

Teachers' Pension and Annuity Fund  
of New Jersey

Experience Study  
July 1, 2012 – June 30, 2015

by

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January 16, 2017

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# Teachers' Pension and Annuity Fund of New Jersey

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Experience Study for the Period  
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## **Executive Summary**

This report presents the results of the statistical analysis of actual experience from July 1, 2012 through June 30, 2015 among active, inactive and retired employees and their spouses and beneficiaries covered by the Teachers' Pension and Annuity Fund of New Jersey (TPAF). This study is intended to comply with Title 18A, Subtitle 10, Chapter 66, Section 58 of New Jersey Statutes. This statute requires that at least once in every 3-year period the actuary shall make an actuarial investigation into the mortality, service and compensation or salary experience of the members and beneficiaries of the retirement system.

There are effectively four sections to the report plus two appendices:

- Section I – Executive Summary and Introduction. This section provides a brief list of the key assumption changes proposed.
- Section II - Economic Assumptions. In this section, a review of the salary increase assumption is discussed and changes proposed where appropriate. The investment return assumption has not reviewed since it is prescribed by the State Treasurer.
- Section III – Demographic Assumptions. This section presents a review of each assumption (rate of termination, retirement, mortality and disability) providing analysis on the experience observed as compared to the current assumption and proposes changes where appropriate.
- Section IV – Impact on Valuation Results displays the effect on the funded status and the statutory pension contribution as of June 30, 2015.
- Appendix I – Demographic Data Analysis summarizes the experience observed as compared to both the current and proposed assumptions utilizing actual to expected ratios. Summaries of this information are provided throughout Section III and can be easily located using the Table Index.
- Appendix II – Proposed Assumptions displays all the assumptions proposed.

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Table 1 provides a brief list of the key proposed assumptions.

Table 1 – Brief Summary of Proposed Assumptions	
Salary	A reduction in salary increases and extending the select period to June 30, 2026 to reflect the expectation of smaller increases in the near-term.
Termination	Reflect the continuing trend of lower rates of termination and a higher percentage of those terminations are electing a refund of contributions rather than a deferred vested benefit.
Retirement	Slight increase in retirement rates for members at first eligibility and for members age 66 and older as well as a decrease in rates for members with less than 25 years of service.
Disability	No change recommended at this time.
Pre-retirement Mortality	Modified for consistency with the postretirement mortality assumption.
Postretirement Mortality	Modified to be based on most recent mortality tables issued by the Society of Actuaries Retirement Plans Experience Committee, with adjustments to reflect actual experience among TPAF members.
Mortality Improvement	To use a generational approach with an improvement scale based on a 60-year average of mortality improvement rates using Social Security data.

The result of the proposed demographic assumptions is a decrease in the plan's actuarial accrued liability as of June 30, 2015 of 0.3%; increasing the funded ratio on an actuarial value basis from 51.1% to 51.3%- and a market value basis from 47.5% to 47.7%. The net impact on the full statutory pension contribution for the fiscal year ending June 30, 2015 is a decrease of \$35.3 million from \$2,737.2 million to \$2,701.9 million. The first year the proposed assumptions would become effective would be the June 30, 2016 actuarial valuation, which determines the statutory contribution for the fiscal year ending June 30, 2018. The percentage contribution the State is expected make in the 2018 fiscal year is 50%. Therefore, the estimated net impact on the statutory contribution is a decrease of \$17.6 million.

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Please note that the assumptions developed in this report are intended to value pension benefits for all members participating in the Teachers' Pension and Annuity Fund. Use of these assumptions may not be appropriate for other purposes or any one subset of the membership.

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In performing this analysis, we relied, without audit, on census data, plan provisions, asset statements and other information (both written and oral) provided by the State of New Jersey Division of Pensions and Benefits. We have not audited or verified the census data, asset statements or other information. To the extent any of these are inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete.

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We performed a limited review of the data used directly in our analysis for reasonableness and consistency and have not found material defects in the data. If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

Future actuarial measurements may differ significantly from the current measurements presented in this analysis due to actual plan experience deviating from the actuarial assumptions, and changes in plan provisions, actuarial assumptions, and applicable law. An assessment of the potential range and cost effect of such differences is beyond the scope of this analysis.

The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

We are members of the American Academy of Actuaries and meet its Qualification Standard to render this actuarial opinion.

Respectfully submitted,

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## Introduction

This report presents the results of the statistical analysis of actual experience from July 1, 2012 through June 30, 2015 among active, inactive and retired employees and their spouses and beneficiaries covered by the Teachers' Pension and Annuity Fund of New Jersey (TPAF). This study is intended to comply with Title 18A, Subtitle 10, Chapter 66, Section 58 of New Jersey Statutes which requires that at least once in every 3-year period the actuary shall make an actuarial investigation into the mortality, service and compensation or salary experience of the members and beneficiaries of the retirement system.

If a retirement system is to operate on a sound actuarial basis, the funds on hand together with the value of expected future employee, district and state contributions must be adequate to cover the value of future expected benefit payments. The determination of the value of expected future contributions and the value of expected future benefit payments involves projections based on anticipated future rates of mortality, withdrawal, disability, and retirement as well as rates of investment income and salary growth. In these projections, it is assumed that a certain proportion of the members of TPAF will terminate, die, retire or become disabled each year. Moreover, benefits are determined for each of these occurrences based on assumptions regarding the rate at which salaries will increase in the future. The value of these benefits are then calculated based on an assumed life expectancy for retirees, surviving spouses and other beneficiaries and the assumed long-term yield on plan assets. At three-year intervals an analysis is made to evaluate the experience under TPAF in order to revise, where necessary, those assumptions that are no longer in line with recent experience and/or best estimates of anticipated future experience.

In many cases of statistical analysis, the greater the volume of data analyzed the more reliable the results. This is not necessarily true in evaluating the experience of the

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members of a retirement system if this involves extending the study over long periods of time. For example, consider mortality experience among retirees. Twenty years ago the mortality rates at each age were considerably higher than the corresponding rates of mortality in more recent years. Thus, to include the experience of twenty years ago in a study of mortality rates would produce rates higher than are currently being experienced and can be expected to be experienced in the future. The use of mortality rates from even 10 or more years ago could understate life expectancy and hence contributions.

The experience from July 1, 2012 through June 30, 2015 served as a basis for this study. In a system as large as TPAF, three years of experience is generally adequate for statistical purposes. However, we also reviewed the results from prior experience studies in order to identify long term trends in the experience. This research from a longer-term historical perspective is the final step of the process before developing assumptions that can serve as best estimates of future experience. Our objective is to avoid frequent changes in assumptions due to random fluctuations in experience while reflecting any emerging long-term trends. One method used to accomplish this is to recommend revised assumptions, which fall between the prior assumptions and the actual experience during the current study period. This avoids frequent, sharp fluctuations in assumptions and costs while recognizing any emerging trends in the underlying plan experience.

As an aid in reviewing the detailed results of the evaluation as set forth in the following sections of this report, the following paragraphs review, in general terms, the effect of the various items of actuarial assumptions on the actuarial valuation. As noted above, an actuarial valuation involves a projection of the salaries and service of present members of the system and a determination of the value of the expected benefits payable to them.

If many members die or terminate before becoming eligible for benefits, required contributions to the fund will be smaller than if members experience lower mortality or

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turnover. Alternatively, if members experience longer life expectancies after commencement of the pension, required contributions would be increased. Similarly, a low investment yield will mean lower expected investment income so that there is a corresponding increase in required contributions today.

The overall reasonableness and consistency of the various actuarial assumptions is therefore a consideration. However, if as time passes each element in the actuarial assumptions moves further from actual experience, it is difficult to tell whether the assumptions are reasonable on an overall basis. Thus, it may be stated that one objective of the current analysis is to bring each element of the actuarial assumptions more in line with recent experience, especially those areas regarding demographic trends - withdrawal, disability, retirement and death.

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## Economic Assumptions

The investment return assumption is not reviewed since it is prescribed by the State Treasurer.

## Salary Increase Assumption

### Current Assumption

The current assumption varies based on years of service and reflects differences in short-term expectations versus long-term expectations. These differences are reflected to minimize actuarial gains or losses in the short-term while maintaining longer-term trends. The current assumption reflects lower expected salary increases until June 30, 2016, slightly higher increases for the following five years until June 30, 2021, and higher increases thereafter. Note that any proposed assumptions would first be reflected in the June 30, 2016 valuation and thus, the first tier would no longer apply if the current assumption was maintained.

### Analysis

The current assumption reflected experience through the fiscal year ending June 30, 2013. In reviewing the experience during the years ending June 30, 2014 and June 30, 2015, there was a continued trend of lower than expected salary increases. In fact the average salary increases for these years of 3.24% and 3.08%, respectively, are lower than the expected average salary increases of 3.37%. Over the 4-year period ending June 30, 2015, the average salary increase was 3.27%.

### Proposed Assumption

Based on information from the State and lower salary increases experienced during the prior two years, the State has recommended that the assumed salary increases be

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reduced by 50 basis points (0.5%) for all service points and the 5-year remaining select period be extended an additional 5 years to June 30, 2026. The rates used in the select period are similar to actual experience during the past 4 years and we believe this is a reasonable assumption.

The current assumptions are 2.75% for inflation and 3.75% for increases in the Social Security Taxable Wage Base. For consistency to the proposed two-tiered salary increase assumption and with Milliman's capital market assumptions, we recommend a reduction to the rate of inflation and rate of increase on the Social Security Taxable Wage Base. We recommend an inflation assumption of 2.3% until June 30, 2026 and 2.6% thereafter. We recommend the Social Security Taxable Wage Base increase assumption be 1% higher than the inflation assumption or 3.3% until June 30, 2026 and 3.6% thereafter.

Table 2 displays salary experience used in the analysis along with the proposed assumption.

### Effect on Plan's Liability

Compared to the current assumptions, the proposed assumptions reduce expected salary and projected benefits, which will result in a decrease in the plan's liability.

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**Table 2 - Summary of Salary Increase Experience and  
Recommended and Current Total Salary Increase Assumptions (wage inflation + merit scale)**

Completed Years of Service	Average Salary Increase During Fiscal Year ending					Recommended Assumptions	
	2012	2013	2014	2015	All Years	Prior to June 30, 2026	Thereafter
less than 1	3.33%	3.18%	3.16%	2.94%	3.15%	3.80%	4.90%
1	3.66%	3.90%	2.98%	2.93%	3.37%	3.80%	4.90%
2	3.77%	4.16%	3.01%	2.77%	3.43%	3.80%	4.90%
3	3.47%	3.58%	3.88%	3.08%	3.50%	3.80%	4.90%
4	3.57%	3.79%	3.63%	3.52%	3.63%	3.80%	4.90%
5	3.83%	3.95%	3.69%	3.66%	3.78%	3.80%	4.90%
6	3.81%	3.79%	4.20%	3.64%	3.86%	3.80%	4.90%
7	3.94%	3.84%	3.95%	3.57%	3.83%	3.80%	4.90%
8	4.03%	3.92%	3.94%	3.75%	3.91%	3.80%	4.90%
9	4.17%	4.30%	4.16%	3.83%	4.11%	4.55%	5.45%
10	4.43%	4.30%	4.04%	4.01%	4.20%	4.55%	5.45%
11	4.46%	4.56%	4.27%	4.00%	4.32%	4.55%	5.45%
12	4.36%	4.17%	4.18%	4.05%	4.19%	4.55%	5.45%
13	4.15%	4.12%	4.14%	3.87%	4.07%	4.30%	5.30%
14	3.85%	4.06%	4.01%	4.05%	3.99%	4.15%	4.95%
15	3.83%	4.05%	3.97%	3.98%	3.96%	3.95%	4.55%
16	3.37%	3.32%	3.51%	3.49%	3.42%	3.40%	4.00%
17	3.25%	3.02%	3.01%	3.11%	3.10%	3.15%	3.65%
18	2.83%	2.90%	2.81%	2.70%	2.81%	2.85%	3.45%
19	2.70%	2.69%	2.59%	2.65%	2.66%	2.70%	3.20%
20	2.48%	2.57%	2.50%	2.28%	2.46%	2.50%	3.10%
21	2.39%	2.37%	2.09%	2.07%	2.23%	2.25%	2.75%
22	2.06%	2.20%	1.89%	1.99%	2.04%	2.00%	2.60%
23	2.03%	2.07%	1.80%	1.63%	1.88%	1.90%	2.45%
24	1.94%	1.92%	1.90%	1.65%	1.85%	1.90%	2.45%
25	1.89%	2.13%	1.82%	1.75%	1.90%	1.90%	2.45%
26	1.93%	1.74%	1.68%	1.49%	1.71%	1.70%	2.30%
27	1.94%	1.85%	1.60%	1.36%	1.69%	1.70%	2.30%
28	2.01%	1.66%	1.49%	1.50%	1.66%	1.70%	2.30%
29	1.95%	1.70%	1.61%	1.30%	1.64%	1.70%	2.30%
30	1.93%	1.58%	1.59%	1.21%	1.58%	1.70%	2.30%
31	1.73%	1.70%	1.48%	1.36%	1.57%	1.55%	2.00%
32	1.63%	1.71%	1.31%	1.41%	1.51%	1.55%	2.00%
33	1.75%	1.45%	1.28%	1.10%	1.39%	1.55%	2.00%
34	1.59%	1.56%	1.45%	1.28%	1.47%	1.55%	2.00%
35	1.83%	1.41%	1.23%	1.17%	1.41%	1.55%	2.00%
36	1.73%	1.62%	1.46%	1.37%	1.55%	1.55%	2.00%
37	1.65%	1.24%	1.27%	0.97%	1.28%	1.55%	2.00%
38	1.94%	1.49%	1.53%	1.00%	1.49%	1.55%	2.00%
39	1.42%	1.28%	1.12%	1.65%	1.37%	1.55%	2.00%
40	2.09%	1.65%	1.06%	1.09%	1.47%	1.55%	2.00%
Average	3.37%	3.38%	3.24%	3.08%	3.27%	3.40%	4.21%

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### **Demographic Assumptions**

We determined the proposed demographic assumptions in accordance with the Actuarial Standards of Practice No. 35 (ASOP 35) revised by the Actuarial Standards Board in September of 2014. This standard provides guidance to actuaries in selecting demographic assumptions – primarily retirement, mortality, termination of employment and disability – for measuring obligations under defined benefit pension plans. An assumption is considered reasonable if it has the following characteristics:

- It is appropriate for the purpose of the measurement
- It reflects the actuary's professional judgment
- It takes into account relevant historical and current demographic data as of the measurement date
- It reflects the actuary's estimate of future experience
- It has no significant bias, i.e. it is not significantly optimistic or pessimistic

In addition, the actuary should recognize the uncertain nature of the items for which assumptions are selected and may consider several different assumptions equally reasonable for a given measurement. The actuary should also recognize that different actuaries will apply different professional judgment and may choose different reasonable assumptions. As a result, a range of reasonable assumptions may develop.

