

TACOMA EMPLOYEES' RETIREMENT SYSTEM

**January 1, 2004 – December 31, 2007
ACTIVE MEMBER EXPERIENCE STUDY**



by

Mark C. Olleman, FSA, EA, MAAA
Fellow, Society of Actuaries
Member, American Academy of Actuaries

and

Joshua A. C. Davis, ASA, MAAA
Associate, Society of Actuaries
Member, American Academy of Actuaries



1301 Fifth Avenue
Suite 3800
Seattle, WA 98101-2605
USA

Tel +1 206 624 7940
Fax +1 206 623 3485

milliman.com

June 16, 2008

Board of Directors
Tacoma Employees' Retirement System
1544 Tacoma Municipal Building
747 Market Street
Tacoma, WA 98402

Re: Tacoma Employees' Retirement System Active Member Experience Study

Dear Members of the Board:

It is a pleasure to submit this report of our investigation of the experience of the Tacoma Employees' Retirement System.

The results of this investigation are the basis for recommended changes in actuarial assumptions for the actuarial valuation to be performed as of January 1, 2009.

In preparing this report, we relied without audit on information (some oral and some in writing) supplied by the Tacoma Employees' Retirement System staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. In our examination, after discussion with the System's staff and certain adjustments, we have found the data to be reasonably consistent and comparable with data used for other purposes. Since the experience study results are dependent on the integrity of the data supplied, the results can be expected to differ if the underlying data is incomplete or missing. It should be noted that if any data or other information is inaccurate or incomplete, our determinations might 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 Actuarial Standards of Practice promulgated by the Actuarial Standards Board and the applicable Guides to Professional Conduct, amplifying Opinions, and supporting Recommendations of the American Academy of Actuaries.

We further certify that the assumptions developed in this report satisfy ASB Standards of Practice, in particular, No. 27 (Selection of Economic Assumptions for Measuring Pension Obligations) and No. 35 (Selection of Demographic and Other Non-economic Assumptions for Measuring Pension Obligations). The Board has the final decision regarding the appropriateness of the assumptions and their adoption.

Future actuarial measurements may differ significantly due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

Milliman has been engaged by the Tacoma Employees' Retirement System as an independent actuary. Any distribution of this report must be in its entirety, including this cover letter, unless prior written consent is obtained from Milliman. Milliman's work product was prepared exclusively for the Tacoma Employees' Retirement System for a specific and limited purpose. It is a complex, technical analysis that assumes a high level of knowledge concerning the Tacoma Employees' Retirement System's operations, and uses the Tacoma Employees' Retirement System's data, which Milliman has not audited. It is not for the use or benefit of any third party for any purpose. Any third party recipient of Milliman's work product who desires professional guidance should not rely upon Milliman's work product, but should engage qualified professionals for advice appropriate to its own specific needs.

We would like to acknowledge the help in the preparation of the data for this investigation given by Ms. Patricia Pabst, Retirement System Director, and members of her staff.

We, Mark C. Olleman and Joshua A. C. Davis, are members of the American Academy of Actuaries and the Society of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,



Mark C. Olleman, FSA, EA, MAAA
Consulting Actuary

MCO/JACD/trs



Joshua A. C. Davis, ASA, MAAA
Actuary

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

TABLE OF CONTENTS

	Page
Section 1 Executive Summary and Recommendations	1
Exhibit A Experience Study Cost Calculations Based on the Current Total Contribution Rate of 14.00%.....	4
Exhibit B Funding and Benefits Policy	5
Section 2 Introduction	6
A. Funding and Valuation Principles and "Actuarial Risk".....	6
B. Overview.....	7
C. Our Philosophy.....	8
D. Actuarial Standard of Practice No. 27 – Selection of Economic Assumptions	9
E. Actuarial Standard of Practice No. 35 – Selection of Demographic Assumptions.....	9
Section 3 Economic Assumptions	11
A. Experience of the System.....	13
Exhibit 1 Historical TERS Investment Returns.....	14
Exhibit 2 Historical Wage and Price Inflation	15
Exhibit 3 Investment Expenses.....	16
B. General Economic Trends.....	17
C. Inflation Assumption	21
D. General Wage Increase Assumption.....	22
E. Expense Assumption.....	24
F. Actuarial Valuation of Assets	25
G. Growth of Membership.....	25
H. Investment Return Assumption	26
Section 4 Salary Increases Due to Promotion and Longevity	30
Exhibit 4 Merit Salary Increases General Wage Inflation Removed from Actual and Assumptions	31
Section 5 Service Retirement	32
Exhibit 5 Retirement with Reduced Benefits Male	35
Exhibit 6 Retirement with Reduced Benefits Female.....	36
Exhibit 7 Retirement in First Year Eligible for Full Benefits Males	37
Exhibit 8 Retirement in First Year Eligible for Full Benefits Females.....	38
Exhibit 9 Retirement with Full Benefits (Excludes First Year of Eligibility) Males	39
Exhibit 10 Retirement with Full Benefits (Excludes First Year of Eligibility) Females	40
Section 6 Disability Retirement	41
Exhibit 11 Disability Retirement Males and Females.....	42
Section 7 Other Terminations of Employment.....	43
Exhibit 12 Other Terminations of Employment Males.....	44
Exhibit 13 Other Terminations of Employment Females.....	45
Section 8 Other Assumptions.....	46
Section 9 Summary of Valuation Assumptions	47

TACOMA EMPLOYEES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Section 1

Executive Summary and Recommendations

This is a study of the active member experience of the Tacoma Employees' Retirement System over the 4 year period from January 1, 2004 to December 31, 2007.

Section 2 - Introduction

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 we use 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.

Section 2 provides an introduction to the process of setting both demographic and economic actuarial assumptions. It discusses the following:

- The "actuarial risk" associated with setting actuarial assumptions.
- An overview of the presentation of results you will see in this report.
- Our philosophy in setting actuarial assumptions.
- Actuarial Standards of Practice No. 27 and No. 35.

Section 3 – Economic Assumptions

Section 3 discusses the economic assumptions. The current economic assumptions are 3.25% price inflation, 4.00% general wage increases, and 7.75% investment return. The economic assumptions all build on the underlying inflation assumption. Although the current assumptions all fall within our expected range of reasonableness, we believe the general wage increase assumption of 4.00% should be increased to 4.25% to reflect a "real wage increase" assumption of 1.00% between the recommended general wage increase assumption (4.25%) and the price inflation assumption (3.25%). The cost impact of the new assumptions is presented at the end of this section.

We also recommend placing a corridor around the actuarial assets of 80% to 120% of market value to make it clear we are complying with Actuarial Standard of Practice No. 44. We do not anticipate this will have an impact on any future actuarial valuation.

Section 4 - Salary Increases for Promotion and Longevity

Salary increases for promotion and longevity (sometimes called merit increases) are individual salary increases above the overall general wage increases granted to all City Employees. The two primary reasons for merit salary increases are seniority and promotion. We base this assumption on years of service. We are recommending the merit salary increase scale be lowered by 0.05% to 0.75% at different years of service.

Section 5 - Service Retirement

Retirements during the active member experience study for 1996 – 1999 were heavily influenced by the early retirement window, which lasted from January 1, 1997 through January 1, 1998. Therefore retirement assumptions were not changed in that study and the study of 2000 - 2003 experience was the first revision of retirement assumptions since the retirement benefit structure was changed at January 1, 1997. This study is the second time these assumptions have been reviewed since those changes.

The recommended assumptions:

- generally decrease the expected number of male retirements and increase the expected number of female retirements,
- make small adjustments to the shape of the curves,
- make no change to the assumption for male unreduced retirements, and
- use the same assumptions for retirement in the first year eligible for full benefits and after the first year eligible for full benefits. This is the second four year study in a row that shows this distinction is not significant.

Section 6 – Disability Retirement

There were only four disability retirements in the study period compared to nine expected disability retirements. Although this is certainly not a statistically valid sample size, we are nonetheless recommending some decrease in the assumed probability of disability to reflect experience.

Section 7 – Other Terminations of Employment

There were generally more terminations than expected by the assumptions. Therefore, we are recommending overall increases in the probability of termination for both males and females.

Section 8 – Other Assumptions

Here we comment on the portability assumption, and continued membership among vested terminated employees. We are recommending no changes be made to these assumptions.

Section 9 – Summary of Recommended Valuation Assumptions

The recommended assumptions are expressed in numerical format in Section 9.

Death from Active Status

We are recommending no change to the mortality assumptions.

The current assumptions are the same for active and retired members. Active member mortality experience is often incomplete due to members who terminate employment before they die, and the possibility of deaths of members with low service being classified as terminations.

The Study of Public Employee Retirement Systems released by the Society of Actuaries in 2002 states:

“Of all noneconomic assumptions reviewed in PERS experience studies, active mortality displayed the greatest overall variance from expectations. For all studies reporting numbers of actual and expected deaths, there were about 32,000 actual deaths compared with 45,000 expected occurrences, yielding an overall active mortality ratio of about 71%. Active mortality does not have a major impact on the calculation of plan liabilities and costs.”

The retired mortality assumptions are scheduled to be reviewed in two years. We recommend that the active mortality assumptions are also evaluated at that time.

Financial Impact

Exhibit A summarizes the cost impact of the assumptions. If the Board adopted all recommended assumptions the Funding Ratio calculated at January 1, 2007 would increase from 114.0% to 114.5% and the Normal Cost Rate would decrease from 17.37% to 16.94% of payroll. As a result the amount by which the Normal Cost Rate exceeds the 14.00% of payroll contribution rate decreases from 3.37% to 2.94%. 2.94% is within the 3.25% of pay guideline specified in the Retirement Board’s Funding and Benefits policy. A copy of the Funding and Benefits Policy is also included as Exhibit B.

In March we provided the Board with early warning estimates of the System’s January 1, 2008 funding status. As documented in our March 4, 2008 letter, these estimates are based on January 1, 2007 member data and January 1, 2008 asset data. Exhibit A shows that if the Board adopted all recommended assumptions the estimated January 1, 2008 Funding Ratio in that letter would increase from 118.8% to 119.5%.

As discussed in section 3 actuarial assumptions are used to measure and budget future costs. It is important to remember that **changing assumptions will not change the actual cost of future benefits.**

- Aggressive assumptions plan for good future experience ahead of time and factor it into budget estimates. Experience gains will be smaller and experience losses will be larger.
- Conservative assumptions on the other hand tend to recognize good experience after it happens. Experience gains will be larger and experience losses will be smaller.

Aggressive assumptions decrease short term contribution requirements, but make the need for future contribution increases more likely. This is because experience less favorable than assumed is more likely. On the other hand, conservative assumptions increase short term contribution requirements, but make the need for future contribution increases less likely.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit A

**Experience Study Cost Calculations Based on the Current Total Contribution Rate of
14.00%**

(All dollar amounts in Millions)

	Actuarial Accrued Liability	Actuarial Value of Assets	Funding Ratio	Normal Cost Rate	Contribution Rate	Contribution Rate minus Normal Cost Rate
A1. 1/1/2007 Valuation	895.8	1,021.3	114.0%	17.37%	14.00%	-3.37%
A2. 1/1/2007 Valuation with New Demographic Assumptions	890.4	1,021.3	114.7%	16.57%	14.00%	-2.57%
A3. 1/1/2007 Valuation with New Demographic and Economic Assumptions	892.2	1,021.3	114.5%	16.94%	14.00%	-2.94%
B1. Estimated 1/1/2008 Results	945.4	1,123.2	118.8%	17.37%	14.00%	-3.37%
B2. Estimated 1/1/2008 Results with New Demographic Assumptions	938.2	1,123.2	119.7%	16.57%	14.00%	-2.57%
B3. Estimated 1/1/2008 Results with New Demographic and Economic Assumptions	939.7	1,123.2	119.5%	16.94%	14.00%	-2.94%

TACOMA EMPLOYEES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit B

Funding and Benefits Policy

Objective

This policy is intended to provide guidance as to when adjustments to the Retirement System's contributions and benefits should be considered. The Funding & Benefits Policy is meant to assist in establishing a contribution rate which is relatively stable over the long term while the System provides its members superior retirement income.

Policy

When the Funding Ratio is:

- (a) Above 120% - The potential for benefit improvements will be reviewed providing the Retirement System's funding status is expected to be stable and remain stable after the improvements.
- (b) Between 95% and 120% - There will be no action, provided that either:
 - 1. The Contribution Rate is greater than or equal to the Normal Cost Rate, or
 - 2. There is a Funding Reserve which is projected to be amortized over not less than 20 years.

If neither of these conditions is met, then the Retirement Board will consider an increase in the contribution rates.

- (c) Between 80% and 95% - The Retirement Board will consider an increase in the contribution rates.
- (d) Under 80% - The funding and benefits policy will be reviewed and reevaluated.

Additional Guidelines

- (a) The amount by which the Normal Cost Rate exceeds the Contribution Rate should not be allowed to grow larger than 3.25%. This was the estimated difference in May of 2006.
- (b) There is a long term goal of achieving a Contribution Rate greater than or equal to the Normal Cost Rate so that if the Funding Reserve is lost due to adverse experience, there will not be a sudden increase in the calculated required contribution.
- (c) Increases in the contribution rate may be made in small increments.
- (e) Requests for increases in the contribution rate should be made at least one year prior to the beginning of the financial biennium.

