

**City of Plano, Texas Retirement Security Plan**

**Actuarial Audit of the December 31, 2017 Valuation**

**Final Actuarial Audit Report**

**November 2018**

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November 5, 2018

City of Plano  
1520 K Avenue, 1<sup>st</sup> Floor, Suite 130  
Plano, TX 75074

Re: City of Plano, Texas Retirement Security Plan  
Final Actuarial Audit of the December 31, 2017 Valuation

Dear Board Members:

The enclosed report presents the findings and comments resulting from a detailed review of the actuarial valuation services performed by your retained actuary, Gabriel, Roeder, Smith & Company (GRS). Milliman was selected to undertake this review by the City of Plano (City) Board.

A preliminary draft of the actuarial audit report was submitted to the City on October 3, 2018. We received a response to our preliminary draft report from the City on October 15, 2018. Section 10 of this report (Summary of Recommendations & Considerations) was expanded to include the response prepared by the City.

In accordance with Texas Government Code §802.1012, we have submitted this final audit report and included the response received from the City not earlier than the 31<sup>st</sup> day and not later than the 60th day after the October 3, 2018 date of the preliminary draft report. This final report must be submitted to your governing body at its next regularly scheduled meeting and to the Texas Pension Review Board within 30 days after the date of your receipt of this final audit report.

An overview of our major findings is included in the Executive Summary section of the report. More detailed commentary on our review process and some suggested recommendations are included in the latter sections.

In preparing this report, we relied on information (some oral and some in writing) supplied by the City's staff and directly from GRS. This information includes, but is not limited to, plan provisions, employee data and financial information. In our examination of these data, we have found them to be reasonably consistent and comparable with data reported and used for other purposes. While our audit reviewed the methods and assumptions used by GRS to develop the actuarial liabilities, we did not audit the data supplied to GRS for the actuarial valuation. It should be noted that if any data or other information provided to us is inaccurate or incomplete, our recommendations may need to be revised.



On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board (ASB) and the Code of Professional Conduct and Qualification Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

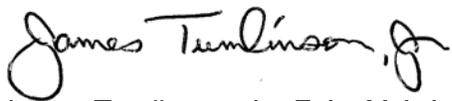
Any distribution of the enclosed report must be in its entirety including this cover letter, unless prior written consent is obtained from Milliman, Inc.

We would like to express our appreciation to you and your staff, as well as to GRS, for the timely cooperation provided to us in supplying the data on which this report is based.

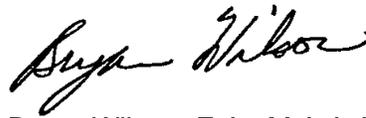
We, James Tumlinson, Jr. and Bryan Wilson, are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

We respectfully submit the following report, and we look forward to discussing it with you and the Board.

Sincerely,



James Tumlinson, Jr., E.A., M.A.A.A.  
Principal & Consulting Actuary



Bryan Wilson, E.A., M.A.A.A.  
Consulting Actuary



**City of Plano, Texas Retirement Security Plan  
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**Section 1**

**Executive Summary**

***Purpose and Scope of the Actuarial Audit***

The purpose of an actuarial audit is to review the work performed by the City's retained actuary to assure the actuarial condition of the Plan (City of Plano, Texas Retirement Security Plan) is accurately measured, and to assess whether the level of contributions, together with the current assets, is sufficient to provide the benefits promised to its participants.

The City has requested that we perform the following tasks regarding the December 31, 2017 actuarial valuation:

- ✓ Evaluate and verify the valuation results, including a review of the data, the degree to which the data is sufficient to support the conclusions of the investigation, and a review of the accuracy of the actuarial calculations
- ✓ Evaluate the actuarial assumptions for consistency, reasonableness and compatibility
- ✓ Evaluate the actuarial cost method and its application for appropriateness
- ✓ Evaluate and verify the current method of asset valuation
- ✓ Evaluate and verify the reasonableness of the calculation of the unfunded liability and the amortization period
- ✓ Determine whether the actuary's reports are accurate and comprehensive
- ✓ Recommend alternate approaches or methods
- ✓ Express an opinion on the reasonableness and accuracy of the valuation results, actuarial assumptions, and application of the actuarial cost method
- ✓ Verify that the valuation meets the requirements of the Texas Pension Review Board Guidelines for Actuarial Soundness, and relevant Actuarial Standards of Practice
- ✓ Confirm the valuation was performed by qualified actuaries

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There are two basic approaches that can be used in an actuarial audit:

1. a “replication” audit, in which the entire actuarial valuation is completely replicated by the review actuary; and
2. a “peer review” audit, in which there is an overall review of the appropriateness of the assumptions and methods. A peer review audit could also include the review of a sample of individual calculations.

The City has requested a peer review audit including the review of a sample of individual calculations. It should be noted that certain situations may not surface based on this limited peer review audit, so there cannot be 100% certainty of the accuracy of the retained actuary’s work. However, this limited peer review audit can give a fairly reasonable sense of confidence that the overall processes and procedures are reasonable. In addition, a peer review audit can reveal some issues that would not necessarily surface in a replication audit. A replication audit focuses on the overall picture, whereas this limited peer review audit is more oriented toward the overall appropriateness of the processes and procedures.

Accordingly, Milliman has performed an actuarial audit on the December 31, 2017 valuation, including a review of individual participant calculations. We also reviewed the December 31, 2013 and December 31, 2015 actuarial valuation reports (valuations performed every other year) for accuracy, consistency, and completeness.

