year Treasury bonds returned less than 5% per year, and the Fund's average return over the 10-year period ending December 31, 2005 was just scarcely over 7%. In 2010, the PROP option was expanded to include all retirement benefits rather than just the Retro DROP balance even though interest rates had continued to decline and the Fund's average return over the 10-year period ending December 31, 2009 was just 2.79% with just 4 of those years returning more than 6% and 4 resulting in negative returns. As noted above, the Fund has taken recent measures to lower future interest accruals on the PROP accounts, but it will take a minimum of 20 years for this change to have any impact on actual plan benefits. Waiting this long to address the PROP account's significant and growing risks points to a lack of proactive decision-making by key stakeholders.

Funding Soundness Restoration Plan

State law recognizes the potential risks of underfunding and a lack of engagement by some key stakeholders and imposes cooperation between the system and sponsoring governmental entity by requiring retirement systems having trouble meeting their long-term obligations work with their sponsors to develop a restoration plan for addressing those issues.⁴ This framework helps ensure that both the system and its sponsoring employer are involved in retirement system reform decisions, but it comes at a point when actuarial health is already threatened. Beaumont Fire has not yet become subject to the statutory requirement to develop a funding soundness restoration plan, but since their last actuarial valuation showed an amortization period of greater than 40 years, it will become subject if the December 31, 2018 valuation does not show an amortization period of 40 years or fewer.

⁴ Texas Government Code 802.2015 and 802.2016 require public retirement systems whose amortization period exceeds 40 years for 2 or 3 consecutive actuarial valuations to develop, with their sponsor, a funding soundness restoration plan designed to bring their amortization period within 40 years over 10 or fewer years.

Conclusion/Recommendation

It is imperative to the long-term health of the Fund that all stakeholders are involved in plan decisions in good times as well as bad. One step to help address these issues is for the Fund and the City to develop written funding, benefit, and investment policies which are linked to provide a formal risk-/cost-sharing arrangement. For example, a funding policy might state that future benefit enhancements, cost of living adjustments, and/or contribution rate reductions can only be considered or made if the Fund's funded ratio remains greater than a threshold. A funding policy can also state that if the funded ratio falls below a certain threshold, the stakeholders would be required to come back to the table to make necessary contribution and benefit adjustments.

In addition to helping maintain a sound plan funding level, putting such trigger mechanisms into place can help reduce uncertainty for stakeholders who would know, in advance, how adverse experience will be managed. If Beaumont Fire together with the City had adopted such a forward-looking policy in the past, its DROP/PROP may not have grown to represent the level of risk for the Fund that it does today.

Funding Risk

Beaumont Fire's recent investment experience, with actual returns far below the assumed rate of return, coupled with the Fund's fixed-rate funding structure which does not adjust to cover those actuarial losses presents serious funding risks that must be mitigated for the Fund to meet its long-term obligations.

Background

Beaumont Fire experienced a significant spike in its amortization period from 39 years as of December 31, 2014 to 104 years as of December 31, 2016. This increase was largely driven by significant asset losses in 2015, and since they are not yet fully recognized in the actuarial value of assets, will continue to hold down the funded ratio and maintain an extremely high amortization period as they are recognized in 2017 and 2018. Without significant offsetting asset gains and/or immediate changes to contributions or benefits, the Fund is likely to become subject to the Funding Soundness Restoration Plan statutory requirement following its next actuarial valuation, as mentioned above.

Fixed-Rate Funding Model and Contribution Insufficiency Risk

This jump in expected funding period highlights certain risks associated with contributions that are a fixed rate of pay set through statute or negotiation:

- 1) Contributions to percent-of-pay plans are inherently back-loaded because the expected contributions to a percent-of-pay plan grow on a nominal basis at the assumed rate of total payroll growth.
- 2) Fixed contributions (whether as a rate of pay or a specific dollar amount) provide budgetary stability for the employer in the short term, but do not include any inherent mechanisms for reacting to changes in a plan's financial condition.

As of October 1, 2017, active members of the Fund contribute 15.50% of pay and the City also contributes 15.50% of pay. The City's and member's contribution rates reflect an increase from 15.00% in 2014.

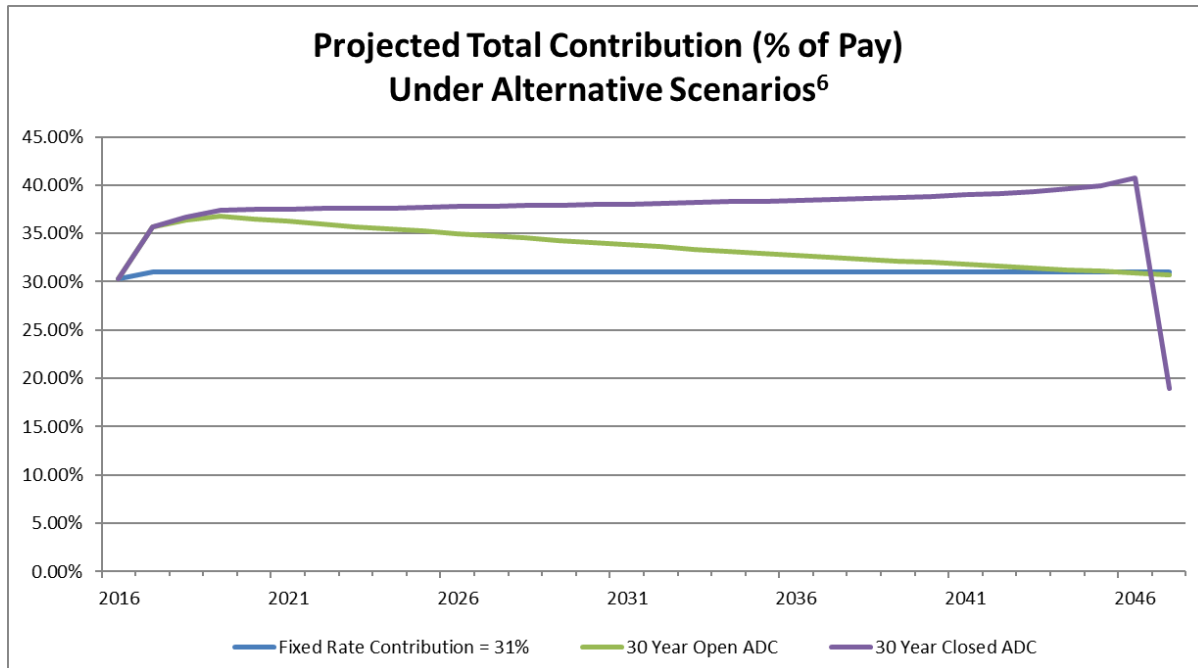
Despite the increase in the contribution rates in 2016, the Fund's UAAL increased by \$13.46 million. This increase in the UAAL was caused by total contributions that were not sufficient to cover the cost of both the new benefits being accrued (normal cost) and the interest accumulated on the unfunded benefits already earned (amortization payment), or to start reducing the total UAAL. This resulted in *negative amortization* because contributions were not sufficient or large enough to cover the interest that accrued on the unfunded liability or pay down the unfunded liability during the year. In part this can be attributed to the lack of a written funding policy and the nature of contributions that are a fixed-rate of pay set through statute or negotiation.

According to its actuarial valuations, Beaumont Fire has not received the reported ADC in any year since 2008. Even with contribution increases in 2012 and 2016, employer contributions have averaged 85% of the Fund's ADC since 2008. Furthermore, the reported ADC is calculated using an open amortization period that results in perpetual negative amortization. If the Fund were to use this ADC as a funding policy, the UAAL would grow indefinitely and the "pension debt" would never be paid off. For the fiscal year ending December 31, 2016, the expected contributions were less than 75% of the reported ADC. This shortfall of \$970,986 is equal to 0.84% of the City's total General Fund expenditures for the fiscal year ending December 31, 2016 and is greater than all its peer TLFFRA plans.

Contribution Levels vs. Actuarially Determined Contribution									
Fiscal Year (12/31)	2000	2002	2004	2006	2008	2010	2012	2014	2016 ⁵
Employee Contribution	13.00%	13.00%	13.00%	13.00%	13.00%	14.00%	15.00%	15.00%	15.13%
Employer Contribution	13.00%	13.00%	13.00%	13.00%	13.00%	13.00%	15.00%	15.00%	15.13%
Employer 30-Year ADC	10.05%	13.26%	11.86%	11.17%	13.79%	15.78%	17.60%	16.43%	20.17%
% of ADC funded	129.35%	98.04%	109.61%	116.38%	94.27%	82.38%	85.23%	91.30%	74.99%
Covered Payroll (in millions)	\$10.56	\$11.28	\$12.65	\$15.3	\$16.59	\$16.42	\$17.89	\$18.41	\$19.25
Contribution Shortfall (in millions)	-	\$0.29	-	-	\$0.13	\$0.46	\$0.46	\$0.26	\$0.97

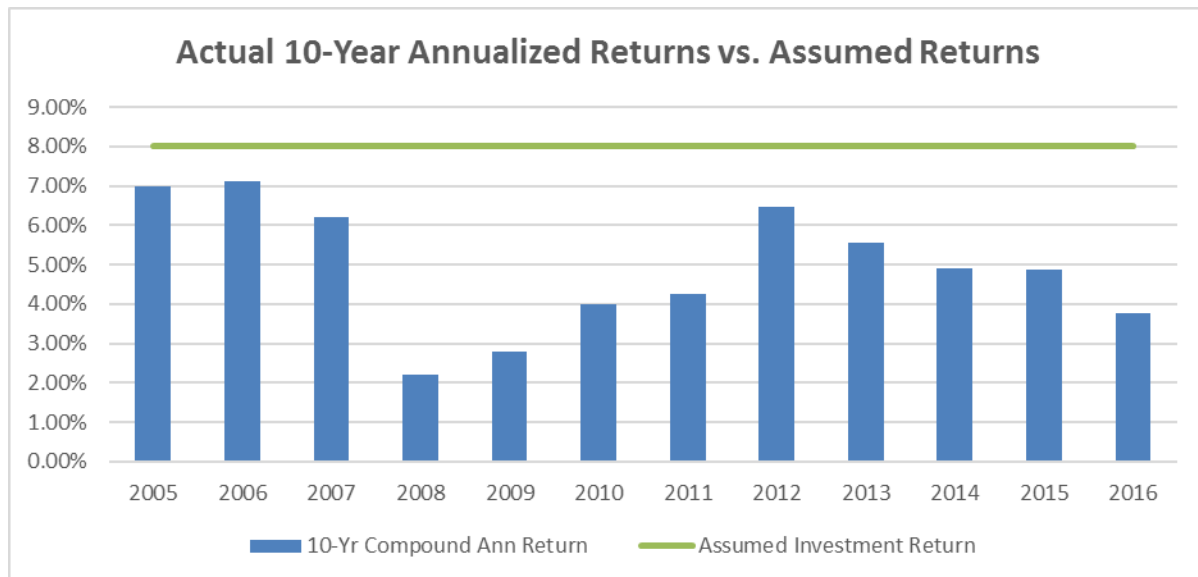
The projection below illustrates the expected total contributions (both employer and employee) under 3 contribution scenarios. The scenarios are 1) maintaining the current fixed contribution rates; 2) adopting a funding policy that utilizes a 30-year open amortization approach; and 3) adopting a funding policy that utilizes a single-layer 30-year closed amortization approach (i.e. will fully fund the Fund in 30 years). As illustrated here, the Fund's current fixed contribution structure under scenario 1 is not sufficient to pay down the unfunded liability and in fact allows the UAAL to continue to grow, resulting in negative amortization.

⁵ The contribution rate of 15.13% was calculated by the PRB due to the increase in contributions from 15.00% to 15.50% not being effective until October 1, 2017.



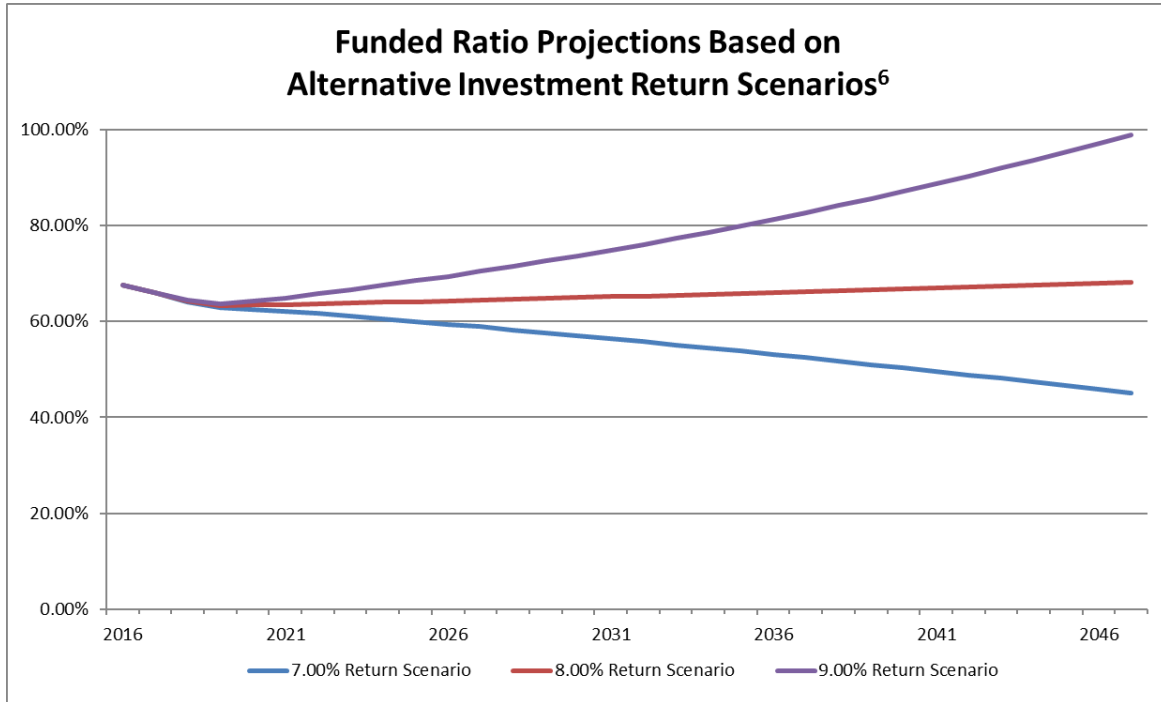
Investment Experience Compared with Investment Return Assumption

Actual investment returns lower than the assumed return has been a large contributor to the Fund's increasing UAAL. The Fund currently assumes an 8.00% interest rate, which exceeds the 2017 national average of 7.52% (reported by NASRA) and most of its peer systems in Texas. As illustrated below, the Fund has not achieved an 8.00% annualized return over a consecutive 10-year period in any of the 10 periods ending December 31, 2007 through December 31, 2016.



The graph below projects the funded ratio for the next 30 years, assuming the member and the city contribution rates remain at a fixed 15.50% each and the investments return 7.00%, 8.00% or 9.00%. The impact of consistently earning less than the expected return on assets (EROA) *but even as high as 7.00%*

over the next 30 years, results in the funded status sinking to 45%. Earning 9.00% over the next 30 years would put Beaumont Fire at 99% funded. However, based on the current asset allocation, the PRB estimates the probability of earning less than or equal to a 7.00% annualized return is approximately twice as likely as achieving a 9.00% or greater annualized return over the next 30-year period.



Conclusion/Recommendation

The investment return assumption is the sole assumption that allocates expected costs between contributions and investment income and the assumed payroll growth rate drives the determination of whether the existing contribution rate is sufficient to meet those needs. Funding risk arises when these assumptions understate the contributions needed in the short and medium term, forcing future members and tax-payers to bear the burden of increased contributions and/or lower benefits.

To address these concerns, a strong funding policy that requires payment of an ADC is encouraged. Numerous actuarial methods can be utilized to help mitigate contribution volatility, including directly smoothing contribution rates or adding “guardrails” that require the stakeholders to come back to the table if the contribution rate falls outside a specified range. If funding according to an ADC is not adopted, a funding policy that fully funds the Fund over a finite period, such as 30 years, is recommended.

⁶ Total payroll and projected benefit payments are assumed to grow at 3.50%. All other current and projected assets and liabilities reflect the actuarial accrued liabilities, actuarial value of assets, plan provisions, and actuarial assumptions and methods as reported in the 12/31/2016 Actuarial Valuation prepared by Foster & Foster Actuaries and Consultants.

Appendix

Key Metrics

Metric	Amortization period (104 years)
What it measures	Approximately how long it would take to fully fund the unfunded actuarial accrued liability (UAAL) based on the current funding policy.
Why it is important	Given the Fund's current assumptions, an amortization period above 18 years indicates the contributions to the Fund in the coming year are less than the interest accumulated for that same period and therefore the total UAAL is expected to grow over the near term. In addition, for a plan that contributes on a fixed-rate basis such as Beaumont Fire, the higher the amortization period, the more sensitive it is to small changes in the UAAL.
Peer Comparison	Beaumont Fire currently has one of the highest amortization periods of all defined benefit pension plans in Texas and ranks highest amongst its peer TLFFRA plans (TLFFRA plans with the 11 highest market value of assets).

Metric	Funded ratio (67.53%)
What it measures	The percent of a fund's actuarially accrued liabilities covered by its actuarial value of assets.
Why it is important	The lower the funded ratio, the fewer assets a fund must pay its current and future benefit payments.
Peer Comparison	Beaumont Fire's funded ratio is below the State's average of 72.53%

Metric	UAAL as a percent of payroll (274.69%)
What it measures	The size of a plan's unfunded liability compared to the annual payroll of its active members.
Why it is important	Provides a way to compare plans of various sizes and expresses the outstanding "pension debt" relative to current personnel costs.
Peer comparison	The Fund's UAAL as a percent of payroll is the third highest amongst the 11 largest TLFFRA funds.

Metric	Assumed rate of return (8.00%)
What it measures	The estimated annual rate of return on the Fund's assets.
Why it is important	If actual future returns are lower than the assumed rate of return, future contributions will need to increase significantly, especially for a poorly funded plan. Beaumont Fire's assumed rate of return is 8.00%, while its actual ten-year investment rate of return for the period ending December 31, 2016 was only 3.77%.
Peer comparison	Beaumont Fire is one of five funds with an assumed rate of return in its peer group with an assumed rate of return at 8.00% or above.

Metric	Payroll growth rate (3.50%)
What it measures	The estimated annual growth in the total payroll of active members contributing into the Fund.
Why it is important	Contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Fund's actuarial valuations. Given the Fund's inactive and active liabilities are not fully funded; contributions below expected levels will have serious consequences on the Fund's long-term solvency.
Peer comparison	The Fund's payroll growth rate of 3.50% percent is average for their peer group.

Metric	Actual contributions as a percent of actuarially determined contributions (74.37%)
What it measures	Whether the current employer contributions have met a theoretical minimum threshold. ⁷
Why it is important	The employer's portion of the contribution is less than 75% of the amount needed to fund the Fund on a rolling 30-year amortization period. The PRB's 2014 Study of the Financial Health of Texas Public Retirement Systems found that plans that have consistently received adequate funding are in a better position to meet their long-term obligations.
Peer comparison	This is one of the largest shortfall percentages in the state and the largest in its peer group.

Metric	DROP/PROP as a percent of fiduciary net position (27.95%)
What it measures	The amount of the Fund's assets that are designated for lump-sum payouts to retired members as a percent of its total assets.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)) shows how large a decrease in the Fund's assets could be if most or all DROP participants decided to take their balances out in a short amount of time.
Peer comparison	This is the fifth largest percentage in the state and the second largest in its peer group.

⁷ The theoretical minimum threshold, or actuarially determined contribution (ADC), is a target or recommended contribution "to the plan as determined by the actuary using a contribution allocation procedure," as defined in Actuarial Standards of Practice No 4. If contributions to the plan are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Metric	Non-investment cash flow as a percent of fiduciary net position (-4.27%)
What it measures	Non-investment cash flow shows how much the Fund is receiving through contributions in relation to its outflows: benefit payments, withdrawals and expenses.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)), in conjunction with the funded ratio and recognition of the relative maturity of a plan, provides information about the stability of a plan's funding arrangement.
Peer comparison	Beaumont Fire's non-investment cash flow as a percent of FNP is the lowest in its peer group. If this trend continues, the Fund could face the potential risk of needing to liquidate a portion of existing assets to pay current benefits and/or expenses.

Plan Summary

The Beaumont Firemen's Relief and Retirement Fund ("Beaumont Fire" or "the Fund") was established in 1937 under what is now entitled the Texas Local Fire Fighter's Retirement Act (TLFFRA). TLFFRA provides general guidelines for fund management, but leaves administration, plan design, contributions, and specific investments to the discretion of the board of trustees. Beaumont Fire, as with all TLFFRA systems, is entirely locally-funded.

Benefits

Retirement Eligibility	Age: 50 years; Years of Credited Service (YCS): 20 years
Vesting	Fully vested after 20 YCS
Benefit Formula	63.15% x Final Average Salary + \$123 per month for each year of service in excess of 20
Final Average Salary (FAS)	Highest 36-Month Average Salary
COLA	None
Retirement Benefit Options	<p>5 –Year Retro DROP: Attainment of age 50 and 20 YCS, not to exceed 60 months</p> <p>7 – Year Retro DROP: Attainment of age 55 and 25 YCS, not to exceed 84 months</p> <p>Post Retirement Option Plan (PROP): For Retro DROP balances on or after January 1, 2006 and for all monthly benefits on or after March 1, 2010. Members can elect to defer receipt of their monthly benefit into a PROP account earning interest at a rate 2% below the actuarial assumed rate of return.</p> <p>For firefighters hired on or after January 1, 2017, interest will be credited at an annual rate equal to:</p> <ul style="list-style-type: none"> • 6% if the actual investment return for the previous calendar year is 6% or greater • 4% if the actual investment return is greater than 2% but less than 6% • 2% if actual investment return is 2% or less. <p>Members can keep their benefit in the PROP until age 70-1/2 when the PROP will then be distributed in annual payments over three years.</p>
Social Security	No

Contributions

As of October 1, 2017, active members of Beaumont Fire contribute 15.50% of pay while the City of Beaumont (the City) also contributes 15.50% of pay.

Membership

Total Active Members	Retired Members	Terminated	Total Members	Active-to-Annuitant Ratio
232	217	1	450	1.07

TLFFRA Board Structure

Active Members	3 - Members of the retirement system; elected by fund members. Three-year terms.
Sponsor Government	1 - Mayor or designated representative, or the political subdivision's Chief Operating Officer or designated representative. 1 - Chief Financial Officer of the political subdivision, or designated representative. Terms correspond to term of office.
Taxpayer, Not Affiliated With Fund/Sponsor Govt.	2 - Residents of the State of Texas, must not be officers/employees of the political subdivision; elected by other Board of Trustee members. Two-year terms.

Contribution and Benefit Decision-Making

TLFFRA authorizes members of the retirement systems to determine their contribution rates by voting. The statute requires cities to make contributions at the same rate paid by employees or 12%, whichever is smaller. TLFFRA also allows a city to contribute at a higher rate than employees do through a change in city ordinance.

TLFFRA gives the board the power to make decisions to modify the benefits (increases and reductions). However, a proposed addition or change must be approved by the actuary and a majority of participating plan members. Benefit changes cannot deprive a member, retiree or beneficiary of the right to receive vested accrued benefits.

Historical Trends

To conduct an intensive review of risks associated with the long-term funding of a pension Fund, it is important to analyze trends in multiple metrics. A plan with an asset level lower than its accrued liability has insufficient funds to cover benefits. A plan can experience an increase in unfunded liability due to various factors, including insufficient investment returns, inadequate contributions and inaccurate or overly aggressive assumptions. Hence, a single metric cannot effectively capture the different drivers contributing to the increase of a plan's unfunded pension obligation. This section analyzes historical trends in various metrics identified by the PRB and makes comparisons to understand the sources of growth in unfunded liability for Beaumont Fire.

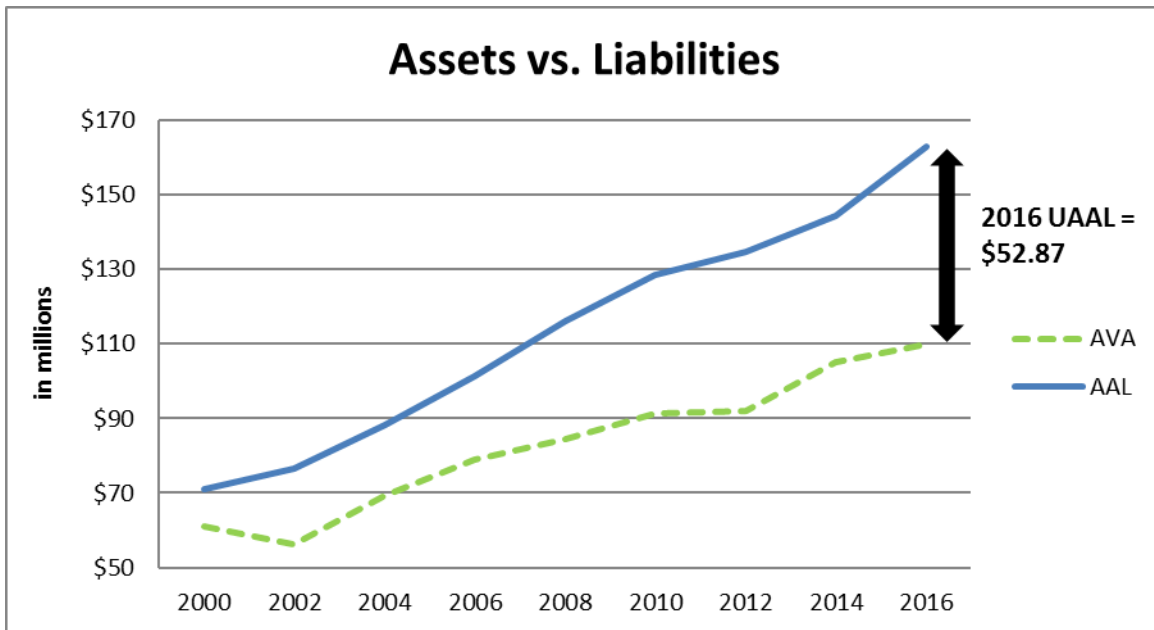
Beaumont Fire's funded status has been steadily declining since 2000. Numerous factors have contributed to this deterioration, including inadequate contributions, investment returns being lower than the chosen

assumption, increased benefit payments, and the inclusion and expansion of PROP accounts accruing interest. The following sections discuss these and other factors in detail.

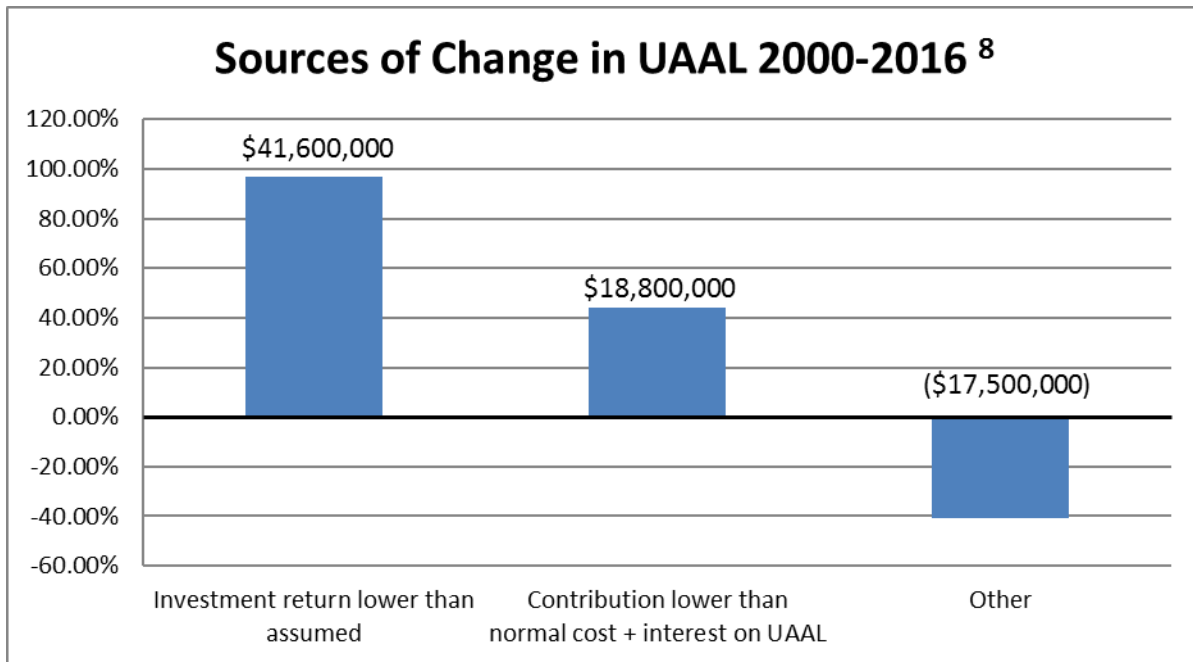
Assets and Liabilities

Funding Trends									
Funded Ratio, Assets, Liabilities and Year over Year Growth									
Fiscal Year (12/31)	2000	2002	2004	2006	2008	2010	2012	2014	2016
Funded Ratio	85.91%	73.67%	78.58%	77.93%	72.65%	71.24%	68.25%	72.72%	67.53%
Am Period (years)	15	32	24	22	34.9	53.6	49.6	39.1	104
UAAL (in millions)	\$9.99	\$20.14	\$18.90	\$22.36	\$31.73	\$36.93	\$42.80	\$39.41	\$52.87
AVA (in millions)	\$60.92	\$56.38	\$69.32	\$78.96	\$84.29	\$91.47	\$92.03	\$105.07	\$109.97
AVA Growth (YoY)	-	-3.80%	10.88%	6.73%	3.32%	4.17%	0.31%	6.85%	2.31%
AAL (in millions)	\$70.91	\$76.52	\$88.22	\$101.32	\$116.02	\$128.40	\$134.84	\$144.48	\$162.84
AAL Growth (YoY)	-	3.88%	7.37%	7.17%	7.01%	5.20%	2.48%	3.51%	6.16%

Beaumont Fire's actuarial accrued liability (AAL) increased by nearly 130% between 2000 and 2016. The Fund's actuarial value of assets (AVA) increased by only 80% over the same period. The Fund was nearly 85% funded in 2000 but fell to just above 67% in 2016.



The graph below illustrates that the increase in the UAAL for the Fund was primarily caused by investment returns being lower than assumed and contributions being less than the ADC since 2000. Investment returns being lower than assumed accounted for over \$41 million in UAAL growth and contributions being below the normal cost and interest on the UAAL accounted for nearly \$19 million in UAAL growth. Other factors such as plan amendments, changes in assumptions and methods, and demographic experiences contributed to a roughly \$17.5 million reduction in the UAAL.



Investment Assumption and Returns

The 10-year net return on investments in 2016 was 3.77%, which is more than 420 basis points below its assumed interest rate. While most plans have been experiencing a difficult 10-year period since the 2008-2009 market downturn, Beaumont Fire's returns are the lowest 10-year average returns reported by its peer group (the 11 largest TLFFRA plans in Texas) over the same period, which is roughly 5.14%. PRB's AV Supplemental Report dated March 1, 2017 showed that out of 91 Texas Funds that reported a 10-year net investment return, Beaumont Fire stood at 69th.

Asset Allocation

As shown in the chart below, the Fund's actual asset allocation is close to its target allocation and within the ranges of the Fund's Investment Policy Statement.

Asset Allocation					
Asset Class	Equities	Fixed Income	Alternatives	Real Estate	Other
Current Allocation	63.03%	22.58%	6.26%	5.31%	2.82%
Target Allocation	62.50%	25.00%	7.50%	5.00%	0.00%

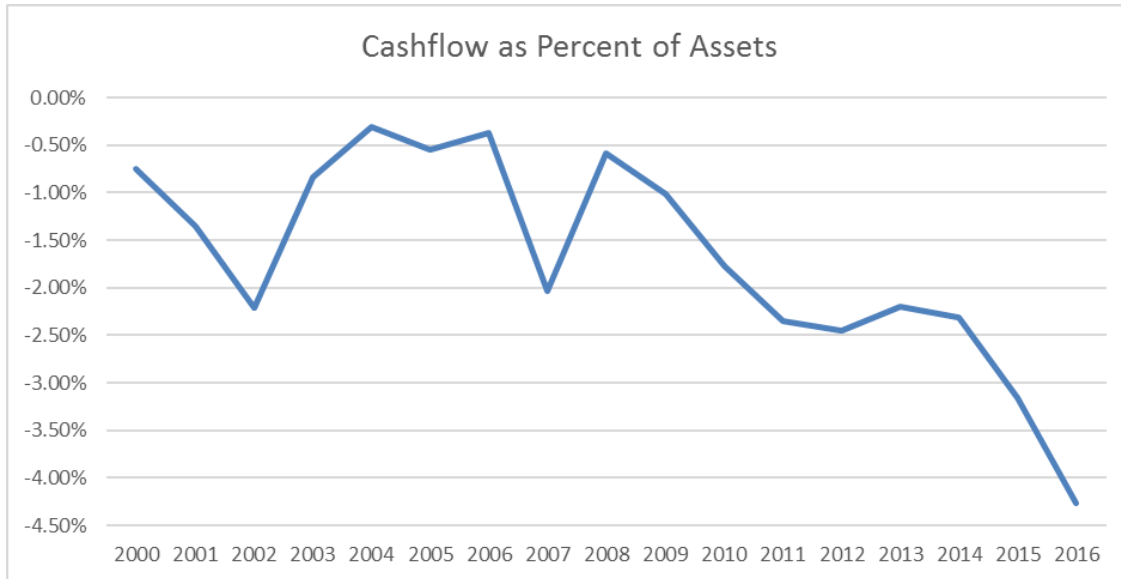
Cash flow

Beaumont Fire has the lowest non-investment cash flow among its peers. In 2016 the Fund's non-investment cash flow dipped to -4.27%, a large drop from before the market downturn in 2008 (-0.58%). The large dips in 2002 and 2007 were due to a decrease in total contributions received and large increases

⁸ The gains in the "Other" category consist of plan amendments, changes in assumptions and methods, and demographic experience. The PRB does not have sufficient detail to outline the exact split between the remaining items.

in total disbursements. Total contributions have grown on average by 2.45% annually since 2000 but are being outpaced by the average growth in yearly benefit disbursements of 4.07%. Total expenses are also the third highest in their peer group as a percentage of the Fund's total assets (0.75%).

A negative non-investment cash flow is not abnormal for mature defined benefit pension plans. However, a cash flow percentage this low is likely to be a drag on potential investment returns because a plan must either invest in a higher proportion of income-producing investments, which traditionally provide lower returns, or must liquidate existing assets to pay out current benefits and/or expenses.



Retroactive DROP and PROP

Beaumont Fire has a 5-year and a 7-year retroactive deferred retirement option plan (Retro DROP) provision that allows members to retroactively end their years of service before their actual retirement date and receive a lump sum payment equal to the total retirement benefits the member would have received plus the amount of contributions the member made into the Fund over that time.

The Fund also offers a post retirement option plan (PROP), which as of 2006 has allowed any member who entered the Retro DROP program to place their accrued Retro DROP Benefit into a PROP account which accrues interest at a rate of 2% less than the Fund's actuarially assumed investment return rate. This was expanded in 2010 to include all accrued benefits for members electing into the PROP account and not just the Retro DROP funds.

The PROP balance as of December 31, 2016 was \$28,627,514, which was a \$26 million increase from 2007's initial balance of \$2,172,699. When the PROP was expanded in 2010 to include all accrued benefits and not just Retro DROP funds, the PROP balance nearly doubled from \$6,930,008 in 2010 to \$12,066,367 in 2011. This PROP balance is 27.95% of the Fund's total net assets.

Peer Group Key Metric Comparison

		Funding Val Metrics						Fiscal Year End Metrics			
Peer Group Plans	MVA	Am Period Date	Am Period	Funded Ratio	UAAL as % of Payroll	Assumed Interest	Payroll Growth	FYE	Actual Cont. as % of ADC	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
Lubbock Fire Pension Fund	\$ 176,016,821	12/31/2016	33.5	72.63%	240.47%	7.75%	4.00%	12/31/2016	100.00%	N/A	-3.63%
Irving Firemen's Relief & Retirement Fund	\$ 174,037,587	12/31/2015	33.0	74.92%	228.54%	8.25%	4.25%	12/31/2016	82.33%	29.63%	-1.24%
Amarillo Firemen's Relief & Retirement Fund	\$ 144,657,881	12/31/2015	34.5	81.82%	172.47%	8.00%	4.00%	12/31/2016	93.92%	N/A	-3.76%
Corpus Christi Fire Fighters' Retirement System	\$ 133,901,631	12/31/2016	23.1	62.14%	265.57%	7.75%	3.50%	12/31/2016	100.00%	N/A	-3.04%
Laredo Firefighters Retirement System	\$ 126,305,204	9/30/2016	28.0	59.28%	263.00%	7.90%	3.25%	9/30/2016	100.17%	N/A	1.58%
Beaumont Firemen's Relief & Retirement Fund	\$ 102,435,664	12/31/2016	104.0	67.53%	274.69%	8.00%	3.50%	12/31/2016	74.37%	27.95%	-4.27%
Midland Firemen's Relief & Retirement Fund	\$ 80,942,385	12/31/2015	44.7	65.78%	264.77%	8.00%	4.50%	12/31/2016	89.77%	0.32%	-2.44%
Denton Firemen's Relief & Retirement Fund	\$ 67,976,717	12/31/2015	31.6	80.82%	115.26%	6.75%	3.00%	12/31/2016	94.99%	N/A	0.42%
Tyler Firemen's Relief & Retirement Fund	\$ 59,949,406	12/31/2015	21.6	75.87%	178.30%	7.65%	3.50%	12/31/2016	106.92%	N/A	-4.21%
San Angelo Firemen's Relief & Retirement Fund	\$ 58,272,932	12/31/2015	38.5	65.65%	280.71%	7.90%	3.50%	12/31/2016	85.40%	N/A	-4.19%
Abilene Firemen's Relief & Retirement Fund	\$ 52,343,510	10/1/2015	31.5	56.60%	316.19%	8.00%	4.00%	9/30/2016	97.77%	N/A	-3.35%

Peer Group Sponsor Funding Comparison

Peer Group Plans	GF Expend	EOY GF Bal	UAAL	Expected Employer Contributions	ADC	30-yr Shortfall	30-Y SF % of ADC	30-Y SF % of GFE
Lubbock Fire Pension Fund	\$ 162,139,351	\$ 35,673,526	\$ 73,353,115	\$ 6,652,807	\$ 6,878,532	\$ 225,725	3.28%	0.14%
Irving Firemen's Relief & Retirement Fund	\$ 216,852,808	\$ 57,666,475	\$ 61,873,333	\$ 4,534,842	\$ 5,146,707	\$ 611,865	11.89%	0.28%
Amarillo Firemen's Relief & Retirement Fund	\$ 157,909,148	\$ 48,079,850	\$ 33,128,756	\$ 3,759,167	\$ 3,884,024	\$ 124,857	3.21%	0.08%
Corpus Christi Fire Fighters' Retirement System	\$ 218,749,071	\$ 41,873,537	\$ 85,995,868	\$ 6,728,823	\$ 6,728,823	\$ -	0.00%	0.00%
Laredo Firefighters Retirement System	\$ 173,176,192	\$ 42,167,732	\$ 87,733,185	\$ 7,047,691	\$ 7,861,156	\$ 813,465	10.35%	0.47%
Beaumont Firemen's Relief & Retirement Fund	\$ 115,988,300	\$ 26,709,699	\$ 52,869,076	\$ 2,911,034	\$ 3,882,020	\$ 970,986	25.01%	0.84%
Midland Firemen's Relief & Retirement Fund	\$ 116,701,277	\$ 62,991,568	\$ 44,243,979	\$ 3,795,617	\$ 4,176,888	\$ 381,271	9.13%	0.33%
Denton Firemen's Relief & Retirement Fund	\$ 97,686,459	\$ 28,169,848	\$ 17,249,607	\$ 2,319,631	\$ 2,743,151	\$ 423,520	15.44%	0.43%
Tyler Firemen's Relief & Retirement Fund	\$ 66,287,413	\$ 14,908,722	\$ 20,639,623	\$ 2,257,337	\$ 2,257,337	\$ -	0.00%	0.00%
San Angelo Firemen's Relief & Retirement Fund	\$ 72,209,393	\$ 38,842,353	\$ 32,163,039	\$ 2,314,444	\$ 2,714,316	\$ 399,872	14.73%	0.55%
Abilene Firemen's Relief & Retirement Fund	\$ 81,777,971	\$ 26,458,762	\$ 43,412,430	\$ 2,642,987	\$ 2,703,398	\$ 60,411	2.23%	0.07%

Peer Group Expense Comparison

Peer Group Plans	10 yr. return (Net)	Active/ Annuitants	Average Benefit	NPL	Admin Expenses	Investment Expenses	Other Expenses	Total Expenses	Exp as % of Assets
Lubbock Fire Pension Fund	4.39%	1.39	\$ 54,610	\$ 90,715,999	\$ 322,882	\$ 651,091	\$ -	\$ 973,973	0.55%
Irving Firemen's Relief & Retirement Fund	5.28%	2	\$ 50,297	\$ 76,692,304	\$ 76,887	\$ 1,391,083	\$ 35,044	\$ 1,503,014	0.81%
Amarillo Firemen's Relief & Retirement Fund	6.80%	1.26	\$ 53,329	\$ 37,044,636	\$ 80,849	\$ 388,013	\$ -	\$ 468,862	0.31%
Corpus Christi Fire Fighters' Retirement System	5.53%	1.35	\$ 44,113	\$ 91,671,329	\$ 257,440	\$ 456,800	\$ -	\$ 714,240	0.53%
Laredo Firefighters Retirement System	4.33%	2.24	\$ 55,268	\$ 93,600,365	\$ 209,946	\$ 340,343	\$ -	\$ 550,289	0.44%
Beaumont Firemen's Relief & Retirement Fund	3.77%	1.07	\$ 41,483	\$ 91,716,980	\$ 479,503	\$ 292,841	\$ -	\$ 772,344	0.75%
Midland Firemen's Relief & Retirement Fund	3.88%	1.28	\$ 42,246	\$ 57,751,765	\$ 139,980	\$ 631,166	\$ 111,641	\$ 882,787	1.07%
Denton Firemen's Relief & Retirement Fund	6.52%	2.15	\$ 50,235	\$ 19,593,428	\$ 94,175	\$ 80,181	\$ -	\$ 174,356	0.23%
Tyler Firemen's Relief & Retirement Fund	4.77%	1.55	\$ 59,999	\$ 25,419,271	\$ 54,206	\$ 128,637	\$ -	\$ 182,843	0.29%
San Angelo Firemen's Relief & Retirement Fund	6.34%	1.20	\$ 41,084	\$ 41,242,389	\$ 55,543	\$ 239,681	\$ 19,648	\$ 314,872	0.52%
Abilene Firemen's Relief & Retirement Fund	4.96%	0.99	\$ 33,920	\$ 49,270,713	\$ 40,529	\$ 196,829	\$ -	\$ 237,358	0.43%

Comments from Beaumont Firemen's Relief and Retirement Fund

April 19, 2018

Mrs. Michelle Kranes
Texas Pension Review Board
P O Box 13498
Austin, TX 78711-3498

Dear Mrs. Kranes,

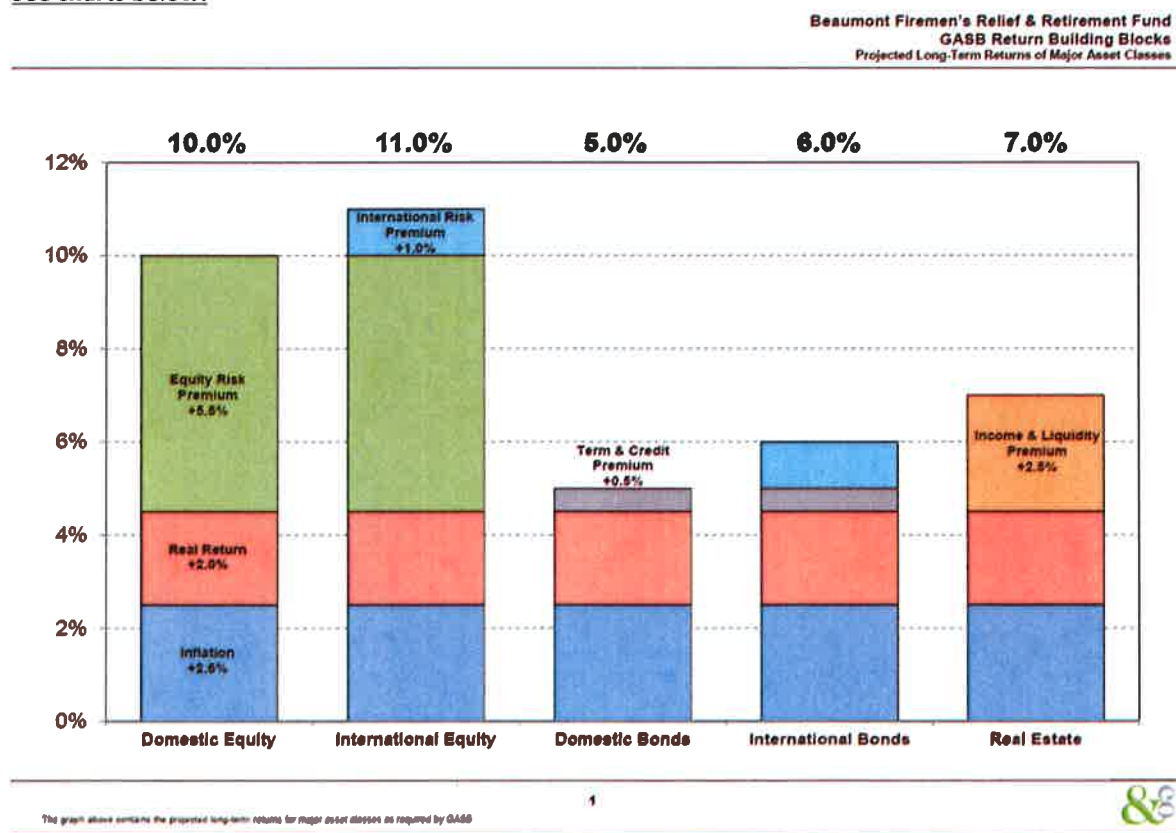
Thank you for providing your preliminary draft of the Actuarial Review of the Beaumont Firemen's Relief and Retirement Fund. The Fund's Board of Trustees (the "Board") wishes to provide a response to the main risk factors presented in the review. The Officers on the Board, the City's Chief Financial Officer Todd A. Simoneaux, CPA, the Fund's Actuary, Brad Heinrichs, the Fund's Attorney, Chuck Campbell, and the Fund's consultant, Jack Evatt will attend the meeting on April 24, 2018.

In the Executive Summary, three (3) main risk factors are presented:

Asset Liability Mismatch (Liquidity)

- a guaranteed 6.00% annual rate of return for the PROP
the annual rate of return is defined as 2.0% less than the actuarial investment return assumption.
The fund's investment assumption rate has been set at 8.00% and is supported by the fund's asset allocations and rates of returns

See charts below:



Beaumont Firemen's Relief & Retirement Fund
Asset Allocation History
As of December 31, 2017

Asset Allocation Attributes	Dec-2017		Dec-2016		Dec-2015		Dec-2014		Dec-2013		Dec-2012	
	(\$)	%	(\$)	%	(\$)	%	(\$)	%	(\$)	%	(\$)	%
Total Equity	76,536,760	66.43	65,193,026	63.81	66,906,068	69.89	61,637,811	59.87	60,871,738	66.75	48,987,817	51.28
Total Domestic Equity	59,757,670	51.87	52,404,860	51.29	46,020,416	46.79	47,589,737	46.23	38,857,306	38.13	28,710,624	31.33
Total International Equity	16,778,090	14.56	12,788,166	12.52	12,884,651	13.10	14,048,074	13.65	21,014,432	20.62	18,277,193	18.95
Total Fixed Income	24,251,955	21.05	24,077,275	23.57	27,784,879	28.25	31,827,075	30.72	33,239,283	32.82	38,140,980	41.82
Total Domestic Fixed Income	18,742,536	16.27	18,532,944	18.14	18,508,567	18.82	19,613,113	19.05	13,806,349	13.55	17,703,231	19.32
Total International Fixed Income	5,509,419	4.78	5,544,331	5.43	9,276,312	9.43	12,013,962	11.67	19,432,934	19.07	20,437,749	22.30
Total Alternative	7,916,141	6.87	6,114,056	5.98	6,017,529	5.10	5,149,812	5.00	3,984,844	3.91	4,314,087	4.71
Total Private Equity	13,239	0.01	319,417	0.31	330,261	0.34	637,333	0.62	1,273,486	1.26	2,146,234	2.24
Total Real Estate	5,942,128	5.16	5,840,098	5.72	6,789,333	5.99	3,615,757	3.51	3,414,665	3.35	-	0.00
Total Cash	657,226	0.48	627,519	0.61	527,780	0.54	277,539	0.27	121,760	0.12	48,849	0.05
Total Fund	115,216,448	100.00	102,171,393	100.00	98,353,850	100.00	102,845,327	100.00	101,905,776	100.00	91,637,947	100.00



- virtually unlimited amount of time to accrue this guaranteed return; and

8. If a PROP participant still has an account balance at the end of the calendar year in which he or she attains age 70 ½, then the following steps must be taken in order for the Fund and the participant to comply with Section 401(a)(9) of the Internal Revenue Code (IRC) and its minimum distribution requirements ("RMD requirements"):

By February 1st of the year following the year of attaining age 70 ½, the

- (a) Participant must file with the Fund's administrative office a new Distribution Form that is **irrevocable** and provides for a specific payment amount to be made in quarterly or annual installments that satisfies the RMD requirements. The participant may consult with the Fund administrative staff prior to filing the Distribution Form to determine what minimum amount is necessary to satisfy the RMD requirements and is encouraged to consult his or her personal tax or financial advisor as to the election. ***The Fund (including a Member of the Board or staff) will not provide under any circumstances tax or financial advice to a participant as to this irrevocable payment election.***
- (b) Once payments under the Distribution Form filed in (a) above have commenced, a participant can only take a different or additional distribution if (A) a participant

requests a distribution of his entire remaining PROP balance or (B) a participant requests an unforeseeable emergency distribution as provided in Section E. A distribution for an unforeseeable emergency will not change the election made by participant, but will be a separate one-time distribution in an amount necessary to satisfy the emergency.

- the ability to withdraw these funds with little to no restriction

A PROP participant may request to receive his/her entire account balance at any time, subject to certain restrictions which is payable the last day of the month following the month the written request is received by the pension office. In addition, a participant may request a partial payment from his/her account balance up to four times a year. To request a payment, either entire or partial, the PROP participant must file, a completed Distribution Form with Fund's administrative office 30 days prior to quarterly payment dates, which is the last day of March, June, September, and December with the requested amount.

The Chart below will hopefully address the issue of Liquidity.

Beaumont Firemen's Relief and Retirement Fund
Data as of March 31, 2018

Liquidity Analysis

Asset Allocation		
Manager/Strategy	Assets	% Plan
- Cash (mutual funds)	372,648	0.3%
- Cash (private equity)	214,909	0.2%
Total (Cash)	587,557	0.5%
- Vanguard Institutional Index (VINXXX)	15,300,733	13.5%
- Orleans Capital Fixed Income	12,178,254	11.6%
- Vanguard Russell 1000 Growth Fund (VRGWZ)	11,445,123	10.1%
- American Funds EuroPacific Growth Fund (REROX)	10,252,350	9.1%
- Cornerstone Small Cap Growth	8,448,617	7.5%
- WCM Focused Int'l Growth Fund (WCMGX)	6,746,866	6.0%
- Vanguard Extended Market Index Fund (VIEGX)	6,277,792	5.5%
- Wisdom Blue Small Cap Value	5,829,872	5.1%
- Westwood Income Opportunity Fund (WHGDX)	5,807,829	5.1%
- Delaware Large Cap Value	5,210,500	4.7%
- Hibbsack Fixed Income	5,219,486	4.6%
- DRZ Large Cap Value	5,215,234	4.6%
- Loomis Sayles Global Bond Fund (LSGBX)	2,891,813	2.6%
- Legg Mason Global Opp. Bond Fund (GOBDX)	2,765,222	2.4%
Total (Liquid)	104,691,719	92.5%
- American Core Realty Fund	5,665,875	5.0%
Total (Short-term Illiquid)	5,665,875	5.0%
- LBC Credit Partners IV	1,916,797	1.7%
- Beaumont Office Buildings	332,370	0.3%
- Franchise Equity III	13,239	0.0%
Total (Long-term Illiquid)	2,262,406	2.0%
Total	112,207,557	100%

Governance

The Board is comprised of three fire fighters, two city trustees, and two civilian trustees. The sponsor is represented by the two city trustees. The Board has and continues to exhibit governance to lower the unfunded

liability to the Fund. Recent examples that address the listed risk factors include, a meeting in March of 2012, the Board held a meeting that included the Mayor, the City Manager and Executive Officers of Local #399. The meeting was to inform the sponsor (City of Beaumont) and Labor Union (IAFF Local #399) of the results of the recent actuarial valuation. These parties are responsible for the negotiations of Beaumont Fire/Rescue Department's CBA (Collective Bargaining Agreement). The Beaumont Fireman's Relief and Retirement Fund Contribution rates are set in this CBA. The result of the meeting helped to increase the City's contributions percentages from 13% to 15%. In 2017 the contribution percentages were again raised to 15.5%. Also, in 2016 the Plan was amended to change the PROP interest rate for all new hires on or after January 1, 2017 and would be based on the actual investment return of the Fund. This was recommended by the Fund's Actuarial Firm to reduce the potential volatility of investment returns. Changes were also made to disability standards and the initial disability period.

The Fund's Benefit policy is covered in the Plan document on page 25, section I. Below is partial content of section I.

Future Increases- Future pensioner benefit increases will be based on the financial condition of the fund as determined by the fund's actuary in future actuarial valuations. The procedure for providing future pensioner increases is not a vested right by any current retiree or beneficiary or by any firefighter who becomes eligible for a benefit after December 1, 2001. It is applicable for both current and future pensioners. It can be removed from the plan or changed in the future by election of the firefighters and approval by the Board of Trustees and the fund's actuary. If this procedure is removed in the future, it will be removed on a prospective basis only and the removal would not apply to increases applicable under this section that would be effective on the

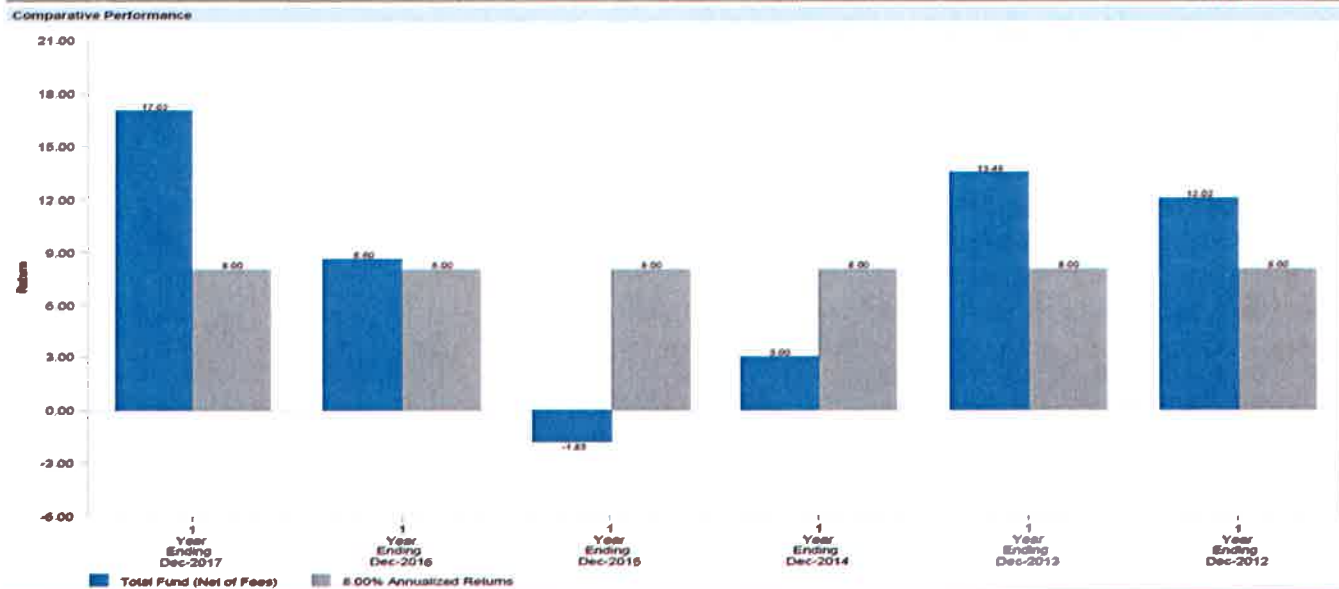
same effective date as the amendment removing the procedure. Unless this procedure is removed from the plan provisions in the future, the Board of Trustees and the Beaumont firefighters will not have the authority to disapprove benefit increases for all pensioners. However, the Board of Trustees will have discretion in determining the type of pensioner increase, the minimum monthly benefit payable to pensioners and any exclusion of types or groups of pensioners (but not the exclusion of pensioners on an individual basis). The procedure for determining future pensioner increases is as follows:

- a. The fund's actuary will determine whether the fund has had "Good Experience", i.e., whether the financial condition of the fund permits benefit improvements to be made to the plan. In making this determination, the actuary will make all appropriate changes in actuarial assumptions, actuarial cost methods, actuarial value of assets method and other technical changes. This determination will also be based on existing plan provisions. This determination will also be before the result of a recent increase in the firefighters' contribution rate when the recent increase was not recognized by the actuary in a prior actuarial study. Generally, the actuary will determine the maximum number of years that the amortization period of the unfunded actuarial accrued liability can be increased for benefit and eligibility changes of any type.

Funding Risk:

Investment Experience (6 Years 8.715%) (5 Years 8.054%)

City of Beaumont Firemen's Relief & Retirement Fund
Comparative Performance
As of December 31, 2017



The Board and the City will soon be in the process of actuarial audit that will follow Texas Government Code, Section 802.1012 which describes the requirements for actuarial audits. This along with a new Actuarial Valuation of the Fund for 2018 will give the Board the needed information to approach the two parties responsible for the Fund's contribution rates. The Fund will most likely follow the same process as in 2012, to inform the sponsor and Labor Union of the results of the actuarial valuation and hopefully influence the need of a rate increase for the 2020 CBA.

Thank you for considering this response. We look forward to meeting the PRB Actuarial Committee and are hopeful to answer and address the questions and concerns of the committee.

Please contact the Fund if you need any clarification regarding this response.

Sincerely,

Brian Hebert
Chairman
Beaumont Fireman's Relief and Retirement Fund

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX A4 – INTENSIVE ACTUARIAL REVIEW – MARSHALL FIREMEN'S RELIEF AND RETIREMENT FUND

Intensive Actuarial Review:

Marshall Firemen's Relief and Retirement Fund

April 2018



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Executive Summary

Introduction

This intensive actuarial review of Marshall Firemen's Relief and Retirement Fund ("Marshall Fire" or "the Fund") is intended to assist the Fund's board of trustees and the City of Marshall ("the City") in assessing the Fund's ability to meet its long-term pension obligation. Overall, the review shows the Fund is facing significant financial stress and is taking considerable risks in its approach to funding. The Pension Review Board encourages the Fund and the City to review the findings and conclusions of this report carefully and jointly adopt a forward-looking plan to address these risks and guide the Fund towards a path of long-term sustainability. The Pension Review Board can provide technical assistance in formulating such a plan.

Overview

Marshall Fire's unfunded actuarially accrued liability (UAAL or "unfunded liability") increased from \$4.5 million in 2002 to \$10.6 million by the end of 2016, and the Fund has routinely maintained an asset-to-liability ratio less than 50%. This chronic underfunding can be primarily attributed to actual investment returns consistently being lower than the assumed investment return and regularly contributing less than the annual benefit accrual plus growth of existing unfunded benefits. At current contribution rates and benefit levels, the unfunded liability can be expected to continue to grow and the funded status to continue to languish. Constantly underfunding a plan places the benefits of both retirees and active members at significant risk and/or places the burden of paying for services already rendered on future generations of taxpayers and employees through the reduction of future benefits or an increase in contributions. Marshall Fire and the City have made incremental contribution increases since 2006, but these changes have not been enough to put the fund on a solid path to sustainability. Marshall Fire and the City have yet to make difficult decisions on additional needed changes to benefit or contribution levels.

Conclusion

Marshall Fire should consider the following actions to help ensure financial stability and mitigate the risks that lead to underfunding: ensuring contributions are adequate to fully fund Marshall Fire over a reasonable period; developing formal policies to guide decision-makers under different economic conditions; reviewing actuarial assumptions against actual experience and making necessary changes; and monitoring investment performance and evaluating asset allocation decisions on a forward-looking basis.

In addition, plans and their sponsors can develop policies that proactively manage risk in the future by laying out a formal risk-sharing plan. Funding and benefit policies can be adopted that provide a framework for how benefit and contribution levels may be modified under different conditions. An advantage of such policies is that changes to plan benefits and costs are known and understood by all parties in advance, rather than negotiated under difficult circumstances. Marshall Fire in conjunction with the City should utilize the funding soundness restoration plan requirement to develop such a long-term funding policy.

Background

Texas Government Code Section 801.202(2) requires the Pension Review Board (PRB) to conduct intensive studies of potential or existing problems that threaten the actuarial soundness of or inhibit an equitable distribution of benefits in one or more public retirement systems. The PRB identified the following key metrics, in addition to amortization period, to determine and prioritize retirement systems for intensive actuarial review. The PRB selected Marshall Firemen's Relief and Retirement Fund ("Marshall Fire" or "the Fund") for review based on the 2016 actuarial valuation data shown below. Unless otherwise noted, the following metrics were reported or calculated as of December 31, 2016.

Amort. Period (Years)	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC ¹	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
56.4	42.02	398.51%	7.75%	4.00%	78.11%	3.99%	-5.50%

Contribution, DROP and cash flow data are from the Fund's 12/31/2016 financial audit.

Plan Profile

Actuarial Accrued Liability: \$18,353,876

Market Value of Assets: \$7,712,228

Normal Cost: 16.39% of payroll

Contributions: 14.0% employee
19.05% employer

Membership: 49 active
47 annuitants

Social Security Participation: No

At the time the Fund was selected for review:

- Its funded ratio was the second lowest of all defined benefit pension plans in Texas.
- Its amortization period was the fifth highest finite period of all defined benefit pension plans in Texas.
- Its unfunded actuarial accrued liability (UAAL or "unfunded liability") as a percent of payroll was the second highest among Texas Local Fire Fighter Retirement Act (TLFFRA) plans with assets of less than \$12 million and the fifth highest of all defined benefit pension plans in Texas.
- Actual contribution as a percent of its actuarially determined contribution (ADC) was the second lowest among TLFFRA plans with assets of less than \$12 million.
- Its non-investment cash flow as a percent of assets was the 12th lowest of all defined benefit pension plans in Texas.
- Its assumed rate of return was 7.75%, but the Fund reported to the PRB in February 2018 that it has since been lowered to 7.50%.

¹ For plans whose contributions are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Risk Analysis

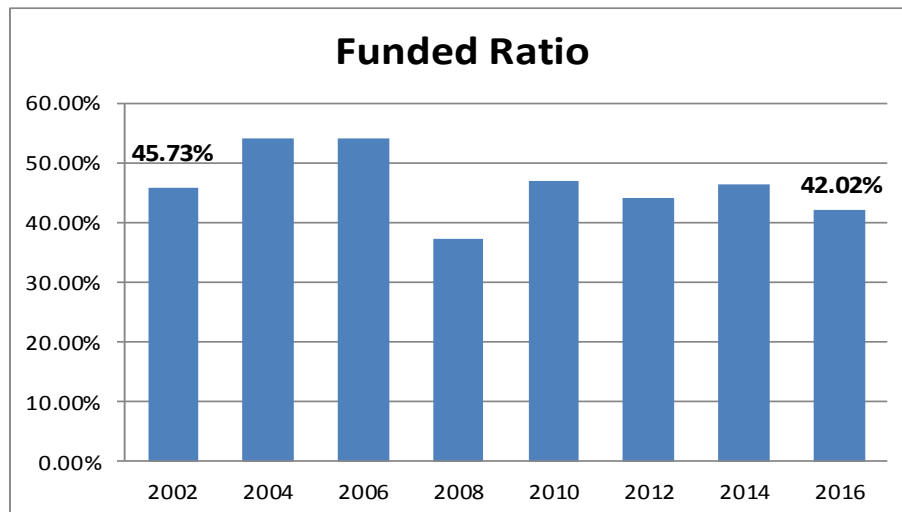
The various risks faced by a pension fund all boil down to one relatively simple question, "Will there be enough money to pay benefits when due?" This section discusses two main risk factors facing the Fund: governance and funding risks. Measuring Marshall Fire based on these factors reveals a significant amount of risk being taken in each of these areas, increasing the probability of a continued period of severe financial stress for the Fund. This also raises the likelihood of deteriorating funding conditions in the coming years, further imperiling the Fund's ability to pay promised benefits.

Funding Risk

Marshall Fire's significant growth in unfunded liability, which increased from \$4.5 million in 2002 to \$10.6 million by the end of 2016, can be attributed to many factors including: actual returns consistently lower than the assumed investment return; contributions consistently lower than the annual benefit accrual plus growth of existing unfunded benefits; and adjustments to the fund's assumptions.

Background

According to Marshall Fire's December 31, 2016 actuarial valuation, it was 42% funded on an actuarial basis, and according to reports filed with the PRB, it has not had a funded ratio above 55% for at least the past 15 years.



For a plan's funding level to improve, its assets should grow faster than liabilities, which can be achieved by three key levers: contribution increases, benefit reductions to lower cost, and/or consistently high investment returns over a long period of time.

Fixed-Rate Funding Model and Contribution Insufficiency Risk

Most Texas plans use a fixed percent of pay funding approach. This is especially true for plans governed by the TLFFRA statute. Under a fixed-rate funding structure, no formal amortization policy (i.e. the expected time to fully fund the plan) exists; therefore, the plan's actuary estimates the amortization

period at each valuation date based on the current financial condition of the plan and the current contribution rates.

