

# Wyoming Retirement System – Public Employee Plan

GASB Statement Nos. 67 and 68 Accounting and Financial  
Reporting for Pensions  
For Measurement Date as of December 31, 2019





April 13, 2020

Board of Trustees  
Wyoming Retirement System

Dear Board Members:

This report provides information required by the Wyoming Retirement System (WRS) in connection with the Governmental Accounting Standards Board (GASB) Statement No. 67 and 68 for the Wyoming Retirement System ("WRS"). These calculations have been made on a basis that is consistent with our understanding of these Statements.

GASB Statement No. 67 is the accounting standard that applies to the stand-alone financial reports issued by retirement systems. GASB Statement No. 68 establishes accounting and financial reporting for state and local government employers who provide their employees (including former employees) pension benefits through a trust.

Our calculation of the liability associated with the benefits described in this report was performed for the purpose of providing reporting and disclosure information that satisfies the requirements of GASB Statement Nos. 67 and 68. The Net Pension Liability is not an appropriate measure for measuring the sufficiency of plan assets to cover the estimated cost of settling the employer's benefit obligation. The Net Pension Liability is not an appropriate measure for assessing the need for or amount of future employer contributions. A calculation of the plan's liability for purposes other than satisfying the requirements of GASB Statement Nos. 67 and 68 may produce significantly different results. This report may be provided to parties other than the Wyoming Retirement System ("WRS") only in its entirety and only with the permission of WRS. GRS is not responsible for unauthorized use of this report.

This report is based upon information, furnished to us by WRS, concerning retirement and ancillary benefits, active members, deferred vested members, retirees and beneficiaries, and financial data. This information was checked for internal consistency, but it was not audited.

This report complements the actuarial valuation report that was provided to WRS and should be considered in conjunction with that report. Please see the actuarial valuation report as of January 1, 2019 for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions. Furthermore, this report incorporates the assumptions adopted by the Board effective August 23, 2017. For a detailed description of the experience related to these assumptions, as well as the rationale for any changes, please see our latest Wyoming Retirement System Actuarial Experience Study Report. Our experience study report was dated January 10, 2018 and it covered the five-year investigation period ending December 31, 2016.

To the best of our knowledge, the information contained with this report is accurate and fairly represents the actuarial position of the Wyoming Retirement System. All calculations have been made in conformity with generally accepted actuarial principles and practices as well as with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

The signing individuals are independent of the plan sponsor.

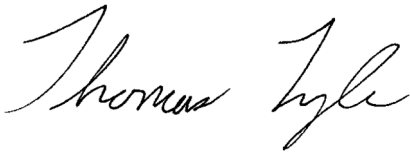
Paul T. Wood and Thomas A. Lyle are members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

**Gabriel, Roeder, Smith & Company**



By \_\_\_\_\_  
Paul T. Wood, ASA, FCA, MAAA



By \_\_\_\_\_  
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# SECTION A

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## EXECUTIVE SUMMARY

# Executive Summary as of December 31, 2019

	<b>2019</b>	
Actuarial Valuation Date	January 1, 2019	
Measurement Date of the Net Pension Liability	December 31, 2019	
Employer's Fiscal Year Ending Date (Reporting Date)	December 31, 2019	
 <b>Membership</b>		
Number of		
- Retirees and Beneficiaries	27,782	
- Inactive, Nonretired Members	31,024	
- Active Members	34,873	
- Total	93,679	
Covered Payroll	\$	1,738,212,750
 <b>Net Pension Liability</b>		
Total Pension Liability	\$	10,140,485,123
Plan Fiduciary Net Position	7,790,558,842	
Net Pension Liability	\$	2,349,926,281
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	76.83 %	
Net Pension Liability as a Percentage of Covered Payroll	135.19 %	
 <b>Development of the Single Discount Rate</b>		
Single Discount Rate	7.00 %	
Long-Term Expected Rate of Investment Return	7.00 %	
Long-Term Municipal Bond Rate*	2.75 %	
Last year ending December 31 in the 2019 to 2118 projection period for which projected benefit payments are fully funded	2118	
 <b>Total Pension Expense</b>	 \$	 309,157,003
 <b>Deferred Outflows and Deferred Inflows of Resources by Source to be recognized in Future Pension Expenses</b>		
	<b>Deferred Outflows of Resources</b>	<b>Deferred Inflows of Resources</b>
Difference between expected and actual experience	\$ 0	\$ 46,339,632
Changes in assumptions	82,823,724	0
Net difference between projected and actual earnings on pension plan investments	462,039,208	812,672,153
Total	\$ 544,862,932	\$ 859,011,785
 <i>*Source: Fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's "20-Year Municipal GO AA Index" as of December 31, 2019. In describing this index, Fidelity notes that the municipal curves are constructed using option-adjusted analytics of a diverse population of over 10,000 tax exempt securities.</i>		



# Discussion

## Accounting Standard

For pension plans that are administered through trusts or equivalent arrangements, Governmental Accounting Standards Board (GASB) Statement No. 67 establishes standards of financial reporting for separately issued financial reports and specifies the required approach for measuring the pension liability. Similarly, GASB Statement No. 68 establishes standards for state and local government employers (as well as non-employer contributing entities) to account for and disclose the net pension liability, pension expense, and other information associated with providing retirement benefits to their employees (and former employees) on their basic financial statements.

The following discussion provides a summary of the information that is required to be disclosed under these accounting standards. A number of these disclosure items are provided in this report. However, certain information, such as notes regarding accounting policies and investments, is not included in this report and the retirement system and/or plan sponsor will be responsible for preparing and disclosing that information to comply with these accounting standards.

## Financial Statements

GASB Statement No. 68 requires state or local governments to recognize the net pension liability and the pension expense on their financial statements. The net pension liability is the difference between the total pension liability and the plan's fiduciary net position. In traditional actuarial terms, this is analogous to the accrued liability less the market value of assets (not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer's contribution requirement).

Paragraph 34 of GASB Statement No. 68 states, "Contributions to the pension plan from the employer subsequent to the measurement date of the collective net pension liability and before the end of the employer's reporting period should be reported as a deferred outflow of resources related to pensions." The information contained in this report does not incorporate any contributions made to WRS subsequent to the measurement date of December 31, 2019.

The pension expense recognized each fiscal year is equal to the change in the net pension liability from the beginning of the year to the end of the year, adjusted for deferred recognition of the liability and investment experience.

Pension plans that prepare their own, stand-alone financial statements are required to present two financial statements – a statement of fiduciary net position and a statement of changes in fiduciary net position in accordance with GASB Statement No. 67. The *statement of fiduciary net position* presents the assets and liabilities of the pension plan at the end of the pension plan's reporting period. The *statement of changes in fiduciary net position* presents the additions, such as contributions and investment income, and deductions, such as benefit payments and expenses, and net increase or decrease in the fiduciary net position.



## Notes to Financial Statements

GASB Statement No. 68 requires the notes of the employer's financial statements to disclose the total pension expense, the pension plan's liabilities and assets, and deferred outflows and inflows of resources related to pensions.

GASB Statement Nos. 67 and 68 require the notes of the financial statements for the employers and pension plans to include certain additional information. The list of disclosure items should include:

- a description of benefits provided by the plan;
- the type of employees and number of members covered by the pension plan;
- a description of the plan's funding policy, which includes member and employer contribution requirements;
- the pension plan's investment policies;
- the pension plan's fiduciary net position and the net pension liability;
- the net pension liability using a discount rate that is 1% higher and 1% lower than used to calculate the total pension liability and net pension liability for financial reporting purposes;
- significant assumptions and methods used to calculate the total pension liability;
- inputs to the discount rates; and
- certain information about mortality assumptions and the dates of experience studies.

Retirement systems that issue stand-alone financial statements are required to disclose additional information in accordance with GASB Statement No. 67. This information includes:

- the composition of the pension plan's Board and the authority under which benefit terms may be amended;
- a description of how fair value is determined;
- information regarding certain reserves and investments, which include concentrations of investments greater than or equal to 5%, receivables, and insurance contracts excluded from plan assets;
- annual money-weighted rate of return.



## Required Supplementary Information

GASB Statement No. 67 requires a 10-year fiscal history of:

- sources of changes in the net pension liability;
- information about the components of the net pension liability and related ratios, including the pension plan's fiduciary net position as a percentage of the total pension liability, and the net pension liability as a percent of covered-employee payroll; and
- a comparison of the actual employer contributions to the actuarially determined contributions based on the plan's funding policy.

## General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.00% on the actuarial value of assets), then the following outcomes are expected:

1. The employer normal cost as a percentage of pay is expected to decrease slightly as a percentage of payroll.
2. The unfunded liability is expected to increase as a percentage of payroll for some time before decreasing.
3. The unfunded liability is not expected to be fully amortized during the lifetimes of current members.
4. The funded status of the plan is expected to remain level for some time before increasing gradually towards a 100% funded ratio.

This funding policy results in no expected crossover date and a GASB single discount rate of 7.00%. This funding policy results in the expectation that the plan's assets will be able to fully pay for promised benefits through at least 2118. The projections in this report are strictly for the purpose of determining the GASB single discount rate and are different from a funding projection for the ongoing plan.

## Timing of the Valuation

An actuarial valuation to determine the total pension liability is required to be performed at least every two years. The net pension liability and pension expense should be measured as of the pension plan's fiscal year end (measurement date) on a date that is within the employer's prior fiscal year. If the actuarial valuation used to determine the total pension liability is not calculated as of the measurement date, the total pension liability is required to be rolled forward from the actuarial valuation date to the measurement date.

The total pension liability shown in this report is based on an actuarial valuation performed as of January 1, 2019 and a measurement date of December 31, 2019.



## Single Discount Rate

Projected benefit payments are required to be discounted to their actuarial present values using a Single Discount Rate that reflects (1) a long-term expected rate of return on pension plan investments (to the extent that the plan's fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating (which is published by the Federal Reserve) as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 7.00%; the municipal bond rate is 2.75% (based on the daily rate closest to but not later than the measurement date of the Fidelity "20-Year Municipal GO AA Index"); and the resulting Single Discount Rate is 7.00%.

## Effective Date and Transition

GASB Statement Nos. 67 and 68 are effective for fiscal years beginning after June 15, 2013, and June 15, 2014 respectively, earlier application is encouraged by the GASB.



## **SECTION B**

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### **FINANCIAL STATEMENTS**

Auditor's Note – This information is intended to assist in preparation of the financial statements of the Wyoming Retirement System. Financial statements are the responsibility of management, subject to the auditor's review. Please let us know if the auditor recommends any changes.

# Statement of Pension Expense under GASB Statement No. 68

## Fiscal Year Ended December 31, 2019

### A. Expense

1. Service Cost	\$	194,455,298
2. Interest on the Total Pension Liability		676,902,286
3. Current-Period Benefit Changes		0
4. Employee Contributions (made negative for addition here)		(157,610,787)
5. Projected Earnings on Plan Investments (made negative for addition here)		(468,137,353)
6. Pension Plan Administrative Expense		6,527,091
7. Other Changes in Plan Fiduciary Net Position		309,531
8. Recognition of Outflow (Inflow) of Resources due to Liabilities		32,143,247
9. Recognition of Outflow (Inflow) of Resources due to Assets		24,567,690
<b>10. Total Pension Expense</b>	<b>\$</b>	<b>309,157,003</b> *

\* In accordance with GASB 71, employers may need to illustrate contributions made after the measurement date.