### ***Statement of Key Findings***

Based upon our review of the December 31, 2017 actuarial valuation, other recent valuation reports covering the 2013 through 2016 plan years, and the December 31, 2016 analysis of actuarial assumptions report (based on experience from December 31, 2011 through December 31, 2016), we found the actuarial work we reviewed was reasonable and appropriate. The valuation was performed by qualified actuaries in accordance with generally accepted actuarial standards and principles.

We have a number of recommendations for consideration in the next valuation. These recommendations are discussed in Section 10.

As this was not a replication audit and was only a limited peer review audit, our analysis focused on overall reasonableness of assumptions and methods rather than on a replication of the total liabilities of the System. Overall, we feel the methodology employed to determine plan funding is reasonable and appropriate.

Our conclusions concerning the primary issues of this review are as follows:

- o **Qualifications:** The December 31, 2017 actuarial valuation for the Plan was performed by qualified actuaries and is in accordance with the principles and practices prescribed by the Actuarial Standards Board.
- o **Membership Data:** We performed tests on the valuation data, both on individuals and in aggregate. Based on this review, we feel the data used in the valuation is accurate and appropriate.

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- o **Actuarial Value of Assets:** We have confirmed that the actuarial value of the assets calculated for the December 31, 2017 valuation is accurate and reasonable.
- o **Actuarial Liabilities:** One purpose of this actuarial review is to opine on the reasonableness of the liabilities given the participant data. While we did not perform a full replication audit, we reviewed the data as well as seven individual test cases to develop a general impression that the liability for the active participants seems reasonable. We performed a rough analysis of the liabilities for the inactive participants and believe that the Board can have a high degree of confidence that inactive participants are being valued appropriately.
- o **Funding:** We reviewed the application of the actuarial cost method (entry age normal level percent of pay method) and find it is reasonable and that it meets generally accepted actuarial standards.
- o **Assumptions:** We have found the actuarial assumptions used by GRS for the December 31, 2017 valuation to be reasonable for funding the Plan's benefits. A study to assess the reasonableness of the actuarial assumptions was performed by GRS in 2017 and changes were made to the interest rate, inflation rate, salary increase, payroll growth, retirement, withdrawal, and disability assumptions for the 2017 valuation. Prospectively, we would expect gains and losses to even out if the new assumptions accurately model experience. If a trend of either demographic gains or losses materializes over the next four or five years, then another assumption study would be warranted. The Texas Pension Review Board Pension Funding Guidelines recommend performing a review of actuarial assumptions for reasonableness at least once every five years as a matter of Best Practice. It appears that the City and GRS have been following this guidance completing an actuarial assumptions experience study in 2017. We believe the current assumptions are appropriate and meet the principles prescribed by the Actuarial Standards Board (ASB) in their Standard of Practice No. 27 for economic assumptions and No. 35 for demographic assumptions.
- o **Valuation Report:** In general, we found that the actuarial reports for the three most recent valuation cycles make full disclosure of the information needed by the Plan and each of its various stakeholders: the participants, the employer and the public taxpayers. However, a recommendation for future reports is included in Section 9 of this report.

## Section 2

### Responsibilities of the Auditor under Texas State Law

#### ***Milliman's Responsibilities under Texas Government Code §802.1012***

In 2007 the Texas State Legislature enacted a law that requires certain public retirement systems with total assets (book value), as of the last day of the preceding fiscal year, of at least \$100 million to be audited every five years with respect to the system's most recent actuarial valuations, studies and reports. This may be the first audit conducted for the City since plan assets were less than \$100 million prior to December 31, 2013.

Under the law, the independent actuary conducting the audit must:

- Meet with the manager of the pension fund to discuss the appropriate assumptions to use during the audit
  - Milliman discussed the assumptions to use during the audit with the City on August 8, 2018
- Submit a preliminary draft of the audit report to the retirement system within 30 days of completing the audit
  - Milliman sent a draft audit report to the City on October 3, 2018
- Discuss the preliminary draft with the governing body of the retirement system
  - Milliman discussed the draft report with the City on October 11, 2018
- Request in writing that the governing body of the retirement system submit within 30 days any response that the system wishes to include with the final report
  - Milliman requested that the City submit responses within 30 days of the receipt of the draft report
  - The City submitted a response on October 15, 2018; included in section 10
- Submit to the governmental entity the final audit report, including any response from the retirement system, at least 31 days but not more than 60 days after submitting the preliminary draft

Once the final audit report is issued, the governmental entity must submit a final copy of the audit report to the public retirement system and the Texas Pension Review Board within 30 days. The government entity is also required to maintain a copy of the final audit report at its main office for public inspection.

In addition, at the first regularly scheduled open meeting after receiving the final audit report, the governing body of the governmental entity must:

- Include on the posted agenda for the meeting the presentation of the audit results
- Present the final audit report and any response from the public retirement system
- Provide printed copies of the final audit report and the response from the public retirement system for individuals attending the meeting

### Section 3

### Qualifications

#### ***Audit Conclusions***

The City's Retirement Security Plan actuarial valuations for the 2013, 2015, and 2017 plan years, as well as the actuarial assumptions study completed in 2017, were performed by qualified actuaries and in accordance with the principles and practices prescribed by the Actuarial Standards Board.

#### ***Comments***

The December 31, 2017 actuarial valuation report and the December 31, 2016 actuarial assumptions study were signed by Mr. Daniel White and Mr. Thomas Bevins of GRS. The 2017 actuarial valuation report was also cosigned by Mr. Daniel Siblik of GRS. We believe that these three actuaries were qualified to perform the City of Plano actuarial valuations.

