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Disability Income Plan of North Carolina Principal Actuarial Valuation Results as of December 31, 2018

October 31, 2019 Board of Trustees Meeting

Larry Langer, ASA, FCA, EA, MAAA

Jonathan Craven, ASA, FCA, EA, MAAA



Disability Income Plan

Principal December 31, 2018

Actuarial Valuation Results



Valuation Results as of	December 31, 2018	December 31, 2017
Active Members		
Teachers' and State Employees'		
Retirement System (TSERS)	304,575	304,554
Optional Retirement Program (ORP)	<u>20,541</u>	<u>20,682</u>
Total	325,116	325,236
Reported compensation		
TSERS	\$14,436,435,848	\$13,914,085,325
ORP	<u>1,893,122,205</u>	<u>1,849,802,363</u>
Total	\$16,329,558,053	\$15,763,887,688
Valuation compensation*		
TSERS	\$15,623,198,876	\$15,058,805,483
ORP	<u>2,098,399,045</u>	<u>2,026,106,857</u>
Total	\$17,721,597,921	\$17,084,912,340
Number of beneficiaries receiving extended short-term or long term disability benefits	6,103	6,594
Annual reported benefits	\$ 70,143,160	\$ 77,899,175

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

Disability Income Plan

Principal December 31, 2018

Actuarial Valuation Results



Assets and Liabilities as of	December 31, 2018	December 31, 2017
Assets		
Actuarial Value	\$ 389,599,221	\$ 424,219,638
Market Value	\$ 372,914,790	\$ 416,504,516
Liability for currently disabled members	\$ 291,049,647	\$ 316,191,137
Deficit / (Surplus) versus Actuarial Value	\$ (98,549,574)	\$ (108,028,501)
ADC Rate for Fiscal Year Ending	June 30, 2021	June 30, 2020
Preliminary actuarially determined contribution (ADC) Rate		
Normal Cost	0.09%	0.15%
Accrued Liability	<u>N/A</u>	<u>N/A</u>
Total	0.09%	0.15%
Impact of Legislative Changes	0.00%	(0.05%)
Final ADC Rate**	0.09%	0.10%

** For FYE 2021, the final ADC Rate may be adjusted to reflect Plan changes that occur after the date of this report.

Disability Income Plan

Employer Contribution

Rate History



Valuation Date	Fiscal Year Ending	Preliminary ADC Rate	Change Due to Legislation	Final ADC Rate	Appropriated Rate
12/31/2018	6/30/2021	0.09%	0.00%	0.09% ¹	TBD
12/31/2017	6/30/2020	0.15%	(0.05%)	0.10%	0.10%
12/31/2016	6/30/2019	0.13%	0.00%	0.13%	0.14%
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%

¹ This ADC Rate is a preliminary rate that will become the final ADC Rate if no legislation is enacted after the date that this report is issued that would affect the determination of the ADC Rate for the fiscal year ending in 2021.



Certification

Cavanaugh Macdonald Consulting, LLC was retained as the actuary for the Disability Income Plan of North Carolina (the Plan) and has prepared this December 31, 2018 actuarial valuation report for the Plan. The information contained in this report is intended to be used by the Board of Trustees for the Teachers' and State Employees' Retirement System of North Carolina (System) for the purposes stated herein, and its use for other purposes may not be appropriate. Calculations for purposes other than those described in this report may produce significantly different results.

Additional information and disclosures related to the census and financial data, assumptions, methods, and Plan information provided by the System for valuation purposes can be found in the unabridged December 31, 2018 actuarial valuation report for the Plan. Results prior to December 31, 2017 were provided by the prior consulting actuary.

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. Retiree group benefits models necessarily rely on the use of approximations and estimates, and small variations in these approximations and estimates may lead to significant changes in actuarial measurements. Because of limited scope, Cavanaugh Macdonald Consulting performed no analysis of the potential range of such future differences, except for some limited analysis in required disclosure information. **This report does not consider all possible scenarios.**



Certification

The funded status measurements included in this report are based on the assumptions and methods used as of the valuation and/or measurement date. These funded status measurements do not indicate whether or not the Plan would have sufficient assets if it were terminated, nor do they indicate what level of future contributions would be required. Funded status measurements would also be different if the market value of assets was used in these calculations instead of an actuarial value of assets.

Cavanaugh Macdonald Consulting does not provide legal, investment, or accounting advice. Thus, the information in this report is not intended to supersede or supplant the advice and interpretations of the System, OSC, or their legal, investing, or accounting partners.

The undersigned are familiar with the near-term and/or long-term aspects of other postemployment benefit plan valuations and collectively meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained in this report. All sections of this report, including any appendices and attachments, are considered an integral part of the actuarial opinions.



Certification

This report has been prepared in accordance with Actuarial Standard of Practice No. 6, as well as all other applicable Actuarial Standards of Practice, and we are available to answer questions about it.

Larry Langer, ASA, EA, FCA, MAAA
Principal and Consulting Actuary

Jonathan T. Craven, ASA, EA, FCA, MAAA
Consulting Actuary

Alisa Bennett, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

Jeffrey Gann, FSA, MAAA, FCA, EA
Senior Actuary



Cavanaugh Macdonald
CONSULTING, LLC

The experience and dedication you deserve

Disability Income Plan of North Carolina

Report on the Annual Valuation
Prepared as of December 31, 2018

October 2019





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

October 7, 2019

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 actuarial valuation of the Disability Income Plan of North Carolina (referred to as "DIPNC", "Disability Income Plan", or "Plan"), prepared as of December 31, 2018.

The primary purpose of the valuation report is to provide the actuarially determined employer contribution rates for DIPNC during the fiscal year ending on June 30, 2021, to describe the current financial condition of DIPNC, to analyze changes in such condition, and to summarize the census data, financial information, assumptions, methods, and plan provisions used to prepare these results.

In addition, the report contains information that will be used by the Office of the State Controller (OSC) in its Comprehensive Annual Financial Report (CAFR), and provides the DIPNC actuarial information that must be disclosed under Governmental Accounting Standards Board (GASB) Statement No. 74 (GASB 74) for the fiscal year ending on June 30, 2019 based on a valuation date of December 31, 2018.

Additional Information and Disclosures

The information contained in this report is intended to be used by the Board of Trustees for the Teachers' and State Employees' Retirement System of North Carolina (System) for Plan funding purposes for the fiscal year ending on June 30, 2021 and Plan accounting purposes for the fiscal year ending on June 30, 2019, and its use for other purposes may not be appropriate. Calculations for purposes other than funding the DIPNC benefits described in this report, or reporting the Plan accounting information required under GASB 74, may produce significantly different results.

This report may also be used in conjunction with other materials for the purposes of auditing the Plan. However, the use of this report for any other purposes or by any parties other than the System, OSC, and its auditors may not be appropriate and may result in mistaken conclusions because of a failure to appreciate the limitations of census and financial data, understand



applicable assumptions and methods, or correctly identify situations where the use of this report would be inappropriate for a given purpose. None of the attached pages should be provided to any other parties without a copy of this cover letter. Moreover, no person or entity may make any representations or warranties based on any statements or conclusions contained in this report without the express written consent of Cavanaugh Macdonald Consulting, LLC.

These results supersede all December 31, 2018 actuarial valuation results for DIPNC, including draft versions of this document, issued prior to the date of this report. The System should rely only on the December 31, 2018 actuarial valuation results and actuarially determined contribution (ADC) rates for the fiscal year ending on June 30, 2021 provided herein.

The results contained in this report were prepared by qualified actuaries according to generally accepted actuarial principles and practices, and in compliance with Actuarial Standard of Practice (ASOP) No. 6, "Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions", as well as other applicable ASOPs issued by the Actuarial Standards Board. Our understanding is that the System has made no changes to the Plan's funding policy since the prior valuation. Thus, ADC rates as of the valuation date were developed based on the contribution allocation procedure described in GASB Statement Nos. 43 and 45, as approved by the System during prior periods. The financial accounting information provided in this report reflects our current understanding of GASB 74, including any applicable guidance provided by the System, or its audit partners as of the date of this report.

The measurement of Plan obligations used as the basis for much of the information presented in this report was performed as of December 31, 2018 ("the valuation date") based on the following information provided by the System for valuation purposes:

- Census data for active and disabled members as of December 31, 2018;
- Current plan provisions, including changes since December 31, 2017;
- Pertinent financial information as of December 31, 2018; and,
- Unaudited financial information as of June 30, 2019.

This information is summarized throughout this report. We did not audit the supplied information, but it was reviewed for reasonableness and consistency. In certain situations, the supplied information was adjusted to account for normal differences in collection dates and/or methods. As a result, we have no reason to doubt the substantial accuracy or completeness of the information and believe that it is reliable for the purposes stated herein. The results and conclusions contained in this report depend on the integrity of this information, and if any of the supplied information or analyses change, our results and conclusions may be different and this report may need to be revised. Likewise, this report may need to be revised to reflect any significant event that affects the Plan subsequent to the valuation date.

Valuation results as of December 31, 2018 are based on the assumptions and methods adopted by the Board on April 21, 2016 and prescribed for use in the Plan's December 31, 2018 annual actuarial valuation, which are summarized in various sections of this report. All GASB 74 assumptions—including, but not limited to, discount rates, expected rates of return on assets, long-term health care cost trend rates, and expected active employee health care coverage election assumptions—have been selected by the System's governing bodies for the measurement of the Plan's benefit obligations as of June 30, 2019 based on the



December 31, 2018 valuation date, and should reflect best estimates of anticipated Plan experience. We have evaluated the assumptions and methods prescribed by the Board, and believe that they are reasonable for the purposes of preparing the measurements described above.

However, based on the pattern of persistent losses related to new disablements, it is likely that the assumed disability utilization rates reflected in these results are lower in the aggregate than what is being experienced. We will be reviewing these assumptions as part of the upcoming experience study to determine how the rates should be refined prior to the next actuarial valuation of the Plan. While we cannot provide a precise impact of the resulting change until the experience study is complete, we believe that a rough estimate of the potential change assuming all other things remain the same would be an increase of 5.00% to 10.00% in the Plan's liability as of December 31, 2018, and an actuarially determined contribution rate for the fiscal year ending on June 30, 2021 that could be as much as 0.03% higher than the related results provided in this report. We will continue to monitor material assumptions.

The actuarial cost method and the asset valuation method used for funding purposes were selected by the System during prior periods and prescribed for use in the Plan's December 31, 2018 annual actuarial valuation. We believe that these methods are appropriate for funding purposes. Additionally, the actuarial cost method, the asset valuation method, and the amortization methods are prescribed under GASB rules for financial accounting purposes as of the June 30, 2018 and June 30, 2019 measurement dates. Actuarial methods such as the actuarial cost methods, asset valuation methods, and amortization methods used in the contribution allocation procedure (for funding purposes) and cost allocation procedure (for financial accounting purposes) are designed to recognize changes in an orderly fashion over a period of years. In certain situations, the actuarial methods used in an allocation procedure may have the effect of deferring changes in contributions or costs into later years. Likewise, the use of these methods could produce deferred gains or losses if any material underlying assumption is not met over a long period of time.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: retiree group benefits program experience differing from that anticipated by the assumptions; changes in assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in retiree group benefits program provisions or applicable law. Retiree group benefits models necessarily rely on the use of approximations and estimates, and are sensitive to changes in these approximations and estimates. Small variations in these approximations and estimates may lead to significant changes in actuarial measurements. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, we have not performed an analysis of the potential range of such future differences other than the sensitivity to changes in the discount rate and healthcare cost trend rates required under GASB 74. **This report does not consider all possible scenarios.**

The funded status measurements included in this report are based on the assumptions and methods used to determine the Plan's obligations and asset values as of the valuation and/or measurement date. Funded status measurements for financial accounting purposes may not be appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling



the Plan's benefit obligations. Likewise, funded status measurements for financial accounting purposes may not be appropriate for assessing the need for or the amount of future actuarially determined contributions. Funded status measurements would be also be different if the market value of assets was used in these calculations instead of an actuarial value of assets.