# Statement of Outflows and Inflows Arising from Current Reporting Period Fiscal Year Ended December 31, 2019

## A. Outflows (Inflows) of Resources due to Liabilities

1. Difference between expected and actual experience of the Total Pension Liability (gains) or losses	\$	(7,044,256)
2. Assumption Changes (gains) or losses	\$	0
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years}		3.9563
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability	\$	(1,780,516)
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for assumption changes	\$	0
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	\$	(1,780,516)
7. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for the difference between expected and actual experience of the Total Pension Liability	\$	(5,263,740)
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for assumption changes	\$	0
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	\$	(5,263,740)

## B. Outflows (Inflows) of Resources due to Assets

1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	\$	(783,381,316)
2. Recognition period for Assets {in years}		5.0000
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets	\$	(156,676,263)
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	\$	(626,705,053)

# History of Deferred Outflows and Inflows of Resources by Source

## Fiscal Year Ended December 31, 2019

**Differences between expected and actual experience - Net (inflows)/outflows of resources**

Recognition Period	4.0139	3.9136	3.8583	4.1947	4.0527	3.9563		Deferred Net (Inflows)/Outflows at Measurement Date
	2014	2015	2016	2017	2018	2019	Total	
<b>Total</b>	\$ -	\$ (66,191,620)	\$ (43,790,701)	\$ (56,701,091)	\$ (49,213,548)	\$ (7,044,256)		
2014	-	-	-	-	-	-	-	-
2015	-	(16,913,231)	-	-	-	-	(16,913,231)	-
2016	-	(16,913,231)	(11,349,740)	-	-	-	(28,262,971)	-
2017	-	(16,913,231)	(11,349,740)	(13,517,317)	-	-	(41,780,288)	-
2018	-	(15,451,927)	(11,349,740)	(13,517,317)	(12,143,398)	-	(52,462,382)	-
2019	-	-	(9,741,481)	(13,517,317)	(12,143,398)	(1,780,516)	(37,182,712)	-
2020	-	-	-	(13,517,317)	(12,143,398)	(1,780,516)	(27,441,231)	\$ (46,339,632)
2021	-	-	-	(2,631,823)	(12,143,398)	(1,780,516)	(16,555,737)	-
2022	-	-	-	-	(639,956)	(1,702,708)	(2,342,664)	-
2023	-	-	-	-	-	-	-	-
2024	-	-	-	-	-	-	-	-
Thereafter	-	-	-	-	-	-	-	-
	\$ -	\$ (66,191,620)	\$ (43,790,701)	\$ (56,701,091)	\$ (49,213,548)	\$ (7,044,256)	\$ (222,941,216)	

**Assumption changes - Net (inflows)/outflows of resources**

Recognition Period	4.0139	3.9136	3.8583	4.1947	4.0527	3.9563		
	2014	2015	2016	2017	2018	2019	Total	
<b>Total</b>	\$ -	\$ -	\$ -	\$ 290,801,601	\$ -	\$ -		
2014	-	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-
2017	-	-	-	69,325,959	-	-	69,325,959	-
2018	-	-	-	69,325,959	-	-	69,325,959	-
2019	-	-	-	69,325,959	-	-	69,325,959	-
2020	-	-	-	69,325,959	-	-	69,325,959	\$ 82,823,724
2021	-	-	-	13,497,765	-	-	13,497,765	-
2022	-	-	-	-	-	-	-	-
2023	-	-	-	-	-	-	-	-
2024	-	-	-	-	-	-	-	-
Thereafter	-	-	-	-	-	-	-	-
	\$ -	\$ -	\$ -	\$ 290,801,601	\$ -	\$ -	\$ 290,801,601	

**Net Difference between projected and actual earnings on pension plan investments - Net (inflows)/outflows of resources**

Recognition Period	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000		
	2014	2015	2016	2017	2018	2019	Total	
<b>Total</b>	\$ 180,861,863	\$ 577,381,461	\$ 35,536,046	\$ (464,917,747)	\$ 758,219,998	\$ (783,381,316)		
2014	36,172,373	-	-	-	-	-	36,172,373	-
2015	36,172,373	115,476,292	-	-	-	-	151,648,665	-
2016	36,172,373	115,476,292	7,107,209	-	-	-	158,755,874	-
2017	36,172,373	115,476,292	7,107,209	(92,983,549)	-	-	65,772,325	-
2018	36,172,371	115,476,292	7,107,209	(92,983,549)	151,644,000	-	217,416,323	-
2019	-	115,476,293	7,107,209	(92,983,549)	151,644,000	(156,676,263)	24,567,690	-
2020	-	-	7,107,210	(92,983,549)	151,644,000	(156,676,263)	(90,908,602)	\$ (350,632,945)
2021	-	-	-	(92,983,551)	151,644,000	(156,676,263)	(98,015,814)	-
2022	-	-	-	-	151,643,998	(156,676,263)	(5,032,265)	-
2023	-	-	-	-	-	(156,676,264)	(156,676,264)	-
2024	-	-	-	-	-	-	-	-
Thereafter	-	-	-	-	-	-	-	-
	\$ 180,861,863	\$ 577,381,461	\$ 35,536,046	\$ (464,917,747)	\$ 758,219,998	\$ (783,381,316)	\$ 303,700,305	

**Total net differences from all sources - Net (inflows)/outflows of resources**

	2014	2015	2016	2017	2018	2019	Total	
<b>Total</b>	\$ 180,861,863	\$ 511,189,841	\$ (8,254,655)	\$ (230,817,237)	\$ 709,006,450	\$ (790,425,572)		
2014	36,172,373	-	-	-	-	-	36,172,373	-
2015	36,172,373	98,563,061	-	-	-	-	134,735,434	-
2016	36,172,373	98,563,061	(4,242,531)	-	-	-	130,492,903	-
2017	36,172,373	98,563,061	(4,242,531)	(37,174,907)	-	-	93,317,996	-
2018	36,172,371	100,024,365	(4,242,531)	(37,174,907)	139,500,602	-	234,279,900	-
2019	-	115,476,293	(2,634,272)	(37,174,907)	139,500,602	(158,456,779)	56,710,937	-
2020	-	-	7,107,210	(37,174,907)	139,500,602	(158,456,779)	(49,023,874)	\$ (314,148,853)
2021	-	-	-	(82,117,609)	139,500,602	(158,456,779)	(101,073,786)	-
2022	-	-	-	-	151,004,042	(158,378,971)	(7,374,929)	-
2023	-	-	-	-	-	(156,676,264)	(156,676,264)	-
2024	-	-	-	-	-	-	-	-
Thereafter	-	-	-	-	-	-	-	-
	\$ 180,861,863	\$ 511,189,841	\$ (8,254,655)	\$ (230,817,237)	\$ 709,006,450	\$ (790,425,572)	\$ 371,560,690	



# Statement of Outflows and Inflows Arising from Current and Prior Reporting Periods Fiscal Year Ended December 31, 2019

## A. Outflows and Inflows of Resources due to Liabilities and Assets to be Recognized in Current Pension Expense

	Outflows of Resources	Inflows of Resources	Net Outflows of Resources
1. Due to Liabilities	\$ 69,325,959	\$ 37,182,712	\$ 32,143,247
2. Due to Assets	274,227,502	249,659,812	24,567,690
<b>3. Total</b>	<b>\$ 343,553,461</b>	<b>\$ 286,842,524</b>	<b>\$ 56,710,937</b>

## B. Outflows and Inflows of Resources by Source to be Recognized in Current Pension Expense

	Outflows of Resources	Inflows of Resources	Net Outflows of Resources
1. Differences between expected and actual experience	\$ 0	\$ 37,182,712	\$ (37,182,712)
2. Assumption Changes	69,325,959	0	69,325,959
3. Net Difference between projected and actual earnings on pension plan investments	274,227,502	249,659,812	24,567,690
<b>4. Total</b>	<b>\$ 343,553,461</b>	<b>\$ 286,842,524</b>	<b>\$ 56,710,937</b>

## C. Deferred Outflows and Deferred Inflows of Resources by Source to be Recognized in Future Pension Expenses

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows of Resources
1. Differences between expected and actual experience	\$ 0	\$ 46,339,632	\$ (46,339,632)
2. Assumption Changes	82,823,724	0	82,823,724
3. Net Difference between projected and actual earnings on pension plan investments	462,039,208	812,672,153	(350,632,945)
<b>4. Total</b>	<b>\$ 544,862,932</b>	<b>\$ 859,011,785</b>	<b>\$ (314,148,853)</b>

## D. Deferred Outflows and Deferred Inflows of Resources by Year to be Recognized in Future Pension Expenses

Year Ending December 31	Net Deferred Outflows of Resources
2020	\$ (49,023,874)
2021	(101,073,786)
2022	(7,374,929)
2023	(156,676,264)
2024	0
Thereafter	0
<b>Total</b>	<b>\$ (314,148,853)</b>



## Statement of Fiduciary Net Position as of December 31, 2019

	<b>2019</b>
<b>Assets</b>	
Cash and Deposits	\$ 260,124,369
Receivables	
Accounts Receivable - Sale of Investments	\$ 28,339,394
Accrued Interest and Other Dividends	17,021,310
Contributions	16,607,418
Accounts Receivable - Other	176,648,086
Total Receivables	\$ 238,616,208
Investments	
Fixed Income	\$ 1,321,249,829
Equities	3,640,214,800
Private Markets	1,260,474,123
Marketable Alternatives	1,306,738,410
Other	354,287,730
Total Investments	\$ 7,882,964,892
<b>Total Assets</b>	<b>\$ 8,381,705,469</b>
<b>Liabilities</b>	
Payables	
Accounts Payable - Purchase of Investments	\$ 566,267,008
Accrued Expenses	24,260,614
Accounts Payable - Other	619,005
Total Liabilities	\$ 591,146,627
<b>Net Position Restricted for Pensions</b>	<b>\$ 7,790,558,842</b>



## Statement of Changes in Fiduciary Net Position for Year Ended December 31, 2019

	<b>2019</b>
<b>Additions</b>	
Contributions	
Employer	\$ 155,456,957
Employee	153,582,203
Other Employer Contributions	1,928,139
Other Employee Contributions	4,028,584
<b>Total Contributions</b>	<b>\$ 314,995,883</b>
Investment Income	
Net Appreciation in Fair Value of Investments	\$ 1,189,569,341
Interest and Dividends	121,126,636
Less Investment Expense	(59,177,308)
<b>Net Investment Income</b>	<b>\$ 1,251,518,669</b>
Other	\$ 0
<b>Total Additions</b>	<b>\$ 1,566,514,552</b>
 <b>Deductions</b>	
Benefit Payments, including Refunds of Employee Contributions	\$ 600,487,685
Pension Plan Administrative Expense	6,527,091
Other	309,531
<b>Total Deductions</b>	<b>\$ 607,324,307</b>
<b>Net Increase in Net Position</b>	<b>\$ 959,190,245</b>
 <b>Net Position Restricted for Pensions</b>	
Beginning of Year	\$ 6,831,368,597
End of Year	<b>\$ 7,790,558,842</b>

## SECTION C

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### REQUIRED SUPPLEMENTARY INFORMATION

Auditor's Note – This information is intended to assist in preparation of the financial statements of the Wyoming Retirement System. Financial statements are the responsibility of management, subject to the auditor's review. Please let us know if the auditor recommends any changes.