Under the qualification standards issued by the American Academy of Actuaries, an actuary must meet each of the following three requirements to be qualified to render a prescribed statement of actuarial opinion:

- ✓ **Basic Education:** Mr. White is a Fellow in the Society of Actuaries, Mr. Bevins is an Associate in the Society of Actuaries, and Mr. Siblik is a Fellow in the Conference of Consulting Actuaries. This satisfies this requirement.
- ✓ **Experience:** Mr. White, Mr. Bevins, and Mr. Siblik are experienced at performing pension valuations. In particular, Mr. Siblik has noted experience working with public-sector retirement systems. This satisfies this requirement.
- ✓ **Continuing Education:** We verified through the Academy website that all three gentlemen are members of the American Academy of Actuaries. As such, they must meet minimum continuing education requirements to maintain this designation. This continuing membership satisfies the continuing education requirement.

## Section 4

### Actuarial Soundness

#### ***Texas Pension Review Board Pension Funding Guidelines***

We have reviewed the City of Plano's funding policy presented in the December 31, 2017 valuation for compliance with the Texas Pension Review Board (PRB) Pension Funding Guidelines for responsible funding. The Pension Funding Guidelines were adopted January 26, 2017 and effective June 30, 2017. The PRB lists six pension funding guidelines:

- ✓ **The funding of a pension plan should reflect all plan liabilities and assets.** This guideline is satisfied since the valuation reflects all liabilities and assets of the plan.
- ✓ **The allocation of the normal cost portion of contributions should be level or declining as a percent of payroll over all generations of taxpayers, and should be calculated under applicable actuarial standards.** This guideline is satisfied since the normal cost is determined using the Entry Age Normal level percent of pay (EAN) cost method, which allocates the normal cost as a percent of payroll over expected career of active participants.
- ✓ **Funding of the unfunded actuarial accrued liability should be level or declining as a percentage of payroll over the amortization period.** The Unfunded Actuarial Accrued Liability (UAAL) is amortized as a level percent of **projected** earnings (level percent of payroll over closed seventeen-year amortization period).
- ✓ **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 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.** The Unfunded Actuarial Accrued Liability (UAAL) is amortized as a level percent of payroll amount over a closed seventeen-year amortization period, thereby satisfying this guideline.
- ✓ **The choice of assumptions should be reasonable, and should comply with applicable actuarial standards.** Our conclusion is that the assumptions are reasonable and comply with applicable actuarial standards. See Section 8 for more information.
- ✓ **Retirement systems should monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.** The actuary performed a review of the actuarial assumptions in 2017. This being the first actuarial audit, we believe this guideline has been satisfied. Another review is expected by 2022.

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### **Actuarial Standards of Practice**

We compared the work performed in the valuation with the Actuarial Standards of Practice (ASOP) prescribed by the Actuarial Standards Board (ASB). In particular, we confirmed that the work done conforms to the ASB's Code of Professional Conduct and the relevant ASOPs:

- ✓ ASOP #4: *Measuring Pension Obligations* – We believe that GRS's work is consistent with this standard.
- ✓ ASOP #27: *Selection of Economic Assumptions for Measuring Pension Obligations* – We believe that GRS's work is consistent with this standard.
- ✓ ASOP #35: *Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations* – We believe that GRS's work is consistent with this standard with one exception.
  - ASOP #35 calls for the actuary to disclose the rationale for selecting each material demographic assumption; however, the rationale for the actuarial assumptions is not disclosed in the December 31, 2017 actuarial valuation report. Following is an excerpt from ASOP #35:

#### **4.1.2 RATIONALE FOR ASSUMPTIONS**

The actuary should disclose the information and analysis used in selecting each demographic assumption that has a significant effect on the measurement. The disclosure may be brief but should be pertinent to the plan's circumstances. For example, the actuary may disclose any specific approaches used, sources of external advice, and how past experience and future expectations were considered. The disclosure may reference any actuarial experience report or study performed, including the date of the report or study. This section is not applicable to prescribed assumptions or methods set by another party or prescribed assumptions or methods set by law.

- ✓ ASOP #44: *Selection and Use of Asset Valuation Methods for Pension Valuations* – We believe that GRS's work is consistent with this standard.

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**Section 5**

**Actuarial Value of Assets**

***Audit Conclusions***

We have confirmed that the actuarial value of the assets calculated for the December 31, 2017 valuation is accurate and reasonable.

***Comments***

The method used to determine the actuarial value of assets is a five-year smoothing of unexpected returns. The asset gains and losses are measured by the difference between the actual market value of assets at the valuation date compared to the expected value of the assets based on the prior year's market value of assets, the actual benefit payments and contributions, and the expected return for the year. The expected investment return is based on the assumed 7.50% net return per year and the market value of assets at the beginning of the year. The actuarial value of assets is limited to be within 80% and 120% of the market value of assets.

An asset valuation method with five-year smoothing, using a 20% corridor, is appropriate for the development of recommended funding of the System. However, please note that the Governmental Accounting Standards Board (GASB) Statements Nos. 67 and 68 provide accounting standards and guidance which require recognition of UAAL based on a fair value of assets to be shown on the balance sheet for financial reporting.

Please note that the 7.50% investment return assumption has been replaced by 7.00% for periods after December 31, 2017.

