



October 26, 2017

Disability Income Plan
Principal Results of Actuarial Valuation
as of December 31, 2016

**Board of Trustees Meeting
David Driscoll and Mike Ribble**

Disability Income Plan Principal Results of Actuarial Valuation as of December 31, 2016

Valuation Date	12/31/2016	12/31/2015
Number of active members		
Teachers' and State Employees' Retirement System (TSERS)	305,013	305,291
Optional Retirement Program (ORP)	<u>18,456</u>	<u>16,427</u>
Total	323,469	321,718
Reported compensation		
TSERS	\$ 13,497,815,754	\$ 13,145,602,154
ORP	<u>1,680,321,122</u>	<u>1,573,134,157</u>
Total	\$ 15,178,136,876	\$ 14,718,736,311
Valuation compensation*		
TSERS	\$ 14,282,093,846	\$ 13,896,781,214
ORP	<u>1,824,702,864</u>	<u>1,662,996,217</u>
Total	\$ 16,106,796,710	\$ 15,559,777,431
Number of disabled members receiving long term disability benefits	6,617	6,709
Annual reported benefits	\$ 78,501,354	\$ 75,872,391

Disability Income Plan Principal Results of Actuarial Valuation as of December 31, 2016

Assets and Liabilities as of	12/31/2016	12/31/2015
Assets		
Actuarial Value	\$ 442,086,171	\$ 439,955,539
Market Value	\$ 433,946,692	\$ 427,102,227
Liability for currently disabled members	\$ 313,361,174	\$ 315,692,874
Deficit/(Surplus)	\$ (128,724,997)	\$ (124,262,665)
GASB 43/45 Results for Fiscal Year Ending	6/30/2019	6/30/2018
Annual required contribution (ARC)		
Normal Cost	0.13%	0.14%
Accrued Liability	<u>0.00%</u>	<u>0.00%</u>
Total	0.13%	0.14%
Impact of Legislative Changes	<u>N/A</u>	<u>0.00%</u>
Final ARC	N/A	0.14%

Disability Income Plan Employer Contribution Rate History

Valuation Date	Fiscal Year Ending	Preliminary ARC	Change due to Legislation	Final ARC	Appropriated Rate
12/31/2016	6/30/2019	0.13%	N/A	N/A	N/A
12/31/2015	6/30/2018	0.14%	0.00%	0.14%	0.14%
12/31/2014	6/30/2017	0.38%	0.00%	0.38%	0.38%
12/31/2013	6/30/2016	0.41%	0.00%	0.41%	0.41%
12/31/2012	6/30/2015	0.41%	0.00%	0.41%	0.41%

Certification



The assumptions, methods, and plan provisions used in the results presented in this presentation were provided in October 2017 in the “Report on the Annual Valuation of the Disability Income Plan of North Carolina prepared as of December 31, 2016.”

The results were prepared under the direction of Michael Ribble and David Driscoll who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. These results have been prepared in accordance with all applicable Actuarial Standards of Practice, and we are available to answer questions about them.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law.

Michael A. Ribble, FSA, EA, MAAA
Principal, Consulting Actuary

David Driscoll, FSA, EA, MAAA, FCA
Principal, Consulting Actuary

Disability Income Plan of North Carolina

Report on the Annual Valuation
Prepared as of December 31, 2016

October 2017

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October 13, 2017

Board of Trustees
Teachers' and State Employees'
Retirement System of North Carolina
3200 Atlantic Avenue
Raleigh, NC 27604

Members of the Board:

This report presents the results of the valuation of the Disability Income Plan of North Carolina (referred to as "DIPNC" or the "Disability Income Plan"), prepared as of December 31, 2016.

The valuation has been prepared in accordance with the parameters set forth in Statement Nos. 43, 45 and 74 of the Governmental Accounting Standards Board (GASB). GASB 74 replaces GASB 43, Financial Reporting for Postemployment Benefit Plans Other than Pension Plans. GASB 74 is effective for fiscal years beginning after June 15, 2016. Similarly, GASB 75, Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions, replaces GASB 45, Accounting and Financial Reporting by Employers for Postemployment Benefits Other than Pensions, and is effective for fiscal years beginning after June 15, 2017. North Carolina has elected to adopt GASB 74 but not GASB 75 for fiscal year ending June 30, 2017.

The primary purpose of the valuation report is to determine the required employer contribution rates, to describe the current financial condition of DIPNC, and to analyze changes in such condition. In addition, the report provides information that the Office of the State Controller (OSC) requires for its Comprehensive Annual Financial Report (CAFR) and it summarizes census data. Use of this report for any other purposes or by anyone other than OSC and its auditors, or North Carolina Retirement Systems Division and Department of State Treasurer Staff may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of the report for that purpose. The attached pages should not be provided without a copy of this cover letter. Because of the risk of misinterpretation of actuarial results, you should ask Conduent to review any statement you wish to make on the results contained in this report. Conduent will not accept any liability for any such statement made without prior review.

The valuation is based upon membership data and financial information as furnished by the Retirement Systems Division and as summarized in this report. Although reviewed for reasonableness and consistency with the prior valuation, these elements have not been audited by Conduent and we cannot certify as to the accuracy and completeness of the data supplied. The valuation is also based on benefit and contribution provisions as presented in this report. If you have reason to believe that the plan provisions are incorrectly described, that important plan provisions relevant to this valuation are not described, or that conditions have changed since the calculations were made, you should contact the authors of this actuarial report prior to relying on this information.

The valuation is further based on the actuarial valuation assumptions, approved by the Board of Trustees, as presented in this report. We believe that these assumptions are appropriate and reasonable and also comply with the requirements of GASB Statement No. 74. We prepared this valuation in accordance with the requirements of this standard and in accordance with all applicable Actuarial Standards of Practice.

The latest assumptions were adopted for use with the December 31, 2016, actuarial valuation, based on the experience study prepared as of December 31, 2014, and adopted by the Board of Trustees on April 21, 2016. The economic assumptions with respect to investment yield, salary increase and inflation have been based upon a review of the existing portfolio structure as well as recent and anticipated experience.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law. Because of limited scope, Conduent performed no analysis of the potential range of such future differences.

The undersigned actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report. This report has been prepared in accordance with all applicable Actuarial Standards of Practice, and we are available to answer questions about it.

Respectfully submitted,



Michael A. Ribble, FSA, EA, MAAA
Principal, Consulting Actuary



Christian Hershey, ASA, MAAA
Consultant, Consulting Actuary

Section 1: Introduction

This report presents the results of the actuarial valuation of the Disability Income Plan of North Carolina, prepared as of December 31, 2016. The purpose of the valuation is to determine the present value of future payments to disabled members as of December 31, 2016, to determine the expected cost of new claims for 2017, and to provide the Actuarially Determined Employer Contribution under GASB Statement No. 74 for postemployment benefits.

Appendix A of this report presents detailed tabulations of the active membership of the plan as of the valuation date.

Appendix B of this report presents detailed tabulations of the disabled membership of the plan as of the valuation date.

Appendix C of this report presents the development of the actuarial value of assets.

Appendix D outlines the full set of actuarial assumptions and methods employed.

The valuation was based on provisions of the Plan as amended through December 31, 2016. A summary of the main Plan provisions used for valuation purposes appears in Appendix E.

Appendix F of this report presents the projection of the Plan's fiduciary net position.

Section 2: Summary of Principal Results

The table below provides the principal results of the valuation and a comparison with the preceding year's results.