Terminology

- (a) The Funding Ratio is calculated by dividing the System's Actuarial Value of Assets by the Actuarial Accrued Liability.
- (b) The Funding Reserve is the dollar amount by which the System's Actuarial Value of Assets exceeds the Actuarial Accrued Liability

TACOMA EMPLOYES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Section 2

Introduction

Actuarial assumptions can be broken into three broad groups:

- Active Demographic Assumptions
- Retired Mortality
- Economic Assumptions

The Systems Assumptions are studied in even years and actuarial valuations are performed in odd years. The assumptions are studied on the following 4 year cycle:

<u>Year</u>	<u>Assumptions Studied</u>
2004	Active Demographic Assumptions and Economic Assumptions
2006	Retired Mortality and Economic Assumptions
2008	Active Demographic Assumptions and Economic Assumptions
2010	Retired Mortality and Economic Assumptions

The focus of this study is the Economic and the Active Demographic Assumptions. This section however encompasses all three and provides an overview of the process and importance of setting actuarial assumptions.

A. Funding and Valuation Principles and “Actuarial Risk”

Just as certain investment choices have an associated “investment risk,” choices in actuarial assumptions have an associated “actuarial risk.” Our responsibility is to always consider the impact our work will have on future taxpayers and on the members of TERS.

Determining the adequacy of the current contribution rates is dependent on the assumptions we use 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.

- If actual experience shows that the assumptions overestimated the true cost of the plan, decisions for change may be inappropriately made based on the current higher costs levels.
- If actual experience shows that the assumptions underestimated the true cost of the plan, decisions for change may be inappropriately made based on the lower current costs levels. This may result in an unexpected need to increase costs in the future and may lead to budgeting difficulties.

- The valuation only presents the costs as of one date. Further analysis illustrating the potential volatility of the cost results may be needed to fully appreciate the “actuarial risk” associated with actuarial assumptions.

The setting of the actuarial assumption for investment return could have an effect on the investment managers’ investment strategies. If a higher, more aggressive assumption is used, there may be a tendency to stretch the investment risk to meet the assumption.

Since the actuarial assumption is for the long term, it is expected that in the short term there will be years in which the actual investment return will exceed the actuarial assumption, and there will be years when the actual experience will not meet the assumed rate. It is the expected long-term rate that is used to project and finance the retirement benefits.

Recognition should be made that a higher investment return assumption will tend to lower required contributions in the short term, while a lower investment return assumption will tend to require higher contributions. In the public environment, any move back from a higher return assumption to a lower return assumption could result in higher contribution rates and, thus, higher taxes. Using a slightly lower assumption gives a greater assurance of having actuarial experience gains in the future, whereas using a slightly higher assumption implies a willingness to assume a greater “actuarial risk” of future experience losses. The same concepts apply to the selection of the other actuarial assumptions.

The question that needs to be asked in the public sector is: How great an actuarial risk is the Board willing to accept in the actuarial assumptions? If actuarial experience gains materialize for TERS, its funded status will be better than expected. If actuarial experience losses materialize, what will be the consequences?

As stated above the actuarial assumptions can be divided into three groups: economic, active demographic, and retired mortality. The economic assumptions must not only reflect TERS’ actual experience but also give even greater consideration to the long-term expectation of future economic growth for the nation, as well as the global economy. By long term, we are looking at time periods of from 20 to 40, possibly to 60, years – a much longer time frame than any period investment managers or economists would be discussing with you.

The non-economic, or demographic assumptions including retired mortality, are based on TERS’ actual experience, adjusted to reflect trends and historical experience. Thus, the economic assumptions are much more subjective than the demographic assumptions, and the demographic assumptions are much more dependent on the results of the experience studies.

B. Overview

This report presents the results of an investigation of the recent actuarial experience of TERS. We will refer to this investigation as an experience study.

Throughout this report, we refer to “expected” and “proposed” actuarial assumptions. The “expected” assumptions are those used for our actuarial valuation of TERS as of January 1, 2007. They may also be referred to as the “current” or “old” assumptions. The “proposed” or “recommended” assumptions are those we recommend for use in the valuation as of January 1, 2009 and for subsequent valuations until further changes are made. Note that the Retirement Board has the authority and responsibility to make the final decision regarding the appropriateness of the assumptions.

Economic assumptions are generally chosen on the basis of the actuary's expectations as to the effect of future economic conditions on the operation of TERS. However, the setting of these assumptions is much more subjective than in setting and recommending the demographic assumptions.

After reviewing the economic assumptions, this report shows the results of our study of active member demographic assumptions. The exhibits are detailed comparisons between the actual and expected experience on both the current and proposed bases.

For each type of assumption, graphs show the actual, the expected (or old) and proposed rates. The exhibits also show the total numbers of actual and expected terminations, retirements and disabilities. Ratios larger than 100% on the current basis indicate that the rates may need to be raised; ratios smaller than 100% indicate that rates may need to be lowered.

For each exhibit, the actual decrement rates are shown as bar graphs on either a quinquennial-age basis, a years-of-service basis, or, in the case of retirement rates, on an age-by-age basis. The graphs also show bars for the actual decrement rates from the prior four year study. The current rates – the “expected” rates – used in the January 1, 2007 actuarial valuation, are shown as well as the new proposed assumptions as line graphs. Therefore, the assumption changes we are proposing are illustrated by the difference between the two lines in each exhibit.

C. Our Philosophy

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. In this report, we recommend new assumptions. To help you understand our thought process, here is a brief summary of our philosophy:

- **Don't Overreact:** When we see significant changes in experience, we generally do not adjust our 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 build in a margin to reflect future decreases in mortality rates.
- **Simplify:** Where there is no material difference in results, we attempt to simplify our assumptions and methods. There is no point in complexity that does not improve accuracy.

D. Actuarial Standard of Practice No. 27 – Selection of Economic Assumptions

The Actuarial Standards Board has adopted Actuarial Standard of Practice (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. We provide more detail on ASOP No. 27 at the beginning of the section of this report concerning economic assumptions.

E. Actuarial Standard of Practice No. 35 – Selection of Demographic Assumptions

Actuarial Standard of Practice No. 35 (ASOP No. 35) governs the selection of demographic and other noneconomic assumptions for measuring pension obligations. ASOP No. 35 states that the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment. The actuary should select reasonable demographic assumptions in light of the particular characteristics of the defined benefit plan that is the subject of the measurement. A reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

ASOP No. 35 Steps

The actuary should follow the following steps in selecting the demographic assumptions:

1. Identify the types of assumptions. Types of demographic assumptions include but are not limited to retirement, mortality, termination of employment, disability, election of optional forms of payment, administrative expenses, family composition, and treatment of missing or incomplete data. The actuary should consider the purpose and nature of the measurement, the materiality of each assumption, and the characteristics of the covered group in determining which types of assumptions should be incorporated into the actuarial model.
2. Consider the relevant assumption universe. The relevant assumption universe includes experience studies or published tables based on the experience of other representative populations, the experience of the plan sponsor, the effects of plan design, and general trends.
3. Consider the assumption format. The assumption format includes whether assumptions are based on parameters such as gender, age, service or calendar year. The actuary should consider the impact the format may have on the results, the availability of relevant information, the potential to model anticipated plan experience, and the size of the covered population.
4. Select the Specific Assumptions. In selecting an assumption the actuary should consider the potential impact of future plan design as well as the factors listed above.
5. Evaluate the Reasonableness of the Selected Assumption. The assumption should be expected to appropriately model the contingency being measured. The assumption should not be anticipated to produce significant actuarial gains or losses.

ASOP No. 35 General Considerations and Application

Each individual demographic assumption should satisfy the criteria of ASOP No. 35. In selecting demographic assumptions the actuary should also consider: the internal consistency between the assumptions, materiality, cost effectiveness, and the combined effect of all assumptions. At each measurement date the actuary should consider whether the selected assumptions continue to be reasonable, but the actuary is not required to do a complete assumption study at each measurement date. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP No. 35.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Section 3

Economic Assumptions

Actuarial Standard of Practice (ASOP) No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, provides guidance to actuaries giving advice on selecting economic assumptions for measuring obligations under defined benefit plans. Because 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.

Recognizing that there is not one "right answer", the standard calls for the actuary to develop a best estimate range for each economic assumption, and then recommend a specific point within that range. Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 27.

The following table compares the current economic assumptions with the new economic assumptions we are recommending for adoption by the Board. The new assumptions will be used in the January 1, 2009 actuarial valuation.

	<u>Current</u>	<u>New</u>	<u>Change</u>
Inflation	3.25%	3.25%	0.00%
Net Real Rate of Return	<u>4.50</u>	<u>4.50</u>	<u>+0.00</u>
Investment Return ⁽¹⁾	7.75%	7.75%	0.00%
Inflation	3.25%	3.25%	0.00%
Real Wage Increase	<u>0.75</u>	<u>1.00</u>	<u>+0.25</u>
General Wage Increase	4.00%	4.25%	+0.25%
Spread (Investment Return - Wage Increase)	3.75%	3.50%	-0.25%

⁽¹⁾ Net of investment expenses.

Actuarial assumptions are used to measure and budget future costs. **Changing assumptions will not change the actual cost of future benefits.**

- Aggressive assumptions plan for good future experience ahead of time and factor it into budget estimates. Experience gains will be smaller and experience losses will be larger.
- Conservative assumptions on the other hand tend to recognize good experience after it happens. Experience gains will be larger and experience losses will be smaller.

Aggressive assumptions decrease short term contributions, but make the need for future contribution increases more likely. This is because experience less favorable than assumed is more likely. On the other hand, conservative assumptions increase short term contributions, but make the need for future contribution increases less likely.

The choice of assumptions depends on a system's risk tolerance. The final determination on whether or not a set of assumptions was either conservative or aggressive will only be born out by future experience.

This section is organized into eight subsections:

Subsection A: Experience of the System	Subsection E: Expense Assumptions
Subsection B: General Economic Trends	Subsection F: Actuarial Valuation of Assets
Subsection C: Inflation Assumption	Subsection G: Growth in Membership
Subsection D: General Wage Increases	Subsection H: Investment Return

The first two subsections provide background. Assumptions are proposed in the last six subsections.

A. Experience of the System

Investment Returns

Exhibit 1 shows 3 different measurements of the System's investment returns for the last 20 years. Overall, this has been a period of both high returns and high volatility for TERS and the capital markets in general. "High Returns" - The System's average return for the last 15 years is still 10.1%. "High Volatility" – In one year (2002 – 2003) the System's returns went from negative 8.9% to positive 29.4%.

Price and Wage Inflation

Exhibit 2 shows the last 20 years of general wage increases for active TERS members. The increases are compared to the national wage index used to determine Social Security benefits and the national inflation index for all urban consumers (CPI-U). The national averages for price inflation (2.6%) and wage inflation (3.8%) over the last 15 years are below the 82 year averages of 3.0% and 4.6%.

Expenses

Exhibit 3 shows the last 12 years of TERS investment and administrative expenses. The assumed impact of investment expenses is subtracted from the investment return assumption. The investment return assumption is "net of investment expenses." Exhibit 3 therefore compares the investment expenses to the TERS assets.

The actuarial valuation adds an assumed allowance for administrative expenses onto the normal cost. The allowance is a level percent of pay. Exhibit 3 therefore compares the administrative expenses to TERS covered earnings.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 1

Historical TERS Investment Returns

Year Ending December 31,	TERS Investment Returns on Total Fund Calculated by Milliman		TERS Investment Returns on Invested Assets as Shown in the Annual Report
	Market Value	Actuarial Value	Market Value
1988	8.8%	2.7%	11.0%
1989	19.7%	22.4%	19.5%
1990	-2.1%	-2.1%	-3.3%
1991	24.4%	20.7%	25.0%
1992	5.7%	5.3%	5.7%
1993	18.2%	22.2%	19.0%
1994	-1.6%	-2.6%	-2.0%
1995	24.7%	18.4%	25.8%
1996	8.7%	7.8%	9.4%
1997	14.9%	9.7%	15.1%
1998	9.0%	10.3%	10.1%
1999	16.9%	12.5%	16.7%
2000	3.9%	11.3%	3.7%
2001	-2.9%	6.5%	-3.0%
2002	-8.9%	1.7%	-8.8%
2003	29.4%	3.6%	29.5%
2004	15.5%	8.1%	15.6%
2005	8.7%	11.3%	8.7%
2006	18.6%	17.0%	18.6%
2007	3.9% *	11.7% *	4.0%

Geometric Averages

5 year periods			
1988-1992	10.9%	9.4%	11.1%
1993-1997	12.6%	10.8%	13.1%
1998-2002	3.2%	8.4%	3.4%
2003-2007	14.9%	10.3%	15.0%
10 year periods			
1988-1997	11.7%	10.1%	12.1%
1998-2007	8.9%	9.3%	9.0%
15 year period			
1993-2007	10.1%	9.8%	10.3%

* 2007 returns are based on preliminary asset statements.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 – 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 2

Historical Wage and Price Inflation

<u>Year Ending December 31,</u>	<u>General Wage Increase</u>		<u>Price Increase</u>
	<u>Tacoma ERS</u>	<u>National Index</u>	<u>CPI Index</u>
1988	3.5%	4.9%	4.4%
1989	3.0%	4.0%	4.6%
1990	4.0%	4.6%	6.1%
1991	3.0%	3.7%	3.1%
1992	3.0%	5.2%	2.9%
1993	3.2%	0.9%	2.7%
1994	3.0%	2.7%	2.7%
1995	3.1%	4.0%	2.5%
1996	3.1%	4.9%	3.3%
1997	2.9%	5.8%	1.7%
1998	3.3%	5.2%	1.6%
1999	3.0%	5.6%	2.7%
2000	3.0%	5.5%	3.4%
2001	3.0%	2.4%	1.5%
2002	3.0%	1.0%	2.4%
2003	1.0%	2.4%	1.9%
2004	2.5%	2.9%	3.3%
2005	2.3%	5.4%	3.5%
2006	1.0%	4.6%	1.9%
2007	2.0%	4.1%	4.6%
Geometric Averages			
5 year periods			
1988-1992	3.3%	4.5%	4.2%
1993-1997	3.1%	3.6%	2.6%
1998-2002	3.1%	3.9%	2.3%
2003-2007	1.8%	3.9%	3.0%
10 year periods			
1988-1997	3.2%	4.1%	3.4%
1998-2007	2.4%	3.9%	2.7%
15 year period			
1993-2007	2.6%	3.8%	2.6%

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 – 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 3

**Investment Expenses
(Dollar Amounts in Millions)**

<u>Year</u>	<u>Year End Assets*</u>	<u>Investment Expenses*</u>	<u>Expenses as a % of Year End Assets</u>
1996	486.8	1.432	0.29%
1997	553.5	1.503	0.27%
1998	596.4	1.833	0.31%
1999	690.2	1.795	0.26%
2000	710.7	2.071	0.29%
2001	680.5	2.078	0.31%
2002	611.2	1.383	0.23%
2003	779.2	1.469	0.19%
2004	889.9	2.053	0.23%
2005	955.5	2.671	0.28%
2006	1,117.6	4.154	0.37%
2007	1,144.4	4.494	0.39%

* Market assets and Investment Expenses as reported in the CAFRs. December 31, 2007 numbers are preliminary.