The nature of a fixed-rate, percent-of-pay contribution policy may exacerbate this risk over the long-term because:

- 1) Contributions to percent-of-pay plans are inherently back-loaded because the expected contributions to a percent-of-pay plan grow on a nominal basis at the assumed rate of total payroll growth.
- 2) Fixed-rate plans provide budgetary stability for the employer in the short term, but do not include any inherent mechanisms for reacting to changes in a plan's financial condition.

Currently, active members of the Fund contribute 14.00% and the City contributes 19.05% of pay. This reflects an increase in the active members' and multiple increases in the City's contribution rate over the past 15 years. Despite these increases, during this period the Fund's unfunded liability increased by \$6.1 million. This increase in the UAAL was caused by total contributions that were not sufficient to cover the cost of both the new benefits being accrued (normal cost) and the interest accumulated on the unfunded benefits already earned (amortization payment), or to start reducing the total UAAL. This resulted in *negative amortization* because contributions were not sufficient or large enough to cover the interest that accrues on the unfunded liability or pay down the unfunded liability during the year. In part, this can be attributed to the lack of a written funding policy and the nature of contributions that are a fixed-rate of pay set through statute or negotiation.

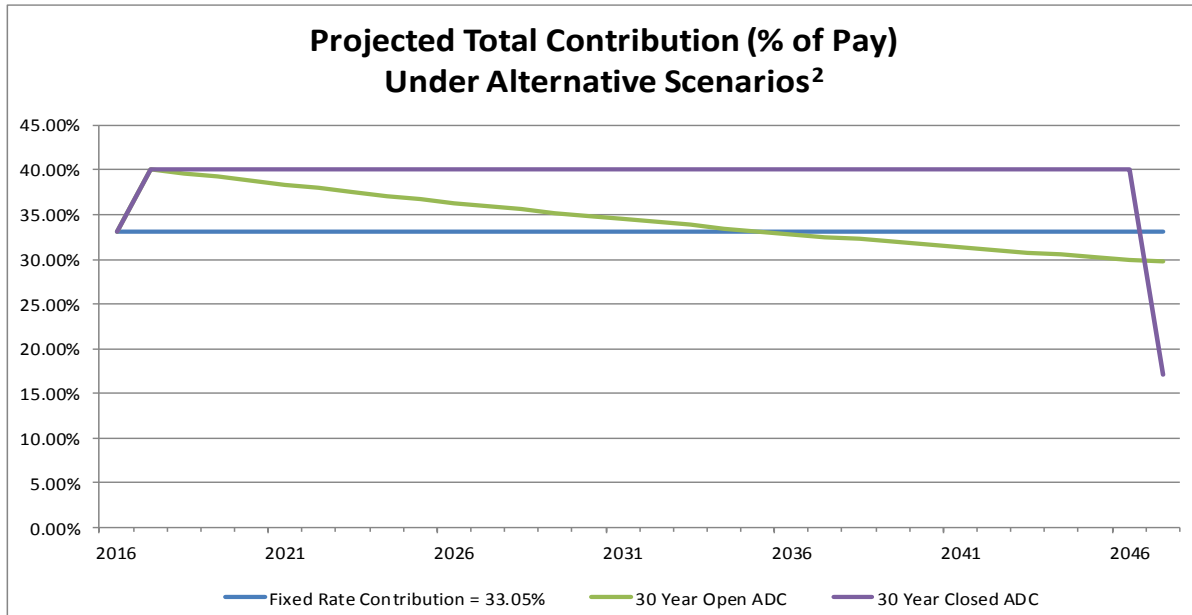
According to its actuarial valuations, Marshall Fire has not received the reported ADC in any year since 2002, with the exceptions of 2006 and 2010. Even with contribution increases in 2006, 2010, and 2012, employer contributions have averaged less than 90% of the Fund's ADC over that period. Furthermore, the reported ADC is calculated using an open amortization period that results in perpetual negative amortization. If the fund were to use this ADC as a funding policy, the UAAL would grow indefinitely and the "pension debt" would never be paid off.

For the fiscal year ending December 31, 2016, the expected contributions were about 78% of the reported ADC. This shortfall of \$142,596 is equal to 0.70% of the City's total General Fund expenditures for the fiscal year ending December 31, 2016 and is the highest among TLFFRA plans of similar size.

Contribution Levels vs. Actuarially Determined Contribution								
Date (12/31)	2002	2004	2006	2008	2010	2012	2014	2016
Employee Contribution	12.00%	12.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%
Employer Contribution	14.00%	14.00%	16.00%	16.00%	18.69%	19.05%	19.05%	19.05%
Employer 30-Year ADC	18.27%	16.20%	13.69%	20.91%	18.30%	21.51%	22.50%	24.39%
% of ADC funded	76.63%	86.42%	116.87%	76.52%	102.13%	88.56%	84.67%	78.11%
Covered Payroll (in thousands)	\$1,581	\$1,617	\$1,916	\$2,064	\$2,218	\$2,399	\$2,466	\$2,670
Contribution Shortfall (in thousands)	\$68	\$36	-	\$101	-	\$59	\$85	\$143

The projection below illustrates the expected total contributions (both employer and employee) under 3 contribution scenarios. The scenarios are 1) maintaining the current fixed contribution rates; 2) adopting a funding policy that utilizes a 30-year open amortization approach; and 3) adopting a funding policy

that utilizes a single-layer 30-year closed amortization approach (i.e. will fully fund the plan in 30 years). As illustrated here, the Fund's current fixed contribution structure under Scenario 1 is not sufficient to pay down the unfunded liability and in fact allows the UAAL to continue to grow, resulting in negative amortization.



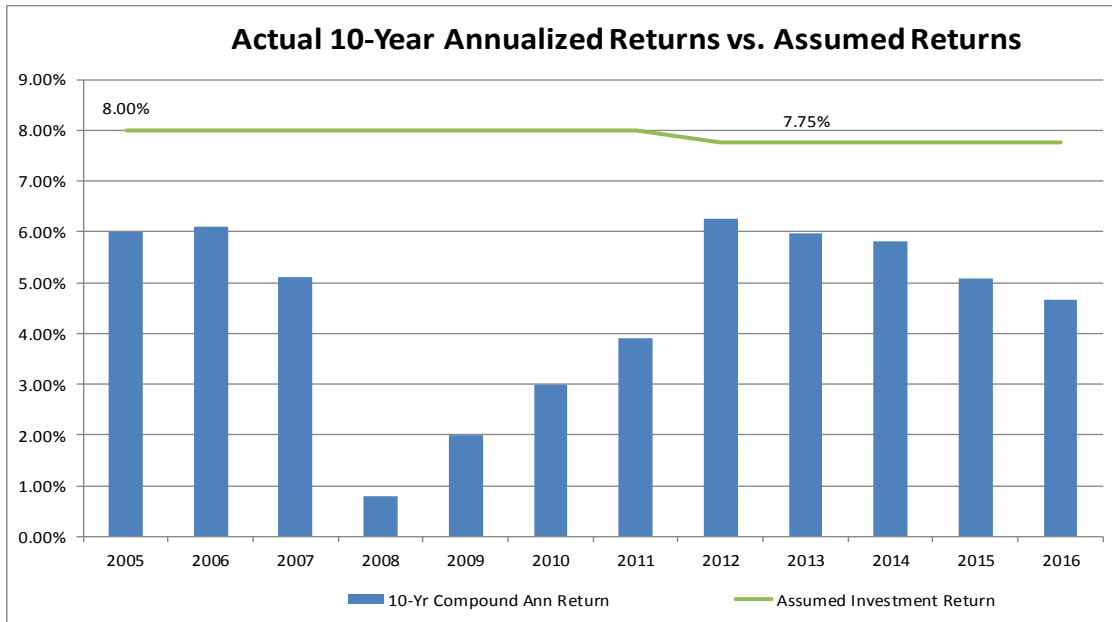
Benefit Adjustments

Benefit changes can be utilized as another lever by public pension plans to reduce cost and address a prolonged, low funding level. Marshall Fire has not made any benefit changes for current or future members of the fund to address its chronic funding shortfall. To the contrary, in 2007 the Fund gave a one-time 3% cost of living adjustment to retirees and 2% to beneficiaries, which may have contributed to the increase in the unfunded liability in the 2007–2008 period.

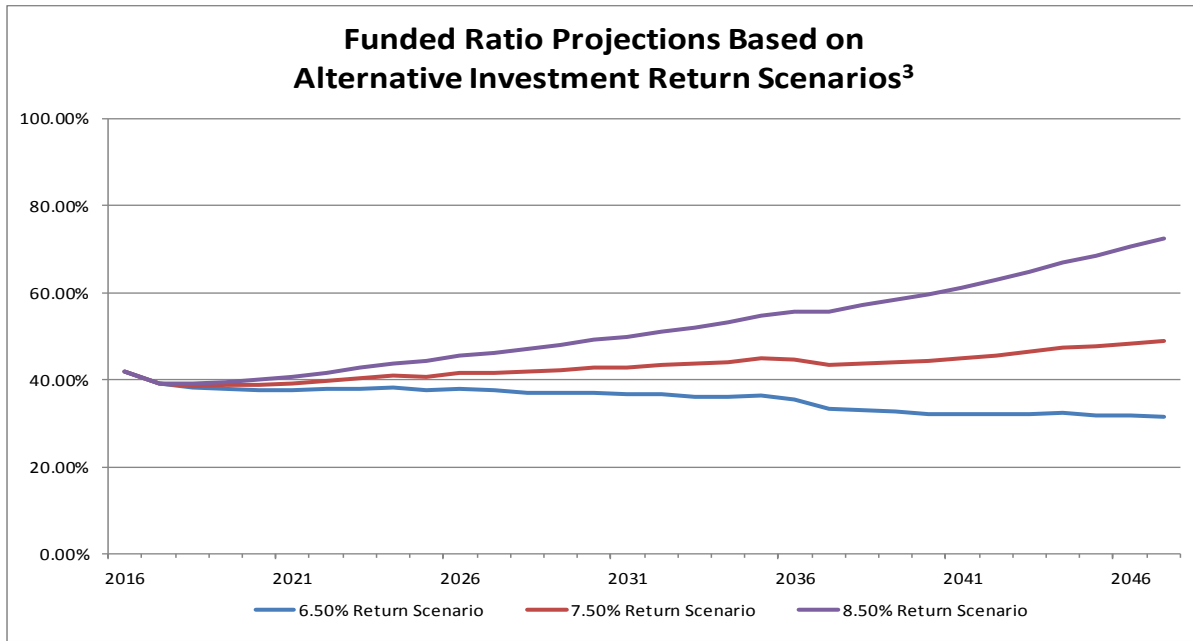
Investment Experience Compared with Investment Return Assumption

For Marshall Fire, actual investment returns lower than the assumed investment return increased the UAAL by more than \$2.1 million between 2006 and 2016. As illustrated below, the Fund has not achieved a 7.75% annualized return over a consecutive 10-year period in any of the 12 periods ending December 31, 2005 through December 31, 2016.

² The updated assumed rate of return of 7.50% was used for this projection. All other current and projected assets and liabilities reflect the actuarial accrued liabilities, actuarial value of assets, plan provisions, and actuarial assumptions and methods as reported in the 12/31/2016 Actuarial Valuation prepared by Retirement Horizons Incorporated.



The graph below projects the funded ratio for the next 30 years, assuming the member and the City contribution rates remain at a fixed 14.00% and 19.05% respectively, and the investments return 6.50%, 7.50%, or 8.50%. The impact of consistently earning less than the expected return on assets (EROA) but *even as high as 6.50% over the next 30 years*, results in the funded status sinking to 31%. Earning 8.50% over the next 30 years would put Marshall Fire at 82% funded. However, based on the current asset allocation, the PRB estimates the probability of earning less than or equal to a 6.50% annualized return is approximately twice as likely as achieving an 8.50% or greater annualized return over the next 30-year period.



Conclusion/Recommendations

Pre-funding a defined benefit plan, i.e. setting aside assets now for benefits that will be paid in the future, is necessary to help balance the three primary policy goals of benefit security, equity between generations of taxpayers and employees, and a stable contribution from year to year. Consistently underfunding a plan places the benefits of both retirees and active members at significant risk and/or places the burden of paying for services already rendered on future generations of taxpayers and employees through the reduction of future benefits or an increase in contributions.

In the absence of a formal, written funding and risk-sharing policy, the result is a de facto risk-sharing arrangement that is simply a reaction to events, often well after the plan finds itself with financial difficulties. Plans and their sponsors can take many actions to ensure financial stability and mitigate the risks that lead to underfunding. These steps include ensuring contributions are adequate to fully fund the plan over a reasonable period; developing formal policies to guide decision-makers under different economic conditions; reviewing actuarial assumptions against actual experience and making necessary changes; and monitoring investment performance and evaluating asset allocation decisions on a forward-looking basis.

Adequate Funding. To address these concerns, a strong funding policy that requires payment of an ADC is encouraged. Numerous actuarial methods can be utilized to help mitigate contribution volatility, including directly smoothing contribution rates or adding “guardrails” that require the stakeholders to come back to the table if the contribution rate falls outside a specified range. If funding according to an

³ The updated assumed rate of return is 7.50% was used for this projection. All other current and projected assets and liabilities reflect the actuarial accrued liabilities, actuarial value of assets, plan provisions, and actuarial assumptions and methods as reported in the 12/31/2016 Actuarial Valuation prepared by Retirement Horizons Incorporated.

ADC is not adopted, a funding policy that fully funds the plan over a finite period, such as 30 years, is recommended.

Actuarial Assumptions. Public pension plans must monitor actuarial assumptions continually through their actuarial valuations and make appropriate adjustments to mitigate bias in the assumptions that result in consistent actuarial gains or losses. Actuarial gains and losses occur when the plan's actual experience does not match expected experience. Over time, without required changes, pension funds such as Marshall Fire whose assumptions consistently diverge from actual experience in the same direction (i.e. consistently seeing actuarial gains or consistently seeing actuarial losses) can exacerbate the issue of intergenerational inequity, causing one group of members and taxpayers to over- or under-pay. Boards of trustees should work with their actuaries and other consultants to ensure assumptions are neither too aggressive nor too conservative, while striving to maintain (or achieve) sound fiscal health to secure existing accrued benefits. PRB's *Pension Funding Guidelines* recommend systems to monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

Investment Performance. Whatever the investment return assumption used, investment returns should be closely monitored, and investment managers' performance should be assessed regularly and compared to appropriate asset class benchmarks. Benchmarks should be reviewed to see if they have been met or exceeded, and should be viewed considering the risk taken to achieve those returns. Best practices also include revisiting investment manager selection periodically, with boards of trustees evaluating managers' performance, fees, and whether their current managers are providing the highest possible value at the lowest possible cost. The asset allocation should also be assessed from a risk perspective to provide insight into how the fund would weather a market correction.

Governance Risk

When public pension plans and their sponsors wait too long to address them, the funding challenges compounding over time can reach a point where small, incremental improvement, such as the contribution increases made for Marshall Fire, are not sufficient to make consistent, long-term improvements to the overall health of the plan. Marshall Fire and the City have yet to make difficult decisions on additional needed changes to benefit or contribution levels. If necessary changes are ultimately made, they may right the ship, but they will potentially be made under less than ideal conditions.

Background

Governance is essentially decision-making, and decision-making for public pension plans must balance the competing interests of plans and their sponsors and should feature collaboration between the two. The primary source of governance risk is the potential lack of involvement of key parties or stakeholders (members, the sponsor government, and taxpayers) in important areas of decision-making for a pension plan including plan design (benefits) and funding (contributions). When a key party is not engaged in important decisions, the risk increases that benefit levels and the contributions required to fund them will diverge, potentially putting the plan's funding stability at risk.

For example, TLFFRA allows boards of trustees to make prospective benefit modifications, both increases and reductions. These changes must be approved by an actuary and a majority of participating members, and may not deprive an eligible participant of vested accrued benefits. Although jointly responsible for funding the retirement plan along with plan members, the sponsoring city may have limited involvement in benefit decision-making, a structure which generates the risk that benefit levels adopted could be unsustainable.

Benefit increases are not the only potential risk related to a potential lack of sponsor involvement under TLFFRA; unwillingness to reduce benefits prospectively when necessary to address funding challenges can be an obstacle to getting things back on track. It should be noted that even plans with very engaged boards and sponsors can be susceptible to increasing benefits to unsustainable levels in good times or failing to lower them when necessary in bad times. Governance risk related to an imbalance in decision-making can only exacerbate these risks. Given the Fund's historically poor funding levels of under 55% for the last 15 years, the absence of benefit modification or member contribution increase discussions by Marshall Fire illustrates this point.

Funding Soundness Restoration Plan

State law recognizes the potential risks of underfunding and a lack of engagement by some key stakeholders and imposes cooperation between the system and sponsoring governmental entity by requiring retirement systems having trouble meeting their long-term obligations work with their sponsors to develop a restoration plan for addressing those issues.⁴ This framework helps ensure that both the system and its sponsoring employer are involved in pension plan reform decisions, but it comes at a point when actuarial health is already threatened. Marshall Fire submitted an FSRP for review on April 19, 2018. The FSRP proposed some eligibility changes for members hired after December 31, 2018 and additional employer contributions that have not been considered in the analysis contained in this report. The benefit changes have since been approved, but the increase in employer contributions is still pending approval by the City. The changes outlined in the FSRP will project an amortization period of 36.5 years in 2026; however, that calculation is contingent upon the City increasing its contribution, nor does it consider already approved assumption changes (i.e. a reduction in the assumed return on investments) that will likely result in the plan being out of compliance when it completes its December 31, 2018 actuarial valuation.

Conclusion/Recommendation

Plans and their sponsors can develop policies that proactively manage risk in the future by laying out a formal risk-sharing plan. To proactively manage governance and funding risk, retirement plans and their sponsors should work together to adopt written policies far in advance, that can guide them through both good and bad years and shield against the risk of either party's exclusion or disengagement from decision-making. Funding and benefit policies can be adopted that provide a framework for how benefit

⁴ Texas Government Code 802.2015 and 802.2016 require public retirement systems whose amortization period exceeds 40 years for 2 or 3 consecutive actuarial valuations to develop, with their sponsor, a funding soundness restoration plan designed to bring their amortization period within 40 years over 10 or fewer years.

and contribution levels may be modified under different conditions. An advantage of such policies is that changes to plan benefits and costs are known and understood by all parties in advance, rather than negotiated under difficult circumstances.

For example, a funding policy might state that future benefit enhancements, cost of living adjustments, and/or contribution rate reductions can only be considered or made if the plan's funded ratio remains greater than a chosen threshold. A funding policy can also state that if the funded ratio falls below a certain threshold, the stakeholders are required to come back to the table to make necessary contribution and benefit adjustments. Marshall Fire in conjunction with the City should utilize the funding soundness restoration plan requirement to develop such a long-term funding policy.

Appendix

Key Metrics

Metric	Amortization period (56 years)
What it measures	Approximately how long it would take to fully fund the unfunded actuarial accrued liability (UAAL or "unfunded liability") based on the current funding policy.
Why it is important	Given the Fund's current assumptions, an amortization period above 17 indicates the contributions to the fund in the coming year are less than the interest accumulated for that same period and therefore the total UAAL is expected to grow over the near term. In addition, for a plan that contributes on a fixed-rate basis such as Marshall Fire, the higher the amortization period, the more sensitive it is to small changes in the UAAL.
Peer Comparison	Marshall Fire currently has the fifth highest finite amortization period of all defined benefit pension plans in Texas.

Metric	Funded ratio (42.02%)
What it measures	The percent of a fund's actuarially accrued liabilities covered by its actuarial value of assets.
Why it is important	The lower the funded ratio, the fewer assets a fund has to pay its current and future benefit payments.
Peer Comparison	Marshall Fire's funded ratio is the second lowest of all defined benefit pension plans in Texas.

Metric	UAAL as a percent of payroll (398.51%)
What it measures	The size of a plan's unfunded liability compared to the annual payroll of its active members.
Why it is important	Provides a way to compare plans of various sizes and expresses the outstanding "pension debt" relative to current personnel costs.
Peer comparison	The Fund's UAAL as a percent of payroll is the second highest among TLFFRA plans with assets of less than \$12 million and the fifth highest of all defined benefit pension plans in Texas.

Metric	Assumed rate of return (7.75%)
What it measures	The estimated annual rate of return on the Fund's assets.
Why it is important	If actual future returns are lower than the assumed rate of return, future contributions will need to increase significantly, especially for a poorly funded plan. Marshall Fire's assumed rate of return was 7.75%, while its actual ten-year investment rate of return for the period ending December 31, 2016 was only 4.67%.
Peer comparison	Marshall Fire has the second highest assumed rate of return in its peer group of TLFFRA plans with assets of less than \$12 million.

Metric	Payroll growth rate (4.00%)
What it measures	The estimated annual growth in the total payroll of active members contributing into the Fund.
Why it is important	Contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Fund's actuarial valuations. Given the fund's inactive and active liabilities are not fully funded; contributions below expected levels will have serious consequences on the Fund's long-term solvency.
Peer comparison	The Fund's payroll growth rate of four percent is tied for the third most aggressive in its peer group of TLFFRA plans with assets of less than \$12 million.

Metric	Actual contributions as a percent of actuarially determined contribution (78.11%)
What it measures	Whether the current employer contributions have met a theoretical minimum threshold. ⁵
Why it is important	The employer's portion of the contribution is less than 80% of the amount needed to fund Marshall Fire on a rolling 30-year amortization period. The PRB's 2014 <i>Study of the Financial Health of Texas Public Retirement Systems</i> found that plans that have consistently received adequate funding are in a better position to meet their long-term obligations.
Peer comparison	This is second largest shortfall percentage in its peer group of TLFFRA plans with assets of less than \$12 million.

Metric	DROP as a percent of fiduciary net position (3.99%)
What it measures	The amount of the Fund's assets that are designated for lump-sum payouts to retired members as a percent of its total assets.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)) shows how large a decrease in the Fund's assets could be if most or all DROP participants decided to take their balances out in a short amount of time. As of December 31, 2016, Marshall Fire's DROP balance was \$307,546 and represented 3.99% of the fund's Fiduciary Net Position (FNP).

⁵ The theoretical minimum threshold, or actuarially determined contribution (ADC), is a target or recommended contribution "to the plan as determined by the actuary using a contribution allocation procedure," as defined in Actuarial Standards of Practice No 4. If contributions to the plan are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Metric	Non-investment cash flow as a percent of fiduciary net position (-5.50%)
What it measures	Non-investment cash flow shows how much the plan is receiving through contributions in relation to its outflows: benefit payments, withdrawals and expenses.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)), in conjunction with the funded ratio and recognition of the relative maturity of a plan, provides information about the stability of a plan's funding arrangement.
Peer comparison	Marshall Fire's non-investment cash flow as a percent of FNP is the 12 th lowest of all defined benefit pension plans in Texas. If this trend continues, the Fund could face the potential risk of needing to liquidate a portion of existing assets to pay current benefits and/or expenses.

Plan Summary

The Marshall Firemen's Relief and Retirement Fund ("Marshall Fire" or "the Fund") was established in 1992 under the Texas Local Fire Fighter's Retirement Act (TLFFRA). TLFFRA provides general guidelines for fund management, but leaves administration, plan design, contributions, and specific investments to the discretion of the board of trustees. Marshall Fire, as with all TLFFRA systems, is entirely locally-funded.

Benefits

Retirement Eligibility	Age: 50 years; Years of Service: 10 years
Vesting	10 Years of Service
Benefit Formula	Years of Service (up to 20 years) x 3.125% x Final Average Salary +\$65 per month for each year > 20 Years of Service
Final Average Salary (FAS)	Final 78 biweekly average salary
COLA	None
Retirement Benefit Options	Forward DROP: 3-year maximum. Employee contributions credited; no interest. Eligible at 50 years of age and 20 years of service.
Social Security	No

Contributions

Currently, active members of Marshall Fire contribute 14.00% of pay while the City of Marshall (the City) contributes 19.05% of pay.

Membership

Total Active Members	Retired Members	Beneficiaries	Total Annuitants	Total Members	Active-to-Annuitant Ratio
49	29	8	37	90	1.32

TLFFRA Board Structure

Active Members	3 - Members of the retirement system; elected by fund members. Three-year terms.
Sponsor Government	1 - Mayor or designated representative, or the political subdivision's Chief Operating Officer or designated representative. 1 - Chief Financial Officer of the political subdivision, or designated representative. Terms correspond to term of office.
Taxpayer, Not Affiliated With Fund/Sponsor Govt.	2 - Residents of the State of Texas, must not be officers/employees of the political subdivision; elected by other Board of Trustee members. Two-year terms.

Contribution and Benefit Decision-Making

TLFFRA authorizes members of the retirement systems to determine their contribution rates by voting. The statute requires cities to contribute the lesser of 12% of pay or the rate at which the active members contribute. TLFFRA also allows a city to contribute at a higher rate than employees through a change in city ordinance.

TLFFRA gives the board the power to make decisions to modify the benefits (increases and reductions). However, a proposed addition or change must be approved by the actuary and a majority of participating plan members. Benefit changes cannot deprive a member, retiree or beneficiary of the right to receive vested accrued benefits.

Funding Soundness Restoration Plan

Texas Government Code §802.2015 requires the governing body of a public retirement system and its governmental sponsor formulate a funding soundness restoration plan if the system's actuarial valuation shows its amortization period exceeds 40 years for three consecutive annual actuarial valuations, or two consecutive actuarial valuations if the system conducts valuations less frequently.

Marshall Fire meets the requirement because the actuarial valuations prepared as of December 31, 2014 and December 31, 2016 reported amortization periods greater than 40 years. Marshall Fire submitted an FSRP for review on April 19, 2018. The FSRP proposed some eligibility changes for members hired after December 31, 2018 and additional employer contributions that have not been considered in the analysis contained in this report. The benefit changes have since been approved, but the increase in employer contributions are still pending approval by the City. The changes outlined in the FSRP will project an amortization period of 36.5 years in 2026, however, that calculation is contingent upon the City increasing its contribution, nor does it consider already approved assumption changes (i.e. a reduction in the assume return on investments) that will likely result in the plan being out of compliance when the plan completes its December 31, 2018 actuarial valuation.

Historical Trends

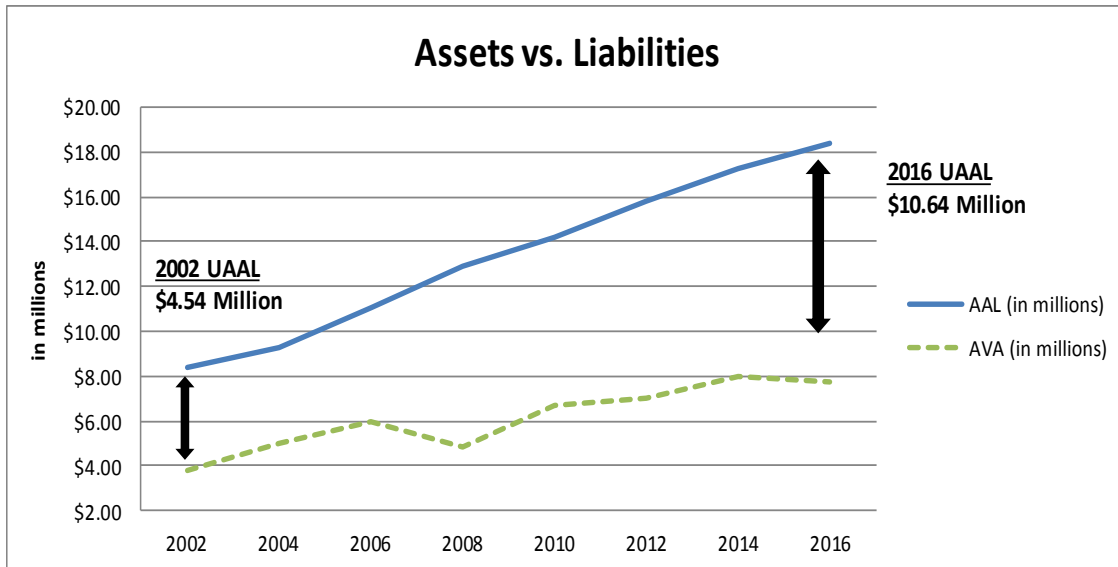
To conduct an intensive review of risks associated with the long-term funding of a pension plan, it is important to analyze trends in multiple metrics. A plan with an asset level lower than its accrued liability has insufficient funds to cover benefits. A plan can experience an increase in unfunded liability due to various factors, including insufficient investment returns, inadequate contributions and inaccurate or overly aggressive assumptions. Hence, a single metric cannot effectively capture the different drivers contributing to the increase of a plan's unfunded pension obligation. This section analyzes historical trends in various metrics identified by the PRB and makes comparisons to understand the sources of growth in unfunded liability for Marshall Fire.

The health of Marshall Fire has been deteriorating since the early 2000s. Numerous factors have contributed to this deterioration, including inadequate contributions, investment returns lower than the assumed return, and increased benefit payments. The following sections discuss these and other factors in detail.

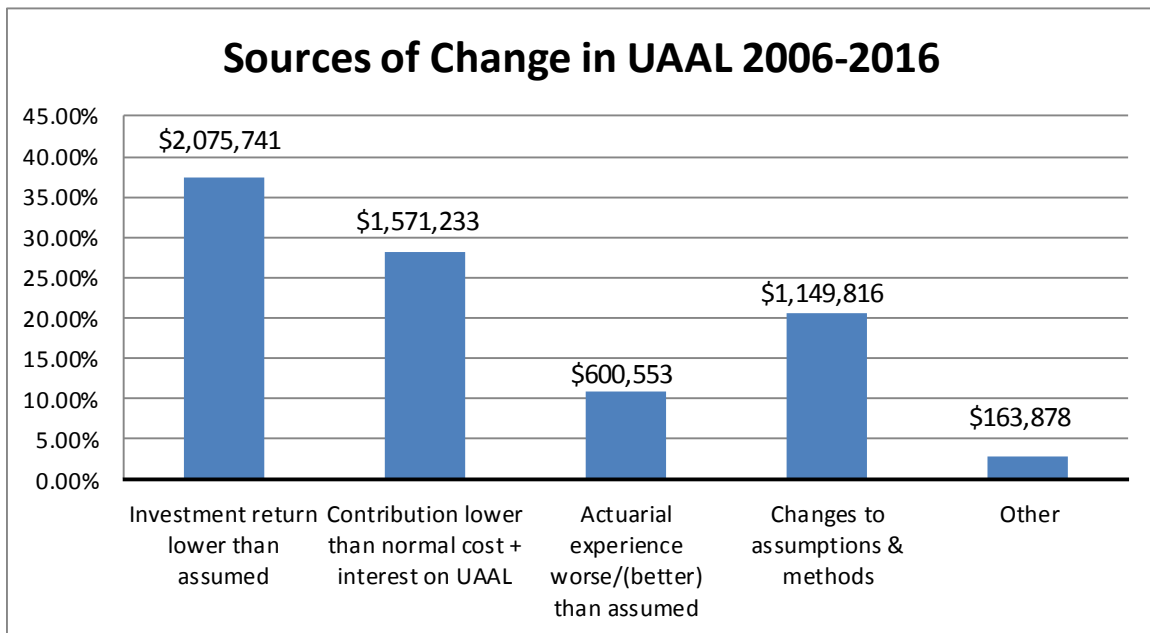
Assets and Liabilities

Funding Trends								
Funded Ratio, Assets, Liabilities and Year over Year Growth								
Date (12/31)	2002	2004	2006	2008	2010	2012	2014	2016
Funded Ratio	45.73%	54.02%	53.93%	37.14%	46.95%	44.18%	46.39%	42.02%
Am Period (years)	55.9	38.3	23.3	51.1	23.5	38.6	43.2	56.4
UAAL (in millions)	\$4.54	\$4.26	\$5.08	\$8.12	\$7.52	\$8.83	\$9.25	\$10.64
AVA (in millions)	\$3.82	\$5.01	\$5.95	\$4.80	\$6.65	\$6.99	\$8.00	\$7.71
AVA Growth (YoY)	-	14.50%	8.96%	-10.19%	17.76%	2.50%	7.00%	-1.84%
AAL (in millions)	\$8.36	\$9.27	\$11.03	\$12.92	\$14.17	\$15.82	\$17.25	\$18.35
AAL Growth (YoY)	-	5.35%	9.05%	8.23%	4.74%	5.66%	4.42%	3.14%

Marshall Fire's actuarial accrued liability (AAL) increased by 119.62% between 2002 and 2016. Conversely, the Fund's actuarial value of assets (AVA) only grew by 101.80% over that same period, resulting in an increase of the UAAL of 134.63%. The funded ratio (AVA/AAL) also fell from 45.73% in 2002 to 42.02% in 2016.



The graph below illustrates that the \$5.6 million increase in UAAL (from \$5.1 million in 2006 to \$10.6 million in 2016) is primarily a result of investment returns lower than the assumed rate of return (\$2.1 million increase in UAAL), the annual contribution lower than the normal cost plus the interest accumulated on the UAAL (\$1.6 million increase in UAAL), and changes to actuarial methods and assumptions (\$1.1 million increase in UAAL).



Investment Assumption and Returns

As illustrated above, actual investment returns lower than the assumed investment return increased the UAAL by more than \$2.1 million between 2006 and 2016. While Marshall Fire lowered its assumed rate of return from 8.00% to 7.75% in 2012, it still exceeds the 2017 national average of 7.52% (reported by

NASRA). In addition, the Fund has not achieved a 7.75% return on assets over a consecutive 10-year period in any of the 12 periods ending December 31, 2005 through December 31, 2016.

Asset Allocation

As shown in the chart below, the Fund's actual asset allocation is close to its target allocation and within the ranges of the Fund's Investment Policy Statement. The asset allocation is very similar to other TLFFRA plans.

Asset Class	Asset Allocation		
	Equities	Fixed Income/Cash	Specialty ⁶
Current Allocation	50.9%	27.3%	21.8%
Target Allocation	50.0%	30.0%	20.0%

*Current allocation as of 12/31/2016 financial audit.

Payroll Growth

Marshall Fire lowered its annualized payroll growth assumption from 4.25% to 4.00% as of December 31, 2012. Even with this decrease, the Fund still has one of the highest payroll growth rate assumptions when compared to other TLFFRA plans of similar size. The Fund's actual payroll growth rate averaged 3.82% between 2002 and 2016 and has only exceeded the target rate in 2006 and 2016.

While this assumption under a fixed-rate funding policy does not directly affect actual contributions, the calculation of the amortization period is highly sensitive to it, especially when a plan's amortization period is as high as the Fund's.

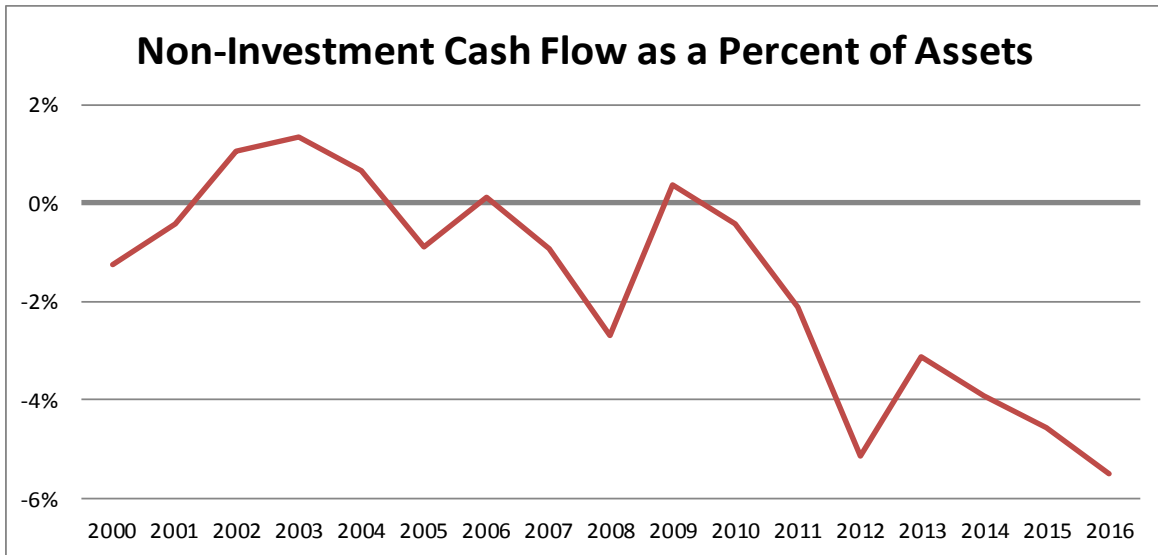
Sensitivity to Changes in Payroll Growth Assumption	
Assumed Payroll Growth	Amortization Period
4.00%	56
3.50%	96

*Based on UAAL as of December 31, 2016 and an employer contribution of 19.05%.

Cash Flow

Marshall Fire's non-investment cash flow was -5.5% in 2016 and has been in decline since 2010. The decrease is due to benefit payments growing 39.7% between 2011 and 2016 while contributions only grew by 6.3% during that same period. A negative non-investment cash flow is not abnormal for mature defined benefit pension plans. However, a cash flow percentage this low is likely to be a drag on potential investment returns because a fund must either invest in a higher proportion of income-producing investments, which traditionally provide lower returns, or must liquidate existing assets to pay out current benefits and/or expenses.

⁶ The specialty asset class consists of convertible securities, a multi-asset fund, a master limited partnership (MLP) and a Real Estate Investment Trust (REIT). These funds hold publicly traded debt and equity securities across various asset classes.



DROP

In 2012, Marshall Fire implemented a deferred retirement option plan (DROP) that allows eligible members to continue to work, but their monthly retirement benefit is calculated as of the date of DROP election and is deferred until formal retirement. The City and the member will continue to make contributions to the Fund during this period. Upon formal retirement, the member will begin to receive their monthly retirement benefit and is then eligible to receive a lump sum payment equal to the total retirement benefit amount the member would have received plus the amount of contributions, with no interest, that the member made into the Fund over the 3-year period of DROP participation.

As of December 31, 2016, Marshall Fire's DROP balance was \$307,546 and represented 3.99% of the fund's fiduciary net position (FNP). The DROP allows members to participate for a maximum of 3 years and does not credit interest.

Peer Group Key Metric Comparison

		Funding Val Metrics						Fiscal Year End Metrics			
Peer Group Plans	MVA	Am Period Date	Amortization Period	Funded Ratio	UAAL as % of Payroll	Assumed Interest	Payroll Growth	FYE	Actual Cont as % of ADC	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
Big Spring Firemen's Relief & Retirement Fund	\$ 11,157,022	1/1/2015	28.7	54.82%	248.61%	8.00%	5.00%	12/31/2016	110.08%	0.00%	-9.54%
Weslaco Firemen's Relief & Retirement Fund	\$ 9,186,148	9/30/2016	14.1	68.53%	111.07%	7.25%	3.25%	9/30/2016	145.69%	N/A	1.33%
Corsicana Firemen's Relief & Retirement Fund	\$ 8,344,317	12/31/2016	28.9	53.14%	211.44%	7.00%	3.00%	12/31/2016	100.01%	N/A	-1.97%
Sweetwater Firemen's Relief & Retirement Fund	\$ 8,264,183	12/31/2014	58.8	69.01%	246.28%	8.00%	4.50%	12/31/2016	83.61%	N/A	-4.60%
Orange Firemen's Relief & Retirement Fund	\$ 8,154,674	12/31/2016	69.3	49.86%	336.03%	7.75%	4.00%	12/31/2016	70.49%	N/A	-7.91%
Marshall Firemen's Relief & Retirement Fund	\$ 7,712,228	12/31/2016	56.4	42.02%	398.51%	7.75%	4.00%	12/31/2016	84.67%	3.99%	-5.50%
Paris Firefighters' Relief & Retirement Fund	\$ 5,461,762	12/31/2014	26.1	42.74%	311.01%	8.00%	4.50%	12/31/2016	100.00%	N/A	-10.31%
Plainview Firemen's Relief & Retirement Fund	\$ 5,296,898	12/31/2015	31.6	37.33%	453.72%	7.75%	3.50%	12/31/2016	87.77%	N/A	-2.63%
Atlanta Firemen's Relief & Retirement Fund	\$ 3,614,929	12/31/2014	36.2	81.87%	130.44%	7.50%	3.00%	12/31/2016	107.62%	N/A	-1.55%
Brownwood Firemen's Relief & Retirement Fund	\$ 3,397,474	12/31/2015	36.1	44.63%	257.78%	7.40%	3.40%	12/31/2016	93.90%	N/A	0.32%
San Benito Firemen Relief & Retirement Fund	\$ 3,301,643	12/31/2015	21.7	60.52%	156.71%	7.50%	4.00%	9/30/2015	0.00%	N/A	0.15%

Peer Group Sponsor Funding Comparison

Peer Group Plans	GF Expend	EOY GF Bal	UAAL	Expected Employer Contributions	ADC	30-yr Shortfall	30-Y SF % of ADC	30-Y SF % of GFE
Sweetwater Firemen's Relief & Retirement Fund	\$ 8,733,810	\$ 3,929,907	\$ 3,674,028	\$ 238,689	\$ 294,781	\$ 56,092	19.03%	0.67%
Orange Firemen's Relief & Retirement Fund	\$ 17,985,946	\$ 8,272,029	\$ 8,199,175	\$ 341,606	\$ 469,709	\$ 128,103	27.27%	0.71%
Marshall Firemen's Relief & Retirement Fund	\$ 20,353,433	\$ 6,537,285	\$ 10,641,648	\$ 508,698	\$ 651,293	\$ 142,595	21.89%	0.70%
Plainview Firemen's Relief & Retirement Fund	\$ 12,768,715	\$ 15,844,471	\$ 9,781,866	\$ 532,083	\$ 606,247	\$ 74,164	12.23%	0.58%
Brownwood Firemen's Relief & Retirement Fund	\$ 19,316,832	\$ 3,038,924	\$ 4,563,878	\$ 354,088	\$ 377,104	\$ 23,016	6.10%	0.12%

Peer Group Expense Comparison

Peer Group Plans	10 yr return (Net)	Active/ Annuitants	Average Benefit	NPL	Admin Expenses	Investment Expenses	Other Expenses	Total Expenses	Exp as % of Assets
Big Spring Firemen's Relief & Retirement Fund	4.26%	1.27	\$ 37,713	\$ 9,713,127	\$ 100,927	\$ -	\$ -	\$ 100,927	0.90%
Weslaco Firemen's Relief & Retirement Fund	2.71%	2.21	\$ 18,578	\$ 4,588,953	\$ 45,252	\$ 52,746	\$ -	\$ 97,998	1.07%
Corsicana Firemen's Relief & Retirement Fund	3.40%	1.81	\$ 31,722	\$ 8,837,348	\$ 22,168	\$ 92,459	\$ -	\$ 114,627	1.37%
Sweetwater Firemen's Relief & Retirement Fund	4.38%	1.04	\$ 30,612	\$ 4,965,694	\$ 41,956	\$ 62,322	\$ -	\$ 104,278	1.26%
Orange Firemen's Relief & Retirement Fund	3.72%	0.88	\$ 26,036	\$ 8,946,685	\$ 18,742	\$ 93,636	\$ -	\$ 112,378	1.38%
Marshall Firemen's Relief & Retirement Fund	4.67%	1.32	\$ 30,632	\$ 10,956,850	\$ 4,077	\$ 45,898	\$ -	\$ 49,975	0.65%
Paris Firefighters' Relief & Retirement Fund	2.16%	1.17	\$ 24,491	\$ 9,642,566	\$ 37,674	\$ 32,730	\$ -	\$ 70,404	1.29%
Plainview Firemen's Relief & Retirement Fund	1.95%	1.03	\$ 24,050	\$ 10,746,840	\$ 12,557	\$ 49,439	\$ 811	\$ 62,807	1.19%
Atlanta Firemen's Relief & Retirement Fund	4.84%	1.25	\$ 9,039	\$ 1,129,175	\$ 23,941	\$ 25,495	\$ -	\$ 49,436	1.37%
Brownwood Firemen's Relief & Retirement Fund	3.52%	1.28	\$ 16,378	\$ 5,056,328	\$ 35,414	\$ 41,080	\$ -	\$ 76,494	2.25%
San Benito Firemen Relief & Retirement Fund	0.94%	2.50	\$ 23,082	\$ 2,154,088	\$ 15,722	\$ 38,370	\$ -	\$ 54,092	1.64%

Comments from Marshall Firemen's Relief and Retirement Fund



City of Marshall

Fire Department

P.O. Box 698

Marshall, Texas 75671

903-935-4580 / FAX 903-935-3568

REGINALD K. COOPER, EFO FIRE CHIEF

RECEIVED

APR 19 2018

Pension Review Board

March 26, 2018

State Pension Review Board

P.O. Box 13498

Austin, TX 78711-3498

Re: Funding Soundness Restoration Plan

The purpose of this letter is to inform the State Pension Review Board of the Marshall Firemen's Relief and Retirement Funds current status in the development of the required Funding Soundness Restoration Plan. Members of the board have been actively working with the City of Marshall Administrative staff in order to make the necessary changes to the fund. The proposed changes to the fund are listed below.

- Increasing the age of eligibility for service retirement benefit from 50 to 53 years of age years for members hired after December 31, 2018.
- Increasing the years of vested pension service from 10 years to 20 years for members hired after December 31, 2018.
- City contributions will be made at the end of the year for unfilled vacancies that existed throughout the year effective December 31, 2018.
- City will consider increasing its contribution rate by 0.75% of payroll effective January 1, 2019, with future contributions being reviewed upon completion on each actuarial evaluation.

For purposes of preparing the Funding Soundness Restoration Plan (FSRP), a cumulative plan design study was performed by Retirement Horizons Inc. to measure the impact that these changes will have based on the assumptions and methods used in the December 31, 2016 valuation of the Marshall Firemen's Relief and Retirement Fund. The result of this study indicates that the 10 year future expected amortization period reaches 36.5 years in 2026 under the assumptions, which is under the required 40 years.

The Marshall Firemen's Relief and Retirement board will consider approval to have an election of the members to approve increasing the age of eligibility for service retirement benefit from 50 to 53 years of age for members hired after December 31, 2018. The election will also vote on increasing the years of vested pension service from 10 years to 20 years for members hired after December 31, 2018. The board will discuss and consider the approval at the next scheduled agenda meeting.

The City of Marshall City Manager has agreed to present to the city commission for approval that contributions will be made at the end of the year for unfilled vacancies that existed throughout the year effective December 31, 2018. Additionally, the city manager has agreed to present to the commission during the 2019 budget process the board's request to increase the employer contribution rate 0.75% of payroll effective January 1, 2019. It was also discussed that future contributions rates would be evaluated at the completion of each actuarial evaluation.

The combined changes will have a positive impact to the fund by reducing the years of amortization below 40 years within 10 years, thus satisfying Pension Review Board requirements. Although no formal changes have been made thus far, the Pension Review Board will be notified once the proposed changes have been approved by the City Commission as well as the members of the fund.

Respectfully,

A handwritten signature in black ink, appearing to read "Joe Dunagan", with a stylized flourish at the end.

Joseph Dunagan
Chairman
Marshall Fire Department
Dunagan.joey@marshalltexas.net
903-935-4584

A handwritten signature in blue ink, appearing to read "Lisa Agnor", with a stylized flourish at the end.

Lisa Agnor
City Manager
City of Marshall
lagnor@marshalltexas.net
903-935-4418

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX A5 - INTENSIVE ACTUARIAL REVIEW – LONGVIEW FIREMEN'S RELIEF AND RETIREMENT FUND

Intensive Actuarial Review:

Longview Firemen's Relief and Retirement Fund

October 2018



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Executive Summary

Introduction

This intensive actuarial review of Longview Firemen's Relief and Retirement Fund ("Longview Fire" or "the Fund") is intended to assist the Fund's board of trustees and the City of Longview ("the City") in assessing the Fund's ability to meet its long-term pension obligation.

Longview Fire has been working with the City since 2012 on a four-step plan to increase both the city and member contributions to improve the Fund. Currently, active members of the Fund contribute either 15.00% or 17.00% of pay depending on their hire date. The City currently contributes 18.00% and effective October 2018, the City will contribute 19.00% of pay. The Fund has also made several benefit reductions for current and future members. These changes have helped to improve the amortization period to 40.2 years as of the 2017 valuation, compared to 50.7 years at the end of 2016.

Despite these changes, the review shows that at the current contribution rates and benefit levels, the unfunded liability can be expected to continue to grow and the funded status to continue to languish. The Pension Review Board (PRB) encourages the Fund and the City to review the findings and conclusions of this report carefully and jointly adopt a forward-looking plan to address these risks and guide the Fund towards a path of long-term sustainability. The PRB can provide technical assistance in formulating such a plan.

Overview

Longview Fire's unfunded actuarially accrued liability (UAAL or "unfunded liability") increased from \$16.9 million at the end of 2005 to over \$50 million by the end of 2017. This chronic underfunding can be primarily attributed to actual returns consistently lower than the investment return assumption; repeated liability losses due to adverse experience compared to the Fund's other assumptions; and contributions consistently lower than the annual benefit accrual plus growth of existing unfunded benefits. The Fund is facing substantial financial stress and is taking risks in its approach to funding.

Conclusion

Longview Fire should consider the following additional actions to help ensure financial stability and mitigate the risks that lead to underfunding: working with its actuaries and other consultants to ensure assumptions are neither too aggressive nor too conservative; evaluating asset allocation decisions and appropriate risk levels on a forward-looking basis; developing a more robust investment policy; and ensuring contributions are adequate to fully fund Longview Fire over a reasonable period.

To address the funding and governance risks, the Fund and the City should develop written funding, benefit, and investment policies that are linked to provide a formal risk-/cost-sharing arrangement. A strong funding policy that requires payment of an actuarially determined contribution (ADC) is encouraged. In addition to helping maintain a sound funding level, putting such forward-looking policies into place can help reduce uncertainty for stakeholders who would know, in advance, how future adverse experience will be managed.

Background

Texas Government Code Section 801.202(2) requires the PRB to conduct intensive studies of potential or existing problems that threaten the actuarial soundness of or inhibit an equitable distribution of benefits in one or more public retirement systems. The PRB identified a set of key metrics, in addition to amortization period, to determine and prioritize retirement systems for intensive actuarial review as included page 13 of the Appendix. After evaluating these metrics, the PRB selected Longview Firemen's Relief and Retirement Fund ("Longview Fire" or "the Fund") for review. The following data points were calculated as of the Fund's December 31, 2016 actuarial valuation and financial audit available to the PRB at the time the Fund was selected for review in April 2018:

Plan Profile (as of 12/31/2017)

Actuarial Accrued Liability: \$93,381,961

Market Value of Assets: \$43,004,267

Normal Cost: 15.14% of payroll

Contributions: 16.84% employee
18.25% employer

Membership: 175 active
147 annuitants

Social Security Participation: No

- Its **funded ratio** of 45.53% was second lowest among its TLFFRA peer plans and one of the lowest in the state of Texas.
- The 50.7-year **amortization period** on its unfunded actuarial accrued liability was the third highest among its peers and the sixth highest finite period in the state.
- Its **assumed rate of return** on assets of 8.00% was tied for the highest within its peer group and among the highest in the state.
- Its 383.31% **UAAL as a percent of payroll** was the second highest in its peer group and sixth highest in the state.
- **Actual contribution as a percent of its Actuarially Determined Contribution (ADC)** of 70.47% was the lowest among its TLFFRA peer plans.

Since selecting Longview Fire, the PRB received the Fund's 2017 actuarial valuation in July 2018. The 2017 data was used for the entirety of this review and is summarized in the table below.

Amort. Period (Years)	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC ¹	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
40.2	46.05%	389.47%	8.00%	3.00%	81.06%	0.00%	-5.56%

*Contribution, DROP and cash flow data are from the Fund's 12/31/2017 financial audit.

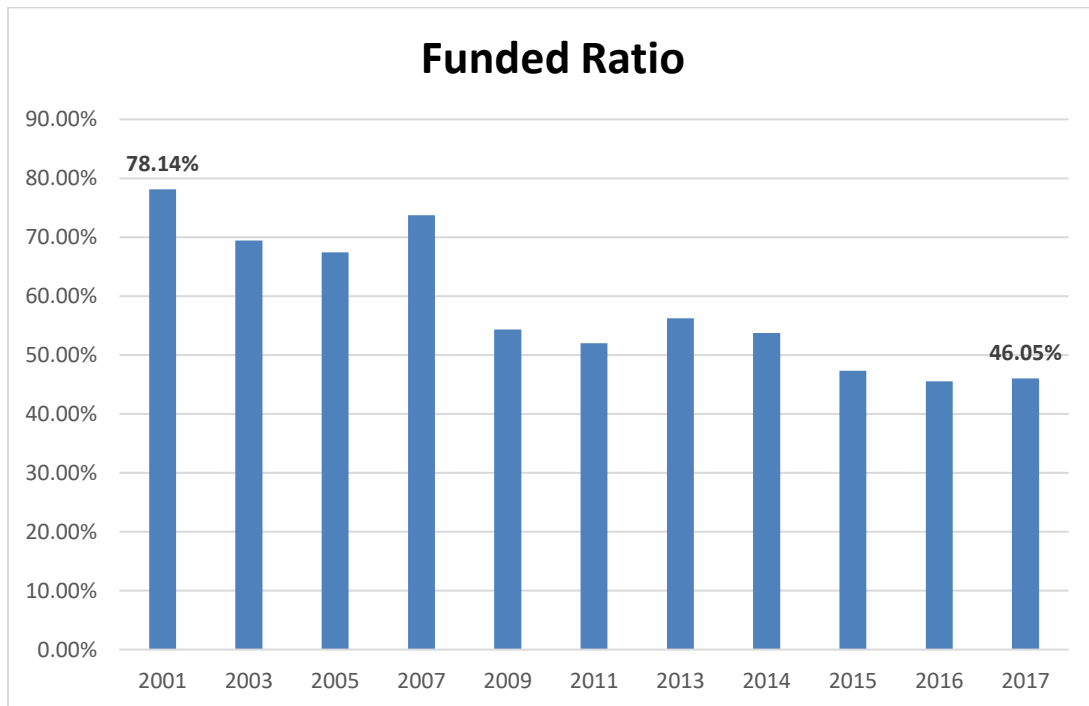
¹ For plans whose contributions are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Risk Analysis

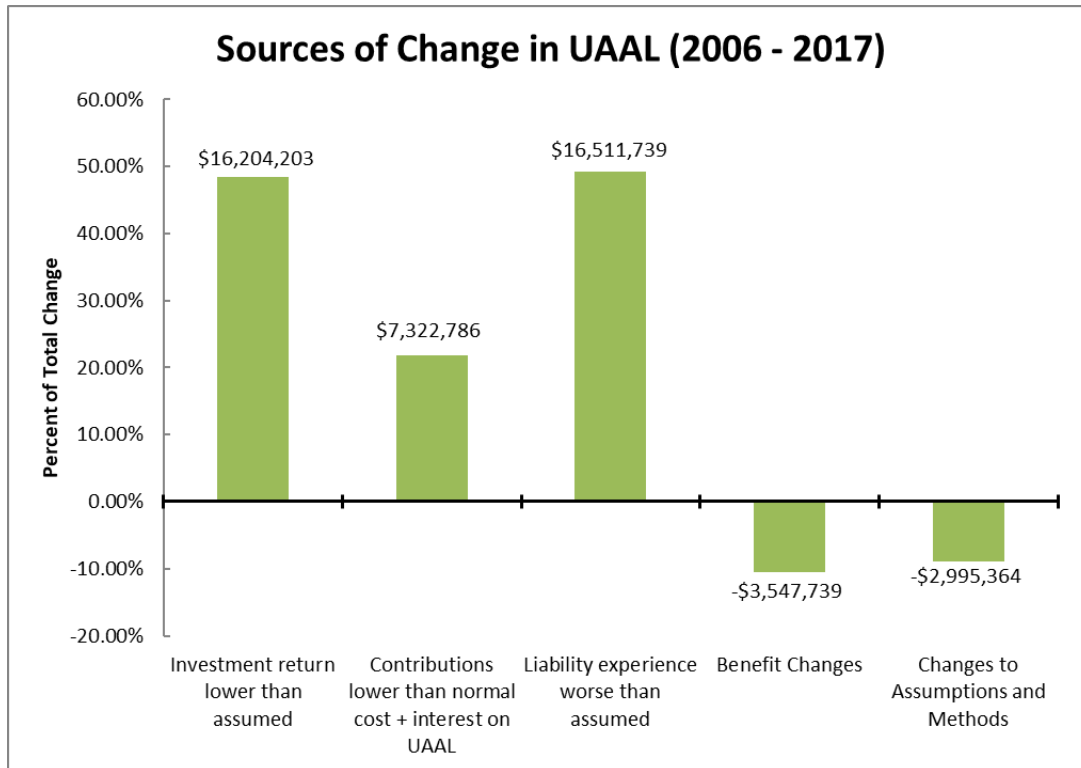
A pension fund faces multiple risks, which can be boiled down to one primary concern of whether there will be enough money to pay benefits when they are due. Since 2012, Longview Fire has made benefit changes for future members, and both the City and members have made contribution increases. However, actual experience consistently not meeting assumptions and a fixed rate contribution structure pose a relatively high level of risk to the Fund. These risks increase the probability of a continued period of substantial financial stress for the Fund and could raise the likelihood of deteriorating funding conditions in the coming years.

Funding Risk

Longview Fire's December 31, 2017 actuarial valuation shows that the Fund is approximately 46% funded on an actuarial basis, and according to reports filed with the PRB, it has not had a funded ratio above 60% since 2007.



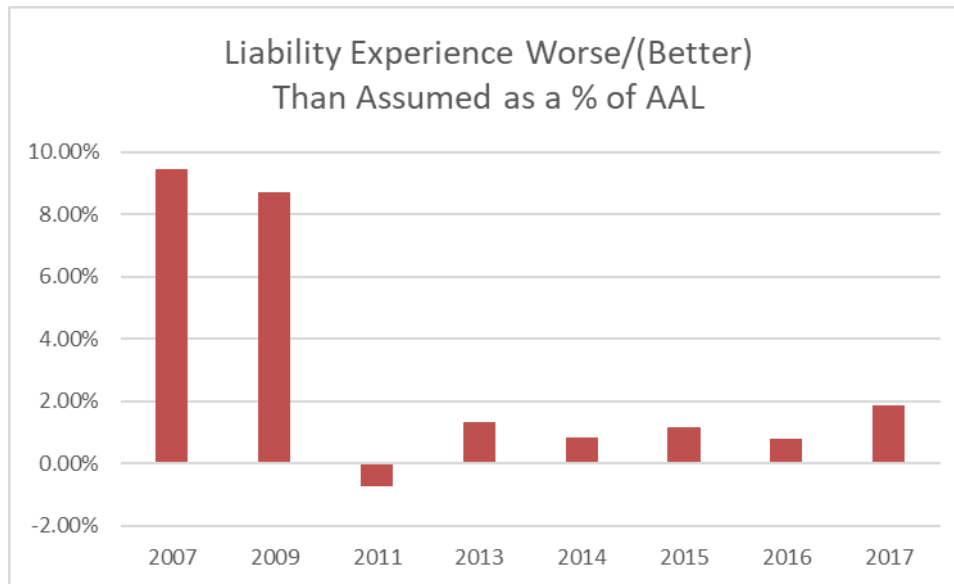
Longview Fire's significant growth in unfunded liability, which increased from \$16.9 million at the end of 2005 to over \$50 million by the end of 2017, can be attributed to 3 key issues: actual returns consistently lower than the assumed investment return; contributions consistently lower than the annual benefit accrual plus growth of existing unfunded benefits; and repeated liability losses due to adverse experience compared to the fund's assumptions.



Liability Experience Compared with Assumptions

In all but one of the past 12 actuarial valuations, Longview Fire's liability increased more than expected, resulting in an increase in the unfunded liability (UAAL) of \$16.5M for the 2006-2017 period. This \$16.5M liability increase resulted from experience not meeting assumptions in areas other than investment returns, which caused a separate, additional \$16.2M liability increase (discussed in the following section).

Of the \$16.5 million loss, more than \$10 million occurred between 2006 and 2009, and the losses that occurred over the past 5 years resulted in less than a 2% loss on the total actuarial accrued liability in a given year, as shown in the following graph.

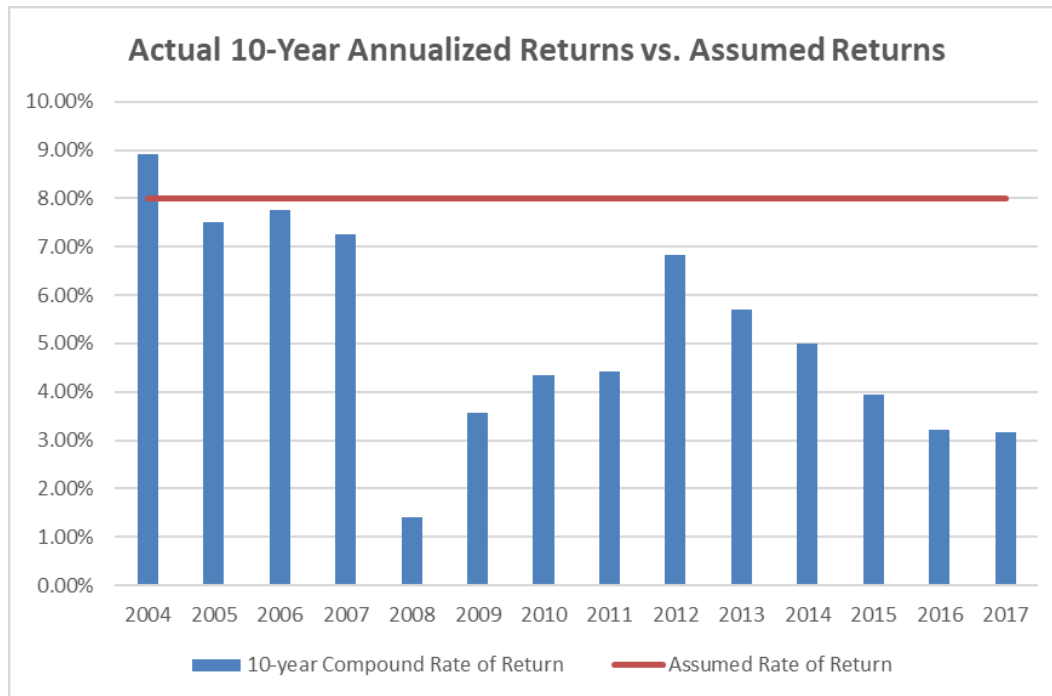


It is rare for plan experience to exactly match assumptions in any given year and a 1-2% gain or loss in a single year is by no means alarming or even unusual. Generally, a plan should expect to have gains in some years (i.e. the liability increases less than expected) and losses in others (i.e. the liability increases more than expected), such that the difference between the assumptions and reality are close to zero over time. However, consistent losses (or gains), even when seemingly insignificant if viewed in isolation, are not expected and the impact can be compounded over time. For example, the 1-2% individual losses over the past 5 valuations have accumulated to an approximate 5% loss on the total AAL and accounts for nearly 40% of the increase in the UAAL over the same period.

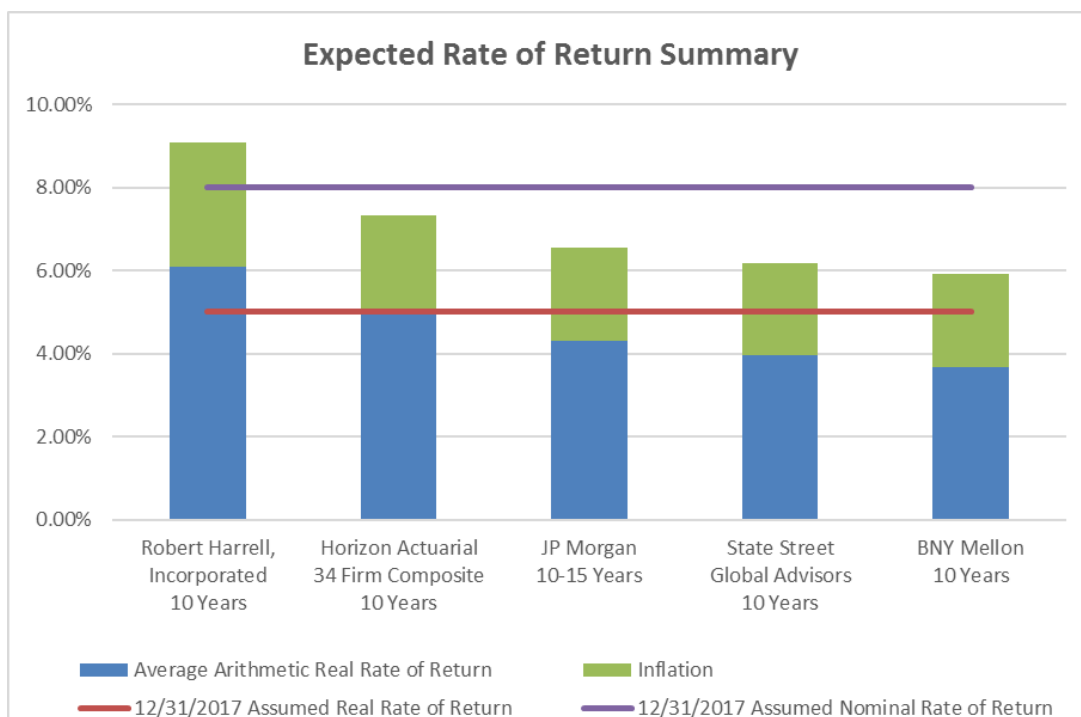
In 2016, the Fund's actuary performed an experience study, which compared the plan's actual experience against what was assumed would occur for the period of January 1, 2009 through December 31, 2015. Following the study, several assumptions were changed. The Fund should continue to closely monitor its assumptions. If future valuations show that Longview Fire continues to experience these types of losses, valuable insight may be gained by further investigation of the causes of both the consistent demographic losses and the unusually large loss between 2006 and 2009. While Longview Fire is not required by state law to have an audit of the Fund's actuarial reports, engaging an outside, independent actuary to perform such an audit is one approach the board could consider to gain additional insight.

Investment Experience and Asset Allocation

Longview Fire's actual investment return has been consistently lower than the assumed investment return, increasing the UAAL by more than \$16.2 million between 2006 and 2017. As illustrated in the following graph, the Fund has not achieved an 8% annualized return (the Fund's current assumed rate of return) over a consecutive 10-year period in any of the 13 periods ending December 31, 2005 through December 31, 2017.



