



BURLINGTON EMPLOYEES' RETIREMENT SYSTEM

2018 EXPERIENCE STUDY

REVIEW PERIOD: JULY 1, 2012 – JUNE 30, 2017

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Table of Contents

Executive Summary	1
Actuarial Certification	8
Exhibit A – Pro Forma Impact on Actuarial Valuation Results	9
Exhibit B – Supporting Analysis for Assumptions	
Section I – Mortality Rates	12
Section II – Retirement Rates	16
Section III – Turnover Rates	20
Section IV – Disability Rates	24
Section V – Rate of Compensation Increase	28
Section VI – COLA (Benefit Accrual Rate) Election	32
Section VII – Investment Return	33

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Burlington Employees' Retirement System

Executive Summary

The following is an Executive Summary of our recommendations based on the results of the Experience Study for the review period July 1, 2012 to June 30, 2017. The impact on the valuation results is shown under five separate investment return assumptions to provide the information necessary to review the effect of that assumption. Exhibit A shows additional details of the impact on the actuarial valuation results under those five scenarios. Exhibit B shows the data analysis used to develop the recommended assumption changes by employee group when appropriate.

Pro Forma Impact on Actuarial Valuation Results

	\$ millions					
Investment Return	8.00%	8.00%	7.75%	7.50%	7.25%	7.00%
Other Assumptions	Current	Proposed	Proposed	Proposed	Proposed	Proposed
Present Value of Benefits	\$296.4	\$286.2	\$295.3	\$304.9	\$315.1	\$325.8
Increase/(Decrease)		(\$10.2)	(\$1.1)	\$8.5	\$18.6	\$29.4
Actuarial Accrued Liability	\$252.4	\$242.8	\$249.1	\$255.8	\$262.7	\$270.0
Increase/(Decrease)		(\$9.6)	(\$3.3)	\$3.3	\$10.3	\$17.5
Actuarial Value of Assets	\$183.8	\$183.8	\$183.8	\$183.8	\$183.8	\$183.8
Increase/(Decrease)		\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Funded Ratio	72.8%	75.7%	73.8%	71.9%	70.0%	68.1%
Increase/(Decrease)		2.9%	1.0%	-1.0%	-2.9%	-4.7%
Actuarially Determined Employer Contribution	\$10.18	\$8.91	\$9.68	\$10.46	\$11.26	\$12.08
Increase/(Decrease)		(\$1.27)	(\$0.51)	\$0.28	\$1.08	\$1.89

Mortality

Current Basis:

105% of the probabilities in the RP-2000 Mortality Table with separate male and female rates, with no adjustment, combined table for non-annuitants and annuitants, projected to the valuation date with Scale BB.

Comment:

We recommend updating the table to be consistent with the latest published mortality study released by the Society of Actuaries. In addition, since Class B actual mortality was greater than expected, we recommend a 2-year set forward of rates for this group.

Recommendation:

Class A (Non-Disabled): RP-2014 Adjusted to 2006 Total Dataset Mortality Table, projected to the valuation date with Scale MP-2018.

Class B (Non-Disabled): RP-2014 Adjusted to 2006 Total Dataset Mortality Table, projected to the valuation date with Scale MP-2018, set forward 2 years.

Class A and B (Disabilities): RP-2014 Adjusted to 2006 Disabled Mortality Table, projected to the valuation date with Scale MP-2018.



Mortality improvement

Current Basis:

Projected to date of decrement using Scale BB (generational mortality).

Comment:

We recommend updating the table to be consistent with the latest published mortality study released by the Society of Actuaries.

Recommendation:

All: Projected to date of decrement using Scale MP-2018 (generational mortality).

Retirement rates

Current Basis:

Class A		Class B	
Age	Rate	Age	Rate
45-46	15%	55-59	5%
47-48	30%	60	10%
49-51	5%	61	15%
52	18%	62	20%
53-59	20%	63-65	25%
60	100%	66	20%
		67	25%
		68	20%
		69	25%
		70	100%

Comment:

Class A retirement experience suggests a change to a table based on years of service, rather than age. Class B retirement experience indicates that participants are retiring later than expected, on average.

Recommendation:

Change to service-based rates for Class A, and extend the age-based rates for Class B to age 75. The proposed rates of retirement are as follows:

Class A

Completed Years of Service	Rate
<15	0%
15-18	5%
19	15%
20-23	25%
24	30%
25	75%
26-29	50%
30-34	75%
35+	100%

Compulsory retirement is assumed at age 60.



Retirement rates (cont.)

Class B

Age	Rate
55-59	5.0%
60	7.5%
61	12.5%
62	18.0%
63	22.5%
64-65	25.0%
66-69	30.0%
70-74	50.0%
75+	100.0%

Termination prior to retirement

Current Basis:

Class A		Class B		
Sample Rates		Sample Rates		
Age	Rate	Age	Years of Service	
			0-2	3+
20	14.0%	20	27.5%	15.0%
25	7.0%	25	27.5%	15.0%
30	6.0%	30	22.0%	12.0%
35	6.0%	35	22.0%	10.0%
40	5.0%	40	16.5%	4.0%
45	4.0%	45	16.5%	4.0%
50	3.0%	50	16.5%	4.0%
55	0.0%	55	16.5%	4.0%
		60	16.5%	4.0%
		65	16.5%	4.0%
		70	0.0%	0.0%

Comment:

Experience suggests a change to a table with age-based rates for Class A, and also shows that members in this group generally do not terminate after attainment of 10 years of service. Although a select and ultimate termination table continues to be appropriate for Class B, the current rates should be updated.



Termination prior to retirement (cont.)

Recommendation:

Class A

Completed Years of Service	Rate
<1	8.0%
1	7.0%
2	6.0%
7	5.0%
8	4.5%
9	4.0%
10+	0.0%

Class B: 100% of the Vaughn Select & Ultimate Withdrawal Table for service prior to 3 years, and 130% of the Vaughn Select & Ultimate Withdrawal Table thereafter.

Sample rates

Age	Completed Years of Service			
	0	1	2	3+
20	29.8%	25.0%	21.0%	24.18%
25	27.8%	22.5%	18.5%	17.68%
30	25.8%	20.0%	16.0%	13.13%
35	23.8%	17.8%	13.8%	10.27%
40	21.8%	15.8%	11.8%	8.45%
45	19.8%	14.1%	10.1%	7.15%
50	17.8%	12.6%	8.6%	5.85%
55	0.0%	0.0%	0.0%	0.00%



Disability

Current Basis:

Class A		Class B	
Age	Rate	Age	Rate
20	0.20%	20	0.08%
25	0.24%	25	0.09%
30	0.29%	30	0.12%
35	0.38%	35	0.14%
40	0.50%	40	0.20%
45	0.74%	45	0.29%
50	1.25%	50	0.49%
55	0.00%	55	0.90%
		60	1.73%
		65	0.00%

Comment:

Experience for both groups indicates that there were fewer disabilities than expected and that lower assumed rates at all ages will provide a better estimate of future plan experience.

