Actuarial Valuation of
The Duty Disability Insurance Program

As of December 31, 2018

For The State of Wisconsin
Department of Employee Trust Funds

Prepared by: Paul L. Correia, FSA, MAAA
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May 23, 2019

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Appendices:

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May 23, 2019

Ms. Cindy Klimke, CPA
Chief Trust Finance Officer
State of Wisconsin
Department of Employee Trust Funds
4822 Madison Yards Way
Madison, Wisconsin 53705-9100

RE: Actuarial Valuation of Duty Disability Program as of December 31, 2018

Dear Cindy:

Thank you for asking Milliman to perform an actuarial valuation of the Duty Disability insurance program as of December 31, 2018. The valuation results are provided in this report, and they include estimated claim liabilities as of December 31, 2018 as well as financial projections for the Duty Disability reserve fund. This report also contains detailed documentation of the methods and assumptions we used for performing the analysis.

The State of Wisconsin Department of Employee Trust Funds (ETF) and its auditors have determined that the Duty Disability insurance program is not subject to the provisions of GASB 74, which govern the financial reporting of Other Post-Employment Benefits (OPEBs), and which require the use of pension accounting methods, including the calculation of a liability for active lives. We have therefore performed this valuation according to the requirements of GASB 10 ("Accounting and Reporting for Risk Financing and Related Insurance Issues"), which does not require the calculation of a liability for active lives. This approach is consistent with last year's valuation of the Duty Disability insurance program. Ultimately it is the responsibility of ETF and its auditors to determine the applicable accounting standards for the plans.

The valuation results discussed in this report include estimated liabilities for Duty Disability claims that were open on December 31, 2018, and for claims that were incurred but had not been reported by December 31, 2018. These liabilities reflect expected future benefit payments and corresponding costs for adjudicating claims. Because GASB 10 does not require the calculation of a liability for active lives, we have not included an estimate of future claim liabilities for active members.

This report is prepared solely for the internal business use of ETF. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exceptions:

a) ETF may provide a copy of Milliman's work, in its entirety, to ETF's auditors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit ETF.

b) ETF may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by ETF, including historical claim data and enrollment data. While Milliman has not audited this data, we have reviewed it for reasonableness and it is, in our opinion, sufficient and reliable for the purposes of our calculations. If any of this information as summarized in this report is inaccurate or incomplete, the results shown could be materially affected and this report may need to be revised.

The discount rate used for this valuation was prescribed by ETF and is specified in this report. We have performed no independent assessment of the reasonableness of this assumption. ETF is solely responsible for establishing the assumption and communicating any changes to Milliman for the purpose of this valuation.

This analysis is only an estimate of the Plan's financial condition as of a single date. It can neither predict the Plan's future condition nor guarantee future financial soundness. Actuarial valuations do not affect the ultimate cost of Plan benefits, only the timing of employer contributions. While this report is based on the assumptions documented here, other assumption sets may also be reasonable and valuation results based on those assumptions would be different. No one set of assumptions is uniquely correct. Determining results using alternative assumptions is outside the scope of our engagement.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements. ETF has the final decision regarding the appropriateness of the assumptions and actuarial cost methods.

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

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices.

I, Paul L. Correia, FSA, MAAA, am a consulting actuary for Milliman, Inc. I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

I, Daniel D. Skwire, FSA, MAAA, am a consulting actuary for Milliman, Inc. I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Sincerely,

Paul L. Correia, FSA, MAAA
Principal and Consulting Actuary
Milliman, Inc.

Daniel D. Skwire, FSA, MAAA
Principal and Consulting Actuary
Milliman, Inc.

Section I: Introduction and Executive Summary

This report contains the results from an actuarial valuation of the Duty Disability insurance program as of December 31, 2018. The estimated liabilities for the program as of December 31, 2018 are summarized in Table 1.1 below:

Table 1.1 Estimated Liabilities for the Duty Disability Program As of December 31, 2018	
Liability Component	Estimated Liability
Open Claims	$398,952,462
Future Survivors	27,044,242
IBNR Claims	19,725,319
Loss Adjustment Expenses	8,863,225
Total	$454,585,247

The liability for open claims includes estimated liabilities for 966 members who were disabled as of December 31, 2018, and 59 survivors (i.e. spouses and domestic partners) who were receiving death benefits as of December 31, 2018. The liability for future survivors represents the present value of expected future benefits payable to survivors of currently disabled members. The liability for IBNR claims reflects expected future benefit payments to members and survivors whose claims were incurred but had not been reported as of December 31, 2018. The liability for loss adjustment expenses reflects expected costs arising from the ongoing management and payment of Duty Disability claims.

We have analyzed the funding status of the Duty Disability program as of December 31, 2018, using the reserve balance sheets provided to Milliman by ETF. The program was in a surplus position as of December 31, 2018, as shown in Table 1.2 below:

Table 1.2 Duty Disability Funding Analysis	
Balance Sheet Item	2018
Beginning of Year Balance	$637,955,774
Plus: Investment Income	30,311,677
Plus: Premium Contributions and Miscellaneous Income	10,194,578
Less: Insurance Claims	35,291,460
Less: Administrative Expenses	1,175,391
End of Year Balance	641,995,178
Actuarial Liability (as of 12/31/2018)	454,585,247
Surplus / (Deficit)	$187,409,931

The surplus as of December 31, 2018 was approximately equal to 41% of program liabilities. Further discussion of the estimated liabilities and funding status are included in the subsequent sections of this report, as well as detailed documentation of the valuation methods and assumptions, comparisons to results from prior years, and an assessment of the adequacy of the liabilities.