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**Section 6**

**Actuarial Liabilities**

***Audit Conclusions***

One purpose of this actuarial review is to verify the benefits and liabilities. Although we were not retained to reproduce the total liabilities of the System, we were provided with enough data to check the reasonableness of the valuation liabilities. Included in the information provided to us by GRS were the liability amounts for seven participants (four active and three inactive participants). We prepared an independent calculation of the liabilities for these seven participants based on the plan provisions, the valuation assumptions, and actuarial cost method. We also performed a rough estimate of the liability for inactive plan participants as commented on below.

***Comments***

We received from GRS the participant data used in the December 31, 2017 valuation. The employee census data is consistent with the information presented in the December 31, 2017 valuation report.

A comparison of the liabilities for the seven individual participants provided by GRS is shown below. As shown, we believe the individual liabilities have been calculated appropriately.

Comparison of 4 Active Lives				
	Milliman		GRS	Ratio
Present Value of Future Benefits	\$	474,621	\$ 474,755	100.0%
Actuarial Accrued Liability	\$	368,552	\$ 372,258	101.0%
Normal Cost	\$	14,810	\$ 15,228	102.8%

Comparison of 3 Inactive Lives				
	Milliman		GRS	Ratio
Term Vested	\$	7,488	\$ 7,624	101.8%
Retired	\$	421,834	\$ 426,492	101.1%
Total Inactive	\$	429,322	\$ 434,116	101.1%

For inactive participants, GRS provided us with historical compensation figures, birth dates and service dates, benefit amounts, and elected forms of benefit payment. We used this information to verify benefit amounts for several vested terminations and retirees and to perform a rough estimate of the total inactive liability. In addition, we used the 'average' active demographic information presented in the 2018 report to develop estimated plan liabilities and costs for an 'average' active participant. We then summed the estimated inactive liability and the estimated active liabilities based on an 'average' active participant.

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We used the census information provided to perform a rough estimate of the total inactive liability, and an aggregate comparison of our calculations to GRS's calculations is shown below.

Comparison of Inactive Liabilities			
	Milliman	GRS	Ratio
Deferred Vested	\$ 2,687,810	\$ 2,653,109	98.7%
Retired	\$ 61,776,932	\$62,443,279	101.1%
Total Inactive Liabilities	\$ 64,464,742	\$65,096,388	101.0%

As a result, we found the total plan liability to be reasonable and consistent with the census data and believe that the Board can have a high degree of confidence that the plan participants are being valued appropriately.

## Section 7

### Funding

#### ***Audit Conclusions***

We reviewed the application of the actuarial cost method and find it is reasonable and that it meets generally accepted actuarial standards. Given the current actuarial cost methods and assumptions, we believe the determination of the employer contribution rate is appropriate.

#### ***Comments***

##### **Cost Method**

The purpose of any actuarial cost method is to allocate the cost of future benefits to specific time periods. Most public plans follow one of a group of generally accepted actuarial cost methods, which allocate the cost over the participants' working years. In this way, benefits are financed during the time in which services are provided.

The entry age normal (level percent of pay) actuarial cost method is being employed in the valuation of the City's Retirement Security Plan. Under this method a projected retirement benefit at assumed retirement age is computed for each participant using anticipated future pay increases. The normal cost for each participant is computed as the level percentage of pay which, if paid from each participant's date of employment by the employer or any predecessor employer (thus, entry age) to his assumed retirement date, would accumulate with interest at the rate assumed in the valuation to an amount sufficient to fund his projected retirement benefit. The normal cost for the plan is the total of the individually computed normal costs for all participants including the costs for any death or disability benefits under the plan. The accrued liability at any point in time for an active participant is the theoretical fund that would have been accumulated on his behalf from his normal cost payments and the earnings thereon for all prior years assuming the plan had always been in effect.

For persons receiving benefits or entitled to a deferred vested retirement income, the accrued liability cost is equal to the present value of their future benefit payments. The accrued liability for the plan is the total of the individually computed accrued liability for all participants. The portion of the actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets, and (b) the actuarial present value of future normal costs is called the unfunded actuarial accrued liability (UAAL). The UAAL, if positive, is amortized as a level percent of compensation or as a level dollar amount.

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The Texas Pension Review Board has recommended that actuarial costs be determined using a method that allocates the normal cost as a level or declining percentage of payroll and allocates liabilities as a level or declining percentage of pay over the amortization period. The cost method being used satisfies these recommendations.

### **Appropriate Funding Level**

GASB provides general guidelines on the appropriate funding of a public retirement system. In general, it expects each system to receive contributions equal to the normal cost plus a payment of the amortization of the UAAL or surplus amount.

The Texas Pension Review Board guidelines suggest that funding should be adequate to amortize the UAAL over a period not exceed 30 years, with 10 to 25 years being a more preferable target. The Plan has a negative UAAL and the recommended contribution rate is determined as the normal cost less a credit for expected return on funding surplus. Had there been a positive UAAL, a 17-year amortization of the UAAL (level percent of pay) would have been added to the normal cost to determine the recommended contribution rate.

We believe the contribution rate determined in the actuarial valuation meets the recommendations of the Texas Pension Review Board Pension Funding Guidelines. However, we would advocate that the application of a credit in determining the recommended contribution rate should be postponed until the Plan reaches a higher threshold of overfunding (e.g., 110% funded). We believe this would provide additional cushion in the event of adverse market performance. Prior to reaching a higher threshold, we would recommend simply using the normal cost, without any credit, as the basis for determining the recommended contribution.

