

City of Delray Beach General Employees' Retirement Plan

EXPERIENCE INVESTIGATION FOR THE 8 YEARS
ENDED SEPTEMBER 30, 2018





June 12, 2019

Board of Trustees
City of Delray Beach General Employees' Retirement Plan
Delray Beach, Florida

Re: Experience Investigation for the 8-Year Period Ending September 30, 2018

Dear Board Members:

Gabriel, Roeder, Smith & Company is pleased to provide the results of our experience investigation for the City of Delray Beach General Employees' Retirement Plan. The period covered by this study is October 1, 2010 through September 30, 2018. Based upon the results, certain changes in actuarial assumptions for valuation purposes are recommended.

The Table of Contents, which immediately follows, sets out the material contained in this report.

This Report was prepared at the request of the Board and is intended for use by the Pension Plan (Plan) and those designated or approved by the Board. This Report may be provided to parties other than the Plan only in its entirety and only with the permission of the Board.

The purpose of this Report is to evaluate the assumptions and methods to be used for the October 1, 2018 and subsequent years' Actuarial Valuations, and to describe the financial effect of the recommended assumption and method changes based on our findings. This Report should not be relied on for any purpose other than the purpose described above.

The study was performed on the basis of participant data and financial information supplied by the Plan Administrator and the City in connection with the valuations performed during the years studied. We checked for internal and year-to-year consistency, but did not audit this data. We are not responsible for the accuracy or completeness of the information provided by the Plan Administrator and the City.

The enclosed calculations are based upon the Plan provisions as summarized in the October 1, 2017 Actuarial Valuation Report dated August 30, 2018. If you have reason to believe the assumptions used are unreasonable, the Plan provisions are incorrectly described or referenced, or that important Plan provisions relevant to this study are not described, you should contact the undersigned prior to relying on this information.

The valuation date used for calculating the financial effect of the assumption changes was October 1, 2018. Future actuarial measurements may differ significantly from the current measurements presented in this Report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or

decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

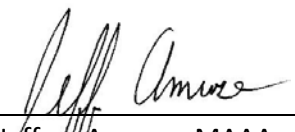
Jeffrey Amrose and Trisha Amrose are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor.

This Report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of the Plan as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

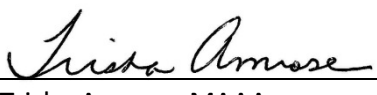
Gabriel, Roeder, Smith & Company will be pleased to review this Report with the Board of Trustees and to answer any questions pertaining to the valuation.

Respectfully submitted,

GABRIEL, ROEDER, SMITH & COMPANY

By 

Jeffrey Amrose, MAAA
Enrolled Actuary No. 17-6599

By 

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SECTION A

SUMMARY OF FINDINGS

SUMMARY OF FINDINGS

The 8-year period (October 1, 2010 to September 30, 2018) covered by this experience investigation period provided sufficient data to form a basis for recommending updates in the following demographic and financial assumptions used in the actuarial valuation of the Pension Plan.

Recommended changes in actuarial assumptions resulting from this experience investigation, including the approximate impact on the FYE 2020 required City contributions as a dollar amount and as a percent of covered payroll and the impact on the funded ratio, are summarized below.

For comparison purposes, the required City contribution for the fiscal year ending September 30, 2020 was 11.72% of covered payroll (assuming a December 31 payment date), or approximately \$2.35 million, and the funded ratio as of October 1, 2018 was 98.3%.

Our recommendations are as follows:

- Update the future salary increase assumption to reflect lower than expected real salary increases.

Estimated First Year Impact on:	
Required Employer Contribution	Funded Ratio
(\$235,256) or (1.17%) of covered payroll	+0.53%

- Update assumed future retirement rates to reflect generally higher observed retirement experience than expected.

Estimated First Year Impact on:	
Required Employer Contribution	Funded Ratio
+\$83,517 or +0.42% of covered payroll	(0.48%)

- Update assumed rates of future separation from employment to reflect generally higher than expected separation.

Estimated First Year Impact on:	
Required Employer Contribution	Funded Ratio
(\$149,435) or (0.74%) of covered payroll	+0.12%

- Update assumed rates of future disability to reflect lower observed disability experience than expected.

Estimated First Year Impact on:	
Required Employer Contribution	Funded Ratio
+\$12,566 or +0.07% of covered payroll	(0.18%)

- Update the net investment return assumption from 7.25% to 7.00%.

Estimated First Year Impact on:	
Required Employer Contribution	Funded Ratio
+\$452,386 or +2.26% of covered payroll	(2.59%)

- Update the net investment return assumption from 7.25% to 6.75%.