**Administrative Expenses
(Dollar Amounts in Millions)**

<u>Year</u>	<u>Covered Earnings</u>	<u>Administrative Expenses*</u>	<u>Expenses as a % of Covered Earnings</u>
1996	116.3	1.240	1.07%
1997	116.1	1.185	1.02%
1998	122.3	1.187	0.97%
1999	132.0	1.172	0.89%
2000	133.4	1.193	0.89%
2001	142.5	1.340	0.94%
2002	154.2	1.218	0.79%
2003	154.1	1.286	0.83%
2004	172.5	1.415	0.82%
2005	172.8	1.296	0.75%
2006	175.0	1.408	0.80%
2007	180.0	1.530	0.85%

* Administrative Expenses as reported in the CAFRs. The December 31, 2007 number is preliminary.

B. General Economic Trends

From a short-term viewpoint, the statistics presented in Exhibits 1 and 2 regarding the economic experience of TERS are important. However, in the long run, broader economic forces will control the experience of TERS in the area of general wage increases and investment returns. Inflation will drive wages, and investment yields will be governed by national and international markets. Accordingly, our analysis of the economic assumptions tends to focus more on national economic statistics than the actual experience of TERS itself.

Economic Statistics

Charts I through IV assist in evaluating the economic assumptions. Each of the charts shows growth patterns in various economic statistics. Chart I summarizes the annualized rates of growth in prices and wages and the annual yields of bonds and stocks for each 20-year period through 2007. These wage statistics reflect the general wage level, including inflation and productivity gains, but excluding pay increases due to an individual's promotion or longevity. The 20-year period helps eliminate the effect of short-term influences and focuses instead on the long-term trends that affect the future actuarial experience of the System.

Chart II shows that wages have generally grown at faster rates than prices. We recently came out of a period where the difference between the two was smaller than the historic average.

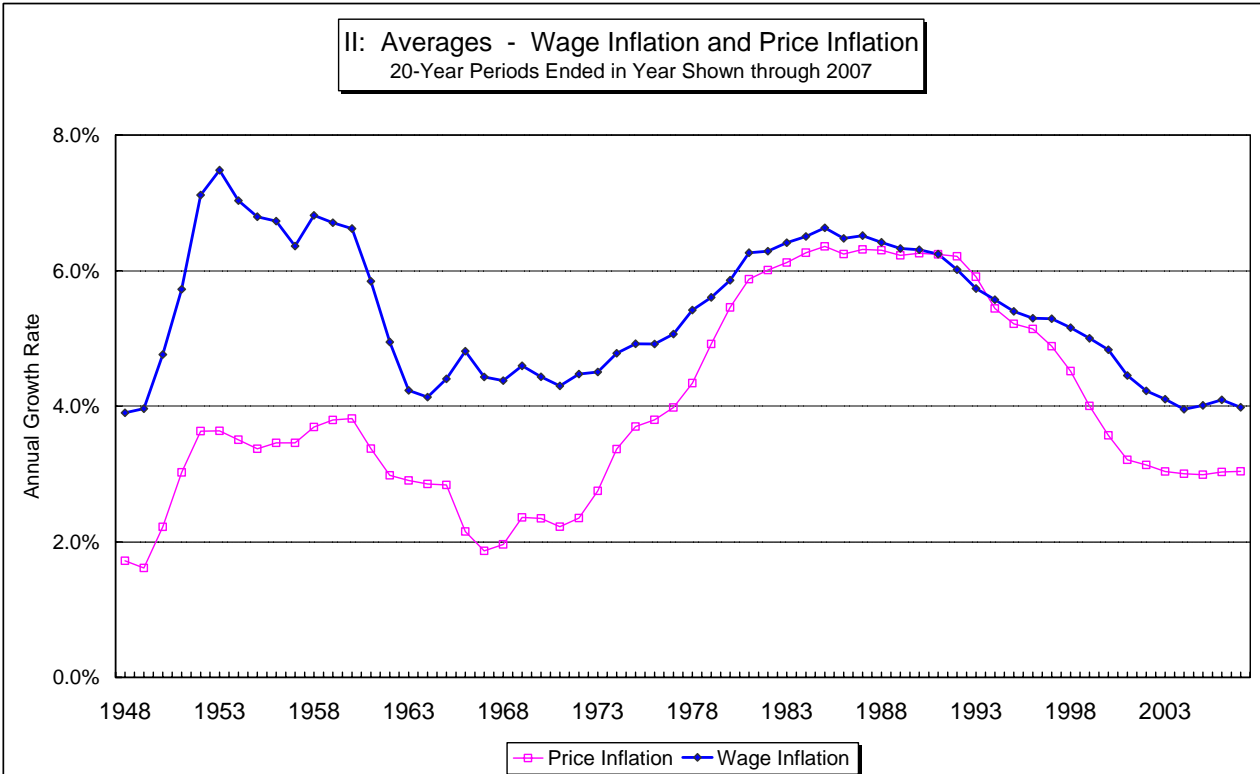
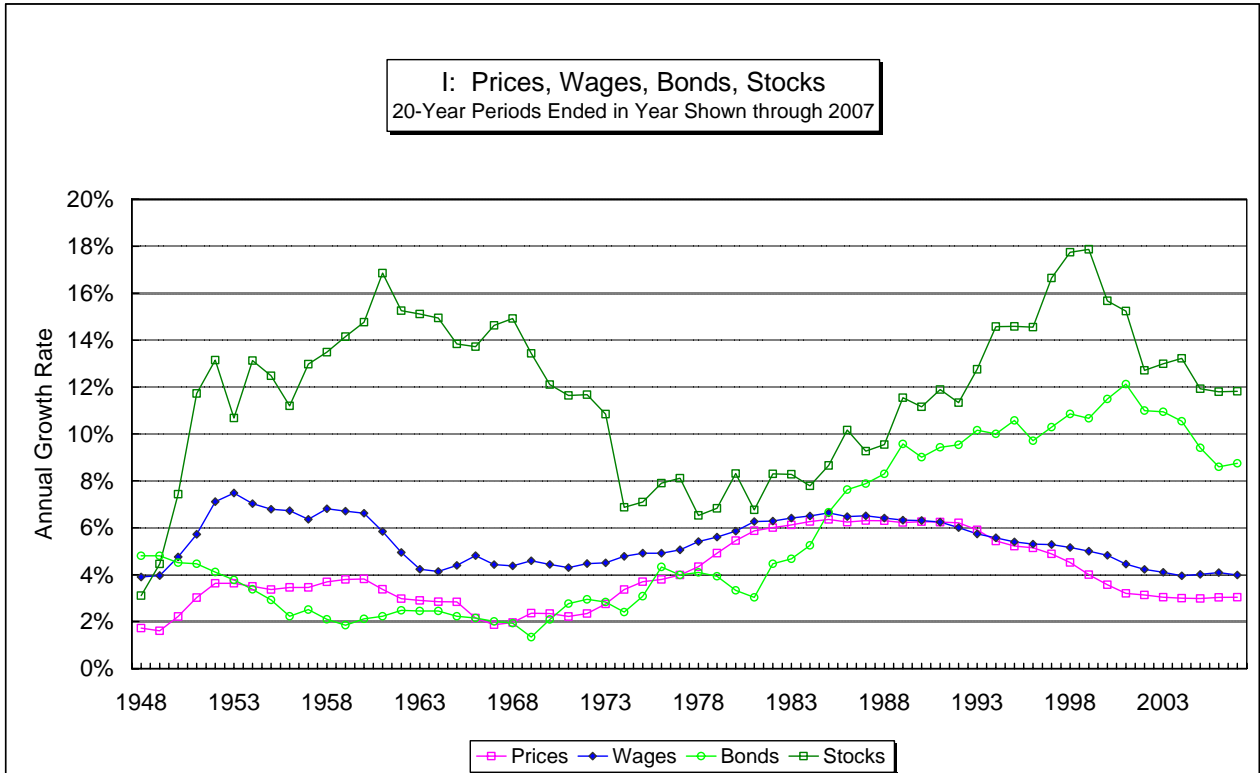
Spreads

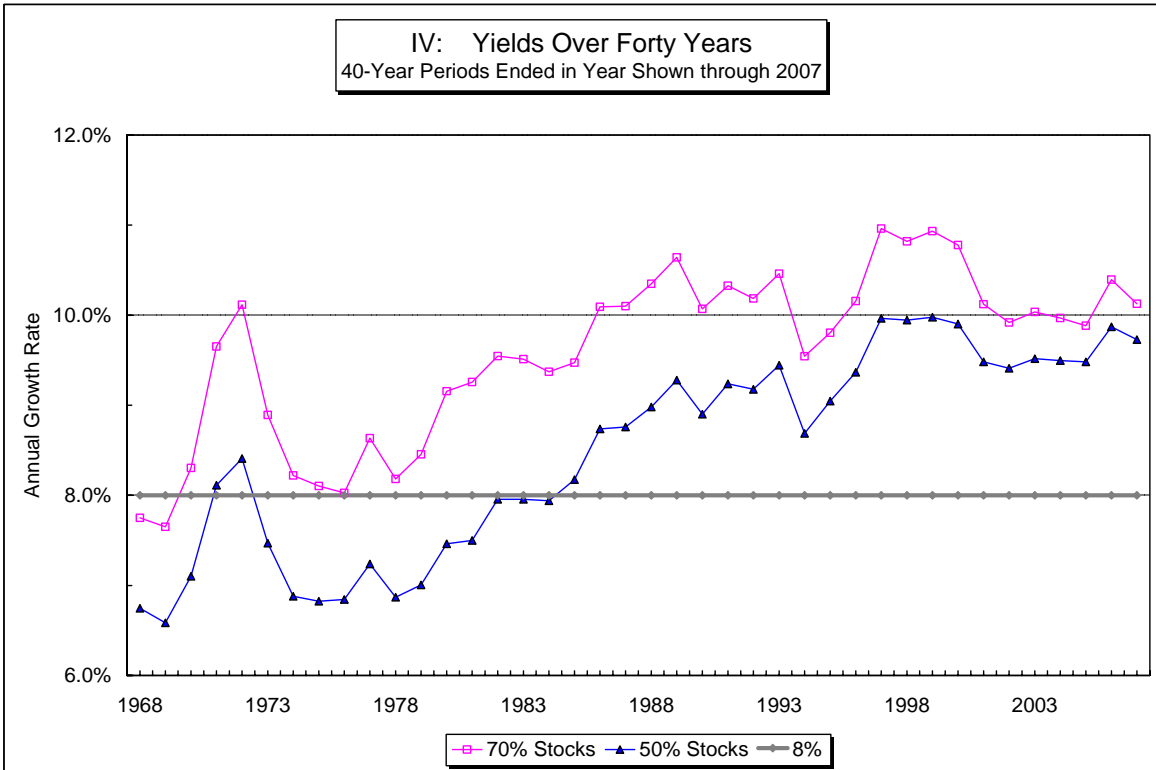
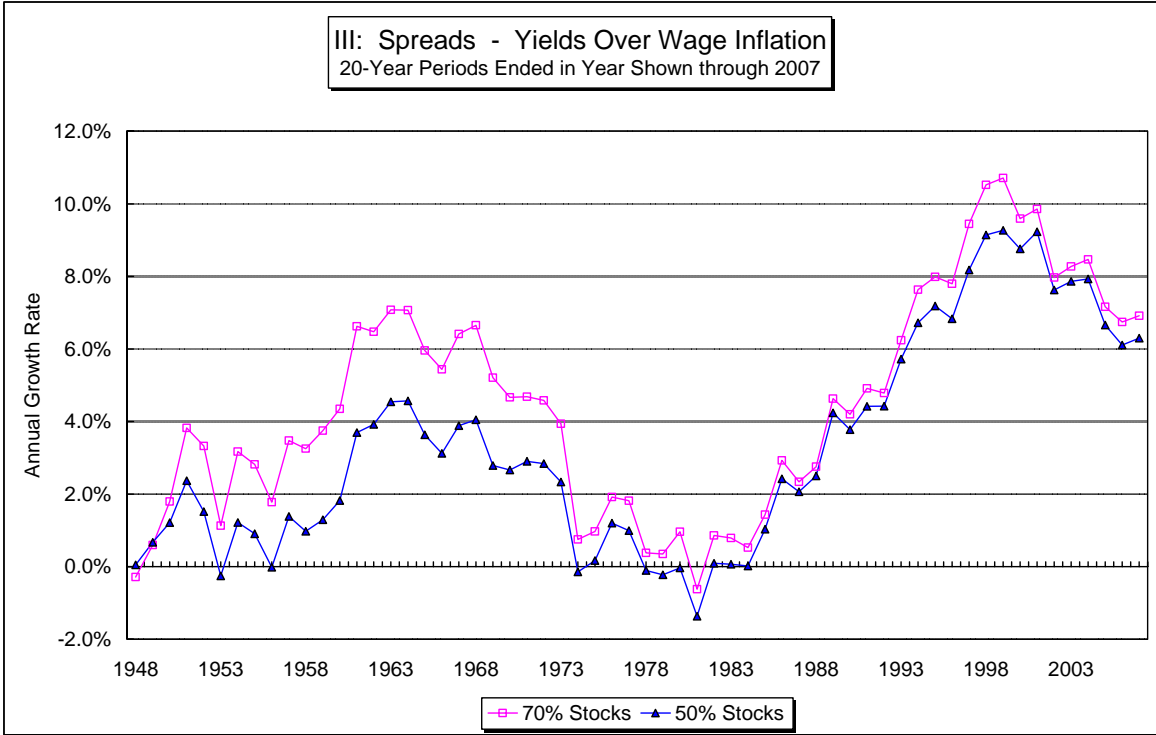
The difference between annual yields on investments and the annual rates of salary growth – the spread – is important to the economic actuarial assumptions. Chart III shows the average spread that would have occurred in various 20-year periods for a mix of either 70% stocks and 30% bonds, or 50% stocks and 50% bonds. Most large pension plans have allocated their investments somewhere in this range.

