



August 12, 2021

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

Re: Review of the Inflation and Investment Return Assumption

Dear Members of the Board:

This report provides our analysis and recommendation of the inflation and investment return assumption used in the actuarial valuation. As a reminder, an experience study of the demographic assumptions was performed last year and the review of the economic assumptions was delayed for one year due to the uncertainty, at that time, of the future market conditions caused by the COVID-19 pandemic.

The economic assumptions adopted by the Board this year will be used in the calculation of the January 1, 2021 actuarial valuation. The results of this actuarial valuation will be used by the Board to certify the contribution rates that become effective July 1, 2022 (i.e. the fiscal year ending June 30, 2023).

This analysis was conducted in accordance with generally accepted actuarial principles and practices. We believe these recommended assumptions comply with Actuarial Standard of Practice No. 27, Selection of Economic Assumptions for Measuring Pension Obligations. Mr. White and Ms. Shaw are members of the American Academy of Actuaries and meet all of the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. In addition, all of the undersigned are experienced in performing valuations for large public retirement systems.

Sincerely,

A handwritten signature in black ink that reads "Daniel J. White".

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

A handwritten signature in black ink that reads "Janie Shaw".

Janie Shaw, ASA, MAAA, EA
Consultant

A handwritten signature in black ink that reads "Lewis Ward".

Lewis Ward
Consultant
Enclosure

Introduction

Actuaries are guided by the Actuarial Standards of Practice (ASOP) No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, when analyzing and giving advice on selecting economic assumptions for measuring obligations under defined benefit plans. It is important that we consider a number of factors, including the purpose and nature of the measurement, and appropriate economic data. The analysis may consider past experience, future expectations, and professional judgment. However, the standard explicitly advises that the actuary not to give undue weight to recent experience.

Under ASOP No. 27, each economic assumption must individually, in the actuary's judgment, be deemed reasonable. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with the other economic assumption over the measurement period. Nevertheless, the economic assumptions are much more subjective in nature than the demographic assumptions, which in itself can still create a difference in opinion among individuals in the actuarial profession and possibly stakeholders of the Retirement System.

Summary of Recommendation

The current inflation assumption is 2.50%. We recommend the 2.50% inflation assumption be maintained in combination with the recommended change in the investment return assumption discussed below.

The current investment return assumption is 6.95%. Capital market expectations developed by investment professionals in 2021 continue their trend of forecasting lower future investment returns, in-part due to the historic low interest rate environment. We believe that the current 6.95% investment return assumption remains reasonable for use in the 2021 actuarial valuation, but it is also at the upper end of a reasonable range. We recommend the Board adopt a 6.85% investment return assumption for use in the 2021 actuarial valuation and reevaluate this assumption next year when the 2022 capital market assumptions are available. Due to the significance and nature of this assumption, it is unlikely the investment return assumption would ever be increased in the future after being lowered. While there has been a general decline in return expectations among investment consultants, we do not recommend undue weight be given to a particular year of return expectations, which provides a case for making more frequent smaller changes versus a larger change this year. Also, this recommendation reflects other considerations that include the Board's funding policy and URS's current financial condition. Specifically, URS is currently 90% funded on an actuarial value of asset basis (i.e. smoothed assets) and 96% funded on a market value of asset basis, with \$2.3 billion in deferred investment gains available to offset possible short-term investment losses.

The enclosed exhibits provide the impact of the assumption change on the contribution rates, funded ratio, and unfunded actuarially accrued liability. If the Board elects to adopt an investment return assumption that is lower than 6.85% then we recommend the inflation assumption also be reduced to 2.40%, as a low investment return situation is likely to be associated with a continuation of low interest rates and inflation.



Inflation Assumption (and Cost-of-Living Increase Assumption)

By “inflation,” we mean price inflation, as measured by annual increases in the Consumer Price Index (CPI). This inflation assumption underlies most of the other economic assumptions. It impacts investment return, salary increases, payroll growth, and COLA assumptions. However, the linkage between the price inflation and the economic assumptions, other than the COLA is not direct. The current annual inflation assumption is 2.50%

URS retirees receive a COLA each year based on the actual change in inflation as measured by CPI-U (subject to either a 2.50% or 4.00% maximum annual increase depending on fund). The current 2.50% inflation assumption has been relatively conservative as actual COLAs have been lower than assumed resulting in a source of liability gains.

