

# Tacoma Employees' Retirement System

Actuarial Audit of the January 1, 2019  
Actuarial Valuation





October 10, 2019

Mr. Timothy Allen, CFA  
Retirement Director  
Chief Investment Officer  
Tacoma Employees' Retirement System

Dear Mr. Allen:

Gabriel, Roeder, Smith & Company (GRS) is pleased to present this report of an actuarial audit of the January 1, 2019 Actuarial Valuation of the Tacoma Employees' Retirement System (TERS). We are grateful to the TERS staff, and Milliman LLC, the retained actuary, for their cooperation throughout the actuarial audit process.

This actuarial audit involves an independent verification and analysis of the assumptions, procedures, methods, and conclusions used by the retained actuary for TERS, in the valuation of TERS as of January 1, 2019, to ensure that the conclusions are technically sound and conform to the appropriate Standards of Practice as promulgated by the Actuarial Standards Board.

GRS is pleased to report to the TERS Board and Staff that, in our professional opinion, the January 1, 2019 Actuarial Valuation prepared by the retained actuary provides a fair and reasonable assessment of the financial position of TERS.

Ms. Woolfrey and Mr. Wood are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Thank you for the opportunity to work on this assignment.

Respectfully submitted,  
**Gabriel, Roeder, Smith & Company**

A handwritten signature in black ink, appearing to read "Dana Woolfrey". The signature is fluid and cursive.

Dana Woolfrey, FSA, FCA, MAAA, EA  
Consultant

A handwritten signature in black ink, appearing to read "Paul Wood". The signature is fluid and cursive.

Paul Wood, ASA, FCA, MAAA  
Consultant

# Table of Contents

	<u>Page</u>
<b>Section A</b> Executive Summary.....	2
<b>Section B</b> General Actuarial Audit Procedure .....	5
<b>Section C</b> Actuarial Assumptions .....	7
<b>Section D</b> Actuarial Methods and Funding Policy .....	18
<b>Section E</b> Actuarial Valuation Results .....	21
<b>Section F</b> Content of the Valuation Report .....	27
<b>Section G</b> Final Remarks.....	30

## SECTION A

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### EXECUTIVE SUMMARY

# Executive Summary

The City of Tacoma issued a Request for Proposal (RFP) for actuarial services that included an Actuarial Audit of the Tacoma Employees' Retirement System (TERS). The actuarial audit included the January 1, 2019 actuarial valuation performed by the retained actuary. The City selected Gabriel, Roeder, Smith & Company (GRS) to perform the actuarial audit and the project formally commenced in May of 2019.

This Actuarial Audit includes the following:

- A full replication of the January 1, 2019 actuarial valuation based on the same census data, assumptions, and actuarial methods used by the retained actuary.
- Review and analysis of the results as well as a review of the mathematical calculations for completeness and accuracy, based on a detailed review of a representative sample of the current plan participants.
- Verification that all appropriate benefits have been valued and valued accurately.
- Evaluation of the actuarial cost method and the actuarial asset valuation method in use and whether other methods may be more appropriate for TERS.
- Verification of the reasonableness of the calculation of the unfunded actuarial accrued liability and the funding period, given the funding policy.
- Review of the demographic and economic actuarial assumptions for consistency, reasonableness and compatibility. Such assumptions shall include, but are not limited to: mortality, retirement and separation rates, levels of pay adjustments, rates of investment return, and disability factors.
- Assessment of the adherence to relevant Actuarial Standards of Practice (ASOPs) published by the American Academy of Actuaries.

## Summary of Findings

Based on our review, the actuarial valuation, studies, and reports of TERS are reasonable, used appropriate assumptions and adhered to Actuarial Standards of Practice. We feel that no changes are required for the actuarial valuation as of January 1, 2019. We offer the following recommendations for consideration as part of the upcoming experience study, and the subsequent valuation as of January 1, 2020.

### Actuarial Assumptions

- 1) GRS recommends review of the application of decrement timing and determination of retirement eligibility.
- 2) GRS recommends review of the application of salary increase timing.

In addition to reviewing these two items carefully in conjunction with the next experience study, we recommend that these items be disclosed in the assumption section of the actuarial valuation as of January 1, 2020.

### **Actuarial Methods and Funding Policy**

- 3) Although the current asset smoothing method is entirely acceptable under Actuarial Standards of Practice, the Board could consider adopting an asset smoothing method which would minimize artificial volatility.

### **Actuarial Valuation Results**

We found no significant issues in the replication of the aggregate actuarial valuation results and found them to be presented in a reasonable manner.

### **Content of Valuation Report**

- 4) In general, GRS found the report to be comprehensive and informative. GRS has noted minor recommendations which could enhance the report.

## **SECTION B**

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### **GENERAL ACTUARIAL AUDIT PROCEDURE**

## General Actuarial Audit Procedure

At the commencement of this engagement, GRS requested the information necessary to thoroughly review the work product of the retained actuary. Specifically, GRS received and reviewed the following items:

- The most recent actuarial valuation reports as of January 1, 2019,
- The Board presentation associated with the January 1, 2019 actuarial valuation,
- The most recent experience study, dated September 1, 2016, including the associated Board presentation,
- TERS Investment Policy Statement, dated March 2016
- TERS Funding and Benefits Policy, and
- A full set of census data for plan participants and beneficiaries as of January 1, 2019 used by the retained actuary for the actuarial valuation as well as the original data received from TERS Staff.