Table 1: Summary of Principal Results

Valuation Date	12/31/2016	12/31/2015
Number of active members		
Teachers' and State Employees' Retirement System (TSERS)	305,013	305,291
Optional Retirement Program (ORP)	<u>18,456</u>	<u>16,427</u>
Total	323,469	321,718
Reported compensation		
TSERS	\$ 13,497,815,754	\$ 13,145,602,154
ORP	<u>1,680,321,122</u>	<u>1,573,134,157</u>
Total	\$ 15,178,136,876	\$ 14,718,736,311
Valuation compensation*		
TSERS	\$ 14,282,093,846	\$ 13,896,781,214
ORP	<u>1,824,702,864</u>	<u>1,662,996,217</u>
Total	\$ 16,106,796,710	\$ 15,559,777,431
Number of disabled members receiving long term disability benefits	6,617	6,709
Annual reported benefits	\$ 78,501,354	\$ 75,872,391
Assets and Liabilities as of	12/31/2016	12/31/2015
Assets		
Actuarial Value	\$ 442,086,171	\$ 439,955,539
Market Value	\$ 433,946,692	\$ 427,102,227
Liability for currently disabled members	\$ 313,361,174	\$ 315,692,874
Deficit/(Surplus)	\$ (128,724,997)	\$ (124,262,665)
ADEC for Fiscal Year Ending	6/30/2019	6/30/2018
Actuarially determined employer contributions (ADEC)		
Normal Cost	0.13%	0.14%
Accrued Liability	<u>0.00%</u>	<u>0.00%</u>
Total	0.13%	0.14%
Impact of Legislative Changes	<u>N/A</u>	<u>0.00%</u>
Final ADEC	N/A	0.14%

* Reported compensation adjusted to reflect the assumed rate of pay increase prior to the valuation date.

Section 2: Summary of Principal Results

Table 2: Reconciliation of Change in Annual Required Contribution (ARC)

Fiscal year ending June 30, 2018 Preliminary ARC (based on December 31, 2015 valuation)	0.14%
Impact of Legislative Changes	<u>0.00%</u>
Fiscal year ending June 30, 2018 Final ARC	0.14%
Change Due to Demographic (Gain)/Loss	(0.01%)
Change Due to Investment (Gain)/Loss	0.00%
Change Due to Contributions Greater than ARC	<u>0.00%</u>
Fiscal year ending June 30, 2019 Preliminary ARC (based on December 31, 2016 valuation)	0.13%

Table 3: History of Annual Required Contributions and Appropriated Rates

Valuation Date	Fiscal Year Ending	Preliminary ARC	Change due to Legislation	Final ARC	Appropriated Rate
12/31/2016	6/30/2019	0.13%	N/A	N/A	N/A
12/31/2015	6/30/2018	0.14%	0.00%	0.14%	0.14%
12/31/2014	6/30/2017	0.38%	0.00%	0.38%	0.38%
12/31/2013	6/30/2016	0.41%	0.00%	0.41%	0.41%
12/31/2012	6/30/2015	0.41%	0.00%	0.41%	0.41%

Section 3: Membership Data

Data for 305,013 active members of the Teachers' and State Employees' Retirement System with reported compensation of \$13,497,815,754 and 18,456 members of the Optional Retirement Program with reported compensation of \$1,680,321,122 were furnished by the Retirement Systems Division as of December 31, 2016. The reported compensation includes annual longevity payments. The number and reported compensation of active members, distributed by age, as of December 31, 2016, are shown in Appendix A.

The membership service requirement for short term disability benefits under the Plan is one year and the membership service requirement for long term disability benefits under the Plan is five years.

The Retirement Systems Division also supplied data for 6,617 disabled employees in receipt of annual long-term disability benefits totaling \$78,501,354 as of the valuation date. Of this number, 85 disabled employees are grandfathered under all provisions of the old Disability Salary Continuation Plan and 6,532 are receiving long-term disability benefits under the provisions of this Plan. Appendix B presents a comparison of the number and annual amount of benefits payable as of the current and previous valuation dates.

Section 4: Assets

Asset information taken into account in this valuation is based principally on information reported by the Retirement Systems Division. The market value of assets was \$433,946,692 as of December 31, 2016.

The actuarial value of assets as of the valuation date was \$442,086,171. The development of this amount is shown in Appendix C.

The following table shows an allocation of investments by category as of December 31, 2016.

**Table 4: Allocation of Investments by Category
as of December 31, 2016**

Cash and Receivables	9.6%
Fixed Income (LTIF)	90.4%
Public Equity	0.0%
Other*	<u>0.0%</u>
Total	100.0%

* Real Estate, Alternatives, Inflation and Credit.

Section 5: Condition of the Plan

The following table shows the assets and liabilities of the Plan as of the current valuation date of December 31, 2016. The items shown in the table, other than the actuarial value of assets, are present values actuarially determined as of the valuation date.

**Table 5: Statement of Condition of the Plan
as of December 31, 2016**

Present value of prospective benefits payable to all disabled members on LTD as of the valuation date for:	
LTD approved claims	\$ 278,766,535
LTD incurred but not reported claims	27,861,651
STD incurred but not reported claims	6,732,988
Total claim liability	\$ 313,361,174
Actuarial value of assets	\$ 442,086,171
Deficit/(Surplus)	\$ (128,724,997)
Prospective present value of benefits for current active members	\$ 323,188,521
Present value of benefits not covered by actuarial value of assets	\$ 194,463,524
Present value of compensation for active members	\$ 157,362,180,716
Level contribution as a percentage of compensation to fund present value of benefits not covered by actuarial value of assets	0.13%

Claim liabilities are equal to the present value of future claim payments the Plan is obligated to make to members disabled as of the valuation date. The claim liabilities are separated into three classifications, which reflect the status of each claim as of the valuation date.

- (a) Approved claim liabilities are for long term disabilities which have occurred, have been approved, and are in long term payment status as of the valuation date.
- (b) LTD incurred but not reported liabilities are for disabilities which have occurred but are not in payment status as of the valuation date. These liabilities are estimated based on the one-year term cost for expected disablements during the year and a reserve of 14/12 of the term cost is added to account for the time after disability to receive LTD benefits.
- (c) STD incurred but not reported liabilities are for disabilities which have occurred but are not in payment status as of the valuation date. These liabilities are estimated based on the one-year term cost for expected disablements during the year and a reserve of 62/72 of the term cost is added to account for the timing of STD payments.

The method of determining claim liabilities and the assumptions used are described in Appendix D.

Section 6: Experience

Section 5 shows that the surplus under the Plan has increased by \$4,462,332 from \$124,262,665 to \$128,724,997 since the previous valuation date.

The following table shows a detailed reconciliation of the change in deficit/(surplus) since the prior valuation.

Table 6: Reconciliation of Change in Deficit/(Surplus) Since the Prior Valuation

Prior Year Deficit/(Surplus)	\$ (124,262,665)
Prior Year Term Cost	31,415,426
Actual Contributions	(62,878,020)
Interest Adjustment	(8,049,653)
STD Experience	214,252
LTD Experience	28,757,894
Asset Loss/(Gain)	<u>3,320,202</u>
Current Deficit/(Surplus)	\$ (131,482,564)

Section 7: Accounting Information

The section contains the accounting information for Governmental Accounting Standards Board (GASB) Statement No. 43, 45 and 74 for fiscal year ending June 30, 2017, based on a valuation date of December 31, 2016.

Please note that GASB Statement No. 43 (*Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans*) is applicable for fiscal years beginning prior to June 15, 2016, and has been replaced by GASB Statement No. 74 (*Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans*) for fiscal years beginning after June 15, 2016. Similarly, GASB Statement No. 45 (*Accounting and Financial Reporting by Employers for Postemployment Benefits Other Than Pension*) is applicable for fiscal years beginning prior to June 15, 2017, and has been replaced by GASB Statement No. 75 (*Accounting and Financial Reporting for Postemployment Benefit Plans Other Than Pensions*) for fiscal years beginning after June 15, 2017. *North Carolina has elected to adopt GASB 74 but not GASB 75 for fiscal year ending June 30, 2017.*

Statement Nos. 43 and 45 of the Governmental Accounting Standards Board (GASB) set forth certain items of information to be disclosed in the financial statements of the Plan.

The table below provides a distribution of the number of employees by type of membership.

**Table 7: Number of Active and Disabled Participants
as of December 31, 2016**

Group	Number
Disabled participants receiving long-term disability benefits	6,617
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	0
Active members, including those in the waiting period or on short-term disability	<u>323,469</u>
Total	330,086

Section 7: Accounting Information

The table below provides the schedule of funding progress.