Cavanaugh Macdonald Consulting does not provide legal, investment, or accounting advice. Thus, the information in this report is not intended to supersede or supplant the advice and interpretations of the System, OSC, or their legal, investing, or accounting partners.

The undersigned are familiar with the near-term and/or long-term aspects of other postemployment benefit plan valuations and collectively meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained in this report. All sections of this report, including any appendices and attachments, are considered an integral part of the actuarial opinions.

We are available to answer questions about this report or the information provided herein.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Alisa Bennett', with a stylized, cursive script.

Alisa Bennett, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink, appearing to read 'Jeffrey Gann', with a stylized, cursive script.

Jeffrey Gann, FSA, MAAA, FCA, EA
Senior Actuary



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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, 2018. The purpose of the valuation is to determine the present value of future payments to disabled members as of December 31, 2018, to determine the expected cost of new claims for 2018, to provide the actuarially determined employer contribution (ADC) rate based on the System's funding policy, and to provide the financial accounting information required under GASB Statement No. 74 for postemployment benefits.

Appendix A presents detailed tabulations of the active membership of the Plan as of the valuation date. Likewise, Appendix B presents detailed tabulations of the disabled membership of the Plan as of the valuation date.

Appendix C presents the development of the Actuarial Value of Assets.

Appendices D and E provide the full set of actuarial assumptions and methods employed for funding and financial accounting purposes, respectively.

The valuation was based on provisions of the Plan as amended through June 30, 2019. A summary of the main Plan provisions used for valuation purposes appears in Appendix F.

Appendices G and H of this report present the projection of the Plan's fiduciary net position and present value of benefits required under GASB 74.



Section 2: Summary of Principal Results

The principal results of the valuation and a comparison with the preceding year's results are provided in the table below:

Table 1: Summary of Principal Results

Valuation Results as of	December 31, 2018	December 31, 2017
Active Members		
Teachers' and State Employees' Retirement System (TSERS)	304,575	304,554
Optional Retirement Program (ORP)	<u>20,541</u>	<u>20,682</u>
Total	325,116	325,236
Reported compensation		
TSERS	\$ 14,436,435,848	\$ 13,914,085,325
ORP	<u>1,893,122,205</u>	<u>1,849,802,363</u>
Total	\$ 16,329,558,053	\$ 15,763,887,688
Valuation compensation*		
TSERS	\$ 15,623,198,876	\$ 15,058,805,483
ORP	<u>2,098,399,045</u>	<u>2,026,106,857</u>
Total	\$ 17,721,597,921	\$ 17,084,912,340
Number of beneficiaries receiving extended short-term or long-term disability benefits	6,103	6,594
Annual reported benefits	\$ 70,143,160	\$ 77,899,175
Assets and Liabilities as of	December 31, 2018	December 31, 2017
Assets		
Actuarial Value	\$ 389,599,221	\$ 424,219,638
Market Value	\$ 372,914,790	\$ 416,504,516
Liability for currently disabled members	\$ 291,049,647	\$ 316,191,137
Deficit / (Surplus) versus Actuarial Value	\$ (98,549,574)	\$ (108,028,501)
ADC Rate for Fiscal Year Ending (FYE)	June 30, 2021	June 30, 2020
Preliminary Actuarially Determined Contribution (ADC) Rate		
Normal Cost	0.09%	0.15%
Accrued Liability	<u>N/A</u>	<u>N/A</u>
Total	0.09%	0.15%
Impact of Legislative Changes	0.00%	(0.05%)
Final ADC Rate**	0.09%	0.10%

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

** For FYE 2021, the ADC Rate may be adjusted to reflect Plan changes that occur after the date of this report.



Section 2: Summary of Principal Results

Table 2: Reconciliation of the Change in the Actuarially Determined Contribution (ADC) Rate

Fiscal year ending June 30, 2020 Preliminary ADC Rate (Based on the December 31, 2017 valuation)	0.15%
Impact of Legislative Changes ¹	<u>(0.05%)</u>
Fiscal year ending June 30, 2020 Final ADC Rate	0.10%
Change Due to Demographic (Gain) / Loss	0.01%
Change Due to Changes in Assumptions	(0.01%)
Change Due to Investment (Gain) / Loss	0.00%
Change Due to Contributions (Greater) / Less than ADC	<u>(0.01%)</u>
Preliminary ADC Rate Before Legislative Changes	0.09%
Impact of Legislative Changes	<u>0.00%</u>
Fiscal year ending June 30, 2021 Final ADC Rate (Based on the December 31, 2018 valuation)	0.09%

Table 3: History of Actuarially Determined Contribution (ADC) Rates and Appropriated Rates

Valuation Date	Fiscal Year Ending	Preliminary ADC Rate	Change Due to Legislation	Final ADC Rate	Appropriated Rate
12/31/2018	6/30/2021	0.09%	0.00%	0.09% ²	TBD
12/31/2017	6/30/2020	0.15%	(0.05%)	0.10%	0.10%
12/31/2016	6/30/2019	0.13%	0.00%	0.13%	0.14%
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%

¹ Reflects the benefit changes effective as of July 1, 2019 under the provisions of the Financial Accountability, Integrity, and Recovery (FAIR) Act of 2018 (Session Law 2018-52).

² This ADC Rate is a preliminary rate that will become the final ADC Rate if no legislation is enacted after the date that this report is issued that would affect the determination of the ADC Rate for the fiscal year ending in 2021.



Section 2: Summary of Principal Results

The table below provides the schedule of funding progress, which presents multi-year trend information about whether the actuarial value of plan assets is increasing or decreasing over time relative to the actuarial accrued liability for benefits.

The aggregate cost method used for Plan funding purposes does not identify or separately amortize unfunded liabilities. Thus, information about the Plan's funded status and funding progress have been prepared using the entry age normal (level percentage of pay) actuarial cost method as an approximation.

Table 4: Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Entry Age Actuarial Accrued Liability (AAL) ¹ (b)	Unfunded AAL (UAAL) (b) – (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll [(b) – (a)] / (c)
12/31/11	\$ 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%)
12/31/17	424,219,638	383,166,480	(41,053,158)	110.7%	15,763,887,688	(0.26%)
12/31/18	389,599,221	345,399,709	(44,199,512)	112.8%	16,329,558,053	(0.27%)

Please note that the funded status measures shown above do not indicate whether or not the Plan would have sufficient assets if it were terminated, nor do they indicate what level of future contributions would be required.

¹ Prior to December 31, 2015, AAL was determined using a 5.75% discount rate. AAL was determined using a 3.75% discount rate for all measurements after December 31, 2014.



Section 3: Membership Data

Data for 304,575 active members of the Teachers' and State Employees' Retirement System with reported compensation of \$14,436,435,848 and 20,541 members of the Optional Retirement Program with reported compensation of \$1,893,122,205 were furnished by the Retirement Systems Division as of December 31, 2018. The reported compensation includes annual longevity payments. The number and reported compensation of active members distributed by age and service as of December 31, 2018, are shown in Appendix A.

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

The Retirement Systems Division also supplied data for 6,103 disabled employees in receipt of annual extended short-term and long-term disability benefits totaling \$70,143,160 as of the valuation date. Of this number, 72 disabled employees are grandfathered under all provisions of the prior Disability Salary Continuation Plan and 6,031 are receiving extended short-term and 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 for the Plan is \$372,914,790 as of December 31, 2018.

The Actuarial Value of Assets for the Plan is \$389,599,221 as of the valuation date based on the "five-year smoothed value" asset valuation method selected by the System. Under this method, investment gains and losses are recognized in equal portions over a five-year period. The development of the Actuarial Value of Assets as of the valuation date is provided in Appendix C.

The following table shows an allocation of investments by category as of December 31, 2018.

**Table 5: Allocation of Investments by Category
as of December 31, 2018**

Cash and Receivables	9.0%
Fixed Income (LTIF)	91.0%
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, 2018. The items shown in the table, other than the Actuarial Value of Assets, are actuarially determined present values or contribution rates as of the valuation date.

Table 6: Statement of Condition of the Plan as of December 31, 2018

Present value of prospective benefits payable to all disabled members as of the valuation date for:		
Extended STD and LTD approved claims	\$	243,641,655
LTD incurred but not reported claims		38,200,878
STD incurred but not reported claims		<u>9,207,114</u>
Total claim liability	\$	291,049,647
Actuarial Value of Assets at end of year	\$	389,599,221
Deficit / (Surplus) as of December 31, 2018	\$	(98,549,574)
Prospective present value of benefits for current active members	\$	235,467,851
Present value of benefits not covered by Actuarial Value of Assets	\$	136,918,277
Present value of future compensation for active members	\$	170,658,047,769
Level contribution as a percentage of compensation to fund present value of benefits not covered by Actuarial Value of Assets		0.08%
Estimated administrative expenses		<u>0.01%</u>
Actuarially determined contribution rate as of December 31, 2018		0.09%

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

- Approved claim liabilities are for extended short-term and long-term disabilities which have occurred, have been approved, and are in payment status as of the valuation date.
- 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 following the valuation date and a reserve of 14/12 of the term cost is added to account for the time after disability to receive LTD benefits.
- 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 following the valuation date and a reserve of 62/72 of the term cost is added to account for the timing of STD payments.

The assumptions and methods used to determine claim liabilities are described in Appendix D.



Section 6: Experience

The difference between the Plan's Total Claim Liability and the Actuarial Value of Assets—a surplus as of December 31, 2018—was developed in Section 5. The surplus under the Plan has decreased by \$9,478,927 from \$108,028,501 to \$98,549,574 since the previous valuation date.

The following table shows a detailed reconciliation of the change in the Plan's Deficit / (Surplus)—the difference between the Total Claim Liability and the Actuarial Value of Assets—since the prior valuation.

**Table 7: Reconciliation of Change in Deficit / (Surplus)
Since the Prior Valuation**

Prior Year Deficit / (Surplus)	\$	(108,028,501)
Prior Year IBNR Claims		(38,330,078)
Actual Contributions During the Period		(22,365,042)
Receivable Contributions		(1,552,326)
Interest Adjustment		(5,903,932)
Aging of the In-Payment Population		5,196,310
Extended STD Experience		1,117,667
LTD Experience		17,045,318
Asset Loss / (Gain) ¹		6,863,018
Current Year IBNR Claims		<u>47,407,992</u>
Current Year Deficit / (Surplus)	\$	(98,549,574)

¹ The Plan's Actuarial Value of Assets is the basis for the asset (gain) / loss reported above.



Section 7: Accounting Information

Governmental Accounting Standards Board (GASB) Statement No. 74 (GASB 74) establishes accounting and financial reporting requirements for other postemployment benefits (OPEB) plans. In general, the GASB 74 rules that apply to OPEB plans are designed to help the plan adequately and systematically account for plan costs, facilitate comparisons of plan financial information by standardizing certain aspects of OPEB plan asset and liability measurement, and improve the utility of financial statement information by requiring that plans provide certain information about cash flows, accruals, returns, and other changes since the previous measurement.