To assess the reasonableness of the assumed investment return, generally accepted practice involves calculating an expected rate of return based on a plan's current, and future expected, asset allocation utilizing a range of forward-looking capital market projections, as illustrated in the graph below. This graph indicates that the expected rate of return produced by the capital market assumptions provided by the plan's investment consultant, RHI, exceeds those calculated using published capital market assumptions from recognized sources for the same time horizon.



Over the last few years, Longview Fire's governing board recognized that some of its alternative investments were not a proper fit for the Fund. As a result, the Fund indicated that it is considering shifting towards a strategy that focuses on using low cost, passively managed index funds. The calculated rates of return shown above do not take this change into account.

According to the 2016 data as reported by TLFFRA systems, the aggregate asset allocation of TLFFRA plans into alternative investments was approximately 8%. Comparatively, Longview Fire currently maintains a high percentage allocated to alternative investments, as shown in the table below.

Asset Allocation				
Asset Class	Equities	Fixed Income	Alternatives	Cash
Minimum Allocation	45.00%	20.00%	0.00%	N/A
Current Allocation ²	46.85%	23.88%	25.32%	4.00%
Maximum Allocation	65.00%	35.00%	35.00%	N/A

Fixed-Rate Funding Model and Contribution Insufficiency Risk

Most Texas plans use a fixed percent of pay funding approach. This is especially true for plans governed by the TLFFRA statute; however, the statute does not require a fixed-rate contribution structure. Under a fixed-rate funding structure, no formal amortization policy (i.e. the expected time to fully fund the plan) exists; therefore, the plan's actuary estimates the amortization period at each valuation date based on the current financial condition of the plan and the current contribution rates.

The nature of a fixed-rate, percent-of-pay contribution policy may exacerbate this risk over the long-term because:

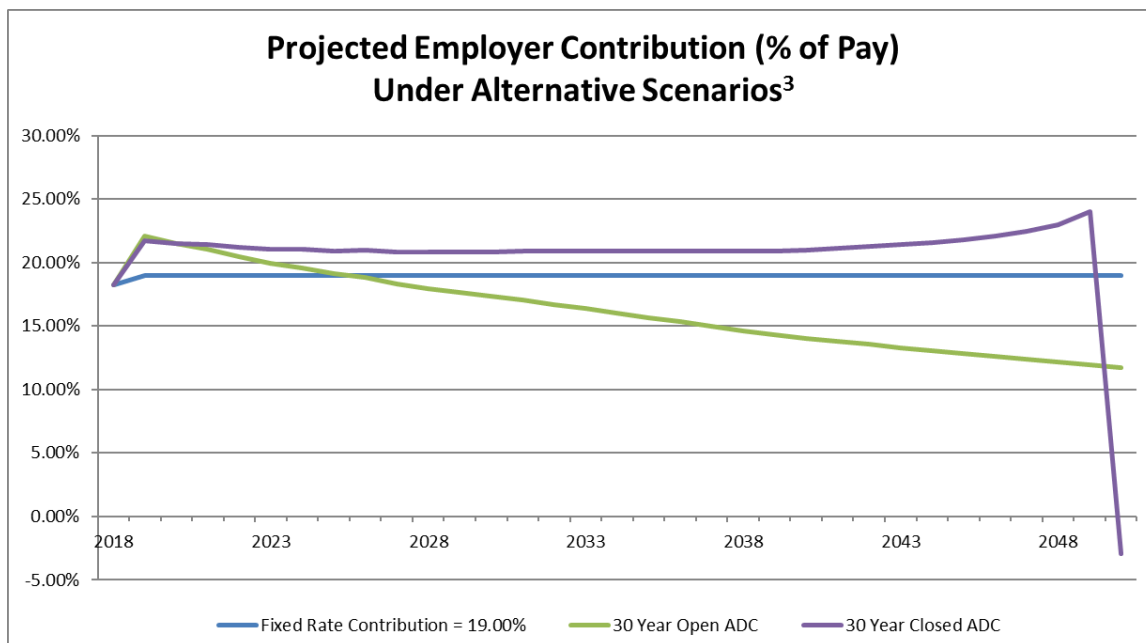
- 1) Contributions to percent-of-pay plans are inherently back-loaded because the expected contributions to a percent-of-pay plan grow on a nominal basis at the assumed rate of total payroll growth.
- 2) Fixed-rate plans provide budgetary stability for the employer in the short term, but do not include any inherent mechanisms for reacting to changes in a plan's financial condition.

Currently, active members of the Fund contribute either 15.00% or 17.00% of pay depending on their hire date, and effective October 2018 the City will be contributing 19.00% of pay. Despite certain proactive steps taken by the City and the Fund to address funding shortfall over the past 6 years, Longview Fire contributions have averaged less than 85% of the Fund's ADC over that period. Furthermore, the reported ADC is calculated using an open amortization period that results in perpetual negative amortization (i.e. contributions that are always less than the interest accruing on the UAAL). If the fund were to use this ADC as a funding policy, the UAAL would grow indefinitely and the "pension debt" would never be paid off.

² Current allocation as reported in the Fund's Investment Performance and Asset Allocation Analysis as of December 31, 2017.

Expected Contribution Levels vs. Actuarially Determined Contribution									
Date (12/31)	2005	2007	2009	2011	2013	2014	2015	2016	2017
Employee Contribution	14.00%	15.00%	15.00%	15.00%	15.00%	15.00%	16.25%	16.88%	16.84%
Employer Contribution	14.00%	14.00%	15.00%	15.00%	16.00%	17.00%	17.00%	17.00%	18.25%
Employer 30-Year ADC	17.24%	11.62%	19.62%	22.14%	20.20%	20.73%	19.26%	21.27%	21.77%
% of ADC funded	81.21%	120.48%	76.45%	67.75%	79.21%	82.01%	88.27%	79.92%	83.83%
Covered Payroll	\$7,452,033	\$8,524,544	\$9,859,161	\$10,123,308	\$10,690,633	\$11,141,833	\$11,411,886	\$12,731,377	\$12,934,792
Contribution Shortfall	\$241,446	-	\$455,493	\$722,804	\$449,007	\$415,590	\$257,909	\$543,630	\$455,305

The following projection illustrates the total expected contributions into the Fund under three contribution scenarios. The scenarios are 1) maintaining the current fixed contribution rates effective October 2018; 2) adopting a funding policy that utilizes a 30-year open amortization approach; and 3) adopting a funding policy that utilizes a single-layer 30-year closed amortization approach (i.e. will fully fund the plan in 30 years). The Fund's current fixed contribution structure under Scenario 1 is not sufficient to pay down the unfunded liability in the near future and in fact allows the UAAL to continue to grow for the next 20 years, resulting in negative amortization during that time.



Conclusion/Recommendations

Pre-funding a defined benefit plan, i.e. setting aside assets now for benefits that will be paid in the future, is necessary to help balance the three primary policy goals of benefit security, equity between generations of taxpayers and employees, and a stable contribution from year to year. Consistently underfunding a plan places the benefits of both retirees and active members at significant risk and/or

³ All current and projected assets and liabilities reflect the actuarial accrued liabilities, actuarial value of assets, plan provisions, and actuarial assumptions and methods as reported in the 12/31/2017 Actuarial Valuation prepared by Foster & Foster.

places the burden of paying for services already rendered on future generations of taxpayers and employees through the reduction of future benefits or an increase in contributions.

In the absence of a formal, written funding and risk-sharing policy, the result is a de facto risk-sharing arrangement that is simply a reaction to events, often well after the plan finds itself with financial difficulties. Plans and their sponsors can take many actions to ensure financial stability and mitigate the risks that lead to underfunding. These steps include ensuring contributions are adequate to fully fund the plan over a reasonable period; developing formal policies to guide decision-makers under different economic conditions; reviewing actuarial assumptions against actual experience and making necessary changes; and monitoring investment performance and evaluating asset allocation decisions on a forward-looking basis.

Actuarial Assumptions. Longview Fire's liability has increased more than expected in all but one of the past 12 actuarial valuations. When pension funds are consistently overestimating their assumptions, they underestimate the funding issues they are facing. Public pension plans must monitor actuarial assumptions continually through their actuarial valuations and make appropriate adjustments to mitigate bias in the assumptions that result in consistent actuarial gains or losses. Actuarial gains and losses occur when the plan's actual experience does not match expected experience.

Over time, without required changes, pension funds such as Longview Fire, whose assumptions consistently diverge from actual experience in the same direction (i.e. consistently seeing actuarial gains or consistently seeing actuarial losses) can exacerbate the issue of intergenerational inequity, causing one group of members and taxpayers to over- or under-pay. Boards of trustees should continue to work with their actuaries and other consultants to ensure assumptions are neither too aggressive nor too conservative, while striving to maintain (or achieve) sound fiscal health to secure existing accrued benefits. PRB's *Pension Funding Guidelines* recommend that systems monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

In addition, if the Fund continues to experience liability losses, while not required by state law, an actuarial audit of the Fund's actuarial valuations, studies and reports performed by an independent actuary is one approach the board could consider to gain additional insight into this concern.

Investment Performance. The Fund continues to maintain a relatively risky target asset allocation, compared to other TLFFRA systems. Evidence suggests that to maintain an 8.00% expected return, public pension portfolios have increased risk by more than three-fold between 1995 and 2016.⁴ It is important that asset allocation decisions are made based on the associated riskiness of the investments and a determination of whether individual investments are appropriate by themselves, as well as within the context of the total risk the Fund is accepting.

According to ASOP 27 and generally accepted actuarial standards of practice, investment allocation decisions should never be made with a goal of achieving a specific assumed rate of return. The assumed rate of return should only be calculated once an appropriate allocation and associated level of risk is determined. The Fund is encouraged to develop an investment policy statement that considers the

⁴ https://www.pacificresearch.org/wp-content/uploads/2017/06/2017-02-01-Risk_Taking_Appropriateness.pdf

plan's general funding policy; follows industry best practices, including outlining general objectives that consider appropriate risk levels; and establishes policies and procedures for evaluating the impact of changes to the funding policy and the Fund not achieving its investment objectives.

Adequate Funding. The Plan and City took proactive steps beginning in 2012 to both increase contribution rates in recent years and lower future benefit accruals. While the actions taken are commendable and in compliance with TLFFRA statute's minimum contribution requirement, the current contribution structure still has not been enough to meet the Plan's ADC rate. To address this concern, a strong funding policy that requires payment of an ADC is encouraged. Numerous actuarial methods can be utilized to help mitigate contribution volatility, including directly smoothing contribution rates or adding "guardrails" that require the stakeholders to come back to the table if the contribution rate falls outside a specified range. If funding according to an ADC is not adopted, a funding policy that fully funds the plan over a finite period, such as 30 years, is recommended.

Governance Risk

When public pension plans and their sponsors wait too long to address them, the funding challenges compounding over time can reach a point where incremental improvement, such as the contribution increases made for Longview Fire, are not sufficient to make consistent, long-term improvements to the overall health of the plan. Longview Fire and the City of Longview have yet to make difficult decisions on additional needed changes to its actuarial assumptions and funding policy. Although a series of contribution increases have been implemented, these haven't been enough to place the Fund on a path to sound financial footing. If necessary changes are ultimately made, they may right the ship, but they will potentially be made under less than ideal conditions.

Governance is essentially decision-making, and decision-making for public pension plans must balance the competing interests of plans and their sponsors and should feature collaboration between the two. Overall, Longview Fire's governance has been proactive regarding its benefit and contribution structure. Starting in 2012, The Fund and the City developed a four-step plan to tackle funding issues without being statutorily subject to any such requirement. The plan included increasing the City's contribution rate from 15% of payroll in 2012 to 19% as of October 2018 and adding a new tier with a lower benefit design for future members in January 2016. The board has also been proactive in making investment management changes after a period of inadequate results. However, even with these contribution increases, the unfunded liability is expected to continue to grow, requiring additional changes in the future.

In the area of investment governance, Longview Fire amended its investment policy statement in May 2017. The Fund removed a number of important elements from its previous IPS that are best practices according to the Government Finance Officers Association (GFOA). The TLFFRA statute requires boards of trustees to give special consideration to the preferred investment practices of the GFOA. The GFOA recommends that investment policy statements include detailed policies in areas such as roles and responsibilities, risk tolerances, liquidity, and manager performance evaluation, among others.⁵ The

⁵ <http://www.gfoa.org/investment-policies-defined-benefit-plans>
<http://www.gfoa.org/investment-policy>

purpose for having a detailed written policy is to help guide board members in their decision-making and ensure both current and future boards follow similar objectives within the same framework.

Conclusion/Recommendation

The PRB encourages Longview Fire and the City of Longview to develop policies that proactively manage risk. This includes following best practices in investment policy statements as well as laying out a formal risk-sharing plan. To proactively manage governance and funding risk, retirement plans and their sponsors should work together to adopt written policies far in advance, that can guide them through both good and bad years and shield against the risk of either party's exclusion or disengagement from decision-making. Funding and benefit policies can be adopted that provide a framework for how benefit and contribution levels may be modified under different conditions. An advantage of such policies is that changes to plan benefits and costs are known and understood by all parties in advance, rather than negotiated under difficult circumstances.

For example, a benefit policy can outline the primary objectives the employer wishes to achieve, which can be as detailed as a specified replacement ratio, or as general as offering competitive benefits at a reasonable cost, as well as identifying policies and procedures designed to determine if the objectives are being met and how they can be reviewed at reasonable intervals. A benefit policy can also outline potential benefit enhancements or reductions based on the funding goals as outlined in the funding policy. The funding policy might incorporate objectives associated with benefit security, contribution stability and intergenerational equity and outline how those objectives will be met through contribution changes, as well as referencing potential changes outlined in the benefit policy. The coordinated policies might limit future benefit enhancements, cost of living adjustments, and/or contribution rate reductions such that they can only be considered or made if the Fund's funded ratio remains greater than a chosen threshold. In addition, if the funded ratio falls below a certain threshold, the stakeholders may be required to come back to the table to make necessary contribution and benefit adjustments.

Finally, the board is encouraged to reassess its investment policy statement to balance its desire to streamline the policy with the guidance provided by the GFOA. Doing so would help ensure that current and future boards maintain thorough policies that clearly delineate roles and responsibilities, risk tolerances, liquidity needs, and a detailed process for evaluating manager performance against appropriate benchmarks.

Appendix

Key Metrics

Amort. Period (Years)	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC ⁶	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
50.7	45.53%	383.31%	8.00%	3.00%	70.47%	0.55%	-5.93%

*Contribution, DROP and cash flow data are from the Fund's 12/31/2016 financial audit.

Metric	Amortization period (50.7 years)
What it measures	Approximately how long it would take to fully fund the unfunded actuarial accrued liability (UAAL) based on the current funding policy.
Why it is important	Given the Plan's current assumptions, an amortization period greater than 17 years indicates that contributions to the Plan in the coming year are less than the interest accumulated for that same period, and therefore the total UAAL is expected to grow over the near term. In addition, for a plan that contributes on a fixed-rate basis such as Longview Fire, the higher the amortization period, the more sensitive it is to small changes in the UAAL.
Peer comparison	Longview Fire's amortization period is the third highest among its peers, the sixth highest finite period in the state and is greater than the maximum PRB pension funding guideline of 30 years.

Metric	Funded ratio (45.53%)
What it measures	The percent of a fund's actuarially accrued liabilities covered by its actuarial value of assets.
Why it is important	The lower the funded ratio, the fewer assets a fund has to pay its current and future benefit payments.
Peer comparison	Longview Fire's 45.53% funded ratio is the second lowest among its TLFFRA peer plans, and one of the lowest in the state of Texas.

⁶ For plans whose contributions are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a). For Longview Fire, the recommended contribution rate comes from the actuarial valuation with a valuation date that is on or before the first day of the fiscal year shown (12/31/2015 AV in this case). The expected employee contribution was 16.25% in this case to reflect the increase in the contribution from 16% to 17% effective October 1, 2016. The employer contribution rate is calculated as the actual \$ contribution during the fiscal year shown as reported in the Fund's 2016 CAFR (\$2,105,902) divided by the covered payroll reported for the same period.

Metric	UAAL as a percent of payroll (383.31%)
What it measures	The size of a plan's unfunded liability compared to the annual payroll of the active members.
Why it is important	Provides a way to compare plans of various sizes and expresses the outstanding "pension debt" relative to current personnel costs.
Peer comparison	The Plan's UAAL as a percent of payroll is was the second highest in its peer group, and sixth highest in the state.

Metric	Assumed rate of return (8.00%)
What it measures	The estimated annual rate of return on the Fund's assets.
Why it is important	If actual future returns are lower than the assumed rate of return, future contributions will need to increase significantly, especially for a poorly funded plan. Longview Fire's assumed rate of return is 8.00%, while its actual ten-year investment rate of return for the period ending December 31, 2017 was 3.17%.
Peer comparison	Longview Fire is tied for the second highest assumed rate of return in the state.

Metric	Payroll growth rate (3.00%)
What it measures	The estimated annual growth in the total payroll of active members contributing into the Fund.
Why it is important	Contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Fund's actuarial valuations. Persistent contributions below expected levels could have serious consequences on the Fund's long-term solvency.
Peer comparison	The Fund's payroll growth rate of 3.00% is tied for the lowest in its peer group of TLFFRA plans with similar asset size and one of the lowest in the state.

Metric	Actual contributions as a percent of actuarially determined contributions (70.47%)
What it measures	Whether the current employer contributions have met a theoretical minimum threshold. ⁷
Why it is important	The employer's portion of the contribution is less than 65% of the amount needed to fund the plan on a rolling 30-year amortization period. The PRB's 2014 Study of the Financial Health of Texas Public Retirement Systems found that plans that have consistently received adequate funding are in a better position to meet their long-term obligations.
Peer comparison	This is the largest shortfall percentage in its peer group.

Metric	DROP balance as a percent of fiduciary net position (0.55%)
What it measures	The amount of the Fund's assets that are designated for lump-sum payouts to retired members as a percent of its total assets.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)) shows how large a decrease in the Fund's assets could be if most or all DROP participants decided to take their balances out in a short amount of time.
Peer comparison	Longview Fire's DROP balance as a percent of FNP is the lowest among its peer group and one of the lowest in the state.

Metric	Non-investment cash flow as a percent of fiduciary net position (-5.93%)
What it measures	Non-investment cash flow shows how much the plan is receiving through contributions in relation to its outflows: benefit payments, withdrawals and expenses.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)), in conjunction with the funded ratio and recognition of the relative maturity of the plan, provides information about the stability of a plan's funding arrangement.
Peer comparison	Longview Fire's non-investment cash flow as a percent of FNP is the second lowest in its peer group and one of the lowest in the state.

⁷ The theoretical minimum threshold, or actuarially determined contribution (ADC), is a target or recommended contribution "to the plan as determined by the actuary using a contribution allocation procedure," as defined in Actuarial Standards of Practice No 4. If contributions to the plan are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Plan Summary

The Longview Firemen's Relief and Retirement Fund ("Longview Fire" or "the Fund") was established in 1937 under the Texas Local Fire Fighter's Retirement Act (TLFFRA). TLFFRA provides general guidelines for fund management, but leaves administration, plan design, contributions, and specific investments to the discretion of the board of trustees. Longview Fire, as with all TLFFRA systems, is entirely locally-funded.

Benefits

Tiers	Tier 1 – Hired before 1/1/2016 Tier 2 – Hired on or after 1/1/2016
Retirement Eligibility	Tier 1 – Age: 50 years; Years of Credited Service (YCS): 20 years Tier 2 – Age: 55 years; YCS: 20 years
Vesting	Fully vested after 20 YCS
Benefit Formula	Tier 1 – $80\% \times \text{Final Average Salary} + \80 per month for each year of service in excess of 20 years. Tier 2 – $\text{YCS} \times 3.0\% \times \text{Final Average Salary (max 75\% FAS)} + \80 per month for each year of service in excess of 25 years.
Final Average Salary (FAS)	Hired before 1/23/1993 – Highest consecutive 36 months Hired on or after 1/23/1993 – Highest consecutive 60 months
COLA	None
Retirement Benefit Options	3-year Retro DROPs: Eligible once a member has satisfied Service Retirement requirements, not to exceed 36 months Retro DROP accumulation includes the sum of the monthly service retirement benefit the member would have received if had retired on the DROP determination date plus an amount equal to the member contributions to the fund while a DROP participant. No interest is credited on Retro DROP. DROP balance is distributed as a lump sum
Social Security	No

Contributions

As of October 1, 2017, active members of Longview Fire hired before 1/1/2016 contribute 17.00% of pay and those hired on or after 1/1/2016 contribute 15.00% of pay, while the City of Longview (the City) contributes 18.00% of pay. City contributions will increase to 19% of pay as of October 1, 2018.

Membership

Total Active Members	Retired Members	Beneficiaries	Total Annuitants	Terminated	Total Members	Active-to-Annuitant Ratio
175	121	26	147	1	323	1.19

TLFFRA Board Structure

Active Members	3 - Members of the retirement system; elected by fund members. Three-year terms.
Sponsor Government	1 - Mayor or designated representative, or the political subdivision's Chief Operating Officer or designated representative. 1 - Chief Financial Officer of the political subdivision, or designated representative. Terms correspond to term of office.
Taxpayer, Not Affiliated With Fund/Sponsor Govt.	2 - Residents of the State of Texas, must not be officers/employees of the political subdivision; elected by other Board of Trustee members. Two-year terms.

Contribution and Benefit Decision-Making

TLFFRA authorizes members of the retirement systems to determine their contribution rates by voting. The statute requires cities to make contributions at the same rate paid by employees or 12%, whichever is smaller. TLFFRA also allows a city to contribute at a higher rate than employees do through a change in city ordinance.

TLFFRA gives the board the power to make decisions to modify the benefits (increases and reductions). However, a proposed addition or change must be approved by the actuary and a majority of participating plan members. Benefit changes cannot deprive a member, retiree or beneficiary of the right to receive vested accrued benefits.

Historical Trends

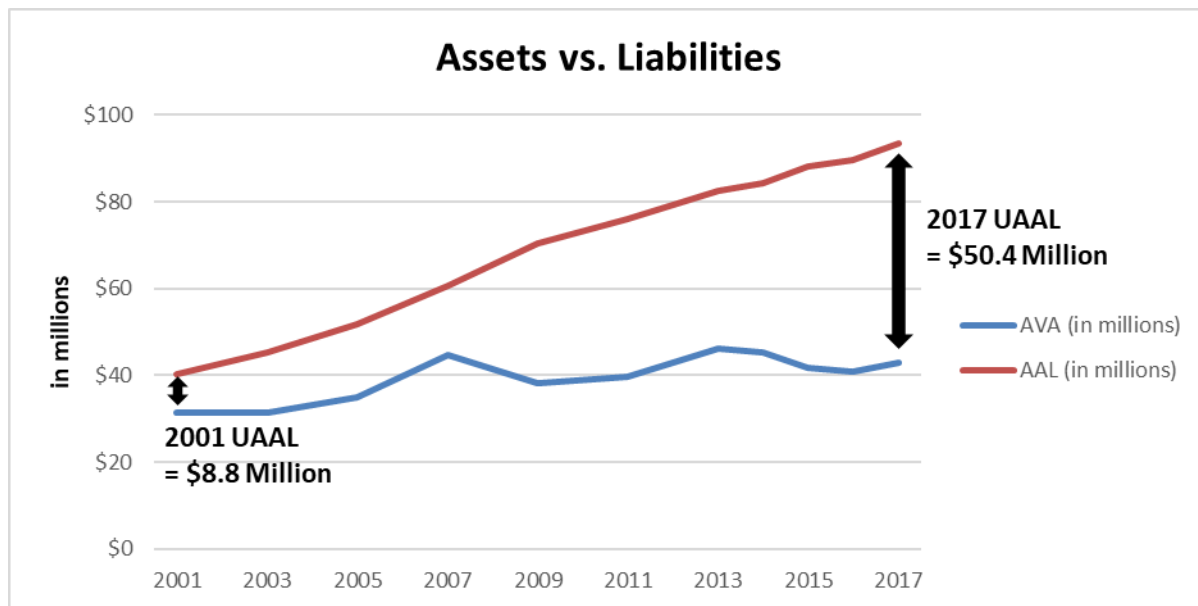
To conduct an intensive review of risks associated with the long-term funding of a pension Fund, it is important to analyze trends in multiple metrics. A Fund with an asset level lower than its accrued liability has insufficient funds to cover benefits. A Fund can experience an increase in unfunded liability due to various factors, including insufficient investment returns, inadequate contributions and inaccurate or overly aggressive assumptions. Hence, a single metric cannot effectively capture the different drivers contributing to the increase of a Fund's unfunded pension obligation. This section analyzes historical trends in various metrics identified by the PRB and makes comparisons to understand the sources of growth in unfunded liability for Longview Fire.

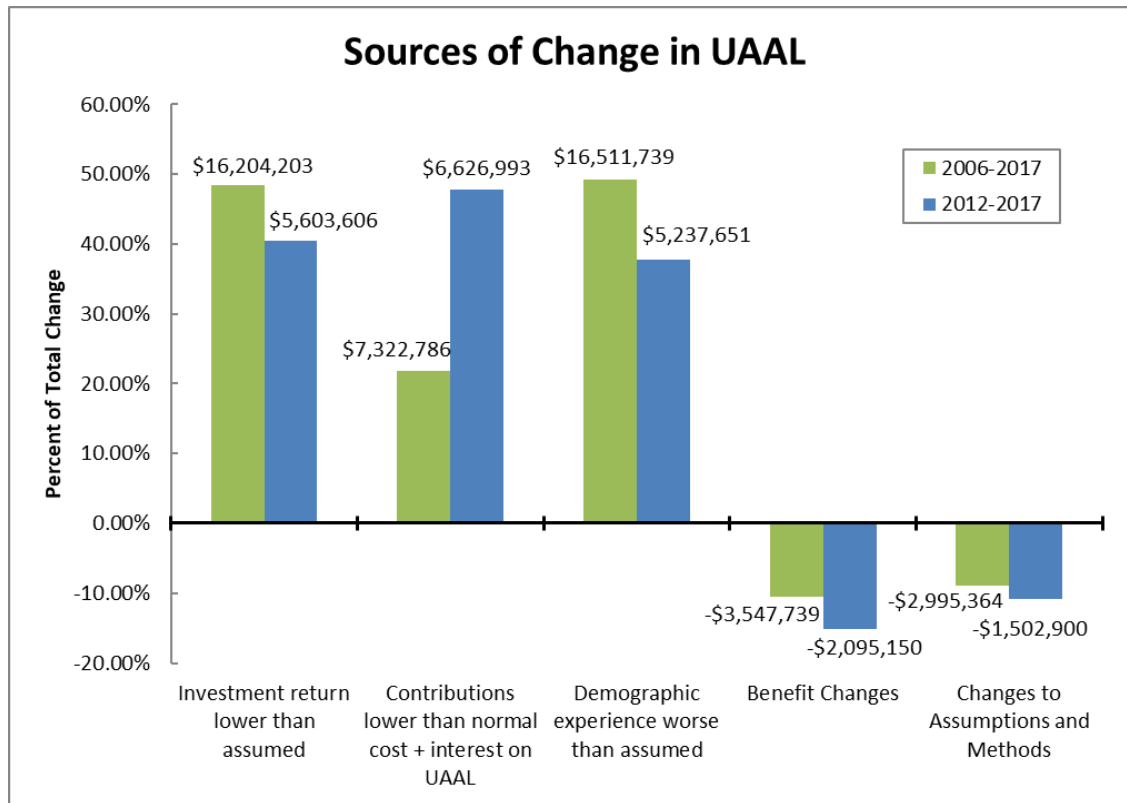
Longview Fire's funded status has been trending downward since 2001. Numerous factors have contributed to this deterioration, including inadequate contributions, investment returns lower than the chosen assumption, and the lack of adjustments to the Fund's assumptions. The following sections discuss these and other factors in detail.

Assets and Liabilities

Funding Trends										
Funded Ratio, Assets, Liabilities and Year over Year Growth										
Fiscal Year	2001	2003	2005	2007	2009	2011	2013	2015	2016	2017
Funded Ratio	78.14%	69.45%	67.43%	73.71%	54.35%	52.02%	56.22%	47.34%	45.53%	46.05%
Am Period (years)	71.6	Infinite	Infinite	20.1	88.6	Infinite	63.3	37.9	50.7	40.2
UAAL (in millions)	\$8.82	\$13.81	\$16.88	\$15.92	\$32.07	\$36.51	\$36.08	\$46.34	\$48.80	\$50.38
AVA (in millions)	\$31.54	\$31.40	\$34.95	\$44.64	\$38.18	\$39.58	\$46.33	\$41.66	\$40.80	\$43.00
AVA Growth (YoY)	-	-0.22%	5.50%	13.01%	-7.52%	1.81%	8.19%	-7.88%	-2.07%	5.41%
AAL (in millions)	\$40.36	\$45.22	\$51.83	\$60.56	\$70.25	\$76.09	\$82.40	\$88.00	\$89.60	\$93.38
AAL Growth (YoY)	-	5.84%	7.07%	8.09%	7.70%	4.07%	4.07%	4.55%	1.81%	4.22%

Longview Fire's actuarial accrued liability (AAL) increased by over 130% between 2001 and 2017. The Fund's actuarial value of assets (AVA) increased by less than 40% over the same period. The Fund was nearly 80% funded in 2001 and has been less than 50% funded since 2015.

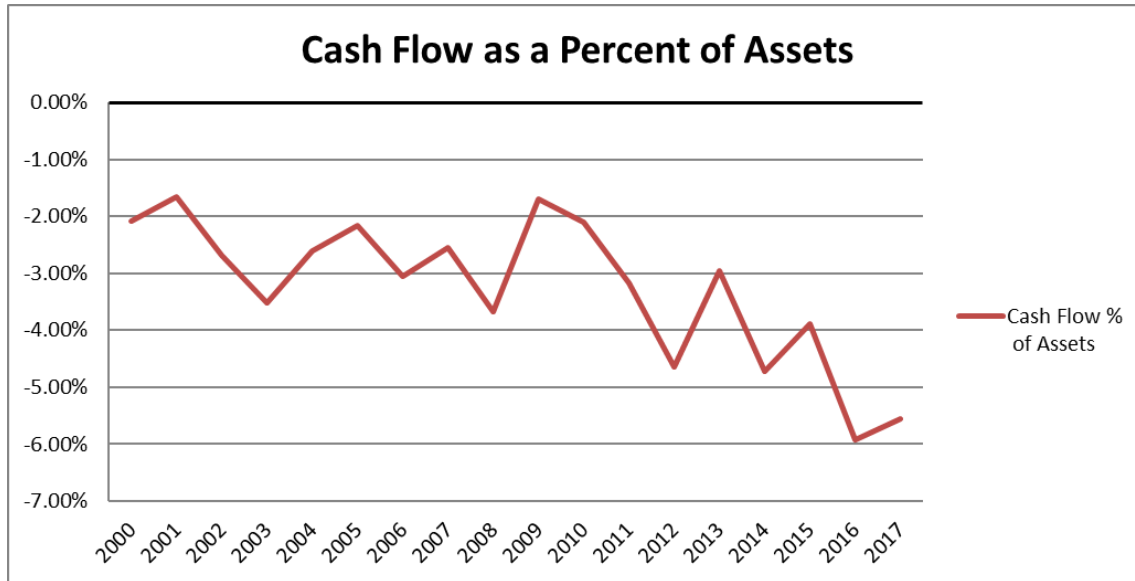




Valuation Date	Investment return lower/ (higher) than assumed	Contribution lower/ (higher) than normal cost + interest on UAAL	Liability experience worse/ (better) than assumed	Benefit Changes	Changes to assumptions & methods	Other	Total Change in UAAL	UAAL
12/31/2005	-	-	-	-	-	-	-	16,881,969
12/31/2007	(3,398,794)	(332,557)	5,717,469	(1,452,589)	(1,492,464)	100	(958,835)	15,923,134
12/31/2009	10,799,265	(779,960)	6,128,602	-	-	-	16,147,907	32,071,041
12/31/2011	3,200,126	1,808,310	(571,983)	-	-	-	4,436,453	36,507,494
12/31/2013	(3,296,512)	2,375,547	1,095,174	(606,080)	-	-	(431,871)	36,075,623
12/31/2014	3,057,982	661,829	695,866	(1,541,398)	-	-	2,874,279	38,949,902
12/31/2015	5,486,836	827,824	1,025,392	52,328	-	-	7,392,380	46,342,282
12/31/2016	2,025,189	1,237,921	698,365	-	(1,502,900)	-	2,458,575	48,800,857
12/31/2017	(1,669,889)	1,523,872	1,722,854	-	-	-	1,576,837	50,377,694
2006-2017	16,204,203	7,322,786	16,511,739	(3,547,739)	(2,995,364)	100	33,495,725	
% of Total	48.38%	21.86%	49.30%	-10.59%	-8.94%	0.00%	100.00%	
2012-2017	5,603,606	6,626,993	5,237,651	(2,095,150)	(1,502,900)	-	13,870,200	
% of Total	40.40%	47.78%	37.76%	-15.11%	-10.84%	0.00%	100.00%	

Cash flow

Longview Fire non-investment cash flow was -5.6% in 2017 and has been in decline since 2009. The decrease is due to benefit payments growing by nearly 87% between 2011 and 2016 while contributions only grew by 37% during that same period. A negative non-investment cash flow is not abnormal for mature defined benefit pension plans. However, a cash flow percentage this low is likely to be a drag on potential investment returns because a fund must either invest in a higher proportion of income-producing investments, which traditionally provide lower returns, or must liquidate existing assets to pay out current benefits and/or expenses.



Peer Group Key Metric Comparison

		Funding Val Metrics						Fiscal Year End Metrics			
Peer Group Plans	MVA	Am Period Date	Am Period	Funded Ratio	UAAL as % of Payroll	Assumed Interest	Payroll Growth	FYE	Actual Cont. as % of ADC	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
Abilene Firemen's Relief & Retirement Fund	\$52,343,510	10/1/2015	31.5	56.60%	316.19%	8.00%	4.00%	9/30/2016	97.77%	N/A	-3.35%
Wichita Falls Firemen's Relief & Retirement Fund	\$46,915,744	1/1/2017	49.4	62.48%	265.13%	8.00%	4.50%	12/31/2016	71.51%	N/A	-4.80%
Odessa Firemen's Relief & Retirement Fund	\$45,718,416	1/1/2017	46.5	45.12%	511.52%	7.75%	3.50%	12/31/2017	81.31%	4.54%	-11.16%
McAllen Firemen's Relief & Retirement Fund	\$44,759,055	10/1/2016	41.4	69.11%	187.25%	7.75%	4.00%	9/30/2016	103.85%	N/A	-3.15%
Port Arthur Firemen's Relief & Retirement Fund	\$43,469,930	12/31/2015	18.3	77.97%	160.73%	8.00%	4.00%	12/31/2016	100.39%	N/A	-5.15%
Longview Firemen's Relief & Retirement Fund	\$40,798,027	12/31/2016	50.7	45.53%	383.31%	8.00%	3.00%	12/31/2016	70.47%	0.55%	-5.93%
Galveston Firefighter's Relief & Retirement Fund	\$40,155,474	12/31/2016	Infinite	68.04%	257.06%	7.75%	3.00%	12/31/2016	79.37%	N/A	-3.04%
Temple Firemen's Relief & Retirement Fund	\$39,838,918	9/30/2016	28.4	75.12%	164.97%	7.75%	3.75%	9/30/2017	95.24%	N/A	-2.89%
Killeen Firemen's Relief & Retirement Fund	\$35,342,830	9/30/2016	22.8	69.74%	114.49%	7.75%	3.25%	9/30/2016	100.97%	N/A	3.14%
Harlingen Firemen's Relief & Retirement Fund	\$31,224,379	9/30/2017	59.1	66.06%	248.99%	7.75%	3.50%	9/30/2016	115.85%	1.12%	-3.78%
Texarkana Firemen's Relief & Retirement Fund	\$31,019,529	12/31/2015	16.3	87.37%	118.93%	7.75%	3.25%	12/31/2016	100.00%	N/A	-4.55%

Peer Group Sponsor Funding Comparison

Peer Group Plans	Sponsor	GF Expend	EOY GF Bal	UAAL	Expected Employer Contributions	ADC	30-yr Shortfall	30-Y SF % of ADC	30-Y SF % of GFE
Abilene Firemen's Relief & Retirement Fund	Abilene	\$83,561,890	\$24,912,196	\$43,412,430	\$2,642,987	\$2,703,398	\$60,411	2.23%	0.07%
Wichita Falls Firemen's Relief & Retirement Fund	Wichita Falls	\$73,605,525	\$14,329,468	\$29,905,176	\$1,353,554	\$1,735,933	\$382,379	22.03%	0.52%
Odessa Firemen's Relief & Retirement Fund	Odessa	\$79,627,501	\$48,378,438	\$60,600,337	\$2,373,699	\$2,987,300	\$613,601	20.54%	0.77%
McAllen Firemen's Relief & Retirement Fund	McAllen	\$106,200,111	\$46,387,548	\$21,571,433	\$1,497,603	\$1,668,099	\$170,496	10.22%	0.16%
Port Arthur Firemen's Relief & Retirement Fund	Port Arthur*	\$58,765,367	\$67,804,846	\$12,792,922	\$1,103,170	\$1,103,170	\$-	0.00%	0.00%
Longview Firemen's Relief & Retirement Fund	Longview	\$60,227,994	\$15,557,734	\$48,800,857	\$2,360,600	\$2,815,904	\$455,305	16.17%	0.76%
Galveston Firefighter's Relief & Retirement Fund	Galveston	\$48,539,395	\$17,786,895	\$20,353,268	\$2,849,458	\$4,475,684	\$1,626,226	36.33%	3.35%
Temple Firemen's Relief & Retirement Fund	Temple	\$68,789,608	\$28,482,112	\$14,003,032	\$1,293,576	\$1,355,539	\$61,963	4.57%	0.09%
Killeen Firemen's Relief & Retirement Fund	Killeen	\$76,816,134	\$20,151,484	\$16,234,675	\$1,843,473	\$1,921,466	\$77,993	4.06%	0.10%
Harlingen Firemen's Relief & Retirement Fund	Harlingen	\$40,931,266	\$18,512,353	\$16,040,541	\$966,349	\$1,179,590	\$213,241	18.08%	0.52%
Texarkana Firemen's Relief & Retirement Fund	Texarkana	\$32,041,046	\$14,114,855	\$4,786,718	\$784,848	\$784,848	\$-	0.00%	0.00%

* 2017 sponsor data was unavailable for Port Arthur at the time of this review. Data in this table for Port Arthur is from 12/31/2016.

Peer Group Expense Comparison

Peer Group Plans	10 yr. return (Net)	Active/ Annuitants	Average Benefit	NPL	Admin Expenses	Investment Expenses	Other Expenses	Total Expenses	Exp as % of Assets
Abilene Firemen's Relief & Retirement Fund	4.40%	0.94	\$36,556	\$50,512,956	\$29,699	\$194,616	\$-	\$224,315	0.39%
Wichita Falls Firemen's Relief & Retirement Fund	5.18%	1.15	\$29,292	\$46,175,637	\$115,843	\$227,282	\$-	\$343,125	0.73%
Odessa Firemen's Relief & Retirement Fund	2.58%	0.91	\$52,055	\$92,884,709	\$204,605	\$218,069	\$-	\$422,674	0.92%
McAllen Firemen's Relief & Retirement Fund	4.17%	1.62	\$37,994	\$27,828,153	\$56,906	\$296,057	\$-	\$352,963	0.79%
Port Arthur Firemen's Relief & Retirement Fund	5.15%	1.30	\$54,098	\$15,326,469	\$36,358	\$45,688	\$-	\$82,046	0.19%
Longview Firemen's Relief & Retirement Fund	3.22%	1.24	\$41,493	\$55,681,251	\$116,238	\$225,267	\$-	\$341,505	0.83%
Galveston Firefighter's Relief & Retirement Fund	3.74%	1.35	\$35,879	\$25,178,930	\$103,459	\$162,606	\$-	\$266,065	0.66%
Temple Firemen's Relief & Retirement Fund	4.17%	1.39	\$40,920	\$16,001,777	\$101,321	\$69,570	\$-	\$170,891	0.40%
Killeen Firemen's Relief & Retirement Fund	4.01%	3.67	\$30,021	\$21,110,703	\$94,483	\$50,299	\$-	\$144,782	0.41%
Harlingen Firemen's Relief & Retirement Fund	5.06%	1.43	\$25,706	\$38,003,230	\$24,755	\$143,491	\$-	\$168,246	0.59%
Texarkana Firemen's Relief & Retirement Fund	5.27%	1.15	\$30,731	\$7,275,575	\$85,879	\$181,904	\$-	\$267,783	0.84%

Comments from Longview Firemen's Relief and Retirement Fund



Kolby Beckham
Chairman

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Station #3 (903) 291-5203
kbeckham@longviewtexas.gov

September 6, 2018

Pension Review Board
RE: 2018 Intensive Actuarial Review

On August 30th 2018 the Longview Firemen's Relief & Retirement Fund received the draft copy of your Intensive Actuarial Review. Please see our formal response below.

First off it was a disappointment to see that the PRB report chose to exclude the 2017 Plan information on the first page. Instead, the PRB chose to use the information that better fit the negative narrative of this report. It was included throughout this report, so updating that page would have been easily accomplished.

What updating those numbers would have done to the bullet points on page 1;

- 40.2 amortization period would have changed the amount from third highest among its peers to 6th out of the group of ten.
- 255.6 UAAL would have taken us from second highest in the peer group to 5th out of the group of 10.

Page 3

There is an implication of some sort of fraud or deception from our last Actuarial Assumption review. All assumptions were discussed and some aspects of them were put on the table for changing over the next several years. Our discussion was to work towards a 7.75% Assumed Rate of Return. If you looked at some of the areas we could have made changes that were well justified, we chose to take the more conservative route. Specifically at the advice of our Actuary, we chose to keep our Payroll growth assumption at 3%, despite actual experience for the 5 year period being 4.32% and 5.1% over the last 14 years.

Page 4

There is a comment that our poor returns were primarily from "illiquid alternative investments, primarily private equity". I am not sure what the basis of this information is, but it is incorrect. We have a diverse assortment of alternatives with none of them being in direct private equity. We have exposure to distressed debt, Capital Ventures, etc. these funds were not underperforming their benchmarks, but rather in their drawdown period (see page 5 of the attached document). The nature of these investments is to have the majority of returns back loaded in the 7-10 years horizon. It is not reasonable to calculate the final ROI at this time. We have reached the positive slope of the J curve on our alternative funds, and have started to receive distributions on a more regular basis (see page 4 of the attached document). I am not sure why the PRB would think we would sell these investments in some secondary market for a loss to lower our allocation. Our plan is to lower that allocation to 10% as they mature. Moreover, we replaced our investment consultant. This, along with the positive impact of the alternative returns, has made a drastic improvement in our fund's performance. You can see on Page 1-2 of the attached document the fund's investment returns vs the peer group. The investment changes have brought us from the 98th percentile 7 years ago, to the 1st percentile YTD.

Page 5

I am proud of the hard work of both the City and Members to make many changes to strengthen the fund. There has been an improvement from an amortization of infinity to 40.2 years. The next increase of contributions in October 2018 along with the gradual effect of the new Tier 2 plan will continue to have a positive impact on the plan.

Page 8

There is a reference that TLFFRA somehow excludes the city from participating in the benefit modifications of the fund. Since 1938 TLFFRA has always placed all stakeholders at the table of the decisions. Boards are comprised of 3 Active members, 2 City personnel and 2 Citizen board members (taxpayers). The report eludes that the firefighters can somehow make changes without the key stakeholders' approval. That assertion is neither factual nor conceptually sound.

Page 8-9

As explained in the conference call last month. The previous Investment Policy Statement (IPS) that was replaced with a much more simplified IPS was a unanimous decision of the board. We found that the previous version that is listed as "Preferred" led to a constant update issue. When you change your IPS every time you change an allocation, you end up with the cart leading the horse. The IPS should drive the investment decisions not vice versa. That is why we changed to a more manageable IPS.

Sincerely,

Kolby Beckham
Chairman



Longview Firefighters' Relief and Retirement Fund

PRB Actuarial Review

For the Period Ending June 30, 2018

Robert Harrell, Incorporated

8310 Capital of Texas Highway, North

Suite 320

Austin, TX 78731

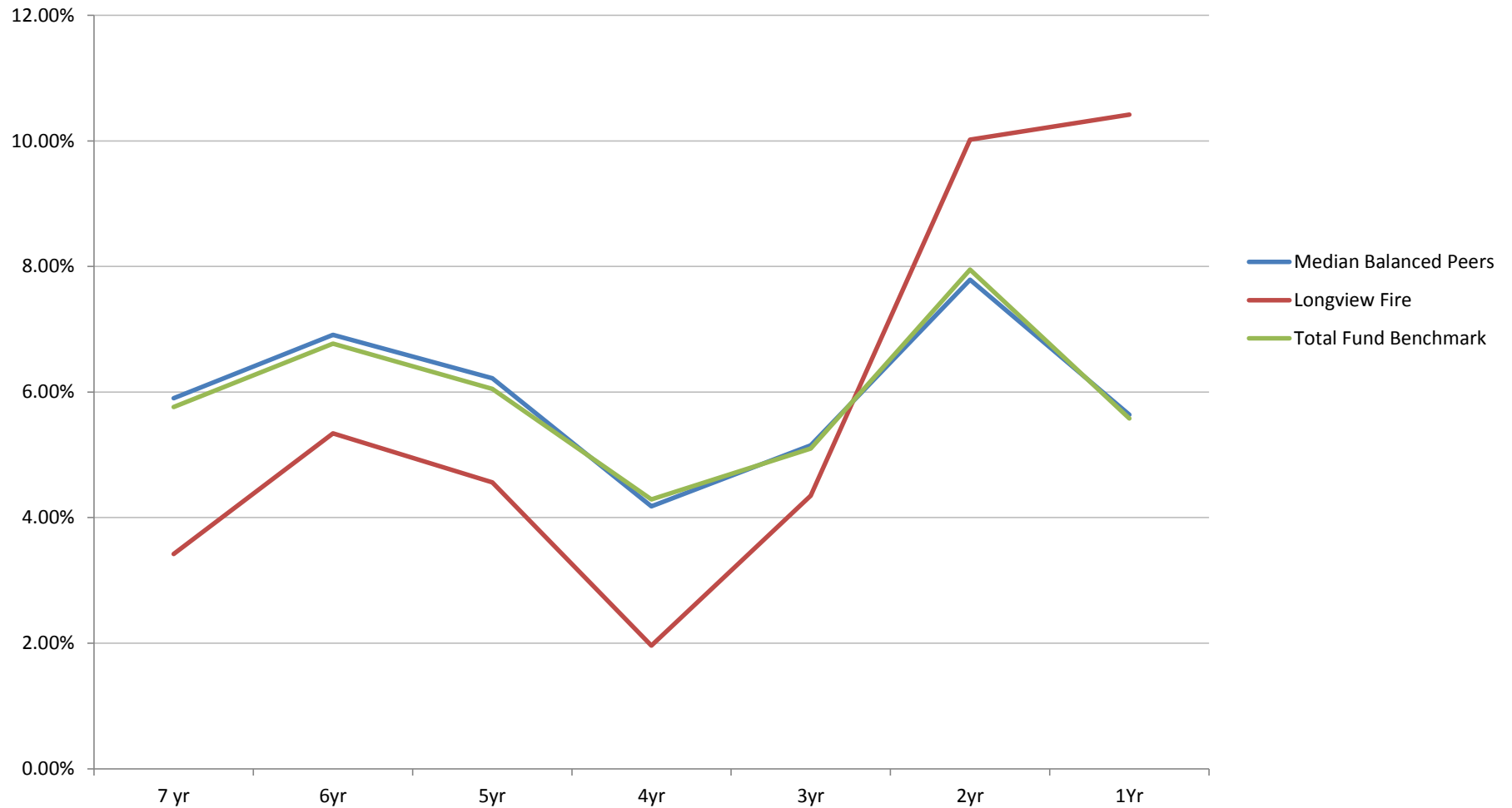
Ph 512-795-9100

Fax 512-795-0633

www.harrell.com

Registered Investment Adviser

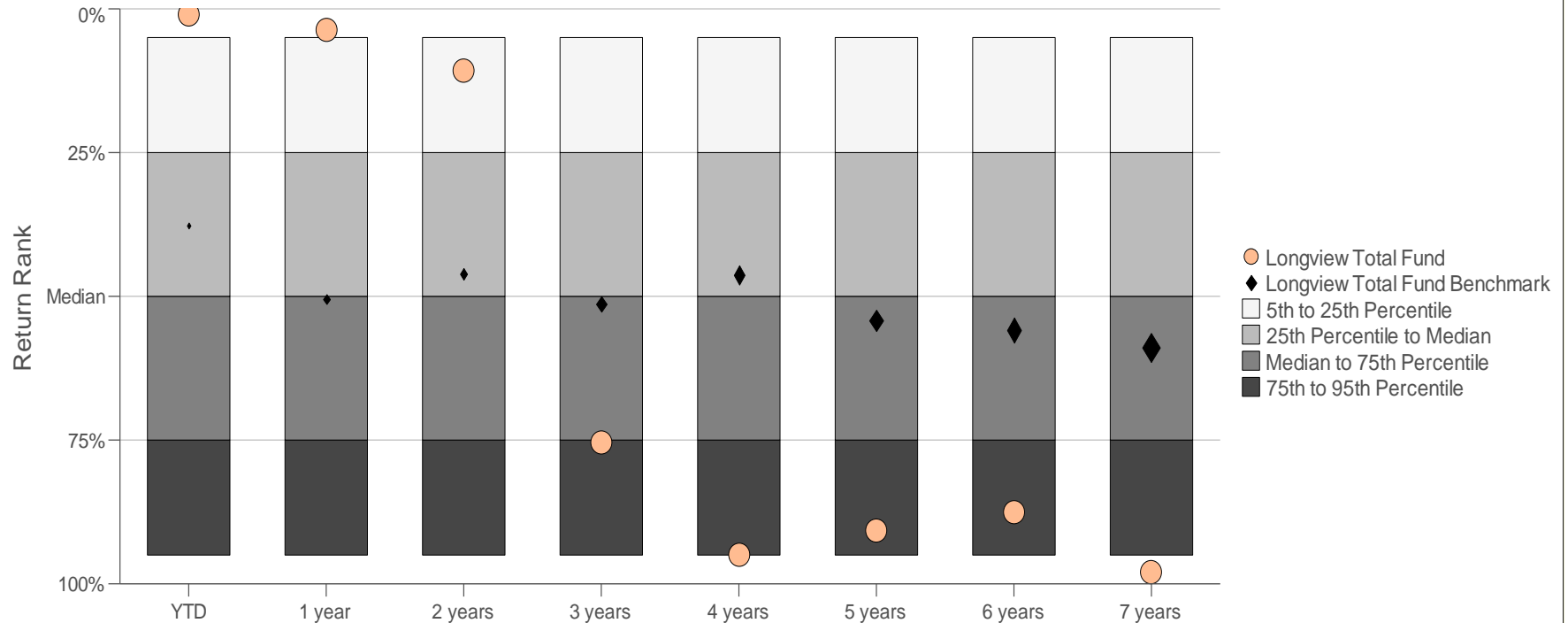
Longview Firemen's Relief and Retirement Fund
Total Investment Returns
as of June 30, 2018



Longview Firemen's Relief and Retirement Fund

Manager vs Lipper Mixed-Asset Target Alloc Moderate Funds: Return Rank

January 2011 - June 2018 (not annualized if less than 1 year)



Manager vs Lipper Mixed-Asset Target Alloc Moderate Funds: Return Rank

January 2011 - June 2018 (not annualized if less than 1 year)

	YTD	1 year	2 years	3 years	4 years	5 years	6 years	7 years
	576 mng	556 mng	535 mng	502 mng	483 mng	457 mng	441 mng	402 mng
Longview Total Fund	0.93%	3.66%	10.79%	75.36%	94.89%	90.81%	87.56%	98.01%
Longview Total Fund Benchmark	37.72%	50.51%	46.09%	51.30%	46.30%	54.21%	55.92%	58.88%

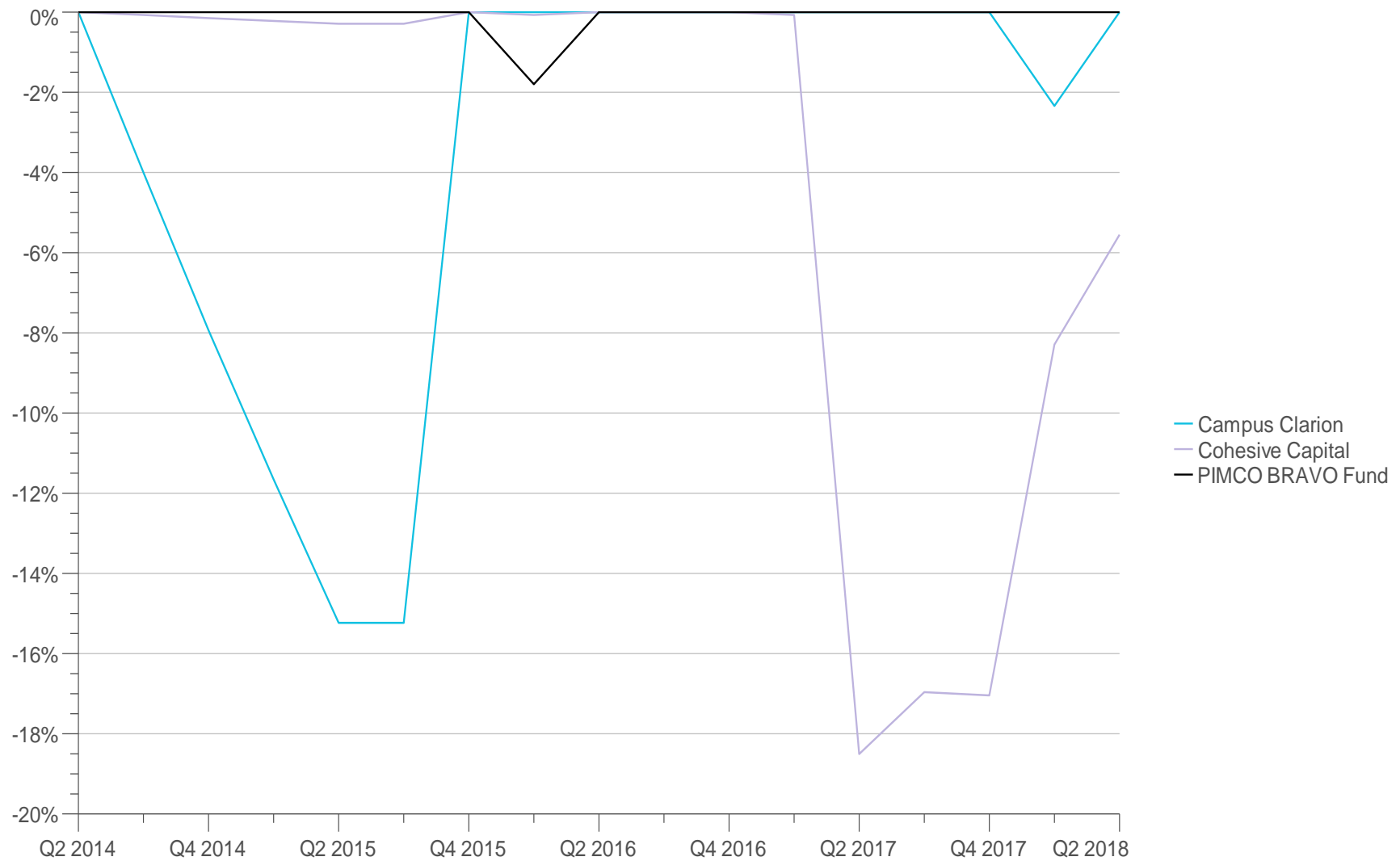
**Longview Firemen's Relief and Retirement Fund
Private Illiquid Investment Returns
as of June 30, 2018**



Longview Firemen's Relief and Retirement Fund - Illiquid Investments

Drawdown

July 2014 - June 2018



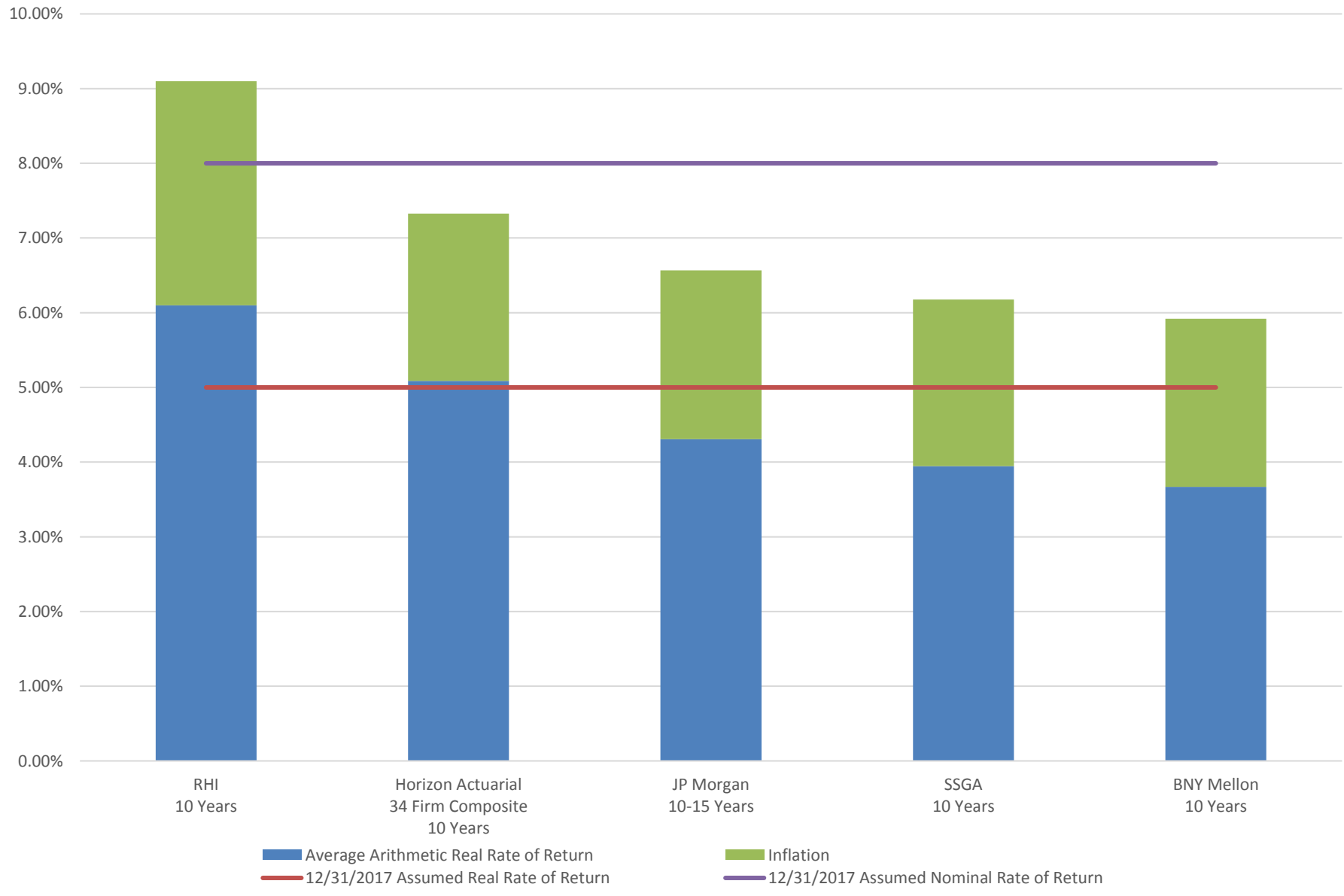
Longview Firemen's Relief and Retirement Fund - Illiquid Investments

Risk / Return Table

Annualized Summary Statistics: July 2014 - June 2018

	Return (%)	Std Dev (%)	Downside Risk (%)	Beta vs. Market	Alpha vs. Market (%)	R-Squared vs. Market (%)	R-Squared vs. Style (%)	Sharpe Ratio	Tracking Error vs. Market (%)	Observs.
Campus Clarion	9.39	16.16	7.51	0.9132	0.52	14.13	19.42	0.5512	14.9828	16
Cohesive Capital	5.00	14.21	10.22	0.1359	4.53	0.40	7.64	0.3180	15.2985	16
PIMCO BRAVO Fund	8.40	3.13	2.28	0.0649	7.72	1.90	3.03	2.5271	6.9510	16
S&P 500	10.79	6.65	5.16	1.0000	0.00	100.00	99.33	1.5487	0.0000	16

Longview Firemen's Relief & Retirement Fund Expected Rate of Return Summary



Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX A6 - INTENSIVE ACTUARIAL REVIEW – ORANGE FIREMEN'S RELIEF AND RETIREMENT FUND

Intensive Actuarial Review:

Orange Firemen's Relief and Retirement Fund

October 2018



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Executive Summary

Introduction

This intensive actuarial review of Orange Firemen's Relief and Retirement Fund ("Orange Fire" or "the Fund") is intended to assist the Fund's board of trustees and the City of Orange ("the City") in assessing the Fund's ability to meet its long-term pension obligation. Overall, the review shows the Fund is taking considerable risks in its approach to funding the system. The Pension Review Board (PRB) encourages the Fund and the City to review the findings and conclusions of this report carefully and jointly adopt a forward-looking plan to address these risks and guide the Fund towards a path of long-term sustainability. The PRB can provide technical assistance in formulating such a plan.

Overview

Orange Fire's unfunded actuarially accrued liability (UAAL or "unfunded liability") increased from \$1.4 million in 2000 to \$8.2 million by the beginning of 2017, and the Fund has routinely maintained funded ratio less than 75%. This chronic underfunding can be primarily attributed to actual investment returns consistently being lower than the assumed investment return and regularly contributing less than the annual benefit accrual plus growth of existing unfunded benefits. The Fund's reported investment expenses are among the highest in Texas and at current contribution rates and benefit levels, the unfunded liability can be expected to continue to grow and the funded status to continue to languish.

Constantly underfunding a plan places the benefits of both retirees and active members at significant risk and/or places the burden of paying for services already rendered on future generations of taxpayers and employees through the reduction of future benefits or an increase in contributions. Orange Fire and the City have made recent contribution increases, but these changes have not been enough to put the Fund on a solid path to sustainability. Orange Fire and the City have yet to make difficult decisions on additional needed changes to benefit or contribution levels.

Conclusion

Orange Fire should consider the following actions to help ensure financial stability and mitigate the risks that lead to underfunding: continually monitoring investment managers' performance against their benchmarks; evaluating asset allocation decisions and appropriate risk levels on a forward-looking basis; conducting a peer group study on investment expenses to get a more accurate picture of investment expenses paid and comparing those against their peers; reviewing actuarial assumptions against actual experience and making necessary changes; and ensuring contributions are adequate to fully fund Orange Fire over a reasonable period.

To address the funding and governance risks, the Fund and the City should develop written funding, benefit, and investment policies that are linked to provide a formal risk-/cost-sharing arrangement. A strong funding policy that requires payment of an actuarially determined contribution (ADC) is encouraged. In addition to helping maintain a sound plan funding level, putting such forward-looking policies into place can help reduce uncertainty for stakeholders who would know, in advance, how adverse experience will be managed.

Background

Texas Government Code Section 801.202(2) requires the Pension Review Board (PRB) to conduct intensive studies of potential or existing problems that threaten the actuarial soundness of or inhibit an equitable distribution of benefits in one or more public retirement systems. The PRB identified the following key metrics, in addition to amortization period, to determine and prioritize retirement systems for intensive actuarial review. The PRB selected Orange Firemen's Relief and Retirement Fund ("Orange Fire" or "the Fund") for review based on the 2017 actuarial valuation data shown below. Unless otherwise noted, the following metrics were calculated as of January 1, 2017.

Amort. Period (Years)	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC ¹	Non-Investment Cash Flow as % of FNP
69.3	49.86%	336.03%	7.75%	4.00%	70.49%	-7.91%

Contribution and cash flow data are from the Fund's 12/31/2016 financial audit.

Plan Profile

Actuarial Accrued Liability: \$16,353,849

Market Value of Assets: \$8,154,674

Normal Cost: 12.76% of payroll

Contributions: 12.50% employee
14.50% employer

Membership: 37 active
42 annuitants

Social Security Participation: No

At the time the Fund was selected for review:

- Its amortization period was the second highest finite period of all defined benefit pension plans in Texas.
- Its funded ratio was the 13th lowest of all defined benefit pension plans in Texas.
- Only 17 plans in Texas used an assumed rate of return above 7.75%, which is above both the Texas and national averages for public pension plans.
- Actual contribution as a percent of actuarially determined contribution (ADC) was the eighth lowest among Texas defined benefit plans and the lowest in its peer group (TLFFRA plans with assets of less than \$15 million).
- Investment expense as a percentage of plan net assets was one of the highest amongst all defined benefit plans in Texas.
- Its non-investment cash flow as a percent of assets (fiduciary net position (FNP)) was the eighth lowest among Texas defined benefit plans.