# Schedule of Changes in Net Pension Liability and Related Ratios

## Current Reporting Period

### Fiscal Year Ended December 31, 2019

<b>A. Total pension liability</b>	
1. Service cost	\$ 194,455,298
2. Interest on the total pension liability	676,902,286
3. Changes of benefit terms	0
4. Difference between expected and actual experience of the total pension liability	(7,044,256)
5. Changes of assumptions	0
6. Benefit payments, including refunds of employee contributions	(600,487,685)
<b>7. Net change in total pension liability</b>	<b>263,825,643</b>
<b>8. Total pension liability – beginning</b>	<b>9,876,659,480</b>
<b>9. Total pension liability – ending</b>	<b>\$ 10,140,485,123</b>
<b>B. Plan fiduciary net position</b>	
1. Contributions – employer	\$ 157,385,096
2. Contributions – employee	157,610,787
3. Net investment income	1,251,518,669
4. Benefit payments, including refunds of employee contributions	(600,487,685)
5. Pension plan administrative expense	(6,527,091)
6. Other	(309,531)
<b>7. Net change in plan fiduciary net position</b>	<b>959,190,245</b>
<b>8. Plan fiduciary net position – beginning</b>	<b>6,831,368,597</b>
<b>9. Plan fiduciary net position – ending</b>	<b>\$ 7,790,558,842</b>
<b>C. Net pension liability</b>	<b>\$ 2,349,926,281</b>
<b>D. Plan fiduciary net position as a percentage of the total pension liability</b>	<b>76.83 %</b>
<b>E. Covered-employee payroll</b>	<b>\$ 1,738,212,750</b>
<b>F. Net pension liability as a percentage of covered-employee payroll</b>	<b>135.19 %</b>



# Schedules of Required Supplementary Information

## Schedule of Changes in Net Pension Liability and Related Ratios Multiyear

Last 10 Fiscal Years (which may be built prospectively)

Fiscal year ending December 31,	2019	2018	2017	2016	2015	2014
<b>Total pension liability</b>						
Service cost	\$ 194,455,298	\$ 195,575,014	\$ 201,824,345	\$ 219,893,113	\$ 217,488,957	\$ 213,059,299
Interest on the total pension liability	676,902,286	658,459,157	641,429,003	664,368,366	638,943,600	614,848,444
Changes of benefit terms	0	0	0	0	0	0
Difference between expected and actual experience	(7,044,256)	(49,213,548)	(56,701,091)	(43,790,701)	(66,191,620)	0
Changes of assumptions	0	0	290,801,601	0	0	0
Benefit payments, including refunds of employee contributions	(600,487,685)	(566,027,667)	(535,492,257)	(501,610,080)	(469,954,814)	(436,096,614)
<b>Net change in total pension liability</b>	<b>263,825,643</b>	<b>238,792,956</b>	<b>541,861,601</b>	<b>338,860,698</b>	<b>320,286,123</b>	<b>391,811,130</b>
<b>Total pension liability - beginning</b>	<b>9,876,659,480</b>	<b>9,637,866,524</b>	<b>9,096,004,923</b>	<b>8,757,144,225</b>	<b>8,436,858,102</b>	<b>8,045,046,972</b>
<b>Total pension liability - ending (a)</b>	<b>\$ 10,140,485,123</b>	<b>\$ 9,876,659,480</b>	<b>\$ 9,637,866,524</b>	<b>\$ 9,096,004,923</b>	<b>\$ 8,757,144,225</b>	<b>\$ 8,436,858,102</b>
<b>Plan fiduciary net position</b>						
Employer contributions	\$ 157,385,096	\$ 147,632,510	\$ 148,746,669	\$ 151,488,715	\$ 144,622,373	\$ 127,929,930
Employee contributions	157,610,787	151,130,515	149,752,251	152,422,538	153,529,134	137,144,565
Pension plan net investment income	1,251,518,669	(252,571,153)	923,878,089	454,712,993	(67,155,642)	318,184,952
Benefit payments, including refunds of employee contributions	(600,487,685)	(566,027,667)	(535,492,257)	(501,610,080)	(469,954,814)	(436,096,614)
Pension plan administrative expense	(6,527,091)	(7,033,951)	(6,551,109)	(5,993,529)	(5,097,818)	(5,182,863)
Other	(309,531)	(287,669)	(312,336)	(312,336)	(312,704)	5,539,339
<b>Net change in plan fiduciary net position</b>	<b>959,190,245</b>	<b>(527,157,415)</b>	<b>680,021,307</b>	<b>250,708,301</b>	<b>(244,369,471)</b>	<b>147,519,309</b>
<b>Plan fiduciary net position - beginning</b>	<b>6,831,368,597</b>	<b>7,358,526,012</b>	<b>6,678,504,705</b>	<b>6,427,796,404</b>	<b>6,672,165,875</b>	<b>6,524,646,566</b>
<b>Plan fiduciary net position - ending (b)</b>	<b>\$ 7,790,558,842</b>	<b>\$ 6,831,368,597</b>	<b>\$ 7,358,526,012</b>	<b>\$ 6,678,504,705</b>	<b>\$ 6,427,796,404</b>	<b>\$ 6,672,165,875</b>
<b>Net pension liability - ending (a) - (b)</b>	<b>\$ 2,349,926,281</b>	<b>\$ 3,045,290,883</b>	<b>\$ 2,279,340,512</b>	<b>\$ 2,417,500,218</b>	<b>\$ 2,329,347,821</b>	<b>\$ 1,764,692,227</b>
<b>Plan fiduciary net position as a percentage of total pension liability</b>	76.83 %	69.17 %	76.35 %	73.42 %	73.40 %	79.08 %
<b>Covered-employee payroll</b>	\$ 1,738,212,750	\$ 1,741,354,609	\$ 1,776,377,586	\$ 1,782,905,215	\$ 1,744,073,882	\$ 1,709,412,443
<b>Projected valuation payroll</b>	\$ 1,781,668,069	\$ 1,784,888,475	\$ 1,820,787,026	\$ 1,858,678,687	\$ 1,818,197,022	\$ 1,782,062,471
<b>Net pension liability as a percentage of covered-employee payroll</b>	135.19 %	174.88 %	128.31 %	135.59 %	133.56 %	103.23 %

**Notes to Schedule:**

For 2019, 2018, 2017, 2016, and 2015, "Other" changes to Plan Fiduciary Net Position includes other funding sources and depreciation expenses.

For 2014, "Other" changes also may include member redeposits and member service purchase contributions.



## Schedules of Required Supplementary Information

### Schedule of Net Pension Liability Multiyear

Last 10 Fiscal Years (which may be built prospectively)

FY Ending December 31,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered Payroll*	Net Pension Liability as a % of Covered Payroll
2014	\$ 8,436,858,102	\$ 6,672,165,875	\$ 1,764,692,227	79.08 %	\$ 1,709,412,443	103.23 %
2015	8,757,144,225	6,427,796,404	2,329,347,821	73.40 %	1,744,073,882	133.56 %
2016	9,096,004,923	6,678,504,705	2,417,500,218	73.42 %	1,782,905,215	135.59 %
2017	9,637,866,524	7,358,526,012	2,279,340,512	76.35 %	1,776,377,586	128.31 %
2018	9,876,659,480	6,831,368,597	3,045,290,883	69.17 %	1,741,354,609	174.88 %
2019	10,140,485,123	7,790,558,842	2,349,926,281	76.83 %	1,738,212,750	135.19 %

\* Covered payroll is the amount in force as of the valuation date and likely differs from the actual payroll paid during the year.

## Schedule of Contributions Multiyear Last 10 Fiscal Years

FY Ending December 31,	Actuarially Determined Contribution	Actual Contribution*	Contribution Deficiency (Excess)	Covered Payroll**	Actual Contribution as a % of Covered Payroll
2014	\$ 183,086,430	\$ 129,627,747	\$ 53,458,683	\$ 1,709,412,443	7.58 %
2015	168,411,742	144,622,373	23,789,369	1,744,073,882	8.29 %
2016	174,211,753	151,488,715	22,723,038	1,782,905,215	8.50 %
2017	167,125,230	148,746,669	18,378,561	1,776,377,586	8.37 %
2018	191,677,662	147,632,510	44,045,152	1,741,354,609	8.48 %
2019	207,518,684	157,385,096	50,133,588	1,738,212,750	9.05 %

\* Includes other funding sources but excludes member redeposits and member service purchase contributions.

\*\* Covered payroll is the amount in force as of the valuation date and likely differs from the actual payroll paid during the year.

## Notes to Schedule of Contributions

**Valuation Date:** January 1, 2019  
**Notes** Actuarially determined contribution rates are calculated as of July 1 each year for implementation the following fiscal year.

### Methods and Assumptions Used to Determine Contribution Rates:

Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Closed
Remaining Amortization Period	29 years
Asset Valuation Method	5-Year smoothed market
Inflation	2.25%
Salary Increases	2.5% to 6.5% including inflation
Payroll Growth Rate	2.50%
Cost-of-Living Increase	0.00%
Investment Rate of Return	7.00%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2018 valuation pursuant to an experience study of the period 2012 - 2016.
Post-Retirement Mortality	RP-2014 Healthy Annuitant Mortality Table, fully generational, projected with Scale MP-2017 Males: No set back with a multiplier of 100% Females: No set back with a multiplier of 88%
Pre-Retirement Mortality	RP-2014 Employee Mortality Table, fully generational, projected with Scale MP-2017 Males: No set back with a multiplier of 100% Females: No set back with a multiplier of 100%

### Other Information:

**Notes** There were no benefit changes during the year.

The employer is contributing at the rate of 8.62% of salary plus, effective March 5, 2015, an additional 1.0% for park rangers. Employees are contributing at the rate of 8.50% of salary. Per Enrolled Act No. 65, both employee and employer contributions rates will increase 0.25% per year for four years starting in September 1, 2018 to an ultimate employer contribution rate of 9.37% and an ultimate employee contribution rate of 9.25%.

The roll-forward methodology employed for purposes of the GASB disclosures is based on generally accepted actuarial methods.



## Schedule of Investment Returns Multiyear Last 10 Fiscal Years

<u>FY Ending December 31,</u>	<u>Annual Return<sup>1</sup></u>
2014	4.70 %
2015	(0.26)%
2016	7.60 %
2017	14.20 %
2018	(3.52)%
2019	18.72 %

<sup>1</sup> Annual money-weighted rate of return, net of investment expenses.



## SECTION D

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### NOTES TO FINANCIAL STATEMENTS

Auditor's Note – This information is intended to assist in preparation of the financial statements of the Wyoming Retirement System. Financial statements are the responsibility of management, subject to the auditor's review. Please let us know if the auditor recommends any changes.

