

November 4, 2019

Board of Trustees
Teacher Retirement System of Texas
1000 Red River Street
Austin, TX 78701

**Subject: GASB 67 Reporting and Disclosure Information for the year ending
August 31, 2019**

Dear Board of Trustees,

This report provides information required by the Teacher Retirement System of Texas (TRS) in connection with the Governmental Accounting Standards Board (GASB) Statement No. 67 “Financial Reporting for Pension Plans.” The information provided herein was prepared for the purpose of assisting TRS to comply with the financial reporting and disclosure requirements of GASB No. 67.

The calculation of the liability associated with the benefits described in this report was performed for the purpose of satisfying the requirements of GASB No. 67 and is not applicable for purposes of funding the plan. A calculation of the plan’s liability for other purposes may produce significantly different results. This report may be provided to parties other than TRS only in its entirety and only with the permission of TRS.

The total pension liability, net pension liability, and certain sensitivity information shown in this report are based on an actuarial valuation performed as of August 31, 2018. The total pension liability was rolled forward from the valuation date to the measurement date of August 31, 2019 using generally accepted actuarial principles. The liabilities reflect the actuarial assumptions adopted by the Board in July of 2018. It is our opinion that the assumptions are internally consistent, reasonable, and comply with the requirements under GASB No. 67. There were no significant events or changes in the benefit provisions that required an adjustment to the rolled forward liabilities.

This report is based upon information, furnished to us by TRS, which include benefit provisions, membership information, and financial data. We did not audit this data and information, but we did apply a number of tests and concluded that it was reasonable and consistent. GRS is not responsible for the accuracy or completeness of the information provided to us by TRS.

The final section of the report titled “Calculation of the Single Discount Rate” is not a required disclosure item for your financial statements. However, it is possible that your auditors will request this information which is why it is included in the report.

Certain tables included in the Required Supplementary Information should include a 10-year history of information. As provided for in GASB No. 67, this historical information is only presented for the years in which the information was measured in conformity with the requirements of GASB No. 67. The historical information in this report begins with the information presented for the fiscal year ending August 31, 2014.

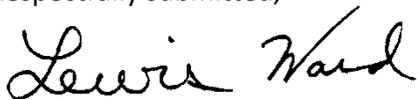
This report compliments the actuarial valuation report that was provided to TRS and should be considered together as a complete report for the plan year ending August 31, 2019. Please see the actuarial valuation report as August 31, 2018 for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions. Also, please see the experience study report dated July 27, 2018 which details the actuarial assumption used in the determination of the net pension liability. The actuarial cost method used to determine the GASB No. 67 net pension liability is the Individual Entry Age Normal method as prescribed in GASB No. 67.

The projected cash flows from the employer are based on contributions for the most recent five year period, modified on consideration of subsequent events. Changes in statute in the 2013 legislative session and the subsequent follow through are indicators that the legislature is committed to an increase in funding levels for the pension funds. Additional changes to the contribution levels were adopted in the 2019 legislative session. Based on these events, projected employer contributions are based on the contribution rates adopted by the 2019 legislature.

The actuarial methods and assumptions have been selected by the Board of Trustees of the Teacher Retirement System of Texas based upon GRS analysis and recommendations. The Board of Trustees has sole authority to determine the actuarial assumptions used for the plan. The actuarial methods and assumptions are primarily based on a study of actual experience for the three year period ending August 31, 2017 and were adopted in July 2018. The assumption change shown in the reconciliation of this year's Net Pension Liability (on page 8 of this report) is primarily due to the change in the Single Discount Rate from last year's blended rate of 6.907% to this year's long term rate of return of 7.25%. Also, included in the assumption change is an assumption about the legislated pay increases from SB 3.

To the best of our knowledge, the information contained with this report is accurate and fairly represents the actuarial position of the Teacher Retirement System of Texas. 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. Mr. Newton is a member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,



Lewis Ward
Consultant



Joe Newton, FSA, EA, MAAA
Pension Market Leader and Actuary

Summary of Population Statistics

| | |
|---|----------------|
| Inactive Plan Members or Beneficiaries Currently Receiving Benefits | 420,458 |
| Inactive Plan Members Entitled to But Not Yet Receiving Benefits | 298,498 |
| Active Plan Members | <u>872,999</u> |
| Total Plan Members | 1,591,955 |

All counts are as of the valuation date August 31, 2018

The Average Expected Remaining Service Life (AERSL) of 6.3623 is based on the membership information as of the beginning of the fiscal year. The AERSL of the active employees was 11.6020 years. This calculates to a total remaining service years of $11.6020 * 872,999 = 10,128,534.40$ years. Divided by the total membership of 1,591,955 as of August 31, 2018 yields an AERSL of 6.3623 years.

Measurement of the Net Pension Liability

The net pension liability is measured as the total pension liability, less the amount of the pension plan's fiduciary net position. In actuarial terms, this will be 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).

A single discount rate of 7.250% 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 7.25%. The projection of cash flows used to determine this single discount rate assumed that plan member contributions, the employer contributions, and the state contributions will be made at the rates set by the legislature during the 2019 legislative session (please see the actuarial valuation report for a description of these rates). It is assumed that future non-member contributions will be 8.50% of payroll in fiscal year 2020 gradually increasing to 9.55% of payroll over the next several fiscal years (these contributions include contributions by the State and the employers for active employees and rehired retirees).

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 period of projected benefit payments to determine the total pension liability.

A brief summary of the primary assumptions used in the determination of the net pension liability is shown in the table on the following page.

Actuarial Assumptions - The total pension liability is determined by an actuarial valuation. The actuarial assumptions used to determine the total pension liability were based on the results of an experience study for the three-year period ending August 31, 2017. The post-retirement mortality rates for healthy lives were based on the 2018 TRS of Texas Healthy Pensioner Mortality Tables, with full generational projection using the ultimate improvement rates from the most recently published projection scale ("U-MP"). The active mortality rates were based on 90% of the RP-2014 Employee Mortality Tables for males and females, also with full generational mortality.

The following methods and assumptions were applied to this measurement period:

| | |
|---|---|
| Valuation Date | August 31, 2018 (total pension liability rolled forward from valuation date to measurement date of August 31, 2019) |
| Actuarial Cost Method | Individual Entry Age Normal actuarial cost method |
| Asset Valuation Method | Market Value |
| Actuarial Assumptions: | |
| Single Discount Rate | 7.250% |
| Long-term Expected Return | 7.25% |
| Municipal Bond Rate* | 2.63% |
| Last year ending August 31 in projection period (100 years) | 2116 |
| Inflation | 2.30% |
| Salary Increases | 3.05% to 9.05% including inflation |
| Ad hoc post-employment benefit changes | None |

* *The municipal bond rate used is 2.63% as of August 2019 (i.e. the rate closest to but not later than the Measurement Date). The source for the rate is the Fixed Income Market Data/Yield Curve/Data 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."*

The actuarial assumptions used in the determination of the total pension liability are the same assumptions used in the actuarial valuation as of August 31, 2018. For a full description of these assumptions please see the actuarial valuation report dated November 9, 2018.

The exceptions to these assumptions are:

- The Single Discount Rate as of August 31, 2018 was a blended rate of 6.907% and that has changed to the long term rate of return of 7.25% as of August 31, 2019.
- With the enactment of SB 3 by the 2019 Legislature, an assumption has been made about how this legislation would impact future salaries. We have assumed that eligible active members would each receive a \$2,700 increase in fiscal year 2020. This is in addition to the salary increase expected based on the actuarial assumptions.

