Actuarial Valuation of The Duty Disability Insurance Program

As of December 31, 2017

For The State of Wisconsin Department of Employee Trust Funds

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May 25, 2018

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Appendices:

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May 25, 2018

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, 2017

Dear Cindy:

Thank you for asking Milliman to perform an actuarial valuation of the Duty Disability program as of December 31, 2017. The valuation results are provided in this report, and include estimated claim liabilities as of December 31, 2017 as well as financial projections for the Duty Disability reserve fund. This report also contains documentation of the methods and assumptions we used for performing the analysis.

In prior years, the valuation of the Duty Disability program was performed according to the Governmental Accounting Standards Board Statement No. 43 (GASB 43), which governs the financial reporting of Other Post-Employment Benefits (OPEBs). GASB 43 requires the use of pension accounting methods, including the calculation of a liability for active lives.

In 2016, GASB adopted new accounting standards for OPEBs and replaced GASB 43 with GASB 74, effective for fiscal years beginning after June 15, 2016. The new standard includes guidelines for calculating and reporting program costs and liabilities that are different than the guidelines prescribed in GASB 43.

After reviewing the new accounting standard, the State of Wisconsin Department of Employee Trust Funds (ETF) and its auditors have determined that the Duty Disability program is not subject to the provisions of GASB 74, and that the valuation of the program should be performed according to GASB 10 ("Accounting and Financial Reporting for Risk Financing and Related Insurance Issues"). Although this approach differs from how valuations have been performed since 2005, it is consistent with the valuation approach for other disability insurance programs administered by ETF, including the State and Local Income Continuation Insurance (ICI) programs.

We have relied on ETF for this determination, and have therefore performed an actuarial valuation of the Duty Disability program as of December 31, 2017 based on the procedures and methods prescribed in GASB 10. The valuation results include estimated liabilities for Duty Disability claims that were open on December 31, 2017, and for claims that were incurred but had not been reported by December 31, 2017. 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 program as of December 31, 2017. We have performed the analysis based on the procedures and methods prescribed in GASB 10. The actuarial liabilities for the Duty Disability program as of December 31, 2017 are summarized in Table 1.1 below:

Table 1.1 Actuarial Liabilities for the Duty Disability Program As of December 31, 2017	
Liability Component	Estimated Liability
Open Claims	$403,395,912
Future Survivors	$35,412,819
IBNR Claims	$16,766,364
Loss Adjustment Expenses	$9,205,578
Total	$464,780,673

The liability for open claims includes estimated liabilities for 954 members who were disabled as of December 31, 2017, and 57 survivors (i.e. spouses and domestic partners) who were receiving death benefits as of December 31, 2017. The liability for future survivors represents an estimate of 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, 2017, and the liability for loss adjustment expenses pertains to the 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, 2017, using the reserve balance sheets and accounting exhibits provided to Milliman by ETF. The program was in a surplus position as of the valuation date, as shown below:

Table 1.2 Duty Disability Funding Analysis	
Balance Sheet Component	2017
Beginning of Year Balance	$592,825,203
Plus: Investment Income	$91,835,116
Plus: Premium Contributions and Miscellaneous Income	$8,665,020
Less: Insurance Claims	$35,025,113
Less: Administrative Expenses	$1,365,226
End of Year Balance	$656,935,000
Actuarial Liability (as of 12/31/2017)	$464,780,673
Surplus / (Deficit)	$192,154,327

Further discussion of the estimated liabilities and funding analyses are included in the remainder of this report, including 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 benefits payable to disabled members and survivors whose claims had been reported on or before December 31, 2017. There were 954 disabled members and 57 survivors reported as of December 31, 2017.

- 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 benefits payable to survivors of currently disabled members.

- Incurred but not Reported (IBNR) Claims: The liability for IBNR claims represents the present value of expected future benefits payable to members and survivors whose claims were incurred but had not been reported as of December 31, 2017.

