

# Judges' Retirement System of Illinois

Annual Actuarial Valuation as of June 30, 2019



October 17, 2019

Board of Trustees  
Judges' Retirement System of Illinois  
Springfield, Illinois

**Re: Judges' Retirement System of Illinois Actuarial Valuation as of June 30, 2019**

Dear Board Members:

The results of the June 30, 2019, Annual Actuarial Valuation of the Judges' Retirement System of Illinois ("JRS" or "System") are presented in this report. The purposes of the actuarial valuation are to measure the System's funding status and to determine the State's contribution rate for the fiscal year beginning July 1, 2020, and ending June 30, 2021. This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results, associated with benefits described in this report, for purposes other than those identified above may be significantly different.

Gabriel, Roeder, Smith & Company ("GRS") has prepared this report exclusively for the Trustees of the Judges' Retirement System of Illinois; GRS is not responsible for reliance upon this report by any other party. This report may be provided to parties other than JRS only in its entirety and only with the permission of the Trustees.

The State's contribution rate has been determined under Illinois statutes, in particular under 40 ILCS Section 5/18-131. Information required by GASB Statement Nos. 67 and 68 is provided in a separate report. The System's current contribution rate determined under the statutory funding policy may not conform with the Actuarial Standards of Practice. Therefore, the Board adopted a policy to be used to calculate the Actuarially Determined Contribution ("ADC") under GASB Statement Nos. 67 and 68 for financial reporting purposes.

Although the statutory contribution requirements were met, the statutory funding method generates a contribution requirement that is less than a reasonable actuarially determined contribution. Meeting the statutory requirement does not mean that the undersigned agree that adequate actuarial funding has been achieved. We recommend the adherence to a funding policy, such as the Board policy used to calculate the ADC under GASB Statement Nos. 67 and 68, that finances the normal cost of the plan as well as an amortization payment that seeks to pay off any unfunded accrued liability over a closed period of 25 years.

The contribution requirement in this report is determined using the actuarial assumptions and methods disclosed in Section E of this report. This report includes risk metrics beginning on page 14, but does not include a more robust assessment of the risks if future experience deviates from the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

This actuarial valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The findings in this report are based on data and other information through June 30, 2019. The actuarial valuation was based upon information furnished by JRS staff, concerning Retirement System benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by JRS staff.

This report was prepared using actuarial assumptions adopted by the Board as authorized under the Illinois Pension Code. The actuarial assumptions used for the June 30, 2019, actuarial valuation are based on an experience review for the three-year period from July 1, 2015 through June 30, 2018. Pursuant to Public Act 99-0232, JRS is required to conduct an actuarial experience review once every three years. All actuarial assumptions used in this report are reasonable for the purposes of this actuarial valuation. Additional information about the actuarial assumptions is included in the Section E of this report entitled Actuarial Methods and Assumptions.

Public Act 100-0023, effective July 6, 2017, modified the State's funding policy beginning with fiscal year 2018, by phasing in contribution rate variances due to changes in actuarial assumptions over a five-year period. The State's contribution requirements provided in this report are determined in accordance with Public Act 100-0023.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge, the information contained in this report is accurate and fairly presents the actuarial position of the JRS as of the actuarial valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

Alex Rivera, Heidi G. Barry, and Jeffrey T. Tebeau are Members of the American Academy of Actuaries and are independent of the plan sponsor and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

Respectfully submitted,

**Gabriel, Roeder, Smith & Company**



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## SECTION A

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### SUMMARY OF ACTUARIAL VALUATION RESULTS

# Summary of the Actuarial Valuation

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## Introduction

The law governing the Judges' Retirement System of Illinois ("JRS" or "System") requires the Actuary, as the technical advisor to the Board of Trustees to:

"...make an annual valuation of the liabilities and reserves of the system, an annual determination of the amount of the required State contributions and certify the results thereof to the board (40 ILCS Section 5/18-152 (2))."

Gabriel, Roeder, Smith & Company has been retained by the Board of Trustees to perform an actuarial valuation as of June 30, 2019. In this report, we present the results of the actuarial valuation and the appropriation requirements under Public Act 88-0593, Public Act 93-0002, Public Act 93-0839, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023 for fiscal year ending June 30, 2021.

The actuarial valuation was completed based upon membership and financial data provided by the administrative staff of the System. The actuarial assumptions used were based on an experience review for the three-year period ending June 30, 2018. The cost method used to determine the benefit liabilities is the Projected Unit Credit Cost Method. For actuarial valuation purposes, as well as projection purposes, the actuarial value of assets is based on a five-year smoothing method.

## Changes Since Last Valuation

### Recent Legislative Changes

The following recently passed Public Acts impact JRS as follows.

Public Act ("P.A.") 100-0023, effective July 6, 2017, modified the State's funding policy to include smoothing State contribution rate increases or decreases due to changes in actuarial assumptions, including investment return assumptions, over a five-year period in equal annual amounts beginning in fiscal year 2018. In addition, changes in actuarial or investment assumptions that increased or decreased the State contribution rate in fiscal years 2014 through 2017 are to be smoothed over a five-year period in equal annual amounts, applying only to the portion of the five-year phase-in that is applicable to fiscal years on and after 2018. The fiscal year 2018 State contribution was recertified, pursuant to P.A. 100-0023.

A summary of the JRS plan provisions is included in Section F of this report.

### Assumptions and Methods

The actuarial valuation results summarized in this report involve actuarial calculations that require assumptions about future events. The actuarial assumptions used for the June 30, 2019, actuarial valuation are based on an experience review for the three-year period from July 1, 2015 through June 30, 2018.

## Summary of the Actuarial Valuation

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As a result of the 2018 experience review, the Board approved the following changes to the assumptions to be used in the June 30, 2019, actuarial valuation:

- Reduce the investment return assumption from 6.75 percent to 6.50 percent;
- Reduce the general (price) inflation assumption from 2.50 percent to 2.25 percent;
- Reduce the wage inflation assumption from 2.75 percent to 2.50 percent;
- Reduce the salary increase assumption;
- Update the mortality tables to the Pub-2010 Above-Median Income General Healthy Retiree and Employee Mortality Tables with adjustments for the System's credibility factors and future mortality improvements using scale MP-2018;
- Update the normal and early retirement rates to better reflect observed experience; and
- Update the turnover rates to better reflect observed experience.

The change in the assumptions detailed above, decreased the actuarial accrued liability as of June 30, 2019, by \$37.7 million or 1.4%.

Pursuant to Public Act 99-0232, JRS is required to conduct an actuarial experience review once every three years.

On the following page is a summary of the key actuarial valuation results for the current and prior plan years.

## Key Valuation Results

Actuarial Valuation Date:	June 30, 2019	June 30, 2018
Fiscal Year Ending:	June 30, 2020	June 30, 2020
<b>Estimated Statutory Contributions:</b>		
· Annual Amount	\$ 148,618,000	\$ 144,160,000
· Percentage of Projected Capped Payroll for Fiscal Year	94.246%	91.851%
<b>Actuarially Determined Contribution<sup>a</sup> (ADC):</b>		
· Annual Amount	\$ 173,205,430	\$ 173,704,375
· Percentage of Projected Capped Payroll for Fiscal Year	109.838%	110.675%
<b>Membership</b>		
· Number of		
- Active Members	956	936
- Members Receiving Payments	1,262	1,193
- Inactive Members	26	21
- Total	2,244	2,150
· Covered Uncapped Payroll Provided by System	\$ 190,741,879	\$ 182,776,153
· Projected Capped Payroll For Fiscal Year	\$ 157,691,549	\$ 156,950,432
· Annualized Benefit Payments	\$ 160,510,208	\$ 149,928,219
<b>Assets</b>		
· Market Value of Assets (MVA)	\$ 1,073,103,751	\$ 1,012,484,801
· Actuarial Value of Assets (AVA)	\$ 1,068,739,561	\$ 1,012,757,312
· Return on MVA	6.41%	7.42%
· Return on AVA	5.95%	7.32%
· Ratio – AVA to MVA	99.59%	100.03%
<b>Actuarial Information</b>		
· Employer Normal Cost Amount	\$ 35,869,092	\$ 38,010,825
· Actuarial Accrued Liability (AAL)	\$ 2,793,016,352	\$ 2,721,852,847
· Unfunded Actuarial Accrued Liability (UAAL)	\$ 1,724,276,791	\$ 1,709,095,535
· Funded Ratio based on AVA	38.26%	37.21%
· UAAL as % of Covered Uncapped Payroll	903.98%	935.08%
· Funded Ratio based on MVA	38.42%	37.20%

<sup>a</sup> For contributions in fiscal years ending on and after June 30, 2017, the Board adopted a recommended policy used to develop the Actuarially Determined Contribution (ADC) as defined in GASB Statements Nos. 67 and 68. The policy adopted by the Board calculates the ADC as the Normal Cost plus a 25-year level percent of capped payroll closed-period amortization of the Unfunded Accrued Liability. As of June 30, 2019, the remaining amortization period is 21 years. The ADC is used for financial reporting purposes only.



## **Appropriation Requirements Under P.A. 88-0593, P.A. 93-0002, P.A. 93-0839, P.A. 94-0004, P.A. 96-0043 and P.A. 100-0023**

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The law governing the System under P.A. 88-0593 provides that:

For fiscal years 2011 through 2045, the minimum contribution to the System for each fiscal year shall be an amount determined to be sufficient to cause the total assets of the System to equal 90 percent of the total actuarial liabilities of the System by the end of fiscal year 2045. In making these determinations, the required contribution shall be calculated each year as a level-percentage-of-payroll over the years remaining to and including fiscal year 2045 and shall be determined under the projected unit credit actuarial cost method. For fiscal years 1997 through 2010, the minimum contribution to the System, as a percentage of the payroll, shall be increased in equal annual increments so that by fiscal year 2010, the contribution rate is at the same level as the contribution rate for fiscal years 2011 through 2045.

The above calculation provides the basis for calculating the appropriation requirements under P.A. 93-0002. For fiscal years 2005 and later, the contributions under P.A. 93-0002 start with a calculation of the contribution based upon the hypothetical asset value which assumes no infusion from the proceeds of the General Obligation Bond (“GOB”) sale that were deposited July 1, 2003 (Table 4a). This contribution is then reduced by the debt service beginning in fiscal year 2005 to produce the maximum contribution. For fiscal years 2006 and 2007, the maximum contribution is equal to the contribution amounts stated in P.A. 94-0004 for each respective year. The contribution amounts stated in P.A. 94-0004 are \$29,189,400 for fiscal year 2006 and \$35,236,800 for fiscal year 2007. A second projection is performed to develop the P.A. 88-0593 formula rate, which includes the GOB deposit. The lower of this formula rate with the GOB assets included and the maximum contribution is the required state appropriation (Table 4b).

Pursuant to Public Act 96-0043, for the calculation of the fiscal year 2011 contribution and beyond, the value of the System's assets shall be equal to the actuarial value of the System's assets. As of June 30, 2008, the actuarial value of the System's assets shall be equal to the market value of the assets as of that date. In determining the actuarial value of the System's assets for fiscal years after June 30, 2008, any actuarial gains or losses from investment return incurred in a fiscal year shall be recognized in equal annual amounts over the five-year period following that fiscal year. Furthermore, for purposes of determining the required State contribution to the System for a particular year, the projected actuarial value of assets shall be assumed to earn a rate of return equal to the System's actuarially assumed rate of return.

Public Act (“P.A.”) 100-0023, effective July 6, 2017, modified the State’s funding policy to include smoothing State contribution rate increases or decreases due to changes in actuarial assumptions, including investment return assumptions, over a five-year period in equal annual amounts beginning in fiscal year 2018. In addition, changes in actuarial or investment assumptions that increased or decreased the State contribution rate in fiscal years 2014 through 2017 are to be smoothed over a five-year period in equal annual amounts, applying only to the portion of the five-year phase-in that is applicable to fiscal years on and after 2018. The development of the contribution rate phase-in schedule that applies to State contribution rates determined on and after fiscal year 2020 is provided on page 43.

## Development of the Actuarial Value of Assets Based upon the Market Value of Assets

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The following tables outline the reconciliation of the market value of assets and the development of the hypothetical asset value as of June 30, 2019. Also, the tables show the development of the actuarial value of assets under both the market value and the hypothetical value of assets.

1. Market Value of Assets 6/30/2018	\$ 1,012,484,801
2. Actual State Contribution Amount	140,469,000
3. Employee Contribution Amount	14,660,408
4. Benefit Payouts & Refunds	(158,340,657)
5. Administrative Expenses	(910,537)
6. Investment Income	64,740,736
7. Market Value of Assets 6/30/2019	1,073,103,751
8. Expected Investment Return at 6.75%	68,205,885
9. Investment Gain/(Loss) Current Year	(3,465,149)
10. Deferred Investment Gains and (Losses) All Years	4,364,190
11. Actuarial Value of Assets 6/30/2019 (7. - 10.)	\$ 1,068,739,561

# Development of the Actuarial Value of Assets Based upon the Hypothetical Value of Assets

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The hypothetical asset value assumes no infusion from the proceeds of the GOB sale that was deposited July 1, 2003.

1. Hypothetical Value of Assets 6/30/2018	\$ 766,663,298
2. State Contribution Amount <sup>a</sup>	157,691,455
3. Employee Contribution Amount	14,660,408
4. Benefit Payouts & Refunds	(158,340,657)
5. Administrative Expenses	(910,537)
6. Investment Income <sup>b</sup>	49,556,473
7. Hypothetical Value of Assets 6/30/2019	829,320,440
8. Expected Investment Return at 6.75%	52,184,701
9. Investment Gain/(Loss) Current Year	(2,628,228)
10. Deferred Investment Gains and (Losses) All Years	3,436,164
11. Hypothetical Actuarial Value of Assets 6/30/2019 (7. - 10.)	\$ 825,884,276

<sup>a</sup> Represents FY 2019 no POB basic contribution. This amount was determined as part of the June 30, 2017 actuarial valuation and is based upon the hypothetical asset value which assumes no infusion from the proceeds of the GOB sale that were deposited July 1, 2003.

<sup>b</sup> Investment income assumes hypothetical value of assets earns the Fund's actual rate of return for fiscal year 2019 of 6.41 percent.

The development of the actuarial smoothed value of assets with GOB proceeds and the hypothetical smoothed value of assets without GOB proceeds are provided in each respective historical valuation report GRS has produced since the GOB proceeds were deposited into the trust.

## State Contribution Requirement for Fiscal Year 2021

The fiscal year ending June 30, 2020, and June 30, 2021, certified contribution requirements and projected future year required State contribution rates and amounts assuming deferred investments gains and losses are recognized in the assets are as follows:

Fiscal Year Ending June 30,	Base Contribution Rate	Assumed Capped Payroll	Total Required Contribution
<b>2020</b>	<b>91.851%</b>	<b>\$156,950,000</b>	<b>\$144,160,000</b>
<b>2021</b>	<b>94.246%</b>	<b>157,692,000</b>	<b>148,618,000</b>
2022	96.148%	157,613,000	151,542,000
2023	95.359%	157,645,000	150,329,000
2024	95.113%	157,617,000	149,914,000
2025	94.811%	157,844,000	149,653,000
2026	94.680%	158,183,000	149,768,000
2027	94.464%	158,705,000	149,919,000
2028	93.981%	159,290,000	149,702,000
2029	93.593%	160,462,000	150,181,000

For fiscal years 2020 through 2033, the base contribution may be limited by the maximum contribution determined under the assumption that the proceeds of the GOB sale were not deposited; therefore, the contribution rate is not level as a percent of pay.

Pursuant to Public Act 96-0043, the fiscal year 2021 contribution rate is calculated assuming the actuarial value of assets as of July 1, 2019, earns a rate of return equal to the System's actuarially assumed rate of return. Pursuant to Public Act 100-0023, contribution rates for fiscal years on and after 2020 through 2025 include smoothing of contribution rate variances due to changes in actuarial assumptions.

The contributions for fiscal years 2022 and beyond, as presented above, are developed in Tables 4c and 4d in this report. In those projections, the actuarial valuations as of June 30 for years 2020 through 2023 have been projected as though a valuation in each of those years was performed. At each projected valuation, an additional 20 percent of the investment gains and losses are recognized. The market value of assets at June 30, 2019, is assumed to have a rate of return equal to the valuation interest rate going forward. Therefore, the actuarial value of assets is calculated by adjusting the market value at each respective valuation date by the remaining percentage of the investment gains and losses. The actuarial value of assets converges to market value in 2023, when all remaining investment gains and losses have been recognized. Because the deferred asset gains and losses are incorporated into the projections, the projections found in Tables 4c and 4d do not show a stable contribution rate until the impact of the five-year asset smoothing has been fully realized.

## Method of Calculation for Appropriation Requirements

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The results are based on the projected unit credit actuarial cost method, the data provided and assumptions used for the June 30, 2019, actuarial valuation. In order to determine projected contribution rates and amounts, the following additional assumptions were used:

Projected annualized capped payroll of \$156,950,000 for fiscal year 2020.

Total employer contributions of \$144,160,000 for fiscal year 2020.

Administrative expenses of \$973,550 for fiscal year 2020, as provided by the System.

New entrants whose average age is 47.44 and average uncapped pay is \$199,596 (2019 dollars) and average capped pay is \$122,547 (2019 dollars). The active member population is assumed to remain level at 956 for all years of the 26-year projection.

Projected benefits for members hired on or after January 1, 2011, are based on the new provisions established in P.A. 96-0889.

The average increase in total uncapped payroll for the 26-year projection period is approximately 2.50 percent per year. It is important to note that benefits for new hires are based on capped payroll which is ultimately projected to grow at 2.25 percent per year. All results in this valuation assume that State contributions will be made on capped pay.

To determine the contribution rates, the expected 2020 appropriation was converted to a percentage of the expected 2020 payroll. An amortization schedule was then determined on the assumption that:

The ratio of total assets to total actuarial liabilities will be 90 percent by June 30, 2045.

The actuarial value of assets shall be assumed to earn a rate of return equal to the System's actuarially assumed rate of return.

The contribution rates for fiscal years 2010 through 2033 will not be uniform, but the rate for any one of these years will be the minimum of: the difference between the "without-GOB" contribution and the debt service, and the underlying formula rate as determined by Public Act 88-0593.

The contribution rate for fiscal year 2020 will be 91.851 percent based on expected total employer contributions of \$144,160,000.

The contribution rates for fiscal years 2034 through 2045 will be a uniform percentage of capped payroll.