Section II: Actuarial Valuation

The actuarial liabilities for the Duty Disability program comprise the following components:

- Open Claims: The liability for open claims represents the present value of expected future benefit payments to disabled members and survivors whose claims had been reported on or before December 31, 2018. There were 966 disabled members and 59 survivors reported as of December 31, 2018.

- Future Survivors: Monthly death benefits are payable to surviving spouses/domestic partners if the disabled member dies as a result of the same injury or disease for which Duty Disability benefits were payable. The liability for future survivors represents the present value of expected future benefit payments to survivors of currently disabled members.

- Incurred But Not Reported (IBNR) Claims: The liability for IBNR claims represents the present value of expected future benefit payments to members and survivors whose claims were incurred but had not been reported as of December 31, 2018.

- Loss Adjustment Expenses: The liability for loss adjustment expenses represents the present value of expected future expenses related to the ongoing management and payment of Duty Disability claims.

The following table compares the December 31, 2017 and December 31, 2018 liabilities for the Duty Disability insurance program.

Table 2.1
Current Year and Prior Year Liabilities for the Duty Disability Program

Liability Component	12/31/2017	12/31/2018
Open Claims	$403,395,912	$398,952,462
Future Survivors	$35,412,819	27,044,242
IBNR Claims	$16,766,364	19,725,319
Loss Adjustment Expense	$9,205,578	8,863,225
Total	$464,780,673	$454,585,247

Each of the liability components is discussed in detail below. Appendix B of this report contains additional documentation of the valuation assumptions that were used to calculate the liabilities for the Duty Disability insurance program as of December 31, 2018.

Open Claims

The open claim liability decreased by approximately 1% from $403.4 million as of December 31, 2017 to $399.0 million as of December 31, 2018. The number of open claims increased by approximately 1% from 1,011 as of December 31, 2017 to 1,025 as of December 31, 2018, and the average monthly benefit amount decreased by approximately 3% from $2,921 as of December 31, 2017 to $2,827 as of December 31, 2018. Of the 1,025 claims that were open on December 31, 2018, there were 997 claims which were also open on December 31, 2017 and remained open through 2018. There were 14 claims that closed and 28 new claims reported in 2018.

We calculated the open claim liability as of December 31, 2018 using the same claim termination rate and estimated offset assumptions as last year. These assumptions are included in Appendix B of this report. The interest rate assumption was reduced from 7.2% last year to 7.0% this year, specified by ETF.

To assess the adequacy of the liability for disabled members, we performed retrospective runoff studies using Duty Disability claim experience from 2012 through 2018. The runoff studies involved calculating liabilities at prior valuation dates using current valuation assumptions, and determining whether the liabilities provided sufficient funding for the emerging cost of claims. These emerging costs were computed as the present value of paid claims during the study period, plus the present value of the remaining liability at the end of the study period for claims that were still open at that time. The results, shown below, correspond to mutually distinct 12-month runoff studies. An average annual margin is provided in the last row of the table representing the average annual margin over the seven year experience period.

Table 2.2
Runoff Study for Disabled Members
Annual Margin as % of Initial Liability

Experience Period	Estimated Margin
2012	0.17%
2013	0.61%
2014	0.05%
2015	0.52%
2016	0.55%
2017	0.52%
2018	0.05%
Average	0.35%

In the preceding table, a positive margin indicates the liability was adequate to cover the runout of open Duty Disability claims during the study period, while a negative margin indicates a deficiency. We typically target an overall average margin of 1% to 5% for this type of program. Although the results from the runoff studies show modest positive margins, which are less than our target 1% to 5% range, we do not believe that the small positive margins pose a significant concern at this time due to the consistency of experience over time. We will continue to monitor Duty Disability experience along with the valuation assumptions to ensure that the liability estimates are adequate.

We also performed liability runoff studies to test the valuation assumptions for survivors, because those assumptions are different than the valuation assumptions for disabled members. The runoff studies used historical experience from 2012 through 2018. The results, shown below, correspond to mutually distinct 12-month runoff studies, along with an overall average margin in the last row representing the average annual margin over the seven year experience period.

Table 2.3 Runout Study for Survivors Annual Margin as % of Initial Liability	
Experience Period	Estimated Margin
2012	2.04%
2013	0.56%
2014	1.19%
2015	3.34%
2016	3.37%
2017	1.75%
2018	-0.48%
Total	1.68%

Although 2018 experience resulted in a small negative margin, the overall average annual margin of 1.68% falls within our target range of 1% to 5%. We will continue to closely monitor experience in the future, and adjust the valuation assumptions as needed.

Future Survivors

The Duty Disability program includes death benefits payable to surviving spouses and domestic partners of disabled members who die as a result of the same injury or disease for which Duty Disability benefits were payable. We calculated a liability for future survivors by computing the present value of expected future benefits payable to survivors of currently disabled members. We have assumed that all of the disabled members are married, and that husbands are three years older than their wives. We also assumed that one third of the disabled members will die from the same injury or disease that triggered Duty Disability benefits, and therefore that one third of the spouses or domestic partners will be eligible to receive monthly benefits upon the death of the disabled member.