## Single Discount Rate

A Single Discount Rate of 7.00% was used to measure the total pension liability. This Single Discount Rate was based on the expected rate of return on pension plan investments of 7.00%. The projection of cash flows used to determine this Single Discount Rate assumed that plan member contributions will be made at the current contribution rate and that employer contributions will be made at rates equal to the statutory contribution rate. Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

## Sensitivity of Results

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 7.00%, as well as what the plan's net pension liability would be if it were calculated using a Single Discount Rate that is one percent lower or one percent higher:

### Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

1% Decrease	Current Single Discount Rate Assumption	1% Increase
6.00%	7.00%	8.00%
\$ 3,550,342,189	\$ 2,349,926,281	\$ 1,348,068,781

## Summary of Population Statistics

Inactive Plan Members or Beneficiaries Currently Receiving Benefits	27,782
Inactive Plan Members Entitled to But Not Yet Receiving Benefits	31,024
Active Plan Members	<u>34,873</u>
Total Plan Members	93,679

**SECTION E**

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**SUMMARY OF BENEFITS**

## Summary of Benefits

<b>Covered Members</b>	Any full-time or regular part-time employee of an employer as defined under W.S. 9-3-402(a)(vii)
<b>Tier</b>	Members who join the State of Wyoming Retirement System by August 31, 2012 are in Tier 1, while members who join on or after September 1, 2012 are in Tier 2.
<b>Final Average Salary</b>	For Tier 1 member: employee's average annual salary for the highest paid three continuous years of service. For Tier 2 member: employee's average annual salary for the highest paid five continuous years of service.
<b>Service Retirement</b>	
Eligibility	Tier 1 members may retire upon normal retirement on the date he/she attains age 60 with four or more years of service while Tier 2 members may retire upon normal retirement on the date he/she attains age 65 with four or more years of service. All employees may also retire upon normal retirement on the date that the sum of the member's age and service is at least 85. Tier 1 members are eligible for a reduced benefit at age 50 with four or more years of service and Tier 2 members are eligible for a reduced benefit at age 55 with four or more years of service. All members are eligible for a reduced benefit at any age with 25 or more years of service.
Monthly Benefit	For Tier 1 member: 2.125% of employee's Final Average Salary for each year of credited service for the first 15 years of service credit plus 2.25% of Final Average Salary for any years of service credit exceeding 15 years. For Tier 2 member: 2.000% of employee's Final (5-year) Average Salary for each year of credited service.  This amount is reduced by 5.0% per year that the employee is under age 60 for Tier 1 and under age 65 for Tier 2. However, members retiring with a combined age and service of at least 85 receive an unreduced benefit. Employees hired prior to July 1, 1981 may be entitled to benefits earned under a different formula.
Vesting	Any employee who has left employment with four or more years of service, and who has not withdrawn accumulated contributions, is eligible to receive the above benefit or can elect to receive a lump-sum refund of employee contributions with interest. An employee who terminates with less than four years of service is only eligible for the lump-sum benefit.



## Disability Benefit

Eligibility	Ten or more years of service.
Benefit	Service retirement benefit earned as of the date of disability, payable immediately.
Park Rangers	Effective March 5, 2015, for eligible peace officers as defined under W.S. 6-1-104(a)(vi)(P) whose disability is duty-related, the member shall be eligible immediately for a benefit of 62.5% of the member's final salary.

## Pre-retirement Death Benefit

Eligibility	No age or service requirements.
Benefit	A lump sum equal to two times the employee contributions with interest. If the employee is vested, the beneficiary can elect, in lieu of this lump sum, to receive a monthly annuity equal to the actuarial equivalent of the retirement benefit that would be due the employee.
Park Rangers	Effective March 5, 2015, for eligible peace officers as defined under W.S. 6-1-104(a)(vi)(P) whose death is duty-related, the member shall be eligible immediately for a benefit of 62.5% of member's final actual salary, payable to the surviving spouse plus 6% of the member's final actual salary for each unmarried child under age 18. Payment shall not exceed the member's final actual salary.

## Contributions

Employee	8.25% of salary
Employer	8.37% of salary plus an additional 1.00% for par rangers. Per Enrolled Act No. 65, both employee and employer contribution rates will increase 0.25% per year for the next four years starting in September 1, 2018.
Interest	3.00% annually.

**Cost-of-Living Improvements** W.S. 9-3-454 prohibits benefit changes, including cost-of-living increases, unless the funded ratio stays above 100% plus a margin for adverse experience throughout the life of the benefit change.



## Optional Forms of Payment

All options include the choice to elect a reduced benefit with a self-funded annual COLA of 1%, 2%, or 3% per year. COLAs commence on the July 1<sup>st</sup> following the two-year anniversary of retirement.

- |           |   |
|-----------|---|
| Option 1  | Monthly benefit for life with a lump-sum death benefit equal to the excess (if any) of the employee contributions with interest over the total benefits received.                                 |
| Option 2  | Monthly benefit for life. Upon death, 100% of the benefit continues to be paid to the beneficiary.  |
| Option 2P | Monthly benefit for life. Upon death, 100% of the benefit continues to be paid to the beneficiary. Benefit reverts to Option 1 amount but without the cash refund feature upon beneficiary death. |
| Option 3  | Monthly benefit for life. Upon death, 50% of the benefit continues to be paid to the beneficiary.   |
| Option 3P | Monthly benefit for life. Upon death, 50% of the benefit continues to be paid to the beneficiary. Benefit reverts to Option 1 amount but without the cash refund feature upon beneficiary death.  |
| Option 4a | Monthly benefit for life with a guarantee of 120 monthly payments   |
| Option 4b | Monthly benefit for life with a guarantee of 240 monthly payments   |
| Option 5  | The largest possible monthly benefit payable for life with no lump-sum death benefit.   |

**SECTION F**

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**ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS**



## Summary of Actuarial Assumptions and Methods

The following methods and assumptions were used in preparing the January 1, 2019 actuarial valuation report.

### 1. Valuation Date

The valuation date for any given year is January 1<sup>st</sup>, the first day of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

### 2. Actuarial Cost Method

The actuarial valuation uses the Entry Age Normal (EAN) actuarial cost method, amortized as a level percentage of payroll. Under this method, the employer contribution rate is the sum of (i) the employer normal cost rate, and (ii) the rate that will amortize the unfunded actuarial accrued liability (UAAL).

- a. The valuation is prepared on the projected benefit basis, under which the present value, at the investment return rate assumed to be earned in the future (currently 7.00%), of each participant's expected benefit payable at retirement or death is determined, based on his/her age, service, sex and compensation. The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his/her terminating with a service, disability, or survivor's benefit. Future salary increases are also anticipated. The present value of the expected benefits payable for the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Fund on account of the present group of participants and beneficiaries.
- b. The employer contributions required to support the benefits of the Fund are determined using a level funding approach, and consist of a normal cost contribution and a unfunded accrued liability contribution.
- c. The normal cost contribution is determined using the "entry age normal" actuarial cost method. Under this method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution which, if applied to the compensation of each new participant during the entire period of his/her anticipated covered service, would be required to meet the cost of all benefits payable on his/her behalf based on the benefits provisions applicable for the individual member.
- d. The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability. Amortization bases are established each year and amortized based on the Board's policy. The Board's policy consists of amortizing the unfunded liability as of January 1, 2018, over a closed 30 year period with each subsequent amortization base created as a result of year to year experience changes over individual 20 year closed periods. The current year amortization base is determined by taking the current unfunded liability less the outstanding amounts of prior year bases..



3. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (less than) expected investment income, with interest, dividends, and other income recognized immediately. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of administrative and investment expenses. An adjustment is made if the actuarial value is not within 20% of the Market Value. For any year following a year in which the 20% of market value adjustment was applied, the actuarial value is determined as if the adjustment was not applied in the previous year.

4. Economic Assumptions

a. Investment return

7.00% per year, compounded annually, composed of an assumed 2.25% inflation rate and a 4.75% net real rate of return. This rate represents the assumed return, net of investment expenses.

b. Salary increase rate

Service	Rate	Service	Rate
1	6.50%	14	3.50%
2	6.50%	15	3.25%
3	6.50%	16	3.25%
4	6.00%	17	3.25%
5	5.25%	18	3.25%
6	4.75%	19	3.00%
7	4.25%	20	3.00%
8	4.00%	21	2.75%
9	4.00%	22	2.75%
10	4.00%	23	2.75%
11	3.75%	24	2.75%
12	3.50%	25	2.50%
13	3.50%	25+	2.50%

c. Payroll growth rate

In the amortization of the unfunded actuarial accrued liability, payroll is assumed to increase 2.50% per year. This increase rate is solely due to the effect of inflation on salaries, with no allowance for future membership growth.

d. Cost-of-Living adjustment

No cost-of-living adjustment is assumed since the policy for providing the benefit requires Board approval to make the recommendation to the Joint Appropriations Committee and the funded level of the plan shows a cost-of-living requirement would not be permitted.

5. Demographic Assumptions

a. Mortality

Healthy Pre-Retirement Mortality:

RP-2014 Employee Mortality Table, fully generational, projected with Scale MP-2017

Males: No set back with a multiplier of 100%

Females: No set back with a multiplier of 100%

Healthy Post-Retirement Mortality:

RP-2014 Healthy Annuitant Mortality Table, fully generational, projected with Scale MP-2017

Males: No set back with a multiplier of 100%

Females: No set back with a multiplier of 88%

Disabled Mortality

RP-2014 Disabled Mortality Table, fully generational, projected with Scale MP-2017

Males: No set back with a multiplier of 100%

Females: No set back with a multiplier of 100%

Age	Pre-Retirement		Post-Retirement		Disabled	
	Projected to 2019 using Scale MP-2017					
	Male	Female	Male	Female	Male	Female
20	0.04%	0.02%	0.04%	0.01%	0.05%	0.02%
25	0.05%	0.02%	0.06%	0.03%	0.20%	0.09%
30	0.05%	0.02%	0.09%	0.06%	0.51%	0.24%
35	0.06%	0.03%	0.13%	0.09%	0.92%	0.45%
40	0.07%	0.04%	0.19%	0.14%	1.32%	0.68%
45	0.09%	0.06%	0.27%	0.18%	1.63%	0.90%
50	0.16%	0.11%	0.38%	0.24%	1.92%	1.15%
55	0.27%	0.17%	0.55%	0.32%	2.26%	1.45%
60	0.47%	0.25%	0.78%	0.47%	2.67%	1.74%
65	0.83%	0.36%	1.11%	0.70%	3.18%	2.05%
70	1.35%	0.60%	1.63%	1.08%	3.92%	2.69%
75			2.56%	1.76%	5.18%	3.91%
80			4.27%	2.96%	7.31%	5.88%
85			7.44%	5.18%	10.87%	8.80%
90			13.11%	9.20%	16.69%	12.94%
95			21.02%	15.32%	23.77%	19.05%
100			30.49%	23.34%	31.73%	27.24%

b. Disability and Withdrawal

Age	Disability		Withdrawal		Withdrawal		
	Male	Female	Ultimate		Service	First five years	
			Male	Female		Male	Female
20	0.01%	0.01%	11.00%	10.00%	1	22%	25%
25	0.01%	0.01%	11.00%	10.00%	2	18%	21%
30	0.01%	0.01%	6.00%	6.00%	3	14%	15%
35	0.01%	0.01%	5.00%	5.00%	4	13%	15%
40	0.01%	0.01%	4.00%	5.00%	5	13%	14%
45	0.02%	0.02%	4.00%	5.00%			
50	0.12%	0.05%	3.00%	4.00%			
55	0.24%	0.12%	3.00%	4.00%			
60	0.24%	0.24%	3.00%	4.00%			

c. Retirement Rates

Age	Retirement	
	Unreduced	Reduced
<50	15.0%	1.0%
50	15.0%	0.5%
51	15.0%	0.5%
52	15.0%	0.5%
53	15.0%	0.5%
54	15.0%	0.5%
55	17.0%	1.0%
56	17.0%	1.0%
57	15.0%	1.0%
58	15.0%	1.0%
59	15.0%	2.5%
60	13.0%	2.5%
61	13.0%	2.5%
62	18.0%	2.5%
63	15.0%	2.5%
64	15.0%	2.5%
65	25.0%	
66	30.0%	
67	28.0%	
68	25.0%	
69	25.0%	
70	15.0%	
71	15.0%	
72	15.0%	
73	15.0%	
74	15.0%	
75	15.0%	
76	15.0%	
77	15.0%	
78	15.0%	
79	15.0%	
80+	100.0%	