In performing our review, we:

- Reviewed the appropriateness of the actuarial assumptions,
- Reviewed the actuarial reports/studies,
- Reviewed the census data used for valuation purposes to ensure appropriate use of the raw data,
- Reviewed the census data used to ensure that records were not being lost during processing, and
- Replicated the actuarial valuation process using the same assumptions, methods, and data used by the retained actuary.

The entire review, which follows, is based on our review of this information and subsequent correspondence with the retained actuary for clarification and further documentation.

### Key Actuarial Concepts

An actuarial valuation is a detailed statistical simulation of the future operation of a retirement plan using the set of actuarial assumptions adopted by the Board. It is designed to simulate all of the dynamics of such a retirement plan for each current participant of the plan, including:

- Accrual of future service,
- Changes in compensation,
- Leaving the plan through retirement, disability, withdrawal, or death, and
- Determination of and payment of benefits from the plan.

This simulated dynamic is applied to each active participant of the plan. This simulation results in a set of expected future benefit payments to that participant. Discounting those future payments for the likelihood of survival and at the assumed rate of investment return, produces the Total Present Value of Plan Benefits (TPV) for that participant. The actuarial cost method will allocate this TPV between the participant's past service (actuarial accrued liability) and future service (future normal costs).

## **SECTION C**

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### **ACTUARIAL ASSUMPTIONS**

# Actuarial Assumptions

## Overview

The actuarial valuation report contains a description of the actuarial assumptions which were used in the actuarial valuation as of January 1, 2019. Additionally, the retained actuary published an actuarial experience report, dated September 1, 2016. We have reviewed this report in detail in order to assess the reasonableness of the assumptions used in the actuarial valuation.

The set of actuarial assumptions is one of the foundations upon which an actuarial valuation is based. An actuarial valuation is, essentially, a statistical projection of the amount and timing of future benefits to be paid under the retirement plan. In any statistical projection, assumptions as to future events will drive the process. Actuarial valuations are no exception.

It is important to understand the nature of the retirement plan and the plan sponsor when assessing the reasonableness of the actuarial assumptions. No projection of future events can be labeled as “correct” or “incorrect”. However, there is a “range of reasonableness” for each assumption. We evaluate individual elements as follows:

- Whether or not they fall within the range of reasonableness, and
- If they fall within that range, whether they are reasonable for the actuarial valuation of the plan.

Actuarial assumptions for the valuation of retirement plans are of two types: (i) demographic assumptions, and (ii) economic assumptions. We have assessed the reasonableness of both types as part of this actuarial audit.

## Demographic Assumptions

### General

These assumptions simulate the movement of participants into and out of plan coverage and between status types. Key demographic assumptions are:

- turnover among active participants,
- retirement patterns among active participants, and
- healthy retiree mortality.

In addition, there are a number of other demographic assumptions with less substantial impact on the results of the process, such as:

- disability incidence and mortality among disabled benefit recipients,
- mortality among active participants,
- distribution of form of payment selection, and
- percent of active participants who are married and the relationship of the ages of participants and spouses.

Demographic assumptions for a retirement plan such as TERS are normally established by statistical studies of recent actual experience, called experience studies. Such studies underlie the assumptions used in the valuations.

Once it is determined whether or not an assumption needs adjustment, setting the new assumption depends upon the extent to which the current experience is an indicator of the long-term future.

- Full credibility may be given to the current experience. Under this approach, the new assumptions are set very close to recent experience.
- Alternatively, the recent experience might be given only partial credibility. Thus, the new assumptions may be set by blending the recent experience with the prior assumption.
- If recent experience is believed to be atypical of the future, such knowledge is taken into account.
- Finally, it may be determined that the size of the plan does not provide a large enough sample to make the data credible. In such cases, the experience of the plan may be disregarded and the assumption is set based upon industry standards for similar groups.

The measurement of experience is normally affected by simply counting occurrences of an event. Thus, for example, in reviewing retirement patterns, an actuary might count the number of actual retirees among males aged 55 with 30 years of service. These retirements would be compared against the number of total people in that group to generate a raw rate of retirement for that group. In many cases, especially for the development of withdrawal and healthy mortality rates, these counts are weighted by liability or benefit amount.

Actuarial Standards of Practice (ASOP) No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, applies to actuaries when they are selecting demographic assumptions. In accordance with ASOP No. 35, an actuary should identify the types of demographic assumptions to use for a specific measurement. In doing so, the actuary should determine the following:

- a) The purpose and nature of the measurement;
- b) The plan provisions or benefits and factors that will affect the timing and value of any potential benefit payments;
- c) The characteristics of the obligation to be measured (such as measurement period, pattern of plan payments over time, open or closed group, and volatility);
- d) The contingencies that give rise to benefits or result in loss of benefits;
- e) The significance of each assumption; and
- f) The characteristics of the covered group.

Not every contingency requires a separate assumption. For example, for a plan that is expected to provide benefits of equal value to employees who voluntarily terminate employment or become disabled, retire, or die, the actuary may use an assumption that reflects some or all of the above contingencies in combination rather than selecting a separate assumption for each.

## Observations on Statistical Data Reported and Used

We find that the statistical data included in the experience study was minimal, including only actual and expected counts in total. We recommend that exposure data be included, and that actual and expected counts be included at individual age and service levels for major decrements, if only as an appendix to the report. Including this information in the upcoming experience study, in conjunction with including a status reconciliation report in the actuarial valuation each year, will allow future reviewing actuaries to make a better assessment of the reasonability of assumptions.