Estimated First Year Impact on:	
Required Employer Contribution	Funded Ratio
+\$913,598 or +4.57% of covered payroll	(5.16%)

- Combined effect above including lowering the net investment return assumption from 7.25% to 7.00%.

Estimated First Year Impact on:	
Required Employer Contribution	Funded Ratio
+\$120,377 or +0.60% of covered payroll	(2.62%)

- Combined effect above including lowering the net investment return assumption from 7.25% to 6.75%.

Estimated First Year Impact on:	
Required Employer Contribution	Funded Ratio
+\$566,378 or +2.83% of covered payroll	(5.19%)

Note: The sum of the individual cost impacts does not equal the impact of all changes combined due to the interaction of Plan provisions and actuarial assumptions with one another and the effect that one assumption can have on the impact of another assumption change.

SECTION B

EXPERIENCE INVESTIGATION RESULTS

Methodology

The methodology, basic results and conclusions of the eight-year experience investigation of the actuarial assumptions are described below.

The expected salaries at the end of each year were obtained by use of the salary scale assumption used in the October 1, 2017 actuarial valuation. The resulting expected salaries were then compared with the actual salaries reported.

The number of members exposed to risk during each period was tabulated (exposure) and the expected incidence of separation (separation of members not eligible for normal retirement), retirement and disability were obtained by use of the retirement, separation and disability rates employed in the October 1, 2017 actuarial valuation. The actual number of retirements, separations and disabilities was tabulated and compared with those expected.

Finally, an evaluation of the Plan's investment return assumption was conducted, using forward-looking capital market assumptions (of expected investment returns and volatilities for various asset classes) collected from 12 different investment consultants.

Consideration was given to the size of the group. Over the 8-year experience study period reviewed, there were a total of 2,897 exposures (each active member compared from one year to the subsequent year). This number of exposures is sufficient to provide partial credibility to the observed experience, but it is insufficient to be considered **fully credible**. Therefore, some weight was given to the current assumptions while developing our recommended demographic assumptions going forward.

Basic Results and Conclusions

Rates of Salary Increase

Observed rates of real salary increases (net of inflation) during the experience investigation period were generally lower than expected based on the current assumption.

We propose revised assumed rates of salary increase based on completed years of service as shown in the tables below. Actual versus expected salary increase experience is shown in Appendix A starting on page 18.

Salary Scale		
Years of Service	Current Rates	Proposed Rates
1 - 2	7.14%	6.75%
3 - 4	6.90%	5.75%
5 - 14	5.89%	5.00%
15 - 19	5.00%	4.50%
20+	4.40%	3.75%

Rates of Retirement

The current normal retirement eligibility is as follows:

- Group 1 - Normal retirement for members within ten years of attaining age 60 or 30 years of service as of October 5, 2010 is the earlier of age 60 with 10 years of service or 30 years of service.
- Group 2 - Normal retirement for other members hired on or before October 5, 2010 is the earlier of age 62 with 10 years of service or 30 years of service.
- Group 3 - Normal retirement for members hired after October 5, 2010 is age 65 with 10 years of service.

Early retirement eligibility is the earlier of age 55 with 15 years of service or 20 years of service.

The retirement experience studied in this report is based on the retirement pattern for Group 1 employees only since members in Group 2 and Group 3 were not eligible for retirement during the study period. We based the proposed retirement rates for Group 2 and Group 3 employees on the experience from Group 1 employees. We recommend monitoring the retirement experience for these other groups of employees as experience emerges.

The observed number of retirements during the experience investigation period was generally higher than expected based on the current assumed rates of retirement. The current and proposed retirement rates are shown in the following tables. Actual versus expected experience is shown in Appendix B on page 19.

Early Retirement			
Age	Service	Current Rates	Proposed Rates
0 - 54	20 +	5.0%	4.0%
55 - 59	All	5.0%	7.5%

Normal Retirement for Members Within Ten Years of Age 60 or 30 Years of Service as of October 5, 2010			
Age	Years of Service	Current Rates	Proposed Rates
0 - 59	30	40.0%	80.0%
0 - 59	31+	48.6%	25.0%
60	All	40.0%	70.0%
61 - 62	All	40.0%	25.0%
63 - 64	All	41.5%	45.0%
65	All	90.0%	85.0%
66 - 69	All	58.5%	55.0%
70+	All	85.0%	100.0%

Normal Retirement for Other Members Hired Before October 5, 2010		
Age	Years of Service	Proposed Rates
0 - 61	30	80.0%
0 - 61	31+	25.0%
62	All	70.0%
63 - 64	All	25.0%
65 - 66	All	45.0%
67	All	85.0%
68 - 69	All	55.0%
70 +	All	100.0%

Normal Retirement for Other Members Hired After October 5, 2010	
Age	Proposed Rates
65	70.0%
66 - 67	25.0%
68 - 69	45.0%
70+	100.0%

Rates of Employment Separation

The Plan currently has a graded vesting schedule which starts at 50% when a member has five years of service and increases by 10% per year until a member is 100% vested at ten years of service.