The contribution rates for fiscal years 2020 through 2025 are reduced according to the phase-in schedule provided on page 43.

The certified FY 2021 contribution rate of 94.246 percent is applied to expected FY 2021 capped payroll. The resulting amount of \$148,618,000 is budgeted pursuant to the continuing appropriations process and deposited into the System in FY 2021.

## Observations on Actuarial Funding and Statutory Funding

GASB Statements Nos. 25, 27, 67 and 68 provide guidance for retirement plans and plan sponsors on the development of an annual expense requirement to be reported in their annual financial statements. Under the prior rules established by GASB Statements Nos. 25 and 27, this expense requirement is called the Annual Required Contribution (ARC). The ARC is the sum of the normal cost and amortization of the unfunded accrued liability and represents the annual employer contributions that are projected to finance benefits for current plan members over a period not to exceed 30 years.

GASB Statements Nos. 67 and 68, which replace GASB Statements Nos. 25 and 27, no longer use the ARC. However, measuring the Statutory Contribution against a policy such as the ARC helps evaluate the funding adequacy of the current statutory funding method. Thus, the Board adopted a policy to calculate the Actuarially Determined Contribution (ADC). Under this funding policy, the ADC is calculated as the Normal Cost plus a 25-year level percent of capped payroll closed-period amortization, as of June 30, 2015, of the Unfunded Accrued Liability. The remaining amortization period as of the June 30, 2019, actuarial valuation is 21 years.

The ADC for fiscal years 2020 and 2021, as well as the statutory contribution for fiscal years 2020 and 2021 are shown below as a percentage of projected capped payroll. The ADC percentage and statutory contribution for 2020 are based on the results of the June 30, 2018, actuarial valuation. The dollar amount of the ADC for 2020 and 2021, and the statutory contribution for 2020 and 2021 will be the product of the actual payroll for 2020 and 2021 and the percentages shown.

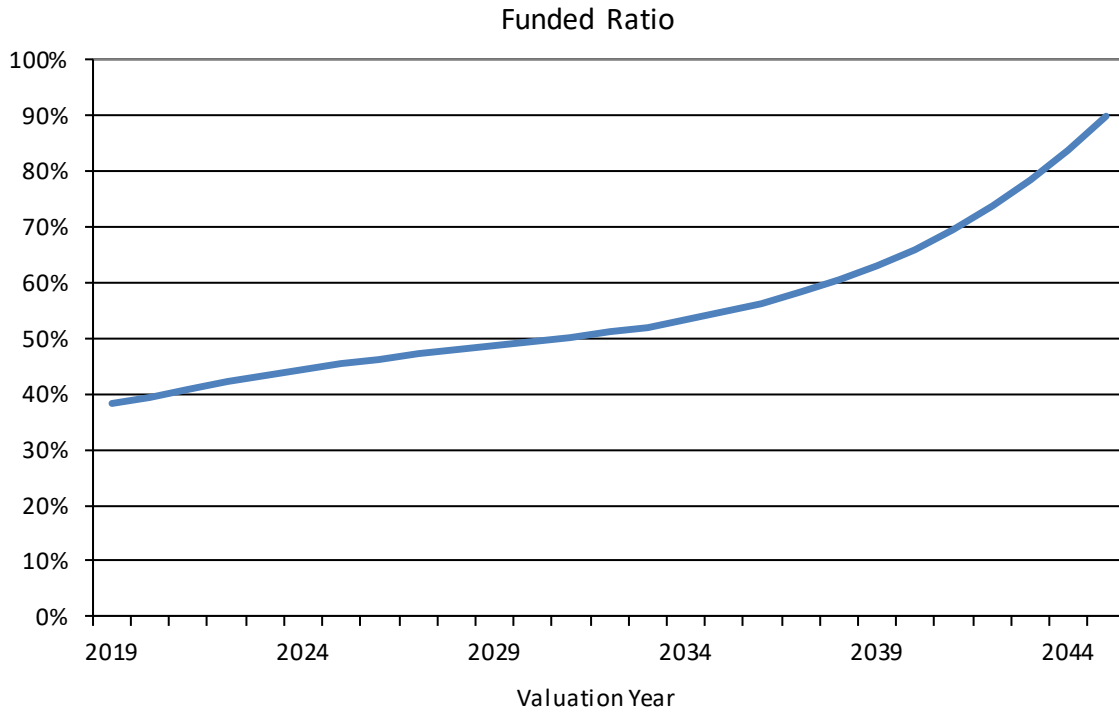
Actuarial Valuation Date:	June 30, 2019	June 30, 2018
Actuarially Determined Contributions for Fiscal Year Ending:	June 30, 2021	June 30, 2020
1. Employer normal cost	\$ 35,869,092	\$ 38,010,825
2. Initial amount to amortize the unfunded liability over a 25-year closed-period, beginning July 1, 2015, as a level percentage of capped payroll	<u>137,336,338</u>	<u>135,693,550</u>
3. ADC [(1) + (2)]	\$ 173,205,430	\$ 173,704,375
4. Projected capped payroll for fiscal year	\$ 157,691,549	\$ 156,950,432
5. ADC as a percentage of projected capped payroll	109.838%	110.675%
6. Estimated statutory contribution	\$ 148,618,000	\$ 144,160,000
7. Estimated statutory contribution as a percentage of projected capped payroll	94.246%	91.851%
8. Estimated statutory contribution as a percentage of ADC [(6) / (3)]	85.804%	82.992%

A key objective of the ADC is to accrue costs over the working lifetime of plan members to ensure that benefit obligations are satisfied and intergenerational equity is promoted. Although the ADC is solely an accounting provision, in certain circumstances it could represent a reasonable annual funding target and therefore is used by some plan sponsors as their “de facto” funding requirement. Given there is no requirement that the accounting provision for pension expense must equal the annual funding requirement, some plan sponsors adopt funding policies that differ from the ADC. However, a funding policy that differs significantly from the ADC approach could result in a potential “back-loading,” meaning contributions are deferred into the future. Back-loading could result in an underfunding of the system.

The statutory funding policy adopted for JRS provides for level percent of pay funding that produces a funding target of 90 percent by 2045, assuming an open group projection. The following graph shows

# Observations on Actuarial Funding and Statutory Funding

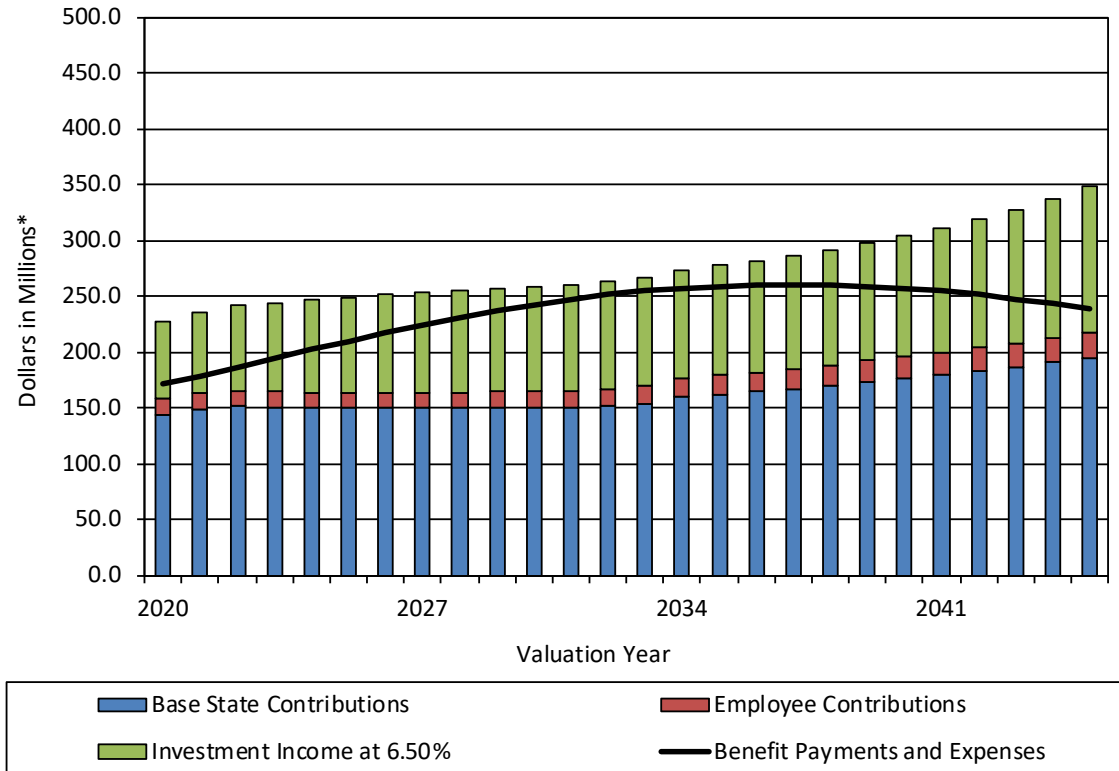
the projected funded ratio. A key observation is that the funded ratio does not grow markedly until after 2033. That is, a majority of the funding occurs between 2034 and 2045. This illustrates how significantly the current funding policy defers or back-loads contributions into the future.



# Observations on Actuarial Funding and Statutory Funding

The following graph compares the projected benefits and expenses against employer contributions, employee contributions and investment income. Beginning in 2020, benefits exceed State and employee contributions. From 2020 to 2033, the percentage of investment income needed to pay ongoing benefits increases from approximately 19 percent to 88 percent. This implies that a lower level of investment income is projected to be available for potential asset growth. After 2033, the percentage of investment income needed to pay ongoing benefits is projected to decrease from approximately 83 percent in 2034 to 16 percent in 2045, which is projected to cause assets to grow at a higher rate.

Comparison of Cash Flows



*\*Future dollar amounts are based on assumed inflationary increases.*

The provisions of P.A. 96-0043 develop a theoretical value of assets that does not recognize deferred investment gains and losses in the projection of assets used to develop the statutory contribution. This policy has a tendency to defer contributions when plan assets experience a loss.

Given that JRS funded ratio at June 30, 2019, is only 38 percent on a market value of assets basis, and because the current statutory policy tends to back-load and defer contributions, we advise strengthening the current statutory funding policy. Examples of methods to strengthen the current funding policy include:

1. Increasing the 90 percent funding target;
2. Reducing the projection period needed to reach the funding target;
3. Eliminating the maximum contribution cap; and
4. Changing the actuarial cost method for calculating liabilities from the Projected Unit Credit to the Entry Age Normal method.



## Observations on Actuarial Funding and Statutory Funding

Also, the statutory contribution policy could be strengthened by changing to an ADC-based funding approach with an appropriate amortization policy for each respective tiered benefit structure.

At the March 27, 2015, Board meeting, the Board adopted a policy, for purposes of financial reporting under GASB Statements Nos. 67 and 68, which provides for the annual financing of JRS' normal cost and amortizing the unfunded liability over a 25-year closed-period, beginning July 1, 2015, as a level percent of capped payroll.

### Number of Projected Future Active Members

The statutory contribution is based on performing an open group projection through the year 2045. The projection is based on assuming that new active members are hired to replace the current members who leave active membership (through termination, retirement or death). Although the number of active members has fluctuated between 2008 and 2019, the active population has remained stable.

Currently, the actuarial valuation assumes that the total number of active members in the future will be equal to the number of active in the current actuarial valuation. If JRS expects to see a decline of the active population in the near term, the Board may want to consider an update to the population projection assumption to include a decreasing population in the near term before reaching an equilibrium number of active members long-term.

Active Membership				
Fiscal Year Ending June 30,	Total	Annual Change in Membership	% Annual Change in Membership	Uncapped Payroll (\$ in Millions)
2008	957			\$154.14
2009	968	11	1.15%	161.85
2010	966	(2)	-0.21%	165.95
2011	968	2	0.21%	170.74
2012	968	0	0.00%	172.35
2013	962	(6)	-0.62%	173.02
2014	951	(11)	-1.14%	172.85
2015	961	10	1.05%	177.16
2016	947	(14)	-1.46%	177.99
2017	953	6	0.63%	182.24
2018	936	(17)	-1.78%	182.78
2019	956	20	2.14%	190.74
<b>Total Change</b>		<b>(1)</b>	<b>0.00%</b>	

# Actuarial Standards of Practice (ASOP) No. 4 Disclosures

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## 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 6.50 percent on the actuarial value of assets), it is expected that:

1. The State contribution rate will be level as a percentage of payroll beginning in 2034 through 2045 (after all deferred asset gains and losses are fully recognized);
2. The unfunded liability will increase in dollar amount through 2020 before it begins to decrease;
3. The unfunded actuarial accrued liabilities will never be fully amortized; and
4. The funded status of the plan will increase gradually towards a 90 percent funded ratio in 2045.

## Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

1. The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
2. The measurement is dependent upon the actuarial cost method which, in combination with the plan's statutory funding policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100 percent is not synonymous with no required future contributions. If the funded status were 100 percent, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
3. The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets.

## Limitation of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

# Risks Associated with Measuring the Accrued Liability and Contributions

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The determination of the accrued liability and the statutory contribution requires the use of actuarial assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the actuarial assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the total required employer contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Fund's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the Fund's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the Fund's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The statutory contribution for fiscal year 2021 shown on page 7 should be considered as the minimum contribution that complies with the funding policy governed by State statute. The timely receipt of the statutory contribution is critical to support the financial health of the System. Users of this report should be aware that contributions made at the statutorily determined amount do not necessarily guarantee benefit security.

# Risks Associated with Measuring the Accrued Liability and Contributions

## Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2019	2018
Ratio of the Market Value of Assets to Uncapped Payroll	5.63	5.54
Ratio of Actuarial Accrued Liability to Uncapped Payroll	14.64	14.89
Ratio of Actives to Retirees and Beneficiaries	0.76	0.78
Ratio of Net Cash Flow to Market Value of Assets	-0.38%	0.07%

### Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 5.0 times the payroll, a return on assets 5 percent different than assumed would equal 25 percent of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

### Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100 percent is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 15 times the payroll, a change in liability 2 percent other than assumed would equal 30 percent of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

# Risks Associated with Measuring the Accrued Liability and Contributions

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## Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

## Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

## Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. At the Board's request, we conducted additional risk assessment of investment and contribution risk through stress testing the investment return assumption and future active population growth.

## **SECTION B**

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### **FUNDING RESULTS**

## Table 1

### Results of Actuarial Valuation as of June 30, 2019

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1	Number of Members		
	a. Active		956
	b. Inactive:		
	i. Eligible for deferred vested pension benefits		10
	ii. Eligible for return of contributions only		16
	c. Current Benefit Recipients:		
	i. Retirement annuities		913
	ii. Disabilities		-
	iii. Survivor annuities*		349
	d. Total		2,244
2	Covered Uncapped Payroll as of Valuation Date	\$	190,741,879
3	Annualized Benefit Payments Currently Being Made		
	a. Retirement	\$	132,767,058
	b. Disability		1,166,470
	c. Survivor*		26,576,680
	d. Total	\$	160,510,208
4	Actuarial Liability—Annuitants		
	a. Current Benefit Recipients:		
	i. Retirement annuities	\$	1,807,419,174
	ii. Disability annuities		-
	iii. Survivor annuities*		268,516,919
	b. Total	\$	2,075,936,093

*\*Includes 28 alternate payees resulting from QILDROs and one retired member who is also receiving a survivor annuity.*

## Table 1 (continued)

### Results of Actuarial Valuation as of June 30, 2019

5	Actuarial Liability—Inactive Members		\$ 13,388,147
		Normal Cost	Actuarial Liability
6	Active Members		
	a. Pension Benefits	\$ 35,843,050	\$ 520,601,311
	b. Cost-of-Living Adjustments	11,346,048	168,308,937
	c. Death Benefits	977,910	11,075,198
	d. Disability	-	-
	e. Withdrawal	561,842	3,706,666
	f. Expenses	973,550	-
	g. Total	\$ 49,702,400	\$ 703,692,112
7	Total Actuarial Liability (4 + 5 + 6)		\$ 2,793,016,352
8	Market Value of Assets (MVA)		\$ 1,073,103,751
9	Unfunded Actuarial Liability Based on MVA (7 – 8)		\$ 1,719,912,601
10	Funded Percentage Based on MVA (8 ÷ 7)		38.42%
11	Actuarial Value of Assets (AVA)		\$ 1,068,739,561
12	Unfunded Actuarial Liability Based on AVA (7 – 11)		\$ 1,724,276,791
13	Funded Percentage Based on AVA (11 ÷ 7) <sup>a</sup>		38.26%
14	Total Normal Cost	\$ 49,702,400	
15	Employee Contributions	\$ 13,833,308	
16	Annual Employer Normal Cost (% uncapped payroll)	\$ 35,869,092 18.81%	

<sup>a</sup> The funded status measure is appropriate for assessing the need for future contributions. The funded status is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.



## Table 2

### Analysis of Change in Unfunded Accrued Actuarial Liability

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In addition to the expected change in the unfunded accrued actuarial liability, changes in membership demographics and fund assets have affected the valuation results. The increase in the unfunded accrued actuarial liability (“UAAL”) of \$15,181,256 was due to the following:

1	UAAL at 06/30/2018	\$ 1,709,095,535
2	Contributions	
	a. Contributions due (Normal Cost plus Interest on UAAL)	
	i Interest on 1)	\$ 115,363,949
	ii Members Contributions	14,660,408
	iii Employer Normal Cost	38,010,825
	iv Interest on ii and iii	1,748,628
	v Total Due	<u>\$ 169,783,810</u>
	b. Contributions paid (Actual)	
	i Member Contributions	\$ 14,660,408
	ii State Agencies	140,469,000
	iii Interest on i and ii	5,150,128
	iv Total Paid	<u>\$ 160,279,536</u>
	c. Expected Increase in UAAL	\$ 9,504,274
3	Expected UAAL at 06/30/2019	\$ 1,718,599,809
4	(Gains)/Losses	
	a. Investment Income	\$ 8,101,850
	b. Demographic	35,313,816
	c. Total	<u>\$ 43,415,666</u>
5	Plan Provision Changes	\$ -
6	Assumption Changes	\$ (37,738,684)
7	Total Change in UAAL	\$ 15,181,256
8	UAAL at 06/30/2019	\$ 1,724,276,791

### Table 3

## Analysis of Financial Gains and Losses in Unfunded Accrued Actuarial Liability for Fiscal Year Ended June 30, 2019

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Activity	(Gain)/Loss	% of 06/30/2018 AAL
1 Actuarial (Gain)/Loss		
a. Retirements	\$ 23,628,341	0.87%
b. Incidence of Disability	-	0.00%
c. In-Service Mortality	(6,324)	0.00%
d. Retiree Mortality and Other	3,454,682	0.13%
e. Salary Increases	(2,071,872)	-0.08%
f. Terminations	1,373,736	0.05%
g. Investment	8,101,850	0.30%
h. New Entrant Liability	2,097,998	0.08%
i. Data/Method Changes <sup>a</sup>	3,630,126	0.13%
j. Other	3,207,129	0.12%
k. Total Actuarial (Gain)/Loss	\$ 43,415,666	1.60%
2 Plan Provision Changes	\$ -	0.00%
3 Assumption Changes	\$ (37,738,684)	-1.39%
4 Contribution (Excess)/Shortfall <sup>b</sup>	\$ 9,504,274	0.35%
5 Total Financial (Gain)/Loss	\$ 15,181,256	0.56%

<sup>a</sup> The method for valuing liabilities resulting from QILDROs was updated to more accurately reflect data records.

