

Utah Retirement Systems

Actuarial Valuation Report

As of January 1, 2019



August 8, 2019

Utah State Retirement Board
540 East 200 South
Salt Lake City, UT 84102

Dear Members of the Board:

Subject: Actuarial Valuation as of January 1, 2019

This report describes the current actuarial condition of the Utah Retirement Systems (URS), determines the calculated employer contribution rates, and analyzes changes in these contribution rates. In addition, the report provides various summaries of the data. A separate report is issued with regard to valuation results determined in accordance with Governmental Accounting Standards Board (GASB) Statements 67 and 68. Results of this report should not be used for any other purpose without consultation with the undersigned. Valuations are prepared annually as of January 1, the first day of the URS plan year. This report was prepared at the request of the Board and is intended for use by the URS staff and those designated or approved by the Board. This report may be provided to parties other than URS staff only in its entirety and only with the permission of the Board.

Under URS statutes, the Board of Trustees must certify employer contribution rates annually. These rates are determined actuarially, based on the Board's funding policy, although, as discussed below, the Board may choose to maintain the current rate if it is greater than the actuarially calculated rate. Contribution rates determined by a given actuarial valuation become effective eighteen months after the valuation date. In other words, the rates determined by this January 1, 2019 actuarial valuation will be used by the Board when certifying the employer contribution rates for the 12-month period beginning July 1, 2020 and ending June 30, 2021. If new legislation is enacted between the valuation date and the date the contribution rates become effective, the Board certified contribution rates will be updated to reflect this new legislation. Such adjustments are based on information supplied by the actuary.

FINANCING OBJECTIVES AND FUNDING POLICY

In setting contribution rates, the Board's principal objectives are:

- To set rates so that the unfunded actuarial accrued liability (UAAL) will be amortized over a reasonable period from the current valuation date
- To set rates so that they remain relatively level over time.

To accomplish this, the Board's funding policy requires that the employer contribution rate be at least equal to the sum of the employer normal cost rate (which pays the current year's cost) and an amortization rate which results in the amortization of the UAAL over 20 years in installments that increase at the assumed rate of growth in payroll for URS.

Under this policy, the objective of maintaining a relatively level contribution rate over time is achieved in normal conditions such as consistent financial markets.

Section 49-11-301(5) of the Utah Code allows the Board to set the employer contribution rate at the prior year's rate, if the rate otherwise would decrease and if the funded ratio is less than 110%. In such a case, the rate set by the Board would be higher than the actuarially determined contribution rate. The purpose of this legislation is to enhance the Board's ability to maintain more level contribution rates while targeting a 100% - 110% funded level. The Board has historically followed this policy, so the certified contribution rate may be greater than the actuarially determined rate.

PROGRESS TOWARD REALIZATION OF FINANCING OBJECTIVES

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) is a standard measure of a plan's funded status. In the absence of benefit improvements, it should increase over time, until it reaches at least 100%.

Since the prior year's valuation, the funded ratio on a combined basis slightly decreased from 87.4% to 87.2%. The slight change in the funded ratio is due to investment losses on an actuarial value of asset basis and liability losses primarily attributable to higher than expected salary increases. Absent unfavorable actuarial experience, we expect the funded ratio to increase in future years.

If market value had been used in the calculation instead of actuarial value, the aggregate funded ratio for all funds combined would have been 84.6% compared to 90.3% in the prior year. The decrease in the funded ratio on a market value basis is attributable to the -0.4% return on the market value of assets during the prior year and liability losses primarily attributable to higher than expected salary increases.

BENEFIT PROVISIONS

The benefit provisions reflected in this valuation are those which were in effect on January 1, 2019. SB 129 was enacted during the 2019 legislative session and will increase the employer contribution requirement to the Tier 2 Public Safety and Firefighter System (Hybrid and Defined Contribution) to 14.00% of payroll. Additionally, the benefit multiplier will increase from 1.50% to 2.00% for service earned after July 1, 2020 in the Tier 2 Public Safety and Firefighter Hybrid System. As a result, the certified contribution rates for this System have increased.

It should also be noted that the increased benefit multiplier in the Tier 2 Public Safety and Firefighter Hybrid System will result in a 2.27% of pay member contribution requirement beginning July 1, 2020.

ASSUMPTIONS AND METHODS

Except as noted below, the economic and demographic assumptions and actuarial methods used to perform this valuation remain unchanged from the prior valuation. The actuary reviews the investment return assumption each year and provides consultation to the Board regarding its appropriateness. The Board has the authority to change this assumption each year. The demographic assumptions are reviewed in detail every three years. The next experience analysis to review the demographic assumptions is scheduled for 2020.

With the passage of SB 129, the retirement pattern for the members in the Tier 2 Public Safety and Firefighter Hybrid System are expected to change. We have modified the retirement rates for these members to be the same as the assumption used to model the retirement pattern in the Tier I Public Safety and Firefighter Systems, except for a 10% load at first eligibility for unreduced retirement prior to age 65.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can and almost certainly will differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities and calculated contribution rates.

It is our opinion that the assumptions used to perform this valuation are internally consistent and are reasonable based on past and anticipated future experience of the System. Also, these assumptions and methods used for funding purposes satisfy the parameters set by the Actuarial Standards of Practice.

DATA

Member data for retired, active and inactive members was supplied as of December 31, 2018 by the URS staff. The staff also supplied asset information as of December 31, 2018. We did not audit this data, but we did apply a number of tests to the data and concluded that it was reasonable and consistent with the prior year's data. GRS is not responsible for the accuracy or completeness of the information provided to us by URS.

CERTIFICATION

We certify that the information presented herein is accurate and fairly portrays the actuarial position of URS as of January 1, 2019.


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

The undersigned are independent actuaries and consultants. Mr. White is an Enrolled Actuary and a Member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. Both consultants below are experienced in performing valuations for large public retirement systems.

Sincerely,



Daniel J. White, FSA, EA, MAAA
Senior Consultant



Lewis Ward
Consultant

K:\3012\MasterLinkedFiles\PensionValRpts\ValReport.docx

Table of Contents

		Page
	COVER LETTER	
SECTION A	EXECUTIVE SUMMARY	
	EXECUTIVE SUMMARY AND CONTRIBUTION REQUIREMENTS	1
SECTION B	DISCUSSION	
	DETERMINATION OF CALCULATED CONTRIBUTION RATES	3
	FINANCIAL DATA AND EXPERIENCE	6
	MEMBER DATA	7
	BENEFIT PROVISIONS	8
	ACTUARIAL METHODS AND ASSUMPTIONS	9
	GOVERNORS AND LEGISLATIVE PENSION PLAN	10
	HIGHER EDUCATION	11
	FIREFIGHTERS AND JUDGES OFFSETS	12
	3% SUBSTANTIAL SUBSTITUTE	13
	RESTORATION OF PURCHASING POWER (ROPP)	14
SECTION C	SUPPORTING EXHIBITS	
	EXHIBIT 1(A) — RECOMMENDED TIER I CONTRIBUTION RATES	15
	EXHIBIT 1(B) — RECOMMENDED TIER II CONTRIBUTION RATES	16
	EXHIBIT 1(C) — DEVELOPMENT OF TIER I CONTRIBUTION RATES	17
	EXHIBIT 1(D) — DEVELOPMENT OF TIER II CONTRIBUTION RATES	18
	EXHIBIT 2(A) — COMPONENTS OF ACTUARIALY CALCULATED CONTRIBUTION RATES	19
	EXHIBIT 2(B) — DETERMINATION OF CONTRIBUTION RATE OFFSETS FOR FIREFIGHTERS AND JUDGES	20
	EXHIBIT 3(A) — SCHEDULE OF FUNDING PROCESS	21
	EXHIBIT 3(B) — COMPARISON OF FUNDED RATIOS	22
	EXHIBIT 4(A) — ANALYSIS OF CHANGES IN CALCULATED CONTRIBUTION RATES	23
	EXHIBIT 4(B) — ANALYSIS OF CHANGES IN UAAL	24
	EXHIBIT 5(A) — ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS BY FUND AND STATUS	25
	EXHIBIT 5(B) — ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS DETAILS FOR RETIREES AND BENEFICIARIES, BY STATUS	26
	EXHIBIT 5(C) — ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS DETAILS FOR INACTIVE MEMBERS, BY STATUS	27

Table of Contents

EXHIBIT 5(D)	—	ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS DETAILS FOR ACTIVE MEMBERS, BY BENEFIT	28
EXHIBIT 5(E)	—	ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS DETAILS FOR MEMBERS RECEIVING BENEFITS, BY BENEFIT	29
EXHIBIT 6(A)	—	NORMAL COST	30
EXHIBIT 6(B)	—	NET EMPLOYER NORMAL COST	31
EXHIBIT 7(A)	—	DETERMINATION OF ACTUARIAL ACCRUED LIABILITY	32
EXHIBIT 7(B)	—	ACTUARIAL ACCRUED LIABILITY DETAILS OF MEMBER AND EMPLOYER FINANCING	33
EXHIBIT 8	—	NUMBER OF MEMBERS	34
EXHIBIT 9	—	ACTIVE MEMBERSHIP STATISTICS	35
EXHIBIT 10	—	RETIRED MEMBER STATISTICS	36
EXHIBIT 11(A)	—	MARKET VALUE OF ASSETS (ALL RETIREMENT SYSTEMS COMBINED)	37
EXHIBIT 11(B)	—	RECONCILIATION OF MARKET VALUE OF ASSETS (MVA)	38
EXHIBIT 12(A)	—	INVESTMENT RETURN RATES FOR PRIOR YEAR	39
EXHIBIT 12(B)	—	SUMMARY OF INVESTMENT RETURN RATES	40
EXHIBIT 13	—	CALCULATION OF ACTUARIAL VALUE OF ASSETS (ALL RETIREMENT SYSTEMS COMBINED)	41
EXHIBIT 14	—	TRANSFER ADJUSTMENTS TO ASSET VALUES	42
EXHIBIT 15(A)	—	CONTRIBUTION RATE FOR 3% SUBSTANTIAL SUBSTITUTE	43
EXHIBIT 15(B)	—	LIABILITIES FOR 3% SUBSTANTIAL SUBSTITUTE	44
EXHIBIT 16	—	LEG\GOV DETERMINATION OF CONTRIBUTION	45
EXHIBIT 17(A)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - PUBLIC EMPLOYEES RETIREMENT SYSTEM (CONTRIBUTORY)	46
EXHIBIT 17(B)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - PUBLIC EMPLOYEES' RETIREMENT SYSTEM (NONCONTRIBUTORY)	47
EXHIBIT 17(C)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - PUBLIC SAFETY RETIREMENT SYSTEM (CONTRIBUTORY)	48
EXHIBIT 17(D)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - PUBLIC SAFETY RETIREMENT SYSTEM (NONCONTRIBUTORY)	49
EXHIBIT 17(E)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - FIREFIGHTERS RETIREMENT SYSTEM	50
EXHIBIT 17(F)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - JUDGES RETIREMENT SYSTEM	51

Table of Contents

EXHIBIT 17(G)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - LEGISLATIVE AND GOVERNORS RETIREMENT SYSTEM	52
EXHIBIT 17(H)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - TIER II PUBLIC EMPLOYEES' RETIREMENT SYSTEM	53
EXHIBIT 17(I)	—	HISTORICAL SUMMARY OF STATISTICAL DATA - TIER II PUBLIC SAFETY AND FIREFIGHTER HYBRID RETIREMENT SYSTEM	54
SUPP EXHIBIT 1(A)	—	TIER I RETIREMENT CONTRIBUTION RATES	55
SUPP EXHIBIT 1(B)	—	TIER II RETIREMENT CONTRIBUTION RATES	56
SUPP EXHIBIT 1(C)	—	RETIREMENT CONTRIBUTION RATE GUIDE	57
SECTION D		ASSESSMENT AND DISCLOSURE OF RISK	58
APPENDIX 1		STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS	62
APPENDIX 2		SUMMARY OF PRINCIPAL PLAN PROVISIONS	
		PUBLIC EMPLOYEES' RETIREMENT SYSTEMS (CONTRIBUTORY AND NONCONTRIBUTORY)	87
		PUBLIC SAFETY RETIREMENT SYSTEMS (CONTRIBUTORY AND NONCONTRIBUTORY)	92
		FIREFIGHTERS RETIREMENT SYSTEM	97
		JUDGES' RETIREMENT SYSTEM	101
		GOVERNORS AND LEGISLATIVE PENSION PLAN	104
		TIER II PUBLIC EMPLOYEES' HYBRID RETIREMENT SYSTEM	107
		TIER II PUBLIC SAFETY AND FIREFIGHTERS HYBRID RETIREMENT SYSTEM	111
APPENDIX 3		GLOSSARY	115

SECTION A



EXECUTIVE SUMMARY

Executive Summary and Contribution Requirements

- The certified contribution rate for the Noncontributory State & School Fund (Fund 16) remains unchanged at 22.19% of payroll.
- The certified contribution rate for the Noncontributory Local Government Fund (Fund 15) remains unchanged at 18.47% of payroll.
- The recommended contribution rate for the defined benefit portion of the Tier II Public Employee Retirement System increased from 8.97% to 9.11% due to a higher than expected liability that is primarily due to larger than assumed salary increases provided to active members in the System.
- No change the contribution rates for the Tier I Public Safety and Tier I Firefighter funds. The contribution offset to the Tier I Firefighter funds also remains unchanged.
 - See Exhibit 2(b) for details about the offsets applied to contribution rates for Firefighters.
- SB 129 was enacted during the 2019 legislative session and will increase the employer contribution rate for the Tier II Public Safety and Firefighter System (Hybrid and Defined Contribution) by 2.00% to 14.00% of pay. Due to the increase in the benefit multiplier to 2.00% for service earned after July 1, 2020, the members in the hybrid plan will not receive an employer contribution to their defined contribution accounts and will be required to contribute 2.27% of pay to finance the defined benefit portion of the hybrid plan.
- Due to a decrease in the average court fee receipts relative to payroll, the net employer contribution rates for the Judicial fund increased by 0.56% of pay to 44.31%.
 - See Exhibit 2(b) for details about the offsets applied to contribution rates for Judges.
- Total projected contributions for all funds combined are estimated to be \$1.3 billion for fiscal year 2021.
- Exhibits 1(a) and 1(b) show the recommended contribution rates for FY 2021, and compare these to the rates certified for FY 2020 based on the last valuation.
 - Rates include funding for the 3% substantial substitute benefit, where applicable.
 - Rates do not include the 1.50% 401(k) contribution.
 - Offsets for Firefighters System and Judges System are shown.
 - Rates shown on Exhibits 1(a) and 1(b), column 6 are for the twelve-month period beginning July 1, 2020 (FY 2021).
 - The rates for FY 2021 may need to be adjusted for the effect of any 2020 legislation.

Executive Summary and Contribution Requirements (Continued)

- Exhibits 1(c) and 1(d) show the development of the recommended rates under §49-11-301(5). The recommended rates are the larger of the actuarially calculated rates from the current valuation (Col. 2) and the rates certified for FY 2020 (Col. 3).
 - §49-11-301(5) permits the Board to set the contribution rate at the prior year's level if the actuarially calculated rate would be less and the funded ratio is less than 110%.
 - The policy is applied to the gross rates for the Tier I Firefighter funds and the Judges, i.e., before application of the offsets for the fire insurance premium tax receipts, State appropriations, and court fees.
 - This policy is separately applied to the contribution rate for the 3% substantial substitute that is included with the contribution rates for the State and School funds, the State Public Safety funds and the Judges.
- Exhibit 2(a) shows the components of the actuarially determined contribution rate, and Exhibit 4(a) reconciles the actuarially calculated rates determined by this valuation and the previous valuation.
 - Due to investment losses and larger than anticipated liabilities, 14 funds experienced an increase in their actuarially calculated contribution rate. However, there were also 12 funds whose calculated contribution rates remain unchanged or decreased from the prior year.
- Amortization payments for the calculated contribution rates are based on:
 - A 20-year amortization period is used for determining the contribution rates (except for Governors and Legislators Plan and the Higher Education risk pools, where amortization periods are 15 years and 18 years, respectively)
 - Contributions determined as level percentage of pay (except for Governors and Legislators Plan and the Higher Education risk pools, where minimum amortization is in level dollar payments)
 - Total payroll assumed to increase 3.00% per year
 - No future growth in the number of active members is taken into account
- The return was -0.4%, net of investment and administrative expenses, on a market-value basis during 2018
 - The actual market value as of December 31, 2018 (\$31.260 billion) was \$2.328 billion less than the expected market assets at this date based on a 6.95% return assumption for the prior year.
 - System uses a 5-year smoothing of net investment earnings that is different than the expected investment return to develop an actuarial value of assets for purposes of determining contribution rates and the funded status
 - As of January 1, 2019, there is a net \$0.960 billion of deferred investment losses that will be recognized in the next four years and the actuarial value of assets is 103.1% of the market value of assets
- The Governors and Legislative Plan was 82.4% funded as of January 1, 2019. We recommend a \$361,437 appropriation be made to the plan on or before June 30, 2021. Please see Exhibit 16.

SECTION B

DISCUSSION

Determination of Calculated Contribution Rates

The URS retirement systems, except for the Governors' and Legislators' Retirement Plan, are funded by employer contributions which are expressed as a percent of pay, and in some cases by member contributions. The Firefighters System and the Judges System receive additional funding from outside sources. As shown in Exhibit 2(a), the calculated employer contribution rate can have as many as four components:

- The normal cost percentage (NC%)
- The amortization percentage (UAAL%)
- The contribution required to fund the 3% substantial substitute benefit (3%SS)
- The offset for fire insurance premium taxes, appropriations, and court fees which reduce the employer contribution rates in the Firefighters System and the Judges System, respectively.

The NC% is the theoretical amount which would be required to pay the members' benefits, based on the current plan provisions, if this amount had been contributed from each member's entry date and if the fund's experience exactly followed the actuarial assumptions. This is the amount it should cost to provide the benefits for an average new member. The NC% for each fund is shown in Exhibit 6(a).

Some of the funds require contributions from active members, and for these, only the excess of the NC% over the member contribution rate is included in the employer contribution rate, as shown in Exhibit 6(b) and in column 2 of Exhibit 2(a).

The actuarial accrued liability (AAL) is the difference between (i) the actuarial present value of all future benefits for all current members of the fund, including active, inactive and retired members, and (ii) the actuarial present value of future normal costs. Thus, the AAL represents the liability associated with past years. The unfunded actuarial accrued liability (UAAL) is the difference between the AAL and the actuarial value of assets (AVA). It is the shortfall/excess between the liability associated with prior years (the AAL) and the assets actually accumulated (the AVA). This shortfall/excess can arise from several sources, including actuarial gains and losses which are caused by differences between actual experience and the plan's assumptions, changes to the plan's actuarial assumptions, and amendments to the benefit provisions.

The UAAL% is the amount required to fund this difference. It is the amount, expressed as a level percentage of payroll (except for the Governors' and Legislators' Plan and the Higher Education funds which are level dollar), necessary to amortize the UAAL. The Board's current policy calls for developing the actuarially determined contribution by amortizing the UAAL over an open 20 year period (except for the Governors' and Legislators' Plan which currently has a closed 15 year funding period, and the Higher Education funds which have a closed 18 year funding period). Column 3 of Exhibit 2(a) shows the UAAL% of the calculated rates for each fund.

Determination of Calculated Contribution Rates

The 3% Substantial Substitute component of the employer contribution rate is only required for funds whose members are employees of the state (or who are paid by state funding). This piece is the amount necessary to fund the 3% Substantial Substitute. It is shown in column 4 of Exhibit 2(a), and is described in greater detail later. The last piece of the contribution rate is the offset. In prior years, the Firefighters System has received a portion of the fire insurance premium taxes collected by the state. However, the state is now making a direct appropriation to the Firefighters System (\$12 million in annually beginning in 2019). The appropriation will be used to determine the offset to the contribution rate for the firefighter funds. The Judges System receives a portion of court fees collected by the judiciary. The calculation of the offsets is shown in Exhibit 2(b).

Section 49-11-301(5) of the Utah Code gives the Board the option of setting contribution rates at the higher of the previous year's rate and the current year's actuarially calculated rate (for the Governors' and Legislative Plan it is the greater of the current and prior years' amortization amount). The Board does not have to decrease the contribution rate from the prior year as long as it is funding towards or maintaining a funded ratio of 110%. The Board has historically followed the policy of holding the rates constant, but not less than the actuarially calculated rate, as permitted by §49-11-301(5).

Under the policy, the actuarial rates and last year's certified rates are compared, and the larger is set as the new certified rate. This is done separately for: (1) the 3% Substantial Substitute fund, (2) each Tier II hybrid fund, (3) the total contribution rate applicable to the payroll of Tier I members, and (4) the total contribution rate applicable to the payroll of Tier II members. Then the offset for the fire insurance premium tax and state appropriation and the court fees are applied, as shown in Exhibit 1(a).

The defined benefit portion of both the Tier II Public Employee Hybrid Retirement System and the Tier II Public Safety and Firefighter Hybrid System's contribution rate increased and exceed last year's certified rate. We recommend that the new calculated rate for the Tier II Public Employee Hybrid Retirement System become the certified rate for FY 2021. For the Tier II Public Safety and Firefighter Hybrid Retirement System, we are recommending a contribution rate that is projected to become effective after the 18-month delay in the effective date of the contribution rate increase becomes fully incorporated in the contribution requirement. For that reason we are recommending that the certified rate for the Tier II Public Safety and Firefighter Hybrid Retirement System for FY 2021 be set to 16.27% resulting in a 14.00% employer contribution rate to the hybrid fund and a 2.27% member contribution rate to the hybrid fund.

The Governors' and Legislators' Retirement Plan, unlike the other systems, is funded by direct legislative appropriations. Similar to last year, we are recommending an appropriation be made for this plan by the end of FY 2021. Please see the discussion about the determination of the appropriation later in this section and the calculation of the appropriation on Exhibit 16.

Exhibit 2(a) also shows the development of the calculated contribution rate for the Tier II Hybrid systems. The State makes contributions on Tier II payroll towards the 3% substantial substitute. However, since the Tier II Hybrid Plans are cost sharing plans and the State and local governments participating in the plans do not have separate Tier II Hybrid Plan contribution rates, the rates shown on Table 2(a) exclude the 3% Substantial Substitute contribution.

Determination of Calculated Contribution Rates

All employers in Tier II must make an additional contribution, based on the payroll of their Tier II employees, towards the amortization of their Tier I unfunded liabilities. This additional contribution rate is not shown on Exhibit 2(a) because it varies by employer. However, the additional amortization payment for each fund is shown in Column 8 of Table 1(d). This additional amortization payment also includes the payment for the 3% Substantial Substitute if applicable.

Financial Data and Experience

As of December 31, 2018 the retirement systems that are part of URS have a total market value of \$31.260 billion. This excludes assets of the defined contribution plans that are also administered by URS. Assets of the various funds and systems are commingled for investment purposes. Financial information was gathered from the 2018 URS Comprehensive Annual Financial Report, with additional information provided by the URS staff.

This report includes a number of exhibits related to plan assets. Exhibit 11(a) shows how the total market value is distributed among the various classes of investments. Currently, 61% of invested assets are held in equities and alternative investments (excluding real assets).

Exhibit 11(b) provides a reconciliation of the market values between the beginning and end of 2018 for each fund. The contributions shown in column 3 of Exhibit 11(b) include employer and member contributions, as well as court fees and fire insurance premium tax receipts. The 3% substantial substitute fund is shown as a separate item.

In determining the contribution rates and funded status of the funds, an actuarial value of assets (AVA) is used, rather than the market value of assets. The method used to compute the AVA takes the difference between actual earnings and expected earnings (based on the assumed rate of investment return) each year, and recognizes the difference over five years, at 20% per year. This is intended to reduce the volatility of the contribution rates from year to year. This “smoothed” asset value is then subjected to the further constraint that the actuarial value of assets cannot be less than 75% or more than 125% of the market value of assets. For 2019, the five-year smoothed asset value is \$32.220 billion for all systems combined, or about 103% of the market value of assets.

During 2018, the total investment return on market values was -0.4%, as shown on Exhibit 12(a). This return is net of all investment and administrative expenses. In addition to the market return, Exhibit 12(a) also shows the return on the actuarial value for URS. For 2018, this return was 6.0%. Because this is less than the 6.95% investment return assumption, the plan experienced a loss on the actuarial value of assets. Exhibit 12(b) shows a summary of market and actuarial return rates in recent years. The development of the AVA is shown on Exhibits 13 and 14. URS staff prepared the initial calculation of the AVAs, but these were reviewed and, if necessary, modified by GRS.

Some funds in the Contributory Public Employees System and the Contributory Public Safety System are paired with funds in the Noncontributory Public Employees and Noncontributory Public Safety systems. For example, Fund 23, Other Division A, in the Contributory Public Safety System is paired with Fund 43, Other Division A, in the Noncontributory Public Safety System. In these cases, URS has established a policy of maintaining either the same difference between contribution rates for pairs of funds, or it maintains equal amortization percentages. To accomplish this, assets are transferred each year between fund pairs, as necessary.

Exhibits 4(a) and 4(b) show the reconciliation of the contribution rates and the unfunded actuarial accrued liabilities from the last valuation to this one, including the effect of asset and liability gains and losses, changes in assumptions, changes in plan provisions, etc.

Member Data

Member data was supplied by URS staff on electronic files as of December 31, 2018. While we did not audit this data, we did perform various tests to ensure that it was internally consistent, consistent with the prior year's data, and was reasonable overall.

Compared to last year, the number of public employees increased from 92,580 to 93,022. Similarly, the number of public safety and firefighters slightly increased from 10,338 to 10,562. The following table provides the number of Tier I and Tier II employees as of the valuation date for these two groups.

Tier I and Tier II Employee Count				
	Tier I	Tier II Hybrid Plan	Tier II Defined Contribution¹	Total
All Public Employee Funds ²	56,756	30,290	5,976	93,022
All Public Safety and Firefighter Funds	6,842	3,301	419	10,562

¹ Tier II members electing the defined contribution plan will be moved into that plan after their first year of employment and their election becomes irrevocable.

² Excludes employees in the Judges and Governors and Legislative Retirement Funds.

For all the funds combined, the number of retirees (including disables and beneficiaries) increased from 65,428 to 68,221. There are 1.5 employees for every retiree in the Retirement System.

Exhibit 8 shows the number of members by category (active, inactive, retired, etc.) and by fund. Exhibit 9 shows active member statistics by fund, and Exhibit 10 shows retiree statistics by fund. Exhibits 17(a)-17(i) show summaries of certain historical data, including membership statistics, for each system.

Benefit Provisions

Appendix 2 includes a summary of the benefit provisions for each of the retirement systems in URS. This valuation reflects the benefit enhancement to the Tier 2 Public Safety and Firefighter System (Hybrid and Defined Contribution) as a result of the enactment of SB 129 during the 2019 legislative session.

The employer contribution requirement to members in the Tier 2 Public Safety and Firefighter System will increase from 12.00% to 14.00% percent of payroll effective July 1, 2020. Also, effective on that same date, the benefit multiplier will increase from 1.5% to 2.0% for service earned after July 1, 2020 in the Tier 2 Public Safety and Firefighter Hybrid System. The Board certified contribution rate for the defined benefit portion of the Hybrid plan will increase from 11.30% to 16.27% of pay as a result of this benefit enhancement. The employer and member contribution requirement to the defined benefit portion of the Hybrid Plan will be 14.00% and 2.27% of pay, respectively.

Although the 2.0% multiplier does not apply for service prior to July 1, 2020, the calculated contribution rate is based on the presumption that the contribution rate would become effective on the valuation date. Since there is an 18 month delay in the effective date of the increased contribution rate for the defined benefit portion of the Hybrid plan, we recommended a Board certified contribution rate that is equal to the projected actuarially determined contribution rate after the contribution delay has been fully reflected in the projected cost. Also, because there is no difference between the Board certified contribution rate and the projected actuarially determined contribution rate, any additional increase in the actuarially determined contribution rate in a future year may result in a corresponding increase in the member contribution rate requirement.

Other than SB 129, there were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

This valuation reflects all benefits promised to URS members, either by the statutes, or in the case of the special supplement for the Governors' and Legislators' Retirement Plan and the ROPP payments (discussed later), by the Board. There are no ancillary benefits that might be deemed a URS liability if continued beyond the availability of funding by the current funding source.

Actuarial Methods and Assumptions

Except as noted below, the actuarial assumptions and methods used to determine the results of the of the 2019 actuarial valuation are the same as those used for the prior year's valuation. Please see Appendix 1 of this report for a complete description of these assumptions.

With the enactment of SB 129, the retirement pattern for the members in the Tier 2 Public Safety and Firefighter Hybrid System are expected to change and now be the same as the assumption used to model the retirement pattern in the Tier I Public Safety and Firefighter Systems, except for a 10% load at first eligibility for unreduced retirement if prior to age 65.

An experience study was last conducted in conjunction with the 2017 valuation which resulted in several updates to the assumptions. Current Board policy is to perform an experience study to review the demographic assumptions every three years, with the next experience study scheduled to be performed in 2020.

The actuary reviews the investment return assumption each year and provides consultation to the Board regarding its appropriateness. The Board has the authority to change this assumption each year. It is our opinion that a 6.95% investment return assumption continues to be appropriate for performing the January 1, 2019 actuarial valuation.

Governors and Legislative Pension Plan

The Governors and Legislative Pension Plan (Leg/Gov Plan) is funded by direct appropriations rather than through pay-period contributions. Since the plan continues to be less than fully funded for 2019, we are recommending an appropriation for fiscal year 2021. Please see Exhibit 16 for the determination of the appropriation amount. We also anticipate that appropriations will be recommended for each fiscal year for the next several years.

The Leg/Gov Plan is unique among the retirement systems in URS in that neither the benefits of the plan nor the contributions to the plan are tied to member pay. As a result, the calculation of the appropriation is performed in a slightly different manner than the determination of the contribution rates for the other funds.

The Entry Age Normal level dollar approach will be used to determine the normal cost and actuarial accrued liabilities of the Leg/Gov Plan. This Entry Age Normal funding method is used to determine the cost allocation of the contribution requirements because it produces a cost pattern that remains level over time for individual members (if the assumptions are met). With the other URS systems, the cost is determined so as to remain level as a percentage of pay over time. Since neither the contributions nor benefits of the Leg/Gov Plan are pay related, we have determined the cost as a level dollar amount. This method would normally be expected to produce appropriations that remain level over time (if the actuarial assumptions are exactly met). However, because the Leg/Gov Plan is closed to new members it is expected that the contributions will decrease over time as the number of active members decrease, thereby decreasing the dollar amount of the normal cost in the future.

In addition, the determination of the amortization payment for amortizing the unfunded liabilities of the system is determined using a level dollar approach over a closed funding period. This valuation determines the appropriation for fiscal year 2021. Because of the lag between the determination of the dollar contribution amount and the payment of the contribution, we included an adjustment for interest in the determination of the appropriation. The recommended appropriation for fiscal year 2021 is \$361,437. The allocation of this appropriation to the Governor's Office, House, and Senate is \$20,080, \$246,171, and \$95,186, respectively.