## Section 8

### Actuarial Assumptions

#### ***Audit Conclusion***

We believe the actuarial assumptions are consistent and meet the principles prescribed by the ASB in their Standard of Practice No. 27 for economic assumptions and No. 35 for demographic assumptions. Furthermore, we believe the December 31, 2017 actuarial valuation meets the requirements of the Texas Pension Review Board Pension Funding Guidelines.

#### ***Comments***

The purpose of the actuarial valuation is to analyze the resources needed to meet the current and future obligations of the System. To provide the best estimate of the long-term funded status of the System, the actuarial valuation must be predicated on methods and assumptions that will estimate the future obligations of the System in a reasonably accurate manner.

An actuarial valuation utilizes various methods and two different types of assumptions: economic and demographic. Economic assumptions are related to the general economy and its long-term impact on the System, or to the operation of the System itself. Demographic assumptions are based on the emergence of the specific experience of the System's participants.

In reviewing the assumptions currently used by GRS, we are guided by the ASB Actuarial Standard of Practice No. 4. The actuary is required by the standard to consider the reasonableness of each actuarial assumption independently on the basis of its own merits, of its consistency with each other assumption, and of the degree of uncertainty and potential for future fluctuations. Although a set of assumptions in the aggregate may appear to reflect the System's experience, failing to isolate the individual assumptions can lead to inappropriate results when a particular aspect of the plan or a change in the plan is under review.

Just as certain investment choices have an associated "investment risk," choices in actuarial assumptions have an associated "actuarial risk." Determining the adequacy of the current contribution rates is dependent on the assumptions used to project the future benefit payments and then to discount the value of future benefits to determine the present values. Thus, it is important that the Board understand the sensitivity of the actuarial calculations to the underlying assumptions.

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### ***Milliman's Approach to Experience Studies***

Similar to an actuarial valuation, the calculation of actual and expected experience is a fairly mechanical process. From one actuary to another, you would expect to see very little difference. However, the setting of assumptions is a different story, as it is more art than science. Our general philosophy in making assumption changes includes the following:

- ✓ **Don't Overreact:** When we see significant changes in experience, we generally do not adjust the rates to reflect the entire difference. We will generally recommend rates somewhere between the old rates and the new experience. If the experience during the next study shows the same result, we will probably recognize this trend at that point. On the other hand, if the experience returns closer to its prior level, we will not have overreacted, possibly causing unnecessary volatility in contribution rates.
- ✓ **Anticipate Trends:** If there is an identified trend that is expected to continue, we believe that this should be recognized. An example of this is the retiree mortality assumption. It is an established trend that people are continuing to live longer; therefore, we will usually like to have a higher margin to reflect future expected decreases in mortality rates.
- ✓ **Simplify:** Where there is no material difference in results, we attempt to simplify our assumptions and methods. There is no benefit in adding complexity that does not improve accuracy.

### ***Comments Regarding GRS's Approach***

GRS performed an experience study in 2017. The study considered inflation, investment return, retirement rates, withdrawal rates, disability rates, mortality rates, and salary increases. As a result of the study, changes were made to each of these assumptions except mortality for the December 31, 2017 valuation.

If the assumption changes accurately reflect actual experience, then the Plan should not see a consistent pattern of demographic gains or losses over the next several years. If a pattern does emerge over a four or five year period, then another experience study would be warranted. The Texas Pension Review Board recommends that retirement systems should monitor, review, and report the impact of actual plan experience on actuarial assumptions at least once every five years.

Additionally, according to the Texas Pension Review Board Pension Funding Guidelines, the choice of assumptions should be reasonable and should comply with actuarial standards. We believe that the assumptions used by GRS are consistent with the Guidelines.

### ***Economic Assumptions***

Based on the information and economic environment present in 2017, we believe the economic assumptions used by GRS for the December 31, 2017 valuation were reasonable for purposes of funding the Plan's pension benefits.

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The ASB has adopted ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*. This standard provides guidance to actuaries giving advice on selecting economic assumptions for measuring obligations under defined benefit plans.

As no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience.

Although ASOP 27 was amended to remove “the best-estimate range”<sup>1</sup> from the selection process, the current version of the Standard recognizes that a range of reasonable assumptions may emerge for both an individual actuary and a larger group of practitioners due to the aforementioned considerations. Each economic assumption should still individually satisfy the standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period. The economic assumptions are much more subjective in nature than the demographic assumptions.

The Board should be aware that the Actuarial Liability is directly impacted by these important assumptions. The present value of benefits for participants is impacted by the total return assumption.

In our opinion, the current package of economic assumptions is reasonable for funding the Plan’s benefits. Since economic assumptions are subjective in nature, it is our recommendation that the Board be fully comfortable with the implications of the assumptions. There is an “actuarial risk” associated with the economic assumptions the same as there is an investment risk associated with a given portfolio mix. The assumptions do not affect the actual long-term cost of a plan. The ultimate cost will emerge in accordance with the benefits and expenses that are actually paid.

**Inflation:** Typically, an inflation assumption is used in the valuation to build the assumptions for investment return and wage growth. In addition, for public plans, the future increases in the IRS Code Section 401(a)(17) compensation limit are typically based on the inflation assumption.

Milliman typically sets the inflation assumption using economic statistics that have been accumulated on a monthly basis since 1926 and published in the Bureau of Labor Statistics. The data is based on the national Consumer Price Index, US City Average, All Urban Consumers (CPI-U). For the 10-year period ending in 2017, the average CPI-U increase was 1.62%. For the 30 and 50 year periods ending in 2017, the average increases were 2.57% and 4.09%.