The estimated liability for future survivors decreased from $35.4 million as of December 31, 2017 to $27.0 million as of December 31, 2018, in part, because we used a different mortality assumption for disabled members this year. This new assumption is based on the same mortality rates that are used to compute the liabilities for open claims, and is lower than the assumption used in prior years, resulting in a lower liability for future survivors, with all else being equal.

IBNR Claims

The liability for IBNR claims represents the expected portion of the total cost attributable to claims that were incurred but not reported as of December 31, 2018. We computed the liability for IBNR claims by estimating the average annual incurred claim cost, and by estimating the proportion of incurred claims from 2018 and prior years that were unreported as of December 31, 2018. The incurred claims were derived from an analysis of historical Duty Disability claim experience from 2012 through 2018, as shown below:

Table 2.4
Duty Disability Incurred Claims
From 2012 through 2018

Calendar Year	Incurred Claims	Annual Payroll	Inc. Claims % of Payroll
2012	$10,499,105	$1,279,908,417	0.82%
2013	$9,499,139	$1,299,551,475	0.73%
2014	$8,127,599	$1,332,780,095	0.61%
2015	$6,226,807	$1,358,934,175	0.46%
2016	$9,876,251	$1,389,907,027	0.71%
2017	$2,637,337	$1,421,147,406	0.19%
2018	$647,246	$1,461,189,324	0.04%

We have assumed that the incurred claims experience from 2012 through 2015 is complete, with all claims incurred in that period being reported as of the study date. Based on this experience, we estimated annual incurred claims to be equal to 0.65% of payroll in any given year, and used this incurred claims ratio to calculate the cost of IBNR claims incurred in 2017 and 2018. We also included an estimate of the cost of IBNR claims incurred in 2016, based on development methods for estimating liabilities for IBNR claims, by looking back several periods to determine what percentage of the ultimate claim cost was reported after one year, two years, and three years.

Based on the methods described above, we determined that approximately 93% of claims incurred in 2018 were unreported as of December 31, 2018, approximately 72% of claims incurred in 2017 were unreported as of December 31, 2018, and approximately 22% of claims incurred in 2016 were unreported as of December 31, 2018, as shown below:

Table 2.5
Duty Disability Actual and Expected Incurred Claims
From 2016 through 2018

Calendar Year	Actual Incurred Claims	Expected Incurred Claims	Reported % (Actual / Expected)	Unreported % (100% – Reported %)
2016	$9,876,251	$12,588,846	78%	22%
2017	$2,637,337	$9,261,727	28%	72%
2018	$647,246	$9,522,684	7%	93%

We then estimated the liability for IBNR claims (based on the actual and expected incurred claims shown above) to be equal to $8,875,438 for claims incurred in 2018, $6,624,391 for claims incurred in 2017, and $2,712,594 for claims incurred in 2016. The total IBNR liability is equal to the sum of the present value of these three components, i.e. $19,725,319.

Loss Adjustment Expenses

The liability for loss adjustment expenses represents the present value of expected future expenses related to the ongoing management and payment of Duty Disability claims. This liability was determined by assuming that the program's administrative costs will equal 1.9% of annual benefit payments in all future years for open claims, and 3.9% of annual benefit payments in future years for IBNR claims. These assumptions are based on an analysis of historical administration expenses provided by ETF, as shown below:

Table 2.6
Duty Disability Historical Benefit Payments and Administrative Expenses
($ millions)

Year	2014	2015	2016	2017	2018	2014 - 2018
A. Benefit Payments	$31.7	$33.1	$34.4	$35.0	$35.3	$169.5
B. Administrative Expenses	$0.7	$1.1	$1.3	$1.4	$1.2	$5.6
C. Expense Ratio (B / A)	2.2%	3.3%	3.8%	3.9%	3.3%	3.3%

The overall expense ratio from 2014 – 2018 was 3.3% of annual benefit payments. Because some administrative costs are not directly related to the ongoing management and payment of Duty Disability claims, we assumed that 60% of the administrative costs are related to the ongoing management and payment of Duty Disability claims, and we used an expense ratio of 1.9% for computing the loss adjustment expense liability for open claims and an expense ratio of 3.9% for IBNR claims, because generally speaking, the expenses related to initial claim investigation and setting up claims in the benefit administration systems tend to be higher than ongoing expenses.

Section III: Discussion of Duty Disability Funding Levels

The actuarial valuation of the Duty Disability program included an analysis of current and future funding levels. The following table shows the Duty Disability fund balance as of December 31, 2018:

Table 3.1
Duty Disability Funding Analysis

Balance Sheet Item	2018
Beginning of Year Balance	$637,955,774
Plus: Investment Income	30,311,677
Plus: Premium Contributions and Miscellaneous Income	10,194,578
Less: Insurance Claims	35,291,460
Less: Administrative Expenses	1,175,391
End of Year Balance	641,995,178
Actuarial Liability (as of 12/31/2018)	454,585,247
Surplus / (Deficit)	$187,409,931

The program was in a surplus position of $187.4 million as of December 31, 2018, which was approximately 41% of the estimated liability as of that date.

We have prepared financial projections to evaluate the long-term performance of the Duty Disability fund. The projections reflect actual results for 2018 and projected values in 2019 and beyond. The key elements of these projections include the following:

- Beginning Balance: The projected beginning balance for each year is equal to the prior year's ending balance.