In addition, we recommend that the exposure, expected and actual data be reviewed carefully as it relates to the recommendation regarding timing of eligibility assessment in the valuation. As it stands currently, members may be eligible for retirement in the projected valuation year one year prior to their first year of eligibility recognized in the valuation. For example, a member that is age 54 and 2 months with sufficient service at the valuation date will not be considered retirement eligible during the first year of the valuation, which covered January 1, 2019 through December 31, 2019. However, we know that they will become eligible in the last couple months of the calendar year.

Those actual retirements need to be captured in the retirement experience. The experience study report indicates that the actual rates were examined to determine if there were increased retirements at first eligibility and that no significant increases were observed. That may be the case, but we recommend paying particularly close attention to the retirement data for members that retired at first eligibility to make sure it is captured in the actual retirements appropriately.

## Observations on Assumptions

Overall, it appears that the current demographic assumptions are reasonable and the gains and losses in the report indicate no significant biases. Below, we offer general observations and considerations for the retained actuary based on our experiences with similar plans.

*Retirement* –The rates at which participants are assumed to retire are based on the member’s age and eligibility for full or reduced benefits. This assumption structure seems reasonable. The current assumption was developed to be consistent with the actual experience of the System. It appears that some increased actual retirements at full eligibility at young ages were not reflected in the rates, but we expect that this was because there was minimal data at these ages on which to base the rates and limited credibility was applied.

*Turnover* – The rates at which participants are assumed to terminate for reasons other than retirement, death or disability are based on the member’s service. This assumption structure is reasonable and typical. The most recent experience study showed increases in actual turnovers compared to prior experience and to the assumption in place, particularly at short service levels and particularly among females. This may be an indication of trends observed in the workforce of shorter job tenures. The current assumption was developed to be consistent with the actual experience of the System; however, Milliman maintained some conservatism in the rates. We agree with that decision. However, if this trend

continues, there may be some room to further increase the termination rates in the upcoming study which may improve the funding results.

*Mortality* – The main demographic assumption in an actuarial valuation is mortality because this assumption is a predictor of how long pension payments will be made by the trust. The current mortality assumption for each type of plan member (i.e., active members, healthy retirees, and disability retirees) is generally based on the applicable RP-2014 mortality tables published by the Society of Actuaries (SOA) based on a 50/50 blend of the Blue Collar and White Collar variants for males and 100% of the Blue Collar variant for females.

We concur with using variants of the RP-2014 mortality tables. The extent to which the data supported a Blue Collar adjustment was surprising to us. We would expect that the makeup of the Tacoma workforce would include both administrative and labor positions. Accordingly, we would not expect that the female retirees would need a fully blue collar table and even then *still* have an actual to expected ratio well in excess of 100 percent. We would have been very cautious about applying that much weight to the Blue Collar variants, and possibly would have given less Blue Collar weighting that resulted in higher actual to expected ratios until getting more years of experience to support the heavy weighting. However, the retiree gain/loss history included in the valuation report shows that actual plan experience continues to support the assumption chosen.

It should also be noted that the SOA also issued the Pub-2010 Public Retirement Plans Mortality Tables Report in January 2019 which presents public plan mortality tables based on public plan participant mortality experience from 2008 to 2013. The report separately identifies mortality tables for three separate job classifications, comprised of General Employees, Teachers, and Public Safety Employees. We recommend that the retained actuary consider the applicability of these Pub-2010 tables in the next actuarial experience study. However, we have not found these new tables to be a better fit than the RP-2014 tables in all instances.

Additionally, the retained actuary utilizes a generational mortality assumption to incorporate future mortality improvements into the actuarial valuation using a one-dimensional mortality improvement scale developed by Milliman. We feel that a one-dimensional approach can be appropriate and often use this approach ourselves. The table developed by Milliman is in line with the ultimate rates of standard tables published by the Society of Actuaries.

*Disability Incidence* –The disability incidence rates are age-based, appear reasonable and are largely immaterial to the valuation.

*Portability Loads* – While difficult to assess this assumption without the actual data, there is evidence that Milliman investigated this assumption to the extent possible with the data that is available. We find it appropriate and commendable that Milliman reached back further into the historical data to help develop this assumption.

## Economic Assumptions

### General

These assumptions simulate the impact of economic forces on the amounts and values of future benefits. Key economic assumptions are the assumed rate of investment return and assumed rates of future salary increase. All economic assumptions are built upon an underlying inflation assumption.

ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, applies to actuaries when they are selecting economic assumptions. ASOP No. 27 states that each economic assumption selected by the actuary should be reasonable. For this purpose, an assumption is reasonable if it has the following characteristics:

- a) It is appropriate for the purpose of the measurement;
- b) It reflects the actuary's professional judgment;
- c) It takes into account historical and current economic data that is relevant as of the measurement date;
- d) It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and
- e) It has no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included and disclosed, or when alternative assumptions are used for the assessment of risk.

Additionally, ASOP No. 27 states that communications regarding actuarial reports subject to this standard should contain the following:

- a) A description of each significant assumption used in the measurement and whether the assumption represents an estimate of future experience, and
- b) A description of the information and analysis used in selecting each economic assumption that has a significant effect on the measurement.

### Inflation

Inflation refers to mean price inflation as measured by annual increases in the Consumer Price Index (CPI). This inflation assumption underlies most of the other economic assumptions. It primarily impacts investment return and salary increases.

The current explicit inflation assumption is 2.75%. The inflation assumption was lowered from 3.00% to 2.75% based on the experience study report, dated September 1, 2016. At the time of the experience study, this was a reasonable recommendation and given that TERS completes experience studies on a regular four-year cycle, it was reasonable to continue using that assumption in the January 1, 2019 valuation. However, we might expect a recommendation to lower that assumption in the upcoming experience study.