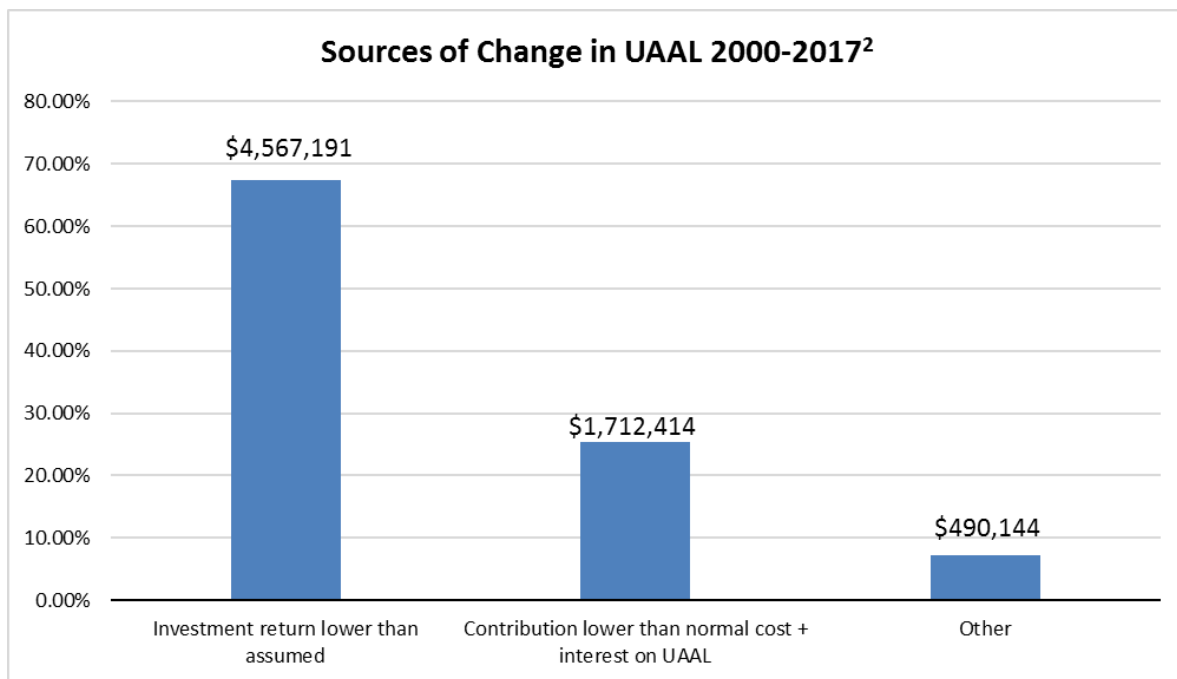
¹ For plans whose contributions are a fixed rate, based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Risk Analysis

A pension fund faces multiple risks, which can be boiled down to one primary concern of whether there will be enough money to pay benefits when they are due. This section discusses potential funding and governance risks facing the fund. The risk being taken in each of these areas increases the probability of a continued period of severe financial stress for the Fund. This also raises the likelihood of deteriorating funding conditions in the coming years, further imperiling the Fund's ability to pay promised benefits.

Funding Risk

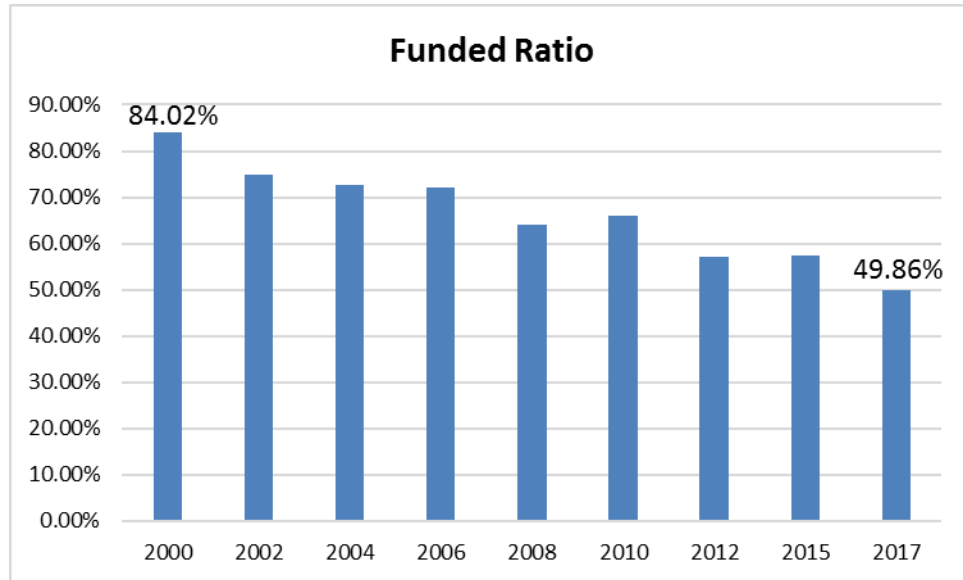
Orange Fire's significant growth in unfunded liability (UAAL), which increased from \$1.4 million in 2000 to \$8.2 million in 2017, can be attributed primarily to actual returns consistently lower than the assumed investment return and contributions consistently lower than the annual benefit accrual plus growth of existing unfunded benefits.



Background

According to Orange Fire's January 1, 2017 actuarial valuation, the Fund was 50% funded on an actuarial basis, and according to reports filed with the PRB, it has not had a funded ratio above 70% since the 2006 valuation.

² Other includes demographic experience, benefit changes, and changes to assumptions and methods.

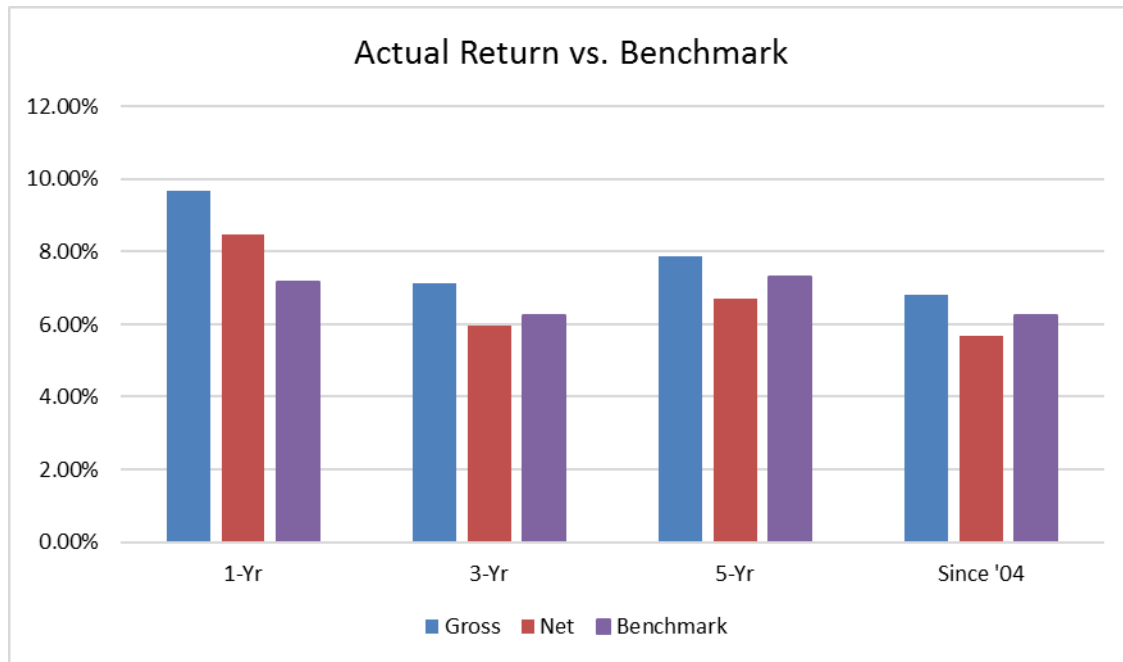


For a plan's funding level to improve, its assets must grow faster than the liabilities, which can be achieved by three key levers: contributions greater than the normal cost plus interest on the UAAL, benefit reductions to lower liabilities, and/or investment returns consistently higher than the assumed rate of return.

Investment Expenses and Performance

The Fund is currently spending a larger percentage of assets on investment related expenses than any other plan in the state with total fees estimated at 1.15%. According to the information provided by the Fund, investment returns have underperformed the Fund's benchmark on a net of fees basis in all but the most recent year. As shown in the chart below, Orange Fire has had a 5.67% net return since 2004, which is 58 basis points lower than its benchmark of 6.25%.³

³ Data is from 2nd Quarter Performance Report for the City of Orange Fireman's Retirement & Relief Fund, Graystone Consulting, July 19, 2018.



According to a study conducted by Morningstar in 2015, investment fees were a major predictor of future fund performance⁴. The study concluded that funds with the lowest fees during the 2010 - 2015 period outperformed funds with higher fees across all asset classes. Reducing total expenses alone is not likely to be sufficient for Orange Fire to consistently meet or exceed its assumed rate of return, but is an important area the board should focus on in its fiduciary duty to improve investment performance and efficiently manage the Fund's investment program. For example, based on current projections, a reduction in expenses of just 25 basis points could potentially save the Fund more than \$2.5 million in investment expenses over the next 30 years.

The chart below shows Orange Fire's investment expenses as a percent of total net assets compared to the TLFFRA plans closest to Orange Fire in asset size.

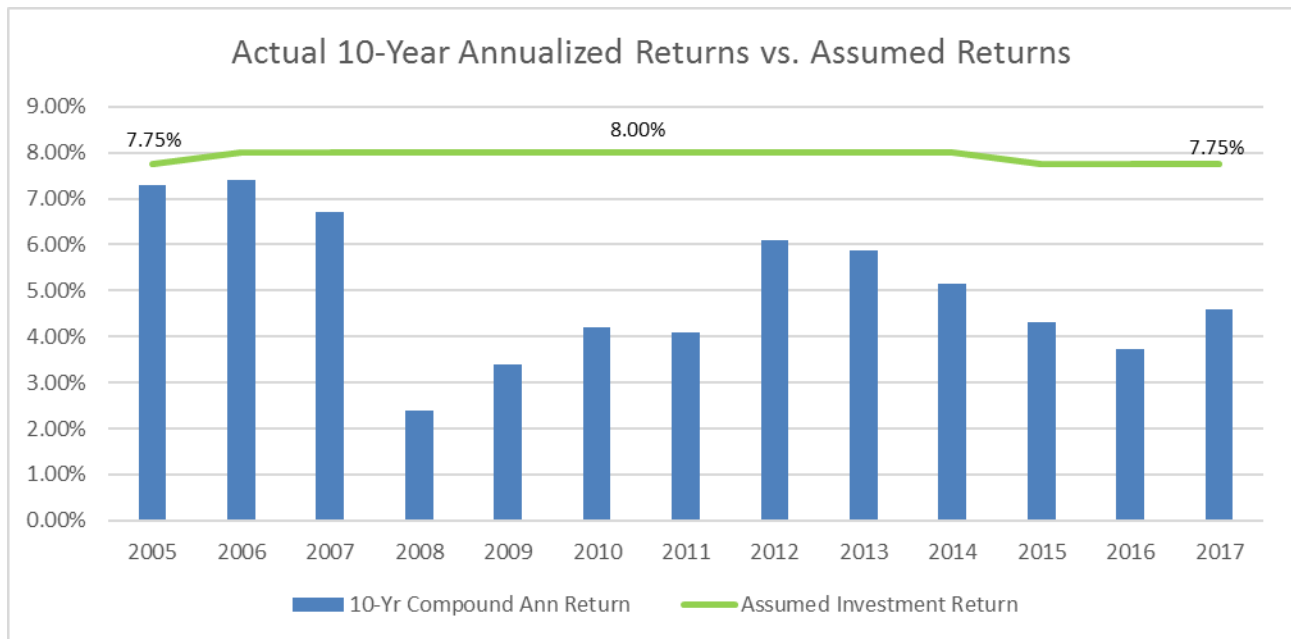
Peer Group Plans	Effective Date	Total Net Assets	Investment Expenses	Inv Exp as % of Assets	10-Year Net Return
Orange Fire	12/31/2016	\$8,154,674	\$93,636	1.15%	3.72%
Corsicana Fire	12/31/2016	\$8,344,317	\$92,459	1.11%	3.40%
Waxahachie Fire	9/30/2016	\$14,201,159	\$142,317	1.00%	4.90%
Plainview Fire	12/31/2016	\$5,427,943	\$49,439	0.91%	1.95%
Sweetwater Fire	12/31/2017	\$8,547,174	\$66,056	0.77%	4.91%
Greenville Fire	12/31/2016	\$12,728,162	\$90,884	0.71%	4.23%
Paris Fire	12/31/2016	\$4,764,272	\$32,730	0.69%	2.16%
Atlanta Fire	12/31/2016	\$3,744,867	\$25,495	0.68%	4.84%
Marshall Fire	12/31/2016	\$7,712,228	\$45,898	0.60%	4.67%
Weslaco Fire	9/30/2017	\$10,429,381	\$61,218	0.59%	2.59%

⁴ <https://corporate1.morningstar.com/ResearchArticle.aspx?documentId=752589>

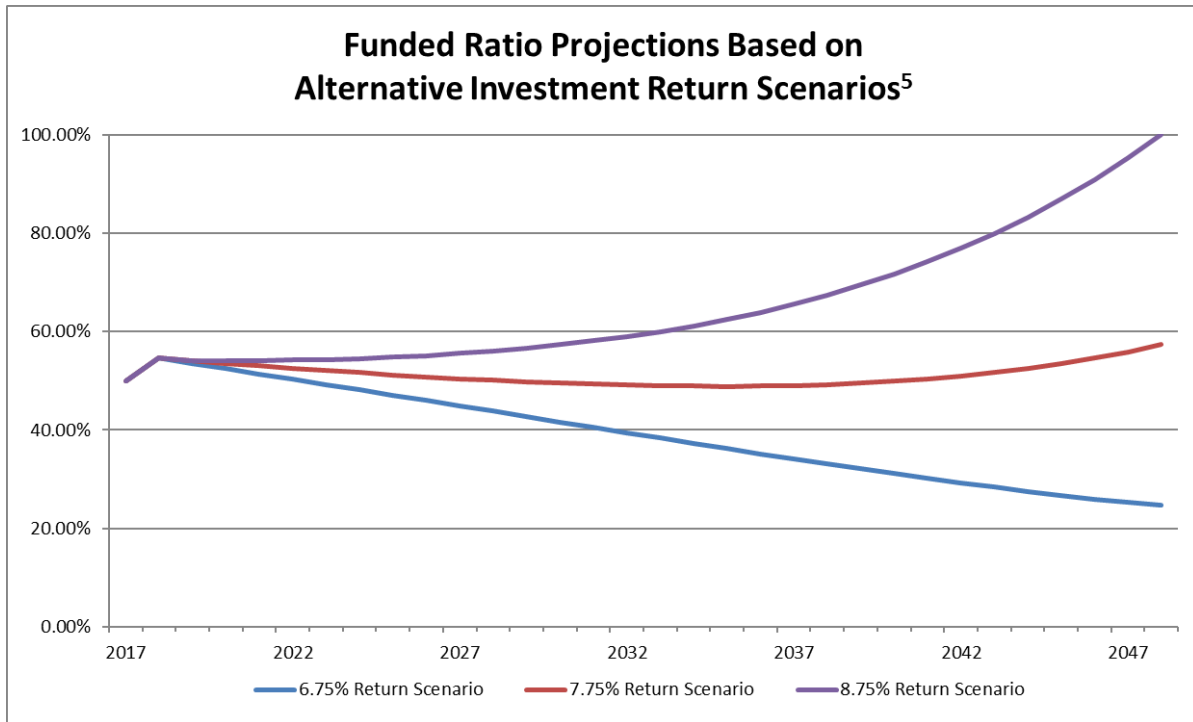
Based on the audited financial statements provided by the systems to the PRB, Orange Fire pays a larger percentage of their total net assets toward reported investment expenses than their peers. However, due to inconsistencies in reporting of investment expenses between various investment vehicles and investment managers and potential differences in expense classification between auditors, the PRB recognizes that this data may not be an entirely accurate depiction of true investment related expenses paid.

Investment Experience Compared with Investment Return Assumption

Orange Fire's actual investment return has consistently been lower than the assumed investment return, increasing the unfunded liability by more than \$4.5 million between 2000 and 2017. As illustrated below, the Fund has not achieved a 7.75% (the Fund's current assumed rate of return) annualized return over a consecutive 10-year period in any of the 13 periods ending December 31, 2005 through December 31, 2017.



The graph below projects the funded ratio for the next 30 years, assuming the member and the City contribution rates remain at a fixed 12.50% and 14.50% respectively, and the investments return 6.75%, 7.75%, or 8.75%. The impact of consistently earning less than the expected return on assets (EROA) but *even as high as 6.75% over the next 30 years*, results in the funded status sinking to 29%.



Fixed-Rate Funding Model and Payroll Growth Rate

Most Texas plans use a fixed percent of pay funding approach. This is especially true for plans governed by the TLFFRA statute. Under a fixed-rate funding structure, no formal amortization policy (i.e. the expected time to fully fund the plan) exists; therefore, the Fund's actuary estimates the amortization period at each valuation date based on the current financial condition of the plan and the current contribution rates.

The nature of a fixed-rate, percent-of-pay contribution policy may exacerbate the risk of underfunding a plan over the long-term because:

- 1) Contributions to percent-of-pay plans are inherently back-loaded because the expected contributions to a percent-of-pay plan grow on a nominal basis at the assumed rate of total payroll growth.
- 2) Fixed-rate plans provide budgetary stability for the employer in the short term, but do not include any inherent mechanisms for reacting to changes in a plan's financial condition.

As noted above, the Fund's unfunded liability increased by more than \$6.7 million from 2000 through 2017. \$1.7 million, or approximately 25%, of this increase, can be attributed total contributions that were not sufficient to cover the cost of both the new benefits being accrued (normal cost) and the interest accumulated on the unfunded benefits already earned (amortization payment).

⁵ Liabilities reflect the actuarial accrued liabilities, plan provisions, and actuarial assumptions and methods as reported in the 1/1/2017 Actuarial Valuation prepared by Foster & Foster Actuaries and Consultants. Projected liabilities include a 2.5% expected benefit growth rate. Asset projections reflect actual 2017 experience as reported in the Fund's 12/31/2017 audited financial statements.

According to its actuarial valuations, Orange Fire has not received the reported ADC in any year since 2006. Even with contribution increases in 2008 and 2015, employer contributions have averaged less than 85% of the Fund's ADC over that period. Furthermore, the reported ADC is calculated using an open amortization period that results in perpetual negative amortization. If the fund were to use this ADC as a funding policy, the UAAL would grow indefinitely and the "pension debt" would never be paid off.

For the fiscal year beginning January 1, 2017, the expected contributions were about 73% of the reported ADC. This shortfall of \$128,102 is equal to 0.71% of the City's total General Fund expenditures for the fiscal year ending December 31, 2016 and is the second highest among TLFFRA plans of similar size.

Expected Contribution Levels vs. Actuarially Determined Contribution									
Date (1/1)	2000	2002	2004	2006	2008	2010	2012	2015	2017
Employee Contribution	9.00%	9.00%	9.00%	9.00%	11.00%	11.00%	11.00%	12.00%	12.00%
Employer Contribution	9.00%	11.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%
Employer 30-Year ADC	8.86%	11.53%	13.25%	13.43%	14.01%	14.95%	19.61%	18.66%	19.25%
% of ADC funded	101.58%	95.40%	105.66%	104.24%	99.93%	93.65%	71.39%	75.03%	72.73%
Covered Payroll (in thousands)	\$1,587	\$1,647	\$1,673	\$1,717	\$2,000	\$1,907	\$1,996	\$2,292	\$2,440
Contribution Shortfall (in thousands)	-	\$8.72	-	-	\$0.2	\$18.12	\$111.98	\$106.81	\$128.1

Both active members and the City increased their contribution rate by 0.25% of payroll in November 2017 and will increase it another 0.25% effective October 1, 2018 to a total of 12.50% and 14.50%, respectively, which was agreed to as part of the latest Funding Soundness Restoration Plan (FSRP). This increase plus positive asset experience during 2017 was enough to satisfy the FSRP requirements, but it still falls 4.25% of pay short of meeting the 2017 recommended ADC.

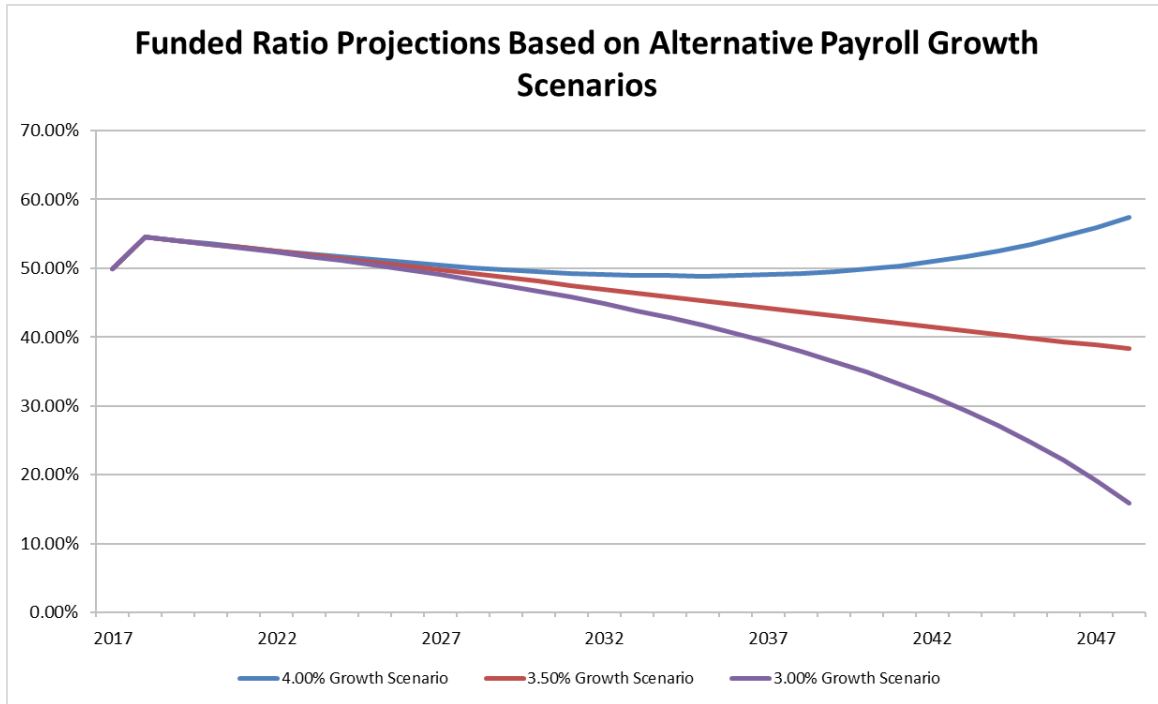
In addition, the FSRP relies on a payroll growth assumption of 4.00%, which is tied for the fifth highest rate in the state. This assumes future payroll growth will be 150% more than the 2.75% per year actual payroll growth rate the Fund experienced from 2000 to 2017. In addition, the population of Orange, Texas has been shrinking since the 1960s from a high around 35,000 to a current population of under 20,000 and is still recovering from the damage wrought by Hurricane Harvey.^{6,7} In order to sustain a payroll growth rate well in excess of expected inflation and both national and Texas wage growth projections, a sustained population boom would be necessary.

As an example of the impact of this key economic assumption, if the assumed rate for the 2017 valuation was just 3.0%, the Fund would be at an infinite amortization period and would not be compliant with the recently submitted FSRP. Regardless of the impact on the Fund's FRSP, the risk associated with backloading the contributions but not achieving the assumed rate of payroll growth, and

⁶ <http://www.orangetexas.net/about-orange/orange-history/>

⁷ <http://www.orangetexas.net/about-orange/city-of-orange-demographics/>

therefore not receiving the expected contributions is significant, as can be seen in the following graph which shows the impact of various scenarios of lower actual payroll growth rates.



Conclusions/Recommendations

Pre-funding a defined benefit plan, i.e. setting aside assets now for benefits that will be paid in the future, is necessary to help balance the three primary policy goals of benefit security, equity between generations of taxpayers and employees, and a stable contribution from year to year. Consistently underfunding a plan places the benefits of both retirees and active members at significant risk and/or places the burden of paying for services already rendered on future generations of taxpayers and employees through the reduction of future benefits or an increase in contributions.

In the absence of a formal, written funding and risk-sharing policy, the result is a de facto risk-sharing arrangement that is simply a reaction to events, often well after the plan finds itself with financial difficulties. Plans and their sponsors can take many actions to ensure financial stability and mitigate the risks that lead to underfunding. These steps include ensuring contributions are adequate to fully fund the plan over a reasonable period; developing formal policies to guide decision-makers under different economic conditions; reviewing actuarial assumptions against actual experience and making necessary changes; and monitoring investment performance and evaluating asset allocation decisions on a forward-looking basis.

Investment Performance. Whatever the investment return assumption used, investment returns should be closely monitored, and investment managers' performance should be assessed regularly and compared to appropriate asset class benchmarks. Orange Fire currently has one of the highest ratios of investment expenses to market value of assets of any defined benefit plan in Texas. The Fund should give serious consideration to its investment management strategy, specifically to the expenses it pays

and if it is receiving a reasonable benefit for these costs. Lowering these expenses should be an effective means to improve net investment performance. Given the limitations of the data reported to the PRB, conducting a peer group study of investment expenses could serve as a useful exercise to determine if actual expenses are in line with other institutional investors of similar size.

In addition, benchmarks should be reviewed to see if they have been met or exceeded and should be viewed considering the risk taken to achieve those returns. Best practices also include revisiting advisor selection periodically, with boards of trustees evaluating performance, fees, and whether their current advisors are providing the highest possible value at the lowest possible cost. The asset allocation should also be assessed from a risk perspective to provide insight into how the fund would weather a market correction.

Actuarial Assumptions. Neither the payroll growth assumption nor the investment return assumption is being consistently met when gauging actual plan experience. When pension funds are consistently overestimating their assumptions, they underestimate the funding issues they are facing. In the case of payroll growth, if Orange Fire had been assuming a growth rate of 2.75% (their average payroll growth since 2000) their amortization period would be infinite rather than the 69 years reported in the 2017 valuation. Public pension plans must monitor actuarial assumptions continually through their actuarial valuations and make appropriate adjustments to mitigate bias in the assumptions that result in consistent actuarial gains or losses.

Actuarial gains and losses occur when the plan's actual experience does not match expected experience. Over time, without required changes, pension funds such as Orange Fire whose assumptions consistently diverge from actual experience in the same direction (i.e. consistently seeing actuarial gains or consistently seeing actuarial losses) can exacerbate the issue of intergenerational inequity, causing one group of members and taxpayers to over- or under-pay. Boards of trustees should work with their actuaries and other consultants to ensure assumptions are neither too aggressive nor too conservative, while striving to maintain (or achieve) sound fiscal health to secure existing accrued benefits. PRB's *Pension Funding Guidelines* recommend systems to monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

Adequate Funding. The Fund has been increasing both the member and city contribution rates in recent years and it is the PRB's understanding that discussions to increase contributions even further is still being discussed. While we commend the actions taken by the Fund's board and members, the current contribution structure still has not been enough to meet the Fund's ADC rate. To address these concerns, a strong funding policy that requires payment of an ADC is encouraged. Numerous actuarial methods can be utilized to help mitigate contribution volatility, including directly smoothing contribution rates or adding "guardrails" that require the stakeholders to come back to the table if the contribution rate falls outside a specified range. If funding according to an ADC is not adopted, a funding policy that fully funds the Fund over a finite period, such as 30 years, is recommended.

Governance Risk

When public pension plans and their sponsors wait too long to address them, the funding challenges compounding over time can reach a point where small, incremental improvement, such as the contribution increases made for Orange Fire, are not sufficient to make consistent, long-term improvements to the overall health of the Fund. Orange Fire and the City have yet to make difficult decisions on additional needed changes to benefit or contribution levels. If necessary changes are ultimately made, they may right the ship, but they will potentially be made under less than ideal conditions.

Funding Decision-making

Governance is essentially decision-making, and decision-making for public pension plans must balance the competing interests of plans and their sponsors and should feature collaboration between the two. The primary source of governance risk is the potential lack of involvement of key parties or stakeholders (members, the sponsor government, and taxpayers) in important areas of decision-making for a pension plan including plan design (benefits) and funding (contributions). When a key party is not engaged in important decisions, the risk increases that benefit levels and the contributions required to fund them will diverge, potentially putting the plan's funding stability at risk.

For example, TLFFRA allows boards of trustees to make prospective benefit modifications, both increases and reductions. These changes must be approved by an actuary and a majority of participating members and may not deprive an eligible participant of vested accrued benefits. Although jointly responsible for funding the retirement plan along with plan members, the sponsoring city may have limited involvement in benefit decision-making, a structure which generates the risk that benefit levels adopted could be unsustainable.

Benefit increases are not the only potential risk related to a potential lack of sponsor involvement under TLFFRA; unwillingness to reduce benefits prospectively when necessary to address funding challenges can be an obstacle to getting things back on track. It should be noted that even plans with very engaged boards and sponsors can be susceptible to increasing benefits to unsustainable levels in good times or failing to lower them when necessary in bad times. Governance risk related to an imbalance in decision-making can only exacerbate these risks. Given the Fund's historically poor funding levels of under 75% for the last 15 years, the absence of benefit modification by Orange Fire illustrates this point.

Funding Soundness Restoration Plan

State law recognizes the potential risks of underfunding and a lack of engagement by some key stakeholders and imposes cooperation between the system and sponsoring governmental entity by requiring retirement systems having trouble meeting their long-term obligations work with their sponsors to develop a restoration plan for addressing those issues.⁸ This framework helps ensure that

⁸ Texas Government Code 802.2015 and 802.2016 require public retirement systems whose amortization period exceeds 40 years for 2 or 3 consecutive actuarial valuations to develop, with their sponsor, a funding soundness restoration plan designed to bring their amortization period within 40 years over 10 or fewer years.

both the system and its sponsoring employer are involved in pension plan reform decisions, but it comes at a point when actuarial health is already threatened. Orange Fire submitted an FSRP for review on November 8, 2016. The FSRP stated after the 1/1/2015 valuation member contributions had increased from 11.00% to 12.00%. The changes outlined in the FSRP recalculated an amortization period of 47.4 years for 2015; however, the 1/1/2017 valuation showed the amortization period had increased to 69.3 years.

Because of the increase in the amortization period, Orange Fire submitted a second FSRP on February 15, 2018. This FSRP instituted further contribution increases bringing the contribution rates for members and the city to 12.50% and 14.50% respectively, by October 2018. Additionally, the board proposed a benefit change to amend the normal form of annuity payment from a 66 2/3% joint annuitant form of payment for married members to a life annuity for all members regardless of marital status, which is expected to decrease the amortization period by approximately 7 years. Plan members ultimately voted down this proposal in July, however the Fund's board has moved to carry out a new vote with the following options: (A) amend the normal form of annuity payments at the time of retirement as recommended by the Fund's actuary; (B) increase the members' contribution rate by 2% over a four-year period beginning on 10/1/2019; or (C) opt out of both (A) and (B) (no action). It is possible the new vote could be completed before mid-September.

Investment Decision-making

For Orange Fire, another area of governance risk relates to management and oversight of the Fund's investment program by the board. Orange Fire has adopted an investment policy statement (IPS) that clearly identifies the overall investment objectives of the Fund and the expectations of investment managers to meet these objectives, as outlined below.

1. Achieve a total return, net of fees, in excess of the assumed rate of return
2. Outperform the annualized return of the Fund's composite policy benchmark
3. Achieve a real return of 4.5% over the CPI

The policy also outlines steps the board can take if at least two of these three objectives are not being met. These include re-evaluating the goals, modifying the asset allocation, and/or revisiting investment manager selection. Given the many years of protracted underperformance of the Fund's assets and not meeting the stated IPS objectives, the following elements of the Fund's investment program should all be reviewed: the Fund's risk tolerance, asset allocation, and investment manager performance. Along with reviewing these factors, the board should re-examine whether the current goals are obtainable and take appropriate actions to improve the overall investment performance of the Fund.

Conclusions/Recommendations

Plans and their sponsors can develop policies that proactively manage risk in the future by laying out a formal risk-sharing plan. To proactively manage governance and funding risk, retirement plans and their sponsors should work together to adopt written policies far in advance, that can guide them through both good and bad years and shield against the risk of either party's exclusion or disengagement from decision-making. Funding and benefit policies can be adopted that provide a framework for how benefit

and contribution levels may be modified under different conditions. An advantage of such policies is that changes to plan benefits and costs are known and understood by all parties in advance, rather than negotiated under difficult circumstances.

For example, a benefit policy can outline the primary objectives the employer wishes to achieve, which can be as detailed as a specified replacement ratio, or as general as offering competitive benefits at a reasonable cost, as well as identifying policies and procedures designed to determine if the objectives are being met and how they can be reviewed at reasonable intervals. In addition, outlining potential benefit enhancements or reductions based on the funding goals outlined in the funding policy.

The funding policy might incorporate objectives associated with benefit security, contribution stability and intergenerational equity and outline how those objectives will be met through the use contribution changes, as well as referencing potential changes outlined in the benefit policy. For example, the coordinated policies might limit future benefit enhancements, cost of living adjustments, and/or contribution rate reductions such that they can only be considered or made if the Fund's funded ratio remains greater than a chosen threshold. In addition, if the funded ratio falls below a certain threshold, the stakeholders are required to come back to the table to make necessary contribution and benefit adjustments.

Orange Fire in conjunction with the City should utilize the funding soundness restoration plan requirement to develop such long-term policies. This will likely require some difficult decisions to get the Fund set on the proper path, but the longer these decisions are delayed, and a reasonable cost-sharing structure is not implemented, the more difficult the decisions become.

In the area of investment governance, the board should work closely with its advisors to manage the Fund's investment program and ensure that the IPS is being fully utilized. Manager performance should be continuously monitored, and appropriate action should be taken in accordance with the steps laid out in the IPS.

Appendix

Key Metrics

Metric	Amortization period (69.3 years)
What it measures	Approximately how long it would take to fully fund the unfunded actuarial accrued liability (UAAL) based on the current funding policy.
Why it is important	Given the Fund's current assumptions, an amortization period above 17 years indicates the contributions to the Fund in the coming year are less than the interest accumulated for that same period and therefore the total UAAL is expected to grow over the near term. In addition, for a plan that contributes on a fixed-rate basis such as Orange Fire, the higher the amortization period, the more sensitive it is to small changes in the UAAL.
Peer comparison	Orange Fire currently has one of the highest amortization periods of all defined benefit pension plans in Texas and ranks highest amongst its peer TLFFRA plans (TLFFRA plans with a market value of assets below \$15 million).

Metric	Funded ratio (49.86%)
What it measures	The percent of a fund's actuarially accrued liabilities covered by its actuarial value of assets.
Why it is important	The lower the funded ratio, the fewer assets a fund must pay its current and future benefit payments.
Peer comparison	Orange Fire's funded ratio is below the State's average of 72.53% and is one of the lowest in the state.

Metric	UAAL as a percent of payroll (336.03%)
What it measures	The size of a plan's unfunded liability compared to the annual payroll of its active members.
Why it is important	Provides a way to compare plans of various sizes and expresses the outstanding "pension debt" relative to current personnel costs.
Peer comparison	The Fund's UAAL as a percent of payroll is one of the highest amongst TLFFRA funds.

Metric	Assumed rate of return (7.75%)
What it measures	The estimated annual rate of return on the Fund's assets.
Why it is important	If actual future returns are lower than the assumed rate of return, future contributions will need to increase significantly, especially for a poorly funded plan. Orange Fire's assumed rate of return is 7.75%, while its actual ten-year investment rate of return for the period ending December 31, 2016 was only 3.72%.
Peer comparison	Orange Fire is tied for the fourth highest Assumed rate of return in its peer group.

Metric	Payroll growth rate (4.00%)
What it measures	The estimated annual growth in the total payroll of active members contributing into the Fund.
Why it is important	Contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Fund's actuarial valuations. Given the Fund's inactive and active liabilities are not fully funded; contributions below expected levels will have serious consequences on the Fund's long-term solvency.
Peer comparison	The Fund's payroll growth rate of 4.00 percent is tied for the second highest in its peer group.

Metric	Actual contributions as a percent of actuarially determined contributions (70.49%)
What it measures	Whether the current employer contributions have met a theoretical minimum threshold. ⁹
Why it is important	The employer's portion of the contribution is less than 71% of the amount needed to fund the Fund on a rolling 30-year amortization period. The PRB's 2014 Study of the Financial Health of Texas Public Retirement Systems found that plans that have consistently received adequate funding are in a better position to meet their long-term obligations.
Peer comparison	This is one of the largest shortfall percentages in the state and the largest in its peer group.

⁹ The theoretical minimum threshold, or actuarially determined contribution (ADC), is a target or recommended contribution "to the Fund as determined by the actuary using a contribution allocation procedure," as defined in Actuarial Standards of Practice No 4. If contributions to the Fund are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Metric	Non-investment cash flow as a percent of fiduciary net position (-7.91%)
What it measures	Non-investment cash flow shows how much the Fund is receiving through contributions in relation to its outflows: benefit payments, withdrawals and expenses.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)), in conjunction with the funded ratio and recognition of the relative maturity of a plan, provides information about the stability of a plan's funding arrangement.
Peer comparison	Orange Fire's non-investment cash flow as a percent of FNP is the third lowest in its peer group. If this trend continues, the Fund could face the potential risk of needing to liquidate a portion of existing assets to pay current benefits and/or expenses.

Plan Summary

The Orange Firemen's Relief and Retirement Fund ("Orange Fire" or "the Fund") is established in the Texas Local Fire Fighter's Retirement Act (TLFFRA). TLFFRA provides general guidelines for fund management, but leaves administration, plan design, contributions, and specific investments to the discretion of the board of trustees. Orange Fire, as with all TLFFRA systems, is entirely locally-funded.

Benefits

Retirement Eligibility	Age: 50 years; Years of Credited Service (YCS): 20 years
Vesting	Fully vested after 20 YCS
Benefit Formula	Years of Service (up to 20 years) x 2.6% x Final Average Salary +\$91 per month for each year > 20 Years of Service
Final Average Salary (FAS)	Highest 60-Month Average Salary
COLA	None
Retirement Benefit Options	Forward DROP: 3-year maximum. Employee contributions credited; no interest. Eligible at 53 years of age and 23 years of service.
Social Security	Yes – Social Security Leveling Option

Contributions

As of October 1, 2018, active members of Orange Fire contribute 12.50% of pay while the City of Orange contributes 14.50% of pay.

Membership

Total Active Members	Retired Members	Terminated	Total Members	Active-to-Annuitant Ratio
37	42	1	80	0.88

TLFFRA Board Structure

Active Members	3 - Members of the retirement system; elected by fund members. Three-year terms.
Sponsor Government	1 - Mayor or designated representative, or the political subdivision's Chief Operating Officer or designated representative. 1 - Chief Financial Officer of the political subdivision, or designated representative. Terms correspond to term of office.
Taxpayer, Not Affiliated With Fund/Sponsor Govt.	2 - Residents of the State of Texas, must not be officers/employees of the political subdivision; elected by other Board of Trustee members. Two-year terms.

Contribution and Benefit Decision-Making

TLFFRA authorizes members of the retirement systems to determine their contribution rates by voting. The statute requires cities to make contributions at the same rate paid by employees or 12 percent, whichever is smaller. TLFFRA also allows a city to contribute at a higher rate than employees do through a change in city ordinance.

TLFFRA gives the board the power to make decisions to modify the benefits (increases and reductions). However, a proposed addition or change must be approved by the actuary and a majority of participating plan members. Benefit changes cannot deprive a member, retiree or beneficiary of the right to receive vested accrued benefits.

Expense Breakdown

Fiscal Year ending 12/31/2016	
Fiduciary Net Position (FNP)	\$8,154,598
Investment Expenses	\$93,636
Investment Expenses % of FNP	1.15%
Administrative Expenses	\$18,742
Administrative Expenses % of FNP	0.23%

Historical Trends

To conduct an intensive review of risks associated with the long-term funding of a pension Fund, it is important to analyze trends in multiple metrics. A plan with an asset level lower than its accrued liability has insufficient funds to cover benefits. A plan can experience an increase in unfunded liability due to various factors, including insufficient investment returns, inadequate contributions and inaccurate or overly aggressive assumptions. Hence, a single metric cannot effectively capture the different drivers contributing to the increase of a plan's unfunded pension obligation. This section analyzes historical trends in various metrics identified by the PRB and makes comparisons to understand the sources of growth in unfunded liability for Orange Fire.

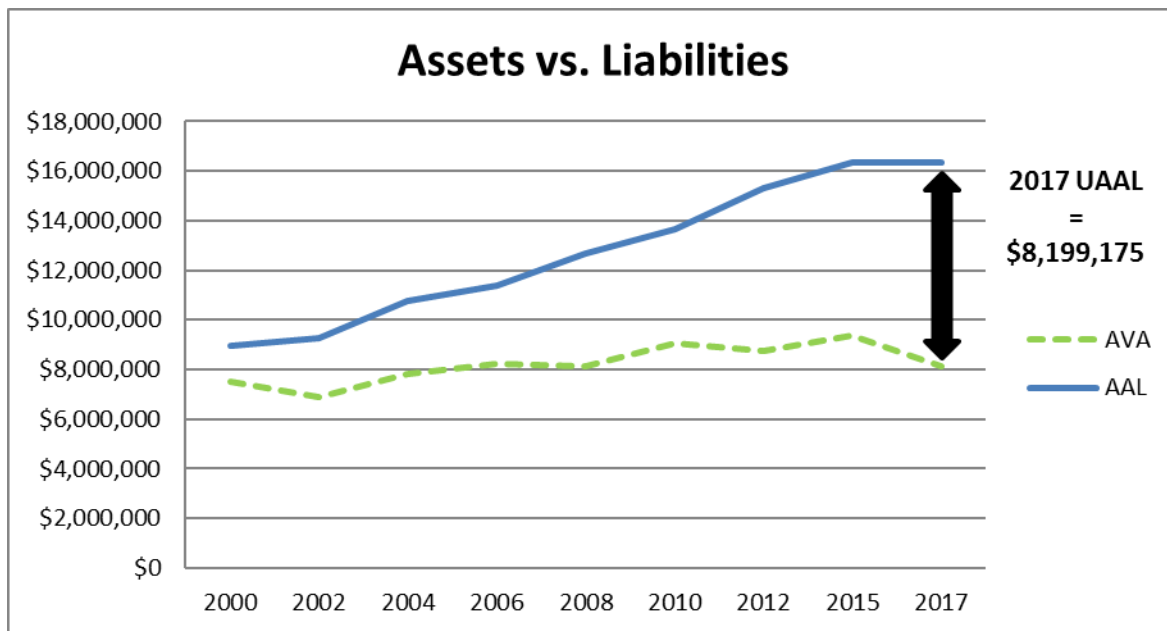
Orange Fire's funded status has been steadily declining since 2000. Numerous factors have contributed to this deterioration, including inadequate contributions, investment returns being lower than the

chosen assumption, increased benefit payments, and the inclusion and expansion of PROP accounts accruing interest. The following sections discuss these and other factors in detail.

Assets and Liabilities

Orange Fire's actuarial accrued liability (AAL) increased by nearly 83% between 2000 and 2017. The Fund's actuarial value of assets (AVA) increased by only 8.50% over the same period. The Fund was 84% funded in 2000 but fell to below 50% in 2017.

Funding Trends									
Funded Ratio, Assets, Liabilities and Year over Year Growth									
Fiscal Year ¹⁰	2000	2002	2004	2006	2008	2010	2012	2015	2017
Funded Ratio	84.02%	74.76%	72.76%	72.09%	63.97%	66.05%	57.25%	57.41%	49.86%
Am Period (years)	27	32	25	27.4	30.1	34.3	82.3	47.4	69.3
UAAL (in millions)	\$1.43	\$2.33	\$2.93	\$3.18	\$4.57	\$4.64	\$6.54	\$6.96	\$8.20
AVA (in millions)	\$7.52	\$6.91	\$7.83	\$8.21	\$8.12	\$9.04	\$8.77	\$9.38	\$8.15
AVA Growth (YoY)	-	-4.12%	6.44%	2.42%	-0.59%	5.52%	-1.50%	3.46%	-6.78%
AAL (in millions)	\$8.95	\$9.24	\$10.76	\$11.39	\$12.69	\$13.68	\$15.31	\$16.35	\$16.35
AAL Growth (YoY)	-	1.65%	7.90%	2.89%	5.54%	3.84%	5.80%	3.32%	0.03%



¹⁰ The report date for Fiscal Year 2000-2012 is December 31st and was changed to January 1st for 2015 and 2017.

Investment Assumption and Returns

The 10-year net return on investments in 2016 was 3.72%, which is more than 400 basis points below its assumed interest rate. PRB's AV Supplemental Report dated June 14, 2018 showed that out of 91 Texas Funds that reported a 10-year net investment return, Orange Fire stood at 71st.

Rates of Return (as of 12/31/2016)				
Time Period	1-year	3-year	10-year	Since 1995
Gross Return	5.85%	2.67%	4.83%	7.18%
Net Return	4.65%	1.54%	3.72%	6.25%

Asset Allocation

As shown in the chart below, the Fund's actual asset allocation is close to its target allocation and within the ranges of the Fund's Investment Policy Statement.

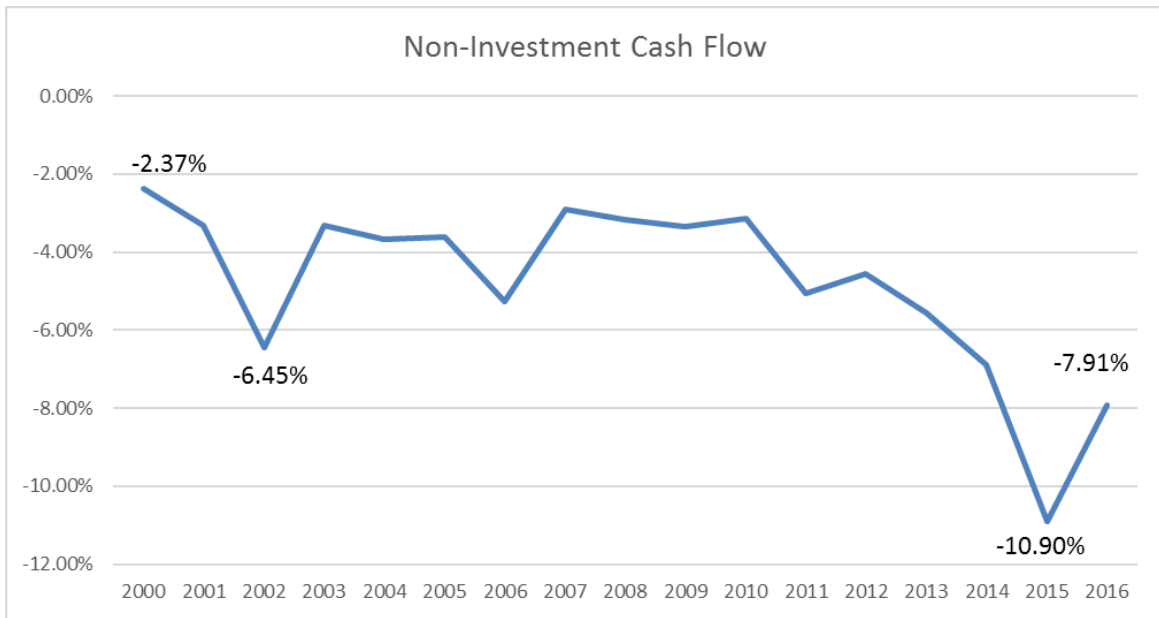
Asset Allocation (as of 12/31/2016)				
Asset Class	Equities	Fixed Income	Cash	Other ¹¹
Current Allocation	55.25%	39.64%	5.03%	0.09%
Target Allocation	65.00%	35.00%	-	-

Cash flow

Orange Fire has the third lowest non-investment cash flow among its peers. In 2016 the Fund's non-investment cash flow was -7.91%. The large dips in 2002 and 2006 were due to large increases in total disbursements. Total contributions have grown on average by 2.29% annually since 2000 but are being outpaced by the average growth in yearly benefit disbursements of 3.38%. Total expenses are growing at an average rate of 4.44%

A negative non-investment cash flow is not abnormal for mature defined benefit pension plans. However, a cash flow percentage this low is likely to be a drag on potential investment returns because a plan must either invest in a higher proportion of income-producing investments, which traditionally provide lower returns, or must liquidate existing assets to pay out current benefits and/or expenses.

¹¹ Other is "accrued interest and dividends"



Peer Group Key Metric Comparison

		Funding Val Metrics						Fiscal Year End Metrics			
Peer Group Plans	MVA	Am Period Date	Am Period	Funded Ratio	UAAL as % of Payroll	Assumed Interest	Payroll Growth	FYE	Actual Cont. as % of ADC	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
Waxahachie Firemen's Relief & Retirement Fund	\$ 14,201,159	10/1/2016	25.4	66.86%	164.84%	7.00%	4.00%	9/30/2016	102.75%	N/A	-3.16%
Greenville Firemen's Relief & Retirement Fund	\$ 12,728,162	12/31/2016	38.0	47.69%	387.00%	8.00%	4.00%	12/31/2016	73.99%	N/A	-5.86%
Big Spring Firemen's Relief & Retirement Fund	\$ 10,399,250	1/1/2017	36.2	54.86%	241.05%	8.00%	5.00%	12/31/2016	110.08%	0.00%	-9.54%
Weslaco Firemen's Relief & Retirement Fund	\$ 9,186,148	9/30/2016	14.1	68.53%	111.07%	7.25%	3.25%	9/30/2017	154.51%	N/A	2.92%
Corsicana Firemen's Relief & Retirement Fund	\$ 8,344,317	12/31/2016	28.9	53.14%	211.44%	7.00%	3.00%	12/31/2016	100.01%	N/A	-1.97%
Orange Firemen's Relief & Retirement Fund	\$ 8,154,674	1/1/2017	69.3	49.86%	336.03%	7.75%	4.00%	12/31/2016	70.49%	N/A	-7.91%
Sweetwater Firemen's Relief & Retirement Fund	\$ 7,826,879	12/31/2016	27.5	69.99%	229.12%	8.00%	4.00%	12/31/2017	154.44%	N/A	-4.07%
Marshall Firemen's Relief & Retirement Fund	\$ 7,712,228	12/31/2016	56.4	42.02%	398.51%	7.75%	4.00%	12/31/2016	84.67%	3.99%	-5.50%
Plainview Firemen's Relief & Retirement Fund	\$ 5,296,898	12/31/2015	31.6	37.33%	453.72%	7.75%	3.50%	12/31/2016	87.77%	N/A	-2.63%
Paris Firefighters' Relief & Retirement Fund	\$ 4,764,272	12/31/2016	41.9	35.64%	373.32%	7.50%	3.50%	12/31/2016	100.00%	N/A	-10.31%
Atlanta Firemen's Relief & Retirement Fund	\$ 3,744,867	12/31/2016	28.4	82.13%	136.63%	7.40%	3.00%	12/31/2016	107.62%	N/A	-1.55%

Peer Group Sponsor Funding Comparison

Peer Group Plans	GF Expend	EOY GF Bal	UAAL	Expected Employer Contributions	ADC	30-yr Shortfall	30-Y SF % of ADC	30-Y SF % of GFE
Waxahachie Firemen's Relief & Retirement Fund	\$ 30,570,845	\$ 14,660,133	\$ 7,039,421	\$ 663,197	\$ 621,346	No Shortfall	N/A	N/A
Greenville Firemen's Relief & Retirement Fund	\$ 19,089,359	\$ 6,271,335	\$ 15,021,872	\$ 652,120	\$ 836,499	\$ 184,379	22.04%	0.97%
Big Spring Firemen's Relief & Retirement Fund	\$ 18,328,572	\$ 6,549,205	\$ 9,078,736	\$ 489,614	\$ 538,952	\$ 49,338	9.15%	0.27%
Weslaco Firemen's Relief & Retirement Fund	\$ 25,524,743	\$ 7,529,804	\$ 4,334,628	\$ 468,327	\$ 310,657	No Shortfall	N/A	N/A
Corsicana Firemen's Relief & Retirement Fund	\$ 16,163,690	\$ 4,689,025	\$ 8,135,345	\$ 538,651	\$ 538,651	No Shortfall	N/A	N/A
Orange Firemen's Relief & Retirement Fund	\$ 17,985,946	\$ 8,272,029	\$ 8,199,175	\$ 341,606	\$ 469,709	\$ 128,102	27.27%	0.71%
Sweetwater Firemen's Relief & Retirement Fund	\$ 8,733,810	\$ 3,929,907	\$ 3,617,210	\$ 284,174	\$ 284,174	No Shortfall	N/A	N/A
Marshall Firemen's Relief & Retirement Fund	\$ 20,353,433	\$ 6,537,285	\$ 10,641,648	\$ 508,698	\$ 651,293	\$ 142,595	21.89%	0.70%
Plainview Firemen's Relief & Retirement Fund	\$ 12,768,715	\$ 15,844,471	\$ 9,781,866	\$ 532,083	\$ 606,247	\$ 74,164	12.23%	0.58%
Paris Firefighters' Relief & Retirement Fund	\$ 25,422,079	\$ 10,839,700	\$ 9,625,814	\$ 309,414	\$ 385,995	\$ 76,581	19.84%	0.30%
Atlanta Firemen's Relief & Retirement Fund	\$ 3,568,284	\$ 1,676,529	\$ 860,536	\$ 81,878	\$ 81,878	No Shortfall	N/A	N/A

Peer Group Expense Comparison

Peer Group Plans	10 yr. return (Net)	Active/ Annuitants	Average Benefit	NPL	Admin Expenses	Admin Exp as % of Assets	Investment Expenses	Inv Exp as % of Assets	Other Expenses	Total Expenses	Exp as % of Assets
Waxahachie Firemen's Relief & Retirement Fund	4.90%	1.77	\$ 43,297	\$ 7,039,421	\$ 21,760	0.15%	\$ 142,317	1.00%	-	\$ 164,077	1.16%
Greenville Firemen's Relief & Retirement Fund	4.23%	0.79	\$ 24,101	\$ 16,709,548	\$ 34,472	0.27%	\$ 90,884	0.71%	-	\$ 125,356	0.98%
Big Spring Firemen's Relief & Retirement Fund	4.26%	1.27	\$ 37,713	\$ 9,713,127	\$ 100,927	0.97%	-	0.00%	-	\$ 100,927	0.97%
Weslaco Firemen's Relief & Retirement Fund	2.59%	2.07	\$ 18,033	\$ 4,702,051	\$ 54,676	0.52%	\$ 61,218	0.59%	-	\$ 115,894	1.11%
Corsicana Firemen's Relief & Retirement Fund	3.40%	1.81	\$ 31,722	\$ 8,837,348	\$ 22,168	0.27%	\$ 92,459	1.11%	-	\$ 114,627	1.37%
Orange Firemen's Relief & Retirement Fund	3.72%	0.88	\$ 26,036	\$ 8,946,685	\$ 18,742	0.23%	\$ 93,636	1.15%	-	\$ 112,378	1.38%
Sweetwater Firemen's Relief & Retirement Fund	4.91%	1.04	\$ 33,311	\$ 4,041,873	\$ 35,021	0.41%	\$ 66,056	0.77%	-	\$ 101,077	1.18%
Marshall Firemen's Relief & Retirement Fund	4.67%	1.32	\$ 30,632	\$10,956,850	\$ 4,077	0.05%	\$ 45,898	0.60%	-	\$ 49,975	0.65%
Plainview Firemen's Relief & Retirement Fund	1.95%	1.03	\$ 24,050	\$ 10,746,840	\$ 12,557	0.23%	\$ 49,439	0.91%	\$ 811	\$ 62,807	1.16%
Paris Firefighters' Relief & Retirement Fund	2.16%	1.17	\$ 24,491	\$ 9,642,566	\$ 37,674	0.79%	\$ 32,730	0.69%	-	\$ 70,404	1.48%
Atlanta Firemen's Relief & Retirement Fund	4.84%	1.25	\$ 9,039	\$ 1,129,175	\$ 23,941	0.64%	\$ 25,495	0.68%	-	\$ 49,436	1.32%

Comments from Orange Firemen's Relief and Retirement Fund and City of Orange

CITY OF ORANGE
FIREMEN'S RELIEF AND RETIREMENT FUND

September 6, 2018

Texas Pension Review Board
P.O. Box 13498
Austin, TX 78711-3498

Dear Sirs,

The Orange Firemen's Relief and Retirement Fund's Board of Trustees (Board) is in receipt of and has reviewed the draft of the Intensive Actuarial Review report. The following is the Board's response to this report prepared by the Texas Pension Review Board (PRB).

The Board is dedicated to the continuity and stability of the Orange Firemen's Relief and Retirement Fund pension plan (Plan). The Board meets once every month with special call meetings as deemed necessary. The Board is concerned with the Plan's amortization period and the unfunded liability. The Board agrees with the report in that steps must be taken to correct the Plan's path to ensure success and longevity.

An initial step towards the Plan's longevity recommended in the report is a written funding and risk-sharing policy. The Plan currently only has an investment policy. The Board agrees with this recommendation and acknowledges the need for and benefit of such a policy. Therefore, the Board will research and work towards developing a funding and risk-sharing policy that would be appropriate for the Plan.

The Board does acknowledge the recommendation by the PRB for increased contributions. The Board has communicated this need to the plan sponsor and the plan members. However, the Board does not have the authority to set or increase the contribution rates. The Plan was initially funded with a 9% member contribution rate and a 10% City contribution rate. Between 1995 and 2006, the City rate increased to 14%. In 2007, the member rate increased to 11% from the initial 9%. From 2015 to 2016, the member rate increased another 1% to 12%. During the last collective bargaining session, the City and the International Association of Firefighters, Local 1432 (Association) agreed to a .25% increase each for fiscal year 2018 and 2019. This brings the contribution rate for fiscal year 2019 for members to 12.5% and 14.5% for the City. The next collective bargaining negotiations will begin in the spring of 2019.

The Board realizes that the Orange Firemen's Relief and Retirement Fund has good benefits, of which the Plan members would prefer to keep. The Board requested that the actuary review the Plan document and benefits; and suggest any actions that would help better position the Plan for the future. The actuary, Foster and Foster, recommended an amendment to the normal form of annuity payments

at the time of retirement. This benefit change was initially voted down by the Plan members. However, a new ballot has been submitted by the Board to offer a choice of the benefit change, a contribution increase of 2% over 4 years or no action for the Plan members. The firefighter board members will also work more diligently to clarify the benefit change and explain the options. The new vote is set to begin on September 6, 2018.

The Board understands the concerns that the PRB has regarding the investment fee and expenses. The Board engages a financial advisor to assist the Board with managing the investments of the Plan. The financial advisor consults, educates and gives the Board their expert advice in relation to the Plan's investments, money managers and the economic outlook. The advisor presents quarterly reports on the Plan's investment portfolio performance. Each quarter, the managers are evaluated and the assets are reallocated as necessary to remain in compliance with the investment policy. The Board has agreed to have a review performed on the investment fees and expenses. Upon completion of the review, the Board will make a determination to best serve the Plan and the Plan members.

In regards to the high amortization period of 69.3 years, the Board acknowledges the severity of the situation, and will seek methods to reduce amortization period. The Board would like to point out that the increase from 58.2 to 69.3 years was partly due to changes agreed upon with the actuary. The Board agreed to change the method of asset valuation from asset smoothing to market value. The actuary explained that this would cause an initial increase in the amortization period, but that the effects will level off in the near future. The Board and the actuary also decided to change the (1) assumed rate of DROP election from 95% to 20% and the (2) assumed rate of salary increase for members with over 25 years of service from 2% to 3% per year. The Board will continue to monitor the amortization period and work with the actuary on the most accurate assumptions for the Plan as possible.

In conclusion, the Board is prepared to follow the actions and recommendations outlined above and to cooperate with the Plan sponsor and the Plan members to ensure the viability and the longevity of the Orange Firemen's Relief and Retirement Fund.

Sincerely,



Jody Cowart

Chairman, Board of Trustees

Orange Firemen's Relief and Retirement Fund



September 6, 2018

Texas Pension Review Board
P.O. Box 13498
Austin, TX 78711-3498

Dear Sirs,

The City of Orange (City) has received a copy of the Orange Firemen's Relief and Retirement Fund's (Plan) Intensive Actuarial Review report. The City, as the Plan sponsor, works in partnership with the International Association of Firefighters, Local 1432 (Association), and the Plan members to ensure the viability of the Plan and the future pension benefits for the City's retired firefighters.

The contribution rates for funding the Plan are part of the collective bargaining process between the City and the Association. The City does not have unilateral control over the contribution rates or funding the Plan. Both the City and the Association work together to make decisions regarding the funding of the Plan. The current Collective Bargaining Agreement includes a .25% increase in the contribution rate for both the City and the Plan members each for 2 consecutive years. This current agreement will be in effect until September 30, 2019. At this time, there is not a clause to reopen negotiations once an agreement is signed. The City has already set the tax rate and the budget for the fiscal year ending September 30, 2019. Therefore, due to budgetary limitations, there cannot be an increase to the contribution rates until the expiration of this agreement. The City will be open to negotiations for the 2019-2020 fiscal year.

The City does not participate in the decision making process regarding the Plan benefits. That responsibility lies with the Association and the Plan members. The City would like to see the Plan realign the benefits along the lines of a pension plan such as Texas Municipal Retirement System (TMRS).

The City recognizes the severity of the Plan's current situation. The City is concerned as the increasing unfunded liability is reported on the City's financial statements, and could possibly affect the City's bond rating. The City agrees with the recommendations made by the PRB in the report and will cooperate with the Association and Plan members in so far as the Collective Bargaining Agreement, budget limitations and the laws allow.

Sincerely,

Dr. Shawn Oubre
City Manager
City of Orange, Texas

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX A7 - INTENSIVE ACTUARIAL REVIEW – IRVING FIREMEN'S RELIEF AND RETIREMENT FUND

Intensive Actuarial Review:

Irving Firemen's Relief and Retirement Fund

October 2018



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Executive Summary

Introduction

This intensive actuarial review of Irving Firemen's Relief and Retirement Fund ("Irving Fire" or "the Fund") is intended to assist the Fund's board of trustees and the City of Irving ("the City") in assessing the Fund's ability to meet its long-term pension obligation. Overall, the review shows the Fund is facing significant financial stress and is taking considerable risks in its approach to funding. The Pension Review Board (PRB) encourages the Fund and the City to review the findings and conclusions of this report carefully and jointly adopt a forward-looking plan to address these risks and guide the Fund towards a path of long-term sustainability. The PRB can provide technical assistance in formulating such a plan.

Overview

Irving Fire faces significant risk associated with its deferred retirement option plan (DROP) because it offers: a guaranteed 6.25% annual rate of return, which is calculated as 2.0% less than the actuarial investment return assumption; a virtually unlimited amount of time to accrue this guaranteed return; and the ability to withdraw these funds with little to no restriction. In an era of extremely low interest rates, offering a guaranteed 6.25% rate of return on accounts that can be withdrawn on short notice is virtually unheard of and presents great risk. It is impossible for the Fund to back these liabilities with assets with a similar investment horizon while providing a similar return. The Fund's DROP balance has grown rapidly in the last few years, from just over 15% of total plan assets in 2014 to nearly 30% of total assets in 2016.

The recent change in Irving Fire's investment return assumption will lower the guaranteed rate of return to 5.50% for future DROP participants. However, this will have little, if any, effect on Irving Fire's DROP program for the next nine years, as those who are already eligible for the DROP are locked in at the guaranteed interest rate based on the Fund's previous 8.25% investment return rate.

Conclusion

To address the immediate risks posed by the DROP, the board should consider performing an in-depth asset-liability study to better understand the potential risks associated with its existing asset mix and the liabilities they support and seriously consider the risk a guaranteed rate of return places on all the Fund's stakeholders while bearing in mind the impact changes could have on DROP participant behavior.

To address the funding and governance risks, the Fund and the City should develop written funding, benefit, and investment policies that are linked to provide a formal risk-/cost-sharing arrangement. A strong funding policy that requires payment of an actuarially determined contribution (ADC) is encouraged. In addition to helping maintain a sound plan funding level, putting such forward-looking policies into place can help reduce uncertainty for stakeholders who would know, in advance, how adverse experience will be managed.

Background

Texas Government Code Section 801.202(2) requires the Pension Review Board (PRB) to conduct intensive studies of potential or existing problems that threaten the actuarial soundness of or inhibit an equitable distribution of benefits in one or more public retirement systems.

Irving Fire's intensive review was initially scheduled to begin in April 2018. The City requested a delay and, after careful consideration of the exceptional circumstances surrounding the request, the PRB agreed. The agency informed the Fund and City in late July that the Fund would be reviewed with a publication date in October 2018.

The PRB identified the following key metrics, in addition to amortization period, to determine and prioritize retirement systems for intensive actuarial review. The PRB selected Irving Firemen's Relief and Retirement Fund ("Irving Fire" or "the Fund") for review based on the data shown below. Unless otherwise noted, the following metrics were calculated as of the Fund's December 31, 2015 actuarial valuation.

Amort. Period (Years)	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC ¹	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
33.0	74.92%	228.54%	8.25%	4.25%	82.33%	29.63%	-1.24%

*Contribution, DROP and cash flow data are from the Fund's 12/31/2016 financial audit.

Plan Profile
Actuarial Accrued Liability: \$246,655,353
Market Value of Assets: \$174,037,587
Normal Cost: 18.53% of payroll
Contributions: 13.00% employee 16.75% employer
Membership: 360 active 180 annuitants
Social Security Participation: No

At the time the Fund was selected for review:

- Its assumed rate of return on assets of 8.25% was the highest of all defined benefit pension plans in Texas and above the national averages for public pension plans.
- Its payroll growth rate of 4.25% was the most aggressive in its peer group of TLFFRA plans with assets over \$100 million and one of the highest among Texas defined benefit plans.
- Actual contribution as a percent of its Actuarially Determined Contribution (ADC) was the second lowest amongst its peer group.
- Members' deferred retirement option plan (DROP)

balances accounted for nearly one-third of the plan's total net assets.

Since selecting Irving Fire, the PRB received the Fund's December 31, 2017 actuarial valuation. The board lowered several key assumptions in the 2017 valuation, which combined with other factors

¹ For plans whose contributions are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

increased the Fund's amortization period to infinity. This data has been incorporated into this review and is summarized in the table below.

Amort. Period (Years)	Funded Ratio	UAAL as % of Payroll	Assumed Rate of Return	Payroll Growth Rate	Actual Cont. as % of ADC ²	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
Infinite	71.61%	252.13%	7.50%	3.50%	82.33%	29.63%	-1.24%

*Contribution, DROP and cash flow data are from the Fund's 12/31/2016 financial audit.

Risk Analysis

A pension fund faces multiple risks, which can be boiled down to one primary concern of whether there will be enough money to pay benefits when they are due. This section discusses three main risk factors facing the Fund: asset-liability mismatch, governance, and funding risks. Measuring Irving Fire based on these factors reveals a significant amount of risk being taken in each of these areas, increasing the probability of a continued period of severe financial stress for the Fund. This also raises the likelihood of deteriorating funding conditions in the coming years, further imperiling the Fund's ability to pay promised benefits.

Asset-Liability Mismatch Risk

Irving Fire faces significant asset-liability mismatch risk associated with its Deferred Retirement Option Plan (DROP) because it offers:

- a guaranteed 6.25% annual rate of return;³
- a virtually unlimited amount of time to accrue this guaranteed return; and
- the ability to withdraw these funds with little to no restriction.