<sup>b</sup> Represents the increase in the Unfunded Actuarial Accrued Liability due to actual contributions being less than the Normal Cost plus interest on the beginning of year Unfunded Actuarial Accrued Liability.

**Table 4a**  
**Baseline Projections — State Contributions Determined Under Public Act 88-0593,**  
**Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023**  
**Maximum Contribution Calculation: Without GOB Proceeds**  
**Investment Return of 6.50% Each Year (\$ in Millions)**

Plan Year End 6/30	Number Active	Actuarial Accrued Liability	Assets	Unfunded Liability	Funded Ratio	Total Payroll	Annual Normal Cost				State Contribution		Total Expenses
							Total	Employee Cont.	Normal Cost	Percent of Pay	Amount	Percent of Pay	
2020	956	\$2,849.26	\$884.50	\$1,964.76	31.04%	\$156.95	\$49.70	\$13.83	\$35.87	22.85%	\$162.07	103.26%	\$171.13
2021	956	2,899.70	943.21	1,956.49	32.53%	157.69	48.15	14.07	34.08	21.61%	165.84	105.17%	178.73
2022	956	2,943.90	1,000.25	1,943.65	33.98%	157.61	46.60	13.96	32.64	20.71%	168.32	106.80%	186.41
2023	956	2,980.82	1,052.43	1,928.39	35.31%	157.64	44.79	13.91	30.88	19.59%	168.09	106.63%	194.44
2024	956	3,010.39	1,099.66	1,910.73	36.53%	157.62	43.29	14.06	29.23	18.54%	167.79	106.45%	202.38
2025	956	3,032.26	1,141.70	1,890.56	37.65%	157.84	41.67	14.13	27.54	17.45%	167.44	106.08%	210.10
2026	956	3,046.60	1,179.47	1,867.13	38.71%	158.18	40.30	14.28	26.02	16.45%	167.80	106.08%	217.39
2027	956	3,052.81	1,212.72	1,840.09	39.72%	158.71	38.78	14.23	24.55	15.47%	168.36	106.08%	224.65
2028	956	3,052.21	1,242.28	1,809.93	40.70%	159.29	37.96	14.10	23.86	14.98%	168.98	106.08%	230.82
2029	956	3,044.64	1,269.08	1,775.56	41.68%	160.46	37.13	14.21	22.92	14.28%	170.22	106.09%	236.70
2030	956	3,030.20	1,293.59	1,736.61	42.69%	161.71	36.46	14.49	21.97	13.59%	171.55	106.08%	242.22
2031	956	3,009.85	1,316.75	1,693.10	43.75%	163.14	36.14	14.62	21.52	13.19%	173.06	106.08%	246.72
2032	956	2,983.24	1,339.37	1,643.87	44.90%	164.93	35.77	15.15	20.62	12.50%	174.96	106.08%	251.13
2033	956	2,951.17	1,362.38	1,588.79	46.16%	166.70	35.65	15.72	19.93	11.96%	176.84	106.08%	254.62
2034	956	2,914.30	1,387.02	1,527.28	47.59%	168.79	35.66	16.28	19.38	11.48%	179.06	106.08%	257.27

Normal cost rate includes administrative expenses.

State contribution based on the requirements of Public Act 88-0593, as amended by Public Act 90-0065, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023.

Total expenses shown include benefit payments, refunds and administrative expenses.

Actuarial accrued liability and assets are measured at Plan Year End.

Total payroll is capped for members hired after December 31, 2010, as defined in Public Act 96-0889.

**Table 4a (Continued)**  
**Baseline Projections — State Contributions Determined Under Public Act 88-0593,  
Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023**  
**Maximum Contribution Calculation: Without GOB Proceeds**  
**Investment Return of 6.50% Each Year (\$ in Millions)**

Plan Year End 6/30	Number Active	Actuarial Accrued Liability	Assets	Unfunded Liability	Funded Ratio	Total Payroll	Annual Normal Cost				State Contribution		Total Expenses
							Total	Employee Cont.	Normal Cost	Percent of Pay	Amount	Percent of Pay	
2035	956	\$2,873.42	\$1,414.64	\$1,458.78	49.23%	\$171.17	\$35.87	\$16.86	\$19.01	11.11%	\$181.58	106.08%	\$259.04
2036	956	2,829.03	1,446.37	1,382.66	51.13%	173.80	36.14	17.40	18.74	10.78%	184.37	106.08%	260.13
2037	956	2,781.54	1,483.24	1,298.30	53.32%	176.59	36.46	17.97	18.49	10.47%	187.33	106.08%	260.66
2038	956	2,731.82	1,526.68	1,205.14	55.89%	179.52	36.92	18.53	18.39	10.24%	190.44	106.08%	260.30
2039	956	2,680.49	1,578.15	1,102.34	58.88%	182.72	37.40	19.08	18.32	10.03%	193.83	106.08%	259.20
2040	956	2,628.15	1,639.02	989.13	62.36%	186.14	37.94	19.61	18.33	9.85%	197.47	106.09%	257.49
2041	956	2,575.90	1,711.04	864.86	66.42%	189.64	38.63	20.16	18.47	9.74%	201.18	106.09%	254.79
2042	956	2,524.26	1,795.72	728.54	71.14%	193.41	39.30	20.69	18.61	9.62%	205.17	106.08%	251.58
2043	956	2,473.99	1,894.67	579.32	76.58%	197.28	40.02	21.23	18.79	9.52%	209.28	106.08%	247.73
2044	956	2,425.65	2,009.49	416.16	82.84%	201.33	40.76	21.77	18.99	9.43%	213.58	106.08%	243.42
2045	956	2,379.85	2,141.80	238.05	90.00%	205.53	41.53	22.30	19.23	9.36%	218.03	106.08%	238.69

Normal cost rate includes administrative expenses.

State contribution based on the requirements of Public Act 88-0593, as amended by Public Act 90-0065, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023.

Total expenses shown include benefit payments, refunds and administrative expenses.

Actuarial accrued liability and assets are measured at Plan Year End.

Total payroll is capped for members hired after December 31, 2010, as defined in Public Act 96-0889.

**Table 4b**  
**Baseline Projections — State Contributions Determined Under Public Act 88-0593,  
Public Act 94-0002, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023**  
**Investment Return of 6.50% Each Year (\$ in Millions)**

Plan Year End 6/30	Actuarial Number Active	Actuarial Accrued Liability	Assets	Unfunded Liability	Funded Ratio	Total Payroll	Annual Normal Cost				Required State Contribution						
							Employer			(a) Without GOB Cont.	(b) Debt Service	(c)=(a)-(b) Maximum Cont.	(d) Formula Rate With GOB	Minimum of (c) and (d)		Total Expenses	
							Employee Cont.	Normal Cost	Percent of Pay					Required Cont.	Percent of Pay		
2020	956	\$2,849.26	\$1,124.66	\$1,724.60	39.47%	\$156.95	\$49.70	\$13.83	\$35.87	22.85%	\$162.07	\$13.09	\$148.98	\$144.16	\$144.16	91.85%	\$171.13
2021	956	2,899.70	1,181.21	1,718.49	40.74%	157.69	48.15	14.07	34.08	21.61%	165.84	13.84	152.00	148.62	148.62	94.25%	178.73
2022	956	2,943.90	1,235.96	1,707.94	41.98%	157.61	46.60	13.96	32.64	20.71%	168.32	14.55	153.77	151.11	151.11	95.87%	186.41
2023	956	2,980.82	1,285.69	1,695.13	43.13%	157.64	44.79	13.91	30.88	19.59%	168.09	15.21	152.88	150.87	150.87	95.70%	194.44
2024	956	3,010.39	1,330.32	1,680.07	44.19%	157.62	43.29	14.06	29.23	18.54%	167.79	16.30	151.49	150.58	150.58	95.53%	202.38
2025	956	3,032.26	1,369.49	1,662.77	45.16%	157.84	41.67	14.13	27.54	17.45%	167.44	17.30	150.14	150.21	150.14	95.12%	210.10
2026	956	3,046.60	1,403.74	1,642.86	46.08%	158.18	40.30	14.28	26.02	16.45%	167.80	17.76	150.04	150.53	150.04	94.86%	217.39
2027	956	3,052.81	1,432.83	1,619.98	46.93%	158.71	38.78	14.23	24.55	15.47%	168.36	18.16	150.20	151.03	150.20	94.64%	224.65
2028	956	3,052.21	1,457.08	1,595.13	47.74%	159.29	37.96	14.10	23.86	14.98%	168.98	19.00	149.98	151.58	149.98	94.16%	230.82
2029	956	3,044.64	1,477.46	1,567.18	48.53%	160.46	37.13	14.21	22.92	14.28%	170.22	19.76	150.46	152.70	150.46	93.77%	236.70
2030	956	3,030.20	1,493.91	1,536.29	49.30%	161.71	36.46	14.49	21.97	13.59%	171.55	20.94	150.61	153.89	150.61	93.14%	242.22
2031	956	3,009.85	1,507.38	1,502.47	50.08%	163.14	36.14	14.62	21.52	13.19%	173.06	22.01	151.05	155.24	151.05	92.59%	246.72
2032	956	2,983.24	1,519.17	1,464.07	50.92%	164.93	35.77	15.15	20.62	12.50%	174.96	22.49	152.47	156.95	152.47	92.44%	251.13
2033	956	2,951.17	1,530.72	1,420.45	51.87%	166.70	35.65	15.72	19.93	11.96%	176.84	22.43	154.41	158.63	154.41	92.63%	254.62
2034	956	2,914.30	1,547.29	1,367.01	53.09%	168.79	35.66	16.28	19.38	11.48%	179.06	0.00	N/A	160.63	160.63	95.16%	257.27

Normal cost rate includes administrative expenses.

State contribution based on the requirements of Public Act 88-0593, as amended by Public Act 90-0065, Public Act 93-0002, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023.

Total expenses shown include benefit payments, refunds and administrative expenses.

Actuarial accrued liability and assets are measured at Plan Year End.

Total payroll is capped for members hired after December 31, 2010, as defined in Public Act 96-0889.

**Table 4b (Continued)**  
**Baseline Projections — State Contributions Determined Under Public Act 88-0593,  
Public Act 94-0002, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023**  
**Investment Return of 6.50% Each Year (\$ in Millions)**

Plan Year End 6/30	Number Active	Actuarial Accrued Liability	Assets	Unfunded Liability	Funded Ratio	Total Payroll	Annual Normal Cost				Required State Contribution				Total Expenses		
							Total	Cont.	Cost	Percent of Pay	(a) Without GOB Cont.	(b) Debt Service	(c)=(a)-(b) Maximum Cont.	(d) Formula Rate With GOB		Minimum of (c) and (d) Required Cont.	Percent of Pay
2035	956	\$2,873.42	\$1,566.04	\$1,307.38	54.50%	\$171.17	\$35.87	\$16.86	\$19.01	11.11%	\$181.58	\$0.00	N/A	\$162.89	\$162.89	95.16%	\$259.04
2036	956	2,829.03	1,588.01	1,241.02	56.13%	173.80	36.14	17.40	18.74	10.78%	184.37	0.00	N/A	165.39	165.39	95.16%	260.13
2037	956	2,781.54	1,614.20	1,167.34	58.03%	176.59	36.46	17.97	18.49	10.47%	187.33	0.00	N/A	168.05	168.05	95.16%	260.66
2038	956	2,731.82	1,645.92	1,085.90	60.25%	179.52	36.92	18.53	18.39	10.24%	190.44	0.00	N/A	170.83	170.83	95.16%	260.30
2039	956	2,680.49	1,684.54	995.95	62.84%	182.72	37.40	19.08	18.32	10.03%	193.83	0.00	N/A	173.88	173.88	95.16%	259.20
2040	956	2,628.15	1,731.36	896.79	65.88%	186.14	37.94	19.61	18.33	9.85%	197.47	0.00	N/A	177.14	177.14	95.16%	257.49
2041	956	2,575.90	1,788.00	787.90	69.41%	189.64	38.63	20.16	18.47	9.74%	201.18	0.00	N/A	180.47	180.47	95.16%	254.79
2042	956	2,524.26	1,855.89	668.37	73.52%	193.41	39.30	20.69	18.61	9.62%	205.17	0.00	N/A	184.05	184.05	95.16%	251.58
2043	956	2,473.99	1,936.52	537.47	78.28%	197.28	40.02	21.23	18.79	9.52%	209.28	0.00	N/A	187.73	187.73	95.16%	247.73
2044	956	2,425.65	2,031.37	394.28	83.75%	201.33	40.76	21.77	18.99	9.43%	213.58	0.00	N/A	191.59	191.59	95.16%	243.42
2045	956	2,379.85	2,141.94	237.91	90.00%	205.53	41.53	22.30	19.23	9.36%	218.03	0.00	N/A	195.59	195.59	95.16%	238.69

Normal cost rate includes administrative expenses.

State contribution based on the requirements of Public Act 88-0593, as amended by Public Act 90-0065, Public Act 93-0002, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023.

Total expenses shown include benefit payments, refunds and administrative expenses.

Actuarial accrued liability and assets are measured at Plan Year End.

Total payroll is capped for members hired after December 31, 2010, as defined in Public Act 96-0889.

**Table 4c**  
**Baseline Projections — State Contributions Determined Under Public Act 88-0593,**  
**Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023**  
**Maximum Contribution Calculation: Without GOB Proceeds**  
**Investment Return of 6.50% Each Year**  
**Phase-In of Deferred Investment Gains and Losses Recognized in the**  
**Projected Actuarial Value of Assets (\$ in Millions)**

Plan Year End 6/30	Number Active	Actuarial Accrued Liability	Assets	Unfunded Liability	Funded Ratio	Total Payroll	Annual Normal Cost				State Contribution		Total Expenses
							Total	Employee Cont.	Employer Normal Cost	Percent of Pay	Amount	Percent of Pay	
2020	956	\$2,849.26	\$881.87	\$1,967.39	30.95%	\$156.95	\$49.70	\$13.83	\$35.87	22.85%	\$162.07	103.26%	\$171.13
2021	956	2,899.70	946.93	1,952.77	32.66%	157.69	48.15	14.07	34.08	21.61%	165.56	104.99%	178.73
2022	956	2,943.90	1,004.34	1,939.56	34.12%	157.61	46.60	13.96	32.64	20.71%	168.04	106.62%	186.41
2023	956	2,980.82	1,055.94	1,924.88	35.42%	157.64	44.79	13.91	30.88	19.59%	167.81	106.45%	194.44
2024	956	3,010.39	1,103.11	1,907.28	36.64%	157.62	43.29	14.06	29.23	18.54%	167.52	106.28%	202.38
2025	956	3,032.26	1,145.09	1,887.17	37.76%	157.84	41.67	14.13	27.54	17.45%	167.17	105.91%	210.10
2026	956	3,046.60	1,182.80	1,863.80	38.82%	158.18	40.30	14.28	26.02	16.45%	167.53	105.91%	217.39
2027	956	3,052.81	1,215.98	1,836.83	39.83%	158.71	38.78	14.23	24.55	15.47%	168.08	105.90%	224.65
2028	956	3,052.21	1,245.46	1,806.75	40.81%	159.29	37.96	14.10	23.86	14.98%	168.70	105.91%	230.82
2029	956	3,044.64	1,272.17	1,772.47	41.78%	160.46	37.13	14.21	22.92	14.28%	169.94	105.91%	236.70
2030	956	3,030.20	1,296.60	1,733.60	42.79%	161.71	36.46	14.49	21.97	13.59%	171.26	105.91%	242.22
2031	956	3,009.85	1,319.65	1,690.20	43.84%	163.14	36.14	14.62	21.52	13.19%	172.77	105.90%	246.72
2032	956	2,983.24	1,342.16	1,641.08	44.99%	164.93	35.77	15.15	20.62	12.50%	174.68	105.90%	251.13
2033	956	2,951.17	1,365.05	1,586.12	46.25%	166.70	35.65	15.72	19.93	11.96%	176.54	105.90%	254.62
2034	956	2,914.30	1,389.57	1,524.73	47.68%	168.79	35.66	16.28	19.38	11.48%	178.76	105.91%	257.27

Normal cost rate includes administrative expenses.

State contribution based on the requirements of Public Act 88-0593, as amended by Public Act 90-0065, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023.

Total expenses shown include benefit payments, refunds and administrative expenses.

Actuarial accrued liability and assets are measured at Plan Year End.

Total payroll is capped for members hired after December 31, 2010, as defined in Public Act 96-0889.