Recommendation:

Class A: 1985 Pension Disability Study Class 2 Table for Males and Females.

Class B: 1985 Pension Disability Study Class 1 Table for Males and Females.

Inflation

Current Basis:

3.00%.

Comment:

We recommend updating the assumption to be consistent with the Social Security's best estimate of the ultimate long-term (75-year horizon) annual percentage increase in CPI, as published in the 2018 OASDI Trustees Report.

Recommendation:

We recommend that the assumption be lowered to 2.60%.

COLAs

Current Basis:

Cost of living increases averaging 3% per year were assumed. For employees retiring after July 1, 2017, cost of living increases were capped at 2.75%

Comment:

We recommend that this assumption be consistent with the recommended inflation assumption.

Recommendation:

We recommend that the assumption be lowered to 2.60%.



Rate of compensation increase (including inflation)

Graded scale (sample rates shown below):

Age	Class A&B
25	8.8%
30	7.0%
35	5.6%
40	4.9%
45	4.6%
50	4.3%
55	4.0%
59	3.9%
60	3.9%
65	3.8%
69	3.8%

Comment:

Plan experience suggests a change to rates based on years of service, rather than age. Also, current long-term capital market assumptions suggest a change to the inflation assumption, from 3.00% to 2.60%.

Recommendation:

Adopt tables shown below, which include an updated long-term inflation assumption of 2.60% for all groups.

Class A

Completed Years of Service	Rate
<1	10.0%
1	8.5%
2	7.3%
3	6.3%
4	5.9%
5	5.6%
6	5.4%
7	5.2%
8	5.0%
9	4.8%
10	4.7%
11	4.6%
12	4.5%
13	4.4%
14	4.3%
15	4.2%
16	4.0%
17	3.8%
18	3.7%
19	3.6%
20+	3.5%

Class B

Completed Years of Service	Rate
<1	6.6%
1	6.0%
2	5.5%
3	5.1%
4	4.9%
5	4.7%
6	4.5%
7	4.4%
8	4.3%
9	4.3%
10	4.2%
11	4.2%
12	4.1%
13	4.0%
14	3.9%
15	3.8%
16	3.8%
17	3.8%
18	3.7%
19	3.6%
20+	3.5%



Payroll growth

Current Basis:

3.50%.

Comment:

We suggest that this assumption be lowered, consistent with the recommendation to lower the inflation assumption.

Recommendation:

We recommend that the assumption be lowered to 3.00%.

COLA (benefit accrual rate) election

Current Basis:

For both Class A and Class B, 85% of retiring members are assumed to elect the no COLA benefit accrual rate and 15% of retiring members are assumed to elect the full COLA benefit accrual rate.

Comment:

See Section VI for details.

Recommendation:

For Class A, retain the current assumption. Change the Class B assumption so that 75% of retiring members are assumed to elect the no COLA benefit accrual rate and 25% of retiring members are assumed to elect the full COLA benefit accrual rate.

Investment return and investment expenses

Current Basis:

8.00% per year, net of investment-related and administrative expenses.

Comment:

See Section VII for details.

Recommendation:

Based on updated capital market assumptions (H&H Investment Advisors, 2018), we recommend that the current 8.00% assumption be reduced to 7.10% or lower. However, the final assumed long-term rate of return should be selected in consultation with the plan's investment advisor.



Actuarial Certification

This report presents the results of the 2018 Experience Study of the Burlington Employees' Retirement System and the pro forma impact that our recommendations for changes in assumptions have on the June 30, 2017 Actuarial Valuation results. It also provides the support for our recommendations. This report may not be appropriate for any other purpose.

The valuation results present in this report have been calculated in accordance with generally accepted actuarial principles and practices. We certify that the actuarial assumptions and methods were selected by us and represent our best estimate of anticipated actuarial experience under the plan.

In preparing all related valuation results, we have relied on employee data provided by the City and on asset and contribution information also provided by the City. We have not audited the employee data or the financial information, although we have reviewed them for reasonableness.

The results in this report are based on the Plan as summarized in the June 30, 2017 Actuarial Valuation Report and unless otherwise specified in this report the actuarial assumptions and methods detailed in that same report.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as, but not limited to, the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of this report, an analysis of the potential range of such future measurements has not been performed.

The signing actuary is independent of the Plan Sponsor. We are not aware of any relationship that would impact the objectivity of our work.

We are members of the American Academy of Actuaries and meet its Qualification Standards to render the actuarial opinion contained herein.

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Team Leader and Actuarial Specialist

November 21, 2018



Exhibit A – Pro Forma Impact on Actuarial Valuation Results

Total

	\$ millions					
Investment Return	8.00%	8.00%	7.75%	7.50%	7.25%	7.00%
Other Assumptions	Current	Proposed	Proposed	Proposed	Proposed	Proposed
Present Value of Benefits - Actives	\$135.1	\$129.9	\$135.6	\$141.8	\$148.3	\$155.3
Present Value of Benefits - Inactives	\$161.3	\$156.3	\$159.7	\$163.1	\$166.8	\$170.5
Present Value of Benefits - Total	\$296.4	\$286.2	\$295.3	\$304.9	\$315.1	\$325.8
Increase/(Decrease)		(\$10.2)	(\$1.1)	\$8.5	\$18.6	\$29.4
Actuarial Accrued Liability - Actives	\$91.1	\$86.4	\$89.5	\$92.6	\$95.9	\$99.4
Actuarial Accrued Liability - Inactives	\$161.3	\$156.3	\$159.7	\$163.1	\$166.8	\$170.5
Actuarial Accrued Liability - Total	\$252.4	\$242.8	\$249.1	\$255.8	\$262.7	\$270.0
Increase/(Decrease)		(\$9.6)	(\$3.3)	\$3.3	\$10.3	\$17.5
Actuarial Value of Assets	\$183.8	\$183.8	\$183.8	\$183.8	\$183.8	\$183.8
Increase/(Decrease)		\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Funded Ratio	72.8%	75.7%	73.8%	71.9%	70.0%	68.1%
Increase/(Decrease)		2.9%	1.0%	-1.0%	-2.9%	-4.7%
Actuarially Determined Employer Contribution	\$10.18	\$8.91	\$9.68	\$10.46	\$11.26	\$12.08
Increase/(Decrease)		(\$1.27)	(\$0.51)	\$0.28	\$1.08	\$1.89





