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October 21, 2016

Senator Krebsbach, Chair
Legislative Employee Benefits Programs Committee
North Dakota State Government

Re: Legislative Studies – Bill No. 17.0119.01000 Based on Actuarial Valuation Results as of July 1, 2016

Dear Senator Krebsbach:

In accordance with your request, we have analyzed the impact of Bill No. 17.0119.01000 on the North Dakota Public Employees Retirement System (NDPERS).

Systems Affected:

North Dakota Public Employees Retirement System (PERS) and Defined Contribution Plan

Summary:

Bill No. 17.0119.01000 (Affects the Main System and the Defined Contribution Plan)

- The employee contribution rate on behalf of temporary employees increases by 2.00% of salary effective with the monthly reporting period of January 2018.
 - The rate increases from 14.12% of salary to 16.12% of salary for the Main System and the Defined Contribution Plan
- The employee contribution rate on behalf of full time employees increases by 1.00% of salary effective with the monthly reporting period of January 2018.
 - The rate increases from 7.00% of salary to 8.00% of salary for the Main System and the Defined Contribution Plan
- The employer contribution rate increases by 1.00% of salary effective with the monthly reporting period of January 2018.
 - The rate increases from 7.12% of salary to 8.12% of salary for the Main System and the Defined Contribution Plan

Actuarial Impact of Bill 119 on the Main System

The table on the following page presents a summary of the projected funded ratio on an actuarial value of assets basis and a market value of assets basis under the current provisions and the proposed provisions of Bill 119.

Year	Main System					
	Funded Ratio (AVA)			Funded Ratio (MVA)		
	Bill 119			Bill 119		
	Current Provisions	Proposed Provisions	Change	Current Provisions	Proposed Provisions	Change
2016	66.1%	66.0%	-0.1%	70.5%	70.4%	-0.1%
2017	66.6%	66.5%	-0.1%	71.2%	71.1%	-0.1%
2018	66.7%	67.0%	0.3%	71.9%	72.2%	0.3%
2019	65.9%	66.8%	0.9%	72.5%	73.5%	0.9%
2020	65.7%	67.1%	1.5%	73.2%	74.7%	1.5%
2021	66.2%	68.2%	2.0%	73.8%	75.9%	2.1%
2026	68.4%	73.2%	4.8%	76.3%	81.5%	5.2%
2031	70.2%	77.9%	7.8%	78.4%	86.9%	8.6%
2036	71.9%	83.0%	11.1%	80.3%	92.6%	12.3%
2041	73.6%	88.5%	14.9%	82.3%	98.7%	16.5%
2046	75.4%	94.6%	19.2%	84.3%	105.6%	21.3%

The change in contribution rates is projected to increase the future funded ratio for the Main System. After 30 years (by the year 2046):

1. The Main System funded ratio is projected to be 19.2 percentage points higher (94.6 percent compared to 75.4 percent) on an actuarial value of assets basis
2. The Main System funded ratio is projected to be 21.3 percentage points higher (105.6 percent compared to 84.3 percent) on a market value of assets basis

We have assumed that there will be no additional future changes in the employer contribution rates.

The following exhibits provide additional information on the impact on NDPERS of the proposed changes:

- Exhibit I: Summary of Actuarial Valuation Results as of July 1, 2016
- Graph I: Comparison of Projected Valuation Results for the Main System Under the Current and Proposed Provisions
- Exhibit II(a): Projected Valuation Results for the Main System Under the Current Provisions
- Exhibit II(b): Projected Valuation Results for the Main System Under the Proposed Provisions

Actuarial Impact of Bill 119 on the Defined Contribution Plan

Under Bill 119, the employee contribution rate and the employer contribution rate to the Defined Contribution Plan would each increase by 1.00 percent of pay. By definition, a defined contribution plan is always 100 percent funded. Therefore, there is no impact to the funded status of the defined contribution plan as a result of this change.

Policy Issue Analysis

Benefits Policy Issues

- Adequacy of Retirement Benefits

The 1.00 percent increase in both member and employer contributions would have no impact on retirement benefits for existing members in the Main System.

The additional 1.00 percent increase in both member and employer contributions to the Defined Contribution Plan will provide additional retirement income to members of that Plan.

The following table presents the percentage increase in member, employer and total contributions to the Defined Contribution Plan:

	Member Contribution Rate	Employer Contribution Rate	Total Contribution
Current Provisions	7.00%	7.12%	14.12%
Bill 119 Provisions	8.00%	8.12%	16.12%
Percentage Increase	14.30%	14.00%	14.20%

This implies that a newly hired member's defined contribution account will be 14.2 percent higher when he/she retires under the proposed provisions of Bill 119.

The following table illustrates the fact that younger members with more working years until retirement will benefit more from the contribution rate increase than older members who are closer to retirement. This table shows the account balance at retirement at age 60 for (1) a new hire at age 30 as well as (2) an existing employee age 50 with a current defined contribution account balance of \$150,000:

Employee	Current Salary	Account Balance at Age 60 (14.12%)*	Account Balance at age 60 (16.12%)*	Percent Increase	Dollar Increase
New Hire at Age 30	\$20,000	\$573,690.58	\$654,949.87	14.16%	\$81,259.29
Current Employee Age 50	\$50,000	\$451,139.17	\$469,170.40	4.00%	\$18,031.22

* Account balances in the previous table were calculated assuming that salary increases 5.5% per year and account balances earn 8.00% per year.

- Competitiveness

The increase in member and employer contributions to the Main System will have no impact on retirement benefits for existing members in the Main System. It will, however, reduce the members' take-home pay. As such, this bill may diminish the total compensation package offered by participating employers in the Main System.

Although the increase in member contributions to the Defined Contribution Plan will decrease the employees' take home pay by 1.00 percent of pay, it will increase their Defined Contribution account by 2.00 percent of pay, thereby increasing the total compensation package offered by participating employers in the Defined Contribution Plan.

- Benefits Equity and Group Integrity

The bill may diminish the total compensation package offered by participating employers in the Main System, but may increase the total compensation package offered by participating employers in the Defined Contribution Plan.

- Purchasing Power

No impact.

- Preservation of Benefits

Increased funding to the Main System in the form of additional employer and member contributions will increase the funded status of the Main System at a faster rate than currently projected. By requiring additional funding, the Main System will reach 100 percent funding sooner and the members' promised benefits will be more secure than without the additional funding.