The general procedure in a study of demographic experience is to calculate rates of decrement and compare these rates to current assumptions. Initially, we determine the number of participants who were exposed to the risk of mortality, withdrawal, disability, etc. The next step is to determine how many actually died, withdrew, became disabled, etc. Dividing the number of decrements in each age and service cell by the number exposed to the risk of decrement in that cell produces the rate of decrement. These crude

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rates of decrement may fluctuate from cell to cell. If there is a tendency for rates to increase (or decrease) by age or service we smooth or "graduate" them in order to provide rates of decrement with a more uniform progression. For all of the decrements we reviewed, we first compared the results to the current rates to determine if a change in assumptions was warranted. If the current assumption does not fit recent experience we developed proposed rates which were either based directly on the graduated rates, an average of graduated rates from prior experience studies or on an average between the current rates and the graduated rates. For the mortality assumption, we compared current experience with that expected by the current assumption as well as recent mortality tables published by the Society of Actuaries to determine if a change was warranted. We believe that a long-term approach which averages recent experience and prior assumptions avoids over-reacting to short-term, random fluctuations while assuring that the assumptions will be gradually modified to the extent that the long-term underlying trend has changed.

The rates of decrement are applied to the number of exposures in order to obtain the expected number who will decrement from the particular cause under study. The actual number of decrements is compared to the expected number of decrements under the current actuarial assumptions and, if a change is proposed, under the new assumptions in order to obtain the ratio of actual to expected (A/E ratio). This A/E ratio provides an overall comparison between the actual decrements (due to death, withdrawal, disability, etc.) with the expected number of decrements based on the actuarial assumptions from the cause of decrement in question. An A/E ratio greater than 1.0 indicates that there were more actual decrements than expected during the study period and an A/E ratio of less than 1.0 indicates that there were fewer actual decrements than expected during the study period.

In the following pages, recent experience is compared to that projected by the current

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actuarial assumptions for each decrement. Our analysis includes information about the current assumption, an analysis of experience observed in the current study period and a discussion on proposed changes to the assumptions.

### **Non-Contributory Members**

The Division of Pensions and Benefits provides data for each annual valuation that identify non-contributory members. Many of these members are, in reality, members who have terminated employment or have applied for retirement or disability, etc., but whose paperwork was not processed in time to be reflected with the valuation data. Others are members who have ceased active service, but choose to let their contributions remain in the system so they could return to service at a later date or apply for a pension when they become eligible.

We reviewed the experience among the non-contributory members since the last study period to estimate the extent which these members are likely to (1) return to active service, (2) elect a refund of their contributions, or (3) wait until they become eligible to collect a pension and apply for retirement at that time. All data was reviewed to determine the status reported for these non-contributing members in subsequent years. That analysis indicated that approximately 20% of the current non-contributory members would return to active status. For those assumed to return to active status, a projected benefit is valued. However, the State modified the information provided for non-contributory members. Specifically, salary information may not be provided if the member became non-contributory status more than two years ago. For these members, an accrued benefit is estimated based on the last known salary provided. We also recommend that this approach be used for all non-contributory members for consistency.

For members who became non-contributing members during the study, approximately 30% are assumed to be rehired. Among the 70% who are not expected to return to active

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status, a percentage of these members were assumed to have become disabled (1.2%), have died (0.5%) or have terminated employment (98.3%). These assumptions are consistent with those used in the prior study and reflect experience among the non-contributing members since 2006. Among those who terminated employment, if the member was eligible for a retirement benefit, they were assumed to have retired. If the member was eligible for a deferred vested benefit, it was assumed that the member would elect the deferred vested benefit 80% of the time. In the prior study, 85% of all eligible members were assumed to elect a deferred vested benefit. All other members were assumed to elect a refund of their contributions.

### **Rate of Termination**

#### *Current Assumption*

The current termination assumptions generally reflect actual experience for the 9-year period ending June 30, 2012. The assumption consists of three components:

- Higher rates of turnover prior to attainment of 10 years of service that vary by service, gender and by age for females
- An assumption for those with 10 or more years of service electing a benefit that varies by service, age and gender
- An assumption for those with 10 or more years of service electing a contribution refund that varies by service, age and gender

Once an employee becomes eligible for reduced or unreduced retirement, the assumption is that the member will no longer leave under the withdrawal decrement. He or she will only retire as a healthy retiree, disabled retiree or die during active service.

#### *Analysis*

Similar patterns of terminations were observed in this analysis as in previous studies.

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Specifically, the rates of withdrawal among shorter service members vary significantly with service whereas withdrawal rates among longer service members vary by service and age.

For female members under age 40, actual experience was lower than expected and lower than actual experience from past three experience studies. For female members over age 40 and male members, actual experience was similar to that expected based on the current assumptions.

There was also a continuing trend of members with 10 or more years of service to leave their contributions in the system and elect a deferred vested benefit. Reflecting that 20% of eligible non-contributing members are assumed to elect a refund, the percentage of members who elected a refund versus a deferred benefit was 29% for female members and 40% for male members versus the current assumption of 20% and 28%, respectively. This may be a growing trend as the rate of employee contributions continues to increase.

### Proposed Assumption

Our proposed assumption is to blend the emerging experience from this study with the current assumption by weighting the emerging experience by 1/3<sup>rd</sup> and the current assumption by 2/3<sup>rd</sup>.

Table 3 summarizes the actual to expected ratios (A/E ratios) for males and females by service based on the current and proposed assumptions. Refer to Appendix A for a more detailed analysis of these ratios.

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Table 3 – A/E Ratios for Rates of Termination				
Completed Years of Employment	Male		Female	
	Current	Proposed	Current	Proposed
0	1.18	1.11	0.91	0.94
1	0.85	0.89	0.81	0.86
2	0.81	0.86	0.88	0.92
3	1.15	1.10	0.84	0.89
4	1.07	1.04	0.87	0.91
5	1.10	1.07	0.82	0.87
6	1.06	1.04	0.84	0.89
7	1.07	1.05	0.83	0.88
8	1.08	1.05	0.85	0.89
9	1.01	1.01	0.90	0.93
Total 0 – 9	0.98	0.99	0.85	0.89
10-14	1.10	1.06	0.92	0.94
15-19	1.02	1.01	0.89	0.92
20-24	1.04	1.04	0.85	0.89
10+ total	1.07	1.05	0.91	0.94
10+ electing a refund	1.43	1.16	1.46	1.18
10+ electing a benefit	0.92	0.98	0.79	0.86

### Effect on Plan's Liability

Overall, the proposed assumptions decrease the expected number of terminations, which would increase the plan's liability since more members would be expected to be eligible for service retirement. This is offset by the increase in the number of members assumed to elect a refund versus a benefit upon termination. In total, we expect the change in liability to be negligible.

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### Rate of Retirement

#### Current Assumption

The current retirement assumptions generally reflect actual experience for the 9-year period ending June 30, 2012. The assumption consists of four components:

- A higher rate of retirement at first eligibility for an unreduced pension benefit and postretirement medical benefits (attainment of age 55 and 25 years of service for Class B employees) that varies by age and gender
- Rates of retirement that vary by age and gender subsequent to attainment of first eligibility
- Rates of retirement that vary by age and gender for an unreduced pension benefit and prior to eligibility for postretirement medical benefits (attainment of age 60 and less than 25 years of service for Class B employees)
- Separate rates of retirement that vary by age and gender for members eligible for a reduced pension benefit and postretirement medical benefits (completion of 25 years of service prior to age 55 for Class B employees)

In addition, there are several new classes of employees with unreduced benefits at later ages or higher reductions upon early retirement. Since these new classes only apply to recent or new hires, the current assumptions are based on the experience for Class B employees with modifications to reflect the different retirement eligibility and early retirement reduction provisions based on our actuarial judgement.

#### Analysis

The retirement experience varied based on the four components of retirement:

- Upon first eligibility, actual experience was higher than expected by 8% for male members and 17% for female members
- Subsequent to first eligibility, actual experience was lower than expected by

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9% for male members and 1% for female members

- For retirement prior to completion of 25 years of service, actual experience was lower than expected by 13% for male members and higher than expected by 12% for female members.
- For early retirement, actual experience was approximately equal to that expected by the current assumption.

### Proposed Assumption

Our proposed assumption is to blend the emerging experience from this study with the current assumption by generally weighting the emerging experience by 1/3<sup>rd</sup> and the current assumption by 2/3<sup>rd</sup>, but reflecting the overall credibility of the experience at each point.

Table 4 summarizes the actual to expected ratios (A/E ratios) for males and females by retirement category for all ages combined based on the current and proposed assumptions. Refer to Appendix A for a more detailed analysis of these ratios.

Table 4 – A/E Ratios for Rates of Retirement					
Retirement Category	Eligibility	Male		Female	
		Current	Proposed	Current	Proposed
First Eligibility	First attain age 55 and 25 years	1.08	1.06	1.17	1.10
Ultimate	After attainment of age 55 and 25 years	0.91	0.93	0.99	0.99
Other	Attainment of age 60, but less than 25 years	0.87	0.91	0.97	0.99
Reduced (unisex)	>25 years, less than age 55	1.00	1.00	1.00	1.00

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### New Tiers

Based on adjustments to the assumptions proposed for Class B employees, similar adjustments are proposed for other classes of employees.

### Effect on Plan's Liability

The proposed assumptions slightly increase the expected number of retirements for members at first eligibility, decrease the expected number of retirements for members with less than 25 years of service and increase the expected number of retirements at ages 66 and older regardless of service. The expected effect of the proposed assumptions is a very slight increase in the plan's liability.

### Rate of Disability

#### Current Assumption

The disability termination assumption consists of two components:

- Rates of ordinary disablement that vary by age and gender (attainment of 10 years of service is required)
- Rates of accidental disablement that vary by gender

The current ordinary disability assumption is not assumed to apply once the member is eligible for an unreduced retirement benefit and postretirement medical benefits (attainment of age 55 and 25 years of service for Class B employees). If a member is eligible for a reduced retirement benefit, the member is assumed to elect a reduced retirement benefit if the reduced retirement benefit is greater than the disability benefit.

### Analysis

In total, actual ordinary and accidental disabilities were slightly lower than expected. Considering the credibility of the experience, we believe the current assumption

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reasonably estimates the number of disabilities and recommend no changes at this time.

Table 5 summarizes the actual to expected ratios (A/E ratios) for males and females by disability category for all ages combined based on the current and proposed assumptions. Refer to Appendix A for a more detailed analysis of these ratios.

Table 5 – A/E Ratio for Rates of Disability				
Disability Category	Male		Female	
	Current	Proposed	Current	Proposed
Ordinary	0.93	0.93	0.97	0.97
Accidental	0.68	0.68	0.80	0.80

### **Mortality**

Actuarial Standards of Practice No. 35 states the actuary should reflect the effect of mortality improvement both before and after the measurement date. With regard to mortality improvement, the actuary should do the following:

- Adjust mortality rates to reflect mortality improvement before the measurement date. For example, if the actuary starts with a published mortality table, the mortality rates may need to be adjusted to reflect mortality improvement from the effective date of the table to the measurement date.
- Include an assumption as to expected mortality improvement after the measurement date. Note that the existence of uncertainty about the occurrence or magnitude of future mortality improvement does not by itself mean that an assumption of zero future improvement is a reasonable assumption.