Background

Most of the benefits expected to be distributed from a public defined benefit pension plan are not expected to be paid in the

Deferred Retirement Option Program Examples*

Regular/Forward DROP - Active employee retires on paper and continues working. DROP account is credited with monthly pension benefit plus contributions and interest.

Back/Retro DROP - At retirement the employee can elect to retire on paper as of a previous date and receive the monthly pension benefits that would have been paid had the employee truly retired at the elected date plus contributions.

*DROP features vary.

² For plans whose contributions are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

³ The annual rate of return is defined as 2.0% less than the actuarial investment return assumption. Irving Fire has recently lowered its investment return assumption to 7.50%, however, the effect on the guaranteed rate of return on the DROP balance won't begin to be realized by the Fund for several years.

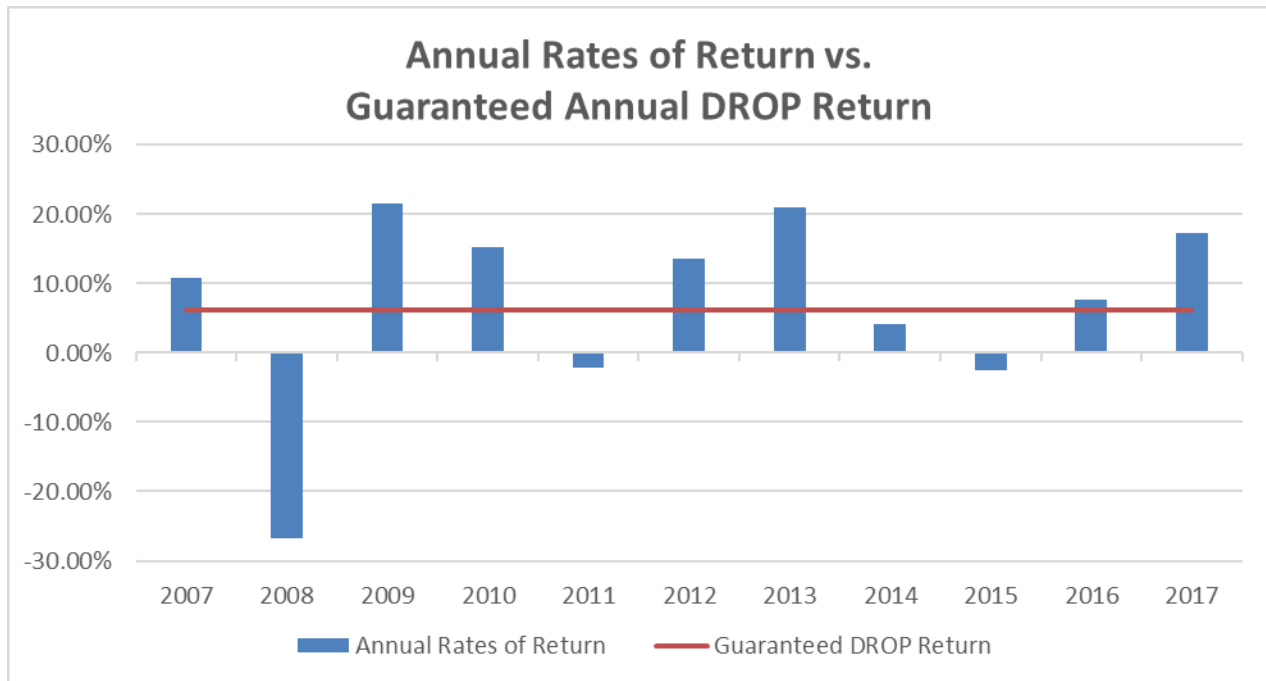
short, or even medium, term. Thus, many believe investments such as equities are more likely to achieve higher returns over a long time horizon and therefore provide a superior risk-return profile to support these long-term liabilities. This has led public pension plans to allocate a large proportion of assets to riskier and potentially less liquid investments. Irving Fire is no exception. However, Irving Fire has unique plan design features that present additional risks which must be examined when considering the reasonableness of this common asset allocation.

During the recent past, the Fund has offered two versions of its DROP, a Forward DROP and a Retro DROP. Both DROPs have a maximum length of nine years. The election into the plan's Forward DROP was ended in January 2012, while the Retro DROP continues to be offered to retiring members. Significant concerns with both versions of Irving Fire's DROP are that DROP balances are allowed to be left in the plan, earning a guaranteed 6.25% annual rate of return and can be withdrawn with virtually no restrictions at any time. The only limit to the DROP provision as specified in the plan document is that distributions must begin in accordance with Internal Revenue Service Required Minimum Distribution rules.

While the Fund lowered its investment return assumption from 8.25% to 7.50% in its December 31, 2017 actuarial valuation, Irving Fire members eligible to participate in the DROP before the assumption was changed will still earn a guaranteed 6.25% annual rate of return on their DROP balance. Because of the length of the Retro DROP, it will take nearly a decade before the Fund is able to begin crediting new DROP accounts at the lower interest rate of 5.50%. Hence, the following analysis of Irving Fire's DROP focuses on the rate credited to current DROP accounts and those due to be opened in the near future.

Risks Associated with Irving Fire's DROP

In an era of extremely low interest rates, offering a guaranteed 6.25% annual rate of return on accounts that can be left in the plan for years after retirement and withdrawn on short notice is virtually unheard of and presents great risk. It is impossible for the Fund to back these liabilities with assets that have a similar investment horizon and provide a similar return. In fact, the Fund has struggled to consistently earn a 6.25% annual rate of return on its entire portfolio for an extended period of time. For example, even though Irving Fire has surpassed a 6.25% return seven times in the past 11 years, it experienced negative returns in three other periods during the same time span, resulting in an average annual return of 5.88% for the ten-year period ending December 31, 2017.



A major concern is the lack of a trigger mechanism to lower or cease the guaranteed interest rate for years with sub-par returns. Participants are incentivized by the nature of this program to treat it like a risk-free savings account – one that earns roughly 6 times more than even the best savings accounts on the market, while the active plan members and taxpayers absorb all the risk. The combined effect of the 6.25% guaranteed return on DROP accounts, the average actual return on assets lower than the interest rate paid, and the option for all participants to leave their DROP balances in the Fund for up to 20 years explains why the Fund's DROP balance has grown to nearly 1/3 of the total assets as of the end of 2016.

	DROP Balance ⁴		
Fiscal Year	2014	2015	2016
DROP Balance	\$27,110,677	\$47,152,159	\$55,284,178
Fiduciary Net Position (FNP)	\$178,839,832	\$174,037,587	\$186,556,007
DROP Balance as % of FNP	15.16%	27.09%	29.63%

Irving Fire amended its plan design in 2012 by ending the ability for members to participate in the Forward DROP. However, because of the way the Retro DROP is designed, crediting interest on monthly benefits and member contributions for up to nine years in the past, this only serves to hide the actual DROP balance until after members have retired. As demonstrated in the table above, the Fund's DROP balance has more than doubled since 2014. Even with its ballooning DROP balance, Irving Fire has yet to make any significant changes to lower the cost of its DROP.

While it makes economic sense for members to continue to participate in the DROP as it currently exists, any attempt to modify future interest accruals may change this calculation, potentially causing the Fund

⁴ The table does not include the 2017 DROP balance since the Fund has yet to submit its 2017 Annual Financial Report which would provide this information.

significant issues. Currently, roughly 3% of the Fund's net assets are in short-term investments, leaving the Fund at risk of needing to sell off assets, potentially with less than ideal market timing, if a larger than expected number of DROP members decide to withdraw their funds.

Conclusions/Recommendations

The Fund's board should consider performing an in-depth asset-liability study to better understand the potential risks associated with its existing asset mix and the liabilities they support. This should include scenario testing large DROP withdrawals coupled with potential adverse investment experience. In addition, the board should seriously consider the risk a guaranteed rate of return places on all the Fund's stakeholders while considering the impact changes could have on DROP participant behavior.

Governance Risk

The expansion of Irving Fire's DROP over time, particularly the continuation of the guaranteed 6.25% return in more recent years as interest rates plummeted, provides some insight into risks associated with the Fund's decision-making processes. The Fund did not have the benefit of written funding or benefit policies to guide its consideration of DROP enhancements over time and may have benefitted from more formal involvement of the City.

Background

Governance is essentially decision-making, and decision-making for public pension plans must balance the competing interests of plans and their sponsors and should feature collaboration between the two.

However, even plans with very engaged boards and sponsors can be susceptible to increasing benefits to unsustainable levels in good times or failing to lower them when necessary in bad times. Unwillingness to reduce benefits prospectively when necessary to address funding challenges can be an obstacle to getting things back on track. In the case of Irving Fire, while the members elected to end the Forward DROP as of January 2012, the changes to the DROP provision, as discussed below, have caused the Fund's DROP balance to increase to a degree that makes the continuation of the Fund's 9-year Retro DROP with 6.25% guaranteed annual interest likely untenable in the long term.

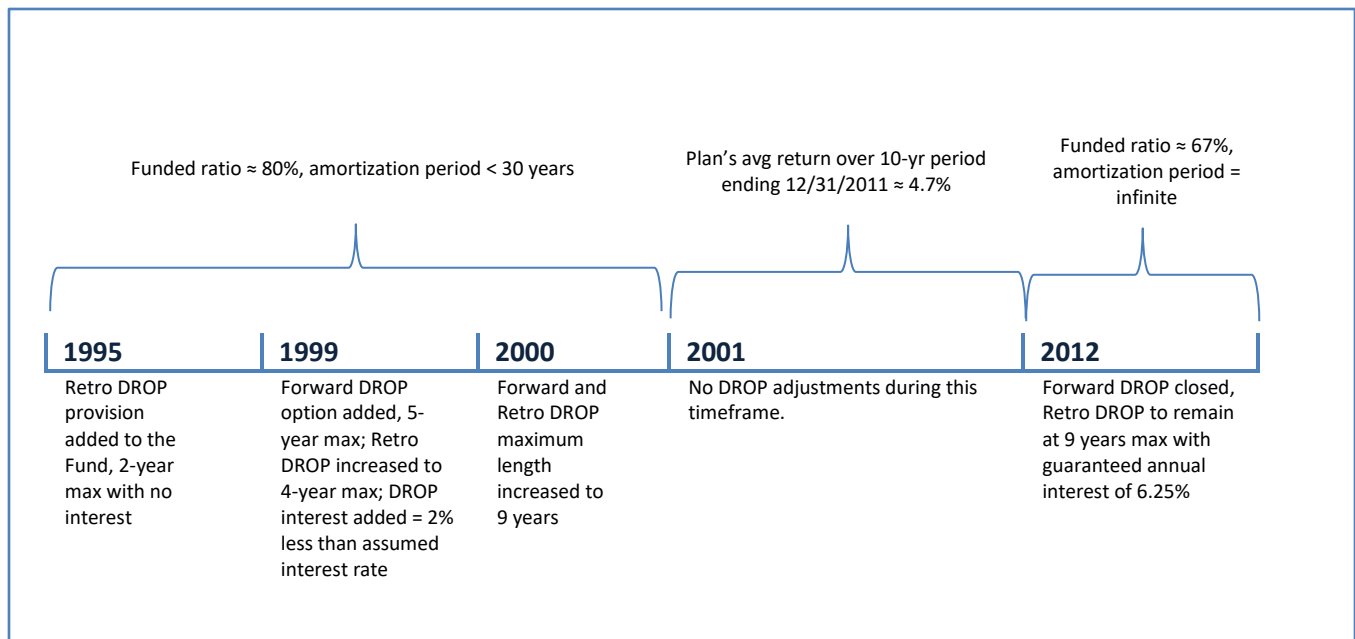
Furthermore, in certain situations even actuarial assumptions are at risk of being susceptible to this type of imbalance in decision-making. When plans choose to tie a benefit to an assumption, making the already difficult choice of changing those assumptions becomes even more complicated. Irving Fire had maintained a return assumption of 8.25% even after experiencing nearly two decades of its long-term average returns not meeting that goal. Studies show that instead of lowering the return assumption, public plans have taken on more risk (even if the asset allocation remains relatively constant) in hopes of achieving higher returns.⁵ The Fund's current asset allocation is shown below.

⁵ https://www.pacificresearch.org/wp-content/uploads/2017/06/2017-02-01-Risk_Taking_Appropriateness.pdf

Asset Allocation					
Asset Class	Equities	Fixed Income	Alternatives	Real Estate	Other
Current Allocation	54.30%	19.24%	19.34%	3.41%	3.71%
Target Allocation	59.00%	11.00%	18.50%	11.50%	0.00%

Governance Risk Case Study: Irving Fire's DROP

Irving Fire made a series benefit increases in the late 1990s, primarily pertaining to its DROP. Between 1997 and 2000 members elected to increase the modest, interest-free, 2-year Retro DROP to four years with an interest rate of 2% less than the assumed interest rate used in actuarial valuations. As mentioned earlier, this has been equal to a guaranteed 6.25% annual return on each DROP participant's DROP account balance every year since. Around the same time, members also added a 5-year Forward DROP with the same credited interest rate. Up until this point, the plan remained reasonably well-funded with a funded ratio hovering just under 80% and an amortization period in the 20s.



In 2000, members again elected to increase the maximum period of the Retro DROP this time from four to nine years and increased the Forward DROP length to nine years as well. At the time, Irving Fire had experienced four out of five previous years of greater than 9% rate of return on its investments, so the 6.25% annual interest rate on DROP balances was looked at as a net positive. In the following 16 years, however, the Fund reported negative returns in five years and has not reported a 10-year return on investments that meets or exceeds its assumed interest rate. Although the Fund has lowered its investment return assumption in its 2017 valuation, it has yet to take any significant measures to lower future interest accruals on the DROP accounts since the new DROP balance interest rate of 5.50% does not affect anyone currently eligible for the DROP. As mentioned before, due to the length of the Retro DROP, it will take several years before the Fund is able to begin crediting new DROP accounts at the lower interest rate. Furthermore, the new DROP interest rate is only slightly less than the Fund's current

10-year return on investment of 5.88%. Failing to address the DROP account's significant and growing risks points to a lack of proactive decision-making by key stakeholders.

Funding Soundness Restoration Plan

State law recognizes the potential risks of underfunding and a lack of engagement by some key stakeholders and imposes cooperation between the system and sponsoring governmental entity by requiring retirement systems having trouble meeting their long-term obligations work with their sponsors to develop a restoration plan for addressing those issues.⁶ This framework helps ensure that both the system and its sponsoring employer are involved in retirement system reform decisions, but it comes at a point when actuarial health is already threatened. Irving Fire was required to submit an FSRP to the PRB in 2016 because the actuarial valuations prepared as of January 1, 2012 and January 1, 2014 reported amortization periods greater than 40 years. The FSRP was developed based on the following: an increase in the number of active members by recognizing 42 new firefighters hired during 2016 and an increase of the City's contribution rate from 15% of payroll to 16.75%. These changes helped lower the Fund's amortization period to 33 years as of December 31, 2015; however, since that FSRP was adopted, the plan's December 31, 2017 actuarial valuation reported an infinite amortization period. Irving Fire is again required to submit a revised FSRP by April 2019 with additional changes to bring the Fund back in compliance with state law.

Conclusions/Recommendations

It is imperative to the long-term health of the Fund that all stakeholders are involved in plan decisions in good times as well as bad. One step to help address these issues is for the plan and the City to develop written funding, benefit, and investment policies which are linked to provide a formal risk-/cost-sharing arrangement. Policies can be adopted that provide a framework for how benefit and contribution levels may be modified under different conditions. An advantage of such policies is that changes to plan benefits and costs are known and understood by all parties in advance, rather than negotiated under difficult circumstances.

For example, a benefit policy can outline the primary objectives the employer wishes to achieve, which can be as detailed as a specified replacement ratio, or as general as offering competitive benefits at a reasonable cost, as well as identifying policies and procedures designed to determine if the objectives are being met and how they can be reviewed at reasonable intervals. A benefit policy can also outline potential benefit enhancements or reductions based on the funding goals as outlined in the funding policy. The funding policy might incorporate objectives associated with benefit security, contribution stability and intergenerational equity and outline how those objectives will be met through contribution changes, as well as referencing potential changes outlined in the benefit policy. The coordinated policies might limit future benefit enhancements, cost of living adjustments, and/or contribution rate reductions such that they can only be considered or made if the plan's funded ratio remains greater than a chosen

⁶ Texas Government Code 802.2015 and 802.2016 require public retirement systems whose amortization period exceeds 40 years for 2 or 3 consecutive actuarial valuations to develop, with their sponsor, a funding soundness restoration plan designed to bring their amortization period within 40 years over 10 or fewer years.

threshold. In addition, if the funded ratio falls below a certain threshold, the stakeholders may be required to come back to the table to make necessary contribution and benefit adjustments.

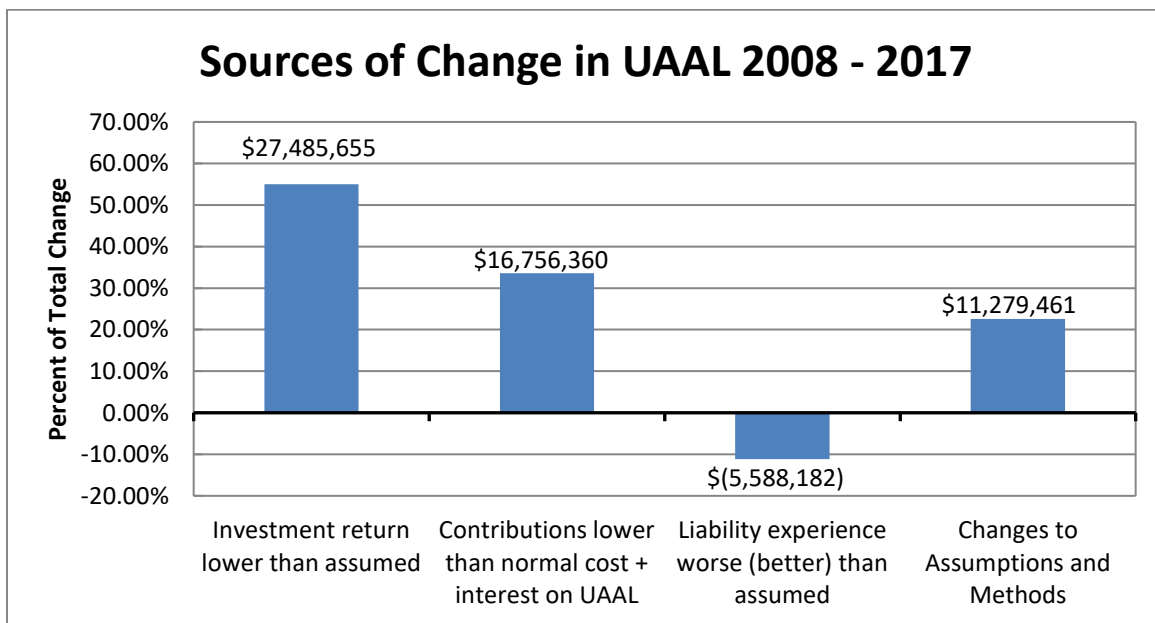
In addition to helping maintain a sound plan funding level, putting such trigger mechanisms into place can help reduce uncertainty for stakeholders who would know, in advance, how adverse experience will be managed. If Irving Fire together with the City had adopted such a forward-looking policy in the past, its DROP may not have grown to represent the level of risk for the Fund that it does today.

Funding Risk

Irving Fire's recent investment experience, with actual returns far below the assumed rate of return, coupled with the Fund's fixed rate funding structure which does not adjust to cover those actuarial losses presents serious funding risks that must be mitigated for the Fund to meet its long-term obligations.

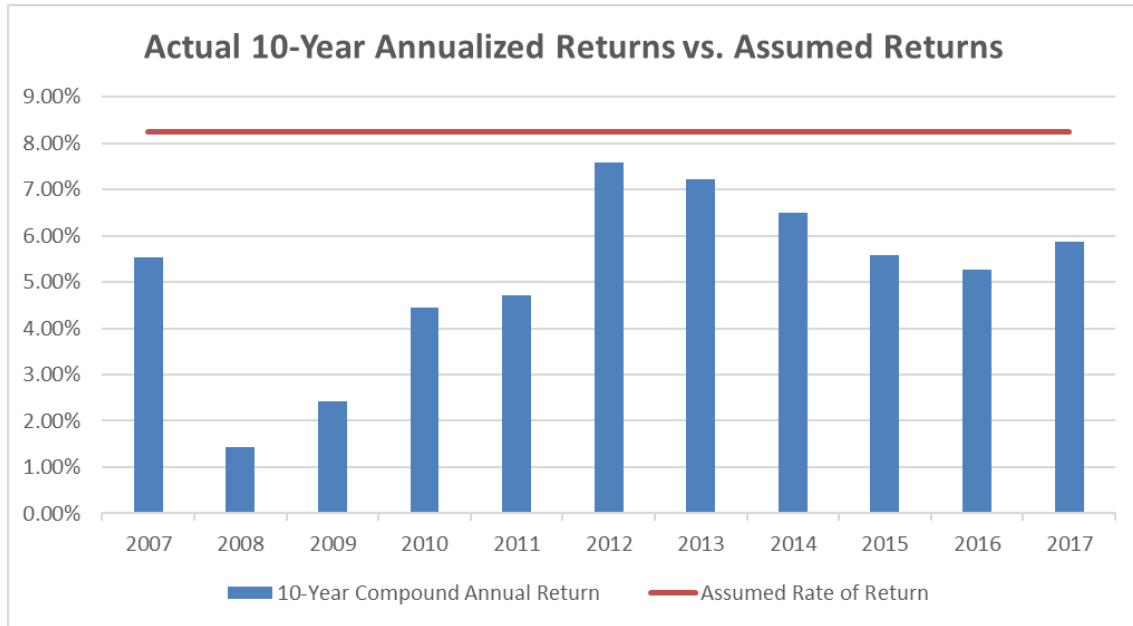
Background

Irving Fire's significant growth in unfunded liability (UAAL), which increased from just over \$32 million at the beginning of 2008 to more than \$82 million at the end of 2017, can be primarily attributed to actual returns consistently lower than the assumed investment return, contributions consistently lower than the annual benefit accrual plus growth of existing unfunded benefits, and partially to the recent changes in the actuarial assumptions in the Fund's latest actuarial valuation. The Fund has made significant increases in both the member and city contribution rates over the last few years. However, with current amortization period at infinite, it is likely that the Fund will need to make even more increases to contribution rates and/or benefit reductions to bring down the amortization period to an acceptable level.

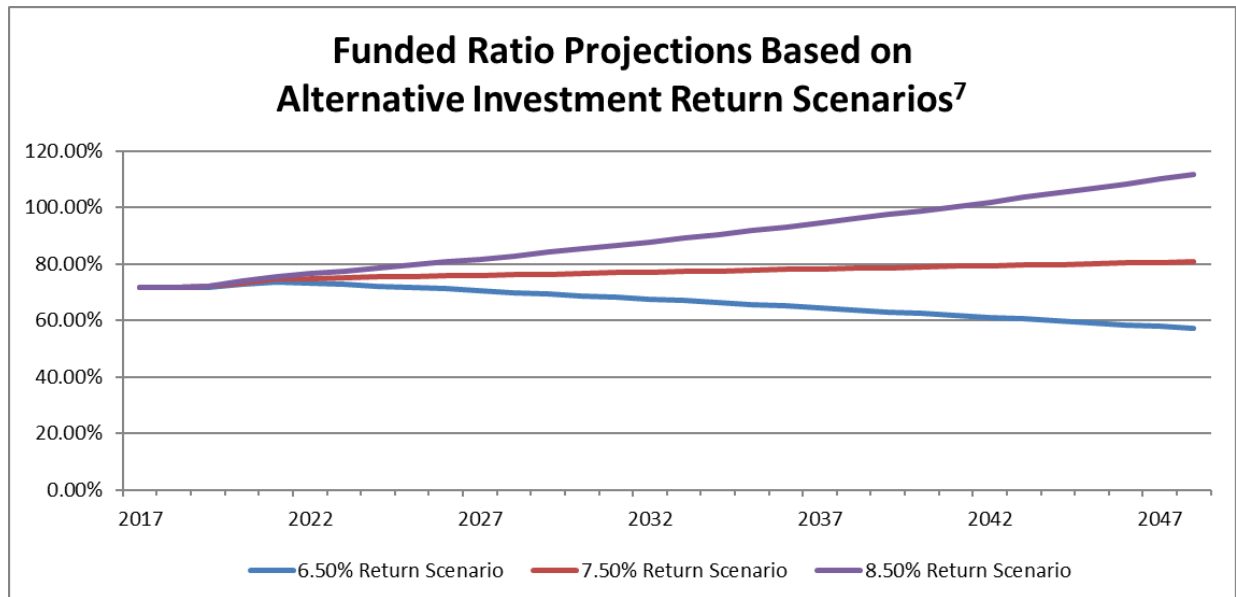


Investment Experience Compared with Investment Return Assumption

Actual investment returns lower than the assumed return has been a large contributor to the Fund's increasing UAAL. Up until the December 31, 2017 actuarial valuation, the Fund assumed an 8.25% interest rate, which exceeded the 2017 national average of 7.52% (reported by NASRA) and all of its peer systems in Texas. As illustrated below, the Fund had not achieved an 8.25% annualized return over a consecutive 10-year period in any of the 11 periods ending December 31, 2007 through December 31, 2017. In its latest valuation, Irving Fire lowered its investment assumption to 7.50%. Even so, the Fund has only exceeded a 7.50% 10-year annualized return once in the past 11 years.



The graph below projects the funded ratio for the next 30 years, assuming the member contribution rates remain at a fixed 13.00%, the city contribution rates remain at a fixed 16.75% and the investments return 6.50%, 7.50% or 8.50%. The impact of consistently earning less than the expected return on assets (EROA) *but even as high as 6.50% over the next 30 years*, results in the funded status sinking below 60%.



Contribution Insufficiency Risk

For most of Irving Fire's recent history, the City's contribution rate was tied to the rate it contributed for its police and other municipal employees who are members of the Texas Municipal Retirement System (TMRS). The problem with this contribution arrangement is that TMRS operates a completely different and much larger trust fund whose members receive different benefits than Irving Fire's members. Due to this arrangement, the Fund was unable to successfully weather negative plan experience throughout the past decade, ultimately leading it to report amortization periods of infinite and 97 years in its 2012 and 2014 valuations, respectively. After adoption of its 2014 valuation, the City's contribution into the Fund was changed to a higher, fixed-rate moving forward.

Several issues exist with fixed-rate contributions that may result in long-term problems:

- 1) Contributions to percent-of-pay plans are inherently back-loaded because the expected contributions to a percent-of-pay plan grow on a nominal basis at the assumed rate of total payroll growth.
- 2) Fixed contributions (whether as a rate of pay or a specific dollar amount) provide budgetary stability for the employer in the short term, but do not include any inherent mechanisms for reacting to changes in a plan's financial condition.

Despite the recent employee contribution rate increase to 13.00% in January 2018, the plan is only receiving approximately 76% of the most recently reported 30-year open amortization ADC.

⁷ All current and projected assets and liabilities reflect the actuarial accrued liabilities, actuarial value of assets, plan provisions, and actuarial assumptions and methods as reported in the 12/31/2017 Actuarial Valuation prepared by John M. Crider, Jr. Consulting Actuary.

Expected Contribution Levels vs. Actuarially Determined Contribution										
Fiscal Year	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018
Employee Contribution	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	12.00%	12.00%	12.00%	13.00%
Employer Contribution	12.00%	13.02%	13.53%	14.42%	15.04%	15.50%	12.00%	15.65%	16.75%	16.75%
Employer 30-Year ADC	12.00%	13.02%	14.87%	15.33%	15.93%	19.04%	23.27%	19.88%	19.01%	22.02%
% of ADC funded	100.00%	100.00%	90.99%	94.06%	94.41%	81.41%	51.57%	78.72%	88.11%	76.07%
Covered Payroll (in millions)	\$14.06	\$17.62	\$18.17	\$18.38	\$19.51	\$22.90	\$20.64	\$25.48	\$27.07	\$32.62
Contribution Shortfall (in millions)	-	-	\$0.24	\$0.17	\$0.17	\$0.81	\$2.33	\$1.01	\$0.61	\$1.72

Conclusions/Recommendations

The investment return assumption is the sole assumption that allocates expected costs between contributions and investment income and the assumed payroll growth rate drives the determination of whether the existing contribution rate is sufficient to meet those needs. Funding risk arises when these assumptions understate the contributions needed in the short and medium term, forcing future members and tax-payers to bear the burden of increased contributions and/or lower benefits.

Pre-funding a defined benefit plan, i.e. setting aside assets now for benefits that will be paid in the future, is necessary to help balance the three primary policy goals of benefit security, equity between generations of taxpayers and employees, and a stable contribution from year to year. Consistently underfunding a plan places the benefits of both retirees and active members at significant risk and/or places the burden of paying for services already rendered on future generations of taxpayers and employees through the reduction of future benefits or an increase in contributions.

In the absence of a formal, written funding and risk-sharing policy, the result is a de facto risk-sharing arrangement that is simply a reaction to events, often well after the plan finds itself with financial difficulties. Plans and their sponsors can take many actions to ensure financial stability and mitigate the risks that lead to underfunding. These steps include ensuring contributions are adequate to fully fund the plan over a reasonable period; developing formal policies to guide decision-makers under different economic conditions; reviewing actuarial assumptions against actual experience and making necessary changes; and monitoring investment performance and evaluating asset allocation decisions on a forward-looking basis.

Adequate Funding. To address these concerns, a strong funding policy that requires payment of an ADC is encouraged. Numerous actuarial methods can be utilized to help mitigate contribution volatility, including directly smoothing contribution rates or adding “guardrails” that require the stakeholders to come back to the table if the contribution rate falls outside a specified range. If funding according to an ADC is not adopted, a funding policy that fully funds the plan over a finite period, such as 30 years, is recommended.

Investment Performance. Whatever the investment return assumption used, investment returns should be closely monitored, and investment managers' performance should be assessed regularly and compared to appropriate asset class benchmarks. Benchmarks should be reviewed to see if they have been met or exceeded and should be viewed considering the risk taken to achieve those returns. Best practices also include revisiting investment manager selection periodically, with boards of trustees evaluating managers' performance, fees, and whether their current managers are providing the highest possible value at the lowest possible cost. The asset allocation should also be assessed from a risk perspective to provide insight into how the fund would weather a market correction.

Actuarial Assumptions. Public pension plans must monitor actuarial assumptions continually through their actuarial valuations and make appropriate adjustments to mitigate bias in the assumptions that result in consistent actuarial gains or losses. Actuarial gains and losses occur when the plan's actual experience does not match expected experience. Over time, without required changes, pension funds such as Irving Fire whose assumptions consistently diverge from actual experience in the same direction (i.e. consistently seeing actuarial gains or consistently seeing actuarial losses) can exacerbate the issue of intergenerational inequity, causing one group of members and taxpayers to over- or under-pay. While the board of trustees has lowered several key assumptions in the latest valuation, they should continue to work with their actuaries and other consultants to ensure assumptions are neither too aggressive nor too conservative, while striving to maintain (or achieve) sound fiscal health to secure existing accrued benefits. PRB's *Pension Funding Guidelines* recommend systems to monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

Appendix

Key Metrics⁸

Metric	Amortization period (33.0 years)
What it measures	Approximately how long it would take to fully fund the unfunded actuarial accrued liability (UAAL) based on the current funding policy.
Why it is important	Given the Plan's current assumptions, an amortization period greater than 17 years indicates that contributions to the Plan in the coming year are less than the interest accumulated for that same period, and therefore the total UAAL is expected to grow over the near term. In addition, for a plan that contributes on a fixed-rate basis such as Irving Fire, the higher the amortization period, the more sensitive it is to small changes in the UAAL.
Peer Comparison	Irving Fire's amortization period is in the highest 1/3 of all Texas retirement plans and is greater than the maximum PRB pension funding guideline of 30 years.

Metric	Funded ratio (74.92%)
What it measures	The percent of a fund's actuarially accrued liabilities covered by its actuarial value of assets.
Why it is important	The lower the funded ratio, the fewer assets a fund has to pay its current and future benefit payments.
Peer Comparison	Irving Fire's 74.92% funded ratio is the second highest in its peer group of TLFFRA plans with similar asset size and in the top 40% of plans in the state.

Metric	UAAL as a percent of payroll (228.54%)
What it measures	The size of a plan's unfunded liability compared to the annual payroll of the active members.
Why it is important	Provides a way to compare plans of various sizes and expresses the outstanding "pension debt" relative to current personnel costs.
Peer Comparison	The Plan's UAAL as a percent of payroll is the second lowest among its peer group and in the bottom 40% of plans in the state.

⁸ The key metrics listed in this section are from the Fund's 2015 Actuarial Valuation and 2016 Annual Financial Report available to the PRB at the time it was selected for review in April 2018.

Metric	Assumed rate of return (8.25%)
What it measures	The estimated annual rate of return on the Fund's assets.
Why it is important	If actual future returns are lower than the assumed rate of return, future contributions will need to increase significantly, especially for a poorly funded plan. Irving Fire's assumed rate of return is 8.25%, while its actual ten-year investment rate of return for the period ending December 31, 2016 was only 5.28%.
Peer comparison	Irving Fire has the highest assumed rate of return in the state.

Metric	Payroll growth rate (4.25%)
What it measures	The estimated annual growth in the total payroll of active members contributing into the Fund.
Why it is important	Contributions are calculated as a percent of active members' pay and are back-loaded based on the expected growth in total payroll. If payroll does not increase at this rate, actual contributions will not meet those expected in the Fund's actuarial valuations. Persistent contributions below expected levels could have serious consequences on the Fund's long-term solvency.
Peer comparison	The Fund's payroll growth rate of 4.25% is the most aggressive in its peer group of TLFFRA plans with similar asset size and one of the highest in the state.

Metric	Actual contributions as a percent of actuarially determined contributions (82.33%)
What it measures	Whether the current employer contributions have met a theoretical minimum threshold. ⁹
Why it is important	The employer's portion of the contribution is less than 85% of the amount needed to fund the plan on a rolling 30-year amortization period. The PRB's 2014 Study of the Financial Health of Texas Public Retirement Systems found that plans that have consistently received adequate funding are in a better position to meet their long-term obligations.
Peer comparison	This is the second largest shortfall percentage in its peer group.

⁹ The theoretical minimum threshold, or actuarially determined contribution (ADC), is a target or recommended contribution "to the plan as determined by the actuary using a contribution allocation procedure," as defined in Actuarial Standards of Practice No 4. If contributions to the plan are made as a fixed rate based on statutory or contractual requirements, the ADC for this purpose is the contribution needed to fund the benefits accrued in the current year and maintain an amortization period that does not exceed 30 years, as required to be reported under Texas Government Code §802.101(a).

Metric	DROP balance as a percent of fiduciary net position (29.63%)
What it measures	The amount of the Fund's assets that are designated for lump-sum payouts to retired members as a percent of its total assets.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)) shows how large a decrease in the Fund's assets could be if most or all DROP participants decided to take their balances out in a short amount of time.
Peer comparison	Irving Fire's DROP balance as a percent of FNP is the highest among its peer group and third highest in the state.

Metric	Non-investment cash flow as a percent of fiduciary net position (-1.24%)
What it measures	Non-investment cash flow shows how much the plan is receiving through contributions in relation to its outflows: benefit payments, withdrawals and expenses.
Why it is important	Viewing this metric as a percent of total net assets (or fiduciary net position (FNP)), in conjunction with the funded ratio and recognition of the relative maturity of the plan, provides information about the stability of a plan's funding arrangement.
Peer Comparison	Irving Fire's non-investment cash flow as a percent of FNP is the second highest in its peer group and in the highest 1/3 of all plans in the state.

Plan Summary

The Irving Firemen's Relief and Retirement Fund ("Irving Fire" or "the Fund") was established in 1945 under what is now entitled the Texas Local Fire Fighter's Retirement Act (TLFFRA). TLFFRA provides general guidelines for fund management, but leaves administration, plan design, contributions, and specific investments to the discretion of the board of trustees. Irving Fire, as with all TLFFRA systems, is entirely locally funded.

Benefits

Retirement Eligibility	Age: 50 years; Years of Service: 20 years
Vesting	Fully vested at 20 years of service, 50% vested at 10 years of service with an additional 5% per year until 100% vested
Benefit Formula	Years of service (up to 21 years) x 3.175% x Final Average Salary +\$60 per month for each year > 21 years of service
Final Average Salary (FAS)	Highest consecutive 78 biweekly pay periods
Automatic COLA	Option to elect a 1% automatic annual cost of living adjustment (COLA) with reduced benefits
Retirement Benefit Options	<p>Forward DROP (if elected before 1/16/2012): 108-month maximum. Employee contributions credited; interest credited equal to 2% less than the greater of the assumed rate of return used in the last valuation prepared before a member's DROP date or the assumed rate of return in the last valuation prepared before a member's retirement date. May be taken in a lump sum or installments. Eligible if member is at least 50 years of age with 21 years of service.</p> <p>Retro DROP: 108-month maximum. Employee contributions credited; interest credited equal to 2% less than the valuation interest rate. May be taken in a lump sum or in installments. Under DROP distribution feature, remaining retiree money in DROP account continues to earn interest. Eligible if member is at least 50 years of age with 21 years of service.</p>
Social Security	No

Contributions

Currently, active members of Irving Fire contribute 13.00% of pay while the City of Irving (the City) contributes 16.75% of pay.

Membership

Total Active Members	Total Annuitants (Retirees & Beneficiaries)	Terminated Vested	Total Members	Active-to-Annuitant Ratio
365	186	2	553	1.9

TLFFRA Board Structure

Active Members	3 - Members of the retirement system; elected by fund members. Three-year terms.
Sponsor Government	1 - Mayor or designated representative, or the political subdivision's Chief Operating Officer or designated representative. 1 - Chief Financial Officer of the political subdivision, or designated representative. Terms correspond to term of office.
Taxpayer, Not Affiliated With Fund/Sponsor Govt.	2 - Residents of the State of Texas, must not be officers/employees of the political subdivision; elected by other Board of Trustee members. Two-year terms.

Contribution and Benefit Decision-Making

TLFFRA authorizes members of the retirement systems to determine their contribution rates by voting. The statute requires to make contributions at the same rate paid by employees or 12%, whichever is smaller. TLFFRA also allows a city to contribute at a higher rate than employees do through a change in city ordinance.

TLFFRA gives the board the power to make decisions to modify the benefits (increases and reductions). However, a proposed addition or change must be approved by the actuary and a majority of participating plan members. Benefit changes cannot deprive a member, retiree or beneficiary of the right to receive vested accrued benefits.

Historical Trends

To conduct an intensive review of risks associated with the long-term funding of a pension Fund, it is important to analyze trends in multiple metrics. A Fund with an asset level lower than its accrued liability has insufficient funds to cover benefits. A Fund can experience an increase in unfunded liability due to various factors, including insufficient investment returns, inadequate contributions and inaccurate or overly aggressive assumptions. Hence, a single metric cannot effectively capture the different drivers contributing to the increase of a Fund's unfunded pension obligation. This section analyzes historical trends in various metrics identified by the PRB and makes comparisons to understand the sources of growth in unfunded liability for Irving Fire.

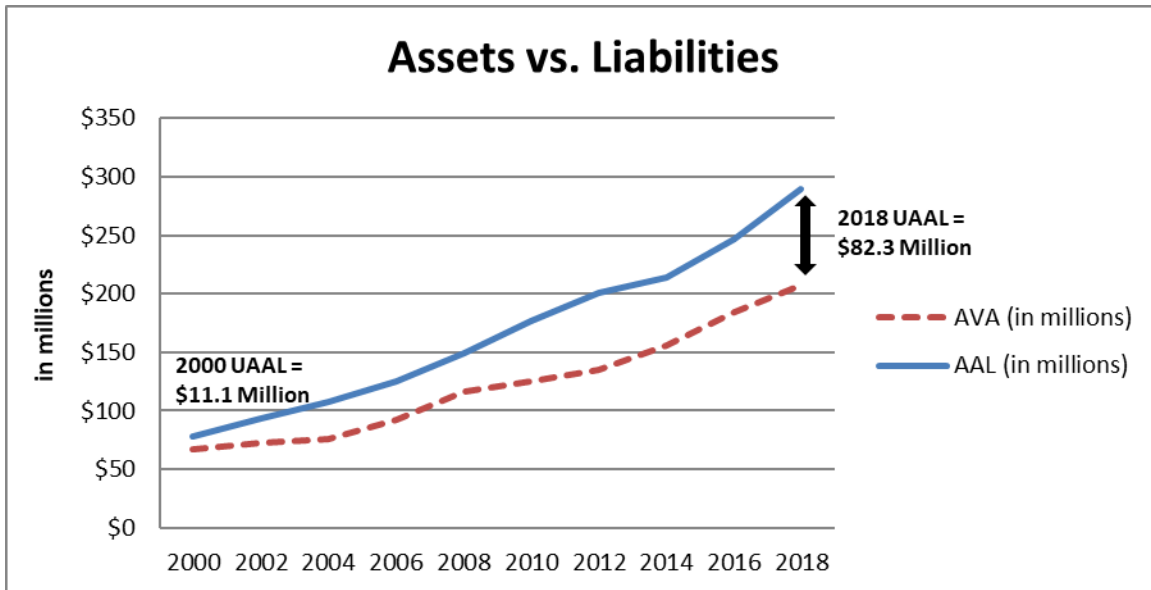
Irving Fire's funded status has been steadily declining since 2000. Numerous factors have contributed to this deterioration, including inadequate contributions, investment returns lower than the chosen assumption, and increased benefit payments due to the expansion of interest-accruing DROP accounts. The following sections discuss these and other factors in detail.

Assets and Liabilities

Funding Trends										
Funded Ratio, Assets, Liabilities and Year over Year Growth										
Fiscal Year*	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018
Funded Ratio	85.75%	78.43%	71.19%	73.85%	78.31%	70.98%	67.40%	73.10%	74.92%	71.61%
Am Period (years)	29.1	30.9	65.0	52.4	36.2	65.9	Infinite	63.4	33.0	Infinite
UAAL (in millions)	\$11.06	\$20.06	\$30.84	\$32.73	\$32.33	\$51.13	\$65.25	\$57.50	\$61.87	\$82.26
AVA (in millions)	\$66.56	\$72.94	\$76.21	\$92.45	\$116.69	\$125.07	\$134.89	\$156.22	\$184.78	\$207.49
AVA Growth (YoY)	-	4.69%	2.21%	10.14%	12.35%	3.53%	3.85%	7.62%	8.76%	5.97%
AAL (in millions)	\$77.63	\$93.01	\$107.04	\$125.18	\$149.02	\$176.20	\$200.14	\$213.73	\$246.66	\$289.75
AAL Growth (YoY)	-	9.46%	7.28%	8.14%	9.11%	8.74%	6.58%	3.34%	7.43%	8.39%

* The dates of the valuations referenced in this table are either 1/1 of the year stated or 12/31 of the prior year.

Irving Fire's actuarial accrued liability (AAL) increased by nearly 275% between 2000 and 2018. The Fund's actuarial value of assets (AVA) increased by just over than 210% over the same period. The Fund was nearly 86% funded in 2000 and fell to below 72% in 2018.



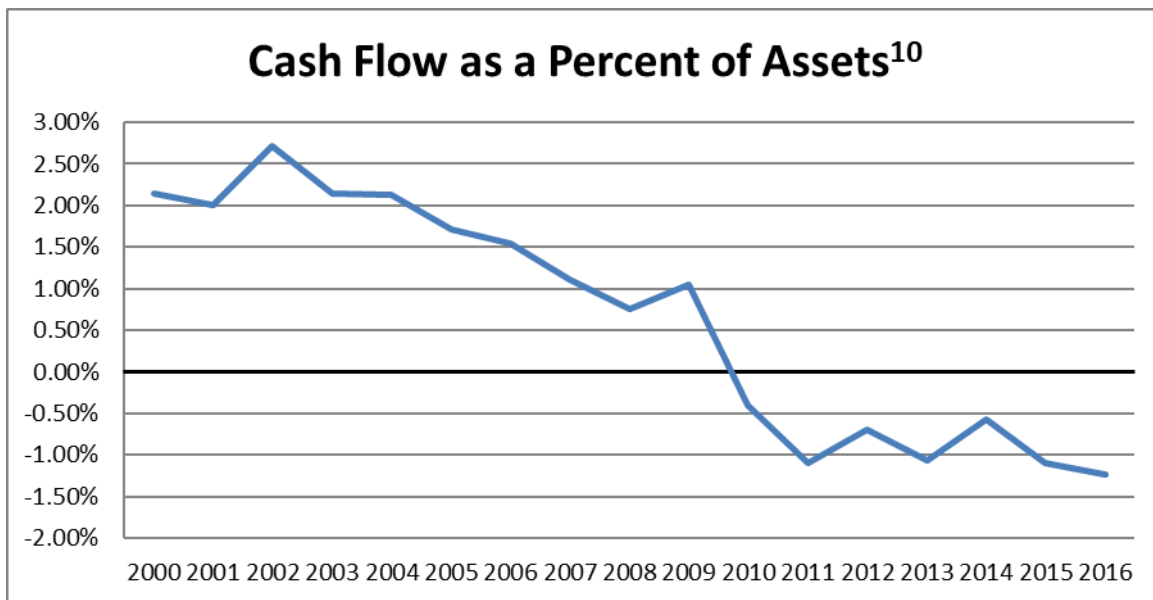
Investment Assumption and Returns

The 10-year net return on investments in 2017 was 5.88%, which was more than 150 basis points below its new assumed interest rate of 7.50%. Most retirement funds have been experiencing a difficult 10-year period since the 2008-2009 market downturn, but the Fund's aggressive 8.25% rate of return assumption for most of this period (the highest in the state) means that Irving Fire should have outperformed most other funds. However, Irving Fire's 10-year return is only the 30th highest of Texas' 93 defined benefit pension plans.

Cash flow

Irving Fire has one of the highest non-investment cash flows among its peer group. However, in 2016 the Fund's non-investment cash flow was the lowest in its recent history and has been trending negatively since 2000. Total contributions have grown on average by 4.95% annually since 2000 but are being outpaced by the average growth in yearly benefit disbursements of 9.44%. Total expenses are also the highest in their peer group as a percent of the Fund's total assets (0.81%)

A negative non-investment cash flow is not abnormal for mature defined benefit pension Funds. However, the Fund's cash flow has been negative since 2010 and with potential large benefit payouts on the horizon due to the Fund's large DROP balance, it is likely to decrease further in the near future. A low cash flow percentage is likely to be a drag on potential investment returns because a Fund must either invest in a higher proportion of income-producing investments, which traditionally provide lower returns, or must liquidate existing assets to pay out current benefits and/or expenses.



Forward and Retroactive DROP

Irving Fire currently has a 9-year Retroactive Deferred Retirement Option Program (Retro DROP) provision and before 2012 offered a 9-year Forward DROP provision. Both of these provisions allow members to end their years of service before their actual retirement date and receive a lump sum payment equal to the total retirement benefits the member would have received plus the amount of contributions the member made into the Fund over that time. The Retro DROP allows members to make the election of this provision at their retirement date and apply the program retroactively rather than having to make the decision years before retirement as the Forward DROP does.

¹⁰ The table does not include 2017 cash flow data since the Fund has yet to submit its 2017 Annual Financial Report which would provide this information.

Both of these DROP provisions give members the added benefit of accruing annual compounded interest on their DROP balance at a rate of 2% less than the Fund's actuarially assumed investment return rate during the time in the DROP and afterwards. Members may leave most of their balance in the fund, accruing interest, as DROP disbursements are only subject to a minimum threshold set by the Internal Revenue Service.

Based on the data available to the PRB, DROP balance reported as of 12/31/2016 was \$55,284,178 which was more than a \$28 million increase from 2014's balance of \$27,110,667. The 2016 DROP balance is 29.63% of the Fund's Total Net Assets. The PRB has yet to receive the Fund's 12/31/2017 Annual Financial Report that would include its 2017 DROP balance.

Peer Group Key Metric Comparison

		Funding Val Metrics							Fiscal Year End Metrics			
Peer Group Plans		MVA	Am Period Date	Am Period	Funded Ratio	UAAL as % of Payroll	Assumed Interest	Payroll Growth	FYE	Actual Cont. as % of ADC	DROP as % of FNP	Non-Investment Cash Flow as % of FNP
Lubbock Fire Pension Fund		\$ 176,016,821	12/31/2016	33.5	72.63%	240.47%	7.75%	4.00%	12/31/2016	100.00%	N/A	-3.63%
Irving Firemen's Relief & Retirement Fund		\$ 174,037,587	12/31/2015	33.0	74.92%	228.54%	8.25%	4.25%	12/31/2016	82.33%	29.63%	-1.24%
Amarillo Firemen's Relief & Retirement Fund		\$ 144,657,881	12/31/2015	34.5	81.82%	172.47%	8.00%	4.00%	12/31/2016	93.92%	N/A	-3.76%
Corpus Christi Fire Fighters' Retirement System		\$ 133,901,631	12/31/2016	23.1	62.14%	265.57%	7.75%	3.50%	12/31/2016	100.00%	N/A	-3.04%
Laredo Firefighters Retirement System		\$ 126,305,204	9/30/2016	28.0	59.28%	263.00%	7.90%	3.25%	9/30/2016	100.17%	N/A	1.58%
Beaumont Firemen's Relief & Retirement Fund		\$ 102,435,664	12/31/2016	104.0	67.53%	274.69%	8.00%	3.50%	12/31/2016	74.37%	27.95%	-4.27%

Peer Group Sponsor Funding Comparison

Peer Group Plans	GF Expend	EOY GF Bal	UAAL	Expected Employer Contributions	ADC	30-yr Shortfall	30-yr SF % of ADC	30-Y SF % of GFE
Lubbock Fire Pension Fund	\$ 162,139,351	\$ 35,673,526	\$ 73,353,115	\$ 6,652,807	\$ 6,878,532	\$ 225,725	3.28%	0.14%
Irving Firemen's Relief & Retirement Fund	\$ 216,852,808	\$ 57,666,475	\$ 61,873,333	\$ 4,534,842	\$ 5,146,707	\$ 611,865	11.89%	0.28%
Amarillo Firemen's Relief & Retirement Fund	\$ 157,909,148	\$ 48,079,850	\$ 33,128,756	\$ 3,759,167	\$ 3,884,024	\$ 124,857	3.21%	0.08%
Corpus Christi Fire Fighters' Retirement System	\$ 218,749,071	\$ 41,873,537	\$ 85,995,868	\$ 6,728,823	\$ 6,728,823	\$ -	0.00%	0.00%
Laredo Firefighters Retirement System	\$ 173,176,192	\$ 42,167,732	\$ 87,733,185	\$ 7,047,691	\$ 7,861,156	\$ 813,465	10.35%	0.47%
Beaumont Firemen's Relief & Retirement Fund	\$ 115,988,300	\$ 26,709,699	\$ 52,869,076	\$ 2,911,034	\$ 3,882,020	\$ 970,986	25.01%	0.84%

Peer Group Expense Comparison

Peer Group Plans	10-yr return (Net)	Active/ Annuitants	Average Benefit	NPL	Admin Expenses	Investment Expenses	Other Expenses	Total Expenses	Exp as % of Assets
Lubbock Fire Pension Fund	4.39%	1.39	\$ 54,610	\$ 90,715,999	\$ 322,882	\$ 651,091	\$ -	\$ 973,973	0.55%
Irving Firemen's Relief & Retirement Fund	5.28%	2.00	\$ 50,297	\$ 76,692,304	\$ 76,887	\$ 1,391,083	\$ 35,044	\$ 1,503,014	0.81%
Amarillo Firemen's Relief & Retirement Fund	6.80%	1.26	\$ 53,329	\$ 37,044,636	\$ 80,849	\$ 388,013	\$ -	\$ 468,862	0.31%
Corpus Christi Fire Fighters' Retirement System	5.53%	1.35	\$ 44,113	\$ 91,671,329	\$ 257,440	\$ 456,800	\$ -	\$ 714,240	0.53%
Laredo Firefighters Retirement System	4.33%	2.24	\$ 55,268	\$ 93,600,365	\$ 209,946	\$ 340,343	\$ -	\$ 550,289	0.44%
Beaumont Firemen's Relief & Retirement Fund	3.77%	1.07	\$ 41,483	\$ 91,716,980	\$ 479,503	\$ 292,841	\$ -	\$ 772,344	0.75%

Comments from Irving Firemen's Relief and Retirement Fund and the City of Irving

**IRVING FIREMEN'S
RELIEF & RETIREMENT FUND**

845 W. Irving Blvd.
Irving, Texas 75060

September 27, 2018

Anumeha Kumar
State Pension Review Board
PO Box 13498
Austin, Texas 78711

RE: Intensive Actuarial Review
Preliminary Draft Dated October 2018

The Board of Trustees for the Irving Firemen's Relief and Retirement Fund has received and reviewed the findings related to the "Intensive Actuarial Review" and offers the following response.

We are committed to the stewardship and the sustainability of the fund so that our members and beneficiaries will continue to receive benefits through their retirement years. The review does not catch us by surprise as to its findings but offers a perspective from another group of professionals that will assist us in the decision making process for future funding and plan document changes.

The "Risk Analysis" identified three main factors that could potentially threaten the funds ability to pay benefits: asset-liability mismatch, governance and funding risks.

Asset-Liability Mismatch concerning the Deferred Retirement Option Program (DROP) has been an on-going concern with the board and our active members for many years. The parameters of the DROP indeed create a "risk free" guaranteed rate of return along with a potentially long duration of assets held by the fund further contributing to the negative health of the fund.

We, like many other boards to include the Pension Review Board (PRB), consult with industry professionals such as attorneys, auditors, actuaries and others to help us in the decision making process. We have diligently sought sound advice specifically relating to the DROP and what action could be taken to alleviate the risk it has created. We were advised, due to language within the plan document, the interest rate and other parameters could not be lowered due to an accrued vested benefit protected by Article 16, Section 66 of the State Constitution. If changes were to be made to the parameters of the DROP, they had to be made through active membership vote resulting in a second tier and would only be applicable to members employed after the adopted date.

The board developed a second tier plan addressing many of the risks identified in the review. The duration of the DROP was limited to sixty months and the member would not receive any interest attributed to their theoretical DROP account. This second tier plan was presented to the active members for a vote in December 2016. The vote failed to pass.

To address the concern of DROP withdrawals, the board takes the position we have the ability to limit the withdrawals based on verbiage within the plan document concerning distributions.

There has been recent court proceedings regarding interest on the DROP and if the interest is considered a constitutionally protected benefit. In short, the results of the courts have ruled the interest is not considered a benefit and, therefore, can be adjusted. The Supreme Court of Texas has agreed to hear this case in which we are awaiting their decision to help guide us in future changes.

The board of trustees and the active members of the fund have pursued assumption risks through the increase of contributions. Since 2011 the active members have repeatedly voted to increase their contributions by some thirty (30) percent. The plan sponsor has also increased their contribution to 16.75 %. We believe this was the most viable option of governance based on professional consultation without reducing the standard service benefit. We agree the assumptions do not match current trends in salary growth and market returns. However, we have been able to address a component of the assumptions through the adoption of more conservative mortality tables and a slight decrease in salary growth. Our anticipation was to be able to "buy down" the assumptions while being compliant with PRB guidelines concerning amortization periods. To our disappointment, we have not been able to do so.

Funding risks continually to be a subject of board governance through anticipated plan design and benefit structure. We are aggressively lowering our assumptions which ultimately leads to a short fall in funding and will lengthen our amortization period beyond the PRB guidelines.

In summary, the board realizes we have work to do in addressing the concerns identified. Your recommendations are welcomed and will assist us in making these decisions regarding plan design, funding obligations and other factors/changes needed to sustain the longevity of benefits for our members.

Sincerely,



Tony Harvey, Chairman

Cc: Chris Hillman, City Manager
John Crider, Actuary
Jeff Litchfield, Chief Financial Officer



September 27, 2018

Anumeha Kumar
State Pension Review Board
PO Box 13498
Austin, Texas 78711

Dear Anu:

Thank you for the opportunity to review and respond to the preliminary draft of the Intensive Actuarial Review (Review) of the Irving Firemen's Relief and Retirement Fund (Fund). We believe it contains timely and relevant information we can use as we continue the process of addressing funding shortfalls and mitigating current and potential risks of the Fund. Additionally, we are thankful you agreed to delay the Review until the fall, for the Preliminary Evaluation as of December 31, 2017, which is based on updated assumptions, presents a more negative picture than expected.

We agree with the findings of the Review and will consider the recommendations shared in the Review. We also look forward to learning the Pension Review Board members' thoughts and hearing their advice on ways to address the identified risks.

Our plan to address the calculated funding shortfall and mitigating current and potential risks will involve significant interaction with the Fund. We received the Preliminary Evaluation report on September 17 and should receive the final report soon. While it would be impossible to develop a concrete plan in such a short time period, we can provide a sketch of some of the actions we expect.

The first step in our plan will be to share the Review and Preliminary Evaluation report with the City Council via its Audit and Finance (A&F) Committee. As we shared with you earlier, we have made numerous presentations to both the A&F Committee and the full Council over the last three years. We have kept them informed of the status of the Fund and the changes made by the Firemen as well as the City.

As alluded to in our opening paragraph, the results of the Preliminary Evaluation were not expected. For example, we believed we might have an amortization rate in the upper 40 to lower 50 year range, so the second step will be to explore the impact of the assumption changes on the various components of the valuation, and why our expectations were not realized. We are particularly interested in understanding the validity of the 7.5% assumed rate of return used in the Preliminary Evaluation, especially after you report the 10 year average was just over 5.25%. This step will involve the use of consultants so we can

understand the probability of having another year like 2008 as well as what the projected rate of return might be for the Fund's current investment strategy. We expect similar analysis to be prepared for the other major assumptions used by the Fund.

The next step will involve significant interactions between the Fund and the City to review and consider the recommendations in each of the three risk factors identified in the Review to determine how they can best help us jointly ensure **"There Will be enough money to pay benefits when due."**

In closing, we would like to share the City of Irving takes great steps to ensure its financial affairs are in order. This is evidenced by the City receiving a Moody's Aaa credit rating for the last 31 years. Now that we better understand the challenges of the Fund, we will work to formalize a plan to bring the Fund within the guidelines recommended by the Pension Review Board.

While I will not be able to attend your meeting on October 4, our Chief Financial Officer, Jeff Litchfield, will be in attendance to hear your thoughts and recommendations.

Sincerely,



Chris Hillman
City Manager

Cc: Tony Harvey, IFRRF Board Chair
John Crider, IFRRF Actuary
Jeff Litchfield, Chief Financial Officer

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX A8 – PROGRESS UPDATES PROVIDED BY SYSTEMS SINCE INTENSIVE REVIEW PUBLICATION

Progress Updates Provided by Systems Since Intensive Review Publication

Intensive Review Date	Retirement System	Updates
January	Greenville Firemen's Relief and Retirement Fund	<ul style="list-style-type: none"> In October, the Fund informed the PRB that an RFP had been issued for actuarial services.
January	Galveston Employees' Retirement Plan for Police	<ul style="list-style-type: none"> At the September 13 PRB Actuarial Committee meeting, both the City and the Plan provided the PRB with preliminary proposals for a funding policy that would include paying an actuarially determined contribution with a closed 30-year amortization period.
April	Marshall Firemen's Relief and Retirement Fund	<ul style="list-style-type: none"> Retirement eligibility age moved from 50 to 53 10-year vesting eliminated .75% City contribution increase effective 1/01/2019 City approved that contributions will be made to the fund at the end of the year for vacancies that exist throughout the year effective 12/31/2018.
April	Beaumont Firemen's Relief and Retirement Fund	<ul style="list-style-type: none"> No changes reported to PRB.
October	Orange Firemen's Relief and Retirement Fund	<ul style="list-style-type: none"> Plan agreed to consult peer pension systems for possible guidelines or examples of governance policies to help develop a governance policy between the Fund and the City. Plan agreed to request the actuary to explain benefit reduction proposals to the fund members. Plan adopted a motion to craft a request for proposal (RFP) for investment consultant services.
October	Longview Firemen's Relief and Retirement Fund	<ul style="list-style-type: none"> Removed deployment pay from benefit calculation and contributions.
October	Irving Firemen's Relief and Retirement Fund	<ul style="list-style-type: none"> No changes reported to PRB

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX B – INTERIM STUDY - ASSET POOLING FOR SMALL PENSION SYSTEMS

Interim Study:

Asset Pooling for Small Pension Systems

October 2018



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Executive Summary

Many public retirement systems across the country face ongoing challenges as unfunded liabilities continue to grow in an overall low interest rate environment. Smaller systems face additional challenges to meet or exceed their assumed rates of return over extended periods of time. Recognizing this, at its November 16, 2017 meeting, the PRB directed staff to study the possible benefits for smaller pension systems of pooling trust funds for investment purposes as part of the agency's mandate to include recommendations relating to public retirement systems that the board finds advisable through its Biennial Report to the Legislature and Governor.

To study the possible benefits of pooling assets, the PRB analyzed investment return and fee data reported by retirement plans for fiscal years 2007 to 2016. The data analyzed included all Texas actuarially funded defined benefit plans that reported to the PRB during that period, except for the 4 largest statewide plans. Staff also identified two primary structures of pooled pension trusts: an Investment Management only model (IM) and an Investment Management and Administration (IMA) model. Under both models, the participating systems transfer all or a portion of their assets into the group investment trust, while maintaining the existing governance structures, including contribution, benefit, actuarial and asset allocation decision-making.

To objectively analyze the benefits of the IM and IMA structures, the PRB modeled the potential impact on small plans. Modeling suggested asset pooling could have resulted in an additional 29% increase (\$32M) in total assets for small plans between 2007 and 2016.

This study constitutes a first step towards developing potential recommendations in this area. The evidence suggests smaller pension plans in Texas could benefit in several ways from pooling assets for investment purposes as well as pooling administrative functions. Further in-depth study of possible governance structures to provide asset pooling services including associated legal requirements is necessary and should include engaging small pension plans to provide input and explore viable options.

Background

The Pension Review Board (PRB) is mandated to oversee all Texas public retirement systems, both state and local, in regard to their actuarial soundness and compliance with state law. Its mission is to provide the state of Texas with the necessary information and recommendations to ensure that its public retirement systems, whose combined assets total in the multi-billions, are financially sound, benefits are equitable, the systems are properly managed, tax expenditures for employee benefits are kept to a minimum while still providing for those employees, and to expand the knowledge and education of administrators, trustees, and members of Texas public pension funds.

Texas is home to many public-sector pension funds sponsored by various political subdivisions with wide-ranging asset values. There are currently close to 350 public retirement systems registered with the PRB. This includes pre-funded defined benefit plans, defined contribution plans, and pay-as-you-go volunteer firefighter plans. The PRB's primary focus is overseeing the approximately 100 pre-funded defined benefit plans covering more than 2.5 million active and retired members; with asset values that range from as low as \$3 million to as large as \$150 billion.

At its November 16, 2017 meeting, the Board directed staff to study the possible benefits for smaller pension systems of pooling trust funds for investment purposes. The Board charged staff with conducting this interim study to develop potential legislative recommendations for inclusion in agency's 2018 Biennial Report to the Legislature and Governor.

This interim study is organized as follows. Section I discusses the potential benefits of pooling assets. Section II analyzes data to assess whether smaller Texas pension funds would likely be able to achieve these benefits. Section III reviews examples of asset pooling and models the potential impact of these on small plans, and Section IV provides recommendations. For the purposes of this study, "small plan" was defined as all plans that fell within the bottom quintile (i.e. smallest 20%) of all Texas plans, when sorted by asset size. For the 2016 Fiscal Year End, this includes all plans with less than \$12.5 million in assets.

I. Potential Benefits of Pooling Pension Assets

Pooling assets of smaller pension plans into a single, larger group investment trust may provide increased performance for participating pension plans for several reasons. Larger retirement systems are able to take advantage of economies of scale to reduce investment and administrative expenses and improve diversification through cost effective access to desired asset classes.¹

Economies of Scale

Higher investment management fees have been shown to be correlated with poorer investment performance, so much so that Morningstar has called expense ratios the "most proven predictor of future

¹ Dyck, Alexander, and Lukasz Pomorski. "Is Bigger Better? Size and Performance in Pension Plan Management." *SSRN Electronic Journal*, Feb. 2011, p. 3., doi:10.2139/ssrn.1690724.

fund returns.”^{2,3} Larger investment funds typically have lower investment management fees because they have improved bargaining power or are able to hire internal investment managers at a lower cost than external investment managers.^{4,5} Further, many administrative costs are fixed and/or decrease on a per-participant basis as total participants increase.⁶ Therefore, pooling small pension plan assets for investment purposes, as well as pooling administrative tasks, could increase efficiency and reduce costs, resulting in an overall improvement in investment performance.

Diversification

Investment management costs for certain asset classes, including alternative investments, are usually much higher than traditional asset classes. Private equity and real estate, in particular, are directly affected by scale and negotiating power, and large plans have opportunities for co-investment that may require sophisticated contracts.⁷ Smaller pension plans pay comparatively high costs for a small allocation or may be unable to access these asset classes at all. Pooling assets allows small pension plans a cost-effective manner to invest in asset classes, and increase portfolio diversification, that frequently is not available to smaller plans.

II. Research and Analysis

Methodology

To study the possible benefits for smaller Texas pension systems of pooling trust funds for investment purposes, the PRB analyzed investment return and fee data submitted by public retirement systems for fiscal years 2007 to 2016.⁸ The data tested includes all actuarially funded defined benefit pension plans that reported to the PRB during that period, except for the 4 largest plans, Teacher Retirement System of Texas (TRS), Employees Retirement System of Texas (ERS), Texas Municipal Retirement System (TMRS), Texas County and District Retirement System (TCDRS).⁹ These large, statewide plans were excluded from the analysis because the smallest of these is 6 times larger than the next largest plan and instead were included as a separate group in the graphs and tables for comparison only. Data for individual pension

² Aubry, Jean-Pierre, and Caroline V. Crawford. “How Do Fees Affect Plans’ Ability to Beat Their Benchmarks?” *State and Local Pension Plans*, vol. 61, Aug. 2018. p. 3.

³ Kinnel, Russel. “Predictive Power of Fees.” *Morningstar Manager Research*, May 2016. p. 1.

⁴ James, Estelle et al. “Administrative Costs and the Organization of Individual Retirement Account Systems: A Comparative Perspective.” *The World Bank Policy Research Dissemination Center*, Feb. 2001. p. 9.

⁵ Dyck, Alexander, and Lukasz Pomorski. “Is Bigger Better? Size and Performance in Pension Plan Management.” *SSRN Electronic Journal*, Feb. 2011, p. 4., doi:10.2139/ssrn.1690724.