The observed rates of employment separations during the experience investigation period were generally higher than expected.

The current and proposed separation (withdrawal) rates are shown in the following table. Actual versus expected experience is shown in Appendix C starting on page 20.

Withdrawal Rates Employees With Less Than 5 Years of Service		
Years of Service	Current Rates	Proposed Rates
0 - 1	16.0%	15.0%
1 - 2	16.0%	15.0%
2 - 3	12.0%	14.5%
3 - 4	10.0%	10.5%
4 - 5	8.0%	9.0%

Withdrawal Rates Employees With More Than 5 Years of Service		
Age	Current Rates	Proposed Rates
0 - 35	7.1%	9.0%
36 - 40	5.8%	5.5%
41 - 45	4.5%	4.8%
46 - 50	3.1%	4.0%
51 - 55	2.9%	4.0%
56 +	1.2%	3.5%

Rates of Disability

The actual number of disabilities was significantly lower than the number of expected disabilities. As a result, we propose lowering the assumed rates of disability, as shown below. Additionally, we propose lowering the assumed percentage of disability retirements that are service connected. Currently, 20% of disability retirements are assumed to be service connected and 80% are assumed to be non-service connected. We proposed assuming 10% of disability retirements are service connected and 90% are non-service connected to be more in line with the actual experience of the Plan. Actual versus expected experience is shown in Appendix D on page 21.

Disability		
Age	Current Rates	Proposed Rates
0 - 24	0.26%	0.20%
25 - 29	0.24%	0.18%
30 - 34	0.23%	0.18%
35 - 39	0.26%	0.20%
40 - 44	0.32%	0.24%
45 - 49	0.35%	0.27%
50 - 54	0.44%	0.33%
55 - 59	0.61%	0.45%
60+	0.82%	0.62%

Rates of Mortality

The mortality assumption used in the Plan's October 1, 2017 Actuarial Valuation was mandated under Florida state law to be the mortality assumption used by the Florida Retirement System (FRS) for Regular Class members. We are therefore not proposing any changes to the mortality assumption. FRS usually updates their mortality assumption once every five years after an experience study is completed. FRS' mortality assumption was last updated (with a minor change) effective with their July 1, 2016 actuarial valuation. The last FRS experience study covered the period 2008 – 2013, and the resulting changes in assumptions were effective in the July 1, 2014 actuarial valuation. The current FRS mortality assumption (and the mortality assumption used in the October 1, 2017 Actuarial Valuation) is described below:

Healthy Mortality

RP-2000 Combined Healthy Participant Mortality Table (for pre-retirement mortality) and the RP-2000 Mortality Table for Annuitants (for post-retirement mortality), with mortality improvements projected to all future years after 2000 using Scale BB. For males, the base mortality rates include a 50% blue collar adjustment and a 50% white collar adjustment. For females, the base mortality rates include a 100% white collar adjustment.

Disabled Mortality

For disabled retirees, the RP-2000 Mortality Table for Disabled Annuitants was used, with ages set back 4 years for males and set forward 2 years for females, with no provision being made for future mortality improvements.

Rate of Investment Return

The selection of the actuarial assumed rate of return is a major decision. It has even been a controversial topic for many pension boards and outside observers at times.

THE USE OF HISTORICAL RETURNS IN SETTING THE INVESTMENT RETURN ASSUMPTION

We have prepared the following table which provides the information regarding the historical returns for the Plan.