In 2014, the Retirement Plans Experience Committee (RPEC) of the Society of Actuaries

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(SOA) published updated mortality tables, referred to as the RP-2014 tables, and mortality improvement scale referred to as MP-2014. In developing the improvement scale, RPEC used historical U.S. population mortality data from Social Security. In 2015 and 2016, the SOA published updated mortality improvement scales (MP-2015 and MP-2016) as additional data became available from Social Security. These revised mortality improvement scales reduced the amount of mortality improvement assumed in the MP-2014 scale. Furthermore, RPEC intends to publish an updated scale each year as new Social Security data becomes available. The reports issued by the SOA indicated these new improvement scales could be applied to the underlying data used to develop the RP-2014 tables. Specifically, RPEC had created the RP-2014 tables by developing base mortality rates using the 2006 data and projecting these rates to 2014 using the MP-2014 improvement scale. Note that higher mortality improvement rates result in lower rates of mortality and thus, higher pension plan costs.

The participant data used by RPEC in developing the underlying mortality tables only reflected experience of private sector pension plans. The public sector pension plan data submitted for the study was excluded from the final analysis by RPEC. At this time RPEC is reviewing experience among public sector pension plans, but that study is not expected to be completed until 2018.

One primary difference between the new mortality MP improvement scales published by RPEC and the prior scales including the current assumption of Scale AA is that the MP improvement scales are two-dimensional (2-D). 2-D improvement scales vary the amount of improvement by year of birth as well as age. This results in overly complex calculations to project rates of mortality and life expectancy for a public pension plan.

In determining an appropriate mortality improvement assumption for TPAF, we have reviewed year-by-year mortality rates published by the Social Security Administration

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from 1900 to 2013, the latest publicly available information. Our observations of this data include:

- People are living longer, but mortality improvement has been volatile from one decade to the next.
- Mortality improvement for males and females has varied over time, such that each gender has experienced higher improvement than the other gender at different points of time
- Mortality improvement decreases with age

Based on these observations, we recommend the use of a 60-year average (1953 – 2013) of actual mortality improvement for males and females combined, applied to preretirement and postretirement healthy annuitant mortality rates. The use of a 60-year average reduces the cost volatility from changing mortality assumptions from one experience study to the next, reflects actual U.S. data that can be updated from time to time and produces reasonable actuarial liabilities without the complexities of a 2-D mortality table given the uncertainty regarding the assumption. We believe the 60-year period is a reasonable period on which to base future projections. It is sufficiently long to avoid giving too much weight to short-term trends and it represents a period when many of the factors that likely played a role in future mortality improvement, such as breakthroughs in medicine and technology and large-scale behavioral trends, became important.

### **Postretirement Mortality**

#### *Current Assumption*

The current mortality assumption for members collecting a benefit consists of three components:

- Mortality rates for retirees collecting a service retirement benefit and all

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beneficiaries that vary by age and gender (for males, the Society of Actuaries RP-2000 Annuitant Mortality Table with White Collar adjustments served as the basis for the assumption and for females, the 1994 Uninsured Pensioner Mortality Table served as the basis for the assumption)

- Mortality rates for retirees collecting a disability retirement that vary by age and gender (75% for males and 90% for females of the RP-2000 Disabled Annuitant Mortality Table)
- Future mortality improvements for healthy retirees and beneficiaries based on a similar approach that is used for private sector plans, which requires an update to the mortality table each year to reflect a projection of mortality improvement for 7 years (based on Scale AA)

### Analysis

In addition to the number of retirees, we also reviewed the mortality experience weighted by the amount of the pension benefit. In pension plans, if assumed mortality rates are set based on incidence, and if members with the larger benefits have lower mortality rates than those with smaller benefits, an actuarial loss would occur due to this bias. Weighting the rates of mortality by benefits would adjust the analysis for this bias. The A/E ratios weighted both by benefits and by counts are reduced since the prior study, meaning that actual experience is lower than the number of deaths projected by the current assumption. Please note that in comparing the current assumption to the current experience, the rates of mortality are projected from the base year of the table (2000 for males; 2003 for females) until the year of exposure.

For disabled mortality, the A/E ratios were reduced from the prior study.

Utilizing the new tables published by RPEC, we compared the base 2006 tables projected to the year of exposure with the 60-year mortality improvement recommendation with the

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actual TPAF experience from the last 6 years.

### Proposed Assumption

Based on this analysis, we recommend the following:

- For healthy retirees, base mortality rates for males and females using the RP-2006 white collar mortality table, with adjustments. The adjustments provide a better fit to actual experience among TPAF retirees.
  - For females, the adjustments consist of 80% of the mortality rates through age 72 linearly increasing until no adjustment is made at ages 92 and later
  - For males, the adjustments consist of 93% of the mortality rates used through age 73 linearly increasing until 115% of the mortality rates used at ages 95 and later
- For disabled retirees, 90% of the mortality rates of the RP-2006 disability annuitant table for males and females. This assumption reflects the limited amount of disability exposures and deaths.

Table 6 highlights the A/E ratios based on the current and proposed assumptions by gender for selected age groups. Refer to Appendix A for a more detailed analysis of these ratios.

Table 6 – A/E Ratio for Rates of Postretirement Mortality				
6 Years of Experience Ending June 30, 2015				
Weighting By	Male		Female	
	Current	Proposed	Current	Proposed
Healthy Retirees and Beneficiaries (Ages 50 and over)				
Counts	0.98	1.01	1.02	0.99
Benefits	0.92	0.96	0.98	0.97
Disabled Retirees				
Counts	0.85	0.92	0.89	0.93

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### Preretirement Mortality

#### Current Assumption

The current mortality assumption for active members varies by age and gender. It is based on the RP-2000 Employee Male and Female tables with White Collar adjustments setback 5 years for males and 10 years for females. Furthermore, mortality improvements are projected based on a similar approach that is used for private sector plans, which requires an update to the mortality table each year to reflect a projection of mortality improvement for 15 years (based on Scale AA).

#### Proposed Assumption

Based on the number of deaths experience by TPAF members prior to retirement, the results are not credible to develop a plan specific mortality table. For consistency with the current assumption and utilizing the most recent tables published by the Society of Actuaries, we recommend the RP-2006 employee mortality table with white collar adjustments setback 5 years for females and 3 years for males.

#### Effect on Plan's Liability of Proposed Assumption

As indicated in the prior experience study, the State decided to incorporate future mortality improvements consistent with methods used by private sector pension plans versus our recommended generational approach. The Administration's decision resulted in a slight decrease in the actuarial accrued liability. As of June 30, 2015, using a full generational approach of the current assumptions would increase the actuarial accrued liability by 0.48%. The proposed assumption for healthy annuitants results in an increase in the actuarial accrued liability of 0.74% or 0.28% higher than the full generational approach of the current assumptions.

# Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
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## Impact on Valuation Results

The impact of the proposed changes to the demographic assumptions on the June 30, 2015 actuarial valuation results is shown below based on the proposed assumptions. The proposed assumptions would first be reflected in the June 30, 2016 actuarial valuation, which produces the statutory contribution payable in the fiscal year ending June 30, 2018. Please note that due to differences in actuarial methods and certain actuarial assumptions, the impact of the proposed changes in the actuarial assumptions on the actuarial liabilities determined for GASB 67/68 purposes would differ.

### New Jersey Teachers' Pension and Annuity Fund

#### Impact on Actuarial Valuation Results of Proposed Assumptions in 2015 Experience Study Based on June 30, 2015 Actuarial Valuation Results (\$ in millions)

	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Difference</u>	<u>Percentage Difference</u>
<b><i>Funded Status Information</i></b>				
Market Value of Pension Assets	\$ 26,320.7	\$ 26,320.7	0.0	0.0 %
Actuarial Value of Pension Assets	\$ 28,301.4	\$ 28,301.4	0.0	0.0 %
Actuarial Accrued Pension Liability	\$ 55,197.7	\$ 55,359.4	(161.7)	(0.3) %
Unfunded Pension Liability				
Based on Market Value	\$ 28,877.0	\$ 29,038.7	(161.7)	(0.6) %
Based on Actuarial Value	\$ 26,896.3	\$ 27,058.0	(161.7)	(0.6) %
Funded Ratio				
Based on Market Value	47.7 %	47.5 %	N/A	0.2 %
Based on Actuarial Value	51.3 %	51.1 %	N/A	0.2 %
<b><i>Statutory Contribution Information</i></b>				
Normal Contribution (1/60th formula)	\$ 268.6	284.8	(16.2)	(5.7) %
Additional Formula Contribution	66.7	71.5	(4.8)	(6.7) %
Accrued Liability Contribution	<u>2,366.6</u>	<u>2,380.9</u>	<u>(14.3)</u>	<u>(0.6) %</u>
Total Pension Contribution by Statute	\$ 2,701.9	\$ 2,737.2	\$ (35.3)	(1.3) %
Expected % of Statutory Contribution Appropriated for FY 2018	50%	50%		
State Appropriation as if for FY 2018	1,351.0	1,368.6	(17.6)	(1.3) %

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## **Appendix A – Demographic Data Analysis**

The following pages summarize the demographic data analysis used in this experience study.

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## Teachers' Pension and Annuity Fund of New Jersey

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Termination - Male  
0 to 9 Years of Service

### Exposures

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	119	542	122	6	1	0	0	0	0	0
25-29	348	1,781	1,647	1,379	1,205	1,044	650	197	14	7
30-34	206	771	771	789	860	1,270	1,758	2,039	2,007	1,706
35-39	112	383	323	364	415	501	634	840	1,045	1,240
40-44	104	265	250	222	237	300	352	378	530	627
45-49	69	158	139	163	173	206	246	286	333	404
50-54	61	165	127	130	122	149	201	235	301	295
55-59	35	112	101	94	99	132	162	194	244	265
60-64	29	72	62	60	43	25	2	1	0	1
All Ages	1,083	4,249	3,542	3,207	3,155	3,627	4,005	4,170	4,474	4,545

### Actual

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	8	29	13	0	0	0	0	0	0	0
25-29	29	95	78	61	37	25	13	4	0	0
30-34	24	41	42	49	30	41	39	30	24	23
35-39	12	29	19	20	13	17	10	15	18	11
40-44	12	18	13	16	14	9	9	8	10	10
45-49	13	23	18	10	6	9	6	11	5	7
50-54	11	22	10	11	8	4	5	4	7	4
55-59	7	17	6	6	3	2	5	8	6	2
60-64	7	16	10	7	2	1	0	1	0	0
All Ages	124	289	210	180	114	107	87	81	70	57

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male  
0 to 9 Years of Service

### Expected - Current Assumptions

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	11.5	43.6	9.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
25-29	33.6	143.4	121.2	67.2	40.8	28.0	13.3	3.6	0.2	0.1
30-34	19.9	62.1	56.7	38.4	29.2	34.0	36.0	36.9	29.3	21.3
35-39	10.8	30.8	23.8	17.7	14.1	13.4	13.0	15.2	15.3	15.5
40-44	10.0	21.3	18.4	10.8	8.0	8.0	7.2	6.8	7.7	7.8
45-49	6.7	12.7	10.2	7.9	5.9	5.5	5.0	5.2	4.9	5.1
50-54	5.9	13.3	9.3	6.3	4.1	4.0	4.1	4.3	4.4	3.7
55-59	3.4	9.0	7.4	4.6	3.4	3.5	3.3	3.5	3.6	3.3
60-64	2.8	5.8	4.6	2.9	1.5	0.7	0.0	0.0	0.0	0.0
All Ages	104.5	342.0	260.7	156.2	107.0	97.2	82.1	75.5	65.3	56.8

### Expected - Proposed Assumptions

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	12.2	41.4	8.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0
25-29	35.6	136.1	113.5	70.6	41.7	28.9	13.6	3.6	0.2	0.1
30-34	21.1	58.9	53.1	40.4	29.8	35.2	36.7	37.7	30.1	21.3
35-39	11.5	29.3	22.3	18.6	14.4	13.9	13.3	15.5	15.7	15.5
40-44	10.6	20.2	17.2	11.4	8.2	8.3	7.4	7.0	8.0	7.8
45-49	7.1	12.1	9.6	8.3	6.0	5.7	5.1	5.3	5.0	5.1
50-54	6.2	12.6	8.8	6.7	4.2	4.1	4.2	4.3	4.5	3.7
55-59	3.6	8.6	7.0	4.8	3.4	3.7	3.4	3.6	3.7	3.3
60-64	3.0	5.5	4.3	3.1	1.5	0.7	0.0	0.0	0.0	0.0
All Ages	110.8	324.6	244.0	164.2	109.2	100.5	83.7	77.1	67.1	56.8

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# Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male  
0 to 9 Years of Service

### Ratio of Actual to Expected - Current Assumptions

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	0.708	0.660	1.443	n/a	n/a	n/a	n/a	n/a	n/a	n/a
25-29	0.868	0.662	0.643	0.904	0.916	0.883	0.939	1.122	n/a	n/a
30-34	1.228	0.661	0.744	1.275	1.032	1.191	1.093	0.814	0.818	1.094
35-39	1.100	0.946	0.795	1.126	0.912	1.281	0.785	1.004	1.189	0.678
40-44	1.240	0.839	0.717	1.435	1.721	1.128	1.180	1.134	1.278	1.245
45-49	1.879	1.786	1.799	1.277	1.023	1.711	1.265	2.091	1.042	1.474
50-54	1.892	1.653	1.084	1.808	1.951	0.924	1.230	0.956	1.537	1.206
55-59	2.092	1.908	0.825	1.393	1.027	0.477	1.526	2.317	1.809	0.510
60-64	2.414	2.688	2.289	2.419	1.631	1.493	n/a	55.249	n/a	n/a
All Ages	1.182	0.846	0.807	1.154	1.066	1.104	1.061	1.074	1.076	1.007