- Portability

The additional member contributions to the Defined Contribution plan would be fully portable as are the existing member contributions.

- Ancillary Benefits

No impact.

- Social Security:

No impact

Funding Policy Issues

- Actuarial Impacts

As previously noted, the additional member and employer contributions required by the Bill will have a positive actuarial impact on the funded status of the Main System.

- Investment Impacts

- Cash Flow: The additional member and employer contributions required by the Bill would increase cash flow to both the Main System and the Defined Contribution Plan.
- Asset Allocation: The Board will need to decide how to invest the additional member and employer contributions required by the Bill -- in the same manner as the current Investment Policy provides, or in an alternate manner.

Administration Issues

- Implementation Issues

This bill would have an impact on the members and participating employers, since their required contributions would increase.

In addition, pursuant to rules under Internal Revenue Code section 414(h), participating employers (including the State) would be required to take formal action to elect to “pick up” the increased member contribution amounts, in order for such contributions to be made on a pre-tax basis. (For this purpose, the employing unit must take formal action to provide that the contributions on behalf of a specific class of employees of the employing unit, although designated as employee contributions, will be paid by the employing unit in lieu of employee contributions. A person duly authorized to take such action with respect to the employing unit must take such action. The action must apply only prospectively and be evidenced by a contemporaneous written document, such as minutes of a meeting, a resolution, or an ordinance.)

- Administrative Costs

The only administrative costs are related to the increase in member and employer contributions and any “pick up” of the member contributions.

- Needed Authority

The bill appears to provide appropriate levels of administrative and governance authority to the PERS Board to implement the changes made by the bill.

- Integration

No impact.

- Employee Communications

Employee communications will be necessary to describe the impact of increased member contributions on employee pay.

- Miscellaneous and Drafting Issues

Since this bill will increase member contribution rates, participating employers (including the State) will need to determine whether they will reduce members' current or future salary, or pay for the increased member contributions from their own funds as a salary supplement (while also paying an increased employer contribution rate). Any participating employer that decides to reduce members' salary to pay for the increased level of member contributions must pay and report FICA taxes on the member contribution amounts made via salary reduction.

Projection Assumptions

Following is a summary of the assumptions made for new hires used in the projections. The average new hire information is based on the average of members with at least one year and less than five years of service. The average assumed new hire salary is based on projecting the valuation salary from the 2016 valuation back to hire age using the assumed salary increase assumption and then projecting back to the 2016 valuation using the assumed wage inflation assumption of 4.5 percent per year. The projections assume that the number of active members remains the same in each future year as the number as of the most recent valuation of July 1, 2016.

	Main System	
	Current Members	Assumed New Hires
Average Age	46.5	38.4
Average Benefit Service	9.6	0.0
Average Salary	\$44,274	\$37,229
Normal Cost Rate (Benefits)	10.00%	10.20%

Although new hires in the Main System are subject to later retirement eligibility conditions (must meet the Rule of 90 instead of the Rule of 85), they are assumed to be hired at slightly older ages (on average) than the current members in NDPERS.

Disclosures and Additional Information

The actuarial assumptions used in this analysis were the same assumptions used in the actuarial valuation as of July 1, 2016, including an assumed rate of investment return of 8.00 percent on

Senator Krebsbach, Chair
Legislative Employee Benefits Programs Committee
October 21, 2016
Page 7

the market value of assets in each future year. A summary of the actuarial assumptions can be found in Appendix I of this letter.

A summary of the current benefit provisions can be found in Appendix II of this letter.

Future actuarial measurements may differ significantly from the current measurements presented in this cost analysis, 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; and changes in plan provisions, contribution amounts or applicable law.

If any of the provisions, underlying data or assumptions used in this analysis appear to be incorrect or unreasonable, please let us know as soon as possible so we can update the analysis.

The signing actuaries are independent of the plan sponsor.

Lance J. Weiss and Amy Williams are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

Please let us know if you have any questions or would like to discuss the results of this analysis further.

Sincerely,



Lance J. Weiss, EA, MAAA, FCA
Senior Consultant and Team Leader



Amy Williams, ASA, MAAA
Consultant

AW:rl

cc: Mr. Sparb Collins, NDPERS
Mr. Bryan Reinhardt, NDPERS
Ms. Sharon Schiermeister, NDPERS
Mr. Alex Rivera, Gabriel, Roeder, Smith & Company
Ms. Kristen Brundirks, Gabriel, Roeder, Smith & Company
Mr. Neil Nguyen, Gabriel, Roeder, Smith & Company

				Actuarial Value of Assets Basis				Market Value of Assets Basis			
	Total Normal Cost*	Employee Rate	Net Employer Normal Cost	Unfunded Liability Rate	Total Employer Actuarial Rate	Employer Statutory Rate	Statutory Rate Deficiency	Unfunded Liability Rate	Total Employer Actuarial Rate	Employer Statutory Rate	Statutory Rate Deficiency
Main System											
2016 Valuation Results	10.24%	7.00%	3.24%	7.24%	10.48%	7.12%	3.36%	6.31%	9.55%	7.12%	2.43%
Illustrative 2016 Results with Change in Contribution Rates	10.30%	8.00%	2.30%	7.27%	9.57%	8.12%	1.45%	6.34%	8.64%	8.12%	0.52%

*Includes assumed administrative expenses.

Unfunded liability rate is based on 20-year open level percentage of payroll amortization of the unfunded liability.