As Chart III indicates, the spreads of yields over wage inflation vary significantly, even with 20-year averaging, depending on the 20-year period covered. Recent periods suggest that a much greater spread than 3.75% can be justified for a 70% / 30% stock/bond mix. However, analysis of earlier periods shows that spreads are cyclical. There have been a number of 20 year periods with spreads less than 2.0%. If history repeats itself and starts a downward cycle, the impact on pension systems could be dramatic.

The spreads shown on Chart III differ in two ways from the current TERS “spread” of 3.75%. First, the investment returns used for Chart III are gross returns, whereas the TERS 7.75% investment return assumption is net of investment expenses. Based on information in the TERS Comprehensive Annual Financial Reports, investment expenses have generally been between 0.20% and 0.40% of market assets in recent years. Thus, the 7.75% return assumption consists of a gross return assumption of approximately 8.10%, less assumed investment expenses of roughly 0.35%.

Chart IV looks at average returns over even longer periods of time – 40 years. This indicates a long-term investment return assumption of somewhere between 7% and 10% could be appropriate, depending on other factors the System needs to consider. Traditionally, most public plans tend to be conservative. Also, recent economic indicators would suggest a downward expectation of yields at least for the near term.





C. Inflation Assumption

Investment returns, general wage increases, payroll increases and statutory COLA increases are each related to the rate of inflation. We need to consider inflation in the development of assumptions for future investment returns and wage growth. The inflation assumption will also have a direct impact on the value of the 50% restoration COLA.

Review of charts I and II shows that there have been extended periods where the 20 year average for inflation stayed has stayed both between 2% - 4% and between 4% - 6%. In fact we find the 25th percentile of average inflation for 20 year periods starting in 1925 is 2.9% and the 75th percentile is 5.2%. However, the average inflation over the entire 82 year period is only 3.0%. Over the last 15 years inflation has averaged 2.6%.

Since the U.S. Treasury started issuing inflation indexed bonds, it is possible to determine the approximate rate of inflation anticipated by the financial markets by comparing the yields on inflation indexed bonds with traditional fixed government bonds. Current market prices suggest investors expect inflation to be about 2.4% over the next 10 years.

Many economists forecast inflation lower than the current assumption of 3.25%, but they may be looking at shorter periods than appropriate for a pension valuation. To find an economic forecast with a long enough time frame to suit our purpose, we looked at the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the 2008 Trustees Report, the projected ultimate annual increase in the CPI under the intermediate cost assumptions was 2.80%. The reasonable range was stated as 1.80% to 3.80%.

Reasonable Range – Inflation

We believe that a range between 2.00% and 4.00% is reasonable for an actuarial valuation of a retirement system. The current assumption of 3.25% is greater than recent experience, and is also greater than the short and long term economic forecasts. However, certain demographic changes in the workforce and global economic situations may lead to higher inflationary demands in the future. We believe 3.25% is a reasonable assumption and recommend no change.

Inflation	
Current Assumption	3.25%
Reasonable Range	2.00% - 4.00%
Recommended Assumption	3.25%

D. General Wage Increase Assumption

An individual's wages are affected by:

- (1) Promotion and longevity
- (2) Productivity (real wage increases)
- (3) Price inflation

For actuarial purposes, productivity and price inflation are often combined into a single assumption for salaries: the general wage increase assumption. The general wage increase assumption is discussed here. The assumptions with respect to promotion and longevity, or merit increases, are discussed later in this report.

The wages we are attempting to project are those to be paid to TERS members. However, it should be recognized that future general wage increases will be decided more by the experience in the nation as a whole than the experience in Tacoma. Economic developments (such as the rates of inflation) are not going to be slowed or accelerated to any significant degree because of Tacoma alone.

The current long-term assumption for general wage increases is 4.0% per year. In recent years, general wage increases have averaged less than the 4.0% assumption. For TERS, general wage increases over the last fifteen years have averaged 2.6% per year, compared to a national index increase of 3.8%.

The excess of the current wage increase assumption (4.0%) over the current price inflation assumption (3.25%) represents the increase in the standard of living, also called the real wage increase or productivity. The current actuarial assumptions provide for a 0.75% real wage increase. The following table shows the compounded wage increases since 1926 broken into approximately 20 year periods, along with the comparable inflation rate for the same period. The difference represents the rate of real wage increase (productivity). The same information can be reviewed in graphical form in Chart II.

Period	Wage Increase	Inflation Rate	Real Wage Increase
1987-2007	4.0%	3.0%	1.0%
1967-1987	6.5	6.3	0.2
1947-1967	4.4	1.9	2.5
1927-1947	3.6	1.5	2.1

Resources: Social Security National Average Wage from 1951 to 2000; Total Private Nonagricultural Wages from 1926 to 1951; Inflation as measured by the CPI-U, reported by Ibbotson Associates.

The "building block" approach for setting actuarial assumptions uses the rate of real wage increase and the inflation assumption developed previously. Currently, the rate of real wage increase is 0.75%, and the inflation assumption is 3.25%, making a total wage increase assumption of 4.00%.

We feel that the general wage increase assumption should have some recognition of wage inflation over price inflation. In addition, recent and future predicted labor shortages may lead to inflationary salary increases as the demographic makeup of the labor market changes.

Reasonable Range and Recommendation – General Wage Increase

Based on our judgment, we believe that a range between 0.25% and 1.25% is reasonable for the real wage increase assumption. The total general wage increase assumption also depends on the price inflation assumption underlying the other assumptions used for the actuarial valuation. Based on the current inflation assumption to 3.25%, we feel a range of reasonableness for the total general wage increase assumption would be from 3.50% to 4.50%. We recommend that the real wage increase assumption be increased from 0.75% to 1.00%. This results in a total general wage increase assumption of 4.25% (3.25% for inflation plus 1.00% for real wage increases.)

General Wage Increase*	
Current Assumption	4.00%
Reasonable Range	3.50% - 4.50%
Recommended Assumption	4.25%

**Based on a 3.25% inflation assumption.*

E. Expense Assumption

Because investment expenses become larger as assets grow, we use an approach that recognizes the distinction between administrative expenses and investment expenses. The investment expense assumption is expressed as a percent of assets and is incorporated into the overall investment return assumption. The administrative expense assumption is expressed as a percent of payroll and is incorporated into the normal cost. Investment and administrative expenses for the last eight years are shown in Exhibit 3 near the beginning of this section.

Our current investment expense assumption is 0.30% of assets. As shown in exhibit 3 actual investment expenses have measured 0.37% and 0.39% of assets for the last 2 years. Our understanding is the System has begun investing in some assets which have higher expected returns, but also higher investment management expenses. Therefore, we anticipate the trend of higher investment expenses will continue and recommend increasing the investment expense assumption from 0.30% to 0.35% of assets.

Administrative expenses during the last eight years have ranged from 0.75% to 0.94% of covered earnings of members, as shown in Exhibit 3. We recommend maintaining the current assumption of adding 0.90% of salary to the normal cost of the System to allow for administrative expenses. The average experience of the last four years has been almost 0.10% lower. If this trend continues we would consider lowering the assumption in the next experience study.

F. Actuarial Valuation of Assets

The current actuarial asset valuation method spreads asset gains and losses over four years. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years. This method was adopted effective January 1, 1997.

Actuarial Standard of Practice No. 44 (Selection and Use of Asset Valuation Methods for Pension Valuations) was issued in September, 2007. Section 3.3 states:

“The asset values should fall within a reasonable range around the corresponding market values. For example, there might be a corridor centered at market value, outside of which the actuarial value of assets may not fall, in order to assure that the difference from market value is not greater than the actuary deems reasonable.”

The standard goes on to say that if no such corridor is used the asset method may still satisfy the standard if in the actuary’s professional judgment, the asset method recognizes differences from market value in a sufficiently short period. In fact, we do believe that the four year period is sufficiently short to satisfy the standard. An 80% to 120% corridor around market value is commonly used to assure any deviation from market value is reasonable. It is unlikely the System’s four year smoothing method will deviate outside a corridor of 80% to 120% of the market value of assets.

Nevertheless, to avoid any doubts or confusion concerning the asset valuation method’s compliance with Actuarial Standard of Practice No. 44, we recommend a corridor of 80% to 120% of the market value be added to the current method. This change would not have had an impact on the results of the 2007 actuarial valuation and seems unlikely to have an impact on any future valuation.

G. Growth of Membership

We propose continuing the assumption that no future growth in membership will occur. This assumption affects the amortization payment rate, which is the portion of the total contributions used to either liquidate the unfunded actuarial accrued liability (UAAL), or increase the funding reserve, if any. The UAAL amortization payments are spread over anticipated future salaries of the entire membership of the System. With no assumed growth in membership, future salary growth due only to general wage increases is being anticipated. If increases should occur not only because of wage increases but also because of additional members, there will be a larger pool of salaries over which to spread the UAAL, if any.

GASB Statement No. 25 will not accept a growth in membership assumption as meeting its required parameters. Thus, if a growth assumption were to be used for funding purposes, a different set of calculations and results would be needed for accounting disclosure purposes.

H. Investment Return Assumption

The investment return assumption is one of the primary determinants in the calculation of the expected cost of the System's benefits, providing a discount of the future benefit payments reflecting the time value of money. The current net investment return assumption of 7.75% per year is equal to the sum of (1) the inflation assumption of 3.25%, and (2) a net real rate of return assumed to be equal to 4.50%. This approach of dividing the nominal return into the real return and inflation piece is referred to as the "building block" method. Investment expenses are assumed to be covered by returns in excess of 7.75%. Therefore, the implied gross investment return assumption is 8.10% (7.75% + 0.35% for investment management expenses.)

Measurement Specific Factors

The Actuarial Standards Board standard for selecting economic assumptions, lists measurement specific factors that can be considered in constructing the best-estimate investment return range and/or selecting an investment return assumption within the range. Such factors are:

1. **The purpose of the measurement.** The measurement of obligations for an ongoing plan will differ from those of a terminating or closed out plan. An ongoing plan such as TERS may reflect a longer time horizon and a more diversified investment portfolio.

For a governmental plan, benefit security is tied to the funding agency's ability to provide the required funding. Since all governmental funding sources are ultimately some type of tax, the funding of the retirement system is dependent on the ability to increase or decrease allocated tax revenues to the system. Given the normal processes, it is much easier to lower the required funding allocations than to increase it, as it is easy enough to either lower the tax income or reallocate it to another need. A primary funding goal of most governmental plans then is a stable contribution rate, so that the budgeting and allocation of tax revenues are not subject to a great deal of fluctuations.

It is reasonable, when setting actuarial assumptions for a governmental plan to consider the impact not only on its membership, but on the taxpayers, and the agency's ability to provide sufficient income to maintain and secure a stable funding for the benefit security of the membership. This is sometimes reflected in a more conservative approach, that is a set of assumptions where experience gains are more likely than losses, as experience gains are more easily absorbed into the funding than are experience losses which may result in a required increase in funding.

2. **Investment policy.** This usually refers to the plan's current asset allocation, the types of securities the system is eligible to invest in, and the target allocation, if different. It may also reflect the investment philosophy regarding risk tolerance and social investing.
3. **Reinvestment Risk.** This should reflect the reinvestment of moneys not immediately required to pay plan benefits.
4. **Investment Volatility.** If a system is required to liquidate assets at depressed values to meet benefit obligations, a higher risk is present. Also lump sum payments may carry a higher need for liquidity.

5. **Investment Manager Performance.** Few investment managers consistently out-perform the market. Those who consistently under-perform may be replaced.
6. **Investment Expenses.** Investment returns are usually both with and without expenses. Actual expenses are measured periodically and taken into account when setting the TERS investment assumptions.
7. **Cash Flow Timing.** The expected stream of contributions and benefit payments may affect the liquidity of a plan's investment opportunities.
8. **Benefit Volatility.** This is a consideration for small plans, plans with full lump sum payment options and supplemental benefits. The concern with these factors is a need to liquidate securities at depressed values. We do not expect benefit volatility to be a factor in considering the TERS investment return assumption.