- Payroll: The current payroll was provided to us by ETF. Future payroll is assumed to increase by 3.0% per year, which is consistent with the assumptions used by ETF for retirement fund projections.

- Premium Contributions: Premiums are modeled as a percentage of payroll. Although actual contribution rates vary by employer, we calculated an overall contribution rate of 0.49% for 2019 based on the Board's action on June 21, 2018, of setting tier rates to target 2019 contributions of $7,375,192.

- Investment Income: Investment income is projected using the valuation assumption of 7.0%, specified by ETF.

- Insurance Claims: Annual paid insurance claims are the sum of projected payments on existing claims as of December 31, 2018, and of payments on expected future claims incurred after December 31, 2018. Incurred claims for 2019 and beyond are based on historical experience of 0.65% of payroll.

- Administrative Expenses: Administrative expenses are modeled as a constant percentage of paid insurance claims, based on actual values in 2018.

- Ending Balance: The ending balance equals the starting balance, plus premiums, plus investment earnings, less claims, and less expenses.

- Incurred Claim Liability: The incurred claim liability is modeled in a similar fashion to the insurance claims. It represents the sum of the decreasing liability on claims that existed as of December 31, 2018 and of the increasing liability for claims incurred after December 31, 2018.

- Surplus or Deficit: The projected surplus or deficit equals the ending balance less the actuarial liability.

Financial projections were developed for the following scenarios:

1. Baseline Scenario: Our baseline scenario assumes that incurred claims equal 0.65% of payroll, and that the Duty Disability fund will earn interest at a rate of 7.0% per year.

2. Scenario 1: In this scenario, we assumed that the contribution rate in 2020 and future years would be 50% lower than the 2019 contribution rate.

3. Scenario 2: In this scenario, we assumed that the contribution rate in 2020 and future years would be 75% lower than the 2019 contribution rate.

4. Scenario 3: In this scenario, we assumed that the Duty Disability fund will earn interest at a rate of 3.5% per year (versus 7.0% from the baseline scenario). We assumed no change to the 2019 contribution rate throughout the projection.

5. Scenario 4: In this scenario, we assumed that the premium contributions would be waived in 2020 and future years.

The detailed output from our projections is provided on the following pages. In the Baseline Scenario, the surplus is expected to grow to $324.2 million by 2028. The growth is driven, in part, by the investment income projected in future years, which was based on 7.0% interest.

Scenarios 1 and 2 demonstrate the sensitivity of the surplus projection to reductions in contribution rates. In Scenario 1, in which a 50% reduction to contribution rates is assumed in 2020, the surplus is expected to grow to $273.6 million by 2028 (versus $324.2 million in the Baseline Scenario). In Scenario 2, in which a 75% reduction to contribution rates is assumed in 2020, the surplus is expected to grow to $248.2 million by 2028.

In Scenario 3, in which the investment income rate was assumed to be 3.5%, the surplus is expected to decrease to $31.4 million by 2028. This result suggests that the fund balance and surplus are very sensitive to the investment income, and that future surplus can deteriorate if the fund earns less than the assumed 7.0% interest for a prolonged period of time.

In Scenario 4, which assumes premium contributions are waived in 2020 and beyond, the surplus is expected to grow to $222.9 million by 2028.

Please note that these projections depend on a variety of actuarial assumptions about future experience, including but not limited to investment earnings, payroll growth, future mortality rates, and disability claim experience. It is nearly certain that actual experience will vary from these assumptions, meaning that the plan's actual surplus or deficit will be higher or lower than the illustrated values.

Baseline Scenario
Investment Income: 7.0%
Premium Contributions: Current contribution rates

Duty Disability Program - Funding Analysis as of December 31, 2018											
Baseline Scenario											
Calendar Year	Actual	Projected									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BOY Fund Balance	$637,955,774	$641,995,178	$657,594,288	$674,257,698	$692,066,548	$711,107,853	$730,648,438	$750,746,125	$771,505,232	$792,948,476	$815,141,785
Premium Contributions	$10,186,996	$7,375,192	$7,596,448	$7,824,341	$8,059,071	$8,300,844	$8,549,869	$8,806,365	$9,070,556	$9,342,673	$9,622,953
Miscellaneous Income	$7,582	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$30,311,677	$44,939,662	$46,031,600	$47,198,039	$48,444,658	$49,777,550	$51,145,391	$52,552,229	$54,005,366	$55,506,393	$57,059,925
Total Revenues	$40,506,255	$52,314,854	$53,628,048	$55,022,380	$56,503,730	$58,078,393	$59,695,260	$61,358,594	$63,075,922	$64,849,066	$66,682,878
Insurance Claims	$35,291,460	$35,532,331	$35,773,202	$36,014,073	$36,254,944	$37,295,666	$38,321,274	$39,290,893	$40,290,784	$41,280,886	$42,232,559
Administrative Expense	$1,175,391	$1,183,413	$1,191,436	$1,199,458	$1,207,480	$1,242,142	$1,276,300	$1,308,593	$1,341,895	$1,374,870	$1,406,566
Total Operating Expenses	$36,466,851	$36,715,744	$36,964,638	$37,213,531	$37,462,424	$38,537,808	$39,597,573	$40,599,486	$41,632,678	$42,655,756	$43,639,125
Net Change in Fund Balance	$4,039,404	$15,599,110	$16,663,410	$17,808,849	$19,041,305	$19,540,585	$20,097,686	$20,759,107	$21,443,244	$22,193,309	$23,043,752
EOY Fund Balance	$641,995,178	$657,594,288	$674,257,698	$692,066,548	$711,107,853	$730,648,438	$750,746,125	$771,505,232	$792,948,476	$815,141,785	$838,185,538
Incurred Claim Liability	$454,585,247	$461,204,043	$467,956,630	$474,491,045	$480,838,228	$486,996,965	$492,853,742	$498,489,356	$503,888,910	$509,062,272	$513,955,038
Surplus / (Deficit)	$187,409,931	$196,390,246	$206,301,068	$217,575,503	$230,269,626	$243,651,473	$257,892,382	$273,015,876	$289,059,566	$306,079,514	$324,230,500
Surplus % of Incurred Claim Liability	41%	43%	44%	46%	48%	50%	52%	55%	57%	60%	63%
Incurred Claim Cost		$9,808,364	$10,102,615	$10,405,694	$10,717,864	$11,039,400	$11,370,582	$11,711,700	$12,063,051	$12,424,942	$12,797,691