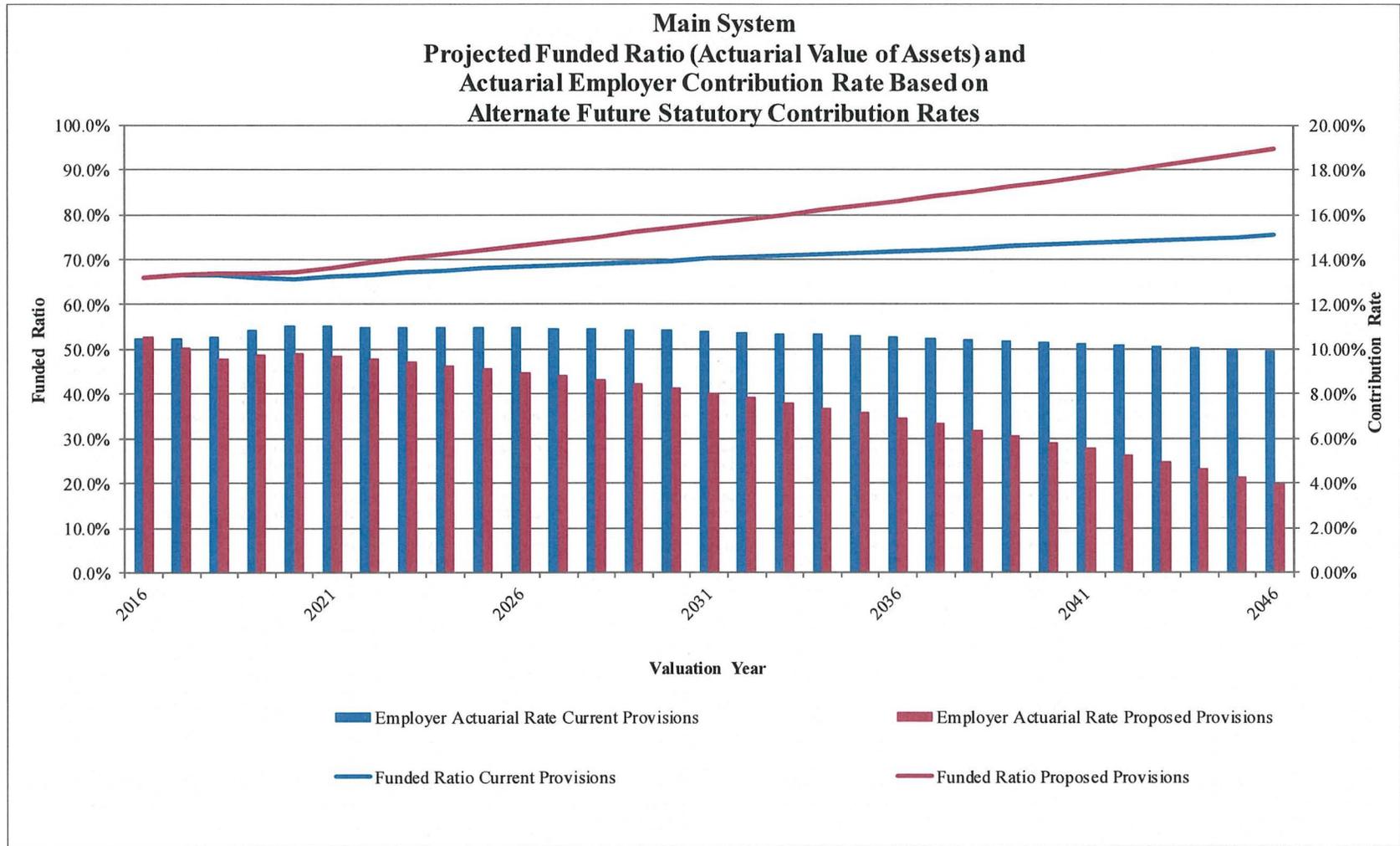


Exhibit II(a)

North Dakota Public Employees Retirement System - Main System
 Projection Results Based on the Actuarial Valuation as of July 1, 2016
 Current Plan Provisions
 (\$ in thousands)

