nyhart

Indiana Public Retirement System

Legislators' Retirement System Defined Benefit Plan

Replication of the Actuarial Valuation
June 30, 2016

March 7, 2017

The Board of Trustees
Indiana Public Retirement System
Indianapolis, IN

Dear Board Members:

An actuarial valuation is prepared annually by PricewaterhouseCoopers LLP (System Actuary) for the Legislators' Retirement System of the Indiana Public Retirement System. Submitted in this report are the results of the replication and review of the June 30, 2016 actuarial valuation. This report has been prepared for use by the Indiana Public Retirement System (INPRS).

Census Data and Asset Information

The member census data and the asset information for this replication were furnished by the System Actuary. The System Actuary received the asset information and member data from INPRS. The System Actuary performed certain checks for reasonableness, but did not audit the data. Nyhart did not audit the information provided, and did not review it thoroughly for reasonableness or compare it with the prior year's submission for consistency. The accuracy of the results presented in this report is dependent on the accuracy and completeness of the information provided.

Benefit Provisions

The benefit provisions reflected in the replication of results are those in effect as of June 30, 2016 and summarized in the System Actuary's valuation report. Nyhart did not audit the benefit provisions compared to Indiana Code, but did review them for reasonableness and consistency with Nyhart's understanding of the System. An audit of the benefit provisions summarized in the valuation report has been performed by INPRS legal staff and they have concluded that all benefit provisions that appear in the report are consistent with Indiana Code.

Assumptions and Methods

The selection of actuarial assumptions and methods are the responsibility of the Board and the System Actuary. The assumptions and methods used in this replication are those described in the Actuarial Assumptions and Methods section of the System Actuary's valuation report. Nyhart relied on the description found in the valuation report and did not review the assumptions for reasonableness. Nyhart performed a cursory review of the actuarial assumptions and methods as they pertained to the relevant replication computations.

The majority of the actuarial assumptions used in the June 30, 2016 valuation were adopted by the Board pursuant to the Experience Study completed in April 2015, which reflects the experience period from July 1, 2010 to June 30, 2014. These assumptions and methods have been used to develop the Actuarially Determined Contribution and are consistent with the accounting requirements detailed in GASB Statements No. 67 and No. 68.

Benefit obligations in the June 30, 2016 valuation are determined using June 30, 2015 census data and rolled-forward to the June 30, 2016 measurement date at the valuation interest rate, using actual distributions, and for any other material events that would require additional adjustments to the benefit obligations.

Certification

To the best of our knowledge, this report is complete and accurate and has been prepared in accordance with generally accepted actuarial principles and the Actuarial Standards of Practice as described by the American Academy of Actuaries. In addition, information has been prepared in accordance with applicable government standards of financial reporting for defined benefit pension funds.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following:

- System 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 System's Funded status); and
- changes in System provisions or applicable law.

We did not perform an analysis of the potential range of future measurements due to the limited scope of our engagement.

In the System Actuary's opinion, the actuarial assumptions and methods are individually reasonable and in combination represent their best estimate of anticipated experience of the System. Nyhart did not review the actuarial assumptions and methods.

Neither Nyhart nor any of its employees have any relationship with the System or its sponsor which could impair or appear to impair the objectivity of this report. While Nyhart has collaborated on INPRS projects with PricewaterhouseCoopers LLP (System Actuary), Nyhart does not have any relationship with the System Actuary that would impair the objectivity of this report.

The undersigned are compliant with the continuing education requirements of the Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States.

Respectfully submitted,

Michael Zurek, EA, MAAA

Danielle Winegardner, ASA, EA, MAAA

Tayt V. Odom, FSA, EA, MAAA

Executive Summary

Purpose and Scope of the Actuarial Peer Review and Replication

INPRS engaged Nyhart to perform an actuarial peer review of the June 30, 2016 actuarial valuation of the Legislators' Retirement System Defined Benefit Plan in order to provide INPRS with an actuarial opinion as to the completeness, accuracy, and compliance with Actuarial Standards of Practice ("ASOPs") of the results and report prepared by PwC, the System Actuary.

We performed our review and replication of the valuation results in a manner consistent with the process we would follow to perform the full actuarial valuation of the system as if we were the newly retained System Actuary. We initially prepared a replication of the June 30, 2016 valuation results based on the underlying census, assumptions, methods, and provisions data provided to us, but independent of any knowledge of specific valuation coding or mathematical techniques applied by the System Actuary. We then conducted a review of selected individual sample life valuations in order to identify any differences in coding or mathematical techniques that resulted in differences between our valuation results and those of the System Actuary.