Historical Inflation

The table below shows the average inflation over various periods, for the last ten years ending May 2021:

Periods Ending May 2021	Average Annual Increase in CPI-U
Last (1) year	4.99%
Last three (3) years	2.28%
Last five (5) years	2.30%
Last seven (7) years	1.78%
Last ten (10) years	1.77%

Source: Bureau of Labor Statistics, CPI-U, all items, not seasonally adjusted

As the table above shows, with the exception for the 12 months ending May 2021, historical inflation has generally been less than assumed. In May of 2021 there was a spike in the year-over-year inflation as measured by CPI which has sparked a debate whether this observed increase is transitory due to supply chain shortages caused by the COVID-19 pandemic or whether this increase is the beginning of systemic inflation. The consensus of the federal reserve is the recent uptick in inflation is temporary.

Expectations by Investment Professionals

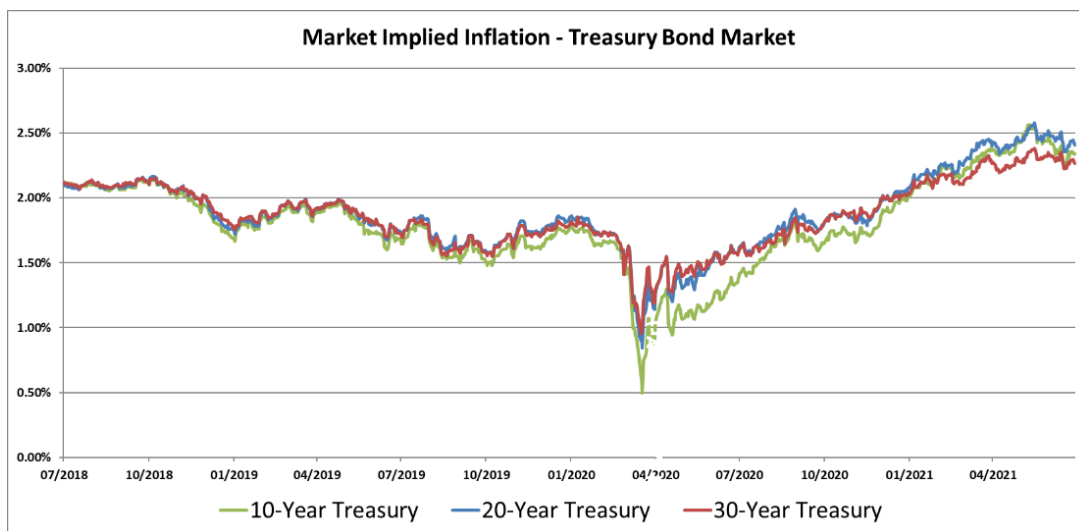
Most of the investment consulting firms, in setting their capital market assumptions, assume that inflation will be less than 2.50%. We examined the 2021 capital market assumption sets for twelve investment consulting firms and the average assumption for inflation was 2.11%, with a range of 1.92% to 2.31%. Note, these investment consulting firms developed these inflation expectations at the beginning of the year, which was prior to the actual CPI increase in May. It is uncertain if some of these investment professionals has since increased their inflation expectations.

Social Security Administration

In the Social Security Administration's 2020 Trustees Report (the 2021 report has not yet been released), the Office of the Chief Actuary is projecting a long-term average annual inflation rate of 2.4% under the intermediate cost assumption. The inflation in low-cost assumption was 1.8% and the inflation in the high-cost assumption was 3.0%. Over the last several years, the Actuary for the Social Security Administration has gradually decreased the inflation assumption as well as the difference in the inflation assumption between their low-cost and high-cost scenarios.