Below is a table providing the sensitivity of the net pension liability to changes in the discount rate. In particular, the table presents the plan’s net pension liability, if it were calculated using a single discount rate that is 1-percentage-point lower or 1-percentage-point higher than the single discount rate:

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

| 1% Decrease 6.250% | Current Single Discount Rate Assumption 7.250% | 1% Increase 8.250% |
|-----------------------|--|-----------------------|
| \$79,905,616,584 | \$51,983,126,213 | \$29,360,519,479 |

Reconciliation of Fiduciary Net Position

for Year Ended August 31, 2019

| | <u>Year Ending August 31, 2019</u> |
|---|--|
| Additions | |
| Contributions | |
| Non-Employer Contributing Entity | \$ 1,737,852,502 |
| Employer | 1,761,821,902 |
| Employee | 3,482,869,726 |
| Other | 660,822,793 |
| Total Contributions | <u>\$ 7,643,366,923</u> |
| Investment Income | |
| Net Appreciation in Fair Value of Investments | \$ 8,345,373,204 |
| Interest and Dividends | 0 |
| Less Investment Expense | (676,344,330) |
| Net Investment Income | <u>\$ 7,669,028,874</u> |
| Other | <u>\$ 8,112,666</u> |
| Total Additions | <u>\$ 15,320,508,463</u> |
| Deductions | |
| Benefit payments, including refunds of employee contributions | \$ 11,740,189,875 |
| Pension Plan Administrative Expense | 60,485,645 |
| Other* | 110,535,701 |
| Total Deductions | <u>\$ 11,911,211,221</u> |
| Net Increase (Decrease) in Net Position | <u>\$ 3,409,297,242</u> |
| Net Position Restricted for Pensions | |
| Beginning of Year | \$ 154,568,901,833 |
| End of Year | <u>\$ 157,978,199,075</u> |

*The \$4,268,648 prior period adjustment to the beginning of year Net Position was reflected as an "Other" addition.

Schedules of Required Supplementary Information

Schedule of Changes in the Employer's Net Pension Liability and Related Ratios

| Fiscal year ending August 31, | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 |
|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Total Pension Liability | | | | | | |
| Service Cost | \$ 5,642,074,695 | \$ 4,654,171,138 | \$ 4,489,045,421 | \$ 4,392,076,679 | \$ 4,225,448,833 | \$ 3,965,994,265 |
| Interest on the Total Pension Liability | 14,267,256,072 | 14,109,276,321 | 13,515,485,995 | 12,896,571,424 | 12,555,645,919 | 11,813,445,940 |
| Benefit Changes | 588,827,787 | 0 | 0 | - | - | - |
| Difference between Expected and Actual Experience | (982,693,577) | 0 | (969,830,844) | 373,668,629 | (1,588,618,832) | 482,638,639 |
| Assumption Changes | (7,425,278,607) | 22,106,679,263 | 700,880,288 | - | (1,474,723,994) | 2,028,541,342 |
| Benefit Payments | (11,253,728,973) | (10,172,997,008) | (9,775,775,472) | (9,379,122,730) | (8,935,111,459) | (8,548,642,525) |
| Refunds | (486,460,902) | (422,335,740) | (420,421,056) | (373,418,687) | (391,341,181) | (410,600,319) |
| Net Change in Total Pension Liability | \$ 349,996,495 | \$ 30,274,793,974 | \$ 7,539,384,332 | 7,909,775,315 | 4,391,299,286 | 9,331,377,342 |
| Total Pension Liability - Beginning | \$ 209,611,328,793 | \$ 179,336,534,819 | \$ 171,797,150,487 | 163,887,375,172 | 159,496,075,886 | 150,164,698,544 |
| Total Pension Liability - Ending (a) | \$ 209,961,325,288 | \$ 209,611,328,793 | \$ 179,336,534,819 | \$ 171,797,150,487 | \$ 163,887,375,172 | \$ 159,496,075,886 |
| Plan Fiduciary Net Position | | | | | | |
| Non-Contributing Entity | \$ 1,737,852,502 | \$ 1,715,784,550 | \$ 1,697,962,608 | 1,675,631,248 | 1,591,482,988 | 1,530,623,829 |
| Employer Contributions | 1,761,821,902 | 1,671,257,303 | 1,588,309,345 | \$ 1,483,389,348 | \$ 1,377,972,653 | \$ 984,552,391 |
| Employee Contributions | 3,482,869,726 | 3,360,773,197 | 3,242,556,261 | 2,943,669,320 | 2,576,024,311 | 2,357,686,000 |
| Pension Plan Net Investment Income | 7,669,028,874 | 11,242,813,657 | 17,079,807,347 | 9,193,280,560 | (412,759,100) | 19,434,430,034 |
| Benefit Payments | (11,253,728,973) | (10,172,997,008) | (9,775,775,472) | (9,379,122,730) | (8,935,111,459) | (8,548,642,525) |
| Refunds | (486,460,902) | (422,335,740) | (420,421,056) | (373,418,687) | (391,341,181) | (410,600,319) |
| Pension Plan Administrative Expense | (60,485,645) | (64,926,169) | (44,189,998) | (44,402,710) | (35,556,979) | (41,904,190) |
| Other | 558,399,758 | (123,390,077) | (14,964,388) | (29,095,088) | (11,248,106) | 84,954,006 |
| Net Change in Plan Fiduciary Net Position | \$ 3,409,297,242 | \$ 7,206,979,713 | \$ 13,353,284,647 | 5,469,931,261 | (4,240,536,873) | 15,391,099,226 |
| Plan Fiduciary Net Position - Beginning | \$ 154,568,901,833 | \$ 147,361,922,120 | \$ 134,008,637,473 | 128,538,706,212 | 132,779,243,085 | 117,388,143,859 |
| Plan Fiduciary Net Position - Ending (b) | \$ 157,978,199,075 | \$ 154,568,901,833 | \$ 147,361,922,120 | \$ 134,008,637,473 | \$ 128,538,706,212 | \$ 132,779,243,085 |
| Net Pension Liability - Ending (a) - (b) | \$ 51,983,126,213 | \$ 55,042,426,960 | \$ 31,974,612,699 | 37,788,513,014 | 35,348,668,960 | 26,716,832,801 |
| Plan Fiduciary Net Position as a Percentage of Total Pension Liability | 75.24 % | 73.74 % | 82.17 % | 78.00 % | 78.43 % | 83.25 % |
| Covered Employee Payroll | \$ 45,232,074,364 | \$ 43,646,405,156 | \$ 42,111,120,273 | \$ 40,742,826,333 | \$ 38,448,124,045 | \$ 36,654,290,800 |
| Net Pension Liability as a Percentage of Covered Employee Payroll | 114.93 % | 126.11 % | 75.93 % | 92.75 % | 91.94 % | 72.89 % |

Notes to Schedule:

N/A

Schedules of Required Supplementary Information

Schedule of the Net Pension Liability (Historical)

Last 10 Fiscal Years

| <u>FY Ending August 31,</u> | <u>Total Pension Liability</u> | <u>Plan Net Position</u> | <u>Net Pension Liability</u> | <u>Plan Net Position as a % of Total Pension Liability</u> | <u>Covered Payroll</u> | <u>Net Pension Liability as a % of Covered Payroll</u> |
|---------------------------------|--|------------------------------|----------------------------------|--|----------------------------|--|
| 2013 | \$ 150,164,698,544 | \$ 117,388,143,859 | \$ 32,776,554,685 | 78.17% | \$ 35,188,983,344 | 93.14% |
| 2014 | 159,496,075,886 | 132,779,243,085 | 26,716,832,801 | 83.25% | 36,654,290,800 | 72.89% |
| 2015 | 163,887,375,172 | 128,538,706,212 | 35,348,668,960 | 78.43% | 38,448,124,045 | 91.94% |
| 2016 | 171,797,150,487 | 134,008,637,473 | 37,788,513,014 | 78.00% | 40,742,826,333 | 92.75% |
| 2017 | 179,336,534,819 | 147,361,922,120 | 31,974,612,699 | 82.17% | 42,111,120,273 | 75.93% |
| 2018 | 209,611,328,793 | 154,568,901,833 | 55,042,426,960 | 73.74% | 43,646,405,156 | 126.11% |
| 2019 | 209,961,325,288 | 157,978,199,075 | 51,983,126,213 | 75.24% | 45,232,074,364 | 114.93% |

SCHEDULES OF REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Contributions

| FY Ending August 31, | Actuarially Determined Contribution | Actual Contribution | Contribution Deficiency (Excess) | Covered Payroll | Actual Contribution as a % of Covered Payroll |
|---------------------------------|--|--------------------------------|---|----------------------------|--|
| 2014 | \$3,177,927,012 | \$2,515,176,220 | 662,750,792 | 36,654,290,800 | 6.86% |
| 2015 | 3,171,970,234 | 2,969,455,641 | 202,514,593 | 38,448,124,045 | 7.72% |
| 2016 | 3,226,831,846 | 3,159,020,596 | 67,811,250 | 40,742,826,333 | 7.75% |
| 2017 | 3,343,622,950 | 3,286,271,953 | 57,350,997 | 42,111,120,273 | 7.80% |
| 2018 | 3,426,242,805 | 3,387,041,853 | 39,200,952 | 43,646,405,156 | 7.76% |
| 2019 | 4,288,000,650 | 3,499,674,404 | 788,326,246 | 45,232,074,364 | 7.74% |

Notes to Schedule of Contributions

Valuation Date: August 31, 2018 (to determine contribution rate for fiscal year ending August 31, 2019).