### Ratio of Actual to Expected - Proposed Assumptions

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	0.668	0.695	1.542	n/a	n/a	n/a	n/a	n/a	n/a	n/a
25-29	0.819	0.698	0.687	0.860	0.897	0.855	0.921	1.098	n/a	n/a
30-34	1.158	0.697	0.795	1.213	1.011	1.152	1.072	0.796	0.796	1.094
35-39	1.038	0.997	0.849	1.071	0.893	1.240	0.770	0.983	1.157	0.678
40-44	1.170	0.884	0.766	1.365	1.686	1.091	1.157	1.109	1.244	1.245
45-49	1.773	1.882	1.922	1.214	1.002	1.655	1.241	2.046	1.014	1.474
50-54	1.784	1.742	1.158	1.720	1.911	0.894	1.206	0.936	1.496	1.206
55-59	1.974	2.010	0.882	1.325	1.006	0.462	1.497	2.267	1.761	0.510
60-64	2.277	2.832	2.445	2.301	1.598	1.444	n/a	54.054	n/a	n/a
All Ages	1.115	0.891	0.862	1.098	1.045	1.068	1.041	1.051	1.047	1.007

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male  
10 or more Years of Service

### Exposures

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	5	0	0
30-34	2,245	1	0
35-39	8,914	1,157	1
40-44	5,159	5,565	671
45-49	2,639	3,234	2,881
50-54	1,926	1,673	1,665
55-59	1,662	1,375	1,210
60-64	2	0	0
All Ages	22,552	13,005	6,428

### Actual

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	0	0	0
30-34	26	0	0
35-39	83	6	0
40-44	57	33	4
45-49	46	22	12
50-54	25	16	8
55-59	21	16	9
60-64	1	0	0
All Ages	258	93	33

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male - With Benefit  
10 or more Years of Service

### Exposures

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	5	0	0
30-34	2,245	1	0
35-39	8,914	1,157	1
40-44	5,159	5,565	671
45-49	2,639	3,234	2,881
50-54	1,926	1,673	1,665
55-59	1,662	1,375	1,210
60-64	2	0	0
All Ages	22,552	13,005	6,428

### Actual

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	0	0	0
30-34	12	0	0
35-39	50	3	0
40-44	29	20	3
45-49	28	13	7
50-54	17	9	6
55-59	14	12	7
60-64	1	0	0
All Ages	151	57	23

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male - Return of Contributions  
10 or more Years of Service

### Exposures

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	5	0	0
30-34	2,245	1	0
35-39	8,914	1,157	1
40-44	5,159	5,565	671
45-49	2,639	3,234	2,881
50-54	1,926	1,673	1,665
55-59	1,662	1,375	1,210
60-64	2	0	0
All Ages	22,552	13,005	6,428

### Actual

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	0	0	0
30-34	14	0	0
35-39	33	3	0
40-44	27	13	2
45-49	18	9	5
50-54	8	7	2
55-59	7	3	2
60-64	0	0	0
All Ages	108	35	10

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male  
10 or more Years of Service

### Expected - Current Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.1	0.0	0.0
30-34	24.5	0.0	0.0
35-39	94.0	8.2	0.0
40-44	46.7	35.3	2.6
45-49	20.8	18.4	10.9
50-54	19.5	12.0	8.0
55-59	28.7	17.0	10.0
60-64	0.0	0.0	0.0
All Ages	234.4	91.0	31.6

### Expected - Proposed Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.1	0.0	0.0
30-34	24.3	0.0	0.0
35-39	90.8	7.4	0.0
40-44	51.2	34.7	2.8
45-49	28.7	20.3	11.7
50-54	22.2	13.6	8.3
55-59	25.1	15.9	9.1
60-64	0.0	0.0	0.0
All Ages	242.3	91.8	32.0

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male - With Benefit  
10 or more Years of Service

### Expected - Current Assumptions

Age	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.0	0.0	0.0
30-34	14.6	0.0	0.0
35-39	59.0	5.3	0.0
40-44	31.6	24.0	1.8
45-49	15.2	13.3	7.9
50-54	15.2	9.4	6.3
55-59	23.8	14.1	8.4
60-64	0.0	0.0	0.0
All Ages	159.4	66.1	24.4

### Expected - Proposed Assumptions

Age	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.0	0.0	0.0
30-34	14.5	0.0	0.0
35-39	54.4	4.5	0.0
40-44	30.8	20.8	1.7
45-49	17.3	12.2	7.1
50-54	15.5	9.5	5.8
55-59	20.1	12.7	7.3
60-64	0.0	0.0	0.0
All Ages	152.7	59.6	21.9

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male - Return of Contributions  
10 or more Years of Service

### Expected - Current Assumptions

Age	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.0	0.0	0.0
30-34	9.9	0.0	0.0
35-39	35.0	2.9	0.0
40-44	15.1	11.3	0.8
45-49	5.7	5.1	3.0
50-54	4.3	2.7	1.8
55-59	4.9	2.9	1.7
60-64	0.0	0.0	0.0
All Ages	74.9	24.8	7.2

### Expected - Proposed Assumptions

Age	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.0	0.0	0.0
30-34	9.8	0.0	0.0
35-39	36.4	2.9	0.0
40-44	20.4	13.9	1.1
45-49	11.4	8.1	4.7
50-54	6.7	4.1	2.5
55-59	5.0	3.2	1.8
60-64	0.0	0.0	0.0
All Ages	89.7	32.2	10.1

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male  
10 or more Years of Service

### Ratio of Actual to Expected - Current Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	n/a	n/a	n/a
30-34	1.069	n/a	n/a
35-39	0.883	0.753	n/a
40-44	1.210	0.928	1.680
45-49	2.214	1.202	1.096
50-54	1.266	1.333	0.977
55-59	0.724	0.924	0.873
60-64	27.027	n/a	n/a
All Ages	1.102	1.021	1.044

### Ratio of Actual to Expected - Proposed Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	n/a	n/a	n/a
30-34	1.077	n/a	n/a
35-39	0.914	0.826	n/a
40-44	1.105	0.945	1.562
45-49	1.607	1.094	1.021
50-54	1.112	1.182	0.943
55-59	0.828	0.991	0.962
60-64	31.847	n/a	n/a
All Ages	1.066	1.011	1.032

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male - With Benefit  
10 or more Years of Service

### Ratio of Actual to Expected - Current Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	n/a	n/a	n/a
30-34	0.831	n/a	n/a
35-39	0.841	0.626	n/a
40-44	0.924	0.825	1.503
45-49	1.855	0.985	0.905
50-54	1.089	0.943	0.937
55-59	0.589	0.877	0.862
60-64	31.847	n/a	n/a
All Ages	0.945	0.869	0.943

### Ratio of Actual to Expected - Proposed Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	n/a	n/a	n/a
30-34	0.836	n/a	n/a
35-39	0.912	0.739	n/a
40-44	0.949	0.955	1.616
45-49	1.625	1.080	1.015
50-54	1.066	0.932	1.006
55-59	0.697	0.973	0.992
60-64	39.683	n/a	n/a
All Ages	0.987	0.964	1.052

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Male - Return of Contributions  
10 or more Years of Service

### Ratio of Actual to Expected - Current Assumptions

<u>Age</u>	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	n/a	n/a	n/a
30-34	1.421	n/a	n/a
35-39	0.953	0.986	n/a
40-44	1.808	1.148	2.080
45-49	3.173	1.767	1.600
50-54	1.894	2.695	1.120
55-59	1.384	1.156	0.928
60-64			
All Ages	1.437	1.424	1.382

### Ratio of Actual to Expected - Proposed Assumptions

<u>Age</u>	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	n/a	n/a	n/a
30-34	1.436	n/a	n/a
35-39	0.918	0.960	n/a
40-44	1.340	0.932	1.481
45-49	1.579	1.116	1.029
50-54	1.218	1.764	0.796
55-59	1.356	1.061	0.845
60-64			
All Ages	1.201	1.099	0.989

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female  
0 to 9 Years of Service

### Exposures

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	543	2,262	612	9	1	1	0	0	0	0
25-29	1,356	6,217	5,997	5,356	4,866	4,410	2,819	982	36	21
30-34	601	2,200	1,984	2,054	2,910	4,135	5,729	6,985	7,073	5,722
35-39	392	1,312	1,039	1,026	1,202	1,477	1,890	2,315	2,801	3,425
40-44	378	1,136	966	950	1,074	1,232	1,331	1,463	1,621	1,758
45-49	256	879	751	774	897	1,116	1,234	1,341	1,422	1,465
50-54	183	516	457	430	581	797	1,025	1,184	1,353	1,444
55-59	115	276	222	249	328	448	576	750	908	1,086
60-64	41	103	95	77	50	27	3	6	7	3
All Ages	3,865	14,901	12,123	10,925	11,909	13,643	14,607	15,026	15,221	14,924

### Actual

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	35	89	58	0	0	0	0	0	0	0
25-29	108	299	284	217	165	146	99	32	1	1
30-34	59	167	153	118	159	181	225	226	254	170
35-39	41	110	76	60	48	51	67	91	79	92
40-44	44	81	53	39	37	34	35	35	24	32
45-49	22	59	49	34	25	34	17	19	25	22
50-54	24	42	37	24	22	17	21	21	10	23
55-59	25	32	19	20	11	14	13	9	8	10
60-64	5	15	9	6	5	2	0	1	0	1
All Ages	363	894	738	518	472	479	476	434	401	349

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# Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female  
0 to 9 Years of Service

### Expected - Current Assumptions

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	55.9	167.8	42.3	0.5	0.1	0.0	0.0	0.0	0.0	0.0
25-29	139.5	461.3	414.4	307.4	246.7	213.4	129.1	42.0	1.4	0.7
30-34	61.8	163.2	137.1	117.9	147.5	200.1	262.4	299.0	283.6	195.1
35-39	40.3	97.4	71.8	58.9	60.9	71.5	86.6	99.1	112.3	116.8
40-44	38.9	84.3	66.8	50.1	32.9	33.8	27.6	26.0	23.2	23.4
45-49	26.3	65.2	51.9	40.8	27.4	30.6	25.5	23.9	20.3	19.5
50-54	18.8	38.3	31.6	22.7	17.8	21.8	21.2	21.1	19.3	19.2
55-59	11.8	20.5	15.3	13.1	10.0	12.3	11.9	13.4	13.0	14.4
60-64	4.2	7.6	6.6	4.1	1.5	0.7	0.1	0.1	0.1	0.0
All Ages	397.7	1,105.7	837.7	615.4	544.9	584.3	564.4	524.5	473.3	389.2

### Expected - Proposed Assumptions

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	52.5	153.8	40.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0
25-29	131.0	422.8	394.6	288.7	231.6	198.0	121.2	39.1	1.4	0.7
30-34	58.1	149.6	130.5	110.7	138.5	185.7	246.3	278.0	268.8	184.8
35-39	37.9	89.2	68.4	55.3	57.2	66.3	81.3	92.1	106.4	110.6
40-44	41.4	86.0	66.2	49.0	34.2	33.9	27.6	26.0	22.4	24.4
45-49	28.1	66.5	51.4	39.9	28.5	30.7	25.5	23.9	19.6	20.4
50-54	20.1	39.1	31.3	22.2	18.5	21.9	21.2	21.1	18.7	20.1
55-59	12.6	20.9	15.2	12.8	10.4	12.3	11.9	13.4	12.5	15.1
60-64	4.5	7.8	6.5	4.0	1.6	0.7	0.1	0.1	0.1	0.0
All Ages	386.0	1,035.7	804.4	583.2	520.6	549.6	535.1	493.7	449.9	376.1

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female  
0 to 9 Years of Service

### Ratio of Actual to Expected - Current Assumptions

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	0.627	0.528	1.381	n/a	n/a	n/a	n/a	n/a	n/a	n/a
25-29	0.774	0.649	0.686	0.705	0.669	0.685	0.763	0.768	0.693	0.962
30-34	0.951	1.023	1.113	1.003	1.080	0.906	0.856	0.755	0.895	0.870
35-39	1.018	1.133	1.055	1.020	0.784	0.716	0.773	0.917	0.707	0.786
40-44	1.136	0.962	0.793	0.770	1.135	1.003	1.276	1.350	1.042	1.349
45-49	0.822	0.910	0.948	0.843	0.912	1.097	0.661	0.804	1.231	1.146
50-54	1.272	1.093	1.173	1.046	1.214	0.773	1.006	0.994	0.511	1.183
55-59	2.077	1.558	1.236	1.521	1.109	1.162	1.049	0.684	0.632	0.668
60-64	1.291	1.989	1.402	1.512	3.109	2.703	n/a	6.452	n/a	17.271
All Ages	0.912	0.809	0.881	0.841	0.866	0.820	0.843	0.827	0.848	0.897