Year	Results Based on Actuarial Value of Assets										Results Based on Market Value of Assets								
	Present Value		Actuarial		Unfunded		Projected	Employer Actuarial Rate (%)			Statutory Contribution Amount (\$)			Benefit	Employer			Member Counts	
	Future Benefits	Accrued Liability	Assets	Accrued Liability	Funded Ratio	Payroll	Normal Cost	Amortization of UAL	Total	Employer (7.12%)	Employee (7.00%)	Total	Payments and Expenses	Assets	Funded Ratio	Rate	Active	Ben Recip.	
2016	\$ 4,418,264	\$ 3,299,381	\$ 2,180,749	\$ 1,118,632	66.1%	\$ 1,078,313	3.24%	7.24%	10.48%	\$ 72,960	\$ 71,997	\$ 144,957	\$ 148,346	\$ 2,324,784	70.5%	9.55%	22,762	10,394	
2017	4,690,061	3,515,754	2,342,737	1,173,017	66.6%	1,132,443	3.24%	7.23%	10.47%	76,776	75,482	152,258	160,403	2,502,301	71.2%	9.49%	22,762	10,981	
2018	4,973,004	3,743,748	2,496,454	1,247,294	66.7%	1,188,841	3.25%	7.32%	10.57%	80,630	79,271	159,901	171,713	2,690,210	71.9%	9.43%	22,762	11,566	
2019	5,269,525	3,984,267	2,626,972	1,357,296	65.9%	1,247,288	3.26%	7.59%	10.85%	84,646	83,219	167,864	183,283	2,889,403	72.5%	9.39%	22,762	12,190	
2020	5,580,020	4,236,983	2,782,107	1,454,877	65.7%	1,308,158	3.26%	7.76%	11.02%	88,807	87,310	176,117	196,362	3,099,516	73.2%	9.33%	22,762	12,844	
2021	5,903,938	4,501,486	2,979,498	1,521,988	66.2%	1,371,251	3.26%	7.75%	11.01%	93,141	91,571	184,712	211,020	3,320,137	73.8%	9.27%	22,762	13,539	
2022	6,243,144	4,777,382	3,185,792	1,591,590	66.7%	1,436,063	3.27%	7.73%	11.00%	97,633	95,988	193,621	227,182	3,550,870	74.3%	9.23%	22,762	14,275	
2023	6,597,583	5,064,948	3,401,243	1,663,705	67.2%	1,503,842	3.27%	7.72%	10.99%	102,248	100,524	202,772	244,141	3,791,947	74.9%	9.18%	22,762	15,031	
2024	6,966,819	5,364,022	3,625,727	1,738,295	67.6%	1,574,124	3.27%	7.71%	10.98%	107,074	105,269	212,342	262,451	4,043,229	75.4%	9.13%	22,762	15,826	
2025	7,351,250	5,674,589	3,859,224	1,815,365	68.0%	1,646,921	3.27%	7.69%	10.96%	112,078	110,189	222,266	281,926	4,304,688	75.9%	9.08%	22,762	16,625	
2026	7,751,298	5,997,093	4,102,178	1,894,915	68.4%	1,723,004	3.27%	7.68%	10.95%	117,261	115,284	232,545	302,107	4,576,772	76.3%	9.02%	22,762	17,446	
2027	8,167,103	6,331,750	4,354,809	1,976,941	68.8%	1,802,441	3.26%	7.65%	10.91%	122,678	120,610	243,288	323,336	4,859,726	76.8%	8.96%	22,762	18,265	
2028	8,599,598	6,679,261	4,617,800	2,061,460	69.1%	1,885,516	3.26%	7.63%	10.89%	128,334	126,171	254,505	345,183	5,154,269	77.2%	8.90%	22,762	19,077	
2029	9,049,370	7,041,005	4,892,496	2,148,509	69.5%	1,972,457	3.26%	7.60%	10.86%	134,249	131,986	266,235	367,071	5,461,819	77.6%	8.85%	22,762	19,869	
2030	9,517,473	7,418,247	5,180,102	2,238,145	69.8%	2,063,741	3.26%	7.57%	10.83%	140,439	138,072	278,511	389,235	5,783,696	78.0%	8.79%	22,762	20,653	
2031	10,005,493	7,812,288	5,481,848	2,330,440	70.2%	2,159,348	3.25%	7.53%	10.78%	146,938	144,462	291,400	411,802	6,121,266	78.4%	8.72%	22,762	21,438	
2032	10,518,661	8,227,868	5,802,317	2,425,551	70.5%	2,259,097	3.25%	7.49%	10.74%	153,746	151,154	304,900	431,558	6,479,341	78.7%	8.65%	22,762	22,223	
2033	11,054,852	8,662,709	6,139,110	2,523,599	70.9%	2,363,499	3.25%	7.45%	10.70%	160,848	158,137	318,985	455,580	6,855,734	79.1%	8.59%	22,762	23,006	
2034	11,614,920	9,117,588	6,492,999	2,624,588	71.2%	2,472,249	3.24%	7.41%	10.65%	168,281	165,445	333,726	480,830	7,251,318	79.5%	8.51%	22,762	23,779	
2035	12,200,054	9,593,073	6,864,580	2,728,493	71.6%	2,585,551	3.24%	7.36%	10.60%	176,024	173,057	349,082	507,522	7,666,767	79.9%	8.44%	22,762	24,572	
2036	12,811,528	10,090,406	7,255,143	2,835,262	71.9%	2,704,109	3.23%	7.32%	10.55%	184,091	180,989	365,080	535,074	8,103,445	80.3%	8.36%	22,762	25,365	
2037	13,450,501	10,610,716	7,665,871	2,944,844	72.2%	2,827,697	3.23%	7.27%	10.50%	192,533	189,288	381,820	563,765	8,562,638	80.7%	8.28%	22,762	26,135	
2038	14,118,406	11,154,669	8,097,457	3,057,212	72.6%	2,956,168	3.22%	7.22%	10.44%	201,332	197,939	399,271	594,113	9,045,164	81.1%	8.20%	22,762	26,885	
2039	14,816,360	11,723,769	8,551,426	3,172,343	72.9%	3,090,495	3.22%	7.16%	10.38%	210,479	206,932	417,411	625,348	9,552,683	81.5%	8.12%	22,762	27,641	
2040	15,545,668	12,318,341	9,028,177	3,290,164	73.3%	3,230,650	3.21%	7.11%	10.32%	220,043	216,335	436,378	658,826	10,085,723	81.9%	8.03%	22,762	28,420	
2041	16,307,300	12,939,076	9,528,500	3,410,576	73.6%	3,376,260	3.21%	7.05%	10.26%	230,022	226,146	456,168	694,223	10,645,186	82.3%	7.95%	22,762	29,167	
2042	17,102,841	13,586,588	10,053,121	3,533,467	74.0%	3,527,522	3.21%	6.99%	10.20%	240,390	236,338	476,728	731,629	11,231,900	82.7%	7.87%	22,762	29,903	
2043	17,933,265	14,261,830	10,603,125	3,658,705	74.3%	3,685,106	3.20%	6.93%	10.13%	251,160	246,927	498,086	770,786	11,847,053	83.1%	7.77%	22,762	30,614	
2044	18,800,293	14,966,131	11,179,987	3,786,143	74.7%	3,849,388	3.20%	6.86%	10.06%	262,380	257,957	520,337	811,485	12,492,248	83.5%	7.69%	22,762	31,295	
2045	19,705,224	15,700,522	11,784,907	3,915,615	75.1%	4,020,712	3.19%	6.80%	9.99%	274,076	269,457	543,534	854,147	13,168,829	83.9%	7.58%	22,762	31,982	
2046	20,649,646	16,466,073	12,419,139	4,046,934	75.4%	4,199,485	3.19%	6.73%	9.92%	286,275	281,450	567,725	898,861	13,878,208	84.3%	7.49%	22,762	32,632	

North Dakota Public Employees Retirement System - Main System
 Projection Results Based on the Actuarial Valuation as of July 1, 2016

Proposed Plan Provisions - 1.00 percent of pay increase to the employee contribution rate and the statutory employer contribution rate
 (\$ in thousands)