Exhibit A – Pro Forma Impact on Actuarial Valuation Results

Class A

	\$ millions					
Investment Return	8.00%	8.00%	7.75%	7.50%	7.25%	7.00%
Other Assumptions	Current	Proposed	Proposed	Proposed	Proposed	Proposed
Present Value of Benefits - Actives	\$54.7	\$57.2	\$60.2	\$63.4	\$66.7	\$70.4
Present Value of Benefits - Inactives	\$80.1	\$78.7	\$80.5	\$82.3	\$84.2	\$86.2
Present Value of Benefits - Total	\$134.9	\$136.0	\$140.7	\$145.7	\$151.0	\$156.6
<i>Increase/(Decrease)</i>		<i>\$1.1</i>	<i>\$5.8</i>	<i>\$10.8</i>	<i>\$16.1</i>	<i>\$21.7</i>
Actuarial Accrued Liability - Actives	\$35.4	\$35.2	\$36.5	\$37.9	\$39.4	\$40.9
Actuarial Accrued Liability - Inactives	\$80.1	\$78.7	\$80.5	\$82.3	\$84.2	\$86.2
Actuarial Accrued Liability - Total	\$115.6	\$113.9	\$117.0	\$120.2	\$123.6	\$127.2
<i>Increase/(Decrease)</i>		<i>(\$1.6)</i>	<i>\$1.5</i>	<i>\$4.7</i>	<i>\$8.1</i>	<i>\$11.6</i>
Actuarial Value of Assets	\$78.6	\$78.6	\$78.6	\$78.6	\$78.6	\$78.6
<i>Increase/(Decrease)</i>		<i>\$0.0</i>	<i>\$0.0</i>	<i>\$0.0</i>	<i>\$0.0</i>	<i>\$0.0</i>
Funded Ratio	68.0%	69.0%	67.2%	65.4%	63.6%	61.8%
<i>Increase/(Decrease)</i>		<i>1.0%</i>	<i>-0.9%</i>	<i>-2.6%</i>	<i>-4.4%</i>	<i>-6.2%</i>
Actuarially Determined Employer Contribution	\$4.81	\$4.74	\$5.11	\$5.49	\$5.87	\$6.27
<i>Increase/(Decrease)</i>		<i>(\$0.06)</i>	<i>\$0.30</i>	<i>\$0.68</i>	<i>\$1.07</i>	<i>\$1.46</i>





Exhibit A – Pro Forma Impact on Actuarial Valuation Results

Class B

	\$ millions					
Investment Return	8.00%	8.00%	7.75%	7.50%	7.25%	7.00%
Other Assumptions	Current	Proposed	Proposed	Proposed	Proposed	Proposed
Present Value of Benefits - Actives	\$80.4	\$72.6	\$75.4	\$78.4	\$81.6	\$84.9
Present Value of Benefits - Inactives	\$81.2	\$77.6	\$79.2	\$80.8	\$82.5	\$84.3
Present Value of Benefits - Total	\$161.5	\$150.2	\$154.6	\$159.2	\$164.1	\$169.2
<i>Increase/(Decrease)</i>		<i>(\$11.3)</i>	<i>(\$6.9)</i>	<i>(\$2.3)</i>	<i>\$2.5</i>	<i>\$7.6</i>
Actuarial Accrued Liability - Actives	\$55.7	\$51.2	\$52.9	\$54.7	\$56.6	\$58.5
Actuarial Accrued Liability - Inactives	\$81.2	\$77.6	\$79.2	\$80.8	\$82.5	\$84.3
Actuarial Accrued Liability - Total	\$136.9	\$128.8	\$132.1	\$135.5	\$139.1	\$142.8
<i>Increase/(Decrease)</i>		<i>(\$8.0)</i>	<i>(\$4.8)</i>	<i>(\$1.3)</i>	<i>\$2.2</i>	<i>\$5.9</i>
Actuarial Value of Assets	\$105.2	\$105.2	\$105.2	\$105.2	\$105.2	\$105.2
<i>Increase/(Decrease)</i>		<i>\$0.0</i>	<i>\$0.0</i>	<i>\$0.0</i>	<i>\$0.0</i>	<i>\$0.0</i>
Funded Ratio	76.9%	81.7%	79.7%	77.7%	75.7%	73.7%
<i>Increase/(Decrease)</i>		<i>4.8%</i>	<i>2.8%</i>	<i>0.8%</i>	<i>-1.2%</i>	<i>-3.2%</i>
Actuarially Determined Employer Contribution	\$5.38	\$4.17	\$4.57	\$4.98	\$5.39	\$5.81
<i>Increase/(Decrease)</i>		<i>(\$1.21)</i>	<i>(\$0.81)</i>	<i>(\$0.40)</i>	<i>\$0.01</i>	<i>\$0.43</i>





Exhibit B – Section I – Mortality Rates

Actual 2012-2017 Experience Compared to Current Assumption

Class A

Age	# of Lives	Actual Deaths	Expected Deaths	Actual %	Expected %	Ratio: Actual over Expected
<55	188	1	0.4	0.53%	0.23%	227.27%
55-59	134	1	0.6	0.75%	0.46%	161.29%
60-64	114	1	1.0	0.88%	0.83%	105.26%
65-69	141	2	1.9	1.42%	1.37%	103.63%
70-74	80	1	1.8	1.25%	2.25%	55.56%
75-79	22	0	0.9	0.00%	3.91%	0.00%
80-84	20	1	1.4	5.00%	6.85%	72.99%
85-89	11	1	1.2	9.09%	11.09%	81.97%
90+	1	0	0.2	0.00%	16.00%	0.00%
Grand Total	711	8	9.4	1.13%	1.32%	85.56%



Exhibit B – Section I – Mortality Rates

Actual 2012-2017 Experience Compared to Proposed Assumption

Class A

Age	# of Lives	Actual Deaths	Expected Deaths	Ratio:		
				Actual %	Expected %	Actual over Expected
<55	188	1	0.7	0.53%	0.37%	144.93%
55-59	134	1	0.9	0.75%	0.66%	112.36%
60-64	114	1	1.1	0.88%	0.95%	92.59%
65-69	141	2	1.9	1.42%	1.36%	104.17%
70-74	80	1	1.7	1.25%	2.09%	59.88%
75-79	22	0	0.8	0.00%	3.45%	0.00%
80-84	20	1	1.2	5.00%	6.10%	81.97%
85-89	11	1	1.1	9.09%	10.00%	90.91%
90+	1	0	0.2	0.00%	15.00%	0.00%
Grand Total	711	8	9.5	1.13%	1.33%	84.39%

Recommendation:

We recommend updating the table to be consistent with the latest published mortality study released by the Society of Actuaries.