Implied Inflation in Treasury Bond Market

Another source of information about future inflation expectations is the market for US Treasury bonds. The June 30, 2021 yield for a 10-year inflation indexed Treasury bond (10-year TIPS) was -0.87% plus actual inflation. The yield for a 10-year non-indexed US Treasury bond was 1.45%. This means that on that day the bond market was predicting that inflation over the next ten years would average 2.32% (1.45% – (-0.87%)) per year. The chart below provides the market implied inflation based on the 10-year, 20-year, and 30-year Treasuries from July 1, 2018 to June 30, 2021. As the chart shows, implied inflation increased from about 2.00% at January 2021 to 2.50% in May of 2021, before leveling-off and possibly beginning to trend lower.



Survey of Professional Forecasters

The Philadelphia Federal Reserve conducts a quarterly survey of the Society of Professional Forecasters. Their most recent forecast, second quarter of 2021 (released in early May), was for inflation over the next ten years to average 2.30%.

Recommendation

An inflation assumption that is more likely to be greater than actual emerging inflation provides a source of liability gains from the COLA provision that can offset possible losses due to investments or other liability sources. Stated another way, there is a risk of setting the inflation assumption too low as future benefits could be larger than assumed if actual inflation is larger than assumed.

However, even in light of May's inflation measure and the recent increase in expected inflation as implied by the bond market, we believe it is reasonable if the Board adopted an inflation assumption that is within 2.40% to 2.50%. A change in the inflation assumption would result in a corresponding change in the COLA assumption, but it would not change the other economic assumptions used in the actuarial valuation (e.g. individual salary increases and the payroll growth rate assumption).

Investment and administrative expenses

The trust fund pays investment and administrative expenses from plan assets. Plan expenses may be explicitly assumed as a direct increase to the annual normal cost or implicitly assumed by developing an investment return assumption as a net return after payment of plan expenses. Given the relatively small size of administrative expenses compared to plan assets (i.e. approximately 4 basis points), we believe the development of an investment return assumption net of administrative expenses remains reasonable.

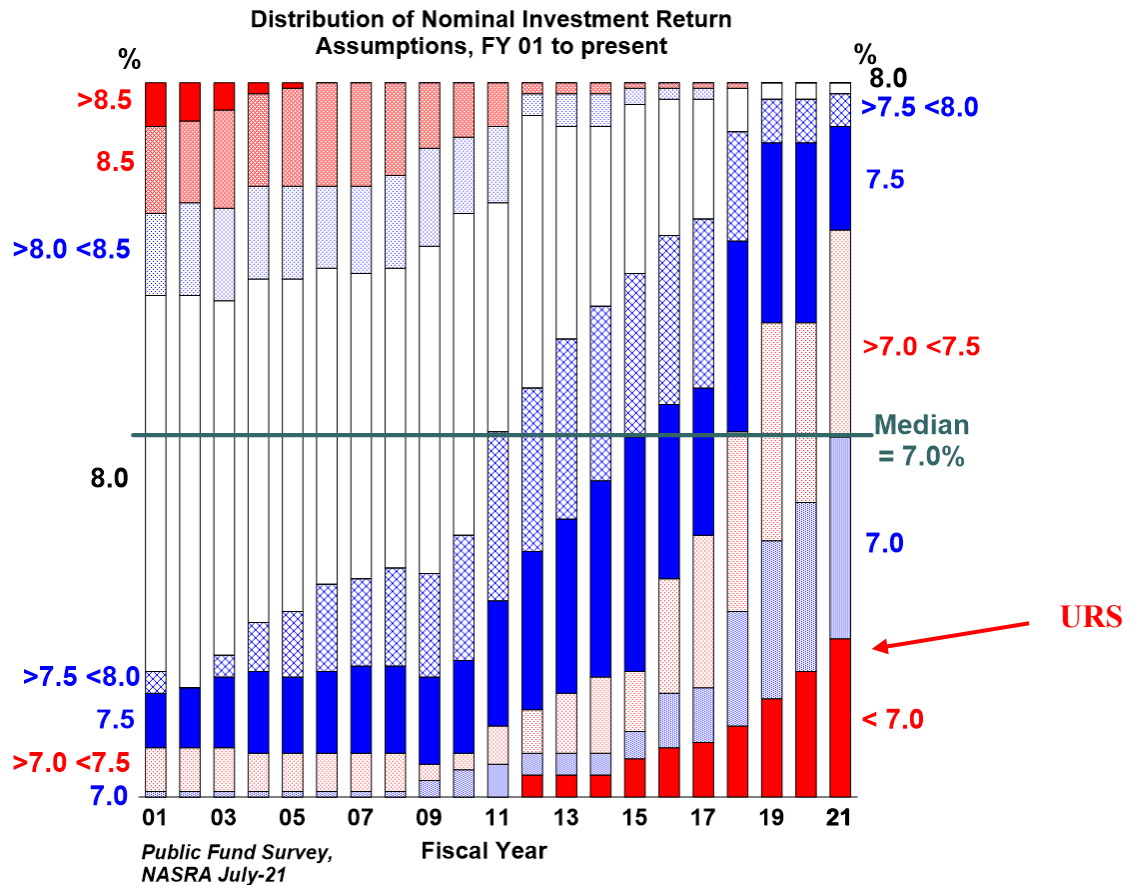
The Retirement System also incurs investment expenses. However, the forward-looking capital market assumptions and return forecasts developed by investment consulting firms already reflect expected investment expenses. Their return estimates for core investments (i.e., fixed income, equities, and real estate) are generally based on anticipated returns produced by passive index funds that are net of investment related fees. Investment return expectations for the alternative asset class such as private equity and hedge funds are also net of investment expenses. Therefore, it is not necessary to make any additional adjustments to account for investment related expenses.