Year	Results Based on Actuarial Value of Assets										Results Based on Market Value of Assets								
	Present Value		Actuarial		Unfunded		Projected		Employer Actuarial Rate (%)		Statutory Contribution Amount (\$)			Benefit Payments and Expenses		Employer Actuarial		Member Counts	
	Future Benefits	Accrued Liability	Assets	Accrued Liability	Funded Ratio	Payroll	Normal Cost	Amortization of UAL	Total	Employer (8.12%)	Employee (8.00%)	Total	Assets	Funded Ratio	Rate	Active	Ben Recip.		
2016	\$ 4,431,386	\$ 3,303,846	\$ 2,180,749	\$ 1,123,098	66.0%	\$ 1,078,313	3.30%	7.27%	10.57%	\$ 72,960	\$ 71,997	\$ 144,957	\$ 148,346	2,324,784	70.4%	9.64%	22,762	10,394	
2017	4,706,199	3,521,348	2,342,737	1,178,611	66.5%	1,132,443	2.82%	7.26%	10.08%	76,776	75,482	152,258	160,403	2,502,301	71.1%	9.10%	22,762	10,981	
2018	4,992,299	3,750,589	2,513,600	1,236,989	67.0%	1,188,841	2.33%	7.26%	9.59%	91,954	84,933	176,888	171,834	2,707,744	72.2%	8.45%	22,762	11,566	
2019	5,292,186	3,992,506	2,668,712	1,323,794	66.8%	1,247,288	2.35%	7.41%	9.76%	96,534	95,107	191,641	183,519	2,932,804	73.5%	8.28%	22,762	12,190	
2020	5,606,356	4,246,846	2,850,770	1,396,076	67.1%	1,308,158	2.36%	7.45%	9.81%	101,280	99,783	201,063	196,646	3,172,018	74.7%	8.09%	22,762	12,844	
2021	5,934,280	4,513,212	3,077,874	1,435,338	68.2%	1,371,251	2.37%	7.31%	9.68%	106,222	104,653	210,875	211,359	3,425,276	75.9%	7.91%	22,762	13,539	
2022	6,277,893	4,791,241	3,317,171	1,474,070	69.2%	1,436,063	2.38%	7.16%	9.54%	111,346	109,700	221,046	227,585	3,692,502	77.1%	7.72%	22,762	14,275	
2023	6,637,155	5,081,227	3,569,370	1,511,857	70.2%	1,503,842	2.39%	7.02%	9.41%	116,608	114,885	231,493	244,613	3,974,268	78.2%	7.53%	22,762	15,031	
2024	7,011,645	5,383,040	3,834,722	1,548,317	71.2%	1,574,124	2.40%	6.86%	9.26%	122,112	120,307	242,419	263,003	4,270,818	79.3%	7.33%	22,762	15,826	
2025	7,401,798	5,696,685	4,113,578	1,583,107	72.2%	1,646,921	2.40%	6.71%	9.11%	127,819	125,930	253,749	282,567	4,582,535	80.4%	7.12%	22,762	16,625	
2026	7,808,064	6,022,649	4,406,779	1,615,871	73.2%	1,723,004	2.41%	6.55%	8.96%	133,730	131,754	265,484	302,844	4,910,312	81.5%	6.92%	22,762	17,446	
2027	8,230,609	6,361,169	4,714,987	1,646,183	74.1%	1,802,441	2.42%	6.37%	8.79%	139,908	137,840	277,748	324,182	5,254,882	82.6%	6.70%	22,762	18,265	
2028	8,670,404	6,712,983	5,039,362	1,673,621	75.1%	1,885,516	2.42%	6.19%	8.61%	146,358	144,195	290,553	346,150	5,617,494	83.7%	6.47%	22,762	19,077	
2029	9,128,053	7,079,511	5,381,774	1,697,737	76.0%	1,972,457	2.42%	6.01%	8.43%	153,104	150,841	303,945	368,168	6,000,152	84.8%	6.24%	22,762	19,869	
2030	9,604,643	7,462,055	5,743,994	1,718,061	77.0%	2,063,741	2.43%	5.81%	8.24%	160,163	157,797	317,960	390,476	6,404,803	85.8%	6.01%	22,762	20,653	
2031	10,101,797	7,861,944	6,127,860	1,734,083	77.9%	2,159,348	2.43%	5.60%	8.03%	167,576	165,099	332,675	413,212	6,833,490	86.9%	5.75%	22,762	21,438	
2032	10,624,779	8,283,940	6,538,607	1,745,334	78.9%	2,259,097	2.43%	5.39%	7.82%	175,339	172,748	348,087	433,168	7,291,751	88.0%	5.50%	22,762	22,223	
2033	11,171,505	8,725,805	6,974,540	1,751,265	79.9%	2,363,499	2.43%	5.17%	7.60%	183,439	180,728	364,166	457,415	7,778,184	89.1%	5.23%	22,762	23,006	
2034	11,742,861	9,188,347	7,437,199	1,751,148	80.9%	2,472,249	2.43%	4.94%	7.37%	191,916	189,080	380,996	482,920	8,294,517	90.3%	4.95%	22,762	23,779	
2035	12,340,076	9,672,168	7,927,996	1,744,172	82.0%	2,585,551	2.43%	4.71%	7.14%	200,747	197,780	398,527	509,905	8,842,330	91.4%	4.67%	22,762	24,572	
2036	12,964,462	10,178,544	8,449,111	1,729,433	83.0%	2,704,109	2.43%	4.46%	6.89%	209,947	206,844	416,791	537,781	9,423,981	92.6%	4.38%	22,762	25,365	
2037	13,617,208	10,708,640	9,002,694	1,705,946	84.1%	2,827,697	2.43%	4.21%	6.64%	219,574	216,329	435,902	566,838	10,041,827	93.8%	4.08%	22,762	26,135	
2038	14,299,798	11,263,158	9,590,475	1,672,683	85.1%	2,956,168	2.43%	3.95%	6.38%	229,609	226,216	455,825	597,591	10,697,845	95.0%	3.76%	22,762	26,885	
2039	15,013,389	11,843,654	10,215,115	1,628,539	86.2%	3,090,495	2.43%	3.68%	6.11%	240,041	236,493	476,534	629,261	11,394,955	96.2%	3.44%	22,762	27,641	
2040	15,759,304	12,450,449	10,878,193	1,572,256	87.4%	3,230,650	2.43%	3.40%	5.83%	250,948	247,240	498,188	663,259	12,135,004	97.5%	3.11%	22,762	28,420	
2041	16,538,542	13,084,259	11,581,807	1,502,452	88.5%	3,376,260	2.43%	3.11%	5.54%	262,329	258,452	520,781	699,237	12,920,348	98.7%	2.77%	22,762	29,167	
2042	17,352,743	13,745,739	12,328,093	1,417,646	89.7%	3,527,522	2.43%	2.80%	5.23%	274,152	270,101	544,253	737,273	13,753,383	100.1%	2.41%	22,762	29,903	
2043	18,202,929	14,435,888	13,119,675	1,316,214	90.9%	3,685,106	2.43%	2.49%	4.92%	286,435	282,202	568,637	777,102	14,637,010	101.4%	2.05%	22,762	30,614	
2044	19,090,879	15,156,086	13,959,695	1,196,391	92.1%	3,849,388	2.43%	2.17%	4.60%	299,231	294,808	594,039	818,519	15,574,684	102.8%	1.67%	22,762	31,295	
2045	20,017,918	15,907,391	14,851,133	1,056,258	93.4%	4,020,712	2.43%	1.83%	4.26%	312,570	307,951	620,521	861,975	16,569,732	104.2%	1.28%	22,762	31,982	
2046	20,985,667	16,690,890	15,797,166	893,724	94.6%	4,199,485	2.43%	1.49%	3.92%	326,482	321,657	648,139	907,565	17,625,707	105.6%	0.88%	22,762	32,632	

ACTUARIAL ASSUMPTIONS

Normal cost and the allocation of benefit values between service rendered before and after the valuation date were determined using the *Individual Entry Age Normal* actuarial cost method having the following characteristics:

- The normal cost for each individual active member, payable from the date of employment to the date of retirement, is sufficient to accumulate the value of the member's benefit at the time of retirement; and
- Each annual normal cost is a constant percentage of the member's year by year projected covered pay.