Exhibit B – Section I – Mortality Rates

Actual 2012-2017 Experience Compared to Current Assumption

Class B

Age	# of Lives	Actual Deaths	Expected Deaths	Actual %	Expected %	Ratio:
						Actual over Expected
<55	0	0	0.0	0.00%	0.00%	0.00%
55-59	77	1	0.3	1.30%	0.44%	294.12%
60-64	241	1	1.9	0.41%	0.79%	52.36%
65-69	517	13	6.4	2.51%	1.24%	202.49%
70-74	329	6	6.9	1.82%	2.09%	87.34%
75-79	229	10	8.2	4.37%	3.57%	122.25%
80-84	153	9	9.0	5.88%	5.86%	100.45%
85-89	55	6	5.3	10.91%	9.64%	113.21%
90+	21	4	3.3	19.05%	15.76%	120.85%
Grand Total	1,622	50	41.3	3.08%	2.55%	121.09%

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Exhibit B – Section I – Mortality Rates

Actual 2012-2017 Experience Compared to Proposed Assumption

Class B

Age	# of Lives	Actual Deaths	Expected Deaths	Actual %	Expected %	Ratio: Actual over Expected
<55	0	0	0.0	0.00%	0.00%	0.00%
55-59	77	1	0.5	1.30%	0.70%	185.19%
60-64	241	1	2.5	0.41%	1.05%	39.37%
65-69	517	13	7.7	2.51%	1.48%	169.49%
70-74	329	6	7.7	1.82%	2.33%	78.43%
75-79	229	10	9.0	4.37%	3.93%	110.99%
80-84	153	9	10.2	5.88%	6.67%	88.15%
85-89	55	6	6.2	10.91%	11.31%	96.46%
90+	21	4	4.0	19.05%	18.81%	101.27%
Grand Total	1,622	50	47.8	3.08%	2.95%	104.62%

Recommendation:

We recommend updating the table to be consistent with the latest published mortality study released by the Society of Actuaries. In addition, since Class B actual mortality was greater than expected, we recommend a 2-year set forward of rates for this group.



Exhibit B – Section II - Retirement Rates

Actual 2012-2017 Experience Compared to Current Assumption

Class A

Service	# of Lives	Actual Retirements	Expected Retirements	Ratio:		
				Actual %	Expected %	Actual over Expected
<15	51	0	6.9	0.00%	13.49%	0.00%
15	16	1	2.1	6.25%	12.81%	48.78%
16	14	1	2.4	7.14%	16.79%	42.55%
17	17	0	3.1	0.00%	18.24%	0.00%
18	16	1	2.7	6.25%	17.06%	36.63%
19	12	2	2.4	16.67%	19.67%	84.75%
20	14	3	1.8	21.43%	12.86%	166.67%
21	9	4	0.8	44.44%	8.89%	500.00%
22	9	4	1.4	44.44%	15.56%	285.71%
23	9	1	1.6	11.11%	17.22%	64.52%
24	10	3	2.2	30.00%	21.80%	137.61%
25	8	6	1.8	75.00%	21.88%	342.86%
26	5	1	1.7	20.00%	33.00%	60.61%
27	4	3	1.7	75.00%	41.25%	181.82%
28	1	1	0.2	100.00%	15.00%	666.67%
29	1	0	0.2	0.00%	15.00%	0.00%
30	1	1	0.2	100.00%	18.00%	555.56%
31	0	0	0.0	0.00%	0.00%	0.00%
32	1	1	1.0	100.00%	100.00%	100.00%
33	1	1	0.2	100.00%	20.00%	500.00%
34	0	0	0.0	0.00%	0.00%	0.00%
35+	2	1	2.0	50.00%	100.00%	50.00%
Grand Total	201	35	35.9	17.41%	17.88%	97.41%



Exhibit B – Section II - Retirement Rates

Actual 2012-2017 Experience Compared to Proposed Assumption

Class A

Service	# of Lives	Actual Retirements	Expected Retirements	Ratio:		
				Actual %	Expected %	Actual over Expected
<15	51	0	0.0	0.00%	0.00%	0.00%
15	16	1	0.8	6.25%	5.00%	125.00%
16	14	1	0.7	7.14%	5.00%	142.86%
17	17	0	1.8	0.00%	10.59%	0.00%
18	16	1	0.8	6.25%	5.00%	125.00%
19	12	2	1.8	16.67%	15.00%	111.11%
20	14	3	3.5	21.43%	25.00%	85.71%
21	9	4	2.3	44.44%	25.00%	177.78%
22	9	4	2.3	44.44%	25.00%	177.78%
23	9	1	2.3	11.11%	25.00%	44.44%
24	10	3	3.0	30.00%	30.00%	100.00%
25	8	6	6.0	75.00%	75.00%	100.00%
26	5	1	3.0	20.00%	60.00%	33.33%
27	4	3	2.5	75.00%	62.50%	120.00%
28	1	1	0.5	100.00%	50.00%	200.00%
29	1	0	0.5	0.00%	50.00%	0.00%
30	1	1	0.8	100.00%	75.00%	133.33%
31	0	0	0.0	0.00%	0.00%	0.00%
32	1	1	1.0	100.00%	100.00%	100.00%
33	1	1	0.8	100.00%	75.00%	133.33%
34	0	0	0.0	0.00%	0.00%	0.00%
35+	2	1	2.0	50.00%	100.00%	50.00%
Grand Total	201	35	36.2	17.41%	17.99%	96.82%

Recommendation:

The proposed table was developed from the actual retirements from 2012-2017 and has rates that are based on service. Our recommendation is to adopt the proposed table.



Exhibit B – Section II - Retirement Rates

Actual 2012-2017 Experience Compared to Current Assumption

Class B

Age	# of Lives	Actual Retirements	Expected Retirements	Ratio:		
				Actual %	Expected %	Actual over Expected
55	94	4	4.7	4.26%	5.00%	85.11%
56	94	6	4.7	6.38%	5.00%	127.66%
57	85	6	4.3	7.06%	5.00%	141.18%
58	78	5	3.9	6.41%	5.00%	128.21%
59	77	5	3.9	6.49%	5.00%	129.87%
60	75	4	7.5	5.33%	10.00%	53.33%
61	85	7	12.8	8.24%	15.00%	54.90%
62	74	12	14.8	16.22%	20.00%	81.08%
63	70	14	17.5	20.00%	25.00%	80.00%
64	61	17	15.3	27.87%	25.00%	111.48%
65	41	10	10.3	24.39%	25.00%	97.56%
66	31	13	6.2	41.94%	20.00%	209.68%
67	16	5	4.0	31.25%	25.00%	125.00%
68	8	2	1.6	25.00%	20.00%	125.00%
69	6	2	1.5	33.33%	25.00%	133.33%
70	2	0	2.0	0.00%	100.00%	0.00%
71	4	0	4.0	0.00%	100.00%	0.00%
72	4	0	4.0	0.00%	100.00%	0.00%
73	4	0	4.0	0.00%	100.00%	0.00%
74	4	2	4.0	50.00%	100.00%	50.00%
75+	20	3	20.0	15.00%	100.00%	15.00%
Grand Total	933	117	150.8	12.54%	16.16%	77.61%