**Table 4c (Continued)**  
**Baseline Projections — State Contributions Determined Under Public Act 88-0593,**  
**Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023**  
**Maximum Contribution Calculation: Without GOB Proceeds**  
**Investment Return of 6.50% Each Year**  
**Phase-In of Deferred Investment Gains and Losses Recognized in the**  
**Projected Actuarial Value of Assets (\$ in Millions)**

Plan Year End 6/30	Number Active	Actuarial Accrued Liability	Assets	Unfunded Liability	Funded Ratio	Total Payroll	Annual Normal Cost				State Contribution		Total Expenses
							Total	Employee Cont.	Normal Cost	Percent of Pay	Amount	Percent of Pay	
2035	956	\$2,873.42	\$1,417.04	\$1,456.38	49.32%	\$171.17	\$35.87	\$16.86	\$19.01	11.11%	\$181.28	105.91%	\$259.04
2036	956	2,829.03	1,448.61	1,380.42	51.21%	173.80	36.14	17.40	18.74	10.78%	184.07	105.91%	260.13
2037	956	2,781.54	1,485.31	1,296.23	53.40%	176.59	36.46	17.97	18.49	10.47%	187.02	105.91%	260.66
2038	956	2,731.82	1,528.56	1,203.26	55.95%	179.52	36.92	18.53	18.39	10.24%	190.12	105.90%	260.30
2039	956	2,680.49	1,579.82	1,100.67	58.94%	182.72	37.40	19.08	18.32	10.03%	193.51	105.91%	259.20
2040	956	2,628.15	1,640.46	987.69	62.42%	186.14	37.94	19.61	18.33	9.85%	197.14	105.91%	257.49
2041	956	2,575.90	1,712.23	863.67	66.47%	189.64	38.63	20.16	18.47	9.74%	200.85	105.91%	254.79
2042	956	2,524.26	1,796.64	727.62	71.17%	193.41	39.30	20.69	18.61	9.62%	204.84	105.90%	251.58
2043	956	2,473.99	1,895.29	578.70	76.61%	197.28	40.02	21.23	18.79	9.52%	208.93	105.91%	247.73
2044	956	2,425.65	2,009.79	415.86	82.86%	201.33	40.76	21.77	18.99	9.43%	213.23	105.91%	243.42
2045	956	2,379.85	2,141.75	238.10	90.00%	205.53	41.53	22.30	19.23	9.36%	217.67	105.91%	238.69

Normal cost rate includes administrative expenses.

State contribution based on the requirements of Public Act 88-0593, as amended by Public Act 90-0065, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023.

Total expenses shown include benefit payments, refunds and administrative expenses.

Actuarial accrued liability and assets are measured at Plan Year End.

Total payroll is capped for members hired after December 31, 2010, as defined in Public Act 96-0889.



**Table 4d**  
**Baseline Projections — State Contributions Determined Under Public Act 88-0593,**  
**Public Act 94-0002, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023**  
**Investment Return of 6.50% Each Year**  
**Phase-In of Deferred Investment Gains and Losses Recognized in the**  
**Projected Actuarial Value of Assets (\$ in Millions)**

Plan Year End 6/30	Number Active	Actuarial Accrued Liability	Assets	Actuarial			Annual Normal Cost					Required State Contribution					Total Expenses
				Unfunded Liability	Funded Ratio	Total Payroll	Total	Employee Cont.	Employer Normal Cost	Percent of Pay	(a) Without GOB Cont.	(b) Debt Service	(c)=(a)-(b) Maximum Cont.	(d) Formula Rate With GOB	Minimum of (c) and (d) Required Cont.	Percent of Pay	
2020	956	\$2,849.26	\$1,120.65	\$1,728.61	39.33%	\$156.95	\$49.70	\$13.83	\$35.87	22.85%	\$162.07	\$13.09	\$148.98	\$144.16	\$144.16	91.85%	\$171.13
2021	956	2,899.70	1,186.27	1,713.43	40.91%	157.69	48.15	14.07	34.08	21.61%	165.56	13.84	151.72	148.62	148.62	94.25%	178.73
2022	956	2,943.90	1,242.37	1,701.53	42.20%	157.61	46.60	13.96	32.64	20.71%	168.04	14.54	153.50	151.54	151.54	96.15%	186.41
2023	956	2,980.82	1,291.22	1,689.60	43.32%	157.64	44.79	13.91	30.88	19.59%	167.81	15.20	152.61	150.33	150.33	95.36%	194.44
2024	956	3,010.39	1,335.53	1,674.86	44.36%	157.62	43.29	14.06	29.23	18.54%	167.52	16.30	151.22	149.92	149.92	95.11%	202.38
2025	956	3,032.26	1,374.54	1,657.72	45.33%	157.84	41.67	14.13	27.54	17.45%	167.17	17.31	149.86	149.65	149.65	94.81%	210.10
2026	956	3,046.60	1,408.83	1,637.77	46.24%	158.18	40.30	14.28	26.02	16.45%	167.53	17.76	149.77	149.97	149.77	94.68%	217.39
2027	956	3,052.81	1,437.96	1,614.85	47.10%	158.71	38.78	14.23	24.55	15.47%	168.08	18.16	149.92	150.47	149.92	94.46%	224.65
2028	956	3,052.21	1,462.26	1,589.95	47.91%	159.29	37.96	14.10	23.86	14.98%	168.70	19.00	149.70	151.02	149.70	93.98%	230.82
2029	956	3,044.64	1,482.68	1,561.96	48.70%	160.46	37.13	14.21	22.92	14.28%	169.94	19.76	150.18	152.14	150.18	93.59%	236.70
2030	956	3,030.20	1,499.19	1,531.01	49.47%	161.71	36.46	14.49	21.97	13.59%	171.26	20.93	150.33	153.32	150.33	92.96%	242.22
2031	956	3,009.85	1,512.70	1,497.15	50.26%	163.14	36.14	14.62	21.52	13.19%	172.77	22.01	150.76	154.67	150.76	92.42%	246.72
2032	956	2,983.24	1,524.54	1,458.70	51.10%	164.93	35.77	15.15	20.62	12.50%	174.68	22.50	152.18	156.37	152.18	92.27%	251.13
2033	956	2,951.17	1,536.14	1,415.03	52.05%	166.70	35.65	15.72	19.93	11.96%	176.54	22.42	154.12	158.05	154.12	92.45%	254.62
2034	956	2,914.30	1,552.44	1,361.86	53.27%	168.79	35.66	16.28	19.38	11.48%	178.76	-	N/A	160.04	160.04	94.81%	257.27

Normal cost rate includes administrative expenses.

State contribution based on the requirements of Public Act 88-0593, as amended by Public Act 90-0065, Public Act 93-0002, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023.

Total expenses shown include benefit payments, refunds and administrative expenses.

Actuarial accrued liability and assets are measured at Plan Year End.

Total payroll is capped for members hired after December 31, 2010, as defined in Public Act 96-0889.

**Table 4d (Continued)**  
**Baseline Projections — State Contributions Determined Under Public Act 88-0593,  
Public Act 94-0002, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023**  
**Investment Return of 6.50% Each Year**  
**Phase-In of Deferred Investment Gains and Losses Recognized in the**  
**Projected Actuarial Value of Assets (\$ in Millions)**

Plan Year End 6/30	Number Active	Actuarial Accrued Liability	Assets	Unfunded Liability	Funded Ratio	Total Payroll	Annual Normal Cost				Required State Contribution					Total Expenses	
							Employer Employee Cont.	Normal Cost	Percent of Pay	(a) Without GOB Cont.	(b) Debt Service	(c)=(a)-(b) Maximum Cont.	(d) Formula Rate With GOB	Minimum of (c) and (d) Required Cont.	Percent of Pay		
2035	956	\$2,873.42	\$1,570.90	\$1,302.52	54.67%	\$171.17	\$35.87	\$16.86	\$19.01	11.11%	\$181.28	\$0.00	N/A	\$162.29	\$162.29	94.81%	\$259.04
2036	956	2,829.03	1,592.57	1,236.46	56.29%	173.80	36.14	17.40	18.74	10.78%	184.07	0.00	N/A	164.78	164.78	94.81%	260.13
2037	956	2,781.54	1,618.41	1,163.13	58.18%	176.59	36.46	17.97	18.49	10.47%	187.02	0.00	N/A	167.43	167.43	94.81%	260.66
2038	956	2,731.82	1,649.76	1,082.06	60.39%	179.52	36.92	18.53	18.39	10.24%	190.12	0.00	N/A	170.20	170.20	94.81%	260.30
2039	956	2,680.49	1,687.97	992.52	62.97%	182.72	37.40	19.08	18.32	10.03%	193.51	0.00	N/A	173.24	173.24	94.81%	259.20
2040	956	2,628.15	1,734.33	893.82	65.99%	186.14	37.94	19.61	18.33	9.85%	197.14	0.00	N/A	176.48	176.48	94.81%	257.49
2041	956	2,575.90	1,790.48	785.42	69.51%	189.64	38.63	20.16	18.47	9.74%	200.85	0.00	N/A	179.80	179.80	94.81%	254.79
2042	956	2,524.26	1,857.82	666.44	73.60%	193.41	39.30	20.69	18.61	9.62%	204.84	0.00	N/A	183.38	183.38	94.81%	251.58
2043	956	2,473.99	1,937.87	536.12	78.33%	197.28	40.02	21.23	18.79	9.52%	208.93	0.00	N/A	187.04	187.04	94.81%	247.73
2044	956	2,425.65	2,032.07	393.58	83.77%	201.33	40.76	21.77	18.99	9.43%	213.23	0.00	N/A	190.89	190.89	94.81%	243.42
2045	956	2,379.85	2,141.95	237.90	90.00%	205.53	41.53	22.30	19.23	9.36%	217.67	0.00	N/A	194.87	194.87	94.81%	238.69

Normal cost rate includes administrative expenses.

State contribution based on the requirements of Public Act 88-0593, as amended by Public Act 90-0065, Public Act 93-0002, Public Act 94-0004, Public Act 96-0043 and Public Act 100-0023.

Total expenses shown include benefit payments, refunds and administrative expenses.

Actuarial accrued liability and assets are measured at Plan Year End.

Total payroll is capped for members hired after December 31, 2010, as defined in Public Act 96-0889.

## SECTION C

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### FUND ASSETS

**Table 5**  
**Statement of Fiduciary Net Position**  
**for Years Ended June 30, 2019, and 2018**

	2019	2018
Assets		
Cash	\$ 27,068,352	\$ 28,938,179
Receivables:		
Contributions:		
Participants	\$ 4,565	\$ 7,438
Employer - GRF Fund	5,852,874	5,215,000
Other accounts	197,710	197,349
	\$ 6,055,149	\$ 5,419,787
Investments - held in the Illinois State Board of Investment Commingled Fund at fair value	\$ 1,040,123,694	\$ 978,196,836
Securities lending collateral with State Treasurer	5,630,000	12,439,000
Capital assets, net of accumulated depreciation	\$ 101,934	\$ 70,481
Total Assets	\$ 1,078,979,129	\$ 1,025,064,283
Liabilities		
Benefits payable	\$ 335	\$ 17,290
Refunds payable	47,913	13,270
Administrative expenses payable	197,130	109,922
Participants' deferred service credit accounts	-	-
Due to the State of Illinois	-	-
Securities lending collateral with State Treasurer	5,630,000	12,439,000
Total Liabilities	\$ 5,875,378	\$ 12,579,482
Net assets held in trust for pension benefits	\$ 1,073,103,751	\$ 1,012,484,801

## Table 6

### Statement of Changes in Fiduciary Net Position for Years Ended June 30, 2019, and 2018

	2019	2018
Additions:		
Contributions:		
Participants	\$ 14,660,408	\$ 14,295,562
Employing state agencies and appropriations	140,469,000	135,962,000
Total Contributions revenue	<u>\$ 155,129,408</u>	<u>\$ 150,257,562</u>
Investments income:		
Net investments income	\$ 15,334,649	\$ 19,629,664
Interest earned on cash balances	463,878	504,929
Net appreciation in fair value of investments	48,942,209	49,815,053
Total Investments income	<u>\$ 64,740,736</u>	<u>\$ 69,949,646</u>
Other:		
Miscellaneous	\$ -	\$ -
Total Investments income	<u>\$ -</u>	<u>\$ -</u>
Total Additions	\$ 219,870,144	\$ 220,207,208
Deductions:		
Benefits:		
Retirement annuities	\$ 131,239,931	\$ 122,966,147
Survivors' annuities	26,021,895	25,140,113
Disability benefits	88,143	40,678
Lump-sum benefits	-	-
Total Benefits	<u>\$ 157,349,969</u>	<u>\$ 148,146,938</u>
Refunds	990,688	481,716
Administrative	<u>910,537</u>	<u>897,285</u>
Total Deductions	<u>\$ 159,251,194</u>	<u>\$ 149,525,939</u>
Net increase	<u>\$ 60,618,950</u>	<u>\$ 70,681,269</u>
Net assets held in trust for pension benefits:		
Beginning of year	<u>\$ 1,012,484,801</u>	<u>\$ 941,803,532</u>
End of year	<u><u>\$ 1,073,103,751</u></u>	<u><u>\$ 1,012,484,801</u></u>

Assets were updated subsequent to the delivery of the actuarial valuation report which was presented to the Board on October 25, 2019. The updates did not impact the certified contribution rate which was approved by the Board on October 25, 2019. The asset updates include:

- i. decreasing participant contributions from \$14,660,408 to \$14,610,446, and
- ii. increasing contributions for employing state agencies and appropriations from \$140,469,000 to \$140,518,962.

The preceding updates did not change the market value of assets at June 30, 2019.

## Table 7

### Development of the Actuarial Value of Assets – Actual Assets

Year Ending June 30	2019	2020	2021	2022	2023
Beginning of Year:					
(1) Market Value of Assets	\$ 1,012,484,801				
(2) Actuarial Value of Assets	1,012,757,312				
End of Year:					
(3) Market Value of Assets	1,073,103,751				
(4) Contributions and Disbursements					
(4a) Actual State Contribution Amount	140,469,000				
(4b) Employee Contribution Amount	14,660,408				
(4c) Benefit Payouts & Refunds	(158,340,657)				
(4d) Administrative Expenses	(910,537)				
(4e) Net of Contributions and Disbursements	(4,121,786)				
(5) Total Investment Income					
=(3)-(1)-(4e)	64,740,736				
(6) Projected Rate of Return	6.75%				
(7) Projected Investment Income					
=(1)x(6)+([1+(6)] <sup>.5</sup> -1)x(4e)	68,205,885				
(8) Investment Income in Excess of Projected Income	(3,465,149)				
(9) Excess Investment Income Recognized					
This Year (5-year recognition)					
(9a) From This Year	\$ (693,030)				
(9b) From One Year Ago	1,270,724	\$ (693,030)			
(9c) From Two Years Ago	8,190,708	1,270,724	\$ (693,030)		
(9d) From Three Years Ago	(13,057,276)	8,190,708	1,270,724	\$ (693,030)	
(9e) From Four Years Ago	(3,812,976)	(13,057,278)	8,190,709	1,270,722	\$ (693,029)
(9f) Total Recognized Investment Gain	(8,101,850)	(4,288,876)	8,768,403	577,692	(693,029)
(10) Change in Actuarial Value of Assets					
=(4e)+(7)+(9f)	\$ 55,982,249				
End of Year:					
<b>(3) Market Value of Assets</b>	<b>\$ 1,073,103,751</b>				
<b>(11) Actuarial Value of Assets</b>					
=(2)+(10)	<b>\$ 1,068,739,561</b>				

## Table 8

### Development of the Actuarial Value of Assets – Hypothetical Assets

Year Ending June 30	2019	2020	2021	2022	2023
Beginning of Year:					
(1) Hypothetical Value of Assets	\$ 766,663,298				
(2) Hypothetical Actuarial Value of Assets	766,053,250				
End of Year:					
(3) Hypothetical Value of Assets	829,320,440				
(4) Contributions and Disbursements					
(4a) State Contribution Amount <sup>a</sup>	157,691,455				
(4b) Employee Contribution Amount	14,660,408				
(4c) Benefit Payouts & Refunds	(158,340,657)				
(4d) Administrative Expenses	(910,537)				
(4e) Net of Contributions and Disbursements	13,100,669				
(5) Total Investment Income <sup>b</sup>					
=(3)-(1)-(4e)	49,556,473				
(6) Projected Rate of Return	6.75%				
(7) Projected Investment Income					
=(1)x(6)+([1+(6)] <sup>5</sup> -1)x(4e)	52,184,701				
(8) Investment Income in Excess of Projected Income	(2,628,228)				
(9) Excess Investment Income Recognized <sup>c</sup>					
This Year (5-year recognition)					
(9a) From This Year	\$ (525,646)				
(9b) From One Year Ago	945,061	\$ (525,646)			
(9c) From Two Years Ago	5,974,936	945,061	\$ (525,646)		
(9d) From Three Years Ago	(9,246,311)	5,974,936	945,061	\$ (525,646)	
(9e) From Four Years Ago	(2,602,384)	(9,246,309)	5,974,936	945,061	\$ (525,644)
(9f) Total Recognized Investment Gain	(5,454,344)	(2,851,958)	6,394,351	419,415	(525,644)
(10) Change in Hypothetical Actuarial Value of Assets					
=(4e)+(7)+(9f)	\$ 59,831,026				
End of Year:					
<b>(3) Hypothetical Market Value of Assets</b>	<b>\$ 829,320,440</b>				
<b>(11) Hypothetical Actuarial Value of Assets</b>					
= <b>(2)+(10)</b>	<b>\$ 825,884,276</b>				

<sup>a</sup> Represents FY 2019 no POB basic contribution. This amount was determined as part of the June 30, 2017 valuation and is based upon the hypothetical asset value which assumes no infusion from the proceeds of the GOB sale that were deposited July 1, 2003.

<sup>b</sup> Investment income assumes hypothetical value of assets earns the Fund's actual rate of return for fiscal year 2019 of 6.41 percent.

## SECTION D

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### **PARTICIPANT DATA**



**Table 9**  
**Active Age and Service Distribution as of June 30, 2019**

Age Group	Years of Service									Total	Percentage of Total
	0-1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35&Up		
Under 20											
20-24											
25-29											
30-34											
35-39	14	7	1							22	2.3%
40-44	11	32	3							46	4.8%
45-49	22	44	33	11	1					111	11.6%
50-54	11	47	48	41	9					156	16.3%
55-59	19	39	47	59	27	4				195	20.4%
60-64	8	23	41	53	31	21	5	1		183	19.1%
65-69	2	10	30	31	27	11	11	8	3	133	13.9%
70 & Over		6	15	21	16	11	14	12	15	110	11.5%
<b>Total</b>	<b>87</b>	<b>208</b>	<b>218</b>	<b>216</b>	<b>111</b>	<b>47</b>	<b>30</b>	<b>21</b>	<b>18</b>	<b>956</b>	<b>100%</b>
<b>Percentage of Total</b>	<b>9.1%</b>	<b>21.8%</b>	<b>22.8%</b>	<b>22.6%</b>	<b>11.6%</b>	<b>4.9%</b>	<b>3.1%</b>	<b>2.2%</b>	<b>1.9%</b>	<b>100%</b>	

*Based on data received from the System, of the 956 active members, 183 were classified as "Single," 724 classified as "Married" and 49 were classified as "Unknown." We assume 80 percent are married and elect survivor benefits when they retire.*

**Table 10**  
**Retirees and Beneficiaries by Type of Benefit Being Paid as of June 30, 2019**

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<u>Type of Benefit Being Paid</u>	<u>Count*</u>	<u>Monthly Payment</u>	<u>Annual Payment</u>	<u>Average Annual Payment</u>
Retirement Annuity	913	\$ 11,063,921.50	\$ 132,767,058	\$ 145,418.46
QILDRO	28	97,205.83	\$ 1,166,470	41,659.64
Survivor's Annuity	321	2,214,723.33	\$ 26,576,680	82,793.40
<b>Total</b>	<b>1,262</b>	<b>\$ 13,375,850.67</b>	<b>\$ 160,510,208</b>	<b>\$ 127,187.17</b>

*\*Counts include one retired member who also has a survivor annuity.*

## SECTION E

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### ACTUARIAL METHODS AND ASSUMPTIONS

# Actuarial Methods and Assumptions (Most Adopted Effective with the June 30, 2019, Actuarial Valuation)

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## Actuarial Cost Method as Mandated by 40 ILCS 5/18-131, Adopted June 30, 1989

The projected unit credit normal cost method is used. Under this method, the projected pension at retirement age is first calculated and the present value at the individual member's current or attained age is determined. The normal cost for the member for the current year is equal to actuarial present value divided by the member's projected service at retirement. The normal cost for the plan for the year is the sum of the individual normal costs.