Year Ended	Market Value Return*	Year Ended	Market Value Return*
12/31/85	24.0 %	9/30/02	(5.1) %
12/31/86	21.1	9/30/03	13.8
12/31/87	5.8	9/30/04	6.4
12/31/88	8.6	9/30/05	8.1
12/31/89	24.2	9/30/06	6.2
12/31/90	3.3	9/30/07	11.3
12/31/91	28.3	9/30/08	(12.4)
12/31/92	6.3	9/30/09	1.9
9/30/93	4.3	9/30/10	9.6
9/30/94	(2.9)	9/30/11	1.2
9/30/95	21.1	9/30/12	18.1
9/30/96	14.8	9/30/13	13.0
9/30/97	23.3	9/30/14	12.0
9/30/98	5.6	9/30/15	0.4
9/30/99	12.2	9/30/16	10.4
9/30/00	8.7	9/30/17	12.8
9/30/01	(1.0)	9/30/18	10.7
Average Returns:			
Last 5 Years	9.2 %		
Last 10 Years	8.9 %		
All Years	9.3 %		

* Net of investment expenses after 2005

It is important that the Board be able to defend the investment return assumption that they adopt. In our opinion, which is supported by the Actuarial Standards of Practice (ASOP), we believe the assumption adopted is best supported if it is based on projections from the experts in the field (i.e. the twelve national investment consultants in our study). The evidence supporting an investment

return assumption should not be “nobody really knows what future returns will be” or “we did not want to change our current assumption”.

The following is taken from ASOP No. 27 regarding the use of historical returns in the setting of the investment return assumption.

- The discount rate used in the measurement of a pension obligation is a **forward-looking assumption**. While the actuary may use some historical results in establishing expectations regarding the future, the discount rate reflects an expectation of events to come, not events that have already occurred.
- The actuary should consider the possibility that some historical economic data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment.
- The actuary should develop a reasonable economic assumption based on the actuary’s estimate of **future** experience, the actuary’s observation of the estimates inherent in market data, or a combination thereof.
- The investment return assumption reflects the **anticipated** returns on the plan’s current and, if appropriate for the measurement, future assets.

We do not recommend basing the investment return solely on the historical returns of the Plan for a number of reasons. Using only the historical returns to set the investment return assumption is not recommended because the assumption will change based on the number of years in the look-back period, and the assumption will not reflect future anticipated changes in the economic environment. It is also important to note that consideration is given to the historical returns of each asset class in the investment consultants’ forward-looking forecasts.

Furthermore, as the size of a fund increases, the investments may shift into less volatile, lower return investments. Since the expected return is based on how the fund is invested, the historical fund returns will be less indicative of the future as the asset allocation changes.

HOW TO DETERMINE THE ACTUARIAL ASSUMED RATE OF RETURN

The assumed net long-term expected rate of return is the Plan fiduciaries’ best estimate of the future compound investment return of the fund. A building block approach should be used, in which the expected real returns (net of inflation) for each asset class in which the Plan is invested are estimated and multiplied by the asset allocation percentage of that asset class.

City of Delray Beach General Employees' Retirement Plan's Asset Allocation

The Plan's target asset allocation detailed in the most recent Investment Policy is shown below.

Asset Class	Target
Domestic Equity Securities	61.5% ¹
International Equity Securities	10.0%
Total Equity	71.5%
Intermediate Term Fixed Income	21.0% ²
Total Fixed Income	21.0%
Global Tactical Asset Allocation (GTAA)	7.5% ³
Total Alternatives	7.5%
Grand Total	100.0%

¹ Reflects 40% large-cap, 17% mid-cap and 4.5% small-cap

² 10.5% corporate bonds and 10.5% government bonds per Investment Consultant

³ Reflects 50% stock and 50% bond blend per Investment Consultant

FORWARD-LOOKING CAPITAL MARKET ASSUMPTIONS

Best practice for selecting the net investment return assumption considers a fund's asset allocation and reliable forecasts for capital market assumptions for each relevant asset class.

GRS is not an investment consulting firm and does not provide investment consulting or forecasting services. But GRS maintains a survey of the forecasts of capital market assumptions from the following twelve (12) major national investment consulting and forecasting firms to obtain a consensus:

Twelve Major National Investment Consultants and Forecasters	
Aon/Hewitt	NEPC
BNY/Mellon	Pension Consulting Alliance
Callan	R. V. Kuhns & Associates
J. P. Morgan	Summit
Marquette Associates	VOYA
Mercer	Wilshire

Of these 12 investment consultants, nine provided only short to mid-term capital market assumptions (over the next 5-15 years), while three (Aon/Hewitt, Mercer, and NEPC) provided long-term capital market assumptions (over the next 20-30 years). We have separately shown the short to mid-term forecasts and the long-term forecasts in our analysis.

Mapping the Asset Allocation

The investment consultants do not all provide their capital market assumptions in exactly the same asset classes as expressed on the previous page, so we have mapped the Plan's target asset allocation to the "best fit" asset classes of each investment consultant.