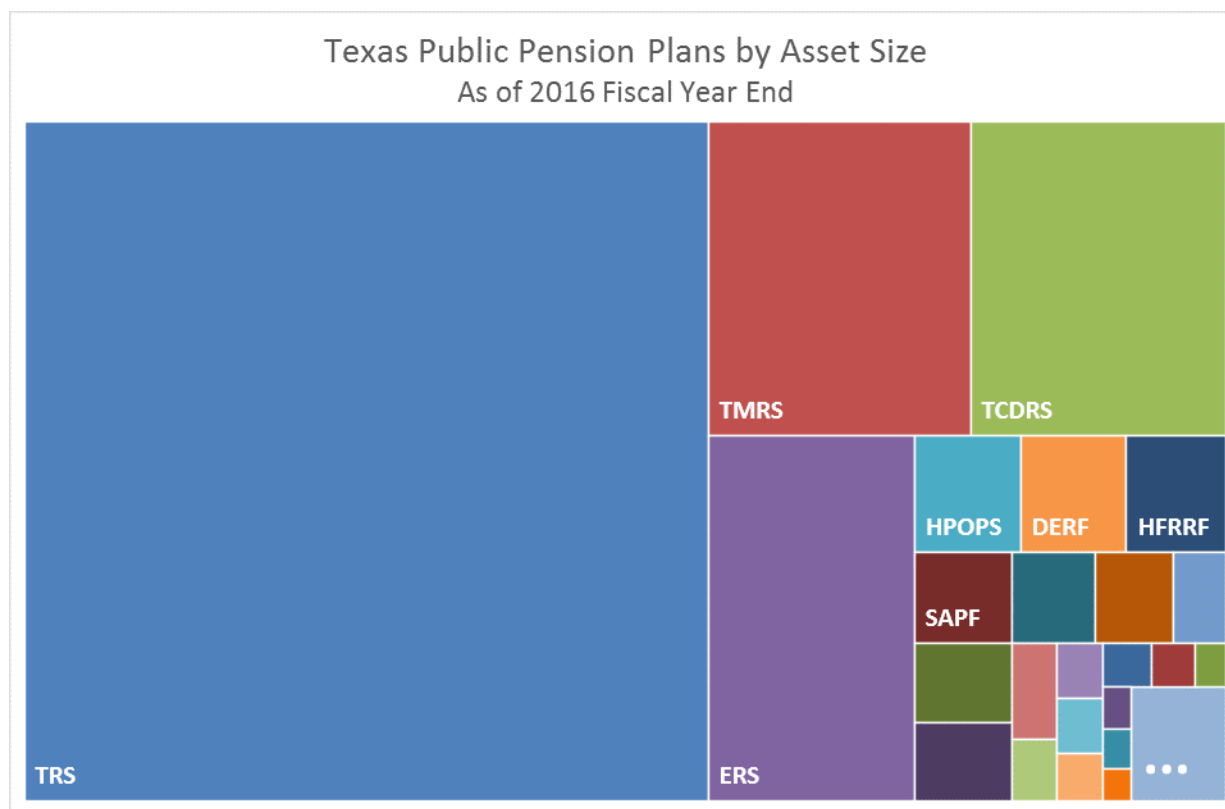
⁶ Bikker, Jacob A., and Jan De Dreu. “Operating Costs of Pension Funds: the Impact of Scale, Governance, and Plan Design.” *Journal of Pension Economics and Finance*, vol. 8, no. 01, Feb. 2009, p. 68., doi:10.1017/s1474747207002995.

⁷ Dyck, Alexander, and Lukasz Pomorski. “Is Bigger Better? Size and Performance in Pension Plan Management.” *SSRN Electronic Journal*, Feb. 2011, p. 4., doi:10.2139/ssrn.1690724.

⁸ Data collected by the PRB is as reported by the plans and may contain errors, omissions or misclassifications.

⁹ The Law Enforcement & Custodial Officer Supplemental Retirement Fund and the Judicial Retirement System of Texas Plan Two are included as part of ERS for this purpose.

plans that are managed as a single trust (e.g. El Paso Firemen’s Pension Fund, El Paso Police Pension Fund, and El Paso Firemen and Policemen’s Pension Staff Plan and Trust) were combined into a single entity.



The remaining data for each year was sorted by asset size and split into quintiles, with Quintile 1 containing the smallest plans, and Quintile 5 the largest (see the “Texas Public Pension Plans by Asset Size” table in the appendix for additional detail). The total assets of Quintile 1 plans (\$107.9M as of FYE 2016) generally fell near the bottom of the range for Quintile 4. Because Quintile 4 (as of FYE 2016) ranged from \$80M to \$400M, plans in Quintile 3 (\$32.5M to \$77M as of FYE 2016) were used to represent large plans in this study.

Investment return performance was evaluated on an absolute basis using annual returns net of investment fees; on a relative basis using excess annual net returns above the assumed rate of return; and on a risk-adjusted basis using 5-year and 10-year Sharpe ratios.^{10,11} In addition, differences in investment and administrative expense ratios were evaluated.

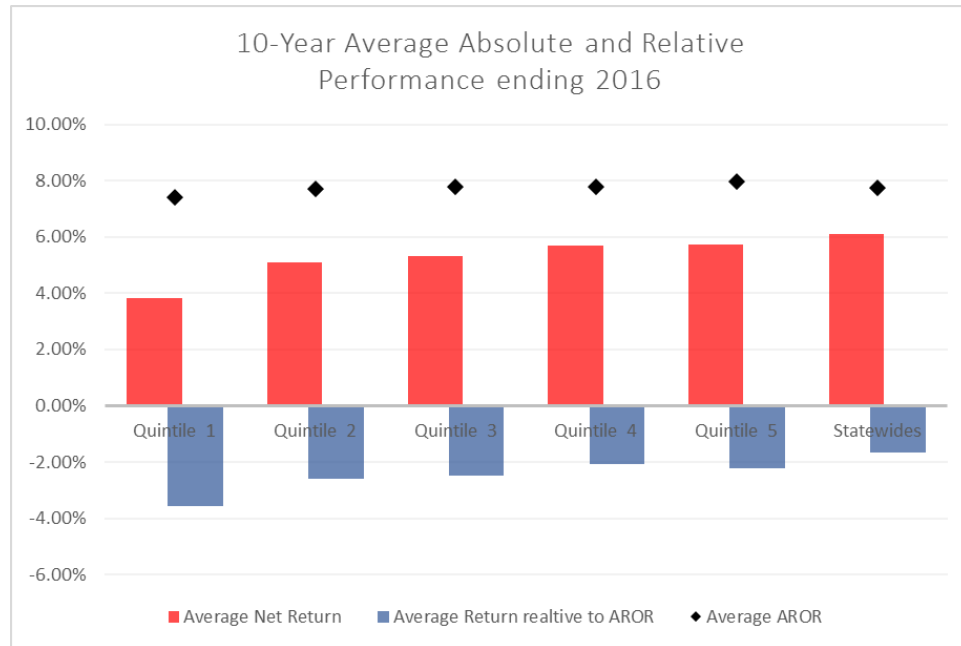
¹⁰ While assumed rate of return is not a common benchmark for evaluating relative performance, it provided a simple approach to measure a plan’s ability to achieve its broad investment goals.

¹¹ Sharpe ratios are a common and widely used measure of risk-adjusted return which attempts to capture the amount of excess return achieved above the risk-free rate per unit of total risk as measured by standard deviation.

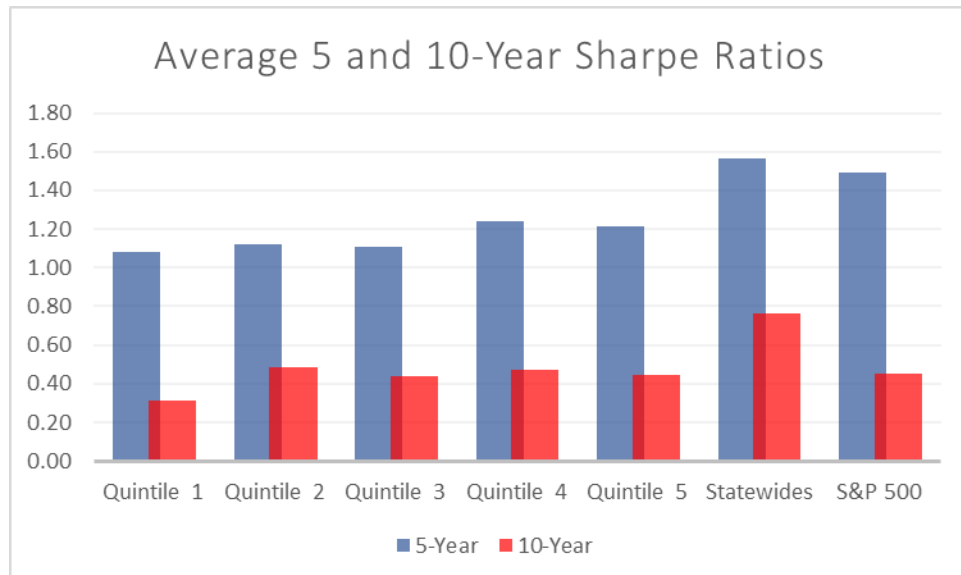
Results

Overall, the data show that larger pension plans performed better than smaller plans on both an absolute basis and relative to their investment return targets.

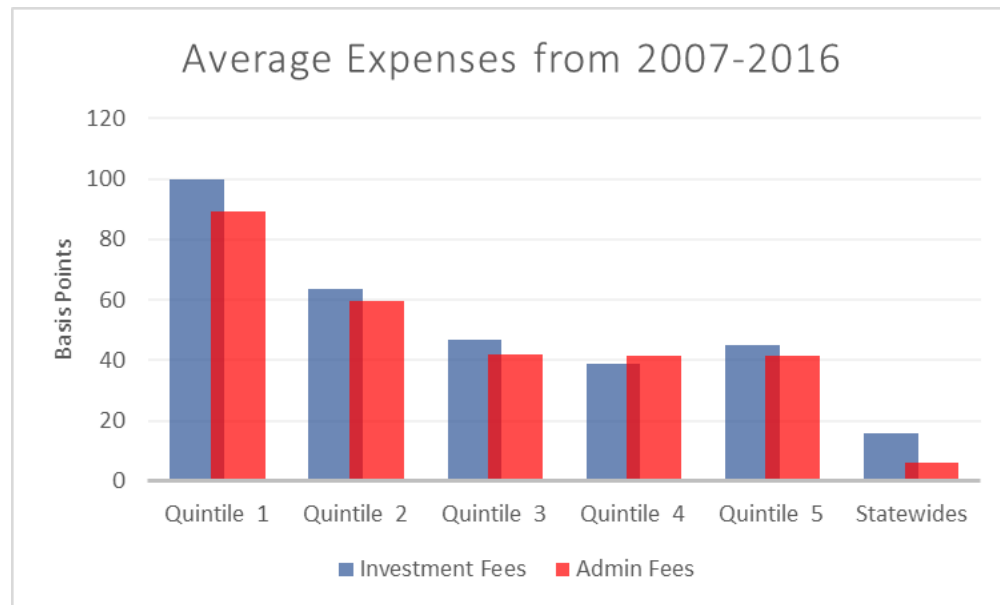
Average annual net returns generally increased as asset size increased. Further, smaller plans not only had lower average assumed rates of return (AROR), but they also performed worse relative to their assumed rates of return (excess return). Over the period we considered, no quintile had average returns in excess of their assumed rates of return, so excess returns are negative for all quintiles.



The chart below shows that the 10-year and the 5-year Sharpe ratios were generally larger as plan size increased (indicating improved performance), although this result was clearer for 5-year ratios.



As illustrated in the chart below, the larger pension plans had significantly lower investment and administrative fees. Investment and administrative fees saw the largest decline from Quintile 1 to Quintile 2 as well as a significant decline from Quintiles 4 and 5 to the Statewide plans.



III. Possible Asset Pooling Models

Staff identified two primary models of pooled pension trusts: an Investment Management only model (IM) and an Investment Management and Administration (IMA) model. Under both models, the participating systems transfer all or a portion of their assets into the group investment trust, while maintaining the existing governance structures, including contribution, benefit, actuarial and asset allocation decision-making. An additional model, the Multiple-Employer Plan (MEP), also pools plan assets, but goes far beyond the scope of this study.

Investment Management Only

The investment management (IM) only model provides investment management services to member systems as a group trust. Some trusts require participating members to invest all assets with the trust, while others allow only a portion of the assets be invested. Some models manage members' assets through model portfolios based on predetermined risk/return levels, while others replicate members' asset allocations.

Massachusetts

The Massachusetts Pension Reserves Investment Management Board (PRIM) is charged with the general supervision of the Pension Reserves Investment Trust Fund (PRIT). The PRIT fund is a pooled investment

trust fund established in 1983 to invest the assets of state and local retirement systems. The State Teachers' Retirement System, the State Employees' Retirement System, the State Boston/Teachers' Retirement System, and the State Retiree Benefits Trust Fund are mandated by statute to invest all their assets in the PRIT. Local retirement systems may invest in the PRIT fund as participating members or purchasing members. Participating members are required to transfer all assets to PRIM for a mandatory five-year period, while purchasing members can elect to invest just a portion of their assets with no minimum dollar amount or investment period.

Alberta and Ontario

The Alberta Investment Management Corporation (AIMCO) and the Investment Management Corporation of Ontario (IMCO) are Canadian Crown corporations (state-owned, nonprofit enterprises) of their respective provinces which provide investment management services to public sector clients. AIMCO provides services to endowment funds, pension plans, short-term government funds and special purpose government funds, while IMCO was created specifically to facilitate pooled asset management for Ontario public-sector institutions including public pension plans and other non-pension investment funds. The clients of both AIMCO and IMCO retain fiduciary duty and control over asset allocation decisions as well as full control of existing plans.

Investment Management and Administration

The Investment Management and Administration (IMA) model expands upon the IM model by adding various administrative functions to the list of services offered to the participating members. The services range from benefit administration to actuarial services.

Texas Hospital Association Master Trust

The Texas Hospital Association (THA) provides a variety of benefits and services to its members, including investment management, investment consulting, actuarial, audit, legal and benefit administration services to qualified defined benefit and defined contribution plans in the health care sector. Participating members include private, not-for-profit and public hospitals. For a defined benefit plan to be considered for inclusion in the program, it must meet minimum actuarial and legal requirements. Once accepted, plans are required to invest all assets with the trust as well as utilize THA's benefit administration services. Investing only a portion of a plan's assets or the use of alternative benefit administration services is generally not allowed. Defined benefit plans may select between four different pre-determined asset allocation models based on the employer's risk preferences. The models are a mix of equity and fixed income investments which are managed by the Trust's board of trustees with the assistance of independent investment advisors. Participating plans retain full control of existing benefit provisions.

Agent Multiple-Employer Plans

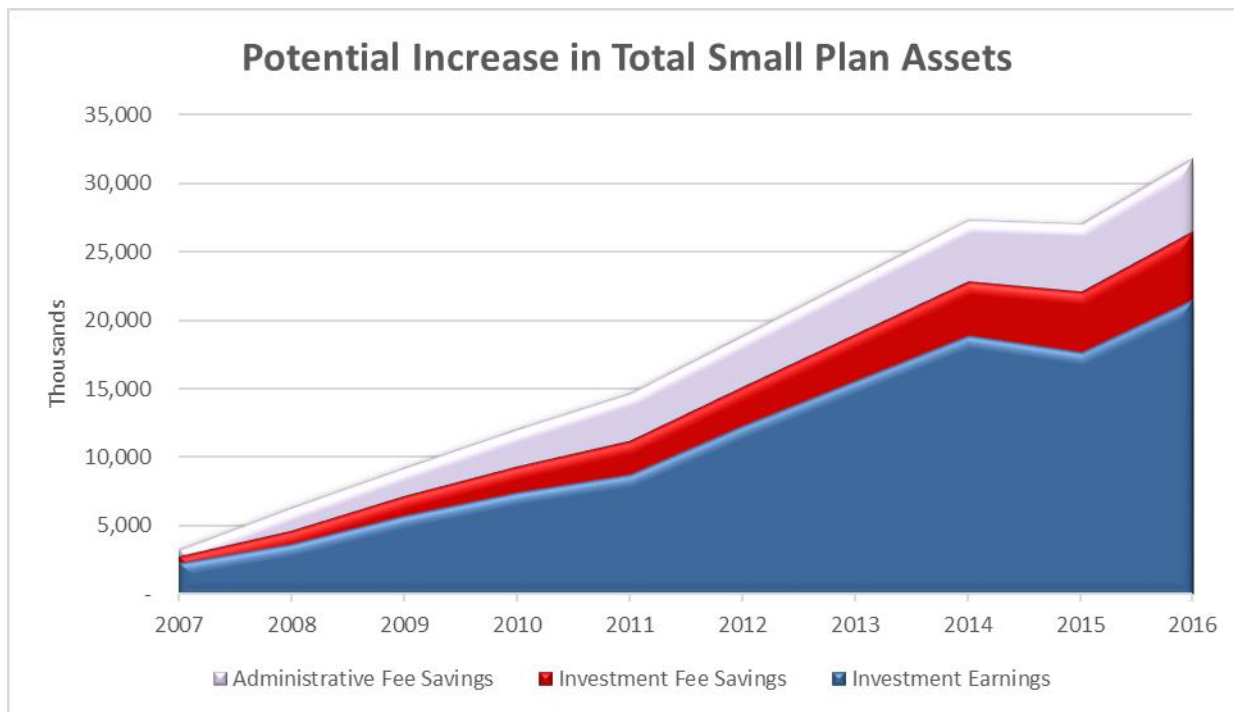
An agent multiple-employer plan goes far beyond the IMA model, and therefore was not examined in this study. In this structure, the plan generally sets parameters for benefits and contributions and makes investment decisions on behalf of its participating employers.

Texas is home to two agent-multiple employer plans, the Texas Municipal Retirement System and the Texas County and District Retirement System, which pool assets of multiple municipalities and/or districts

for investment purposes. member municipalities/districts may voluntarily join the systems, and those that participate have their own retirement plans within the general framework of their respective governing statutes. Plan provisions may vary depending upon the options selected by each individual employer.

Potential Impact

To objectively analyze the benefits of the IM and IMA structures, the PRB modeled the potential impact, by calculating the additional investment earnings systems in Quintile 1 could have earned if they achieved the same average returns as the systems in Quintile 3, as well as the potential savings in investment and administrative expenses if the average expenses paid by systems in Quintile 1 were the same as those paid by the systems in Quintile 3. It is estimated that the systems would have accrued an additional \$21.5 million in investment earnings plus saved approximately \$5 million in investment fees, totaling \$26.5 million in additional assets as of the end of the 2016 FY under the IM model. Under the IMA model, an additional \$5 million in administrative fees could have been saved, totaling \$32 million for the 10-year period ending in 2016. This represents an increase from \$108 million to \$140 million in aggregate assets, or a 29% increase.



IV. Recommendations

This study constitutes a first step towards developing potential recommendations in this area. The evidence suggests smaller pension plans in Texas could benefit in several ways from pooling assets for investment purposes as well as pooling administrative functions. Further in-depth study of possible

governance structures to provide asset pooling services including associated legal requirements is necessary and should include engaging small pension plans to provide input and explore viable options.

Appendix

The appendix provides additional detail and explanation of the research performed and the data used.

Data and Methodology

Texas Public Pension Plans by Asset Size		
Plan Name	2016 FYE	
	Assets	Quintile
Teacher Retirement System of Texas	\$134,008,637,473	N/A
Texas County & District Retirement System	\$26,287,148,901	N/A
Employees Retirement System of Texas, LECOS & JRS II	\$25,706,748,855	N/A
Texas Municipal Retirement System	\$25,233,205,773	N/A
Houston Police Officers' Pension System	\$4,080,460,000	5
Houston Firefighters' Relief & Retirement Fund	\$3,729,670,009	5
Dallas Police & Fire Pension System-Combined Plan	\$3,378,593,785	5
Dallas Employees' Retirement Fund	\$3,352,043,000	5
San Antonio Fire & Police Pension Fund	\$2,834,548,000	5
Houston Municipal Employees Pension System	\$2,400,023,240	5
Austin Employees' Retirement System	\$2,299,708,386	5
Fort Worth Employees' Retirement Fund	\$2,097,716,741	5
CPS Energy Pension Plan	\$1,450,150,734	5
El Paso Police, Firemen's and Staff Pension Fund	\$1,295,716,967	5
Austin Fire Fighters Relief & Retirement Fund	\$829,610,196	5
Dallas County Hospital District Retirement Income Plan	\$828,755,000	5
El Paso City Employees' Pension Fund	\$723,103,443	5
Austin Police Retirement System	\$686,020,263	5
Harris County Hospital District Pension Plan	\$594,401,173	5
Dallas/Fort Worth Airport Board Retirement Plan	\$439,738,000	5
Lower Colorado River Authority Retirement Plan	\$403,120,000	4
University Health System Pension Plan	\$295,051,029	4
San Antonio Metropolitan Transit Retirement Plan	\$246,002,425	4
Houston MTA Workers Union Pension Plan	\$240,688,461	4

Texas Public Pension Plans by Asset Size		
Plan Name	2016 FYE	
	Assets	Quintile
Irving Firemen's Relief & Retirement Fund	\$186,556,007	4
Lubbock Fire Pension Fund	\$176,016,821	4
DART Employees' Defined Benefit Retirement Plan & Trust	\$168,334,000	4
Port of Houston Authority Retirement Plan	\$163,311,014	4
Dallas/Fort Worth Airport Board DPS Retirement Plan	\$160,945,000	4
Houston MTA Non-Union Pension Plan	\$153,103,411	4
Amarillo Firemen's Relief & Retirement Fund	\$152,996,702	4
Corpus Christi Fire Fighters' Retirement System	\$133,901,631	4
Plano Retirement Security Plan	\$126,698,362	4
Laredo Firefighters Retirement System	\$126,305,204	4
Beaumont Firemen's Relief & Retirement Fund	\$102,438,832	4
Texas Emergency Services Retirement System	\$93,964,008	4
Midland Firemen's Relief & Retirement Fund	\$82,664,948	4
Denton Firemen's Relief & Retirement Fund	\$75,304,750	3
Tyler Firemen's Relief & Retirement Fund	\$62,536,196	3
San Angelo Firemen's Relief & Retirement Fund	\$60,206,802	3
Abilene Firemen's Relief & Retirement Fund	\$55,018,029	3
Irving Supplemental Benefit Plan	\$52,258,122	3
Wichita Falls Firemen's Relief & Retirement Fund	\$46,950,042	3
Galveston Employees' Retirement Fund	\$45,640,194	3
McAllen Firemen's Relief & Retirement Fund	\$44,759,055	3
Odessa Firemen's Relief & Retirement Fund	\$44,257,040	3
Port Arthur Firemen's Relief & Retirement Fund	\$44,135,666	3
Nacogdoches County Hospital District Retirement Plan	\$43,662,691	3
Longview Firemen's Relief & Retirement Fund	\$41,056,538	3
Galveston Firefighter's Relief & Retirement Fund	\$40,155,474	3
Temple Firemen's Relief & Retirement Fund	\$39,862,402	3

Texas Public Pension Plans by Asset Size		
Plan Name	2016 FYE	
	Assets	Quintile
Killeen Firemen's Relief & Retirement Fund	\$35,342,830	3
Corpus Christi Regional Transportation Authority	\$32,583,077	3
Texarkana Firemen's Relief & Retirement Fund	\$31,777,180	2
Capital MTA Retirement Plan for Bargaining Unit Employees	\$29,535,196	2
Harlingen Firemen's Relief & Retirement Fund	\$28,747,083	2
Guadalupe-Blanco River Authority	\$26,632,375	2
The Woodlands Firefighters' Retirement System	\$26,188,804	2
Capital MTA Retirement Plan for Administrative Employees	\$23,811,865	2
Conroe Fire Fighters' Retirement Fund	\$22,529,049	2
Cleburne Firemen's Relief & Retirement Fund	\$21,323,149	2
Northwest Texas Healthcare System Retirement Plan	\$19,960,895	2
Galveston Employees' Retirement Plan for Police	\$19,784,817	2
Brazos River Authority Retirement Plan	\$18,726,771	2
Denison Firemen's Relief & Retirement Fund	\$15,721,368	2
Travis County ESD #6 Firefighter's Relief & Retirement Fund	\$15,043,500	2
Texas City Firemen's Relief & Retirement Fund	\$14,412,584	2
Lufkin Firemen's Relief & Retirement Fund	\$14,335,797	2
Waxahachie Firemen's Relief & Retirement Fund	\$14,201,159	2
Greenville Firemen's Relief & Retirement Fund	\$12,728,162	2
Galveston Wharves Pension Plan	\$11,895,228	1
Big Spring Firemen's Relief & Retirement Fund	\$10,387,399	1
Colorado River Municipal Water District Defined Benefit Retirement Plan & Trust	\$9,660,662	1
University Park Firemen's Relief & Retirement Fund	\$9,448,371	1
Weslaco Firemen's Relief & Retirement Fund	\$9,186,148	1
Corsicana Firemen's Relief & Retirement Fund	\$8,344,317	1
Orange Firemen's Relief & Retirement Fund	\$8,154,598	1
Sweetwater Firemen's Relief & Retirement Fund	\$7,826,879	1

Texas Public Pension Plans by Asset Size		
Plan Name	2016 FYE	
	Assets	Quintile
Marshall Firemen's Relief & Retirement Fund	\$7,712,228	1
Plainview Firemen's Relief & Retirement Fund	\$5,427,943	1
Paris Firefighters' Relief & Retirement Fund	\$4,764,272	1
Atlanta Firemen's Relief & Retirement Fund	\$3,744,867	1
Brownwood Firemen's Relief & Retirement Fund	\$3,617,575	1
San Benito Firemen Relief & Retirement Fund	\$2,987,515	1
Arlington Employees Deferred Income Plan	\$2,727,969	1
Refugio County Memorial Hospital District Retirement Plan	\$2,051,124	1

Total assets are all the assets available to a fund and may include, investments, cash, receivables, and capital assets. Investment return data was provided on a total fund level and is net of investment fees. Sharpe ratios were calculated based on annual data for investment returns, T-bill returns and standard deviation.

Expense data was calculated as a percentage of assets based on fees reported for investment and administrative expenses. Investment expenses primarily consist of investment management fees, investment consultant fees, and custodial and brokerage fees. Administrative expenses are fees related to operating the pension plan and may include professional consultants and benefits administration. The data is self-reported and, in some instances, contain inconsistencies in classification of fees across different pension plans with investment expenses, such as investment consultant fees, being reported as administrative expenses. Further, where pension funds utilize employees of the sponsoring entity to help perform administrative functions for the plan, administrative costs may not be fully recognized by the plan.¹²

For each year, the pension plans were grouped into quintiles by total assets and averages were calculated for each metric, excluding Sharpe ratios, which were calculated at the end of 2016 on a 5-year and 10-year basis. The metrics were then analyzed across quintiles for differences in performance based on asset size.

Summary statistics for each metric are included to provide information about the observations in each data set and include; mean, median, standard deviation and minimum and maximum values.

¹² Bikker, Jacob A., and Jan De Dreu. "Operating Costs of Pension Funds: the Impact of Scale, Governance, and Plan Design." *Journal of Pension Economics and Finance*, vol. 8, no. 01, Feb. 2009, doi:10.1017/s1474747207002995.

Results

Investment Returns

Investment return performance was evaluated on an absolute, relative, and risk-adjusted basis using net returns, excess returns over the assumed rate of return, and 5-year and 10-year Sharpe ratios respectively.

Absolute Returns. Pension plan returns were analyzed on an absolute basis using annual returns net of investment fees. 10-year geometric average annual net returns ranged from 3.30% for quintile 1 (the smallest plans) to 5.40% in quintile 5 (the largest plans). The statewide plans performed the best with an average return of 5.89%. Average annual net returns generally increased as asset size increased and demonstrate that larger plans have been outperforming smaller plans.

The mean average annual return for defined-benefit plans ranged from a minimum of -18.74% in 2008 to a maximum of 13.84% in 2013 while the median return ranged from -22.14% in 2008 to 18.50% in 2009. The standard deviation of returns for defined-benefit plans ranged from a minimum of 2.65% in 2015 to a maximum of 13.82% in 2009 with an average standard deviation during the period of 5.50%. The average annual range during the period was 26.16% suggesting that there is great variability between the returns of the best and worst performing funds.

Summary of Average Net Asset Returns											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Geometric Average 10-Year 5-Year
Quintile 1	7.36%	-21.81%	13.33%	10.35%	-0.12%	9.38%	12.55%	4.50%	-1.98%	4.61%	3.30% 5.69%
Quintile 2	8.06%	-20.46%	13.04%	12.58%	2.38%	11.07%	14.34%	6.36%	-2.02%	5.77%	4.60% 6.96%
Quintile 3	9.93%	-18.06%	14.62%	11.02%	1.26%	11.24%	13.16%	6.18%	-2.50%	6.46%	4.88% 6.77%
Quintile 4	9.22%	-20.54%	14.98%	11.86%	1.91%	11.53%	16.10%	6.62%	-1.04%	6.48%	5.17% 7.78%
Quintile 5	10.94%	-15.12%	5.71%	13.37%	5.11%	9.83%	13.76%	8.59%	-0.81%	5.95%	5.40% 7.35%
Statewide	10.98%	-9.80%	4.23%	9.70%	7.26%	9.54%	11.23%	11.05%	-0.10%	6.80%	5.89% 7.62%
Mean	9.19%	-18.74%	11.96%	11.75%	2.35%	10.56%	13.84%	6.66%	-1.61%	5.90%	N/A N/A
Median	8.60%	-22.14%	18.50%	11.49%	-0.23%	11.02%	14.54%	5.80%	-1.77%	6.84%	N/A N/A
Minimum	1.31%	-33.70%	-23.56%	3.79%	-4.80%	-0.75%	2.27%	0.11%	-12.60%	-10.84%	N/A N/A
Maximum	18.35%	5.00%	31.13%	28.50%	22.03%	18.28%	24.34%	18.66%	5.80%	10.78%	N/A N/A
St Dev	3.78%	9.73%	13.82%	3.43%	6.59%	3.94%	4.15%	3.96%	2.65%	3.53%	N/A N/A

Relative Returns. The assumed rate of return for a pension plan is the expected return of its assets and is generally used to value its liabilities (i.e. discount expected future benefit payments) for funding/budgetary purposes. The return assumption is based on the plan's asset allocation and future capital market expectations. Comparing actual pension plan investment returns to assumed rates of return provides insight into the relative performance of the funds against the required fund return. While assumed rate of return is not a common benchmark for evaluating relative performance, we felt it provided a simple approach that illustrates a plan's ability to achieve its broad investment goals.

The assumed rate of return for Texas pension plans trended down during the 2007 through 2016 period. The average and median assumed rates of return decreased from 7.87% and 8.00% in 2007 to 7.48% and

7.50% in 2016 respectively. The standard deviation ranged from .42% to .50% indicating data was tightly clustered.

The average assumed rate of return was generally lower for pension plans with fewer assets and increased as asset size increased. The average assumed rate of return for pension plans in quintile 1 was 7.40% and increased to 7.96% for pension plans in quintile 5.

Average excess returns, defined as average net investment returns greater than the average assumed rates of return for pension plans, were negative for all quintiles. 10-year geometric average excess returns ranged from -4.15% for quintile 1 to -2.60% for quintile 5. Relative to all the systems, statewide plans performed the best averaging 1.87% below their assumed rate of return. Although pension plans in quintile 1 had the lowest average assumed rate of return, they had the lowest excess average return of all the quintile groups.

Summary of Average Excess Asset Returns												
											Geometric Average	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10-Year	5-Year
Quintile 1	-0.14%	-29.22%	5.89%	2.96%	-7.49%	2.05%	5.20%	-2.93%	-9.43%	-2.71%	-4.15%	-1.69%
Quintile 2	0.15%	-28.34%	5.24%	4.83%	-5.35%	3.39%	6.71%	-1.24%	-9.54%	-1.71%	-3.15%	-0.63%
Quintile 3	2.03%	-25.95%	6.81%	3.18%	-6.56%	3.40%	5.37%	-1.63%	-10.24%	-1.16%	-2.97%	-1.00%
Quintile 4	1.22%	-28.54%	6.99%	3.94%	-5.84%	3.78%	8.35%	-1.11%	-8.55%	-1.00%	-2.68%	0.13%
Quintile 5	2.80%	-23.26%	-2.45%	5.30%	-2.95%	1.81%	5.82%	0.73%	-8.52%	-1.58%	-2.60%	-0.46%
Statewide	3.23%	-17.55%	-3.52%	1.95%	-0.49%	1.79%	3.48%	3.30%	-7.78%	-0.89%	-1.87%	-0.11%
Mean	1.31%	-26.60%	4.13%	3.95%	-5.40%	2.84%	6.15%	-1.03%	-9.20%	-1.59%	N/A	N/A
Median	0.80%	-29.86%	10.36%	3.60%	-7.75%	3.18%	6.66%	-1.90%	-9.47%	-0.85%	N/A	N/A
Minimum	-6.28%	-41.45%	-31.06%	-3.96%	-12.06%	-9.01%	-5.73%	-7.54%	-19.85%	-17.84%	N/A	N/A
Maximum	9.85%	-3.00%	23.13%	21.00%	14.03%	10.28%	16.09%	11.16%	-1.69%	4.03%	N/A	N/A
St Dev	3.74%	9.75%	13.86%	3.39%	6.55%	3.95%	4.12%	3.99%	2.74%	3.47%	N/A	N/A

Risk-adjusted Returns. Sharpe ratios are a measure of risk-adjusted return and capture the amount of excess return achieved above the risk-free rate per unit of total risk as measured by standard deviation. As a reference the S&P 500 had 10-Year and 5-Year Sharpe ratios of .45 and 1.49 respectively.

The mean 10-Year Sharpe ratio for all defined-benefit plans was .45 while the median was .41. 10-Year Sharpe ratios ranged from a minimum of .08 to a maximum of 1.42 with a standard deviation of .22. The mean and median 5-Year Sharpe ratio for all defined-benefit plans was 1.15. 5-Year Sharpe ratios ranged from a minimum of .24 to a maximum of 1.80 with a standard deviation of .29.

Sharpe ratios generally increased as asset size increased suggesting larger pension plans had better risk-adjusted returns. The average 10-Year Sharpe ratio for quintile 1 was .32 and was .45 for quintile 5 while the 5-Year Sharpe ratio for quintile 1 was 1.08 and was 1.22 for quintile 5. Further, the statewide plans had 10- and 5-year Sharpe ratios of 0.76 and 1.57, respectively, showing better performance than the S&P 500 over the same period.

Expenses

Pension plans pay various expenses to operate a pension fund, including investment and administrative expenses. Investment and administrative expenses reduce pension plan returns as they are paid from investment earnings and plan assets. Higher expenses generally lead to a decrease in performance. The results of the study seem to indicate that pension plans exhibit economies of scale as average fees as a percent of assets appear to be inversely correlated with asset size.

The 10-year average investment fee for defined-benefit pension plans was 1.00% for pension plans in quintile 1 and .45% for pension plans in quintile 5. The average administrative fee was .81% for pension plans in quintile 1 and was .15% for pension plans in quintile 5. Average investment fees for quintile 1 were 1.5 to 2.5 times the size of the other quintile groups while average administrative fees were 2 to 5 times as large as the other quintile groups.

The average investment fee for defined-benefit plans ranged from a minimum of .48% in 2016 to a maximum of .69% in 2008 while the median investment fee ranged from .40% in 2016 to .62% in 2008. The standard deviation of investment fees for defined-benefit plans ranged from a minimum of .28% in 2014 to a maximum of .44% in 2008.

The average administrative fee for defined-benefit plans ranged from a minimum of .25% in 2014 to a maximum of .57% in 2008 while the median investment fee ranged from .17% in 2014 to .26% in 2011. The standard deviation of investment fees for defined-benefit plans ranged from a minimum of .24% in 2007 to a maximum of 1.83% in 2008.

Summary of Average Investment Fees												
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Arithmetic Average	
											10-Year	5-Year
Quintile 1	1.12%	1.23%	1.04%	1.04%	1.09%	0.92%	0.92%	0.91%	0.90%	0.82%	1.00%	0.89%
Quintile 2	0.68%	0.78%	0.59%	0.69%	0.64%	0.72%	0.57%	0.59%	0.57%	0.54%	0.64%	0.60%
Quintile 3	0.50%	0.68%	0.45%	0.51%	0.46%	0.44%	0.42%	0.45%	0.46%	0.34%	0.47%	0.42%
Quintile 4	0.34%	0.43%	0.33%	0.32%	0.38%	0.39%	0.39%	0.44%	0.44%	0.41%	0.39%	0.41%
Quintile 5	0.48%	0.64%	0.41%	0.45%	0.44%	0.45%	0.41%	0.41%	0.42%	0.40%	0.45%	0.42%
Statewide	0.23%	0.16%	0.12%	0.14%	0.17%	0.15%	0.15%	0.12%	0.15%	0.17%	0.16%	0.15%
Mean	0.55%	0.69%	0.51%	0.51%	0.53%	0.52%	0.50%	0.51%	0.52%	0.48%	N/A	N/A
Median	0.50%	0.62%	0.43%	0.44%	0.47%	0.46%	0.41%	0.47%	0.48%	0.40%	N/A	N/A
Minimum	0.00%	0.01%	0.02%	0.02%	0.00%	0.03%	0.03%	0.03%	0.11%	0.10%	N/A	N/A
Maximum	1.66%	1.91%	2.35%	1.63%	1.63%	1.39%	1.37%	1.18%	1.21%	1.28%	N/A	N/A
St Dev	0.36%	0.44%	0.40%	0.34%	0.36%	0.30%	0.29%	0.28%	0.29%	0.28%	N/A	N/A

Summary of Average Administrative Fees												
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Arithmetic Average	
											10-Year	5-Year
Quintile 1	0.53%	1.97%	0.68%	1.00%	1.09%	0.63%	0.45%	0.50%	0.64%	0.59%	0.81%	0.56%
Quintile 2	0.30%	0.46%	0.49%	0.37%	0.45%	0.32%	0.37%	0.32%	0.33%	0.32%	0.37%	0.33%
Quintile 3	0.24%	0.25%	0.21%	0.21%	0.26%	0.29%	0.27%	0.23%	0.21%	0.24%	0.24%	0.25%
Quintile 4	0.26%	0.38%	0.26%	0.27%	0.29%	0.18%	0.17%	0.13%	0.16%	0.17%	0.23%	0.16%
Quintile 5	0.14%	0.18%	0.16%	0.15%	0.15%	0.15%	0.14%	0.13%	0.15%	0.16%	0.15%	0.15%
Statewide	0.05%	0.06%	0.06%	0.06%	0.07%	0.06%	0.06%	0.06%	0.07%	0.06%	0.06%	0.06%
Mean	0.27%	0.57%	0.33%	0.37%	0.42%	0.30%	0.26%	0.25%	0.28%	0.28%	N/A	N/A
Median	0.19%	0.23%	0.24%	0.19%	0.26%	0.19%	0.18%	0.17%	0.19%	0.19%	N/A	N/A
Minimum	0.02%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	N/A	N/A
Maximum	1.17%	16.65%	2.44%	3.44%	6.42%	1.66%	1.90%	1.74%	2.80%	2.08%	N/A	N/A
St Dev	0.24%	1.83%	0.37%	0.52%	0.74%	0.31%	0.29%	0.25%	0.36%	0.29%	N/A	N/A

Statistical Analysis

Many statistical techniques and financial theories rely on the assumption that returns are normally distributed to simplify analysis. Studies have shown that asset returns do not follow a normal distribution as they have excess kurtosis, i.e. fatter tails or more results at the extreme ends of the distribution, therefore this study assumes that asset returns are log-normally distributed in order to address this concern.

The combined total assets for the plans in Quintile 1 fell within the lower end of the range of plans in Quintile 4. However, due to the large range of Quintile 4 (\$80mm to \$400mm), Quintile 3 was chosen as a more appropriate representation for comparing expected returns and expenses.

Except where specifically noted below, this study relies on the Welch t-Test for two samples assuming equal variances to test for statistical significance and the central limit theorem for samples of $n > 30$ to approximate a normal distribution. The null hypothesis is that the difference between the means of the underlying distribution equals zero while the alternative hypothesis is that the difference does not equal zero.

The t-Test for net investment returns failed to reject the null hypothesis at the 95% confidence level. However, sample size is likely driving this result. The sample size required to achieve 95% confidence, given the sample statistics cited above, is roughly 1,050 total observations (or 525 per sample), while our sample only includes 322 observations. So while the differences in average returns are arguably large in practical terms (i.e., greater than 100 basis points), we simply do not have a large enough sample for statistical significance.

Similarly, the t-Test for excess returns above the assumed rate of return failed to reject the null hypothesis at the 95% confidence level. Again, this could be caused by the small sample size. The sample size required for 95% confidence is roughly 2,100 total observations (or 1,050 per sample).

Average Annual Return 2007-2016			Average Excess Return 2007-2016		
	Q3	Q1		Q3	Q1
Mean	4.64%	3.30%	Mean	(3.16%)	(4.19%)
Variance	1.18%	1.28%	Variance	1.41%	1.52%
Observations	163	159	Observations	163	159
Pooled Variance	1.23%		Pooled Variance	1.46%	
df	320		df	320	
t Stat	1.09		t Stat	0.77	
P(T<=t) two-tail	0.28		P(T<=t) two-tail	0.44	

Numerous papers have shown that Sharpe ratios are not normally distributed,^{13,14} and have discussed several different approaches to performing hypothesis testing on the difference between two Sharpe ratios that produce robust results but are generally beyond the scope of this analysis. For simplicity, this study relies on the Mann–Whitney U test which is distribution free so does not rely on the assumption that the underlying values are normally distributed. The Mann-Whitney U test for the 5-Year Sharpe Ratio failed to reject the null hypothesis at the 95% confidence level, however, the 10-Year Sharpe Ratios are shown to be statistically different.

5-Year Sharpe Ratio			10-Year Sharpe Ratio		
	Q3	Q1		Q3	Q1
Median	1.05	1.11	Median	0.42	0.32
Observations	16	15	Observations	16	14
Sum of Ranks	248	248	Sum of Ranks	313	152
Mann-Whitney U	128	128	Mann-Whitney U	201	40
z	0.32		z	-2.99	
P(Z<=z) two-tail	0.75		P(Z<=z) two-tail	0.00	

The t-Tests for both investment and administrative fees indicates the differences in fees between Quintile 3 and Quintile 1 are statistically significant.

Average Investment Fees 2007-2016			Average Administrative Fees 2007-2016		
	Q3	Q1		Q3	Q1
Mean	0.47%	0.99%	Mean	0.24%	0.79%
Variance	0.00%	0.00%	Variance	0.00%	0.02%
Observations	152	102	Observations	162	142
Pooled Variance	0.00%		Pooled Variance	0.01%	
df	252		df	302	
t Stat	-14.04		t Stat	-4.51	
P(T<=t) two-tail	0.00		P(T<=t) two-tail	0.00	

¹³ Opdyke, John Douglas. “Comparing Sharpe Ratios: So Where Are the p-Values?” *Journal of Asset Management*, vol. 8, no. 5, Dec. 2007, pp. 308–336., doi:10.1057/palgrave.jam.2250084.

¹⁴ Riondato, Matteo. “Sharpe Ratio: Estimation, Confidence Intervals, and Hypothesis Testing.” *Two Sigma Technical Report 2018-001*, 14 June 2018.

The statistical analysis demonstrates that some of the metrics of pension performance examined as part of the study are not random and pooling assets could provide significant benefits to pension plans. Although net investment returns and excess returns over the assumed rate of return did not show any statistical significance, 10-Year Sharpe ratios suggest that larger pension plans had better risk-adjusted returns as compared to smaller pension plans during the period. Additionally, the differences between investment and administrative fees were significant.

Potential Impact Modeling

Average Investment Returns										
Quintiles	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	7.36%	-21.81%	13.33%	10.35%	-0.12%	9.38%	12.55%	4.50%	-1.98%	4.61%
3	9.93%	-18.06%	14.62%	11.02%	1.26%	11.24%	13.16%	6.18%	-2.50%	6.46%
Additional Investment Returns	2.58%	3.75%	1.29%	0.67%	1.37%	1.86%	0.62%	1.68%	-0.52%	1.85%

Average Investment Fees										
Quintiles	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	1.09%	1.28%	1.10%	1.04%	1.15%	0.92%	0.91%	0.92%	0.91%	0.84%
3	0.50%	0.70%	0.44%	0.50%	0.49%	0.42%	0.42%	0.45%	0.46%	0.34%
Savings	0.59%	0.58%	0.66%	0.54%	0.66%	0.50%	0.50%	0.47%	0.45%	0.50%

Average Administrative Fees										
Quintiles	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	0.79%	2.34%	0.81%	1.00%	1.21%	0.63%	0.58%	0.54%	0.68%	0.63%
3	0.27%	0.32%	0.28%	0.28%	0.34%	0.34%	0.27%	0.23%	0.21%	0.24%
Savings	0.52%	2.02%	0.53%	0.72%	0.86%	0.29%	0.31%	0.31%	0.47%	0.39%

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APPENDIX C1 – PRB PENSION FUNDING GUIDELINES

Pension Review Board
Pension Funding Guidelines
(Adopted 01/26/17; Effective 06/30/17)

The purpose of the Pension Review Board's Pension Funding Guidelines is to provide guidance to public retirement systems and their sponsoring governmental entities in meeting their long-term pension obligations. The Guidelines are intended to foster communication between plans and their sponsors as they determine a reasonable approach to responsible funding, whether the contribution rate is fixed or actuarially determined.

Public retirement systems should develop a funding policy, the primary objective of which is to fund the obligations over a time frame that ensures benefit security while balancing the additional, and sometimes competing, goals of intergenerational equity and a stable contribution rate.

1. The funding of a pension plan should reflect all plan obligations and assets.
2. The allocation of the normal cost portion of the contributions should be level or declining as a percentage of payroll over all generations of taxpayers, and should be calculated under applicable actuarial standards.
3. Funding of the unfunded actuarial accrued liability should be level or declining as a percentage of payroll over the amortization period.
4. Actual contributions made to the plan should be sufficient to cover the normal cost and to amortize the unfunded actuarial accrued liability over as brief a period as possible, but not to exceed 30 years, with 10 - 25 years being the preferable target range.* For plans that use multiple amortization layers, the weighted average of all amortization periods should not exceed 30 years.* Benefit increases should not be adopted if all plan changes being considered cause a material increase in the amortization period and if the resulting amortization period exceeds 25 years.
5. The choice of assumptions should be reasonable, and should comply with applicable actuarial standards.
6. Retirement systems should monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

*Plans with amortization periods that exceed 30 years as of 06/30/2017 should seek to reduce their amortization period to 30 years or less as soon as practicable, but not later than 06/30/2025.

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APPENDIX C2 – PRB PRINCIPLES FOR RETIREMENT PLAN DESIGN

PRB Principles of Retirement Plan Design
(Adopted June 14, 2018)

The Pension Review Board (PRB) recognizes that offering a sustainable, secure retirement benefit is vital to achieving the objectives of multiple public-sector stakeholders including employers, employees, retirees, beneficiaries, and taxpayers, and that benefits should be protected through sound plan design and adequate funding. Therefore, the PRB intends for these Principles to guide and inform public retirement systems and their associated governmental entities on how to structure retirement plans.

Because:

- state and local government is a major employer in Texas;
- the state and its many political subdivisions—counties, cities, school districts, special districts, and others—rely on employees to deliver essential public services, including teaching at public schools; protecting public health and safety; planning, building, and maintaining transportation, utility and other infrastructure, parks and recreational facilities; protecting vulnerable individuals, including children, the elderly, and those with developmental disabilities; and protecting the state’s natural resources;
- employee compensation is a vital component in the ability of the state and its political subdivisions to attract qualified workers to perform public services and to keep those workers employed as long as they continue to add value to their employer and to the public;
- a retirement benefit is a critical element of employee compensation, serving as an important tool in the ability of employers to recruit and retain qualified and experienced employees; and
- the design and prudent financial management of the retirement benefit provided to public employees can significantly affect the ability of employers to attract and retain employees and maintain budgetary stability while providing essential public services;

The PRB supports the following Principles of Retirement Plan Design for public retirement systems in Texas:

1. Public employers should offer a retirement benefit, and participation in the employer-sponsored primary retirement plan should be mandatory.
2. Contributions to retirement plans should be consistent with the PRB *Pension Funding Guidelines*.
3. Employers and employees should share the cost of the benefit.
4. Retirement plan vesting should occur over a short period, preferably five years or less.
5. Benefits should be designed to place employees on the path to financial security in retirement in consideration of participation or nonparticipation in Social Security.
6. A primary retirement plan should require annuitization of a substantial portion of retirement benefits.
7. In the absence of an immediate and heavy financial need, a retirement benefit should be used only for retirement.

8. Retirement benefits should be protected against the erosion of the benefit's value due to inflation; such benefits should not exceed actual inflation and should be funded in accordance with the Pension Review Board's *Pension Funding Guidelines*.
9. Employers should provide death and disability benefits.
10. Employers are encouraged to offer plans that are supplemental to the primary retirement plan.
11. Retirement plan governance should represent the interests of all stakeholders, respect fiduciary standards, and be transparent and publicly accountable.
12. Retirement plan assets should be pooled and professionally invested according to prudent investor standards, giving careful consideration to cost.

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APPENDIX D1 – FSRP STATUS REPORT

Systems Immediately Subject to and At Risk of FSRP Formulation Requirement

The FSRP requirement is triggered for retirement systems that have had amortization periods over 40 years for three consecutive annual actuarial valuations, or two consecutive actuarial valuations if the systems conduct the valuations every two or three years.

The at-risk systems' most recent actuarial valuation shows an amortization period that exceeds 40 years but does not yet trigger the FSRP requirement.

Systems Immediately Subject to FSRP Formulation Requirement							
Plan Name	Am Period	Date of AV	Am Period	Date of AV	Am Period	Date of AV	FSRP Due Date
Fort Worth Employees' Retirement Fund	72.5	12/31/2015	Infinite	12/31/2016	Infinite	12/31/2017	1/15/2017 ¹
University Park Firemen's Relief & Retirement Fund – REVISED FSRP ²	81.3	12/31/2012	53.7	1/1/2015	Infinite	12/31/2016	10/22/2018
Harlingen Firemen's Relief & Retirement Fund – REVISED FSRP ²	66.6	12/31/2013	Infinite	12/31/2015	59.1	9/30/2017	10/29/2018 ³
Wichita Falls Firemen's Relief & Retirement Fund – REVISED FSRP ²	43.7	1/1/2016	49.4	1/1/2017	Infinite	1/1/2018	2/10/2019
Irving Firemen's Relief & Retirement Fund – REVISED FSRP ²	63.4 ⁴	1/1/2014	46.5	12/31/2015	Infinite	12/31/2017	4/17/2019
Systems at Risk of FSRP- <u>Not Yet Subject to FSRP Requirement</u>							
Amarillo Firemen's Relief & Retirement Fund	28.8	1/1/2014	34.5	12/31/2015	43.5	12/31/2017	N/A
Beaumont Firemen's Relief & Retirement Fund	49.6	12/31/2012	39.1	12/31/2014	104.0	12/31/2016	N/A
Cleburne Firemen's Relief & Retirement Fund	34.1	12/31/2012	27.3	12/31/2014	49.6	12/31/2016	N/A
Longview Firemen's Relief & Retirement Fund	37.9	12/31/2015	50.7	12/31/2016	40.2	12/31/2017	N/A
McAllen Firemen's Relief & Retirement Fund	43.9	9/30/2012	29.0	10/1/2014	41.4	10/1/2016	N/A
Paris Firefighters' Relief & Retirement Fund	29.2	1/1/2013	26.1	12/31/2014	41.9	12/31/2016	N/A

¹ The City and the Fund are currently considering proposed changes to address the funding shortfall and achieve compliance with the FSRP requirement.

² Texas Government Code Section 802.2015(d) requires plans to formulate a revised FSRP if the system conducts an actuarial valuation showing that the system's amortization period exceeds 40 years, and the previously formulated FSRP has not been adhered to.

³ The PRB has been informed that the Fund and City are working on developing a revised FSRP and are expected to provide an update in January of 2019.

⁴ The amortization period was calculated by the PRB in consultation with the plan actuary.

Progress Report on Previously Submitted FSRPs

The following plans have previously formulated an FSRP. The table below outlines their progress towards the FSRP requirement.

Systems Still Working Towards Meeting the 40-Year Amortization Period Requirement						
Plan Name	FSRP Trigger		Current Progress ¹		Goal Year ²	Update Required ³
	Am Period	Date	Am Period	Date		
Midland Firemen's Relief & Retirement Fund	59.1	1/1/2014	44.7	12/31/2015	2026	1/2019
Dallas Employees' Retirement Fund	Infinite	12/31/2015	47.0	12/31/2017	2026	7/2019
Dallas Police & Fire Pension System - Combined Plan	44.0	1/1/2017	N/A	N/A	2027	9/2019
Galveston Employees' Retirement Plan for Police	55.1	1/1/2014	48.7	1/1/2017	2026	12/2019
Greenville Firemen's Relief & Retirement Fund – REVISED FSRP	55.0	12/31/2016	38.0 ⁴	12/31/2016	2026	1/2020
Orange Firemen's Relief & Retirement Fund – REVISED FSRP	69.3	1/1/2017	47.0	1/1/2017	2026	2/2020
Marshall Firemen's Relief & Retirement Fund	56.4	12/31/2016	46.5 ⁵	12/31/2016	2026	3/2020
Odessa Firemen's Relief & Retirement Fund	Infinite	1/1/2016	47.1	1/1/2018	2026	4/2020
Galveston Firefighter's Relief & Retirement Fund – REVISED FSRP	Infinite	12/31/2016	25.3 ⁴	12/31/2016	2026	5/2020

¹ Based on the most recent valuation or FSRP.

² The year in which a plan must reach an amortization period of 40 years or less.

³ Reflects the statutory 2-year FSRP progress update requirement. The PRB considers a Fund's most recent actuarial valuation or revised FSRP as an update that fulfills the requirement.

⁴ The amortization period reflects estimates of actions that occurred after the valuation date. Plans will be removed from the list if a subsequent valuation reflects an amortization period of 40 years or less.

⁵ This calculation does not consider recent assumption changes that may increase the amortization period to be reported in the next actuarial valuation.

Progress Report on Previously Submitted FSRPs (continued)

The following plans have previously formulated an FSRP. The table below outlines their progress towards the FSRP requirement.

Systems No Longer Subject to FSRP Formulation Requirement						
Systems that Have Submitted Post-FSRP Actuarial Valuations Showing Amortization Period Below 40 Years						
Plan Name	FSRP Trigger		Current Progress ¹		Goal Year ²	Update Required
	Am Period	Date	Am Period	Date		
Lufkin Firemen's Relief and Retirement Fund	40.6	12/31/2014	33.1 ³	12/31/2016	2026	N/A
Sweetwater Firemen's Relief and Retirement Fund	58.8	12/31/2014	27.5	12/31/2016	2026	N/A

¹ Based on the most recent valuation.

² The year in which a plan is expected to reach an amortization period of 40 years or less.

³ This valuation reflects a 10-year reduction in the amortization period associated with a change in actuarial consulting firms. The new actuary and the PRB were unable to determine the reason for the reduction without more detailed information and discussion with the prior actuarial firm.

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APPENDIX D2 – SUMMARY OF FUNDING SOUNDNESS RESTORATION PLANS SUBMITTED DURING 2017-2018 BIENNIUM

Summary of FSRPs Submitted During 2017-2018 Biennium

Retirement System	AV Effective Date ¹	Amortization Period	Changes			Comments
			Employee Contributions	Employer Contributions	Other	
Dallas Employees' Retirement Fund	12/31/2015	Infinite	N/A	N/A	For members hired after 12/31/2016: - Decreased normal retirement benefit multiplier, increased retirement age & increased final average salary period - Increased age/service needed early retirement eligibility (Rule of 80 with full actuarial reduction) - Removed unreduced pension benefit under a joint and one-half survivor option - Removed \$125 monthly health supplement - COLA is capped at a maximum of 3%	The system sent the PRB an AV with projections based on the changes made through city referendum.
Dallas Police & Fire Pension System - Combined Plan	1/1/2016	Infinite	Old: 8.50% New: 13.50%	Old: 27.50% New: 34.50% + \$13 million annually with a floor until 2024	- Ended DROP interest & COLA credit, instated maximum DROP period of 10 years, & annuitized DROP balances as of 9/1/2017 - Decreased normal retirement benefit multiplier, increased retirement age & increased final average salary period for service after 9/1/2017 - Increased age of early retirement & decreased benefit multiplier for service after 9/1/2017 - Ended supplemental retirement benefit for retirees not receiving it before 9/1/2017 - Decreased vesting period of members hired on or after 3/1/2011 - Decreased maximum benefit from 96% to 90% of computational pay for members hired before 3/1/2011 - Suspended COLA until plan is at least 70% funded	All changes listed are from H.B. 3158 signed by the Governor on May 31, 2017. The bill went into effect on September 1, 2017.
Galveston Firefighter's Relief & Retirement Fund - REVISED FSRP ²	12/31/2016	Infinite	Old: 16.00% New: 3/1/18: 17.00% 10/1/18: 18.00%	Old: 14.00% New: 17.00% + \$1 million one-time lump sum	Discontinued automatic COLA for firefighters not yet retired; effective March 1, 2018.	
Greenville Firemen's Relief & Retirement Fund - REVISED FSRP ²	12/31/2016	55.0	N/A	Old: 17.30% New: 19.30%	N/A	The City provided a letter with analysis from its actuary to show the impact of the increase in city contributions.
Marshall Firemen's Relief & Retirement Fund ³	12/31/2016	56.4	N/A	Old: 19.05% New: 19.80%	For members hired after 12/31/2018: - Increased retirement age from 50 to 53 - Increased vesting period from 10 to 20 years	The City's contribution rate increase is assumed to be effective 1/1/2019, but has not yet been approved. The FSRP also assumes city contributions will be made as of 12/31/2018 for unfilled vacancies that existed throughout the year.
Orange Firemen's Relief & Retirement Fund - REVISED FSRP ²	1/1/2017	69.3	Old: 12.00% New: 12.50%	Old: 14.00% New: 14.50%	N/A	In addition to the FSRP employee contribution increase, the FSRP's amortization period calculation recognized the 2017 actual return of 17.88%.

¹ Actuarial valuation that triggered the funding soundness restoration plan requirement.

² Texas Government Code Section 802.2015(d) requires plans to formulate a revised FSRP if the system conducts an actuarial valuation showing that the system's amortization period exceeds 40 years, and the previously formulated FSRP has not been adhered to.

³ The FSRP does not consider already approved assumption changes that will likely result in the plan being out of compliance with the FSRP when the plan completes its December 31, 2018 actuarial valuation. The PRB has recommended that the system and sponsoring governmental entity consider taking potential corrective actions now, rather than waiting for the results of the upcoming valuation.

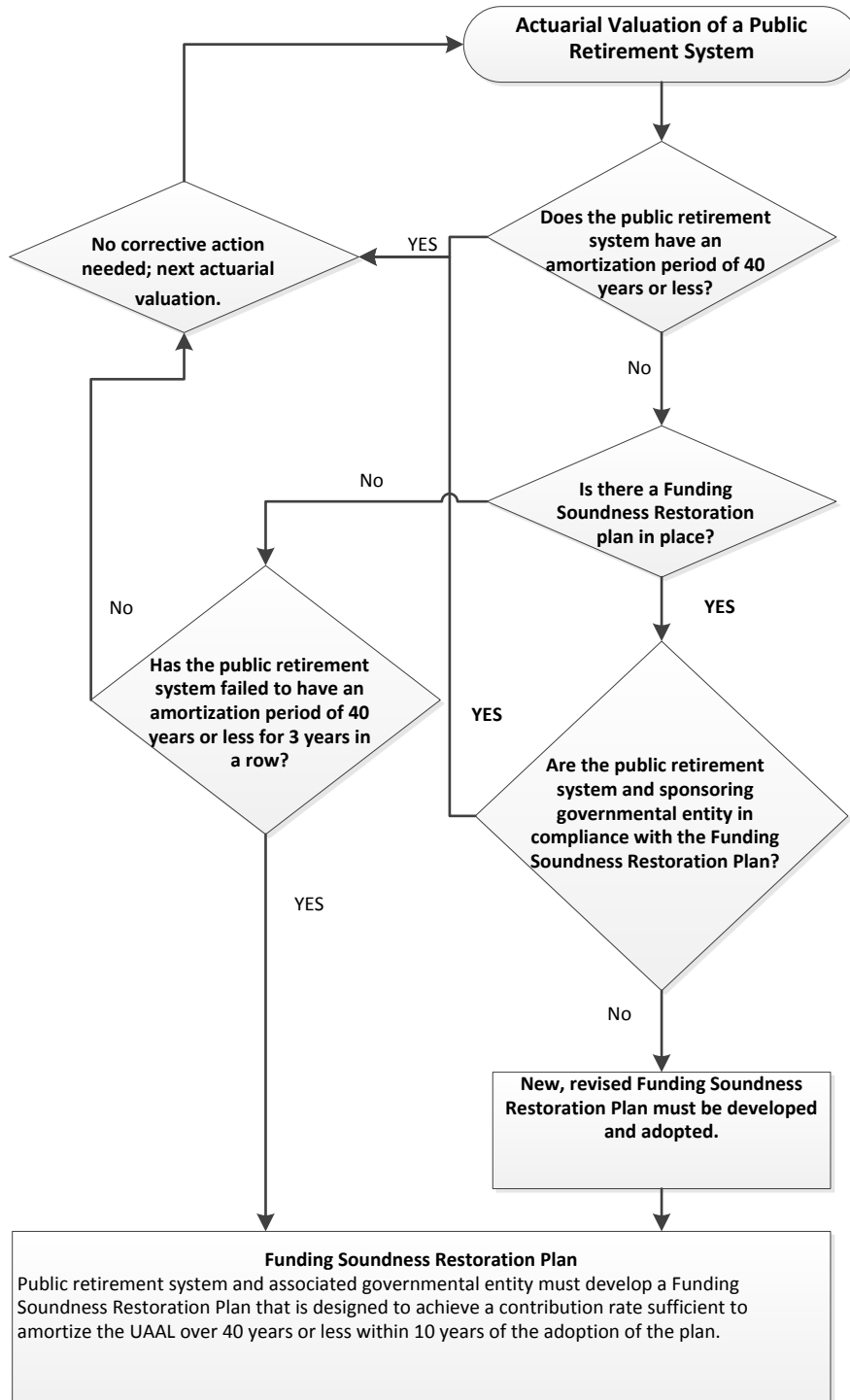
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APPENDIX D3 – FSRP FLOW CHART

Funding Soundness Restoration Plan

Flowchart



Texas Pension Review Board

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APPENDIX E1 – MET ACCREDITED SPONSOR LIST

PRB Minimum Educational Training Program Accredited Sponsors

Alternative Investments Forum (AIF) (CE Only)

www.aifglobal.org

The “Callan College” (CE Only)

www.callan.com/callan-college-intro/

Cantor Fitzgerald (CE Only)

www.cantor.com

CFA Societies of Texas (CE Only)

www.cfasociety.org/texas/Pages/default.aspx

Chartered Alternative Investment Analyst (CAIA) Association (CE Only)

<https://fundamentals.caia.org/#/login>

City of Austin Employees’ Retirement System (Core & CE)

www.coaers.org

Dallas Police & Fire Pension System (Core & CE)

www.dfp.org

El Paso City Employees’ Pension Fund (Core & CE)

www.eppension.org

Employees Retirement System of Texas (CE Only)

www.ers.state.tx.us

Fort Worth Employees’ Retirement Fund (CE Only)

www.fwretirement.org

**National Conference of Public Employee Retirement Systems
(NCPERS) (CE Only)**

www.ncpers.org

Pension Review Board (Core & CE)

www.softchalkcloud.com/lesson/serve/Ud8eHX7n0Qpv5Y/html

Robbins Geller Rudman & Dowd LLP (CE Only)

www.rgrdlaw.com

Teacher Retirement System of Texas (CE Only)

www.trs.state.tx.us

**Texas Association of Public Employees Retirement Systems (TEXpers)
(Core & CE)**

www.texpers.org

Texas County and District Retirement System (Core & CE)

www.tcdrs.org

**Texas Local Fire Fighters Retirement Act (TLFFRA) Educational
Foundation (Core & CE)**

www.tlffra.org

Texas Municipal Retirement System (Core & CE)

www.tmr.org

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APPENDIX E2 – PUBLIC RETIREMENT SYSTEM COMPLIANCE WITH MINIMUM EDUCATIONAL TRAINING REQUIREMENTS

Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board

This report contains METcompliance information reported to the PRB for Texas public retirement system trustees' and system administrators' most recently completed training cycle.