The allocation of the Plan's normal cost was based on the number of active positions in each of the branches of government. Since the current Governor does not participate in the defined benefit plan, there is no normal cost assigned to the Governor's Office. Therefore, the normal cost was allocated to just the House and Senate based on their percentage of positions that are eligible for coverage (75 House members and 29 Senators). Because there are only three former governors on whose behalf benefits are payable (or will be payable in the future), we determined the liability and amortization charge directly for the Governor's office based on that percentage of the total liability of the Plan. We then allocated the remaining liability between the House and Senate in the same manner as the allocation of the normal cost. Finally, the interest charge was allocated in proportion to the sum of the normal cost and amortization charges.

We believe this procedure fairly allocates the required appropriation to the three entities.

Higher Education

Beginning with the January 1, 2017 actuarial valuation, certain colleges and universities were assigned to their own risk pool for benefits being earned in the Tier I Public Employees Contributory and Noncontributory Retirement Systems. These entities at January 1, 2018 included:

- Utah Valley University
- Dixie State College
- Salt Lake Community College
- Snow College
- University of Utah
- Utah State University
- Weber State University
- University of Utah Hospital

During 2018, Dixie Technical College and Mountainland Technical College elected to be transferred to this risk pool. The covered members for these employers were previously in Funds 12 & 16 of the Public Employees System. These employers are being assigned to these new risk pools because they are classifying all new employees as being ineligible for participation in URS. Because employer contribution rates for financing the unfunded liability in Funds 12 & 16 include an assumption that covered payroll will increase in future years, it is inappropriate to include employers whose covered membership (and thus covered payroll) will decline in future years in the same risk pool.

Employees of these entities will continue to earn benefits in the Tier I Public Employees Retirement System but their liability, assets, contributions, and benefit payments will be separately tracked in Funds 17 and 18. The liability for URS retirees who retired from one of these entities and former employees of these entities with a vested retirement benefit are also included in these funds. These two new risk pool funds (Funds 17 and 18) are also paired such that the difference between contribution rates for these funds remains a constant 4.49%, which is the same difference maintained for Funds 12 and 16.

The minimum contribution requirement for these funds will be determined on a level-dollar basis over a closed funding period (20 years from January 1, 2017). As of 2019, there are 18 years remaining in the funding period. Since these funds are paired, these minimum contribution requirements will be determined in aggregate (i.e. Funds 17 and 18 combined) and will also reflect the anticipated amortization contributions received on the payroll of the employees that participate in the Tier II Retirement Systems. Finally, the contribution requirements are allocated to the individual employers. As permitted by §49-11-301(5), the Board of Trustees may hold the contribution rates for these funds at the prior year's rate if it is higher and the Funds are not 110% funded. Based on this funding policy, the contribution rate for the 2021 fiscal year for these funds will be the same contribution rate these employers are currently contributing for the 2020 fiscal year.

It is important to note that these funds have an unfunded actuarial accrued liability and contributions include an amortization charge to finance, or decrease, this unfunded actuarial accrued liability. The contribution rate, as a percentage of payroll, may increase in future years to ensure the appropriate dollar amount of contributions are maintained to finance the unfunded actuarial accrued liability over the funding period.

Firefighters and Judges Offsets

Beginning in 2019, the State is expected to make \$12 million in annual appropriations to the Tier I Firefighters System. In addition, the State will make a one-time appropriation \$17.0 million in 2019. This system may also on occasion receive a portion of the fire insurance premium taxes collected by the State of Utah. Similarly, the Judges System regularly receives revenue from a portion of the court fees collected by the state judiciary is contributed to the Judges System. To account for these expected revenue sources, the recommended employer contribution rates for these funds are offset, or reduced.

For purposes of determining the offset for the Firefighter System, it is assumed this System will receive \$12 million in annual appropriations. Revenue attributable to Fire insurance premium taxes will be recognized as they are actually received rather than as an offset to the contribution rates. The offset for the amortization costs is determined using the combined payroll of Tier I and Tier II. The offset for the normal cost, if any, is determined only using the expected pay from Tier I. In addition, it is assumed that all of the offset will be contributed to Tier I.

Since the \$12 million in annual appropriations is not sufficient to maintain the current offset to the employer contribution rates for this System, it is URS's intention to use the one-time appropriation of \$17 million as a reserve to stabilize the contribution rate offset at the current level until the one-time appropriation has been exhausted.

The gross employer contribution rate for both Firefighter funds remains larger than the offset, so employers will be required to make contributions. Member contribution rates will remain at last year's rate of 15.05% and 16.71% for Division A and Division B respectively.

Since the portion of court fees that are contributed to the Judges System varies from year to year, a rolling three-year average of the historical court fees is used as a basis for the expected receipts in computing the offset for FY 2021. The offset is first applied to reduce the amortization cost. The remaining offset (if any) will reduce the employer's normal cost. The calculation of the offsets is shown on Exhibit 2(b). Due to a decrease in the average court fees and an increasing covered payroll, the offset for the Judges System will decrease from 8.16% to 7.60%.

The 2004 Legislature enacted legislation which created the Public Safety Retirees' Cost-of-Living Increases Restricted Account (Restricted Account). As a result of this legislation a portion of fire insurance premium tax receipts that would normally have been contributed to the Firefighter System may instead be redirected to this new account. No funds were transferred to this account in calendar year 2018.

3% Substantial Substitute

Due to the removal of the state income tax exemption for benefits paid by URS, legislation was passed to provide a 3% retirement benefit increase for URS retirees who were members of URS prior to January 1, 1989. All future retirees who were members of URS prior to January 1, 1989 will be eligible for this benefit as well, as will beneficiaries of eligible members.

The 3% increase applies to all benefits paid to eligible members, including benefits earned after January 1, 1989 and including future cost-of-living increases. However, the 3% increase does not apply to refunds of employee contributions or to the Restoration of Purchasing Power (ROPP) benefits; see the next section.

Due to legislation passed in 1994, this benefit is now pre-funded. The obligation for payment of this benefit belongs to the state, however, not to the employer. Therefore the contribution needed to fund the benefit is determined as an addition to the employer contribution rates required for the State and School Funds in the Public Employees Contributory and Noncontributory Systems, the State of Utah Public Safety System, and the Judges System. Contributions are also collected on the payroll of state employees covered under the Tier II systems.

The actuarially determined contribution required to pay for this benefit is 0.56%, 0.29% less than the current contribution rate of 0.85%. Details of the calculation are shown in Exhibit 15(a), while Exhibit 15(b) shows a distribution of the liabilities associated with this benefit.

The Board has the authority, under Section 11-49-301(5), to hold the contribution rate for the Substantial Substitute at 0.85% (last year's rate).

Restoration of Purchasing Power (ROPP)

URS provides a special benefit to a closed group of retired members. This benefit was granted by the Board of Trustees, not by the legislature, and hence it does not appear in the statutes governing URS. The Board provided this benefit, called the Restoration of Purchasing Power benefit or ROPP benefit, to retired members during the 1980s, in order to counteract some of the impact of inflation.

The ROPP benefit is a fixed amount that does not increase and is not adjusted for changes in the cost of living. It is provided only to the closed group of members who were retired at the time of the Board's action. Therefore, since the group is closed and since the benefit amount cannot increase, this liability decreases from year to year as the retiree group receiving the ROPP grows older and decreases in size due to mortality.

Exhibit 5(e) shows the liabilities for the ROPP benefits in column 5.

SECTION C

SUPPORTING EXHIBITS

EXHIBIT 1(a)

Comparison of Tier I Prior Year Certified and Current Year Recommended Contribution Rates

Fund/Division (1)	Prior Year Valuation Certified Rates for FY 2020			Current Year Valuation Recommended Rates for FY 2021			Increase/ (Decrease) in Total (8)
	Member (2)	Employer (3)	Total (4)	Member (5)	Employer (6)	Total (7)	
I. Public Employees Contributory							
A. Local Government	6.00%	14.46%	20.46%	6.00%	14.46%	20.46%	0.00%
B. State and School	6.00%	17.70%	23.70%	6.00%	17.70%	23.70%	0.00%
C. Higher Education	6.00%	17.70%	23.70%	6.00%	17.70%	23.70%	0.00%
II. Public Employees Noncontributory							
A. Local Government	0.00%	18.47%	18.47%	0.00%	18.47%	18.47%	0.00%
B. State and School	0.00%	22.19%	22.19%	0.00%	22.19%	22.19%	0.00%
C. Higher Education	0.00%	22.19%	22.19%	0.00%	22.19%	22.19%	0.00%
III. Public Safety Contributory							
A. Other Division A (2.5% COLA)	12.29%	22.79%	35.08%	12.29%	22.79%	35.08%	0.00%
B. Other Division A (4% COLA)	12.29%	24.37%	36.66%	12.29%	24.37%	36.66%	0.00%
C. Other Division B (2.5% COLA)	10.50%	22.81%	33.31%	10.50%	22.81%	33.31%	0.00%
D. Other Division B (4% COLA)	10.50%	28.98%	39.48%	10.50%	28.98%	39.48%	0.00%
IV. Public Safety Noncontributory							
A. State	0.00%	41.35%	41.35%	0.00%	41.35%	41.35%	0.00%
B. Other Division A (2.5% COLA)	0.00%	34.04%	34.04%	0.00%	34.04%	34.04%	0.00%
C. Other Division A (4% COLA)	0.00%	35.71%	35.71%	0.00%	35.71%	35.71%	0.00%
D. Salt Lake City	0.00%	46.71%	46.71%	0.00%	46.71%	46.71%	0.00%
E. Ogden	0.00%	48.72%	48.72%	0.00%	48.72%	48.72%	0.00%
F. Provo	0.00%	42.23%	42.23%	0.00%	42.23%	42.23%	0.00%
G. Logan	0.00%	41.97%	41.97%	0.00%	41.97%	41.97%	0.00%
H. Bountiful	0.00%	50.38%	50.38%	0.00%	50.38%	50.38%	0.00%
I. Other Division B (2.5% COLA)	0.00%	32.28%	32.28%	0.00%	32.28%	32.28%	0.00%
J. Other Division B (4% COLA)	0.00%	38.97%	38.97%	0.00%	38.97%	38.97%	0.00%
V. Firefighters							
A. Division A							
1. Gross Rate	15.05%	15.67%	30.72%	15.05%	15.67%	30.72%	0.00%
2. Less Estimated Offset	<u>-0.00%</u>	<u>-11.06%</u>	<u>-11.06%</u>	<u>0.00%</u>	<u>-11.06%</u>	<u>-11.06%</u>	<u>0.00%</u>
3. Net Rate	15.05%	4.61%	19.66%	15.05%	4.61%	19.66%	0.00%
B. Division B							
1. Gross Rate	16.71%	18.30%	35.01%	16.71%	18.30%	35.01%	0.00%
2. Less Estimated Offset	<u>-0.00%</u>	<u>-11.06%</u>	<u>-11.06%</u>	<u>0.00%</u>	<u>-11.06%</u>	<u>-11.06%</u>	<u>0.00%</u>
3. Net Rate	16.71%	7.24%	23.95%	16.71%	7.24%	23.95%	0.00%
VI. Judges							
A. Gross Rate	0.00%	51.91%	51.91%	0.00%	51.91%	51.91%	0.00%
B. Less Estimated Offset	<u>-0.00%</u>	<u>-8.16%</u>	<u>-8.16%</u>	<u>-0.00%</u>	<u>-7.60%</u>	<u>-7.60%</u>	<u>0.56%</u>
C. Net Rate	0.00%	43.75%	43.75%	0.00%	44.31%	44.31%	0.56%

Note: Rates reflect 3% Substantial Substitute where applicable

The recommended contribution rate for the Public Employees Retirement Funds for FY 2020 and FY 2021 includes the cost of 75% of pay active death benefit.

Recommended rates reflect application of U.C. Sec. 49-11-301(5)

EXHIBIT 1(b)

Comparison of Tier II Prior Year Certified and Current Year Recommended Contribution Rates

Fund/Division (1)	Prior Year Valuation Certified Rates for FY 2020			Current Year Valuation Recommended Rates for FY 2021			Increase/ (Decrease) in Total (8)
	Member	Employer	Total	Member	Employer	Total	
	(2)	(3)	(4)	(5)	(6)	(7)	
I. Public Employees Contributory							
A. Local Government	0.00%	18.45%	18.45%	0.00%	18.45%	18.45%	0.00%
II. Public Employees Noncontributory							
A. Local Government	0.00%	16.69%	16.69%	0.00%	16.69%	16.69%	0.00%
B. State and School	0.00%	20.02%	20.02%	0.00%	20.02%	20.02%	0.00%
C. Higher Education	0.00%	20.02%	20.02%	0.00%	20.02%	20.02%	0.00%
III. Public Safety Contributory							
A. Other Division A (2.5% COLA)	0.00%	23.85%	23.85%	2.27%	25.85%	28.12%	4.27%
B. Other Division A (4% COLA)	0.00%	25.01%	25.01%	2.27%	27.01%	29.28%	4.27%
C. Other Division B (2.5% COLA)	0.00%	21.85%	21.85%	2.27%	23.85%	26.12%	4.27%
D. Other Division B (4% COLA)	0.00%	28.02%	28.02%	2.27%	30.02%	32.29%	4.27%
IV. Public Safety Noncontributory							
A. State	0.00%	30.54%	30.54%	2.27%	32.54%	34.81%	4.27%
B. Other Division A (2.5% COLA)	0.00%	23.83%	23.83%	2.27%	25.83%	28.10%	4.27%
C. Other Division A (4% COLA)	0.00%	24.99%	24.99%	2.27%	26.99%	29.26%	4.27%
D. Salt Lake City	0.00%	36.28%	36.28%	2.27%	38.28%	40.55%	4.27%
E. Ogden	0.00%	38.38%	38.38%	2.27%	40.38%	42.65%	4.27%
F. Provo	0.00%	31.69%	31.69%	2.27%	33.69%	35.96%	4.27%
G. Logan	0.00%	31.45%	31.45%	2.27%	33.45%	35.72%	4.27%
H. Bountiful	0.00%	38.97%	38.97%	2.27%	40.97%	43.24%	4.27%
I. Other Division B (2.5% COLA)	0.00%	21.74%	21.74%	2.27%	23.74%	26.01%	4.27%
J. Other Division B (4% COLA)	0.00%	28.02%	28.02%	2.27%	30.02%	32.29%	4.27%
V. Firefighters							
A. Division A	0.00%	12.08%	12.08%	2.27%	14.08%	16.35%	4.27%
B. Division B	0.00%	12.08%	12.08%	2.27%	14.08%	16.35%	4.27%

Note: Recommended contribution rates include the contribution to the Tier II DC Plan and the Tier I amortization cost

Rates reflect 3% Substantial Substitute where applicable

The contribution rates shown above include the cost of the 75% of pay active death benefit. The cost of the death benefit for all public employee, public safety, and firefighter funds for FY 2020 and FY 2021 was 0.08%.

Recommended rates reflect application of U.C. Sec. 49-11-301(5)

EXHIBIT 1(c)

Development of Recommended Tier I Employer Contribution Rates

Fund/Division (1)	Actuarially Calculated Rates for Current Year* (2)	Certified Rates from Prior Year* (3)	Larger of Columns (2,3)* (4)	Recommended Rates Including 3% Substantial Substitute (5)
I. Public Employees Contributory				
A. Local Government	11.33%	14.46%	14.46%	14.46%
B. State and School	14.06%	16.85%	16.85%	17.70%
C. Higher Education	15.68%	16.85%	16.85%	17.70%
II. Public Employees Noncontributory				
A. Local Government	15.34%	18.47%	18.47%	18.47%
B. State and School	18.55%	21.34%	21.34%	22.19%
C. Higher Education	20.17%	21.34%	21.34%	22.19%
III. Public Safety Contributory				
A. Other Division A (2.5% COLA)	19.95%	22.79%	22.79%	22.79%
B. Other Division A (4% COLA)	20.48%	24.37%	24.37%	24.37%
C. Other Division B (2.5% COLA)	22.10%	22.81%	22.81%	22.81%
D. Other Division B (4% COLA)	17.91%	28.98%	28.98%	28.98%
IV. Public Safety Noncontributory				
A. State	33.89%	40.50%	40.50%	41.35%
B. Other Division A (2.5% COLA)	31.30%	34.04%	34.04%	34.04%
C. Other Division A (4% COLA)	32.01%	35.71%	35.71%	35.71%
D. Salt Lake City	42.29%	46.71%	46.71%	46.71%
E. Ogden	44.57%	48.72%	48.72%	48.72%
F. Provo	38.72%	42.23%	42.23%	42.23%
G. Logan	36.83%	41.97%	41.97%	41.97%
H. Bountiful	46.02%	50.38%	50.38%	50.38%
I. Other Division B (2.5% COLA)	31.54%	32.28%	32.28%	32.28%
J. Other Division B (4% COLA)	27.99%	38.97%	38.97%	38.97%
V. Firefighters				
A. Division A	12.08%	15.67%	15.67%	15.67%
B. Division B	9.82%	18.30%	18.30%	18.30%
VI. Judges	49.80%	51.06%	51.06%	51.91%
VII. 3% Substantial Substitute	0.56%	0.85%	0.85%	N/A

* Rates exclude 3% Substantial Substitute

Note: Rates shown for Firefighters and Judges exclude offsets for fire insurance premium tax and court fees
 Rates include the cost of the 75% of pay active death benefit
 Rates in Column (4) reflect application of U.C. Sec. 49-11-301(5).

EXHIBIT 1(d)

Development of Recommended Tier II Employer and Member Contribution Rates

Fund/Division (1)	Certified Rates from Prior Year* (2)	Actuarially Calculated Rates for Current Year* (3)	Member Rate Tier II Hybrid Plan (4)	Recommended Employer Rate -- Max(2 and 3) less (4)** (5)	Employer Rate Hybrid Plan DC (6)	Total Employer Tier II Rate (7)	Tier I Certified Amortization % (8)	Total Employer Rate on Behalf of Tier II Members (9)
I. Public Employees Contributory								
A. Local Government	8.97%	9.11%	0.00%	9.11%	0.89%	10.00%	8.37%	18.37%
II. Public Employees Noncontributory								
A. Local Government	8.97%	9.11%	0.00%	9.11%	0.89%	10.00%	6.61%	16.61%
B. State and School	8.97%	9.11%	0.00%	9.11%	0.89%	10.00%	9.94%	19.94%
C. Higher Education	8.97%	9.11%	0.00%	9.11%	0.89%	10.00%	9.94%	19.94%
III. Public Safety Contributory								
A. Other Division A (2.5% COLA)	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	11.77%	25.77%
B. Other Division A (4% COLA)	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	12.93%	26.93%
C. Other Division B (2.5% COLA)	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	9.77%	23.77%
D. Other Division B (4% COLA)	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	15.94%	29.94%
IV. Public Safety Noncontributory								
A. State	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	18.46%	32.46%
B. Other Division A (2.5% COLA)	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	11.75%	25.75%
C. Other Division A (4% COLA)	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	12.91%	26.91%
D. Salt Lake City	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	24.20%	38.20%
E. Ogden	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	26.30%	40.30%
F. Provo	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	19.61%	33.61%
G. Logan	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	19.37%	33.37%
H. Bountiful	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	26.89%	40.89%
I. Other Division B (2.5% COLA)	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	9.66%	23.66%
J. Other Division B (4% COLA)	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	15.94%	29.94%
V. Firefighters								
A. Division A	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	0.00%	14.00%
B. Division B	11.30%	16.27%	2.27%	14.00%	0.00%	14.00%	0.00%	14.00%

* Contribution rate for the Tier II defined benefit plan. The actuarially calculated rate for the current year includes the projected impact due to the delay between the valuation date and the effective date of the higher contribution rate. Rates shown above do not include the cost of the 75% of pay death benefit provided to active members.

**The recommended contribution rate for the public employees hybrid plan is equal to the greater of the calculated rate for the current year and the certified rate from the prior year, less the member contribution rate to the hybrid plan.

Note: Tier I certified amortization rates include 3% Substantial Substitute where applicable.

Tier I certified amortization rates shown above are certified and maintained by the Board as permitted by U.C. Sec. 49-11-301(5).

EXHIBIT 2(a)

Components of Actuarially Calculated Contribution Rates

Fund/Division (1)	Net Normal Cost (2)	Amortization of UAAL (3)	3% Substantial Substitute (4)	Gross Employer Rate (2 + 3 + 4) (5)	Offset (6)	Net Employer Rate ¹ (5 - 6) (7)
I. Public Employees Contributory						
A. Local Government	5.43%	5.90%	0.00%	11.33%	0.00%	11.33%
B. State and School	5.30%	8.76%	0.56%	14.62%	0.00%	14.62%
C. Higher Education	4.97%	10.71%	0.56%	16.24%	0.00%	16.24%
II. Public Employees Noncontributory						
A. Local Government	11.60%	3.74%	0.00%	15.34%	0.00%	15.34%
B. State and School	12.76%	5.79%	0.56%	19.11%	0.00%	19.11%
C. Higher Education	11.74%	8.43%	0.56%	20.73%	0.00%	20.73%
III. Public Safety Contributory						
A. Other Division A (2.5% COLA)	12.06%	7.89%	0.00%	19.95%	0.00%	19.95%
B. Other Division A (4% COLA)	11.91%	8.57%	0.00%	20.48%	0.00%	20.48%
C. Other Division B (2.5% COLA)	14.08%	8.02%	0.00%	22.10%	0.00%	22.10%
D. Other Division B (4% COLA)	13.54%	4.37%	0.00%	17.91%	0.00%	17.91%
IV. Public Safety Noncontributory						
A. State	23.52%	10.37%	0.56%	34.45%	0.00%	34.45%
B. Other Division A (2.5% COLA)	23.41%	7.89%	0.00%	31.30%	0.00%	31.30%
C. Other Division A (4% COLA)	23.44%	8.57%	0.00%	32.01%	0.00%	32.01%
D. Salt Lake City	23.55%	18.74%	0.00%	42.29%	0.00%	42.29%
E. Ogden	23.53%	21.04%	0.00%	44.57%	0.00%	44.57%
F. Provo	23.58%	15.14%	0.00%	38.72%	0.00%	38.72%
G. Logan	23.68%	13.15%	0.00%	36.83%	0.00%	36.83%
H. Bountiful	23.73%	22.29%	0.00%	46.02%	0.00%	46.02%
I. Other Division B (2.5% COLA)	23.52%	8.02%	0.00%	31.54%	0.00%	31.54%
J. Other Division B (4% COLA)	23.62%	4.37%	0.00%	27.99%	0.00%	27.99%
V. Firefighters						
A. Division A	11.06%	1.02%	0.00%	12.08%	11.06%	1.02%
B. Division B	9.14%	0.68%	0.00%	9.82%	11.06%	0.00%
VI. Judges	31.61%	18.19%	0.56%	50.36%	7.60%	42.76%
VII. Tier II - Hybrid Plans ²						
A. Public Employees	8.92%	0.19%	0.00%	9.11%	0.00%	9.11%
B. Public Safety and Firefighter	15.77%	0.50%	0.00%	16.27%	0.00%	16.27%

¹ The net employer rate may be less than the recommended contribution rates because they do not reflect the Board's policy of maintaining the prior year's rate, if greater, as permitted by U.C. Sec. 49-11-301(5).

² The actuarially calculated contribution rate before reflecting the maximum employer contribution rate to the hybrid plan. These rates also exclude the Tier I amortization payment and the 3% Substantial Substitute. The normal cost excludes the 75% of pay death benefit provided to active members.

EXHIBIT 2(b)

Determination of Contribution Rate Offsets for Firefighters and Judges

A. Firefighter's Offset

1. Anticipated annual State appropriation to Tier I Firefighter Funds	\$	12,000,000
2. Expected Tier I amortization payment		11,386,376
3. Payroll (Tier I + Tier II)		146,980,525
4. Amortization payment as % of pay (minimum (1. and 2.) / 3.)		7.75%
5. Total target offset		11.06%
6. Remaining target offset to be funded as % of Tier I pay (6. less (4. + 5.))		3.31%
7. Tier I payroll	\$	113,329,452
8. Dollar amount of remaining target offset		3,751,205
9. Remaining available offset (1. less 2., but not less than \$0)		613,624
10. Funds needed from reserve (8. less. 9.)		3,137,581
11. Remaining reserve from prior years		14,453,276
12. Funds used in this year's determination (minimum of 10. and 11.)		3,137,581
13. Remaining reserve for future years (11. less 12.)		11,315,695
14. Normal cost rate offset ((9. + 12.) / 7.)		3.31%
15. Total offset as % of pay (4. + 14.)		11.06%

B. Judge's Offset

1. Calendar year	2016	2017	2018
2. Court fees	\$ 1,470,000	\$ 1,477,000	\$ 1,518,442
3. 3-year average of court fees			\$ 1,488,481
4. Payroll			19,595,556
5. Offset: average of court fees as a percent of payroll			7.60%

EXHIBIT 3(a)

Schedule of Funding Progress

Fund/Division (1)	Actuarial Value of Assets (2)	Actuarial Accrued Liability (AAL) (3)	Unfunded AAL (UAAL) (3 - 2) (4)	Funded Ratio (2 / 3) (5)	Covered Payroll (6)	UAAL as a Percentage of Covered Payroll (4 / 6) (7)
I. Public Employees Contributory						
A. Local Government	437,158	457,930	20,772	95.5%	15,968	130.1%
B. State and School	637,387	658,976	21,589	96.7%	12,401	174.1%
C. Higher Education	147,795	155,118	7,323	95.3%	5,381	136.1%
D. Subtotal	1,222,340	1,272,024	49,684	96.1%	33,750	147.2%
II. Public Employees Noncontributory						
A. Local Government	5,069,857	5,701,571	631,714	88.9%	781,448	80.8%
B. State and School	18,447,254	21,175,231	2,727,977	87.1%	2,242,640	121.6%
C. Higher Education	1,666,685	1,938,463	271,778	86.0%	236,310	115.0%
D. Subtotal	25,183,796	28,815,265	3,631,469	87.4%	3,260,398	111.4%
III. Public Safety Contributory						
A. Other Division A (2.5% COLA)	115,795	118,617	2,822	97.6%	1,508	187.1%
B. Other Division A (4% COLA)	22,777	22,959	182	99.2%	111	164.0%
C. Other Division B (2.5% COLA)	32,785	32,887	102	99.7%	76	134.2%
D. Other Division B (4% COLA)	8,884	8,953	69	99.2%	77	89.6%
E. Subtotal	180,241	183,416	3,175	98.3%	1,772	179.2%
IV. Public Safety Noncontributory						
A. State	1,220,434	1,432,288	211,854	85.2%	103,333	205.0%
B. Other Division A (2.5% COLA)	1,019,986	1,184,336	164,350	86.1%	99,937	164.5%
C. Other Division A (4% COLA)	308,092	357,878	49,787	86.1%	29,682	167.7%
D. Salt Lake City	297,795	392,375	94,580	75.9%	28,264	334.6%
E. Ogden	65,834	86,488	20,654	76.1%	4,248	486.2%
F. Provo	52,355	65,611	13,256	79.8%	4,377	302.9%
G. Logan	29,525	35,288	5,763	83.7%	2,067	278.8%
H. Bountiful	21,023	28,088	7,065	74.8%	1,671	422.8%
I. Other Division B (2.5% COLA)	393,149	473,345	80,196	83.1%	53,263	150.6%
J. Other Division B (4% COLA)	47,391	51,198	3,807	92.6%	4,110	92.6%
K. Subtotal	3,455,584	4,106,895	651,312	84.1%	330,952	196.8%
V. Firefighters						
A. Division A	223,262	229,815	6,553	97.1%	30,380	21.6%
B. Division B	1,021,434	1,031,067	9,633	99.1%	80,443	12.0%
C. Subtotal	1,244,696	1,260,882	16,186	98.7%	110,823	14.6%
VI. Judges	201,325	251,328	50,003	80.1%	19,288	259.2%
VII. Governors and Legislative	10,852	13,174	2,322	82.4%	639	363.4%
VIII. 3% Substantial Substitute	226,669	527,400	300,731	43.0%	N/A	N/A
IX. Tier II - Hybrid Plans						
A. Public Employees	438,366	473,597	35,231	92.6%	1,267,301	2.8%
B. Public Safety and Firefighter	56,073	60,934	4,861	92.0%	145,332	3.3%
X. Grand Total	32,219,942	36,964,915	4,744,974	87.2%	5,170,255	91.8%

Note: Amounts shown are in \$ thousands

Columns may not add to total due to rounding

Covered Payroll consists of payroll for members in the Tier I and Tier II Hybrid Retirement System

EXHIBIT 3(b)

Comparison of Funded Ratios

Fund/Division (1)	Funded Ratios as of January 1		
	2019 (2)	2018 (3)	2017 (4)
I. Public Employees Contributory			
A. Local Government	95.5%	95.2%	94.2%
B. State and School	96.7%	96.4%	95.5%
C. Higher Education	95.3%	95.2%	94.4%
D. Subtotal	96.1%	95.8%	94.9%
II. Public Employees Noncontributory			
A. Local Government	88.9%	89.0%	86.5%
B. State and School	87.1%	87.5%	85.2%
C. Higher Education	86.0%	86.6%	85.3%
D. Subtotal	87.4%	87.7%	85.5%
III. Public Safety Contributory			
A. Other Division A (2.5% COLA)	97.6%	97.7%	97.3%
B. Other Division A (4% COLA)	99.2%	98.7%	98.5%
C. Other Division B (2.5% COLA)	99.7%	99.7%	99.7%
D. Other Division B (4% COLA)	99.2%	98.5%	97.1%
E. Subtotal	98.3%	98.3%	97.9%
IV. Public Safety Noncontributory			
A. State	85.2%	85.1%	82.2%
B. Other Division A (2.5% COLA)	86.1%	87.0%	85.0%
C. Other Division A (4% COLA)	86.1%	85.2%	83.7%
D. Salt Lake City	75.9%	74.7%	72.1%
E. Ogden	76.1%	75.9%	72.4%
F. Provo	79.8%	78.9%	77.3%
G. Logan	83.7%	82.4%	78.7%
H. Bountiful	74.8%	74.8%	71.8%
I. Other Division B (2.5% COLA)	83.1%	83.0%	79.3%
J. Other Division B (4% COLA)	92.6%	91.5%	87.7%
K. Subtotal	84.1%	84.1%	81.5%
V. Firefighters			
A. Division A	97.1%	98.3%	99.5%
B. Division B	99.1%	99.2%	97.8%
C. Subtotal	98.7%	99.1%	98.1%
VI. Judges	80.1%	80.5%	79.4%
VII. Governors and Legislative	82.4%	81.9%	79.7%
VIII. 3% Substantial Substitute	43.0%	43.2%	41.9%
IX. Tier II - Hybrid Plans			
A. Public Employees	92.6%	94.7%	95.1%
B. Public Safety and Firefighter	92.0%	98.2%	98.4%
X. Grand Total	87.2%	87.4%	85.2%

EXHIBIT 4(a)