Financing of Unfunded Actuarial Accrued Liabilities. The unfunded actuarial accrued liability is amortized using 20-year open level-percentage of pay amortization of the unfunded liability as of the valuation date.

Actuarial Value of Pension Plan Assets. The asset value is the actuarial value of assets which is calculated by recognizing 100 percent of the current year's interest and dividends and 20 percent of the current year and previous four years' total appreciation/(depreciation). The total appreciation/(depreciation) for a given year is fully recognized after a five-year period.

Valuation Assumptions

The contribution and benefit values of the System are calculated by applying actuarial assumptions to the benefit provisions and census information furnished, using the actuarial cost method described above.

The principal areas of financial risk which require assumptions about future experiences are:

- Long-term rates of investment return to be generated by the assets of the Plan;
- Patterns of pay increases to members;
- Rates of mortality among members, retirees and beneficiaries;
- Rates of withdrawal of active members;
- Rates of disability among members; and
- The age patterns of actual retirement.

In a valuation, the monetary effect of each assumption is calculated for as long as a present covered person survives; a period of time which can be as long as a century.

Actual experience of the Plan will not coincide exactly with assumed experience. Each valuation provides a complete recalculation of assumed future experience and takes into account all past differences between assumed and actual experience. The result is a continual series of adjustments (usually small) to the computed contribution rate.

From time-to-time it becomes appropriate to modify one or more of the assumptions, to reflect experience trends (but not random year-to-year fluctuations). Thus, an experience review of the North Dakota Public Employees Retirement System for the period July 1, 2009, to July 1, 2014, was performed to compare the demographic and economic experience against the actuarial assumptions used in the valuations. The actuarial assumptions described in this section were adopted by the Board for use beginning with the July 1, 2015, valuation. Additional information

ACTUARIAL ASSUMPTIONS

regarding the rationale for the assumptions may be found in the 2015 experience review report. **The experience review was performed by the prior actuary.** All actuarial assumptions are expectations of future experience, not current market measures.

The assumptions were provided by, and are the responsibility of, the NDPERS Board. GRS was unable to judge the reasonableness of the assumptions and methods without performing a substantial amount of additional work beyond the scope of the assignment, and did not do so.

Current Valuation Assumptions and Methods

The assumed rate of investment return used was 8.00 percent, net of expenses, annually.

The assumed rate of price inflation is 3.50 percent.

No Cost of Living Adjustments (COLA) are provided to benefits recipients. Therefore, there is no assumption for this valuation.

The rates of annual salary increase used for individual members are in accordance with the following table. This assumption is used to project a member's current salary to the salaries upon which benefit amounts will be based.

<u>Service At Beginning of Year</u>	<u>State Employee</u>	<u>Non-State Employee</u>	<u>Law Enforcement</u>	<u>Judges</u>
0	12.00%	15.00%	20.00%	
1	9.50%	10.00%	20.00%	
2	7.25%	8.00%	20.00%	
3			10.00%	
4			10.00%	
<u>Age</u>				
Under 30	7.25%	10.00%	7.25%	4.00%
30-39	6.50%	7.50%	6.50%	4.00%
40-49	6.25%	6.75%	6.25%	4.00%
50-59	5.75%	6.50%	5.75%	4.00%
60+	5.00%	5.25%	5.00%	4.00%

The assumed rate of total payroll growth used in amortizing the unfunded liability as a level percentage of pay is:

Main System and Law Enforcement: 4.50 percent

Judges: 4.00 percent

ACTUARIAL ASSUMPTIONS

The mortality assumptions are as follows:

	Male Setback	Female Setback
RP-2000 Combined Healthy Mortality Table (healthy mortality)	2 years	3 years
RP-2000 Disabled Retiree Mortality Table (disabled post retirement)*	1 year	0 years

*Rates multiplied by 125 percent.

To provide a margin for future mortality improvements, generational mortality improvements from the year 2014 using the Social Security Administration (SSA) 2014 Intermediate Cost scale were assumed.

Following is a table with the life expectancies by age as of the valuation date.

Age	<u>Healthy Mortality</u>		<u>Disabled Mortality</u>	
	Future Life		Future Life	
	<u>Expectancy (years) in 2016</u>		<u>Expectancy (years) in 2016</u>	
	Men	Women	Men	Women
20	67.65	72.06	32.27	49.75
25	62.25	66.64	30.36	45.90
30	56.86	61.22	28.35	41.98
35	51.49	55.82	26.21	37.97
40	46.17	50.44	23.85	33.83
45	40.91	45.11	21.15	29.52
50	35.70	39.83	18.27	25.27
55	30.58	34.64	15.76	21.51
60	25.63	29.56	13.57	18.22
65	20.97	24.71	11.54	15.22
70	16.74	20.23	9.58	12.45
75	12.92	16.11	7.73	9.95
80	9.60	12.46	6.12	7.79
85	6.86	9.28	4.81	5.97
90	4.78	6.69	3.63	4.49
95	3.40	4.89	2.55	3.40
100	2.59	3.85	1.92	2.76
105	2.15	3.13	1.60	2.14

ACTUARIAL ASSUMPTIONS

Rates of separation from active membership are represented by the following table (rates do not apply to members eligible to retire and do not include separation on account of death or disability). This assumption measures the probabilities of members terminating employment.