Notes: Actuarially determined contribution rates are calculated as of August 31 preceding fiscal year. Members and employers contribute based on statutorily fixed rates.

Methods and Assumptions Used to Determine Contribution Rates:

| | |
|-------------------------------|--|
| Actuarial Cost Method | Individual Entry Age Normal actuarial cost method |
| Amortization Method | Level Percentage of Payroll, Floating |
| Remaining Amortization Period | 87 years based on rates contributed during fiscal year. 30 based on increased employer and member rates to begin Sept 1, 2019 from 2019 legislative session . |
| Asset Valuation Method | 5 Year smoothed market |
| Inflation | 2.30% |
| Salary Increases | 3.05% to 9.05% including inflation |
| Investment Rate of Return | 7.25% |
| 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 conducted for the period ending on August 31, 2017. |
| Mortality | The post-retirement mortality rates for healthy lives were based on the 2018 TRS of Texas Healthy Pensioner Mortality Tables, with full generational projection using the ultimate improvement rates from the most recently published projection scale ("U-MP"). The active mortality rates were based on 90% of the RP-2014 Employee Mortality Tables for males and females, also with full generational mortality. |

Other Information:

Notes A 13th check was paid during the fiscal year. A supplemental contribution equal to the 13th check was also made during the fiscal year. Future member contribution rates were also increased.

The assumptions used to determine the ADEC are those in effect for the August 31, 2018 actuarial valuation. Due to the lag between valuation date and the measurement date, they may not be the same as the assumptions used to measure the Net Pension Liability.

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 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 7.25%; the municipal bond rate is 2.630% (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 7.250%.

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 Fiduciary 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.

Single Discount Rate Development

Projection of Contributions Beginning September 1, 2019

| Year | Payroll for Current Employees | Payroll for Future Employees | Total Employee Payroll | Contributions from Current Employees | Employer Contributions for All Employees | Employer Normal Cost Contributions Related to Payroll of Future Employees | Total Contributions |
|------|-------------------------------|------------------------------|------------------------|--------------------------------------|--|---|---------------------|
| 1 | 40,667,679,594 | \$ 5,921,357,001 | 46,589,036,595 | 3,131,411,329 | 3,960,068,111 | (246,731,929) | 6,844,747,511 |
| 2 | 39,235,147,432 | 8,751,560,261 | 47,986,707,692 | 3,021,106,352 | 4,107,662,178 | (358,084,611) | 6,770,683,919 |
| 3 | 37,926,441,769 | 11,499,867,154 | 49,426,308,923 | 3,034,115,342 | 4,389,056,232 | (430,340,160) | 6,992,831,414 |
| 4 | 36,679,368,184 | 14,229,730,006 | 50,909,098,191 | 2,934,349,455 | 4,678,546,124 | (525,899,478) | 7,086,996,101 |
| 5 | 35,488,751,049 | 16,947,620,087 | 52,436,371,137 | 2,927,821,962 | 4,981,455,258 | (576,498,436) | 7,332,778,784 |
| 6 | 34,329,802,696 | 19,679,659,574 | 54,009,462,271 | 2,832,208,722 | 5,157,903,647 | (661,238,957) | 7,328,873,412 |
| 7 | 33,179,118,227 | 22,450,627,912 | 55,629,746,139 | 2,737,277,254 | 5,312,640,756 | (745,496,024) | 7,304,421,986 |
| 8 | 32,015,892,481 | 25,282,746,042 | 57,298,638,523 | 2,641,311,130 | 5,472,019,979 | (830,040,447) | 7,283,290,662 |
| 9 | 30,829,284,029 | 28,188,313,650 | 59,017,597,679 | 2,543,415,932 | 5,636,180,578 | (915,288,937) | 7,264,307,573 |
| 10 | 29,611,297,374 | 31,176,828,235 | 60,788,125,609 | 2,442,932,033 | 5,805,265,996 | (1,001,429,782) | 7,246,768,247 |
| 11 | 28,351,982,049 | 34,259,787,329 | 62,611,769,377 | 2,339,038,519 | 5,979,423,976 | (1,088,973,425) | 7,229,489,070 |
| 12 | 27,070,508,929 | 37,419,613,529 | 64,490,122,459 | 2,233,316,987 | 6,158,806,695 | (1,177,507,282) | 7,214,616,400 |
| 13 | 25,766,076,862 | 40,658,749,270 | 66,424,826,132 | 2,125,701,341 | 6,343,570,896 | (1,266,959,464) | 7,202,312,773 |
| 14 | 24,440,501,737 | 43,977,069,180 | 68,417,570,916 | 2,016,341,393 | 6,533,878,023 | (1,357,487,911) | 7,192,731,505 |
| 15 | 23,097,171,036 | 47,372,927,008 | 70,470,098,044 | 1,905,516,610 | 6,729,894,363 | (1,448,999,107) | 7,186,411,866 |
| 16 | 21,752,765,237 | 50,831,435,749 | 72,584,200,985 | 1,794,603,132 | 6,931,791,194 | (1,541,249,104) | 7,185,145,222 |
| 17 | 20,423,103,572 | 54,338,623,442 | 74,761,727,015 | 1,684,906,045 | 7,139,744,930 | (1,633,921,358) | 7,190,729,617 |
| 18 | 19,142,177,384 | 57,862,401,441 | 77,004,578,825 | 1,579,229,634 | 7,353,937,278 | (1,726,198,352) | 7,206,968,560 |
| 19 | 17,928,618,599 | 61,386,097,591 | 79,314,716,190 | 1,479,111,034 | 7,574,555,396 | (1,817,694,775) | 7,235,971,655 |
| 20 | 16,767,004,583 | 64,927,153,092 | 81,694,157,676 | 1,383,277,878 | 7,801,792,058 | (1,909,042,099) | 7,276,027,837 |
| 21 | 15,658,811,141 | 68,486,171,265 | 84,144,982,406 | 1,291,851,919 | 8,035,845,820 | (2,000,420,650) | 7,327,277,089 |
| 22 | 14,593,349,315 | 72,075,982,563 | 86,669,331,878 | 1,203,951,318 | 8,276,921,194 | (2,092,281,351) | 7,388,591,161 |
| 23 | 13,561,702,432 | 75,707,709,402 | 89,269,411,834 | 1,118,840,451 | 8,525,228,830 | (2,185,192,105) | 7,458,877,176 |
| 24 | 12,554,035,058 | 79,393,459,131 | 91,947,494,189 | 1,035,707,892 | 8,780,985,695 | (2,279,716,324) | 7,536,977,263 |
| 25 | 11,566,574,774 | 83,139,344,241 | 94,705,919,015 | 954,242,419 | 9,044,415,266 | (2,376,292,482) | 7,622,365,203 |
| 26 | 10,586,573,917 | 86,960,522,668 | 97,547,096,586 | 873,392,348 | 9,315,747,724 | (2,475,772,208) | 7,713,367,864 |
| 27 | 9,626,250,389 | 90,847,259,094 | 100,473,509,483 | 794,165,657 | 9,595,220,156 | (2,577,955,437) | 7,811,430,376 |
| 28 | 8,698,747,748 | 94,788,967,020 | 103,487,714,768 | 717,646,689 | 9,883,076,760 | (2,682,453,349) | 7,918,270,100 |
| 29 | 7,809,314,060 | 98,783,032,151 | 106,592,346,211 | 644,268,410 | 10,179,569,063 | (2,789,141,728) | 8,034,695,745 |
| 30 | 6,954,201,652 | 102,835,914,945 | 109,790,116,597 | 573,721,636 | 10,484,956,135 | (2,898,479,234) | 8,160,198,537 |
| 31 | 6,113,960,964 | 106,969,859,131 | 113,083,820,095 | 504,401,780 | 10,799,504,819 | (3,011,646,054) | 8,292,260,545 |
| 32 | 5,295,946,913 | 111,180,387,784 | 116,476,334,698 | 436,915,620 | 11,123,489,964 | (3,130,189,933) | 8,430,215,651 |
| 33 | 4,512,785,031 | 115,457,839,708 | 119,970,624,739 | 372,304,765 | 11,457,194,663 | (3,250,617,980) | 8,578,881,448 |
| 34 | 3,769,951,049 | 119,799,792,432 | 123,569,743,481 | 311,020,962 | 11,800,910,502 | (3,372,861,992) | 8,739,069,472 |
| 35 | 3,082,138,878 | 124,194,696,907 | 127,276,835,785 | 254,276,457 | 12,154,937,817 | (3,496,596,817) | 8,912,617,457 |
| 36 | 2,464,586,394 | 128,630,554,464 | 131,095,140,859 | 203,328,378 | 12,519,585,952 | (3,621,484,640) | 9,101,429,690 |
| 37 | 1,923,272,912 | 133,104,722,173 | 135,027,995,084 | 158,670,015 | 12,895,173,531 | (3,747,451,054) | 9,306,392,492 |
| 38 | 1,470,231,186 | 137,608,603,751 | 139,078,834,937 | 121,294,073 | 13,282,028,736 | (3,874,254,037) | 9,529,068,772 |
| 39 | 1,111,114,335 | 142,140,085,650 | 143,251,199,985 | 91,666,933 | 13,680,489,599 | (4,001,834,083) | 9,770,322,449 |
| 40 | 831,042,606 | 146,717,693,378 | 147,548,735,985 | 68,561,015 | 14,090,904,287 | (4,130,712,763) | 10,028,752,539 |
| 41 | 611,843,042 | 151,363,355,023 | 151,975,198,064 | 50,477,051 | 14,513,631,415 | (4,261,507,444) | 10,302,601,022 |
| 42 | 445,292,563 | 156,089,161,443 | 156,534,454,006 | 36,736,636 | 14,949,040,358 | (4,394,558,533) | 10,591,218,461 |
| 43 | 318,836,730 | 160,911,650,896 | 161,230,487,626 | 26,304,030 | 15,397,511,568 | (4,530,331,651) | 10,893,483,947 |
| 44 | 222,871,503 | 165,844,530,752 | 166,067,402,255 | 18,386,899 | 15,859,436,915 | (4,669,212,718) | 11,208,611,096 |
| 45 | 150,603,003 | 170,898,821,320 | 171,049,424,323 | 12,424,748 | 16,335,220,023 | (4,811,512,001) | 11,536,132,770 |
| 46 | 96,895,051 | 176,084,012,002 | 176,180,907,052 | 7,993,842 | 16,825,276,624 | (4,957,496,666) | 11,875,773,800 |
| 47 | 58,470,978 | 181,407,863,287 | 181,466,334,264 | 4,823,856 | 17,330,034,922 | (5,107,385,203) | 12,227,473,575 |
| 48 | 32,365,193 | 186,877,959,099 | 186,910,324,292 | 2,670,128 | 17,849,935,970 | (5,261,391,132) | 12,591,214,966 |
| 49 | 15,511,718 | 192,502,122,302 | 192,517,634,021 | 1,279,717 | 18,385,434,049 | (5,419,734,697) | 12,966,979,069 |