The actuarial liability at any point in time is the present value of the projected pensions at that time less the value of future normal costs.

For ancillary benefits for active members, in particular death and survivor benefits, termination benefits, and the postretirement increases, the same procedure as outlined above is followed.

Estimated annual administrative expenses are added to the normal cost.

For actuarial valuation purposes, as well as projection purposes, an actuarial value of assets is used.

## Most Actuarial Assumptions Adopted June 30, 2019

Actuarial assumptions are set by the Board of Trustees. Additional information regarding the rationale for the assumptions may be found in the experience study of the Judges' Retirement System for the three-year period ending June 30, 2018. All actuarial assumptions are expectations of future experience, not market measures.

### Mortality

#### *Post-Retirement Mortality*

Pub-2010 Above-Median Income General Healthy Retiree Mortality tables, sex distinct, with scaling factors of 102 percent for males and 98 percent for females, and the MP-2018 two-dimensional generational mortality improvement scale. This assumption provides a margin for future mortality improvements.

#### *Pre-Retirement Mortality, including terminated vested members prior to attaining age 50*

Pub-2010 Above-Median Income General Employee Mortality tables, sex distinct, with scaling factors of 99 percent for males and females, and the MP-2018 two-dimensional generational mortality improvement scale. This assumption provides a margin for future mortality improvements.

Future mortality improvements are reflected by projecting the base mortality tables forward from the year 2010 using the MP-2018 projection scale.

# Actuarial Methods and Assumptions (Most Adopted Effective with the June 30, 2019, Actuarial Valuation)

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## Interest

6.50 percent per year, compounded annually, net of investment expenses.

## General Inflation

2.25 percent per year, compounded annually.

This assumption serves as the basis for the determination of Tier 2 pay cap growth and annual increases that are equal to the lesser of 3.0 percent or the annual change in the Consumer Price Index-U during the preceding 12-month calendar year.

## Marriage Assumption

80.0 percent of active and retired participants are assumed to be married.

## Termination

Illustrative rates of withdrawal from the plan are as follows:

Age Based Withdrawal		
Age	Male	Female
30	0.0129	0.0162
35	0.0124	0.0162
40	0.0108	0.0162
45	0.0095	0.0162
50	0.0083	0.0158
55	0.0071	0.0092
60	0.0059	0.0074
65	0.0047	0.0057

It is assumed that terminated employees will not be rehired. The rates apply only to employees who have not fulfilled the service requirement necessary for retirement at any given age.

## Salary Increases

A salary increase assumption of 2.50 percent per year, compounded annually, was used. This 2.50 percent salary increase assumption includes an inflation component of 2.25 percent per year, and a productivity/merit/promotion component of 0.25 percent.

## Disability

No assumption for disability.

# Actuarial Methods and Assumptions (Most Adopted Effective with the June 30, 2019, Actuarial Valuation)

## Load for Inactive Members Eligible for Deferred Vested Pension Benefits

Deferred vested liability is increased by 10 percent to account for increases in final average salary due to participation in a reciprocal system.

## Employee Contribution Election

For purposes of the actuarial valuation, it is assumed that all judges elect to contribute only on increases in salary when they become eligible for this provision.

## Population Projection

For purposes of determining annual appropriation as a percent of total covered payroll, the size of the active group is assumed to remain level at the number of actives as of the actuarial valuation date. New entrants are assumed to enter with an average age and average pay as disclosed below. The new entrant profile is based on the averages for all current active members. The average increase in uncapped payroll for the projection period is 2.50 percent per year. The average increase in capped payroll for the projection period is 2.25 percent per year.

New Entrant Profile				
Age Group	No.	Uncapped Salary		Capped Salary
<b>Under 20</b>				
<b>20-24</b>				
<b>25-29</b>	1	\$	202,433	\$ 122,547
<b>30-34</b>	26		5,458,283	3,186,222
<b>35-39</b>	92		18,596,652	11,274,324
<b>40-44</b>	199		39,550,362	24,386,853
<b>45-49</b>	211		42,097,135	25,857,417
<b>50-54</b>	159		31,556,232	19,484,973
<b>55-59</b>	111		22,044,193	13,602,717
<b>60-64</b>	50		9,950,780	6,127,350
<b>65-69</b>	4		799,610	490,188
<b>70 &amp; Over</b>				
<b>Total</b>	853	\$	170,255,680	\$ 104,532,591
<b>Avg. Salary</b>		\$	199,596	\$ 122,547
<b>Avg. Age</b>				47.44
<b>Percent Male</b>				67.29%

# Actuarial Methods and Assumptions (Most Adopted Effective with the June 30, 2019, Actuarial Valuation)

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## Retirement

Employees are assumed to retire in accordance with the rates shown on the following page. The rates apply only to employees who have fulfilled the service requirement necessary for retirement at any given age.

Retirement Rates	
Age	Males & Females
60	9.00%
61-65	11.00%
66-70	12.00%
70-74	13.00%
75-79	14.00%
80+	100.00%

Early Retirement Rates		
Age	Male	Female
55	5.50%	8.50%
56	5.50%	8.50%
57	5.50%	8.50%
58	5.50%	8.50%
59	5.50%	8.50%

## Assets

Assets available for benefits are determined as described on page 42. The asset valuation method is prescribed by statute, and does not appear to allow a corridor; therefore, a corridor has not been established.

## Expenses

As estimated and advised by JRS staff, based on current expenses and expected to increase in relation to the projected capped payroll. Expenses are included in the service cost.

## Spouse's Age

The female spouse is assumed to be four years younger than the male spouse.

## Decrement Timing

All decrements are assumed to occur beginning of year.

# Actuarial Methods and Assumptions (Most Adopted Effective with the June 30, 2019, Actuarial Valuation)

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## Decrement Relativity

Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

## Decrement Operation

Turnover decrements do not operate after member reaches retirement eligibility.

## Eligibility Testing

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

## 415(b) and 401(a)(17) Limits

No explicit assumption is made with respect to these items.

## Assumptions as a result of Public Act 96-0889 – Tier 2 Assumptions

Members hired after December 31, 2010, are assumed to make contributions on salary up to the final average compensation cap in a given year until this plan provision or administrative procedure is clarified. State contributions, expressed as a percentage of pay, are calculated based upon capped pay.

Retirement rates for Tier 2 members to account for the change in retirement age, as follows:

Retirement Rates for Tier Two Members	
Age	Male & Female
67	30.00%
68-69	12.00%
70	13.00%
71	10.00%
72	11.00%
73	12.00%
74	13.00%
75-79	14.00%
80	100.00%

Early Retirement Rates for Tier Two Members	
Age	Males and Females
62	11.00%
63	12.00%
64	13.00%
65	14.00%
66	14.00%



# Actuarial Methods and Assumptions (Most Adopted Effective with the June 30, 2019, Actuarial Valuation)

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Illustrative rates of withdrawal from the plan for Tier 2 members are as follows:

Age Based Withdrawal for Tier Two Members		
Age	Male	Female
30	0.0175	0.0150
35	0.0172	0.0145
40	0.0157	0.0129
45	0.0148	0.0129
50	0.0139	0.0129
55	0.0124	0.0113
60	0.0124	0.0095
65	0.0124	0.0078

# Projection Methodology and Appropriation Requirements Under P.A. 93-0002, P.A. 94-0004, P.A. 96-0043 and P.A. 100-0023

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## State Contributions under P.A. 93-0002

In general, for each year during the life of the GOB program, the state contributions to the System are to be calculated as follows:

1. Calculation of the contribution maximum
  - a. A projection of contributions will be made from the valuation date to June 30, 2045. Such projection will be based on hypothetical asset values determined using the following assumptions:
    - i) That the System had received no portion of the general obligation bond proceeds in excess of the scheduled contributions for the remainder of fiscal 2003 and for the entirety of 2004,
    - ii) That hypothetical state contributions had been made each fiscal year from 2005 through the valuation date, based on the funding process in place prior to P.A. 93-0002 (without regard to prior state minimum requirements),
    - iii) That the actual amounts of member contributions and the actual cash outflows (benefit payments, refunds and administrative expenses) for each year prior to the valuation date were realized, and
    - iv) That the hypothetical fund earned returns in each prior fiscal year equal to the rate of total return actually earned by the retirement fund in that year.
  - b. The hypothetical asset values developed in a., above, will not exceed the actual assets of the fund.
  - c. A projection of maximum contributions for each year of the GOB program will be performed each year, by reducing the contributions produced in a., above, by the respective amount of debt service allocated to the System for each year.
2. Calculation of the contribution with GOB proceeds
  - a. The basic projection of State contributions from the valuation date through June 30, 2045, will be made, taking into account all assets of the System, including the GOB proceeds.
  - b. State contribution rates (expressed as a percentage of covered pay), in the pattern required by the funding sections of the statutes, are calculated.
  - c. In those projections, the dollars of state contributions which are added to assets each year during the GOB program are limited by the contribution maximum. Because the bonds are to be liquidated by the end of fiscal 2033, there is no contribution maximum thereafter.

# Projection Methodology and Appropriation Requirements Under P.A. 93-0002, P.A. 94-0004, P.A. 96-0043 and P.A. 100-0023

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## State Contributions Under P.A. 94-0004

The following is an excerpt from the Illinois Compiled statutes 40 ILCS 5/18-131:

- (c) Notwithstanding any other provision of this Article, the total required State contribution for fiscal year 2006 is \$29,189,400.

Notwithstanding any other provision of this Article, the total required State contribution for fiscal year 2007 is \$35,236,800.

For each State fiscal year 2008 through 2010, the State contribution to the System, as a percentage of the applicable employee payroll, shall be increased in equal annual increments from the required State contribution for State fiscal year 2007, so that by State fiscal year 2011, the State is contributing at a rate otherwise required under this Section.

## State Contributions Under P.A. 96-0043

The following is an excerpt from the Illinois Compiled statutes 40 ILCS 5/18-131:

- (d) For purposes of determining the required State contribution to the System, the value of the System's assets shall be equal to the actuarial value of the System's assets, which shall be calculated as follows:

As of June 30, 2008, the actuarial value of the System's assets shall be equal to the market value of the assets as of that date. In determining the actuarial value of the System's assets for fiscal years after June 30, 2008, any actuarial gains or losses from investment return incurred in a fiscal year shall be recognized in equal annual amounts over the five-year period following that fiscal year.

- (e) For purposes of determining the required State contribution to the system for a particular year, the actuarial value of assets shall be assumed to earn a rate of return equal to the system's actuarially assumed rate of return.

## State Contributions Under P.A. 100-0023

Public Act ("P.A.") 100-0023, effective July 6, 2017, modified the State's funding policy to include smoothing State contribution rate increases or decreases due to changes in actuarial assumptions, including investment return assumptions, over a five-year period in equal annual amounts beginning in fiscal year 2018. In addition, changes in actuarial or investment assumptions that increased or decreased the State contribution rate in fiscal years 2014 through 2017 are to be smoothed over a five-year period in equal annual amounts, applying only to the portion of the five-year phase-in that is applicable to fiscal years on and after 2018.

# Projection Methodology and Appropriation Requirements Under P.A. 93-0002, P.A. 94-0004, P.A. 96-0043 and P.A. 100-0023

## Phase-in of the Financial Impact of Assumption Changes

Following is a table with the recognition schedule for the phase-in of actuarial assumption changes required under Public Act 100-0023. The following actuarial assumption changes were made:

1. Beginning with the June 30, 2013, actuarial valuation, there were changes to the economic and demographic assumptions.
2. Beginning with the June 30, 2016, actuarial valuation, there were changes to the economic and demographic assumptions.
3. Beginning with the June 30, 2018, actuarial valuation, there were changes to the economic assumptions.
4. Beginning with the June 30, 2019, actuarial valuation, there were changes to the economic and demographic assumptions.

Valuation Year Ending June 30,	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Applicable Fiscal Year Ending June 30,	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
\$ in Millions After Impact of GOB Proceeds											
Contribution Before Assumption Change											
(1) Contribution Dollar	\$ 127.624	\$ -	\$ -	\$ 132.782	\$ -	\$ 143.976	\$ 149.827				
(2) Contribution Rate	76.115%	0.000%	0.000%	82.414%	0.000%	91.511%	94.872%				
Contribution After Assumption Change											
(3) Contribution Dollar	\$ 133.982	\$ -	\$ -	\$ 146.767	\$ -	\$ 145.223	\$ 146.667				
(4) Contribution Rate	79.961%	0.000%	0.000%	91.395%	0.000%	92.528%	93.009%				
(5) Assumption Change Impact as a Percentage of Capped Payroll [(4) - (2)]	3.846%	0.000%	0.000%	8.981%	0.000%	1.017%	-1.863%				
(6) Assumption Change Impact Recognized This Year (5-year Recognition)											
(6a) From This Year	0.769%	0.000%	0.000%	1.796%	0.000%	0.203%	-0.373%				
(6b) From One Year Ago	0.000%	0.769%	0.000%	0.000%	1.796%	0.000%	0.203%	-0.373%			
(6c) From Two Years Ago	0.000%	0.000%	0.769%	0.000%	0.000%	1.796%	0.000%	0.203%	-0.373%		
(6d) From Three Years Ago	0.000%	0.000%	0.000%	0.769%	0.000%	0.000%	1.796%	0.000%	0.203%	-0.373%	
(6e) From Four Years Ago	0.000%	0.000%	0.000%	0.000%	0.770%	0.000%	0.000%	1.797%	0.000%	0.205%	-0.371%
(6f) Total Recognized Assumption Change Impact	0.769%	0.769%	0.769%	2.565%	2.566%	1.999%	1.626%	1.627%	-0.170%	-0.168%	-0.371%

## **SECTION F**

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### **SUMMARY OF PLAN PROVISIONS**

# Summary of Plan Provisions (as of June 30, 2019)

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1. Participation. Participation in the system is mandatory when a person first becomes a judge, unless an "Election Not to Participate" is filed by the judge within 30 days of the date of notification of this option.
2. Member Contributions. All members of the system are required to contribute to the system the following percentage of their salaries:

Retirement Annuity	7.5 percent
Automatic Annuity Increase	1.0
Survivor's Annuity	2.5
Total	11.0 percent

All judges who become participants after December 31, 1992, are required to make contributions toward the survivor's annuity unless they file an election not to participate in the survivor's annuity benefit, in which case the total participant contribution rate is 8.5 percent of salary.

3. Discontinuance of Contributions. A participant who becomes eligible to receive the maximum rate of annuity may elect to discontinue contributions and have his or her benefits "fixed" based upon the final rate of salary immediately prior to the effective date of such election. This election, once made, is irrevocable.
4. Election to Contribute Only on Increases in Salary. A participant who has attained age 60 and continues to serve as a judge after becoming eligible to receive the maximum rate of annuity and has not elected to discontinue contributing to the system may elect to make contributions based only on the amount of the increases in salary received by the judge on or after the date of the election.
5. Retirement Annuity – Eligibility. A judge who has at least 10 years of service may retire with an unreduced retirement annuity upon attainment of age 60. A judge with at least six years of service may retire with an unreduced retirement annuity upon attainment of age 62.

A judge with at least 10 years of service may retire upon attainment of age 55, with the amount of the retirement annuity reduced 1/2 of 1 percent for each month that the judge is under age 60 if the judge has less than 28 years of service. This penalty for retirement before age 60 is reduced by 5/12 of 1 percent for every month of service in the System in excess of 20 years.

6. Retirement Annuity – Amount. The retirement annuity is determined according to the following formula based upon the final rate of salary:
  - 3 ½ percent for each of the first 10 years of service; plus
  - 5 percent for each year of service in excess of 10

The maximum retirement annuity is 85 percent of the final rate of salary.

## Summary of Plan Provisions (as of June 30, 2019)

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7. Automatic Increase In Retirement Annuity. Annual automatic increases of 3 percent of the current amount of retirement annuity are provided. The initial increase is effective in the month of January of the year next following the year in which the first anniversary of retirement occurs.
8. Temporary Total Disability. A member with at least two years of service who becomes totally disabled and unable to perform his or her duties as a judge is entitled to a temporary disability benefit equal to 50 percent of salary payable during the period of disability but not beyond the end of the term of office.
9. Total and Permanent Disability. A member with at least 10 years of service who becomes totally and permanently disabled while serving as a judge is eligible to commence receiving his or her retirement annuity without reduction regardless of age.
10. Survivor's Annuity – Participation and Eligibility. A married judge, an unmarried judge who becomes a participant after December 31, 1992, or a judge who marries after becoming a participant is subject to the provisions relating to the survivor's annuity unless he or she files a written notice of election not to participate in the survivor's annuity.

An active judge who is not contributing for the survivor's annuity and later marries or remarries may receive partial credit for the survivor's annuity thereby providing a prorated benefit for his or her spouse by contributing to the survivor's annuity benefit prospectively from the date of marriage.

A surviving spouse without children is eligible for survivor benefits at age 50 or over provided marriage to the member had been in effect for at least one year immediately prior to the member's death.

A surviving spouse with unmarried eligible children of the member is eligible for a survivor's annuity benefit at any age provided the above marriage requirements have been met. When all children are disqualified because of death, marriage or attainment of age 18, or age 22 in the case of a full-time student, the spouse's benefit is suspended if the spouse is under age 50 until the attainment of such age.