Investment Return Assumption

The investment return assumption is one of the principal assumptions in any actuarial valuation of a pension plan. It is used to discount future expected benefit payments to the valuation date, in order to determine the liabilities of the plans. Even a small change to this assumption can produce significant changes to the liabilities and calculated contribution rates. The current investment return assumption is 6.95% per year, net of investment and administrative expenses.

Comparison to Peers

The National Association of State Retirement Administrators (NASRA) maintains a survey of the investment return assumption used by large public retirement systems (approximately 120 Systems). NASRA has conducted this survey for approximately 20 years and currently updates their information on almost a monthly basis. The chart on the following page shows the distribution of the investment return assumption adopted by retirement systems as well as how this distribution has changed over the years. As of July, the median return assumption used by Retirement Systems is 7.0% which is about a 10 to 15 basis point lower from last year's median. While we do not recommend the Board select an assumption based on prevalence information, it is still informative to see where URS is compared to its peers.



Forward-Looking Investment Return

We believe a more appropriate approach to assessing an investment return assumption is to determine the expected portfolio return given the fund’s target allocation and current capital market assumptions. Since we are not investment professionals, we refer to capital market assumptions developed by several major investment consulting firms. For this analysis we used URS’s target investment policy shown below, which is disclosed in the 2020 annual report.

Asset Category	Target Allocation
Equities (Domestic and International)	37%
Debt Securities	20%
Real Assets	15%
Private Equity	12%
Absolute Return	16%
Cash	0%
Total	100%

Source: Page 61 of the 2020 annual report.

The following is a list of the source of capital asset market assumptions used in our analysis, which includes URS's Investment Consultant, Callan, as well as the following other well-known investment consulting firms and asset managers:

10-Yr Assumptions Sets

- Cambridge
- Callan (URS's Consultant)
- JP Morgan
- Mercer Consulting
- RV Kuhns
- Versus
- Wilshire

20-30 Year Assumption Sets

- Aon
- Cambridge
- Meketa
- Mercer Consulting
- NEPC

We believe that the benefit of performing this analysis using multiple investment firms is to recognize the uncertain nature and subjectivity of the investment return assumption. Also, some of the investment consultants may not have precise return expectations with regard to some of URS's private investments, so we have attempted to align the various assumption sets to be as consistent as possible. In some cases, we have made minor adjustments or assumptions to align the various assumption sets within our model for consistency purposes.