Projection Model using Capital Market Assumptions

Even though history provides a valuable perspective for setting the investment return assumption, we rely primarily on an approach which builds upon the latest capital market assumptions. Specifically, we are using the assumptions provided by Wilshire in their "2008 Asset Allocation Return and Risk Assumptions" report and a formula based model.

Wilshire's assumptions are used by the Retirement Board in analyzing the System's asset allocation. The assumptions and the System's current asset allocation policy are shown below.

Asset Category	Asset Allocation	Expected Return	Standard Deviation
US Equity	40%	8.25%	16.00%
Non-US Equity	15	8.50%	17.25%
Core Fixed Income	20	5.00%	5.00%
High Yield Fixed Income	10	7.00%	10.00%
U.S. Real Estate Securities	<u>15</u>	5.75%	15.00%
Total Portfolio	100%		

Correlation Table

	US Eq.	Non-US Eq.	Core Fixed	High Yield	US Real Est. Sec.
US Equity	1.00				
Non-US Equity	0.83	1.00			
Core Fixed Inc.	0.29	0.04	1.00		
High Yld Fixed Inc.	0.48	0.37	0.28	1.00	
US Real Estate Sec.	0.35	0.28	0.15	0.30	1.00

The formula-based model predicts future returns based on the capital market assumptions, the asset allocation policy, and assumed annual rebalancing. The formula-based model assumes that investment returns are lognormally distributed and is based on mathematical formulas from The Long-Term Expected Rate of Return: Setting It *Right* by Olivier de la Grandville as published in the Financial Analysts Journal, Nov/Dec 1998.

The capital market assumptions were adjusted to remove Wilshire's inflation assumption and combined with the Board's asset allocation policy to generate expected returns. The expected real rate of return of a portfolio allocated according to the current asset allocation policy is 4.89% for one year (8.14% including an assumed inflation rate of 3.25%). However, the return is subject to significant year-to-year volatility as evidenced by the standard deviation. Volatility over time will lower the mean rate of return, but diversification by asset class narrows the range of expected returns. The model provides a guide to see if it is reasonable to expect this return to compound over longer periods of time. The results are summarized below, showing expected real rates of return up to 30 years.

HORIZON in Years	Mean	Std Dev	Percentile Results for Real Rate of Return				
			5th	25 th	50th	75th	95th
1	4.89%	10.49%	-11.43%	-2.43%	4.37%	11.63%	22.98%
5	4.47	4.66	-3.02	1.27	4.37	7.56	12.32
10	4.42	3.30	-0.91	2.17	4.37	6.61	9.93
20	4.39	2.33	0.61	2.81	4.37	5.95	8.27
30	4.38	1.90	1.29	3.09	4.37	5.66	7.54

In the first year, the mean real return is 4.89%, but due to the volatility associated with the asset allocation, the range of probable outcomes is quite large. For example, in the first year there is a 5% chance the real rate of return will be less than -11.43% and a 5% chance it will be greater than 22.98%. As the time horizon lengthens, the range of cumulative average results narrows.

Over a thirty-year time horizon, there is a 25% chance the real rate of return will be less than 3.09% and a 25% chance the return will be greater than 5.66%. Therefore, we can say the real return is just as likely to be within the range from 3.09% to 5.66% as not. The median real return over thirty years is expected to be 4.37%. Adding 3.25% for our inflation assumption, less 0.35% for investment expenses to 3.09% and 5.66% gives a reasonable range of 5.99% to 8.56% and a 50th percentile of 7.27%.

Reasonable Range and Recommendation – Investment Return

Based on the ASOP No. 27 guidelines and our comments above, we conclude that a reasonable range for the net investment return assumption could be from 5.99% to 8.56% for an actuarial valuation of a retirement system with the current TERS asset allocation policy. We recommend keeping the current net investment return assumption of 7.75% (3.25% inflation assumption + 4.50% net real rate of return assumption).

Investment Return	
Current Assumption (net)	7.75%
Reasonable Range	5.99% - 8.56%
Recommended Assumption	7.75%

The chart below summarizes the changes:

	<u>Current</u>	<u>Recommended</u>	<u>Change</u>
Inflation	3.25%	3.25%	0.00%
Net Real Rate of Return	<u>4.50</u>	<u>4.50</u>	<u>0.00</u>
Investment Return ⁽¹⁾	7.75%	7.75%	0.00%
Inflation	3.25%	3.25%	0.00%
Real Wage Growth	<u>0.75</u>	<u>1.00</u>	<u>+0.25</u>
Wage Growth	4.00%	4.25%	+0.25%
Spread (Investment Return - Wage Growth)	3.75%	3.50%	-0.25%

(1) Net of investment expenses.

TACOMA EMPLOYEES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Section 4

Salary Increases Due to Promotion and Longevity

Estimates of future salaries are based on assumptions for two types of increases:

- (1) Increases in the general wage level of the membership, which are directly related to inflation and increases in productivity, and
- (2) Increases in each individual's salary due to promotion or longevity (sometimes called merit increases), which occur even in the absence of inflation.

The first, increases in the general wage level, were discussed in the prior section. In this section we will study the second type, increases due to promotion and longevity (merit).

Assumption Format

We recommend maintaining the current format which bases merit salary increases on length of service alone. This study reinforces that pay increases are larger early in a member's career and smaller as time progresses.

Results and Recommendations

Exhibit 4 excludes the actual general wage increases granted during the study period. The shape of the old assumptions is still a good fit, but is a little higher than the actual experience of the last 4 years. Accordingly we are proposing lower assumed salary increases. The recommended assumptions are roughly halfway between the old assumptions and the actual experience of the past four years. This follows our general philosophy of changing assumptions gradually.

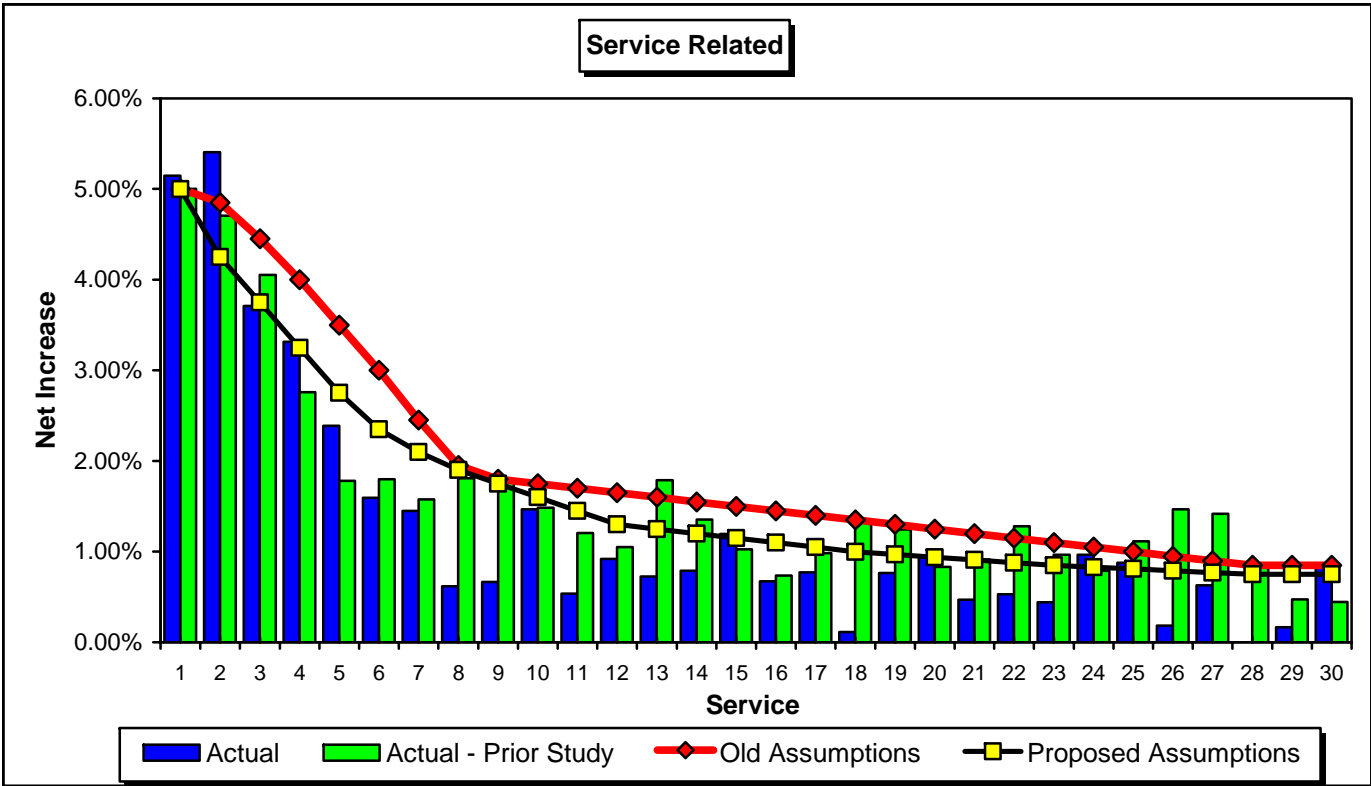
Reader's Note

The recommended assumptions are expressed in numerical format in Section 9.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 4

Merit Salary Increases General Wage Inflation Removed from Actual and Assumptions



TACOMA EMPLOYEES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Section 5

Service Retirement

Exhibits in this section present comparisons of actual retirements during the study period with those expected according to the actuarial assumptions used in our 2007 valuation.

Recent History

Retirements during the active member experience study for 1996 – 1999 were heavily influenced by the early retirement window, which lasted from January 1, 1997 through January 1, 1998. The System also made significant improvements in the retirement benefit provisions effective January 1, 1997. The benefit percentages used to calculate retirement benefits were improved, and a minimum retirement benefit equal to the actuarial equivalent of 200% of the member's accumulated normal contributions was instituted.

Therefore, based on a lack of credible experience the retirement assumptions were not changed in the study of active member experience for 1996 – 1999. The active member experience study for 2000 - 2003 and this study for 2004 – 2007 represent experience under the new benefit structure.

Assumption Format

Retirement rates are currently based on two factors:

- Age, and
- Eligibility for an Unreduced Retirement Benefit based on the 2.0% benefit percentage

Our study found each factor to be significant.

The requirements for retirement with a reduced benefit (benefit percentage less than 2.0% of average final compensation for each year of service) are age 40 with 20 years of service, or age 55 with 10 years of service. The requirements for retirement with an unreduced benefit are either 30 years of service, regardless of age, age 60 regardless of service, or a combination of age and service which add up to 80.

In the past there was a greater likelihood members would retire in the first year they became eligible for the full 2.0% benefit percentage than in the succeeding years. Neither this study nor the prior study gave material evidence to support that pattern. Therefore, our recommended assumptions do not recognize an increased probability of retirement in the first year of eligibility for a full 2.0% benefit although we did study it separately. This may well be a result of the new benefit structure. Many members may not be ready to retire at earlier ages, and it may not be as obvious when they hit the 2.0% threshold.

Results and Recommendations

AGES 70 AND OVER

All exhibits exclude retirees after age 70. We continue to recommend an assumption of immediate retirement for members aged 70 and older.

EXHIBITS 5 & 6: RETIREMENT WITH REDUCED BENEFITS – MALE (EXHIBIT 5) AND FEMALE (EXHIBIT 6)

These are members who retired before they were eligible for the full 2.0% benefit. Male experience was very close to expected and we are recommending no change to the assumption for males. Although these are both small groups, we saw considerably more reduced retirements for females than expected, 41 compared to 26. Therefore we are increasing the reduced retirement assumption for females.

EXHIBIT 7: RETIREMENT IN FIRST YEAR ELIGIBLE FOR FULL BENEFITS - MALES

There were fewer retirements in this group than expected. Therefore, we are recommending lower probabilities at all ages 60 and before. There are not enough retirements to form a distinct pattern so we are also assuming a flat assumption of 14.5% at all ages 60 and before. As discussed under assumption format, we did not see a greater incidence of retirement in the first year eligible for unreduced benefits. Therefore, these are the same assumptions we are recommending for retirement after the first year eligible for full benefits.

EXHIBIT 8: RETIREMENT IN FIRST YEAR ELIGIBLE FOR FULL BENEFITS - FEMALES

Again, there are not enough retirements to form a distinct pattern so we are also assuming a flat assumption of 12.0% at all ages before 60. 13 of the 23 retirements occurred at 60, so we have assumed a higher probability of 23% at age 60. The recommended rates are overall slightly higher than the old rates.

EXHIBIT 9: RETIREMENT WITH FULL BENEFITS (EXCLUDES FIRST YEAR OF ELIGIBILITY) - MALES

There were fewer retirements than expected, but the shape generally followed expectations. Therefore we are recommending lowering the rates below age 66, but keeping generally the same shape.

EXHIBIT 10: RETIREMENT WITH FULL BENEFITS (EXCLUDES FIRST YEAR OF ELIGIBILITY) - FEMALES

The 77 retirements in this group were very close to the 75 expected. Therefore we are making small adjustments which generally offset each other, but make the shape of the curve closer to actual experience for the last four years.

Summary

The recommended assumptions:

- generally decrease the expected number of male retirements and increase the expected number of female retirements.
- make small adjustments to the shape of the curves,
- make no change to the assumption for male unreduced retirements
- use the same assumptions for retirement in the first year eligible for full benefits and after the first year eligible for full benefits. This is the second four year study in a row that shows this experience.