Children of the member who are under age 18 or under age 22 and a full-time student or who are over age 18 and dependent because of a physical or mental disability are eligible for survivor benefits. Legally adopted children are eligible for survivor benefits on the same basis as other children.

If the member dies in service as a judge, the member must have at least 1 1/2 years of service credit for survivor's annuity eligibility. If death occurs after termination of service, the deceased member must have at least 10 years of service credit for survivor's annuity eligibility.

# Summary of Plan Provisions (as of June 30, 2019)

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## 11. Survivor's Annuity – Amount.

(a) Upon the death of an annuitant, his or her surviving spouse shall be entitled to a survivor's annuity of 66-2/3 percent of the annuity the annuitant was receiving immediately prior to his or her death.

(b) Upon the death of a judge while in service, the surviving spouse shall receive a survivor's annuity of 66-2/3 percent of the annuity earned by the judge as of the date of death, or 7-1/2 percent of the judge's last salary, whichever is greater.

(c) Upon the death of a former judge who had terminated service with at least 10 years of service, his or her surviving spouse shall be entitled to a survivor's annuity of 66-2/3 percent of the annuity earned by the deceased member as of the date of death.

(d) Upon the death of an annuitant, a judge in service, or a former judge who had terminated service with at least 10 years of service, each surviving child unmarried and under the age of 18, or age 22 in the case of a full-time student, or disabled shall be entitled to a child's annuity in an amount equal to 5 percent of the decedent's final salary, not to exceed in total for all such children the greater of 20 percent of final salary or 66-2/3 percent of the earned retirement annuity.

(e) Survivor's annuities are subject to annual automatic increases of 3 percent of the current amount of annuity.

## 12. Refund of Contributions. A participant who ceases to be a judge may apply for and receive a refund of his or her total contributions to the system, provided he or she is not then eligible to receive a retirement annuity.

A participant who becomes unmarried, either before or after retirement, is entitled to a refund of contributions made for the survivor's annuity.

### Judges Who First Become Participants On or After January 1, 2011 ("Tier 2")

The following changes to the above provisions apply to judges who first become participants on or after January 1, 2011:

1. The highest salary for annuity purposes is equal to the average monthly salary obtained by dividing the participant's total salary during the 96 consecutive months of service within the last 120 months of service in which the total compensation was the highest by the number of months in that period.
2. The required contributions shall not exceed the contributions that would be due on the highest salary for annuity purposes.



## Summary of Plan Provisions (as of June 30, 2019)

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3. For 2011, the final average salary is limited to the Social Security wage base of \$106,800. Limitations for future years shall automatically be increased or decreased, as applicable, by a percentage change in the Consumer Price Index-U during the preceding 12-month calendar year.
4. A participant is eligible to retire with unreduced benefits after attainment of age 67 with at least eight years of service credit. However, a participant may elect to retire at age 62 with at least eight years of service credit and receive a retirement annuity reduced by one-half of 1 percent for each month that his or her age is under 67.
5. The annual retirement annuity provided is equal to 3 percent of the participant's final average salary for each year of service. The maximum retirement annuity payable shall be 60 percent of the participant's final average salary.
6. Automatic annual increases are provided in the retirement annuity then being paid equal to 3 percent or the annual change in the Consumer Price Index for all Urban Consumers, whichever is less. Such increases are payable in the January next following attainment of age 67 and in January of each year thereafter.
7. Automatic annual increases are provided in the survivor annuity then being paid equal to 3 percent or the annual change in the Consumer Price Index for all Urban Consumers, whichever is less. Such increases are payable on each January 1 occurring on or after attainment of age 67.
8. The retirement annuity being paid is suspended when an annuitant accepts full time employment in a position covered under the Judges' Retirement System or any other article of the Illinois Pension Code. Upon termination of the employment, the retirement annuity shall resume and, if appropriate, be recalculated.
9. Salary and COLA development for members hired on or after January 1, 2011, are shown in the table below:

Year Ending	CPI-U	COLA	Maximum Annual Pensionable Earnings
2011		3.00%	\$106,800.00
2012	3.90%	3.00%	\$110,004.00
2013	2.00%	2.00%	\$112,204.08
2014	1.20%	1.20%	\$113,550.53
2015	1.70%	1.70%	\$115,480.89
2016	0.00%	0.00%	\$115,480.89
2017	1.50%	1.50%	\$117,213.10
2018	2.20%	2.20%	\$119,791.79
2019	2.30%	2.30%	\$122,547.00

## **SECTION G**

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### **GLOSSARY OF TERMS**

# Glossary of Terms

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<b><i>Actuarial Accrued Liability (“AAL”)</i></b>	The difference between the Actuarial Present Value of Future Benefits, and the Actuarial Present Value of Future Normal Costs.
<b><i>Actuarial Assumptions</i></b>	Assumptions about future plan experience that affect costs or liabilities, such as: mortality, withdrawal, disablement and retirement; future increases in salary; future rates of investment earnings; future investment and administrative expenses; characteristics of members not specified in the data, such as marital status; characteristics of future members; future elections made by members; and other items.
<b><i>Actuarial Cost Method</i></b>	A procedure for allocating the Actuarial Present Value of Future Benefits between the Actuarial Present Value of future Normal Costs and the Actuarial Accrued Liability.
<b><i>Actuarial Equivalent</i></b>	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
<b><i>Actuarial Present Value (“APV”)</i></b>	The amount of funds required to provide a payment or series of payments in the future. It is determined by discounting the future payments with an assumed interest rate and with the assumed probability each payment will be made.
<b><i>Actuarial Present Value of Future Benefits (“APVFB”)</i></b>	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
<b><i>Actuarial Valuation</i></b>	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB No. 67, such as the Funded Ratio and the Actuarially Determined Contribution (“ADC”).
<b><i>Actuarial Value of Assets</i></b>	The value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio or contribution requirement.

# Glossary of Terms

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<b><i>Actuarially Determined Contribution (“ADC”)</i></b>	The employer’s periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ADC consists of the Employer Normal Cost and Amortization Payment.
<b><i>Amortization Method</i></b>	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the rate at which total covered payroll of all active members is assumed to increase.
<b><i>Amortization Payment</i></b>	That portion of the plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
<b><i>Amortization Period</i></b>	The period used in calculating the Amortization Payment.
<b><i>Closed Amortization Period</i></b>	A specific number of years that is reduced by one each year, and declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc.
<b><i>Employer Normal Cost</i></b>	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
<b><i>Equivalent Single Amortization Period</i></b>	For plans that do not establish separate amortization bases (separate components of the UAAL), this is the same as the Amortization Period. For plans that do establish separate amortization bases, this is the period over which the UAAL would be amortized if all amortization bases were combined upon the current UAAL payment.
<b><i>Experience Gain/Loss</i></b>	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuations. To the extent that actual experience differs from that assumed, Unfunded Actuarial Accrued Liabilities emerge which may be larger or smaller than projected. Gains are due to favorable experience; e.g., the assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, losses are the result of unfavorable experience; i.e., actual results that produce Unfunded Actuarial Accrued Liabilities which are larger than projected.

# Glossary of Terms

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<b><i>Funded Ratio</i></b>	The ratio of the Actuarial Value of Assets to the Actuarial Accrued Liability.
<b><i>GASB</i></b>	Governmental Accounting Standards Board.
<b><i>GASB No. 67 and GASB No. 68</i></b>	These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68, which replaced Statement No. 27 effective with fiscal year ending June 30, 2015, sets the accounting rules for the employers that sponsor or contribute to public retirement systems. Statement No. 67, which replaced Statement No. 25 effective with fiscal year ending June 30, 2014, sets the rules for the systems themselves.
<b><i>Normal Cost</i></b>	The annual cost assigned, under the Actuarial Cost Method, to the current plan year.
<b><i>Open Amortization Period</i></b>	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.
<b><i>Unfunded Actuarial Accrued Liability</i></b>	The difference between the Actuarial Accrued Liability and Actuarial Value of Assets.
<b><i>Valuation Date</i></b>	The date as of which the Actuarial Present Value of Future Benefits are determined. The benefits expected to be paid in the future are discounted to this date.

## **SECTION H**

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### **ADDITIONAL PROJECTION DETAILS**

**Table 11**  
**Additional Projection Details — Actuarial Accrued Liability**  
**(\$ in Millions)**

Valuation Date June 30	Current Inactives		Current Actives			Grand Totals		
	Retirees & Beneficiaries	Deferreds	Tier 1	Current Tier 2	Future Tier 2	Current Retirees, Beneficiaries & Deferreds	Actives	Total
2019	\$2,075.94	\$13.39	\$660.94	\$42.75	\$0.00	\$2,089.32	\$703.69	\$2,793.02
2020	2,043.71	13.84	735.60	56.11	0.00	2,057.55	791.71	2,849.26
2021	2,007.92	14.51	805.74	70.27	1.27	2,022.43	877.27	2,899.70
2022	1,968.59	15.22	870.87	85.36	3.86	1,983.81	960.09	2,943.90
2023	1,925.75	15.93	930.01	101.23	7.90	1,941.68	1,039.14	2,980.82
2024	1,879.46	16.42	983.25	117.65	13.62	1,895.88	1,114.52	3,010.39
2025	1,829.77	16.77	1,030.14	134.40	21.17	1,846.54	1,185.71	3,032.26
2026	1,776.78	17.12	1,070.38	151.48	30.84	1,793.91	1,252.69	3,046.60
2027	1,720.59	17.39	1,103.49	168.54	42.80	1,737.99	1,314.82	3,052.81
2028	1,661.34	17.62	1,130.45	185.41	57.39	1,678.96	1,373.25	3,052.21
2029	1,599.18	17.84	1,151.02	202.00	74.61	1,617.02	1,427.63	3,044.64
2030	1,534.29	18.00	1,165.19	218.13	94.60	1,552.29	1,477.91	3,030.20
2031	1,466.91	18.15	1,173.57	233.75	117.48	1,485.06	1,524.80	3,009.85
2032	1,397.28	18.19	1,175.69	248.77	143.31	1,415.47	1,567.77	2,983.24
2033	1,325.71	18.16	1,172.15	262.96	172.19	1,343.87	1,607.30	2,951.17
2034	1,252.52	18.10	1,163.41	276.06	204.21	1,270.62	1,643.67	2,914.30
2035	1,178.11	18.00	1,149.91	287.98	239.42	1,196.11	1,677.31	2,873.42
2036	1,102.87	17.87	1,131.86	298.61	277.82	1,120.74	1,708.29	2,829.03
2037	1,027.27	17.70	1,109.41	307.77	319.39	1,044.97	1,736.57	2,781.54
2038	951.78	17.50	1,083.06	315.36	364.13	969.27	1,762.55	2,731.82
2039	876.90	17.25	1,053.28	321.13	411.94	894.15	1,786.34	2,680.49
2040	803.16	16.96	1,020.10	325.21	462.72	820.12	1,808.03	2,628.15
2041	731.06	16.62	984.13	327.75	516.34	747.68	1,828.22	2,575.90
2042	661.10	16.24	945.54	328.79	572.58	677.35	1,846.92	2,524.26
2043	593.77	15.82	904.76	328.35	631.30	609.59	1,864.40	2,473.99
2044	529.50	15.35	862.12	326.40	692.28	544.85	1,880.81	2,425.65
2045	468.68	14.84	817.89	323.10	755.35	483.52	1,896.33	2,379.85

**Table 12**  
**Additional Projection Details — Present Value of Future Benefits**  
**(\$ in Millions)**

Valuation Date	Current Inactives		Current Actives			Grand Totals		
	Retirees & Beneficiaries	Deferreds	Tier 1	Current Tier 2	Future Tier 2	Current Retirees, Beneficiaries & Deferreds	Actives	Total
2019	\$2,075.94	\$13.39	\$887.99	\$156.73	\$0.00	\$2,089.32	\$1,044.72	\$3,134.05
2020	2,043.71	13.84	937.39	166.23	19.02	2,057.55	1,122.63	3,180.18
2021	2,007.92	14.51	983.70	176.11	38.07	2,022.43	1,197.88	3,220.31
2022	1,968.59	15.22	1,026.63	186.39	57.90	1,983.81	1,270.91	3,254.73
2023	1,925.75	15.93	1,065.41	197.05	80.31	1,941.68	1,342.77	3,284.46
2024	1,879.46	16.42	1,100.00	207.96	103.89	1,895.88	1,411.86	3,307.74
2025	1,829.77	16.77	1,130.05	219.06	129.96	1,846.54	1,479.07	3,325.61
2026	1,776.78	17.12	1,155.31	230.30	157.22	1,793.91	1,542.84	3,336.75
2027	1,720.59	17.39	1,175.39	241.60	187.83	1,737.99	1,604.82	3,342.81
2028	1,661.34	17.62	1,190.86	252.80	218.38	1,678.96	1,662.04	3,341.00
2029	1,599.18	17.84	1,201.43	263.79	251.35	1,617.02	1,716.58	3,333.59
2030	1,534.29	18.00	1,207.00	274.44	286.76	1,552.29	1,768.21	3,320.50
2031	1,466.91	18.15	1,207.96	284.71	323.39	1,485.06	1,816.05	3,301.11
2032	1,397.28	18.19	1,203.90	294.49	362.83	1,415.47	1,861.22	3,276.69
2033	1,325.71	18.16	1,195.19	303.64	404.53	1,343.87	1,903.36	3,247.23
2034	1,252.52	18.10	1,182.13	311.98	448.92	1,270.62	1,943.03	3,213.65
2035	1,178.11	18.00	1,165.01	319.43	495.57	1,196.11	1,980.02	3,176.13
2036	1,102.87	17.87	1,143.96	325.92	545.05	1,120.74	2,014.93	3,135.67
2037	1,027.27	17.70	1,119.06	331.29	597.63	1,044.97	2,047.98	3,092.95
2038	951.78	17.50	1,090.71	335.45	652.60	969.27	2,078.75	3,048.03
2039	876.90	17.25	1,059.25	338.24	710.52	894.15	2,108.01	3,002.16
2040	803.16	16.96	1,024.75	339.71	771.10	820.12	2,135.56	2,955.68
2041	731.06	16.62	987.69	339.95	833.66	747.68	2,161.30	2,908.98
2042	661.10	16.24	948.23	338.98	898.85	677.35	2,186.07	2,863.41
2043	593.77	15.82	906.75	336.79	966.35	609.59	2,209.89	2,819.48
2044	529.50	15.35	863.56	333.35	1,036.19	544.85	2,233.09	2,777.94
2045	468.68	14.84	818.91	328.76	1,108.23	483.52	2,255.89	2,739.41



**Table 13**  
**Additional Projection Details — Benefit Payments Including Administrative Expenses**  
**(\$ in Millions)**

Valuation Date June 30	Current Inactives		Current Actives			Grand Totals		
	Retirees & Beneficiaries	Deferreds	Tier 1	Current Tier 2	Future Tier 2	Current Retirees, Beneficiaries & Deferreds	Actives	Total
2019	\$161.98	\$0.41	\$8.07	\$0.67	\$0.00	\$162.39	\$8.73	\$171.13
2020	163.40	0.22	14.16	0.90	0.05	163.62	15.11	178.73
2021	164.58	0.22	20.37	1.13	0.11	164.80	21.61	186.41
2022	165.50	0.27	27.08	1.41	0.18	165.77	28.67	194.44
2023	166.15	0.53	33.59	1.84	0.27	166.68	35.70	202.38
2024	166.52	0.70	40.17	2.34	0.37	167.22	42.88	210.10
2025	166.60	0.71	46.69	2.91	0.48	167.31	50.08	217.39
2026	166.36	0.82	53.31	3.56	0.61	167.17	57.48	224.65
2027	165.79	0.88	59.04	4.37	0.75	166.67	64.16	230.82
2028	164.88	0.90	64.76	5.27	0.89	165.77	70.93	236.70
2029	163.60	0.97	70.28	6.29	1.09	164.56	77.65	242.22
2030	161.93	0.99	75.10	7.34	1.36	162.92	83.80	246.72
2031	159.86	1.11	80.02	8.45	1.70	160.97	90.17	251.13
2032	157.36	1.17	84.27	9.68	2.13	158.54	96.08	254.62
2033	154.42	1.20	87.93	11.05	2.67	155.62	101.65	257.27
2034	151.00	1.23	91.04	12.43	3.33	152.23	106.80	259.04
2035	147.11	1.26	93.78	13.84	4.15	148.37	111.76	260.13
2036	142.72	1.29	96.18	15.33	5.14	144.01	116.65	260.66
2037	137.85	1.32	97.96	16.83	6.34	139.17	121.13	260.30
2038	132.50	1.34	99.18	18.43	7.75	133.84	125.36	259.20
2039	126.69	1.37	100.15	19.88	9.41	128.06	129.44	257.49
2040	120.45	1.39	100.46	21.16	11.33	121.85	132.95	254.79
2041	113.83	1.41	100.44	22.35	13.53	115.25	136.33	251.58
2042	106.89	1.43	99.92	23.48	16.01	108.32	139.41	247.73
2043	99.68	1.45	98.97	24.55	18.78	101.13	142.29	243.42
2044	92.28	1.46	97.66	25.45	21.84	93.75	144.95	238.69
2045	84.78	1.47	95.89	26.25	25.20	86.25	147.33	233.59

**Table 14**  
**Additional Projection Details — Active Population, Covered Payroll,  
Employee Contributions and Normal Costs**  
**(\$ in Millions)**