Compliant: has successfully completed previous training cycle
Not Compliant: has been not compliant in one or more previous training cycles
In Progress: working toward completion of first training cycle
Exempt: systems that have met the criteria for their system administrators to be exempt from MET requirements

Abilene Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Baker Bryant	Active	Compliant
Weldon Hurt	Mayor Designee	Compliant
Will McBride	Active	Compliant
Mike Rains	CFO	Compliant
Jack Rich	Citizen	Compliant
Mike Whalen	Citizen	Compliant
System Administrator:	Rodney Goodman	Compliant

Amarillo Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Michelle Bonner	CFO	Compliant
Dean Frigo	Citizen	Compliant
Brandon Mason	Active	Compliant
Joseph Peterson	Mayor Designee	In Progress
Tony Robinson	Active	Compliant
Rodney Ruthart	Citizen	In Progress
Arick Wray	Active	In Progress
System Administrator:	Laura Storrs	Compliant

Arlington Employees Deferred Income Plan		100% Compliant
Name	Trustee Type	Compliance
Don Crowson	Active	Compliant
Mike Finley	Active	Compliant
Pete Jamieson	Retired	Compliant
Gilbert Perales	Active	Compliant
Walter Pishkur	Active	Compliant
Lemuel Randolph	Active	Compliant
Kari Zika	Active	Compliant
System Administrator:	Exempt	

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Atlanta Firemen's Relief & Retirement Fund		85.7% Compliant
Name	Trustee Type	Compliance
Daniel Camp	Active	Compliant
Ricky Draper	Active	Compliant
Alton Endsley	Citizen	Compliant
Mark Hill	Active	Compliant
Danica Porter	CFO	Not Compliant
Travis Ransom	Mayor	Compliant
Randy Sanders	Citizen	Compliant
System Administrator:	Exempt	

Austin Employees' Retirement System		100% Compliant
Name	Trustee Type	Compliance
Stephanie Beach	Citizen (appointed by City Council)	Compliant
Michael Benson	Active Elected Member	Compliant
Eyna Canales-Zarate	Retired	Compliant
Amy Hunter	Active	Compliant
Yuejiao Liu	Active	Compliant
Frank Merriman	Citizen (appointed by City Council)	Compliant
Chris Noak	Active Elected Member	Compliant
Leslie Pool	City Council Member	Compliant
Anthony Ross Sr.	Retiree Elected	Compliant
J. Randall Spencer	Citizen Board Appointed	Compliant
Ed Van Eenoo	City Manager Designee	Compliant
System Administrator:	Chris Hanson	Compliant

Austin Fire Fighters Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Steve Adler	Mayor	Compliant
Jeremy Burke	Fund Member	Compliant
Keith Johnson	Fund Member	Compliant
Dimitri Nichols	Fund Member	Compliant
Belinda Weaver	Secretary-Treasurer	In Progress
System Administrator:	William Stefka	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Austin Police Retirement System		100% Compliant
Name	Trustee Type	Compliance
Jim Beck	Police Member	Compliant
Keith Harrison	Retired Member	Compliant
Elaine Hart	City Member	Compliant
Thomas Hugonett	Active	In Progress
Tyler Link	Police Member	Compliant
Andrew Romero	Police Member	Compliant
Todd Smith	Police Member	Compliant
Kathie Tovo	City Member	Compliant
Belinda Weaver	Employer	In Progress
Chesley Wood	Citizen Member	Compliant
Carl Zimmerman	Retired Member	Compliant
System Administrator:	Pattie Featherston	Compliant

Beaumont Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Clint Cheshire	Active	Compliant
Laura Clark	Citizen	In Progress
Bill Darling	Citizen	Compliant
Kristin Ferguson	Mayor Designee	Compliant
Brian Hebert	Active	Compliant
Todd Simoneaux	CFO	Compliant
Carl Whitehead, Jr.	Active	Compliant
System Administrator:	Joni Hanley	Compliant

Big Spring Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Paul Brown	Citizen	Compliant
Cecil Cevallos	Citizen	Compliant
Todd Darden	Mayor Designee	Compliant
Chanley Delk	Active	Compliant
Don Moore	CFO	Compliant
Chad Pederson	Active	Compliant
Jake Sparks	Active	Compliant
System Administrator:	Tom Ferguson	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Brazos River Authority Retirement Plan		100% Compliant
Name	Trustee Type	Compliance
Peter Bennis	BRA Board Member	Compliant
Jim Forte	Active	Compliant
John Luton	BRA Board Member	Compliant
Michael McClendon	Active	In Progress
Jeff Tallas	BRA Board Member	Compliant
Ford Taylor	BRA Board Member	Compliant
Matt Wheelis	Active	Compliant
System Administrator:	David Thompson	Compliant

Brownwood Firemen's Relief & Retirement Fund		85.7% Compliant
Name	Trustee Type	Compliance
Mark Bessent	Citizen	Compliant
William Campbell	Active	Compliant
Jody Horton	Active	Compliant
Walter Middleton	CFO	Compliant
Pierre Osbourne	Mayor Designee	Not Compliant
Carey Stewart	Citizen	Compliant
Joe Stieber	Active	Compliant
System Administrator:	Exempt	

Capital MTA Retirement Plan for Administrative Employees		20% Compliant
Name	Trustee Type	Compliance
Gerardo Castillo	Active	Not Compliant
John Hodges	Retired	Compliant
Lea Sandoz	Active	Not Compliant
Donna Simmons	Active	Not Compliant
Elaine Timbes	Active	Not Compliant
System Administrator:	Exempt	

Capital MTA Retirement Plan for Bargaining Unit Employees		83.3% Compliant
Name	Trustee Type	Compliance
Kerri Butcher	Sponsor - Employer	Compliant
Michael "Kevin" Conlan	Sponsor - Employer	Compliant
Brent Payne	Retiree - Bargaining Unit	Compliant
Lawrence Prosser	Active - Bargaining Unit	Compliant
Donna Simmons	Employer	Not Compliant
Greg Talley	Active-Bargaining Unit	In Progress
System Administrator:	Exempt	

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Cleburne Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
John Harrell	Active	Compliant
Sean Herren	Active	In Progress
Terry Leake	CFO	Compliant
Steve Polasek	Mayor Designee	Compliant
Jake Simms	Citizen	Compliant
Roger Trussell	Citizen	Compliant
Kris Watson	Active	Compliant
System Administrator:	Exempt	

Colorado River Municipal Water District Defined Benefit Retirement Plan & Trust		100% Compliant
Name	Trustee Type	Compliance
Mireya Castilaw	Active	Compliant
John Grant	Active	Compliant
Dan Hollman	Employer	Compliant
Jeff Knowles	Employer	Compliant
Karla Oliva	Active	Compliant
Clif Talbot	Employer	Compliant
John Womack	Active	Compliant
System Administrator:	Exempt	

Conroe Fire Fighters' Retirement Fund		71.4% Compliant
Name	Trustee Type	Compliance
Steve Cottar	Active	Compliant
Joe Craig	Active	Not Compliant
Tom Garvey	Active	Compliant
Russell Moss	Citizen	Not Compliant
Steve Williams	CFO	Compliant
Marcus Winberry	Mayor Designee	Compliant
Cary Wortham	Citizen	Compliant
System Administrator:	Exempt	

Corpus Christi Fire Fighters' Retirement System		100% Compliant
Name	Trustee Type	Compliance
Darron Bergstrom	Citizen	Compliant
Michael Gilley	Active	Compliant
Javier Jasso	Active	Compliant
Laurelyn Pohlmeier	Citizen	Compliant
Constance Sanchez	CFO	Compliant
Penn Thomas	Mayor Designee	Compliant
Matthew Wood	Active	Compliant
System Administrator:	Gracie Flores	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Corpus Christi Regional Transportation Authority		54.5% Compliant
Name	Trustee Type	Compliance
Anne Bauman	Active	In Progress
George Clower	Citizen	Not Compliant
Patricia Dominguez	Active	Compliant
Scott Harris	Citizen	Not Compliant
Dan Leyendecker	Active	Compliant
Glenn Martin	Citizen	Not Compliant
Edward Martinez	Citizen	Not Compliant
Tom Niskala	Retired	Not Compliant
Michael Reeves	Citizen	Compliant
Philip Skrobarczyk	Active	Compliant
Matthew Woolbright	Active	In Progress
System Administrator:	Exempt	

Corsicana Firemen's Relief & Retirement Fund		62.5% Compliant
Name	Trustee Type	Compliance
Don Denbow	Mayor	Not Compliant
Travis Ellington	Active	Not Compliant
Brandy Harrison	Citizen	Not Compliant
Johnny Pattison	Active	Compliant
Kevin Putman	Active	Compliant
Freddy Thomas	CFO	In Progress
Bobby Willingham	Citizen	Compliant
System Administrator:	Melissa O'Sullivan	Compliant

CPS Energy Pension Plan		100% Compliant
Name	Trustee Type	Compliance
Paul Barham	Active	Compliant
Linda Dzierzanowski	Active	Compliant
Bill Gunst	Retired	Compliant
Rodney Jones	Active	Compliant
David Jungman	Active	Compliant
Richard Medina	Active	Compliant
Paul White	Active	Compliant
System Administrator:	Lois Emerson	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Dallas County Hospital District Retirement Income Plan		53.8% Compliant
Name	Trustee Type	Compliance
Bryan Fant	Citizen	Compliant
Paula Dobbs-Wiggins	Citizen	Compliant
Marvin Earle	Citizen	Not Compliant
Scherry Johnson	Citizen	Compliant
Robert Martinez	Citizen	Compliant
Winfred Parnell	Citizen	Compliant
Natalie Sorrell	Citizen	Not Compliant
Jeff Tillotson	Citizen	Compliant
Jesse Vallejo	Citizen	Not Compliant
Gonzalo Venegas	Citizen	Not Compliant
Michael Williams	Citizen	Not Compliant
Don O'Bannon	Citizen	Compliant
System Administrator:	J.D. Davis	Not Compliant

Dallas Employees' Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Randy Bowman	Citizen	Compliant
Carla Brewer	Active	Compliant
John Jenkins	Active	Compliant
Craig Kinton	Active	Compliant
Lee Kleinman	Citizen	Compliant
Dr. John Peavy III	Citizen	Compliant
Tina Richardson	Active	Compliant
System Administrator:	Cheryl Alston	Compliant

Dallas Police & Fire Pension System-Combined Plan		83.3% Compliant
Name	Trustee Type	Compliance
Blaine Dickens	Non-Member-Elected	Compliant
Samuel Friar	Fire-Elected	Compliant
Gilbert Garcia	Non-Member-Elected	Compliant
Tina Hernandez-Patterson	Non-Member-Elected	Compliant
Nicholas Merrick	Citizen Mayor-Appointed	Compliant
Ray Nixon	Citizen Mayor-Appointed	Compliant
William Quinn	Citizen Mayor-Appointed	Compliant
Fredrick Rowe	Citizen Mayor-Appointed	Compliant
Joseph Schutz	Police-Elected	Compliant
Robert Walters	Citizen Mayor-Appointed	Not Compliant
Kneeland Youngblood	Citizen Mayor-Appointed	Compliant
System Administrator:	Kelly Gottschalk	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Dallas/Fort Worth Airport Board DPS Retirement Plan		83.3% Compliant
Name	Trustee Type	Compliance
Lillie Biggins	Active	Compliant
Henry Borbolla III	Active	Not Compliant
Sam Coats	Active	Compliant
Bridget Lopez	Active	Not Compliant
William Meadows	Active	Compliant
Regina Montoya	Active	Compliant
Betsy Price	Active	Compliant
Curtis Ransom	Active	Compliant
Michael Rawlings	Active	Compliant
Amir Rupani	Active	Compliant
Bernice Washington	Active	Compliant
System Administrator:	Michael Phemister	Compliant

DART Employees' Defined Benefit Retirement Plan & Trust		100% Compliant
Name	Trustee Type	Compliance
Larry Knott	Active-Elected	Compliant
	Employer- Chairman of the Board	
David Leininger	Appointment	Compliant
Reginald Moore	Active-Elected	Compliant
	Employer- Appointed by the	
Jesse Oliver	President	Compliant
William Velasco	Chairman of the Board Appointee	Compliant
System Administrator:	Blake Horton	Compliant

Denison Firemen's Relief & Retirement Fund		87.5% Compliant
Name	Trustee Type	Compliance
Keith Bates	Active	Compliant
Eric Batey	Citizen	Not Compliant
Seth Foltermann	Active	Compliant
Jared Johnson	Mayor	Compliant
Lee Thornton	Citizen	Compliant
Renee Waggoner	CFO	Compliant
John Weda	Active	Compliant
System Administrator:	Raj Allada	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Denton Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Donald Manes	Active	Compliant
Derek Oswald	Active	Compliant
Charlie Parker	Citizen	Compliant
Tony Puente	CFO	In Progress
David Reeder	Active	Compliant
Richard Smith	Citizen	Compliant
System Administrator:	Gary Calmes	Compliant

El Paso City Employees' Pension Fund		100% Compliant
Name	Trustee Type	Compliance
Nicholas Costanzo	Retired	Compliant
Mario Hernandez	Active Employee	Compliant
Cassandra Hernandez	City Representative	Compliant
Sam Morgan	City Representative	Compliant
Presi Ortega	Citizen	Compliant
Rene Pena	Citizen	Compliant
Karl Rimkus	Active Participant	Compliant
Robert Studer	Active	Compliant
Diana Nunez	Active Participant	Compliant
System Administrator:	Robert Ash	Compliant

El Paso Firemen & Policemen's Pension Fund		100% Compliant
Name	Trustee Type	Compliance
Gary Borsch	Citizen	Compliant
Ricci Carson	Active Fire	Compliant
Jerry Armendariz	Active Police	Compliant
Leila Melendez	Citizen	Compliant
Presi Ortega	Mayoral Appointee	Compliant
John Schneider	Active Police	Compliant
Sean Shelton	Active Police	Compliant
Paul Thompson	Active Fire	Compliant
Robert Tollen	Mayoral Appointee	Compliant
Jerry Villanueva	Active Fire	Compliant
System Administrator:	Tyler Grossman	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Employees Retirement System of Texas		100% Compliant
Name	Trustee Type	Compliance
Ilesa Daniels	Elected Member	Compliant
Doug Danzeiser	Appointed by ERS Board	Compliant
Cydney Donnell	Appointed by Governor	Compliant
Craig Hester	Appointed by Chief Justice	Compliant
Catherine Melvin	Elected Member	Compliant
Jeanie Wyatt	Appointed by Speaker	Compliant
System Administrator:	Porter Wilson	Compliant

Fort Worth Employees' Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Marsha Anderson	Retired General Employee	Compliant
Aaron Bovos	CFO	Compliant
Loriane Coleman	Active Municipal	Compliant
Todd Cox	Active Fire	Compliant
Jarod Cox	Council Appointee	Compliant
Kevin Foster	Retired Police	Compliant
Thomas Lewis	Retired Fire	Compliant
Steve Litke	Appointed Citizen	In Progress
Jesus Payan	Council Appointee	Compliant
Richard Van Houten	Active Police	Compliant
Andrea Wright	Active Municipal	In Progress
System Administrator:	Joelle Mevi	Compliant

Galveston Employees' Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Brandon Cook	Active	Compliant
Don Davison	Citizen	Compliant
Mike Loftin	Active	Compliant
Janice Norman	Active	Compliant
James Patterson	Citizen	Compliant
Robert Simmons	Active	In Progress
System Administrator:	Jacque Vasquez	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Galveston Employees' Retirement Plan for Police		100% Compliant
Name	Trustee Type	Compliance
Thayer Evans	Citizen	Compliant
Geoffrey Gainer	Active	Compliant
Richard Moore	Citizen	In Progress
Mike Loftin	Council Appointment	Compliant
Andre Mitchell	Active	Compliant
Jeff Murdock	Active	In Progress
Matthew Whiting	Active	Compliant
System Administrator:	Jacque Vasquez	Compliant

Galveston Firefighter's Relief & Retirement Fund		85.7% Compliant
Name	Trustee Type	Compliance
Mike Dean	Mayor Designee	Not Compliant
Travis Hill	Active	Compliant
Mike Loftin	CFO	Compliant
Charlie Olsen	Active	Compliant
John Ovalle	Citizen	Compliant
Gary Staudt	Active	Compliant
System Administrator:	Rebecca Johnson	Compliant

Galveston Wharves Pension Plan		40% Compliant
Name	Trustee Type	Compliance
Elizabeth Beeton	Active	Not Compliant
Richard DeVries	Active	Not Compliant
Jason Levy	Active	Not Compliant
Mark Murchison	CFO	Compliant
E.L."Ted" O'Rourke	Active	Compliant
John Perterlin	Active	Not Compliant
Albert Shannon	Active	Compliant
Peter Simons	Active	Compliant
Todd Sullivan	Active	Not Compliant
James Yarbrough	Active	Not Compliant
System Administrator:	Exempt	

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Greenville Firemen's Relief & Retirement Fund		85.7% Compliant
Name	Trustee Type	Compliance
Bryan Ausmus	Active	Not Compliant
David Dreiling	Mayor	Compliant
Craig Himes	Active	Compliant
Derek Sheets	Active	Compliant
Greg Parsons	Citizen	Compliant
Summer Spurlock	CFO	Compliant
Howard Winans	Citizen	Compliant
System Administrator:	Exempt	

Guadalupe-Blanco River Authority		100% Compliant
Name	Trustee Type	Compliance
Darel Ball	Active	Compliant
William Carbonara	Employer	Compliant
Oscar Fogle	Employer	Compliant
Charles Hickman	Active	Compliant
Susan Hubbert	Active	Compliant
Thomas Mathews	Employer	Compliant
Kenneth Motl	Employer	Compliant
Lauren Willis	Active	Compliant
System Administrator:	Randy Staats	Compliant

Harlingen Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Mario Alvarado	Active	Compliant
Michael Browning	Citizen	Compliant
Owen Flinn	Citizen	Compliant
Gabriel Gonzalez	Mayor Designee	Compliant
Cirilo Rodriguez Jr.	Active	Compliant
Juan Saucedo	Active	Compliant
Elvia Trevino	CFO	Compliant
System Administrator:	Nanette Fox	Compliant

Harris County Hospital District Pension Plan		75% Compliant
Name	Trustee Type	Compliance
Donald Butts		Compliant
Anne Clutterbuck	Active	Compliant
Lawrence Finder	Active	Compliant
Elvin Franklin Jr.	Retired	Compliant
Kimberly Monday	Active	Not Compliant
Daisy Stiner	Active	Not Compliant
Carolyn Truesdell	Retired	Compliant
System Administrator:	Michael Norby	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Houston Firefighters' Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Brett Besselman	Active	Compliant
Garry Blackmon, Sr	Active Member	Compliant
Juliet Higgins	Active Member	Compliant
Albertino "AL" May	Citizen Member	Compliant
Arif Rasheed	City Treasurer Designee	Compliant
Lisa Slagle	Citizen Member	In Progress
Stephen Whitehead	Active Member	Compliant
Ernest Wotring	Mayor's Representative	Compliant
System Administrator:	Ralph Marsh	Compliant

Houston MTA Non-Union Pension Plan		100% Compliant
Name	Trustee Type	Compliance
Sean Cagan	Active	Compliant
Thomas Jasien	Active	Compliant
Heidi Davis	Citizen	Compliant
Rey Reza	Citizen	Compliant
Debbie Sechler	Active	Compliant
Jason Simpson	Citizen	Compliant
Arthur Smiley III	Active	Compliant
Marcus Smith	Citizen	Compliant
System Administrator:	Daniel Weber	Compliant

Houston MTA Workers Union Pension Plan		100% Compliant
Name	Trustee Type	Compliance
John Bland	Retired	Compliant
Aurturo Jackson	Employer	Compliant
Horace Marves	Active	Compliant
Debbie Sechler	Employer	Compliant
System Administrator:	Daniel Weber	Compliant

Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board

Houston Municipal Employees Pension System		100% Compliant
Name	Trustee Type	Compliance
Denise Castillo-Rhodes	City Council Appointee	Compliant
Barbara Chelette	Board Appointee	Compliant
David Donnelly	Mayoral Appointee	Compliant
Edward Hamb II	Controller Appointee	Compliant
Sherry Mose	Active	Compliant
Roderick Newman	Retired	Compliant
Asha Patnaik	Active	Compliant
Adrian Patterson	City Council Appointee	Compliant
Lenard Polk	Active	Compliant
Roy Sanchez	Active	Compliant
Lonnie Vara	Retired	Compliant
System Administrator:	David Long	Compliant

Houston Police Officers' Pension System		100% Compliant
Name	Trustee Type	Compliance
Terry Bratton	Retired	Compliant
J. Larry Doss	Retired	Compliant
Kelly Dowe	City Treasurer	Compliant
George Guerrero	Active	Compliant
Michael Newsome	Active	Compliant
Dwayne Ready	Active	Compliant
Don Sanders	Mayor's Representative	Compliant
System Administrator:	John Lawson	Compliant

Irving Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Jason Darrow	Active	Compliant
Colvin Gibson	Citizen	Compliant
Tony Harvey	Active	Compliant
Micah Johnson	Active	Compliant
Jeff Litchfield	CFO	Compliant
Jill McAdams	Mayor Designee	Compliant
Cynthia Thatcher	Citizen	Compliant
System Administrator:	Edith Auston	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Irving Supplemental Benefit Plan		90% Compliant
Name	Trustee Type	Compliance
Rodney Adams	Active	Not Compliant
David Cardenas	Active/Elected	Compliant
Cecilia Castillo	Active	Compliant
Brad Duff	Active/Elected	Compliant
Jeff Litchfield	Active/Appointed	Compliant
Jill McAdams	Active	Compliant
Kuruvilla Oommen	Active	Compliant
Durenda Pena	Active	Compliant
Oscar Ward	Active/Elected	Compliant
System Administrator:	Robert Cascante-Diaz	Compliant

JPS Pension Plan - Tarrant County Hospital District		100% Compliant
Name	Trustee Type	Compliance
Sharon Clark	Active	In Progress
John Graves	Active	In Progress
John Hughson	Active	In Progress
Ted Matthews	Active	Compliant
Mike Olson	Active	Compliant
Sam Schultz	Active	Compliant
Penny Wallace	Active	Compliant
Ignacio Zamarron	Active	Compliant
System Administrator:	Lea Anne Porter	Compliant

Killeen Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Daniel Corbin	Mayor Designee	Compliant
Otis Evans	Citizen	Compliant
Scotty Jones	Active	Compliant
Jonathan Locke	CFO	Compliant
Gerald Pittman	Active	Compliant
Timothy Rabroker	Active	Compliant
Jerry Sutton	Citizen	Compliant
System Administrator:	Jennifer Hanna	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Laredo Firefighters Retirement System		100% Compliant
Name	Trustee Type	Compliance
Fernando Alarcon Jr	Citizen	Compliant
Alberto Chapa	Active	Compliant
David Esparza	Active	Compliant
Jesus Esparza	CFO	Compliant
John Hourigan	Active	In Progress
Pete Saenz	Mayor	Compliant
Louis Vaillancourt	Citizen	Compliant
System Administrator:	Jaime Jasso	Compliant

Longview Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Kolby Beckham	Active	Compliant
Angela Coen	CFO	Compliant
Jason Dodson	Citizen	Compliant
Kristen Ishihara	Mayor Designee	Compliant
Brian Jones	Active	Compliant
Maria Mills	Citizen	Compliant
Andy Parker	Active	Compliant
System Administrator:	Pam Randolph	Compliant

Lower Colorado River Authority Retirement Plan		87.5% Compliant
Name	Trustee Type	Compliance
Raymond Gill Jr	Board of Director Appointee	Compliant
Charles Johnson	Board of Director Appointee	Compliant
Dale Jurecka	Employee Representative	Compliant
Stephen Kellicker	Employee Representative	Compliant
Steve Mailten	Employee Representative	Compliant
David Smith	Chief Financial Officer	In Progress
Jim Travis	GM Executive Appointee	Compliant
System Administrator:	Laura Flores	Not Compliant

Lubbock Fire Pension Fund		100% Compliant
Name	Trustee Type	Compliance
Steve Exter	Mayor Designee	Compliant
Kevin Ivy	Active	Compliant
Blu Kostelich	CFO	Compliant
Randy Lammons	Active	Compliant
Alva Littlejohn	Citizen	Compliant
Cory McLaurin	Active	In Progress
Dub Wade	Citizen	Compliant
System Administrator:	Krista Bailey	Compliant

Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board

Lufkin Firemen's Relief & Retirement Fund		87.5% Compliant
Name	Trustee Type	Compliance
Levi Cole	Active	Compliant
Rufus Duncan	Mayor Designee	Compliant
William "Bill" Gates	Active	Compliant
Jimmy Ragsdale	Active	Compliant
John Thannisch	Citizen	Compliant
Hilary Walker	Citizen	Not Compliant
Keith Wright	CFO	Compliant
System Administrator:	Diana Russell	Compliant

Marshall Firemen's Relief & Retirement Fund		85.7% Compliant
Name	Trustee Type	Compliance
Elaine Altman	CFO	Compliant
Phillip Burnett	Active	Compliant
Joseph Dunagan	Active	Compliant
Joseph Hudson	Active	Compliant
Larry Hurta	Mayor	Not Compliant
David Scholl	Citizen	Compliant
Mike Verhalen	Citizen	Compliant
System Administrator:	Exempt	

McAllen Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Jose Castillo	Citizen	Compliant
Leonard Dalhberg	Active	Compliant
Javier Gutierrez	Active	Compliant
Abel Leal	Citizen	Compliant
Susan Lozano	CFO	Compliant
Roel "Roy" Rodriguez	Mayor Designee	Compliant
Gerald Williamson	Active	Compliant
System Administrator:	Exempt	

Midland Firemen's Relief & Retirement Fund		62.5% Compliant
Name	Trustee Type	Compliance
Seth Boles	CFO	In Progress
James Martin	Active	In Progress
Brian McGary	Active	Compliant
Alan Meyers	Citizen	Not Compliant
Jerry Morales	Mayor	Not Compliant
Van Percy	Citizen	Not Compliant
David Stacy	Active	Compliant
System Administrator:	Shera Crow	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Nacogdoches County Hospital District Retirement Plan

No Current PRB-150 On File

Northeast Medical Center Hospital Retirement Plan		100% Compliant
Name	Trustee Type	Compliance
Guy Sconzo	Retirement Committee	Compliant

System Administrator: Exempt

Northwest Texas Healthcare System Retirement Plan		100% Compliant
Name	Trustee Type	Compliance
Mitchell Normand	HR Director	Compliant

System Administrator: Michelle Bonner Compliant

Odessa Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Michael Gardner	Mayor Designee	Compliant
Terri Gayhart	Employer	In Progress
Travis Jones	Active	Compliant
James "Jay" Kirk	Citizen	Compliant
Ben Marts	Active	Compliant
Kathy McIntyre	Citizen	Compliant
Brad Reese	Active	Compliant

System Administrator: Jill Jones Compliant

Orange Firemen's Relief & Retirement Fund		87.5% Compliant
Name	Trustee Type	Compliance
John Bilbo	Active	Compliant
Jody Cowart	Active	Compliant
Sherry Jackson	Mayor Designee	Compliant
Jason Maddox	Active	Compliant
Kenneth Parsons	Citizen	Not Compliant
Walter Riedel	Citizen	Compliant
Cheryl Zeto	CFO	Compliant

System Administrator: Carol Wetherington Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Paris Firefighters' Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Gene Anderson	CFO	Compliant
Sandy Collard	Mayor Designee	Compliant
Kenny Dority	Citizen	In Progress
Jerry Horton	Active	In Progress
Thomas McMonigle	Vice Chair	In Progress
Bob Rast	Chair	In Progress
Casey Ressler	Citizen	In Progress
System Administrator:	Exempt	

Plainview Firemen's Relief & Retirement Fund		85.7% Compliant
Name	Trustee Type	Compliance
Sarianne Beversdorf	CFO	Compliant
Wendall Dunlap	Mayor	Not Compliant
Michael Frizzell	Active	Compliant
Bobby Gipson	Active	Compliant
Steve Martinez	Citizen	Compliant
Thomas Ramirez	Active	Compliant
Kevin Whisenant	Citizen	Compliant
System Administrator:	Exempt	

Plano Retirement Security Plan		83.3% Compliant
Name	Trustee Type	Compliance
Myra Conklin	Active	Compliant
Bob Gehbauer	Active	Compliant
Karen Rhodes	Active	Not Compliant
Greg Rushin	Active	Compliant
Sean Sullivan	Citizen	Compliant
System Administrator:	Fannie Layer	Compliant

Port Arthur Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Bernard Brown	Citizen	Compliant
Dall Kole	Active	In Progress
Mercer Nessour	Active	Compliant
Paul Washburn	Active	Compliant
System Administrator:	Debra Jones	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Port of Houston Authority Retirement Plan		100% Compliant
Name	Trustee Type	Compliance
Theldon Branch III	Active	Compliant
Dean Corgey	Active	Compliant
Stephen DonCarlos	Active	Compliant
Clyde Fitzgerald	Active	Compliant
John Kennedy	Active	Compliant
Janiece Longoria	Active	Compliant
Roy Mease	Active	Compliant

System Administrator:	Ramon Yi	Compliant
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Refugio County Memorial Hospital District Retirement Plan		0% Compliant
Name	Trustee Type	Compliance
Sandra Ermis	Active	Not Compliant

System Administrator:	Exempt
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Retirement Plan for Employees of Brownsville Navigation District		100% Compliant
Name	Trustee Type	Compliance
Ariel Chavez	Active	In Progress
Deborah Duke	Active	In Progress
Steve Fitzgibbons	Active	In Progress
Tony Rodriguez	Active	In Progress
Beatrice Rosenbaum	Active	In Progress

System Administrator:	Donna Eymard	In Progress
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San Angelo Firemen's Relief & Retirement Fund		87.5% Compliant
Name	Trustee Type	Compliance
Michael Anderson	Active	Compliant
Steve Cecil	Citizen	Compliant
Tina Dierschke	CFO	Compliant
Brian Dunn	Mayor Designee	Compliant
Ana Henderson	Citizen	Not Compliant
Leslie Williams	Active	Compliant
Cory Word	Active	Compliant

System Administrator:	Ron Partusch	Compliant
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**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

San Antonio Fire & Police Pension Fund		100% Compliant
Name	Trustee Type	Compliance
James Foster	Active Police	Compliant
Harry Griffin	Retired Police	Compliant
Dean Pearson	Active Fire	Compliant
Clayton Perry	City Council- Sponsor	Compliant
Larry Reed	Retired Fire	Compliant
William Shaw	City Council- Sponsor	In Progress
Jim Smith	Active Police	Compliant
JT Trevino	Active Fire	Compliant
Reed Williams	City Council, Sponsor	Compliant
System Administrator:	Warren Schott	Compliant

San Antonio Metropolitan Transit Retirement Plan		91.7% Compliant
Name	Trustee Type	Compliance
Steve Allison	Active	Compliant
Hope Andrade	Active	Compliant
Lester Bryant	Active	Compliant
Rebecca Cedillo	Active	Compliant
Robert "Bob" Comeaux	Active	Compliant
Richard Gambatta	Active	Compliant
Steven Hussain	Active	Compliant
A David Marne	Active	Compliant
Carl "Tex" Morgan	Active	Compliant
Bobby Perez	Active	Not Compliant
Patricia Rodriguez	Active	Compliant
System Administrator:	Cathy Schnitzer	Compliant

San Benito Firemen Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Boris Esparza	Active	Compliant
Adan Gonzalez	Active	Compliant
Ida Martinez	Citizen	Compliant
Belen Pena	CFO	Compliant
Rafael Perez	Active	Compliant
Caleb Silva	Citizen	Compliant
System Administrator:	Ana Tinsley	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Sweetwater Firemen's Relief & Retirement Fund		87.5% Compliant
Name	Trustee Type	Compliance
Chris Kiser	Citizen	Not Compliant
Grant Madden	Mayor Designee	Compliant
Brad Payne	Active	Compliant
Preston Peacock	Active	Compliant
Russell Reeves	Active	Compliant
Gail Rose	Citizen	Compliant
Patty Torres	CFO	Compliant
System Administrator:	Debra Jones	Compliant

Teacher Retirement System of Texas		100% Compliant
Name	Trustee Type	Compliance
Joe Colonna	Appointed by the Governor	Compliant
	Nominated by the State Board of	
David Corpus	Education	Compliant
John Elliott	Appointed by the Governor	Compliant
Dr. Greg Gibson	Active Member	Compliant
Jarvis Hollingsworth	Direct Appointee	Compliant
	Nominated by the State Board of	
Christopher Moss	Education	Compliant
James Nance	Retiree	Compliant
Dolores Ramirez	Active Public Education Position	Compliant
Nanette Sissney	Active Public Education Position	Compliant
System Administrator:	Brian Guthrie	Compliant

Temple Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Bryan Daniel	CFO	Compliant
Jason Haltom	Active	Compliant
Scott Hoelscher	Active	Compliant
Patrick Kelly	Citizen	Compliant
Daniel Meyer	Active	Compliant
Randy Ramsey	Mayor Designee	Compliant
Blake Stapp	Citizen	Compliant
System Administrator:	Jake Herndon	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Texarkana Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
David Cook	Citizen	Compliant
Scott Daniel	Active	Compliant
Paul Lauck	Active	Compliant
Tim Martin	Active	Compliant
Kristin Peebles	CFO	Compliant
Clay Roberts	Citizen	Compliant
Rick Wisdom	Mayor Designee	Compliant
System Administrator:	Debra Jones	Compliant

Texas City Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Matt Doyle	Mayor	Compliant
Jennifer Price	CFO	Compliant
Brian Ringleben	Citizen	Compliant
Jesse Rubio	Active	Compliant
Michael Rusnak	Active	Compliant
Bob Senter	Citizen	Compliant
Joe Tumbleson	Active	Compliant
System Administrator:	Exempt	

Texas County & District Retirement System		100% Compliant
Name	Trustee Type	Compliance
Chuck Cazalas	Retired	Compliant
Chris Davis	Active	Compliant
Robert Eckels	Retired	Compliant
Mary Garcia	Active	Compliant
Deborah Hunt	Active	Compliant
Bridget McDowell	Active	Compliant
Bill Metzger	Active	Compliant
Kristeen Roe	Active	Compliant
Robert "Bob" Willis	Active	Compliant
System Administrator:	Amy Bishop	Compliant

Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board

Texas Emergency Services Retirement System		100% Compliant
Name	Trustee Type	Compliance
Andrew "Taylor" Allen	Investment Professional	Compliant
Courtney Bechtol	Investment Advisor	Compliant
Dan Key	Retired	Compliant
Ronald Larson	Secretary	Compliant
Virginia "Jenny" Moore	Active	Compliant
Pilar Rodriguez	Trustee	Compliant
Don Shipman	Actuary Professional	Compliant
Frank Torres	Active	Compliant
Stephen Williams	City Manager	Compliant
System Administrator:	Kevin Deiters	Compliant

Texas Municipal Retirement System		100% Compliant
Name	Trustee Type	Compliance
Jesus Garza	Active	In Progress
Jim Jeffers	Active	Compliant
David Landis	Active	Compliant
Julie Oakley	Active	Compliant
Jim Parrish	Active	Compliant
Bill Phililbert	Active	Compliant
System Administrator:	David Gavia	Compliant

The Woodlands Firefighters' Retirement System		100% Compliant
Name	Trustee Type	Compliance
Doug Adams	Active	Compliant
Anthony Fasone	Citizen	Compliant
Jeff Johnston	Active	Compliant
Andrew Pitre	Citizen	Compliant
Erik Secrest	Active	Compliant
Monique Sharp	Mayor Designee	Compliant
Susan Welbes	CFO	Compliant
System Administrator:	Jennifer Hanna	Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

Travis County ESD #6 Firefighter's Relief & Retirement Fund		75% Compliant
Name	Trustee Type	Compliance
Paula Barr	Mayor Designee	Not Compliant
Jim DeWitt	CFO	Compliant
Scott Falltrick	Active	Compliant
Brad King	Active	Compliant
Graham Taylor	Active	Not Compliant
Jeff Timlin	Citizen	Compliant
Rick White	Citizen	Compliant
System Administrator:	Ana Tinsley	Compliant

Tyler Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Leesa Hedge	Citizen	Compliant
Steve Kean	Mayor Designee	Compliant
Darren McCawley	Active	Compliant
James Mullicane	Active	Compliant
Steve Roosth	Citizen	Compliant
Keidric Trimble	CFO	Compliant
Kenny Vent	Active	Compliant
System Administrator:	Paula Henderson	Compliant

University Health System Pension Plan		44.4% Compliant
Name	Trustee Type	Compliance
Robert Engberg	Board of Manager Volunteer	Not Compliant
Kevin Harris	Citizen	Not Compliant
Christopher Hurley	Active	Compliant
Steven Klaffke	Citizen	Compliant
Carlos Resendez	Citizen	Not Compliant
Theresa Scepanski	Active	Compliant
Ira Smith	Board of Manager Volunteer	Compliant
David Wallace	Citizen	Not Compliant
System Administrator:	George Hernandez Jr	Not Compliant

**Public Retirement System Compliance With Minimum Educational Training Requirements
Texas Pension Review Board**

University Park Firemen's Relief & Retirement Fund		16.7% Compliant
Name	Trustee Type	Compliance
Ashley Cook	Citizen	Not Compliant
Matt Kelton	Active	Not Compliant
Dustin Lewis	Active	Compliant
Tom Tvardzik	CFO	Not Compliant
Mike Williams	Citizen	Not Compliant
Civic Yip	Mayor Designee	Not Compliant

System Administrator: Exempt

Waxahachie Firemen's Relief & Retirement Fund		83.3% Compliant
Name	Trustee Type	Compliance
Marcus Brown	Active	Compliant
Matt Dorsey	Active	Compliant
Charles Harris	CFO	Not Compliant
David Hill	Mayor Designee	Compliant
Gary Myers	Active	Compliant
John Tillery	Citizen	Compliant

System Administrator: Exempt

Weslaco Firemen's Relief & Retirement Fund		100% Compliant
Name	Trustee Type	Compliance
Maria Barrera	CFO	Compliant
David Cuellar	Active	Compliant
Jaime Hernandez	Active	Compliant
Jim Hiebert	Citizen	Compliant
David Suarez	Mayor	Compliant
Florentino Vela	Active	Compliant
Charles Warren	Citizen	Compliant

System Administrator: Debra Jones Compliant

Wichita Falls Firemen's Relief & Retirement Fund		87.5% Compliant
Name	Trustee Type	Compliance
Rowdy Elledge	Active	Compliant
Pat Halverson	CFO	Compliant
John Luig	Citizen	Compliant
Tracey Petersen	Active	Compliant
Michelle Riggins	Citizen	Compliant
Stephen Santellana	Mayor Designee	Not Compliant
Ray Wood	Active	Compliant

System Administrator: James Duncan Compliant

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX F – 85TH REGULAR LEGISLATIVE SESSION REPORT

85th Regular Legislative Session
Pension Legislation Passed

Local Systems

Dallas Police and Fire Pension System

HB 3158 – Flynn, West

The bill was signed by the Governor on May 31, 2017. Article 1 of the bill becomes effective September 1, 2017, unless the board of trustees of the system violates the DROP distribution prohibitions section, then Article 1 has no effect.

HB 3158 amends and adds sections to Title 109, Revised Civil Statutes Article 6243a-1 to increase both employee and City contributions, modify future benefit accruals, provide a retroactive multiplier increase for certain members, modify Deferred Retirement Option Plan (DROP) participation and cost of living adjustment, make changes to the board's composition and governance structure, and require the creation of an investment advisory committee.

Board Composition

The bill changes the board composition by establishing new requirements for trustee positions. Six of the board trustees will be selected by the mayor in consultation with city council, three will be selected by the pension system through a nominations committee, and two will be current or former police officers or fire fighters nominated and elected by members of the pension system under rules adopted by the board. The board may not take any action until at least ten initial trustees have been appointed.

Board Governance

The bill clarifies that the executive director is a fiduciary of the pension system if acting in their own discretion, whereas currently the statute states that the "administrator" of the plan is *not* a fiduciary. If the executive director is acting at the discretion of the board and not exercising their own discretion, the executive director does not owe a fiduciary duty.

- Two-thirds vote: The bill requires at least a two-thirds vote of the full board (8 out of 11 trustees) for creating an alternative benefit plan, reducing the city contribution rate, increasing the member contribution rate, lowering benefits or otherwise reducing amounts payable to, or accrued for, the benefit of any member, or any rules requiring the equitable return of funds paid to or credited to the benefit of a member or pensioner.

At least twice each year, the board shall have a meeting to receive public input regarding the pension system and to inform the public about the health and performance of the pension

system. The PRB is entitled to all documents and other information provided by DPFPS to the public, which would then be subject to an independent review by the PRB. Any employee or other agent acting on behalf of DPFPS or the city must certify to the PRB that any information provided is accurate and based on realistic assumptions.

The bill also requires the board to adopt a code of ethics, which must be filed with the PRB upon adoption or amendment. The bill also requires the board members to take pension-related training from a manual created by the DPFPS executive director.

City and Member Contributions

- City - The bill increases City contributions from 27.5% to 34.5%. The contribution policy for the City is a fixed percentage of pay plus a flat dollar contribution per year through the end of 2024. However, the fixed percentage contribution will be subject to a minimum dollar floor in each year through 2024.
- Any change to the contributions required to be made to the pension system by the City may only be made by the legislature, by a majority vote of the voters of the City, or by written agreement with at least a 2/3 vote of all trustees on the board, and the City, provided that a change may not increase the period required to amortize the UAAL of the fund. Any reduction in City contributions requires the approval of at least a 2/3 vote of all trustees of the board.
- Member – The bill increases employee contributions from 8.5% to 13.5%. Any increase in member contribution rate requires approval of at least 2/3 vote of all the trustees on the board.

Actuarial Analysis and Legislative Recommendations

Prior to July 1, 2024, the PRB will select an actuary without conflicts to be hired by the DPFPS board to perform an analysis based on the January 1, 2024 actuarial valuation prepared by the pension system. The analysis will include a conclusion by the actuary on whether the plan meets the current PRB pension funding guidelines, and the actuary will recommend changes to benefits, member or city contributions to be submitted to the board by October 1, 2024.

The DPFPS board will adopt a plan that complies with funding and amortization period requirements applicable to the pension system under Chapter 802 of the Texas Government Code and takes into consideration the independent actuary's recommendations.

The DPFPS board will provide a copy of the analysis and a summary of any rules adopted by the DPFPS board under this section to the PRB. Not later than December 1, 2024, the PRB will submit a report to the legislature regarding actions taken under this section. The report must include a copy of the analysis prepared by the independent actuary and a summary of rules adopted by the DPFPS board under this section. The legislature must approve the changes for them to become part of the statute.

Benefit Changes

The bill makes several changes to member benefits, including (for Normal Service Retirement):

- Changing the multiplier for all members to 2.5% for future service;
- Increasing the normal retirement age to 58 years for all members, and decreasing the vesting requirement to 5 years from 10 years for Tier 3 members;
- Lowering the maximum retirement annuity from 96% to 90% of final average salary; and
- Changing the calculation of final average salary prospectively from the highest 36 month period for Tiers 1 and 2 to highest 60 month period for service after September 1, 2017.

For a comprehensive list of changes, please see **Appendix A**.

Rulemaking to Change Benefits

The DPFPS board shall conduct an evaluation to study the impact on the pension system of establishing one or more alternative benefit plans, including a defined contribution plan or a hybrid plan for newly hired employees and for members who voluntarily elect to transfer to an alternative benefit plan. This evaluation must be completed by January 1, 2018.

Based on the evaluation, if the DPFPS board considers adopting a rule to establish any plan, it would be subject to the following:

- may not cause the amortization period of the system to exceed 35 years; and
- require the approval of 2/3 vote of all trustees on the board.

Additionally, any rule considered to increase benefits (obtained with 2/3 vote of all board members) can only be made if the increase will not cause the amortization period of the UAAL to exceed 25 years, after taking into account the impact of the increase. Any rules under this section must be reviewed by the PRB and the PRB must find that the implementation of the rule complies with the amortization periods prescribed by the specific subdivisions of the section.

Investment Advisory Committee

The bill requires the board to establish an investment advisory committee. The committee will be composed of a majority of outside investment professionals, as well as sitting board members. The committee will review investment-related matters and make recommendations to the board.

Board Approval of Certain Alternative Investments

Any person with delegated authority to invest or reinvest pension system assets under this article may not invest pension system assets in a single alternative investment unless the DPFPS board votes to approve the investment by at least a two-thirds vote. The bill defines "alternative investment" as an investment in an asset other than a traditional asset. The term includes an

investment in private equity funds, private real estate transactions, hedge funds, and infrastructure.

Equitable Adjustments to Benefits

The bill allows the DPFPS board by at least a 2/3 vote of all trustees to consider and adopt rules requiring the equitable return of funds paid or credited to the benefit of a member or a pensioner before 9/1/17, including the return of excessive interest credited to a member's DROP account and excessive adjustments made as disability or COLA benefits. The bill also outlines the adjudication process for any judicial challenges to the equitable return of funds as required by the board.

DROP Payment Options

A member who terminated service on or before 9/1/2017, or who terminates from active service shall have their DROP account annuitized over their life expectancy as of the date of the annuitization using mortality tables recommended by the system's actuary. Upon election by the member, the account will be payable either monthly or annually.

The DPFPS board may adopt a shorter period for annuitizing DROP balances under this section if the system's actuary determines doing so will not cause the system's amortization period to exceed 25 years. The annuitization of an account under this section must reflect accrual of interest on the amount in the DROP account as of 9/1/17. The interest rate applied must be a rate as reasonably equivalent as practicable to the interest rate on a note issued by the U.S. Department of the Treasury or other federal treasury note with a duration that is reasonably comparable to the annuitization period applied to the account, as determined by the DPFPS board.

Prohibition on Certain Distributions

Distributions from DROP accounts are immediately prohibited, except in certain cases including hardships, those in compliance with court order, and minimum annual distributions under current DPFPS board policy are allowed to continue until August 31, 2017. If any lump sums are paid in violation of the bill prior to August 31, 2017, changes made under the legislation become null and void.

The board of trustees shall provide data or other information requested to the PRB in order for the PRB to determine whether DPFPS has violated the prohibition of certain distributions provision by August 31, 2017. If the PRB determines that the system is in violation of the statute, the PRB shall, before August 31, 2017, notify the board of trustees of the system and the mayor and city council of its determination under this section and publish notice of its determination on the PRB website and a notice of its determination under this section in the *Texas Register*.

Alternative Benefit Plan

The bill adds Section 810.002 to the Government Code to allow the City to establish an alternative benefit plan by ordinance and determine the benefits, funding source and amount, and administration of the alternative benefit plan. Also, the bill allows the municipality to require an employee first hired by the municipality on or after the date the alternative benefit plan is implemented to participate in the alternative benefit plan instead of participating in DFPs. Employee and employer contributions shall be determined by the City.

An alternative benefit plan may only be established by the City if the pension system's actuary determines that its implementation would allow the pension system to continue to comply with funding and amortization period requirements of Chapter 802 and if the PRB conducts a review of and validates this determination.

Houston Systems – Houston Firefighters' Relief & Retirement Fund (HFRRF), Houston Police Officers' Pension System (HPOPS), Houston Municipal Employees Pension System (HMEPS)

SB 2190 – Huffman/Flynn

The bill was signed by the Governor on May 31, 2017 and became effective July 1, 2017.

SB 2190 amends and adds sections to Title 109, Revised Civil Statutes Articles 6243e.2(1), 6243g-4, and 6243h to reduce benefits, increase employee contributions, outline funding policies, codify certain actuarial assumptions and methods for purposes of valuing benefits, and detail an approach to making modifications to the assumptions, methods and benefits under certain economic scenarios with the intent of minimizing the volatility of future contributions requirements for the affected retirement systems. The bill also requires the city to make contributions as outlined by the risk sharing sections.

Board Composition/Governance

- HPOPS – The bill requires candidates for active or retired board member positions to receive the majority vote for that position, otherwise a runoff election shall be held.
- HMEPS trustees are required to complete minimum educational training requirements established by the PRB, and the bill allows the appointing entity to remove an appointed trustee who does not complete the required training. Also, a member may be removed if he or she attends less than 50% of board meetings.

Benefit Changes

The bill increases employee contributions and introduces a corridor mechanism to determine employer contributions for each fiscal year. The bill also makes substantive changes to the three systems' benefit formulas, DROP programs, and death and disability benefits.

For more detail on benefit changes, please refer to **Appendix B1-B3**.

Corridor Midpoint

The bill establishes a unique funding policy that establishes a "target" contribution rate (or corridor midpoint) for the City, develops a minimum and maximum corridor around the City's target contribution rate (equal to +/- 5% of the projected midpoint), and defines steps that must be taken should the annual calculated contribution move outside this corridor. Generally, for all three retirement systems, the retirement system and the city must jointly determine the expected contribution requirements for the 31-year period beginning with the fiscal year starting July 1, 2017, consisting of the expected normal cost plus a closed 30-year amortization of the UAAL as it exists on June 30, 2016.

- For HFRRF and HPOPS, the sum of the expected normal cost, amortization payment and a provision for administrative expenses for each of the next 31 years becomes the "target" rate or corridor midpoint.
- For HMEPS, the corridor midpoint is the sum of the normal cost and a provision for administrative expenses. The 30-year amortization schedule of the unfunded liability as of June 30, 2016, known as the legacy liability, is established and treated separately from the corridor for HMEPS.

Additionally, in future years, a new base would be established to amortize gains and losses. The losses are amortized over a closed 30-year period, while the gains are amortized over the same period as the largest outstanding liability loss base, the gain and associated loss base are treated as a single base for any future actions.

Once the corridor is established in the initial valuation, it will not change.

For more detail on the corridor mechanism, please refer to **Appendix C1 and C2**.

Preparation of the Risk Sharing Valuation Study (RSVS)

The bill requires the systems' actuary and City actuary to separately prepare a draft of an RSVS, based on the systems' respective actuarial data. The initial RSVS must use the following assumptions set in statute to arrive at an estimated city contribution rate:

- Assumed rate of return (subject to adjustment) may not exceed 7% per year;
- Ultimate entry age normal actuarial cost method;
- Assets marked-to-market method applied as of June 30, 2016 (after initial RSVS, this changes to use 5-year smoothing method over a five-year period applied prospectively beginning on the year 2017 effective date);
- Closed 30-year amortization of legacy liability;
- For HMEPS, the City contribution rate is calculated without inclusion of the legacy liability
- Payroll growth rate assumption of 2.75%, not to exceed 3% in future RSVS

The RSVS must be included within an actuarial valuation. Once completed, each actuary shall exchange their draft RSVS. If the difference between the two estimated city contribution rates

falls at or below 2%, the system's RSVS and estimated city contribution rate will be used to determine the contribution rate for the fiscal year. If the difference is greater than 2%, the actuaries must reconcile the rates until the difference falls below 2%. If it cannot be reconciled, the arithmetic average will be used.

PRB Review of RSVS

The bill requires the systems and City to jointly submit a copy of the RSVS to the PRB for a determination that the pension systems and City are in compliance with the articles. The PRB shall notify the governor, lieutenant governor, the speaker of the house of representatives, and the legislative committees having principal jurisdiction over legislation governing public retirement systems if the PRB determines the system or city is not in compliance with the applicable sections.

City Approval of POBs

The bill amends Chapter 107, Local Government Code to require voter approval for POBs issued to fund the Houston pension systems.

Delivery of POBs

The bill allows HFRRF, HPOPS and HMEPS to rescind, prospectively, any or all benefit changes made effective under the bill, and allow HPOPS and HMEPS to reestablish the deadline of the delivery of the POB proceeds, if the city fails to deliver the proceeds of pension obligation bonds before March 31, 2018. If HPOPS and HMEPS do not receive the proceeds from the POBs by December 31, 2017, the initial RSVS shall be reprepared without assuming delivery of POB proceeds.

Additional Reporting Requirements

The bill adds reporting requirements for the three systems, including the requirement to conduct actuarial experience studies at least once every four years with the first experience study for HFRRF no later than September 30, 2020, for HPOPS no later than September 30, 2022 and for HMEPS published no later than September 30, 2021.

The systems must also contract with an investment consultant to perform an audit on investments at least once every three years.

Alternative Retirement Plans

The bill allows the three retirement systems' boards and the City to enter into a written agreement to offer an alternative retirement plan or plans, including a cash balance retirement plan or plans, if both parties consider it appropriate.

The bill also requires the respective boards to close the existing plan to new entrants and establish a separate cash balance plan for new hires under the following circumstances:

1. For HFRRF and HPOPS, if the plan's ratio of assets to liabilities falls below 65% at any time after June 30, 2021, and
2. For HMEPS, if the plan's ratio of assets to liabilities falls below 60% at any time after June 30, 2027.

The requirement to establish a separate cash balance plan for new hires will not take effect for HMEPS if they do not receive the required POB proceeds. The requirement to establish a separate cash balance plan for new hires will not take effect for HPOPS if they do not receive the required POB proceeds.

University Park Firemen's Relief & Retirement System

HB 3056 – Meyer/Huffines

The bill was signed by the Governor on June 15, 2107, and becomes effective September 1, 2017.

The bill adds Section 31A to the Texas Local Fire Fighters Relief and Retirement Act (TLFFRA) to allow the City of University Park to adopt ordinances that would concurrently:

- a) exclude fire fighters hired on or after the "closure effective date" under the bill from participation in the University Park Firemen's Relief and Retirement Fund, and
- b) allow those excluded employees to participate in TMRS.

Current employees of the City's fire department who are members of the Retirement Fund would continue to participate and would retire and receive benefits under the Fund.

The bill requires that within 60 days following the date the City adopts the ordinances, the ordinances must be approved, via election, by a majority of the participating members of the Retirement Fund. As soon as practicable following approval, the board of the Retirement Fund must amend the plan documents and the City must provide a notice of the election results and copies of the amended plan documents to TMRS. The "closure effective date" is the first day of the second month after the month TMRS receives the notice.

All actions required by the bill must occur before October 1, 2018; otherwise, any ordinances adopted by the City to enact such changes expire on October 1, 2018. The bill also amends the definition of "Department" in the Texas Government Code Section 851.001(7) of the TMRS Act to include employees of the City excluded from the Retirement Fund and allowed in TMRS in accordance with the amended Section 31A of TLFFRA.

Statewide Systems

HB 89 – King, Phil/Creighton

The bill was signed by the Governor on May 2, 2017; and becomes effective September 1, 2017.

HB 89 adds Chapter 808 to the Texas Government Code to prohibit certain state governmental entities from investing in companies engaged in a boycott of a person or entity doing business in Israel or in an Israeli-controlled territory. State public retirement systems that qualify under the bill include the Employees Retirement System, Teacher Retirement System of Texas, the Texas Municipal Retirement System, Texas County and District Retirement System, and the Texas Emergency Services Retirement System. The provisions of the bill could potentially impact the investment decisions made by these governmental entities, and could cause the entities to sell certain current investment holdings.

SB 253 – Taylor, Van/Davis, Sarah

The bill was signed by the Governor and became effective May 23, 2017.

The bill transfers and consolidates the investment prohibitions and divestment provisions of Government Code Chapters 806 and 807 into a new Chapter 2270 of the Government Code. The bill also adds provisions to prohibit certain governmental entities defined as investing entities under the bill from investing in companies with business ties to designated foreign terrorist organizations. State public retirement systems that qualify under the bill include the Employees Retirement System of Texas and the Teacher Retirement System of Texas. The provisions of the bill could potentially impact the investment decisions made by these investing entities, and could cause the entities to sell certain current investment holdings.

Additionally, the bill transfers the duties of the PRB to prepare, maintain, and administer the Texas Prohibition on Investment in Iran Scrutinized Companies List to the Office of the Comptroller. The bill repeals Chapter 807, Government Code.

SB 500 – Taylor, Van/Geren

The bill was signed by the Governor and became effective immediately June 6, 2017.

The bill adds Section 810.002 of the Texas Government Code, which makes certain elected officials who are convicted of a qualified felony related to the member's performance of public service, ineligible for retirement annuity. A qualifying felony is defined as any felony involving bribery; embezzlement, extortion, or other theft of public money; perjury; coercion of public servant or voter; tampering with governmental record; misuse of official information; conspiracy or the attempt to commit any of these crimes; or abuse of official capacity. The provisions of this bill apply to qualified offenses committed on or after the effective date of the bill.

Employees Retirement System of Texas (ERS)

SB 301 – Watson/Flynn

The bill was signed by the Governor on June 9, 2017, and becomes effective September 1, 2017.

SB 301 is the Sunset bill for the Employees Retirement System of Texas (ERS). The legislation focuses primarily on strengthening board oversight of alternative investments, improving transparency of alternative investments, and ensuring the Group Benefit Program is managed effectively to meet the needs of members and the state. The bill requires the ERS board of trustees to approve any individual alternative investment over \$100 million and allows the board of trustees to discuss the investment in closed session or by teleconference. A vote on the alternative investment, however, must be taken in public.

The bill also directs the agency to develop a consistent method to collect or calculate profit-sharing data for alternative investments, which are defined in the bill as a private equity fund, private real estate fund, hedge fund, infrastructure fund, or another asset as defined by rule by the board of trustees. ERS will be required to conduct its experience study and adopt actuarial assumptions once every four years, instead of its previous requirement of every five years.

The bill improves the insurance appeal process for state employees and other ERS members by allowing members to participate more directly in the appeal process and providing a precedent manual to help guide agency appeal decisions. In addition, the bill applies Sunset's standard across-the-board good government recommendations and sets the next Sunset review for ERS at 2029.

Teacher Retirement System of Texas (TRS)

SB 1663 – Huffman/Flynn

The bill was signed by the Governor June 15, 2017. Chapter 825.212, as amended by the bill, became effective immediately. The remainder of the bill becomes effective September 1, 2017.

The bill amends the Insurance Code and various sections of the Government Code to make clarifications and updates to the Teacher Retirement System of Texas (TRS) statute. The bill clarifies that certain student employment is not eligible for TRS service credit. The bill also makes administrative changes, which include the protection of key employees' personal information from public disclosure and prohibiting TRS employees from receiving "double" benefits while working outside the country.

The bill provides that a retiree working during the first 12 months following retirement as an independent contractor, volunteer, or who waives compensation is considered an employee of the public school or higher education employer. The bill also allows the TRS board to go into executive session to discuss particular investment strategies; allows TRS to charge late fees not to exceed \$1,000 for each business day and \$25,000 per reporting period if employer reports are filed after statutory deadlines; and allows TRS to send information to members electronically. The bill removes auxiliary personnel positions from the TRS Retiree Advisory Committee and removes the prohibition on members who do not complete a purchase of

service credit using an installment payment method from using the method for the next three years.

SB 1664 – Huffman/Flynn

The bill was signed by the Governor on June 15, 2017, and becomes effective September 1, 2017.

The bill amends the Education Code and Government Code to make clarifications, updates and corrections to the TRS statute. The bill clarifies sections in the Government Code to correctly cite the IRS Code, and updates TRS plan terms to allow rollover by TRS to a 401(a) plan. The bill makes statutory corrections to include the removal of a previous error that included a requirement for school districts to provide health care comparability reports to TRS. The bill also makes administrative changes, including granting additional time for TRS members to purchase service credit at retirement, as well as granting members additional time for purchasing sick or personal leave credit.

SB 1665 – Huffman/Flynn

The bill was signed by the Governor and became effective immediately on June 15, 2017.

SB 1665 amends the Government Code to include in the definition of "securities" any derivative instrument, and any other instrument commonly used by institutional investors to manage institutional investment portfolios.

The bill allows the board to delegate discretionary investment authority to external managers to invest and not manage more than 30 percent of the total assets held in trust by the system.

The bill repeals the temporary provision authorizing the board to buy and sell certain investment instruments for the purpose of efficiently managing and reducing the risk of the overall investment portfolio. The bill also extends the exemption of a contract under certain provisions relating to the investment of TRS assets from statutory provisions relating to the resolution of certain contract claims against the state to all contracts under provisions relating to the investment of TRS assets.

Optional Retirement Program (ORP)

SB 1954 – Hughes/Lozano

The bill was signed by the Governor on May 26, 2017 and becomes effective September 1, 2017.

SB 1954 amends the Government Code to allow a person more time to decide to participate in ORP if they are notified later than the day they become eligible.

The bill adds a section to the Government Code to establish procedures for correcting reporting errors. The bill states that an employer submits a member contribution to TRS on behalf of a person in error if the person previously elected to participate in the optional TRS retirement program, participated in the program for at least one year, and is or was employed by a public institution of higher education in a position normally covered by TRS and is or was at the time of that employment not eligible for membership in TRS. The bill requires a person's participation in ORP to be immediately restored if an employer commits such an error and the person on whose behalf the member contribution is erroneously made is a participant in the optional retirement program and requires funds to be deposited in the person's participant account in the program or otherwise remitted to the person in accordance with the bill's provisions and as soon as practicable.

Retirement Systems – General

SB 1735 – Hughes/Springer

The bill became effective June 12, 2017.

SB 1735 is a repeal of several pension-related statutes that no longer apply to any existing persons, programs, or funds. The bill amends current law relating to the repeal of certain obsolete laws governing state pensions and other similar benefits.

Appendix A – HB 3158 Summary of Plan Changes for DPFPS

Normal Retirement Benefit

Eligibility

Current	Tier 3: Age 55 and 10 Years of Service
HB 3158	Tier 3: Age 58 and 5 Years of Service

Amount

Current	Tiers 1 & 2: 3.0% x Years of Service x Final Average Salary, no more than 96% x Final Average Salary or less than \$2,200 per month (minimum is prorated for periods of service less than 20) Tier 3: [Years of Service (up to 20) x 2.0% + Years of Service (>20, <=25) x 2.5% + Years of Service (>25) x 3.0%] x Final Average Salary, not less than \$110 x Years of Service (up to 20)
HB3158	Tiers 1 & 2: [3.0% x Years of Service (prior to September 1, 2017) + Percent Multiplier (in table below) x Years of Service (after September 1, 2017)] x Final Average Salary, max is the greater of i. 90% or ii. the vested accrued benefit as of August 31, 2017

<u>Age at Retirement</u>	<u>Percent Multiplier</u>
57	2.40%
56	2.30%
55	2.20%
54	2.10%
53 and younger	2.00%

Tier 3: Years of Service x 2.5% x Final Average Salary, max 90%

Final Average Salary

Current	Tiers 1 & 2: Highest 36 month period
HB 3158	Tiers 1 & 2: Highest 36 month period for service prior to September 1, 2017 and highest 60 month period for service after September 1, 2017

Early Retirement Benefit

Eligibility

Current	Tiers 1 & 2: Age 45 and 5 Years of Service or 20 Years of Service Tier 3: N/A
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Pension Review Board

August 11, 2017

- HB 3158 Tiers 1 & 2: Age 45 and 5 Years of Service, if 45 years or older as of September 1, 2017, age 53 and 5 Years of Service otherwise, or 20 Years of Service
- Tier 3: Age 53 and 5 Years of Service or 20 Years of Service

Amount

- Current Tiers 1 & 2 with 20 Years of Service – replace 3% multiplier with the following based on age at retirement:

Age at

<u>Retirement</u>	<u>Multiplier</u>
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48 & 49	2.75%
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47	2.50%
----	-------

46	2.25%
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45 or younger	2.00%
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Tiers 1 & 2 with less than 20 Years of Service: Reduction equal to 2/3 of 1% per month retirement date precedes age 50.

- HB 3158 Tiers 1 & 2 with 20 Years of Service accrued as of September 1, 2017 – replace 3% multiplier with the following based on age at retirement:

Age at

<u>Retirement</u>	<u>Multiplier</u>
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48 & 49	2.75%
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47	2.50%
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46	2.25%
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45 and younger	2.00%
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All others with 20 Years of Service – replace 2.5% multiplier with the following based on age at retirement:

Age at

<u>Retirement</u>	<u>Multiplier</u>
-------------------	-------------------

57	2.40%
----	-------

56	2.30%
----	-------

55	2.20%
----	-------

54	2.10%
----	-------

53 and younger	2.00%
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With less than 20 Years of Service: Reduction equal to 2/3 of 1% per month retirement date precedes age 45 if 45 years or older as of September 1, 2017, age 53 otherwise.

Unreduced at any retirement age if a member's pension is equal to 90% of Final Average Salary.

Supplemental Retirement Benefit

Current	The greater of \$75 per month or 3% of their Normal or Early Retirement Benefit, payable beginning at age 55
HB 3158	Payable only to those receiving the supplement as of September 1, 2017

Vesting

Current	Tier 3: 10 Year Cliff
HB 3158	Tier 3: 5 Year Cliff

Cost of Living Adjustment

Current	Tier 1: 4.0% simple
HB 3158	Ad-hoc, which may only be paid if the plan is at least 70% funded after taking into account the COLA equal to a simple crediting rate on October 1 equal to 100% of the average annual rate of actual investment return for the five-year period ending on the preceding December 31 minus 5%, and not to exceed 4%, beginning at the earlier of age 62 or 3 years after retirement.

Deferred Retirement Option Plan

Active

Current	Interest credited is 6% effective October 1, 2016 dropping to 5% effective October 1, 2017 and variable based on the plans funded ratio thereafter.
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<u>Funded Ratio</u>	<u>Crediting Rate</u>
>=95%	7.0%
90%-94%	6.5%
85%-89%	6.0%
65%-84%	5.0%
60%-64%	4.0%
55%-59%	3.0%
<55%	0.0%

COLA credited to account

No maximum participation period

May elect a lump sum distribution or leave up to 100% of account balance in plan at separation of service and continue to accrue interest credit

Pension Review Board

August 11, 2017

HB 3158 No interest credited to account
No COLA credited to account
10 year maximum participation period
DROP balance distributed over the life expectancy at separation of service,
DROP account balance as of September 1, 2017 will be annuitized using a rate on a United States Treasury or other federal treasury note with a reasonable duration, as determined by the Board.

Contributions

Employee

Current 8.5% for non-DROP active participants & 4.0% for DROP active participants
HB 3158 13.5% as of the effective date

Employer

Current 27.5% of total pay
HB 3158 A + B, as described below

A. 34.5% of computation pay

The employer contribution above will be no less than

- i. \$5,173,000 for each of the pay periods beginning in 2017;
- ii. \$5,344,000 for each of the pay periods beginning in 2018;
- iii. \$5,571,000 for each of the pay periods beginning in 2019;
- iv. \$5,724,000 for each of the pay periods beginning in 2020;
- v. \$5,882,000 for each of the pay periods beginning in 2021;
- vi. \$6,043,000 for each of the pay periods beginning in 2022;
- vii. \$5,812,000 for each of the pay periods beginning in 2023;
- viii. \$6,024,000 for each of the pay periods beginning in 2024; and
- ix. \$0 thereafter

B. 1/26th of \$13 million per pay period for each pay period beginning after September 1, 2017 and before December 31, 2024

The contributions outlined above will remain in force as long as the system has a UAAL. If the plan is fully funded, contributions would be split equally between the city and members.

Appendix B1

SB 2190

Summary of Plan Benefit Changes for HFRRF

Employee Contributions

Old	9.00%
SB 2190	10.50%

Final Average Salary

Old	Highest 78 pay periods of salary
SB 2190	Hired before the effective date: Highest 78 pay periods of salary, excluding overtime for salary paid after the effective date Hired on or after the effective date: Final 78 pay periods of salary, excluding overtime

Retirement Benefit

Eligibility

Old	20 Years of Service
SB 2190	Hired before effective date: 20 Years of Service Hired on or after effective date: Rule of 70

Amount

Old	Final Average Salary x [Years of Service (20 max) x 2.5% + Years of Service (>20) x 3.0%; 80% max]
SB 2190	Hired before effective date: Member's accrued benefit as of the effective date + Final Average Salary x [Years of Service after effective date (20 max) x 2.75% per year + Years of Service after effective date (>20) x 2.0%] Hired on or after effective date: Final Average Salary x [Years of Service (20 max) x 2.25% + Years of Service (>20) x 2.0%; 80% max]

Termination Benefit

Old	Terminate with at least 10 years of service but less than 20 years of service, choice of: Refund of employee contributions with 5% interest; or Final Average Salary x 1.7% x Years of Service, payable at age 50
SB 2190	Members hired before the effective date will not receive interest on employee contributions made after the effective date Members hired after the effective date receive a refund of employee contributions without interest only

Cost of Living Adjustment (COLA)

Old 3.0% compounded, beginning at age 48

SB 2190 Crediting rate of 100% of the 5 year smoothed return minus 4.75%, not less than 0% or greater than 4%, beginning at age 55 with a 3 year freeze on COLAs for members under 70 years of age.