We did note a fairly strong emphasis on the peer group information Public Plan Database information as support for the 2.75% recommendation. The other statistics provided would possibly have led to a lower

recommendation. We would caution against placing too much reliance on the peer group comparison data. Often this data reflects a certain amount of lag in assumptions. Including the same exhibit, but only for systems that have done an experience study in the last year or two, may produce significantly different (likely lower) results. In addition, the assumptions should be reasonable on their own merit, without reliance on peer group justification.

In regard to current inflation metrics, all investment consulting firms used in our analysis, in setting their capital market assumptions, currently assume that inflation will be at or below 2.50%. In our review of the 2019 capital market assumption sets for the fourteen investment consulting firms listed on the next page, the average assumption for inflation was approximately 2.18%, with a range of 1.70% to 2.50%. It should be noted that all of these investment consulting firms set their assumptions based on approximately a ten-year outlook, while actuaries generally must make longer projections.

In the Social Security Administration's 2019 Trustees Report, the Office of the Chief Actuary projected a long-term average annual inflation rate of 2.60% under the intermediate cost assumption. These inflation assumptions forecasts have not materially changed for several years.

The Philadelphia Federal Reserve conducts a quarterly survey of the Society of Professional Forecasters. In their forecast for the third quarter of 2019, they forecasted inflation over the next ten years to average 2.10% to 2.20%.

It is possible that the current inflation assumption may still be considered reasonable as part of the upcoming experience, but current economic forecasts point to downward pressure on this assumption.

### Investment Return

The investment return assumption is one of the principal assumptions in any actuarial valuation of a retirement plan. It is used to discount future expected benefit payments to the valuation date, in order to determine the liabilities of the retirement plan. Even a small change to this assumption can produce significant changes to the liabilities and contribution rates. The current assumption incorporates inflation of 2.75% per annum plus an annual real rate of return of 4.25%, net of investment-related expenses paid from the trust, for an assumed nominal rate of return of 7.00%.

We believe an appropriate approach to reviewing an investment return assumption is to determine the median expected portfolio return given the TERS target asset allocation and a given set of capital market assumptions. Per the TERS Investment Policy Statement, approved March, 2016, the TERS target asset allocation is:

<b>Asset Class</b>	<b>Target</b>
Global Equity	33.5%
Low Volatility Global Equity	8.0%
Private Equity	10.0%
Fixed Income	
Investment Grade	15.0%
High Yield	9.0%
TIPS	5.0%
Emerging Market Debt	5.0%
Real Estate	4.5%
Real Assets	10.0%
<b>Total</b>	<b>100.0%</b>

Because GRS is a benefits consulting firm and does not develop or maintain our own capital market assumptions, we reviewed assumptions developed and published by the following investment consulting firms:

- Aon Hewitt
- BNY Mellon
- Callan
- JPMorgan
- Marquette
- Mercer
- Maketa
- NEPC
- Blackrock
- Cambridge
- Verus
- Wilshire
- Voya
- RVK

These investment consulting firms periodically issue reports that describe their capital market assumptions, that is, their estimates of expected returns, volatility, and correlations. While these assumptions are developed based upon historical analysis, many of these firms also incorporate forward looking adjustments to better reflect near-term expectations. The estimates for core investments (i.e. fixed income, equities, and real estate) are generally based on anticipated returns produced by passive index funds.

Given the TERS target asset allocation and the investment firms' capital market assumptions for 2019, the development of the average nominal return, net of investment fees paid from the trust, is provided in the following table:

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)-(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Investment Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	5.53%	2.20%	3.33%	2.75%	6.08%	0.00%	6.08%	11.18%
2	6.68%	2.50%	4.18%	2.75%	6.93%	0.00%	6.93%	12.53%
3	6.74%	2.50%	4.24%	2.75%	6.99%	0.00%	6.99%	11.47%
4	6.29%	2.20%	4.09%	2.75%	6.84%	0.00%	6.84%	9.78%
5	6.52%	2.00%	4.52%	2.75%	7.27%	0.00%	7.27%	10.18%
6	7.04%	2.21%	4.83%	2.75%	7.58%	0.00%	7.58%	12.62%
7	7.15%	2.26%	4.89%	2.75%	7.64%	0.00%	7.64%	12.79%
8	7.12%	2.25%	4.87%	2.75%	7.62%	0.00%	7.62%	12.50%
9	7.05%	2.00%	5.05%	2.75%	7.80%	0.00%	7.80%	11.93%
10	7.36%	2.31%	5.05%	2.75%	7.80%	0.00%	7.80%	11.64%
11	7.51%	2.30%	5.21%	2.75%	7.96%	0.00%	7.96%	11.35%
12	7.68%	2.15%	5.53%	2.75%	8.28%	0.00%	8.28%	12.28%
13	7.28%	1.70%	5.58%	2.75%	8.33%	0.00%	8.33%	11.39%
14	7.77%	2.00%	5.77%	2.75%	8.52%	0.00%	8.52%	9.66%
<b>Average</b>	<b>6.98%</b>	<b>2.18%</b>	<b>4.80%</b>	<b>2.75%</b>	<b>7.55%</b>	<b>0.00%</b>	<b>7.55%</b>	<b>11.52%</b>

We determined for each firm the expected nominal return rate based on the TERS target asset allocation, and then subtracted that firm's expected inflation to arrive at their expected real return in column (4). Then we added back the TERS current 2.75% inflation assumption to get a net nominal return. As the table shows, the resulting average one-year expected return of the 12 firms is 7.55%.