- 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, 2016 and December 31, 2017 liabilities for the Duty Disability program. Note that last year's results included an estimate of the liability for active lives because the valuation was performed under GASB 43. This year, the valuation was performed under GASB 10 which does not require estimating a liability for active lives.

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

Liability Component	12/31/2016 (GASB 43)	12/31/2017 (GASB 10)
Active Lives	$104,884,541	$0
Open Claims	$403,959,057	$403,395,912
Future Survivors	$34,724,572	$35,412,819
IBNR Claims	$8,704,812	$16,766,364
Loss Adjustment Expense	$6,059,386	$9,205,578
Total	$558,332,368	$464,780,673

A discussion of each of the liability components is provided below. Appendix B of this report includes additional details of the valuation assumptions that were used to calculate the liabilities for the Duty Disability program as of December 31, 2017.

Open Claims

The open claim liability decreased slightly from $404.0 million as of December 31, 2016 to $403.4 million as of December 31, 2017. The change in liability was driven, in part, by differences in claim inventories, and by differences in the demographic mix of disabled members and survivors. Of the 1,011 claims that were open on December 31, 2017, there were 985 claims which were also open on December 31, 2016 and remained open through 2017. There were 22 claims that closed in 2017, and 26 new claims reported in 2017.

We calculated the liability for open claims using the same valuation methods and assumptions as last year. In particular, we used the same claim termination rate assumptions, estimated offset assumptions, and interest rate assumptions. These assumptions are included in Appendix B of this report.

To assess the adequacy of the liability for disabled members, we performed a retrospective runoff test using Duty Disability claim experience from the period 2012 through 2017. The runoff test 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 margin is shown in the last row of the table representing the average annual margin over the six year experience period.

Table 2.2
Runout Study for Disabled Members
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%
Average	0.40%

In the preceding table, a positive margin indicates the liability was adequate to cover the runout of open disability claims during the study period, while a negative margin indicates a deficiency. We typically target a positive average margin of 1% to 5% for this type of program.

Although the results from the runout studies show modest positive margins, which are slightly 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 2017. The results, shown below, correspond to mutually distinct 12-month runoff studies, along with an average margin in the last row representing the average annual margin over the six year experience period. The average margin of 2.05% falls within our target range of 1% to 5%.

Table 2.3 Runout Study for Survivors 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%
Total	2.05%

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 and domestic partners will be eligible to receive monthly benefits upon the death of the disabled member.

IBNR Claims

The liability for IBNR claims represents the expected portion of the total cost attributable to claims that were incurred but had not been reported as of December 31, 2017. We computed the IBNR liability by first estimating average annual incurred claim costs, and then estimating the incurred claims that were unreported as of the valuation date. Estimated incurred claims were derived from an analysis of historical claim experience from 2010 through 2017, as shown below:

Table 2.4 Duty Disability Incurred Claims From 2010 through 2017			
Calendar Year	Incurred Claims	Annual Payroll	Inc. Claims % of Payroll
2010	$8,631,331	$1,301,100,577	0.66%
2011	$8,013,867	$1,289,108,049	0.62%
2012	$9,931,393	$1,279,908,417	0.78%
2013	$9,357,141	$1,299,551,475	0.72%
2014	$8,371,923	$1,332,780,095	0.63%
2015	$5,416,170	$1,358,934,175	0.40%
2016	$5,534,910	$1,389,907,027	0.40%
2017	$2,326,280	$1,421,147,406	0.16%

Based on average incurred claims experience from 2010 through 2014 (which we assume are complete, with all claims incurred in that period being reported as of the study date), we estimated annual incurred claims to be equal to 0.69% of payroll in any given year.