Male Member Retirement Summary					
Type of Retirement			Actual/		Actual/
	Actual	Expected	Expected	Proposed	Proposed
Reduced	38	38	100%	38	100%
1 st Year Unreduced	35	45	78%	39	90%
After 1 st Year Unreduced	136	181	75%	145	94%
Total	209	264	79%	222	94%

Female Member Retirement Summary					
Type of Retirement			Actual/		Actual/
	Actual	Expected	Expected	Proposed	Proposed
Reduced	41	26	158%	33	124%
1 st Year Unreduced	23	21	110%	23	100%
After 1 st Year Unreduced	77	75	103%	77	100%
Total	141	122	116%	133	106%

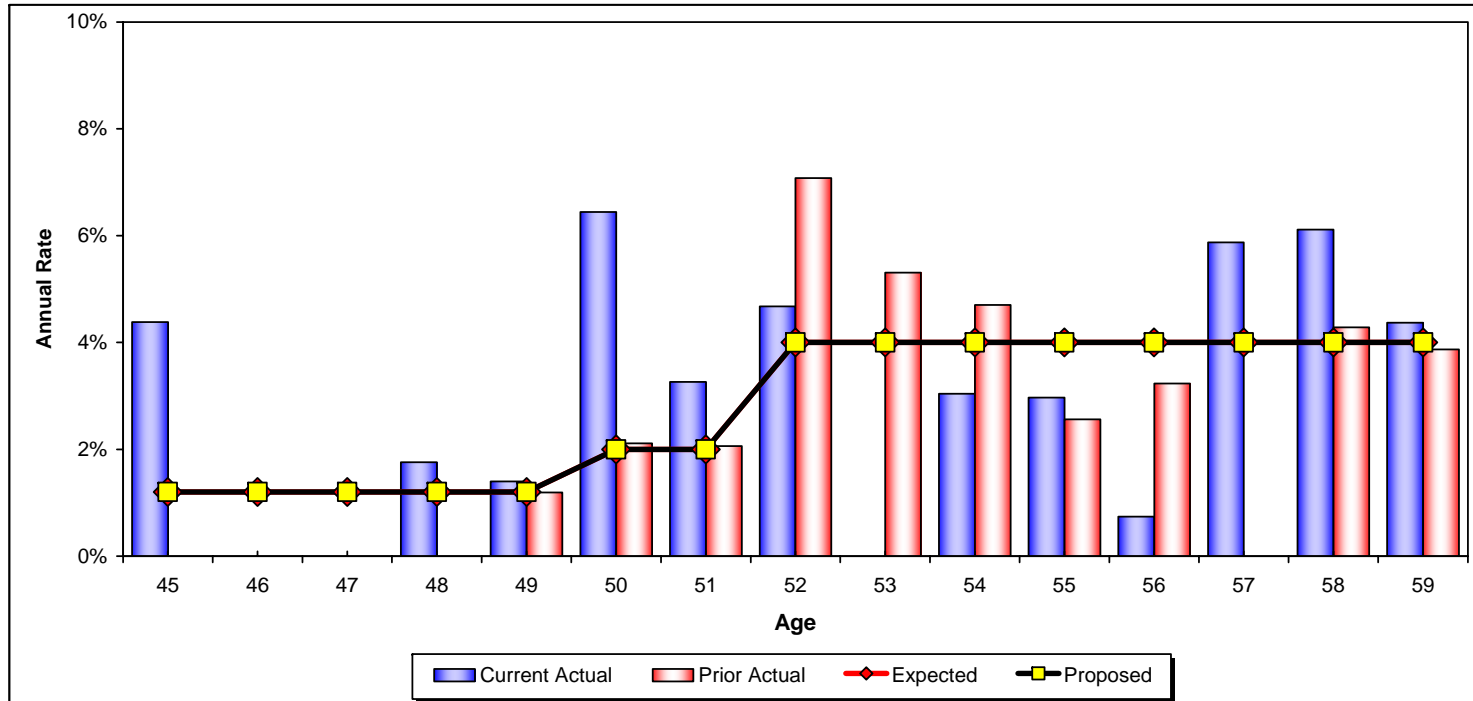
Reader's Note

The recommended assumptions are expressed in numerical format in Section 9.

TACOMA EMPLOYES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 5

Retirement with Reduced Benefits Male

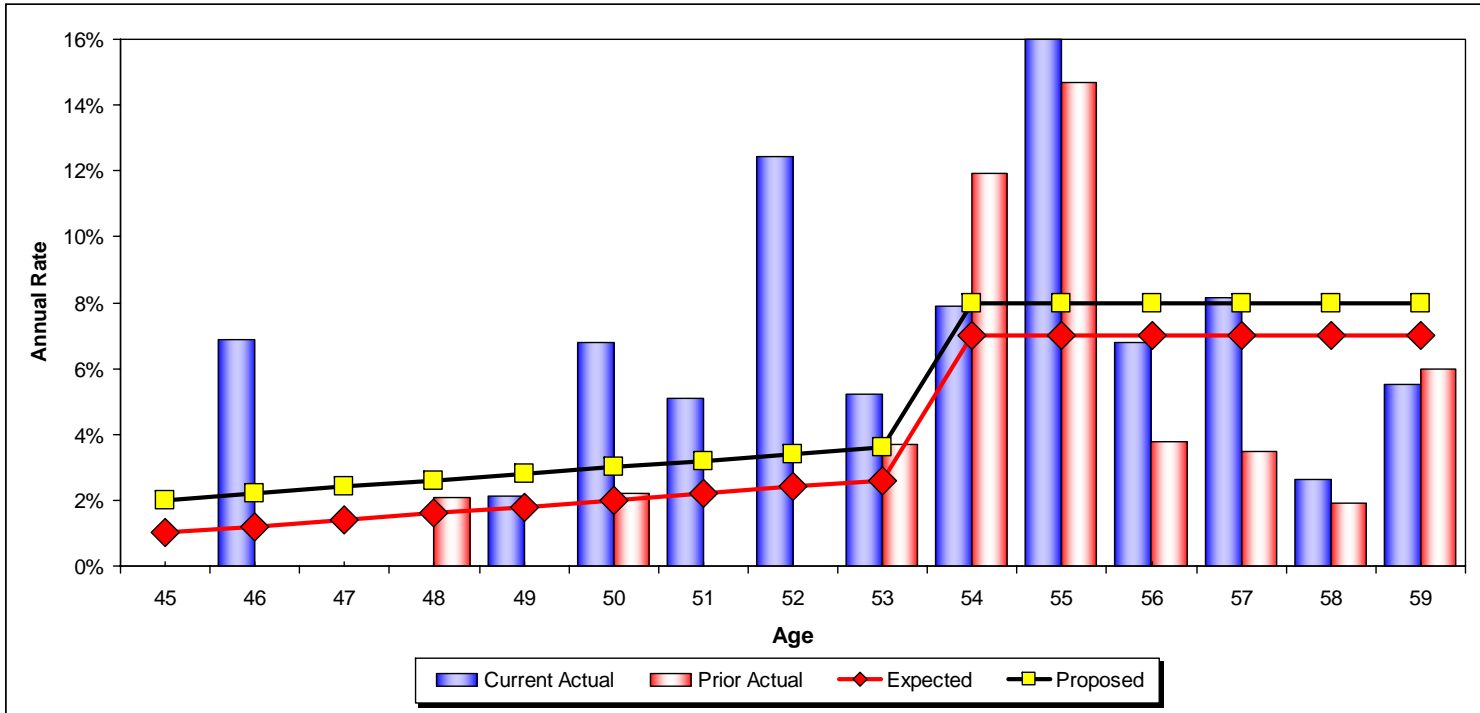


All Ages	Old Assumptions	Actual	Proposed
Total Count	38	38	38
Actual/Expected	100%		100%

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 6

**Retirement with Reduced Benefits
Female**

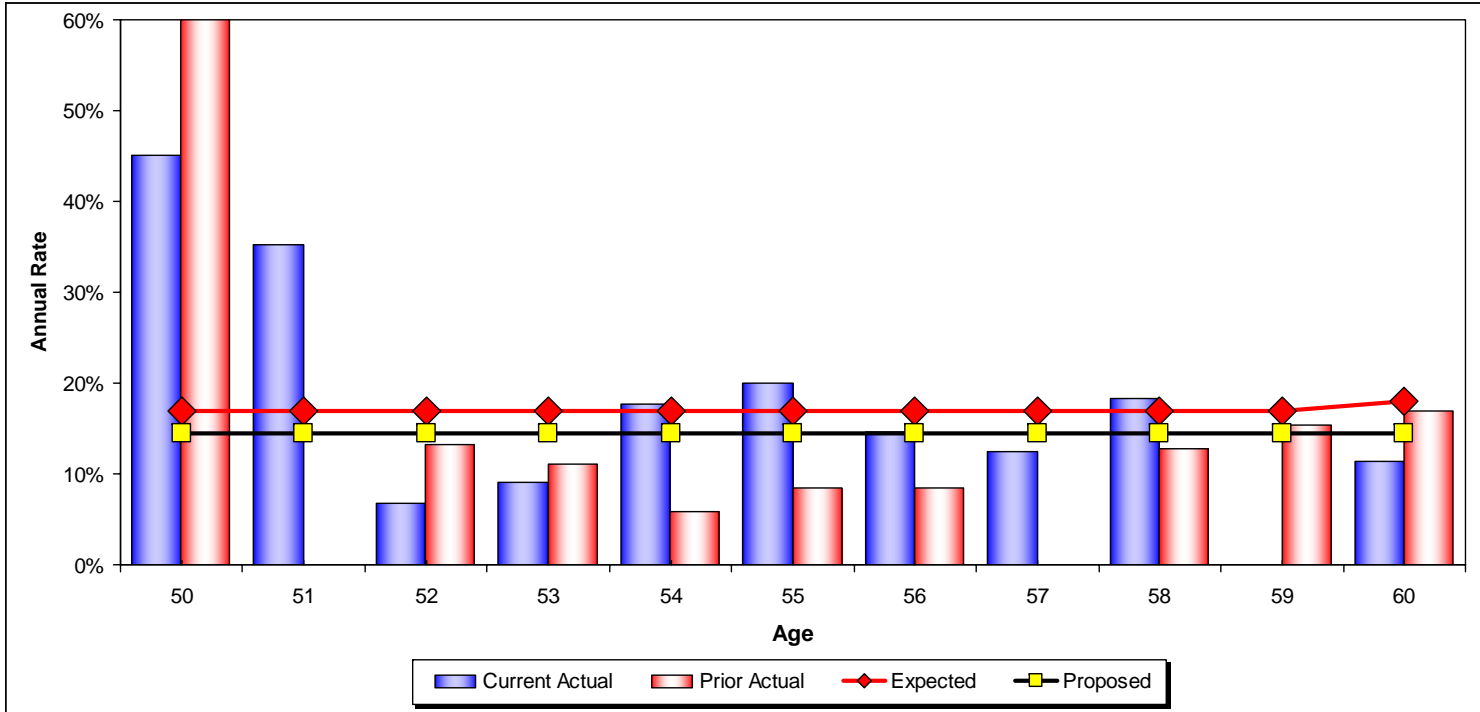


All Ages	Old Assumptions	Actual	Proposed
Total Count	26	41	33
Actual/Expected	158%		124%

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 7

**Retirement in First Year Eligible for Full Benefits
Males**

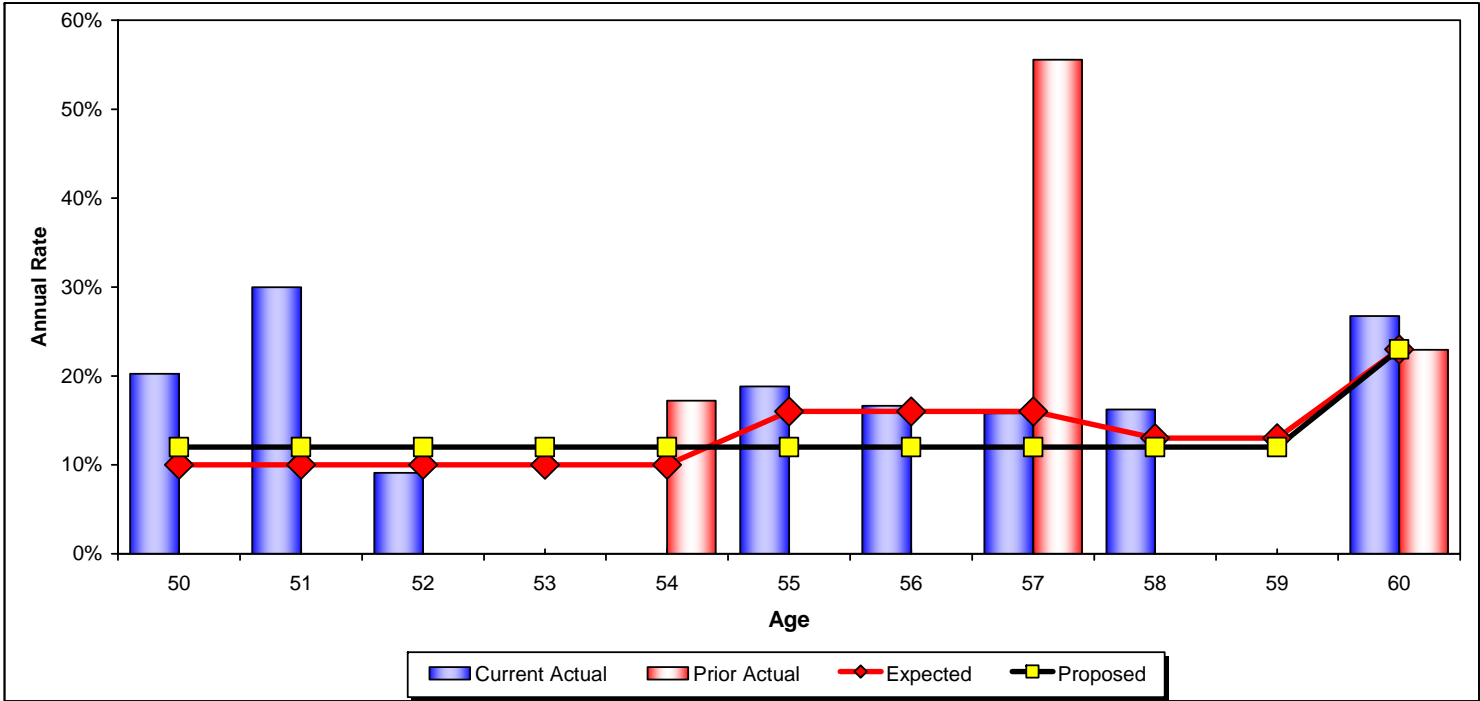


All Ages	Old Assumptions	Actual	Proposed
Total Count	45	35	39
Actual/Expected	78%		90%