Single Discount Rate Development

Projection of Contributions Beginning September 1, 2019(continued)

| Year | Payroll for Current Employees | Payroll for Future Employees | Total Employee Payroll | Contributions from Current Employees | Employer Contributions for All Employees | Employer Normal Cost Contributions Related to Payroll of Future Employees | Total Contributions |
|------|-------------------------------|------------------------------|------------------------|--------------------------------------|--|---|---------------------|
| 50 | 6,117,518 | 198,287,045,523 | 198,293,163,041 | 504,695 | 18,936,997,070 | (5,582,604,326) | 13,354,897,439 |
| 51 | 2,226,679 | 204,239,731,253 | 204,241,957,933 | 183,701 | 19,505,106,983 | (5,750,197,166) | 13,755,093,518 |
| 52 | 950,846 | 210,368,265,824 | 210,369,216,671 | 78,445 | 20,090,260,192 | (5,922,740,881) | 14,167,597,756 |
| 53 | 336,583 | 216,679,956,588 | 216,680,293,171 | 27,768 | 20,692,967,998 | (6,100,441,205) | 14,592,554,561 |
| 54 | 86,492 | 223,180,615,474 | 223,180,701,966 | 7,136 | 21,313,757,038 | (6,283,461,766) | 15,030,302,408 |
| 55 | 12,558 | 229,876,110,467 | 229,876,123,025 | 1,036 | 21,953,169,749 | (6,471,967,774) | 15,481,203,011 |
| 56 | 1,224 | 236,772,405,491 | 236,772,406,716 | 101 | 22,611,764,841 | (6,666,127,137) | 15,945,637,805 |
| 57 | - | 243,875,578,917 | 243,875,578,917 | - | 23,290,117,787 | (6,866,110,987) | 16,424,006,800 |
| 58 | - | 251,191,846,285 | 251,191,846,285 | - | 23,988,821,320 | (7,072,094,316) | 16,916,727,004 |
| 59 | - | 258,727,601,673 | 258,727,601,673 | - | 24,708,485,960 | (7,284,257,146) | 17,424,228,814 |
| 60 | - | 266,489,429,723 | 266,489,429,723 | - | 25,449,740,539 | (7,502,784,860) | 17,946,955,679 |
| 61 | - | 274,484,112,615 | 274,484,112,615 | - | 26,213,232,755 | (7,727,868,406) | 18,485,364,349 |
| 62 | - | 282,718,635,993 | 282,718,635,993 | - | 26,999,629,737 | (7,959,704,458) | 19,039,925,279 |
| 63 | - | 291,200,195,073 | 291,200,195,073 | - | 27,809,618,629 | (8,198,495,592) | 19,611,123,037 |
| 64 | - | 299,936,200,925 | 299,936,200,925 | - | 28,643,907,188 | (8,444,450,460) | 20,199,456,728 |
| 65 | - | 308,934,286,953 | 308,934,286,953 | - | 29,503,224,404 | (8,697,783,973) | 20,805,440,431 |
| 66 | - | 318,202,315,562 | 318,202,315,562 | - | 30,388,321,136 | (8,958,717,493) | 21,429,603,643 |
| 67 | - | 327,748,385,029 | 327,748,385,029 | - | 31,299,970,770 | (9,227,479,017) | 22,072,491,753 |
| 68 | - | 337,580,836,579 | 337,580,836,579 | - | 32,238,969,893 | (9,504,303,388) | 22,734,666,505 |
| 69 | - | 347,708,261,677 | 347,708,261,677 | - | 33,206,138,990 | (9,789,432,489) | 23,416,706,501 |
| 70 | - | 358,139,509,527 | 358,139,509,527 | - | 34,202,323,160 | (10,083,115,464) | 24,119,207,696 |
| 71 | - | 368,883,694,813 | 368,883,694,813 | - | 35,228,392,855 | (10,385,608,928) | 24,842,783,927 |
| 72 | - | 379,950,205,657 | 379,950,205,657 | - | 36,285,244,640 | (10,697,177,196) | 25,588,067,444 |
| 73 | - | 391,348,711,827 | 391,348,711,827 | - | 37,373,801,979 | (11,018,092,512) | 26,355,709,467 |
| 74 | - | 403,089,173,182 | 403,089,173,182 | - | 38,495,016,039 | (11,348,635,287) | 27,146,380,752 |
| 75 | - | 415,181,848,377 | 415,181,848,377 | - | 39,649,866,520 | (11,689,094,346) | 27,960,772,174 |
| 76 | - | 427,637,303,829 | 427,637,303,829 | - | 40,839,362,516 | (12,039,767,176) | 28,799,595,340 |
| 77 | - | 440,466,422,943 | 440,466,422,943 | - | 42,064,543,391 | (12,400,960,191) | 29,663,583,200 |
| 78 | - | 453,680,415,632 | 453,680,415,632 | - | 43,326,479,693 | (12,772,988,997) | 30,553,490,696 |
| 79 | - | 467,290,828,101 | 467,290,828,101 | - | 44,626,274,084 | (13,156,178,667) | 31,470,095,417 |
| 80 | - | 481,309,552,944 | 481,309,552,944 | - | 45,965,062,306 | (13,550,864,027) | 32,414,198,279 |
| 81 | - | 495,748,839,532 | 495,748,839,532 | - | 47,344,014,175 | (13,957,389,948) | 33,386,624,227 |
| 82 | - | 510,621,304,718 | 510,621,304,718 | - | 48,764,334,601 | (14,376,111,646) | 34,388,222,955 |
| 83 | - | 525,939,943,860 | 525,939,943,860 | - | 50,227,264,639 | (14,807,394,996) | 35,419,869,643 |
| 84 | - | 541,718,142,175 | 541,718,142,175 | - | 51,734,082,578 | (15,251,616,846) | 36,482,465,732 |
| 85 | - | 557,969,686,441 | 557,969,686,441 | - | 53,286,105,055 | (15,709,165,351) | 37,576,939,704 |
| 86 | - | 574,708,777,034 | 574,708,777,034 | - | 54,884,688,207 | (16,180,440,312) | 38,704,247,895 |
| 87 | - | 591,950,040,345 | 591,950,040,345 | - | 56,531,228,853 | (16,665,853,521) | 39,865,375,332 |
| 88 | - | 609,708,541,555 | 609,708,541,555 | - | 58,227,165,719 | (17,165,829,126) | 41,061,336,593 |
| 89 | - | 627,999,797,802 | 627,999,797,802 | - | 59,973,980,690 | (17,680,804,000) | 42,293,176,690 |
| 90 | - | 646,839,791,736 | 646,839,791,736 | - | 61,773,200,111 | (18,211,228,120) | 43,561,971,991 |
| 91 | - | 666,244,985,488 | 666,244,985,488 | - | 63,626,396,114 | (18,757,564,964) | 44,868,831,150 |
| 92 | - | 686,232,335,053 | 686,232,335,053 | - | 65,535,187,998 | (19,320,291,913) | 46,214,896,085 |
| 93 | - | 706,819,305,104 | 706,819,305,104 | - | 67,501,243,637 | (19,899,900,670) | 47,601,342,967 |
| 94 | - | 728,023,884,257 | 728,023,884,257 | - | 69,526,280,947 | (20,496,897,690) | 49,029,383,257 |
| 95 | - | 749,864,600,785 | 749,864,600,785 | - | 71,612,069,375 | (21,111,804,621) | 50,500,264,754 |
| 96 | - | 772,360,538,809 | 772,360,538,809 | - | 73,760,431,456 | (21,745,158,760) | 52,015,272,696 |
| 97 | - | 795,531,354,973 | 795,531,354,973 | - | 75,973,244,400 | (22,397,513,522) | 53,575,730,878 |
| 98 | - | 819,397,295,622 | 819,397,295,622 | - | 78,252,441,732 | (23,069,438,928) | 55,183,002,804 |
| 99 | - | 843,979,214,491 | 843,979,214,491 | - | 80,600,014,984 | (23,761,522,096) | 56,838,492,888 |