In addition to examining the expected one-year return, it is important to review anticipated volatility of the investment portfolio and understand the range of long-term net returns that could be expected to be produced by the investment portfolio. Therefore, the following table provides the 40<sup>th</sup>, 50<sup>th</sup>, and 60<sup>th</sup> percentiles of the 20-year geometric average of the expected nominal return, net of investment-related expenses paid from the trust, as well as the probability of exceeding the current 7.00% assumption.

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of exceeding 7.00%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	4.87%	5.49%	6.12%	27.33%
2	5.50%	6.21%	6.91%	38.76%
3	5.74%	6.38%	7.03%	40.42%
4	5.85%	6.40%	6.95%	39.13%
5	6.22%	6.79%	7.36%	46.24%
6	6.14%	6.84%	7.56%	47.79%
7	6.18%	6.89%	7.61%	48.48%
8	6.21%	6.91%	7.61%	48.65%
9	6.47%	7.14%	7.81%	52.13%
10	6.53%	7.18%	7.83%	52.75%
11	6.73%	7.37%	8.01%	55.79%
12	6.91%	7.59%	8.28%	58.66%
13	7.10%	7.74%	8.38%	61.56%
14	7.55%	8.10%	8.64%	69.60%
<b>Average</b>	<b>6.29%</b>	<b>6.93%</b>	<b>7.58%</b>	<b>49.09%</b>

The table above shows that the resulting 20-year geometric average of the expected nominal return is 6.93%. Additionally, the table above documents that the average probability of exceeding the current 7.00% investment return assumption over a 20-year period is 49%.

Given this average median return of 6.93%, the 2016 timing of the experience study (at which time real return expectations were higher), and the regularly scheduled experience studies, we feel a 7.00% investment return assumption can be supported for use in the 2019 valuation.

However, given the pressure on the inflation assumption, as well as some recent changes to the target asset allocation, we feel there may be downward pressure on this assumption in the upcoming experience study.

### Expenses

The investment return assumption is stated net of expected investment-related expenses from the trust. Accordingly, the actuarial valuation includes an explicit assumption for administrative expenses of 0.80% of payroll. This is our preferred approach and a reasonable assumption based on past experience.

## Earnings Progression

In general, assumed rates of pay increase are often constructed as the total of three main components:

- Price inflation – currently 2.75%
- Economic Productivity Increases – currently 1.00%
- Merit, Promotion, and Longevity – This portion of the salary increase assumption reflects components such as promotional increases as well as increases for merit and longevity. This portion of the assumption is not related to inflation. The current assumptions vary this component based on the participant's current service.

This structure is reasonable and our preferred approach. The productivity increase assumption is supportable. The merit assumption looks reasonable given the experience study data which appropriately isolated the merit and longevity component of the salary increase experience.

## **Summary**

The set of actuarial assumptions and methods, taken in combination, are within the range of reasonableness and established in accordance with ASOP No. 27 and ASOP No. 35.

We have the no recommended changes to the actuarial assumptions. We only recommend particularly careful attention be paid to the retirement experience data in the context of the eligibility timing issue in the upcoming experience study.

## SECTION D

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### **ACTUARIAL METHODS AND FUNDING POLICY**

# Actuarial Methods and Funding Policy

## Actuarial Cost Methods

The ultimate cost of TERS is equal to the benefits paid plus the expenses related to operating TERS. This cost is funded through City and member contributions to TERS plus the investment return on accumulated contributions which are not immediately needed to pay benefits or expenses. The level and timing of the contributions needed to fund the ultimate cost are determined by the actuarial assumptions, plan provisions, participant characteristics, investment experience, and the actuarial cost method.

An actuarial cost method is a mathematical process for allocating the dollar amount of the Present Value of Benefits (PVB) between future normal costs and the Actuarial Accrued Liability (AAL). The retained actuary uses the Entry Age Normal actuarial cost method, characterized by:

- (1) Normal Cost (NC) – the level percent of payroll contribution, paid from each participant’s date of hire to date of retirement, which will accumulate enough assets at retirement to fund the participant’s projected benefits from retirement to death.
- (2) Actuarial Accrued Liability – the excess of the PVB over the present value of all future remaining normal costs.

The Entry Age Normal actuarial cost method is the most prevalent funding method in the public sector. It is appropriate for the public sector because it produces costs that remain relatively stable as a percentage of payroll over time, resulting in intergenerational equity for taxpayers. Historically, most public plans have used the Entry Age Normal actuarial cost method.

We have reviewed the retained actuary’s application of the Entry Age Normal actuarial cost method and we believe that the method is reasonable and appropriately applied.

## Asset Valuation Method

Sharp short-term swings in market value can result in large fluctuations in the actuarially determined contributions. Thus, many actuaries use an asset valuation method which smooths out these fluctuations in support of achieving level contributions. A good asset valuation method places values on a retirement plan’s assets which are related to current market value but which will also produce a smoother pattern of costs.

ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*, provides a framework for the determination of the actuarial value of assets (AVA) emphasizing that the method should bear a reasonable relationship to the market value of assets (MVA), recognize investment gains and losses over an appropriate time period, and avoid systematic bias that would overstate or understate the AVA in comparison to MVA.

The actuarial valuation of TERS currently utilizes an asset valuation method that smooths market value gains and losses over four years as compared to the assumed 7.00% rate of return. The smoothing

method used for the actuarial valuation of TERS is very common among public employee retirement systems and complies with ASOP No. 44. Additionally, this method is reasonable and appropriately applied for the valuation.