Analysis of Changes in Calculated Contribution Rates

Fund/Division	Calculated Rate From Jan. 1, 2018 Valuation	Changes in Calculated Rate Due To							Calculated Rate Jan. 1, 2019 Valuation
		Payroll Growth	Investment Return	Liabilities	Benefit Changes	New Risk Pools	Act. vs Exp. Contributions	Assumption & Methods Change	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I. Public Employees Contributory									
A. Local Government	11.33%	-0.08%	0.29%	0.09%	0.00%	0.00%	-0.30%	0.00%	11.33%
B. State and School	14.56%	-0.15%	0.39%	0.05%	0.00%	0.00%	-0.23%	0.00%	14.62%
C. Higher Education	15.16%	-0.03%	0.57%	0.65%	0.00%	0.00%	-0.11%	0.00%	16.24%
II. Public Employees Noncontributory									
A. Local Government	15.34%	-0.08%	0.29%	0.09%	0.00%	0.00%	-0.30%	0.00%	15.34%
B. State and School	19.05%	-0.15%	0.39%	0.05%	0.00%	0.00%	-0.23%	0.00%	19.11%
C. Higher Education	19.65%	-0.03%	0.57%	0.65%	0.00%	0.00%	-0.11%	0.00%	20.73%
III. Public Safety Contributory									
A. Other Division A (2.5% COLA)	19.31%	-0.16%	0.51%	0.64%	0.00%	0.00%	-0.35%	0.00%	19.95%
B. Other Division A (4% COLA)	20.95%	0.17%	0.49%	-0.92%	0.00%	0.00%	-0.21%	0.00%	20.48%
C. Other Division B (2.5% COLA)	21.74%	-0.20%	0.31%	0.43%	0.00%	0.00%	-0.18%	0.00%	22.10%
D. Other Division B (4% COLA)	18.51%	-0.11%	0.47%	-0.13%	0.00%	0.00%	-0.83%	0.00%	17.91%
IV. Public Safety Noncontributory									
A. State	34.54%	-0.10%	0.55%	0.05%	0.00%	0.00%	-0.59%	0.00%	34.45%
B. Other Division A (2.5% COLA)	30.76%	-0.16%	0.51%	0.54%	0.00%	0.00%	-0.35%	0.00%	31.30%
C. Other Division A (4% COLA)	32.15%	0.17%	0.49%	-0.59%	0.00%	0.00%	-0.21%	0.00%	32.01%
D. Salt Lake City	43.69%	-0.54%	0.53%	-1.01%	0.00%	0.00%	-0.38%	0.00%	42.29%
E. Ogden	44.06%	0.68%	0.63%	-0.36%	0.00%	0.00%	-0.44%	0.00%	44.57%
F. Provo	39.49%	-0.05%	0.55%	-0.98%	0.00%	0.00%	-0.29%	0.00%	38.72%
G. Logan	38.45%	-0.52%	0.63%	-1.33%	0.00%	0.00%	-0.40%	0.00%	36.83%
H. Bountiful	47.64%	-1.55%	0.61%	-0.38%	0.00%	0.00%	-0.30%	0.00%	46.02%
I. Other Division B (2.5% COLA)	31.20%	-0.20%	0.31%	0.41%	0.00%	0.00%	-0.18%	0.00%	31.54%
J. Other Division B (4% COLA)	28.67%	-0.11%	0.47%	-0.21%	0.00%	0.00%	-0.83%	0.00%	27.99%
V. Firefighters									
A. Division A	11.69%	-0.07%	0.31%	0.23%	0.00%	0.00%	-0.08%	0.00%	12.08%
B. Division B	9.68%	0.00%	0.66%	-0.23%	0.00%	0.00%	-0.29%	0.00%	9.82%
VI. Judges	49.32%	-0.22%	0.65%	0.90%	0.00%	0.00%	-0.28%	0.00%	50.36%
VII. 3% Substantial Substitute	0.59%	-0.01%	0.01%	-0.03%	0.00%	0.00%	0.00%	0.00%	0.56%
VIII. Tier II - Hybrid Plans									
A. Public Employees	8.97%	-0.02%	0.01%	0.12%	0.00%	0.00%	0.03%	0.00%	9.11%
B. Public Safety and Firefighter	11.30%	0.00%	0.02%	0.03%	4.91%	0.00%	0.01%	0.00%	16.27%

Notes: Rates shown include contribution for 3% Substantial Substitute, if applicable. Rates shown do not include the offsets for court fees or for fire insurance premium taxes.
The change in the contribution rate due to liabilities includes the effect of the rolling 20-year amortization period.
For paired funds, rates include asset rebalancing at each point of the analysis
Rates for Tier II Hybrid Plans exclude the cost of the 75% of pay active death benefit

EXHIBIT 4(b)

Analysis of Change in UAAL

Fund/Division	Changes in Unfunded Actuarial Accrued Liability Due To								
	Jan. 1, 2018 UAAL	Amortization Payments	Liability (Gain)\Loss	Asset (Gain)\Loss	Change in Benefit Provisions	New Risk Pools	Change in Assumptions	Other Asset Transfers	Jan. 1, 2019 UAAL
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I. Public Employees Contributory									
A. Local Government	21,820	(436)	8,482	(3,794)	0	0	0	(5,300)	20,772
B. State and School	24,384	(1,554)	10,366	(3,357)	0	0	0	(8,250)	21,589
C. Higher Education	7,538	(286)	(3,130)	2,731	0	0	0	470	7,323
D. Subtotal	53,742	(2,276)	15,718	(4,420)	0	0	0	(13,080)	49,684
II. Public Employees Noncontributory									
A. Local Government	593,905	(49,835)	29,083	53,261	0	0	0	5,300	631,714
B. State and School	2,549,300	(165,905)	157,032	179,302	0	(2)	0	8,250	2,727,977
C. Higher Education	243,708	(8,407)	21,294	15,651	0	2	0	(470)	271,778
D. Subtotal	3,386,913	(224,147)	207,409	248,214	0	0	0	13,080	3,631,469
III. Public Safety Contributory									
A. Other Division A (2.5% COLA)	2,753	(30)	(71)	(945)	0	0	0	1,115	2,822
B. Other Division A (4% COLA)	314	7	230	(847)	0	0	0	478	182
C. Other Division B (2.5% COLA)	89	(4)	(370)	(166)	0	0	0	553	102
D. Other Division B (4% COLA)	131	6	(69)	(13)	0	0	0	14	69
E. Subtotal	3,287	(21)	(280)	(1,971)	0	0	0	2,160	3,175
IV. Public Safety Noncontributory									
A. State	204,975	(12,255)	8,052	11,082	0	0	0	0	211,854
B. Other Division A (2.5% COLA)	145,659	(7,368)	15,419	11,755	0	0	0	(1,115)	164,350
C. Other Division A (4% COLA)	50,389	(1,254)	(2,595)	3,725	0	0	0	(478)	49,787
D. Salt Lake City	96,015	(2,153)	(1,936)	2,654	0	0	0	0	94,580
E. Ogden	20,269	(482)	249	618	0	0	0	0	20,654
F. Provo	13,450	(282)	(390)	478	0	0	0	0	13,256
G. Logan	6,027	(188)	(352)	276	0	0	0	0	5,763
H. Bountiful	6,864	(113)	121	193	0	0	0	0	7,065
I. Other Division B (2.5% COLA)	72,562	(1,855)	6,805	3,237	0	0	0	(553)	80,196
J. Other Division B (4% COLA)	4,134	(737)	(6)	430	0	0	0	(14)	3,807
K. Subtotal	620,344	(26,687)	25,367	34,448	0	0	0	(2,160)	651,312
V. Firefighters									
A. Division A	3,742	(358)	1,195	1,974	0	0	0	0	6,553
B. Division B	7,502	(3,721)	(3,520)	9,372	0	0	0	0	9,633
C. Subtotal	11,244	(4,079)	(2,325)	11,346	0	0	0	0	16,186
VI. Judges	46,396	(839)	2,718	1,728	0	0	0	0	50,003
VII. Governors and Legislative	2,393	(179)	6	102	0	0	0	0	2,322
VIII. 3% Substantial Substitute	302,176	(2,884)	(2,244)	3,683	0	0	0	0	300,731
IX. Tier II - Hybrid Plans									
A. Public Employees	17,664	3,837	10,829	2,901	0	0	0	0	35,231
B. Public Safety and Firefighter	731	399	847	346	2,538	0	0	0	4,861
X. Grand Total	4,444,890	(256,876)	258,045	296,377	2,538	0	0	0	4,744,975

Note: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 5(a)

Actuarial Present Value of Future Benefits by Fund and Status

Fund/Division (1)	Retirees and Beneficiaries (2)	Inactive Members (3)	Active Members (4)	Total (5)
I. Public Employees Contributory				
A. Local Government	324,118	40,808	102,403	467,328
B. State and School	531,881	25,898	105,549	663,328
C. Higher Education	99,061	11,810	46,040	156,912
D. Subtotal	955,060	78,516	253,992	1,287,568
II. Public Employees Noncontributory				
A. Local Government	2,476,929	467,592	3,461,831	6,406,352
B. State and School	11,425,194	1,028,621	11,037,957	23,491,772
C. Higher Education	761,269	250,960	1,131,152	2,143,382
D. Subtotal	14,663,392	1,747,173	15,630,940	32,041,506
III. Public Safety Contributory				
A. Other Division A (2.5% COLA)	101,803	10,239	9,659	121,700
B. Other Division A (4% COLA)	21,752	519	817	23,089
C. Other Division B (2.5% COLA)	30,656	1,547	721	32,924
D. Other Division B (4% COLA)	8,266	132	640	9,038
E. Subtotal	162,477	12,437	11,837	186,751
IV. Public Safety Noncontributory				
A. State	845,362	53,348	704,582	1,603,292
B. Other Division A (2.5% COLA)	560,149	114,359	683,495	1,358,003
C. Other Division A (4% COLA)	170,583	26,907	209,816	407,306
D. Salt Lake City	247,105	12,439	183,061	442,605
E. Ogden	61,174	3,223	29,296	93,694
F. Provo	39,903	1,432	31,943	73,278
G. Logan	21,168	1,918	15,570	38,656
H. Bountiful	19,652	1,313	10,178	31,143
I. Other Division B (2.5% COLA)	235,277	20,784	308,023	564,083
J. Other Division B (4% COLA)	31,438	2,177	25,136	58,751
K. Subtotal	2,231,811	237,900	2,201,100	4,670,811
V. Firefighters				
A. Division A	96,944	10,782	198,887	306,614
B. Division B	603,811	19,466	597,796	1,221,073
C. Subtotal	700,755	30,248	796,683	1,527,687
VI. Judges	168,711	1,639	127,101	297,451
VII. Governors and Legislative	8,517	2,529	2,322	13,369
VIII. Tier II - Hybrid Plans				
A. Public Employees	2,066	12,403	1,700,779	1,715,248
B. Public Safety and Firefighter	0	473	406,466	406,939
IX. Grand Total	18,892,789	2,123,318	21,131,220	42,147,330

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 5(b)

Actuarial Present Value of Future Benefits Details for Retirees and Beneficiaries, by Status

Fund/Division (1)	Retired Members (2)	Disabled Members (3)	Beneficiaries (4)	Total (5)
I. Public Employees Contributory				
A. Local Government	292,064	5,347	26,707	324,118
B. State and School	481,242	15,099	35,540	531,881
C. Higher Education	94,977	13	4,071	99,061
D. Subtotal	868,283	20,459	66,318	955,060
II. Public Employees Noncontributory				
A. Local Government	2,244,815	45,318	186,796	2,476,929
B. State and School	10,623,699	145,872	655,623	11,425,194
C. Higher Education	716,795	0	44,474	761,269
D. Subtotal	13,585,309	191,190	886,893	14,663,392
III. Public Safety Contributory				
A. Other Division A (2.5% COLA)	84,259	1,262	16,281	101,803
B. Other Division A (4% COLA)	16,519	236	4,997	21,752
C. Other Division B (2.5% COLA)	28,899	534	1,223	30,656
D. Other Division B (4% COLA)	7,149	397	720	8,266
E. Subtotal	136,826	2,429	23,221	162,477
IV. Public Safety Noncontributory				
A. State	777,679	8,393	59,289	845,362
B. Other Division A (2.5% COLA)	516,010	6,144	37,994	560,149
C. Other Division A (4% COLA)	160,914	1,561	8,108	170,583
D. Salt Lake City	220,783	3,958	22,364	247,105
E. Ogden	54,887	501	5,786	61,174
F. Provo	36,892	0	3,011	39,903
G. Logan	20,001	132	1,035	21,168
H. Bountiful	18,983	310	359	19,652
I. Other Division B (2.5% COLA)	218,384	3,162	13,730	235,277
J. Other Division B (4% COLA)	30,314	427	697	31,438
K. Subtotal	2,054,847	24,588	152,373	2,231,811
V. Firefighters				
A. Division A	76,528	11,388	9,028	96,944
B. Division B	513,289	29,987	60,535	603,811
C. Subtotal	589,817	41,375	69,563	700,755
VI. Judges	155,708	0	13,004	168,711
VII. Governors and Legislative	7,257	0	1,260	8,517
VIII. Tier II - Hybrid Plans				
A. Public Employees	2,066	0	0	2,066
B. Public Safety and Firefighter	0	0	0	0
IX. Grand Total	17,400,113	280,041	1,212,632	18,892,789

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 5(c)

Actuarial Present Value of Future Benefits Details for Inactive Members, by Status

Fund/Division (1)	Disabled (2)	Other Vested (3)	Nonvested (4)	Total (5)
I. Public Employees Contributory				
A. Local Government	896	37,588	2,324	40,808
B. State and School	0	25,892	6	25,898
C. Higher Education	0	11,765	45	11,810
D. Subtotal	896	75,245	2,375	78,516
II. Public Employees Noncontributory				
A. Local Government	26,308	440,322	962	467,592
B. State and School	82,735	942,619	3,268	1,028,621
C. Higher Education	0	249,519	1,441	250,960
D. Subtotal	109,043	1,632,460	5,671	1,747,173
III. Public Safety Contributory				
A. Other Division A (2.5% COLA)	0	9,832	407	10,239
B. Other Division A (4% COLA)	0	506	14	519
C. Other Division B (2.5% COLA)	0	1,486	61	1,547
D. Other Division B (4% COLA)	0	132	0	132
E. Subtotal	0	11,956	482	12,437
IV. Public Safety Noncontributory				
A. State	2,663	50,658	27	53,348
B. Other Division A (2.5% COLA)	2,184	112,134	42	114,359
C. Other Division A (4% COLA)	1,022	25,885	0	26,907
D. Salt Lake City	516	11,924	0	12,439
E. Ogden	0	3,223	0	3,223
F. Provo	0	1,432	0	1,432
G. Logan	0	1,918	0	1,918
H. Bountiful	0	1,313	0	1,313
I. Other Division B (2.5% COLA)	218	20,539	27	20,784
J. Other Division B (4% COLA)	0	2,177	0	2,177
K. Subtotal	6,603	231,203	96	237,900
V. Firefighters				
A. Division A	0	10,479	303	10,782
B. Division B	0	19,276	190	19,466
C. Subtotal	0	29,755	493	30,248
VI. Judges	0	1,639	0	1,639
VII. Governors and Legislative	0	2,523	6	2,529
VIII. Tier II - Hybrid Plans				
A. Public Employees	0	12,403	0	12,403
B. Public Safety and Firefighter	0	473	0	473
IX. Grand Total	116,542	1,997,657	9,123	2,123,318

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 5(d)

Actuarial Present Value of Future Benefits Details for Active Members, by Benefit

Fund/Division (1)	Deferred					Total (7)
	Retirement (2)	Termination (3)	Disability (4)	Refunds (5)	Death (6)	
I. Public Employees Contributory						
A. Local Government	98,243	1,123	551	373	2,112	102,403
B. State and School	103,712	0	0	0	1,837	105,549
C. Higher Education	45,378	0	0	0	662	46,040
D. Subtotal	247,333	1,123	551	373	4,611	253,992
II. Public Employees Noncontributory						
A. Local Government	3,155,415	142,641	77,684	3	86,088	3,461,831
B. State and School	10,330,962	359,880	175,158	1	171,956	11,037,957
C. Higher Education	1,052,367	38,749	19,749	66	20,222	1,131,152
D. Subtotal	14,538,744	541,270	272,591	70	278,266	15,630,940
III. Public Safety Contributory						
A. Other Division A (2.5% COLA)	9,253	152	93	77	84	9,659
B. Other Division A (4% COLA)	811	0	0	0	6	817
C. Other Division B (2.5% COLA)	714	0	0	0	6	721
D. Other Division B (4% COLA)	635	0	0	0	5	640
E. Subtotal	11,413	152	93	77	101	11,837
IV. Public Safety Noncontributory						
A. State	684,038	10,295	4,456	0	5,793	704,582
B. Other Division A (2.5% COLA)	662,678	10,794	4,570	0	5,452	683,495
C. Other Division A (4% COLA)	204,402	2,698	1,136	0	1,580	209,816
D. Salt Lake City	177,625	2,604	1,112	0	1,719	183,061
E. Ogden	28,493	381	166	0	257	29,296
F. Provo	30,963	482	205	0	293	31,943
G. Logan	15,193	171	70	0	137	15,570
H. Bountiful	9,815	179	89	0	95	10,178
I. Other Division B (2.5% COLA)	298,456	4,450	1,961	0	3,156	308,023
J. Other Division B (4% COLA)	24,268	425	183	0	260	25,136
K. Subtotal	2,135,931	32,479	13,948	0	18,742	2,201,100
V. Firefighters						
A. Division A	190,071	980	4,529	491	2,817	198,887
B. Division B	577,633	2,108	8,727	949	8,379	597,796
C. Subtotal	767,704	3,088	13,256	1,440	11,196	796,683
VI. Judges	124,660	0	0	0	2,441	127,101
VII. Governors and Legislative	1,817	494	0	0	11	2,322
VIII. Tier II - Hybrid Plans						
A. Public Employees	1,324,650	284,840	44,132	0	47,158	1,700,779
B. Public Safety and Firefighter	365,588	20,739	10,363	189	9,587	406,466
IX. Grand Total	19,517,840	884,185	354,934	2,149	372,113	21,131,220

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 5(e)

Actuarial Present Value of Future Benefits Details for Members Receiving Benefits, by Benefit

Fund/Division (1)	Basic Benefit (2)	COLA (3)	Subtotal (2) + (3) (4)	ROPP (5)	Total (4) + (5) (6)
I. Public Employees Contributory					
A. Local Government	240,593	83,496	324,089	29	324,118
B. State and School	389,834	141,940	531,774	107	531,881
C. Higher Education	74,663	24,398	99,061	0	99,061
D. Subtotal	705,090	249,834	954,924	136	955,060
II. Public Employees Noncontributory					
A. Local Government	1,835,821	641,108	2,476,929	0	2,476,929
B. State and School	8,303,133	3,122,061	11,425,194	0	11,425,194
C. Higher Education	569,896	191,373	761,269	0	761,269
D. Subtotal	10,708,850	3,954,542	14,663,392	0	14,663,392
III. Public Safety Contributory					
A. Other Division A (2.5% COLA)	64,472	37,037	101,509	294	101,803
B. Other Division A (4% COLA)	12,550	9,038	21,588	164	21,752
C. Other Division B (2.5% COLA)	20,346	10,308	30,654	2	30,656
D. Other Division B (4% COLA)	5,621	2,645	8,266	0	8,266
E. Subtotal	102,989	59,028	162,017	460	162,477
IV. Public Safety Noncontributory					
A. State	590,000	254,862	844,862	499	845,362
B. Other Division A (2.5% COLA)	396,987	163,162	560,149	0	560,149
C. Other Division A (4% COLA)	121,808	48,775	170,583	0	170,583
D. Salt Lake City	167,407	79,526	246,933	172	247,105
E. Ogden	41,137	20,019	61,156	19	61,174
F. Provo	27,465	12,411	39,876	27	39,903
G. Logan	14,369	6,796	21,165	3	21,168
H. Bountiful	13,639	6,008	19,647	5	19,652
I. Other Division B (2.5% COLA)	172,821	62,456	235,277	0	235,277
J. Other Division B (4% COLA)	22,748	8,690	31,438	0	31,438
K. Subtotal	1,568,381	662,705	2,231,086	725	2,231,811
V. Firefighters					
A. Division A	69,344	27,542	96,886	58	96,944
B. Division B	412,264	190,605	602,869	942	603,811
C. Subtotal	481,608	218,147	699,755	1,000	700,755
VI. Judges	118,152	50,559	168,711	0	168,711
VII. Governors and Legislative	5,745	2,018	7,763	755	8,517
VIII. Tier II - Hybrid Plans					
A. Public Employees	1,708	358	2,066	0	2,066
B. Public Safety and Firefighter	0	0	0	0	0
VIII. Grand Total	13,692,523	5,197,191	18,889,714	3,076	18,892,789

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 6(a)

Normal Cost

Fund/Division (1)	Retirement (2)	Deferred Termination (3)	Disability (4)	Refunds (5)	Death (6)	Total (7)
I. Public Employees Contributory						
A. Local Government	8.26%	1.07%	0.44%	1.40%	0.26%	11.43%
B. State and School	8.40%	0.80%	0.32%	1.58%	0.20%	11.30%
C. Higher Education	7.98%	0.79%	0.32%	1.69%	0.19%	10.97%
II. Public Employees Noncontributory						
A. Local Government	8.64%	2.08%	0.56%	0.00%	0.32%	11.60%
B. State and School	10.22%	1.88%	0.44%	0.00%	0.22%	12.76%
C. Higher Education	8.94%	2.08%	0.48%	0.00%	0.24%	11.74%
III. Public Safety Contributory						
A. Other Division A (2.5% COLA)	21.19%	0.81%	0.58%	1.51%	0.26%	24.35%
B. Other Division A (4% COLA)	20.99%	0.85%	0.57%	1.51%	0.28%	24.20%
C. Other Division B (2.5% COLA)	21.83%	0.70%	0.49%	1.23%	0.33%	24.58%
D. Other Division B (4% COLA)	21.59%	0.51%	0.34%	1.32%	0.28%	24.04%
IV. Public Safety Noncontributory						
A. State	21.19%	1.47%	0.60%	0.00%	0.26%	23.52%
B. Other Division A (2.5% COLA)	21.18%	1.41%	0.57%	0.00%	0.25%	23.41%
C. Other Division A (4% COLA)	21.31%	1.35%	0.54%	0.00%	0.24%	23.44%
D. Salt Lake City	21.35%	1.31%	0.54%	0.00%	0.35%	23.55%
E. Ogden	21.18%	1.39%	0.58%	0.00%	0.38%	23.53%
F. Provo	21.36%	1.31%	0.55%	0.00%	0.36%	23.58%
G. Logan	21.53%	1.28%	0.52%	0.00%	0.35%	23.68%
H. Bountiful	21.14%	1.63%	0.66%	0.00%	0.30%	23.73%
I. Other Division B (2.5% COLA)	21.25%	1.35%	0.56%	0.00%	0.36%	23.52%
J. Other Division B (4% COLA)	21.34%	1.36%	0.56%	0.00%	0.36%	23.62%
V. Firefighters						
A. Division A	23.00%	0.35%	1.64%	0.68%	0.44%	26.11%
B. Division B	22.88%	0.31%	1.43%	0.74%	0.49%	25.85%
VI. Judges	30.68%	0.00%	0.00%	0.00%	0.93%	31.61%
VII. Tier II - Hybrid Plans						
A. Public Employees	6.88%	1.63%	0.24%	0.00%	0.17%	8.92%
B. Public Safety and Firefighter	14.09%	0.92%	0.41%	0.04%	0.31%	15.77%

Note: Columns may not add to total due to rounding.

The normal cost for the Tier II Hybrid Plans does not include the cost of the 75% of pay death benefit provided to active members.

EXHIBIT 6(b)

Net Employer Normal Cost

Fund/Division (1)	Total Normal Cost (2)	Member Rate (3)	Net Employer Normal Cost (2) - (3) (4)
I. Public Employees Contributory			
A. Local Government	11.43%	6.00%	5.43%
B. State and School	11.30%	6.00%	5.30%
C. Higher Education	10.97%	6.00%	4.97%
II. Public Employees Noncontributory			
A. Local Government	11.60%	0.00%	11.60%
B. State and School	12.76%	0.00%	12.76%
C. Higher Education	11.74%	0.00%	11.74%
III. Public Safety Contributory			
A. Other Division A (2.5% COLA)	24.35%	12.29%	12.06%
B. Other Division A (4% COLA)	24.20%	12.29%	11.91%
C. Other Division B (2.5% COLA)	24.58%	10.50%	14.08%
D. Other Division B (4% COLA)	24.04%	10.50%	13.54%
IV. Public Safety Noncontributory			
A. State	23.52%	0.00%	23.52%
B. Other Division A (2.5% COLA)	23.41%	0.00%	23.41%
C. Other Division A (4% COLA)	23.44%	0.00%	23.44%
D. Salt Lake City	23.55%	0.00%	23.55%
E. Ogden	23.53%	0.00%	23.53%
F. Provo	23.58%	0.00%	23.58%
G. Logan	23.68%	0.00%	23.68%
H. Bountiful	23.73%	0.00%	23.73%
I. Other Division B (2.5% COLA)	23.52%	0.00%	23.52%
J. Other Division B (4% COLA)	23.62%	0.00%	23.62%
V. Firefighters			
A. Division A	26.11%	15.05%	11.06%
B. Division B	25.85%	16.71%	9.14%
VI. Judges			
	31.61%	0.00%	31.61%
VII. Tier II - Hybrid Plans			
A. Public Employees	8.92%	0.00%	8.92%
B. Public Safety and Firefighter	15.77%	0.00% ¹	15.77%

¹ The member rate is equal to the difference between the 16.27% employer contribution rate set in Statute less the Board certified rate for the hybrid DB plan, which is 14.00% for FY 2021.

EXHIBIT 7(a)

Determination of Actuarial Accrued Liability

Fund/Division (1)	Actuarial Present Value of Future Benefits (2)	Actuarial Present Value of Future Normal Costs			Actuarial Accrued Liability (2) - (5) (6)
		Members (3)	Employers (4)	Total (5)	
I. Public Employees Contributory					
A. Local Government	467,328	4,933	4,465	9,398	457,930
B. State and School	663,328	2,311	2,041	4,352	658,976
C. Higher Education	156,912	981	813	1,794	155,118
D. Subtotal	1,287,568	8,225	7,319	15,544	1,272,024
II. Public Employees Noncontributory					
A. Local Government	6,406,352	0	704,781	704,781	5,701,571
B. State and School	23,491,772	0	2,316,541	2,316,541	21,175,231
C. Higher Education	2,143,382	0	204,919	204,919	1,938,463
D. Subtotal	32,041,506	0	3,226,241	3,226,241	28,815,265
III. Public Safety Contributory					
A. Other Division A (2.5% COLA)	121,700	1,556	1,528	3,084	118,617
B. Other Division A (4% COLA)	23,089	66	64	130	22,959
C. Other Division B (2.5% COLA)	32,924	16	21	37	32,887
D. Other Division B (4% COLA)	9,038	37	48	85	8,953
E. Subtotal	186,751	1,675	1,661	3,336	183,416
IV. Public Safety Noncontributory					
A. State	1,603,292	0	171,004	171,004	1,432,288
B. Other Division A (2.5% COLA)	1,358,003	0	173,666	173,666	1,184,336
C. Other Division A (4% COLA)	407,306	0	49,428	49,428	357,878
D. Salt Lake City	442,605	0	50,231	50,231	392,375
E. Ogden	93,694	0	7,206	7,206	86,488
F. Provo	73,278	0	7,667	7,667	65,611
G. Logan	38,656	0	3,368	3,368	35,288
H. Bountiful	31,143	0	3,055	3,055	28,088
I. Other Division B (2.5% COLA)	564,083	0	90,738	90,738	473,345
J. Other Division B (4% COLA)	58,751	0	7,553	7,553	51,198
K. Subtotal	4,670,811	0	563,916	563,916	4,106,895
V. Firefighters					
A. Division A	306,614	44,267	32,531	76,798	229,815
B. Division B	1,221,073	122,824	67,182	190,006	1,031,067
C. Subtotal	1,527,687	167,091	99,713	266,804	1,260,882
VI. Judges	297,451	0	46,123	46,123	251,328
VII. Governors and Legislative	13,369	0	194	194	13,174
VIII. Tier II - Hybrid Plans					
A. Public Employees	1,715,248	0	1,241,651	1,241,651	473,597
B. Public Safety and Firefighter	406,939	0	346,005	346,005	60,934
IX. Grand Total	42,147,330	176,991	5,532,823	5,709,814	36,437,515

Notes: Amounts shown are in \$ thousands

Columns may not add to total due to rounding

The amounts shown above do not include the actuarial accrued liability attributable to the 3% Substantial Substitute

EXHIBIT 7(b)

Actuarial Accrued Liability Details of Member and Employer Financing

Fund/Division	Inactive Members			Active Members		
	Accumulated	Employer Financed	Total	Accumulated	Employer Financed	Total
	Member Contributions			Member Contributions		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I. Public Employees Contributory						
A. Local Government	33,495	7,313	40,808	40,726	52,278	93,004
B. State and School	23,132	2,766	25,898	45,203	55,994	101,197
C. Higher Education	10,925	885	11,810	20,075	24,171	44,246
D. Subtotal	67,552	10,964	78,516	106,004	132,443	238,447
II. Public Employees Noncontributory						
A. Local Government	22,235	445,357	467,592	64,125	2,692,925	2,757,050
B. State and School	45,487	983,134	1,028,621	102,722	8,618,693	8,721,415
C. Higher Education	15,136	235,824	250,960	16,369	909,865	926,234
D. Subtotal	82,858	1,664,315	1,747,173	183,216	12,221,483	12,404,699
III. Public Safety Contributory						
A. Other Division A (2.5% COLA)	8,302	1,937	10,239	2,708	3,867	6,575
B. Other Division A (4% COLA)	479	40	519	255	433	688
C. Other Division B (2.5% COLA)	1,253	294	1,547	372	312	684
D. Other Division B (4% COLA)	132	0	132	220	335	555
E. Subtotal	10,166	2,271	12,437	3,555	4,947	8,502
IV. Public Safety Noncontributory						
A. State	1,360	51,988	53,348	1,518	532,060	533,578
B. Other Division A (2.5% COLA)	4,754	109,605	114,359	11,318	498,510	509,828
C. Other Division A (4% COLA)	993	25,914	26,907	1,836	158,552	160,388
D. Salt Lake City	137	12,302	12,439	1,087	131,743	132,830
E. Ogden	22	3,201	3,223	182	21,908	22,090
F. Provo	909	523	1,432	4,990	19,286	24,276
G. Logan	830	1,088	1,918	2,371	9,832	12,203
H. Bountiful	0	1,313	1,313	0	7,123	7,123
I. Other Division B (2.5% COLA)	2,619	18,165	20,784	5,145	212,139	217,284
J. Other Division B (4% COLA)	176	2,001	2,177	616	16,967	17,583
K. Subtotal	11,800	226,100	237,900	29,063	1,608,120	1,637,183
V. Firefighters						
A. Division A	5,855	4,927	10,782	39,369	82,720	122,089
B. Division B	8,606	10,860	19,466	133,563	274,227	407,790
C. Subtotal	14,461	15,787	30,248	172,932	356,947	529,879
VI. Judges	53	1,586	1,639	1,276	79,702	80,978
VII. Governors and Legislative	27	2,502	2,529	0	2,128	2,128
VIII. Tier II - Hybrid Plans						
A. Public Employees	0	12,403	12,403	0	459,129	459,129
B. Public Safety and Firefighter	0	473	473	56	60,405	60,461
IX. Grand Total	186,917	1,936,401	2,123,318	496,102	14,925,304	15,421,406

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 8

Number of Members

Fund/Division (1)	Active (2)	Inactive Members			Members Receiving Benefits			Total (9)
		Disabled (3)	Vested (4)	Nonvested (5)	Regular Retirees (6)	Disabled Retirees (7)	Beneficiaries (8)	
I. Public Employees Contributory								
A. Local Government	258	4	791	597	959	30	206	2,845
B. State and School	178	0	225	3	1,847	90	397	2,740
C. Higher Education	83	0	104	2	339	1	48	577
D. Subtotal	519	4	1,120	602	3,145	121	651	6,162
II. Public Employees Noncontributory								
A. Local Government	12,674	138	13,024	231	8,801	235	1,147	36,250
B. State and School	39,301	431	28,103	428	37,498	817	3,826	110,404
C. Higher Education	4,262	0	7,268	217	3,742	0	338	15,827
D. Subtotal	56,237	569	48,395	876	50,041	1,052	5,311	162,481
III. Public Safety Contributory								
A. Other Division A (2.5% COLA)	26	0	166	39	244	5	129	609
B. Other Division A (4% COLA)	2	0	12	4	75	1	47	141
C. Other Division B (2.5% COLA)	1	0	36	11	64	3	10	125
D. Other Division B (4% COLA)	1	0	1	0	25	1	7	35
E. Subtotal	30	0	215	54	408	10	193	910
IV. Public Safety Noncontributory								
A. State	1,717	8	1,399	7	1,818	34	364	5,347
B. Other Division A (2.5% COLA)	1,624	7	1,855	2	1,122	23	172	4,805
C. Other Division A (4% COLA)	496	3	436	0	340	4	40	1,319
D. Salt Lake City	381	1	169	0	431	14	120	1,116
E. Ogden	66	0	103	0	124	2	35	330
F. Provo	63	0	29	1	72	0	20	185
G. Logan	33	0	30	0	44	1	5	113
H. Bountiful	24	0	12	0	41	1	3	81
I. Other Division B (2.5% COLA)	801	1	375	3	398	9	62	1,649
J. Other Division B (4% COLA)	66	0	36	0	52	1	4	159
K. Subtotal	5,271	20	4,444	13	4,442	89	825	15,104
V. Firefighters								
A. Division A	450	0	205	36	144	28	39	902
B. Division B	1,091	0	202	77	908	76	269	2,623
C. Subtotal	1,541	0	407	113	1,052	104	308	3,525
VI. Judges	116	0	3	0	121	0	34	274
VII. Governors and Legislative	52	0	89	2	173	0	77	393
VIII. Tier II - Hybrid Plans								
A. Public Employees	30,290	0	1,878	0	64	0	0	32,232
B. Public Safety and Firefighter	3,301	0	111	0	0	0	0	3,412
IX. Grand Total	97,357	593	56,662	1,660	59,446	1,376	7,399	224,493

Note: The counts for the inactive members shown above includes members who may have a benefit in multiple funds/divisions.