### Ratio of Actual to Expected - Proposed Assumptions

Age	Years of Service									
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
<=24	0.668	0.576	1.450	n/a	n/a	n/a	n/a	n/a	n/a	n/a
25-29	0.824	0.708	0.720	0.750	0.713	0.739	0.813	0.826	0.731	1.016
30-34	1.013	1.116	1.169	1.068	1.150	0.977	0.911	0.812	0.944	0.918
35-39	1.084	1.236	1.108	1.086	0.836	0.772	0.823	0.986	0.746	0.830
40-44	1.067	0.943	0.800	0.786	1.092	0.999	1.276	1.350	1.080	1.291
45-49	0.772	0.891	0.956	0.861	0.877	1.093	0.661	0.804	1.275	1.097
50-54	1.195	1.071	1.184	1.069	1.168	0.771	1.006	0.994	0.530	1.132
55-59	1.950	1.528	1.247	1.553	1.068	1.158	1.049	0.684	0.655	0.639
60-64	1.212	1.950	1.414	1.544	2.991	2.694	n/a	6.452	n/a	16.525
All Ages	0.940	0.864	0.918	0.888	0.907	0.872	0.889	0.879	0.892	0.928

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Female  
10 or more Years of Service

### Exposures

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	13	0	0
30-34	6,992	9	0
35-39	24,129	2,600	8
40-44	13,825	13,475	1,777
45-49	7,972	6,774	7,909
50-54	8,718	5,463	5,175
55-59	8,210	7,270	6,361
60-64	6	2	2
All Ages	69,865	35,593	21,232

### Actual

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	1	0	0
30-34	177	1	0
35-39	447	23	0
40-44	165	87	10
45-49	90	41	16
50-54	104	43	22
55-59	133	69	41
60-64	0	0	0
All Ages	1,118	264	90

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female - With Benefit  
10 or more Years of Service

### Exposures

Age	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	13	0	0
30-34	6,992	9	0
35-39	24,129	2,600	8
40-44	13,825	13,475	1,777
45-49	7,972	6,774	7,909
50-54	8,718	5,463	5,175
55-59	8,210	7,270	6,361
60-64	6	2	2
All Ages	69,865	35,593	21,232

### Actual

Age	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	1	0	0
30-34	124	1	0
35-39	310	16	0
40-44	101	61	7
45-49	59	30	12
50-54	75	32	15
55-59	106	58	32
60-64	0	0	0
All Ages	776	198	66

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female - Return of Contributions  
10 or more Years of Service

### Exposures

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	13	0	0
30-34	6,992	9	0
35-39	24,129	2,600	8
40-44	13,825	13,475	1,777
45-49	7,972	6,774	7,909
50-54	8,718	5,463	5,175
55-59	8,210	7,270	6,361
60-64	6	2	2
All Ages	69,865	35,593	21,232

### Actual

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0	0	0
25-29	0	0	0
30-34	53	0	0
35-39	137	7	0
40-44	65	26	4
45-49	31	10	4
50-54	29	11	7
55-59	27	10	9
60-64	0	0	0
All Ages	342	66	23

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Female  
10 or more Years of Service

### Expected - Current Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.5	0.0	0.0
30-34	233.9	0.2	0.0
35-39	542.0	37.9	0.1
40-44	163.8	103.2	7.1
45-49	56.9	33.8	26.0
50-54	83.3	36.5	22.7
55-59	136.8	85.1	50.1
60-64	0.1	0.0	0.0
All Ages	1,217.3	296.7	105.9

### Expected - Proposed Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.4	0.0	0.0
30-34	195.3	0.2	0.0
35-39	515.0	28.9	0.1
40-44	178.3	102.3	7.2
45-49	73.2	39.2	25.8
50-54	95.3	40.5	23.2
55-59	128.9	76.7	45.1
60-64	0.1	0.0	0.0
All Ages	1,186.5	287.8	101.3

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female - With Benefit  
10 or more Years of Service

### Expected - Current Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.4	0.0	0.0
30-34	187.2	0.2	0.0
35-39	433.8	30.3	0.1
40-44	131.2	83.0	5.6
45-49	45.5	26.9	20.8
50-54	66.8	29.2	18.1
55-59	123.2	76.8	45.1
60-64	0.1	0.0	0.0
All Ages	988.2	246.4	89.7

### Expected - Proposed Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.3	0.0	0.0
30-34	146.6	0.2	0.0
35-39	386.3	21.7	0.0
40-44	133.8	76.8	5.4
45-49	55.0	29.6	19.3
50-54	71.5	30.2	17.4
55-59	109.5	65.5	38.4
60-64	0.1	0.0	0.0
All Ages	902.9	223.9	80.6

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female - Return of Contributions  
10 or more Years of Service

### Expected - Current Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.1	0.0	0.0
30-34	46.6	0.0	0.0
35-39	108.2	7.6	0.0
40-44	32.6	20.2	1.4
45-49	11.3	6.9	5.2
50-54	16.5	7.3	4.5
55-59	13.7	8.3	5.0
60-64	0.0	0.0	0.0
All Ages	229.1	50.3	16.2

### Expected - Proposed Assumptions

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	0.0	0.0	0.0
25-29	0.1	0.0	0.0
30-34	48.7	0.1	0.0
35-39	128.7	7.2	0.0
40-44	44.5	25.5	1.9
45-49	18.2	9.7	6.4
50-54	23.8	10.3	5.8
55-59	19.4	11.2	6.7
60-64	0.0	0.0	0.0
All Ages	283.6	63.9	20.7

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Termination - Female  
10 or more Years of Service

### Ratio of Actual to Expected - Current Assumptions

<u>Age</u>	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	1.388	n/a	n/a
30-34	0.757	2.766	n/a
35-39	0.825	0.607	n/a
40-44	1.009	0.848	1.456
45-49	1.587	1.204	0.622
50-54	1.252	1.184	0.960
55-59	0.974	0.809	0.825
60-64	n/a	n/a	n/a
All Ages	0.918	0.889	0.845

### Ratio of Actual to Expected - Proposed Assumptions

<u>Age</u>	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	1.727	n/a	n/a
30-34	0.907	3.231	n/a
35-39	0.868	0.796	n/a
40-44	0.927	0.855	1.423
45-49	1.233	1.038	0.627
50-54	1.094	1.068	0.939
55-59	1.034	0.898	0.916
60-64	n/a	n/a	n/a
All Ages	0.942	0.917	0.883

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female - With Benefit  
10 or more Years of Service

### Ratio of Actual to Expected - Current Assumptions

<u>Age</u>	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	1.386	n/a	n/a
30-34	0.662	2.766	n/a
35-39	0.715	0.528	n/a
40-44	0.767	0.737	1.179
45-49	1.301	1.127	0.583
50-54	1.127	1.089	0.828
55-59	0.864	0.762	0.720
60-64	n/a	n/a	n/a
All Ages	0.786	0.805	0.738

### Ratio of Actual to Expected - Proposed Assumptions

<u>Age</u>	Years of Service		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	1.844	n/a	n/a
30-34	0.846	3.443	n/a
35-39	0.803	0.737	n/a
40-44	0.752	0.797	1.233
45-49	1.077	1.027	0.627
50-54	1.053	1.052	0.862
55-59	0.972	0.893	0.844
60-64	n/a	n/a	n/a
All Ages	0.860	0.886	0.821

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**Teachers' Pension and Annuity Fund of New Jersey**

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Rates of Termination - Female - Return of Contributions  
10 or more Years of Service

**Ratio of Actual to Expected - Current Assumptions**

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	1.395	n/a	n/a
30-34	1.137	2.767	n/a
35-39	1.267	0.921	n/a
40-44	1.981	1.302	2.529
45-49	2.738	1.509	0.778
50-54	1.758	1.563	1.490
55-59	1.962	1.248	1.778
60-64	n/a	n/a	n/a
All Ages	1.492	1.303	1.441

**Ratio of Actual to Expected - Proposed Assumptions**

<u>Age</u>	<u>Years of Service</u>		
	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>
<=24	n/a	n/a	n/a
25-29	1.377	n/a	n/a
30-34	1.087	2.591	n/a
35-39	1.065	0.973	n/a
40-44	1.453	1.030	1.972
45-49	1.704	1.070	0.627
50-54	1.220	1.115	1.171
55-59	1.382	0.924	1.329
60-64	n/a	n/a	n/a
All Ages	1.205	1.026	1.124

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Retirement with Reduced Benefit, 25 or more Years of Service  
Unisex

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Retirements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=49	2,181	44	33.6	33.6	1.299	1.299
50+	9,394	251	262.3	262.3	0.957	0.957
All Ages	11,575	295	295.9	295.9	0.995	0.995

Retirement with Unreduced Benefit  
Male - Age 60 and Less Than 25 Years of Service

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Retirements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=59	0	0	0.0	0.0	n/a	n/a
60	1,022	58	71.5	81.8	0.811	0.710
61	893	34	58.2	71.6	0.586	0.477
62	854	69	76.9	78.2	0.900	0.884
63-64	1,419	121	127.7	134.8	0.947	0.897
65	573	80	82.3	85.1	0.977	0.944
66-70	1,141	195	205.4	205.4	0.949	0.949
71+	224	46	42.6	40.3	1.085	1.146
All Ages	6,126	604	664.6	697.2	0.908	0.866

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Retirement with Unreduced Benefit

Male - First Year Attainment of Age 55 and 25 Years of Service

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Retirements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=54	0	0	0.0	0.0	n/a	n/a
55	824	136	123.6	123.6	1.098	1.098
56-57	113	26	24.9	24.9	1.046	1.046
58-59	116	38	32.5	30.2	1.170	1.260
60	45	18	15.8	14.4	1.143	1.250
61	58	12	18.6	20.3	0.647	0.591
62	51	21	23.0	23.0	0.915	0.915
63-64	79	31	35.6	35.6	0.872	0.872
65	35	18	17.5	17.5	1.029	1.029
66-70	71	51	39.1	35.5	1.306	1.437
71+	10	5	5.5	5.0	0.909	1.000
All Ages	1,402	356	335.8	329.8	1.059	1.078

Retirement with Unreduced Benefit

Male - After First Year Attainment of Age 55 and 25 Years of Service

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Retirements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=54	0	0	0.0	0.0	n/a	n/a
55	0	0	0.0	0.0	n/a	n/a
56-57	1,676	204	209.8	209.8	0.974	0.974
58-59	1,831	281	274.9	274.9	1.024	1.024
60	947	171	189.4	198.9	0.901	0.858
61	909	178	204.5	218.2	0.872	0.818
62	831	253	290.9	299.2	0.870	0.846
63-64	1,128	311	338.4	338.4	0.919	0.919
65	394	112	130.0	137.9	0.861	0.812
66-70	707	225	212.1	212.1	1.059	1.059
71+	182	39	49.1	54.6	0.794	0.714
All Ages	8,605	1,775	1,899.1	1,943.9	0.934	0.913

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Retirement with Unreduced Benefit  
Female - Age 60 and Less Than 25 Years of Service

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Retirements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=59	0	0	0.0	0.0	n/a	n/a
60	4,892	241	244.8	269.2	0.985	0.896
61	3,958	176	198.1	217.9	0.889	0.808
62	3,449	278	266.3	263.5	1.044	1.055
63-64	4,913	339	368.5	393.0	0.920	0.863
65	1,694	197	207.5	207.5	0.949	0.949
66-70	2,868	470	430.2	401.5	1.092	1.170
71+	399	68	63.8	63.8	1.068	1.068
All Ages	22,173	1,769	1,779.1	1,816.5	0.994	0.974

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Retirement with Unreduced Benefit

Female - First Year Attainment of Age 55 and 25 Years of Service

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Retirements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=54	0	0	0.0	0.0	n/a	n/a
55	2,629	477	446.9	420.6	1.067	1.133
56-57	515	114	97.9	92.7	1.162	1.226
58-59	599	164	161.7	155.7	1.014	1.053
60	365	122	120.5	116.8	1.013	1.045
61	366	161	139.1	128.1	1.158	1.257
62	376	194	188.0	188.0	1.032	1.032
63-64	623	340	311.5	299.0	1.091	1.137
65	246	159	135.3	123.0	1.173	1.290
66-70	451	307	248.1	225.5	1.238	1.361
71+	63	43	34.7	31.5	1.241	1.365
All Ages	6,233	2,080	1,883.5	1,781.0	1.104	1.168

Retirement with Unreduced Benefit

Female - After First Year Attainment of Age 55 and 25 Years of Service

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Retirements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=54	0	0	0.0	0.0	n/a	n/a
55	0	0	0.0	0.0	n/a	n/a
56-57	4,723	643	638.0	638.0	1.008	1.008
58-59	5,219	845	835.3	835.3	1.011	1.011
60	2,728	574	572.9	572.9	1.002	1.002
61	2,624	580	603.5	603.5	0.961	0.961
62	2,370	752	758.4	758.4	0.991	0.991
63-64	3,201	907	928.3	928.3	0.977	0.977
65	1,133	328	373.9	396.6	0.877	0.827
66-70	2,164	698	649.2	649.2	1.076	1.076
71+	527	162	158.1	158.1	1.025	1.025
All Ages	24,689	5,489	5,517.6	5,540.2	0.995	0.991