** The incurred claim liability shown above includes the liability for open claims and claims incurred but not reported as of December 31, 2018, as well as the liability for new claims incurred by active members and survivors in 2019 and beyond*

Scenario 1:

Investment Income: 7.0%

Premium Contributions: Contribution rates in 2020 and future years are 50% lower than 2019 contribution rates

Duty Disability Program - Funding Analysis as of December 31, 2018

Scenario 1 - 50% Reduction to Contribution Rates in 2020

Calendar Year	Actual	Projected									
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
BOY Fund Balance	$637,955,774	$641,995,178	$657,594,288	$670,459,475	$684,090,277	$698,543,708	$713,054,382	$727,645,550	$742,384,434	$757,253,944	$772,277,300
Premium Contributions	$10,186,996	$7,375,192	$3,798,224	$3,912,171	$4,029,536	$4,150,422	$4,274,934	$4,403,182	$4,535,278	$4,671,336	$4,811,476
Miscellaneous Income	$7,582	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$30,311,677	$44,939,662	$46,031,600	$46,932,163	$47,886,319	$48,898,060	$49,913,807	$50,935,188	$51,966,910	$53,007,776	$54,059,411
Total Revenues	$40,506,255	$52,314,854	$49,829,824	$50,844,334	$51,915,855	$53,048,481	$54,188,741	$55,338,371	$56,502,188	$57,679,112	$58,870,887
Insurance Claims	$35,291,460	$35,532,331	$35,773,202	$36,014,073	$36,254,944	$37,295,666	$38,321,274	$39,290,893	$40,290,784	$41,280,886	$42,232,559
Administrative Expense	$1,175,391	$1,183,413	$1,191,436	$1,199,458	$1,207,480	$1,242,142	$1,276,300	$1,308,593	$1,341,895	$1,374,870	$1,406,566
Total Operating Expenses	$36,466,851	$36,715,744	$36,964,638	$37,213,531	$37,462,424	$38,537,808	$39,597,573	$40,599,486	$41,632,678	$42,655,756	$43,639,125
Net Change in Fund Balance	$4,039,404	$15,599,110	$12,865,186	$13,630,803	$14,453,431	$14,510,673	$14,591,168	$14,738,885	$14,869,510	$15,023,356	$15,231,762
EOY Fund Balance	$641,995,178	$657,594,288	$670,459,475	$684,090,277	$698,543,708	$713,054,382	$727,645,550	$742,384,434	$757,253,944	$772,277,300	$787,509,062
Incurred Claim Liability	$454,585,247	$461,204,043	$467,956,630	$474,491,045	$480,838,228	$486,996,965	$492,853,742	$498,489,356	$503,888,910	$509,062,272	$513,955,038
Surplus / (Deficit)	$187,409,931	$196,390,246	$202,502,844	$209,599,233	$217,705,481	$226,057,416	$234,791,807	$243,895,078	$253,365,035	$263,215,028	$273,554,025
Surplus % of Incurred Claim Liability	41%	43%	43%	44%	45%	46%	48%	49%	50%	52%	53%
Incurred Claim Cost		$9,808,364	$10,102,615	$10,405,694	$10,717,864	$11,039,400	$11,370,582	$11,711,700	$12,063,051	$12,424,942	$12,797,691

Scenario 2:

Investment Income: 7.0%

Premium Contributions: Contribution rates in 2020 and future years are 75% lower than 2019 contribution rates