EXHIBIT 9

Active Membership Statistics

Fund/Division (1)	Number (2)	Total Compensation \$ Thousands (3)	Average Compensation (\$'s) (4)	Accumulated Member Contributions With Interest \$ Thousands (5)	Average Age (6)	Average Service (7)
I. Public Employees Contributory						
A. Local Government	258	15,968	61,893	40,726	56.0	23.5
B. State and School	178	12,401	69,666	45,203	61.3	35.7
C. Higher Education	83	5,381	64,835	20,075	61.3	36.0
D. Subtotal	519	33,750	65,029	106,004	58.7	29.7
II. Public Employees Noncontributory						
A. Local Government	12,674	781,448	61,658	64,125	50.4	15.7
B. State and School	39,301	2,242,640	57,063	102,722	50.6	16.3
C. Higher Education	4,262	236,310	55,446	16,369	51.5	16.5
D. Subtotal	56,237	3,260,398	57,976	183,216	50.6	16.2
III. Public Safety Contributory						
A. Other Division A (2.5% COLA)	26	1,508	58,004	2,708	42.9	12.3
B. Other Division A (4% COLA)	2	111	55,724	255	49.5	17.0
C. Other Division B (2.5% COLA)	1	76	76,377	372	62.0	29.0
D. Other Division B (4% COLA)	1	77	77,427	220	52.0	21.0
E. Subtotal	30	1,772	59,112	3,555	44.3	13.5
IV. Public Safety Noncontributory						
A. State	1,717	103,333	60,182	1,518	45.4	14.5
B. Other Division A (2.5% COLA)	1,624	99,937	61,538	11,318	43.9	14.1
C. Other Division A (4% COLA)	496	29,682	59,842	1,836	43.8	15.0
D. Salt Lake City	381	28,264	74,183	1,087	43.5	13.0
E. Ogden	66	4,248	64,357	182	43.8	14.2
F. Provo	63	4,377	69,473	4,990	43.9	15.7
G. Logan	33	2,067	62,629	2,371	44.5	16.2
H. Bountiful	24	1,671	69,629	0	43.8	11.4
I. Other Division B (2.5% COLA)	801	53,263	66,496	5,145	44.0	10.8
J. Other Division B (4% COLA)	66	4,110	62,280	616	42.8	11.0
K. Subtotal	5,271	330,952	62,787	29,063	44.4	13.7
V. Firefighters						
A. Division A	450	30,380	67,511	39,369	44.3	12.3
B. Division B	1,091	80,443	73,733	133,563	44.9	16.0
C. Subtotal	1,541	110,823	71,916	172,932	44.7	14.9
VI. Judges	116	19,288	166,280	1,276	55.3	8.1
VII. Governors and Legislative	52	639	12,285	0	58.6	9.5
VIII. Tier II - Hybrid Plans						
A. Public Employees	30,290	1,267,301	41,839	0	37.5	2.9
B. Public Safety and Firefighter	3,301	145,332	44,027	56	31.0	2.8
IX. Grand Total	97,357	5,170,255	53,106	496,102	45.5	11.5

EXHIBIT 10

Retired Member Statistics (Including Disabled Retirees and Beneficiaries)

Fund/Division (1)	Number (2)	Annual Total Benefits (\$ Thousands) (3)	Average Monthly Benefit (\$'s) (4)
I. Public Employees Contributory			
A. Local Government	1,195	27,578	1,923
B. State and School	2,334	48,408	1,728
C. Higher Education	388	8,558	1,838
D. Subtotal	3,917	84,544	1,799
II. Public Employees Noncontributory			
A. Local Government	10,183	214,353	1,754
B. State and School	42,141	1,014,832	2,007
C. Higher Education	4,080	70,410	1,438
D. Subtotal	56,404	1,299,595	1,920
III. Public Safety Contributory			
A. Other Division A (2.5% COLA)	378	9,194	2,027
B. Other Division A (4% COLA)	123	2,358	1,598
C. Other Division B (2.5% COLA)	77	2,236	2,420
D. Other Division B (4% COLA)	33	627	1,583
E. Subtotal	611	14,415	1,966
IV. Public Safety Noncontributory			
A. State	2,216	66,447	2,499
B. Other Division A (2.5% COLA)	1,317	40,457	2,560
C. Other Division A (4% COLA)	384	11,666	2,532
D. Salt Lake City	565	19,512	2,878
E. Ogden	161	4,658	2,411
F. Provo	92	3,120	2,826
G. Logan	50	1,572	2,621
H. Bountiful	45	1,504	2,785
I. Other Division B (2.5% COLA)	469	15,152	2,692
J. Other Division B (4% COLA)	57	2,105	3,077
K. Subtotal	5,356	166,193	2,586
V. Firefighters			
A. Division A	211	7,012	2,769
B. Division B	1,253	48,686	3,238
C. Subtotal	1,464	55,698	3,170
VI. Judges	155	14,558	7,827
VII. Governors and Legislative	250	974	325
VIII. Tier II - Hybrid Plans			
A. Public Employees	64	160	209
B. Public Safety and Firefighter	0	0	0
IX. Grand Total	68,221	1,636,137	1,998

EXHIBIT 11(a)

Market Value of Assets (All Retirement Systems Combined)

Item	December 31, 2017	December 31, 2018
(1)	(2)	(3)
1. Cash	33	33
2. Receivables		
a. Member contributions	761	777
b. Employer contributions	58,465	55,270
c. Fire insurance premium tax & court fees	2,989	847
d. Investments	678,786	611,588
e. Total	741,001	668,482
3. Investments		
a. Short-term securities	2,758,739	1,590,727
b. Debt securities	4,557,137	5,313,032
c. Equity investments	12,154,933	11,006,650
d. Absolute return	4,459,239	4,598,396
e. Private equity	3,450,900	3,661,356
f. Real assets	4,744,525	5,206,229
g. Total	32,125,473	31,376,390
4. Other	1,343,120	1,062,731
5. Total Assets	34,209,627	33,107,636
6. Liabilities		
a. Securities lending liability	(1,338,730)	(1,058,056)
b. Other accounting liabilities and reserves	(992,279)	(790,058)
c. Total	(2,331,009)	(1,848,114)
7. Net assets	31,878,618	31,259,522

Note: Assets exclude the defined contribution plans
Amount shown are in \$ thousands
Amounts shown are from the December 31, 2018 Comprehensive Annual Financial
Report and may differ from other numbers contained in this report due to rounding.

EXHIBIT 11(b)

Reconciliation of Market Value of Assets (MVA)

Fund/Division (1)	MVA as of Dec. 31, 2017 (2)	Contributions (3)	Benefits and Refunds (4)	Earnings, Net of Expenses (5)	Transfers (6)	MVA as of Dec. 31, 2018 (7)
I. Public Employees Contributory						
A. Local Government	454,744	3,831	(28,392)	(1,766)	(9,774)	418,643
B. State and School	672,194	3,283	(51,476)	(2,600)	(16,512)	609,900
C. Higher Education	156,525	1,369	(8,395)	(603)	(5,011)	143,885
D. Subtotal	<u>1,283,463</u>	<u>8,483</u>	<u>(88,263)</u>	<u>(4,969)</u>	<u>(31,297)</u>	<u>1,172,428</u>
II. Public Employees Noncontributory						
A. Local Government	4,973,845	180,972	(219,049)	(20,232)	9,584	4,925,120
B. State and School	18,371,271	617,652	(1,034,040)	(74,461)	42,384	17,917,795
C. Higher Education	1,625,825	51,339	(69,871)	(6,639)	5,011	1,605,665
D. Subtotal	<u>24,970,941</u>	<u>849,963</u>	<u>(1,322,960)</u>	<u>(101,332)</u>	<u>56,979</u>	<u>24,448,580</u>
III. Public Safety Contributory						
A. Other Division A (2.5% COLA)	124,329	623	(9,360)	(483)	(1,749)	113,360
B. Other Division A (4% COLA)	25,455	52	(2,407)	(96)	(430)	22,574
C. Other Division B (2.5% COLA)	35,937	25	(2,485)	(135)	(1,020)	32,322
D. Other Division B (4% COLA)	9,095	34	(619)	(36)	169	8,643
E. Subtotal	<u>194,816</u>	<u>734</u>	<u>(14,871)</u>	<u>(750)</u>	<u>(3,030)</u>	<u>176,899</u>
IV. Public Safety Noncontributory						
A. State	1,206,584	50,295	(68,592)	(4,907)	738	1,184,118
B. Other Division A (2.5% COLA)	1,002,190	40,819	(43,066)	(4,075)	(7,894)	987,974
C. Other Division A (4% COLA)	298,947	12,108	(12,462)	(1,227)	1,175	298,541
D. Salt Lake City	292,944	15,294	(20,265)	(1,209)	2,259	289,023
E. Ogden	65,911	2,970	(4,848)	(270)	106	63,869
F. Provo	51,883	2,266	(3,241)	(212)	97	50,793
G. Logan	29,137	1,068	(1,625)	(118)	185	28,647
H. Bountiful	21,060	964	(1,571)	(86)	35	20,402
I. Other Division B (2.5% COLA)	367,170	19,499	(16,306)	(1,535)	12,959	381,766
J. Other Division B (4% COLA)	45,871	1,980	(2,003)	(187)	352	46,034
K. Subtotal	<u>3,381,697</u>	<u>147,263</u>	<u>(173,979)</u>	<u>(13,826)</u>	<u>10,012</u>	<u>3,351,167</u>
V. Firefighters						
A. Division A	217,737	8,352	(7,616)	(872)	(982)	216,619
B. Division B	1,016,668	25,721	(49,951)	(4,064)	2,899	991,273
C. Subtotal	<u>1,234,405</u>	<u>34,073</u>	<u>(57,567)</u>	<u>(4,936)</u>	<u>1,917</u>	<u>1,207,892</u>
VI. Judges	198,486	9,610	(16,117)	(814)	4,403	195,568
VII. Governors and Legislative	11,220	392	(977)	(47)	(51)	10,537
VIII. 3% Substantial Substitute	234,187	23,083	(24)	(836)	(38,933)	217,477
IX. Tier II - Hybrid Plans						
A. Public Employees	329,217	97,680	(690)	(1,572)	0	424,635
B. Public Safety and Firefighter	40,181	14,348	0	(194)	0	54,335
X. Grand Total	<u>31,878,613</u>	<u>1,185,629</u>	<u>(1,675,448)</u>	<u>(129,276)</u>	<u>0</u>	<u>31,259,518</u>

Notes: Amounts shown are in \$ thousands. Columns may not add to total due to rounding.
Beginning of year assets for the State and School and Higher Education Funds reflect the transfer of assets attributable to Salt Lake Community College.
The end of year asset amounts for the Tier I public employee risk pools are prior to the transfer of assets attributable to Dixie Technical College and Mountainland Technical College.

EXHIBIT 12(a)

Investment Return Rates for Prior Year

	Basis of Assets	
	Market Value (1)	Actuarial Value (2)
1. Beginning of year assets	31,878,613	30,877,197
2. Contributions to fund during year	1,185,629	1,185,629
3. Benefit payments during year (including refunds of contributions)	(1,675,448)	(1,675,448)
4. Transfers to and (from) URS	0	0
5. Investment income, net of investment and administrative expenses	<u>(129,276)</u>	<u>1,832,564</u>
6. End of year assets	31,259,518	32,219,942
7. Investment rate return	-0.4%	6.0%

Note: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 12(b)

Summary of Investment Return Rates

Year	Return on Market Value	Return on Actuarial Value
(1)	(2)	(3)
1993	15.7%	13.8%
1994	0.0%	8.8%
1995	21.4%	11.6%
1996	14.7%	11.7%
1997	15.8%	13.7%
1998	9.4%	12.6%
1999	16.3%	14.7%
2000	1.8%	11.2%
2001	-5.3%	6.8%
2002	-8.0%	-1.5%
2003	25.6%	8.0%
2004	13.7%	5.3%
2005	9.2%	7.4%
2006	14.4%	11.1%
2007	6.6%	13.0%
2008	-23.4%	-1.1%
2009	13.2%	6.1%
2010	13.2%	2.9%
2011	2.5%	1.3%
2012	12.6%	2.7%
2013	14.8%	11.0%
2014	7.1%	10.2%
2015	1.7%	7.8%
2016	8.4%	8.1%
2017	13.3%	8.3%
2018	-0.4%	6.0%
Average return		
Last 5 years:	5.9%	8.1%
Last 10 years:	8.5%	6.4%
Last 15 years:	6.6%	6.6%
Last 20 years:	6.3%	6.9%
Last 25 years:	7.4%	7.8%

EXHIBIT 13

Calculation of Actuarial Value of Assets (All Retirement Systems Combined)

1.	Market value of assets	\$ 31,259,518																												
2.	Adjustments to smooth asset values based on excess/shortfall of expected investment income for:																													
	<table style="width: 100%; border-collapse: collapse; margin-left: 40px;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Year</th> <th style="text-align: center; border-bottom: 1px solid black;">Total Excess / (Shortfall)</th> <th style="text-align: center; border-bottom: 1px solid black;">Weight Subtracted</th> <th style="text-align: center; border-bottom: 1px solid black;">Weight Subtracted</th> </tr> </thead> <tbody> <tr> <td>a. 2018</td> <td style="text-align: right;">(2,327,819)</td> <td style="text-align: center;">80%</td> <td style="text-align: right;">(1,862,254)</td> </tr> <tr> <td>b. 2017</td> <td style="text-align: right;">1,792,944</td> <td style="text-align: center;">60%</td> <td style="text-align: right;">1,075,767</td> </tr> <tr> <td>c. 2016</td> <td style="text-align: right;">329,864</td> <td style="text-align: center;">40%</td> <td style="text-align: right;">131,946</td> </tr> <tr> <td>d. 2015</td> <td style="text-align: right;">(1,529,413)</td> <td style="text-align: center;">20%</td> <td style="text-align: right;">(305,883)</td> </tr> <tr> <td>e. 2014</td> <td style="text-align: right;">(95,447)</td> <td style="text-align: center;">0%</td> <td style="text-align: center; border-top: 1px solid black;">0</td> </tr> <tr> <td>f. Total</td> <td></td> <td></td> <td style="text-align: right; border-top: 1px solid black;">(960,424)</td> </tr> </tbody> </table>	Year	Total Excess / (Shortfall)	Weight Subtracted	Weight Subtracted	a. 2018	(2,327,819)	80%	(1,862,254)	b. 2017	1,792,944	60%	1,075,767	c. 2016	329,864	40%	131,946	d. 2015	(1,529,413)	20%	(305,883)	e. 2014	(95,447)	0%	0	f. Total			(960,424)	
Year	Total Excess / (Shortfall)	Weight Subtracted	Weight Subtracted																											
a. 2018	(2,327,819)	80%	(1,862,254)																											
b. 2017	1,792,944	60%	1,075,767																											
c. 2016	329,864	40%	131,946																											
d. 2015	(1,529,413)	20%	(305,883)																											
e. 2014	(95,447)	0%	0																											
f. Total			(960,424)																											
3.	Preliminary actuarial value of assets (1-2f)	\$ 32,219,942																												
4.	Corridor Limits																													
	a. 75% of market value	\$ 23,444,639																												
	b. 125% of market value	39,074,398																												
	c. Actuarial value (Item 3, not more than 4b, not less than 4a)	\$ 32,219,942																												
5.	Ratio of actuarial value to market value	103.1%																												

Note: Amounts shown are in \$ thousands

EXHIBIT 14

Transfer Adjustments to Asset Values

Fund/Division (1)	Market Value of Assets (MVA) at January 1, 2019			Actuarial Value of Assets (AVA) at January 1, 2019		
	MVA Before Transfer	Transfer Amount	MVA After Transfer	AVA Before Transfer	Transfer Amount	AVA After Transfer
	(2)	(3)	(4)	(5)	(6)	(7)
I. Public Employees Contributory						
A. Local Government	418,643	5,143	423,786	431,858	5,300	437,158
B. State and School	609,900	8,005	617,905	629,137	8,250	637,387
C. Higher Education	143,885	(456)	143,429	148,265	(470)	147,795
D. Subtotal	<u>1,172,428</u>	<u>12,692</u>	<u>1,185,120</u>	<u>1,209,260</u>	<u>13,080</u>	<u>1,222,340</u>
II. Public Employees Noncontributory						
A. Local Government	4,925,120	(5,143)	4,919,977	5,075,157	(5,300)	5,069,857
B. State and School	17,906,419	(8,005)	17,898,414	18,455,504	(8,250)	18,447,254
C. Higher Education	1,617,041	456	1,617,497	1,666,215	470	1,666,685
D. Subtotal	<u>24,448,580</u>	<u>(12,692)</u>	<u>24,435,888</u>	<u>25,196,876</u>	<u>(13,080)</u>	<u>25,183,796</u>
III. Public Safety Contributory						
B. Other Division A (2.5% COLA)	113,360	(1,082)	112,278	116,910	(1,115)	115,795
C. Other Division A (4% COLA)	22,574	(464)	22,110	23,255	(478)	22,777
E. Other Division B (2.5% COLA)	32,322	(537)	31,785	33,338	(553)	32,785
F. Other Division B (4% COLA)	8,643	(14)	8,629	8,898	(14)	8,884
G. Subtotal	<u>176,899</u>	<u>(2,096)</u>	<u>174,803</u>	<u>182,401</u>	<u>(2,160)</u>	<u>180,241</u>
IV. Public Safety Noncontributory						
A. State	1,184,118	0	1,184,118	1,220,434	0	1,220,434
B. Other Division A (2.5% COLA)	987,974	1,082	989,056	1,018,871	1,115	1,019,986
C. Other Division A (4% COLA)	298,541	464	299,005	307,614	478	308,092
D. Salt Lake City	289,023	0	289,023	297,795	0	297,795
E. Ogden	63,869	0	63,869	65,834	0	65,834
F. Provo	50,793	0	50,793	52,355	0	52,355
G. Logan	28,647	0	28,647	29,525	0	29,525
H. Bountiful	20,402	0	20,402	21,023	0	21,023
I. Other Division B (2.5% COLA)	381,766	537	382,303	392,596	553	393,149
J. Other Division B (4% COLA)	46,034	14	46,048	47,377	14	47,391
K. Subtotal	<u>3,351,167</u>	<u>2,096</u>	<u>3,353,263</u>	<u>3,453,424</u>	<u>2,160</u>	<u>3,455,584</u>
V. Firefighters						
A. Division A	216,619	0	216,619	223,262	0	223,262
B. Division B	991,273	0	991,273	1,021,434	0	1,021,434
C. Subtotal	<u>1,207,892</u>	<u>0</u>	<u>1,207,892</u>	<u>1,244,696</u>	<u>0</u>	<u>1,244,696</u>
VI. Judges	195,568	0	195,568	201,325	0	201,325
VII. Governors and Legislative	10,537	0	10,537	10,852	0	10,852
VIII. 3% Substantial Substitute	217,477	0	217,477	226,669	0	226,669
IX. Tier II - Hybrid Plans						
A. Public Employees	424,635	0	424,635	438,366	0	438,366
B. Public Safety and Firefighter	54,335	0	54,335	56,073	0	56,073
X. Grand Total	<u>31,259,518</u>	<u>0</u>	<u>31,259,518</u>	<u>32,219,942</u>	<u>0</u>	<u>32,219,942</u>

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding
The Before Transfer amounts above already reflect the transfer of Dixie Technical College and Mountainland Technical College from Funds 12/16 to funds 17/18

EXHIBIT 15(a)

Actuarially Determined Contribution Rate for 3% Substantial Substitute

1. Actuarial accrued liability, all funds combined		
a. Retirees	\$	440,071
b. Inactives		13,307
c. Actives		<u>74,021</u>
d. Total	\$	527,400
2. Actuarial value of assets	\$	226,669
3. Unfunded actuarial accrued liability		300,731
4. Covered compensation of state funds that will pay for benefit	\$	3,854,577
5. Calculated rate (20-year funding period and 3.00% PGR)		0.56%

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 15(b)

Liabilities for 3% Substantial Substitute

Fund/Division (1)	Retirees and Beneficiaries (2)	Inactive Members (3)	Active Members (4)	Total (5)
I. Public Employees Contributory				
A. Local Government	9,079	781	2,333	12,192
B. State and School	15,929	777	3,166	19,872
C. Higher Education	2,948	353	1,381	4,683
D. Subtotal	<u>27,956</u>	<u>1,911</u>	<u>6,880</u>	<u>36,747</u>
II. Public Employees Noncontributory				
A. Local Government	53,359	2,463	13,281	69,103
B. State and School	276,634	4,938	42,855	324,427
C. Higher Education	16,425	1,524	5,544	23,493
D. Subtotal	<u>346,418</u>	<u>8,925</u>	<u>61,680</u>	<u>417,023</u>
III. Public Safety Contributory				
A. Other Division A (2.5% COLA)	2,759	160	0	2,919
B. Other Division A (4% COLA)	601	12	0	613
C. Other Division B (2.5% COLA)	788	38	22	847
D. Other Division B (4% COLA)	152	4	0	156
E. Subtotal	<u>4,300</u>	<u>214</u>	<u>22</u>	<u>4,535</u>
IV. Public Safety Noncontributory				
A. State	17,281	390	1,213	18,884
B. Other Division A (2.5% COLA)	10,150	1,100	927	12,177
C. Other Division A (4% COLA)	2,575	174	292	3,041
D. Salt Lake City	5,065	96	393	5,554
E. Ogden	1,333	8	23	1,365
F. Provo	818	17	133	968
G. Logan	458	31	51	539
H. Bountiful	442	14	0	456
I. Other Division B (2.5% COLA)	3,172	182	303	3,657
J. Other Division B (4% COLA)	516	22	94	633
K. Subtotal	<u>41,810</u>	<u>2,034</u>	<u>3,429</u>	<u>47,274</u>
V. Firefighters				
A. Division A	1,733	64	274	2,071
B. Division B	14,235	143	1,260	15,638
C. Subtotal	<u>15,968</u>	<u>207</u>	<u>1,534</u>	<u>17,709</u>
VI. Judges	3,489	0	471	3,959
VII. Governors and Legislative	131	16	6	153
VIII. Tier II - Hybrid Plans				
A. Public Employees	0	0	0	0
B. Public Safety and Firefighter	0	0	0	0
VIII. Grand Total	440,071	13,307	74,021	527,399

Notes: Amounts shown are in \$ thousands
Columns may not add to total due to rounding

EXHIBIT 16

Governors and Legislative Pension Plan Determination of Contribution

1. Actuarial Accrued Liability	
a. Retirees	\$ 8,517,433
b. Inactives	2,529,338
c. Actives	<u>2,127,702</u>
d. Total	\$ 13,174,472
2. Actuarial Value of Assets	\$ 10,852,000
3. Unfunded Actuarial Accrued Liability (UAAL) (1d) - (2)	2,322,472
4. Normal Cost	\$ 51,372
5. Total Recommended Appropriation Payable by June 30, 2021	
a. Normal Cost	\$ 51,372
b. Amortization Charge (15-year funding period, level dollar)*	<u>264,616</u>
c. Subtotal	\$ 315,988
d. Interest Adjustment (two years at 6.95%)	<u>45,449</u>
e. Total	\$ 361,437

* Greater of the current year amortization dollar amount based on the closed 15-year funding and the amortization amount actually contributed based on the prior year's valuation results.

EXHIBIT 17(a)

Historical Summary of Statistical Data Public Employees Retirement System (Contributory)

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active (2)	Inactive (3)	Retired (4)	Total (5)						
1995	10,421	1,805	11,115	23,341	284,657	27,316	58,345	437	922,155	935,845
1996	6,954	2,028	10,645	19,627	195,717	28,145	58,238	456	919,007	852,034
1997	4,673	1,906	10,176	16,755	135,083	28,907	57,770	473	859,304	772,977
1998	4,396	1,975	9,724	16,095	134,341	30,560	57,496	493	916,532	809,388
1999	4,144	2,089	9,208	15,441	133,440	32,201	56,599	512	927,169	840,215
2000	3,967	2,134	8,717	14,818	133,615	33,682	55,716	533	974,834	878,190
2001	3,827	2,149	8,264	14,240	134,816	35,228	56,264	567	936,798	924,573
2002	3,703	2,262	7,822	13,787	137,721	37,192	55,569	592	827,741	927,523
2003	3,608	2,269	7,375	13,252	137,743	38,177	54,765	619	749,408	899,290
2004	3,444	2,293	6,916	12,653	134,144	38,950	53,815	648	873,520	913,948
2005	3,318	2,285	6,550	12,153	134,810	40,630	53,630	682	971,242	933,974
2006	3,140	2,321	5,963	11,424	131,437	41,859	51,646	722	1,014,414	951,540
2007	2,964	2,372	5,687	11,023	127,588	43,046	53,059	777	1,105,890	1,004,452
2008	2,821	2,425	5,718	10,964	128,030	45,385	57,596	839	1,142,078	1,102,107
2009	2,701	2,476	5,408	10,585	128,970	47,749	58,318	899	878,169	1,097,711
2010	2,470	2,467	5,171	10,108	120,258	48,687	62,382	1,005	939,905	1,116,735
2011	2,289	2,416	4,947	9,652	110,691	48,358	64,170	1,081	1,046,886	1,132,661
2012	2,110	2,364	4,751	9,225	104,065	49,320	65,688	1,152	1,065,149	1,135,251
2013	1,891	2,306	4,573	8,770	95,985	50,759	68,055	1,240	1,176,614	1,133,433
2014	1,694	2,223	4,411	8,328	88,875	52,464	70,747	1,337	1,251,018	1,165,002
2015	1,476	2,164	4,315	7,955	80,845	54,773	73,475	1,419	1,253,647	1,198,862
2016	911	2,054	4,222	7,187	47,623	58,026	77,219	1,524	1,193,241	1,209,069
2017	738	1,919	4,165	6,822	44,428	60,200	80,399	1,606	1,210,294	1,227,072
2018	620	1,822	4,042	6,484	38,631	62,307	82,534	1,702	1,261,473	1,228,311
2019	519	1,726	3,917	6,162	33,750	65,029	84,544	1,799	1,185,120	1,222,340

EXHIBIT 17(b)

Historical Summary of Statistical Data Public Employees Retirement System (Noncontributory)

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active	Inactive	Retired	Total						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1995	67,698	10,131	9,143	86,972	1,688,967	24,949	121,850	1,111	4,312,948	4,372,190
1996	69,922	12,413	10,458	92,793	1,862,940	26,643	142,838	1,138	5,497,373	5,128,203
1997	73,478	13,965	11,841	99,284	2,048,876	27,884	166,432	1,171	6,547,598	5,954,796
1998	76,728	15,383	13,242	105,353	2,231,957	29,089	192,723	1,213	7,711,808	6,896,740
1999	77,360	17,494	14,645	109,499	2,343,986	30,300	220,230	1,253	8,560,909	7,894,249
2000	80,639	18,630	16,163	115,432	2,486,200	30,831	248,366	1,281	10,112,606	9,186,463
2001	81,850	20,357	17,728	119,935	2,611,413	31,905	280,910	1,320	10,367,596	10,294,444
2002	83,690	27,385	19,145	130,220	2,801,564	33,475	314,821	1,370	9,848,682	11,021,828
2003	83,925	26,664	20,623	131,212	2,888,853	34,422	351,690	1,421	8,963,388	10,756,065
2004	84,039	28,673	22,202	134,914	2,915,008	34,686	388,305	1,457	11,191,566	11,551,092
2005	85,502	30,498	23,782	139,782	3,058,487	35,771	426,813	1,496	12,639,732	12,093,408
2006	86,502	33,035	25,446	144,983	3,121,800	36,089	466,287	1,527	13,756,039	12,935,862
2007	87,960	34,820	27,866	150,646	3,284,295	37,339	532,188	1,592	15,664,709	14,295,945
2008	91,342	36,713	30,325	158,380	3,583,525	39,232	596,337	1,639	16,564,574	16,026,629
2009	93,633	38,324	32,104	164,061	3,837,934	40,989	642,434	1,668	12,533,979	15,667,473
2010	92,847	39,583	34,433	166,863	3,888,415	41,847	726,282	1,758	13,992,989	16,434,614
2011	91,871	40,928	36,612	169,411	3,842,855	41,828	778,376	1,772	15,585,991	16,663,090
2012	87,220	42,646	38,708	168,574	3,760,961	43,120	830,698	1,788	15,704,227	16,615,078
2013	80,837	44,655	40,959	166,451	3,610,948	44,669	892,610	1,816	17,392,873	16,777,789
2014	75,381	46,653	43,362	165,396	3,486,507	46,252	959,814	1,845	19,728,833	18,396,476
2015	70,453	48,326	45,921	164,700	3,378,417	47,953	1,024,495	1,859	20,889,367	20,024,686
2016	66,649	49,306	48,739	164,694	3,154,812	50,259	1,098,066	1,877	20,967,157	21,308,181
2017	63,220	49,603	51,355	164,178	3,304,602	52,271	1,154,650	1,907	22,393,742	22,683,206
2018	59,494	49,983	53,898	163,375	3,261,711	54,824	1,223,333	1,891	24,992,931	24,200,612
2019	56,237	49,840	56,404	162,481	3,260,398	57,976	1,299,595	1,920	24,435,888	25,183,796