Deferred Retirement Option Plan (DROP)

Old Eligibility is 20 Years of Service

Interest credited is 100% of the 5 year average investment return, not less than 5.0% or greater than 10.0%

COLA credited to account

Member contributions credited to account for 10 years

Participation limited to 13 years

Retirement annuity is increased upon exit by 2% per year of DROP participation up to a maximum of 20%

SB 2190 Eligibility is 20 Years of Service and must be hired prior to effective date

Interest credited is 65% of the 5 year compounded average investment return, no less than 2.5%

COLA and member contributions not credited to account after effective date

Member's unused leave pay will be contributed and credited to member's DROP account

Participation limited to 13 years

Retirement annuity is increased upon exit by 2% per year of DROP participation up to a maximum of 20% as long as accrued at least 20 years of service as of the effective date

Post Retirement Option Plan (PROP)

Old Up to 100% of DROP account, \$5,000 Lump Sum payment, and/or a portion of monthly annuity may be deposited and earn the same interest credit as DROP accounts

SB 2190 No new funds may be added to PROP accounts

Appendix B2
SB 2190
Summary of Plan Benefit Changes for HPOPS

Employee Contributions

Old	If sworn prior to October 9, 2004	9.00%
	If sworn after October 9, 2004	10.20%
SB 2190	All	10.50%

Retirement Benefit

Eligibility (if sworn after October 9, 2004)

Old	Age 55 with 10 Years of Service
SB 2190	Rule of 70

Termination Benefit (if sworn after October 9, 2004)

Eligibility

Old	None
SB 2190	10 Years of Service

Amount

Old	None, refund of employee contributions (without interest) only
SB 2190	Monthly annuity payable at age 60 equal to Years of Service x 2.25% x Final Average Salary or refund of employee contributions (without interest)

Cost of Living Adjustment (COLA)

Old	Crediting rate of 80% increase in CPI-U, not less than 2.4% or greater than 8.0%
SB 2190	Crediting rate of 100% of the 5 year smoothed return minus 5.00%, not less than 0% or greater than 4%
	Must be 70 years of age or older as of April 1 for fiscal years ending June 30, 2018, 2019 and 2020 and 55 years of age or older for fiscal years end on or after June 30, 2021

Deferred Retirement Option Plan (DROP) (if sworn prior to October 9, 2004)

Old	Eligibility is 20 Years of Service
	Interest credited is 100% of the 5 year average investment return, not less than 3.0% or greater than 7.0%
	COLA credited to account
	8.75% of member contributions are credited to account
	No maximum participation period

Retirement annuity is recalculated upon exit as the greater of annuity credited to DROP immediately prior to DROP exit (i.e. including COLA) or using service at DROP entry and Final Average salary at DROP exit

SB 2190 No entry after June 30, 2027

Interest credited is 65% of the 5 year compounded average investment return, no less than 2.5%

COLAs occurring after effective date not credited to account

Member contributions not credited to account

Participation limited to 20 years

No recalculation of annuity at DROP exit

Post Retirement Option Plan (PROP) (if sworn prior to October 9, 2004)

Old Up to 100% of DROP account, \$5,000 Lump Sum payment, and/or a portion of monthly annuity may be deposited and earn the same interest credit as DROP accounts

SB 2190 No new funds may be added to PROP accounts

Appendix B3
SB 2190
Summary of Plan Benefit Changes for HMEPS

Employee Contributions

Old	Group A: 5.00% Group B: 0.00% Group D: 0.00%
SB 2190	Group A: 7.00% for FYE 2018; 8.00% thereafter Group B: 2.00% for FYE 2018; 4.00% thereafter Group D: 3.00% (2.00% for service benefit; 1.00% for cash balance benefit)

Post-Retirement Survivor Benefit (Groups A &B)

SB 2190	Group D: Cash Balance Benefit equal to 1.00% employee contributions credited with the DROP interest crediting rate.
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Post-Retirement Survivor Benefit (Groups A &B)

Old	100% Joint & Survivor, no actuarial reduction
SB 2190	80% Joint & Survivor, no actuarial reduction

Cost of Living Adjustment (COLA)

Old	Group A/B: 3.0% not compounded, if hired before 2005; 2.0% not compounded, if hired after 2004. Group D: 0%
SB 2190	50% of the rolling 5 year net investment return minus 2.00% less than the assumed rate of return (currently 5.00%), not less than 0.00% or greater than 2.00%

Deferred Retirement Option Plan (DROP) (Groups A & B)

Old	Interest credited is 50% of the prior year investment return, not less than 2.5% or greater than 7.5%
SB 2190	COLA credited to account Interest credited is 50% of the rolling 5 year net investment return, not less than 2.5% or greater than 7.5% COLA credited on or after 62 years of age

Appendix C1

SB 2190

HFRRF – Municipal Contribution Rate When Estimated Municipal Contribution Rate Lower than Corridor Midpoint, Authorization for Certain Adjustments (Sec 13E)	
If funded ratio is less than 90%	Municipal Contribution Rate = Corridor Midpoint
If funded ratio is equal to or greater than 90%	<p>If municipal contribution rate is equal to or greater than the minimum contribution rate</p> <p style="text-align: center;">Estimated contribution rate = Municipal Contribution Rate</p> <hr/> <p>If municipal contribution rate is less than the minimum contribution rate for corresponding fiscal year</p> <p style="text-align: center;">Municipal Contribution Rate = Minimum Contribution Rate Achieved in accordance with subsection c.</p> <p>SUBSECTION c (Adjustments):</p> <ul style="list-style-type: none"> • First, adjust AVA to = MVA, if making adjustment causes municipal contribution rate to increase • Second, under written agreement (not later than April 30 before the first day of the next fiscal year), reduce assumed rate of return • Third, under written agreement (not later than April 30), prospectively restore all or part of any benefit reductions or reduce increased employee contributions, in each case made after the year 2017 effective date • Fourth, accelerate the payoff year of the existing liability loss layers, including the legacy liability, by accelerating the oldest liability loss layers first, to an amortization period that is not less than 10 years from the first day of the fiscal year beginning 12 months after the date of the risk sharing valuation study in which the liability loss layer is first recognized.
If funded ratio is equal to or greater than 100%	<ul style="list-style-type: none"> • All existing liability layers, including the legacy liability, are considered fully amortized and paid • The applicable fiscal year is the payoff year for the legacy liability • For each fiscal year subsequent, the corridor midpoint shall be determined as provided by Section 13C(g) of the article
If funded ratio is greater than 100%	<p>In a written agreement between the municipality and the fund, the fund may reduce member contributions or increase pension benefits if, as a result of the action:</p> <ul style="list-style-type: none"> • the funded ratio is not less than 100 percent, and

	<ul style="list-style-type: none"> the municipal contribution rate is not more than the minimum contribution rate
HPOPS – City Contribution Rate When Estimated City Contribution Rate Lower than Corridor Midpoint, Authorization for Certain Adjustments (Sec 9D)	
If funded ratio is less than 90%	City Contribution Rate = Corridor Midpoint
If funded ratio is equal to or greater than 90%	<p>If city contribution rate is equal to or greater than the minimum contribution rate</p> <p>Estimated contribution rate = City Contribution Rate</p> <hr/> <p>If city contribution rate is less than the minimum contribution rate for corresponding fiscal year</p> <p>City Contribution Rate = Minimum Contribution Rate Achieved in accordance with Subsection (c).</p> <p>Subsection (c) (Adjustments):</p> <ul style="list-style-type: none"> First, adjust AVA to = MVA, if making adjustment causes city contribution rate to increase Second, under written agreement (not later than April 30 before the first day of the next fiscal year), reduce assumed rate of return Third, under written agreement (not later than April 30), prospectively restore all or part of any benefit reductions or reduce increased employee contributions, in each case made after the year 2017 effective date Fourth, accelerate the payoff year of the existing liability loss layers, including the legacy liability, by accelerating the oldest liability loss layers first, to an amortization period that is not less than 10 years from the first day of the fiscal year beginning 12 months after the date of the RSVS in which the liability loss layer is first recognized.
If funded ratio is equal to or greater than 100%	<ul style="list-style-type: none"> All existing liability layers, including the legacy liability, are considered fully amortized and paid The applicable fiscal year is the payoff year for the legacy liability For each fiscal year subsequent, the corridor midpoint shall be determined as provided by Section 9B(g) of the article
If funded ratio is greater than 100%	<p>In a written agreement between the city and the board, the fund may reduce member contributions or increase pension benefits if, as a result of the action:</p> <ul style="list-style-type: none"> the funded ratio is not less than 100 percent, and the municipal contribution rate is not more than the minimum contribution rate

HMEPS – City Contribution Rate When Estimated City Contribution Rate Lower than Corridor Midpoint, Authorization for Certain Adjustments (Sec 8E)	
If funded ratio is less than 90%	City Contribution Rate = Corridor Midpoint
If funded ratio is equal to or greater than 90%	<p>If city contribution rate is equal to or greater than the minimum contribution rate</p> <p>Estimated Contribution Rate = City Contribution Rate</p> <hr/> <p>If city contribution rate is less than the minimum contribution rate for corresponding fiscal year</p> <p>City Contribution Rate = Minimum Contribution Rate achieved in accordance with subsection c.</p> <p>Subsection (c) (Adjustments):</p> <ul style="list-style-type: none"> • First, adjust AVA to = MVA, if making adjustment causes city contribution rate to increase • Second, under written agreement (not later than April 30), prospectively restore all or part of any benefit reductions or reduce increased employee contributions, in each case made after the year 2017 effective date • Third, accelerate the payoff year of the legacy liability by offsetting the remaining legacy liability by the amount of the new liability loss layer, provided that during the accelerated period the city will continue to pay the city contribution amount as scheduled in the initial RSVS • Fourth, accelerate the payoff year of existing liability loss layers, excluding the legacy liability, by accelerating the oldest liability loss layers first, to an amortization period not less than 20 years from the first day of the fiscal year beginning 12 months after the date of the RSVS in which the liability loss layer is first recognized • Fifth, under a written agreement (not later than the 30th day before the first day of the next fiscal year), the city and pension board may agree to reduce the assumed rate of return
If funded ratio is equal to or greater than 100%	<ul style="list-style-type: none"> • All existing liability layers, including the legacy liability, are considered fully amortized and paid • The city contribution amount may no longer be included in the city contribution under 8A • The city and the pension system may mutually agree to change assumptions in a written agreement
If funded ratio is greater than 100%	<p>In a written agreement between the city and the board, the fund may reduce member contributions or increase pension benefits if, as a result of the action:</p> <ul style="list-style-type: none"> • the funded ratio is not less than 100 percent, and • the city contribution rate is not more than the minimum contribution rate

Appendix C2

SB 2190

HFRRF – Municipal Contribution Rate When Estimated Municipal Contribution Rate Equal to or Greater than Corridor Midpoint, Authorization for Certain Adjustments (Sec 13F)	
If estimated municipal contribution rate is less than or equal to maximum contribution rate	Estimated Municipal Contribution Rate = Municipal Contribution Rate
If municipal contribution rate is greater than maximum contribution rate for corresponding fiscal year	<p>Municipal Contribution Rate = Corridor Midpoint Achieved in accordance with Subsection (c).</p> <p>Subsection (c) (Adjustments):</p> <ul style="list-style-type: none"> • First, if payoff year of the legacy liability was accelerated previously (falling cost scenario), extend the payoff year of existing liability loss layers, by extending the most recent loss layers first, to a payoff year not later than 30 years for the first day of the fiscal year beginning 12 months after the date of the RSVS in which the liability loss layer first recognized • Second, adjust AVA to current MVA, if making the adjustment causes the municipal contribution rate to decrease
If municipal contribution rate after adjustment by Subsection (c) is greater than the third quarter line rate	<p>Municipal Contribution Rate = Third Quarter Line Rate</p> <ul style="list-style-type: none"> • To the extent necessary to comply with the statute, the City and System shall enter into a written agreement to increase member contributions and make other benefit or plan changes not otherwise prohibited by applicable federal law or regulations • If an agreement is not reached on/before April 30 before the first day of the next fiscal year, before the start of the next fiscal year to which the municipal contribution rate would apply, the board, to the extent necessary to set the municipal contribution rate equal to the third quarter line, shall: <ul style="list-style-type: none"> ○ Increase member contributions and decrease cost-of-living adjustments; ○ Increase normal retirement age; or ○ Any combination of the two
If municipal contribution rate remains greater than corridor midpoint in the third fiscal year after adjustments	<p>In third fiscal year, Municipal Contribution Rate = Corridor Midpoint achieved in accordance with Subsection (g).</p> <p>Subsection (g): Municipal contribution rate must be set at corridor midpoint by:</p> <ul style="list-style-type: none"> • In RSVS for third fiscal year, adjust AVA to MVA, if making the

	<p>adjustment causes the municipal contribution rate to decrease</p> <ul style="list-style-type: none"> • Under written agreement between City and board: <ul style="list-style-type: none"> ○ Increase member contributions ○ Make any other benefit or plan changes not otherwise prohibited by applicable federal law or regulations • If an agreement is not reached on/before April 30 before the first day of the next fiscal year, before the start of the next fiscal year, the board, to the extent necessary to set the municipal contribution rate equal to the corridor midpoint, shall: <ul style="list-style-type: none"> ○ Increase member contributions and decrease cost-of-living adjustments; ○ Increase normal retirement age; or ○ Any combination of the two
<p>HPOPS – City Contribution Rate When Estimated City Contribution Rate Equal to or Greater Than Corridor Midpoint, Authorization for Certain Adjustments (Sec 9F)</p>	
<p>If estimated City contribution rate is less than or equal to maximum contribution rate</p>	<p>Estimated City Contribution Rate = City Contribution Rate</p>
<p>If City contribution rate is greater than maximum contribution rate for corresponding fiscal year</p>	<p>City Contribution Rate = Corridor Midpoint achieved in accordance with Subsection (c).</p> <p>Subsection (c) (Adjustments):</p> <ul style="list-style-type: none"> • First, if payoff year of the legacy liability was accelerated previously (falling cost scenario), extend the payoff year of existing liability loss layers, by extending the most recent loss layers first, to a payoff year not later than 30 years for the first day of the fiscal year beginning 12 months after the date of the RSVS in which the liability loss layer first recognized • Second, adjust AVA to current MVA, if making the adjustment causes the city contribution rate to decrease
<p>If city contribution rate after adjustment by Subsection (c) is greater than the third quarter line rate</p>	<p>City Contribution Rate = Third Quarter Line Rate</p> <ul style="list-style-type: none"> • To the extent necessary to comply with the statute, the City and board shall enter into a written agreement to increase member contributions and make other benefit or plan changes not otherwise prohibited by applicable federal law or regulations • If an agreement is not reached on/before April 30 before the first day of the next fiscal year, before the start of the next fiscal year to which the city contribution rate would apply, the board, to the extent necessary to set the city contribution rate equal to the third

	<p>quarter line, shall:</p> <ul style="list-style-type: none"> ○ Increase member contributions and decrease cost-of-living adjustments; ○ Increase normal retirement age; or ○ Any combination of the two
If city contribution rate remains greater than corridor midpoint in the third fiscal year after adjustments	<p>In third fiscal year, City Contribution Rate = Corridor Midpoint achieved in accordance with Subsection (g).</p> <p>Subsection (g): City contribution rate must be set at corridor midpoint by:</p> <ul style="list-style-type: none"> • In RSVS for third fiscal year, adjust AVA to MVA, if making the adjustment causes the city contribution rate to decrease • Under written agreement between City and board: <ul style="list-style-type: none"> ○ Increase member contributions ○ Make any other benefit or plan changes not otherwise prohibited by applicable federal law or regulations • If an agreement is not reached on/before April 30 before the first day of the next fiscal year, before the start of the next fiscal year, the board, to the extent necessary to set the city contribution rate equal to the corridor midpoint, shall: <ul style="list-style-type: none"> ○ Increase member contributions and decrease cost-of-living adjustments; ○ Increase normal retirement age; or ○ Any combination of the two
<p align="center">HMEPS – City Contribution Rate When Estimated City Contribution Rate Equal to or Greater Than Corridor Midpoint, Authorization for Certain Adjustments (Sec 8F)</p>	
If estimated City contribution rate is less than or equal to maximum contribution rate	<p>Estimated City Contribution Rate = City Contribution Rate</p>
If City contribution rate is greater than maximum contribution rate for corresponding fiscal year	<p>City Contribution Rate = Corridor Midpoint achieved in accordance with Subsection (c).</p> <p>Subsection (c) (Adjustments):</p> <ul style="list-style-type: none"> • First, adjust AVA to current MVA, if making the adjustment causes the city contribution rate to decrease • Second, if payoff year of the legacy liability was accelerated previously (falling cost scenario), <ul style="list-style-type: none"> ○ extend the payoff year of the legacy liability by the amount of the new liability gain layer to a maximum amount ○ during extended period, the city shall continue to pay the city contribution amount for the extended period

	<ul style="list-style-type: none"> • Third, if the payoff year of a liability loss layer other than legacy liability was previously accelerated(falling cost scenario), extend the payoff year of existing liability loss layers, excluding legacy liability, by extending the most recent loss layers first, to a payoff year not later than 30 years from the first day of the fiscal year beginning 12 months after the date of the RSVS in which the liability loss layer first recognized
If city contribution rate after adjustment by Subsection (c) is greater than the third quarter line rate	<p style="text-align: center;">City Contribution Rate = Third Quarter Line Rate</p> <ul style="list-style-type: none"> • To the extent necessary to comply with the statute, the City and board shall enter into a written agreement to increase member contributions and make other benefit or plan changes not otherwise prohibited by applicable federal law or regulations • Gains resulting from adjustments made as the result of a written agreement may not be used as a direct offset against the city contribution amount in any fiscal year • If an agreement is not reached on/before the 30th day before the first day of the next fiscal year, before the start of the next fiscal year to which the city contribution rate would apply, the board, to the extent necessary to set the city contribution rate equal to the third quarter line, shall: <ul style="list-style-type: none"> ○ Increase member contributions and decrease cost-of-living adjustments; ○ Increase normal retirement age
If city contribution rate remains greater than corridor midpoint in the third fiscal year after adjustments	<p>In third fiscal year, City Contribution Rate = Corridor Midpoint achieved in accordance with Subsection (h).</p> <p>Subsection (h): City contribution rate must be set at corridor midpoint by:</p> <ul style="list-style-type: none"> • In RSVS for third fiscal year, adjust AVA to MVA, if making the adjustment causes the city contribution rate to decrease • Under written agreement between City and board: <ul style="list-style-type: none"> ○ Increase member contributions ○ Make any other benefit or plan changes not otherwise prohibited by applicable federal law or regulations • If an agreement is not reached on/before the 30th day before the first day of the next fiscal year, before the start of the next fiscal year, the board, to the extent necessary to set the city contribution rate equal to the corridor midpoint, shall: <ul style="list-style-type: none"> ○ Increase member contributions ○ decrease cost-of-living adjustments

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX G1 – APRIL 4, 2018 PRESENTATION TO THE SENATE COMMITTEE ON STATE AFFAIRS

Texas Pension Review Board

Senate Committee on State Affairs

April 4, 2018



PENSION REVIEW BOARD

PRB Overview

- Oversees all Texas **public retirement systems**, both state and local, in regard to their actuarial soundness and compliance with state law.
- Service population consists of the members, administrators and trustees of **340** individual public retirement plans, state and local government officials, and the public.
- Current PRB activities:
 - **intensive actuarial reviews** of certain retirement systems facing significant funding shortfall
 - **interim studies** to develop legislative recommendations on the following topics: Funding Policies for Fixed Rate Pension Plans and Pooling of Assets for Smaller Plans
 - **online pension dashboard** to provide accessible current, historical, and comparative data on Texas defined benefit plans

PUBLIC PENSION PLAN TYPES IN TEXAS

Public Pension Plan Types

- A **defined benefit (DB) plan** promises the participant a specified benefit at retirement, which is not tied to actual investment performance. For public sector plans, generally, both the employee and employer contribute to the plan, and plan assets are pooled and invested by the plan.
- For participants in a **defined contribution (DC) plan**, the contribution amount is defined, but the benefit at retirement is variable as a result of investment returns and based on the ending account balance.
- **Hybrid plans** utilize both DB and DC components. In Texas, cash balance plans utilize “notional accounts” that receive contributions and interest credits. Benefits are valued and funded like a DB plan.



Landscape of Texas Public Pensions by Plan Type

- **340 Public Retirement Systems in Texas:** **99** actuarially funded DB plans (including **2** hybrid plans); **160 defined contribution** and **81 pay-as-you-go** volunteer firefighter plans.
- **The two hybrid/cash-balance plans** are **Texas Municipal Retirement System (TMRS)** and **Texas County and District Retirement System (TCDRS)**. Currently, **872** municipalities are participating in **TMRS**, and **738** counties and districts are participating in **TCDRS**.
- **DC plans** are primarily offered as supplemental plans by school districts, housing authorities, municipal districts, COGs, and MHMR facilities. Plan types include 401(a), 401(k), 403(b), and 457(b) plans.



ACTUARIAL ASSUMPTIONS AND PLAN LIABILITIES

Actuarial Assumptions

- Funding a **defined benefit (DB) plan** requires assumptions to be made about future events. Actuarial assumptions (along with current plan participant data and the benefit formula) are used to estimate future benefit obligations/the cost of the plan.
- Assumptions do not drive costs, actual plan experience does.
- Actuarial assumptions can be split into two broad categories: **economic** and **demographic**.
- Key **economic** assumptions: investment return, inflation, salary increases, payroll growth.

ASOP Standards: Reasonable Economic Assumptions

Actuarial Standard of Practice #27

1. Appropriate for the purpose of the measurement
2. Reflects actuary's professional judgement
3. Takes into account relevant historical and current economic data (the actuary should not give undue weight to recent experience)
4. Reflects the actuary's estimate of future experience
5. It has no significant bias (i.e., it is not significantly optimistic or pessimistic)

Process for Developing Investment Return Assumption

Plan actuary develops a recommendation for pension board consideration

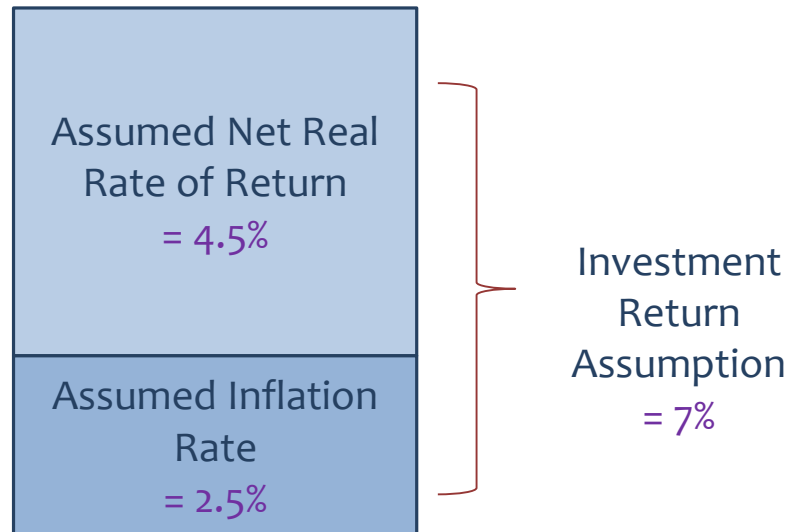
➤ Plan actuary considers the following:

- plan's investment policy statement
- capital market assumptions to estimate future expected returns
- current and historical plan experience
- investment and administrative expenses
- cash flow timing

Process for Developing Investment Return Assumption

- A common approach is the building block method:
 - expected price inflation
 - real rate of return for each asset class

Example



Process for Developing Investment Return Assumption

Pension board adopts investment return assumption

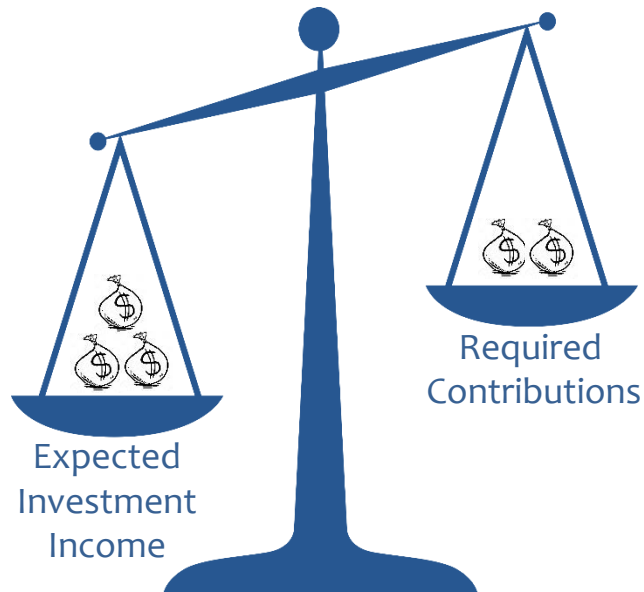
- Considers the following:
 - plan actuary's recommendation
 - investment consultant's projections regarding the plan's expected return on assets
 - fiduciary duty to plan to choose an appropriate assumption
 - ✓ not overly optimistic or pessimistic
 - ✓ ability to weather adverse experience
 - peer comparison data and national trends

Process for Developing Investment Return Assumption

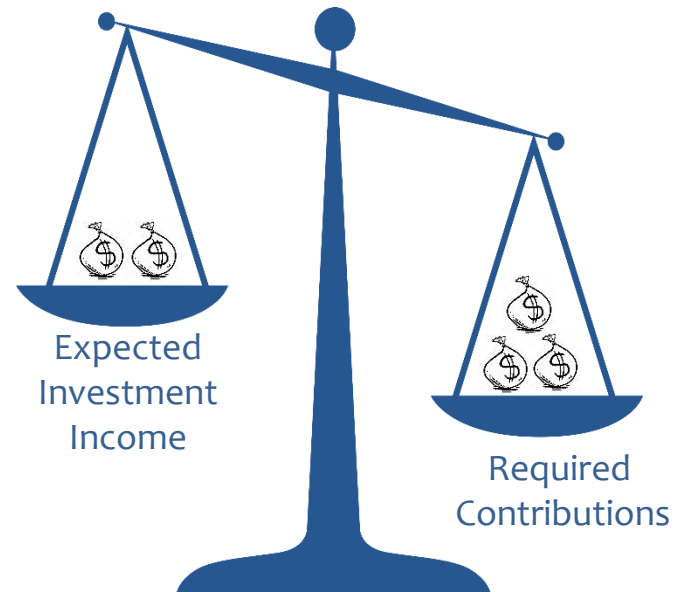
- Short-term fluctuations should not overly influence the expected **long-term investment return assumption**; however order matters. Lower returns in the near term will result in lower total assets even if actual long-term average returns are closer to the return assumption.
- Plans should **regularly review** their investment return and inflation assumptions to ensure those assumptions align with the systems' investment strategy, asset allocation, risk tolerance, and expected future returns on assets.

Impact of Investment Return Assumption

Investment Return Assumption = 8%



Investment Return Assumption = 6%



Impact of Investment Return Assumption

- Has a direct, **inverse correlation** with the liability and expected contribution requirements of a plan.
- A higher return assumption leads to a lower liability calculation and vice versa. Therefore, reducing the return assumption leads to an increase in the unfunded liability of a plan.
- **Lowering the return assumption results in higher contribution requirement.**
- If a retirement plan receives the increased contribution, its actuarial soundness should not be affected in the long term.

Investment Return Assumption Trends

- The average investment return assumption for Texas public retirement systems is currently **7.46%**. The national average is **7.36%** (NASRA, Feb. 2018).
- In response to projected market conditions and actual plan experience, retirement systems across the country including Texas have reduced their return assumptions in recent years, and we expect this trend to continue.

Texas Plans' Investment Return Assumptions		
	Current AV Effective Date	Prior AV Effective Date
> 8.00%	1	3
8.00%	16	22
> 7.50%, < 8.00%	26	22
7.50%	16	17
> 7.00%, < 7.50%	13	7
7.00%	10	14
< 7.00%	11	6
Total Plans Registered	93	91

Average Actual Investment Returns

Average Returns by Plan Type			
Plan Type	1-Year Net	3-Year Net	10-Year Net
Statewide	9.10%	5.70%	5.52%
Municipal	8.26%	3.50%	4.66%
Local Fire Fighter	6.46%	2.96%	4.18%
Special District/ Supplemental	6.70%	4.39%	4.90%
Total	7.04%	4.39%	4.90%

According to the most recent fiscal year-end Investment Returns and Assumptions Report.

Additional Resources

- * Blue Ribbon Panel on Public Pension Plan Funding, Society of Actuaries.
<http://www.soa.org/blueribbonpanel/>
- * ASOP 27, Selection of Economic Assumptions for Measuring Pension Obligations, Actuarial Standards Board. http://www.actuarialstandardsboard.org/wp-content/uploads/2014/02/asop027_172.pdf
- * Pension Plan Valuation: Views on Using Multiple Measures to Offer a More Complete Financial Picture, Government Accountability Office. <http://www.gao.gov/products/GAO-14-264>
- * Measuring Pension Obligations: Discount Rates Serve Various Purposes, American Academy of Actuaries. https://www.actuary.org/files/IB_Measuring-Pension-Obligations_Nov-21-2013.pdf
- * Public Pension Plan Investment Return Assumptions, NASRA.
<http://www.nasra.org/files/Issue%20Briefs/NASRAInvReturnAssumptBrief.pdf>
- * 2014 Study of the Financial Health of Texas Public Retirement Systems, PRB.
http://www.prb.state.tx.us/files/reports/Financial_Health_Study_Final.pdf

Educational Resources

- **PRB Online Courses:** Actuarial Matters, Benefits Administration, Investments, Governance, Fiduciary Matters, Ethics, Risk Management
- Available at: <http://www.prb.state.tx.us/resource-center/trustees-administrators/educational-training-program/>
- Login: enter office and name. No password required.

www.prb.state.tx.us

512-463-1736

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX G2 – MAY 10, 2018 PRESENTATION TO THE HOUSE PENSIONS COMMITTEE

Texas Pension Review Board

House Pensions Committee

May 10, 2018

PRB Mission and Current Activities

- PRB mission: to provide the State of Texas with the necessary information and recommendations to help ensure that Texas public retirement systems are properly managed and actuarially sound
- Service population consists of the members, administrators and trustees of **342** individual public retirement plans, state and local government officials, and the public
- Current PRB activities to help improve actuarial soundness of plans:
 - ❑ **online pension dashboard** to provide accessible current, historical, and comparative data on Texas defined benefit plans
 - ❑ **interim studies** to develop legislative recommendations on the following topics: Funding Policies for Fixed Rate Pension Plans and Pooling of Assets for Smaller Plans (for publication in Nov. 2018 Biennial Report)
 - ❑ **intensive actuarial reviews** of certain retirement systems facing potential risks that threaten long-term stability

Intensive Actuarial Review Process

- PRB statutory duty to conduct intensive studies of potential or existing problems threatening the actuarial soundness of public retirement systems (Gov't Code 801.202(2))
- Adopted criteria for selecting systems for review
- Established a review process which includes:
 - drafts sent to the system and its sponsor with invitation for written response
 - written responses included in final report
 - request for system and sponsor to attend committee meeting to discuss review
- Conducted in-depth reviews focusing on assessment of major risks
- Intensive review results (and updates) will be provided to the legislature in PRB Biennial Report (Nov. 2018)

Intensive Actuarial Reviews to date

- Beaumont Firemen's Relief & Retirement Fund, Galveston Employees Retirement Plan for Police, Greenville Firemen's Relief & Retirement Fund, Marshall Firemen's Relief & Retirement Fund
- Recommendations:
 - Adopt a funding policy that requires payment of an actuarially determined contribution, or at minimum, that fully funds the plan over a finite period of 30 years or less
 - Adopt a formal risk/cost-sharing framework with "guardrails" or trigger mechanisms that reduce uncertainty and guide stakeholders in how benefit and contribution levels will be modified under different economic conditions
 - Closely monitor investment performance and evaluate asset allocation decisions
 - Conduct an in-depth asset-liability study of potential risks associated with existing asset mix and liabilities they support. Perform scenario testing of large PROP withdrawals coupled with potential adverse investment experience
 - Regularly review actuarial assumptions against experience, making necessary changes

PRB Pension Funding Guidelines

(effective 6/30/17)

1. The funding of a pension plan should reflect all plan obligations and assets.
2. The allocation of the normal cost portion of the contributions should be level or declining as a percentage of payroll over all generations of taxpayers, and should be calculated under applicable actuarial standards.
3. Funding of the unfunded actuarial accrued liability should be level or declining as a percentage of payroll over the amortization period.
4. Actual contributions made to the plan should be sufficient to cover the normal cost and to amortize the unfunded actuarial accrued liability over as brief a period as possible, but **not to exceed 30 years, with 10-25 years being a more preferable target range.*** For plans that use multiple amortization layers, the weighted average of all amortization period should not exceed 30 years.* Benefit increases should not be adopted if all plan changes being considered cause a material increase in the amortization period and if the resulting amortization period **exceeds 25 years.**
5. The choice of assumptions should be reasonable, and should comply with applicable actuarial standards.
6. Retirement systems should monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

*Plans with amortization periods that exceed 30 years as of 6/30/2017 should seek to reduce their amortization period to 30 years or less as soon as practicable, but not later than 6/30/2025.

Assets - Liabilities Trends

In the last seven years, the difference between the AVA and AAL has steadily increased, from \$41 billion in 2011 to over \$69 billion as of March 2018. The average funded ratio was highest in 2011, and has slowly decreased through 2018.

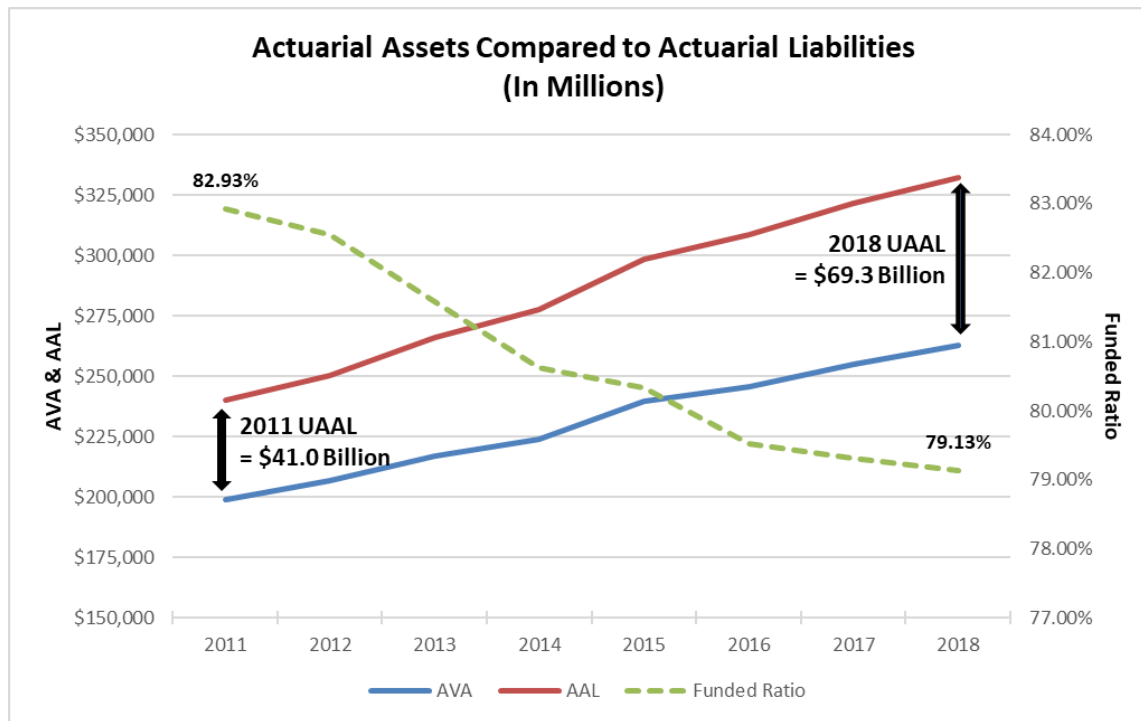
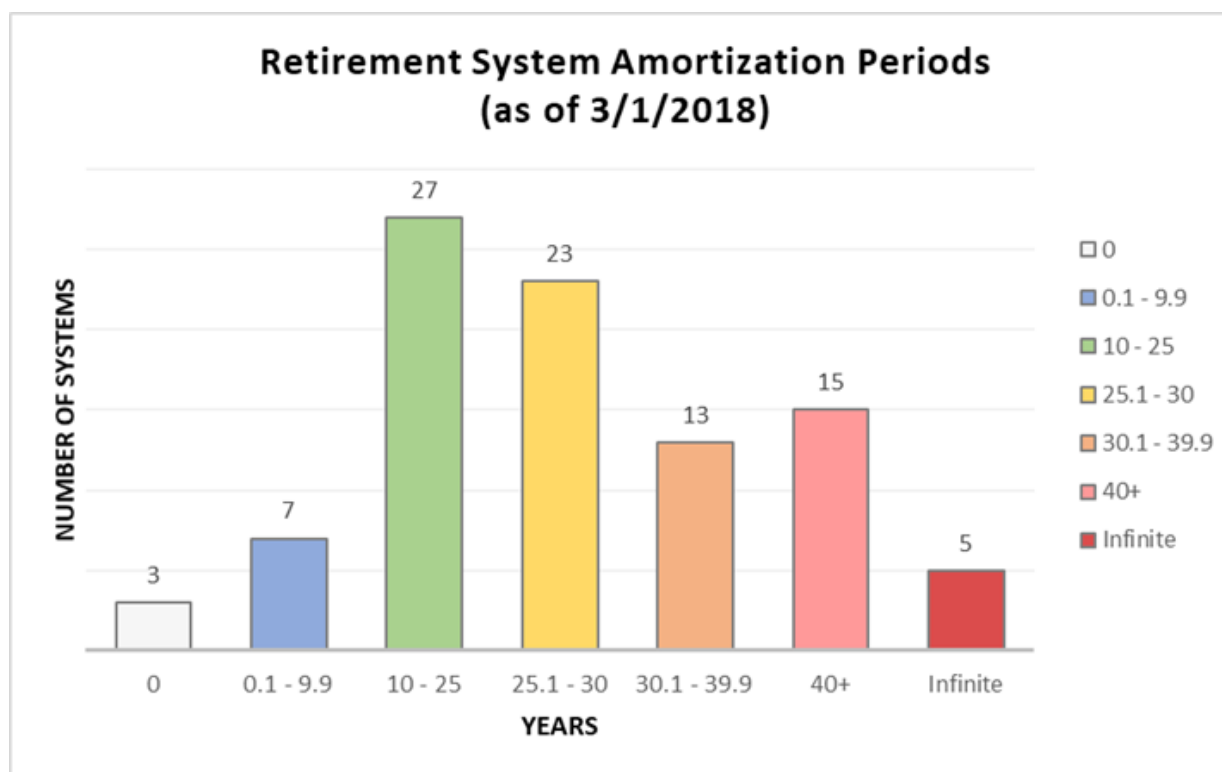


Chart utilizes information received by the PRB current through the dates listed.

Amortization Periods

The PRB *Pension Funding Guidelines* establish a maximum amortization period of not more than **30 years** with a preferred target range of 10 to 25 years.

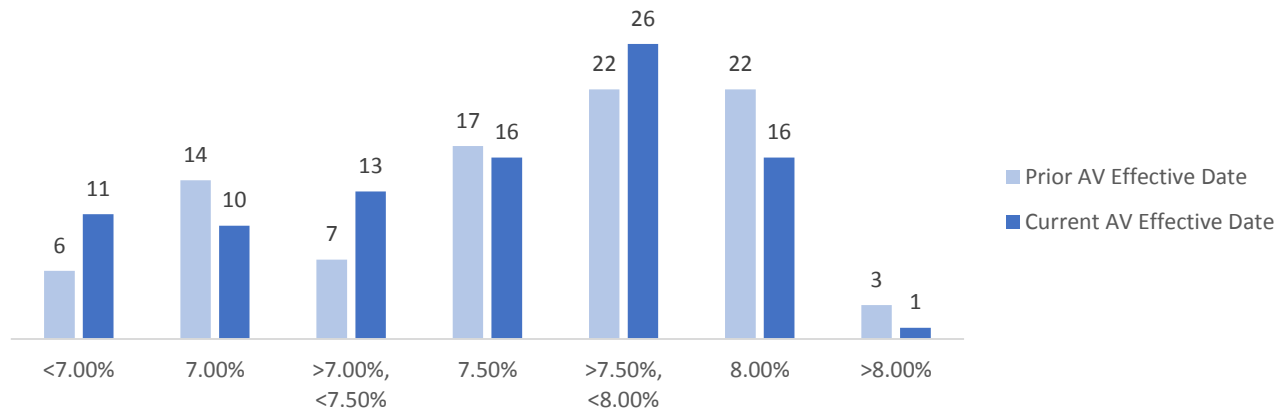


Actuarial Assumptions

Investment Return Assumption Trends

- The average investment return assumption for Texas systems is currently **7.46%**. The national average is **7.36%** (NASRA, February 2018).
- In response to projected market conditions and actual plan experience, retirement systems across the country, including Texas, have reduced return assumptions in recent years. This trend expected to continue.

Texas Plans' Investment Return Assumptions
as of 3/1/2018



Actuarial Assumptions

Impact of Investment Return Assumption

- Has an **inverse correlation** with the liability and expected contribution requirements of a plan
- A higher return assumption leads to a lower liability calculation and vice versa. Therefore, reducing the return assumption leads to an increase in the unfunded liability of a plan
- **Lowering the return assumption** results in a **higher contribution requirement**
- If a retirement plan receives the increased contribution, its actuarial soundness should not be affected in the long term

Average Actual Investment Returns

Average Returns by Plan Type				
Plan Type	1-Year Net	3-Year Net	10-Year Net	Long-Term Net*
Statewide	10.62%	5.21%	5.56%	8.04%
Municipal	9.04%	3.63%	4.57%	8.10%
Local Fire Fighter	6.76%	3.08%	4.17%	6.30%
Special District/Supplemental	6.29%	4.18%	4.91%	6.44%
All	7.33%	3.66%	4.56%	6.85%

According to the most recent fiscal year-end Investment Returns and Assumptions Report.

**Long-term return is 30 years or longest term available between 11-30 years that plans reported to the PRB.*

Funding Soundness Restoration Plan Update

- 14 systems have submitted FSRPs. Of those, two systems have achieved their goal and are below 40 years. The remaining 12 are working towards 40 years
- One system is subject to the requirement but has not yet submitted its FSRP
- Four systems will be subject to the FSRP requirement if their next valuation shows an amortization period greater than 40 years

H.B. 3310 by Paul/Taylor (84thR)

- If a retirement system receives several consecutive valuations showing its **amortization period exceeds 40 years**, the system's board and sponsoring entity must jointly formulate an FSRP and submit the plan to the PRB within 6 months following the trigger of the requirement.
- The FSRP must reduce the amortization period to 40 within **10 years**. Systems must report **updates** to PRB at least **every two years**.

House Bill 3158 – Highlights

Dallas Police and Fire Pension System

- Increased both employee and City contributions:
 - Employee – from 8.5% for non-DROP active participants and 4.0% for DROP active participants to 13.5% for all participants
 - City – from 27.5% of total pay to 34.5% of computation pay with a floor for 7 years, plus \$13m per year until 2024
- Modified DROP. No interest or COLAs while in Active DROP; upon retirement, interest earned based on a Treasury-based interest rate; DROP distributed as annuity based on the member's life expectancy; DROP participation limited to 10 years (effective 1/1/18)
- Reduced benefits. Lowered benefit multiplier and raised normal retirement age for all members. Ad hoc COLA for retired members only if funded ratio above 70% based on actual return; minimum 0%, maximum 4%
- Changed board composition. Six of the trustees are selected by the mayor and five are selected by the pension system. All members of the board must be experts in finance, accounting, business, investment, budgeting, real estate, or actuarial science
- Governance changes. Two-thirds vote of the full board required for major actions of the board, for example, implementing any rule change concerning board governance or creating an alternative benefit plan
- Established investment advisory committee. Committee reviews investment-related matters and makes recommendations to the board. Two-thirds vote by the board required to approve each alternative investment



House Bill 3158 – Impact (per 1/1/17 Actuarial Valuation)

	Prior to HB 3158	After HB 3158
Amortization Period	Infinite	44
Funded Ratio	40.2%	49.4%
Actuarially Determined Contribution (ADC)	69.9%	47.25%
Actuarial Value of Assets (AVA)	\$2,157,799,730	\$2,157,799,730
Market Value of Assets (MVA)	\$2,149,836,260	\$2,149,836,260
Unfunded Accrued Actuarial Liability (UAAL)	\$3,206,255,505	\$2,209,380,724
UAAL as % of Payroll	897%	618%

House Bill 3158 – PRB Duties

2017

- **Authorized DROP distributions:** PRB determined DPFPS did not make unauthorized distributions before Aug. 31, 2017, per the bill requirements. Sent letters to DPFPS and the City regarding the determination

2024

- **Independent actuarial analysis:** HB 3158 requires the PRB to select an independent actuary to perform an analysis based on the system's Jan. 1, 2024 actuarial valuation. PRB is developing criteria to make this selection
- **Funding plan:** Based on the independent actuarial analysis and applicable funding and amortization period requirements, DPFPS shall adopt a funding plan by rule. PRB shall report to the legislature on the actuarial analysis and rules adopted by the system

Ongoing

- **Benefit increases:** A DPFPS rule that proposes a benefit increase must be reviewed by the PRB for compliance with amortization period requirements (must not exceed 25 years after the change). PRB is developing a procedure for rule review
- **Alternative benefit plans:** A DPFPS rule that proposes to establish a defined contribution or hybrid plan (for new hires or on a voluntary transfer basis) must be reviewed by the PRB for compliance with amortization period requirements (must not exceed 35 years after the change). PRB is developing a procedure for rule review

Minimum Educational Training Program

- **PRB Online Courses:** Actuarial Matters, Benefits Administration, Investments, Governance, Fiduciary Matters, Ethics, Risk Management
- Available at: <http://www.prb.state.tx.us/resource-center/trustees-administrators/educational-training-program/>
- Login: enter office and name. No password required

www.prb.state.tx.us

512-463-1736

Texas Pension Review Board

2017-2018 Biennial Report

APPENDIX G3 – OCTOBER 12, 2018 PRESENTATION TO THE HOUSE PENSIONS COMMITTEE

Texas Pension Review Board

House Pensions Committee
October 12, 2018

PRB Mission and Current Activities

- PRB mission: to provide the State of Texas with the necessary information and recommendations to help ensure that Texas public retirement systems are properly managed and actuarially sound
- Service population consists of the members, administrators and trustees of **346** individual public retirement plans, state and local government officials, and the public
- Current PRB activities to help improve actuarial soundness of plans:
 - ❑ **online pension dashboard** to provide accessible current, historical, and comparative data on Texas defined benefit plans
 - ❑ **interim studies** to develop legislative recommendations on two topics: Funding Policies for Fixed-Rate Pension Plans and Asset Pooling for Smaller Pension Plans
 - ❑ **intensive actuarial reviews** of certain retirement systems facing potential risks that threaten long-term funding stability

Intensive Actuarial Review Process

- PRB statutory duty to conduct intensive studies of potential or existing problems threatening the actuarial soundness of public retirement systems (Gov't Code 801.202(2))
- Adopted criteria for selecting systems for review
- Established a review process which includes:
 - drafts sent to the system and its sponsor with invitation for written response
 - written responses included in final report
 - request for system and sponsor to attend committee meeting to discuss review
- Conducted 7 in-depth reviews focusing on assessment of major risks
- Intensive review results (and updates) will be provided to the Legislature in PRB Biennial Report in Nov. 2018

2018 Intensive Actuarial Reviews

January	April	October
Galveston Police Greenville Fire	Beaumont Fire Marshall Fire	Longview Fire Orange Fire Irving Fire

■ Recommendations:

- ❑ Adopt a funding policy that requires payment of an actuarially determined contribution, or at minimum, that fully funds the plan over a finite period of 30 years or less
- ❑ Adopt a formal risk/cost-sharing framework with “guardrails” or trigger mechanisms that reduce uncertainty and guide stakeholders in how benefit and contribution levels will be modified under different economic conditions
- ❑ Closely monitor investment performance including expenses and evaluate asset allocation decisions
- ❑ Conduct an in-depth asset-liability study of potential risks associated with existing asset mix and liabilities they support. Perform scenario testing of large DROP/PROP withdrawals coupled with potential adverse investment experience
- ❑ Regularly review actuarial assumptions against experience, making necessary changes

PRB Pension Funding Guidelines

(effective 6/30/17)

1. The funding of a pension plan should reflect all plan obligations and assets.
2. The allocation of the normal cost portion of the contributions should be level or declining as a percentage of payroll over all generations of taxpayers, and should be calculated under applicable actuarial standards.
3. Funding of the unfunded actuarial accrued liability should be level or declining as a percentage of payroll over the amortization period.
4. Actual contributions made to the plan should be sufficient to cover the normal cost and to amortize the unfunded actuarial accrued liability over as brief a period as possible, but **not to exceed 30 years, with 10-25 years being a more preferable target range.*** For plans that use multiple amortization layers, the weighted average of all amortization period should not exceed 30 years.* Benefit increases should not be adopted if all plan changes being considered cause a material increase in the amortization period and if the resulting amortization period **exceeds 25 years.**
5. The choice of assumptions should be reasonable, and should comply with applicable actuarial standards.
6. Retirement systems should monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

*Plans with amortization periods that exceed 30 years as of 6/30/2017 should seek to reduce their amortization period to 30 years or less as soon as practicable, but not later than 6/30/2025.

Assets - Liabilities Trends

In the last seven years, the difference between the AVA and AAL has steadily increased, from \$41 billion in 2011 to \$69.5 billion as of October 2018. The average funded ratio was highest in 2011, and has slowly decreased through 2018.

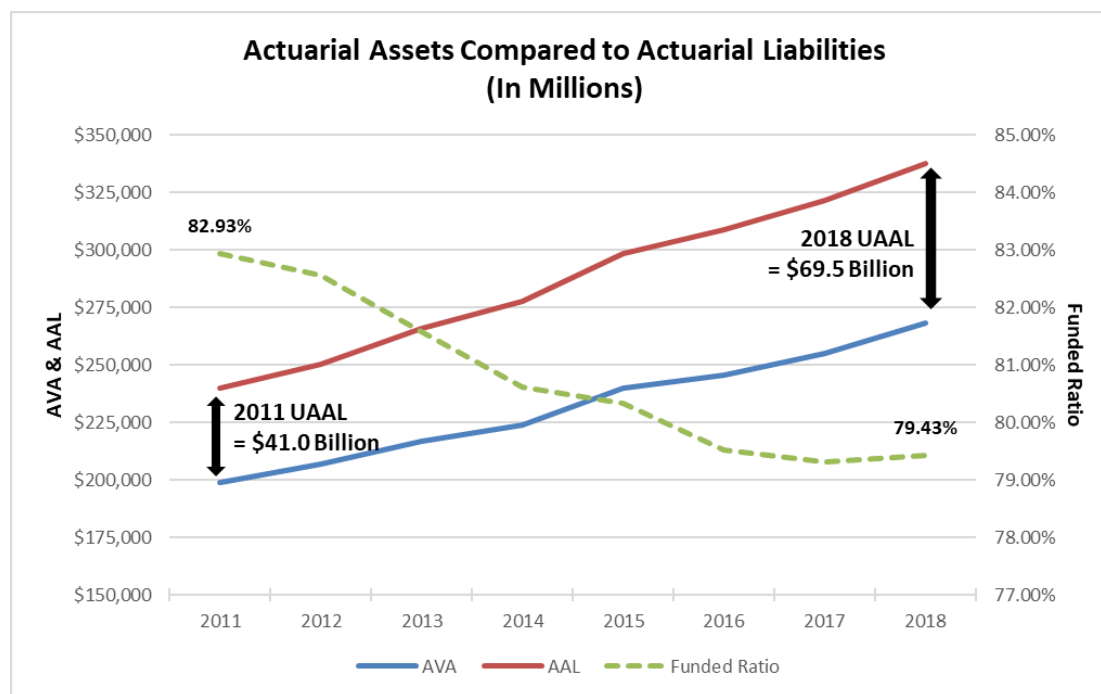
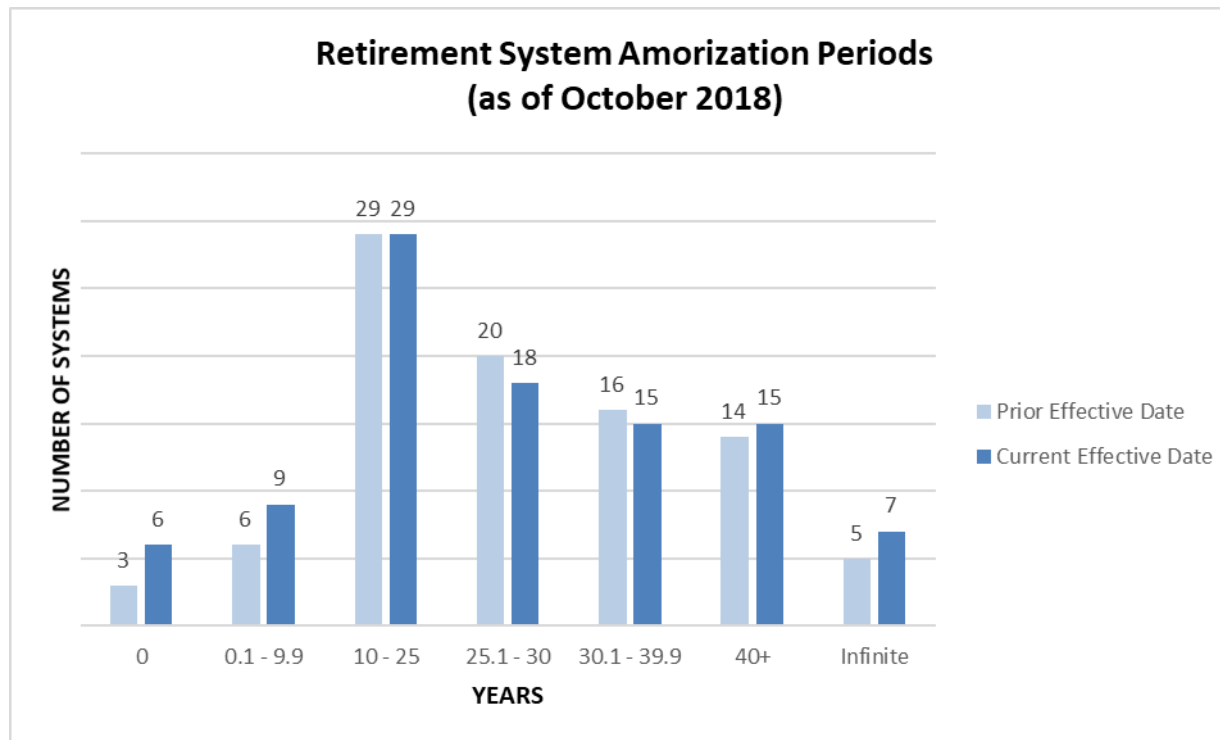


Chart utilizes information received by the PRB current through the dates listed.

Amortization Periods

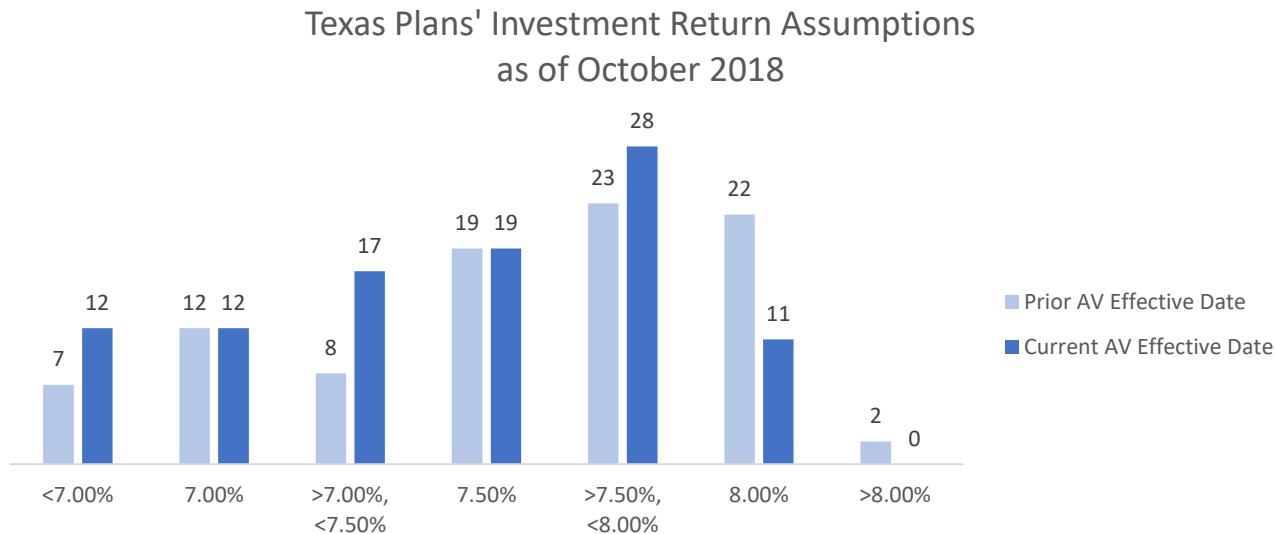
The PRB *Pension Funding Guidelines* establish a maximum amortization period of not more than **30 years** with a preferred target range of **10 to 25** years.



Actuarial Assumptions

Investment Return Assumption Trends

- The average investment return assumption for Texas systems is currently **7.40%**. The national average is **7.36%** (NASRA, February 2018).
- In response to projected market conditions and actual plan experience, retirement systems across the country, including Texas, have reduced return assumptions in recent years. This trend is expected to continue.



Actuarial Assumptions

Impact of Investment Return Assumption

- Has an **inverse correlation** with the liability and expected contribution requirements of a plan
- A higher return assumption leads to a lower liability calculation and vice versa. Therefore, reducing the return assumption leads to an increase in the unfunded liability of a plan
- **Lowering the return assumption results in a higher contribution requirement**
- If a retirement plan receives the increased contribution, its actuarial soundness should not be affected in the long term

Average Actual Investment Returns

Average Returns by Plan Type				
Plan Type	1-Year Net	3-Year Net	10-Year Net	Long-Term Net*
Statewide	12.61%	5.94%	5.74%	8.18%
Municipal	12.76%	5.34%	4.78%	8.14%
Local Fire Fighter	13.16%	5.24%	4.71%	6.56%
Special District/Supplemental	12.31%	6.13%	5.41%	6.70%
All	12.80%	5.57%	5.00%	7.06%

According to the most recent fiscal year-end Investment Returns and Assumptions Report.

**Long-term return is 30 years or longest term available between 11-30 years that plans reported to the PRB.*

Funding Soundness Restoration Plan

- **15 systems have submitted FSRPs.** Of those, two systems have achieved their goal and are below 40 years
- **Three of the 15** systems with submitted FSRPs are in the process of developing a **revised** FSRP as these systems did not meet their initial FSRP. The remaining 10 are currently working towards 40 years
- One system is subject to the requirement but has not yet submitted its FSRP
- **Six systems will be subject** to the FSRP requirement if their next valuation shows an amortization period greater than 40 years

H.B. 3310 by Paul/Taylor (84thR)

- If a retirement system receives several consecutive valuations showing its **amortization period exceeds 40 years**, the system's board and sponsoring entity must jointly formulate an FSRP and submit the plan to the PRB within 6 months following the trigger of the requirement.
- The FSRP must reduce the amortization period to 40 within **10 years**. Systems must report **updates** to PRB at least **every two years**.

Minimum Educational Training Program

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Houston Systems (SB 2190) – Highlights

Houston Firefighters'	Houston Police Officers	Houston Municipal Employees
<ul style="list-style-type: none"> ▪ Increased employee contributions from 9% to 10.5% and introduced a corridor mechanism to determine employer contributions. ▪ Made prospective changes to benefit formula for current members, created a second tier for new hires that modified the following: final average salary calculation, retirement eligibility, benefit calculation, and termination benefit. ▪ Three-year COLA freeze for members under 70 years of age, then COLA modified to be based on 5 year smoothed return minus 4.75%, min 0% max 4%, beginning at 55. ▪ Modified DROP. Interest credit modified, no COLAs or member contributions credited to DROP. No DROP for new hires. ▪ No new funds may be added to PROP accounts. 	<ul style="list-style-type: none"> ▪ Increased employee contributions from 9% and 10.2% to 10.5% for all members and introduced a corridor mechanism to determine employer contributions. ▪ Changed retirement eligibility to Rule of 70 for members sworn in after 10/9/04. ▪ COLA modified to be the 5 year smoothed return minus 5%, min 0% max 4%. Also, three-year COLA freeze for members under 70 years of age. ▪ Modified DROP. No DROP entry after June 30, 2027. No COLAs credited to accounts after 7/1/2017, interest credit is 65% of the 5-year compounded average investment return, min 2.5%. DROP participation limited to 20 years, no recalculation of annuity at DROP exit. ▪ No new funds may be added to PROP accounts. 	<ul style="list-style-type: none"> ▪ Increased employee contributions (below) and introduced a corridor mechanism to determine employer contributions . ▪ Group A: From 5% to 7% for FYE 2018; 8% thereafter □ Group B: From 0% to 2% for FYE 2018; 4% thereafter □ Group D: From 0% to 3% (2% service benefit; 1% for cash balance benefit ▪ Created cash balance benefit for Group D participants equal to 1% employee contributions credited with DROP interest crediting rate. ▪ COLA equal to 50% of the rolling 5 year net investment return minus 2.00% less than the assumed rate of return (currently 5.00%), not less than 0.00% or greater than 2.00%. ▪ Modified DROP (Groups A and B). Interest is based on rolling 5 year net investment return; COLAs credited on or after 62 years of age.

Houston Systems (SB 2190) – Corridor

- The bill established a unique funding policy that establishes a "target" contribution rate (or corridor midpoint) for the City, developed a minimum and maximum corridor around the City's target contribution rate (equal to +/- 5% of the projected midpoint), and defined steps to be taken should the annual calculated contribution move outside the corridor.
- The corridor was established in the initial **risk sharing valuation study (RSVS)**, and will not change.
- Separate annual RSVSs are prepared by the systems and City to establish the contribution rates.
- If the City and the systems' estimated contribution rates differ by more than 2%, their actuaries must reconcile the rates until the difference falls below 2%. If it cannot be reconciled, the arithmetic average will be used. If there is no difference, the systems' contribution rates will be used.

PRB Review of RSVS

- After completion of the annual RSVS, the system and City jointly submit a copy to the PRB for a determination that the RSVSs comply with statute. If not, the PRB shall notify the governor, lieutenant governor, the speaker of the house of representatives, and legislative committees with principal jurisdiction over pension issues.

Houston Systems (SB 2190) – Additional Items

Additional Reporting Requirements

- The bill requires the three systems to conduct actuarial experience studies at least every 4 years, with the first study adopted as follows:
 - ❑ HFRRF by September 30, 2020
 - ❑ HPOPS by September 30, 2022
 - ❑ HMEPS by September 30, 2021.
- The systems must perform an audit of investments at least once every 3 years.

Alternative Retirement Plans

- The three retirement systems' boards and the City **may** enter into a written agreement to offer an alternative retirement plan or plans, including a cash balance retirement plan, if both parties consider it appropriate.
- The respective boards **are required to** close the existing plan to new entrants and establish a separate cash balance plan for new hires under the following circumstances:
 - ❑ For HFRRF and HPOPS, if the plan's funded ratio falls below 65% at any time after June 30, 2021
 - ❑ For HMEPS, if the plan's funded ratio falls below 60% at any time after June 30, 2027

Houston Systems (SB 2190) – Impact Houston Firefighters’

HFRRF	Prior to SB 2190*	After SB 2190*	2017 RSVS
Discount Rate	7.00%	7.00%	7.00%
Accrued Actuarial Liability (AAL)	\$5,189,396,000	\$4,551,412,000	\$4,827,721,000
Actuarial Value of Assets (AVA)	\$4,089,047,000	\$3,729,670,000	\$3,883,807,000
Unfunded Accrued Actuarial Liability (UAAL) (AAL - AVA)	\$1,100,349,000	\$821,742,000	\$943,914,000
Funded Ratio	78.80%	81.95%	80.45%
Total Employer Contribution	52.20%	30.60%	32.99%

*Prepared by Conduent at the Request of HFRRF

Houston Systems (SB 2190) – Impact

Houston Police Officers

HPOPS	Prior to SB 2190	After SB 2190	2017 RSVS
Discount Rate	7.00%	7.00%	7.00%
Accrued Actuarial Liability (AAL)	\$6,894,274,000	\$6,081,391,000	\$6,218,293,000
Actuarial Value of Assets (AVA)	\$4,758,079,000	\$4,758,079,000	\$4,868,614,000
Unfunded Accrued Actuarial Liability (UAAL) (AAL - AVA)	\$2,136,195,000	\$1,323,312,000	\$1,349,679,000
Funded Ratio	69.01%	78.24%	78.30%
Total Employer Contribution	52.96%	31.77%	31.85%

Houston Systems (SB 2190) – Impact

Houston Municipal Employees

HMEPS	Prior to SB 2190	After SB 2190	2017 RSVS
Discount Rate	7.00%	7.00%	7.00%
Accrued Actuarial Liability (AAL)	\$5,509,951,000	\$4,734,999,000	\$4,866,031,000
Actuarial Value of Assets (AVA)	\$2,400,023,000	\$2,625,896,000	\$2,742,539,000
Unfunded Accrued Actuarial Liability (UAAL) (AAL-AVA)	\$3,109,928,000	\$2,109,103,000	\$2,123,492,000
Funded Ratio	43.56%	55.46%	56.36%
Total Employer Contribution	39.22%	27.84%	29.00%