This section contains accounting information that may be used to satisfy the reporting requirements under GASB 74 for the fiscal year ending on June 30, 2019, based on a December 31, 2018 valuation date. The Plan is assumed to be a cost-sharing, other than insured, defined benefit OPEB plan without a special funding situation where assets are accumulated in a trust that meets the criteria outlined in paragraph 3 of GASB 74. Additionally, the System elected not to restate results for any period prior to the adoption of GASB 74. This report does not include any non-actuarial items that may need to be reported or disclosed.

The table below provides a distribution of the number of members by type of membership as of December 31, 2018.

**Table 8: Number of Active and Disabled Members
as of December 31, 2018**

Membership Group	Number
Disabled members currently receiving extended short-term and long-term disability benefits	6,103
Inactive plan members entitled to, but not currently receiving benefits	0
Active members, including those in the waiting period or on short-term disability	<u>325,116</u>
Total membership	331,219

A 3.75% discount rate was used to measure the Plan's Total OPEB Liability as of June 30, 2019. The projection of cash flows used to determine the discount rate assumed that System contributions will continue to follow the current funding policy (please see Appendix E for a description of the assumptions and methods used in this projection). Based on those assumptions, the Plan's fiduciary net position (PFNP) was projected to be available to make all projected future benefit payments to current Plan members. Please see Appendices G and H for additional details.

However, please note that these PFNP projections are based upon the Plan's financial status on the valuation date, the set of methods and assumptions described in this report, and the guidance provided in GASB 74. As such, the PFNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, which would also include the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the fund will actually run out of money, the financial condition of the Plan, or the Plan's ability to make benefit payments in future years.



Section 7: Accounting Information

GASB 74 requires the disclosure of certain information in the financial statements of the Plan. The tables below provide the reconciliation of changes in the Net OPEB Liability / (Asset) (NOL) and the schedule of the NOL.

Table 9: Reconciliation of Changes in Net OPEB Liability / (Asset)

Fiscal Year Ending On	June 30, 2019
Total OPEB Liability	
Service Cost	\$ 22,567,000
Interest on the Total OPEB Liability	13,800,000
Changes of Benefit Terms	0
Difference Between Expected and Actual Experience	4,106,000
Changes of Assumptions or Other Inputs	(4,980,000)
Net Benefit Payments	<u>(61,946,000)</u>
Net Change in Total OPEB Liability	\$ (26,453,000)
Total OPEB Liability—Beginning of Year	\$ 358,431,000
Total OPEB Liability—End of Year	\$ 331,978,000
Plan Fiduciary Net Position	
Employer Contributions	\$ 24,468,000
Member Contributions	N/A
Net Investment Income	24,725,000
Net Benefit Payments	(61,946,000)
Administrative Expenses	(926,000)
Other	<u>0</u>
Net Change in Plan Fiduciary Net Position	\$ (13,679,000)
Plan Fiduciary Net Position—Beginning of Year	\$ 388,807,000
Plan Fiduciary Net Position—End of Year	\$ 375,128,000



Section 7: Accounting Information

Table 10: Schedule of the Net OPEB Liability / (Asset)

Measurement Date as of	June 30, 2019	June 30, 2018
Total OPEB Liability	\$ 331,978,000	\$ 358,431,000
Plan Fiduciary Net Position	<u>375,128,000</u>	<u>388,807,000</u>
Net OPEB Liability / (Asset)	\$ (43,150,000)	\$ (30,376,000)
Plan Fiduciary Net Position as a Percentage of the Total OPEB Liability	113.00%	108.47%
Covered Payroll	\$ 16,329,558,053	\$ 15,763,887,688
Net OPEB Liability / (Asset) as a Percentage of Covered Payroll	(0.26%)	(0.19%)

The sensitivity of the NOL to changes in the discount rate must be disclosed under GASB 74. The table below provides the NOL of the Plan determined using the current discount rate of 3.75%, as well as what the Plan's NOL would be if the discount rate was 1-percentage-point lower or 1-percentage-point higher than the current rate:

Table 11: Sensitivity of the Net OPEB Liability / (Asset) at June 30, 2019 to Changes in the Discount Rate

	1% Decrease	Current	1% Increase
Discount Rate	2.75%	3.75%	4.75%
Net OPEB Liability / (Asset)	\$ (36,547,000)	\$ (43,150,000)	\$ (49,566,000)

Please keep in mind that the estimates provided in the table above were prepared using streamlined calculation techniques, and they are intended to provide an "order of magnitude" indication of the NOL's sensitivity to changes in these assumptions. Results based on more refined calculations may yield findings and conclusions different than those suggested by the methodology required under GASB 74, as shown above. For example, one possible refinement would consider the impact of similar changes in bond yields on Plan assets, including (but not limited to) the valuations of certain fixed income investments held by the Plan. However, as required by GASB rules, we have not made any attempt to adjust the Plan's PFNP to reflect a potentially related change in fixed income asset pricing.



Section 7: Accounting Information

The sensitivity of the NOL to changes in health care cost trend rates must also be disclosed under GASB 74. The table below provides the NOL of the Plan determined using current health care cost trend rates, as well as what the Plan's NOL would be if health care cost trend rates were 1-percentage-point lower or 1-percentage-point higher than current health care cost trend rates:

Table 12: Sensitivity of the Net OPEB Liability / (Asset) at June 30, 2019 to Changes in Healthcare Cost Trend Rates

	1% Decrease	Current	1% Increase
Initial Trend Rates	5.50%–8.50%	6.50%–9.50%	7.50%–10.50%
Ultimate Trend Rate	4.00%	5.00%	6.00%
Net OPEB Liability / (Asset)	\$ (43,226,000)	\$ (43,150,000)	\$ (43,079,000)

Please keep in mind that the estimates provided in the table above were prepared using streamlined calculation techniques, and they are intended to provide an “order of magnitude” indication of the NOL’s sensitivity to changes in these assumptions. Results based on more refined calculations may yield findings and conclusions different than those suggested by the methodology required under GASB 74, as shown above.

The table below provides a reconciliation of the preliminary employer actuarially determined contribution rate to the final actuarially determined contribution amount for fiscal year ending on June 30, 2019. The preliminary actuarially determined contribution rate is based on the Plan’s actuarial valuation as of December 31, 2016.

Table 13: Development of the Actuarially Determined Contribution Amount for the Fiscal Year Ending June 30, 2019

Fiscal Year Ending	June 30, 2019
Preliminary Actuarially Determined Contribution Rate	
Normal Cost	0.13%
Accrued Liability	<u>N/A</u>
Total	0.13%
Impact of Legislative Changes	<u>0.00%</u>
Final Actuarially Determined Contribution Rate	0.13%
Actual Payroll for Year Ending June 30, 2019	\$ 17,477,148,000
Actuarially Determined Contribution	\$ 22,720,292



Section 7: Accounting Information

The tables below provide the actuarially determined contribution (ADC) rate for the employer as a percentage of payroll, determined in accordance with the Plan's funding policy, and a summary of the key assumptions and methods used in the determination of the ADC rate.

Table 14: Fiscal Year 2020 / 2021 Actuarially Determined Contribution (ADC) Rate based on the Valuation as of December 31, 2018

ADC Rate Component	Rate
Normal Cost	0.09%
Actuarial Accrued Liability	N/A
Total	0.09%

Table 15: Additional Information About the Determination of the Fiscal Year 2020 / 2021 ADC Rate for GASB 74 Disclosures

Valuation Date	December 31, 2018
Actuarial Cost Method	Aggregate
Amortization Method	Level percentage of payroll
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
State Health Plan	
Active Subscriber Premiums	
2019 70 / 30 Plan	\$518.64 per month prior to July 1, 2019 \$0 per month on or after July 1, 2019
Healthcare Cost Trend Rates	Varies from 6.50% to 9.50% in 2019 grading down to 5.00% in 2024 and 2028 for pre-65 medical and prescription drugs, respectively.
Future State Health Plan Enrollment	100% of active employees will elect to enroll in the 70 / 30 Plan option
Expected Administrative Expenses Included in Normal Cost	0.01% of payroll



Appendix A — Detailed Tabulations of Active Member Data

Table A-1: The Number and Average Reported Compensation of Active Members Distributed by Age and Service as of December 31, 2018

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	4,851 \$16,185	4,966 \$36,983	11 *									9,828 \$26,722
25 to 29	5,348 \$17,974	18,921 \$40,180	5,410 \$43,991	22 \$37,535								29,701 \$36,874
30 to 34	3,752 \$20,489	13,006 \$44,964	12,589 \$47,674	4,426 \$50,489	16 *							33,789 \$43,980
35 to 39	3,050 \$21,232	10,488 \$49,430	8,852 \$53,385	12,100 \$54,644	3,844 \$56,724	49 \$49,660						38,383 \$50,476
40 to 44	2,611 \$19,729	9,038 \$47,558	7,704 \$54,990	9,408 \$57,570	9,580 \$60,126	3,222 \$60,832	29 \$49,217					41,592 \$53,377
45 to 49	2,400 \$19,821	8,653 \$45,917	7,915 \$51,378	9,973 \$56,082	8,440 \$59,631	9,415 \$62,624	2,963 \$65,094	28 \$49,693				49,787 \$54,191
50 to 54	1,982 \$20,219	6,897 \$44,963	6,650 \$48,945	8,928 \$52,168	7,779 \$57,075	6,169 \$60,677	5,740 \$65,909	801 \$66,075	8 *			44,954 \$53,197
55 to 59	1,492 \$19,652	5,630 \$44,955	5,583 \$49,018	8,177 \$50,362	7,441 \$53,075	5,983 \$57,503	4,017 \$65,586	1,772 \$69,449	257 \$69,889	5 *		40,357 \$52,323
60 to 64	669 \$20,437	3,339 \$48,046	3,871 \$49,026	5,336 \$50,833	4,844 \$54,218	3,841 \$58,878	2,236 \$73,997	1,116 \$82,444	478 \$79,835	135 \$71,074		25,865 \$55,253
65 to 69	215 \$19,877	1,000 \$48,257	1,362 \$52,082	1,737 \$55,737	1,265 \$63,848	897 \$66,834	665 \$70,086	471 \$99,384	267 \$118,718	173 \$93,588		8,052 \$63,743
70 & Up	86 \$19,579	346 \$42,501	385 \$50,818	587 \$52,370	467 \$58,160	270 \$70,086	216 \$91,306	138 \$102,500	122 \$119,705	191 \$123,661		2,808 \$65,837
Total	26,456 \$19,065	82,284 \$44,491	60,332 \$50,071	60,694 \$53,758	43,676 \$57,412	29,846 \$60,692	15,866 \$67,995	4,326 \$76,362	1,132 \$90,870	504 \$98,492		325,116 \$50,227

* Average reported compensation is not shown for age / service groups with fewer than 20 individuals.