Table 8: Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Entry Age Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll [(b) - (a)] / (c)
12/31/10	\$ 377,994,992	\$ 498,505,723	\$ 120,510,731	75.8%	\$ 14,360,373,354	0.84%
12/31/11	406,067,915	511,416,654	105,348,739	79.4%	14,139,467,246	0.75%
12/31/12	432,667,367	503,192,392	70,525,025	86.0%	14,163,204,361	0.50%
12/31/13	442,422,332	522,940,655	80,518,323	84.6%	14,294,017,494	0.56%
12/31/14	450,598,573	503,060,332	52,461,759	89.6%	14,459,666,607	0.36%
12/31/15	439,955,539	395,950,392	(44,005,147)	111.1%	14,718,736,311	-0.30%
12/31/16	442,086,171	392,674,478	(49,411,693)	112.6%	15,178,136,876	-0.33%

The aggregate cost method does not identify or separately amortize unfunded liabilities. Information about the plan's funded status and funding progress have been prepared using the entry age actuarial cost method as an approximation and as required by GASB Statements 43 and 45.

The table below provides a reconciliation of the preliminary employer annual required contribution rate to the final employer annual required contribution for fiscal year ending June 30, 2017. The preliminary annual required contribution rate is based on the December 31, 2014, valuation.

Table 9: Reconciliation of Annual Required Contribution Rate

	Fiscal Year Ending 06/30/2017
Preliminary Annual Required Contribution Rate	
Normal Cost	0.38 %
Accrued Liability	<u>0.00</u>
Total	0.38 %
Impact of Experience Study	<u>0.00</u>
Final Annual Required Contribution Rate	0.38 %
Actual payroll for June 30, 2017	\$ <u>16,213,745,197</u>
Annual Required Contribution	\$ 61,612,232

Section 7: Accounting Information

The tables below provide the calculation of the annual OPEB cost and net OPEB obligation for the fiscal year ending June 30, 2017 followed by a three-year trend of the net OPEB obligation.

Table 10: Annual OPEB Cost and Net OPEB Obligation

	Fiscal Year Ending 06/30/2017
(a) Employer annual required contribution	\$ 61,612,232
(b) Interest on OPEB obligation*	(1,139,348)
(c) Adjustment to annual required contribution**	<u>2,224,937</u>
(d) Annual OPEB cost: (a) + (b) + (c)	\$ 62,697,821
(e) Employer contributions made for fiscal year ending 6/30/2017	<u>61,612,232</u>
(f) Increase (decrease) in net OPEB obligation: (d) - (e)	\$ 1,085,589
(g) Net OPEB obligation beginning of fiscal year	<u>(19,814,750)</u>
(h) Net OPEB obligation end of fiscal year: (f) + (g)	\$ (18,729,161)

* Based on the 5.75% investment rate of return assumption used for the December 31, 2014 valuation.

** Based on the ratio of the present value of future salary to valuation compensation for the December 31, 2014 valuation.

Table 11: Trend Information

Fiscal Year Ending	Annual OPEB Cost (AOC)	Percentage of AOC Contributed	Net OPEB Obligation
6/30/2015	\$ 64,423,727	98.1%	\$ (20,960,957)
6/30/2016	65,130,372	98.2%	(19,814,750)
6/30/2017	62,697,821	98.3%	(18,729,161)

Section 7: Accounting Information

The table below provides the annual required contribution (ARC) of the employer as a percentage of payroll, determined in accordance with the parameters of GASB 43/45.

Table 12: 2018/2019 Fiscal Year Annual Required Contribution (ARC) based on the Valuation as of December 31, 2016

Normal Cost	0.13 %
Accrued Liability	<u>0.00</u>
Total	0.13 %

Table 13: Additional Information for GASB 43/45 and 74

Valuation Date	12/31/2016
Actuarial Cost Method	Aggregate
Amortization Method	Level percent
Remaining amortization period	The aggregate cost method does not identify or separately amortize unfunded liabilities
Asset Valuation Method	Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period (not greater than 120% of market value and not less than 80% of market value)
Actuarial Assumptions:	
Investment Rate of Return*	3.75%
Projected Salary Increases**	3.50% - 8.10%
*Includes Inflation of	3.00%
**Includes Inflation and Productivity of	3.50%
Cost-of-living Adjustments	3.50% for gross long term disability benefits

Section 7: Accounting Information

GASB Statement No. 74 set forth certain items of information to be disclosed in the financial statements of the Plan. The tables below provide the schedule of changes in the Net OPEB Liability (Asset).

Table 14: Schedule of Changes in Net OPEB Liability (Asset)

Calculation as of	June 30, 2017
Total OPEB Liability	
Service Cost	\$ 25,441,000
Interest	14,111,000
Changes of Benefit Terms	(403,000)
Difference between Expected and Actual Experience	22,345,000
Change of Assumptions	0
Benefit Payments, including Refund of Member Contributions	<u>(71,728,000)</u>
Net Change in Total OPEB Liability	\$ (10,234,000)
Total OPEB Liability - Beginning of Year	\$ 386,720,000
Total OPEB Liability - End of Year	\$ 376,486,000
Plan Fiduciary Net Position	
Employer Contributions	\$ 61,654,000
Member Contributions	0
Net Investment Income	(122,000)
Benefit Payments, including Refund of Member Contributions	(71,728,000)
Administrative Expenses	(1,050,000)
Other	<u>32,000</u>
Net Change in Fiduciary Net Position	\$ (11,214,000)
Plan Fiduciary Net Position - Beginning of Year	\$ 448,820,000
Plan Fiduciary Net Position - End of Year	\$ 437,606,000

Table 15: Net OPEB Liability (Asset)

Calculation as of	June 30, 2017	June 30, 2016
Total OPEB Liability	\$ 376,486,000	\$ 386,720,000
Plan Fiduciary Net Position	<u>437,606,000</u>	<u>448,820,000</u>
Net OPEB Liability (Asset)	\$ (61,120,000)	\$ (62,100,000)
Plan Fiduciary Net Position as a Percentage of the Total OPEB Liability	116.23%	116.06%

Section 7: Accounting Information

The table below is the sensitivity of the Net OPEB Liability to changes in the discount rate.

Table 16: Sensitivity of the Net OPEB Liability at June 30, 2017 to Changes in the Discount Rate

	1% Decrease	Current	1% Increase
Discount Rate	2.75%	3.75%	4.75%
Net OPEB Liability (Asset)	(51,961,000)	(61,120,000)	(70,300,000)

The discount rate used to measure the total OPEB liability was 3.75%. The projection of cash flows used to determine the discount rate assumed that System contributions will continue to follow the current funding policy. Based on those assumptions, the System’s fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Please see Appendix F for additional detail.