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 8

**Retirement in First Year Eligible for Full Benefits
Females**

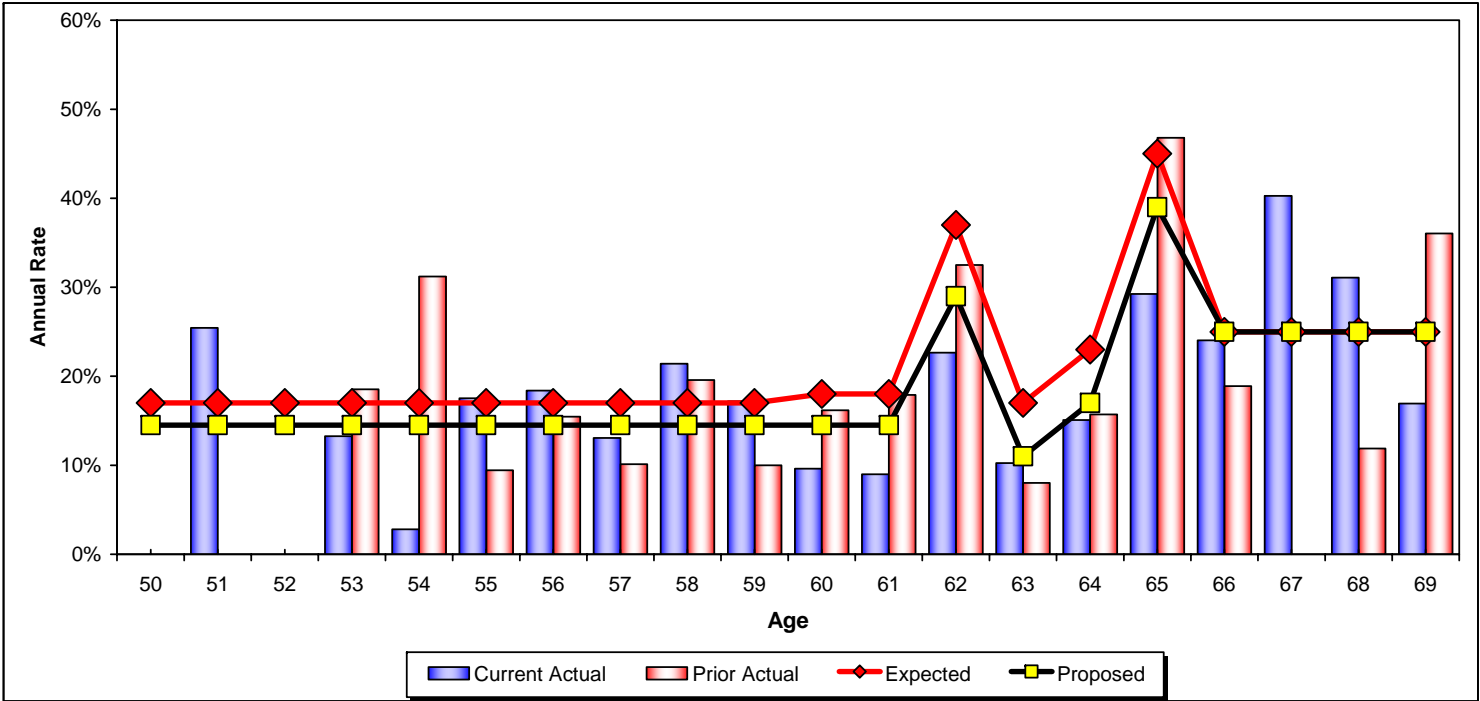


All Ages	Old Assumptions	Actual	Proposed
Total Count	21	23	23
Actual/Expected	110%		100%

TACOMA EMPLOYEES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 9

Retirement with Full Benefits (Excludes First Year of Eligibility) Males

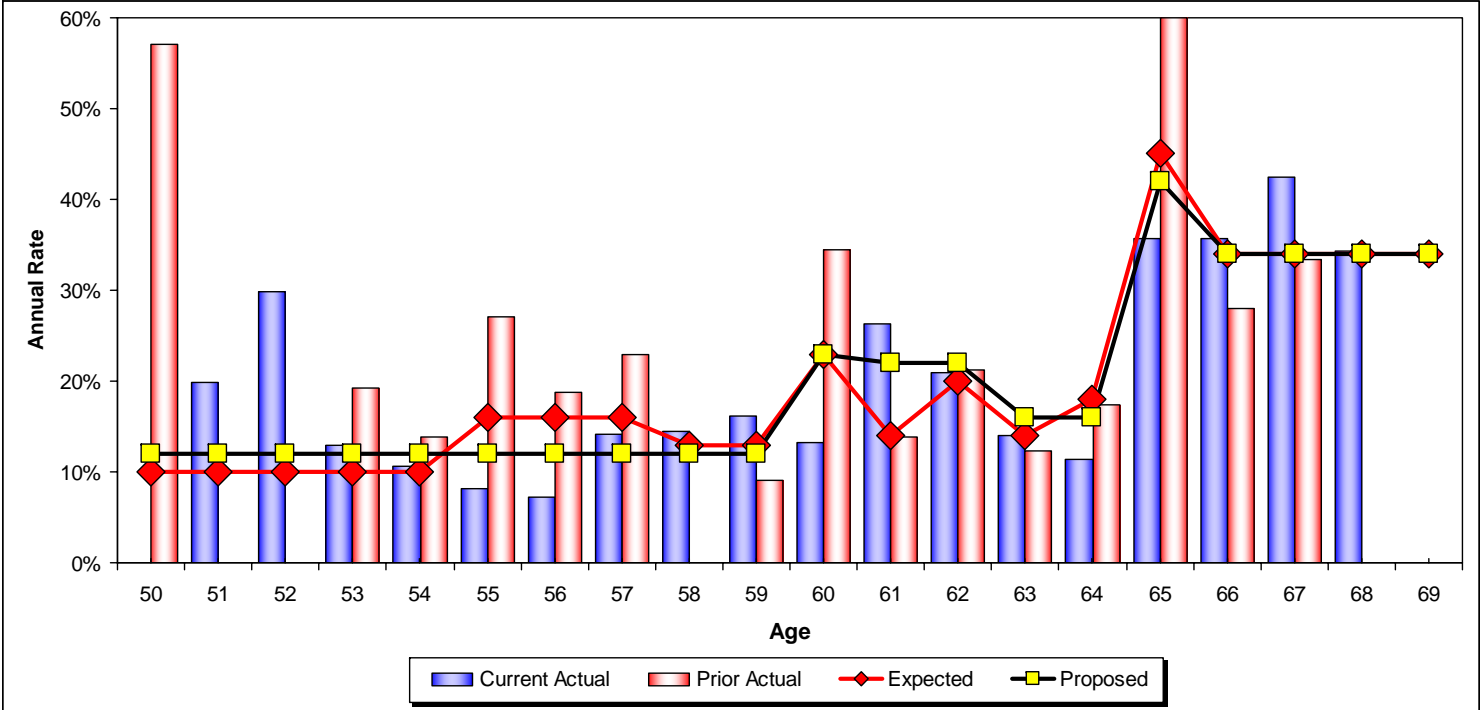


All Ages	Old Assumptions	Actual	Proposed
Total Count	181	136	145
Actual/Expected	75%		87%

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 10

**Retirement with Full Benefits (Excludes First Year of Eligibility)
Females**



All Ages	Old Assumptions	Actual	Proposed
Total Count	75	77	77
Actual/Expected	103%		100%

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Section 6

Disability Retirement

The exhibit in this section compares actual disabled retirements during the study period with those expected by the actuarial assumptions used in our 2007 valuation.

Assumption Format, Results and Recommendation

Disability rates are currently based on one factor:

- Age

The requirement for a disability retirement is 5 years of service.

Although the four disabilities in the study period do not form a statistically valid sample, the shape of the disability curve remains generally reasonable. The four disabilities during the period is significantly less than the 9 expected by the current assumptions. Therefore we are recommending the current probabilities be reduced.

EXHIBIT 11: DISABILITY RETIREMENT – MALE AND FEMALE

We are recommending reduced probabilities.

Disability Retirement Summary					
Member Type	Actual	Expected	Actual/ Expected	Proposed	Actual/ Proposed
Total	4	9	44%	6	67%

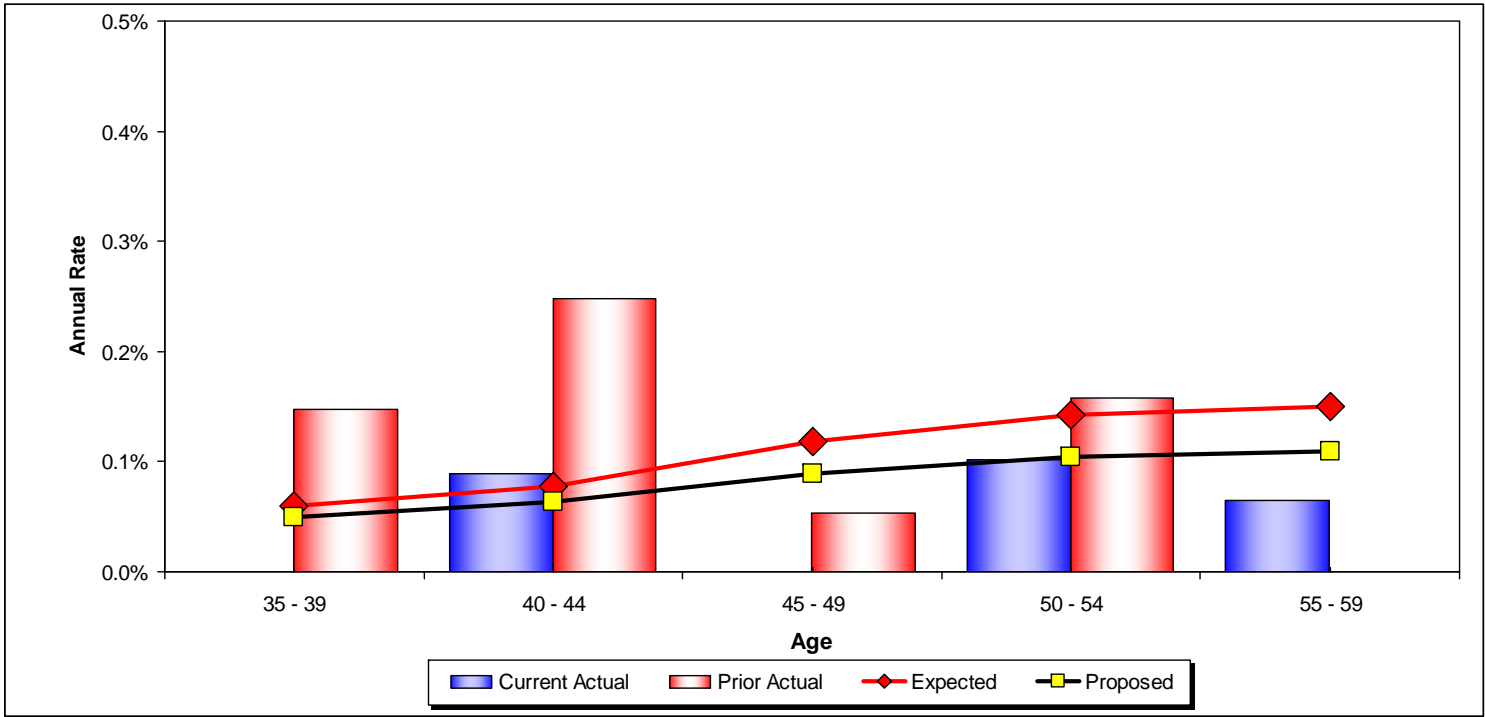
Reader's Note

The recommended assumptions are expressed in numerical format in Section 9.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 11

**Disability Retirement
Males and Females**



All Ages	Old Assumptions	Actual	Proposed
Total Count	9	4	6
Actual/Expected	44%		67%

TACOMA EMPLOYEES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Section 7

Other Terminations of Employment

The exhibits in this section compare actual terminations (for reasons other than retirement, death and disability) during the study period with those expected by the actuarial assumptions used in our 2007 valuation.