Single Discount Rate Development

PROJECTION OF PLAN FIDUCIARY NET POSITION BEGINNING SEPTEMBER 1, 2019

| Year | Projected Beginning | Projected Total | Projected Benefit | Projected | Projected Investment | Projected Ending Plan |
|------|---------------------|-----------------|-------------------|-------------------------|----------------------|-------------------------|
| | Plan Net Position | Contributions | Payments | Administrative Expenses | Earnings at 7.25% | Net Position |
| | (a) | (b) | (c) | (d) | (e) | (f)=(a)+(b)-(c)-(d)+(e) |
| 1 | 157,978,199,075 | 6,844,747,511 | 11,402,175,205 | 44,734,448 | 11,289,509,936 | 164,665,546,869 |
| 2 | 164,665,546,869 | 6,770,683,919 | 11,921,683,059 | 43,158,662 | 11,753,258,276 | 171,224,647,344 |
| 3 | 171,224,647,344 | 6,992,831,414 | 12,452,191,594 | 41,719,086 | 12,217,861,820 | 177,941,429,897 |
| 4 | 177,941,429,897 | 7,086,996,101 | 13,009,781,274 | 40,347,305 | 12,688,372,179 | 184,666,669,599 |
| 5 | 184,666,669,599 | 7,332,778,784 | 13,596,317,459 | 39,037,626 | 13,163,862,508 | 191,527,955,805 |
| 6 | 191,527,955,805 | 7,328,873,412 | 14,205,722,998 | 37,762,783 | 13,639,507,629 | 198,252,851,065 |
| 7 | 198,252,851,065 | 7,304,421,986 | 14,838,487,493 | 36,497,030 | 14,103,700,372 | 204,785,988,900 |
| 8 | 204,785,988,900 | 7,283,290,662 | 15,494,559,149 | 35,217,482 | 14,553,279,340 | 211,092,782,270 |
| 9 | 211,092,782,270 | 7,264,307,573 | 16,172,658,634 | 33,912,212 | 14,985,741,222 | 217,136,260,219 |
| 10 | 217,136,260,219 | 7,246,768,247 | 16,869,746,229 | 32,572,427 | 15,398,489,111 | 222,879,198,922 |
| 11 | 222,879,198,922 | 7,229,489,070 | 17,587,890,392 | 31,187,180 | 15,788,708,843 | 228,278,319,262 |
| 12 | 228,278,319,262 | 7,214,616,400 | 18,301,945,877 | 29,777,560 | 16,154,233,943 | 233,315,446,168 |
| 13 | 233,315,446,168 | 7,202,312,773 | 19,013,098,033 | 28,342,685 | 16,493,710,321 | 237,970,028,544 |
| 14 | 237,970,028,544 | 7,192,731,505 | 19,721,137,261 | 26,884,552 | 16,805,660,877 | 242,220,399,114 |
| 15 | 242,220,399,114 | 7,186,411,866 | 20,425,377,422 | 25,406,888 | 17,088,558,245 | 246,044,584,916 |
| 16 | 246,044,584,916 | 7,185,145,222 | 21,117,835,446 | 23,928,042 | 17,341,156,856 | 249,429,123,505 |
| 17 | 249,429,123,505 | 7,190,729,617 | 21,790,284,883 | 22,465,414 | 17,562,837,092 | 252,369,939,916 |
| 18 | 252,369,939,916 | 7,206,968,560 | 22,414,534,305 | 21,056,395 | 17,754,441,710 | 254,895,759,487 |
| 19 | 254,895,759,487 | 7,235,971,655 | 22,971,473,119 | 19,721,480 | 17,918,808,342 | 257,059,344,884 |
| 20 | 257,059,344,884 | 7,276,027,837 | 23,474,066,343 | 18,443,705 | 18,059,240,184 | 258,902,102,857 |
| 21 | 258,902,102,857 | 7,327,277,089 | 23,918,197,204 | 17,224,692 | 18,178,890,777 | 260,472,848,826 |
| 22 | 260,472,848,826 | 7,388,591,161 | 24,311,463,819 | 16,052,684 | 18,280,988,860 | 261,814,912,345 |
| 23 | 261,814,912,345 | 7,458,877,176 | 24,662,797,558 | 14,917,873 | 18,368,319,154 | 262,964,393,244 |
| 24 | 262,964,393,244 | 7,536,977,263 | 24,981,714,143 | 13,809,439 | 18,443,119,134 | 263,948,966,060 |
| 25 | 263,948,966,060 | 7,622,365,203 | 25,277,058,540 | 12,723,232 | 18,507,061,591 | 264,788,611,082 |
| 26 | 264,788,611,082 | 7,713,367,864 | 25,565,271,652 | 11,645,231 | 18,560,950,449 | 265,486,012,512 |
| 27 | 265,486,012,512 | 7,811,430,376 | 25,831,661,622 | 10,588,875 | 18,605,554,566 | 266,060,746,957 |
| 28 | 266,060,746,957 | 7,918,270,100 | 26,056,275,073 | 9,568,623 | 18,643,064,549 | 266,556,237,910 |
| 29 | 266,556,237,910 | 8,034,695,745 | 26,232,170,540 | 8,590,245 | 18,676,904,426 | 267,027,077,296 |
| 30 | 267,027,077,296 | 8,160,198,537 | 26,176,126,052 | 7,649,622 | 18,717,539,727 | 267,721,039,886 |
| 31 | 267,721,039,886 | 8,292,260,545 | 26,309,805,389 | 6,725,357 | 18,767,827,331 | 268,464,597,015 |
| 32 | 268,464,597,015 | 8,430,215,651 | 26,417,382,131 | 5,825,542 | 18,822,849,219 | 269,294,454,213 |
| 33 | 269,294,454,213 | 8,578,881,448 | 26,478,860,331 | 4,964,064 | 18,886,149,800 | 270,275,661,067 |
| 34 | 270,275,661,067 | 8,739,069,472 | 26,482,380,145 | 4,146,946 | 18,962,896,256 | 271,491,099,704 |
| 35 | 271,491,099,704 | 8,912,617,457 | 26,404,248,343 | 3,390,353 | 19,060,006,271 | 273,056,084,737 |
| 36 | 273,056,084,737 | 9,101,429,690 | 26,223,788,379 | 2,711,045 | 19,186,643,789 | 275,117,658,791 |
| 37 | 275,117,658,791 | 9,306,392,492 | 25,936,469,812 | 2,115,600 | 19,353,662,090 | 277,839,127,961 |
| 38 | 277,839,127,961 | 9,529,068,772 | 25,526,825,289 | 1,617,254 | 19,573,506,939 | 281,413,261,128 |
| 39 | 281,413,261,128 | 9,770,322,449 | 24,990,256,408 | 1,222,226 | 19,860,348,404 | 286,052,453,346 |
| 40 | 286,052,453,346 | 10,028,752,539 | 24,353,081,199 | 914,147 | 20,228,598,474 | 291,955,809,014 |
| 41 | 291,955,809,014 | 10,302,601,022 | 23,643,949,273 | 673,027 | 20,691,609,941 | 299,305,397,676 |
| 42 | 299,305,397,676 | 10,591,218,461 | 22,871,964,948 | 489,822 | 21,262,235,781 | 308,286,397,148 |
| 43 | 308,286,397,148 | 10,893,483,947 | 22,050,685,359 | 350,720 | 21,953,379,107 | 319,082,224,123 |
| 44 | 319,082,224,123 | 11,208,611,096 | 21,190,883,221 | 245,159 | 22,777,926,321 | 331,877,633,160 |
| 45 | 331,877,633,160 | 11,536,132,770 | 20,300,822,272 | 165,663 | 23,748,961,436 | 346,861,739,431 |
| 46 | 346,861,739,431 | 11,875,773,800 | 19,387,028,477 | 106,585 | 24,879,953,277 | 364,230,331,446 |
| 47 | 364,230,331,446 | 12,227,473,575 | 18,454,390,948 | 64,318 | 26,184,920,351 | 384,188,270,106 |
| 48 | 384,188,270,106 | 12,591,214,966 | 17,507,807,257 | 35,602 | 27,678,540,149 | 406,950,182,362 |
| 49 | 406,950,182,362 | 12,966,979,069 | 16,552,614,763 | 17,063 | 29,376,182,477 | 432,740,712,083 |
| 50 | 432,740,712,083 | 13,354,897,439 | 15,593,142,213 | 6,729 | 31,293,984,600 | 461,796,445,180 |