Over the last several years, we have observed a general trend of decreasing return expectations. The methodology used in the development of some of the investment firms' assumption sets appear to be dependent on the market conditions at the time they are developed which results in them being sensitive to short-term market fluctuations. Other investment consulting firms appear to use methods that include a "revert to the mean bias" meaning that when the market is high, future expectations are lowered and when the market is low, future expectations are raised. The amount of these fluctuations varies between the various investment consulting firms.

The chart on the following page provides the expected return by investment consultant. To better understand the differences in return expectations, we separated the consultants in into two groups based on the underlying time-horizon (i.e. 7-10 year and 20-30 year) of their return expectations. Next, to quantify the recent change in return expectations, the chart shows each investment consultant's return expectations for each of the two prior years.

	Investment Consultant	50th Percentile Expected Return (Geometric)			Probability of Exceeding 6.95%		
		2019	2020	2021	2019	2020	2021
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
7 to 10 Year Expectations	1	6.6%	6.7%	5.5%	46%	47%	36%
	2	5.9%	5.7%	5.5%	40%	34%	36%
	3	6.9%	6.2%	5.5%	50%	43%	35%
	4	6.9%	6.4%	5.7%	50%	44%	37%
	5	7.8%	6.6%	5.7%	59%	46%	39%
	6	7.1%	6.5%	6.1%	52%	46%	42%
	7	6.7%	6.6%	6.2%	48%	46%	42%
20 to 30 Year Expectations	1	7.3%	7.7%	6.5%	54%	58%	43%
	2	7.3%	6.8%	6.3%	54%	48%	41%
	3	7.6%	7.1%	6.5%	60%	52%	44%
	4	7.4%	6.9%	6.4%	57%	50%	41%
	5	7.2%	6.8%	6.3%	54%	48%	41%
7-10 Year Expectation Avg:		6.9%	6.4%	5.7%	49%	44%	38%
20-30 Year Expectation Avg:		7.3%	7.1%	6.4%	56%	51%	42%

The chart clearly shows there are two characteristics in the assumptions. First, the longer-term assumptions are generally higher than the shorter-term assumptions, however this difference is less evident in 2019. Second, there is a general decline in return expectations each subsequent year with a relatively larger change occurring from 2020 to 2021.

Recommendation

Given the variability in the return expectations by investment consultant as well as the change in the return expectations from year-to-year, we recommend that URS does not give undue weight to an individual investment consultant or a particular year of return expectations.

Given the financial condition of the retirement system, the three-year average of the 20-year to 30-year capital market assumptions is 6.93% and supports the current 6.95% return assumption as an upper range of an appropriate assumption for use in the 2021 actuarial valuation. However, given the declining trend in return expectations we recommend the Board decrease the investment return assumption by 10 basis points to 6.85% for use in the 2021 actuarial valuation and reevaluate this assumption again next year to determine if an additional decrease is warranted. While a slightly lower investment return assumption does not significantly change the probability of exceeding the return assumption in future years, a slightly lower return assumption will result in marginally lower investment losses in years when the actual investment return is less than assumed rate of return.

We believe our analysis and comments satisfy the best-estimate assumption requirement under ASOP No. 27.