## 6. Other Assumptions

- a. Percent married: 85.00% of employees are assumed to be married. (No beneficiaries other than the spouse assumed.)
- b. Age difference: Male members are assumed to be three years older than their spouses, and female members are assumed to be three years younger than their spouses.
- c. Percent electing annuity on death (when eligible): All of the spouses of vested, married participants are assumed to elect an annuity.
- d. Percent electing deferred termination benefit: Vested terminating members are assumed to elect a refund or a deferred benefit. It is assumed that 25% of active members who terminate with a deferred vested benefit will elect to have their contributions refunded.
- e. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt at the first age at which unreduced benefits are available, which for this plan is age 60 (65 for Tier 2).
- f. No benefit amount data is available for members entitled to deferred benefits. The benefit is estimated using the final average compensation and service provided by WRS.
- g. There will be no recoveries once disabled. We assume all members are totally disabled.
- h. No surviving spouse will remarry.
- i. Administrative expenses: Assumed to be the average of the prior two years, with each year projected at 2.5% to the valuation date.
- j. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported pay represents amount paid to members during the year ended on the valuation date.
- k. Decrement timing: Decrements of all types are assumed to occur mid-year.
- l. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
- m. Decrement relativity: Decrement rates are converted to probabilities in order to account for multiple decrements.
- n. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in the report, and the actual payroll payable at the time contributions are made.
- o. Benefit Service: All members are assumed to accrue one year of service each year. Exact fractional service is used to determine the amount of benefit payable.

## Experience Analysis

An experience study was conducted on behalf of all WRS' plans covering the five year period ending December 31, 2016. That study provided a detailed analysis concerning the development of the long term inflation rate, real rate of return and discount rate. The study also analyzed each major actuarial assumption (e.g. mortality, salary increases, retirement, termination and disability) and proposed assumptions consistent with the findings. For further information on the experience study and related assumption recommendation, the reader is directed to request the December 31, 2016 Wyoming Retirement System Experience Study.

# SECTION G

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## CALCULATION OF THE SINGLE DISCOUNT RATE

## Calculation of the Single Discount Rate

GASB Statement No. 67 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the Fund to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The Plan Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the assumed valuation discount rate is used. In years where assets are not projected to be sufficient to meet benefit payments, the use of a municipal bond rate is required, as described in the following paragraph.

The Single Discount Rate (SDR) is equivalent to applying these two rates to the benefits that are projected to be paid during the different time periods. The SDR reflects (1) the long-term expected rate of return on pension plan investments (during the period in which the fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating (which is published by the Federal Reserve) as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 7.00%; the municipal bond rate is 2.75%; and the resulting Single Discount Rate is 7.00%.

The tables in this section provide background for the development of the Single Discount Rate.

The **Projection of Contributions** table shows the development of expected contributions in future years. Normal Cost contributions for future hires are not included (nor are their liabilities).

The **Projection of Plan Net Position** table shows the development of expected asset levels in future years.

The **Present Values of Projected Benefit Payments** table shows the development of the Single Discount Rate (SDR). It breaks down the benefit payments into present values for funded and unfunded portions and shows the equivalent total at the SDR.

The projections in this report are strictly for the purpose of determining the GASB single discount rate and are different from a funding projection for the ongoing plan.



# Single Discount Rate Development

## Projection of Contributions

### Ending December 31 for 2019 to 2068

Year	Projected Payroll for Current Employees	Payroll for Future Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Employer Contributions Related to Payroll of Future Employees	Total Contributions
	(a)	(b)=max(0,(c)-(a))	(c)	(d)	(e)=(a)*ER%	(f) = (b)*netER%	(g)=(d)+(e)+(f)
2019	\$ 1,738,212,750	\$ 43,455,319	\$ 1,781,668,069	\$ 157,610,787	\$ 156,232,258	\$ 3,253,283	\$ 317,096,328
2020	1,723,040,245	103,169,526	1,826,209,771	152,919,822	159,295,071	8,239,635	320,454,528
2021	1,624,451,137	247,413,878	1,871,865,015	148,231,166	152,211,071	21,014,434	321,456,671
2022	1,544,957,363	373,704,277	1,918,661,640	142,908,556	144,762,505	33,630,037	321,301,098
2023	1,475,796,783	490,831,398	1,966,628,181	136,511,202	138,282,159	44,154,078	318,947,439
2024	1,413,207,604	602,586,282	2,015,793,886	130,721,703	132,417,552	54,143,101	317,282,356
2025	1,355,469,410	710,719,323	2,066,188,733	125,380,920	127,007,484	63,783,636	316,172,040
2026	1,299,890,888	817,952,563	2,117,843,451	120,239,907	121,799,776	73,339,912	315,379,595
2027	1,244,438,640	926,350,897	2,170,789,537	115,110,574	116,603,901	83,010,238	314,724,713
2028	1,189,313,734	1,035,745,541	2,225,059,275	110,011,520	111,438,697	92,790,504	314,240,721
2029	1,134,585,190	1,146,100,567	2,280,685,757	104,949,130	106,310,632	102,687,447	313,947,209
2030	1,079,490,674	1,258,212,227	2,337,702,901	99,852,887	101,148,276	112,781,612	313,782,775
2031	1,024,389,517	1,371,755,957	2,396,145,474	94,756,030	95,985,298	123,050,439	313,791,767
2032	969,892,700	1,486,156,411	2,456,049,111	89,715,075	90,878,946	133,447,818	314,041,839
2033	916,008,008	1,601,442,331	2,517,450,339	84,730,741	85,829,950	143,980,415	314,541,106
2034	862,391,855	1,717,994,742	2,580,386,597	79,771,247	80,806,117	154,684,996	315,262,360
2035	809,034,713	1,835,861,549	2,644,896,262	74,835,711	75,806,553	165,565,968	316,208,232
2036	755,763,259	1,955,255,410	2,711,018,669	69,908,101	70,815,017	176,640,030	317,363,148
2037	702,311,582	2,076,482,554	2,778,794,136	64,963,821	65,806,595	187,931,993	318,702,409
2038	648,993,586	2,199,270,403	2,848,263,989	60,031,907	60,810,699	199,416,621	320,259,227
2039	596,475,254	2,322,995,335	2,919,470,589	55,173,961	55,889,731	211,036,332	322,100,024
2040	545,020,729	2,447,436,625	2,992,457,354	50,414,417	51,068,442	222,770,898	324,253,757
2041	494,739,230	2,572,529,558	3,067,268,788	45,763,379	46,357,066	234,614,369	326,734,814
2042	446,020,042	2,697,930,466	3,143,950,508	41,256,854	41,792,078	246,533,929	329,582,861
2043	399,019,373	2,823,529,898	3,222,549,271	36,909,292	37,388,115	258,514,167	332,811,574
2044	354,152,271	2,948,960,732	3,303,113,003	32,759,085	33,184,068	270,522,882	336,466,035
2045	311,615,618	3,074,075,210	3,385,690,828	28,824,445	29,198,383	282,545,738	340,568,566
2046	271,528,848	3,198,804,251	3,470,333,099	25,116,418	25,442,253	294,564,671	345,123,342
2047	234,417,135	3,322,674,291	3,557,091,426	21,683,585	21,964,886	306,522,866	350,171,337
2048	200,479,005	3,445,539,707	3,646,018,712	18,544,308	18,784,883	318,391,817	355,721,008
2049	169,750,649	3,567,418,531	3,737,169,180	15,701,935	15,905,636	330,155,744	361,763,315
2050	142,347,805	3,688,250,605	3,830,598,410	13,167,172	13,337,989	341,792,010	368,297,171
2051	118,388,027	3,807,975,343	3,926,363,370	10,950,893	11,092,958	353,283,990	375,327,841
2052	97,806,540	3,926,715,914	4,024,522,454	9,047,105	9,164,473	364,643,538	382,855,116
2053	80,430,874	4,044,704,641	4,125,135,515	7,439,856	7,536,373	375,897,019	390,873,248
2054	65,894,188	4,162,369,715	4,228,263,903	6,095,212	6,174,285	387,088,806	399,358,303
2055	53,729,203	4,280,241,298	4,333,970,501	4,969,951	5,034,426	398,271,929	408,276,306
2056	43,536,414	4,398,783,350	4,442,319,764	4,027,118	4,079,362	409,493,239	417,599,719
2057	35,090,562	4,518,287,196	4,553,377,758	3,245,877	3,287,986	420,782,704	427,316,567
2058	28,138,775	4,639,073,427	4,667,212,202	2,602,837	2,636,603	432,172,279	437,411,719
2059	22,429,422	4,761,463,085	4,783,892,507	2,074,721	2,101,637	443,694,346	447,870,704
2060	17,789,746	4,885,700,074	4,903,489,820	1,645,552	1,666,899	455,373,413	458,685,864
2061	14,029,908	5,012,047,158	5,026,077,066	1,297,767	1,314,602	467,235,631	469,848,000
2062	11,041,460	5,140,687,533	5,151,728,993	1,021,335	1,034,585	479,300,300	481,356,220
2063	8,671,815	5,271,850,403	5,280,522,218	802,143	812,549	491,590,897	493,205,589
2064	6,762,051	5,405,773,222	5,412,535,273	625,490	633,604	504,131,520	505,390,614
2065	5,227,574	5,542,621,081	5,547,848,655	483,551	489,824	516,938,875	517,912,250
2066	4,008,534	5,682,536,337	5,686,544,871	370,789	375,600	530,027,345	530,773,734
2067	3,059,108	5,825,649,385	5,828,708,493	282,967	286,638	543,409,746	543,979,351
2068	2,312,794	5,972,113,411	5,974,426,205	213,933	216,709	557,100,582	557,531,224