Single Discount Rate Development

Projection of Plan Fiduciary Net Position Beginning September 1, 2019 (continued)

| Year | Projected Beginning Plan Net Position | Projected Total Contributions | Projected Benefit Payments | Projected Administrative Expenses | Projected Investment Earnings at 8.50% | Projected Ending Plan Net Position |
|------|---------------------------------------|-------------------------------|----------------------------|-----------------------------------|--|------------------------------------|
| | (a) | (b) | (c) | (d) | (e) | (f)=(a)+(b)-(c)-(d)+(e) |
| 51 | 461,796,445,180 | 13,755,093,518 | 14,634,303,929 | 2,449 | 33,448,928,442 | 494,366,160,762 |
| 52 | 494,366,160,762 | 14,167,597,756 | 13,682,318,678 | 1,046 | 35,858,830,201 | 530,710,268,995 |
| 53 | 530,710,268,995 | 14,592,554,561 | 12,742,546,151 | 370 | 38,542,383,942 | 571,102,660,977 |
| 54 | 571,102,660,977 | 15,030,302,408 | 11,818,461,901 | 95 | 41,519,335,054 | 615,833,836,442 |
| 55 | 615,833,836,442 | 15,481,203,011 | 10,913,289,046 | 14 | 44,810,642,864 | 665,212,393,258 |
| 56 | 665,212,393,258 | 15,945,637,805 | 10,029,939,708 | 1 | 48,438,590,588 | 719,566,681,941 |
| 57 | 719,566,681,941 | 16,424,006,800 | 9,171,113,920 | - | 52,426,901,725 | 779,246,476,545 |
| 58 | 779,246,476,545 | 16,916,727,004 | 8,339,508,052 | - | 56,800,853,711 | 844,624,549,208 |
| 59 | 844,624,549,208 | 17,424,228,814 | 7,537,850,693 | - | 61,587,390,677 | 916,098,318,006 |
| 60 | 916,098,318,006 | 17,946,955,679 | 6,768,845,206 | - | 66,815,244,943 | 994,091,673,422 |
| 61 | 994,091,673,422 | 18,485,364,349 | 6,035,181,967 | - | 72,515,069,017 | 1,079,056,924,821 |
| 62 | 1,079,056,924,821 | 19,039,925,279 | 5,339,507,304 | - | 78,719,577,832 | 1,171,476,920,628 |
| 63 | 1,171,476,920,628 | 19,611,123,037 | 4,684,358,022 | - | 85,463,704,809 | 1,271,867,390,452 |
| 64 | 1,271,867,390,452 | 20,199,456,728 | 4,072,103,198 | - | 92,784,773,742 | 1,380,779,517,724 |
| 65 | 1,380,779,517,724 | 20,805,440,431 | 3,504,767,443 | - | 100,722,691,632 | 1,498,802,882,345 |
| 66 | 1,498,802,882,345 | 21,429,603,643 | 2,983,859,781 | - | 109,320,168,135 | 1,626,568,794,342 |
| 67 | 1,626,568,794,342 | 22,072,491,753 | 2,510,288,919 | - | 118,622,960,289 | 1,764,753,957,465 |
| 68 | 1,764,753,957,465 | 22,734,666,505 | 2,084,361,571 | - | 128,680,138,197 | 1,914,084,400,596 |
| 69 | 1,914,084,400,596 | 23,416,706,501 | 1,705,814,767 | - | 139,544,368,928 | 2,075,339,661,258 |
| 70 | 2,075,339,661,258 | 24,119,207,696 | 1,373,760,466 | - | 151,272,221,805 | 2,249,357,330,293 |
| 71 | 2,249,357,330,293 | 24,842,783,927 | 1,086,788,883 | - | 163,924,494,237 | 2,437,037,819,574 |
| 72 | 2,437,037,819,574 | 25,588,067,444 | 843,058,505 | - | 177,566,554,190 | 2,639,349,382,703 |
| 73 | 2,639,349,382,703 | 26,355,709,467 | 640,212,935 | - | 192,268,707,169 | 2,857,333,586,404 |
| 74 | 2,857,333,586,404 | 27,146,380,752 | 475,331,688 | - | 208,106,594,666 | 3,092,111,230,135 |
| 75 | 3,092,111,230,135 | 27,960,772,174 | 344,841,764 | - | 225,161,626,503 | 3,344,888,787,047 |
| 76 | 3,344,888,787,047 | 28,799,595,340 | 244,505,005 | - | 243,521,448,273 | 3,616,965,325,655 |
| 77 | 3,616,965,325,655 | 29,663,583,200 | 169,636,335 | - | 263,280,435,409 | 3,909,739,707,929 |
| 78 | 3,909,739,707,929 | 30,553,490,696 | 115,428,850 | - | 284,540,203,496 | 4,224,717,973,270 |
| 79 | 4,224,717,973,270 | 31,470,095,417 | 77,240,900 | - | 307,410,133,399 | 4,563,520,961,186 |
| 80 | 4,563,520,961,186 | 32,414,198,279 | 50,913,315 | - | 332,007,912,639 | 4,927,892,158,789 |
| 81 | 4,927,892,158,789 | 33,386,624,227 | 33,065,919 | - | 358,460,093,802 | 5,319,705,810,899 |
| 82 | 5,319,705,810,899 | 34,388,222,955 | 21,153,064 | - | 386,902,680,564 | 5,740,975,561,354 |
| 83 | 5,740,975,561,354 | 35,419,869,643 | 13,323,612 | - | 417,481,759,204 | 6,193,863,866,588 |
| 84 | 6,193,863,866,588 | 36,482,465,732 | 8,258,070 | - | 450,354,186,912 | 6,680,692,261,163 |
| 85 | 6,680,692,261,163 | 37,576,939,704 | 5,033,815 | - | 485,688,340,874 | 7,203,952,507,926 |
| 86 | 7,203,952,507,926 | 38,704,247,895 | 3,016,133 | - | 523,664,930,563 | 7,766,318,670,251 |
| 87 | 7,766,318,670,251 | 39,865,375,332 | 1,775,715 | - | 564,477,875,944 | 8,370,660,145,812 |
| 88 | 8,370,660,145,812 | 41,061,336,593 | 1,027,181 | - | 608,335,254,650 | 9,020,055,709,875 |
| 89 | 9,020,055,709,875 | 42,293,176,690 | 583,618 | - | 655,460,321,762 | 9,717,808,624,709 |
| 90 | 9,717,808,624,709 | 43,561,971,991 | 325,502 | - | 706,092,606,388 | 10,467,462,877,587 |
| 91 | 10,467,462,877,587 | 44,868,831,150 | 178,097 | - | 760,489,089,753 | 11,272,820,620,392 |
| 92 | 11,272,820,620,392 | 46,214,896,085 | 95,542 | - | 818,925,470,170 | 12,137,960,891,105 |
| 93 | 12,137,960,891,105 | 47,601,342,967 | 50,186 | - | 881,697,520,770 | 13,067,259,704,657 |
| 94 | 13,067,259,704,657 | 49,029,383,257 | 25,693 | - | 949,122,546,364 | 14,065,411,608,585 |
| 95 | 14,065,411,608,585 | 50,500,264,754 | 12,686 | - | 1,021,540,946,422 | 15,137,452,807,075 |
| 96 | 15,137,452,807,075 | 52,015,272,696 | 6,057 | - | 1,099,317,891,707 | 16,288,785,965,421 |
| 97 | 16,288,785,965,421 | 53,575,730,878 | 2,909 | - | 1,182,845,122,701 | 17,525,206,816,090 |
| 98 | 17,525,206,816,090 | 55,183,002,804 | 1,450 | - | 1,272,542,878,636 | 18,852,932,696,080 |
| 99 | 18,852,932,696,080 | 56,838,492,888 | 775 | - | 1,368,861,966,495 | 20,278,633,154,688 |