Service Beginning of Year	Service and Age-Based Rates For First Five Years of Service					
	Main System			Law Enforcement		
	Age					
	Under 30	30-39	40+	Under 30	30-39	40+
0	22.00%	16.00%	12.00%	25.00%	20.00%	17.00%
1	18.00%	14.00%	10.00%	23.00%	17.00%	15.00%
2	16.00%	12.00%	10.00%	20.00%	15.00%	12.00%
3	14.00%	12.00%	8.00%	17.00%	13.00%	10.00%
4	14.00%	11.00%	7.00%	15.00%	11.00%	7.00%

Age	Age-Based Rates Only After First Five Years of Service	
	Main System	Law Enforcement
20-24	8.80%	8.80%
25-29	8.80%	8.80%
30-34	5.50%	5.50%
35-39	4.70%	4.70%
40-44	3.90%	3.90%
45-49	3.70%	3.70%
50-54	3.40%	3.40%
55-59	0.10%	0.10%
60+	0.20%	0.20%

No pre-retirement termination is assumed for Judges.

Vested participants that terminate are assumed to elect the option with the greater present value:

- 1) *A refund of their accumulated contributions with interest or*
- 2) *A deferred benefit.*

Withdrawal rates end upon eligibility for early retirement.

Early retirement eligibility is as follows:

Main System: Earlier of (i) age 55 and 3 years of service, and (ii) eligibility for Rule of 85.

Law Enforcement: Age 50 and 3 years of service.

Account Balance Due to Vested Employer Contribution (PEP): Participation Under Chapter 54-52.2: If not elected: None. If elected: 100% of active members of the Main System and Law Enforcement. Contribution: Maximum allowed, based on service at the beginning of the Plan year.

ACTUARIAL ASSUMPTIONS

Rates of disability:

Before age 65: Males: 20% of OASDI disability incidence rates.
 Females: 10% of OASDI disability incidence rates.
 Age 65 and later: 0.25% per year.

Rates of disability were as follows:

Age	All Plans	
	Male	Female
20	0.0120%	0.0060%
25	0.0171%	0.0085%
30	0.0220%	0.0110%
35	0.0295%	0.0147%
40	0.0440%	0.0220%
45	0.0719%	0.0360%
50	0.1212%	0.0606%
55	0.2018%	0.1009%
60	0.3254%	0.1627%
65	0.2500%	0.2500%

Social Security Disability (for Judges' disability benefit offset):

Eligibility: 50%
 Consumer Price Index Increases: 3.5% per annum
 Wage Base Increases: 5.0% per annum

Workers' Compensation (for Judges' disability benefit offset):

None assumed.

ACTUARIAL ASSUMPTIONS

Rates of retirement for members eligible to retire during the next year were as follows:

Age	Main System		Law Enforcement	Judges
	Reduced	Unreduced	Unreduced	Unreduced
50		30.00%	25.00%	
51		10.00%	25.00%	
52		10.00%	25.00%	
53		10.00%	25.00%	
54		10.00%	25.00%	
55	1.00%	10.00%	10.00%	10.00%
56	1.00%	8.00%	10.00%	10.00%
57	1.00%	8.00%	10.00%	10.00%
58	1.00%	8.00%	10.00%	10.00%
59	1.00%	8.00%	10.00%	10.00%
60	2.00%	8.00%	10.00%	10.00%
61	5.00%	15.00%	10.00%	10.00%
62	10.00%	30.00%	50.00%	10.00%
63	10.00%	30.00%	50.00%	10.00%
64	10.00%	20.00%	50.00%	10.00%
65		30.00%	50.00%	20.00%
66		20.00%	20.00%	20.00%
67		15.00%	20.00%	20.00%
68		15.00%	20.00%	20.00%
69		15.00%	20.00%	20.00%
70		15.00%	20.00%	20.00%
71		15.00%	20.00%	20.00%
72		15.00%	20.00%	20.00%
73		15.00%	20.00%	20.00%
74		15.00%	20.00%	20.00%
75+		100.00%	100.00%	100.00%

ACTUARIAL ASSUMPTIONS

Assumed Service**Credit:**

All active members (full time and part time) are assumed to earn one full year of service for each assumed future year of service.

Marital Status:

It is assumed that 75 percent of participants in the Main System and Law Enforcement and 100 percent of Judges have an eligible spouse at the time of retirement or pre-retirement death. The male spouse is assumed to be three years older than the female spouse.

Form of Payment Election Assumption:	Form of Payment	Main System and Law Enforcement		Judges
	Life Annuity	50%		0%
	50% Joint and Survivor	45%		100%
	Refund of Member Contributions	5%		0%

Benefit Service:

Exact fractional years of service are used to determine the amount of benefit payable.

Decrement Timing:

All decrements are assumed to occur at the middle of the year.

Decrement**Operation:**

Turnover decrements do not operate after the member reaches retirement eligibility (early or normal).

Eligibility Testing:

Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.

Pay Increase Timing:

End of (fiscal) year.

Expenses:

Assumed administrative expenses were added to the Normal Cost and are based on the prior year's expenses, adjusted for inflation. The assumed amount added to the Normal Cost is:

Expenses	Main System	Judges	Law Enforcement		Total
			With Prior	Without Prior	
Assumed FY 2016	\$ 2,400,044	\$ 11,559	\$ 29,842	\$ 7,402	\$ 2,448,847
Actual FY 2016	2,481,187	11,685	37,211	7,716	2,537,799
Assumed FY 2017	2,568,029	12,094	38,513	7,986	2,626,622

ACTUARIAL ASSUMPTIONS

Assumptions for

Missing or

Incomplete Data:

Annual compensation for members with no pay or equal to \$100 or less was assumed to be \$44,831.

BENEFIT PROVISIONS

This section summarizes the major benefit provisions of the North Dakota Public Employees Retirement System as included in the valuation. It is not intended to be, nor should it be, interpreted as a complete statement of all plan provisions.

1. Normal Service Retirement:

➤ Eligibility:

Main System and Judges:

Attainment of age 65, or at any age with age plus service equal to at least 85 (Rule of 85).

For members enrolled after December 31, 2015, into the Main System, attainment of age 65, or at age 60 with age plus service equal to at least 90 (Rule of 90).

Law Enforcement:

Attainment of age 55 and three consecutive years of service, or if not former National Guard, at any age with age plus service equal to at least 85 (Rule of 85). Former National Guard is eligible for Rule of 85 on August 1, 2015.

➤ Benefit:

Main System and Law Enforcement:

2.00% of final average salary multiplied by service.