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Ordinary Disability - Male

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Disablements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=24	0	0	0.0	0.0	n/a	n/a
25-29	5	0	0.0	0.0	0.000	0.000
30-34	2,246	1	1.3	1.3	0.881	0.881
35-39	10,073	6	6.5	6.5	0.887	0.887
40-44	11,399	4	9.0	9.0	0.414	0.414
45-49	9,244	15	11.0	11.0	1.336	1.336
50-54	7,904	7	21.5	21.5	0.345	0.345
55-59	4,264	25	25.4	25.4	0.997	0.997
60-64	3,219	34	29.4	29.4	1.161	1.161
65-69	1,305	13	15.5	15.5	0.841	0.841
70+	278	9	3.4	3.4	2.625	2.625
All Ages	49,937	114	123.0	123.0	0.929	0.929

### Ordinary Disability - Female

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Disablements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=24	0	0	0.0	0.0	n/a	n/a
25-29	13	0	0.0	0.0	1.196	1.196
30-34	7,005	9	4.5	4.5	1.919	1.919
35-39	26,737	14	19.7	19.7	0.736	0.736
40-44	29,083	24	30.3	30.3	0.802	0.802
45-49	24,334	47	36.5	36.5	1.295	1.295
50-54	28,940	67	64.2	64.2	1.037	1.037
55-59	21,893	108	102.0	102.0	1.057	1.057
60-64	15,270	115	121.7	121.7	0.948	0.948
65-69	3,860	36	50.1	50.1	0.720	0.720
70+	555	8	11.3	11.3	0.711	0.711
All Ages	157,690	429	440.4	440.4	0.973	0.973

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Accidental Disability - Male

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Disablements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=24	790	0	0.0	0.0	0.437	0.437
25-29	8,270	0	0.5	0.5	0.243	0.243
30-34	12,717	0	0.8	0.8	0.150	0.150
35-39	14,689	1	0.9	0.9	1.251	1.251
40-44	14,036	0	0.8	0.8	0.100	0.100
45-49	11,018	0	0.7	0.7	0.122	0.122
50-54	9,436	0	0.6	0.6	0.094	0.094
55-59	9,963	1	0.6	0.6	1.749	1.749
60-64	8,168	1	0.5	0.5	2.094	2.094
65-69	0	0	0.0	0.0	n/a	n/a
70+	0	0	0.0	0.0	n/a	n/a
All Ages	89,087	4	5.3	5.3	0.682	0.682

### Accidental Disability - Female

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Disablements</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
<=24	3,428	0	0.2	0.2	0.382	0.382
25-29	32,052	1	1.9	1.9	0.308	0.308
30-34	40,672	1	2.4	2.4	0.345	0.345
35-39	40,191	2	2.4	2.4	0.651	0.651
40-44	39,233	0	2.4	2.4	0.132	0.132
45-49	33,009	1	2.0	2.0	0.601	0.601
50-54	35,606	2	2.1	2.1	1.026	1.026
55-59	39,335	3	2.4	2.4	1.350	1.350
60-64	29,396	4	1.8	1.8	2.299	2.299
65-69	0	0	0.0	0.0	n/a	n/a
70+	0	0	0.0	0.0	n/a	n/a
All Ages	292,922	14	17.6	17.6	0.797	0.797

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## Teachers' Pension and Annuity Fund of New Jersey

### Experience Study for the Period July 1, 2012 through June 30, 2015

Healthy Retiree and Beneficiary Mortality - Male  
Counts - 6-Year Period Ending June 30, 2015

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Deaths</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
50-54	550	7	1.8	2.2	3.894	3.153
55-59	5,730	43	24.0	24.1	1.788	1.783
60-64	29,765	196	178.1	195.3	1.101	1.003
65-69	43,737	408	409.4	470.6	0.997	0.867
70-74	30,412	480	492.4	531.6	0.975	0.903
75-79	22,096	654	665.3	715.5	0.983	0.914
80-84	16,784	934	931.9	995.0	1.002	0.939
85-89	8,696	910	914.5	902.6	0.995	1.008
90+	3,526	757	751.0	657.1	1.008	1.152
All Ages	161,296	4,389	4,368.4	4,494.1	1.005	0.977

Healthy Retiree and Beneficiary Mortality - Male  
Benefits - 6-Year Period Ending June 30, 2015

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Deaths</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
50-54	17,718,709	182,311	58,314	71,174	3.126	2.561
55-59	263,053,943	1,858,020	1,106,892	1,108,686	1.679	1.676
60-64	1,424,616,282	8,303,692	8,528,597	9,358,478	0.974	0.887
65-69	2,058,884,313	18,347,986	19,218,684	22,098,113	0.955	0.830
70-74	1,369,351,010	20,294,365	22,107,639	23,871,193	0.918	0.850
75-79	935,604,891	25,639,040	28,055,704	30,167,738	0.914	0.850
80-84	641,982,876	33,541,850	35,335,373	37,750,329	0.949	0.889
85-89	280,382,902	28,262,003	29,140,383	28,801,873	0.970	0.981
90+	88,947,437	19,134,760	18,607,558	16,345,886	1.028	1.171
All Ages	7,080,542,363	155,564,027	162,159,143	169,573,470	0.959	0.917

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## Teachers' Pension and Annuity Fund of New Jersey

### Experience Study for the Period July 1, 2012 through June 30, 2015

Healthy Retiree and Beneficiary Mortality - Female  
Counts - 6-Year Period Ending June 30, 2015

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Deaths</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
50-54	1,328	8	2.4	3.0	3.271	2.634
55-59	15,892	62	43.2	61.7	1.435	1.005
60-64	69,106	302	311.1	410.7	0.971	0.735
65-69	85,528	536	612.1	663.7	0.876	0.808
70-74	57,084	639	662.1	679.8	0.965	0.940
75-79	39,494	820	822.3	804.7	0.997	1.019
80-84	32,127	1,258	1,256.0	1,136.4	1.002	1.107
85-89	21,233	1,612	1,603.0	1,602.2	1.006	1.006
90+	14,863	2,533	2,529.8	2,228.0	1.001	1.137
All Ages	336,655	7,770	7,842.0	7,590.2	0.991	1.024

Healthy Retiree and Beneficiary Mortality - Female  
Benefits - 6-Year Period Ending June 30, 2015

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Deaths</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
50-54	42,462,154	193,953	78,566	97,942	2.469	1.980
55-59	696,683,844	2,609,239	1,899,117	2,715,246	1.374	0.961
60-64	2,914,410,838	12,230,235	13,088,089	17,290,045	0.934	0.707
65-69	3,431,757,311	21,715,937	24,466,879	26,539,945	0.888	0.818
70-74	2,120,764,486	23,091,825	24,493,545	25,167,304	0.943	0.918
75-79	1,335,888,089	27,503,799	27,634,058	27,056,826	0.995	1.017
80-84	940,114,236	35,839,119	36,344,840	32,955,246	0.986	1.088
85-89	501,401,971	37,211,774	37,343,886	37,406,973	0.996	0.995
90+	282,583,444	46,597,812	47,329,185	41,949,944	0.985	1.111
All Ages	12,266,066,373	206,993,693	212,678,166	211,179,470	0.973	0.980

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Disabled Retiree Mortality - Male  
Counts - 6-Year Period Ending June 30, 2015

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Deaths</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
50-54	212	4	4.7	5.1	0.856	0.783
55-59	484	10	11.3	13.9	0.886	0.717
60-64	935	27	26.4	31.9	1.023	0.848
65-69	971	35	35.4	39.5	0.989	0.886
70-74	549	22	27.2	28.5	0.808	0.771
75-79	350	17	23.9	23.9	0.712	0.710
80-84	181	11	17.6	16.4	0.624	0.671
85-89	89	14	12.5	10.2	1.116	1.375
90+	23	7	4.6	3.5	1.514	1.993
All Ages	3,794	147	163.6	173.0	0.898	0.850

Disabled Retiree Mortality - Female  
Counts - 6-Year Period Ending June 30, 2015

	<u>Exposures</u>	<u>Actual</u>	<u>Expected Deaths</u>		<u>Ratio of Actual/Expected</u>	
			<u>Proposed Assumptions</u>	<u>Current Assumptions</u>	<u>Proposed Assumptions</u>	<u>Current Assumptions</u>
50-54	911	16	11.1	11.3	1.447	1.413
55-59	1,801	26	27.4	30.7	0.950	0.847
60-64	2,929	65	57.5	64.1	1.130	1.015
65-69	3,060	72	78.1	86.3	0.922	0.834
70-74	2,002	59	70.2	76.4	0.840	0.773
75-79	1,169	47	59.7	62.0	0.788	0.758
80-84	627	41	47.6	46.0	0.862	0.892
85-89	315	31	35.2	31.9	0.881	0.973
90+	106	16	19.1	16.3	0.838	0.982
All Ages	12,920	373	405.8	424.9	0.919	0.878

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# Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

## **Appendix B – Proposed Assumptions**

The proposed demographic assumptions are summarized on the following pages.

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# Teachers' Pension and Annuity Fund of New Jersey

## Experience Study for the Period July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Termination - Male

Years of Service	Less than 10 Years of Service		10 to 14 Years of Service		15 to 19 Years of Service		20 to 24 Years of Service	
	Proposed Rate	Age	Proposed Rates		Proposed Rates		Proposed Rates	
			With Benefit	Contribution Refund	With Benefit	Contribution Refund	With Benefit	Contribution Refund
0	0.1023	25	0.0067	0.0045	0.0047	0.0031	0.0027	0.0018
1	0.0764	26	0.0067	0.0045	0.0047	0.0031	0.0027	0.0018
2	0.0689	27	0.0067	0.0045	0.0047	0.0031	0.0027	0.0018
3	0.0512	28	0.0067	0.0045	0.0047	0.0031	0.0027	0.0018
4	0.0346	29	0.0067	0.0045	0.0047	0.0031	0.0027	0.0018
5	0.0277							
6	0.0209	30	0.0067	0.0045	0.0047	0.0031	0.0027	0.0018
7	0.0185	31	0.0067	0.0045	0.0047	0.0031	0.0027	0.0018
8	0.0150	32	0.0067	0.0045	0.0047	0.0031	0.0027	0.0018
9	0.0125	33	0.0065	0.0044	0.0045	0.0030	0.0027	0.0018
		34	0.0064	0.0043	0.0044	0.0029	0.0027	0.0018
		35	0.0063	0.0042	0.0042	0.0028	0.0027	0.0018
		36	0.0062	0.0041	0.0040	0.0027	0.0027	0.0018
		37	0.0060	0.0041	0.0039	0.0026	0.0027	0.0018
		38	0.0060	0.0040	0.0038	0.0026	0.0027	0.0018
		39	0.0060	0.0040	0.0039	0.0025	0.0026	0.0018
		40	0.0060	0.0039	0.0038	0.0025	0.0026	0.0018
		41	0.0059	0.0039	0.0038	0.0025	0.0026	0.0018
		42	0.0058	0.0039	0.0037	0.0025	0.0026	0.0017
		43	0.0060	0.0040	0.0037	0.0025	0.0026	0.0017
		44	0.0062	0.0041	0.0037	0.0025	0.0025	0.0017
		45	0.0063	0.0042	0.0036	0.0025	0.0025	0.0016
		46	0.0065	0.0043	0.0037	0.0024	0.0024	0.0016
		47	0.0067	0.0044	0.0037	0.0024	0.0023	0.0016
		48	0.0067	0.0044	0.0039	0.0026	0.0025	0.0016
		49	0.0067	0.0044	0.0041	0.0027	0.0026	0.0017
		50	0.0077	0.0033	0.0050	0.0022	0.0031	0.0013
		51	0.0077	0.0033	0.0053	0.0023	0.0032	0.0014
		52	0.0077	0.0033	0.0056	0.0024	0.0034	0.0014
		53	0.0083	0.0036	0.0062	0.0026	0.0038	0.0016
		54	0.0090	0.0039	0.0067	0.0029	0.0042	0.0018
		55	0.0110	0.0028	0.0083	0.0021	0.0054	0.0013
		56	0.0118	0.0029	0.0090	0.0022	0.0058	0.0015
		57	0.0126	0.0031	0.0097	0.0024	0.0063	0.0016
		58	0.0126	0.0031	0.0097	0.0024	0.0063	0.0016
		59	0.0126	0.0031	0.0097	0.0024	0.0063	0.0016

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# Teachers' Pension and Annuity Fund of New Jersey