Appendix A: Detailed Tabulations of the Active Member Data

Table A-1: The Number and Average Reported Compensation of Active Members Distributed by Age and Service as of December 31, 2016

Age	Years of Service										Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & Up		
Under 25	3,213	4,529	16	0	0	0	0	0	0	0	0	7,758
	12,938	32,467		0	0	0	0	0	0	0	0	24,375
25 to 29	3,833	20,759	4,492	29	0	0	0	0	0	0	0	29,113
	12,592	36,781	40,286	35,475	0	0	0	0	0	0	0	34,136
30 to 34	2,444	13,247	12,053	5,141	39	0	0	0	0	0	0	32,924
	14,386	40,844	43,636	45,395	36,738	0	0	0	0	0	0	40,608
35 to 39	2,025	10,610	8,739	12,164	4,082	19	0	0	0	0	0	37,639
	14,580	44,192	48,972	49,626	51,408		0	0	0	0	0	46,249
40 to 44	1,687	9,200	8,004	9,219	9,768	3,286	28	0	0	0	0	41,192
	13,759	41,999	50,796	51,645	54,425	56,616	43,914	0	0	0	0	48,825
45 to 49	1,542	8,847	8,516	10,172	8,672	8,937	2,939	32	0	0	0	49,657
	13,005	41,583	47,588	51,051	53,615	58,501	60,015	50,870	0	0	0	49,908
50 to 54	1,197	7,072	7,109	8,893	7,860	6,015	5,871	1,087	6	0	0	45,110
	12,497	40,456	46,377	47,472	52,205	56,379	61,302	63,777		0	0	49,478
55 to 59	912	5,643	6,123	8,160	7,746	5,940	4,497	2,027	346	10	0	41,404
	12,919	41,939	45,740	46,301	49,549	55,148	62,057	67,623	65,031			49,676
60 to 64	417	3,383	4,226	5,533	4,990	4,067	2,693	1,269	549	164	0	27,291
	14,345	44,263	47,374	47,566	51,294	56,077	67,164	77,633	78,512	69,270	0	52,654
65 to 69	131	1,002	1,529	1,902	1,375	1,013	676	459	290	189	0	8,566
	13,896	46,608	49,388	53,618	60,186	66,346	79,818	105,907	108,794	87,094	0	61,471
70 & Up	39	337	415	634	459	272	227	124	137	171	0	2,815
	8,795	40,750	47,229	50,103	53,748	68,733	86,782	98,995	120,726	107,791	0	62,435
Total	17,440	84,629	61,222	61,847	44,991	29,549	16,931	4,998	1,328	534	0	323,469
	13,341	40,267	46,589	48,998	52,574	57,207	63,264	73,515	85,860	87,441	0	46,923

Appendix A: Detailed Tabulations of the Active Member Data

Table A-2: The Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2016

Age	Men		Women	
	Number	Compensation	Number	Compensation
18	1		3	
19	18		16	
20	53	\$ 804,333	49	\$ 392,540
21	158	2,589,949	137	1,698,559
22	306	6,545,870	594	10,138,253
23	682	14,788,995	1,907	41,593,541
24	1,068	27,953,717	2,766	82,241,886
25	1,334	41,307,705	3,499	110,300,963
26	1,597	51,980,899	4,086	134,357,072
27	1,827	61,361,041	4,323	149,294,446
28	1,901	67,014,134	4,283	151,539,727
29	1,812	65,666,308	4,451	160,978,544
30	1,924	74,437,735	4,369	164,574,055
31	1,990	80,677,464	4,456	170,914,240
32	2,082	87,741,403	4,490	177,261,492
33	2,090	93,596,949	4,539	183,928,146
34	2,225	103,134,723	4,759	200,718,209
35	2,296	106,124,141	4,981	214,825,700
36	2,343	115,654,651	5,084	223,300,992
37	2,414	122,245,992	5,131	226,863,891
38	2,375	123,453,237	5,220	236,814,867
39	2,449	128,573,118	5,346	242,901,169
40	2,467	135,208,191	5,449	249,629,482
41	2,460	134,173,972	5,296	245,503,006
42	2,533	140,187,465	5,762	264,714,662
43	2,631	141,275,173	5,768	268,167,110
44	2,766	151,134,086	6,060	281,194,368
45	3,028	168,697,607	6,513	303,869,606
46	3,312	183,032,728	7,232	337,041,406
47	3,167	183,132,398	7,174	338,037,636
48	3,112	181,185,448	6,771	317,665,065
49	2,935	170,040,918	6,413	295,573,124
50	2,871	165,984,568	6,394	294,785,883
51	2,855	164,320,797	6,091	278,197,951
52	2,793	159,404,969	6,225	283,609,081
53	2,856	167,217,495	6,163	279,855,029
54	2,814	163,095,047	6,048	275,455,635
55	2,687	152,205,103	6,110	279,266,962
56	2,667	152,180,316	5,852	265,831,639
57	2,510	144,903,637	5,697	264,394,244

For confidentiality purposes, amounts for groups with fewer than 20 individuals are not shown.

Appendix A: Detailed Tabulations of the Active Member Data

Table A-2: The Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2016 (continued)

Age	Men		Women	
	Number	Compensation	Number	Compensation
58	2,576	\$ 148,447,112	5,432	\$ 249,669,579
59	2,490	146,315,090	5,383	253,587,086
60	2,335	136,355,013	5,013	236,756,928
61	2,115	123,435,935	4,188	200,504,881
62	1,945	118,008,588	3,582	170,561,280
63	1,637	104,812,677	2,824	140,893,671
64	1,349	88,709,395	2,303	116,947,342
65	1,160	79,256,305	1,772	93,955,267
66	908	67,428,690	1,236	65,482,132
67	659	49,109,927	767	37,443,205
68	555	42,695,495	586	30,257,300
69	453	36,557,411	470	24,376,261
70	421	31,614,135	402	20,116,652
71	245	18,952,647	225	11,243,524
72	183	13,639,509	173	8,472,329
73	163	12,380,444	130	6,086,806
74	136	10,534,115	116	4,731,303
75	104	8,918,516	75	3,506,510
76	70	4,801,676	49	1,936,837
77	46	3,196,135	36	1,788,687
78	44	2,312,165	24	881,136
79	34	2,400,336	18	
80	25	2,057,066	10	
81	12		9	
82	9		6	
83	12		4	
84	4		5	
85	5		4	
86	2		1	
87	4		1	
88	1		1	
89	1			
90			2	
91			1	
92	2			
Total	103,114	\$ 5,489,023,276	220,355	\$ 9,689,113,600

For confidentiality purposes, amounts for groups with fewer than 20 individuals are not shown.

Appendix A: Detailed Tabulations of the Active Member Data

Table A-3: The Number and Reported Compensation of Active Members Distributed by Service as of December 31, 2016

Service	Men		Women	
	Number	Compensation	Number	Compensation
0	5,091	\$ 71,735,358	12,349	\$ 160,939,580
1	8,558	330,252,466	17,390	581,395,980
2	7,249	331,101,009	14,804	585,659,092
3	6,332	298,912,381	12,528	510,686,197
4	5,800	278,199,315	11,968	491,545,308
5	4,939	245,265,194	9,628	410,097,810
6	4,141	213,045,015	8,103	356,917,375
7	3,547	179,371,103	6,820	304,104,853
8	3,073	174,574,357	6,184	276,318,595
9	4,720	247,011,497	10,067	445,554,089
10	4,272	235,097,858	9,570	426,122,972
11	4,170	228,313,363	9,741	440,542,050
12	3,778	206,032,484	8,658	401,574,382
13	3,490	197,524,553	8,059	379,351,722
14	3,098	177,354,226	7,011	338,470,967
15	2,669	162,287,332	6,379	309,691,075
16	2,767	169,463,247	6,947	337,369,185
17	2,716	166,120,059	6,694	328,449,095
18	2,560	157,868,640	6,292	308,851,409
19	2,323	143,696,414	5,644	281,582,055
20	2,118	131,543,118	4,928	251,555,491
21	1,989	128,926,982	4,458	232,732,176
22	1,780	113,945,076	3,913	211,082,694
23	1,935	128,287,057	3,616	197,261,870
24	1,556	110,882,483	3,256	184,207,564
25	1,489	103,342,910	2,805	159,295,022
26	1,094	80,360,950	2,104	126,656,713
27	1,309	94,212,254	2,231	132,420,510
28	1,065	75,658,494	2,114	124,825,994
29	875	64,251,592	1,844	110,031,758
30	584	47,314,412	1,152	73,264,303
31	376	31,990,331	710	46,790,471
32	331	29,682,743	611	40,298,820
33	285	27,276,286	469	30,661,231
34	201	20,287,622	278	19,778,154
35	145	14,525,720	194	14,897,875
36	143	13,963,528	144	9,511,630
37	97	10,286,057	160	10,533,489
38	105	11,610,597	135	9,580,300
39	90	11,050,475	115	8,062,481

Appendix A: Detailed Tabulations of the Active Member Data

Table A-3: The Number and Reported Compensation of Active Members Distributed by Service as of December 31, 2016 (continued)

Service	Men		Women	
	Number	Compensation	Number	Compensation
40	67	\$ 6,699,581	79	\$ 5,800,341
41	38	4,293,453	54	4,094,388
42	37	3,679,853	35	2,829,356
43	29	2,839,427	36	2,341,584
44	18		20	1,333,631
45	25	2,374,153	19	
46	7		13	
47	10		12	
48	4		3	
49	14		3	
50	1			
51	2			
52			1	
53	1			
54			3	
55			1	
56	1		1	
57			1	
61			1	
Total	103,114	\$ 5,489,023,276	220,355	\$ 9,689,113,600

For confidentiality purposes, amounts for groups with fewer than 20 individuals are not shown.