We then determined that approximately 76% of claims incurred in 2017 were unreported as of December 31, 2017; 42% of claims incurred in 2016 were unreported as of December 31, 2017; and 42% of claims incurred in 2015 were unreported as of December 31, 2017, as shown below:

Table 2.5 Duty Disability Incurred Claims From 2015 through 2017				
Calendar Year	Actual Incurred Claims	Expected Incurred Claims	Reported % (Actual / Expected)	Unreported % (100% – Reported %)
2015	$5,416,170	$9,320,480	58%	42%
2016	$5,534,910	$9,532,912	58%	42%
2017	$2,326,280	$9,747,180	24%	76%

Based on these assumptions, we estimated the liability for IBNR claims to be equal to $7,683,409 for claims incurred in 2017; $4,437,468 for claims incurred in 2016; and $4,645,487 for claims incurred in 2015. The total IBNR liability is equal to the sum of these three components, i.e. $16,766,364.

The liability for IBNR claims as of December 31, 2017 is higher than the liability reported on December 31, 2016 (i.e., $8.7 million), because this year we assumed that some claims incurred within the past three years had not been reported as of the valuation date, whereas last year we only looked back two years from the valuation date. The experience we analyzed this year, as shown in Table 2.4, justifies the longer lookback period. We also modified our approach for estimating average annual incurred claims to reflect more precise timing.

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	2013	2014	2015	2016	2017	2013 - 2017
A. Benefit Payments	$31.4	$31.7	$33.1	$34.4	$35.0	$165.6
B. Administrative Expenses	$0.8	$0.7	$1.1	$1.3	$1.4	$5.3
C. Expense Ratio (B / A)	2.6%	2.2%	3.3%	3.8%	3.9%	3.2%

The overall expense ratio from 2013 – 2017 was 3.2% of annual benefit payments. Because some administrative costs are not directly related to the ongoing management and payment of Duty Disability claims, we assumed an expense ratio of 1.9% for computing the loss adjustment expense liability for open claims. We used 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, 2017:

Table 3.1 Duty Disability Funding Analysis	
Balance Sheet Component	2017
Beginning of Year Balance	$592,825,203
Plus: Investment Income	$91,835,116
Plus: Premium Contributions and Miscellaneous Income	$8,665,020
Less: Insurance Claims	$35,025,113
Less: Administrative Expenses	$1,365,226
End of Year Balance	$656,935,000
Actuarial Liability (as of 12/31/2017)	$464,780,673
Surplus / (Deficit)	$192,154,327

The program was in a surplus position of $192.1 million as of 12/31/2017.

We have prepared financial projections to evaluate the long-term performance of the Duty Disability fund. The projections reflect actual results for 2017 and projected values in 2018 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 3.20% 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 0.61% based on contributions and payroll from 2017, and kept the rate constant for future years.

- Investment Income: Investment income is projected using the valuation assumption of 7.2%, specified by ETF.

- Insurance Claims: Annual paid insurance claims are the sum of projected payments on existing claims as of 12/31/2017, and of payments on expected future claims incurred after 12/31/2017. Incurred claims for 2018 are based on historical experience of 0.69% of payroll.

- Administrative Expenses: Administrative expenses are modeled as a constant percentage of paid insurance claims, based on actual values in 2017.

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

- Actuarial Liability: The actuarial 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 12/31/2017 and of the increasing liability for claims incurred after 12/31/2017.

- 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 0.69% of payroll, and that the Duty Disability fund will earn interest at a rate of 7.2% per year.

2. Scenario 1: This scenario is meant to stress the morbidity assumption by assuming that Duty Disability incurred claims will be 20% higher than the baseline assumption. We assumed no change to the current contribution rate throughout the projection.

3. Scenario 2: This scenario is similar to Scenario 1 (i.e., it includes the higher level of incurred claims), except we assumed that the contribution rate in 2019 and future years would be 20% lower than the current 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 7.2% from the baseline scenario). We assumed no change to the current contribution rate throughout the projection.

5. Scenario 4: This scenario includes the lower investment earnings rate (3.5%) and higher level of incurred claims (increased by 20%), and we assumed that the contribution rate in 2019 and future years would be 20% lower than the current rate.