Exhibit B – Section II - Retirement Rates

Actual 2012-2017 Experience Compared to Proposed Assumption

Class B

Age	# of Lives	Actual Retirements	Expected Retirements	Ratio:		
				Actual %	Expected %	Actual over Expected
55	94	4	4.7	4.26%	5.00%	85.11%
56	94	6	4.7	6.38%	5.00%	127.66%
57	85	6	4.3	7.06%	5.00%	141.18%
58	78	5	3.9	6.41%	5.00%	128.21%
59	77	5	3.9	6.49%	5.00%	129.87%
60	75	4	5.6	5.33%	7.50%	71.11%
61	85	7	10.6	8.24%	12.50%	65.88%
62	74	12	13.3	16.22%	18.00%	90.09%
63	70	14	15.8	20.00%	22.50%	88.89%
64	61	17	15.3	27.87%	25.00%	111.48%
65	41	10	10.3	24.39%	25.00%	97.56%
66	31	13	9.3	41.94%	30.00%	139.78%
67	16	5	4.8	31.25%	30.00%	104.17%
68	8	2	2.4	25.00%	30.00%	83.33%
69	6	2	1.8	33.33%	30.00%	111.11%
70	2	0	1.0	0.00%	50.00%	0.00%
71	4	0	2.0	0.00%	50.00%	0.00%
72	4	0	2.0	0.00%	50.00%	0.00%
73	4	0	2.0	0.00%	50.00%	0.00%
74	4	2	2.0	50.00%	50.00%	100.00%
75+	20	3	20.0	15.00%	100.00%	15.00%
Grand Total	933	117	139.5	12.54%	14.95%	83.86%

Recommendation:

The proposed table was developed from the actual retirements from 2012-2017 and has rates that extend to age 75. Our recommendation is to adopt the proposed table.



Exhibit B – Section III - Turnover Rates

Actual 2012-2017 Experience Compared to Current Assumption

Class A

Service	# of Lives	Actual Terminations	Expected Terminations	Ratio:		Ratio: Actual over Expected
				Actual %	Expected %	
0	28	2	2.1	7.14%	7.46%	95.69%
1	74	6	5.2	8.11%	7.07%	114.72%
2	60	3	4.1	5.00%	6.75%	74.07%
3	57	1	3.7	1.75%	6.40%	27.40%
4	51	6	3.1	11.76%	6.14%	191.69%
5	46	1	2.8	2.17%	6.02%	36.10%
6	39	2	2.3	5.13%	5.95%	86.21%
7	35	1	2.1	2.86%	5.94%	48.08%
8	34	3	2.0	8.82%	5.85%	150.75%
9	26	1	1.5	3.85%	5.77%	66.67%
10+	222	1	11.8	0.45%	5.31%	8.48%
Grand Total	672	27	40.6	4.02%	6.04%	66.50%



Exhibit B – Section III - Turnover Rates

Actual 2012-2017 Experience Compared to Proposed Assumption

Class A

Service	# of Lives	Actual		Expected		Ratio:
		Terminations	Terminations	Actual %	Expected %	Actual over Expected
0	28	2	2.2	7.14%	8.00%	89.29%
1	74	6	5.2	8.11%	7.00%	115.83%
2	60	3	3.6	5.00%	6.00%	83.33%
3	57	1	3.4	1.75%	6.00%	29.24%
4	51	6	3.1	11.76%	6.00%	196.08%
5	46	1	2.8	2.17%	6.00%	36.23%
6	39	2	2.3	5.13%	6.00%	85.47%
7	35	1	1.8	2.86%	5.00%	57.14%
8	34	3	1.5	8.82%	4.50%	196.08%
9	26	1	1.0	3.85%	4.00%	96.15%
10	222	1	0.0	0.45%	0.00%	0.00%
Grand Total	672	27	26.9	4.02%	4.01%	100.30%

Recommendation:

Actual experience from 2012-2017 suggests that employees generally do not terminate after attainment of 10 years of service.

Our recommendation is to adopt a revised table that does not assume any terminations for 10 years of service or later.



Exhibit B – Section III - Turnover Rates

Actual 2012-2017 Experience Compared to Current Assumption

Class B

Service	Age	# of Lives	Actual		Expected		Ratio:
			Terminations	Terminations	Actual %	Expected %	Actual over Expected
<3	<25	61	11	16.1	18.03%	26.44%	68.20%
	25-29	202	51	47.0	25.25%	23.25%	108.58%
	30-34	150	26	29.5	17.33%	19.64%	88.26%
	35-39	126	22	21.7	17.46%	17.18%	101.62%
	40-44	133	17	18.6	12.78%	13.95%	91.59%
	45-49	142	19	19.0	13.38%	13.41%	99.79%
	50-54	110	13	14.7	11.82%	13.32%	88.74%
	Subtotal	924	159	166.5	17.21%	18.02%	95.52%
3+	<25	5	0	0.8	0.00%	15.00%	0.00%
	25-29	51	6	6.9	11.76%	13.55%	86.83%
	30-34	144	15	15.9	10.42%	11.05%	94.28%
	35-39	201	18	15.4	8.96%	7.67%	116.73%
	40-44	215	17	8.6	7.91%	4.00%	197.44%
	45-49	328	16	13.1	4.88%	4.00%	121.86%
	50-54	485	24	19.4	4.95%	4.00%	123.71%
	Subtotal	1,429	96	80.1	6.72%	5.61%	119.81%
Total	<25	66	11	16.9	16.67%	25.58%	65.17%
	25-29	253	57	53.9	22.53%	21.30%	105.79%
	30-34	294	41	45.4	13.95%	15.43%	90.37%
	35-39	327	40	37.1	12.23%	11.34%	107.90%
	40-44	348	34	27.2	9.77%	7.81%	125.14%
	45-49	470	35	32.2	7.45%	6.84%	108.80%
	50-54	595	37	34.1	6.22%	5.72%	108.66%
Grand Total		2,353	255	246.6	10.84%	10.48%	103.41%