EXHIBIT 17(c)

Historical Summary of Statistical Data Public Safety Retirement System (Contributory)

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active	Inactive	Retired	Total						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1995	1,280	568	1,294	3,142	38,571	30,134	16,087	1,036	284,198	289,572
1996	971	525	1,321	2,817	30,304	31,209	17,323	1,093	310,209	291,478
1997	952	543	1,322	2,817	31,940	33,550	17,735	1,118	335,065	304,699
1998	1,006	531	1,340	2,877	34,262	34,058	18,487	1,150	364,531	324,488
1999	855	498	1,344	2,697	29,704	34,742	19,147	1,187	347,477	316,739
2000	804	486	1,333	2,623	28,957	36,016	19,351	1,210	363,654	327,635
2001	794	479	1,243	2,516	30,021	37,810	18,611	1,248	331,370	326,949
2002	795	503	1,257	2,555	30,783	38,721	19,480	1,291	293,617	328,959
2003	789	502	1,250	2,541	31,501	39,925	20,222	1,348	269,041	322,275
2004	759	519	1,249	2,527	31,688	41,749	20,759	1,385	316,514	331,432
2005	740	522	1,241	2,503	32,446	43,846	21,202	1,424	352,753	339,304
2006	698	526	1,256	2,480	31,443	45,047	22,127	1,468	368,717	345,699
2007	693	534	1,252	2,479	32,291	46,596	23,020	1,532	398,502	361,788
2008	539	505	1,101	2,145	25,700	47,681	20,452	1,548	330,176	318,303
2009	188	431	1,027	1,646	9,507	50,569	19,531	1,585	201,270	267,761
2010	165	404	1,046	1,615	8,398	50,906	21,177	1,687	222,779	271,894
2011	140	408	1,018	1,566	6,933	49,514	21,200	1,735	243,309	269,379
2012	130	398	1,003	1,531	6,475	49,817	21,293	1,769	244,173	263,771
2013	120	386	990	1,496	6,067	50,549	21,448	1,805	271,029	260,591
2014	110	381	968	1,459	5,646	51,320	21,455	1,847	277,988	258,627
2015	62	341	915	1,318	3,215	51,848	20,408	1,859	247,934	236,598
2016	49	305	635	989	2,561	52,266	14,701	1,929	187,613	189,713
2017	45	289	629	963	2,422	53,837	14,558	1,929	186,753	189,110
2018	37	280	619	936	2,094	56,595	14,430	1,943	192,327	185,215
2019	30	269	611	910	1,772	59,112	14,415	1,966	174,803	180,241

EXHIBIT 17(d)

Historical Summary of Statistical Data Public Safety Retirement System (Noncontributory)

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active	Inactive	Retired	Total						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1995	3,899	360	304	4,563	111,292	28,544	5,684	1,558	297,278	300,101
1996	4,455	555	395	5,405	130,552	29,305	7,596	1,603	409,217	379,132
1997	4,720	614	492	5,826	149,086	31,586	9,870	1,672	496,197	450,407
1998	5,033	664	592	6,289	161,826	32,153	12,068	1,699	606,326	542,680
1999	5,427	752	747	6,926	180,904	33,334	15,603	1,741	726,304	672,062
2000	5,735	865	882	7,482	196,271	34,223	18,504	1,748	898,266	818,697
2001	5,974	832	1,118	7,924	212,442	35,561	23,428	1,746	964,708	960,047
2002	6,120	1,464	1,326	8,910	225,760	36,889	28,907	1,817	936,286	1,047,507
2003	6,228	1,733	1,462	9,423	237,192	38,085	33,444	1,906	855,508	1,027,160
2004	6,324	1,915	1,617	9,856	243,745	38,543	38,614	1,990	1,087,654	1,117,457
2005	6,428	2,093	1,808	10,329	257,241	40,019	44,508	2,051	1,241,290	1,185,601
2006	6,556	2,283	2,038	10,877	263,905	40,254	51,112	2,090	1,367,735	1,287,322
2007	6,740	2,481	2,205	11,426	282,955	41,981	57,294	2,165	1,582,989	1,447,411
2008	7,015	2,633	2,612	12,260	311,886	44,460	67,997	2,169	1,776,121	1,720,309
2009	7,642	2,854	2,841	13,337	356,186	46,609	75,602	2,218	1,409,649	1,745,887
2010	7,519	3,066	3,042	13,627	359,978	47,983	84,735	2,321	1,598,416	1,861,644
2011	7,443	3,186	3,207	13,836	355,318	47,739	91,555	2,379	1,809,515	1,919,525
2012	7,495	3,613	3,355	14,463	360,231	48,063	96,988	2,409	1,854,254	1,952,972
2013	7,129	3,877	3,550	14,556	350,623	49,183	104,366	2,450	2,095,022	2,023,320
2014	6,847	4,014	3,743	14,604	346,544	50,612	111,953	2,493	2,434,192	2,272,082
2015	6,551	4,190	3,993	14,734	343,668	52,460	120,426	2,513	2,651,448	2,544,778
2016	6,285	4,320	4,529	15,134	341,997	54,415	135,829	2,499	2,751,226	2,798,714
2017	5,988	4,425	4,783	15,196	340,917	56,933	143,957	2,508	2,989,794	3,028,111
2018	5,666	4,465	5,019	15,150	339,112	59,850	152,444	2,531	3,384,186	3,277,704
2019	5,271	4,477	5,356	15,104	330,952	62,787	166,193	2,586	3,353,263	3,455,584

EXHIBIT 17(e)

Historical Summary of Statistical Data Firefighters Retirement System

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active (2)	Inactive (3)	Retired (4)	Total (5)						
1995	1,123	103	618	1,844	39,669	35,324	9,811	1,323	249,712	253,304
1996	1,165	116	644	1,925	42,599	36,566	10,397	1,415	315,063	293,816
1997	1,229	123	675	2,027	47,550	38,690	12,049	1,488	362,555	329,475
1998	1,285	130	707	2,122	50,886	39,600	13,747	1,620	421,184	376,178
1999	1,352	156	736	2,244	54,402	40,238	14,940	1,692	460,190	423,405
2000	1,380	160	772	2,312	57,664	41,786	16,112	1,739	532,783	483,373
2001	1,433	173	823	2,429	61,593	42,982	18,163	1,839	540,822	536,503
2002	1,504	179	866	2,549	66,871	44,462	20,008	1,925	508,565	569,151
2003	1,545	197	884	2,626	71,347	46,179	22,246	2,097	461,324	553,589
2004	1,577	222	920	2,719	75,148	47,653	22,859	2,071	570,160	589,502
2005	1,608	237	948	2,793	79,168	49,234	24,242	2,131	637,979	610,688
2006	1,647	294	979	2,920	83,495	50,695	26,064	2,219	686,062	644,496
2007	1,690	315	1,021	3,026	87,089	51,532	28,312	2,311	773,774	705,051
2008	1,786	338	1,098	3,222	94,488	52,905	31,944	2,424	814,674	787,663
2009	1,852	370	1,120	3,342	101,508	54,810	33,985	2,529	612,696	765,871
2010	1,899	396	1,168	3,463	105,341	55,472	37,991	2,711	682,218	802,576
2011	1,890	399	1,199	3,488	105,471	55,805	39,823	2,768	756,256	810,216
2012	1,931	451	1,227	3,609	108,222	56,045	41,291	2,804	765,526	810,764
2013	1,874	463	1,262	3,599	107,495	57,361	43,349	2,862	853,776	824,060
2014	1,834	485	1,271	3,590	108,307	59,055	44,620	2,926	968,661	903,627
2015	1,775	502	1,298	3,575	108,207	60,962	46,405	2,979	1,031,040	988,806
2016	1,722	503	1,333	3,558	109,517	63,599	48,458	3,029	1,043,058	1,060,312
2017	1,664	514	1,372	3,550	110,321	66,299	50,424	3,063	1,115,726	1,130,198
2018	1,603	516	1,423	3,542	111,002	69,246	53,137	3,112	1,234,406	1,195,358
2019	1,541	520	1,464	3,525	110,823	71,916	55,698	3,170	1,207,892	1,244,696

EXHIBIT 17(f)

Historical Summary of Statistical Data Judges Retirement System

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active	Inactive	Retired	Total						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1995	87	0	70	157	7,263	83,488	2,193	2,610	38,220	38,726
1996	98	3	70	171	8,480	86,534	2,309	2,749	47,531	44,304
1997	100	1	69	170	9,202	92,019	2,396	2,894	55,757	50,721
1998	102	1	72	175	9,298	91,158	2,778	3,215	66,299	59,373
1999	103	2	73	178	9,667	93,850	2,970	3,391	73,650	67,998
2000	106	2	73	181	10,150	95,750	3,078	3,514	85,921	78,130
2001	104	4	75	183	10,318	99,208	3,299	3,666	87,731	87,139
2002	106	4	78	188	10,910	102,925	3,608	3,855	82,760	92,649
2003	106	4	77	187	11,095	104,674	3,728	4,035	75,753	90,904
2004	106	5	83	194	11,163	105,311	4,306	4,324	94,467	97,412
2005	108	6	84	198	11,820	109,442	4,431	4,396	105,483	100,814
2006	109	5	85	199	11,721	107,533	4,711	4,618	113,353	106,374
2007	110	5	87	202	12,336	112,143	5,145	4,928	128,300	116,879
2008	110	6	96	212	13,387	121,700	5,931	5,149	134,366	129,847
2009	110	5	97	212	14,347	130,423	6,190	5,318	100,896	126,120
2010	108	4	107	219	14,458	133,873	7,435	5,791	111,727	131,491
2011	110	5	115	230	14,849	134,987	8,555	6,199	123,037	131,869
2012	112	4	118	234	15,061	134,477	8,692	6,138	123,237	130,561
2013	111	4	119	234	14,922	134,432	9,149	6,407	136,129	131,217
2014	111	5	127	243	15,932	142,249	10,244	6,722	155,680	145,121
2015	113	5	132	250	15,568	137,768	11,090	7,001	163,834	156,956
2016	112	4	140	256	16,484	147,175	11,963	7,121	163,748	166,298
2017	115	3	141	259	18,368	159,722	11,956	7,066	175,621	177,782
2018	114	4	148	266	18,507	162,345	13,122	7,389	198,486	192,037
2019	116	3	155	274	19,288	166,280	14,558	7,827	195,568	201,325

EXHIBIT 17(g)

Historical Summary of Statistical Data Legislative and Governors Retirement System

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active (2)	Inactive (3)	Retired (4)	Total (5)						
1995	89	112	196	397	412	4,628	422	180	7,684	7,804
1996	96	111	201	408	439	4,569	445	184	8,788	8,185
1997	75	115	200	390	367	4,892	457	190	9,561	8,636
1998	90	108	208	406	488	5,419	476	191	10,531	9,318
1999	91	99	211	401	495	5,440	504	199	10,976	9,988
2000	94	101	221	416	511	5,437	531	200	12,159	10,946
2001	86	96	218	400	478	5,557	536	205	11,724	11,569
2002	94	107	228	429	601	6,391	562	206	10,448	11,710
2003	94	105	231	430	592	6,297	585	211	8,932	10,719
2004	100	110	223	433	610	6,097	573	214	10,390	10,906
2005	97	103	221	421	521	5,374	577	218	11,066	10,650
2006	88	113	224	425	788	8,955	608	226	11,319	10,587
2007	89	110	216	415	797	8,955	604	233	12,163	10,983
2008	92	118	220	430	538	5,850	596	226	12,195	11,736
2009	91	111	222	424	532	5,850	580	218	8,673	10,841
2010	94	117	223	434	585	6,224	773	289	8,995	10,770
2011	83	119	221	423	547	6,587	778	293	9,337	10,197
2012	96	116	219	431	505	5,256	819	312	8,932	9,565
2013	74	125	224	423	390	5,265	806	300	9,444	9,077
2014	76	113	235	424	854	12,200	867	307	10,165	9,457
2015	73	105	236	414	943	12,923	886	313	10,365	9,908
2016	65	105	241	411	799	12,289	904	313	10,040	10,173
2017	61	98	244	403	722	11,830	942	322	10,351	10,470
2018	52	99	253	404	639	12,285	975	321	11,220	10,856
2019	52	91	250	393	639	12,285	974	325	10,537	10,852

EXHIBIT 17(h)

Historical Summary of Statistical Data Tier II Public Employees' Hybrid Retirement System

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active (2)	Inactive (3)	Retired (4)	Total (5)						
2012	4,342	0	0	4,342	115,876	26,687	0	0	2,799	2,833
2013	9,510	0	0	9,510	269,287	28,316	0	0	17,935	17,817
2014	13,352	0	0	13,352	410,861	30,771	0	0	47,690	46,239
2015	16,786	0	0	16,786	552,585	32,919	0	0	89,289	88,743
2016	21,100	92	1	21,193	662,190	31,383	1	72	140,539	145,518
2017	24,372	401	9	24,782	836,175	34,309	14	130	217,293	219,885
2018	27,150	1,073	26	28,249	1,009,865	37,196	50	161	329,217	318,755
2019	30,290	1,878	64	32,232	1,267,301	41,839	160	209	424,635	438,366

EXHIBIT 17(i)

Historical Summary of Statistical Data Tier II Public Safety and Firefighter Hybrid Retirement System

Plan Year Beginning January 1st	Participant Counts				Covered Payroll (\$ Thousands)	Average Pay (7)	Retirement Benefits in Force Annual Amount (\$ Thousands)	Average Retiree Monthly Benefit (9)	Market Value of Assets (\$ Thousands)	Actuarial Value of Assets (\$ Thousands)
	Active (2)	Inactive (3)	Retired (4)	Total (5)						
2012	87	0	0	87	3,146	36,161	0	0	90	90
2013	439	0	0	439	16,152	36,793	0	0	1,172	1,161
2014	843	0	0	843	30,887	36,639	0	0	3,934	3,819
2015	1,280	0	0	1,280	47,707	37,271	0	0	8,706	8,666
2016	1,755	1	0	1,756	67,731	38,593	0	0	15,089	15,618
2017	2,240	26	0	2,266	89,558	39,981	0	0	25,135	25,388
2018	2,699	63	0	2,762	113,162	41,927	0	0	40,181	38,872
2019	3,301	111	0	3,412	145,332	44,027	0	0	54,335	56,073

SUPPLEMENT EXHIBIT 1(A)

Preliminary Tier I Retirement Contribution Rates as a Percentage of Salary and Wages Fiscal Year July 1, 2020 - June 30, 2021

	Preliminary Tier I 2020-2021 Rates						Increase (Decrease) From Prior Year
	(1)	(2)	(3)	(4)	(5)	(6)	
	Employee	Employer	Normal cost* (6) - (4)	Amortization of UAAL**	Net Employer (2) + (4)	Total (3) + (4)	
Public Employees							
Contributory Retirement System							
11- Local Government	6.00%	6.09%	12.09%	8.37%	14.46%	20.46%	0.00%
12- State and School***	6.00%	5.45%	11.45%	12.25%	17.70%	23.70% ^{1,2}	0.00%
17- Higher Education	6.00%	5.45%	11.45%	12.25%	17.70%	23.70% ^{1,2}	0.00%
Public Employees							
Noncontributory Retirement System							
15- Local Government	-	11.86%	11.86%	6.61%	18.47%	18.47%	0.00%
16- State and School***	-	12.25%	12.25%	9.94%	22.19%	22.19% ^{1,2}	0.00%
18- Higher Education	-	12.25%	12.25%	9.94%	22.19%	22.19% ^{1,2}	0.00%
Public Safety							
Contributory Retirement System							
Division A							
23- Other Division A with 2.5% COLA	12.29%	11.02%	23.31%	11.77%	22.79%	35.08%	0.00%
77- Other Division A with 4% COLA	12.29%	11.44%	23.73%	12.93%	24.37%	36.66%	0.00%
Division B							
29- Other Division B with 2.5% COLA	10.50%	13.04%	23.54%	9.77%	22.81%	33.31%	0.00%
74- Other Division B with 4% COLA	10.50%	13.04%	23.54%	15.94%	28.98%	39.48%	0.00%
Public Safety							
Noncontributory Retirement System							
Division A							
42- State with 4% COLA	-	22.89%	22.89%	18.46%	41.35%	41.35% ¹	0.00%
23- Other Division A with 2.5% COLA	-	22.29%	22.29%	11.75%	34.04%	34.04%	0.00%
75- Other Division A with 4% COLA	-	22.80%	22.80%	12.91%	35.71%	35.71%	0.00%
48- Bountiful with 2.5% COLA	-	23.49%	23.49%	26.89%	50.38%	50.38%	0.00%
Division B							
44- Salt Lake City with 2.5% COLA	-	22.51%	22.51%	24.20%	46.71%	46.71%	0.00%
45- Ogden with 2.5% COLA	-	22.42%	22.42%	26.30%	48.72%	48.72%	0.00%
46- Provo with 2.5% COLA	-	22.62%	22.62%	19.61%	42.23%	42.23%	0.00%
47- Logan with 2.5% COLA	-	22.60%	22.60%	19.37%	41.97%	41.97%	0.00%
49- Other Division B with 2.5% COLA	-	22.62%	22.62%	9.66%	32.28%	32.28%	0.00%
76- Other Division B with 4% COLA	-	23.03%	23.03%	15.94%	38.97%	38.97%	0.00%
Firefighters' Retirement System							
Division A							
Gross Rate	15.05%	11.68%	26.73%	3.99%	15.67%	30.72%	0.00%
Insurance Premium Offset	-	<u>-7.07%</u>	<u>-7.07%</u>	<u>-3.99%</u>	<u>-11.06%</u>	<u>-11.06%</u>	<u>0.00%</u>
31- Net Rate	15.05%	4.61%	19.66%	0.00%	4.61%	19.66%	0.00%
Division B							
Gross Rate	16.71%	9.80%	26.51%	8.50%	18.30%	35.01%	0.00%
Insurance Premium Offset	-	<u>-2.56%</u>	<u>-2.56%</u>	<u>-8.50%</u>	<u>-11.06%</u>	<u>-11.06%</u>	<u>0.00%</u>
32- Net Rate	16.71%	7.24%	23.95%	0.00%	7.24%	23.95%	0.00%
Judges' Retirement System							
Gross Rate	-	31.60%	31.60%	20.31%	51.91%	51.91% ¹	0.00%
Court Fees Offset	-	-	-	<u>-7.60%</u>	<u>-7.60%</u>	<u>-7.60%</u>	<u>0.56%</u>
37- Net Rate- Noncontributory	-	31.60%	31.60%	12.71%	44.31%	44.31% ¹	0.56%
Governors and Legislative							
14- Appropriation Payable by June 30, 2021				\$ 361,437	\$ 361,437		\$ (7,789)

Note: The net employer contribution rate and amortization rates shown above are certified and maintained by the Board. The net employer contribution rates for all funds except Funds 29, 48, 49, Firefighters and Judges are maintained at the 2014-15 levels. The net employer contribution rates for Funds 29, 48, and 49 are established by the 2017 actuarial valuation. The net employer contribution rates for the Firefighters and Judges changed (due to the offset) in accordance with Utah Code Subsection 49-11-301(5)(a). The contribution rates for certain Tier I public safety and firefighter funds were increased in FY 2019 due to the modification to certain line of duty death benefits (2018 SB 21).

1 Includes funding of 3% Substantial Substitute based on salaries for all state and school employees.

2 Does not include 1.5% 401(k).

* The difference between the Board certified employer contribution rate and the Board certified amortization rate.

** Amortization of Unfunded Actuarial Accrued Liability (UAAL).

*** Public School Districts and Charter School rates are effective September 1, 2020 - August 21, 2021.

SUPPLEMENT EXHIBIT 1(B)

Preliminary Tier II Retirement Contribution Rates as a Percentage of Salary and Wages Fiscal Year July 1, 2020 - June 30, 2021

	Tier II Hybrid Retirement System							Tier II Defined Contribution Plan					Employer Increase (Decrease) From Prior Year ²
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	
	Total Hybrid Plan DB Rate	Employee Tier II Rate	Employer Hybrid Plan DB Rate	Employer Hybrid Plan DC Rate	Death Benefit**	Tier I Amort %	Total Required Contribution Rate (2)+(3)+(4)+(5)+(6)	Employer Tier II Rate	Employee Tier II Rate	Death Benefit**	Tier I Amort %	Total Required Contribution Rate (1)+(2)+(3)+(4)	
Public Employees													
Contributory Retirement System													
11- Local Government	9.11%	0.00%	9.11%	0.89%	0.08%	8.37%	18.45%	10.00%	0.00%	0.08%	8.37%	18.45%	0.00%
Public Employees													
Noncontributory Retirement System													
15- Local Government	9.11%	0.00%	9.11%	0.89%	0.08%	6.61%	16.69%	10.00%	0.00%	0.08%	6.61%	16.69%	0.00%
16- State and School ¹	9.11%	0.00%	9.11%	0.89%	0.08%	9.94%	20.02%	10.00%	0.00%	0.08%	9.94%	20.02%	0.00%
18- Higher Education	9.11%	0.00%	9.11%	0.89%	0.08%	9.94%	20.02%	10.00%	0.00%	0.08%	9.94%	20.02%	0.00%
Public Safety													
Contributory Retirement System													
23- Other Division A (2.5% COLA)	16.27%	2.27%	14.00%	0.00%	0.08%	11.77%	28.12%	14.00%	0.00%	0.08%	11.77%	25.85%	2.00%
77- Other Division A (4% COLA)	16.27%	2.27%	14.00%	0.00%	0.08%	12.93%	29.28%	14.00%	0.00%	0.08%	12.93%	27.01%	2.00%
29- Other Division B (2.5% COLA)	16.27%	2.27%	14.00%	0.00%	0.08%	9.77%	26.12%	14.00%	0.00%	0.08%	9.77%	23.85%	2.00%
74- Other Division B (4% COLA)	16.27%	2.27%	14.00%	0.00%	0.08%	15.94%	32.29%	14.00%	0.00%	0.08%	15.94%	30.02%	2.00%
Public Safety													
Noncontributory Retirement System													
42- State	16.27%	2.27%	14.00%	0.00%	0.08%	18.46%	34.81%	14.00%	0.00%	0.08%	18.46%	32.54%	2.00%
43- Other Division A (2.5% COLA)	16.27%	2.27%	14.00%	0.00%	0.08%	11.75%	28.10%	14.00%	0.00%	0.08%	11.75%	25.83%	2.00%
75- Other Division A (4% COLA)	16.27%	2.27%	14.00%	0.00%	0.08%	12.91%	29.26%	14.00%	0.00%	0.08%	12.91%	26.99%	2.00%
44- Salt Lake City	16.27%	2.27%	14.00%	0.00%	0.08%	24.20%	40.55%	14.00%	0.00%	0.08%	24.20%	38.28%	2.00%
45- Ogden	16.27%	2.27%	14.00%	0.00%	0.08%	26.30%	42.65%	14.00%	0.00%	0.08%	26.30%	40.38%	2.00%
46- Provo	16.27%	2.27%	14.00%	0.00%	0.08%	19.61%	35.96%	14.00%	0.00%	0.08%	19.61%	33.69%	2.00%
47- Logan	16.27%	2.27%	14.00%	0.00%	0.08%	19.37%	35.72%	14.00%	0.00%	0.08%	19.37%	33.45%	2.00%
48- Bountiful	16.27%	2.27%	14.00%	0.00%	0.08%	26.89%	43.24%	14.00%	0.00%	0.08%	26.89%	40.97%	2.00%
49- Other Division B (2.5% COLA)	16.27%	2.27%	14.00%	0.00%	0.08%	9.66%	26.01%	14.00%	0.00%	0.08%	9.66%	23.74%	2.00%
76- Other Division B (4% COLA)	16.27%	2.27%	14.00%	0.00%	0.08%	15.94%	32.29%	14.00%	0.00%	0.08%	15.94%	30.02%	2.00%
Firefighters													
31- Division A*	16.27%	2.27%	14.00%	0.00%	0.08%	0.00%	16.35%	14.00%	0.00%	0.08%	0.00%	14.08%	2.00%
32- Division B*	16.27%	2.27%	14.00%	0.00%	0.08%	0.00%	16.35%	14.00%	0.00%	0.08%	0.00%	14.08%	2.00%

Note: * For Firefighters, the fire insurance premium offset was applied first to the amortization charge, leaving no amount owed to Tier I by employers for Tier II firefighters.

** Employer paid active member death benefit (75% of salary) per Utah Code Section 49-22-501 and 49-23-501.

1 Public School Districts and Charter School rates are effective September 1, 2020 - August 31, 2021.

2 The employer contribution rate increase by 2.00% of pay for the Tier 2 Public Safety and Firefighter System (Hybrid and Defined Contribution) and the employee contribution rate increased by 2.27% of pay for the Tier 2 Public Safety and Firefighter Hybrid Plan. This results in a total increase of 4.27% of pay in the Tier 2 Public Safety and Firefighter Hybrid Plan and a total increase of 2.00% of pay in the Tier 2 Public Safety and Firefighter Defined Contribution Plan.

SUPPLEMENT EXHIBIT 1(C)

Preliminary Condensed Retirement Contribution Rate Guide Fiscal Year July 1, 2020 - June 30, 2021

	Tier I DB System			Tier I Post Retired		Tier II - DB Hybrid System					Tier II - DC Plan				
	Contribution Reporting Fields			Post Retired Employment post 6/30/2010 - No 401(k)	Post Retired Employment prior July 1, 2010	Contribution Reporting Fields Tier II 2020-2021 Rates					Contribution Reporting Fields Tier II 2020-2021 Rates				
	Member	Employer	Total	Amount of UAAL ¹	Optional 401(k) Cap	Tier II Fund	Employee	Employer	401(k)	Total	Tier II Fund	Employee	Employer	401(k)	Total
Public Employees															
Contributory Retirement System															
11- Local Government	6.00%	14.46%	20.46%		8.37%	111	0.00%	17.56%	0.89%	18.45%	211	0.00%	8.45%	10.00%	18.45%
12- State and School ³	6.00%	17.70%	23.70%		12.25%										
17- Higher Education	6.00%	17.70%	23.70%		12.25%										
Public Employees															
Noncontributory Retirement System															
15- Local Government	-	18.47%	18.47%		6.61%	111	0.00%	15.80%	0.89%	16.69%	211	0.00%	6.69%	10.00%	16.69%
16- State and School ³	-	22.19%	22.19%		9.94%	112	0.00%	19.13%	0.89%	20.02%	212	0.00%	10.02%	10.00%	20.02%
18- Higher Education	-	22.19%	22.19%		9.94%	117	0.00%	19.13%	0.89%	20.02%	217	0.00%	10.02%	10.00%	20.02%
Public Safety															
Contributory Retirement System															
Division A															
23- Other Division A with 2.5% COLA	12.29%	22.79%	35.08%		11.77%	122	2.27%	25.85%	0.00%	28.12%	222	0.00%	11.85%	14.00%	25.85%
77- Other Division A with 4% COLA	12.29%	24.37%	36.66%		12.93%	122	2.27%	27.01%	0.00%	29.28%	222	0.00%	13.01%	14.00%	27.01%
Division B															
29- Other Division B with 2.5% COLA	10.50%	22.81%	33.31%		9.77%	122	2.27%	23.85%	0.00%	26.12%	222	0.00%	9.85%	14.00%	23.85%
74- Other Division B with 4% COLA	10.50%	28.98%	39.48%		15.94%	122	2.27%	30.02%	0.00%	32.29%	222	0.00%	16.02%	14.00%	30.02%
Public Safety															
Noncontributory Retirement System															
Division A															
42- State with 4% COLA	-	41.35%	41.35%		18.46%	122	2.27%	32.54%	0.00%	34.81%	222	0.00%	18.54%	14.00%	32.54%
43- Other Division A with 2.5% COLA	-	34.04%	34.04%		11.75%	122	2.27%	25.83%	0.00%	28.10%	222	0.00%	11.83%	14.00%	25.83%
75- Other Division A with 4% COLA	-	35.71%	35.71%		12.91%	122	2.27%	26.99%	0.00%	29.26%	222	0.00%	12.99%	14.00%	26.99%
48- Bountiful with 2.5% COLA	-	50.38%	50.38%		26.89%	122	2.27%	40.97%	0.00%	43.24%	222	0.00%	26.97%	14.00%	40.97%
Division B															
44- Salt Lake City with 2.5% COLA	-	46.71%	46.71%		24.20%	122	2.27%	38.28%	0.00%	40.55%	222	0.00%	24.28%	14.00%	38.28%
45- Ogden with 2.5% COLA	-	48.72%	48.72%		26.30%	122	2.27%	40.38%	0.00%	42.65%	222	0.00%	26.38%	14.00%	40.38%
46- Provo with 2.5% COLA	-	42.23%	42.23%		19.61%	122	2.27%	33.69%	0.00%	35.96%	222	0.00%	19.69%	14.00%	33.69%
47- Logan with 2.5% COLA	-	41.97%	41.97%		19.37%	122	2.27%	33.45%	0.00%	35.72%	222	0.00%	19.45%	14.00%	33.45%
49- Other Division B with 2.5% COLA	-	32.28%	32.28%		9.66%	122	2.27%	23.74%	0.00%	26.01%	222	0.00%	9.74%	14.00%	23.74%
76- Other Division B with 4% COLA	-	38.97%	38.97%		15.94%	122	2.27%	30.02%	0.00%	32.29%	222	0.00%	16.02%	14.00%	30.02%
Firefighters Retirement System															
Division A															
31- Division A	15.05%	4.61%	19.66%		0.00%	132	2.27%	14.08%	0.00%	16.35%	232	0.00%	0.08%	14.00%	14.08%
Division B															
32- Division B	16.71%	7.24%	23.95%		0.00%	132	2.27%	14.08%	0.00%	16.35%	232	0.00%	0.08%	14.00%	14.08%
Judges' Retirement System															
32- Judges' Noncontributory	0.00%	44.31%	44.31%												

Note: ¹ Unfunded actuarial accrued liability.

² Does not include the required 1.5% 401(k) contribution.

³ Public School Districts and Charter School rates are effective September 1, 2020 - August 31, 2021.