The detailed output from our projections is provided on the following pages. In the baseline scenario, the surplus is expected to grow to $345.2 million by 2027. The growth is driven, in part, by the investment income projected in future years, which was based on 7.2% interest.

Scenarios 1 and 2 demonstrate the sensitivity of the surplus projection to expected annual incurred claims. Although future surplus levels still increase in both of these scenarios, the increase is more modest than the baseline scenario. In Scenario 1, the surplus is expected to grow to $316.5 million by 2027 (versus $345.2 million in the baseline scenario). In Scenario

2, in which a 20% reduction to contribution rates is assumed in 2019, the surplus is expected to grow to $295.4 million by 2027.

In Scenario 3, in which the investment income rate was assumed to be 3.5%, the surplus is expected to decrease to $63.2 million by 2027. 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 7.2% interest for a prolonged period of time.

In Scenario 4, which assumes lower investment income, adverse morbidity experience, and a 20% reduction to contribution rates in 2019, the surplus decreases to $17.0 million by 2027. The surplus is still positive under this scenario, but significantly lower than the starting surplus.

The current surplus is approximately 41% of the incurred claim liability, which is relatively high for the Duty Disability plan (a more reasonable target may be 10% to 20% of the incurred claim liability). You may wish to consider reducing future contribution rates in order to reduce the growth in surplus. The financial projections corresponding to Scenario 2 suggest that reducing the contribution rates by 20% in 2019, then holding rates level thereafter, is likely to provide sufficient protection against adverse experience, and will reduce the rate of surplus growth. If experience were to emerge as in the Baseline Scenario, then the reduced contribution rate would result in a higher level of surplus than shown in Scenario 2, but it will still help reduce the rate of surplus growth in future years. Furthermore, even under very adverse conditions as modeled in Scenario 4, the 20% reduction to contribution rates in 2019 does not result in negative surplus throughout the projection period. For these reasons, we believe it would be reasonable to reduce Duty Disability contribution rates by 20% in 2019. Additional rate actions can be taken in future years to address any concerns related to the fund balance and surplus levels.

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: 7.2%
Incurred Claims: 0.69% of payroll
Contribution Rate: Current contribution rate

Duty Disability Program - Funding Analysis as of December 31, 2017
Baseline

Calendar Year	Actual	Projected								
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
BOY Fund Balance	$592,825,203	$656,935,000	$677,406,187	$698,343,539	$720,066,332	$742,624,009	$766,100,553	$790,524,235	$815,971,040	$842,574,044
Premium Contributions	$8,658,587	$8,933,129	$9,218,989	$9,513,997	$9,818,445	$10,132,635	$10,456,880	$10,791,500	$11,136,828	$11,493,206
Miscellaneous Income	$6,433	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$91,835,116	$47,299,320	$48,773,245	$50,280,735	$51,844,776	$53,468,929	$55,159,240	$56,917,745	$58,749,915	$60,665,331
Total Revenues	$100,500,136	$56,232,449	$57,992,235	$59,794,732	$61,663,221	$63,601,564	$65,616,119	$67,709,245	$69,886,743	$72,158,537
Insurance Claims	$35,025,113	$34,419,636	$35,664,726	$36,643,625	$37,638,454	$38,619,683	$39,647,055	$40,676,915	$41,659,899	$42,676,648
Administrative Expense	$1,365,226	$1,341,625	$1,390,157	$1,428,313	$1,467,090	$1,505,337	$1,545,382	$1,585,525	$1,623,840	$1,663,471
Total Operating Expenses	$36,390,339	$35,761,262	$37,054,883	$38,071,939	$39,105,544	$40,125,020	$41,192,438	$42,262,439	$43,283,739	$44,340,119
Net Change in Fund Balance	$64,109,797	$20,471,188	$20,937,352	$21,722,793	$22,557,677	$23,476,544	$24,423,682	$25,446,805	$26,603,003	$27,818,418
EOY Fund Balance	$656,935,000	$677,406,187	$698,343,539	$720,066,332	$742,624,009	$766,100,553	$790,524,235	$815,971,040	$842,574,044	$870,392,462
Incurred Claim Liability*	$464,780,673	$471,776,227	$479,077,389	$486,194,429	$493,134,674	$499,915,633	$506,547,746	$512,948,001	$519,185,620	$525,241,343
Surplus / (Deficit)	$192,154,327	$205,629,960	$219,266,150	$233,871,904	$249,489,335	$266,184,921	$283,976,489	$303,023,039	$323,388,424	$345,151,119