# Single Discount Rate Development Projection of Contributions Ending December 31 for 2069 to 2118 (concluded)

Year	Projected Payroll for Current Employees	Payroll for Future Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Employer Contributions Related to Payroll of Future Employees	Total Contributions
	(a)	(b)=max(0,(c)-(a))	(c)	(d)	(e)=(a)*ER%	(f) = (b)*netER%	(g)=(d)+(e)+(f)
2069	\$ 1,720,971	\$ 6,122,065,889	\$ 6,123,786,860	\$ 159,190	\$ 161,255	\$ 571,112,801	\$ 571,433,246
2070	1,257,195	6,275,624,337	6,276,881,532	116,291	117,799	585,457,417	585,691,507
2071	892,280	6,432,911,290	6,433,803,570	82,536	83,607	600,145,946	600,312,089
2072	615,248	6,594,033,411	6,594,648,659	56,910	57,649	615,188,607	615,303,166
2073	412,478	6,759,102,397	6,759,514,875	38,154	38,649	630,596,006	630,672,809
2074	258,009	6,928,244,738	6,928,502,747	23,866	24,175	646,380,309	646,428,350
2075	151,779	7,101,563,537	7,101,715,316	14,040	14,222	662,551,472	662,579,734
2076	87,635	7,279,170,564	7,279,258,199	8,106	8,211	679,120,296	679,136,613
2077	48,269	7,461,191,385	7,461,239,654	4,465	4,523	696,099,167	696,108,155
2078	24,929	7,647,745,716	7,647,770,645	2,306	2,336	713,499,827	713,504,469
2079	11,023	7,838,953,888	7,838,964,911	1,020	1,033	731,333,954	731,336,007
2080	3,537	8,034,935,497	8,034,939,034	327	331	749,612,958	749,613,616
2081	707	8,235,811,803	8,235,812,510	65	66	768,348,373	768,348,504
2082	0	8,441,707,823	8,441,707,823	0	0	787,552,052	787,552,052
2083	0	8,652,750,519	8,652,750,519	0	0	807,236,009	807,236,009
2084	0	8,869,069,282	8,869,069,282	0	0	827,412,458	827,412,458
2085	0	9,090,796,014	9,090,796,014	0	0	848,093,822	848,093,822
2086	0	9,318,065,914	9,318,065,914	0	0	869,292,797	869,292,797
2087	0	9,551,017,562	9,551,017,562	0	0	891,022,370	891,022,370
2088	0	9,789,793,001	9,789,793,001	0	0	913,295,827	913,295,827
2089	0	10,034,537,826	10,034,537,826	0	0	936,126,754	936,126,754
2090	0	10,285,401,272	10,285,401,272	0	0	959,529,055	959,529,055
2091	0	10,542,536,304	10,542,536,304	0	0	983,516,962	983,516,962
2092	0	10,806,099,712	10,806,099,712	0	0	1,008,105,053	1,008,105,053
2093	0	11,076,252,205	11,076,252,205	0	0	1,033,308,267	1,033,308,267
2094	0	11,353,158,510	11,353,158,510	0	0	1,059,141,914	1,059,141,914
2095	0	11,636,987,473	11,636,987,473	0	0	1,085,621,688	1,085,621,688
2096	0	11,927,912,160	11,927,912,160	0	0	1,112,763,676	1,112,763,676
2097	0	12,226,109,964	12,226,109,964	0	0	1,140,584,367	1,140,584,367
2098	0	12,531,762,713	12,531,762,713	0	0	1,169,100,664	1,169,100,664
2099	0	12,845,056,781	12,845,056,781	0	0	1,198,329,894	1,198,329,894
2100	0	13,166,183,201	13,166,183,201	0	0	1,228,289,820	1,228,289,820
2101	0	13,495,337,781	13,495,337,781	0	0	1,258,998,656	1,258,998,656
2102	0	13,832,721,226	13,832,721,226	0	0	1,290,475,080	1,290,475,080
2103	0	14,178,539,257	14,178,539,257	0	0	1,322,738,247	1,322,738,247
2104	0	14,533,002,738	14,533,002,738	0	0	1,355,807,798	1,355,807,798
2105	0	14,896,327,806	14,896,327,806	0	0	1,389,703,874	1,389,703,874
2106	0	15,268,736,001	15,268,736,001	0	0	1,424,447,134	1,424,447,134
2107	0	15,650,454,401	15,650,454,401	0	0	1,460,058,757	1,460,058,757
2108	0	16,041,715,761	16,041,715,761	0	0	1,496,560,465	1,496,560,465
2109	0	16,442,758,655	16,442,758,655	0	0	1,533,974,525	1,533,974,525
2110	0	16,853,827,621	16,853,827,621	0	0	1,572,323,768	1,572,323,768
2111	0	17,275,173,312	17,275,173,312	0	0	1,611,631,599	1,611,631,599
2112	0	17,707,052,645	17,707,052,645	0	0	1,651,922,007	1,651,922,007
2113	0	18,149,728,961	18,149,728,961	0	0	1,693,219,584	1,693,219,584
2114	0	18,603,472,185	18,603,472,185	0	0	1,735,549,535	1,735,549,535
2115	0	19,068,558,990	19,068,558,990	0	0	1,778,937,696	1,778,937,696
2116	0	19,545,272,965	19,545,272,965	0	0	1,823,410,546	1,823,410,546
2117	0	20,033,904,789	20,033,904,789	0	0	1,868,995,224	1,868,995,224
2118	0	20,534,752,409	20,534,752,409	0	0	1,915,719,545	1,915,719,545



# Single Discount Rate Development

## Projection of Plan Net Position

### Ending December 31 for 2019 to 2068

Year	Projected Beginning Plan Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.000%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2019	\$ 6,831,368,597	\$ 314,995,883	\$ 600,487,685	\$ 6,836,622	\$ 1,251,518,669	\$ 7,790,558,842
2020	7,790,558,842	320,454,528	625,792,070	7,304,839	534,581,706	8,012,498,168
2021	8,012,498,168	321,456,671	646,860,431	7,487,460	549,420,736	8,229,027,684
2022	8,229,027,684	321,301,098	667,465,273	7,674,647	563,857,036	8,439,045,898
2023	8,439,045,898	318,947,439	690,412,586	7,866,513	577,681,153	8,637,395,390
2024	8,637,395,390	317,282,356	713,039,806	8,063,176	590,723,000	8,824,297,765
2025	8,824,297,765	316,172,040	735,239,738	8,264,755	602,997,170	8,999,962,481
2026	8,999,962,481	315,379,595	757,029,765	8,471,374	614,509,572	9,164,350,509
2027	9,164,350,509	314,724,713	778,313,952	8,683,158	625,254,567	9,317,332,679
2028	9,317,332,679	314,240,721	798,534,731	8,900,237	635,243,438	9,459,381,870
2029	9,459,381,870	313,947,209	818,601,141	9,122,743	644,478,681	9,590,083,876
2030	9,590,083,876	313,782,775	838,266,447	9,350,812	652,937,671	9,709,187,063
2031	9,709,187,063	313,791,767	857,105,749	9,584,582	660,618,937	9,816,907,436
2032	9,816,907,436	314,041,839	874,884,600	9,824,196	667,547,987	9,913,788,466
2033	9,913,788,466	314,541,106	891,911,271	10,069,801	673,752,533	10,000,101,034
2034	10,000,101,034	315,262,360	908,457,588	10,321,546	679,241,241	10,075,825,501
2035	10,075,825,501	316,208,232	924,403,472	10,579,585	684,016,954	10,141,067,630
2036	10,141,067,630	317,363,148	939,449,254	10,844,075	688,096,845	10,196,234,294
2037	10,196,234,294	318,702,409	953,599,618	11,115,177	691,508,378	10,241,730,286
2038	10,241,730,286	320,259,227	966,140,027	11,393,056	694,305,613	10,278,762,042
2039	10,278,762,042	322,100,024	977,412,208	11,677,882	696,563,520	10,308,335,497
2040	10,308,335,497	324,253,757	987,569,203	11,969,829	698,348,240	10,331,398,461
2041	10,331,398,461	326,734,814	995,678,341	12,269,075	699,758,700	10,349,944,559
2042	10,349,944,559	329,582,861	1,001,847,215	12,575,802	700,932,109	10,366,036,512
2043	10,366,036,512	332,811,574	1,005,538,422	12,890,197	702,031,815	10,382,451,283
2044	10,382,451,283	336,466,035	1,007,071,416	13,212,452	703,242,756	10,401,876,206
2045	10,401,876,206	340,568,566	1,005,946,994	13,542,763	704,770,985	10,427,725,999
2046	10,427,725,999	345,123,342	1,001,565,669	13,881,332	706,876,294	10,464,278,635
2047	10,464,278,635	350,171,337	994,119,131	14,228,366	709,852,951	10,515,955,426
2048	10,515,955,426	355,721,008	983,649,993	14,584,075	714,009,263	10,587,451,629
2049	10,587,451,629	361,763,315	970,069,356	14,948,677	719,676,639	10,683,873,549
2050	10,683,873,549	368,297,171	953,449,501	15,322,394	727,209,988	10,810,608,814
2051	10,810,608,814	375,327,841	933,976,181	15,705,453	736,980,227	10,973,235,247
2052	10,973,235,247	382,855,116	911,985,982	16,098,090	749,366,206	11,177,372,497
2053	11,177,372,497	390,873,248	888,048,824	16,500,542	764,741,485	11,428,437,865
2054	11,428,437,865	399,358,303	862,614,516	16,913,056	783,468,966	11,731,737,561
2055	11,731,737,561	408,276,306	835,996,640	17,335,882	805,908,116	12,092,589,461
2056	12,092,589,461	417,599,719	808,203,500	17,769,279	832,429,944	12,516,646,345
2057	12,516,646,345	427,316,567	779,347,573	18,213,511	863,425,855	13,009,827,683
2058	13,009,827,683	437,411,719	749,776,682	18,668,849	899,297,712	13,578,091,582
2059	13,578,091,582	447,870,704	719,505,236	19,135,570	940,461,581	14,227,783,061
2060	14,227,783,061	458,685,864	688,691,183	19,613,959	987,355,903	14,965,519,686
2061	14,965,519,686	469,848,000	657,589,652	20,104,308	1,040,434,805	15,798,108,531
2062	15,798,108,531	481,356,220	626,421,917	20,606,916	1,100,167,127	16,732,603,044
2063	16,732,603,044	493,205,589	595,399,441	21,122,089	1,167,039,153	17,776,326,256
2064	17,776,326,256	505,390,614	564,604,334	21,650,141	1,241,560,471	18,937,022,865
2065	18,937,022,865	517,912,250	534,106,741	22,191,395	1,324,270,817	20,222,907,796
2066	20,222,907,796	530,773,734	503,986,480	22,746,179	1,415,742,591	21,642,691,463
2067	21,642,691,463	543,979,351	474,349,356	23,314,834	1,516,582,016	23,205,588,640
2068	23,205,588,640	557,531,224	445,273,723	23,897,705	1,627,431,493	24,921,379,929