Duty Disability Program - Funding Analysis as of December 31, 2018

Scenario 2 - 75% Reduction to Contribution Rates in 2020

Calendar Year	Actual	Projected									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BOY Fund Balance	$637,955,774	$641,995,178	$657,594,288	$668,560,363	$680,102,142	$692,261,636	$704,257,353	$716,095,262	$727,824,035	$739,406,678	$750,845,058
Premium Contributions	$10,186,996	$7,375,192	$1,899,112	$1,956,085	$2,014,768	$2,075,211	$2,137,467	$2,201,591	$2,267,639	$2,335,668	$2,405,738
Miscellaneous Income	$7,582	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$30,311,677	$44,939,662	$46,031,600	$46,799,225	$47,607,150	$48,458,315	$49,298,015	$50,126,668	$50,947,682	$51,758,467	$52,559,154
Total Revenues	$40,506,255	$52,314,854	$47,930,712	$48,755,311	$49,621,918	$50,533,525	$51,435,482	$52,328,260	$53,215,321	$54,094,136	$54,964,892
Insurance Claims	$35,291,460	$35,532,331	$35,773,202	$36,014,073	$36,254,944	$37,295,666	$38,321,274	$39,290,893	$40,290,784	$41,280,886	$42,232,559
Administrative Expense	$1,175,391	$1,183,413	$1,191,436	$1,199,458	$1,207,480	$1,242,142	$1,276,300	$1,308,593	$1,341,895	$1,374,870	$1,406,566
Total Operating Expenses	$36,466,851	$36,715,744	$36,964,638	$37,213,531	$37,462,424	$38,537,808	$39,597,573	$40,599,486	$41,632,678	$42,655,756	$43,639,125
Net Change in Fund Balance	$4,039,404	$15,599,110	$10,966,074	$11,541,780	$12,159,494	$11,995,718	$11,837,909	$11,728,773	$11,582,643	$11,438,379	$11,325,767
EOY Fund Balance	$641,995,178	$657,594,288	$668,560,363	$680,102,142	$692,261,636	$704,257,353	$716,095,262	$727,824,035	$739,406,678	$750,845,058	$762,170,825
Incurred Claim Liability	$454,585,247	$461,204,043	$467,956,630	$474,491,045	$480,838,228	$486,996,965	$492,853,742	$498,489,356	$503,888,910	$509,062,272	$513,955,038
Surplus / (Deficit)	$187,409,931	$196,390,246	$200,603,732	$205,611,098	$211,423,408	$217,260,388	$223,241,520	$229,334,679	$235,517,769	$241,782,786	$248,215,787
Surplus % of Incurred Claim Liability	41%	43%	43%	43%	44%	45%	45%	46%	47%	47%	48%
Incurred Claim Cost		$9,808,364	$10,102,615	$10,405,694	$10,717,864	$11,039,400	$11,370,582	$11,711,700	$12,063,051	$12,424,942	$12,797,691

Scenario 3:

Investment Income: 3.5%

Premium Contributions: Current contribution rates

Duty Disability Program - Funding Analysis as of December 31, 2018 Scenario 3 - Investment Income = 3.5%											
Calendar Year	Actual	Projected									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
BOY Fund Balance	$637,955,774	$641,995,178	$635,130,155	$628,002,916	$620,610,922	$612,951,744	$604,191,193	$594,313,490	$583,344,913	$571,223,652	$557,927,396
Premium Contributions	$10,186,996	$7,375,192	$7,596,448	$7,824,341	$8,059,071	$8,300,844	$8,549,869	$8,806,365	$9,070,556	$9,342,673	$9,622,953
Miscellaneous Income	$7,582	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$30,311,677	$22,469,831	$22,229,555	$21,980,102	$21,721,382	$21,453,311	$21,146,692	$20,800,972	$20,417,072	$19,992,828	$19,527,459
Total Revenues	$40,506,255	$29,845,023	$29,826,003	$29,804,443	$29,780,454	$29,754,155	$29,696,561	$29,607,337	$29,487,628	$29,335,500	$29,150,412
Insurance Claims	$35,291,460	$35,526,817	$35,762,174	$35,997,530	$36,232,887	$37,273,308	$38,298,716	$39,268,080	$40,267,762	$41,257,659	$42,209,231
Administrative Expense	$1,175,391	$1,183,230	$1,191,068	$1,198,907	$1,206,745	$1,241,397	$1,275,548	$1,307,833	$1,341,128	$1,374,097	$1,405,789
Total Operating Expenses	$36,466,851	$36,710,046	$36,953,242	$37,196,437	$37,439,633	$38,514,705	$39,574,264	$40,575,913	$41,608,890	$42,631,756	$43,615,020
Net Change in Fund Balance	$4,039,404	-$6,865,023	-$7,127,239	-$7,391,994	-$7,659,179	-$8,760,550	-$9,877,704	-$10,968,576	-$12,121,262	-$13,296,255	-$14,464,608
EOY Fund Balance	$641,995,178	$635,130,155	$628,002,916	$620,610,922	$612,951,744	$604,191,193	$594,313,490	$583,344,913	$571,223,652	$557,927,396	$543,462,788
Incurred Claim Liability	$454,585,247	$461,044,228	$467,631,483	$473,994,906	$480,165,363	$486,141,591	$491,810,018	$497,251,398	$502,450,759	$507,417,899	$512,098,338
Surplus / (Deficit)	$187,409,931	$174,085,927	$160,371,433	$146,616,017	$132,786,380	$118,049,602	$102,503,471	$86,093,516	$68,772,893	$50,509,498	$31,364,450
Surplus % of Incurred Claim Liability	41%	38%	34%	31%	28%	24%	21%	17%	14%	10%	6%
Incurred Claim Cost		$9,808,364	$10,102,615	$10,405,694	$10,717,864	$11,039,400	$11,370,582	$11,711,700	$12,063,051	$12,424,942	$12,797,691

Scenario 4:

Investment Income: 7.0%

Premium Contributions: Premium contributions are waived in 2020 and beyond

Duty Disability Program - Funding Analysis as of December 31, 2018

Scenario 4 - Premium holiday beginning in 2020

Calendar Year	Actual	Projected									
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
BOY Fund Balance	$637,955,774	$641,995,178	$657,594,288	$666,661,251	$676,114,007	$685,979,563	$695,460,325	$704,544,974	$713,263,636	$721,559,413	$729,412,815
Premium Contributions	$10,186,996	$7,375,192	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous Income	$7,582	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$30,311,677	$44,939,662	$46,031,600	$46,666,288	$47,327,981	$48,018,569	$48,682,223	$49,318,148	$49,928,455	$50,509,159	$51,058,897
Total Revenues	$40,506,255	$52,314,854	$46,031,600	$46,666,288	$47,327,981	$48,018,569	$48,682,223	$49,318,148	$49,928,455	$50,509,159	$51,058,897
Insurance Claims	$35,291,460	$35,532,331	$35,773,202	$36,014,073	$36,254,944	$37,295,666	$38,321,274	$39,290,893	$40,290,784	$41,280,886	$42,232,559
Administrative Expense	$1,175,391	$1,183,413	$1,191,436	$1,199,458	$1,207,480	$1,242,142	$1,276,300	$1,308,593	$1,341,895	$1,374,870	$1,406,566
Total Operating Expenses	$36,466,851	$36,715,744	$36,964,638	$37,213,531	$37,462,424	$38,537,808	$39,597,573	$40,599,486	$41,632,678	$42,655,756	$43,639,125
Net Change in Fund Balance	$4,039,404	$15,599,110	$9,066,963	$9,452,757	$9,865,556	$9,480,762	$9,084,649	$8,718,662	$8,295,776	$7,853,402	$7,419,772
EOY Fund Balance	$641,995,178	$657,594,288	$666,661,251	$676,114,007	$685,979,563	$695,460,325	$704,544,974	$713,263,636	$721,559,413	$729,412,815	$736,832,587
Incurred Claim Liability	$454,585,247	$461,204,043	$467,956,630	$474,491,045	$480,838,228	$486,996,965	$492,853,742	$498,489,356	$503,888,910	$509,062,272	$513,955,038
Surplus / (Deficit)	$187,409,931	$196,390,246	$198,704,620	$201,622,963	$205,141,336	$208,463,360	$211,691,232	$214,774,280	$217,670,503	$220,350,543	$222,877,549
Surplus % of Incurred Claim Liability	41%	43%	42%	42%	43%	43%	43%	43%	43%	43%	43%
Incurred Claim Cost		$9,808,364	$10,102,615	$10,405,694	$10,717,864	$11,039,400	$11,370,582	$11,711,700	$12,063,051	$12,424,942	$12,797,691

Appendix A: Plan Description

A summary of the Duty Disability plan provisions is provided below:

Benefit Eligibility: Members must satisfy all of the following:

- Injured while performing duties or contracted disease due to occupation
- Disability is work-related
- Disability is expected to be permanent

Also, the disability must result in one of the following:

- Reduction in pay or position
- Assignment to light duty
- Retirement
- Impairs promotional opportunities

Member Benefits: 80% of salary (75% for local employees who are not eligible for a Social Security disability award and not eligible for a WRS disability benefit or LTDI). For local members who have been terminated but not approved for WRS disability or LTDI only, the percentage is reduced by 0.5% for each month of WRS creditable service over 25 years. For local members who have not been terminated or have been approved for WRS disability or LTDI, the percentage is reduced by 0.5% per month for every month over 30 years. For all members, the offsets are as follows (with mandatory commencement ages in parenthesis if applicable):

- Any Social Security benefit based upon the participant's work record (age 62; if not already receiving SSDI)
- Unemployment compensation
- Worker's Compensation
- Any WRS retirement, separation, or disability benefit based upon member's earnings and service
- All earnings from the employer where the disability occurred
- A percent of other earnings as follows:
  - 1/3 of earnings less than 40% of salary
  - 1/2 of earnings between 40% and 80% of salary
  - 2/3 of earnings over 80% of salary
- A 5% reduction for non-state members who have not filed a Worker's Compensation claim for permanent disability

Benefit Increases — Individuals receive an annual increase of either 1 or 2 below:

1. Social Security salary index for the following individuals:
   - Under age 60, or
   - Older than 60 and receiving a regular disability retirement or regular LTDI, or
   - Receiving a duty disability death benefit based on 1998 law.

2. Prior year's WRS core annuity dividend for the following individuals:
   - Over age 60 and receiving special disability retirement or special LTDI, or
   - Over age 60 not receiving any regular disability retirement or LTDI

Survivor Benefits: — State employees and pre-5/3/88 applications for local employees:

- Disabled member dies from the same condition that triggered the onset of Duty Disability benefit in order for a survivor benefit to be payable
- 1/3 of the participant's monthly salary at time of death to surviving spouse (or domestic partner – State employees only), plus
- $15/month to the guardian of each unmarried child under the age of 18
- Not to exceed 65% of the participant's monthly salary at time of death
- No annual adjustments

Post-5/3/88 applications for local employees:

- Disabled member dies from the same condition that triggered the onset of Duty Disability benefit in order for a survivor benefit to be payable
- 1/2 of the participant's monthly salary at time of death to surviving spouse or domestic partner, less other income sources that are based on the participant's earnings record, plus
- 1/10 of the participant's monthly salary at time of death to each unmarried child under the age of 18
- Not to exceed 70% of the participant's monthly salary at time of death less offsets for other income
- Subject to annual adjustments based on salary indexing

Cancer Presumptive Law (state and local)