## Experience Study for the Period July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Termination - Female

Years of Service	Less than 10 Years of Service		Age	10 to 14 Years of Service		15 to 19 Years of Service		20 to 24 Years of Service	
	Proposed Rates			Proposed Rates		Proposed Rates		Proposed Rates	
	Less than Age 40	At Least Age 40		With Benefit	Contribution Refund	With Benefit	Contribution Refund	With Benefit	Contribution Refund
0	0.0966	0.1096	25	0.0230	0.0077	0.0208	0.0069	0.0055	0.0019
1	0.0680	0.0757	26	0.0230	0.0077	0.0208	0.0069	0.0055	0.0019
2	0.0658	0.0685	27	0.0230	0.0077	0.0208	0.0069	0.0055	0.0019
3	0.0539	0.0516	28	0.0230	0.0077	0.0208	0.0069	0.0055	0.0019
4	0.0476	0.0318	29	0.0230	0.0077	0.0208	0.0069	0.0055	0.0019
5	0.0449	0.0275							
6	0.0430	0.0207	30	0.0230	0.0077	0.0208	0.0069	0.0055	0.0019
7	0.0398	0.0178	31	0.0230	0.0077	0.0208	0.0069	0.0055	0.0019
8	0.0380	0.0138	32	0.0230	0.0077	0.0208	0.0069	0.0055	0.0019
9	0.0323	0.0139	33	0.0216	0.0072	0.0185	0.0062	0.0055	0.0019
			34	0.0202	0.0067	0.0163	0.0054	0.0055	0.0019
			35	0.0188	0.0062	0.0140	0.0047	0.0055	0.0019
			36	0.0173	0.0058	0.0118	0.0039	0.0055	0.0019
			37	0.0159	0.0053	0.0095	0.0032	0.0055	0.0019
			38	0.0145	0.0048	0.0087	0.0029	0.0051	0.0017
			39	0.0130	0.0044	0.0079	0.0026	0.0047	0.0016
			40	0.0117	0.0039	0.0070	0.0024	0.0043	0.0014
			41	0.0103	0.0034	0.0062	0.0021	0.0038	0.0013
			42	0.0089	0.0030	0.0055	0.0018	0.0035	0.0011
			43	0.0084	0.0028	0.0052	0.0017	0.0031	0.0011
			44	0.0079	0.0026	0.0049	0.0016	0.0029	0.0010
			45	0.0074	0.0025	0.0046	0.0015	0.0027	0.0009
			46	0.0069	0.0023	0.0043	0.0014	0.0024	0.0008
			47	0.0064	0.0021	0.0040	0.0013	0.0022	0.0007
			48	0.0067	0.0022	0.0043	0.0014	0.0024	0.0008
			49	0.0070	0.0023	0.0045	0.0015	0.0026	0.0009
			50	0.0072	0.0024	0.0048	0.0016	0.0028	0.0009
			51	0.0075	0.0025	0.0050	0.0017	0.0030	0.0010
			52	0.0078	0.0026	0.0053	0.0018	0.0032	0.0011
			53	0.0087	0.0029	0.0059	0.0020	0.0037	0.0012
			54	0.0096	0.0032	0.0064	0.0022	0.0042	0.0014
			55	0.0120	0.0021	0.0080	0.0014	0.0053	0.0009
			56	0.0130	0.0023	0.0087	0.0015	0.0058	0.0010
			57	0.0140	0.0025	0.0094	0.0016	0.0063	0.0011
			58	0.0140	0.0025	0.0094	0.0016	0.0063	0.0011
			59	0.0140	0.0025	0.0094	0.0016	0.0063	0.0011

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Retirement - Male - Class A and B

<u>Age</u>	<u>Less than 25 Years of Service</u>	<u>More than 25 Years of Service First Eligibility</u>	<u>After First Eligibility</u>
Less than Age 55 or			
Less than 48	0.0120	N/A	N/A
48	0.0145	N/A	N/A
49	0.0165	N/A	N/A
50	0.0195	N/A	N/A
51	0.0235	N/A	N/A
52	0.0275	N/A	N/A
53	0.0375	N/A	N/A
54	0.0475	N/A	N/A
55	N/A	0.1500	N/A
56	N/A	0.2200	0.1200
57	N/A	0.2200	0.1300
58	N/A	0.2800	0.1400
59	N/A	0.2800	0.1600
60	0.0700	0.3500	0.2000
61	0.0650	0.3200	0.2250
62	0.0800	0.4500	0.3500
63	0.0900	0.4500	0.3000
64	0.0900	0.4500	0.3000
65	0.1400	0.5000	0.3300
66	0.1800	0.5500	0.3000
67	0.1800	0.5500	0.3000
68	0.1800	0.5500	0.3000
69	0.1800	0.5500	0.3000
70	0.1800	0.5500	0.3000
71 and older	0.1900	0.5500	0.2700

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Retirement - Female - Class A and B

<u>Age</u>	<u>Less than 25 Years of Service</u>	<u>More than 25 Years of Service First Eligibility</u>	<u>After First Eligibility</u>
Less than Age 55 or			
Less than 48	0.0120	N/A	N/A
48	0.0145	N/A	N/A
49	0.0165	N/A	N/A
50	0.0195	N/A	N/A
51	0.0235	N/A	N/A
52	0.0275	N/A	N/A
53	0.0375	N/A	N/A
54	0.0475	N/A	N/A
55	N/A	0.1700	N/A
56	N/A	0.1900	0.1300
57	N/A	0.1900	0.1400
58	N/A	0.2700	0.1500
59	N/A	0.2700	0.1700
60	0.0500	0.3300	0.2100
61	0.0500	0.3800	0.2300
62	0.0750	0.5000	0.3200
63	0.0750	0.5000	0.2900
64	0.0750	0.5000	0.2900
65	0.1200	0.5500	0.3300
66	0.1500	0.5500	0.3000
67	0.1500	0.5500	0.3000
68	0.1500	0.5500	0.3000
69	0.1500	0.5500	0.3000
70	0.1500	0.5500	0.3000
71 and older	0.1600	0.5500	0.3000

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Retirement - Male - Class D

<u>Age</u>	<u>Less than 25 Years of Service</u>	<u>More than 25 Years of Service First Eligibility</u>	<u>After First Eligibility</u>
Less than 48	0.0060	N/A	N/A
48	0.0075	N/A	N/A
49	0.0085	N/A	N/A
50	0.0100	N/A	N/A
51	0.0120	N/A	N/A
52	0.0140	N/A	N/A
53	0.0190	N/A	N/A
54	0.0240	N/A	N/A
55	0.1150	N/A	N/A
56	0.1200	N/A	N/A
57	0.1250	N/A	N/A
58	0.1350	N/A	N/A
59	0.1400	N/A	N/A
60	0.0700	0.3200	N/A
61	0.0650	0.3200	0.2250
62	0.0800	0.4500	0.3500
63	0.0900	0.4500	0.3000
64	0.0900	0.4500	0.3000
65	0.1400	0.5000	0.3300
66	0.1800	0.5500	0.3000
67	0.1800	0.5500	0.3000
68	0.1800	0.5500	0.3000
69	0.1800	0.5500	0.3000
70	0.1800	0.5500	0.3000
71 and older	0.1900	0.5500	0.2700

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Retirement - Female - Class D

<u>Age</u>	<u>Less than 25 Years of Service</u>	<u>More than 25 Years of Service First Eligibility</u>	<u>After First Eligibility</u>
Less than 48	0.0060	N/A	N/A
48	0.0075	N/A	N/A
49	0.0085	N/A	N/A
50	0.0100	N/A	N/A
51	0.0120	N/A	N/A
52	0.0140	N/A	N/A
53	0.0190	N/A	N/A
54	0.0240	N/A	N/A
55	0.1150	N/A	N/A
56	0.1200	N/A	N/A
57	0.1250	N/A	N/A
58	0.1350	N/A	N/A
59	0.1400	N/A	N/A
60	0.0500	0.3100	N/A
61	0.0500	0.3800	0.2300
62	0.0750	0.5000	0.3200
63	0.0750	0.5000	0.2900
64	0.0750	0.5000	0.2900
65	0.1200	0.5500	0.3300
66	0.1500	0.5500	0.3000
67	0.1500	0.5500	0.3000
68	0.1500	0.5500	0.3000
69	0.1500	0.5500	0.3000
70	0.1500	0.5500	0.3000
71 and older	0.1600	0.5500	0.3000

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Retirement - Male - Class E and F

<u>Age</u>	<u>Less than 25 Years of Service</u>	<u>More than 25 Years of Service First Eligibility</u>	<u>After First Eligibility</u>
Less than 48	0.0055	N/A	N/A
48	0.0070	N/A	N/A
49	0.0075	N/A	N/A
50	0.0090	N/A	N/A
51	0.0110	N/A	N/A
52	0.0125	N/A	N/A
53	0.0170	N/A	N/A
54	0.0215	N/A	N/A
55	0.1050	N/A	N/A
56	0.1075	N/A	N/A
57	0.1100	N/A	N/A
58	0.1200	N/A	N/A
59	0.1250	N/A	N/A
60	0.2000	N/A	N/A
61	0.2200	N/A	N/A
62	0.3000	0.5000	N/A
63	0.0900	0.4500	0.3000
64	0.0900	0.4500	0.3000
65	0.1400	0.5000	0.3300
66	0.1800	0.5500	0.3000
67	0.1800	0.5500	0.3000
68	0.1800	0.5500	0.3000
69	0.1800	0.5500	0.3000
70	0.1800	0.5500	0.3000
71 and older	0.1900	0.5500	0.2700

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Retirement - Female - Class E and F

<u>Age</u>	<u>Less than 25 Years of Service</u>	<u>More than 25 Years of Service First Eligibility</u>	<u>After First Eligibility</u>
Less than 48	0.0055	N/A	N/A
48	0.0070	N/A	N/A
49	0.0075	N/A	N/A
50	0.0090	N/A	N/A
51	0.0110	N/A	N/A
52	0.0125	N/A	N/A
53	0.0170	N/A	N/A
54	0.0215	N/A	N/A
55	0.1050	N/A	N/A
56	0.1075	N/A	N/A
57	0.1100	N/A	N/A
58	0.1200	N/A	N/A
59	0.1250	N/A	N/A
60	0.2000	N/A	N/A
61	0.2200	N/A	N/A
62	0.2400	0.4600	N/A
63	0.0750	0.5000	0.2900
64	0.0750	0.5000	0.2900
65	0.1200	0.5500	0.3300
66	0.1500	0.5500	0.3000
67	0.1500	0.5500	0.3000
68	0.1500	0.5500	0.3000
69	0.1500	0.5500	0.3000
70	0.1500	0.5500	0.3000
71 and older	0.1600	0.5500	0.3000

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Retirement - Male - Class G

<u>Age</u>	Less than Age 65 or Less than 30 Years of Service	More than 30 Years of Service First <u>Eligibility</u>	After First <u>Eligibility</u>
Less than 48	0.0030	N/A	N/A
48	0.0035	N/A	N/A
49	0.0040	N/A	N/A
50	0.0045	N/A	N/A
51	0.0055	N/A	N/A
52	0.0065	N/A	N/A
53	0.0085	N/A	N/A
54	0.0110	N/A	N/A
55	0.0500	N/A	N/A
56	0.0600	N/A	N/A
57	0.0700	N/A	N/A
58	0.0800	N/A	N/A
59	0.0900	N/A	N/A
60	0.1500	N/A	N/A
61	0.1600	N/A	N/A
62	0.3600	N/A	N/A
63	0.2800	N/A	N/A
64	0.2800	N/A	N/A
65	0.4000	0.5000	N/A
66	0.1800	0.5500	0.3000
67	0.1800	0.5500	0.3000
68	0.1800	0.5500	0.3000
69	0.1800	0.5500	0.3000
70	0.1800	0.5500	0.3000
71 and older	0.1900	0.5500	0.2700

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Retirement - Female - Class G

<u>Age</u>	Less than Age 65 or		
	<u>Less than 30 Years of Service</u>	<u>More than 30 Years of Service</u>	
		<u>First Eligibility</u>	<u>After First Eligibility</u>
Less than 48	0.0030	N/A	N/A
48	0.0035	N/A	N/A
49	0.0040	N/A	N/A
50	0.0045	N/A	N/A
51	0.0055	N/A	N/A
52	0.0065	N/A	N/A
53	0.0085	N/A	N/A
54	0.0110	N/A	N/A
55	0.0500	N/A	N/A
56	0.0600	N/A	N/A
57	0.0700	N/A	N/A
58	0.0800	N/A	N/A
59	0.0900	N/A	N/A
60	0.1500	N/A	N/A
61	0.1600	N/A	N/A
62	0.3200	N/A	N/A
63	0.2800	N/A	N/A
64	0.2800	N/A	N/A
65	0.4000	0.5500	N/A
66	0.1500	0.5500	0.3000
67	0.1500	0.5500	0.3000
68	0.1500	0.5500	0.3000
69	0.1500	0.5500	0.3000
70	0.1500	0.5500	0.3000
71 and older	0.1600	0.5500	0.3000

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Disability

<u>Age</u>	<u>Ordinary Disability*</u>		<u>Accidental Disability</u>	
	<u>Male</u>	<u>Female</u>	<u>Gender</u>	<u>Proposed Rate</u>
25	0.000301	0.000379	Male	0.00006
26	0.000313	0.000408	Female	0.00006
27	0.000326	0.000439		
28	0.000375	0.000476		
29	0.000424	0.000513		
30	0.000473	0.000550		
31	0.000522	0.000587		
32	0.000573	0.000626		
33	0.000585	0.000642		
34	0.000597	0.000658		
35	0.000609	0.000674		
36	0.000621	0.000690		
37	0.000635	0.000704		
38	0.000657	0.000767		
39	0.000679	0.000830		
40	0.000701	0.000893		
41	0.000723	0.000956		
42	0.000744	0.001020		
43	0.000837	0.001119		
44	0.000930	0.001218		
45	0.001023	0.001317		
46	0.001116	0.001416		
47	0.001211	0.001513		
48	0.001281	0.001595		
49	0.001351	0.001677		