** The incurred claim liability shown above includes the liability for open claims and claims incurred but not reported as of December 31, 2017, as well as the liability for new claims incurred by active members and survivors in 2018 and beyond*

Scenario 1:
Investment Income: 7.2%
Incurred Claims: 0.82% of payroll
Contribution Rate: Current contribution rate

Duty Disability Program - Funding Analysis as of December 31, 2017 Scenario 1 - 20% Increase in Incurred Claims										
Calendar Year	Actual	Projected								
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
BOY Fund Balance	$592,825,203	$656,935,000	$677,339,000	$698,067,467	$719,423,664	$741,438,908	$764,177,749	$787,647,764	$811,902,788	$837,051,906
Premium Contributions	$8,658,587	$8,933,129	$9,218,989	$9,513,997	$9,818,445	$10,132,635	$10,456,880	$10,791,500	$11,136,828	$11,493,206
Miscellaneous Income	$6,433	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$91,835,116	$47,299,320	$48,768,408	$50,260,858	$51,798,504	$53,383,601	$55,020,798	$56,710,639	$58,457,001	$60,267,737
Total Revenues	$100,500,136	$56,232,449	$57,987,397	$59,774,855	$61,616,949	$63,516,237	$65,477,678	$67,502,139	$69,593,828	$71,760,943
Insurance Claims	$35,025,113	$34,484,303	$35,861,118	$36,977,337	$38,116,001	$39,247,583	$40,431,697	$41,624,648	$42,777,315	$43,970,430
Administrative Expense	$1,365,226	$1,344,146	$1,397,812	$1,441,321	$1,485,704	$1,529,812	$1,575,966	$1,622,466	$1,667,395	$1,713,901
Total Operating Expenses	$36,390,339	$35,828,449	$37,258,930	$38,418,658	$39,601,705	$40,777,395	$42,007,663	$43,247,114	$44,444,710	$45,684,331
Net Change in Fund Balance	$64,109,797	$20,404,000	$20,728,467	$21,356,197	$22,015,244	$22,738,842	$23,470,014	$24,255,024	$25,149,118	$26,076,612
EOY Fund Balance	$656,935,000	$677,339,000	$698,067,467	$719,423,664	$741,438,908	$764,177,749	$787,647,764	$811,902,788	$837,051,906	$863,128,518
Incurred Claim Liability	$464,780,673	$473,832,995	$483,268,527	$492,599,486	$501,834,353	$510,991,624	$520,083,070	$529,026,826	$537,893,351	$546,665,140
Surplus / (Deficit)	$192,154,327	$203,506,006	$214,798,940	$226,824,178	$239,604,555	$253,186,125	$267,564,693	$282,875,962	$299,158,555	$316,463,378

Scenario 2:

Investment Income: 7.2%
Incurred Claims: 0.82% of payroll
Contribution Rate: Contribution rate in 2019 and future years is 20% lower than the current rate

Duty Disability Program - Funding Analysis as of December 31, 2017

Scenario 3 - 20% Increase in Incurred Claims and 20% Reduction in Contribution Rates in 2019