In the 4th Quarter 2017 Survey of Professional Forecasters published by the Philadelphia Federal Reserve Bank, the annual increase in the CPI over the next five and ten years under the intermediate cost assumptions was 2.17% and 2.20%, respectively, and the likely

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<sup>1</sup> Previously, ASOP 27 defined the best-estimate range as “the narrowest range within which the actuary reasonably anticipates that the actual results, compounded over the measurement period, are more likely to fall.”

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range over the ten-year period was 2.00% to 2.30%. Also, the 2017 Social Security Trustees Report assumes 2.6% ultimate CPI in their intermediate forecast.

Based on the above information, Milliman generally recommends a best-estimate inflation assumption of 2.30% (or as high as 2.50%) for valuations performed in 2018. Note that based on similar analyses, we have been consistently recommending a best estimate inflation assumption of 2.30% (or as high as 2.50%) for at least the past three years.

GRS disclosed a general inflation assumption with the December 31, 2017 valuation of 2.50%. The valuation inflation assumption of 2.50% is a reasonable assumption for the inflation assumption.

**Cost of Living Adjustments (COLA):** The Texas Security Plan provides retirees with an annual cost of living adjustment each April 1 based on changes to the Consumer Price Index (CPI), but capped at 4% per annum. As a result, a COLA assumption is used in the actuarial valuation to project the level of future benefits. Typically, a COLA assumption will be the same as the inflation assumption. However, with a 4% annual cap the COLA assumption would typically be slightly less than the inflation assumption to account for the possibility that inflation will exceed 4% in the future. This is the reason the 2015 valuation used a COLA assumption of 2.70% with an inflation assumption of 2.75%.

GRS disclosed a COLA assumption with the December 31, 2017 valuation of 2.50%. This agrees with their recommendation in the 2017 experience study. Since the likelihood of annual inflation exceeding the 4% cap is small, we believe the 2.50% COLA assumption is reasonable. However, we would recommend considering a COLA assumption slightly less than the inflation assumption as a best-estimate COLA assumption.

**Investment Return:** The investment return assumption is one of the primary determinants to allocate the expected cost of the benefits, providing a discount of the estimated future benefit payments to reflect the time value of money. The December 31, 2017 assumption for investment return is 7.00% per year, net of expenses. Prior to the 2017 valuation, the investment return assumption had been 7.50% for the 2015 valuation and 7.75% for the 2013 and 2011 valuations prior to that. The change from 7.50% to 7.00% was one of the results of the 2017 experience study performed by GRS. The study reviewed the 5-year, 10-year, and 15-year historical returns in addition to developing a projected return.

Milliman performed an independent analysis using the December 31, 2017 asset allocation from the auditor's report along with our current capital market assumptions including an inflation assumption of 2.30%. For a 20-year investment horizon, Milliman's capital market assumptions model as of December 31, 2017 produces an expected (mean) return of 5.26%, net of expenses, with a standard deviation of 2.46% and a 20-year reasonable-estimate range of 3.59% to 6.90%. Note that our initial analysis finds that a current investment assumption of 7.00% is somewhat optimistic since it falls outside our initial reasonable-estimate range. However, since we believe that 2.50% is also a reasonable assumption for inflation, we find that a 20-year investment horizon analysis also could also produce a best estimate return assumption of 5.46%, net of expenses, and a reasonable-estimate range up to 7.10% (i.e., 20 basis points higher based on an inflation assumption 20 basis points higher). Thus, using a reasonable inflation assumption of 2.50% our analysis

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finds that a current investment assumption of 7.00% is within a reasonable range of investment return assumptions.

Furthermore, subtracting our best-estimate inflation assumption of 2.30% from our best estimate 20-year return assumption of 5.26% and our estimated high-end of reasonable returns assumption of 6.90% reveals that our underlying best-estimate real rate of return assumption is 2.96% with up to 4.60% being reasonable. Note that the difference between the 2017 valuation investment return assumption of 7.00% and inflation assumption of 2.50% is 4.50% and that this is also within our analysis of reasonable real rates of return for a 2017 valuation. However, we recommend monitoring this assumption concurrent with each new measurement date for continued reasonableness.

**Salary Increases:** Expected salary increases are another economic assumption with material influence on plan liabilities and experience gains and losses. Annual salary increases are a reflection of inflation, productivity, and merit. External influences include national wage and productivity increases, industry trends, and geographic area. Internal employer influences include recent corporate earnings and historical employment practices.

Historically, the valuation has used a salary scale that varied based on age with increases net of inflation and productivity expected to be 5.1% at age 20 and grading down to 0.5% at age 65.

The 2017 experience study reviewed salary increases over the ten-year period ending with 2016. The study concluded that compensation increases overall had been higher than the previous assumption at earlier ages and lower than the previous assumption at later ages. Adjustments were made accordingly and the 2017 valuation used a salary scale that varies based on age with increases net of inflation and productivity expected to be 5.25% at age 20 and grading down to 0.0% at age 65. Based on the experience reviewed, we agree that the new assumptions are reasonable.

### ***Demographic Assumptions***

Demographic assumptions relate to the probability of an active member leaving the System. Studies of demographic experience involve a detailed comparison of actual and expected experience. If the actual experience differs significantly from the overall expected results, or if the actual pattern does not follow the expected pattern, new assumptions are considered. Recommended revisions normally are not an exact representation of the experience during the observation period. Judgment is required to predict future experience from past trends and current evidence, including a determination of the amount of weight to assign to the most recent experience.