Our review and replication procedures were not audit procedures performed in accordance with auditing standards prescribed by the American Institute of Certified Public Accountants. Therefore, the results presented in this report should not be construed as an audit opinion, but rather an actuarial statement of opinion.

In particular, the scope of our review and replication procedures included the following steps:

- Request information from the System Actuary, including a copy of the June 30, 2016 actuarial valuation report, a copy of the most recent experience study completed in April 2015, the member census data and assets used in the actuarial valuation, and detailed output for individual "sample life" valuations for selected members.

- Review and validate the member census data and market value of asset data provided by the System Actuary by replicating various statistics shown in the System Actuary's actuarial valuation report.

- Review the assumption recommendations contained in the System Actuary's 2015 experience study report for consistency with the historical experience and future expectations summarized in the report and for consistency with the assumption development guidance in ASOP 27 and ASOP 35. We note that the study was primarily based on member experience during the period from June 30, 2010 to June 30, 2014.

- Confirm that the recommended actuarial assumptions presented in the System Actuary's experience study report and subsequently adopted by the Board were properly reflected in the June 30, 3016 actuarial valuation and disclosed in the actuarial valuation report.

- Independently value the June 30, 2015 benefit liabilities, in particular the actuarial accrued liability and normal cost based on the member census data provided and the actuarial assumptions, methods, and plan provisions summarized in the actuarial valuation report.

- Review and replicate the roll forward of benefit liabilities from June 30, 2015, the date of the underlying member census data, to June 30, 2016, including application of the interest rate to reflect the time value of money, the benefit distributions reflected, and other adjustments for known activity during the roll forward period.

- Review sample life output for certain selected individuals provided by the System's Actuary to identify any differences in programming or mathematical technique in the System Actuary's valuation and our independent valuation of the benefit liabilities.

Executive Summary

- Review the calculation of the actuarial value of assets based on the investment gain/losses for each of the past five years disclosed in the System Actuary's actuarial valuation report and our understanding of the five-year smoothing method selected by the Board as part of its funding policy.

- Review the calculation of the actuarially determined contributions based on outstanding liability gains/losses disclosed in the System Actuary's actuarial valuation report and our understanding of the unfunded actuarial accrued liability amortization method selected by the Board as part of its funding policy.

- Review the June 30, 2016 actuarial valuation report for compliance with ASOP 41, Actuarial Communications, and other applicable ASOPs.

- Confirm the credentials of the actuaries who signed the June 30, 2016 actuarial valuation report and their ability to certify the results and render the opinions contained in their report.

- Identify recommendations and considerations for INPRS and the System Actuary for improving future valuations and reports.

Note that scope of our review and replication did not include the following:

- Audit of the member census and asset data, or otherwise review the data for reasonableness. We relied on the member census and asset data provided by the System Actuary as is. It is our understanding that the member census and asset data utilized by the System Actuary are audited by the independent accounting firm retained by INPRS.

- Independent replication of the experience study analysis supporting the assumptions selected by the Board for the June 30, 2016 valuation. Rather, we relied on the analysis completed by the System Actuary and summarized in their experience study report for validating the assumptions selected by the Board and used in the June 30, 2016 actuarial valuation.

- Verification of the benefit provisions summarized in the actuarial valuation report to the applicable sections of the Indiana Code. A comparison of the benefit provisions summarized in the report to the Indiana Code was performed by INPRS legal staff and they confirmed to us that the significant benefit provisions summarized the report are consistent with Indiana Code. No exceptions were noted.

- Replication of information prepared by the System Actuary in accordance with GASB 67 and GASB 68 for financial reporting. It is our understanding that financial reporting information prepared by the System Actuary is audited by the independent accounting firm retained by INPRS. We replicated the valuation of benefit liabilities and calculation of the actuarial determined contributions on a funding basis only. However, we note that the "total pension liability" valuation for financial reporting purposes is based on the same underlying member census data, actuarial assumptions, actuarial methods, benefit provisions, and valuation date as the valuation performed for funding purposes, resulting in the total pension liability being equal to the "actuarial accrued liability" for funding purposes.

Executive Summary

Conclusions

Our replication of the actuarial valuation results and funding policy calculations matched those of the System Actuary to within a small margin, generally less than 1%. We did not identify any significant errors or omissions on the part of the System Actuary. We also found the actuarial valuation and report prepared by the System Actuary to be generally in compliance with applicable ASOPs.