# Single Discount Rate Development

## Projection of Plan Net Position

### Ending December 31 for 2069 to 2118 (concluded)

Year	Projected Beginning Plan Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 7.000%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
2069	\$ 24,921,379,929	\$ 571,433,246	\$ 416,803,977	\$ 24,495,147	\$ 1,748,974,256	\$ 26,800,488,307
2070	26,800,488,307	585,691,507	388,995,520	25,107,526	1,881,938,205	28,854,014,972
2071	28,854,014,972	600,312,089	361,890,386	25,735,214	2,027,099,174	31,093,800,635
2072	31,093,800,635	615,303,166	335,538,527	26,378,595	2,185,284,562	33,532,471,241
2073	33,532,471,241	630,672,809	310,004,656	27,038,060	2,357,376,224	36,183,477,558
2074	36,183,477,558	646,428,350	285,328,829	27,714,011	2,544,314,572	39,061,177,641
2075	39,061,177,641	662,579,734	261,559,924	28,406,861	2,747,103,317	42,180,893,907
2076	42,180,893,907	679,136,613	238,757,644	29,117,033	2,966,813,292	45,558,969,135
2077	45,558,969,135	696,108,155	216,971,036	29,844,959	3,204,587,104	49,212,848,398
2078	49,212,848,398	713,504,469	196,244,515	30,591,083	3,461,644,711	53,161,161,981
2079	53,161,161,981	731,336,007	176,614,365	31,355,860	3,739,289,331	57,423,817,095
2080	57,423,817,095	749,613,616	158,110,133	32,139,756	4,038,913,808	62,022,094,629
2081	62,022,094,629	768,348,504	140,755,810	32,943,250	4,362,007,348	66,978,751,421
2082	66,978,751,421	787,552,052	124,567,819	33,766,831	4,710,162,739	72,318,131,563
2083	72,318,131,563	807,236,009	109,554,901	34,611,002	5,085,084,154	78,066,285,823
2084	78,066,285,823	827,412,458	95,716,979	35,476,277	5,488,595,548	84,251,100,573
2085	84,251,100,573	848,093,822	83,045,129	36,363,184	5,922,649,683	90,902,435,764
2086	90,902,435,764	869,292,797	71,521,073	37,272,264	6,389,337,802	98,052,273,025
2087	98,052,273,025	891,022,370	61,117,631	38,204,070	6,890,899,983	105,734,873,677
2088	105,734,873,677	913,295,827	51,799,204	39,159,172	7,429,736,180	113,986,947,308
2089	113,986,947,308	936,126,754	43,521,322	40,138,151	8,008,418,043	122,847,832,632
2090	122,847,832,632	959,529,055	36,231,479	41,141,605	8,629,701,545	132,359,690,148
2091	132,359,690,148	983,516,962	29,870,808	42,170,145	9,296,540,416	142,567,706,573
2092	142,567,706,573	1,008,105,053	24,375,219	43,224,399	10,012,100,412	153,520,312,420
2093	153,520,312,420	1,033,308,267	19,676,372	44,305,009	10,779,774,511	165,269,413,817
2094	165,269,413,817	1,059,141,914	15,702,672	45,412,634	11,603,199,110	177,870,639,534
2095	177,870,639,534	1,085,621,688	12,380,845	46,547,950	12,486,271,261	191,383,603,688
2096	191,383,603,688	1,112,763,676	9,637,815	47,711,649	13,433,166,996	205,872,184,896
2097	205,872,184,896	1,140,584,367	7,402,114	48,904,440	14,448,360,821	221,404,823,530
2098	221,404,823,530	1,169,100,664	5,604,946	50,127,051	15,536,646,484	238,054,838,681
2099	238,054,838,681	1,198,329,894	4,181,123	51,380,227	16,703,159,137	255,900,766,362
2100	255,900,766,362	1,228,289,820	3,070,167	52,664,733	17,953,398,966	275,026,720,248
2101	275,026,720,248	1,258,998,656	2,217,380	53,981,351	19,293,256,409	295,522,776,583
2102	295,522,776,583	1,290,475,080	1,573,858	55,330,885	20,729,039,102	317,485,386,022
2103	317,485,386,022	1,322,738,247	1,096,821	56,714,157	22,267,500,694	341,017,813,985
2104	341,017,813,985	1,355,807,798	749,810	58,132,011	23,915,871,664	366,230,611,626
2105	366,230,611,626	1,389,703,874	502,396	59,585,311	25,681,892,304	393,242,120,098
2106	393,242,120,098	1,424,447,134	329,718	61,074,944	27,573,848,031	422,179,010,601
2107	422,179,010,601	1,460,058,757	211,783	62,601,818	29,600,607,214	453,176,862,971
2108	453,176,862,971	1,496,560,465	133,045	64,166,863	31,771,661,691	486,380,785,219
2109	486,380,785,219	1,533,974,525	81,659	65,771,035	34,097,170,165	521,946,077,214
2110	521,946,077,214	1,572,323,768	48,888	67,415,310	36,588,004,678	560,038,941,462
2111	560,038,941,462	1,611,631,599	28,518	69,100,693	39,255,800,391	600,837,244,241
2112	600,837,244,241	1,651,922,007	16,172	70,828,211	42,113,008,884	644,531,330,749
2113	644,531,330,749	1,693,219,584	8,852	72,598,916	45,172,955,234	691,324,897,799
2114	691,324,897,799	1,735,549,535	4,677	74,413,889	48,449,899,112	741,435,927,880
2115	741,435,927,880	1,778,937,696	2,406	76,274,236	51,959,100,187	795,097,689,121
2116	795,097,689,121	1,823,410,546	1,194	78,181,092	55,716,888,128	852,559,805,509
2117	852,559,805,509	1,868,995,224	564	80,135,619	59,740,737,525	914,089,402,075
2118	914,089,402,075	1,915,719,545	310	82,139,010	64,049,348,053	979,972,330,353



# Single Discount Rate Development

## Present Values of Projected Benefits

### Ending December 31 for 2019 to 2068

Year	Projected Beginning Plan Net Position	Projected Benefit Payments	Funded Portion of Projected Benefit Payments	Unfunded Portion of Projected Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of All Benefit Payments using Single Discount Rate (SDR)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v^(a)-.5	(g)=(e)*vf^(a)-.5	(h)=[(c)/(1+SDR)^(a)-.5]
2019	\$ 6,831,368,597	\$ 600,487,685	\$ 600,487,685	\$ 0	\$ 580,513,356	\$ 0	\$ 580,513,356
2020	7,790,558,842	625,792,070	625,792,070	0	565,398,157	0	565,398,157
2021	8,012,498,168	646,860,431	646,860,431	0	546,199,303	0	546,199,303
2022	8,229,027,684	667,465,273	667,465,273	0	526,726,845	0	526,726,845
2023	8,439,045,898	690,412,586	690,412,586	0	509,192,151	0	509,192,151
2024	8,637,395,390	713,039,806	713,039,806	0	491,476,773	0	491,476,773
2025	8,824,297,765	735,239,738	735,239,738	0	473,624,780	0	473,624,780
2026	8,999,962,481	757,029,765	757,029,765	0	455,758,338	0	455,758,338
2027	9,164,350,509	778,313,952	778,313,952	0	437,917,908	0	437,917,908
2028	9,317,332,679	798,534,731	798,534,731	0	419,901,979	0	419,901,979
2029	9,459,381,870	818,601,141	818,601,141	0	402,293,189	0	402,293,189
2030	9,590,083,876	838,266,447	838,266,447	0	385,007,012	0	385,007,012
2031	9,709,187,063	857,105,749	857,105,749	0	367,906,268	0	367,906,268
2032	9,816,907,436	874,884,600	874,884,600	0	350,969,820	0	350,969,820
2033	9,913,788,466	891,911,271	891,911,271	0	334,392,767	0	334,392,767
2034	10,000,101,034	908,457,588	908,457,588	0	318,314,266	0	318,314,266
2035	10,075,825,501	924,403,472	924,403,472	0	302,711,720	0	302,711,720
2036	10,141,067,630	939,449,254	939,449,254	0	287,512,821	0	287,512,821
2037	10,196,234,294	953,599,618	953,599,618	0	272,750,893	0	272,750,893
2038	10,241,730,286	966,140,027	966,140,027	0	258,259,562	0	258,259,562
2039	10,278,762,042	977,412,208	977,412,208	0	244,180,128	0	244,180,128
2040	10,308,335,497	987,569,203	987,569,203	0	230,577,177	0	230,577,177
2041	10,331,398,461	995,678,341	995,678,341	0	217,262,145	0	217,262,145
2042	10,349,944,559	1,001,847,215	1,001,847,215	0	204,306,752	0	204,306,752
2043	10,366,036,512	1,005,538,422	1,005,538,422	0	191,644,392	0	191,644,392
2044	10,382,451,283	1,007,071,416	1,007,071,416	0	179,379,967	0	179,379,967
2045	10,401,876,206	1,005,946,994	1,005,946,994	0	167,457,649	0	167,457,649
2046	10,427,725,999	1,001,565,669	1,001,565,669	0	155,820,841	0	155,820,841
2047	10,464,278,635	994,119,131	994,119,131	0	144,544,232	0	144,544,232
2048	10,515,955,426	983,649,993	983,649,993	0	133,665,446	0	133,665,446
2049	10,587,451,629	970,069,356	970,069,356	0	123,196,272	0	123,196,272
2050	10,683,873,549	953,449,501	953,449,501	0	113,164,106	0	113,164,106
2051	10,810,608,814	933,976,181	933,976,181	0	103,600,780	0	103,600,780
2052	10,973,235,247	911,985,982	911,985,982	0	94,543,486	0	94,543,486
2053	11,177,372,497	888,048,824	888,048,824	0	86,039,230	0	86,039,230
2054	11,428,437,865	862,614,516	862,614,516	0	78,107,485	0	78,107,485
2055	11,731,737,561	835,996,640	835,996,640	0	70,745,146	0	70,745,146
2056	12,092,589,461	808,203,500	808,203,500	0	63,918,866	0	63,918,866
2057	12,516,646,345	779,347,573	779,347,573	0	57,604,412	0	57,604,412
2058	13,009,827,683	749,776,682	749,776,682	0	51,793,196	0	51,793,196
2059	13,578,091,582	719,505,236	719,505,236	0	46,450,561	0	46,450,561
2060	14,227,783,061	688,691,183	688,691,183	0	41,552,557	0	41,552,557
2061	14,965,519,686	657,589,652	657,589,652	0	37,080,401	0	37,080,401
2062	15,798,108,531	626,421,917	626,421,917	0	33,012,059	0	33,012,059
2063	16,732,603,044	595,399,441	595,399,441	0	29,324,480	0	29,324,480
2064	17,776,326,256	564,604,334	564,604,334	0	25,988,566	0	25,988,566
2065	18,937,022,865	534,106,741	534,106,741	0	22,976,422	0	22,976,422
2066	20,222,907,796	503,986,480	503,986,480	0	20,262,333	0	20,262,333
2067	21,642,691,463	474,349,356	474,349,356	0	17,823,176	0	17,823,176
2068	23,205,588,640	445,273,723	445,273,723	0	15,636,159	0	15,636,159