Appendix B: Detailed Tabulations of the Disabled Member Data

Table B-1: The Number and Annual Amount of Long Term Disability Benefits Reported

Group	As of December 31, 2016		As of December 31, 2015	
	Number	Annual Reported Benefits	Number	Annual Reported Benefits
Disabled prior to January 1, 1988	85	\$ 172,088	92	\$ 187,444
Disabled after January 1, 1988	<u>6,532</u>	<u>78,329,266</u>	<u>6,617</u>	<u>75,684,947</u>
Total	6,617	\$ 78,501,354	6,709	\$ 75,872,391

Appendix B: Detailed Tabulations of the Disabled Member Data

Table B-2: The Number and Annual Long Term Disability Benefits of Disabled Members by Age as of December 31, 2016 Disabled Prior to January 1, 1988

Age	Men		Women	
	Number	Allowances	Number	Allowances
56			1	
60			1	
61			4	
62			3	
63	1		3	
64	1			
65	1		3	
66	2		1	
67	2		1	
68			1	
69	1		2	
70	2		6	
71	1			
72	1		2	
73	1			
74	1		1	
75	1		3	
76	2		3	
77			2	
79	1		1	
80			1	
81	1		1	
82			1	
84			1	
85			1	
87			2	
88			3	
89			4	
90			2	
92			3	

For confidentiality purposes, amounts for groups with fewer than 20 individuals are not shown.

Appendix B: Detailed Tabulations of the Disabled Member Data

**Table B-2: The Number and Annual Long Term Disability Benefits of Disabled Members by Age as of December 31, 2016 (continued)
Disabled Prior to January 1, 1988**

Age	Men		Women	
	Number	Allowances	Number	Allowances
93			1	
94	1		3	
95			2	
97			1	
99			1	
Total	20	\$ 35,496	65	\$ 136,592

For confidentiality purposes, amounts for groups with fewer than 20 individuals are not shown.

Appendix B: Detailed Tabulations of the Disabled Member Data

Table B-3: The Number and Annual Long Term Disability Benefits of Disabled Members by Age as of December 31, 2016 Disabled After January 1, 1988

Age	Men		Women	
	Number	Allowances	Number	Allowances
28			4	
29	2		1	
30	1			
31	1		3	
32			3	
33	2		6	
34	2		10	
35	5		15	
36	6		11	
37	5		20	\$ 349,659
38	10		21	305,765
39	12		27	475,008
40	12		41	721,294
41	13		46	650,703
42	21	\$ 341,390	42	665,325
43	27	430,525	43	589,663
44	27	358,071	58	804,963
45	30	425,034	80	1,138,619
46	32	506,811	90	1,247,192
47	40	542,645	119	1,747,196
48	48	675,731	108	1,626,155
49	70	906,069	133	2,047,592
50	61	767,401	144	2,168,643
51	74	950,813	174	2,247,003
52	88	1,147,411	208	2,818,144
53	86	1,028,496	211	2,603,303
54	111	1,267,281	206	2,693,232
55	99	1,088,308	232	2,864,866
56	94	1,055,551	308	3,669,995
57	110	1,273,016	269	3,072,230
58	141	1,410,526	278	3,127,377
59	138	1,372,635	303	3,366,368
60	156	1,449,523	263	2,873,160
61	105	973,018	248	2,863,008

For confidentiality purposes, amounts for groups with fewer than 20 individuals are not shown.

Appendix B: Detailed Tabulations of the Disabled Member Data

**Table B-3: The Number and Annual Long Term Disability Benefits of Disabled Members by Age as of December 31, 2016 (continued)
Disabled After January 1, 1988**

Age	Men		Women	
	Number	Allowances	Number	Allowances
62	108	\$ 1,093,470	242	\$ 2,516,053
63	106	808,006	251	2,661,913
64	105	728,610	210	2,225,021
65	47	346,382	97	1,085,402
66			3	
67	1		2	
69			2	
71			1	
72			1	
78	2			
Total	1,998	\$ 22,042,616	4,534	\$ 56,286,650

For confidentiality purposes, amounts for groups with fewer than 20 individuals are not shown.

Appendix C: Development of Actuarial Value of Assets

Development of Actuarial Value of Assets for the Year Ending December 31, 2016

Asset Data as of	12/31/2016
Beginning of Year Market Value of Assets	\$ 427,102,227
Contributions	62,878,020
Benefit Payments	<u>(73,722,191)</u>
Net Cash Flow	(10,844,171)
Expected Investment Return	15,813,005
Expected End of Year Market Value of Assets	432,071,061
End of Year Market Value of Assets	433,946,692
Excess of Market Value over Expected Market Value of Assets	1,875,631
80% of 2016 Asset Gain/(Loss)	1,500,505
60% of 2015 Asset Gain/(Loss)	(9,639,984)
40% of 2014 Asset Gain/(Loss)	N/A
20% of 2013 Asset Gain/(Loss)	<u>N/A</u>
Total Deferred Asset Gain/(Loss)	(8,139,479)
Preliminary End of Year Actuarial Value of Assets	442,086,171
Final End of Year Actuarial Value of Assets (not less than 80% and not greater than 120% of Market Value)	442,086,171
Estimated Net Investment Return on Actuarial Value	2.99%

Commentary: The actuarial value of assets smooths investment gains/losses, resulting in less volatility in the employer contribution. The asset valuation method recognizes asset returns in excess of or less than the expected return on the market value of assets over a five-year period.

The continued deferral of losses from 2015 resulted in an actuarial value of asset return for calendar year 2016 of 2.99% and a recognized actuarial asset loss of \$3.3 million during 2016.

Appendix D: Statement of Actuarial Assumptions and Methods

Assumptions are based on the experience investigation prepared as of December 31, 2014 and adopted by the Board of Trustees on April 21, 2016 for use with the December 31, 2016 annual actuarial valuation.

Interest Rate: 3.75% per annum, compounded annually.

Inflation: Both general and wage inflation are assumed to be 3.00% per annum.

Real Wage Growth: 0.50% per annum.

Separations From Active Service: Representative values of the assumed rates of separation from active service are as follows:

Service	Annual Rates of Withdrawal							
	General Employees		Classroom Teachers		Law Enforcement Officers		Other Education	
	Male	Female	Male	Female	Male	Female	Male	Female
0	.180	.195	.190	.170	.130	.130	0.190	0.165
1	.155	.170	.160	.145	.100	.100	0.160	0.135
2	.130	.145	.140	.135	.090	.090	0.130	0.120
3	.110	.115	.120	.120	.060	.060	0.115	0.100
4	.090	.100	.095	.100	.060	.060	0.100	0.085

Age	General Employees Annual Rates of			
	Withdrawal and Vesting*		Base Mortality**	
	Male	Female	Male	Female
25	.0800	.1100	.0005	.0002
30	.0700	.0850	.0005	.0002
35	.0525	.0600	.0005	.0003
40	.0400	.0450	.0006	.0004
45	.0350	.0375	.0010	.0007
50	.0350	.0375	.0017	.0011
55	.0350	.0375	.0028	.0017
60	.0350	.0375	.0047	.0024
65			.0083	.0037
69			.0125	.0057

* These rates apply only after five years of membership in the system.