Since we have not independently performed an experience study, we will make general observations about the experience study and the appropriateness of the assumption changes. Based on this review, we feel that the demographic assumption changes made for the December 31, 2017 are reasonable but should be monitored as future experience emerges and adjusted as deemed appropriate.

- o **Mortality:** The mortality assumption has generally followed the mortality assumption of the larger Texas Municipal Retirement System (TMRS) or which the City of Plano

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is a member. The mortality assumption was updated for the 2015 valuation to the RP-2000 combined mortality table with blue collar adjustment and generational projection using Scale BB. Pre-retirement mortality is adjusted 54.5% for males and 52% for females. Post-retirement mortality is adjusted 109% for males and 103% for females. These adjustments are made prior to application of the generational projection.

Disabled mortality is the post-retirement assumption set forward three years with a 3% minimum mortality rate.

The Society of Actuaries just released in August 2018, "Exposure Draft: Pub-2010 Public Retirement Plans Mortality Tables Report which includes the development of multiple mortality tables based on public plan experience. We recommend that this report be reviewed prior to the next valuation and that consideration be given to using the Pub-2010 General Employees tables as well as new Pub-2010 tables for retirees, disabled retirees, and contingent survivors for the 2018 valuation.

- o **Retirement:** Plan experience from 2011-2016 as noted in the 2017 experience study supported small changes in the retirement rates for ages 45-69 and extension of the 100% retirement age from 70 to 74.
- o **Termination:** The withdrawal assumption was changed from a service-based table to an age-based turnover table as a result of the 2017 experience study. In our opinion, rates of withdrawal are more highly correlated with service than age. However, age-based tables are commonly used and typically reflect higher rates of withdrawal at younger ages.

We have three recommendations regarding our review of the actuarial assumptions:

1. We recommend considering a considering a COLA assumption slightly less than the inflation assumption as a best-estimate COLA assumption.
2. We recommend a review of the 7.00% investment return assumption as it is at the high end of a reasonable range as determined using Milliman's capital market assumptions. It should be noted that GRS also recommended consideration of 6.75% in their 2017 assumption study.
3. We recommend that consideration be given to using the Pub-2010 General Employees tables as well as new Pub-2010 tables for retirees, disabled retirees, and contingent survivors beginning with the 2018 valuation.

## Section 9

### Review of the Actuarial Valuations

#### ***Audit Conclusions***

In general, the actuarial reports make full disclosure of the information needed by the System and each of its various stakeholders: the participants, the employers and the public taxpayers. However, see the comments below for a recommendation for additional information we believe would be helpful to include in future valuation reports.

#### ***Comments***

We recommend including in the actuarial valuation report a projection of the estimated benefit payments for at least the next 10 years. This can be useful to understand how the System's cash flows are projected to change over time.

In addition, we also recommend a more detailed disclosure of plan assets which identifies various asset classes including cash, fixed income and equity investments, including foreign equity investments.

We also recommend a careful review of the new Actuarial Standard of Practice No. 51 which is effective for measurement dates on or after November 1, 2018, and will require additional information to be provided regarding the different types of risks that can affect the actuarial soundness of the System beginning with the December 31, 2018 valuation.

#### **Reasonableness of Valuation Data**

We received files containing the final data used for the valuation as well as the raw data from the City of Plano. Based on the information provided, we believe GRS followed acceptable and appropriate procedures of data auditing.

We examined the data for general reasonableness and compared the basic census with summaries presented in the December 31, 2017 report. We feel the data used in the valuation is accurate and appropriate.

## Section 10

### Summary of Recommendations & Considerations

#### ***Recommendations and Considerations***

Our conclusions, which are addressed in detail in other sections of this report, and the response from the City of Plano are summarized below.

- ✓ We recommend deferring the application of a credit in determining the recommended contribution rate until the Plan reaches a higher threshold of overfunding than 100% (e.g., 110% funded). We believe this would provide additional cushion in the event of future adverse market performance. Prior to reaching a higher threshold, we would recommend simply using the normal cost, without any credit, as the basis for determining the recommended contribution.
- ✓ We recommend considering a considering a COLA assumption slightly less than the inflation assumption as a best-estimate COLA assumption.
- ✓ We recommend a review of the 7.00% investment return assumption as it is at the high end of a reasonable range as determined using Milliman's capital market assumptions. It should be noted that GRS also recommended consideration of a 6.75% investment return assumption in their 2017 study.
- ✓ We recommend including in the actuarial valuation report a projection of the estimated benefit payments for at least the next 10 years. This can be useful to understand how the System's cash flows are projected to change over time.
- ✓ We recommend adding an asset allocation exhibit to the report illustrating the various investments of the trust.
- ✓ We recommend explicit language be added to the Summary of Actuarial Assumptions to document the basis for each of the demographic assumptions.
- ✓ We recommend that consideration be given to using the Pub-2010 General Employees tables as well as new Pub-2010 tables for retirees, disabled retirees, and contingent survivors beginning with the 2018 valuation.

#### ***Response by the City of Plano***

In relation to your recommendations, the City will work with the actuary (GRS) to review and address the recommendations identified by Milliman.