Appendix A — Detailed Tabulations of Active Member Data

**Table A–2: The Number and Reported Compensation of Active Members
Distributed by Age and Gender as of December 31, 2018**

Age	Male		Female	
	Number	Reported Compensation	Number	Reported Compensation
Under 19	19	\$ *	9	\$ *
19	63	1,107,195	40	571,538
20	132	2,521,007	121	1,648,432
21	214	4,651,192	284	4,966,686
22	512	11,922,517	1,248	23,071,622
23	852	24,164,292	2,192	58,173,687
24	1,188	37,995,262	2,954	91,597,030
25	1,384	46,409,659	3,550	117,473,608
26	1,536	54,780,971	3,969	140,176,594
27	1,795	66,363,630	4,225	155,835,718
28	1,900	73,975,934	4,723	178,213,810
29	2,026	82,373,051	4,593	179,595,746
30	1,974	83,846,776	4,692	188,469,659
31	2,009	89,585,795	4,541	188,028,133
32	2,067	97,616,070	4,573	196,366,836
33	2,138	102,273,069	4,765	210,018,432
34	2,196	111,187,619	4,834	218,631,974
35	2,298	123,235,763	4,843	226,821,775
36	2,373	126,010,595	5,243	249,728,016
37	2,339	129,926,877	5,320	257,274,924
38	2,527	141,591,207	5,448	267,068,849
39	2,431	141,555,986	5,561	274,209,466
40	2,475	145,282,481	5,481	276,410,314
41	2,485	147,704,511	5,832	291,116,141
42	2,576	156,254,610	5,647	285,354,951
43	2,542	153,418,443	5,782	291,454,113
44	2,690	163,245,570	6,082	309,797,158
45	2,798	168,130,792	6,126	310,102,091
46	2,940	180,770,109	6,493	329,578,457
47	3,173	195,558,936	7,172	360,017,547
48	3,296	204,995,587	7,521	383,541,772
49	3,184	201,980,797	7,084	363,324,388
50	2,958	185,926,220	6,666	339,142,175
51	2,782	172,649,814	6,443	319,279,758
52	2,752	170,289,845	6,048	294,154,587
53	2,731	168,250,276	5,898	287,707,638
54	2,655	162,220,787	6,021	291,785,414
55	2,677	165,247,961	5,744	275,488,513
56	2,634	159,826,493	5,785	278,788,937
57	2,507	145,888,337	5,676	274,877,675

* Total reported compensation is not shown for groups with fewer than 20 individuals.



Appendix A — Detailed Tabulations of Active Member Data

Table A–2: The Number and Reported Compensation of Active Members Distributed by Age and Gender as of December 31, 2018 (continued)

Age	Male		Female	
	Number	Reported Compensation	Number	Reported Compensation
58	2,455	\$ 152,130,963	5,345	\$ 261,443,145
59	2,394	145,626,247	5,140	252,269,063
60	2,210	136,124,124	4,596	225,304,643
61	2,124	133,762,177	4,138	206,246,573
62	1,734	111,142,113	3,409	174,853,847
63	1,462	97,721,850	2,678	141,031,772
64	1,332	90,078,756	2,182	112,862,078
65	1,037	75,850,950	1,648	87,592,367
66	813	60,186,732	1,115	63,263,197
67	628	49,385,960	811	45,330,957
68	522	43,196,477	591	33,363,742
69	439	32,475,741	448	22,608,494
70	353	29,197,146	338	17,193,513
71	295	23,862,708	276	14,711,905
72	223	16,361,222	190	9,666,212
73	152	13,199,104	129	6,375,969
74	119	9,057,207	104	4,536,251
75	98	7,288,148	79	3,779,343
76	82	6,387,974	57	2,799,602
77	53	4,902,297	38	1,689,133
78	29	2,264,983	24	969,144
79	30	1,947,817	22	1,018,999
80	19	*	9	*
81	22	2,038,390	9	*
82	8	*	3	*
83	6	*	7	*
84	7	*	2	*
85	5	*	4	*
86	1	*	4	*
87	2	*	1	*
88	3	*		
89	3	*		
90				
91				
92			1	*
93				
94			1	*
95				
Over 95				
Total	102,488	\$ 5,849,079,197	222,628	\$ 10,480,478,856

* Total reported compensation is not shown for groups with fewer than 20 individuals.



Appendix A — Detailed Tabulations of Active Member Data

**Table A–3: The Number and Reported Compensation of Active Members
Distributed by Service and Gender as of December 31, 2018**

Service	Male		Female	
	Number	Reported Compensation	Number	Reported Compensation
0	8,357	\$ 184,454,556	18,099	\$ 319,920,816
1	7,823	367,863,812	16,784	662,878,139
2	7,055	352,605,220	15,116	627,251,129
3	6,063	315,127,432	12,570	543,687,959
4	5,390	280,787,924	11,483	510,690,796
5	5,033	270,104,368	10,327	473,970,250
6	4,770	259,925,008	9,996	456,957,043
7	3,632	206,824,562	7,304	353,000,001
8	3,799	212,273,175	7,417	362,340,995
9	2,412	142,544,014	5,642	282,970,924
10	3,841	231,495,987	8,202	406,748,189
11	4,057	241,583,877	9,127	453,760,929
12	3,915	238,877,114	8,953	456,732,241
13	3,496	215,570,854	8,188	422,017,388
14	3,224	198,754,765	7,691	397,236,288
15	2,983	189,850,393	6,707	357,823,264
16	2,385	155,851,630	5,811	318,870,088
17	2,483	169,373,300	6,064	325,293,134
18	2,515	164,790,908	6,337	338,410,674
19	2,380	162,299,999	6,011	324,957,362
20	2,127	145,974,423	5,212	284,869,384
21	1,982	136,432,821	4,466	252,221,979
22	1,735	121,222,874	4,212	240,590,097
23	1,658	115,961,390	3,620	209,596,149
24	1,576	111,563,315	3,258	192,987,994
25	1,537	113,880,237	2,816	170,469,797
26	1,327	103,041,205	2,517	156,618,917
27	994	79,720,946	1,864	118,745,954
28	938	73,740,557	1,648	106,873,353
29	747	61,081,379	1,478	94,641,028
30	484	41,743,069	992	64,093,753
31	363	32,372,256	676	44,602,371
32	264	25,015,576	443	32,323,084
33	230	22,062,927	389	28,049,060
34	181	18,373,198	304	21,707,877
35	152	16,631,555	210	14,973,067
36	112	13,730,030	145	12,320,944
37	72	8,108,864	104	7,880,649
38	93	10,268,164	82	5,323,372
39	66	7,288,158	96	6,339,738
40	57	7,739,796	65	5,064,668

* Total reported compensation is not shown for groups with fewer than 20 individuals.



Appendix A — Detailed Tabulations of Active Member Data

Table A-3: The Number and Reported Compensation of Active Members Distributed by Service and Gender as of December 31, 2018 (continued)

Service	Male		Female	
	Number	Reported Compensation	Number	Reported Compensation
41	44	\$ 6,558,909	65	\$ 4,484,070
42	27	3,538,469	37	2,868,926
43	20	2,629,018	18	*
44	26	2,727,028	23	1,817,390
45	13	*	16	*
46	13	*	9	*
47	11	*	8	*
48	8	*	13	*
49	4	*	3	*
50	3	*	3	*
51	9	*		
52	1	*		
53				
54				
55				
56			3	*
57			2	*
58	1	*	1	*
59				
60				
Over 60			1	*
Total	102,488	\$ 5,849,079,197	222,628	\$ 10,480,478,856

* Total reported compensation is not shown for groups with fewer than 20 individuals.



Appendix B — Detailed Tabulations of Disabled Member Data

**Table B–1: The Number and Annual Amount of Disability Benefits
Reported for Each Disability Group**

Disability Group	As of December 31, 2018		As of December 31, 2017	
	Number	Annual Reported Benefits	Number	Annual Reported Benefits
Disabled prior to January 1, 1988	72	\$ 142,336	79	\$ 161,826
Disabled after December 31, 1987	<u>6,031</u>	<u>70,000,824</u>	<u>6,515</u>	<u>77,737,349</u>
Total	6,103	\$ 70,143,160	6,594	\$ 77,899,175



Appendix B — Detailed Tabulations of Disabled Member Data

Table B-2: The Number and Annual Long-Term Disability Benefits of Members Disabled Prior to January 1, 1988 by Age and Gender as of December 31, 2018

Age	Male		Female	
	Number	Allowances	Number	Allowances
57		\$		\$
58			1	*
59				
60				
61				
62			2	*
63			5	*
64	1	*	2	*
65			2	*
66	2	*	3	*
67	1	*		
68	2	*	1	*
69			1	*
70			2	*
71			5	*
72	1	*	2	*
73	1	*		
74			1	*
75	2	*		
76			2	*
77	2	*	4	*
78	1	*	3	*
79				
80			1	*
81	1	*	1	*
82				
83			1	*
84				
85			1	*
86				
87			1	*
88			1	*
89			3	*
90			1	*
91			2	*
92			1	*
93			2	*
94			2	*
95				
Over 95			5	*
Total	14	\$	58	\$

* To protect the privacy of beneficiary information, total allowances are not shown for groups with fewer than 20 individuals.
Cavanaugh Macdonald Consulting, LLC



Appendix B — Detailed Tabulations of Disabled Member Data

**Table B–3: The Number and Annual Disability Benefits of Members
Disabled After December 31, 1987 by Age and Gender
as of December 31, 2018**

Age	Male		Female	
	Number	Allowances	Number	Allowances
Under 26		\$		\$
26				
27				
28				
29			1	*
30				
31			3	*
32	1	*	5	*
33	1	*	4	*
34	3	*	9	*
35			10	*
36	4	*	8	*
37	9	*	12	*
38	4	*	18	*
39	4	*	18	*
40	9	*	33	484,382
41	11	*	32	549,421
42	13	*	53	914,786
43	17	*	51	849,952
44	29	496,668	57	939,995
45	28	363,680	62	1,044,638
46	34	664,516	81	978,314
47	39	551,109	100	1,624,345
48	48	707,264	106	1,541,753
49	49	513,008	128	1,783,415
50	57	677,530	147	2,290,469
51	72	859,064	142	2,176,341
52	76	890,939	180	2,491,176
53	74	894,354	195	2,282,046
54	89	987,400	224	2,952,338
55	83	849,838	224	2,582,591
56	112	1,152,840	226	2,725,091
57	112	1,035,958	289	2,812,691
58	92	983,308	325	3,438,242
59	138	1,427,344	288	3,043,126
60	129	1,401,043	237	2,312,389
61	120	1,190,122	240	2,475,331
62	118	979,160	232	2,203,822

* To protect the privacy of beneficiary information, total allowances are not shown for groups with fewer than 20 individuals.



Appendix B — Detailed Tabulations of Disabled Member Data

**Table B-3: The Number and Annual Disability Benefits of Members
Disabled After December 31, 1987 by Age and Gender
as of December 31, 2018 (continued)**

Age	Male		Female	
	Number	Allowances	Number	Allowances
63	104	\$ 884,037	224	\$ 2,067,739
64	101	809,283	220	2,059,897
65	10	*	22	212,391
66	2	*	1	*
67	1	*	2	*
68	1	*	3	*
69	1	*	2	*
70			2	*
71			5	*
72				
73	1	*	1	*
74			1	*
75			1	*
76			1	*
77				
78				
79			1	*
80	2	*		
81			3	*
82				
83			1	*
84			1	*
85				
86				
87				
88				
89				
90			1	*
91			1	*
92				
93				
94				
95				
Over 95				
Total	1,798	\$ 19,476,068	4,233	\$ 50,524,756

* To protect the privacy of beneficiary information, total allowances are not shown for groups with fewer than 20 individuals.



Appendix C — Development of the Actuarial Value of Assets

The Actuarial Value of Assets is determined using a method that attempts to “flatten” the peaks and valleys inherent in market values of assets. Under the “five-year smoothed value” asset valuation method selected by the System, investment gains and losses are recognized in equal portions over a five-year period. The calculation of the Actuarial Value of Assets is based on a formula that is mathematically equivalent to the process described above:

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

where,

MV is the market value of assets as of the valuation date; and,
G/(L)_i is the asset gain or (loss) for the i-th year preceding the valuation date.