Judges:

3.50% of final average salary for each of the first ten years of service, 2.80% for each of the next ten years of service and 1.25% for service in excess of twenty years.

2. Early Retirement:

➤ Eligibility:

Main System:

Attainment of age 55 with three years of service.

Judges:

Attainment of age 55 with five years of service.

BENEFIT PROVISIONS

Law Enforcement:

Attainment of age 50 with three years of service.

➤ **Benefit:****Main System:**

The Normal Service Retirement Benefit as determined above. A benefit that begins before age 65 (or Rule of 85, if earlier) is reduced by one-half of one percent for each month before the earlier of age 65 or the age at which the Rule of 85 is met.

For members enrolled after December 31, 2015, into the Main System, a benefit that begins before age 65 (or Rule of 90, if earlier) is reduced by 2/3% of one percent for each month before the earlier of age 65 or the age at which the Rule of 90 is met.

Judges:

The Normal Service Retirement Benefit as determined above. A benefit that begins before age 65 (or Rule of 85, if earlier) is reduced by one-half of one percent for each month before age 65 or the age at which the Rule of 85 is met.

Law Enforcement:

The Normal Service Retirement Benefit as determined above. A benefit that begins before age 55 (or Rule of 85, if earlier) is reduced by one-half of one percent for each month before age 55 or the age at which the Rule of 85 is met.

3. Disability Benefit:➤ **Eligibility:**

Six months of service and inability to engage in any substantial gainful activity.

➤ **Benefit:***Main System and Law Enforcement:*

25% of the member's final average salary at disability minus workers' compensation benefits, with a minimum of \$100 per month.

Judges:

70% of the member's final average salary at disability minus Social Security and Workers' Compensation benefits paid.

BENEFIT PROVISIONS

4. Deferred Vested Retirement:

➤ Eligibility:

Main System and Law Enforcement:

Three years of service.

Judges:

Five years of service.

➤ Benefit:

Main System and Judges:

The Normal Service Retirement Benefit payable at age 65 or the Rule of 85, if earlier. Reduced early retirement benefits can be elected upon attainment of age 55.

Law Enforcement:

The Normal Service Retirement Benefit payable at age 55 or the Rule of 85, if earlier. Reduced early retirement benefit can be selected upon attainment of age 50.

5. Pre-Retirement Death Benefits:

(a) Vested participants with a surviving spouse

➤ Eligibility:

Main System and Law Enforcement:

Three years of service.

Judges:

Five years of service.

➤ Benefit:

Main System and Law Enforcement:

One of the following options:

- Lump sum payment of member's accumulated contributions with interest.

BENEFIT PROVISIONS

- 50% of the member's accrued benefit (not reduced on account of age) payable for the surviving spouse's lifetime.
- Continuation portion of 100% joint and survivor annuity (only if participant was eligible for normal retirement).
- A partial lump sum payment in addition to the one of the annuity options above.

Judges:

One of the following options:

- Lump sum payment of member's accumulated contributions with interest.
- 100% of the member's accrued benefit (not reduced on account of age) payable for the spouse's lifetime.

(b) Non-vested members or vested members without a surviving spouse

➤ Eligibility:

Main System, Judges and Law Enforcement:

Non-vested or no surviving spouse.

➤ Benefit:

Main System, Judges and Law Enforcement:

Lump sum payment of member's accumulated contributions with interest.

6. Refund of Member Contributions:

Paid to terminated non-vested members and terminated vested members who choose a refund of employee contributions in lieu of a monthly retirement benefit.

BENEFIT PROVISIONS

7. Accumulated Member Contributions:

Member contributions accumulate with interest at the following rates:

<u>Time Period</u>	<u>Per Annum Interest Rate</u>
Through June 30, 1981	5.0%
July 1, 1981, to June 30, 1986	6.0%
After June 30, 1986	0.5% less than the actuarial interest rate assumption

8. Standard and Optional Forms of Payment:

Standard form of payment:

Main System and Law Enforcement:

Monthly benefit for life with a refund to beneficiary at death of the remaining balance (if any) of accumulated member contributions.

Judges:

Monthly benefit for life, with 50% payable to an eligible survivor.

Optional forms of payment:

- Life annuity (for Judges).
 - 50% joint and survivor annuity with pop-up (for Main System and Law Enforcement).
 - 100% joint and survivor annuity with pop-up.
 - Twenty-year certain and life annuity.
 - Ten-year certain and life annuity.
 - Social Security level income annuity.
 - A partial lump sum payment in addition to one of the annuity options above.
 - An actuarially equivalent graduated benefit option with either a one percent or two percent increase to be applied the first day of January of each year. Not available for disability or early retirements or in combination with a partial lump sum option, a deferred normal retirement option, or a Social Security level income annuity.

BENEFIT PROVISIONS

9. Final Average Salary:

Average of the highest salary received by the member for any 36 months employed during the last 180 months of employment.

10. Contributions:

Contribution rates specified in the Century Code (except employer rate for Law Enforcement); differ between permanent full-time employees and part-time temporary employees. Rates are as follow:

	<u>Rates Set by Statute</u>		<u>Rates Determined by the Board of Retirement</u>
	<u>Member</u>	<u>Employer</u>	<u>Employer</u>
Main System Full-Time Employees	7.00%	7.12%	
Main System Part-Time Employees	14.12%	0.00%	
Judges	8.00%	17.52%	
Law Enforcement with prior Main System service	5.50%		9.81%
➤ BCI Employees	6.00%		9.81%
➤ National Guard members	5.50%		9.81%
Law Enforcement without prior Main System service	5.50%		7.93%

BENEFIT PROVISIONS

Effective January 1, 2000:

A member's account balance includes vested employer contributions equal to the member's contributions to the deferred compensation Plan under chapter 54-52.2. The vested employer contribution may not exceed:

1. For months one through 12 of service credit, \$25 or 1% of the member's monthly salary, whichever is greater.
2. For months 13 through 24 of service credit, \$25 or 2% of the member's monthly salary, whichever is greater.
3. For months 25 through 36 of service credit, \$25 or 3% of the member's monthly salary, whichever is greater.
4. For service exceeding 36 months, \$25 or 4% of the member's monthly salary, whichever is greater.

Vested employer contributions are credited monthly to the member's account balance.

11. Rollovers:

The fund may accept rollovers from other qualified plans under rules adopted by the Board for the purchase of additional service credit.