## Appendix A

### Summary of December 31, 2017 Actuarial Valuation Assumptions

#### Demographic Assumptions

##### Mortality

- Actives: Gender distinct RP-2000 Combined Healthy Mortality Table with Blue Collar Adjustment, with male rates multiplied by 54.5% and female rates multiplied by 51.5%, with generational improvement scale BB
- Service Retirees, Beneficiaries, and Inactive Participants: Gender distinct RP-2000 Combined Healthy Mortality Table with Blue Collar Adjustment, with male rates multiplied by 109% and female rates multiplied by 103%, with generational improvement scale BB
- Disabled: Gender distinct RP-2000 Combined Healthy Mortality Table with Blue Collar Adjustment, with male rates multiplied by 109% and female rates multiplied by 103%, set forward three years. In addition, a 3% minimum mortality rate will be applied. Rates will be projected on a generational basis using scale BB subject to the 3% minimum.

##### Termination Rates

- Age-based rates with select ages illustrated below

<u>Age</u>	<u>Male</u>	<u>Female</u>
20	30.00%	35.00%
25	20.00%	25.00%
30	9.50%	20.00%
35	6.75%	15.00%
40	4.00%	10.00%
44+	4.00%	6.00%

##### Retirement Rates

- Based on age

<u>Age</u>	<u>Male</u>	<u>Female</u>
45-49	5%	4%
50-52	5%	6%
53	8%	6%
54	8%	10%
55-56	12%	12%
57	12%	15%
58-59	14%	20%
60	16%	25%
61	20%	25%
62-63	25%	25%
64-65	30%	30%
66	25%	20%
67-70	20%	20%
71	20%	25%
72	20%	50%
73	50%	50%
74+	100%	100%

## Appendix A - continued

### Disability Rates

- Age-based rates with select ages illustrated below

<u>Age</u>	<u>Rate</u>
20	0.0004%
25	0.0025%
30	0.0099%
35	0.0259%
40	0.0494%
45	0.0804%
50	0.1188%
55	0.1647%
60	0.2180%
65	0.2787%

### Salary Scale

- Sample increases as follows

<u>Age</u>	<u>Promotional Rates of Increase</u>	<u>Total Rate including 2.75% General Increase</u>
20	5.25%	8.00%
25	4.00%	6.75%
30	3.00%	5.75%
35	2.00%	4.75%
40	1.50%	4.25%
45	1.20%	3.95%
50	0.95%	3.70%
55	0.70%	3.45%
60	0.50%	3.25%
65	0.00%	2.75%

### Economic Assumptions

Discount Rate = 7.00%, net of expenses

Cost of Living adjustments = 2.50%, except 2.13% (actual) for 2018

Inflation Rate = 2.50%

Payroll Growth Rate = 2.75%

Administrative Expenses = 0.25% of payroll, added to the benefit normal cost

### Cost Method

Entry Age Normal level percent of pay with the amortization of the unfunded actuarial liability over a closed 17-year period as a level percent of payroll. The current intent is that the amortization period will be reduced in successive valuation years until the December 31, 2021 valuation when new amortization bases will be established and separately maintained.

Actuarial Asset Method

5 year smoothing of unexpected returns with a 20% corridor

## Appendix B

### Summary of City of Plano, Texas Retirement Security Plan Provisions as Described in the December 31, 2017 Actuarial Valuation Report

#### Plan Year

- January 1 - December 31

#### Eligibility

- All full-time employees, excluding elected employees, are immediately eligible.

#### Employee Contributions

- None

#### Service

- Credited Service – Days, months, and years of employment less any period of severance. Service prior to the January 1, 1983 effective date excluded from credited service in the computation of benefits.
- Vesting Service – Days, months, and years of employment including any prior TMRS service.

#### Vesting

- 100% after 5 years of Vesting Service; 0% otherwise

#### Compensation Limits

- Statutory \$270,000 limit in 2017

#### Normal Retirement Age

- Age 65 with 5 years of Credited Service

#### Early Retirement Age

- 20 years of Credited Service or age 60 and 5 years of Credited Service

#### Normal Retirement Benefit

- $0.7\% * \text{Final Average Compensation} * \text{years of Credited Service}$ , not to exceed 25 years
- Final Average Compensation defined as highest 36 consecutive months of compensation out of last 120 months

## Appendix B - continued

### Early Retirement Benefit

- Accrued Benefit reduced by 1/15 per year for the first five years prior to Normal Retirement and 1/30 per year for the next five years. Below age 55, benefits are reduced on an actuarial basis.

### Normal Form of Payment

- 5 year certain and life annuity

### Optional Forms of Payment

- life annuity
- 10 year certain and life annuity
- 50% joint and survivor annuity
- 100% joint and survivor annuity
- Lump sum
  - Automatic if less than \$5,000
  - Discretionary if between \$5,000 and \$25,000
  - Not available if greater than \$25,000

### Disability Benefit

- Prior to normal retirement:
  - 60% of the greater of base pay or final average compensation, minus any TMRS benefit
- Upon attainment of age 65:
  - Determined as if the participant had continued employment until the first date participant would have been eligible for a Normal Retirement benefit.

### Death Benefits

- No Active death benefit

### Termination Benefit

- 100% vested after 5 years of service, payable at age 65
- Early commencement requires age 60 and the benefit is reduced 1/15<sup>th</sup> per year prior to age 65

### Cost of Living Adjustment (COLA)

- On April 1<sup>st</sup> of each year, COLA based on CPI not to exceed 4%. COLAs only apply during participant's lifetime. Benefits payable to spouse/beneficiary are not eligible for COLA.