However, the resulting Actuarial Value of Assets cannot be less than 80% or more than 120% of the market value of assets as of the measurement date. The development of the Actuarial Value of Assets as of December 31, 2018 is shown in the table below:

Development of the Actuarial Value of Assets for the Year Ending		December 31, 2018
Market Value of Assets Without Receivables, Beginning of Year	\$	414,956,343
Employer Contributions	\$	23,913,215
Employer Contributions Receivable		1,552,326
Net Benefit Payments and Administrative Expenses		<u>(66,758,291)</u>
Net Cash Flow	\$	(41,292,750)
Expected Investment Return	\$	14,764,911
Expected Market Value of Assets, End of Year	\$	388,428,504
Market Value of Assets, End of Year	\$	372,914,790
Excess of Market Value over Expected Market Value of Assets	\$	(15,513,714)
80% of 2018 Asset Gain / (Loss)	\$	(12,410,971)
60% of 2017 Asset Gain / (Loss)		(1,810,384)
40% of 2016 Asset Gain / (Loss)		750,252
20% of 2015 Asset Gain / (Loss)		<u>(3,213,328)</u>
Total Deferred Asset Gain / (Loss)	\$	(16,684,431)
Preliminary Actuarial Value of Assets, End of Year	\$	389,599,221
Final End of Year Actuarial Value of Assets (not less than 80% and not greater than 120% of Market Value)	\$	389,599,221
Estimated Net Investment Return on Actuarial Value ¹		2.04%

¹ Dollar-weighted rate of return assuming that all cash flows occur in the middle of the year.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

Unless otherwise indicated below, the following assumptions and methods were developed based on an investigation of demographic and economic experience over the five-year period from January 1, 2010 to December 31, 2014 prepared by the prior actuary, adopted by the Board of Trustees on April 21, 2016, and prescribed for use in the Plan's December 31, 2018 annual actuarial valuation.

ECONOMIC ASSUMPTIONS

Discount Rate

3.75% per year, compounded annually.

Expected Rate of Return on Assets

3.75% per year, net of investment expenses.

Expected Long-term Rates of Inflation

Both general and wage inflation are assumed to be 3.00% per year.

Expected Long-term Real Wage Growth

0.50% per year.

Expected Across-the-Board Salary Increases

For disability events that first occur on or after January 1, 1988, extended STD and LTD benefits (before reductions) are assumed to increase 3.50% per year. Otherwise, no increases have been assumed.

Expected Long-term National Average Wage Growth

3.50% per year for the purposes of calculating Social Security benefits.

Expected Future Increases in Social Security Benefits

For disability events that first occur on or after January 1, 1988, Social Security disability benefits are assumed to increase by 3.00% per year. Otherwise, no increases have been assumed.

Expected Administrative Expenses Included in Normal Cost

Estimated administrative expenses equal to 0.01% of payroll were included in the normal cost rate (adopted December 31, 2017).

Expected Claims Administration Expenses

None. Our understanding is that approximately \$60,000 is budgeted for annual expenses related to claims administration during the 2019 calendar year. As a result, budgeted claims administration expenses are immaterial to the Plan's actuarially determined contribution rate calculations as of December 31, 2018.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

ECONOMIC ASSUMPTIONS

Employers' Share of State Health Plan

Monthly Active Subscriber Premiums (adopted December 31, 2018)

Calendar Year	Monthly Premium Per Active Subscriber
2019	\$518.64 prior to July 1, 2019 \$0 on or after July 1, 2019 ¹

Long-term Health Care Cost Trend Rates

Annual health care premium rates are expected to increase in future years as a result of medical inflation, utilization, leverage in the plan design, and improvements in technology adjusted for any implicit and/or explicit cost containment features. The assumed rates of increases in expected active (non-Medicare primary) subscriber 70 / 30 plan health care premium rates vary by year, as shown in the table below (adopted December 31, 2018):

Year Ending June 30	Medical Non-Medicare	Prescription Drug
2019 ²	6.50%	9.50%
2020	6.50%	9.00%
2021	6.00%	8.50%
2022	6.00%	8.00%
2023	5.50%	7.50%
2024	5.00%	7.00%
2025	5.00%	6.50%
2026	5.00%	6.00%
2027	5.00%	5.50%
2028+	5.00%	5.00%

¹ The Financial Accountability, Integrity, and Recovery (FAIR) Act of 2018 amended the Plan's eligibility criteria for STD benefits to eliminate employer reimbursements for the "second six months" of short-term disability benefits that begin on or after July 1, 2019.

² Initial trend rates (for the year ending June 30, 2019) were used to project premium rates backward from 2019 to entry year in measurements of benefit obligations based on the Entry Age Normal actuarial cost method.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Mortality and Mortality Improvement Rates

Pre-Retirement RP-2014 total dataset mortality with fully generational projected mortality improvements using MP-2015 for general employees and law enforcement officers. RP-2014 white collar employee mortality with fully generational projected mortality improvements using MP-2015 for teachers, librarians, counselors and other education employees.

Post Retirement RP-2014 total dataset mortality prior to age 50, and RP-2014 healthy annuitant mortality after age 49 with fully generational projected mortality improvements using MP-2015 for general employees and law enforcement officers. RP-2014 white collar total dataset mortality prior to age 50, and RP-2014 white collar healthy annuitant mortality after age 49 with fully generational projected mortality improvements using MP-2015 for teachers, librarians, counselors and other education employees. Generationally projected healthy annuitant mortality rates for males and females in certain employee groups were further adjusted by the factors in the following tables:

Employee Group	Male Retiree Adjustment Factors	
	Ages 50 – 78	Ages 79+
General Employees	108%	124%
Teachers, Librarians, Counselors and Other Education Employees	92%	120%

Employee Group	Female Retiree Adjustment Factors	
	Ages 50 – 78	Ages 79+
General Employees	81%	113%
Teachers, Librarians Counselors, and Other Education Employees	78%	108%

Post-Disablement RP-2014 disabled retiree mortality with no projection of mortality improvements. RP-2014 disabled retiree mortality rates for males and females have been adjusted to reflect 103% and 99%, respectively, of gender-specific table rates at each age.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Mortality and Mortality Improvement Rates (continued)

The table below provides pre-retirement base mortality rates (as of 2014) for males and females in each employee group at sample ages:

Age	General Employees		Teachers, Librarians and Counselors		Law Enforcement Officers		Other Education Employees	
	Male	Female	Male	Female	Male	Female	Male	Female
25	0.0005	0.0002	0.0003	0.0001	0.0005	0.0002	0.0003	0.0001
30	0.0005	0.0002	0.0003	0.0002	0.0005	0.0002	0.0003	0.0002
35	0.0005	0.0003	0.0004	0.0002	0.0005	0.0003	0.0004	0.0002
40	0.0006	0.0004	0.0004	0.0003	0.0006	0.0004	0.0004	0.0003
45	0.0010	0.0007	0.0007	0.0006	0.0010	0.0007	0.0007	0.0006
50	0.0017	0.0011	0.0012	0.0009	0.0017	0.0011	0.0012	0.0009
55	0.0028	0.0017	0.0020	0.0014	0.0028	0.0017	0.0020	0.0014
60	0.0047	0.0024	0.0033	0.0021	0.0047	0.0024	0.0033	0.0021
65	0.0083	0.0037	0.0058	0.0031	0.0083	0.0037	0.0058	0.0031
69	0.0125	0.0057	0.0092	0.0049	0.0125	0.0057	0.0092	0.0049

Withdrawal Rates

The following tables contain age, service, and gender based annual rates of separation from active service (for causes other than death, disability or retirement) for the employee groups listed below. For rates that vary based on age, sample ages have been provided.

Service	General Employees		Teachers, Librarians and Counselors		Law Enforcement Officers		Other Education Employees	
	Male	Female	Male	Female	Male	Female	Male	Female
0	0.1800	0.1950	0.1900	0.1700	0.1300	0.1300	0.1900	0.1650
1	0.1550	0.1700	0.1600	0.1450	0.1000	0.1000	0.1600	0.1350
2	0.1300	0.1450	0.1400	0.1350	0.0900	0.0900	0.1300	0.1200
3	0.1100	0.1150	0.1200	0.1200	0.0600	0.0600	0.1150	0.1000
4	0.0900	0.1000	0.0950	0.1000	0.0600	0.0600	0.1000	0.0850



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Withdrawal Rates (continued)

<u>Age</u>	<u>General Employees*</u>		<u>Teachers, Librarians and Counselors*</u>		<u>Law Enforcement Officers*</u>		<u>Other Education Employees*</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
25	0.0800	0.1100	0.0800	0.0900	0.0400	0.0400	0.0800	0.1200
30	0.0700	0.0850	0.0700	0.0750	0.0350	0.0350	0.0600	0.0700
35	0.0525	0.0600	0.0450	0.0450	0.0300	0.0300	0.0450	0.0450
40	0.0400	0.0450	0.0350	0.0340	0.0300	0.0300	0.0400	0.0400
45	0.0350	0.0375	0.0325	0.0325	0.0400	0.0400	0.0400	0.0375
50	0.0350	0.0375	0.0325	0.0325	0.0400	0.0400	0.0400	0.0375
55	0.0350	0.0375	0.0325	0.0325	0.0400	0.0400	0.0400	0.0375
60	0.0350	0.0375	0.0325	0.0325	0.0400	0.0400	0.0400	0.0375

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

Retirement Rates

The following tables contain age, service, and gender based annual rates of retirement at sample ages for the employee groups listed below:

<u>Age</u>	<u>General Employees—Male</u>						
	<u>Years of Service</u>						
	<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	0.3500	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



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Retirement Rates (continued)

General Employees—Female							
Years of Service							
<u>Age</u>	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>
50				0.0350	0.0600	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

Teachers, Librarians and Counselors—Male							
Years of Service							
<u>Age</u>	<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

Teachers, Librarians and Counselors—Female							
Years of Service							
<u>Age</u>	<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



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Retirement Rates (continued)

Other Education Employees—Male							
Years of Service							
<u>Age</u>	<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—Female							
Years of Service							
<u>Age</u>	<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

Law Enforcement Officers							
Years of Service							
<u>Age</u>	<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



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Salary Increase Rates

Rates of salary increases for each employee group are constructed geometrically based on the expected long-term rate of inflation plus the expected productivity component (currently, 3.50%), and a variable expected merit component that is dependent on years of service. The following table provides a sample of the service-based rates of salary increases that are used to project a member's total salary as of the valuation date to future years. Salary increases are assumed to occur on July 1 of each year.

<u>Service</u>	Total Annual Salary Increase Rates			
	<u>General Employees</u>	<u>Teachers, Librarians and Counselors</u>	<u>Law Enforcement Officers</u>	<u>Other Education Employees</u>
0	5.50%	7.55%	8.10%	7.00%
5	4.50%	6.05%	6.10%	6.25%
10	4.00%	5.10%	4.40%	5.50%
15	3.50%	4.35%	3.95%	4.75%
20	3.50%	3.65%	3.65%	4.00%
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%

Disability Rates

The table below provides age and gender based annual rates of disability per 1,000 lives exposed at sample ages:

<u>Age</u>	<u>Male</u>	<u>Female</u>
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



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Decrement Timing and Adjustment

Decrements—retirement, withdrawal, death, and disability—are assumed to occur at the middle of the year, except that 100% retirement is assumed to occur at the beginning of the year. Decrement rates (or “probabilities”) are assumed to be uniformly distributed throughout the year, and reflect multiple decrement effects.