Assumption Format

The termination assumptions are based on service. Our experience with TERS and other systems shows that termination assumptions based on service are more consistent with actual experience than assumptions based on age.

Results and Specific Recommendations

EXHIBITS 12 AND 13 OTHER TERMINATIONS OF EMPLOYMENT – MALE AND FEMALE

There were generally more terminations than expected by the actuarial assumptions. Therefore, we are recommending overall increases in the probability of termination for both males and females.

Other Terminations of Employment Summary					
Member Type	Actual	Expected	Actual/ Expected	Proposed	Actual/ Proposed
Males	207	195	106%	205	101%
Females	213	164	130%	194	110%
Total	420	359	117%	399	105%

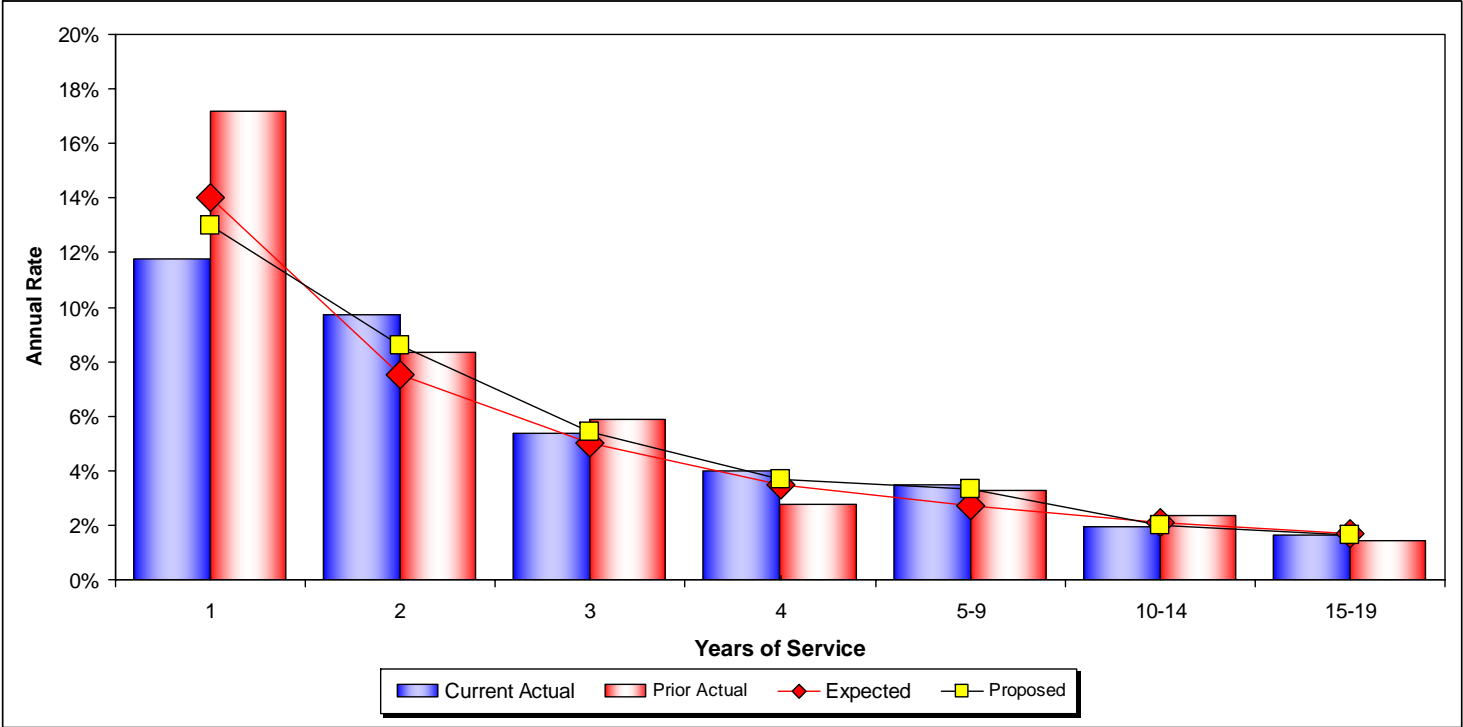
Reader's Note

The recommended assumptions are expressed in numerical format in Section 9.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 12

**Other Terminations of Employment
Males**

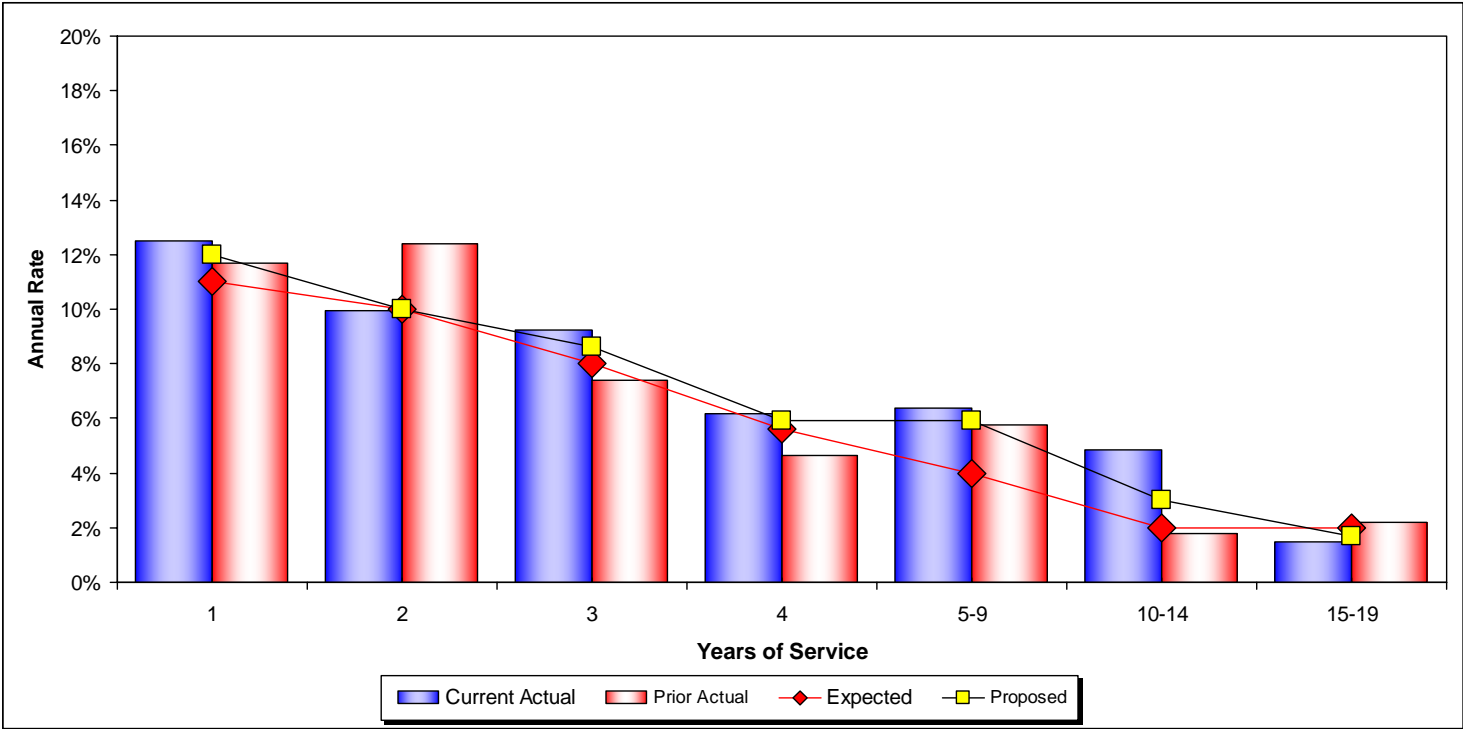


Excluding Service Less Than One			
All Ages	Old Assumptions	Actual	Proposed
Total Count	195	207	205
Actual/Expected	106%		101%

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 13

**Other Terminations of Employment
Females**



All Ages	Excluding Service Less Than One		
	Old Assumptions	Actual	Proposed
Total Count	164	213	194
Actual/Expected	130%		110%

TACOMA EMPLOYEES' RETIREMENT SYSTEM 2004 - 2007 INVESTIGATION OF EXPERIENCE

Section 8

Other Assumptions

This section of the report comments on the portability assumption, and the assumption for continued membership among vested terminated employees. We are recommending no changes be made to these assumptions.

Portability with Other Washington Retirement Systems

Effective January 1, 1994, the System adopted agreements for portability of retirement benefits with the State of Washington. In the second half of 1999, the System expanded its portability provisions to include the benefit percentage factor used in calculating benefits. Currently, 40 members have retired from TERS under the portability provisions. 5 of these retired before 1996, 8 retired in the 1996 to 1999 study period, 10 more retired in the 2000 – 2003 study period, and 17 more retired in the current study period (2004 – 2007). We began using specific assumptions for portability in the January 1, 2001 valuation. These assumptions are:

- 20% of all members retiring with reduced or deferred benefits will be eligible for portability benefits;
- Members retiring from active service with TERS, who are eligible for a retirement benefit based on the full 2.0% benefit percentage factor without portability, will not have their benefits changed by portability;
- The average number of years a member will have with another system will be 15 years; and
- Portability service will increase the benefit percentage factor by 33%.

These assumptions are used to calculate an additional liability load which is applied to members who are projected to retire with deferred or reduced benefits. Based on experience so far it appears these assumptions are probably on the conservative side. However, the amount of experience available is small, especially since the improvement to include the benefit percentage factor in the second half of 1999, and the number of portability retirements seems to be steadily growing. These assumptions should be monitored closely. The impact of members taking a retirement with portability could become significant. Nevertheless, the current assumptions appear to be calculating an adequate reserve for portability. We recommend no change at this time.

Continued Membership Among Vested Terminated Employees

The current valuation assumption is that the member will take the benefit with the greatest financial value, i.e., the greater of the refund with the 50% employer match, or the deferred vested benefit with the money purchase feature (2 x employee contributions with interest). Therefore, based on the valuation methods, we no longer apply a specific probability to the event that vested members will leave their contributions in the System. No change recommended.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Section 9

Summary of Valuation Assumptions

Note: The following is a summary of the demographic valuation assumptions expected to be used for the January 1, 2009 actuarial valuation, if the Retirement Board adopts the changes recommended in this report.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Table A-1

Future Salaries

Years of Service	Annual Rate of Increase	
	Promotion and Longevity	Total*
1	5.00%	9.46%
2	4.25	8.68
3	3.75	8.16
4	3.25	7.64
5	2.75	7.12
6	2.35	6.70
7	2.10	6.44
8	1.90	6.23
9	1.75	6.07
10	1.60	5.92
11	1.45	5.76
12	1.30	5.61
13	1.25	5.55
14	1.20	5.50
15	1.15	5.45
16	1.10	5.40
17	1.05	5.34
18	1.00	5.29
19	0.97	5.26
20	0.94	5.23
21	0.91	5.20
22	0.88	5.17
23	0.85	5.14
24	0.83	5.12
25	0.81	5.09
26	0.79	5.07
27	0.77	5.05
28 and over	0.75	5.03

* Including a 4.25% general wage increase assumption.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Table A-2

Service Retirement

Annual Probabilities

Age	Males			Females		
	Eligible for Reduced Benefits	First Year Eligible for Full Benefits	Thereafter	Eligible for Reduced Benefits	First Year Eligible for Full Benefits	Thereafter
45 or less	1.2%	14.5%	14.5%	2.0%	12.0%	12.0%
46	1.2	14.5	14.5	2.2	12.0	12.0
47	1.2	14.5	14.5	2.4	12.0	12.0
48	1.2	14.5	14.5	2.6	12.0	12.0
49	1.2	14.5	14.5	2.8	12.0	12.0
50	2.0	14.5	14.5	3.0	12.0	12.0
51	2.0	14.5	14.5	3.2	12.0	12.0
52	4.0	14.5	14.5	3.4	12.0	12.0
53	4.0	14.5	14.5	3.6	12.0	12.0
54	4.0	14.5	14.5	8.0	12.0	12.0
55	4.0	14.5	14.5	8.0	12.0	12.0
56	4.0	14.5	14.5	8.0	12.0	12.0
57	4.0	14.5	14.5	8.0	12.0	12.0
58	4.0	14.5	14.5	8.0	12.0	12.0
59	4.0	14.5	14.5	8.0	12.0	12.0
60		14.5	14.5		23.0	23.0
61			14.5			22.0
62			29.0			22.0
63			11.0			16.0
64			17.0			16.0
65			39.0			42.0
66			25.0			34.0
67			25.0			34.0
68			25.0			34.0
69			25.0			34.0
70			*			*

* Immediate retirement is assumed for every person age 70 or over.

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Table A-3

Disablement

Annual Probabilities

<u>Age</u>	<u>Males and Females</u>
22	.02%
27	.02
32	.05
37	.05
42	.05
47	.09
52	.10
57	.11

**TACOMA EMPLOYEES' RETIREMENT SYSTEM
2004 - 2007 INVESTIGATION OF EXPERIENCE**

Table A-4

**Other Terminations of Employment
Among Members Not Eligible to Retire**

Annual Probabilities

Year of Service	Males	Females
1	33.00%	28.00%
2	13.00	12.00
3	8.60	10.00
4	5.40	8.60
5	3.70	5.90
6	3.57	5.90
7	3.43	5.90
8	3.30	5.90
9	3.04	5.32
10	2.78	4.74
11	2.52	4.16
12	2.26	3.58
13	2.00	3.00
14	1.93	2.74
15	1.86	2.48
16	1.79	2.22
17	1.72	1.96
18 and up	1.65	1.70