Calendar Year	Actual	Projected								
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
BOY Fund Balance	$592,825,203	$656,935,000	$677,339,000	$696,223,669	$715,544,313	$735,316,555	$755,588,060	$776,348,241	$797,631,399	$819,525,612
Premium Contributions	$8,658,587	$8,933,129	$7,375,192	$7,611,198	$7,854,756	$8,106,108	$8,365,504	$8,633,200	$8,909,462	$9,194,565
Miscellaneous Income	$6,433	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$91,835,116	$47,299,320	$48,768,408	$50,128,104	$51,519,191	$52,942,792	$54,402,340	$55,897,073	$57,429,461	$59,005,844
Total Revenues	$100,500,136	$56,232,449	$56,143,600	$57,739,302	$59,373,947	$61,048,900	$62,767,844	$64,530,273	$66,338,923	$68,200,409
Insurance Claims	$35,025,113	$34,484,303	$35,861,118	$36,977,337	$38,116,001	$39,247,583	$40,431,697	$41,624,648	$42,777,315	$43,970,430
Administrative Expense	$1,365,226	$1,344,146	$1,397,812	$1,441,321	$1,485,704	$1,529,812	$1,575,966	$1,622,466	$1,667,395	$1,713,901
Total Operating Expenses	$36,390,339	$35,828,449	$37,258,930	$38,418,658	$39,601,705	$40,777,395	$42,007,663	$43,247,114	$44,444,710	$45,684,331
Net Change in Fund Balance	$64,109,797	$20,404,000	$18,884,669	$19,320,644	$19,772,241	$20,271,505	$20,760,181	$21,283,159	$21,894,213	$22,516,078
EOY Fund Balance	$656,935,000	$677,339,000	$696,223,669	$715,544,313	$735,316,555	$755,588,060	$776,348,241	$797,631,399	$819,525,612	$842,041,690
Incurred Claim Liability	$464,780,673	$473,832,995	$483,268,527	$492,599,486	$501,834,353	$510,991,624	$520,083,070	$529,026,826	$537,893,351	$546,665,140
Surplus / (Deficit)	$192,154,327	$203,506,006	$212,955,143	$222,944,827	$233,482,202	$244,596,436	$256,265,170	$268,604,574	$281,632,261	$295,376,550

Scenario 3:
Investment Income: 3.5%
Incurred Claims: 0.69% of payroll
Contribution Rate: Current contribution rate

Duty Disability Program - Funding Analysis as of December 31, 2017 Scenario 3 - Investment Income = 3.5%										
Calendar Year	Actual	Projected								
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
BOY Fund Balance	$592,825,203	$656,935,000	$653,109,685	$648,152,866	$642,300,726	$635,514,935	$627,786,654	$619,044,956	$609,262,125	$598,461,137
Premium Contributions	$8,658,587	$8,933,129	$9,218,989	$9,513,997	$9,818,445	$10,132,635	$10,456,880	$10,791,500	$11,136,828	$11,493,206
Miscellaneous Income	$6,433	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$91,835,116	$22,992,725	$22,858,839	$22,685,350	$22,480,525	$22,243,023	$21,972,533	$21,666,573	$21,324,174	$20,946,140
Total Revenues	$100,500,136	$31,925,854	$32,077,828	$32,199,347	$32,298,970	$32,375,658	$32,429,412	$32,458,073	$32,461,002	$32,439,346
Insurance Claims	$35,025,113	$34,409,922	$35,645,249	$36,623,942	$37,618,451	$38,599,393	$39,626,528	$40,656,187	$41,638,966	$42,655,526
Administrative Expense	$1,365,226	$1,341,247	$1,389,398	$1,427,546	$1,466,310	$1,504,546	$1,544,582	$1,584,717	$1,623,024	$1,662,648
Total Operating Expenses	$36,390,339	$35,751,169	$37,034,647	$38,051,487	$39,084,762	$40,103,939	$41,171,111	$42,240,904	$43,261,990	$44,318,174
Net Change in Fund Balance	$64,109,797	-$3,825,315	-$4,956,819	-$5,852,140	-$6,785,791	-$7,728,281	-$8,741,698	-$9,782,831	-$10,800,988	-$11,878,828
EOY Fund Balance	$656,935,000	$653,109,685	$648,152,866	$642,300,726	$635,514,935	$627,786,654	$619,044,956	$609,262,125	$598,461,137	$586,582,309
Incurred Claim Liability	$464,780,673	$471,597,196	$478,712,572	$485,636,901	$492,377,411	$498,951,523	$505,369,564	$511,548,420	$517,557,205	$523,376,509
Surplus / (Deficit)	$192,154,327	$181,512,489	$169,440,294	$156,663,825	$143,137,524	$128,835,130	$113,675,391	$97,713,705	$80,903,932	$63,205,801