Single Discount Rate Development

Present Values of Projected Benefits Beginning September 1, 2019

| Year | Projected Beginning Plan Net Position | Projected Benefit Payments | Funded Portion of Benefit Payments | Unfunded Portion of 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 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} |
| 1 | \$ 157,978,199,075 | \$ 11,402,175,205 | \$ 11,402,175,205 | \$ - | \$ 10,265,775,411 | \$ - | \$ 10,265,775,411 |
| 2 | 164,665,546,869 | 11,921,683,059 | 11,921,683,059 | - | 10,007,931,397 | - | 10,007,931,397 |
| 3 | 171,224,647,344 | 12,452,191,594 | 12,452,191,594 | - | 9,746,647,090 | - | 9,746,647,090 |
| 4 | 177,941,429,897 | 13,009,781,274 | 13,009,781,274 | - | 9,494,719,548 | - | 9,494,719,548 |
| 5 | 184,666,669,599 | 13,596,317,459 | 13,596,317,459 | - | 9,252,011,025 | - | 9,252,011,025 |
| 6 | 191,527,955,805 | 14,205,722,998 | 14,205,722,998 | - | 9,013,238,983 | - | 9,013,238,983 |
| 7 | 198,252,851,065 | 14,838,487,493 | 14,838,487,493 | - | 8,778,289,079 | - | 8,778,289,079 |
| 8 | 204,785,988,900 | 15,494,559,149 | 15,494,559,149 | - | 8,546,772,952 | - | 8,546,772,952 |
| 9 | 211,092,782,270 | 16,172,658,634 | 16,172,658,634 | - | 8,317,772,956 | - | 8,317,772,956 |
| 10 | 217,136,260,219 | 16,869,746,229 | 16,869,746,229 | - | 8,089,783,341 | - | 8,089,783,341 |
| 11 | 222,879,198,922 | 17,587,890,392 | 17,587,890,392 | - | 7,864,023,282 | - | 7,864,023,282 |
| 12 | 228,278,319,262 | 18,301,945,877 | 18,301,945,877 | - | 7,630,113,636 | - | 7,630,113,636 |
| 13 | 233,315,446,168 | 19,013,098,033 | 19,013,098,033 | - | 7,390,763,850 | - | 7,390,763,850 |
| 14 | 237,970,028,544 | 19,721,137,261 | 19,721,137,261 | - | 7,147,778,625 | - | 7,147,778,625 |
| 15 | 242,220,399,114 | 20,425,377,422 | 20,425,377,422 | - | 6,902,587,600 | - | 6,902,587,600 |
| 16 | 246,044,584,916 | 21,117,835,446 | 21,117,835,446 | - | 6,654,170,695 | - | 6,654,170,695 |
| 17 | 249,429,123,505 | 21,790,284,883 | 21,790,284,883 | - | 6,401,918,532 | - | 6,401,918,532 |
| 18 | 252,369,939,916 | 22,414,534,305 | 22,414,534,305 | - | 6,140,159,522 | - | 6,140,159,522 |
| 19 | 254,895,759,487 | 22,971,473,119 | 22,971,473,119 | - | 5,867,343,033 | - | 5,867,343,033 |
| 20 | 257,059,344,884 | 23,474,066,343 | 23,474,066,343 | - | 5,590,409,999 | - | 5,590,409,999 |
| 21 | 258,902,102,857 | 23,918,197,204 | 23,918,197,204 | - | 5,311,124,401 | - | 5,311,124,401 |
| 22 | 260,472,848,826 | 24,311,463,819 | 24,311,463,819 | - | 5,033,520,477 | - | 5,033,520,477 |
| 23 | 261,814,912,345 | 24,662,797,558 | 24,662,797,558 | - | 4,761,083,168 | - | 4,761,083,168 |
| 24 | 262,964,393,244 | 24,981,714,143 | 24,981,714,143 | - | 4,496,642,528 | - | 4,496,642,528 |
| 25 | 263,948,966,060 | 25,277,058,540 | 25,277,058,540 | - | 4,242,241,248 | - | 4,242,241,248 |
| 26 | 264,788,611,082 | 25,565,271,652 | 25,565,271,652 | - | 4,000,570,601 | - | 4,000,570,601 |
| 27 | 265,486,012,512 | 25,831,661,622 | 25,831,661,622 | - | 3,769,003,750 | - | 3,769,003,750 |
| 28 | 266,060,746,957 | 26,056,275,073 | 26,056,275,073 | - | 3,544,779,749 | - | 3,544,779,749 |
| 29 | 266,556,237,910 | 26,232,170,540 | 26,232,170,540 | - | 3,327,467,726 | - | 3,327,467,726 |
| 30 | 267,027,077,296 | 26,176,126,052 | 26,176,126,052 | - | 3,095,905,511 | - | 3,095,905,511 |
| 31 | 267,721,039,886 | 26,309,805,389 | 26,309,805,389 | - | 2,901,366,944 | - | 2,901,366,944 |
| 32 | 268,464,597,015 | 26,417,382,131 | 26,417,382,131 | - | 2,716,298,542 | - | 2,716,298,542 |
| 33 | 269,294,454,213 | 26,478,860,331 | 26,478,860,331 | - | 2,538,573,313 | - | 2,538,573,313 |
| 34 | 270,275,661,067 | 26,482,380,145 | 26,482,380,145 | - | 2,367,282,763 | - | 2,367,282,763 |
| 35 | 271,491,099,704 | 26,404,248,343 | 26,404,248,343 | - | 2,200,744,516 | - | 2,200,744,516 |
| 36 | 273,056,084,737 | 26,223,788,379 | 26,223,788,379 | - | 2,037,951,998 | - | 2,037,951,998 |
| 37 | 275,117,658,791 | 25,936,469,812 | 25,936,469,812 | - | 1,879,369,101 | - | 1,879,369,101 |
| 38 | 277,839,127,961 | 25,526,825,289 | 25,526,825,289 | - | 1,724,649,008 | - | 1,724,649,008 |
| 39 | 281,413,261,128 | 24,990,256,408 | 24,990,256,408 | - | 1,574,263,145 | - | 1,574,263,145 |
| 40 | 286,052,453,346 | 24,353,081,199 | 24,353,081,199 | - | 1,430,418,875 | - | 1,430,418,875 |
| 41 | 291,955,809,014 | 23,643,949,273 | 23,643,949,273 | - | 1,294,887,485 | - | 1,294,887,485 |
| 42 | 299,305,397,676 | 22,871,964,948 | 22,871,964,948 | - | 1,167,933,701 | - | 1,167,933,701 |
| 43 | 308,286,397,148 | 22,050,685,359 | 22,050,685,359 | - | 1,049,879,619 | - | 1,049,879,619 |
| 44 | 319,082,224,123 | 21,190,883,221 | 21,190,883,221 | - | 940,739,046 | - | 940,739,046 |
| 45 | 331,877,633,160 | 20,300,822,272 | 20,300,822,272 | - | 840,304,018 | - | 840,304,018 |
| 46 | 346,861,739,431 | 19,387,028,477 | 19,387,028,477 | - | 748,232,828 | - | 748,232,828 |
| 47 | 364,230,331,446 | 18,454,390,948 | 18,454,390,948 | - | 664,091,507 | - | 664,091,507 |
| 48 | 384,188,270,106 | 17,507,807,257 | 17,507,807,257 | - | 587,438,850 | - | 587,438,850 |
| 49 | 406,950,182,362 | 16,552,614,763 | 16,552,614,763 | - | 517,845,510 | - | 517,845,510 |