Disability Claim Termination Rates

Monthly select disability claim termination rates were used for the first 24 months of disability. The following tables contain age-at-disability and gender based rates of disability claim termination per 1,000 lives for sample durations of disability:

Duration of Disability (Months)	Male								
	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	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

Duration of Disability (Months)	Female								
	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	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

Annual select and ultimate disability claim termination rates were used after the first 24 months of disability, with select rates effective from 5 to 25 years. The following tables contain age-at-disability and gender based rates of disability claim termination per 1,000 lives for sample durations of disability:



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Disability Claim Termination Rates (continued)

Duration of Disability (Years)	Male								
	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

Duration of Disability (Years)	Female								
	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

Dates of Disability

The date of disability is the calendar month, day, and year on which a claimant meets the definition of disability under Plan. This date is used to estimate the member's age-at-disability and the duration of the member's disability, which are used in the determination of the applicable monthly select, and annual select and ultimate, disability claim termination rates described above.

The Retirement Systems Division (RSD) did not provide date of disability or age-at-disability for members who are receiving extended short-term and long-term disability benefits under the Plan as of December 31, 2018. As instructed by RSD, we assumed that dates of disability for these members occurred twelve months before their benefit start dates. We note that benefit start dates could be deferred as a result of member decisions, any delay in the disability application and/or certification process(es), or any change in the applicable disability program (for example, if a new benefit start date would be generated for members who begin receiving long-term disability benefits after having exhausted extended short-term disability benefits). Nevertheless, we believe that the prescribed method is a reasonable approach because, generally speaking, members must have been enrolled for twelve months under the short-term disability program before extended short-term or long-term disability benefits can be paid, and the number of members whose estimated dates of disability reflect more recent event dates than actual experience would support is likely not significant.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

DEMOGRAPHIC ASSUMPTIONS

Assumed Social Security Disability Benefit Approval Rates

Future Disabled Members 50% of members who had less than five years of service as of July 31, 2007 are assumed to receive approval for Social Security disability benefits from the conclusion of the waiting period and prior to the completion of four years of disability. All other members are assumed to receive approval for Social Security disability benefits.

Current Disabled Members Actual Social Security disability benefit approval information is used where available. If actual Social Security disability decisions are not available, 50% of currently disabled members who had less than five years of service as of July 31, 2007 are assumed to receive approval for Social Security disability benefits. Otherwise, all other currently disabled members are assumed to receive approval for Social Security disability benefits.

Our understanding is that the Retirement Systems Division (RSD) has implemented a number of changes to the disability application process since the prior valuation, including the addition of a case manager to the operations team staff and reviews to ensure that applications contain all of the required provider documentation prior to Medical Review Board consideration. Since the new application process would likely generate better, and timelier, documentation of members' disabilities than the old process, actual Social Security disability benefit approval rates could be higher than expected in the future. As such, we will be reviewing this assumption as part of the upcoming experience study to determine how the rates should be refined prior to the next actuarial valuation of the Plan, and the results provided in this report should be viewed as having a likely range of variability.

Future State Health Plan Enrollment

100% of active employees will elect to enroll in the 70 / 30 Plan option prior to July 1, 2019. Otherwise, no active employees are assumed to participate in the State Health Plan on or after July 1, 2019¹.

¹ The Financial Accountability, Integrity, and Recovery (FAIR) Act of 2018 amended the Plan's eligibility criteria for STD benefits to eliminate employer reimbursements for the "second six months" of short-term disability benefits that begin on or after July 1, 2019.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

OTHER ASSUMPTIONS AND METHODS

Gross Benefit Adjustments

Our understanding is that the gross benefit amounts provided by the Retirement Systems Division (RSD) as of December 31, 2018 reflect the multipliers and/or limits applicable to the disability program in which the claimant is enrolled, as reported on the census data. For the purposes of estimating incurred but not reported (IBNR) liabilities, gross benefit amounts payable to members who are currently receiving extended short-term disability benefits were adjusted to reflect the multipliers used under the long-term disability program. However, if “unlimited” gross benefits were not provided on the census data, we assumed that claimants would have the highest allowable gross benefit under the Plan’s long-term disability provisions if the highest allowable extended short-term gross benefit was provided on the census data.

Social Security Benefit Offsets

Future Disabled Members

Estimated projected Social Security benefits for future disabled members are based on expected long-term National Average Wage growth assumptions, assumptions about future increases in Social Security benefits, valuation salaries from age at entry to future decrement dates, and the Social Security benefit determination rules applicable to the law year in effect on future decrement dates. Estimated projected Social Security retirement benefits were adjusted to reflect reductions / increases for early / late commencement.

Current Disabled Members

Social Security benefit offsets were not provided for some claimants—for example, members who are currently receiving extended short-term disability benefits—as of December 31, 2018. We estimated Social Security benefits for affected claimants based on the relevant assumptions listed above, wages at termination projected backward reflecting relative changes in National Average Wages to member age 20, and the Social Security benefit determination rules applicable to the 2019 law year.

Other Offsets

No additional offsets—including but not limited to Worker’s Compensation, VA benefits, and Outside Earnings—other than those reported, have been assumed.

Reported Compensation

Calendar year compensation provided 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.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

OTHER ASSUMPTIONS AND METHODS

Valuation Date

December 31, 2018

Benefits Not Valued

None.

Actuarial Cost Method

The valuation is prepared on the projected benefit basis, under which the present value, at the interest rate assumed to be earned in the future (currently 3.75%), of each member's expected benefits at future disability events is determined, based upon age, service, and gender. The calculations take into account the probability of a member's disability, recovery from disability, death, retirement, or termination of employment prior to receiving benefits under the Plan. The present value of the expected benefits payable on account of active members is added to the present value of the expected future payments to currently disabled members to obtain the present value of all expected benefits payable by the Plan.

The actuarial cost method is a procedure for allocating the actuarial present value of postemployment benefits and expenses to time periods. The method used for funding purposes is known as the Aggregate actuarial cost method, and has the following characteristics:

- (i) The annual normal cost is determined for the entire group active participants rather than individually for each participant.
- (ii) This cost method does not identify or separately amortize unfunded actuarial liabilities. Thus, actuarial gains (losses), as they occur, reduce (increase) future normal costs.

The Aggregate actuarial cost method allocates the actuarial present value of postemployment benefits for all active participants and currently disabled members in excess of the Actuarial Value of Assets on a level basis over the present value of projected compensation for all active participants between the valuation date and the date that the last employee retires (collectively).

The portion of the actuarial present value allocated to the valuation year is called the normal cost. Under the Aggregate actuarial cost method, the annual normal cost is a percentage of the year-by-year projected total covered compensation for all employees. This actuarial cost method does not produce an Actuarial Accrued Liability, so the Actuarial Accrued Liability based on the Entry Age Normal (Level Percentage of Pay) actuarial cost method is often reported in connection with results based on the Aggregate actuarial cost method.

The actuarial cost method was prescribed by the System for the purposes of preparing the actuarially determined employer contribution rate for the Plan as of December 31, 2018.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

OTHER ASSUMPTIONS AND METHODS

Asset Valuation Method

The Actuarial Value of Assets for this purpose is determined using the “five-year smoothed value” asset valuation method, which attempts to “flatten” the peaks and valleys inherent in market values of assets. Under this method, investment gains and losses are recognized in equal portions over a five-year period. Investment gains and losses are determined by comparing the actual return on market value for a given period to the anticipated earnings over the same period if the market value of assets at the beginning of the period, contributions, benefit payments, and administrative expenses during the period earned the expected rate of return for the portion of the period that each was expected to be including in, or excluded from, plan assets. The expected rate of return for this purpose is equal to the expected long-term rate of return assumption selected at the beginning of the experience period (in this case, 3.75% as of January 1, 2018). The resulting Actuarial Value of Assets cannot be less than 80% or more than 120% of the market value of assets. Please see Appendix C for the development of the Actuarial Value of Assets as of the valuation date.

The asset valuation method was prescribed by the System for the purposes of preparing the actuarially determined employer contribution rate for the Plan as of December 31, 2018.

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.

Funding Policy

The actuarial cost method, asset valuation method, and other components of the contribution allocation procedure were considered and approved by the Board during the most recent experience study. ADC rates as of the valuation date were developed based on the contribution allocation procedure described in GASB Statement Nos. 43 and 45, as approved by the System.



Appendix D — Summary of Actuarial Assumptions and Methods for Funding Purposes

OTHER ASSUMPTIONS AND METHODS

Other Assumptions and Methods

Unless otherwise stated above, all other actuarial assumptions and methods are the same as those used for the purpose of determining periodic funding contributions as of December 31, 2017.

Please see the December 31, 2017 actuarial valuation report for additional information about the data, assumptions, methods, and plan provisions used to prepare results as of the December 31, 2017 measurement date. Likewise, additional information concerning historical results can be found in the relevant actuarial valuation report for each valuation date. Please keep in mind that any information that may be included in this report for periods prior to December 31, 2017 was produced by other actuarial consulting firms.

Changes in Funding Assumptions and Methods Since the Prior Valuation

The December 31, 2018 measurements used in the development of actuarially determined contribution rates reflect the following changes in assumptions and methods:

Prescribed Changes

- Long-term health care cost trend rates were updated to better reflect the anticipated impact, as of June 30, 2019, of changes in medical inflation, utilization, leverage in the plan design, and improvements in technology on expected active (non-Medicare primary) subscriber 70 / 30 plan health care premium rates in future periods;
- Expected active (non-Medicare primary) subscriber 70 / 30 plan health care premium rates were updated to better reflect anticipated Plan experience; and,

Non-Prescribed Changes

- The method of estimating Social Security benefits for future disabled members was changed to reflect the Social Security benefit determination rules applicable to the law year in effect on future decrement dates instead of basing these calculations on a “frozen” law year (the calendar year following the valuation date). This change was made to better reflect the actual operation of the Plan and, consequently, better reflect anticipated Plan experience.

The aggregate effect of the changes described above was a reduction in the Plan’s actuarial present value of projected benefits and the normal cost rate measured as of December 31, 2018.



Appendix E — Summary of Actuarial Assumptions and Methods for Financial Accounting Purposes

ECONOMIC AND OTHER ASSUMPTIONS AND METHODS

Discount Rate

3.75% per year, compounded annually (adopted June 30, 2019).

The projection of cash flows used to determine the discount rate was performed in accordance with the procedures described in GASB 74. The basis for this projection is the Plan's actuarial valuation performed as of December 31, 2018 (Valuation Date). In addition to the actuarial methods and assumptions used for funding purposes as of December 31, 2018, the following actuarial methods and assumptions were used in the projection of cash flows for the purpose of determining the discount rate under GASB 74 as of June 30, 2019 (Measurement Date):

- The System selected a 3.50% Municipal Bond Index Rate and prescribed it for use in determining the Plan's discount rate under GASB 74 as of the Measurement Date.
- Total payroll for the initial projection year consists of the payroll of the active membership present on the Valuation Date. In subsequent projection years, total payroll was assumed to increase annually at a rate of 3.50%.
- Employers are assumed to make projected contributions in the middle of each calendar year equal to the projected covered payroll for the period multiplied by the average actuarially determined contribution (ADC) rate expected to be in effect during that period. Projected employer contributions for future employees were first applied to reduce applicable service costs for these members.
- ADC rates were projected from June 30, 2021 using the greater of the ADC rate for the fiscal year ending on June 30, 2021 and the rate determined based on projected liabilities, actuarial values of assets, and other inputs attributable to current employees and disabled members that were used in the funding method selected by the System as of December 31, 2018. Projected ADC rates were not permitted to exceed the most recent five year average ADC rate as of the Valuation Date.
- Administrative expenses were projected from calendar 2018 using a 3.00% assumed annual rate of increase. Projected administrative expenses were allocated to current and future employees based on the change in the percentage of total payroll attributable to each group during each future period, and are assumed to be paid in the middle of each calendar year.
- Projected benefit payments for current employees and disabled members are assumed to be paid in the middle of each calendar year.