Build-up of Comparable Net Expected Returns

The following tables show the results of applying the mapping and calculation process of the nominal returns for each of the investment consultants. The expected nominal returns are called the "arithmetic means". The first table shows the results of the short to mid-term capital market assumptions. The second table shows the results of the long-term capital market assumptions (from the three investment consultants who provided long-term assumptions).

Short to Mid-Term Capital Market Assumptions

Investment Consultant	Investment Consultant Expected Nominal Return	Alpha for Active Management	Investment Consultant Inflation Assumption	Expected Real Return (2)+(3)-(4)	Actuary Inflation Assumption	Expected Nominal Return (5)+(6)	Active Management Expenses	Expected Nominal Return Net of Expenses (7)-(8)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	5.54%	0.11%	2.21%	3.43%	2.50%	5.93%	0.11%	5.82%	14.25%
2	5.61%	0.11%	2.20%	3.52%	2.50%	6.02%	0.11%	5.91%	13.58%
3	6.24%	0.11%	2.50%	3.85%	2.50%	6.35%	0.11%	6.24%	13.96%
4	6.30%	0.11%	2.50%	3.91%	2.50%	6.41%	0.11%	6.30%	14.00%
5	6.12%	0.11%	2.26%	3.97%	2.50%	6.47%	0.11%	6.36%	11.61%
6	6.41%	0.11%	2.25%	4.27%	2.50%	6.77%	0.11%	6.66%	14.06%
7	6.19%	0.11%	2.00%	4.30%	2.50%	6.80%	0.11%	6.69%	12.91%
8	6.68%	0.11%	2.31%	4.48%	2.50%	6.98%	0.11%	6.87%	13.76%
9	6.44%	0.11%	2.00%	4.55%	2.50%	7.05%	0.11%	6.94%	12.05%
10	6.70%	0.11%	1.95%	4.86%	2.50%	7.36%	0.11%	7.25%	13.27%
11	7.07%	0.11%	2.26%	4.92%	2.50%	7.42%	0.11%	7.31%	14.09%
12	7.55%	0.11%	2.00%	5.66%	2.50%	8.16%	0.11%	8.05%	13.65%
Average	6.40%	0.11%	2.20%	4.31%	2.50%	6.81%	0.11%	6.70%	13.43%

Long-Term Capital Market Assumptions

Investment Consultant	Investment Consultant Expected Nominal Return	Alpha for Active Management	Investment Consultant Inflation Assumption	Expected Real Return (2)+(3)-(4)	Actuary Inflation Assumption	Expected Nominal Return (5)+(6)	Active Management Expenses	Expected Nominal Return Net of Expenses (7)-(8)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	6.73%	0.11%	2.20%	4.64%	2.50%	7.14%	0.11%	7.03%	14.25%
2	7.04%	0.11%	2.31%	4.84%	2.50%	7.34%	0.11%	7.23%	14.08%
3	8.13%	0.11%	2.75%	5.49%	2.50%	7.99%	0.11%	7.88%	13.96%
Average	7.30%	0.11%	2.42%	4.99%	2.50%	7.49%	0.11%	7.38%	14.10%

Normalizing for Inflation

Since each investment consultant uses slightly different inflation assumptions, in columns (4) through (7) the returns are normalized for inflation so that each investment consultant's gross 1-year return includes the same inflation assumption.

Returns Net of Investment-related Expenses

The exhibits on the prior page show the development of a return assumption that is net of investment-related expenses. Investment-related expenses in the Plan are approximately 0.21% of assets (21 basis points) which means that the current expected gross return is approximately 7.5%. For purposes of this study we have assumed that there are 10 basis points of passive management expenses and 11 basis points of active management expenses for a total of 21 basis points of investment-related expenses.

Active and passive investment expenses are accounted for in the calculation of the expected return shown in column 9 on the prior page (i.e. it is net of investment-related expenses). A description of how the investment-related expenses are reflected in the returns shown in Column 9 is as follows:

- The investment returns from the Investment Consultants are net of passive investment expenses as they are included in their forecasts.
- Active management investment fees (Column 8), which are assumed to be 11 basis points, are subtracted from the returns.
- Alpha for active management equal to 11 basis points is added to the returns (Column 3) in order to cover the active management expenses.
 - While excess "alpha" returns may be expected by some to be achieved by the Plan's current and future investment managers and investment consultant, we cannot add alpha value in our assessment or development of our recommendation for the net investment return assumption.

Based on the above, all expenses (active and passive) are accounted for in the development of the return shown in Column 9 and therefore the return is net of investment-related expenses. These returns are called the expected "arithmetic means".