- Disabled member dies from the same condition that triggered the onset of Duty Disability benefit in order for a survivor benefit to be payable
- 70% of the participant’s monthly salary at time of death to surviving spouse or domestic partner, less other income sources that are based on the participant’s earnings record
- 1/10 of the participant’s monthly salary at time of death to the guardian of each unmarried child under the age of 18, as long as there is no surviving spouse or domestic partner
- There is no maximum on dependent benefits
- Subject to annual adjustments based on salary indexing

Survivor benefits are offset by Chapter 102 Worker’s Compensation death benefits

Appendix B: Valuation Assumptions

Valuation Date: December 31, 2018

Discount Rate: 7.00%, specified by ETF

Claim Termination Rates: Rates are based on the 2012-2014 Experience Study performed by the actuary for the Wisconsin Retirement System, adjusted for recent trends in claim termination experience of Duty Disability claimants[1]. Sample rates are provided below:

Duty Disability Claim Termination Rates				
Age	Members		Survivors	
	Male	Female	Male	Female
25	0.03%	0.01%	0.03%	0.02%
30	0.04%	0.02%	0.04%	0.02%
35	0.05%	0.03%	0.07%	0.04%
40	0.07%	0.05%	0.10%	0.06%
45	0.13%	0.08%	0.13%	0.09%
50	0.25%	0.14%	0.18%	0.14%
55	0.33%	0.20%	0.40%	0.24%
60	0.58%	0.31%	0.57%	0.35%
65	0.95%	0.55%	0.88%	0.54%
70	1.66%	1.00%	1.45%	0.92%
75	3.17%	1.88%	2.47%	1.66%
80	5.83%	3.82%	4.54%	3.11%
85	9.39%	6.59%	8.46%	6.22%
90	16.23%	11.89%	14.68%	11.28%

Estimated Offsets: We estimated the following offsets to the member's Duty Disability benefit:

Estimated Offset	Assumption
WRS Benefits and LTDI:	Assume 20% of members qualify for a WRS disability benefit or LTDI. Assume 10% of members under age 50 who do not qualify for a WRS disability benefit or LTDI elect to receive a WRS separation benefit.

[1] Although GRS performed a new experience study in 2018, we did not compute a new claim termination rate assumption for Duty Disability because (1) the current assumption reflects recent program-specific experience and, (2) according to the results from our runout studies, the current assumption provides a reasonable basis for estimating future Duty Disability benefit payments.

	Assume other members commence a WRS retirement benefit at age 50 (requirement of plan). Benefits are based on plan provisions and actuarial assumptions stated above.
Social Security:	Assume 10% of members covered by Social Security qualify for a Social Security disability award. Benefits are based on the Social Security Primary Insurance Amount formula using 2018 bend points. Benefits for currently active participants are based on Social Security formula and assuming: • 3.20% pay increases • 3.20% Social Security Taxable Wage Base increases • 2.50% cost-of-living adjustments
Unemployment Compensation:	None (No offsets observed)
Combined Offset from: • Worker's Compensation • Employer Earnings • Other Earnings	Assume 3.00% reduction to 75%/80% target benefit (Observed reduction from all these offsets was about 3.00% of target benefits as of 12/31/2015. This observation does not include a review of income tax returns or one-time earnings offsets as observation is taken from the December Payroll of each year.)

Benefit Increases: Annual benefit increases of either 3.20% or 2.10% were assumed based on the following criteria:

1. Assumed 3.20% annual increases for the following individuals:
   - Under age 60, or
   - Older than 60 and receiving a regular disability retirement or regular LTDI, or
   - Receiving a duty disability death benefit based on 1998 law.

2. Assumed 2.10% for the following individuals:
   - Over age 60 and receiving special disability retirement or special LTDI, or

- Over age 60 not receiving any regular disability retirement or LTDI

Death Benefits: Assumed that 33% of survivors (i.e. spouses/domestic partners) will be eligible to receive monthly benefits upon the death of the disabled member. These benefits are payable to survivors of disabled members who die as a result of the same injury or disease that triggered the Duty Disability benefit.

Appendix C: Contribution Rates

The Plan is funded entirely by Employer contributions, which vary by experience as detailed in the following table. The contribution rate is adjusted by an Actuarial Adjustment Rate (AAR), updated each year such that expected employer contributions equal a targeted amount based on actuarial projections.

2019 Contribution Rate Schedule

Employers pay the lower of the contribution rate associated with their claims as a percentage of payroll or their number of claims.

Contribution Rate (as a % of Covered Payroll)	Claims as a % of Covered Payroll	Number of Claims
0.17%	<=1.5%	1
0.34%	> 1.5% but ≤ 3.0%	2
0.67%	> 3.0% but ≤ 4.5%	3
1.17%	> 4.5% but ≤ 6.0%	4
1.84%	> 6.0% but ≤ 7.5%	5
2.68%	> 7.5% but ≤ 9.0%	6
3.69%	> 9.0% but ≤ 10.5%	7
4.42%	Claims > 10.5%	8 or more

Appendix D: Reliance Items

In performing the valuation of the Duty Disability program as of December 31, 2018, we relied, without audit, on certain data and information provided by ETF. To the extent any of the data or other items were incomplete or inaccurate, the results of our work may be materially affected.

The principal items on which we relied included the following:

- Lists of active disability claims and related information
- Fund balances, premium contributions, plan expenses, payroll, and other financial information provided by ETF
- Plan descriptions provided by ETF
- Discussions with ETF