Exhibit B – Section III - Turnover Rates

Actual 2012-2017 Experience Compared to Proposed Assumption

Class B

Service	Age	# of Lives	Actual		Expected		Ratio:
			Terminations	Terminations	Actual %	Expected %	Actual over Expected
<3	<25	58	10	13.6	17.24%	23.38%	73.75%
	25-29	163	41	34.2	25.15%	20.98%	119.92%
	30-34	117	20	21.9	17.09%	18.73%	91.28%
	35-39	99	19	16.8	19.19%	16.97%	113.10%
	40-44	106	12	16.0	11.32%	15.06%	75.19%
	45-49	107	13	14.0	12.15%	13.12%	92.59%
	50-54	82	8	9.5	9.76%	11.57%	84.30%
	Subtotal	732	123	126.0	16.80%	17.21%	97.66%
3+	<25	8	1	1.6	12.50%	20.13%	62.11%
	25-29	90	16	13.7	17.78%	15.18%	117.13%
	30-34	177	21	20.8	11.86%	11.75%	101.01%
	35-39	228	21	21.5	9.21%	9.41%	97.90%
	40-44	242	22	19.1	9.09%	7.89%	115.24%
	45-49	363	22	24.0	6.06%	6.61%	91.67%
	50-54	513	29	27.2	5.65%	5.30%	106.66%
	Subtotal	1,621	132	127.8	8.14%	7.88%	103.29%
Total	<25	66	11	15.2	16.67%	22.98%	72.51%
	25-29	253	57	47.9	22.53%	18.91%	119.12%
	30-34	294	41	42.7	13.95%	14.52%	96.02%
	35-39	327	40	38.3	12.23%	11.70%	104.58%
	40-44	348	34	35.1	9.77%	10.07%	97.00%
	45-49	470	35	38.0	7.45%	8.09%	92.01%
	50-54	595	37	36.7	6.22%	6.16%	100.87%
Grand Total		2,353	255	253.7	10.84%	10.78%	100.50%

Recommendation:

Actual experience from 2012-2017 suggests that the current assumption should remain a select and ultimate table but that the assumed rates should be updated. We recommend adopting 100% of the Vaughn Select & Ultimate Withdrawal Table for service prior to 3 years and 130% of the Vaughn Select & Ultimate Withdrawal Table thereafter.



Exhibit B – Section IV - Disability Rates

Actual 2012-2017 Experience Compared to Current Assumption

Class A

Age	# of Lives	Actual Disabilities	Expected Disabilities	Actual %	Expected %	Ratio: Actual over Expected
<25	41	0	0.1	0.00%	0.22%	0.00%
25-29	148	0	0.4	0.00%	0.25%	0.00%
30-34	192	0	0.6	0.00%	0.33%	0.00%
35-39	170	0	0.7	0.00%	0.42%	0.00%
40-44	158	0	0.9	0.00%	0.59%	0.00%
45-49	111	2	1.0	1.80%	0.89%	202.02%
50-54	31	0	0.5	0.00%	1.48%	0.00%
55+	22	0	0.0	0.00%	0.00%	0.00%
Grand Total	873	2	4.2	0.23%	0.48%	47.85%



Exhibit B – Section IV - Disability Rates

Actual 2012-2017 Experience Compared to Proposed Assumption

Class A

Age	# of Lives	Actual Disabilities	Expected Disabilities	Actual %	Expected %	Ratio: Actual over Expected
<25	41	0	0.0	0.00%	0.07%	0.00%
25-29	148	0	0.2	0.00%	0.11%	0.00%
30-34	192	0	0.3	0.00%	0.17%	0.00%
35-39	170	0	0.4	0.00%	0.24%	0.00%
40-44	158	0	0.6	0.00%	0.39%	0.00%
45-49	111	2	0.7	1.80%	0.60%	298.51%
50-54	31	0	0.3	0.00%	0.97%	0.00%
55+	22	0	0.3	0.00%	1.27%	0.00%
Grand Total	873	2	2.8	0.23%	0.32%	71.94%

Recommendation:

The 2012-2017 actual experience shows that there were fewer disabilities than expected. Also, since there was a relatively low number of exposures, a standard disability table should be used.

Our recommendation is to adopt the 1985 Pension Disability Study Class 2 Table for Males and Females.



Exhibit B – Section IV - Disability Rates

Actual 2012-2017 Experience Compared to Current Assumption

Class B

Age	# of Lives	Actual Disabilities	Expected Disabilities	Actual %	Expected %	Ratio: Actual over Expected
<25	66	0	0.1	0.00%	0.09%	0.00%
25-29	253	0	0.2	0.00%	0.09%	0.00%
30-34	294	0	0.4	0.00%	0.13%	0.00%
35-39	327	0	0.5	0.00%	0.16%	0.00%
40-44	348	0	0.8	0.00%	0.23%	0.00%
45-49	470	0	1.7	0.00%	0.37%	0.00%
50-54	595	2	3.8	0.34%	0.64%	52.22%
55-59	534	8	6.3	1.50%	1.18%	126.58%
60-64	416	6	10.1	1.44%	2.42%	59.58%
65+	152	0	0.0	0.00%	0.00%	0.00%
Grand Total	3,455	16	23.9	0.46%	0.69%	66.83%

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Exhibit B – Section IV - Disability Rates

Actual 2012-2017 Experience Compared to Proposed Assumption

Class B

Age	# of Lives	Actual Disabilities	Expected Disabilities	Actual %	Expected %	Ratio: Actual over Expected
<25	66	0	0.0	0.00%	0.03%	0.00%
25-29	253	0	0.1	0.00%	0.05%	0.00%
30-34	294	0	0.2	0.00%	0.07%	0.00%
35-39	327	0	0.4	0.00%	0.12%	0.00%
40-44	348	0	0.7	0.00%	0.19%	0.00%
45-49	470	0	1.5	0.00%	0.31%	0.00%
50-54	595	2	3.4	0.34%	0.56%	59.70%
55-59	534	8	5.3	1.50%	0.99%	152.09%
60-64	416	6	5.6	1.44%	1.35%	106.76%
65+	152	0	2.0	0.00%	1.28%	0.00%
Grand Total	3,455	16	19.1	0.46%	0.55%	83.90%

Recommendation:

The 2012-2017 actual experience shows that there were fewer disabilities than expected. Also, since there was a relatively low number of exposures, a standard disability table should be used.

Our recommendation is to adopt the 1985 Pension Disability Study Class 1 Table for Males and Females.