There are methods that compress individual gain and loss bases if there are offsetting gains and losses. In a situation of a significant loss followed by a large recovery (or vice versa), a “return to normal” type situation, these methods will more quickly reduce the gap between smoothed and market values, and in general, further reduce the volatility of results over traditional methods. The Board may wish to consider an asset smoothing method with this approach.

## **Funding Policy**

The TERS Board of Trustees approved a Funding and Benefits Policy July 14, 2016. We find this policy to be very responsible and thoughtful. The policy instructs the Board to weigh numerous factors and does not force them into a single decision, which can often render a funding policy unsustainable. However, it does provide guidelines and priorities. The statement “Funding Ratios between 100% and 120% should be viewed as desirable reserves to offset future adverse events and not as surplus funds” is an incredibly important message, one that should be repeated as often as possible in the defined benefit community.

## SECTION E

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### ACTUARIAL VALUATION RESULTS

## Actuarial Valuation Results

To verify the accuracy of the retained actuary's valuation results, GRS performed an independent valuation of TERS as of January 1, 2019. The replication valuation was based on the final valuation data provided by the retained actuary and the same methods and procedures that were used by the retained actuary. GRS was pleased to have the chance to perform an audit that included both a full replication and review of individual test cases. Most audits include only one or the other and using this approach does not guarantee that two wrongs aren't making a right in terms of the aggregate results. In addition, GRS requested the present value of benefits by participant before the test life request was established, ensuring that the test lives that we received after were actually associated with the results that were used to develop the aggregate funding results. We feel Milliman went above and beyond providing this information for each participant, and we particularly thank them for their cooperation in this matter.

Generally accepted actuarial standards and practices provide actuaries with the basic mathematics and frameworks for calculating the actuarial results. When it comes to applying those actuarial standards to complex calculations, differences may exist due to individual opinion on the best way to make those complex calculations. This may lead to differences in the calculated results, but these differences should not be material. Generally, differences in actuarial liabilities of 5% or less are considered within acceptable tolerance ranges.

As the following tables show, our replication of the Total Present Value of Benefits was within 1% of the retained actuary's actual result. Further, the replication of the actuarial cost method resulted in an active Actuarial Accrued Liability (AAL) within approximately 2% of the retained actuary's actual result and a normal cost within 1%. This can be considered a highly successful replication of the aggregate results. This replication of the actuarial accrued liabilities indicates that the liabilities presented in the retained actuary's valuation reports provided a reasonable representation of the AAL based on the assumptions, methods and procedures used by the retained actuary in the actuarial valuation. The following table summarizes our replication.

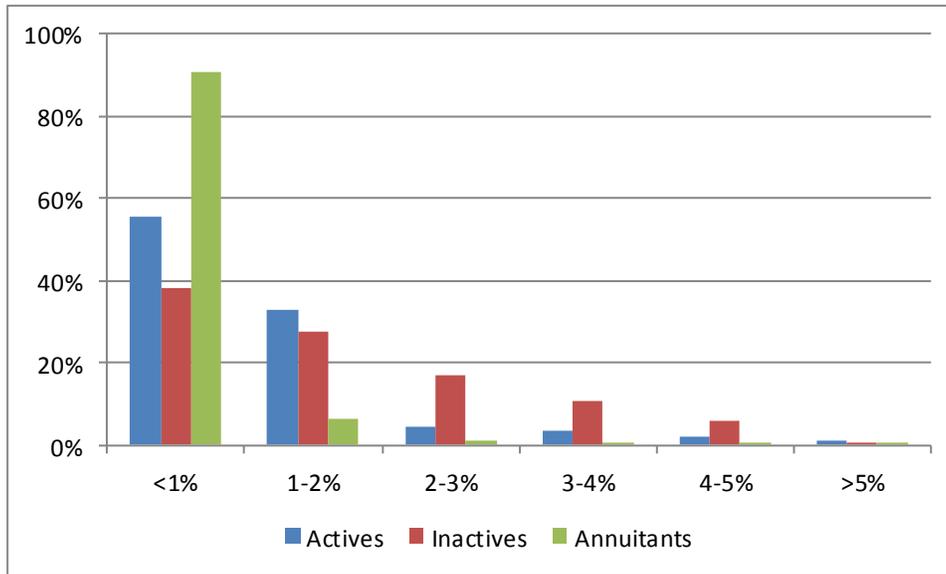
## Aggregate Results

Actuarial Valuation Results as of January 1, 2019			
\$ in millions			
	<u>GRS</u>	<u>Milliman</u>	<u>% Diff</u>
<b>Present Value of Future Benefits</b>			
<b>Active participants</b>			
Service and early retirement	\$ 1,002.9	\$ 1,016.9	-1.4%
Vested termination and return of member contributions	57.8	60.5	-4.5%
Disability retirement	7.0	6.9	1.4%
Survivors' benefits	25.6	22.6	13.3%
<b>Total</b>	<b>\$ 1,093.3</b>	<b>\$ 1,106.9</b>	<b>-1.2%</b>
<b>Inactive and retired participants and beneficiaries</b>			
Service retirement	\$ 900.1	\$ 900.1	0.0%
Disability retirement	5.7	5.7	0.0%
Survivors' benefits	58.6	58.7	-0.2%
Terminated vested benefits	102.9	103.9	-1.0%
<b>Total</b>	<b>\$ 1,067.3</b>	<b>\$ 1,068.4</b>	<b>-0.1%</b>
<b>Grand Total</b>	<b>\$ 2,160.6</b>	<b>\$ 2,175.4</b>	<b>-0.7%</b>