Valuation Date	Tier 1 Active Members				Tier 2 Active Members				Future Tier 2 Active Members			
	Population	Covered Payroll	Employee Contributions	Normal Cost	Population	Covered Payroll	Employee Contributions	Normal Cost	Population	Covered Payroll	Employee Contributions	Normal Cost
2019	527	\$104.90	\$8.11	\$38.79	429	\$52.05	\$5.73	\$10.92	0	\$0.00	\$0.00	\$0.00
2020	470	96.81	7.38	35.79	421	52.81	5.81	11.08	64	8.07	0.89	1.28
2021	424	89.46	6.46	32.73	410	52.47	5.77	11.33	122	15.69	1.73	2.55
2022	380	82.23	5.62	29.54	399	52.24	5.75	11.41	177	23.17	2.55	3.85
2023	337	74.73	4.95	26.60	385	51.61	5.68	11.38	233	31.28	3.44	5.31
2024	299	67.84	4.23	23.68	370	50.67	5.57	11.16	287	39.34	4.33	6.84
2025	263	61.08	3.60	20.80	351	49.21	5.41	10.98	342	47.89	5.27	8.51
2026	229	54.62	2.78	17.98	333	47.76	5.25	10.55	393	56.32	6.20	10.25
2027	197	48.20	1.88	15.66	311	45.57	5.01	10.10	447	65.52	7.21	12.20
2028	172	43.13	1.30	13.50	290	43.36	4.77	9.67	494	73.97	8.14	13.96
2029	149	38.12	0.90	11.51	270	41.28	4.54	9.20	538	82.31	9.05	15.75
2030	127	33.36	0.35	9.83	250	39.07	4.30	8.74	579	90.70	9.98	17.57
2031	109	29.38	0.24	8.16	231	36.99	4.07	8.28	616	98.56	10.84	19.32
2032	91	25.18	0.15	6.78	214	34.99	3.85	7.77	651	106.53	11.72	21.10
2033	76	21.62	0.09	5.63	196	32.85	3.61	7.17	683	114.33	12.58	22.85
2034	64	18.57	0.07	4.68	178	30.51	3.36	6.59	714	122.10	13.43	24.59
2035	54	15.95	0.04	3.86	161	28.24	3.11	6.00	741	129.62	14.26	26.27
2036	45	13.54	0.03	3.13	145	25.99	2.86	5.39	766	137.06	15.08	27.93
2037	36	11.26	0.02	2.55	130	23.69	2.61	4.79	790	144.57	15.90	29.57
2038	30	9.44	0.02	2.10	115	21.47	2.36	4.16	812	151.80	16.70	31.14
2039	24	7.98	0.02	1.66	100	19.14	2.11	3.61	832	159.02	17.49	32.67
2040	19	6.48	0.01	1.35	87	17.06	1.88	3.14	849	166.11	18.27	34.14
2041	16	5.41	0.01	1.07	76	15.20	1.67	2.72	864	172.81	19.01	35.51
2042	12	4.35	0.01	0.84	66	13.47	1.48	2.34	878	179.45	19.74	36.84
2043	10	3.53	0.01	0.66	57	11.86	1.30	1.98	890	185.94	20.45	38.11
2044	8	2.82	0.01	0.49	48	10.35	1.14	1.68	900	192.37	21.16	39.35
2045	6	2.14	0.00	0.37	41	8.98	0.99	1.41	909	198.73	21.86	40.55

## **SECTION I**

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### **STRESS TESTING SCENARIOS**

December 6, 2019

Board of Trustees  
Judges' Retirement System of Illinois  
2101 South Veterans Parkway  
P.O. Box 19255  
Springfield, IL 62694-9255

**Re: Stress Testing Scenarios Based on Actuarial Valuation Results as of June 30, 2019**

Dear Members of the Board:

At your request, we have performed stress testing of the required statutory contributions and funded ratio for the Judges' Retirement System of Illinois ("JRS") based on the results of the June 30, 2019, actuarial valuation. This stress testing was performed to illustrate the projected impact on actuarial valuation results (including the annual contribution requirement and funded ratio) if there is a significant market downturn or significant volatility in investment returns, or volatility in salary growth.

GRS has prepared this analysis exclusively for the Trustees of the Judges' Retirement System; GRS is not responsible for reliance upon this report by any other party. This report may be provided to parties other than the JRS only in its entirety and only with the permission of the Board.

Exhibit A-1 contains the rates of return used for the investment return stress test. The investment return stress test analysis projects the actuarial valuation results assuming that the assets earn 6.50 percent, the 25<sup>th</sup> percentile return of 3.65 percent, and the 40<sup>th</sup> percentile return of 5.18 percent. In order to demonstrate the risk and volatility of the returns, we are providing results assuming both static returns of 6.50 percent, 3.65 percent, or 5.18 percent and volatile returns that produce 26-year geometric average returns of 6.50 percent, 3.65 percent, or 5.18 percent. In Scenarios 1 through 5, the discount rate used to determine liabilities remains at 6.50 percent, average future wage inflation remains at 2.5 percent per year and the future active population remains constant at 956 members. Please note that each volatile scenario represents one possible trial that generates the targeted average geometric return, and that another equally likely trial that produces the same targeted average geometric return could produce significantly different contribution and funded ratio patterns. The 25<sup>th</sup> and 40<sup>th</sup> percentile returns used in Scenarios 2 through 5 were determined based on the expected investment return and the current target asset allocation of the System as of the most recent experience study for the three-year period ending June 30, 2018, issued to the System on July 16, 2019.

In addition to the investment return stress test scenarios, we have provided scenarios that stress test the required statutory contributions and funded ratio based on fluctuations in salary growth and wage inflation. In order to demonstrate the risk and volatility associated with changes to the uncapped salary growth, we are providing results under the following scenarios: Scenario 6 – wage inflation increases by

one percentage point from the assumed rate of 2.50 percent per year to 3.50 percent per year; and Scenario 7 – wage inflation decreases by one percentage point from the assumed rate of 2.50 percent per year to 1.50 percent per year. In Scenarios 6 and 7, the investment return assumption and discount rate used to determine the liabilities remain at 6.50 percent.

GRS believes that these scenarios provide a reasonable illustration of potential future volatility of investment returns, salary growth and the resulting actuarial valuation results. Annual returns will likely be significantly different from the returns shown in Exhibits A-1 and the 26-year geometric average of actual returns may be either higher or lower than the assumption of 6.50 percent.

Exhibits B-1 through B-8 contains the numerical results of the stress testing.

### **Analysis of Stress Testing Scenario Results**

#### **Baseline – Static 6.50 Percent**

Under the projected results from the actuarial valuation as of June 30, 2019, in which all future actuarial assumptions are assumed to be realized, the statutory dollar contribution increases through 2022, decreases in 2023 through 2025 and then increases through 2045, with the exception of 2028. Annual increases become larger in 2034, once the deferred asset gains and losses are fully recognized in the actuarial value of assets and the statutory contributions are no longer limited by the maximum contribution. The funded ratio grows steadily to 90.0 percent in 2045.

#### **Scenario 1 – Volatile 6.50 Percent**

In Scenario 1, which is based on the assumption that the 26-year geometric average of the returns is equal to 6.50 percent but with volatility in the year to year rate of return, the annual contribution requirement is not stable. Relative to the baseline, the contribution requirement is lower through 2032, and then intermittently higher and lower through 2045.

#### **Scenario 2 – Static 3.65 Percent**

In Scenario 2, which is based on the assumption that the annual rate of return is equal to 3.65 percent, the annual contribution requirement steadily increases at an increasing rate. Relative to the baseline, the contribution requirement is higher in all years after 2021.

#### **Scenario 3 – Volatile 3.65 Percent**

Scenario 3 is based on the assumption that the 26-year geometric average of the returns is equal to 3.65 percent but with volatility in the year to year rate of return.



Under this scenario, the annual contribution requirement relative to the baseline is lower through 2025, then significantly higher through 2045. In this Scenario, the unfunded liability after 2024 is significantly higher than the baseline. The Scenario demonstrates that while the long-term geometric average may be the same as Scenario 2, the pattern of contributions can be significantly different.

#### **Scenario 4 – Static 5.18 Percent**

In Scenario 4, which is based on the assumption that the annual rate of return is equal to 5.18 percent, the annual contribution requirement steadily increases at an increasing rate. Relative to the baseline, the contribution requirement is higher in all years. Relative to Scenario 2, the rate of increase is lower because more investment income is used to fund benefits.

#### **Scenario 5 – Volatile 5.18 Percent**

Scenario 5 is based on the assumption that the 26-year geometric average of the returns is equal to 5.18 percent but with volatility in the year to year rate of return. Under this scenario the annual contribution requirement relative to the baseline is higher for all years, except 2032 through 2034. In this Scenario, the unfunded liability is generally greater than the baseline. Again, this Scenario demonstrates that while the long-term geometric average may be the same as Scenario 4, the pattern of contributions can be significantly different.

#### **Scenario 6 – Increased Salary Growth**

Scenario 6 is based on the assumption that wage inflation for active members will increase from the baseline assumption of 2.5 percent per year to 3.5 percent per year. Under this scenario the statutory contribution increases each year except two, with more modest annual increases beginning in 2035 once the statutory dollar contributions are no longer limited by the maximum contribution. Relative to the baseline, the contribution requirement is higher in all years from 2022 through 2045.

#### **Scenario 7 – Decreased Salary Growth**

Scenario 7 is based on the assumption that wage inflation for active members will decrease from the baseline assumption of 2.5 percent per year to 1.5 percent per year. Under this scenario, the statutory contribution initially increases and then decreases gradually starting in 2023 through 2031, then increases again. Increase become larger beginning in 2034 once the statutory contributions are no longer limited by the maximum contribution. Relative to the baseline, the contribution requirement is lower in all years from 2022 through 2045.

In all Scenarios, it is apparent that based on the funding policy of attaining 90 percent funding in 2045, market volatility will have a larger impact on the statutory contribution as the number of years until 2045 becomes shorter.



In Scenarios 2 through 5, the funded ratio is not 90 percent in the year 2045 because of deferred asset gains and losses that have not been fully recognized in the actuarial value of assets. This is a result of the fact that the assumed investment return in each of these Scenarios is not equal to the actuarial valuation assumption of 6.50 percent.

In each projection Scenario, the actuarial valuations in each year have been projected as though an actuarial valuation in each of those years was performed. The market value of assets at each projected actuarial valuation is assumed to have a rate of return according to the Scenario being modeled for that one year and the actuarial valuation interest rate going forward. At each projected actuarial valuation, an additional 20 percent of the investment gains and losses are recognized. This iterative process is followed for each projection year through 2045.

Statutory contributions in each projection scenario were determined in accordance with Public Act 100-0023, which modified the State's funding policy beginning in fiscal year 2018, by phasing in contribution rate variances due to changes in actuarial assumptions over a five-year period. The phase-in schedule used to determine the statutory contributions can be found in the June 30, 2019, actuarial valuation report.

It is important to note that the Scenarios presented in this letter represent an extremely small sample of possibilities.

In each scenario, we have assumed that the plan sponsor will make the statutory contribution when due. However, some scenarios result in very high contribution rates for extended periods of time and may jeopardize the sustainability of the system. We are not qualified to opine on the sponsor's ability to pay the statutory contribution when due.

To the best of our knowledge, this actuarial statement is complete and accurate, fairly presents the actuarial position of JRS as of June 30, 2019, based on the stress testing scenarios, and has been prepared in accordance with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions, contribution amounts or applicable law.



Due to the limited scope of the actuary's assignment, the actuary did not perform an analysis of the potential range of such future measurements in this report.

This letter is part of the actuarial valuation as of June 30, 2019, and is subject to the same actuarial assumptions and disclosures as used in the presentation and the annual actuarial valuation report. The investment return stress testing scenarios used future investment returns as shown in Exhibit A-1 and the salary growth stress testing scenarios used wage inflation assumptions as shown in Exhibit A-2. All other assumptions and methods were the same as those used in the actuarial valuation.

The statutory funding method generates a contribution requirement that is less than a reasonable actuarially determined contribution. Meeting the statutory requirement does not mean that the undersigned agree that adequate actuarial funding has been achieved. We recommend adherence to a funding policy, such as the Board policy used to calculate the ADC under GASB Statement Nos. 67 and 68, that funds the normal cost of the plan as well as an amortization payment that seeks to pay off any unfunded accrued liability over a closed period of 25 years beginning July 1, 2015.

The signing actuaries are independent of the plan sponsor.

Alex Rivera, Heidi G. Barry, and Jeffrey T. Tebeau are Members of the American Academy of Actuaries ("MAAA") and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions herein.

Respectfully submitted,

**Gabriel, Roeder, Smith & Company**



Alex Rivera, FSA, EA, MAAA, FCA  
Senior Consultant



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**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Assumed Rates of Investment Return**  
**Based on Actuarial Valuation as of June 30, 2019**

Illinois JRS						
Scenario	Baseline	1	2	3	4	5
<b>Investment Return Assumption</b>	6.50% per year	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter
<b>26-Year Geometric Return</b>	6.50%	6.50%	3.65%	3.65%	5.18%	5.18%
<b>Summary of Investment Returns Included in the Scenario</b>	N/A	Investment returns during the first 26 years with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with volatility, based on the System's asset allocation policy
<b>Fiscal Year</b>	<b>Rates of Investment Returns</b>					
2020	6.50%	9.26%	3.65%	33.97%	5.18%	-1.34%
2021	6.50%	16.90%	3.65%	-7.50%	5.18%	7.23%
2022	6.50%	8.21%	3.65%	-5.32%	5.18%	2.46%
2023	6.50%	8.93%	3.65%	-2.38%	5.18%	-2.17%
2024	6.50%	0.30%	3.65%	-9.64%	5.18%	-1.17%
2025	6.50%	15.19%	3.65%	-1.33%	5.18%	1.12%
2026	6.50%	14.77%	3.65%	12.93%	5.18%	17.53%
2027	6.50%	-12.50%	3.65%	14.18%	5.18%	10.75%
2028	6.50%	-5.02%	3.65%	-8.50%	5.18%	24.66%
2029	6.50%	22.30%	3.65%	11.81%	5.18%	14.48%
2030	6.50%	8.00%	3.65%	-1.88%	5.18%	5.78%
2031	6.50%	0.72%	3.65%	42.54%	5.18%	-8.40%
2032	6.50%	7.01%	3.65%	-5.77%	5.18%	8.21%
2033	6.50%	3.41%	3.65%	2.87%	5.18%	-2.94%
2034	6.50%	3.65%	3.65%	16.17%	5.18%	-1.59%
2035	6.50%	23.44%	3.65%	7.62%	5.18%	13.16%
2036	6.50%	6.80%	3.65%	-12.17%	5.18%	-2.60%
2037	6.50%	0.53%	3.65%	-2.17%	5.18%	22.15%
2038	6.50%	0.38%	3.65%	20.20%	5.18%	6.80%
2039	6.50%	11.75%	3.65%	15.14%	5.18%	-9.25%
2040	6.50%	-4.83%	3.65%	-0.45%	5.18%	17.99%
2041	6.50%	18.75%	3.65%	-9.72%	5.18%	-1.40%
2042	6.50%	9.17%	3.65%	25.53%	5.18%	-6.54%
2043	6.50%	1.14%	3.65%	-10.42%	5.18%	7.98%
2044	6.50%	19.08%	3.65%	-3.12%	5.18%	14.90%
2045	6.50%	-7.99%	3.65%	-4.38%	5.18%	7.03%



**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Projection of Capped Payroll**  
**Based on Actuarial Valuation as of June 30, 2019**

<b>Illinois JRS</b>			
<b>Scenario</b>	<b>Baseline; 1-5</b>	<b>6</b>	<b>7</b>
<b>Investment Return Assumption</b>	6.50% per year	6.50% per year	6.50% per year
<b>Wage Inflation Assumption</b>	2.50%	3.50%	1.50%
<b>Population Growth Assumption</b>	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period
<b>Fiscal Year</b>	<b>Capped Payroll (\$ in millions)</b>		
<b>2020</b>	\$156.95	\$156.95	\$156.95
<b>2021</b>	157.69	158.64	156.75
<b>2022</b>	157.61	159.37	155.82
<b>2023</b>	157.64	160.08	155.09
<b>2024</b>	157.62	160.58	154.40
<b>2025</b>	157.84	161.22	154.02
<b>2026</b>	158.18	161.85	153.82
<b>2027</b>	158.71	162.55	153.86
<b>2028</b>	159.29	163.18	154.01
<b>2029</b>	160.46	164.40	154.69
<b>2030</b>	161.71	165.60	155.50
<b>2031</b>	163.14	166.90	156.51
<b>2032</b>	164.93	168.56	157.84
<b>2033</b>	166.70	170.08	159.20
<b>2034</b>	168.79	171.94	160.85
<b>2035</b>	171.17	174.08	162.75
<b>2036</b>	173.80	176.48	164.86
<b>2037</b>	176.59	179.02	167.14
<b>2038</b>	179.52	181.67	169.55
<b>2039</b>	182.72	184.63	172.20
<b>2040</b>	186.14	187.85	175.03
<b>2041</b>	189.64	191.11	177.98
<b>2042</b>	193.41	194.70	181.14
<b>2043</b>	197.28	198.37	184.43
<b>2044</b>	201.33	202.26	187.90
<b>2045</b>	205.53	206.31	191.52



**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Projection of Statutory Contribution Dollars**  
**Based on Actuarial Valuation as of June 30, 2019**

Illinois JRS						
Scenario	Baseline	1	2	3	4	5
<b>Investment Return Assumption</b>	6.50% per year	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter
<b>26-Year Geometric Return</b>	6.50%	6.50%	3.65%	3.65%	5.18%	5.18%
<b>Summary of Investment Returns Included in the Scenario</b>	N/A	Investment returns during the first 26 years with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with volatility, based on the System's asset allocation policy
<b>Fiscal Year</b>	<b>Contribution Dollar Amount (\$ in millions)</b>					
2020	\$144.16	\$144.16	\$144.16	\$144.16	\$144.16	\$144.16
2021	148.62	148.62	148.62	148.62	148.62	148.62
2022	151.54	150.96	152.10	146.23	151.79	153.11
2023	150.33	146.95	152.27	142.14	151.23	153.87
2024	149.92	142.83	153.81	142.68	151.90	155.19
2025	149.65	138.23	154.45	146.01	151.99	157.11
2026	149.77	135.92	156.86	153.25	153.09	161.70
2027	149.92	132.72	159.64	165.02	154.52	166.42
2028	149.70	128.79	162.20	172.73	155.66	169.36
2029	150.18	131.35	165.63	177.28	157.61	171.06
2030	150.33	139.97	168.89	182.05	159.32	167.07
2031	150.76	143.23	172.60	184.09	161.43	158.92
2032	152.18	147.30	177.53	187.15	164.66	150.40
2033	154.12	155.88	183.16	185.60	168.53	149.09
2034	160.04	161.16	203.88	203.87	182.02	158.96
2035	162.29	160.87	211.03	203.77	186.92	168.05
2036	164.78	167.78	218.82	202.63	192.31	184.45
2037	167.43	169.09	227.18	197.70	198.12	199.92
2038	170.20	165.04	236.25	210.97	204.41	211.58
2039	173.24	164.55	246.42	225.95	211.41	219.73
2040	176.48	167.45	257.88	235.97	219.28	220.71
2041	179.80	166.02	270.92	244.71	228.03	227.35
2042	183.38	187.89	286.59	259.20	238.37	234.70
2043	187.04	205.06	306.31	277.26	250.85	239.96
2044	190.89	204.54	334.07	270.00	267.86	292.46
2045	194.87	196.74	385.93	330.04	297.61	396.64
<b>Total Cont. Through 2045</b>	<b>\$4,211.62</b>	<b>\$4,103.10</b>	<b>\$5,437.20</b>	<b>\$5,139.08</b>	<b>\$4,851.70</b>	<b>\$4,960.59</b>
<b>Present Value of Total Cont.</b>	<b>\$1,997.72</b>	<b>\$1,927.93</b>	<b>\$2,360.78</b>	<b>\$2,281.50</b>	<b>\$2,185.14</b>	<b>\$2,219.14</b>