Exhibit B – Section V – Rate of Compensation Increase

Actual 2012-2017 Experience Compared to Current Assumption

Class A

Service	# of Lives	Prior Year Salaries	Actual Salaries	Expected Salaries	Ratio:
					Actual over Expected
<1	94	2,655,845	4,153,024	2,849,486	145.75%
1	57	2,472,592	2,700,812	2,651,319	101.87%
2	56	2,511,525	2,695,271	2,686,533	100.33%
3	45	2,269,816	2,368,425	2,426,620	97.60%
4	45	2,265,473	2,378,355	2,419,897	98.28%
5	37	1,944,949	2,048,564	2,076,282	98.67%
6	34	1,763,918	1,803,233	1,880,735	95.88%
7	32	1,709,079	1,885,243	1,810,979	104.10%
8	26	1,497,457	1,604,637	1,583,415	101.34%
9	29	1,692,072	1,736,561	1,787,949	97.13%
10	33	1,943,942	2,019,895	2,047,719	98.64%
11	38	2,281,761	2,356,212	2,398,506	98.24%
12	41	2,537,625	2,645,430	2,664,540	99.28%
13	46	2,877,443	3,030,364	3,011,441	100.63%
14	38	2,548,945	2,653,251	2,670,699	99.35%
15	36	2,224,902	2,359,122	2,330,758	101.22%
16	33	1,912,379	2,007,974	1,996,205	100.59%
17	26	1,421,334	1,479,561	1,479,741	99.99%
18	16	804,258	853,235	836,711	101.97%
19	12	526,420	547,615	548,641	99.81%
20+	35	979,831	1,027,884	1,017,744	101.00%
Grand Total	809	40,841,566	44,354,668	43,175,920	102.73%



Exhibit B – Section V - Rate of Compensation Increase

Actual 2012-2017 Experience Compared to Proposed Assumption

Class A

Service	# of Lives	Prior Year Salaries	Actual Salaries	Expected Salaries	Ratio:
					Actual over Expected
<1	94	2,655,845	4,153,024	2,921,429	142.16%
1	57	2,472,592	2,700,812	2,682,762	100.67%
2	56	2,511,525	2,695,271	2,694,866	100.02%
3	45	2,269,816	2,368,424	2,412,815	98.16%
4	45	2,265,473	2,378,355	2,399,136	99.13%
5	37	1,944,949	2,048,564	2,053,866	99.74%
6	34	1,763,918	1,803,233	1,859,170	96.99%
7	32	1,709,079	1,885,243	1,797,951	104.86%
8	26	1,497,457	1,604,637	1,572,330	102.05%
9	29	1,692,072	1,736,561	1,773,291	97.93%
10	33	1,943,942	2,019,895	2,035,307	99.24%
11	38	2,281,761	2,356,212	2,386,722	98.72%
12	41	2,537,625	2,645,430	2,651,818	99.76%
13	46	2,877,443	3,030,364	3,004,051	100.88%
14	38	2,548,945	2,653,251	2,658,550	99.80%
15	36	2,224,902	2,359,122	2,318,348	101.76%
16	33	1,912,379	2,007,974	1,988,875	100.96%
17	26	1,421,334	1,479,561	1,475,345	100.29%
18	16	804,258	853,235	834,015	102.30%
19	12	526,420	547,615	545,371	100.41%
20+	35	979,831	1,027,884	1,014,125	101.36%
Grand Total	809	40,841,566	44,354,667	43,080,143	102.96%

Recommendation:

Plan experience suggests a change to rates based on years of service, rather than age.

Our recommendation is to adopt the proposed merit table, which includes an updated long-term inflation assumption of 2.60%.



Exhibit B – Section V - Rate of Compensation Increase

Actual 2012-2017 Experience Compared to Current Assumption

Class B

Service	# of Lives	Prior Year Salaries	Actual Salaries	Expected Salaries	Ratio: Actual over Expected
<1	456	10,579,447	16,750,669	11,155,549	150.16%
1	242	8,919,844	9,504,853	9,399,191	101.12%
2	190	7,601,278	7,989,931	8,004,783	99.81%
3	163	6,911,001	7,320,631	7,269,646	100.70%
4	145	5,869,801	6,225,283	6,173,749	100.83%
5	144	5,943,054	6,092,295	6,244,222	97.57%
6	129	5,658,733	5,826,517	5,935,108	98.17%
7	117	5,123,520	5,361,936	5,369,059	99.87%
8	108	4,745,805	4,906,755	4,967,797	98.77%
9	102	4,292,151	4,443,586	4,493,832	98.88%
10	95	3,973,410	4,140,768	4,156,111	99.63%
11	85	3,826,279	4,001,284	4,000,796	100.01%
12	88	4,092,975	4,216,673	4,278,089	98.56%
13	88	4,109,096	4,272,289	4,293,760	99.50%
14	81	3,862,962	3,962,622	4,031,591	98.29%
15	72	3,394,080	3,546,706	3,539,559	100.20%
16	72	3,618,283	3,753,550	3,771,369	99.53%
17	62	3,162,535	3,248,638	3,296,018	98.56%
18	53	2,836,916	2,921,970	2,955,849	98.85%
19	43	2,493,360	2,551,421	2,596,688	98.26%
20+	511	25,454,064	26,144,965	26,492,920	98.69%
Grand Total	3,046	126,468,594	137,183,342	132,425,686	103.59%



Exhibit B – Section V – Rate of Compensation Increase

Actual 2012-2017 Experience Compared to Proposed Assumption

Class B

Service	# of Lives	Prior Year Salaries	Actual Salaries	Expected Salaries	Ratio:
					Actual over Expected
<1	456	10,579,447	16,750,669	11,277,691	148.53%
1	242	8,919,844	9,504,853	9,455,035	100.53%
2	190	7,601,278	7,989,931	8,019,348	99.63%
3	163	6,911,001	7,320,631	7,263,462	100.79%
4	145	5,869,801	6,225,283	6,157,422	101.10%
5	144	5,943,054	6,092,295	6,222,378	97.91%
6	129	5,658,733	5,826,517	5,913,376	98.53%
7	117	5,123,520	5,361,936	5,348,955	100.24%
8	108	4,745,805	4,906,755	4,949,874	99.13%
9	102	4,292,151	4,443,586	4,476,713	99.26%
10	95	3,973,410	4,140,768	4,140,293	100.01%
11	85	3,826,279	4,001,284	3,986,983	100.36%
12	88	4,092,975	4,216,673	4,260,787	98.96%
13	88	4,109,096	4,272,289	4,273,460	99.97%
14	81	3,862,962	3,962,622	4,013,617	98.73%
15	72	3,394,080	3,546,706	3,523,055	100.67%
16	72	3,618,283	3,753,550	3,755,778	99.94%
17	62	3,162,535	3,248,638	3,282,712	98.96%
18	53	2,836,916	2,921,970	2,941,882	99.32%
19	43	2,493,360	2,551,421	2,583,120	98.77%
20+	511	25,454,064	26,144,965	26,344,957	99.24%
Grand Total	3,046	126,468,594	137,183,342	132,190,898	103.78%

Recommendation:

Our recommendation is to adopt the proposed merit table, which includes an updated long-term inflation assumption of 2.60%.