Arithmetic and Geometric Returns

Arithmetic expected returns represent the investment forecaster's expectation for any one given year. Geometric expected returns represent the investment forecaster's expectation for the average compound return over a given horizon period. Everything in the tables on the previous page relates to arithmetic means.

Geometric compounded average returns are always lower than arithmetic average returns. Actuarial valuations use compounding for measuring costs and liabilities. That is why the expected compound average return (geometric mean) is more appropriate for an actuarial investment return assumption.

As an investment return assumption, the geometric expected return is the return assumption that has a 50% chance of being achieved as a compound average over time. The geometric expected returns for the investment consultants who provided capital market assumptions are shown in the following tables. The first table shows the geometric expected returns using the short to mid-term capital market assumptions. The second table shows the geometric expected returns using the long-term capital market assumptions (from the three investment consultants who provided long-term assumptions).

Short to Mid-Term Capital Market Assumptions

Investment Consultant	Distribution of 5- 15 Year Average Geometric Net Nominal Return		
	40th	50th	60th
(1)	(2)	(3)	(4)
1	4.08%	4.88%	5.68%
2	4.29%	5.05%	5.81%
3	4.56%	5.34%	6.12%
4	4.61%	5.39%	6.17%
5	5.09%	5.74%	6.39%
6	4.96%	5.74%	6.53%
7	5.20%	5.92%	6.65%
8	5.23%	6.00%	6.77%
9	5.59%	6.27%	6.94%
10	5.70%	6.44%	7.19%
11	5.61%	6.40%	7.19%
12	6.44%	7.20%	7.97%
Average	5.11%	5.86%	6.62%

Long-Term Capital Market Assumptions

Investment Consultant	Distribution of 20 - 30 Year Average Geometric Net Nominal Return		
	40th	50th	60th
(1)	(2)	(3)	(4)
1	5.30%	6.09%	6.89%
2	5.53%	6.31%	7.11%
3	6.21%	6.99%	7.77%
Average	5.68%	6.46%	7.26%

As shown in the first table, the average short to mid-term expected geometric return (or the 50th percentile of compound average returns) net of investment-related expenses is 5.86%. The short to mid-term forecasting period is generally the next 5 - 15 years, so this means there is a 50-50 chance of achieving a 5.86% compound average net investment return over the next 5 - 15 years. Among the three investment consultants who provided long-term capital market assumptions, the average long-term expected geometric return net of investment-related expenses is 6.46%. This means the consensus opinion is that there is a 50-50 chance of achieving a 6.46% net compound average investment return over the next 20 to 30 years. Based on the forecasts, the “most appropriate rate net of investment-related expenses” would be between 5.86% and 6.46%.

Recommendation

We recognize that the capital market assumptions of each investment consultant surveyed differ from the average rate amongst the 12 consultants and that this analysis is not an exact science. We believe it is reasonable to reflect a margin of +/- 25 or 50 basis points to the average rate to reflect differing expectations amongst the 12 consultants. Based on this adjustment, we believe the upper end of the range for the rate net of investment-related expenses is 6.75% to 7.00%.

Our recommendation is to lower the investment return assumption from the current level of 7.25% net of investment-related expenses to a rate between 6.75% and 7.00% net of investment-related expenses. Our study shows the financial impact of lowering the net return assumption from 7.25% to 6.75% and 7.00%.

Other Assumptions and Methods

We do not recommend any change to the funding method, asset smoothing method or inflation assumption being used to determine the funding requirements. Below is a list of these items along with a description of each.

- **Individual Entry-Age Normal Actuarial Cost Method** - Normal cost and the allocation of benefit values between service rendered before and after the valuation date are determined using an Individual Entry-Age Actuarial Cost Method having the following characteristics:
 - (i) the annual normal cost for each individual active member, payable from the date of employment to the date of retirement, is sufficient to accumulate the value of the member's benefit at the time of retirement;
 - (ii) each annual normal cost is a constant percentage of the member's year by year projected covered pay.

Actuarial gains/(losses), as they occur, reduce/(increase) the Unfunded Actuarial Accrued Liability.

Financing of Unfunded Actuarial Accrued Liabilities - Unfunded Actuarial Accrued Liabilities (full funding credit if assets exceed liabilities) are amortized by level (principal & interest combined) dollar contributions over a reasonable period of future years.