Utah Retirement Systems

2021 Actuarial Valuation Results

Exhibit 1. Actuarially Determined Contribution Rates

Fund/Division (1)	FY 21/22 Board Certified Contribution Rates (2)	Current. 6.95% Interest (2.50% COLA) (3)	Proposed. 6.85% Interest (2.50% COLA) (3)	Alt 1. 6.75% Interest (2.50% COLA) (4)	Alt 2. 6.75% Interest (2.40% COLA) (5)
I. Public Employees Contributory					
A. Local Government	14.46%	9.84%	10.55%	11.29%	10.96%
B. State and School	17.70%	13.70%	14.54%	15.39%	14.99%
C. Higher Education	17.70%	12.28%	13.53%	14.79%	14.14%
II. Public Employees Noncontributory					
A. Local Government	18.47%	13.85%	14.56%	15.30%	14.97%
B. State and School	22.19%	18.19%	19.03%	19.88%	19.48%
C. Higher Education	22.19%	16.77%	18.02%	19.28%	18.63%
III. Public Safety Contributory					
A. Other Division A (2.5% COLA)	22.79%	18.34%	19.66%	21.00%	20.32%
B. Other Division A (4% COLA)	24.37%	17.83%	19.26%	20.71%	19.97%
C. Other Division B (2.5% COLA)	22.81%	20.91%	22.16%	23.44%	22.78%
D. Other Division B (4% COLA)	28.98%	13.45%	14.91%	16.41%	15.66%
IV. Public Safety Noncontributory					
A. State	41.35%	31.35%	32.80%	34.28%	33.52%
B. Other Division A (2.5% COLA)	34.04%	29.65%	30.99%	32.35%	31.68%
C. Other Division A (4% COLA)	35.71%	29.35%	30.79%	32.25%	31.51%
D. Salt Lake City	46.71%	39.34%	40.84%	42.36%	41.53%
E. Ogden	48.72%	39.75%	41.31%	42.89%	42.03%
F. Provo	42.23%	36.98%	38.40%	39.86%	39.08%
G. Logan	41.97%	35.99%	37.56%	39.14%	38.29%
H. Bountiful	50.38%	41.91%	43.41%	44.91%	44.06%
I. Other Division B (2.5% COLA)	32.28%	30.31%	31.59%	32.89%	32.23%
J. Other Division B (4% COLA)	38.97%	23.35%	24.82%	26.32%	25.58%
V. Firefighters					
A. Division A	15.67%	9.70%	10.82%	11.97%	11.48%
B. Division B	18.30%	5.60%	7.18%	8.76%	8.01%
VI. Judges	51.91%	47.06%	48.62%	50.20%	48.94%
VII. 3% Substantial Substitute	0.85%	0.46%	0.46%	0.47%	0.46%
VIII. Tier II - Hybrid Plans					
A. Public Employees	9.38%	9.44%	9.82%	10.20%	10.10%
B. Public Safety and Firefighter	16.27%	16.04%	16.59%	17.18%	17.00%

Note: Rates shown include contribution for 3% Substantial Substitute, if applicable.

Rates shown for Firefighters and Judges exclude offsets for fire insurance premium tax and court fees.

Rates for Tier II Hybrid Plans exclude the cost of the 75% of pay active death benefit and include required member contributions.



Utah Retirement Systems

2021 Actuarial Valuation Results

Exhibit 2. Funded Ratio (Actuarial Value of Asset Basis)