Exhibit B – Section VI – COLA (Benefit Accrual Rate)

For both Class A and Class B, 85% of retiring members are assumed to elect the no COLA benefit accrual rate and 15% of retiring members are assumed to elect the full COLA benefit accrual rate.

For members that retired during the 2012-2017 measurement period, the COLA elected was as follows:

COLA Selection	Class A	Class B
Full COLA	8.3%	28.9%
Half COLA	2.8%	5.4%
No COLA	88.9%	65.8%

Recommendation:

We recommend retaining the Class A assumption. We recommend changing the Class B assumption so that 75% of retiring members are assumed to elect the no COLA benefit accrual rate and 25% of retiring members are assumed to elect the full COLA benefit accrual rate.

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Exhibit B – Section VII - Investment Return Assumption

Expected Long-Term Return Based on Asset Allocation

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*	Weighting
US Large Cap	30.09%	4.50%	1.35%
US Mid Cap	8.99%	5.00%	0.45%
US Small Cap	8.99%	5.00%	0.45%
MSCI EAFE	9.31%	5.25%	0.49%
MSCI Emerging Markets	10.40%	6.25%	0.65%
Intermediate Government Credit	27.74%	1.50%	0.42%
Real Estate	2.08%	4.50%	0.09%
Private Equity	1.56%	6.25%	0.10%
Cash	0.84%	0.25%	0.00%
	100.00%		4.00%
Long-Term Inflation Expectation			2.60%
Long-Term Expected Nominal Return			6.60%

**Long-Term Expected Real Rates of Return are provided by H&H Investment Advisors. The returns are geometric means.*

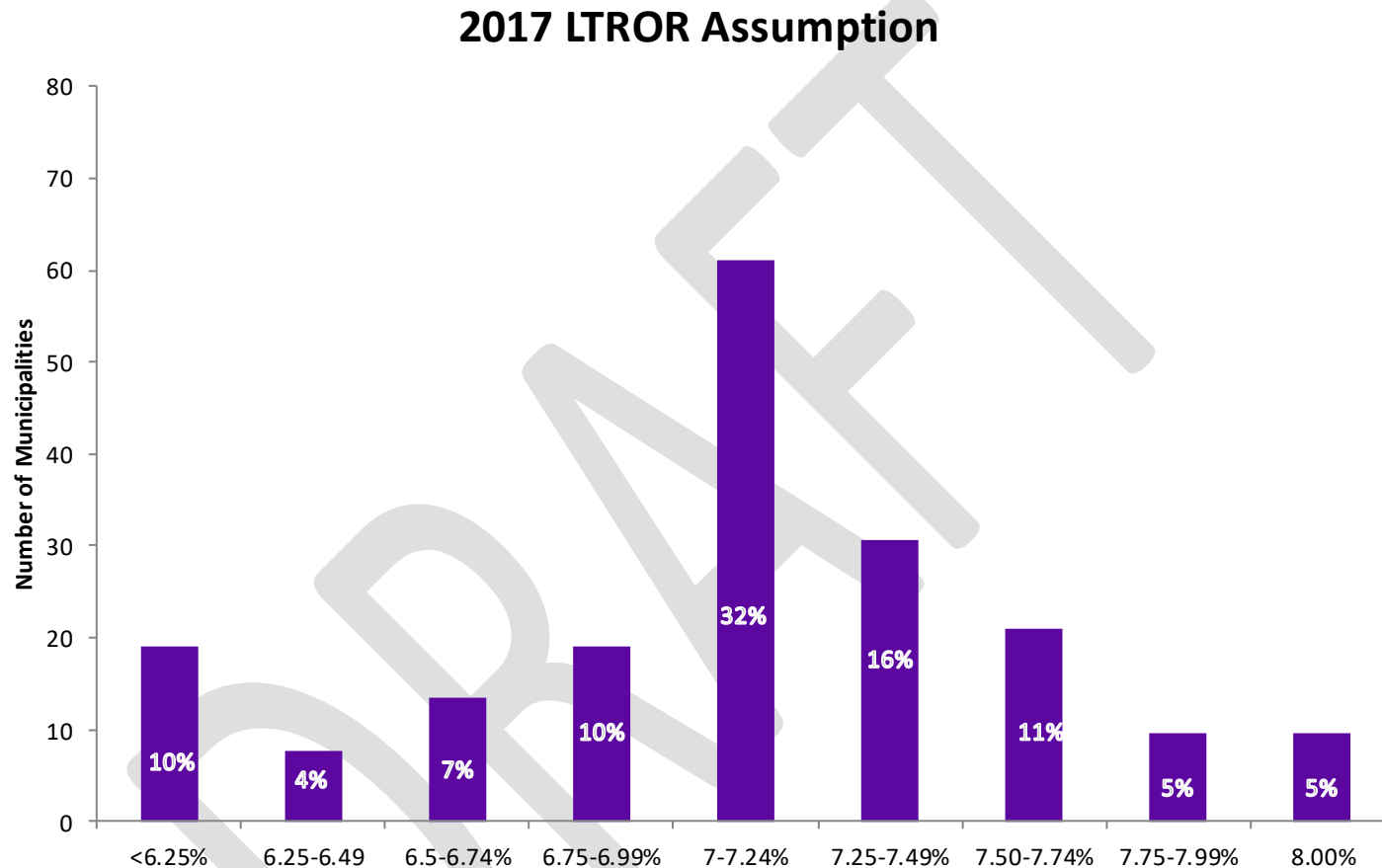
The long-term expected rate of return on pension plan investments was determined using a building block method in which best-estimate ranges of expected future real rates of return are developed. Best estimates of the real rates of return for each major asset class are included in the pension plan's target asset allocation.

The information above is based on geometric means and does not reflect additional returns through investment selection, asset allocation and rebalancing. The results support a rate between 6.60% and 7.10%.



Exhibit B – Section VII - Investment Return Assumption

Survey of Long-Term Rate of Return Assumption, based on FYE 2017 CAFRs*



* This information comes from 191 Connecticut plans that we gathered data on.

Recommendation:

The plan's current asset allocation combined with updated long term capital market expectations (H&H Investment Advisors, 2018) that assume 2.60% inflation support an investment return assumption in the range of 6.60% to 7.10%.

As a result, our recommendation is to change the current assumption of 8.00% to 7.10% or lower. However, the final rate should be selected in consultation with the plan's investment advisor.