Actuarial Valuation Results as of January 1, 2019		
\$ in millions		
	<u>GRS</u>	<u>Milliman</u>
<b>Accrued Liability</b>		
Active	\$ 682.4	\$ 693.3
Inactives	\$ 1,067.3	\$ 1,068.4
<b>Total</b>	<b>\$ 1,749.7</b>	<b>\$ 1,761.7</b>
<b>Assets</b>	<b>\$ 1,713.9</b>	<b>\$ 1,713.9</b>
<b>Unfunded Actuarial Accrued Liability (UAAL)</b>	<b>\$ 35.8</b>	<b>\$ 47.8</b>
<b>Funded Ratio</b>	<b>98.0%</b>	<b>97.3%</b>
<b>Normal Cost Rate</b>	<b>18.40%</b>	<b>18.53%</b>
<b>Amount Available for Amortization</b>	<b>2.60%</b>	<b>2.47%</b>
<b>Funding Period</b>	<b>5.9 years</b>	<b>8.7 years</b>
<b>Payroll</b>	<b>\$ 258.9</b>	<b>\$ 258.9</b>

## Individual Results

As mentioned, Milliman provided the Total Present Value of Benefits for all individuals with liabilities under the plan. GRS was able to compare this result for *each* individual valued in the liabilities, something which is not considered to be a standard part of the actuarial audit process. The following shows the distribution of the membership by percentage difference in total present value between GRS and Milliman. The percentage of participants off by more than five percent was less than one percent for all categories (active, inactive, and annuitant). For annuitants, 91% of the individual results were off by less than one percent. TERS can feel assured that the results are accurate on both an aggregate and individual level.



In addition to the aggregate results and the individual present value of benefits for each participant, GRS examined the detailed results for 5 active member test cases. The threshold for a successful replication of a single test case is less exact because system rounding differences and timing applications that are considered reasonable by both parties may produce slightly different results. These differences, if there is no bias, will wash out in the aggregate results.

Although the threshold is not as exact, GRS was able to replicate the individual test cases with relative precision, with the total present value for each of the selected active test cases being within 1.1%. The following shows the present value of benefits by decrement and in total for each of the five active test cases:

**Case #1**

Gender	Female		
Age	52.0		
Service	19.7		
	<b>Milliman</b>	<b>GRS</b>	<b>% Diff</b>
Retirement	\$631,777	\$624,197	-1.2%
Termination	0	0	N/A
Death	9,761	10,062	3.1%
Disability	3,354	3,497	4.3%
Refund of EEC	0	0	N/A
<b>Total</b>	<b>\$644,892</b>	<b>\$637,756</b>	<b>-1.1%</b>

**Case #4**

Gender	Male		
Age	26.4		
Service	4.4		
	<b>Milliman</b>	<b>GRS</b>	<b>% Diff</b>
Retirement	\$283,501	\$281,302	-0.8%
Termination	39,571	41,452	4.8%
Death	5,660	6,500	14.9%
Disability	4,971	5,072	2.0%
Refund of EEC	1,606	1,567	-2.4%
<b>Total</b>	<b>\$335,308</b>	<b>\$335,893</b>	<b>0.2%</b>

**Case #2**

Gender	Female		
Age	54.8		
Service	15.8		
	<b>Milliman</b>	<b>GRS</b>	<b>% Diff</b>
Retirement	\$563,685	\$562,384	-0.2%
Termination	0	0	N/A
Death	9,079	9,371	3.2%
Disability	1,977	2,029	2.6%
Refund of EEC	0	0	N/A
<b>Total</b>	<b>\$574,741</b>	<b>\$573,784</b>	<b>-0.2%</b>

**Case #5**

Gender	Female		
Age	28.2		
Service	1.2		
	<b>Milliman</b>	<b>GRS</b>	<b>% Diff</b>
Retirement	\$74,462	\$73,603	-1.2%
Termination	20,536	21,725	5.8%
Death	1,140	1,158	1.6%
Disability	1,385	1,406	1.6%
Refund of EEC	3,584	3,458	-3.5%
<b>Total</b>	<b>\$101,106</b>	<b>\$101,350</b>	<b>0.2%</b>

**Case #3**

Gender	Female		
Age	49.3		
Service	7.2		
	<b>Milliman</b>	<b>GRS</b>	<b>% Diff</b>
Retirement	\$253,570	\$249,279	-1.7%
Termination	39,170	40,601	3.7%
Death	4,734	4,444	-6.1%
Disability	2,694	2,719	0.9%
Refund of EEC	0	0	N/A
<b>Total</b>	<b>\$300,168</b>	<b>\$297,043</b>	<b>-1.0%</b>

Through the process of evaluating the individual active member test lives, GRS did identify some application of eligibility and salary increase timing that we feel should be given particular attention as part of the upcoming experience study.

Milliman has indicated that they use midyear timing for decrements. GRS believes that is the most appropriate decrement timing. This represents an expectation that retirements and terminations will occur throughout the calendar year and that, on average, will occur at middle of year.