** Base mortality rates as of 2014.

Appendix D: Statement of Actuarial Assumptions and Methods

Classroom Teachers

Annual Rates of

<u>Age</u>	<u>Withdrawal and Vesting*</u>		<u>Base Mortality**</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
25	.0800	.0900	.0003	.0001
30	.0700	.0750	.0003	.0002
35	.0450	.0450	.0004	.0002
40	.0350	.0340	.0004	.0003
45	.0325	.0325	.0007	.0006
50	.0325	.0325	.0012	.0009
55	.0325	.0325	.0020	.0014
60	.0325	.0325	.0033	.0021
65			.0058	.0031
69			.0092	.0049

* These rates apply only after five years of membership in the system.

** Base mortality rates as of 2014.

Other Education Employees

Annual Rates of

<u>Age</u>	<u>Withdrawal and Vesting*</u>		<u>Base Mortality**</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
25	.0800	.1200	.0003	.0001
30	.0600	.0700	.0003	.0002
35	.0450	.0450	.0004	.0002
40	.0400	.0400	.0004	.0003
45	.0400	.0375	.0007	.0006
50	.0400	.0375	.0012	.0009
55	.0400	.0375	.0020	.0014
60	.0400	.0375	.0033	.0021
65			.0058	.0031
69			.0092	.0049

* These rates apply only after five years of membership in the system.

** Base mortality rates as of 2014.

Appendix D: Statement of Actuarial Assumptions and Methods

Law Enforcement Officers

Annual Rates of

Age	Withdrawal and Vesting*		Base Mortality**	
	Male	Female	Male	Female
	25	.0400	.0400	.0005
30	.0350	.0350	.0005	.0002
35	.0300	.0300	.0005	.0003
40	.0300	.0300	.0006	.0004
45	.0400	.0400	.0010	.0007
50	.0400	.0400	.0017	.0011
55	.0400	.0400	.0028	.0017
60	.0400	.0400	.0047	.0024
65			.0083	.0037
69			.0125	.0057

* These rates apply only after five years of membership in the system.

** Base mortality rates as of 2014.

Retirements: Representative values of the assumed rates of retirement from active service are as follows:

General Employees - Males

Age	Service						
	5	10	15	20	25	30	35
50				0.0350	0.0800	0.3500	0.2000
55				0.0500	0.1000	0.3500	0.2000
60	0.0850	0.0850	0.0850	0.0850	0.2750	0.3000	0.2250
65	0.2500	0.2750	0.2750	0.2750	0.2750	0.2750	0.2750
70	0.3250	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

General Employees - Females

Age	Service						
	5	10	15	20	25	30	35
50				0.0350	0.0600	0.4000	0.3000
55				0.0500	0.0800	0.3250	0.2250
60	0.0950	0.0950	0.0950	0.0950	0.2500	0.3000	0.2000
65	0.4000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
70	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Appendix D: Statement of Actuarial Assumptions and Methods

Classroom Teachers - Males

Age	Service						
	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>
50				0.0250	0.0650	0.3000	0.3000
55				0.0450	0.0900	0.3250	0.2500
60	0.1200	0.1200	0.1200	0.1200	0.3000	0.2500	0.2500
65	0.3000	0.3250	0.3250	0.3250	0.2000	0.2000	0.2000
70	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Classroom Teachers - Females

Age	Service						
	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>
50				0.0350	0.0550	0.2750	0.2750
55				0.0600	0.0950	0.4000	0.3000
60	0.1350	0.1350	0.1350	0.1350	0.4500	0.5000	0.3250
65	0.3500	0.3750	0.3750	0.3750	0.3500	0.3500	0.3500
70	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Other Education Employees - Males

Age	Service						
	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>
50				0.0350	0.0800	0.3000	0.1500
55				0.0400	0.1000	0.2500	0.2000
60	0.0900	0.0900	0.0900	0.0900	0.2250	0.2500	0.2500
65	0.2750	0.3000	0.3000	0.3000	0.2750	0.2750	0.2750
70	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Other Education Employees - Females

Age	Service						
	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>
50				0.0400	0.0550	0.3250	0.2250
55				0.0500	0.0900	0.2250	0.2250
60	0.1100	0.1100	0.1100	0.1100	0.2500	0.2500	0.2500
65	0.2500	0.2750	0.2750	0.2750	0.3500	0.3500	0.3500
70	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Appendix D: Statement of Actuarial Assumptions and Methods

Age	Law Enforcement Officers						
	Service						
	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>
50			0.0900	0.0900	0.0900	0.6000	0.6000
55	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
60	0.2000	0.2000	0.2000	0.2000	0.2000	0.5000	0.5000
65	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
70	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Salary Increases: Representative values of the assumed annual rates of salary increases are as follows:

Annual Rate of Salary Increase				
<u>Service</u>	<u>Classroom Teachers</u>	<u>Other Education Employees</u>	<u>General Employees</u>	<u>Law Enforcement Officers</u>
0	7.55%	7.00%	5.50%	8.10%
5	6.05	6.25	4.50	6.10
10	5.10	5.50	4.00	4.40
15	4.35	4.75	3.50	3.95
20	3.65	4.00	3.50	3.65
25	3.50	3.50	3.50	3.50
30	3.50	3.50	3.50	3.50
35	3.50	3.50	3.50	3.50
40	3.50	3.50	3.50	3.50
45	3.50	3.50	3.50	3.50
50	3.50	3.50	3.50	3.50

Deaths Prior to Retirement: Mortality Rates are based on the RP-2014 Total Data Set Employee Mortality Table for general employees and law enforcement officers. Mortality rates are based on the RP-2014 White Collar Employee Mortality Table for teachers and other education employees.

Mortality Projection (Non-Disabled): All mortality rates are projected from 2014 using generational improvement with Scale MP-2015.

Timing of Assumptions: All withdrawals, deaths, disabilities, retirements and salary increases are assumed to occur on July 1 of each year.

Appendix D: Statement of Actuarial Assumptions and Methods

Rates of Disability: The assumed rates of disability per 1,000 lives exposed are as follows:

Rate of Disability Per 1,000 Lives		
Age	Males	Females
20-24	0.621	0.779
25-29	0.684	0.889
30-34	0.802	1.186
35-39	1.045	1.766
40-44	1.529	2.309
45-49	2.649	3.444
50-54	4.826	5.307
55-59	8.551	7.696
60-64	12.054	9.040

Rates of Termination of Disability: Monthly select rates of termination of disability were used for the first 24 months of disability. Sample rates of termination per 1,000 lives are as follows:

Males

Duration of Disability (in months)	Age at Disability								
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
5	187.7	166.3	150.7	135.4	121.8	108.3	94.4	83.9	75.6
10	51.5	44.4	38.3	33.3	29.5	26.6	23.1	21.2	19.8
15	32.7	27.9	23.7	20.2	17.8	16.1	13.8	12.6	12.0
20	23.0	20.1	17.1	14.7	12.8	11.6	9.6	9.0	8.6
24	20.6	18.1	15.4	13.3	11.4	10.2	8.3	7.7	7.3

Females

Duration of Disability (in months)	Age at Disability								
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
5	177.5	157.7	139.5	126.0	115.0	106.0	96.0	88.7	81.3
10	46.5	40.8	36.5	33.2	31.0	29.1	26.3	24.6	22.6
15	29.7	25.8	22.6	20.2	18.4	17.1	15.2	14.1	13.0
20	21.8	18.7	16.3	14.3	12.8	11.8	10.2	9.5	8.9
24	19.8	16.8	14.6	12.7	11.2	10.3	8.6	8.1	7.5

Appendix D: Statement of Actuarial Assumptions and Methods

Annual select and ultimate rates of termination of disability were used after the first 24 months of disability, with select rates effective from 5 to 25 years. Sample rates per 1,000 lives are as follows:

Males

Duration of Disability (in years)	Age at Disability								
	<u>20-24</u>	<u>25-29</u>	<u>30-34</u>	<u>35-39</u>	<u>40-44</u>	<u>45-49</u>	<u>50-54</u>	<u>55-59</u>	<u>60-64</u>
5	94.7	83.8	72.9	63.5	56.3	51.2	42.3	43.8	43.2
10	42.0	40.3	36.3	32.2	30.0	31.2	34.3	38.0	40.9
15	29.2	28.3	28.4	27.3	28.3	32.2	35.9	40.8	47.2
20	25.2	26.3	29.3	31.4	36.1	42.2	47.8	58.5	68.4
25	28.3	28.5	33.6	36.2	38.1	53.1	59.6	88.8	129.4

Females

Duration of Disability (in years)	Age at Disability								
	<u>20-24</u>	<u>25-29</u>	<u>30-34</u>	<u>35-39</u>	<u>40-44</u>	<u>45-49</u>	<u>50-54</u>	<u>55-59</u>	<u>60-64</u>
5	90.9	76.3	64.7	55.4	48.5	44.4	37.2	38.5	37.1
10	40.0	35.6	29.3	25.4	23.0	23.0	24.5	27.9	29.5
15	28.5	26.5	22.4	20.6	20.5	22.2	25.1	26.2	37.5
20	26.8	23.8	21.8	21.5	24.2	27.7	31.9	39.8	55.7
25	27.6	25.5	25.1	24.2	27.1	41.7	41.5	76.6	130.2

Social Security Assumptions: The assumed rate of approval for Social Security disability benefits prior to completion of four years of disability from the conclusion of the waiting period is 50%.

National Average Wage: National average wage growth is assumed to be 3.50% per year for purposes of calculating Social Security benefits.

Future Increases in Social Security Benefits: Social Security disability benefits are assumed to increase by 3.00% per year. This impacts those disabled on or after January 1, 1988.

Across-the-Board Salary Increases: 3.50% per year. This impacts the LTD benefits (before reductions) for those disabled on or after January 1, 1988.

Other Offsets: No additional offsets due to Worker’s Compensation or Outside Earnings, other than those reported, have been assumed.

Appendix D: Statement of Actuarial Assumptions and Methods

Reported Compensation: Calendar year compensation as furnished by the system's office.

Valuation Compensation: Reported compensation adjusted based on the assumed annual rates of salary increase to reflect the assumed rate of pay as of the valuation date.

Administrative Expenses: No allowance made. It is assumed that the administrative costs of the plan are provided for out of the general operating funds of the state.

Valuation Method: Aggregate.

Asset Valuation Method: Actuarial value, as developed in Appendix C. Actuarial value of assets is based upon a smoothed market value method. Under this method, asset returns in excess of or less than the expected return on market value of assets will be reflected in the actuarial value of assets over a five-year period. The calculation of the Actuarial Value of Assets is based on the following formula:

$$MV - 80\% \times G/(L)_1 - 60\% \times G/(L)_2 - 40\% \times G/(L)_3 - 20\% \times G/(L)_4$$

MV = the market value of assets as of the valuation date

$G/(L)_i$ = the asset gain or (loss) for the i-th year preceding the valuation date

Incurred But Not Reported Claims (IBNR): IBNR claims are based on the one-year term cost for expected disablements during the year. For short-term disability, a reserve of 62/72 of the term cost is added to account for the timing of STD payments. That reserve includes an allowance for STD that has been incurred but not reported, as well as STD in pay status. For long-term disability, a reserve of 14/12 of the term cost is added to account for the waiting time after disability to receive LTD benefits.

Changes Since Prior Valuation: None.

Appendix E: Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

The Disability Income Plan of North Carolina became effective January 1, 1988. The Plan replaced the Disability Salary Continuation Plan for Teachers and State Employees of North Carolina (DSC Plan). Those beneficiaries disabled prior to January 1, 1988 continue to be covered under the provisions of the DSC Plan as in effect December 31, 1987. Beneficiaries disabled on or after January 1, 1988 are covered under the provisions of the Disability Income Plan. The following summary describes the main membership, benefit and contribution provisions of the Plan as interpreted for the valuation.

Membership in the Plan

All teachers and other employees who are in active service and are members of the Teachers and State Employees' Retirement System or the Optional Retirement Program on or after January 1, 1988 are eligible to participate in the Plan.

Benefits

Definition of Disability

The mental or physical incapacity for the further performance of duty of a beneficiary; provided that such incapacity was not the result of terrorist activity, of active participation in a riot, of the commission or attempt to commit a felony, or of the intentional self-infliction of an injury.

Waiting Period

A beneficiary shall receive no benefits from the Plan for a period of 60 continuous calendar days from the onset of disability determined as the last actual day of service or the day succeeding at least 365 calendar days after the commencement of service as a teacher or employee, whichever is later.

Salary Continuation Benefits

During the waiting period, a beneficiary may be paid such salary continuation as provided by an employer through the use of sick leave, vacation leave or any other salary continuation.

A disabled beneficiary may elect to receive any such salary continuation in lieu of STD benefits provided such election shall not extend the 365 days duration of the STD period.

A disabled beneficiary may elect to receive any such salary continuation in lieu of LTD benefits provided such election shall not extend the first 36 consecutive calendar months of the LTD period.

Appendix E: Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

Eligibility for Short Term Disability	Any beneficiary who becomes disabled and is no longer able to perform his usual occupation after at least 365 calendar days succeeding his date of initial employment and at least one year of contributing membership service in the Teachers' and State Employees' Retirement System (TSERS) may be eligible for STD benefits.
Commencement of STD Benefits	The STD benefit commences on the first day succeeding the waiting period.
Duration of STD Benefits	These benefits are payable for 365 days following the waiting period. The first six months of benefits are payable by the employer outside of the trust. The remaining six months are paid by the employer outside of the trust but the employer is reimbursed by the trust quarterly. STD benefits may be extended up to an additional 365 days if the Medical Board determines that the beneficiary's disability is temporary and is likely to end within the extended period. During this extended period, STD benefits are paid directly from the trust.
Amount of Monthly STD Benefits	50% of 1/12th of the annual base rate of compensation last payable to the beneficiary prior to the beginning of the STD period plus 50% of 1/12th of the annual longevity payment (see below) to which the beneficiary would be eligible, to a maximum of \$3,000 per month, reduced by monthly payments for Workers' Compensation. Provided that a beneficiary has earnings in excess of the STD benefit, the STD benefit shall be reduced on a dollar-for-dollar basis by the amount that exceeds the STD benefit.
Eligibility for Long Term Disability	Any beneficiary who has five or more years of (LTD) Benefits membership service may receive LTD benefits from the Plan upon approval by the Board of Trustees provided that the disability is likely to be permanent.
Commencement of LTD Benefits	Benefits commence on the first day succeeding the conclusion of the short-term disability period provided the beneficiary makes application for such benefits within 180 days after the short-term disability period ceases or after salary continuation payments cease, whichever is later.

Appendix E: Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

Duration of LTD Benefits	The LTD benefit is payable until the earliest date at which the beneficiary is eligible for an unreduced service retirement allowance from TSERS as described in the December 31, 2012 valuation report for TSERS.
Amount of Monthly LTD Benefits	65% of 1/12th of the annual base rate of compensation last payable to the beneficiary prior to the beginning of the STD benefit period plus 65% of 1/12th of the annual longevity payment (see below) to which the beneficiary would be eligible, to a maximum of \$3,900 per month, reduced by benefits payable from other plans including but not limited to the "Plan Offsets" (listed below).
Post Disability Benefit Adjustments	The compensation upon which the short-term or long-term disability benefit is calculated may be increased by any percentage across-the-board salary increases granted by the General Assembly. Benefits shall be reduced by future increases granted by the Social Security Administration.
Plan Offsets	<ol style="list-style-type: none"> (1) Primary Social Security disability benefits. For beneficiaries not approved for Primary Social Security disability benefits, upon completion of four years from the conclusion of the waiting period, the beneficiary's benefit shall be reduced by an amount as determined by the Board of Trustees, equal to a Primary Social Security disability benefit to which the beneficiary might be entitled had the beneficiary been awarded Social Security disability benefits. For members with less than five years of service as of July 31, 2007, the LTD benefit ceases after 36 months if the member has not been approved for Social Security disability benefits. (2) Workers' Compensation and statutory disability plans. (3) Teachers' and State Employees' Retirement System, or other retirement systems supported by the State. (4) Other insurance plans to which the State contributes. (5) Wages or other income paid by public or private employers.