- **Actuarial Value of Assets** - The Actuarial Value of Assets phase in the difference between the actual market value and the expected actuarial value of assets at the rate of 20% per year. The Actuarial Value of Assets will be further adjusted to the extent necessary to fall within the corridor whose lower limit is 80% of the Market Value of plan assets and whose upper limit is 120% of the Market Value of plan assets. During periods when investment performance exceeds the assumed rate, Actuarial Value of Assets will tend to be less than Market Value. During periods when investment performance is less than assumed rate, Actuarial Value of Assets will tend to be greater than Market Value.
- **Inflation** is assumed to be 2.50% per year. The average forecasted long-term CPI of the 3 national investment consultants shown in the investment return assumption section of our experience study report is 2.42%.

SECTION C

APPENDICES

APPENDIX A

COMPARISON OF ACTUAL AND EXPECTED ANNUAL MEMBER SALARIES

Salary Scale										Proposed Real Increase
Years of Service	Prior Year	Current Salary Increase Rates				Actual Experience				
		Expected	% Increase	Assumed Inflation	Assumed Real Increase	Actual	% Increase	Actual Inflation	Actual Real Increase	
1 - 2	11,681,432	12,515,717	7.14%	2.50%	4.64%	12,364,639	5.85%	1.82%	4.03%	4.25%
3 - 4	10,488,395	11,211,909	6.90%	2.50%	4.40%	10,930,214	4.21%	1.82%	2.39%	3.25%
5 - 14	52,147,226	55,216,165	5.89%	2.50%	3.39%	54,100,412	3.75%	1.82%	1.93%	2.50%
15 - 19	20,527,701	21,554,086	5.00%	2.50%	2.50%	21,244,170	3.49%	1.82%	1.67%	2.00%
20+	24,789,154	25,879,877	4.40%	2.50%	1.90%	25,499,812	2.87%	1.82%	1.05%	1.25%
Totals	119,633,908	126,377,754	5.64%	2.50%	3.39%	124,139,247	3.77%	1.82%	1.95%	2.39%

APPENDIX B

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

Early Retirement								
Age	Service	Exposures	Expected ER's	Expected %*	Actual ER's	Actual %	Expected ER's (Proposed Rates)	Proposed %
0 - 54	20 +	261	13.1	5.00%	10.0	3.83%	10.4	4.00%
55 - 59	All	214	10.7	5.00%	20.0	9.35%	16.1	7.50%
Totals		475	23.8		30.0		26.5	

Normal Retirement for Members within 10 Years of Age 60 or 30 Years of Service as of October 5, 2010								
Age	Years of Service	Exposures	Expected NR's	Expected %	Actual NR's	Actual %	Expected NR's (Proposed Rates)	Proposed %
0 - 59	30	29	11.6	40.00%	24.0	82.76%	23.2	80.00%
0 - 59	31+	14	6.8	48.57%	3.0	21.43%	3.5	25.00%
60	All	61	24.4	40.00%	45.0	73.77%	42.7	70.00%
61 - 62	All	37	14.8	40.00%	8.0	21.62%	9.3	25.00%
63 - 64	All	40	16.6	41.50%	22.0	55.00%	18.0	45.00%
65	All	6	5.4	90.00%	5.0	83.33%	5.1	85.00%
66 - 69	All	13	7.6	58.46%	7.0	53.85%	7.2	55.00%
70+	All	4	3.4	85.00%	2.0	50.00%	4.0	100.00%
Totals		204	90.6		116.0		112.9	

In developing the proposed retirement rates, we gave credibility to both the prior assumptions, which were developed based on prior experience and the actual experience during the study period. Giving credibility to the experience in both the current study period and the study period covered under the prior experience study report is important because they cover periods of time with varying economic landscapes which could impact when a member's decision to retire.

APPENDIX C

COMPARISON OF ACTUAL AND EXPECTED SEPARATIONS

Withdrawal Experience								
Years of Service	Age	Exposures	Expected W/D's	Expected %	Actual W/D's	Actual %	Expected W/D's (Proposed Rates)	Proposed %
0 - 1*	All Ages	8	1.3	16.00%	1.0	12.50%	1.2	15.00%
1 - 2	All Ages	128	20.5	16.00%	18.0	14.06%	19.2	15.00%
2 - 3	All Ages	190	22.8	12.00%	28.0	14.74%	27.6	14.50%
3 - 4	All Ages	143	14.3	10.00%	15.0	10.49%	15.0	10.50%
4 - 5	All Ages	149	11.9	8.00%	14.0	9.40%	13.4	9.00%
5+	0 - 35	180	12.8	7.11%	20.0	11.11%	16.2	9.00%
	36 - 40	209	12.2	5.82%	11.0	5.26%	11.5	5.50%
	41 - 45	313	14.2	4.53%	15.0	4.79%	14.9	4.75%
	46 - 50	343	10.6	3.08%	12.0	3.50%	13.7	4.00%
	51 - 55	311	9.0	2.90%	19.0	6.11%	12.4	4.00%
	56 +	244	3.0	1.24%	9.0	3.69%	8.5	3.50%
Totals		2,218	132.5		162.0		153.6	