**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Projection of Statutory Contribution as a Percent of Pay**  
**Based on Actuarial Valuation as of June 30, 2019**

Illinois JRS						
Scenario	Baseline	1	2	3	4	5
<b>Investment Return Assumption</b>	6.50% per year	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter
<b>26-Year Geometric Return</b>	6.50%	6.50%	3.65%	3.65%	5.18%	5.18%
<b>Summary of Investment Returns Included in the Scenario</b>	N/A	Investment returns during the first 26 years with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with volatility, based on the System's asset allocation policy
<b>Fiscal Year</b>	<b>Contribution as a Percent of Payroll</b>					
2020	91.85%	91.85%	91.85%	91.85%	91.85%	91.85%
2021	94.25%	94.25%	94.25%	94.25%	94.25%	94.25%
2022	96.15%	95.78%	96.50%	92.78%	96.30%	97.15%
2023	95.36%	93.22%	96.59%	90.17%	95.93%	97.60%
2024	95.11%	90.62%	97.59%	90.52%	96.37%	98.46%
2025	94.81%	87.57%	97.85%	92.50%	96.29%	99.53%
2026	94.68%	85.92%	99.16%	96.88%	96.78%	102.23%
2027	94.46%	83.63%	100.59%	103.98%	97.36%	104.86%
2028	93.98%	80.85%	101.83%	108.44%	97.72%	106.33%
2029	93.59%	81.86%	103.22%	110.48%	98.22%	106.60%
2030	92.96%	86.55%	104.44%	112.58%	98.52%	103.32%
2031	92.42%	87.80%	105.81%	112.85%	98.96%	97.42%
2032	92.27%	89.31%	107.64%	113.47%	99.84%	91.19%
2033	92.45%	93.51%	109.87%	111.34%	101.10%	89.44%
2034	94.81%	95.48%	120.78%	120.78%	107.83%	94.18%
2035	94.81%	93.98%	123.29%	119.04%	109.20%	98.18%
2036	94.81%	96.53%	125.90%	116.59%	110.65%	106.13%
2037	94.81%	95.76%	128.65%	111.96%	112.19%	113.21%
2038	94.81%	91.94%	131.60%	117.52%	113.87%	117.86%
2039	94.81%	90.06%	134.86%	123.66%	115.71%	120.26%
2040	94.81%	89.96%	138.54%	126.77%	117.80%	118.57%
2041	94.81%	87.54%	142.86%	129.04%	120.24%	119.88%
2042	94.81%	97.15%	148.18%	134.02%	123.25%	121.35%
2043	94.81%	103.95%	155.27%	140.54%	127.16%	121.63%
2044	94.81%	101.59%	165.93%	134.11%	133.04%	145.26%
2045	94.81%	95.72%	187.77%	160.58%	144.80%	192.98%



**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Projection of Funded Ratio**  
**Based on Actuarial Valuation as of June 30, 2019**

Scenario	Illinois JRS					
	Baseline	1	2	3	4	5
<b>Investment Return Assumption</b>	6.50% per year	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter
<b>26-Year Geometric Return</b>	6.50%	6.50%	3.65%	3.65%	5.18%	5.18%
<b>Summary of Investment Returns Included in the Scenario</b>	N/A	Investment returns during the first 26 years with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with volatility, based on the System's asset allocation policy
<b>Fiscal Year</b>	<b>Funded Ratio</b>					
<b>2020</b>	39.33%	39.54%	39.12%	41.39%	39.23%	38.74%
<b>2021</b>	40.91%	42.21%	40.21%	44.25%	40.58%	39.62%
<b>2022</b>	42.20%	44.96%	40.76%	45.16%	41.53%	39.99%
<b>2023</b>	43.32%	47.71%	40.90%	44.79%	42.18%	39.53%
<b>2024</b>	44.36%	49.71%	40.76%	42.97%	42.67%	38.33%
<b>2025</b>	45.33%	51.93%	40.49%	38.39%	43.04%	37.16%
<b>2026</b>	46.24%	54.37%	40.16%	35.50%	43.34%	36.60%
<b>2027</b>	47.10%	54.60%	39.76%	34.50%	43.57%	36.92%
<b>2028</b>	47.91%	52.63%	39.32%	33.47%	43.74%	39.38%
<b>2029</b>	48.70%	52.28%	38.85%	33.70%	43.88%	43.58%
<b>2030</b>	49.47%	51.92%	38.38%	34.08%	44.00%	48.20%
<b>2031</b>	50.26%	50.21%	37.93%	36.13%	44.13%	50.33%
<b>2032</b>	51.10%	50.72%	37.56%	37.48%	44.32%	51.57%
<b>2033</b>	52.05%	52.40%	37.32%	39.30%	44.61%	50.51%
<b>2034</b>	53.27%	52.55%	37.77%	42.17%	45.38%	48.03%
<b>2035</b>	54.67%	54.17%	38.51%	46.13%	46.38%	46.21%
<b>2036</b>	56.29%	57.38%	39.61%	46.22%	47.66%	46.01%
<b>2037</b>	58.18%	60.11%	41.13%	46.13%	49.29%	47.37%
<b>2038</b>	60.39%	62.32%	43.16%	47.82%	51.34%	50.79%
<b>2039</b>	62.97%	65.45%	45.81%	50.69%	53.90%	53.96%
<b>2040</b>	65.99%	65.91%	49.21%	53.74%	57.06%	57.56%
<b>2041</b>	69.51%	67.51%	53.50%	57.48%	60.95%	62.20%
<b>2042</b>	73.60%	71.94%	58.91%	64.55%	65.71%	64.39%
<b>2043</b>	78.33%	77.73%	65.69%	70.25%	71.53%	66.92%
<b>2044</b>	83.77%	85.16%	74.33%	73.56%	78.71%	75.27%
<b>2045</b>	90.00%	92.49%	86.02%	79.12%	87.92%	88.27%



**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Unfunded Actuarial Accrued Liability**  
**Based on Actuarial Valuation as of June 30, 2019**

Illinois JRS						
Scenario	Baseline	1	2	3	4	5
<b>Investment Return Assumption</b>	6.50% per year	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter	Varying Rates for the first 26 years, 6.50% per year thereafter
<b>26-Year Geometric Return</b>	6.50%	6.50%	3.65%	3.65%	5.18%	5.18%
<b>Summary of Investment Returns Included in the Scenario</b>	N/A	Investment returns during the first 26 years with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 25th percentile return with volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with no volatility, based on the System's asset allocation policy	Investment returns during the first 26 years represent the 40th percentile return with volatility, based on the System's asset allocation policy
<b>Fiscal Year</b>	<b>Unfunded Accrued Liability (\$ in millions)</b>					
<b>2020</b>	\$1,728.61	\$1,722.72	\$1,734.69	\$1,669.99	\$1,731.43	\$1,745.34
<b>2021</b>	1,713.43	1,675.80	1,733.79	1,616.73	1,722.90	1,750.82
<b>2022</b>	1,701.53	1,620.31	1,744.08	1,614.29	1,721.44	1,766.65
<b>2023</b>	1,689.60	1,558.74	1,761.64	1,645.63	1,723.48	1,802.61
<b>2024</b>	1,674.86	1,513.95	1,783.26	1,716.76	1,725.94	1,856.51
<b>2025</b>	1,657.72	1,457.51	1,804.39	1,868.28	1,727.25	1,905.58
<b>2026</b>	1,637.77	1,390.12	1,823.14	1,965.10	1,726.35	1,931.68
<b>2027</b>	1,614.85	1,386.12	1,838.86	1,999.56	1,722.74	1,925.81
<b>2028</b>	1,589.95	1,445.93	1,852.21	2,030.49	1,717.26	1,850.26
<b>2029</b>	1,561.96	1,452.78	1,861.71	2,018.59	1,708.61	1,717.81
<b>2030</b>	1,531.01	1,456.93	1,867.14	1,997.66	1,696.77	1,569.61
<b>2031</b>	1,497.15	1,498.55	1,868.18	1,922.25	1,681.57	1,494.89
<b>2032</b>	1,458.70	1,470.09	1,862.75	1,864.98	1,661.12	1,444.71
<b>2033</b>	1,415.03	1,404.77	1,849.85	1,791.31	1,634.59	1,460.40
<b>2034</b>	1,361.86	1,382.97	1,813.61	1,685.41	1,591.80	1,514.68
<b>2035</b>	1,302.52	1,316.92	1,766.83	1,547.90	1,540.78	1,545.64
<b>2036</b>	1,236.46	1,205.72	1,708.47	1,521.32	1,480.61	1,527.40
<b>2037</b>	1,163.13	1,109.44	1,637.46	1,498.31	1,410.38	1,464.04
<b>2038</b>	1,082.06	1,029.31	1,552.69	1,425.34	1,329.19	1,344.30
<b>2039</b>	992.52	926.20	1,452.47	1,321.70	1,235.71	1,234.20
<b>2040</b>	893.82	895.90	1,334.87	1,215.84	1,128.46	1,115.38
<b>2041</b>	785.42	837.03	1,197.67	1,095.18	1,005.90	973.66
<b>2042</b>	666.44	708.24	1,037.34	894.96	865.57	898.88
<b>2043</b>	536.12	551.04	848.82	735.91	704.36	818.31
<b>2044</b>	393.58	360.07	622.69	641.45	516.51	599.88
<b>2045</b>	237.90	178.63	332.61	496.95	287.49	279.22



**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Projection of Statutory Contribution Dollars**  
**Based on Actuarial Valuation as of June 30, 2019**

<b>Illinois JRS</b>			
<b>Scenario</b>	<b>Baseline</b>	<b>6</b>	<b>7</b>
<b>Investment Return Assumption</b>	6.50% per year	6.50% per year	6.50% per year
<b>Wage Inflation Assumption</b>	2.50%	3.50%	1.50%
<b>Population Growth Assumption</b>	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period
<b>Fiscal Year</b>	<b>Contribution Dollar Amount (\$ in millions)</b>		
<b>2020</b>	\$144.16	\$144.16	\$144.16
<b>2021</b>	148.62	148.62	148.62
<b>2022</b>	151.54	155.09	150.54
<b>2023</b>	150.33	154.55	148.63
<b>2024</b>	149.92	154.70	147.65
<b>2025</b>	149.65	154.74	146.79
<b>2026</b>	149.77	154.96	146.48
<b>2027</b>	149.92	155.31	146.11
<b>2028</b>	149.70	155.15	145.44
<b>2029</b>	150.18	155.69	145.41
<b>2030</b>	150.33	155.79	145.10
<b>2031</b>	150.76	156.10	145.09
<b>2032</b>	152.18	157.39	146.03
<b>2033</b>	154.12	159.08	147.55
<b>2034</b>	160.04	165.10	153.31
<b>2035</b>	162.29	167.15	155.11
<b>2036</b>	164.78	169.46	157.13
<b>2037</b>	167.43	171.89	159.29
<b>2038</b>	170.20	174.44	161.60
<b>2039</b>	173.24	177.28	164.12
<b>2040</b>	176.48	180.38	166.82
<b>2041</b>	179.80	183.50	169.63
<b>2042</b>	183.38	186.95	172.64
<b>2043</b>	187.04	190.47	175.77
<b>2044</b>	190.89	194.21	179.08
<b>2045</b>	194.87	198.09	182.53
<b>Total Cont. Through 2045</b>	<b>\$4,211.62</b>	<b>\$4,320.25</b>	<b>\$4,050.63</b>
<b>Present Value of Total Cont.</b>	<b>\$1,997.72</b>	<b>\$2,048.80</b>	<b>\$1,939.42</b>



**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Projection of Statutory Contribution as a Percent of Pay**  
**Based on Actuarial Valuation as of June 30, 2019**

<b>Illinois JRS</b>			
<b>Scenario</b>	<b>Baseline</b>	<b>6</b>	<b>7</b>
<b>Investment Return Assumption</b>	6.50% per year	6.50% per year	6.50% per year
<b>Wage Inflation Assumption</b>	2.50%	3.50%	1.50%
<b>Population Growth Assumption</b>	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period
<b>Fiscal Year</b>	<b>Contribution as a Percent of Payroll</b>		
<b>2020</b>	91.85%	91.85%	91.85%
<b>2021</b>	94.25%	93.69%	94.81%
<b>2022</b>	96.15%	97.31%	96.62%
<b>2023</b>	95.36%	96.55%	95.84%
<b>2024</b>	95.11%	96.34%	95.63%
<b>2025</b>	94.81%	95.98%	95.31%
<b>2026</b>	94.68%	95.75%	95.22%
<b>2027</b>	94.46%	95.55%	94.97%
<b>2028</b>	93.98%	95.08%	94.44%
<b>2029</b>	93.59%	94.70%	94.00%
<b>2030</b>	92.96%	94.08%	93.31%
<b>2031</b>	92.42%	93.53%	92.71%
<b>2032</b>	92.27%	93.37%	92.52%
<b>2033</b>	92.45%	93.53%	92.68%
<b>2034</b>	94.81%	96.02%	95.31%
<b>2035</b>	94.81%	96.02%	95.31%
<b>2036</b>	94.81%	96.02%	95.31%
<b>2037</b>	94.81%	96.02%	95.31%
<b>2038</b>	94.81%	96.02%	95.31%
<b>2039</b>	94.81%	96.02%	95.31%
<b>2040</b>	94.81%	96.02%	95.31%
<b>2041</b>	94.81%	96.02%	95.31%
<b>2042</b>	94.81%	96.02%	95.31%
<b>2043</b>	94.81%	96.02%	95.31%
<b>2044</b>	94.81%	96.02%	95.31%
<b>2045</b>	94.81%	96.02%	95.31%





**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Projection of Funded Ratio**  
**Based on Actuarial Valuation as of June 30, 2019**

<b>Illinois JRS</b>			
<b>Scenario</b>	<b>Baseline</b>	<b>6</b>	<b>7</b>
<b>Investment Return Assumption</b>	6.50% per year	6.50% per year	6.50% per year
<b>Wage Inflation Assumption</b>	2.50%	3.50%	1.50%
<b>Population Growth Assumption</b>	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period
<b>Fiscal Year</b>	<b>Funded Ratio</b>		
<b>2020</b>	39.33%	38.84%	39.80%
<b>2021</b>	40.91%	40.34%	41.45%
<b>2022</b>	42.20%	41.68%	42.79%
<b>2023</b>	43.32%	42.85%	43.93%
<b>2024</b>	44.36%	43.97%	45.00%
<b>2025</b>	45.33%	45.02%	45.97%
<b>2026</b>	46.24%	46.02%	46.89%
<b>2027</b>	47.10%	46.97%	47.74%
<b>2028</b>	47.91%	47.86%	48.54%
<b>2029</b>	48.70%	48.74%	49.31%
<b>2030</b>	49.47%	49.60%	50.06%
<b>2031</b>	50.26%	50.46%	50.81%
<b>2032</b>	51.10%	51.38%	51.61%
<b>2033</b>	52.05%	52.39%	52.51%
<b>2034</b>	53.27%	53.66%	53.69%
<b>2035</b>	54.67%	55.11%	55.05%
<b>2036</b>	56.29%	56.76%	56.62%
<b>2037</b>	58.18%	58.67%	58.46%
<b>2038</b>	60.39%	60.88%	60.61%
<b>2039</b>	62.97%	63.45%	63.13%
<b>2040</b>	65.99%	66.44%	66.09%
<b>2041</b>	69.51%	69.90%	69.55%
<b>2042</b>	73.60%	73.92%	73.59%
<b>2043</b>	78.33%	78.56%	78.30%
<b>2044</b>	83.77%	83.90%	83.74%
<b>2045</b>	90.00%	90.00%	90.00%



**Judges' Retirement System of Illinois**  
**Comparison of Actuarial Valuation Results and Stress Testing Scenarios**  
**Unfunded Actuarial Accrued Liability**  
**Based on Actuarial Valuation as of June 30, 2019**

<b>Illinois JRS</b>			
<b>Scenario</b>	<b>Baseline</b>	<b>6</b>	<b>7</b>
<b>Investment Return Assumption</b>	6.50% per year	6.50% per year	6.50% per year
<b>Wage Inflation Assumption</b>	2.50%	3.50%	1.50%
<b>Population Growth Assumption</b>	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period	Active population remains constant at 956 members through the projection period
<b>Fiscal Year</b>	<b>Unfunded Accrued Liability (\$ in millions)</b>		
<b>2020</b>	\$1,728.61	\$1,764.63	\$1,695.38
<b>2021</b>	1,713.43	1,754.21	1,675.73
<b>2022</b>	1,701.53	1,743.74	1,659.96
<b>2023</b>	1,689.60	1,732.62	1,644.58
<b>2024</b>	1,674.86	1,718.12	1,626.70
<b>2025</b>	1,657.72	1,700.82	1,606.78
<b>2026</b>	1,637.77	1,680.48	1,584.31
<b>2027</b>	1,614.85	1,656.84	1,559.23
<b>2028</b>	1,589.95	1,631.01	1,532.47
<b>2029</b>	1,561.96	1,601.86	1,503.02
<b>2030</b>	1,531.01	1,569.56	1,471.01
<b>2031</b>	1,497.15	1,534.29	1,436.42
<b>2032</b>	1,458.70	1,494.28	1,397.74
<b>2033</b>	1,415.03	1,449.06	1,354.27
<b>2034</b>	1,361.86	1,393.97	1,301.46
<b>2035</b>	1,302.52	1,332.67	1,242.96
<b>2036</b>	1,236.46	1,264.60	1,178.29
<b>2037</b>	1,163.13	1,189.21	1,106.89
<b>2038</b>	1,082.06	1,106.09	1,028.34
<b>2039</b>	992.52	1,014.47	941.95
<b>2040</b>	893.82	913.60	847.12
<b>2041</b>	785.42	803.05	743.32
<b>2042</b>	666.44	681.82	629.75
<b>2043</b>	536.12	549.22	505.68
<b>2044</b>	393.58	404.31	370.30
<b>2045</b>	237.90	246.14	222.72