Single Discount Rate Development

PVs of Projected Benefits Beginning September 1, 2019 (continued)

| Year | Projected Beginning Plan Net Position | Projected Benefit Payments | Funded Portion of Benefit Payments | Unfunded Portion of 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 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}) |
| 50 | \$ 432,740,712,083 | \$ 15,593,142,213 | \$ 15,593,142,213 | \$ - | \$ 454,851,830 | \$ - | \$ 454,851,830 |
| 51 | 461,796,445,180 | 14,634,303,929 | 14,634,303,929 | - | 398,025,665 | - | 398,025,665 |
| 52 | 494,366,160,762 | 13,682,318,678 | 13,682,318,678 | - | 346,977,574 | - | 346,977,574 |
| 53 | 530,710,268,995 | 12,742,546,151 | 12,742,546,151 | - | 301,301,032 | - | 301,301,032 |
| 54 | 571,102,660,977 | 11,818,461,901 | 11,818,461,901 | - | 260,560,190 | - | 260,560,190 |
| 55 | 615,833,836,442 | 10,913,289,046 | 10,913,289,046 | - | 224,339,352 | - | 224,339,352 |
| 56 | 665,212,393,258 | 10,029,939,708 | 10,029,939,708 | - | 192,243,128 | - | 192,243,128 |
| 57 | 719,566,681,941 | 9,171,113,920 | 9,171,113,920 | - | 163,899,372 | - | 163,899,372 |
| 58 | 779,246,476,545 | 8,339,508,052 | 8,339,508,052 | - | 138,962,728 | - | 138,962,728 |
| 59 | 844,624,549,208 | 7,537,850,693 | 7,537,850,693 | - | 117,113,815 | - | 117,113,815 |
| 60 | 916,098,318,006 | 6,768,845,206 | 6,768,845,206 | - | 98,056,837 | - | 98,056,837 |
| 61 | 994,091,673,422 | 6,035,181,967 | 6,035,181,967 | - | 81,518,535 | - | 81,518,535 |
| 62 | 1,079,056,924,821 | 5,339,507,304 | 5,339,507,304 | - | 67,246,530 | - | 67,246,530 |
| 63 | 1,171,476,920,628 | 4,684,358,022 | 4,684,358,022 | - | 55,007,445 | - | 55,007,445 |
| 64 | 1,271,867,390,452 | 4,072,103,198 | 4,072,103,198 | - | 44,585,421 | - | 44,585,421 |
| 65 | 1,380,779,517,724 | 3,504,767,443 | 3,504,767,443 | - | 35,779,643 | - | 35,779,643 |
| 66 | 1,498,802,882,345 | 2,983,859,781 | 2,983,859,781 | - | 28,402,587 | - | 28,402,587 |
| 67 | 1,626,568,794,342 | 2,510,288,919 | 2,510,288,919 | - | 22,279,524 | - | 22,279,524 |
| 68 | 1,764,753,957,465 | 2,084,361,571 | 2,084,361,571 | - | 17,248,763 | - | 17,248,763 |
| 69 | 1,914,084,400,596 | 1,705,814,767 | 1,705,814,767 | - | 13,161,926 | - | 13,161,926 |
| 70 | 2,075,339,661,258 | 1,373,760,466 | 1,373,760,466 | - | 9,883,285 | - | 9,883,285 |
| 71 | 2,249,357,330,293 | 1,086,788,883 | 1,086,788,883 | - | 7,290,179 | - | 7,290,179 |
| 72 | 2,437,037,819,574 | 843,058,505 | 843,058,505 | - | 5,272,947 | - | 5,272,947 |
| 73 | 2,639,349,382,703 | 640,212,935 | 640,212,935 | - | 3,733,557 | - | 3,733,557 |
| 74 | 2,857,333,586,404 | 475,331,688 | 475,331,688 | - | 2,584,627 | - | 2,584,627 |
| 75 | 3,092,111,230,135 | 344,841,764 | 344,841,764 | - | 1,748,331 | - | 1,748,331 |
| 76 | 3,344,888,787,047 | 244,505,005 | 244,505,005 | - | 1,155,831 | - | 1,155,831 |
| 77 | 3,616,965,325,655 | 169,636,335 | 169,636,335 | - | 747,701 | - | 747,701 |
| 78 | 3,909,739,707,929 | 115,428,850 | 115,428,850 | - | 474,380 | - | 474,380 |
| 79 | 4,224,717,973,270 | 77,240,900 | 77,240,900 | - | 295,980 | - | 295,980 |
| 80 | 4,563,520,961,186 | 50,913,315 | 50,913,315 | - | 181,907 | - | 181,907 |
| 81 | 4,927,892,158,789 | 33,065,919 | 33,065,919 | - | 110,154 | - | 110,154 |
| 82 | 5,319,705,810,899 | 21,153,064 | 21,153,064 | - | 65,705 | - | 65,705 |
| 83 | 5,740,975,561,354 | 13,323,612 | 13,323,612 | - | 38,588 | - | 38,588 |
| 84 | 6,193,863,866,588 | 8,258,070 | 8,258,070 | - | 22,300 | - | 22,300 |
| 85 | 6,680,692,261,163 | 5,033,815 | 5,033,815 | - | 12,674 | - | 12,674 |
| 86 | 7,203,952,507,926 | 3,016,133 | 3,016,133 | - | 7,081 | - | 7,081 |
| 87 | 7,766,318,670,251 | 1,775,715 | 1,775,715 | - | 3,887 | - | 3,887 |
| 88 | 8,370,660,145,812 | 1,027,181 | 1,027,181 | - | 2,096 | - | 2,096 |
| 89 | 9,020,055,709,875 | 583,618 | 583,618 | - | 1,111 | - | 1,111 |
| 90 | 9,717,808,624,709 | 325,502 | 325,502 | - | 578 | - | 578 |
| 91 | 10,467,462,877,587 | 178,097 | 178,097 | - | 295 | - | 295 |
| 92 | 11,272,820,620,392 | 95,542 | 95,542 | - | 147 | - | 147 |
| 93 | 12,137,960,891,105 | 50,186 | 50,186 | - | 72 | - | 72 |
| 94 | 13,067,259,704,657 | 25,693 | 25,693 | - | 34 | - | 34 |
| 95 | 14,065,411,608,585 | 12,686 | 12,686 | - | 16 | - | 16 |
| 96 | 15,137,452,807,075 | 6,057 | 6,057 | - | 7 | - | 7 |
| 97 | 16,288,785,965,421 | 2,909 | 2,909 | - | 3 | - | 3 |
| 98 | 17,525,206,816,090 | 1,450 | 1,450 | - | 1 | - | 1 |
| 99 | 18,852,932,696,080 | 775 | 775 | - | 1 | - | 1 |
| Totals | | | | | \$ 232,962,015,855 | \$ - | \$ 232,962,015,855 |