However, to evaluate those mid year decrements, Milliman first rounds the age to the nearest integer at the beginning of year and then adds a half year to evaluate eligibility at decrement timing. For the case that we discussed, this process was applied as follows:

Valuation Year	Actual Age		Milliman Application		
	Beginning of Year	End of Year	Beginning of Year	End of Year	Eligible for Retirement During Year?
1	49.3	50.3	49	49.5	No
2	50.3	51.3	50	50.5	No
3	51.3	52.3	51	51.5	No
4	52.3	53.3	52	52.5	No
5	53.3	54.3	53	53.5	No
6	54.3	55.3	54	54.5	No
7	55.3	<b>56.3</b>	55	55.5	Yes

The process effectively ends up evaluating eligibility for a particular calendar year based on rounded age at beginning of year and will end of treating those with June through December birthdays as ineligible for retirement during their first calendar year of eligibility. We feel that rounded age at middle of year may be more appropriate for eligibility purposes and would recommend that it be considered as part of the upcoming experience. In addition, we have included recommendations that the experience study data be evaluated carefully to make sure that retirements occurring during that first year of eligibility for those with a June through December birthday are being treated as such in determining the actual rates.

Milliman also indicated that the salary increase timing used was end of year. In other words, the valuation pay is not increased from the amount reported in the census data until a full year after the valuation date. If Tacoma uses a consistent pay review process whereby most members receive their annual increase January 1, then this is likely the most appropriate assumption. However, based on discussions with staff, not all employees are on this type of pay increase schedule. As with the decrement timing, we recommend that this assumption be reviewed carefully as part of the experience study.

This recommendation should not be construed as concern about the overall results. GRS performed the replication using alternative timing and obtained results which were still within an acceptable tolerance of those produced by Milliman.

## Summary

We believe that the valuation results are developed in a reasonable manner, and only recommend that the retained actuary closely examine the timing assumptions in conjunction with the next experience study.

## **SECTION F**

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### **CONTENT OF THE VALUATION REPORT**

## Content of the Valuation Report

ASOP No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions, ASOP No. 41, Actuarial Communications, and ASOP No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions provide guidance for measuring pension obligations and communicating the results. The Standards list specific elements to be included, either directly or by references to prior communication, in pension actuarial communications. The pertinent items that should be included in actuarial valuation report on a pension plan should include:

- The name of the person and/or firm retaining the actuary and the purposes that the communication is intended to serve.
- A statement as to the effective date of the calculations, the date as of which the participant and financial information were compiled, and the sources and adequacy of such information.
- An outline of the benefits being discussed or valued and of any significant benefits not included in the actuarial determinations.
- A summary of the participant information, separated into significant categories such as active, retired, and terminated with future benefits payable. Actuaries are encouraged to include a detailed display of the characteristics of each category and reconciliation with prior reported data.
- A description of the actuarial assumptions, cost method and the asset valuation method used. Changes in assumptions and methods from those used in previous communications should be stated and their effects noted. If the actuary expects that the long-term trend of costs resulting from the continued use of present assumptions and methods would result in a significantly increased or decreased cost basis, this should also be communicated.
- A summary of asset information and derivation of the actuarial value of assets. Actuaries are encouraged to include an asset summary by category of investment and reconciliation with prior reported assets showing total contributions, benefits, investment return, and any other reconciliation items.
- A statement of the findings, conclusions, or recommendations necessary to satisfy the purpose of the communication and a summary of the actuarial determinations upon which these are based. The communication should include applicable actuarial information regarding financial reporting. Actuaries are encouraged to include derivation of the items underlying these actuarial determinations.
- A disclosure of any facts which, if not disclosed, might reasonably be expected to lead to an incomplete understanding of the communication.
- Identify risks that may reasonably be anticipated to significantly affect the pension plan's future financial condition such as investment risk, asset/liability mismatch risk, interest rate risk, longevity and other demographic risks, and contribution risk.

In general, the January 1, 2019 actuarial valuation report complied with the applicable ASOPs and communicated the assumptions, methods and benefit provisions in a reasonable manner. The projections included in the report, while becoming more commonplace, are certainly not standard in all reports and are an excellent addition. In addition, the inclusion of the gain/loss by source history makes it easy to identify any biases in the assumptions.

We have a few very minor suggested modifications to the report that would improve adherence to the ASOPs or be of use to the reader.

1. ASOP 4 covers “Measuring Pension Obligations and Determining Pension Plan Costs or Contributions.” Section 4.1.q.1 indicates that in conjunction with disclosing a plan’s funded status, the actuary should include “whether the funded status measure is appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan’s benefit obligations.” While this statement is not always meaningful to the reader of a public sector pension valuation report, it is a disclosure requirement and should be included.
2. Many actuarial valuation reports include a status reconciliation of plan participants showing movement among statuses. This would help the reader understand the workforce transition and year to year changes in these patterns. It would also help validate the gain loss by source and experience study results.
3. We recommend that the decrement timing, eligibility timing and salary increase timing be included in the assumption section of the report.
4. We recommend including the investment return assumptions used to perform the stochastic modeling.

## Summary

In general, the actuarial valuation report complied with the applicable Actuarial Standards of Practice. We recommend that the retained actuary incorporate the noted enhancements to future actuarial valuation reports.

## **SECTION G**

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### **FINAL REMARKS**

## Final Remarks

The auditing actuarial firm, Gabriel, Roeder, Smith & Company (GRS), is independent of TERS, the City of Tacoma and retained actuarial firm. The auditing actuaries are not aware of any conflict of interest that would impair the objectivity of this work.

We again thank the TERS Staff and the retained actuary, Milliman, LLC, for their cooperation in this audit process. We received prompt and thorough responses to all questions asked.

In our professional opinion, the January 1, 2019 Actuarial Valuation prepared by the retained actuary provides a fair and reasonable assessment of the financial position of TERS.