Based on these assumptions, the Plan's PFNP was not projected to be depleted. As a result, the Municipal Bond Index Rate was not used in the determination of the discount rate, and the 3.75% long-term expected rate of return selected by the System was used, as prescribed, in the measurement of the Plan's Total OPEB Liability (TOL) as of the Measurement Date under GASB 74.

Municipal Bond Index Rate

3.50% per year, compounded annually (adopted June 30, 2019).



Appendix E — Summary of Actuarial Assumptions and Methods for Financial Accounting Purposes

ECONOMIC AND OTHER ASSUMPTIONS AND METHODS

Expected Rate of Return on Assets

3.75% per year, net of investment expenses.

Expected Administrative Expenses Included in Service Cost

None.

Measurement Date

June 30, 2019

Measurement Period

July 1, 2018 to June 30, 2019

Actuarial Cost Method

The valuation is prepared on the projected benefit basis, under which the present value, at the interest rate assumed to be earned in the future (currently 3.75%), of each member's expected benefits at future disability events is determined, based upon age, service, and gender. The calculations take into account the probability of a member's disability, recovery from disability, death, retirement, or termination of employment prior to receiving benefits under the Plan. The present value of the expected benefits payable on account of active members is added to the present value of the expected future payments to currently disabled members to obtain the present value of all expected benefits payable by the Plan.

The actuarial cost method is a procedure for allocating the actuarial present value of postemployment benefits and expenses to time periods. The method used for financial accounting purposes is known as the Entry Age Normal (Level Percentage of Pay) actuarial cost method, and has the following characteristics:

- (i) The annual service costs for each individual active participant are sufficient to accumulate the value of the participant's postemployment benefits at time of retirement.
- (ii) Each annual service cost is a constant percentage of the participant's year-by-year projected covered compensation.

The Entry Age Normal (Level Percentage of Pay) actuarial cost method allocates the actuarial present value of each participant's projected benefits on a level basis over the participant's assumed compensation rates between the entry age of the participant and the assumed ages at which the participant will leave active service.

The portion of the actuarial present value allocated to the valuation year is called the service cost (SC). The portion of the actuarial present value of expected benefits not provided for by the actuarial present value of future service costs is called the Total OPEB Liability (TOL). The difference between the TOL and the Actuarial Asset Value is the Net OPEB Liability (NOL).

The actuarial cost method is prescribed by GASB 74 and 75 for financial accounting purposes.



Appendix E — Summary of Actuarial Assumptions and Methods for Financial Accounting Purposes

ECONOMIC AND OTHER ASSUMPTIONS AND METHODS

Asset Valuation Method

The Actuarial Value of Assets for financial accounting purposes is equal to the Plan Fiduciary Net Position (PFNP)—the market value of the financial accounting asset—on the measurement date.

The asset valuation method is prescribed by GASB 74 and 75 for financial accounting purposes.

Applicable Accounting Standards

Our understanding is that the State has determined that the Plan's liability for short-term disability benefits associated with currently active employees is not measurable. As a result, the System accounts for all Plan benefits under Governmental Accounting Standards Board Statement No. 74 (GASB 74), "Financial Reporting For Postemployment Benefit Plans Other Than Pension Plans", and Statement No. 75 (GASB 75), "Accounting and Financial Reporting For Postemployment Benefits Other Than Pensions".

For plan and financial accounting purposes, the Plan is assumed to be a cost-sharing, other than insured, defined benefit OPEB plan without a special funding situation where assets are accumulated in a trust that meets the criteria outlined in paragraph 3 of GASB 74 and paragraph 4 of GASB 75, respectively. The System elected not to restate results for any period prior to the adoption of GASB 74/75.

Other Assumptions and Methods

Unless otherwise stated above, all other actuarial assumptions and methods are the same as those used for the purpose of determining periodic funding contributions as of December 31, 2018.

Please see the December 31, 2017 actuarial valuation report for additional information about the data, assumptions, methods, and plan provisions used to prepare financial accounting results as of the June 30, 2018 measurement date. Please keep in mind that any information that may be included in this report for periods prior to December 31, 2017 was produced by other actuarial consulting firms.



Appendix E — Summary of Actuarial Assumptions and Methods for Financial Accounting Purposes

ECONOMIC AND OTHER ASSUMPTIONS AND METHODS

Changes in Financial Accounting

Assumptions and Methods Since the Prior Valuation

The December 31, 2018 measurements used in the development of June 30, 2019 financial accounting results for the Plan reflect the following changes in assumptions and methods:

Prescribed Changes

- As required under GASB rules, the yield on 20-year tax-exempt municipal bonds rated AA/Aa or higher was updated to equal the Municipal Bond Index Rate as of June 30, 2019. The System selected the 3.50% Municipal Bond Index Rate as of the June 30, 2019 measurement date. However, the Municipal Bond Index Rate was not used in the determination of the discount rate based on the procedure described in GASB 74;
- Long-term health care cost trend rates were updated to better reflect the anticipated impact, as of June 30, 2019, of changes in medical inflation, utilization, leverage in the plan design, and improvements in technology on expected active (non-Medicare primary) subscriber 70 / 30 plan health care premium rates in future periods;

Experience-related Changes

- Expected active (non-Medicare primary) subscriber 70 / 30 plan health care premium rates were updated to better reflect anticipated Plan experience; and,

Non-Prescribed Changes

- The method of estimating Social Security benefits for future disabled members was changed to reflect the Social Security benefit determination rules applicable to the law year in effect on future decrement dates instead of basing these calculations on a “frozen” law year (the calendar year following the valuation date). This change was made to better reflect the actual operation of the Plan and, consequently, better reflect anticipated Plan experience.

The aggregate effect of the changes described above was a reduction in the Plan's Total OPEB Liability and service cost measured as of December 31, 2018.



Appendix F — Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

This summary of main benefit provisions is intended to describe only the principal features of the Disability Income Plan of North Carolina (DIPNC, or the Plan), a cost-sharing, multiple employer defined benefit OPEB plan sponsored by the Teachers' and State Employees' Retirement System of North Carolina (the System) as interpreted for valuation purposes. All actual eligibility requirements and benefit amounts will be determined in accordance with the Plan document and any System practices, processes, and procedures.

Overview of the Plan

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.

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 (TSERS) or the UNC Optional Retirement Program (ORP) on or after January 1, 1988 are eligible to participate in the Plan.

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.

Definition of Base Rate of Compensation

The regular monthly rate of compensation not including pay for shift premiums, overtime, or other types of extraordinary pay as determined by the Board of Trustees.

Definition of Annual Longevity Payment

Full-time and part-time (20 hours or more) permanent, probationary, and time-limited employees are eligible for annual longevity payments; whereas, part-time (less than 20 hours) and temporary employees are not eligible for these payments.

Annual longevity pay amounts are based on the length of total State service and a percentage of the eligible employee's annual base rate of compensation on the date of eligibility. Longevity pay amounts are determined by multiplying the eligible employee's annual base rate of compensation by the appropriate percentage from the following table:

Years of Total State Service	Longevity Pay Percentage
Under 10 years	0.00%
10 but less than 15 years	1.50%
15 but less than 20 years	2.25%
20 but less than 25 years	3.25%
25 or more years	4.50%



Appendix F — Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

SHORT-TERM DISABILITY BENEFITS

Eligibility for Short-Term Disability Benefits

Prior to June 25, 2018, any participant 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 System may be eligible for STD benefits.

Effective June 25, 2018, any participant who becomes disabled and is no longer able to perform his or her usual occupation may be eligible for STD benefits provided all of the following conditions are met:

- (1) Application for the benefit occurs at least 365 calendar days succeeding the participant's date of initial employment as a teacher or employee;
- (2) The participant has at least one year of contributing membership service earned within 36 calendar months immediately preceding the date of disability. Salary continuation (see below) used during the period shall count toward this one-year requirement;
- (3) The member applies for short-term disability within one year of the end of the waiting period;
- (4) The participant's employer and attending physician certify that the participant is mentally or physically incapacitated for the further performance of duty; and,
- (5) The participant's incapacity was incurred at the time of active employment and has been continuous thereafter.

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, the day that the physician certified the disability, 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.

Commencement of STD Benefits

The STD benefit commences on the first day succeeding the waiting period.



Appendix F — Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

SHORT-TERM DISABILITY BENEFITS

Monthly STD Benefit Amounts

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 to which the beneficiary would be eligible, to a maximum of \$3,000 per month, reduced by any other benefits that are payable to the beneficiary including but not limited to:

- (1) Monthly temporary total Workers' Compensation payments by any employer¹;
- (2) Monthly Veterans Administration (VA) disability payments for the same (or for a related) disability;
- (3) Monthly benefits payable under other Federal or certain statutory disability plans;
- (4) Monthly wages or other income paid by public or private employers in excess of the participant's earnable allowance. If a beneficiary has earnings in excess of the STD benefit, the STD benefit shall be also reduced on a dollar-for-dollar basis by the amount that exceeds the STD benefit; and,
- (5) Monthly severance pay as a result of a reduction-in-force from the State.

State Health Plan Coverage Benefit

The employer's-share of the premium for State Health Plan coverage under the 70 / 30 Plan option will continue to be paid by the employer on behalf of beneficiaries who have five or more years of contributing membership service on the date that STD payments begin. Beneficiaries who do not meet this requirement are permitted to enroll in a State Health Plan option while they are receiving STD benefits, but they must pay the associated premium for the coverage option that they elect.

Post Disability Benefit Adjustments

The compensation upon which the STD benefit is calculated may be increased by any percentage across-the-board salary increases granted by the General Assembly.

Duration of STD Benefits

STD benefits are payable for up to 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 also paid by the employer outside of the trust. However, the employer may request reimbursement from the trust for short-term disability benefits and State Health Plan premiums paid during this "second six month" period.

Effective July 1, 2019, the Plan will no longer reimburse employers for short-term disability or State Health Plan premiums paid during the "second six month" period for disabilities occurring on or after that date.

¹ However, STD benefits are not offset by permanent, partial Workers' Compensation benefits.



Appendix F — Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

EXTENDED SHORT-TERM DISABILITY BENEFITS

Eligibility for Extended Short-Term Disability Benefits

Any beneficiary who completes 365 days of short-term disability benefits may be eligible to receive extended STD benefits if the disability is expected to end during the extended period, and the extension is approved by the Medical Board.

Waiting Period

There is no waiting period for extended STD benefits. However, a member must exhaust STD benefits before extended STD benefits can be paid.

Salary Continuation Benefits

Same as for STD benefits.

Commencement of Extended STD Benefits

The extended STD benefit commences on the first day succeeding the conclusion of the short-term disability period.

Monthly Extended STD Benefit Amounts

Same as STD benefit amounts.

State Health Plan Coverage Benefit

The State Health Plan trust pays the employer's share of the premium for beneficiaries who are receiving extended STD benefits.

Post Disability Benefit Adjustments

Same as for STD benefits.

Duration of Extended STD Benefits

Extended STD benefits are payable for up to an additional 365 days beyond the initial 365 day short-term period. During this extended period, STD benefits are paid directly from the trust.



Appendix F — Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

LONG-TERM DISABILITY BENEFITS

Eligibility for Long-Term Disability Benefits

Any beneficiary who has five or more years of contributing membership service in the System, earned within the 96 calendar months prior to the conclusion of the short-term disability period or the conclusion of salary continuation, whichever is later, may be eligible to receive LTD benefits from the Plan upon approval by the Board of Trustees provided that the disability is likely to be permanent, and the beneficiary or participant withdraws from active service by terminating employment as a teacher or State employee.