SECTION D

ASSESSMENT AND DISCLOSURE OF RISK

Risks Associated with Measuring the Accrued Liability And Actuarially Determined Contribution

(As Required by ASOP No. 51)

The determination of URS's accrued liability and actuarially determined contributions requires the use of assumptions regarding future economic and demographic experience. The risk measures illustrated in this section are intended to aid stakeholders in understanding the effects when future experience differs from the assumptions used in performing an actuarial valuation. These risk measures may also help with illustrating the potential volatility in the funded status and actuarially determined contributions that result from differences between actual experience and the expected experience based on the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience (economic and demographic) differing from the assumptions, changes in assumptions due to changing conditions, changes in contribution requirements due to modifications to the funding policy, and changes in the liability and cost due to changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

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

- Investment risk – actual investment returns may differ from expected returns;
- Longevity risk – members may live longer or shorter than expected and receive pensions for a time period different than assumed;
- Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liabilities and contributions differing from expected;
- Salary and payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liabilities and contributions differing from expected;
- Asset/Liability mismatch – changes in assets may be inconsistent with changes in liabilities, thereby altering the relative difference between the assets and liabilities which may alter the funded status and contribution requirements;
- Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions are not made in accordance with the System's funding policy, withdrawal liability assessments or other anticipated payments to the plan are not made, or material changes occur in the anticipated number of covered employees, covered payroll, or another relevant contribution base.

Effects of certain experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate of return, the funded status of the plan can be expected to decrease (or increase) more than anticipated.

The Board certified contribution rates shown in this report comply with the Board's funding policy, but stakeholders should be aware that contributions made at the current Board certified rate do not necessarily guarantee that the contribution requirements will not increase in a future year.

Employer Risk with Contribution Rates

URS's Board policy is intended to finance the unfunded actuarial accrued liability over a reasonable time period and provide stability in the employer contribution rates so employers are better able to budget their pension cost in future years. For the Tier 1 funds, the Board certified contribution rate is equal to the greater of: (1) the prior year Board certified contribution rate, and (2) an actuarially determined contribution rate based on a 20-year funding period. The contribution rates for a majority of the funds have been relatively stable since the fiscal year ending in 2015. The greater the margin, or difference between the prior year's Board certified rate and the actuarially determined contribution rate, the greater ability for the fund to incur some adverse experience without requiring an increase in the Board certified contribution rate. However, providing stability in the contribution rates means that projecting the year the fund actually attains a 100% funded ratio becomes less certain. If actual experience is more favorable than assumed then the year the fund attains a 100% funded ratio will be earlier than projected, but the projected year the fund attains a 100% funded ratio will be later than projected if actual experience is less favorable than assumed.

The Tier 2 Retirement Systems (Hybrid and Defined Contribution) were created to provide retirement benefits to members who joined URS on an after July 1, 2011. A key feature of this plan design was to try to eliminate the contribution rate risk for employers with respect to the benefits provided to Tier 2 members. Specifically, the employer contribution rate is set at 10% of pay for the Tier 2 Public Employee Systems and 14% of pay (beginning July 1, 2020) for the Tier 2 Public Safety and Firefighter Systems, (ignoring the amortization cost to finance the unfunded actuarial accrued liability in the Tier 1 System). Since the employer contribution rate is a fixed rate, the benefits provided to Tier 2 members are less certain, as are the member contribution requirements in the Tier 2 Hybrid Systems.

Plan Maturity Measures

Risks faced by a pension plan evolve over time. A relatively new plan with virtually no assets and paying few benefits will experience lower investment risk than a mature plan with a significant amount of assets and large number of members receiving benefits. There are a few measures that can assist stakeholders in understanding and comparing the maturity of a plan to other systems, which include:

- Ratio of market value of assets to payroll: The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. If assets are approximately the same as covered payroll, an investment return that is 5% different than assumed would equal 5% of payroll. In another example, if the assets are approximately twice as large as covered payroll, an investment return that is 5% different than assumed would equal 10% of payroll. A ratio that increases over time generally indicates the potential of an increasing volatility in employer contribution rates as a percentage of payroll. For the Tier 1 Systems this measure includes the Tier 2 payroll on which the Tier 1 funds receive amortization contributions to finance the unfunded actuarial accrued liability.

- Ratio of actuarial accrued liability to payroll: The ratio of actuarial accrued liability to payroll can be used as a measure to indicate the potential volatility of contributions due to volatility in the liability experience. For instance, if the actuarial accrued liability is 5 times the size of the covered payroll, then a change in the liability that is 2% different than expected would be a change in magnitude that is 10% of payroll. A ratio that increases over time generally indicates the potential of an increasing volatility in employer contribution rates as a percentage of payroll. Generally, this ratio will be greater for the public safety and firefighter funds than the public employee funds because the benefits provided to public safety members and firefighters are more generous compared to those provided to public employees. For the Tier 1 Systems this measure includes the Tier 2 payroll on which the Tier 1 funds receive amortization contributions.
- Ratio of active to retired members: A relatively new plan will have a high ratio of active to retired members. A relatively mature open plan is likely to have close to the same number of actives to retirees resulting in a ratio that is around 1.0. On the other hand, a super-mature plan, or a plan that is closed to new entrants will have more retirees than active members resulting in a ratio below 1.0. As you will see on the table below, most of the Tier 1 funds have ratios at or below 1. As this ratio declines, a larger portion of the liability in the system is attributable to retirees (versus actives). This metric also typically moves in tandem with the liability to payroll metric, which provides an indication of potential contribution volatility. Finally, a low ratio active to retiree ratio can be an indicator of the relative cost impact for COLA type benefit changes (improvements or reductions).
- Ratio of net cash flow to market value of assets: A negative net cash flow means that benefit payments exceed contributions and the plan is depending on investment earnings and possibly existing funds to make payments to retirees. A certain amount of negative net cash flow is expected to occur when benefits are prefunded and the plan has matured. A large negative net cash flow as a percent of assets may be an indication of the need for additional contributions for a plan with a low funded ratio.

The following exhibit provides a comparison of these measures for each fund maintained by URS. Only the Tier II Hybrid and Defined Contribution Retirement Systems are open to new members. Both are considered relatively new funds. On the other hand, the Tier I Public Employee and Tier I Public Safety and Firefighter Systems are mature funds that are closed to new members. As a result, the maturity measures for these type funds will be very different.

Certain Risk and Maturity Measures by Fund

Fund/Division (1)	MVA / Payroll ¹ (2)	AAL / Payroll ¹ (3)	Active / Retiree	Net Cash
			Member Ratio (4)	Flow / MVA (5)
I. Tier I Public Employees				
A. Local Government	4.3	5.0	1.1	-1.2%
B. State and School	5.5	6.5	0.9	-2.5%
C. Higher Education	5.6	6.6	1.0	-1.5%
II. Tier I Public Safety				
A. State	8.1	9.8	0.8	-1.5%
B. Other Division A (2.5% COLA)	7.3	8.6	1.0	-1.0%
C. Other Division A (4% COLA)	7.7	9.2	1.0	-0.8%
D. Salt Lake City	8.0	10.9	0.7	-1.7%
E. Ogden	9.1	12.4	0.4	-2.9%
F. Provo	8.1	10.5	0.7	-1.9%
G. Logan	9.2	11.3	0.7	-1.9%
H. Bountiful	9.0	12.4	0.5	-3.0%
I. Other Division B (2.5% COLA)	5.8	7.1	1.5	0.2%
J. Other Division B (4% COLA)	8.7	9.5	0.7	-1.1%
III. Tier I Firefighters				
A. Division A	4.7	5.0	2.1	0.3%
B. Division B	9.8	10.2	0.9	-2.4%
IV. Judges	10.0	12.8	0.7	-3.3%
V. Governors and Legislative	16.5	20.6	0.2	-5.6%
VI. 3% Substantial Substitute	0.1	0.1	N/A	-7.3%
VII. Tier II - Hybrid Plans				
A. Public Employees	0.3	0.4	473.3	22.8%
B. Public Safety and Firefighter	0.4	0.4	N/A	26.4%
VIII. Grand Total	3.9	4.6	1.4	-1.7%

¹ Payroll for the Tier 1 funds is based on contributing payroll, which includes Tier II pay which provides amortization payments the Tier I funds to finance the unfunded actuarial accrued liability.

APPENDIX 1

APPENDIX 1

Statement of Actuarial Assumptions and Methods

1. *Investment return rate:*

6.95% per annum, compounded annually, composed of a 2.50% inflation rate and a 4.45% net real rate of return.

2. *Active member mortality rates:*

The base table used for active members is the RP-2014 Employees Mortality Table with White Collar Adjustment. Multipliers were applied to the base active member mortality rates by occupation and were developed based on plan experience. For the Public Safety and Firefighters Systems, 25% of deaths are assumed to be service related. Rates at selected ages are shown:

Active Male Members		
Age	Public Educators	All Public Employees Except Educators
20	0.000228	0.000285
25	0.000271	0.000339
30	0.000254	0.000317
35	0.000294	0.000367
40	0.000352	0.000440
45	0.000546	0.000682
50	0.000946	0.001182
55	0.001564	0.001955
60	0.002630	0.003288
65	0.004644	0.005805
70	0.008223	0.010279

Active Female Members			
Age	Public Educators	Public Safety and Firefighters	All Other Public Employees
20	0.000069	0.000137	0.000110
25	0.000073	0.000146	0.000117
30	0.000092	0.000184	0.000147
35	0.000121	0.000241	0.000193
40	0.000167	0.000334	0.000267
45	0.000277	0.000554	0.000443
50	0.000465	0.000930	0.000744
55	0.000706	0.001412	0.001130
60	0.001030	0.002060	0.001648
65	0.001560	0.003119	0.002495
70	0.002717	0.005433	0.004346

APPENDIX 1 (Continued)

3. Disability rates:

Disability rates are a function of the member's sex, occupation, and age. These rates were developed based on plan experience. Rates are applied at all ages. For the Firefighters Systems, 25% of disabilities are assumed to be service related. Rates at selected ages are shown:

Active Male Members					
Age	Local Government	Public Employees	Public Educators	Public Safety	Firefighters
20	0.000200	0.000200	0.000090	0.000240	0.000420
25	0.000300	0.000300	0.000135	0.000360	0.000630
30	0.000600	0.000600	0.000270	0.000720	0.001260
35	0.000900	0.000900	0.000405	0.001080	0.001890
40	0.001200	0.001200	0.000540	0.001440	0.002520
45	0.002000	0.002000	0.000900	0.002400	0.004200
50	0.002600	0.002600	0.001170	0.003120	0.005460
55	0.004100	0.004100	0.001845	0.004920	0.008610
60	0.005600	0.005600	0.002520	0.006720	0.011760

Active Female Members					
Age	Local Government	Public Employees	Public Educators	Public Safety	Firefighters
20	0.000170	0.000170	0.000120	0.000240	0.000420
25	0.000255	0.000255	0.000180	0.000360	0.000630
30	0.000510	0.000510	0.000360	0.000720	0.001260
35	0.000765	0.000765	0.000540	0.001080	0.001890
40	0.001020	0.001020	0.000720	0.001440	0.002520
45	0.001700	0.001700	0.001200	0.002400	0.004200
50	0.002210	0.002210	0.001560	0.003120	0.005460
55	0.003485	0.003485	0.002460	0.004920	0.008610
60	0.004760	0.004760	0.003360	0.006720	0.011760

APPENDIX 1 (Continued)

4. *Termination rates (for causes other than death, disability or retirement):*

Termination rates are a function of the member's sex, occupation, and service. These rates were developed based on plan experience. Termination rates are not applied after a member becomes eligible for a reduced or unreduced retirement benefit.

Active Male Members					
Years of Service					
Service	Local Government	Public Employees	Public Educators	Public Safety	Firefighters
0	0.1700	0.2500	0.1400	0.1200	0.0600
1	0.1300	0.2000	0.1100	0.0650	0.0500
2	0.0900	0.1400	0.0800	0.0550	0.0400
3	0.0800	0.1000	0.0700	0.0525	0.0350
4	0.0750	0.1000	0.0650	0.0500	0.0300
5	0.0700	0.1000	0.0600	0.0450	0.0250
6	0.0650	0.0900	0.0550	0.0425	0.0225
7	0.0600	0.0750	0.0400	0.0400	0.0200
8	0.0550	0.0600	0.0350	0.0350	0.0175
9	0.0475	0.0550	0.0300	0.0325	0.0150
10	0.0450	0.0500	0.0275	0.0300	0.0150
11	0.0400	0.0450	0.0250	0.0275	0.0150
12	0.0350	0.0400	0.0250	0.0250	0.0050
13	0.0300	0.0375	0.0225	0.0225	0.0050
14	0.0300	0.0350	0.0200	0.0150	0.0050
15	0.0275	0.0300	0.0200	0.0150	0.0050
16	0.0275	0.0275	0.0175	0.0150	0.0050
17	0.0275	0.0250	0.0175	0.0150	0.0050
18	0.0250	0.0200	0.0175	0.0150	0.0050
19	0.0250	0.0200	0.0150	0.0150	0.0050
20	0.0200	0.0200	0.0100	0.0100	0.0050
21	0.0200	0.0200	0.0100	0.0100	0.0050
22	0.0175	0.0200	0.0100	0.0100	0.0050
23	0.0150	0.0150	0.0100	0.0100	0.0050
24	0.0125	0.0150	0.0100	0.0100	0.0050
25+	0.0100	0.0100	0.0100	0.0100	0.0050

APPENDIX 1 (Continued)

4. *Termination rates (continued):*

Active Female Members					
Years of Service					
Service	Local Government	Public Employees	Public Educators	Public Safety	Firefighters
0	0.2200	0.2800	0.1600	0.1200	0.0600
1	0.1800	0.2300	0.1500	0.0650	0.0500
2	0.1300	0.1700	0.1200	0.0550	0.0400
3	0.1100	0.1300	0.1000	0.0525	0.0350
4	0.1050	0.1250	0.0900	0.0500	0.0300
5	0.1000	0.1100	0.0800	0.0450	0.0250
6	0.0950	0.1000	0.0750	0.0425	0.0225
7	0.0900	0.0750	0.0600	0.0400	0.0200
8	0.0750	0.0650	0.0500	0.0350	0.0175
9	0.0700	0.0600	0.0450	0.0325	0.0150
10	0.0600	0.0550	0.0400	0.0300	0.0150
11	0.0550	0.0475	0.0350	0.0275	0.0150
12	0.0525	0.0450	0.0325	0.0250	0.0050
13	0.0500	0.0425	0.0300	0.0225	0.0050
14	0.0450	0.0375	0.0250	0.0150	0.0050
15	0.0400	0.0350	0.0225	0.0150	0.0050
16	0.0375	0.0300	0.0200	0.0150	0.0050
17	0.0350	0.0275	0.0175	0.0150	0.0050
18	0.0300	0.0275	0.0150	0.0150	0.0050
19	0.0300	0.0275	0.0125	0.0150	0.0050
20	0.0250	0.0275	0.0125	0.0100	0.0050
21	0.0250	0.0250	0.0125	0.0100	0.0050
22	0.0225	0.0225	0.0125	0.0100	0.0050
23	0.0200	0.0200	0.0125	0.0100	0.0050
24	0.0200	0.0200	0.0125	0.0100	0.0050
25+	0.0100	0.0100	0.0100	0.0100	0.0050

APPENDIX 1 (Continued)

5. *Refund rates:*

Refund rates are the percentage of vested members electing to receive a refund of contributions upon termination of employment. This rate is only applied to members of the contributory systems; vested members in the noncontributory systems are assumed to defer their benefits until retirement, even if they have a contribution account from service prior to the establishment of the noncontributory system. The rate is a function of the member's sex, occupation and service. These rates are based on plan experience.

Males				
Service	Local Government	Public Employees	Public Educators	Public Safety & Firefighters ¹
0-3	100%	100%	100%	100%
4	75%	86%	75%	76%
5	73%	83%	73%	74%
6	70%	80%	70%	71%
7	67%	78%	66%	69%
8	65%	77%	61%	67%
9	62%	75%	57%	65%
10	61%	73%	54%	57%
11	59%	70%	50%	50%
12	58%	68%	47%	42%
13	55%	66%	42%	40%
14	52%	65%	38%	37%
15	49%	63%	33%	35%
16	48%	61%	28%	33%
17	46%	60%	22%	31%
18	45%	58%	17%	29%
19	23%	29%	09%	15%
20 or more	0%	0%	0%	0%

¹Male and female members combined.

APPENDIX 1 (Continued)

5. *Refund rates (continued):*

Females			
Service	Local Government	Public Employees	Public Educators
0-3	100%	100%	100%
4	77%	80%	65%
5	75%	79%	64%
6	72%	77%	62%
7	69%	74%	61%
8	67%	71%	59%
9	64%	68%	58%
10	61%	64%	53%
11	57%	60%	48%
12	54%	56%	43%
13	49%	55%	39%
14	45%	53%	36%
15	40%	52%	32%
16	35%	49%	27%
17	30%	46%	21%
18	25%	43%	16%
19	13%	22%	08%
20 or more	0%	0%	0%

APPENDIX 1 (Continued)

6. *Retirement rates:*

Retirement rates are a function of the member's age, sex and occupation (and service in the case of Firefighters, Public Safety and Judges). Rates are based on plan experience. Rates are applied only at ages at which the member is eligible for a reduced or unreduced retirement benefit. Members are assumed to retire no later than age 75 (age 70 for the public safety, firefighter and judges systems). Sample rates are shown below.

Tier I - Local Government				
Age	Male		Female	
	Reduced	Unreduced	Reduced	Unreduced
50	0.025	0.150	0.040	0.200
51	0.025	0.150	0.040	0.200
52	0.025	0.150	0.040	0.200
53	0.025	0.150	0.040	0.200
54	0.025	0.150	0.040	0.200
55	0.030	0.150	0.040	0.250
56	0.030	0.150	0.040	0.250
57	0.030	0.150	0.040	0.250
58	0.050	0.150	0.060	0.250
59	0.050	0.150	0.060	0.250
60	0.050	0.200	0.100	0.300
61	0.050	0.200	0.130	0.300
62	0.110	0.230	0.130	0.300
63	0.110	0.230	0.130	0.300
64	0.110	0.230	0.130	0.300
65	N/A	0.230	N/A	0.250
66	N/A	0.300	N/A	0.250
67	N/A	0.220	N/A	0.250
68	N/A	0.220	N/A	0.250
69	N/A	0.220	N/A	0.250
70	N/A	0.220	N/A	0.200
71	N/A	0.180	N/A	0.150
72	N/A	0.180	N/A	0.150
73	N/A	0.180	N/A	0.150
74	N/A	0.180	N/A	0.150
75+	N/A	1.000	N/A	1.000

APPENDIX 1 (Continued)

6. Retirement rates (continued):

Tier II - Local Government				
Age	Male		Female	
	Reduced	Unreduced ¹	Reduced	Unreduced ¹
50	N/A	0.150	N/A	0.200
51	N/A	0.150	N/A	0.200
52	N/A	0.150	N/A	0.200
53	N/A	0.150	N/A	0.200
54	N/A	0.150	N/A	0.200
55	N/A	0.150	N/A	0.250
56	N/A	0.150	N/A	0.250
57	N/A	0.150	N/A	0.250
58	N/A	0.150	N/A	0.250
59	N/A	0.150	N/A	0.250
60	0.020	0.200	0.020	0.300
61	0.040	0.200	0.040	0.300
62	0.060	0.230	0.060	0.300
63	0.080	0.230	0.080	0.300
64	0.100	0.230	0.100	0.300
65	N/A	0.230	N/A	0.250
66	N/A	0.300	N/A	0.250
67	N/A	0.220	N/A	0.250
68	N/A	0.220	N/A	0.250
69	N/A	0.220	N/A	0.250
70	N/A	0.220	N/A	0.200
71	N/A	0.180	N/A	0.150
72	N/A	0.180	N/A	0.150
73	N/A	0.180	N/A	0.150
74	N/A	0.180	N/A	0.150
75+	N/A	1.000	N/A	1.000

¹ The retirement rate is increased by 30% (i.e. adding 30%) at the age the member is first eligible for an unreduced retirement benefit prior to the age of 65.

APPENDIX 1 (Continued)

6. *Retirement rates (continued):*

Tier I - Public Employees				
Age	Male		Female	
	Reduced	Unreduced	Reduced	Unreduced
50	0.023	0.150	0.025	0.170
51	0.023	0.150	0.025	0.160
52	0.025	0.150	0.025	0.160
53	0.025	0.150	0.025	0.160
54	0.025	0.150	0.025	0.160
55	0.025	0.160	0.040	0.160
56	0.040	0.160	0.040	0.160
57	0.040	0.160	0.040	0.160
58	0.040	0.160	0.040	0.200
59	0.050	0.160	0.040	0.200
60	0.075	0.200	0.100	0.250
61	0.075	0.200	0.100	0.250
62	0.130	0.300	0.160	0.330
63	0.130	0.300	0.160	0.330
64	0.130	0.300	0.160	0.330
65	N/A	0.220	N/A	0.280
66	N/A	0.220	N/A	0.280
67	N/A	0.220	N/A	0.280
68	N/A	0.220	N/A	0.220
69	N/A	0.220	N/A	0.220
70	N/A	0.220	N/A	0.220
71	N/A	0.220	N/A	0.220
72	N/A	0.220	N/A	0.220
73	N/A	0.220	N/A	0.220
74	N/A	0.220	N/A	0.220
75+	N/A	1.000	N/A	1.000

APPENDIX 1 (Continued)

6. Retirement rates (continued):

Tier II - Public Employees				
Age	Male		Female	
	Reduced	Unreduced ¹	Reduced	Unreduced ¹
50	N/A	0.150	N/A	0.170
51	N/A	0.150	N/A	0.160
52	N/A	0.150	N/A	0.160
53	N/A	0.150	N/A	0.160
54	N/A	0.150	N/A	0.160
55	N/A	0.160	N/A	0.160
56	N/A	0.160	N/A	0.160
57	N/A	0.160	N/A	0.160
58	N/A	0.160	N/A	0.200
59	N/A	0.160	N/A	0.200
60	0.020	0.200	0.020	0.300
61	0.040	0.200	0.040	0.300
62	0.060	0.330	0.060	0.300
63	0.080	0.330	0.080	0.300
64	0.100	0.300	0.100	0.300
65	N/A	0.220	N/A	0.260
66	N/A	0.220	N/A	0.260
67	N/A	0.220	N/A	0.220
68	N/A	0.220	N/A	0.220
69	N/A	0.220	N/A	0.220
70	N/A	0.220	N/A	0.220
71	N/A	0.220	N/A	0.220
72	N/A	0.220	N/A	0.220
73	N/A	0.220	N/A	0.220
74	N/A	0.220	N/A	0.220
75+	N/A	1.000	N/A	1.000

¹ The retirement rate is increased by 30% (i.e. adding 30%) at the age the member is first eligible for an unreduced retirement benefit due to attaining 35 years of service prior to the age of 65.

APPENDIX 1 (Continued)

6. *Retirement rates (continued):*

Tier I - Public Educators				
Age	Male		Female	
	Reduced	Unreduced	Reduced	Unreduced
50	0.020	0.200	0.020	0.300
51	0.020	0.200	0.020	0.300
52	0.020	0.200	0.030	0.300
53	0.025	0.200	0.030	0.140
54	0.025	0.150	0.030	0.140
55	0.028	0.150	0.040	0.140
56	0.028	0.150	0.040	0.180
57	0.035	0.150	0.070	0.180
58	0.035	0.150	0.070	0.180
59	0.035	0.150	0.070	0.180
60	0.100	0.230	0.110	0.300
61	0.100	0.230	0.110	0.300
62	0.130	0.330	0.180	0.350
63	0.130	0.330	0.180	0.350
64	0.130	0.330	0.180	0.350
65	N/A	0.330	N/A	0.350
66	N/A	0.330	N/A	0.350
67	N/A	0.300	N/A	0.350
68	N/A	0.300	N/A	0.230
69	N/A	0.250	N/A	0.230
70	N/A	0.200	N/A	0.230
71	N/A	0.200	N/A	0.230
72	N/A	0.200	N/A	0.230
73	N/A	0.200	N/A	0.230
74	N/A	0.200	N/A	0.230
75+	N/A	1.000	N/A	1.000

APPENDIX 1 (Continued)

6. *Retirement rates (continued):*

Tier II - Public Educators				
Age	Male		Female	
	Reduced	Unreduced¹	Reduced	Unreduced¹
50	N/A	0.200	N/A	0.300
51	N/A	0.200	N/A	0.300
52	N/A	0.200	N/A	0.300
53	N/A	0.200	N/A	0.140
54	N/A	0.120	N/A	0.140
55	N/A	0.120	N/A	0.140
56	N/A	0.120	N/A	0.180
57	N/A	0.120	N/A	0.180
58	N/A	0.120	N/A	0.180
59	N/A	0.120	N/A	0.180
60	0.020	0.230	0.020	0.300
61	0.040	0.230	0.040	0.300
62	0.060	0.300	0.060	0.350
63	0.080	0.300	0.080	0.350
64	0.100	0.300	0.100	0.300
65	N/A	0.300	N/A	0.300
66	N/A	0.300	N/A	0.300
67	N/A	0.300	N/A	0.300
68	N/A	0.300	N/A	0.230
69	N/A	0.250	N/A	0.230
70	N/A	0.200	N/A	0.230
71	N/A	0.200	N/A	0.230
72	N/A	0.200	N/A	0.230
73	N/A	0.200	N/A	0.230
74	N/A	0.200	N/A	0.230
75+	N/A	1.000	N/A	1.000

¹ The retirement rate is increased by 30% (i.e. adding 30%) at the age the member is first eligible for an unreduced retirement benefit due to attaining 35 years of service prior to the age of 65.

APPENDIX 1 (Continued)

6. *Retirement rates (continued):*

Tier I - Public Safety (Unisex)				Tier I - Firefighters (Unisex)	
Age	Years of Service			Years of Service	
	0 – 19	20 – 29	30+	0 – 29	30+
40-44	N/A	0.150	0.150	0.100	N/A
45	N/A	0.150	0.150	0.100	0.150
46	N/A	0.150	0.150	0.100	0.150
47	N/A	0.150	0.150	0.050	0.150
48	N/A	0.150	0.150	0.050	0.150
49	N/A	0.150	0.150	0.050	0.150
50	N/A	0.150	0.150	0.050	0.150
51	N/A	0.150	0.150	0.050	0.150
52	N/A	0.150	0.150	0.050	0.150
53	N/A	0.150	0.150	0.100	0.150
54	N/A	0.150	0.150	0.100	0.150
55	N/A	0.150	0.150	0.100	0.150
56	N/A	0.150	0.150	0.100	0.150
57	N/A	0.150	0.150	0.100	0.150
58	N/A	0.150	0.150	0.100	0.200
59	N/A	0.150	0.200	0.100	0.200
60	0.120	0.200	0.200	0.100	0.200
61	0.120	0.200	0.200	0.100	0.200
62	0.120	0.300	0.350	0.250	0.250
63	0.120	0.300	0.350	0.250	0.250
64	0.120	0.300	0.350	0.250	0.250
65	0.250	0.300	0.350	0.500	0.500
66	0.250	0.300	0.500	0.500	0.500
67	0.250	0.300	0.500	0.500	0.500
68	0.250	0.300	0.500	0.500	0.500
69	0.250	0.300	0.500	0.500	0.500
70+	1.000	1.000	1.000	1.000	1.000

APPENDIX 1 (Continued)

6. *Retirement rates (continued):*

Tier II - Public Safety (Unisex)				Tier II - Firefighters (Unisex)	
Age	Years of Service			Years of Service	
	0 – 19 ¹	20 - 29 ¹	30+	0 - 29 ¹	30+
40-44	N/A	0.150	N/A	0.100	N/A
45	N/A	0.150	0.150	0.100	0.150
46	N/A	0.150	0.150	0.100	0.150
47	N/A	0.150	0.150	0.050	0.150
48	N/A	0.150	0.150	0.050	0.150
49	N/A	0.150	0.150	0.050	0.150
50	N/A	0.150	0.150	0.050	0.150
51	N/A	0.150	0.150	0.050	0.150
52	N/A	0.150	0.150	0.050	0.150
53	N/A	0.150	0.150	0.100	0.150
54	N/A	0.150	0.150	0.100	0.150
55	N/A	0.150	0.150	0.100	0.150
56	N/A	0.150	0.150	0.100	0.150
57	N/A	0.150	0.150	0.100	0.150
58	N/A	0.150	0.150	0.100	0.200
59	N/A	0.150	0.200	0.100	0.200
60	N/A	0.200	0.200	0.100	0.200
61	N/A	0.200	0.200	0.100	0.200
62	0.120	0.300	0.350	0.250	0.250
63	0.120	0.300	0.350	0.250	0.250
64	0.120	0.300	0.350	0.250	0.250
65	0.250	0.300	0.350	0.500	0.500
66	0.250	0.300	0.500	0.500	0.500
67	0.250	0.300	0.500	0.500	0.500
68	0.250	0.300	0.500	0.500	0.500
69	0.250	0.300	0.500	0.500	0.500
70+	1.000	1.000	1.000	1.000	1.000

¹ There is a 10% increase (i.e. plus 10%) to the retirement rate upon first eligibility (if under age 65) for an unreduced retirement benefit. Retirement rates for reduced retirements are 50% of the rates shown in the table above.

APPENDIX 1 (Continued)

6. *Retirement rates (continued):*

Judges - Males and Females			
Age	Years of Service		
	0 - 24	25 - 29	30+
45	N/A	0.100	0.100
46	N/A	0.100	0.100
47	N/A	0.100	0.100
48	N/A	0.100	0.100
49	N/A	0.100	0.100
50	N/A	0.100	0.100
51	N/A	0.100	0.100
52	N/A	0.100	0.100
53	N/A	0.100	0.100
54	N/A	0.100	0.100
55	N/A	0.100	0.100
56	N/A	0.100	0.100
57	N/A	0.100	0.100
58	N/A	0.100	0.100
59	N/A	0.100	0.100
60	N/A	0.100	0.100
61	N/A	0.100	0.100
62	0.200	0.100	0.100
63	0.200	0.100	0.100
64	0.200	0.150	0.150
65	0.200	0.150	0.150
66	0.200	0.200	0.200
67	0.200	0.200	0.200
68	0.200	0.200	0.200
69	0.200	0.200	0.200
70	1.000	1.000	1.000

APPENDIX 1 (Continued)

7. *Salary increase rates:*

Salaries for individual members are assumed to increase each year, as a function of the member's occupation and service. Rates are composed of a 2.50% inflation rate, a 0.75% general increase rate that applies to all, and a variable promotional/longevity component that is a function of the member's service.