Appendix E: Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

Annual Longevity Payments

These payments are based on service and are additional components of the STD and LTD benefit formulas.

<u>Years of Service</u>	<u>Percentage of Base Salary</u>
less than 10	0.00%
10 - 14	1.50%
15 - 19	2.25%
20 - 24	3.25%
25 and over	4.50%

Benefits for Participants Disabled Prior to January 1, 1988 and Receiving Payments Under Former Disability Salary Continuation Plan

The LTD benefit is payable until termination of disability and pays 60% of monthly salary to a maximum of \$1,000 per month reduced by benefits payable from other plans including but not limited to the "Plan Offsets."

Plan Offsets include:

- Social Security benefits payable:
Prior to July 1, 1974 - Full family benefits.
July 1, 1974 and after – Primary benefits only.
- Workers' Compensation and statutory disability plans.
- Teachers' and State Employees' Retirement System, or other retirement systems supported by the State.
- Other insurance plans to which the State contributes.
- Wages or other income paid by public or private employers.

Benefits shall not be increased by future across-the-board salary increases granted by the General Assembly nor decreased by any future increases granted by the Social Security Administration.

Contributions

All contributions are to be made by the State or Employing Units.

Changes Since Prior Valuation: Probation/parole officers were reclassified as law enforcement officers with respect to service rendered on or after July 1, 2017.

Appendix F: GASB 74 Fiduciary Net Position Projection

Table F-1: Projection of Fiduciary Net Positions
(in thousands)

Calendar Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
2017	\$ 433,947	\$ 0	\$ 43,664	\$ 58,838	\$ 1,060	\$ 15,971	\$ 433,684
2018	433,684	0	21,781	67,084	952	15,404	402,833
2019	402,833	0	18,396	64,092	863	14,242	370,516
2020	370,516	0	16,058	59,423	785	13,074	339,440
2021	339,440	0	15,271	58,144	717	11,919	307,769
2022	307,769	0	14,539	54,694	657	10,783	277,740
2023	277,740	0	13,831	51,254	601	9,709	249,425
2024	249,425	0	13,132	48,805	549	8,681	221,884
2025	221,884	0	12,443	46,032	501	7,687	195,481
2026	195,481	0	11,763	42,843	456	6,745	170,690
2027	170,690	0	11,085	39,638	414	5,863	147,586
2028	147,586	0	9,963	36,422	375	5,036	125,788
2029	125,788	0	8,903	33,037	339	4,263	105,578
2030	105,578	0	8,305	29,571	305	3,558	87,565
2031	87,565	0	7,711	26,116	273	2,938	71,825
2032	71,825	0	7,128	22,849	244	2,396	58,256
2033	58,256	0	6,553	19,832	216	1,934	46,695
2034	46,695	0	5,699	17,188	191	1,534	36,549
2035	36,549	0	4,917	14,633	168	1,186	27,851
2036	27,851	0	4,438	12,188	147	898	20,852
2037	20,852	0	3,978	10,041	127	667	15,329
2038	15,329	0	3,344	8,147	109	482	10,899
2039	10,899	0	2,790	6,648	94	336	7,283
2040	7,283	0	2,449	5,209	80	220	4,663
2041	4,663	0	1,988	3,916	67	138	2,806
2042	2,806	0	1,578	2,915	55	79	1,493
2043	1,493	0	1,218	2,163	45	38	541
2044	541	0	912	1,505	35	0	0
2045	0	0	656	889	27	0	0
2046	0	0	447	355	19	0	73
2047	73	0	259	74	13	7	252
2048	252	0	121	57	10	11	317
2049	317	0	57	52	7	11	326
2050	326	0	17	46	5	12	304
2051	304	0	3	40	3	11	275
2052	275	0	2	32	2	10	253
2053	253	0	2	25	2	9	237
2054	237	0	1	19	1	9	227
2055	227	0	1	11	1	9	225
2056	225	0	1	5	1	8	228
2057	228	0	0	4	0	9	233
2058	233	0	0	4	0	10	239
2059	239	0	0	2	0	8	245
2060	245	0	0	1	0	10	254
2061	254	0	0	0	0	9	263
2062	263	0	0	0	0	10	273
2063	273	0	0	0	0	11	284
2064	284	0	0	0	0	10	294
2065	294	0	0	0	0	11	305
2066	305	0	0	0	0	12	317

Appendix F: GASB 74 Fiduciary Net Position Projection

Table F-2: Actuarial Present Value of Projected Benefit Payments
(in thousands)

Calendar Year	Beginning Fiduciary Position	Benefit Payments	Funded Benefit Payments	Unfunded Benefit Payments	Present Value of Benefit Payments		
					Funded Payments at 3.75%	Unfunded Payments at 3.13%	Using Single Discount Rate of 3.75%
2017	\$ 433,947	\$ 58,838	\$ 58,838	\$ 0	\$ 57,765	\$ 0	\$ 57,765
2018	433,684	67,084	67,084	0	63,480	0	63,480
2019	402,833	64,092	64,092	0	58,457	0	58,457
2020	370,516	59,423	59,423	0	52,239	0	52,239
2021	339,440	58,144	58,144	0	49,267	0	49,267
2022	307,769	54,694	54,694	0	44,669	0	44,669
2023	277,740	51,254	51,254	0	40,346	0	40,346
2024	249,425	48,805	48,805	0	37,030	0	37,030
2025	221,884	46,032	46,032	0	33,664	0	33,664
2026	195,481	42,843	42,843	0	30,199	0	30,199
2027	170,690	39,638	39,638	0	26,930	0	26,930
2028	147,586	36,422	36,422	0	23,851	0	23,851
2029	125,788	33,037	33,037	0	20,852	0	20,852
2030	105,578	29,571	29,571	0	17,990	0	17,990
2031	87,565	26,116	26,116	0	15,314	0	15,314
2032	71,825	22,849	22,849	0	12,914	0	12,914
2033	58,256	19,832	19,832	0	10,803	0	10,803
2034	46,695	17,188	17,188	0	9,025	0	9,025
2035	36,549	14,633	14,633	0	7,405	0	7,405
2036	27,851	12,188	12,188	0	5,945	0	5,945
2037	20,852	10,041	10,041	0	4,721	0	4,721
2038	15,329	8,147	8,147	0	3,692	0	3,692
2039	10,899	6,648	6,648	0	2,904	0	2,904
2040	7,283	5,209	5,209	0	2,193	0	2,193
2041	4,663	3,916	3,916	0	1,589	0	1,589
2042	2,806	2,915	2,806	109	1,097	50	1,140
2043	1,493	2,163	1,493	670	563	296	815
2044	541	1,505	541	964	197	413	547
2045	0	889	0	889	0	369	311
2046	0	355	0	355	0	143	120
2047	73	74	73	1	24	0	24
2048	252	57	57	0	18	0	18
2049	317	52	52	0	16	0	16
2050	326	46	46	0	13	0	13
2051	304	40	40	0	11	0	11
2052	275	32	32	0	9	0	9
2053	253	25	25	0	7	0	7
2054	237	19	19	0	5	0	5
2055	227	11	11	0	3	0	3
2056	225	5	5	0	1	0	1
2057	228	4	4	0	1	0	1
2058	233	4	4	0	1	0	1
2059	239	2	2	0	0	0	0
2060	245	1	1	0	0	0	0
2061	254	0	0	0	0	0	0
2062	263	0	0	0	0	0	0
2063	273	0	0	0	0	0	0
2064	284	0	0	0	0	0	0
2065	294	0	0	0	0	0	0
2066	305	0	0	0	0	0	0