Waiting Period

There is no waiting period for LTD benefits. However, a member must exhaust STD benefits before LTD benefits can be paid.

Salary Continuation Benefits

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.

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.

Monthly LTD Benefit Amounts

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 to which the beneficiary would be eligible, to a maximum of \$3,900 per month, reduced by any other benefits that are payable to the beneficiary including but not limited to:

- (1) Monthly primary Social Security disability benefits¹;
- (2) Monthly temporary total or partial Workers' Compensation payments by any employer;
- (3) Monthly Veterans Administration (VA) disability payments for the same (or for a related) disability;
- (4) Monthly benefits payable under other Federal or certain statutory disability plans;
- (5) Monthly benefits payable from TSERS, or other retirement systems supported by the State;
- (6) Monthly benefits payable through other insurance plans to which the State contributes;
- (7) Monthly wages or other income paid by public or private employers in excess of the participant's earnable allowance; and,
- (8) Monthly severance pay as a result of a reduction-in-force from the State.

¹ For members with less than five years of service as of July 31, 2007, LTD benefits terminate after 36 months if the member has not been approved for Social Security disability benefits. Otherwise, the beneficiary's benefit shall be reduced by an amount—as determined by the Board of Trustees—equal to the primary Social Security disability benefit to which the beneficiary might have been entitled had the beneficiary been awarded Social Security disability benefits.



Appendix F — Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

LONG-TERM DISABILITY BENEFITS

Monthly LTD Benefit Amounts (continued)

However, in any event, the monthly LTD benefit payable after all offsets have been deducted cannot be less than \$10 per month.

State Health Plan Coverage Benefit

The State Health Plan trust pays the employer's share of the premium for beneficiaries who are receiving LTD benefits.

Post Disability Benefit Adjustments

The compensation upon which the 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.

Duration of LTD Benefits

Under N.C. G.S. § 135-112, some participants who were actively employed on January 1, 1988 and started receiving LTD benefits before completing 5 years of contributory membership service will receive lifetime benefits in lieu of service accruals under the System.

For all other participants, the LTD benefit is payable until the earliest date at which the beneficiary is eligible for an unreduced service retirement allowance from TSERS, or the termination of disability, whichever occurs first.

Please see the December 31, 2018 actuarial valuation report for TSERS for a complete description of the eligibility requirements related to TSERS unreduced service retirement allowances for various employee groups.



Appendix F — Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

DSC PLAN LONG-TERM DISABILITY BENEFITS

Eligibility for DSC Plan Long-Term Disability Benefits

Only participants who were first disabled prior to January 1, 1988 and are currently receiving LTD payments are eligible for LTD benefits under the predecessor Disability Salary Continuation Plan (DSC Plan).

Monthly DSC Plan LTD Benefit Amounts

60% of monthly salary to a maximum of \$1,000 per month reduced by benefits payable from other plans including but not limited to:

- (1) Social Security benefits payable:
 - Before July 1, 1974—full family benefits.
 - On or after July 1, 1974—primary benefits only;
- (2) Workers' Compensation, and other Federal and certain statutory disability benefits;
- (3) Benefits payable from TSERS, or other retirement systems supported by the State;
- (4) Benefits payable through other insurance plans to which the State contributes; and,
- (5) Wages or other income paid by public or private employers in excess of the participant's earnable allowance.

Post Disability Benefit Adjustments

DSC Plan LTD 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.

Duration of DSC Plan LTD Benefits

The LTD benefit under the DSC Plan is payable until the termination of disability.



Appendix F — Summary of Main Benefit Provisions as Interpreted for Valuation Purposes

Termination of Disability Benefits

Disability benefits will end—and all future disability benefits will be forfeited—if a beneficiary receives a refund of his or her contributions or, in the case of STD benefits, starts receiving a retirement benefit from the System. Disability benefits can also be terminated by member request.

Plan benefits may be terminated by the System for reasons including but not limited to:

- (1) The beneficiary returns to a contributing membership position with TSERS or ORP;
- (2) Beneficiary earnings consistently exceed his or her earnable allowance;
- (3) A medical professional does not continue to certify the beneficiary's disability when a reexamination is requested by the Medical Board;
- (4) The Medical Board certifies that the beneficiary is no longer disabled;
- (5) The beneficiary did not have 5 years of service as of July 31, 2007 and was denied or did not receive approval for Social Security disability benefits after receiving 36 months of LTD payments;
- (6) The beneficiary becomes eligible (or would have become eligible) for a TSERS unreduced service retirement benefit while he or she is receiving LTD benefits; or
- (7) The beneficiary dies.

Contributions

The Plan is funded solely through contributions made by the State and/or employing units. Participants do not contribute.

Changes in Benefit Provisions Since the Prior Valuation

There were no changes in the Plan's benefit provisions as of June 30, 2019 since the prior valuation.



Appendix G — GASB 74 Plan Fiduciary Net Position Projection

Table G–1: Projection of Plan Fiduciary Net Position (\$ in Thousands)

Calendar Year	Beginning Plan Fiduciary Net Position	Projected Member Contributions	Projected Employer Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings	Ending Plan Fiduciary Net Position
2019	\$ 372,915	\$ 0	\$ 20,156	\$ 77,651	\$ 853	\$ 12,900	\$ 327,467
2020	327,467	0	15,123	74,396	833	11,163	278,525
2021	278,525	0	13,640	53,339	817	9,692	247,701
2022	247,701	0	13,017	48,986	803	8,606	219,535
2023	219,535	0	12,436	44,143	790	7,629	194,667
2024	194,667	0	11,877	40,731	777	6,750	171,786
2025	171,786	0	11,329	37,090	763	5,949	151,210
2026	151,210	0	10,780	33,547	748	5,234	132,928
2027	132,928	0	10,233	30,694	732	4,591	116,327
2028	116,327	0	9,689	27,712	713	4,014	101,605
2029	101,605	0	9,143	25,024	693	3,502	88,532
2030	88,532	0	8,595	22,501	671	3,049	77,003
2031	77,003	0	8,048	20,135	648	2,651	66,920
2032	66,920	0	7,504	17,900	622	2,305	58,207
2033	58,207	0	6,965	16,039	595	2,003	50,541
2034	50,541	0	6,435	14,308	566	1,739	43,841
2035	43,841	0	5,916	12,773	536	1,507	37,955
2036	37,955	0	5,407	11,314	504	1,304	32,848
2037	32,848	0	4,912	10,006	472	1,128	28,411
2038	28,411	0	4,435	8,783	439	976	24,600
2039	24,600	0	3,980	7,665	406	846	21,355
2040	21,355	0	3,542	6,666	372	736	18,595
2041	18,595	0	3,113	5,722	337	643	16,292
2042	16,292	0	2,691	4,792	300	566	14,457
2043	14,457	0	2,280	3,881	262	508	13,103
2044	13,103	0	1,894	3,047	224	466	12,192
2045	12,192	0	1,540	2,433	187	437	11,549
2046	11,549	0	1,215	1,919	152	417	11,110
2047	11,110	0	921	1,441	119	405	10,876
2048	10,876	0	673	1,002	90	400	10,858
2049	10,858	0	489	630	67	403	11,053
2050	11,053	0	360	447	51	412	11,327
2051	11,327	0	266	340	39	423	11,637
2052	11,637	0	195	260	29	435	11,978
2053	11,978	0	143	198	22	448	12,348
2054	12,348	0	104	150	17	462	12,748
2055	12,748	0	75	113	12	477	13,175
2056	13,175	0	54	85	10	493	13,628
2057	13,628	0	39	63	10	510	14,105
2058	14,105	0	28	46	10	528	14,604
2059	14,604	0	20	34	10	547	15,128
2060	15,128	0	14	24	10	567	15,674
2061	15,674	0	10	18	10	587	16,243
2063	16,836	0	5	9	10	631	17,453
2064	17,453	0	3	6	10	654	18,094
2065	18,094	0	2	4	10	678	18,761
2066	18,761	0	1	3	10	703	19,452
2067	19,452	0	1	2	10	729	20,171
2068	20,171	0	0	1	10	756	20,916



Appendix H — GASB 74 Present Value of Projected Benefit Payments

Table H-1: Present Value of Projected Benefit Payments (\$ in Thousands)

Calendar Year	Beginning Plan Fiduciary Net Position	Projected Benefit Payments	Funded Projected Payments	Unfunded Projected Payments	Present Value of Projected Benefit Payments		
					Funded Payments Using 3.75%	Unfunded Payments Using 3.50%	Using Single Discount Rate Equal to 3.75%
2019	\$ 372,915	\$ 77,651	\$ 77,651	\$ 0	\$ 76,235	\$ 0	\$ 76,235
2020	327,467	74,396	74,396	0	70,399	0	70,399
2021	278,525	53,339	53,339	0	48,649	0	48,649
2022	247,701	48,986	48,986	0	43,064	0	43,064
2023	219,535	44,143	44,143	0	37,404	0	37,404
2024	194,667	40,731	40,731	0	33,265	0	33,265
2025	171,786	37,090	37,090	0	29,197	0	29,197
2026	151,210	33,547	33,547	0	25,453	0	25,453
2027	132,928	30,694	30,694	0	22,447	0	22,447
2028	116,327	27,712	27,712	0	19,533	0	19,533
2029	101,605	25,024	25,024	0	17,002	0	17,002
2030	88,532	22,501	22,501	0	14,735	0	14,735
2031	77,003	20,135	20,135	0	12,708	0	12,708
2032	66,920	17,900	17,900	0	10,889	0	10,889
2033	58,207	16,039	16,039	0	9,405	0	9,405
2034	50,541	14,308	14,308	0	8,087	0	8,087
2035	43,841	12,773	12,773	0	6,958	0	6,958
2036	37,955	11,314	11,314	0	5,941	0	5,941
2037	32,848	10,006	10,006	0	5,064	0	5,064
2038	28,411	8,783	8,783	0	4,284	0	4,284
2039	24,600	7,665	7,665	0	3,604	0	3,604
2040	21,355	6,666	6,666	0	3,021	0	3,021
2041	18,595	5,722	5,722	0	2,499	0	2,499
2042	16,292	4,792	4,792	0	2,018	0	2,018
2043	14,457	3,881	3,881	0	1,575	0	1,575
2044	13,103	3,047	3,047	0	1,192	0	1,192
2045	12,192	2,433	2,433	0	917	0	917
2046	11,549	1,919	1,919	0	697	0	697
2047	11,110	1,441	1,441	0	505	0	505
2048	10,876	1,002	1,002	0	338	0	338
2049	10,858	630	630	0	205	0	205
2050	11,053	447	447	0	140	0	140
2051	11,327	340	340	0	103	0	103
2052	11,637	260	260	0	76	0	76
2053	11,978	198	198	0	56	0	56
2054	12,348	150	150	0	41	0	41
2055	12,748	113	113	0	29	0	29
2056	13,175	85	85	0	21	0	21
2057	13,628	63	63	0	15	0	15
2058	14,105	46	46	0	11	0	11
2059	14,604	34	34	0	8	0	8
2060	15,128	24	24	0	5	0	5
2061	15,674	18	18	0	4	0	4
2063	16,836	9	9	0	2	0	2
2064	17,453	6	6	0	1	0	1
2065	18,094	4	4	0	1	0	1
2066	18,761	3	3	0	0	0	0
2067	19,452	2	2	0	0	0	0
2068	20,171	1	1	0	0	0	0