Active Male and Female Members - Local Government		
Years of Service	Annual Promotional/Longevity Rates of Increase	Total Annual Rate of Increase Including 3.25% Wage Inflation
0	5.50%	8.75%
1	4.00	7.25
2	3.25	6.50
3	2.75	6.00
4	2.25	5.50
5	2.00	5.25
6	1.75	5.00
7	1.50	4.75
8	1.25	4.50
9	1.25	4.50
10	1.00	4.25
11	0.75	4.00
12	0.75	4.00
13	0.75	4.00
14	0.75	4.00
15	0.75	4.00
16	0.50	3.75
17	0.50	3.75
18	0.50	3.75
19	0.50	3.75
20	0.25	3.50
21	0.25	3.50
22	0.25	3.50
23	0.00	3.25
24	0.00	3.25
25+	0.00	3.25

APPENDIX 1 (Continued)

7. *Salary increase rates (continued):*

Active Male and Female Members - Public Employees		
Years of Service	Annual Promotional/Longevity Rates of Increase	Total Annual Rate of Increase Including 3.25% Wage Inflation
0	5.25%	8.50%
1	4.50	7.75
2	3.50	6.75
3	2.75	6.00
4	2.50	5.75
5	2.00	5.25
6	1.75	5.00
7	1.50	4.75
8	1.50	4.75
9	1.25	4.50
10	1.25	4.50
11	1.00	4.25
12	1.00	4.25
13	1.00	4.25
14	0.75	4.00
15	0.50	3.75
16	0.50	3.75
17	0.50	3.75
18	0.50	3.75
19	0.50	3.75
20	0.25	3.50
21	0.25	3.50
22	0.25	3.50
23	0.25	3.50
24	0.00	3.25
25+	0.00	3.25

APPENDIX 1 (Continued)

7. *Salary increase rates (continued):*

Active Male and Female Members Public Educators		
Years of Service	Annual Promotional/Longevity Rates of Increase	Total Annual Rate of Increase Including 3.25% Wage Inflation
0	6.50%	9.75%
1	5.75	9.00
2	4.75	8.00
3	4.25	7.50
4	4.00	7.25
5	3.75	7.00
6	3.75	7.00
7	3.50	6.75
8	3.50	6.75
9	3.25	6.50
10	2.75	6.00
11	2.25	5.50
12	2.00	5.25
13	1.50	4.75
14	1.25	4.50
15	1.00	4.25
16	0.75	4.00
17	0.50	3.75
18	0.50	3.75
19	0.50	3.75
20	0.50	3.75
21	0.50	3.75
22	0.50	3.75
23	0.50	3.75
24	0.25	3.50
25+	0.00	3.25

APPENDIX 1 (Continued)

7. *Salary increase rates (continued):*

Active Male and Female Members Public Safety		
Years of Service	Annual Promotional/Longevity Rates of Increase	Total Annual Rate of Increase Including 3.25% Wage Inflation
0	4.00%	7.25%
1	3.00	6.25
2	2.75	6.00
3	2.50	5.75
4	2.50	5.75
5	2.50	5.75
6	2.50	5.75
7	2.25	5.50
8	2.00	5.25
9	2.00	5.25
10	1.75	5.00
11	1.50	4.75
12	1.25	4.50
13	1.25	4.50
14	1.00	4.25
15	1.00	4.25
16	1.00	4.25
17	0.75	4.00
18	0.75	4.00
19	0.75	4.00
20	0.75	4.00
21	0.50	3.75
22	0.50	3.75
23	0.25	3.50
24	0.25	3.50
25+	0.00	3.25

APPENDIX 1 (Continued)

7. *Salary increase rates (continued):*

Active Male and Female Members Firefighters		
Years of Service	Annual Promotional/Longevity Rates of Increase	Total Annual Rate of Increase Including 3.25% Wage Inflation
0	5.50%	8.75%
1	5.00	8.25
2	4.75	8.00
3	4.50	7.75
4	4.25	7.50
5	4.00	7.25
6	4.00	7.25
7	3.50	6.75
8	3.25	6.50
9	3.00	6.25
10	2.50	5.75
11	1.75	5.00
12	1.75	5.00
13	1.25	4.50
14	1.25	4.50
15	1.25	4.50
16	1.25	4.50
17	1.00	4.25
18	0.75	4.00
19	0.75	4.00
20	0.75	4.00
21	0.50	3.75
22	0.25	3.50
23	0.25	3.50
24	0.25	3.50
25+	0.00	3.25

APPENDIX 1 (Continued)

8. *Annuitant mortality rates (nondisabled retirees):*

All non-educator groups except judges:

Male retirees: 110% of 2017 PR UTAH Retiree Mortality Table for males, projected with Scale AA from 2017.

Female retirees: 110% of 2017 PR UTAH Retiree Mortality Table for females, projected with Scale AA from 2017.

Educators and judges:

Male retirees: 90% of 2017 PR UTAH Retiree Mortality Table for males, projected with Scale AA from 2017.

Female retirees: 90% of 2017 PR UTAH Retiree Mortality Table for females, projected with Scale AA from 2017.

Mortality Rates in Base Tables before Projection (Multipliers Applied)				
Age	Non-educators except judges		Educators and judges	
	Males	Females	Males	Females
50	0.001757	0.001152	0.001437	0.000942
55	0.002578	0.001657	0.002110	0.001355
60	0.004168	0.002918	0.003410	0.002388
65	0.007647	0.005546	0.006257	0.004538
70	0.013862	0.010542	0.011342	0.008626
75	0.025332	0.019797	0.020726	0.016197
80	0.046859	0.037778	0.038339	0.030910
85	0.086326	0.072093	0.070630	0.058985
90	0.159026	0.138685	0.130112	0.113469

The following table provides the life expectancy for individuals retiring in future years based on the assumption with full generational projection:

Life Expectancy for an Age 65 Retiree in Years					
Group	Year of Retirement				
	2020	2025	2030	2035	2040
Noneducators - Male	21.0	21.3	21.6	22.0	22.3
Noneducators - Female	22.1	22.3	22.5	22.6	22.8
Educators/Judges - Male	22.4	22.8	23.1	23.4	23.7
Educators/Judges - Female	23.5	23.7	23.9	24.1	24.2

APPENDIX 1 (Continued)

9. *Disabled annuitant mortality rates:*

Males: 110% of the RP-2014 for Disabled Males with a base year of 2006, projected with Scale AA from 2006.

Females: 120% of the RP-2014 for Disabled Females with a base year of 2006, projected with Scale AA from 2006.

Disabled Mortality Rates in Base Table before Projections (Multipliers Applied)		
Age	Males	Females
20	0.000669	0.000302
25	0.002522	0.001150
30	0.005596	0.002624
35	0.010072	0.005334
40	0.016701	0.009401
45	0.022935	0.012733
50	0.026335	0.014926
55	0.027353	0.018016
60	0.030922	0.023351
65	0.039943	0.030359
70	0.053693	0.041104
75	0.073711	0.058944
80	0.103687	0.087108
85	0.150812	0.130198
90	0.225018	0.190367

The following table provides the life expectancy for individuals retiring in future years based on the assumption with full generational projection:

Life Expectancy for an Age 65 Retiree in Years					
Gender	Year of Retirement				
	2020	2025	2030	2035	2040
Males	14.7	15.2	15.7	16.1	16.6
Females	15.5	15.8	16.0	16.3	16.5

APPENDIX 1 (Continued)

10. *Actuarial cost method:*

The Entry Age Normal actuarial cost method is used. This method is designed to produce a relatively level funding pattern when expressed as a percent of pay.

First, the actuarial present value of all future expected benefits is determined for each member, including retired members, beneficiaries, inactive members and active members. This takes into account both the probability that a benefit will be paid at a given age and the time value of money. The sum of these amounts--the Present Value of Future Benefits (PVFB)--is then determined.

Next, the Entry Age Normal actuarial cost method is used to allocate the PVFB between the current year (the normal cost), prior years (the Actuarial Accrued Liability), and future years (future normal costs). The current and future normal costs are determined as a level percentage of pay, except that for the Legislators and Governors plan, which is not pay related, normal costs are determined as a level dollar amount.

A portion of the normal cost may be paid by employee contributions in which case the balance becomes the normal cost portion of the employer contribution rate.

The difference between the Actuarial Accrued Liability (the portion of the total actuarial present value of future benefits allocated to prior years) and the Actuarial Value of Assets is called the Unfunded Actuarial Accrued Liability (UAAL). This is funded over 20 years from the valuation date (except for the Higher Education Risk pool and the Legislators and Governors plan). The development of the amortization cost for the Tier 2 Public Safety and Firefighter Hybrid System includes the projected increase in cost due to an 18 month delay in the effective date of the contribution rate determined by this actuarial valuation.

The total employer cost rate is the sum of (i) the normal cost rate, net of employee contributions if applicable, and (ii) the level percent-of-pay amortization of the UAAL. For the Judges' System and the Firefighters' System, certain specified revenues (court fees and a tax on fire insurance premiums, respectively) are used as an offset to the employer contribution rate each year, as described elsewhere in this report.

All contribution rates are based upon monthly payments of contributions.

11. *Actuarial value of assets:*

The actuarial value of assets is equal to the market value, adjusted for a five-year phase in of actual investment return in excess of (or less than) expected investment return. The actual return is calculated net of investment and administrative expenses, and the expected investment return is equal to the assumed investment return rate multiplied by the prior year's market value of assets, adjusted for contributions, benefits paid, and refunds. The actuarial value of assets is further adjusted, if necessary, so that it is not less than 75% of market value and not more than 125% of market value.

APPENDIX 1 (Continued)

12. *Payroll growth rate:*

In determining the level percent of payroll amortization rate (except for the Higher Ed risk pools and the Governors and Legislative Pension Plan), payroll is assumed to grow annually at 3.00%. No allowance is made for future growth in the number of members. The payroll growth assumption is 0.00% for the Higher Ed risk pools and the Governors and Legislative Pension Plan.

13. *Marital status:*

All nonretired members are assumed to be married with no children. Female members are assumed to be three years younger than their spouses, while male members are assumed to be three years older than their spouses.

14. *Administrative and investment expenses:*

The assumed 6.95% investment return rate represents the anticipated net return after payment of all investment and administrative expenses.

15. *Judges System:*

For the Judges System, no disability or withdrawal rates were used. Salaries are assumed to increase at 3.25% per year.

16. *Governors and Legislative Pension Plan:*

A 10% withdrawal rate is assumed regardless of age or service. No disability rates are used. No salary increase rate is used because the benefits do not reflect pay. Members are assumed to retire at the earlier of (i) age 65 with four years of service, or (ii) age 62 with 10 years of service. Normal cost and actuarial accrued liability are based on Level Dollar Entry Age Cost Method (not Level Percent of Pay).

17. *Interest Credited on Member Contribution Account Balances:*

In projecting member contribution account balances, we assume that the rate credited is 6.95% each year. (The actual rate is set by the Board of Trustees annually, based on investment performance.) Interest is not credited to account balances for members of the Firefighters Retirement System.

18. *Mortality Improvement:*

For post-retirement mortality, both healthy and disabled, we assume continuous (generational) mortality improvement according to Scale AA from the base year of the table. Mortality improvement is ignored for the pre-retirement mortality assumption, since it would not have a material effect on the liabilities.

APPENDIX 1 (Continued)

19. *LTD Benefit Protection Contracts:*

It is assumed that all members of the Tier I Public Employee Retirement Systems are covered by an LTD Benefit Protection Contract. LTD benefit protection contract coverage for the Tier II Hybrid Retirement Systems (Public Employees and Public Safety and Firefighters) is being valued for those members who are employed by a participating employer that elected to provide coverage to their workforce.

20. *Cost-of-living increases:*

Retirement benefits for all systems with a maximum 4.00% COLA are assumed to increase at 2.50% even though the maximum allowable rate is 4.00%. Retirement benefits for the funds with a maximum 2.50% COLA—e.g., some of the Public Safety funds—are assumed to increase at the maximum allowable rate of 2.50%.

For current retirees who have received cumulative COLAs less than the total of annual CPI increases since retirement, we assume higher COLAs, subject to the annual maximum, as long as the member has “banked” CPI increases left.

APPENDIX 2

APPENDIX 2 - Public Employees

Summary of Benefit Provisions for Public Employee Retirement Systems (Contributory and Noncontributory)

1. *Effective Date:* Contributory System - July 1, 1961.
Noncontributory System - July 1, 1986.
2. *Plan Year:* Twelve-month period ending December 31st.
3. *Administration:* The Systems are administered by a Board of Trustees (which also administers the other Utah Retirement Systems). The Board of Trustees is responsible for both administration of the Systems and investment of the fund assets.
4. *Type of Plan:* These are qualified governmental defined benefit retirement plans. Under GASB 25, they are considered to be cost-sharing multiple-employer plans.
5. *Eligibility:* These Systems cover eligible employees of the State of Utah, most local government employees, and most public education employees. Generally all employees are covered, except for those covered by another System--public safety employees, firefighters, judges, legislators, and higher education employees covered under TIAA-CREF. Eligible employees become participants immediately when hired, and are required to participate. The employer-selected plan determines whether new employees participate in the Contributory or Noncontributory System. Employees who were members of the Contributory System at the time their employer selected the Noncontributory System had an option to remain in the Contributory System. These Systems are closed to members hired on and after July 1, 2011.
6. *Employee Contributions:* Members of the Contributory System contribute 6.00% of salary per year. Employers may "pick-up" employee contributions under Section 414(h) of the Internal Revenue Code. No contributions are made by members of the Noncontributory System.
7. *Employer Contributions:* The current contribution rates differ between the Contributory and Noncontributory Systems, and also differ depending on whether the member is employed by a local government (Level B) or the State of Utah or a public school (Level A). Rates are set by the Board of Trustees, based upon the actuarial valuation report for the preceding year. The Funds participating in these systems are:
 - Fund 11 - Local Government Contributory
 - Fund 12 - State and School Contributory
 - Fund 15 - Local Government Noncontributory
 - Fund 16 - State and School Noncontributory
 - Fund 17 - State and School Contributory (Certain Higher Education Entities)
 - Fund 18 - State and School Noncontributory (Certain Higher Education Entities)

APPENDIX 2 - Public Employees (Continued)

8. *Final Average Monthly Salary (FAMS)*: The monthly average of the member's highest salaries preceding retirement. For the Contributory System a five-year average is used, while a three-year average is used for the Noncontributory System.
9. *Service Retirement (Unreduced)*:
- a. Eligibility: A member may retire with an unreduced benefit at age 65 with four years of service or after 30 years of service if earlier.
 - b. Monthly Benefit (Contributory): 2.00% times Final Average Monthly Salary (FAMS) times years of service earned since July 1, 1975, plus 1.25% of FAMS times service earned prior to July 1, 1975.
 - c. Monthly Benefit (Noncontributory): 2.00% of Final Average Monthly Salary times years of service.
 - d. Payment Form: Life annuity.
10. *Service Retirement (Reduced)*:
- a. Eligibility: A member may retire with a reduced benefit upon attaining age 62 with 10 years of service or age 60 with 20 years of service. A member of the Noncontributory System may retire at any age after earning 25 years of service.
 - b. Reduction: 3% per year that retirement is earlier than age 65. For Noncontributory System members retiring prior to age 60, actuarial reduction is applied to the 85% factor at age 60. The early retirement reduction factors are shown below:

Age	Factor	Age	Factor
64	97.00%	54	49.58%
63	94.00%	53	45.47%
62	91.00%	52	41.73%
61	88.00%	51	38.34%
60	85.00%	50	35.24%
59	77.49%	49	32.42%
58	70.73%	48	29.84%
57	64.62%	47	27.49%
56	59.10%	46	25.33%
55	54.11%	45	23.36%

- c. Payment Form: Life annuity.

APPENDIX 2 - Public Employees (Continued)

11. *Disability Retirement:*

- a. Eligibility: Member must be eligible for retirement under the Disability Act and must not be eligible for a 30-year service retirement at time of disability.
- b. Monthly Benefits Payable Prior to Retirement: A separate fund established under the Disability Act provides benefits from the time of disability until the age specified in 49-21-403. Benefits from this separate fund are not covered by these Systems.
- c. Monthly Benefits Payable after Retirement: An unreduced service retirement benefit is payable. The member receives service credit for time while disabled (both for computing the benefit amount and for determining whether the member is eligible for an unreduced service retirement benefit). Final Average Monthly Salary is increased by the same factors used for automatic cost-of-living benefit increases. I.e., the FAMS is adjusted by a cost-of-living increase up to 4.0% per year (simple interest).
- d. Payment Form: Life annuity.
- e. Death while Disabled: A disabled member is treated as an active member for purposes of determining a death benefit for the period prior to retirement.

12. *Vesting and Refunds:*

- a. Eligibility: All members who are not vested are eligible for a refund when they terminate service. Members are vested after four years of service. Vested members may also elect to receive a refund in lieu of the deferred termination benefit described below. (Noncontributory System members hired after July 1, 1986, are ineligible for a refund.)
- b. Amount: The refund benefit is the accumulated value of the member's contributions plus interest credited by the fund. The amount of interest credited each year is set annually by the Board of Trustees.

13. *Deferred Termination Benefit:*

- a. Eligibility: Member must be vested (4 years of service) and must elect to leave his/her contributions on deposit.
- b. Monthly Benefit: Same as the unreduced or reduced service retirement benefit, based on service and FAMS at termination, and commencing once the member is eligible.
- c. Payment Form: Life annuity.
- d. Death Benefit: The beneficiary of an inactive member who dies is entitled to receive the benefit described in 14.2.a. and 2.b.

APPENDIX 2 - Public Employees (Continued)

14. *Death while an Active Member:*

a. Members will receive benefits 1. and 2. described below.

1. Death Benefit Insurance: A lump-sum payment that is equal to 75% of the member's highest annual salary.

2.a. In General: A refund of the member's accumulated contributions (with interest) is paid to the beneficiary of a deceased member.

2.b. Spousal Annuity: If the deceased member was married at the time of death and was either (i) eligible for reduced or unreduced service retirement, or (ii) had 25 years of service (15 years of service in the noncontributory system), the spouse may elect an annuity benefit in lieu of the refund benefit. The annuity is equal to the reduced or unreduced service retirement benefit payable as though Option 3 (a Joint and 100% Survivor annuity) were elected. If the member had 25 years of service or more, no reduction factor is applied in determining the service retirement benefit. If a member of the noncontributory system is not eligible for a retirement benefit and has less than 25 years of service, then the death benefit is equal to 1/3 of Option 3 benefit if the member has at least 15 and less than 20 years of service, and 2/3 of the Option 3 benefit if the member has at least 20 and less than 25 years of service.

15. *Optional Forms of Benefit*: The Systems permit members to elect from six forms of benefit at retirement. In each case the benefit amount is adjusted to be actuarially equivalent to the "Option 1" form. The six optional forms are:

Option 1 - A life annuity with no benefits due following the member's death.

Option 2 - Modified Cash Refund Annuity. A reduced annuity payable for the member's lifetime, plus a death benefit equal to the excess of the member's accumulated contributions (determined at retirement) over the sum of the member's annuity payments from retirement. (The annuity payments are that part of the original benefit derived from the member's own accumulated contributions.)

Option 3 - Joint and 100% Survivor Annuity. An annuity payable as long as either the member or his/her spouse is living.

Option 4 - Joint and 50% Survivor Annuity. An annuity payable during the member's lifetime, and after the member's death if the member's spouse is still living, an annuity to the spouse of 50% of the original benefit.

Option 5 - Joint and 100% Pop-up Annuity. Same as Option 3, except that the benefit amount reverts to the Option 1 (life annuity) amount if the member's spouse predeceases the member.

APPENDIX 2 - Public Employees (Continued)

Option 6 - Joint and 50% Pop-up Annuity. Same as Option 4, except that the benefit amount reverts to the Option 1 (life annuity) amount if the member's spouse predeceases the member.

16. *Postretirement Death Benefit:* None, except as elected by the member. See Optional Forms of Benefit above.
17. *Postretirement Benefit Increases:* Benefits are increased annually to take into account changes in the cost of living, with a maximum annual increase of 4% of the original benefit (i.e., a maximum 4% simple interest increase). In years in which the cost of living increases more than 4%, the excess increase is accumulated and used in later years in which the cost-of-living increase is less than 4%. This calculation is made separately for each individual. In addition, a closed group of retirees also receives a second special increase amount paid as a level annuity under whichever form of payment was elected. This is the Restoration of Purchasing Power (ROPP) payment.
18. *3% Substantial Substitute:* All members whose service began before January 1, 1989, receive an additional annual payment equal to 3% of their benefit. These payments are made to offset the taxability of the retirement benefits under the State income tax provisions. Prior to July 1, 1995, this benefit was funded by annual appropriations made by the State on a pay-as-you go basis. Beginning July 1, 1995, this benefit is funded on an actuarial basis by increasing the employer contribution rate for those Funds which are funded by the State.

APPENDIX 2 (Public Safety)

Summary of Benefit Provisions for Public Safety Retirement Systems (Contributory and Noncontributory)

1. *Effective Date:* Contributory System - July 1, 1969.
Noncontributory System - July 1, 1989.
2. *Plan Year:* Twelve-month period ending December 31st.
3. *Administration:* The Systems are administered by a Board of Trustees (which also administers the other Utah Retirement Systems). The Board of Trustees is responsible for both administration of the Systems and investment of the fund assets.
4. *Type of Plan:* These are qualified governmental defined benefit retirement plans. Under GASB 25, they are considered to be a combination of agent and cost-sharing multiple-employer plans.
5. *Eligibility:* These Systems cover eligible public safety employees of the State of Utah and some local governments. Eligible employees become participants immediately when hired, and are required to participate. The employer-selected plan determines whether new employees participate in the Contributory or Noncontributory System. Employees who were members of the Contributory System at the time their employer selected the Noncontributory System had an option to remain in the Contributory System. These Systems are closed to members hired on and after July 1, 2011.
6. *Employee Contributions:* Members of the Contributory System contribute a percentage of salary, as shown below. Employers may "pick-up" employee contributions under Section 414(h) of the Internal Revenue Code. No contributions are made by members of the Noncontributory System. Rates in the Contributory System vary by employer as follows:

Fund 22 - State of Utah	12.29%
Fund 23 - Other Division A (2.5% COLA)	12.29%
Fund 77 - Other Division A (4.0% COLA)	12.29%
Fund 27 - Logan	11.13%
Fund 29 - Other Division B (2.5% COLA)	10.50%
Fund 74 - Other Division B (4.0% COLA)	10.50%

APPENDIX 2 - Public Safety (Continued)

7. *Employer Contributions:* The current contribution rates differ between the Contributory and Noncontributory Systems, and also differ depending on which fund (employer or group of employers) the member belongs to. Rates are set by the Board of Trustees, based upon the actuarial valuation report for the preceding year. The Funds included in these Systems are:

Contributory System

Fund 22 - State of Utah (Div A)
Fund 23 - Other Division A (2.5% COLA)
Fund 77 - Other Division A (4.0% COLA)
Fund 27 - Logan (Div B)
Fund 29 - Other Division B (2.5% COLA)
Fund 74 - Other Division B (4.0% COLA)

Noncontributory System

Fund 42 - State of Utah (Div A)
Fund 43 - Other Division A (2.5% COLA)
Fund 75 - Other Division A (4.0% COLA)
Fund 44 - Salt Lake City (Div B)
Fund 45 - Ogden (Div B)
Fund 46 - Provo (Div B)
Fund 47 - Logan (Div B)
Fund 48 - Bountiful (Div A)
Fund 49 - Other Division B (2.5% COLA)
Fund 76 - Other Division B (4.0% COLA)

The division designation (A or B) distinguishes between those employers covered by Social Security (A) and those not covered (B). Some plan provisions differ depending on the member's division.

8. *Final Average Monthly Salary (FAMS):* The monthly average of the member's highest three salaries preceding retirement.
9. *Service Retirement:*
- Eligibility: A member may retire with an unreduced benefit at age 65 with four years of service or at age 60 with 10 years of service or at any age with 20 years of service.
 - Monthly Benefit: 2.50% of Final Average Monthly Salary (FAMS) times years of service up to 20 years, plus 2.00% of FAMS times years of service in excess of 20.
 - Payment Form: For married members benefits are paid as an automatic unreduced Joint and 65% Survivor Annuity. A life annuity is payable to unmarried members (although children's benefits may also be due following the member's death).

APPENDIX 2 - Public Safety (Continued)

10. *Disability Retirement:*

- a. Eligibility: Member must be eligible for retirement under the Disability Act (or a substantially equivalent program) and must not be eligible for a 20-year service retirement at time of disability. Note that not all political subdivisions cover their members under a disability program.
- b. Monthly Benefits Payable Prior to Retirement: A separate fund established under the Disability Act (or an equivalent program) provides benefits from the time of disability until the age specified in 49-21-403. Benefits from this separate fund are not covered by these Systems.
- c. Monthly Benefits Payable after Retirement: An unreduced service retirement benefit is payable. The member receives service credit for time while disabled (both for computing the benefit amount and for determining whether the member is eligible for an unreduced service retirement benefit). Final Average Monthly Salary is increased by the same factors used for automatic cost-of-living benefit increases. I.e., the FAMS is adjusted by a cost-of-living increase up to 2.5% per year (up to 4% per year for the 4% COLA funds).
- d. Payment Form: Same as for Service Retirement.
- e. Death while Disabled: A disabled member is treated as an active member for purposes of determining a death benefit for the period prior to retirement.

11. *Vesting and Refunds:*

- a. Eligibility: All members who are not vested are eligible for a refund when they terminate service. Members are vested after four years of service. Vested members may also elect to receive a refund in lieu of the deferred termination benefit described below. (Noncontributory System members hired after July 1, 1989, are ineligible for a refund.)
- b. Amount: The refund benefit is the accumulated value of the member's contributions credited by the fund. Interest is credited on the member's contribution account, beginning July 1, 1996. The amount of interest credited each year is set annually by the Board of Trustees.

12. *Deferred Termination Benefit:*

- a. Eligibility: Member must be vested (4 years of service) and must elect to leave his/her contributions on deposit.
- b. Monthly Benefit: Same as the service retirement benefit, based on service and FAMS at retirement, and commencing once the member is eligible.
- c. Payment Form: Same as for service retirement.
- d. Death Benefit: The beneficiary of an inactive member who dies is entitled to receive a refund benefit (or \$500 if larger). The spouse of an inactive member with 20 years of service receives a monthly annuity equal to 50% of the service retirement benefit that

APPENDIX 2 - Public Safety (Continued)

would have been paid had the member died immediately prior to retirement. (An actuarial reduction factor is applied if the member was under age 50 at death.)

13. *Death while an Active Member (On Duty)*: If death occurs in the line of duty, the lump-sum and annuity benefits described below will be paid to the spouse. (The benefits are not applicable to unmarried members, although children's benefits may be due.)
 - a. Lump-sum (Division A members): \$1,500.
 - b. Annuity (Division A members): 30% of member's FAMS.*
 - c. Lump-sum (Division B members): \$1,500.
 - d. Annuity (Division B members): 37.5% of member's FAMS.*

* The annuity will not be less than the benefit payable to the surviving spouse if the member had retired the day before the member's date of death.
14. *Death of an Active Member (Off Duty)*: If death occurs from a cause not related to the member's duties, the lump-sum and annuity benefits described below will be paid to the spouse. (The benefits are not applicable to unmarried members, although children's benefits may be due.)
 - a. Lump-sum (Division A members): If the member has less than 10 years of service, the benefit is \$1,000 or a refund benefit, whichever is larger. If the member has 10 or more years of service, the benefit is \$500.
 - b. Annuity (Division A members): If the member has less than 10 years of service, no annuity is due. For members with 10 or more years of service, the benefit is 2% of FAMS per year of service, to a maximum of 30% of FAMS.*
 - c. Lump-sum (Division B members): If the member does not have two years of service, the benefit is the sum of 50% of the member's salary plus a refund benefit. If the member has two or more years of service, the benefit is \$1,500.
 - d. Annuity (Division B members): If the member has fewer than two years of service, no annuity is due. If the member has two or more years of service, the annuity is 37.5% of the member's FAMS.*

* The annuity will not be less than the benefit payable to the surviving spouse if the member had retired the day before the member's date of death.
15. *Optional Forms of Benefit*: Married members may elect an optional Joint & 75% Survivor option in lieu of the standard Joint & 65% option. The amount of the Joint & 75% Survivor option is determined actuarially.
16. *Postretirement Death Benefit*: None, except for survivor benefit applicable to married members.

APPENDIX 2 - Public Safety (Continued)

17. *Postretirement Benefit Increases:* Benefits are increased annually to take into account changes in the cost of living. Most funds have a maximum annual increase of 2.50% of the original benefit (i.e., a maximum 2.50% simple interest increase). A window was opened in 2008 to allow employers to make an election to provide a 4.00% maximum COLA. If elected, the 4.00% maximum applies to both current and future annuitants. The legislation opening the window mandated that the State public safety members would receive the 4.00% maximum COLA. The window was originally scheduled to close at the end of 2009, but it was extended in 2009 to December 2012.

In years in which the cost of living increases more than the maximum COLA, the excess increase is accumulated and used in later years in which the cost-of-living increase is less than the maximum COLA. This calculation is made separately for each individual. In addition, a closed group of retirees also receives a second special increase amount paid as a level annuity under whichever form of payment is applicable. This is the Restoration of Purchasing Power (ROPP) payment.

The table below shows which funds provide the 2.5% maximum COLA and which ones provide the 4.0% maximum COLA:

2.50% Maximum COLA

Funds 23 & 43 - Other Division A
Fund 44 - Salt Lake City (Div B)
Fund 45 - Ogden (Div B)
Fund 46 - Provo (Div B)
Funds 27 & 47 - Logan (Div B)
Fund 48 - Bountiful (Div A)
Funds 29 & 49 - Other Division B

4.00% Maximum COLA

Funds 22 & 42 - State of Utah (Div A)
Funds 75 & 77 - Other Division A
Funds 74 & 76 - Other Division B

18. *3% Substantial Substitute:* All members whose service began before January 1, 1989, receive an additional annual payment equal to 3% of their benefit. These payments are made to offset the taxability of the retirement benefits under the State income tax provisions. Prior to July 1, 1995, this benefit was funded by annual appropriations made by the State on a pay-as-you go basis. Beginning July 1, 1995, this benefit is funded on an actuarial basis by increasing the employer contribution rate for those Funds which are funded by the State.

APPENDIX 2 –Firefighters

Summary of Benefit Provisions for Firefighters Retirement System

1. *Effective Date:* July 1, 1971.
2. *Plan Year:* Twelve-month period ending December 31st.
3. *Administration:* The System is administered by a Board of Trustees (which also administers the other Utah Retirement Systems). The Board of Trustees is responsible for both administration of the System and investment of the fund assets.
4. *Type of Plan:* This is a qualified governmental defined benefit retirement plan. Under GASB 25, it is considered to be a cost-sharing multiple-employer plan.
5. *Eligibility:* This System covers eligible firefighters employed by participating local governments in Utah. Eligible employees become participants immediately when hired, and are required to participate. Employers are designated as either Division A (employers with Social Security coverage) or Division B (employers without Social Security coverage). Benefit provisions and contribution rates differ for members of different divisions. This System is closed to members hired on and after July 1, 2011.
6. *Employee Contributions:* Members contribute a percentage of salary, as shown below. Employers may "pick-up" employee contributions under Section 414(h) of the Internal Revenue Code.

Fund 31 - Division A	15.05%
Fund 32 - Division B	16.71%

Contribution rates shown may be reduced by expected income from a tax on fire insurance premiums.

7. *Employer Contributions:* The current employer contribution rates depend on the Fund. Division A covers employers covered by Social Security and Division B covers other employers. The contribution rates are set by the Board of Trustees, based on the actuarial valuation for the preceding year. Contribution rates are reduced by expected income from a tax on fire insurance premiums. The Funds in this System are:

Fund 31 - Division A
Fund 32 - Division B
8. *Final Average Monthly Salary (FAMS):* The monthly average of the member's highest three salaries preceding retirement.