Fund/Division (1)	2020 Valuation (2)	Current. 6.95% Interest (2.50% COLA) (3)	Proposed. 6.85% Interest (2.50% COLA) (3)	Alt 1. 6.75% Interest (2.50% COLA) (4)	Alt 2. 6.75% Interest (2.40% COLA) (5)
I. Public Employees Contributory					
A. Local Government	95.7%	96.9%	96.6%	96.3%	96.4%
B. State and School	97.1%	97.6%	97.4%	97.3%	97.4%
C. Higher Education	96.2%	97.9%	97.7%	97.4%	97.5%
II. Public Employees Noncontributory					
A. Local Government	89.5%	92.8%	91.7%	90.5%	91.1%
B. State and School	86.8%	88.7%	87.7%	86.6%	87.2%
C. Higher Education	89.7%	94.5%	93.3%	92.2%	92.8%
III. Public Safety Contributory					
A. Other Division A (2.5% COLA)	97.2%	97.5%	97.2%	96.9%	97.1%
B. Other Division A (4% COLA)	99.2%	99.3%	99.2%	99.1%	99.2%
C. Other Division B (2.5% COLA)	99.6%	99.7%	99.6%	99.6%	99.6%
D. Other Division B (4% COLA)	99.0%	100.0%	99.8%	99.6%	99.8%
IV. Public Safety Noncontributory					
A. State	86.3%	89.9%	88.8%	87.8%	88.4%
B. Other Division A (2.5% COLA)	85.4%	88.6%	87.4%	86.1%	86.9%
C. Other Division A (4% COLA)	87.8%	90.3%	89.0%	87.8%	88.5%
D. Salt Lake City	77.0%	80.8%	79.9%	78.9%	79.5%
E. Ogden	78.4%	81.8%	80.8%	79.9%	80.4%
F. Provo	79.4%	81.8%	80.8%	79.8%	80.4%
G. Logan	82.3%	85.4%	84.3%	83.3%	83.9%
H. Bountiful	76.2%	79.1%	78.2%	77.3%	77.8%
I. Other Division B (2.5% COLA)	82.4%	86.2%	85.0%	83.8%	84.6%
J. Other Division B (4% COLA)	92.3%	100.1%	98.7%	97.3%	98.2%
V. Firefighters					
A. Division A	100.3%	103.8%	102.4%	101.0%	101.8%
B. Division B	101.1%	104.7%	103.5%	102.2%	102.9%
VI. Judges	80.8%	83.8%	82.9%	82.0%	82.8%
VII. Governors and Legislative	81.5%	85.3%	84.5%	83.7%	84.2%
VIII. 3% Substantial Substitute	42.3%	46.9%	46.5%	46.1%	46.4%
IX. Tier II - Hybrid Plans					
A. Public Employees	91.4%	92.4%	90.3%	88.2%	88.8%
B. Public Safety and Firefighter	85.6%	89.2%	87.2%	85.3%	85.9%
X. Grand Total	87.4%	89.9%	88.8%	87.8%	88.4%



Utah Retirement Systems

Preliminary 2021 Actuarial Valuation Results

Exhibit 3. Unfunded Actuarial Accrued Liability (Actuarial Value of Asset Basis) (\$ in millions)

Fund/Division (1)	2020 Valuation (2)	Current. 6.95% Interest (2.50% COLA) (3)	Proposed. 6.85% Interest (2.50% COLA) (3)	Alt 1. 6.75% Interest (2.50% COLA) (4)	Alt 2. 6.75% Interest (2.40% COLA) (5)
I. Public Employees Contributory					
A. Local Government	\$ 20	\$ 14	\$ 16	\$ 17	\$ 16
B. State and School	19	15	17	18	17
C. Higher Education	6	3	4	4	4
II. Public Employees Noncontributory					
A. Local Government	629	451	531	613	568
B. State and School	2,938	2,637	2,914	3,201	3,038
C. Higher Education	209	108	135	156	142
III. Public Safety Contributory					
A. Other Division A (2.5% COLA)	3	3	3	4	3
B. Other Division A (4% COLA)	0	0	0	0	0
C. Other Division B (2.5% COLA)	0	0	0	0	0
D. Other Division B (4% COLA)	0	(0)	0	0	0
IV. Public Safety Noncontributory					
A. State	205	156	174	193	182
B. Other Division A (2.5% COLA)	184	150	169	188	177
C. Other Division A (4% COLA)	46	39	44	50	47
D. Salt Lake City	94	80	86	91	88
E. Ogden	19	16	17	18	18
F. Provo	14	13	14	15	15
G. Logan	7	6	6	7	6
H. Bountiful	7	6	6	7	7
I. Other Division B (2.5% COLA)	92	77	85	93	88
J. Other Division B (4% COLA)	4	(0)	1	2	1
V. Firefighters					
A. Division A	(1)	(10)	(6)	(3)	(5)
B. Division B	(12)	(53)	(39)	(25)	(34)
VI. Judges	50	44	47	50	48
VI. Governors and Legislative	2	2	2	2	2
VIII. 3% Substantial Substitute	305	277	282	286	283
IX. Tier II - Hybrid Plans					
A. Public Employees	56	65	85	106	100
B. Public Safety and Firefighter	13	14	17	20	19
X. Grand Total	\$ 4,910	\$ 4,114	\$ 4,609	\$ 5,113	\$ 4,829