Scenario 4:

Investment Income: 3.5%
Incurred Claims: 0.82% of payroll
Contribution Rate: Contribution rate in 2019 and future years is 20% lower than the current rate

Duty Disability Program - Funding Analysis as of December 31, 2017

Scenario 4 - 3.5% interest / 20% increase in incurred claims / 20% reduction to contribution rates in 2019

Calendar Year	Actual	Projected								
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
BOY Fund Balance	$592,825,203	$656,935,000	$653,042,498	$646,035,482	$637,859,715	$628,458,638	$617,804,485	$605,806,809	$592,417,668	$577,638,788
Premium Contributions	$8,658,587	$8,933,129	$7,375,192	$7,611,198	$7,854,756	$8,106,108	$8,365,504	$8,633,200	$8,909,462	$9,194,565
Miscellaneous Income	$6,433	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Income	$91,835,116	$22,992,725	$22,856,487	$22,611,242	$22,325,090	$21,996,052	$21,623,157	$21,203,238	$20,734,618	$20,217,358
Total Revenues	$100,500,136	$31,925,854	$30,231,679	$30,222,440	$30,179,846	$30,102,161	$29,988,661	$29,836,438	$29,644,081	$29,411,923
Insurance Claims	$35,025,113	$34,474,589	$35,841,641	$36,957,653	$38,095,998	$39,227,293	$40,411,170	$41,603,921	$42,756,382	$43,949,308
Administrative Expense	$1,365,226	$1,343,767	$1,397,053	$1,440,554	$1,484,925	$1,529,021	$1,575,166	$1,621,658	$1,666,579	$1,713,078
Total Operating Expenses	$36,390,339	$35,818,356	$37,238,695	$38,398,207	$39,580,923	$40,756,314	$41,986,336	$43,225,579	$44,422,961	$45,662,386
Net Change in Fund Balance	$64,109,797	-$3,892,502	-$7,007,016	-$8,175,767	-$9,401,077	-$10,654,153	-$11,997,676	-$13,389,141	-$14,778,880	-$16,250,463
EOY Fund Balance	$656,935,000	$653,042,498	$646,035,482	$637,859,715	$628,458,638	$617,804,485	$605,806,809	$592,417,668	$577,638,788	$561,388,325
Incurred Claim Liability	$464,780,673	$473,618,157	$482,830,746	$491,930,452	$500,925,637	$509,834,692	$518,669,252	$527,347,328	$535,939,254	$544,427,339
Surplus / (Deficit)	$192,154,327	$179,424,341	$163,204,737	$145,929,263	$127,533,001	$107,969,792	$87,137,557	$65,070,340	$41,699,534	$16,960,986

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, 2017

Discount Rate: 7.20%, 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. 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. 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.

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
0.25%	<=1.5%	1
0.50%	> 1.5% but ≤ 3.0%	2
1.00%	> 3.0% but ≤ 4.5%	3
1.75%	> 4.5% but ≤ 6.0%	4
2.75%	> 6.0% but ≤ 7.5%	5
4.00%	> 7.5% but ≤ 9.0%	6
5.50%	> 9.0% but ≤ 10.5%	7
6.60%	Claims > 10.5%	8 or more

* *Contribution rates shown above are before adjustment for the Actuarial Adjustment Rate (AAR); for FY 2018, the AAR was -8%.*

Appendix D: Reliance Items

In performing the valuation of the Duty Disability program as of December 31, 2017, 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