* small number of exposures due to 1 year participation requirement

In developing the proposed withdrawal rates, we gave credibility to both the prior assumptions, which were developed based on prior experience and the actual experience during the study period. Giving credibility to the experience in both the current study period and the study period covered under the prior experience study report is important because they cover periods of time with varying economic landscapes which could impact when a member's decision to terminate employment before becoming eligible for retirement.

APPENDIX D

COMPARISON OF ACTUAL AND EXPECTED DISABILITIES

Disability							
Age	Exposures	Expected Disabilities	Expected %	Actual Dis.	Actual %	Expected Dis. (Proposed Rates)	Proposed %
0 - 24	31	0.08	0.26%	0.0	0.00%	0.06	0.20%
25 - 29	119	0.29	0.24%	0.0	0.00%	0.22	0.18%
30 - 34	200	0.47	0.23%	0.0	0.00%	0.35	0.18%
35 - 39	267	0.70	0.26%	0.0	0.00%	0.52	0.20%
40 - 44	372	1.18	0.32%	0.0	0.00%	0.88	0.24%
45 - 49	527	1.87	0.35%	0.0	0.00%	1.40	0.27%
50 - 54	577	2.52	0.44%	0.0	0.00%	1.89	0.33%
55 - 59	507	3.07	0.61%	0.0	0.00%	2.30	0.45%
60+	297	2.45	0.82%	0.0	0.00%	1.83	0.62%
Totals	2,897	12.62		0.0		9.46	

Please note that we did not set the proposed disability rates equal to the actual experience since there were no members who became disabled during the study period. We do not believe it is reasonable to set the disability probability to 0%, even though the actual experience showed this, because there is always a chance that a member will become disabled at any age. Our proposed rates are set equal to 75% of the current rates.

APPENDIX E

Purpose of the Actuarial Valuation

In a defined benefit pension plan, an employer makes a promise to its employees of a lifetime pension. The amount of the monthly pension is determined by a *benefit formula* which is often based upon a multiplier percentage and the number of years of service and the average final earnings of the employee.

The employer must design and follow a systematic plan for advance-funding this obligation. That is accomplished by establishing a pension fund and performing annual actuarial valuations to measure the liabilities associated with the obligation and to calculate how much the employer must contribute to the pension fund in order to make good on its promise.

The calculations in the actuarial valuation are performed each year to re-measure the liabilities. The stakeholders need to know how the plan is doing in its goal of systematically financing the promised benefits. So it is important to make the actuarial calculations in accordance with the professional actuarial standards of practice and the accounting standards.

Role of Actuarial Assumptions

The nature of the pension promise and its systematic funding require long term projections of the employee workforce (using demographic assumptions) and long term projections of the salaries and investment returns (using economic assumptions). The entire actuarial valuation process depends on the selection and use of reasonable actuarial assumptions as to future demographics and future economics. There are many different actuarial assumptions employed in an actuarial valuation. The primary actuarial assumptions include:

1. Rates of Salary Increases
2. Rates of Retirement
3. Rates of Mortality
4. Rates of Employment Separation
5. Rates of Disability
6. Rate of Investment Return

The actuary and plan management must be comfortable with the actuarial assumptions. The assumptions must be reasonable. Without a level of confidence in the reasonableness of the actuarial assumptions, the stakeholders and users of the valuation results cannot have confidence in the results. However, there is no way to have confidence in the actuarial assumptions unless an actuarial experience study is performed to assess the reasonableness of the current assumptions or to change them to be more in line with past experience and with future expectations.

For this reason the Board has requested that we undertake an actuarial experience study to recommend changes to the actuarial assumptions used in the annual actuarial valuation.

APPENDIX F

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and 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 differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; 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. 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 Plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the either assumed or forecasted returns;
2. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the Plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
3. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
4. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
5. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return is less (or more) than the assumed rate, the cost of the Plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The computed contribution amounts may be considered as a minimum contribution that complies with the pension Board's funding policy and the State statutes. The timely receipt of the actuarially determined contributions is critical to support the financial health of the Plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Risk Assessment

Risk assessment was outside the scope of this report. Risk assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. We are prepared to perform such assessment to aid the Board in the decision making process.