\* Assumption does not apply if have less than 10 years of service or have attained age 55 and 25 years of service (for Class B employees)

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

### Proposed Assumptions Rates of Disability

<u>Age</u>	<u>Ordinary Disability*</u>		<u>Accidental Disability</u>	
	<u>Proposed Rates</u>		<u>Gender</u>	<u>Proposed Rate</u>
	<u>Male</u>	<u>Female</u>		
50	0.001421	0.001759	Male	0.00006
51	0.002074	0.001841	Female	0.00006
52	0.002727	0.001925		
53	0.003380	0.002452		
54	0.004033	0.002979		
55	0.004686	0.003506		
56	0.005339	0.004033		
57	0.005992	0.004558		
58	0.006645	0.005254		
59	0.007298	0.005950		
60	0.007951	0.006646		
61	0.008604	0.007342		
62	0.009257	0.008039		
63	0.009910	0.009177		
64	0.010563	0.010315		
65	0.011216	0.011453		
66	0.011869	0.012591		
67	0.012522	0.013730		
68	0.012522	0.015590		
69	0.012522	0.017450		
70	0.012522	0.019310		
71	0.012522	0.021170		
72	0.012522	0.023030		
73	0.012522	0.022140		
74	0.012522	0.021250		

\* Assumption does not apply if have less than 10 years of service or have attained age 55 and 25 years of service (for Class B employees)

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Proposed Assumptions  
Rates of Mortality - Male  
Base Year = 2015

<u>Age</u>	<u>Active Ordinary</u>	<u>Postretirement Healthy</u>	<u>Postretirement Disabled</u>	<u>Mortality Improvement</u>
15	0.000096	0.000173	0.000196	0.0176
16	0.000128	0.000202	0.000228	0.0168
17	0.000159	0.000234	0.000261	0.0157
18	0.000191	0.000188	0.005170	0.0143
19	0.000225	0.000215	0.005816	0.0128
20	0.000261	0.000300	0.008034	0.0115
21	0.000209	0.000328	0.008700	0.0104
22	0.000237	0.000351	0.009256	0.0096
23	0.000330	0.000360	0.009443	0.0090
24	0.000358	0.000359	0.009365	0.0086
25	0.000383	0.000330	0.008598	0.0082
26	0.000391	0.000310	0.008038	0.0078
27	0.000390	0.000296	0.007661	0.0075
28	0.000357	0.000288	0.007441	0.0074
29	0.000335	0.000285	0.007376	0.0075
30	0.000318	0.000287	0.007410	0.0076
31	0.000308	0.000292	0.007564	0.0079
32	0.000305	0.000301	0.007808	0.0081
33	0.000306	0.000311	0.008109	0.0084
34	0.000311	0.000321	0.008420	0.0088
35	0.000321	0.000335	0.008774	0.0091
36	0.000331	0.000348	0.009156	0.0095
37	0.000342	0.000364	0.009625	0.0100
38	0.000355	0.000384	0.010209	0.0106
39	0.000369	0.000408	0.010932	0.0112
40	0.000385	0.000439	0.011813	0.0118
41	0.000407	0.000475	0.012828	0.0122
42	0.000434	0.000519	0.014034	0.0124
43	0.000470	0.000572	0.015474	0.0123
44	0.000512	0.000636	0.017149	0.0121

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Proposed Assumptions  
Rates of Mortality - Male  
Base Year = 2015

<u>Age</u>	<u>Active Ordinary</u>	<u>Postretirement Healthy</u>	<u>Postretirement Disabled</u>	<u>Mortality Improvement</u>
45	0.000561	0.000707	0.019031	0.0118
46	0.000619	0.000787	0.019720	0.0117
47	0.000687	0.000873	0.020303	0.0116
48	0.000761	0.000964	0.020799	0.0117
49	0.000846	0.001059	0.021209	0.0118
50	0.000936	0.002710	0.021547	0.0119
51	0.001033	0.002870	0.021829	0.0120
52	0.001136	0.003028	0.022079	0.0121
53	0.001244	0.003173	0.022171	0.0120
54	0.001359	0.003316	0.022247	0.0119
55	0.001483	0.003478	0.022379	0.0117
56	0.001601	0.003617	0.022620	0.0117
57	0.001729	0.003795	0.023015	0.0117
58	0.001868	0.004010	0.023587	0.0119
59	0.002030	0.004275	0.024346	0.0121
60	0.002224	0.004589	0.025300	0.0124
61	0.002462	0.004968	0.026441	0.0125
62	0.002750	0.005409	0.027761	0.0126
63	0.003097	0.005920	0.029248	0.0127
64	0.003513	0.006521	0.030890	0.0126
65	0.004002	0.007214	0.032681	0.0125
66	0.004566	0.008005	0.034618	0.0125
67	0.005214	0.008918	0.036691	0.0124
68	0.005946	0.009955	0.038925	0.0124
69	0.006769	0.011148	0.041338	0.0123
70	0.007690	0.012494	0.043931	0.0122
71	0.008721	0.014002	0.046713	0.0121
72	0.009876	0.015691	0.049730	0.0120
73	0.011166	0.017568	0.052986	0.0119
74	0.012603	0.019865	0.056508	0.0118

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Proposed Assumptions  
Rates of Mortality - Male  
Base Year = 2015

<u>Age</u>	<u>Active Ordinary</u>	<u>Postretirement Healthy</u>	<u>Postretirement Disabled</u>	<u>Mortality Improvement</u>
75	0.014226	0.022465	0.060309	0.0116
76	0.016055	0.025421	0.064427	0.0113
77	0.018086	0.028743	0.068901	0.0111
78	0.020314	0.032457	0.073762	0.0111
79	0.022795	0.036679	0.079047	0.0111
80	0.025583	0.041550	0.084835	0.0110
81	0.028737	0.047215	0.091157	0.0107
82	0.032308	0.053837	0.098103	0.0102
83	0.036370	0.061577	0.105734	0.0095
84	0.047605	0.070586	0.114167	0.0087
85	0.053895	0.080913	0.123392	0.0079
86	0.061100	0.092734	0.133506	0.0071
87	0.069301	0.106142	0.144608	0.0064
88	0.078541	0.121229	0.156702	0.0058
89	0.088923	0.138142	0.169849	0.0053
90	0.100554	0.157030	0.184106	0.0049
91	0.113577	0.177414	0.198174	0.0045
92	0.128234	0.199128	0.212018	0.0040
93	0.144442	0.221562	0.225586	0.0036
94	0.161867	0.244961	0.238837	0.0031
95	0.179730	0.268526	0.251661	0.0028
96	0.198029	0.291991	0.265731	0.0025
97	0.216435	0.315986	0.279789	0.0023
98	0.234768	0.340651	0.293981	0.0022
99	0.254593	0.365594	0.308204	0.0022
100	0.275266	0.388596	0.322492	0.0021
101	0.296753	0.411600	0.336817	0.0020
102	0.318482	0.433780	0.351218	0.0020
103	0.338520	0.455797	0.365774	0.0019
104	0.358559	0.476966	0.380385	0.0018
105	0.378222	0.497068	0.395013	0.0017
106	0.397419	0.516321	0.409943	0.0016
107	0.415502	0.533685	0.423729	0.0016
108	0.433013	0.550226	0.436469	0.0015
109	0.449785	0.565550	0.448221	0.0014

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Proposed Assumptions  
Rates of Mortality - Female  
Base Year = 2015

<u>Age</u>	<u>Active Ordinary</u>	<u>Postretirement Healthy</u>	<u>Postretirement Disabled</u>	<u>Mortality Improvement</u>
15	0.000070	0.000090	0.000119	0.0176
16	0.000072	0.000098	0.000128	0.0168
17	0.000084	0.000104	0.000135	0.0157
18	0.000097	0.000093	0.001946	0.0143
19	0.000108	0.000098	0.002008	0.0128
20	0.000119	0.000123	0.002507	0.0115
21	0.000129	0.000122	0.002442	0.0104
22	0.000138	0.000119	0.002372	0.0096
23	0.000122	0.000118	0.002356	0.0090
24	0.000127	0.000118	0.002326	0.0086
25	0.000159	0.000117	0.002307	0.0082
26	0.000156	0.000117	0.002300	0.0078
27	0.000151	0.000119	0.002328	0.0075
28	0.000150	0.000120	0.002376	0.0074
29	0.000149	0.000126	0.002459	0.0075
30	0.000147	0.000131	0.002588	0.0076
31	0.000146	0.000140	0.002754	0.0079
32	0.000148	0.000149	0.002948	0.0081
33	0.000149	0.000161	0.003179	0.0084
34	0.000155	0.000174	0.003440	0.0088
35	0.000162	0.000186	0.003725	0.0091
36	0.000173	0.000201	0.004029	0.0095
37	0.000184	0.000219	0.004399	0.0100
38	0.000197	0.000238	0.004816	0.0106
39	0.000212	0.000261	0.005299	0.0112
40	0.000227	0.000286	0.005843	0.0118
41	0.000245	0.000313	0.006421	0.0122
42	0.000267	0.000343	0.007064	0.0124
43	0.000293	0.000379	0.007781	0.0123
44	0.000324	0.000418	0.008562	0.0121

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Proposed Assumptions  
Rates of Mortality - Female  
Base Year = 2015

<u>Age</u>	<u>Active Ordinary</u>	<u>Postretirement Healthy</u>	<u>Postretirement Disabled</u>	<u>Mortality Improvement</u>
45	0.000358	0.000460	0.009402	0.0118
46	0.000393	0.000504	0.009831	0.0117
47	0.000432	0.000552	0.010226	0.0116
48	0.000476	0.000598	0.010562	0.0117
49	0.000524	0.000646	0.010874	0.0118
50	0.000575	0.001558	0.011194	0.0119
51	0.000629	0.001611	0.011543	0.0120
52	0.000687	0.001679	0.011937	0.0121
53	0.000745	0.001771	0.012391	0.0120
54	0.000807	0.001885	0.012915	0.0119
55	0.000873	0.002026	0.013512	0.0117
56	0.000944	0.002195	0.014186	0.0117
57	0.001020	0.002394	0.014930	0.0117
58	0.001105	0.002623	0.015738	0.0119
59	0.001200	0.002889	0.016608	0.0121
60	0.001308	0.003185	0.017513	0.0124
61	0.001433	0.003636	0.018467	0.0125
62	0.001574	0.004110	0.019456	0.0126
63	0.001731	0.004601	0.020489	0.0127
64	0.001910	0.005125	0.021591	0.0126
65	0.002106	0.005674	0.022769	0.0125
66	0.002320	0.006254	0.024061	0.0125
67	0.002555	0.006887	0.025490	0.0124
68	0.002809	0.007572	0.027081	0.0124
69	0.003085	0.008335	0.028853	0.0123
70	0.003387	0.009182	0.030828	0.0122
71	0.003800	0.010123	0.033020	0.0121
72	0.004255	0.011170	0.035431	0.0120
73	0.004759	0.012497	0.038090	0.0119
74	0.005317	0.013999	0.041013	0.0118

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## Teachers' Pension and Annuity Fund of New Jersey

Experience Study for the Period  
July 1, 2012 through June 30, 2015

Proposed Assumptions  
Rates of Mortality - Female  
Base Year = 2015

<u>Age</u>	<u>Active Ordinary</u>	<u>Postretirement Healthy</u>	<u>Postretirement Disabled</u>	<u>Mortality Improvement</u>
75	0.005940	0.015719	0.044208	0.0116
76	0.006641	0.017698	0.047704	0.0113
77	0.007412	0.019952	0.051540	0.0111
78	0.008256	0.022500	0.055740	0.0111
79	0.009198	0.025426	0.060327	0.0111
80	0.010256	0.028819	0.065331	0.0110
81	0.011460	0.032804	0.070811	0.0107
82	0.012841	0.037464	0.076734	0.0102
83	0.014423	0.042948	0.083183	0.0095
84	0.016226	0.049352	0.090164	0.0087
85	0.018268	0.056746	0.097648	0.0079
86	0.038084	0.065284	0.105677	0.0071
87	0.043087	0.075026	0.114237	0.0064
88	0.048806	0.086037	0.123255	0.0058
89	0.055322	0.098416	0.132728	0.0053
90	0.062698	0.112362	0.142775	0.0049
91	0.071105	0.127768	0.153736	0.0045
92	0.080709	0.144635	0.165484	0.0040
93	0.091423	0.160995	0.177866	0.0036
94	0.103497	0.178301	0.190734	0.0031
95	0.116852	0.196050	0.204018	0.0028
96	0.131411	0.215072	0.218211	0.0025
97	0.146872	0.234793	0.232864	0.0023
98	0.163042	0.255222	0.247994	0.0022
99	0.179755	0.276193	0.263489	0.0022
100	0.197292	0.296499	0.279306	0.0021
101	0.216044	0.316527	0.295294	0.0020
102	0.235430	0.336257	0.311473	0.0020
103	0.255913	0.356063	0.327751	0.0019
104	0.277191	0.375397	0.343998	0.0018
105	0.297570	0.394238	0.360289	0.0017
106	0.317671	0.412431	0.376576	0.0016
107	0.337472	0.429160	0.391851	0.0016
108	0.357349	0.445401	0.406313	0.0015
109	0.376754	0.460564	0.419767	0.0014

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