APPENDIX 2 –Firefighters (Continued)

9. *Service Retirement:*

- a. Eligibility: A member may retire with an unreduced benefit at age 65 with four years of service or at age 60 with 10 years of service or at any age with 20 years of service.
- b. Monthly Benefit: 2.50% of Final Average Monthly Salary (FAMS) times years of service up to 20 years, plus 2.00% of FAMS times years of service in excess of 20. There is a minimum benefit of \$500 per month.
- c. Payment Form: For married members benefits are paid as an automatic unreduced Joint and 75% Survivor Annuity. A life annuity is payable to unmarried members (although children's benefits may also be due following the member's death).

10. *Disability Retirement:*

- a. Eligibility: Member must have five or more years of service or the disability must be related to the member's duties. In addition, the member must not be eligible for a 20-year service retirement at time of disability.
- b. Monthly Benefits: 50% of FAMS.
- c. Payment Form: Benefits are payable as long as the member is disabled. Upon reaching 20 years of service, including time while disabled, or at age 65 if earlier, benefits are converted to a retirement benefit. There are special rules governing when benefits must be converted for members who become disabled after age 60.
- d. Death while Disabled: Upon the death of a disabled firefighter, the spouse shall receive 75% of the benefit currently being paid.

11. *Vesting and Refunds:*

- a. Eligibility: All members who are not vested are eligible for a refund when they terminate service. Members are vested after four years of service. Vested members may also elect to receive a refund in lieu of the deferred termination benefit described below.
- b. Amount: The refund benefit is the accumulated value of the member's contributions credited by the fund. Interest is not credited on member contributions.

12. *Deferred Termination Benefit:*

- a. Eligibility: Member must be vested (4 years of service) and must elect to leave his/her contributions on deposit.
- b. Monthly Benefit: Same as the service retirement benefit, based on service and FAMS at termination, and commencing once the member is eligible.
- c. Payment Form: Same as for service retirement.
- d. Death Benefit: The beneficiary of an unmarried inactive member who dies with 20 or more years of service prior to retirement is entitled to receive a refund benefit (or \$500 if larger). The spouse of an inactive member with 20 years of service receives a monthly

APPENDIX 2 –Firefighters (Continued)

annuity equal to 50% of the service retirement benefit that would have been paid had the member died immediately prior to retirement. (An actuarial reduction factor is applied if the member was under age 50 at death.) If the inactive member had less than 20 years of service, no death benefit is due.

13. *Death while an Active Member (On Duty)*: If death occurs in the line of duty, the lump-sum and annuity benefits described below will be paid to the spouse. (The benefits are not applicable to unmarried members, although children's benefits may be due.)
- a. Lump-sum (Division A members): \$1,500.
 - b. Annuity (Division A members): 30% of member's FAMS. For members with more than 20 years of service, the annuity is 75% of the retirement benefit earned by the member as of his/her date of death.*
 - c. Lump-sum (Division B members): \$1,500.
 - d. Annuity (Division B members): 37.5% of member's FAMS. For members with more than 20 years of service, the annuity is 75% of the retirement benefit earned by the member as of his/her date of death.*

* The annuity will not be less than the benefit payable to the surviving spouse if the member had retired the day before the member's date of death.

14. *Death of an Active Member (Off Duty)*: If death occurs from a cause not related to the member's duties, the lump-sum and annuity benefits described below will be paid to the spouse. (The benefits are not applicable to unmarried members, although children's benefits may be due.)
- a. Lump-sum (Division A members): If the member has less than 10 years of service, the benefit is \$1,000 or a refund benefit, whichever is larger. If the member has 10 or more years of service, the benefit is \$500.
 - b. Annuity (Division A members): If the member has less than 10 years of service, no annuity is due. For members with 10 or more years of service, the benefit is 2% of FAMS per year of service, to a maximum of 30% of FAMS.*
 - c. Lump-sum (Division B members): If the member does not have five years of service, the benefit is the sum of 50% of the member's salary plus a refund benefit. If the member has five or more years of service, the benefit is \$1,500.
 - d. Annuity (Division B members): If the member has fewer than five years of service, no annuity is due. If the member has five or more years of service, the annuity is 37.5% of the member's FAMS. For members with more than 20 years of service, the annuity is 75% of the retirement benefit earned by the member as of his/her date of death.*

* The annuity will not be less than the benefit payable to the surviving spouse if the member had retired the day before the member's date of death.

APPENDIX 2 –Firefighters (Continued)

15. *Optional Forms of Benefit:* None.
16. *Postretirement Death Benefit:* None, except for survivor benefit applicable to married members.
17. *Postretirement Benefit Increases:* Benefits are increased annually to take into account changes in the cost of living, with a maximum annual increase of 4% of the original benefit (i.e., a maximum 4% simple interest increase). In years in which the cost of living increases more than 4%, the excess increase is accumulated and used in later years in which the cost-of-living increase is less than 4%. This calculation is made separately for each individual. In addition, a closed group of retirees also receives a second special increase amount paid as a level annuity under whichever form of payment is applicable. This is the Restoration of Purchasing Power (ROPP) payment.
18. *3% Substantial Substitute:* All members whose service began before January 1, 1989, receive an additional annual payment equal to 3% of their benefit. These payments are made to offset the taxability of the retirement benefits under the State income tax provisions. Prior to July 1, 1995, this benefit was funded by annual appropriations made by the State on a pay-as-you go basis. Beginning July 1, 1995, this benefit is funded on an actuarial basis by increasing the employer contribution rate for those Funds which are funded by the State.

APPENDIX 2 – Judges

Summary of Benefit Provisions for Judges' Noncontributory Retirement System

1. *Effective Date:* July 1, 1963.
2. *Plan Year:* Twelve-month period ending December 31st.
3. *Administration:* The System is administered by a Board of Trustees (which also administers the other Utah Retirement Systems). The Board of Trustees is responsible for both administration of the System and investment of the fund assets.
4. *Type of Plan:* This is a qualified governmental defined benefit retirement plan. Under GASB 25, it is considered to be a single-employer plan.
5. *Eligibility:* This System covers judges of the State of Utah, including Supreme Court justices and appellate, district, circuit and juvenile court judges.
6. *Employee Contributions:* None. There are no longer any members in the Judges' Contributory Retirement System.
7. *Employer Contributions:* Fund 37 (Judges) has a contribution rate which is set by the Board of Trustees, based on the actuarial valuation for the preceding year. The rate is reduced by estimated court fees which are earmarked for this fund.
8. *Final Average Monthly Salary (FAMS):* The monthly average of the member's highest two salaries preceding retirement.
9. *Service Retirement (Unreduced):*
 - a. Eligibility: A member may retire with an unreduced benefit at age 70 with six years of service or after age 62 with 10 years of service or after 25 years of service.
 - b. Monthly Benefit: 5.00% times Final Average Monthly Salary (FAMS) times years of service up to 10, plus 2.25% of FAMS times years of service in excess of 10 but less than 20, plus 1.00% times FAMS times years of service in excess of 20. There is a minimum benefit equal to 110% of the formula benefit (but not greater than \$1,000 per month).
 - c. Payment Form: Married members receive an automatic, unreduced Joint and 65% Survivor annuity. Unmarried members receive a life annuity.

APPENDIX 2 – Judges (Continued)

10. *Service Retirement (Reduced):*

- a. Eligibility: A member may retire with a reduced benefit upon attaining age 55 with 20 years of service.
- b. Reduction: An actuarial reduction from age 65. The reduction factors are shown in the following table:

Age	Factor	Age	Factor
64	90.31%	59	55.57%
63	81.71%	58	50.62%
62	74.05%	57	46.16%
61	67.20%	56	42.14%
60	61.07%	55	38.50%

- c. Payment Form: Same as for unreduced service retirement.

11. *Disability Retirement:*

- a. Eligibility: Member must be eligible for retirement under the Disability Act (or a substantially equivalent program) and must not be eligible for an unreduced service retirement benefit at time of disability.
- b. Monthly Benefits Payable Prior to Retirement: A separate fund established under the Disability Act (or an equivalent program) provides benefits from the time of disability until the age specified in 49-21-403. Benefits from this separate fund are not covered by these Systems.
- c. Monthly Benefits Payable after Retirement: An unreduced service retirement benefit is payable. The member receives service credit for time while disabled (both for computing the benefit amount and for determining whether the member is eligible for an unreduced service retirement benefit). Final Average Monthly Salary is increased by the same factors used for automatic cost-of-living benefit increases. I.e., the FAMS is adjusted by a cost-of-living increase up to 2.75% per year.
- d. Payment Form: Same as for Service Retirement.
- e. Death while Disabled: A disabled member is treated as an active member for purposes of determining a death benefit for the period prior to retirement.

12. *Vesting and Refunds:*

- a. Eligibility: All members who are not vested are eligible for a refund when they terminate service. Members are vested after six years of service. Vested members may also elect to receive a refund in lieu of the deferred termination benefit described below. (Although all judges are now members in the noncontributory system, some retain member contribution accounts from their participation in the Judges' Contributory Retirement System.)

APPENDIX 2 – Judges (Continued)

- b. Amount: The refund benefit is the accumulated value of the member's contributions plus interest credited by the fund. The amount of interest credited each year is set annually by the Board of Trustees.
13. *Deferred Termination Benefit*:
- a. Eligibility: Member must be vested (6 years of service) and must elect to leave his/her contributions on deposit.
- b. Monthly Benefit: Same as the unreduced or reduced service retirement benefit, based on service and FAMS at termination, and commencing once the member is eligible.
- c. Payment Form: Same as for unreduced service retirement.
- d. Death Benefit: Same as for an active member.
14. *Death while an Active Member*: A refund of the member's accumulated contributions (with interest) is paid to the beneficiary of a deceased member. In addition, 65% of the member's FAMS (annualized) is paid to the spouse if the member was married. Alternatively, the spouse may waive these benefits and elect instead an annuity. The annuity is equal to 65% of the benefit determined using the unreduced service retirement formula, and based on current service and FAMS at the time of death.
15. *Optional Forms of Benefit*: The System permits married members to elect a reduced Joint and 75% Survivor annuity in lieu of the automatic Joint and 65% Survivor annuity. No other optional payment forms are available.
16. *Postretirement Death Benefit*: None, except for the Joint and Survivor annuities available to married members.
17. *Postretirement Benefit Increases*: Benefits are increased annually to take into account changes in the cost of living, with a maximum annual increase of 4% of the current benefit (i.e., a maximum 4% compound interest increase). In years in which the cost of living increases more than 4%, the excess increase is accumulated and used in later years in which the cost-of-living increase is less than 4%. This calculation is made separately for each individual. In addition, judges retired prior to July 1, 1983 received an increase of \$120 per month (\$60 for beneficiaries).
18. *3% Substantial Substitute*: All members whose service began before January 1, 1989, receive an additional annual payment equal to 3% of their benefit. These payments are made to offset the taxability of the retirement benefits under the State income tax provisions. Prior to July 1, 1995, this benefit was funded by annual appropriations made by the State on a pay-as-you go basis. Beginning July 1, 1995, this benefit is funded on an actuarial basis by increasing the employer contribution rate for those Funds which are funded by the State.

APPENDIX 2 – Legislative

Summary of Benefit Provisions for the Governors and Legislative Pension Plan

1. *Effective Date:* July 1, 1967.
2. *Plan Year:* Twelve-month period ending December 31st.
3. *Administration:* The System is administered by a Board of Trustees (which also administers the other Utah Retirement Systems). The Board of Trustees is responsible for both administration of the System and investment of the fund assets.
4. *Type of Plan:* This is a qualified governmental defined benefit retirement plan. Under GASB 25, it is considered to be a single-employer plan.
5. *Eligibility:* This System covers state legislators with four or more years of service, and governors of the state who enter office before July 1, 2011, or accrued service credit in a Tier I system before July 1, 2011.
6. *Employee Contributions:* None.
7. *Employer Contributions:* The state annually appropriates an actuarially determined contribution.
8. *Benefit base:* The benefit base is used to determine the benefits payable at retirement.
 - a. Legislators: The base was \$10.00 per month per year of service as of July 1, 1967. The base is increased 2% each six months after that date. As of July 1, 2019, the benefit base is therefore \$30.80.
 - b. Governors: The base was \$500.00 per month per term as of July 1, 1973. The base is increased 2% each six months after that date. As of July 1, 2019, the benefit base is therefore \$1,420.00.
 - c. Supplemental Benefit: An additional benefit of \$3.50 per month per year of service. This benefit is not indexed nor are COLAs granted on it. This benefit only applies to members of the System on March 1, 2000 and is effective March 1, 2000.
9. *Service Retirement (Unreduced):*
 - a. Eligibility: Age 65 with 4 years of service.
 - b. Monthly Benefit: Legislators receive the benefit base (see above) per year of service, while former governors receive the benefit base (see above) for each term served (maximum of two terms).
 - c. Payment Form: For married members, a Joint and 50% Survivor annuity. For unmarried members, a life annuity.

APPENDIX 2 – Legislative (Continued)

10. *Service Retirement (Reduced):*
 - a. Eligibility: A member may retire with a reduced benefit upon attaining age 62 with 10 years of service.
 - b. Reduction: 3% per year that retirement is prior to age 65.
 - c. Payment Form: Same as for unreduced service retirement.
11. *Disability Retirement*: This System has no provisions applying to disability retirement.
12. *Vesting and Refunds*: A vested member who made contributions in another System and withdraws them forfeits all benefits under this System.
13. *Deferred Termination Benefit*:
 - a. Eligibility: Same as for reduced or unreduced service retirement. The member must not have withdrawn his/her contributions under another System.
 - b. Monthly Benefit: Same as the unreduced or reduced service retirement benefit, based on service at termination, and commencing once the member is eligible.
 - c. Payment Form: Same as for unreduced service retirement.
 - d. Death Benefit: Same as for an active member.
14. *Death while an Active Member*:
 - a. Eligibility: Four years of service as a legislator or governor.
 - b. Monthly Benefit: 50% of the unreduced service retirement benefit that the member would have been entitled to upon reaching age 65 based on the current benefit base. Benefit is paid to surviving spouse only.
15. *Optional Forms of Benefit*: None.
16. *Postretirement Death Benefit*: None, except for the Joint and Survivor annuity available to married members.
17. *Postretirement Benefit Increases*: Benefits are increased annually to take into account changes in the cost of living, with a maximum annual increase of 4% of the original benefit (i.e., a maximum 4% simple interest increase). In years in which the cost of living increases more than 4%, the excess increase is accumulated and used in later years in which the cost-of-living increase is less than 4%. This calculation is made separately for each individual. Note that the supplemental \$3.50 per month per year of service benefit is not eligible for these increases.

APPENDIX 2 – Legislative (Continued)

18. *3% Substantial Substitute*: All members whose service began before January 1, 1989, receive an additional annual payment equal to 3% of their benefit. These payments are made to offset the taxability of the retirement benefits under the State income tax provisions. Prior to July 1, 1995, this benefit was funded by annual appropriations made by the State on a pay-as-you go basis. Beginning July 1, 1995, this benefit is funded on an actuarial basis by increasing the employer contribution rate for those Funds which are funded by the State.

APPENDIX 2 – Tier II Public Employees

Summary of Benefit Provisions for Tier II Public Employee Hybrid Retirement System

1. *Effective Date:* July 1, 2011.
2. *Plan Year:* Twelve-month period ending December 31st.
3. *Administration:* The Systems are administered by a Board of Trustees (which also administers the other Utah Retirement Systems). The Board of Trustees is responsible for both administration of the Systems and investment of the fund assets.
4. *Type of Plan:* This is a qualified governmental defined benefit retirement plan. Under GASB 25, it is considered to be a cost-sharing multiple-employer plan.
5. *Eligibility:* This System covers eligible employees (i.e. those employees first hired after June 30, 2011) of the State of Utah, most local government employees, and most public education employees. Generally all employees are covered, except for those covered by another System—public safety employees, firefighters, judges, legislators, and higher education employees covered under TIAA-CREF.

Eligible employees are required to make an election within their first 30 days after employment to participate in this Plan or to participate in the Tier II Defined Contribution System. This election is irrevocable beginning 1 year after employment.
6. *Employee Contributions:* Member contributions are required only when the certified contribution rate of the defined benefit portion of the Plan exceeds 10% in which case they must pay the excess.
7. *Employer Contributions:* Contribution rates are set by the Board of Trustees, based upon the actuarial valuation report for this preceding year, and the employers must pay up to 10% of employee compensation towards this rate. If the certified contribution rate is less than 10%, they must make a contribution to the member's 401(k) account equal to the difference. Finally, employers must pay the corresponding Tier I amortization rate on Tier II employees' compensation to be applied to the employer's corresponding Tier I System liability.
8. *Final Average Monthly Salary (FAMS):* The monthly average of the member's five highest years of annual compensation preceding retirement.
9. *Service Retirement (Unreduced):*
 - a. Eligibility: A member may retire with an unreduced benefit at age 65 with four years of service or after 35 years of service if earlier.
 - b. Monthly Benefit (Contributory): 1.50% times Final Average Monthly Salary (FAMS) times years of service.

APPENDIX 2 – Tier II Public Employees (Continued)

c. Payment Form: Life annuity.

10. *Service Retirement (Reduced)*:

a. Eligibility: A member may retire with a reduced benefit upon attaining age 62 with 10 years of service or age 60 with 20 years of service.

b. Reduction: A full actuarial reduction is applied for each year of retirement prior to age 65 if a member has less than 35 years of service. The early retirement reduction factors are shown below:

Age	Factor	Age	Factor
64	90.51%	61	67.80%
63	82.07%	60	61.75%
62	74.54%		

c. Payment Form: Life annuity.

11. *Disability Retirement*:

a. Eligibility: Member must be eligible for retirement under the Disability Act and must not be eligible for a 35-year service retirement at time of disability. Note that not all political subdivisions cover their members under a disability program or provide LTD benefit protection contracts covering their Tier II members.

b. Monthly Benefits Payable Prior to Retirement: A separate fund established under the Disability Act provides benefits from the time of disability until the age specified in 49-21-403. Benefits from this separate fund are not covered by these Systems.

c. Monthly Benefits Payable after Retirement:

1. Member is covered by an LTD benefit protection contract: An unreduced service retirement benefit is payable at eligibility for an unreduced retirement benefit. The member receives service credit for time while disabled (both for computing the benefit amount and for determining whether the member is eligible for an unreduced service retirement benefit). Final Average Monthly Salary is increased by the same factors used for automatic cost-of-living benefit increases. I.e., the FAMS is adjusted by a cost-of-living increase up to 2.5% per year (simple interest). Employers are required to contribute the full contribution rate on the imputed pay of the disabled member to the Retirement System while the member is disabled.

2. Member is not covered by an LTD benefit protection contract: An unreduced service retirement benefit is payable at eligibility for an unreduced retirement benefit. The benefit is determined using the member's service and Final Average Monthly Salary as of the date of their disability. Employers do not make contributions to the retirement system on the imputed pay of their disabled members.

d. Payment Form: Life annuity.

APPENDIX 2 – Tier II Public Employees (Continued)

- e. Death while Disabled: A disabled member is treated as an active member for purposes of determining a death benefit for the period prior to retirement.
12. *Vesting and Refunds*:
- a. Eligibility: All members who are not vested are eligible for a refund when they terminate service. Members are vested after four years of service. Vested members may also elect to receive a refund in lieu of the deferred termination benefit described below.
 - b. Amount: The refund benefit is the accumulated value of the member's contributions plus interest credited by the fund. The amount of interest credited each year is set annually by the Board of Trustees.
13. *Deferred Termination Benefit*:
- a. Eligibility: Member must be vested (4 years of service) and must elect to leave his/her contributions on deposit.
 - b. Monthly Benefit: Same as the unreduced or reduced service retirement benefit, based on service and FAMS at termination, and commencing once the member is eligible.
 - c. Payment Form: Life annuity.
 - d. Death Benefit: The beneficiary of an inactive member who dies is entitled to receive a benefit as described in 14.2.a or 14.2.b below.
14. *Death while an Active Member*:
- a. Members will receive benefits 1. and 2. described below.
 - 1. Death Benefit Insurance: A lump-sum payment that is equal to 75% of the member's highest annual salary.
 - 2.a. In General: A refund of the member's accumulated contributions (with interest) is paid to the beneficiary of a deceased member.
 - 2.b. Spousal Annuity: If the deceased member was married at the time of death and was either (i) eligible for reduced or unreduced service retirement, or (ii) had 25 years of service (15 years of service in the noncontributory system), the spouse may elect an annuity benefit in lieu of the refund benefit. The annuity is equal to the reduced or unreduced service retirement benefit payable as though Option 3 (a Joint and 100% Survivor annuity) were elected. If the member had 25 years of service or more, no reduction factor is applied in determining the service retirement benefit. If a member of the noncontributory system is not eligible for a retirement benefit and has less than 25 years of service, then the death benefit is equal to 1/3 of Option 3 benefit if the member has at least 15 and less than 20 years of service, and 2/3 of the Option 3 benefit if the member has at least 20 and less than 25 years of service.

APPENDIX 2 – Tier II Public Employees (Continued)

15. *Optional Forms of Benefit:* The Systems permit members to elect from six forms of benefit at retirement. In each case the benefit amount is adjusted to be actuarially equivalent to the "Option 1" form. The six optional forms are:
- Option 1 - A life annuity with no benefits due following the member's death.
- Option 2 - Modified Cash Refund Annuity. A reduced annuity payable for the member's lifetime, plus a death benefit equal to the excess of the member's accumulated contributions (determined at retirement) over the sum of the member's annuity payments from retirement. (The annuity payments are that part of the original benefit derived from the member's own accumulated contributions.)
- Option 3 - Joint and 100% Survivor Annuity. An annuity payable as long as either the member or his/her spouse is living.
- Option 4 - Joint and 50% Survivor Annuity. An annuity payable during the member's lifetime, and after the member's death if the member's spouse is still living, an annuity to the spouse of 50% of the original benefit.
- Option 5 - Joint and 100% Pop-up Annuity. Same as Option 3, except that the benefit amount reverts to the Option 1 (life annuity) amount if the member's spouse predeceases the member.
- Option 6 - Joint and 50% Pop-up Annuity. Same as Option 4, except that the benefit amount reverts to the Option 1 (life annuity) amount if the member's spouse predeceases the member.
16. *Postretirement Death Benefit:* None, except as elected by the member. See Optional Forms of Benefit above.
17. *Postretirement Benefit Increases:* Benefits are increased annually to take into account changes in the cost of living, with a maximum annual increase of 2.5% of the original benefit (i.e., a maximum 2.5% simple interest increase). In years in which the cost of living increases more than 2.5%, the excess increase is accumulated and used in later years in which the cost-of-living increase is less than 2.5%. This calculation is made separately for each individual.

APPENDIX 2 – Tier II Public Safety and Firefighters

Summary of Benefit Provisions for Tier II Public Safety and Firefighters Hybrid Retirement System

1. *Effective Date:* July 1, 2011.
2. *Plan Year:* Twelve-month period ending December 31st.
3. *Administration:* The Systems are administered by a Board of Trustees (which also administers the other Utah Retirement Systems). The Board of Trustees is responsible for both administration of the Systems and investment of the fund assets.
4. *Type of Plan:* These are qualified governmental defined benefit retirement plans. Under GASB 25, it is considered to be a cost-sharing multiple-employer plan.
5. *Eligibility:* This System covers eligible public safety employees (i.e. those employees first hired after June 30, 2011) of the State of Utah as well as eligible public safety employees and firefighters employed by participating local governments.

Eligible employees are required to make an election within their first 30 days after employment to participate in this Plan or to participate in the Tier II Defined Contribution System. This election is irrevocable beginning 1 year after employment.

6. *Employee Contributions:* Member contributions are required only when the certified contribution rate of the defined benefit portion of the Plan exceeds 14% in which case they must pay the excess.
 - Beginning July 1, 2020 members will contribute 2.27% of payroll.
7. *Employer Contributions:* Contribution rates are set by the Board of Trustees, based upon the actuarial valuation report for this preceding year, and the employers must pay up to 12% of employee compensation towards this rate. If the certified contribution rate is less than 12%, they must make a contribution to the member's 401(k) account equal to the difference. Finally, employers must pay the corresponding Tier I amortization rate on Tier II employees' compensation to be applied to the employer's corresponding Tier I System liability.
8. *Final Average Monthly Salary (FAMS):* The monthly average of the member's highest five salaries preceding retirement.
9. *Service Retirement:*
 - a. Eligibility: A member may retire with an unreduced benefit at age 65 with four years of service or at any age with 25 years of service.
 - b. Monthly Benefit: 1.50% of Final Average Monthly Salary (FAMS) times years of service earned prior to July 1, 2020, plus 2.00% of FAMS times years of service earned on and after July 1, 2020.
 - c. Payment Form: Life annuity

APPENDIX 2 – Tier II Public Safety and Firefighters (Continued)

10. *Service Retirement (Reduced):*

- a. Eligibility: A member may retire with a reduced benefit upon attaining age 62 with 10 years of service or age 60 with 20 years of service.
- b. Reduction: A full actuarial reduction is applied for each year of retirement prior to age 65 if a member has less than 25 years of service. The early retirement reduction factors are shown below:

Age	Factor	Age	Factor
64	90.21%	61	66.99%
63	81.55%	60	60.87%
62	73.85%		

11. *Disability Retirement:*

- a. Eligibility: Member must be eligible for retirement under the Disability Act (or a substantially equivalent program) and must not be eligible for a 25-year service retirement at time of disability. Note that not all political subdivisions cover their members under a disability program or provide LTD benefit protection contracts covering their Tier II members.
- b. Monthly Benefits Payable Prior to Retirement: A separate fund established under the Disability Act (or an equivalent program) provides benefits from the time of disability until the age specified in 49-21-403. Benefits from this separate fund are not covered by these Systems.
- c. Monthly Benefits Payable after Retirement:
 1. Member is covered by an LTD benefit protection contract: An unreduced service retirement benefit is payable at eligibility for an unreduced retirement benefit. The member receives service credit for time while disabled (both for computing the benefit amount and for determining whether the member is eligible for an unreduced service retirement benefit). Final Average Monthly Salary is increased by the same factors used for automatic cost-of-living benefit increases. I.e., the FAMS is adjusted by a cost-of-living increase up to 2.5% per year (simple interest). Employers are required to contribute the full contribution rate on the imputed pay of the disabled member to the Retirement System while the member is disabled.
 2. Member is not covered by an LTD benefit protection contract: An unreduced service retirement benefit is payable at eligibility for an unreduced retirement benefit. The benefit is determined using the member's service and Final Average Monthly Salary as of the date of their disability. Employers do not make contributions to the retirement system on the imputed pay of their disabled members.
- d. Payment Form: Life annuity.

APPENDIX 2 – Tier II Public Safety and Firefighters (Continued)

- e. Death while Disabled: A disabled member is treated as an active member for purposes of determining a death benefit for the period prior to retirement.
12. *Vesting and Refunds*:
- a. Eligibility: All members who are not vested are eligible for a refund when they terminate service. Members are vested after four years of service. Vested members may also elect to receive a refund in lieu of the deferred termination benefit described below.
 - b. Amount: The refund benefit is the accumulated value of the member's contributions credited by the fund. Interest is credited on the member's contribution account, and the amount of interest credited each year is set annually by the Board of Trustees.
13. *Deferred Termination Benefit*:
- a. Eligibility: Member must be vested (4 years of service) and must elect to leave his/her contributions on deposit.
 - b. Monthly Benefit: Same as the service retirement benefit, based on service and FAMS at retirement, and commencing once the member is eligible.
 - c. Payment Form: Life annuity.
 - d. Death Benefit: The beneficiary of an inactive member who dies is entitled to receive a benefit as described in 14.2.a or 14.2.b below.
14. *Death while an Active Member*: All members who die while an active member receive a lump-sum payment that is equal to 75% of the member's highest annual salary. Members also receive death benefits described below depending on whether their death was duty related or non-duty related.
- a. *Death while an Active Member (On Duty)*: If death occurs in the line of duty, the lump-sum and annuity benefits described below will be paid to the spouse. (The benefits are not applicable to unmarried members)
 - 1. Less than 20 years of service: \$1,000 lump sum payment plus an annuity equal to 30% of FAMS.
 - 2. 20 or more years of service: The option 1 benefit (life annuity) is calculated and paid to the spouse with no actuarial reduction.
 - b. *Death of an Active Member (Off Duty)*: If the deceased member was married at the time of death and had (i) 15 or more years of service or (ii) attained age 62 with 10 or more years of service or (iii) attained age 65 with 4 or more years of service, the spouse may elect an annuity benefit in lieu of the refund benefit. The annuity is equal to the reduced or unreduced service retirement benefit payable as though Option 3 (a Joint and 100% Survivor annuity) were elected. If the member had 25 years of service or more, no reduction factor is applied in determining the service retirement benefit (the "full

APPENDIX 2 – Tier II Public Safety and Firefighters (Continued)

allowance”). If a member has 20 to 24 years of service but is not 60 or older, then the death benefit is equal to 2/3 of the “full allowance”. If the member has at least 15 but less than 20 years of service and is below age 62, the benefit is 1/3 of the “full allowance”. If the member is age 60 or older with at least 20 years of service, age 62 or older with at least 10 years of service, or age 65 with 4 or more years of service, the spouse will receive the Option 3 benefit with actuarial reductions.

15. *Optional Forms of Benefit:* The Systems permit members to elect from six forms of benefit at retirement. In each case the benefit amount is adjusted to be actuarially equivalent to the "Option 1" form. The six optional forms are:

Option 1 - A life annuity with no benefits due following the member's death.

Option 2 - Modified Cash Refund Annuity. A reduced annuity payable for the member's lifetime, plus a death benefit equal to the excess of the member's accumulated contributions (determined at retirement) over the sum of the member's annuity payments from retirement. (The annuity payments are that part of the original benefit derived from the member's own accumulated contributions.)

Option 3 - Joint and 100% Survivor Annuity. An annuity payable as long as either the member or his/her spouse is living.

Option 4 - Joint and 50% Survivor Annuity. An annuity payable during the member's lifetime, and after the member's death if the member's spouse is still living, an annuity to the spouse of 50% of the original benefit.

Option 5 - Joint and 100% Pop-up Annuity. Same as Option 3, except that the benefit amount reverts to the Option 1 (life annuity) amount if the member's spouse predeceases the member.

Option 6 - Joint and 50% Pop-up Annuity. Same as Option 4, except that the benefit amount reverts to the Option 1 (life annuity) amount if the member's spouse predeceases the member.

16. *Postretirement Death Benefit:* None, except as elected by the member. See Optional Forms of Benefit above.
17. *Postretirement Benefit Increases:* Benefits are increased annually to take into account changes in the cost of living. The maximum annual increase is 2.50% of the original benefit (i.e., a maximum 2.50% simple interest increase). However, in years in which the cost of living increases more than the maximum COLA, the excess increase is accumulated and used in later years in which the cost-of-living increase is less than the maximum COLA. This calculation is made separately for each individual.

APPENDIX 3

Glossary

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

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

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

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

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

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

Glossary (Continued)

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

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

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

Actuarial Valuation: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB 25, such as the funded ratio and the ARC.

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

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

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

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

Glossary (Continued)

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

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

Defined Benefit Plan: A retirement plan that is not a Defined Contribution Plan. Typically a defined benefit plan is one in which benefits are defined by a formula applied to the member's compensation and/or years of service.

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

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

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

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA, although GASB 25 reporting requires the use of the AVA.

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

GASB: Governmental Accounting Standards Board.

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

Glossary (Continued)

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 20 years, the same 20-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.

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

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