# Single Discount Rate Development

## Present Values of Projected Benefits

### Ending December 31 for 2069 to 2118 (concluded)

Year	Projected Plan Net Position	Projected Benefit Payments	Funded Portion of Projected Benefit Payments	Unfunded Portion of Projected Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of All Benefit Payments using Single Discount Rate (SDR)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v^(a-.5)	(g)=(e)*vf^(a-.5)	(h)=((c)/(1+SDR))^(a-.5)
2069	\$ 24,921,379,929	\$ 416,803,977	\$ 416,803,977	\$ 0	\$ 13,678,897	\$ 0	\$ 13,678,897
2070	26,800,488,307	388,995,520	388,995,520	0	11,931,088	0	11,931,088
2071	28,854,014,972	361,890,386	361,890,386	0	10,373,581	0	10,373,581
2072	31,093,800,635	335,538,527	335,538,527	0	8,988,977	0	8,988,977
2073	33,532,471,241	310,004,656	310,004,656	0	7,761,619	0	7,761,619
2074	36,183,477,558	285,328,829	285,328,829	0	6,676,456	0	6,676,456
2075	39,061,177,641	261,559,924	261,559,924	0	5,719,891	0	5,719,891
2076	42,180,893,907	238,757,644	238,757,644	0	4,879,666	0	4,879,666
2077	45,558,969,135	216,971,036	216,971,036	0	4,144,296	0	4,144,296
2078	49,212,848,398	196,244,515	196,244,515	0	3,503,182	0	3,503,182
2079	53,161,161,981	176,614,365	176,614,365	0	2,946,507	0	2,946,507
2080	57,423,817,095	158,110,133	158,110,133	0	2,465,230	0	2,465,230
2081	62,022,094,629	140,755,810	140,755,810	0	2,051,069	0	2,051,069
2082	66,978,751,421	124,567,819	124,567,819	0	1,696,430	0	1,696,430
2083	72,318,131,563	109,554,901	109,554,901	0	1,394,370	0	1,394,370
2084	78,066,285,823	95,716,979	95,716,979	0	1,138,549	0	1,138,549
2085	84,251,100,573	83,045,129	83,045,129	0	923,194	0	923,194
2086	90,902,435,764	71,521,073	71,521,073	0	743,069	0	743,069
2087	98,052,273,025	61,117,631	61,117,631	0	593,441	0	593,441
2088	105,734,873,677	51,799,204	51,799,204	0	470,057	0	470,057
2089	113,986,947,308	43,521,322	43,521,322	0	369,101	0	369,101
2090	122,847,832,632	36,231,479	36,231,479	0	287,175	0	287,175
2091	132,359,690,148	29,870,808	29,870,808	0	221,270	0	221,270
2092	142,567,706,573	24,375,219	24,375,219	0	168,749	0	168,749
2093	153,520,312,420	19,676,372	19,676,372	0	127,307	0	127,307
2094	165,269,413,817	15,702,672	15,702,672	0	94,951	0	94,951
2095	177,870,639,534	12,380,845	12,380,845	0	69,967	0	69,967
2096	191,383,603,688	9,637,815	9,637,815	0	50,902	0	50,902
2097	205,872,184,896	7,402,114	7,402,114	0	36,537	0	36,537
2098	221,404,823,530	5,604,946	5,604,946	0	25,856	0	25,856
2099	238,054,838,681	4,181,123	4,181,123	0	18,026	0	18,026
2100	255,900,766,362	3,070,167	3,070,167	0	12,370	0	12,370
2101	275,026,720,248	2,217,380	2,217,380	0	8,350	0	8,350
2102	295,522,776,583	1,573,858	1,573,858	0	5,539	0	5,539
2103	317,485,386,022	1,096,821	1,096,821	0	3,608	0	3,608
2104	341,017,813,985	749,810	749,810	0	2,305	0	2,305
2105	366,230,611,626	502,396	502,396	0	1,443	0	1,443
2106	393,242,120,098	329,718	329,718	0	885	0	885
2107	422,179,010,601	211,783	211,783	0	531	0	531
2108	453,176,862,971	133,045	133,045	0	312	0	312
2109	486,380,785,219	81,659	81,659	0	179	0	179
2110	521,946,077,214	48,888	48,888	0	100	0	100
2111	560,038,941,462	28,518	28,518	0	55	0	55
2112	600,837,244,241	16,172	16,172	0	29	0	29
2113	644,531,330,749	8,852	8,852	0	15	0	15
2114	691,324,897,799	4,677	4,677	0	7	0	7
2115	741,435,927,880	2,406	2,406	0	4	0	4
2116	795,097,689,121	1,194	1,194	0	2	0	2
2117	852,559,805,509	564	564	0	1	0	1
2118	914,089,402,075	310	310	0	0	0	0
<b>Totals</b>	\$ 11,382,071,477	\$ 0	\$ 11,382,071,477	\$ 0	\$ 11,382,071,477	\$ 0	\$ 11,382,071,477



**SECTION H**

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**GLOSSARY OF TERMS**

# Glossary of Terms

<b>Accrued Service</b>	Service credited under the system that was rendered before the date of the actuarial valuation.
<b>Actuarial Accrued Liability (AAL)</b>	The AAL is the difference between the actuarial present value of all benefits and the actuarial value of future normal costs. The definition comes from the fundamental equation of funding which states that the present value of all benefits is the sum of the Actuarial Accrued Liability and the present value of future normal costs. The AAL may also be referred to as "accrued liability" or "actuarial liability."
<b>Actuarial Assumptions</b>	These assumptions are estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and compensation increases. Actuarial assumptions are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (compensation increases, payroll growth, inflation and investment return) consist of an underlying real rate of return plus an assumption for a long-term average rate of inflation.
<b>Actuarial Cost Method</b>	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of the pension trust benefits between future normal cost and actuarial accrued liability. The actuarial cost method may also be referred to as the actuarial funding method.
<b>Actuarial Equivalent</b>	A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate actuarial assumptions.
<b>Actuarial Gain (Loss)</b>	The difference in liabilities between actual experience and expected experience during the period between two actuarial valuations is the gain (loss) on the accrued liabilities.
<b>Actuarial Present Value (APV)</b>	The amount of funds currently required to provide a payment or series of payments in the future. The present value is determined by discounting future payments at predetermined rates of interest and probabilities of payment.
<b>Actuarial Valuation</b>	The actuarial valuation report determines, as of the actuarial valuation date, the service cost, total pension liability, and related actuarial present value of projected benefit payments for pensions.
<b>Actuarial Valuation Date</b>	The date as of which an actuarial valuation is performed.
<b>Actuarially Determined Contribution (ADC) or Annual Required Contribution (ARC)</b>	A calculated contribution into a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically the Actuarially Determined Contribution has a normal cost payment and an amortization payment.



## Glossary of Terms

<b>Amortization Method</b>	The method used to determine the periodic amortization payment may be a level dollar amount, or a level percent of pay amount. The period will typically be expressed in years, and the method will either be “open” (meaning, reset each year) or “closed” (the number of years remaining will decline each year).
<b>Amortization Payment</b>	The amortization payment is the periodic payment required to pay off an interest-discounted amount with payments of interest and principal.
<b>Cost-of-Living Adjustments</b>	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
<b>Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (cost-sharing pension plan)</b>	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
<b>Covered-Employee Payroll</b>	The payroll of employees that are provided with pensions through the pension plan.
<b>Deferred Inflows and Outflows</b>	The deferred inflows and outflows of pension resources are amounts used under GASB Statement No. 68 in developing the annual pension expense. Deferred inflows and outflows arise with differences between expected and actual experiences; changes of assumptions. The portion of these amounts not included in pension expense should be included in the deferred inflows or outflows of resources.
<b>Deferred Retirement Option Program (DROP)</b>	A program that permits a plan member to elect a calculation of benefit payments based on service credits and salary, as applicable, as of the DROP entry date. The plan member continues to provide service to the employer and is paid for the service by the employer after the DROP entry date; however, the pensions that would have been paid to the plan member are credited to an individual member account within the defined benefit pension plan until the end of the DROP period. Other variations for DROP exist and will be more fully detailed in the plan provision section of the valuation report.

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<b>Discount Rate</b>	<p>For GASB purposes, the discount rate is the single rate of return that results in the present value of all projected benefit payments to be equal to the sum of the funded and unfunded projected benefit payments, specifically:</p> <ol style="list-style-type: none"><li>1. The benefit payments to be made while the pension plans' fiduciary net position is projected to be greater than the benefit payments that are projected to be made in the period; and</li><li>2. The present value of the benefit payments not in (1) above, discounted using the municipal bond rate.</li></ol>
<b>Entry Age Actuarial Cost Method (EAN)</b>	<p>The EAN is a cost method for allocating the costs of the plan between the normal cost and the accrued liability. The actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis (either level dollar or level percent of pay) over the earnings or service of the individual between entry age and assumed exit ages(s). The portion of the actuarial present value allocated to a valuation year is the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is the actuarial accrued liability. The sum of the accrued liability plus the present value of all future normal costs is the present value of all benefits.</p>
<b>Fiduciary Net Position</b>	<p>The fiduciary net position is the market value of the assets of the trust dedicated to the defined benefit provisions.</p>
<b>GASB</b>	<p>The Governmental Accounting Standards Board is an organization that exists in order to promulgate accounting standards for governmental entities.</p>
<b>Money-Weighted Rate of Return</b>	<p>The money-weighted rate of return is a method of calculating the returns that adjusts for the changing amounts actually invested. For purposes of GASB Statement No. 67, money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.</p>
<b>Multiple-Employer Defined Benefit Pension Plan</b>	<p>A multiple-employer plan is a defined benefit pension plan that is used to provide pensions to the employees of more than one employer.</p>
<b>Municipal Bond Rate</b>	<p>The Municipal Bond Rate is the discount rate to be used for those benefit payments that occur after the assets of the trust have been depleted.</p>
<b>Net Pension Liability (NPL)</b>	<p>The NPL is the liability of employers and non-employer contributing entities to plan members for benefits provided through a defined benefit pension plan.</p>

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<b>Other Postemployment Benefits (OPEB)</b>	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits regardless of the manner in which they are provided. Other post-employment benefits do not include termination benefits.
<b>Real Rate of Return</b>	The real rate of return is the rate of return on an investment after adjustment to eliminate inflation.
<b>Service Cost</b>	The service cost is the portion of the actuarial present value of projected benefit payments that is attributed to a valuation year.
<b>Total Pension Expense</b>	<p>The total pension expense is the sum of the following items that are recognized at the end of the employer's fiscal year:</p> <ol style="list-style-type: none"><li>1. Service Cost</li><li>2. Interest on the Total Pension Liability</li><li>3. Current-Period Benefit Changes</li><li>4. Employee Contributions (made negative for addition here)</li><li>5. Projected Earnings on Plan Investments (made negative for addition here)</li><li>6. Pension Plan Administrative Expense</li><li>7. Other Changes in Plan Fiduciary Net Position</li><li>8. Recognition of Outflow (Inflow) of Resources due to Liabilities</li><li>9. Recognition of Outflow (Inflow) of Resources due to Assets</li></ol>
<b>Total Pension Liability (TPL)</b>	The TPL is the portion of the actuarial present value of projected benefit payments that is attributed to past periods of member service.
<b>Unfunded Actuarial Accrued Liability (UAAL)</b>	The UAAL is the difference between actuarial accrued liability and valuation assets.
<b>Valuation Assets</b>	The valuation assets are the assets used in determining the unfunded liability of the plan. For purposes of GASB Statement Nos. 67 and 68, the valuation assets are equal to the market value of assets.