Specifically:

- We were able to match the summary of member census data without any significant differences.
- The actuarial assumptions selected by the Board pursuant to the results of the 2015 experience study completed by the System Actuary do not appear unreasonable based on the underlying experience and future expectations summarized in the study. The analysis summarized in the experience study report appears consistent with the assumption development guidance in ASOP 27 and ASOP 35.
- The actuarial assumptions used in the June 30, 2016 actuarial valuation and disclosed in the actuarial valuation report match the System Actuary's recommendations contained in the 2015 experience study report.
- We were able to replicate the actuarial accrued liability and normal cost in aggregate, and for the individual sample lives provided, to within a small margin. Generally less than 1%.
- The calculations performed for the liability roll-forward from June 30, 2015 to June 30, 2016, the actuarial value of assets, and the actuarially determined contributions are consistent with customary actuarial practices and appear to be consistent with the Board funding policy.
- The actuarial valuation report prepared by the System Actuary generally complies with ASOP 41.
- The signing actuaries have the actuarial credentials that we generally consider appropriate for purposes of preparing pension actuarial valuations. We have also verified that the signing actuaries, as applicable, have satisfied the continuing education requirements of the Society of Actuaries for the period ended December 31, 2015, based on documentation on the Society of Actuaries website (www.soa.org).

Executive Summary

The remainder of this report is divided into the following sections that align with the steps taken during our review and replication.

- Member Census Data
- Actuarial Assumptions and Methods
- Valuation Replication
- Actuarial Value of Assets
- Actuarially Determined Contributions
- Actuarial Report

Additional detailed conclusions are presented at the end of each section of the report and identify a number of recommendations and considerations for INPRS and the System Actuary for improving future valuations. However, we note that the individual and cumulative impact of the various recommendations and considerations presented in this report would have only a minor impact on the valuation of the benefit liabilities and funding policy calculations.

Member Data

The table below summarizes the member data used in the valuation. The June 30, 2016 valuation is based on June 30, 2015 census data, with liabilities rolled-forward to the June 30, 2016 measurement date. The data summarized in this section is as of the June 30, 2015 census collection date.

	Nyhart June 30, 2015	System Actuary June 30, 2015
Number of Actives	11	11
Average Age	71.8	71.8
Average Service	7.4	7.5
Number of Inactive Vesteds	12	12
Average Age	67.9	67.9
Average Service	7.3	7.3
Number of Retirees and Beneficiaries	74	74
Average Age	76.6	75.9
Annual Benefits Payable	$364,024	$ 364,024
Total Number of Members	97	97

Conclusions:

We note the following conclusions with respect to our review and analysis of the member census data provided to us by the System Actuary:

- Our summary statistics of the member census data provided by the System Actuary are consistent with the same statistics presented in the System Actuary's valuation reports with no significant differences noted. This provided assurance that the data provided to us is the same data used in the June 30, 2016 valuation. There are minor discrepancies between the average age of retirees and beneficiaries. This is due to minor differences in data overrides. The differences are immaterial to the replication results.

As a result of our review and analysis, we offer the following recommended revisions to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- None.

As a result of our review and analysis, we offer the following additional considerations to INPRS and the System Actuary for implementation in future actuarial valuations of the Legislators' Retirement System:

- We understand the System Actuary uses data override assumptions when needed. A review/cleanup of the census data on the front end may be a preferable approach if information is available to review those records.

Actuarial Assumptions and Methods

The selection of actuarial assumptions and methods are the responsibility of the Board and the System Actuary. The assumptions and methods used in this replication are those described in the Actuarial Assumptions and Methods section of the System Actuary's valuation report. Nyhart relied on the description found in the valuation report and did not review the assumptions for reasonableness.

Nyhart reviewed the results of the 2015 experience study performed by the System Actuary for consistency with the assumptions used in the valuation. Nyhart also reviewed the actuarial methods and Funding policies disclosed in the System Actuary's valuation report for consistency with Nyhart's understanding of INPRS policies.

Actuarial Methods used by the System Actuary:

Actuarial Cost Method:	Unit Credit Cost Method
Actuarial Asset Valuation Method:	5-year smoothing of investment gains and losses, with a 20% corridor
Calculated Contribution Rate:	Normal cost plus 5-year (30-year prior to 2016 and 30-year after 2016 if the plan is at least 100% funded) closed level dollar amortization of the unfunded accrued liability

Conclusions:

- Actuarial Standard of Practice (ASOP) No. 27 provides recommendations for economic assumptions and ASOP No. 35 provides guidance for the selection of demographic and other noneconomic assumptions. ASOP 27 and 35 recognize the uncertain nature in which assumptions are selected and that a range of assumptions may be reasonable. Under both standards, a reasonable assumption should have the following characteristics.
    - Appropriate for the purpose of the measurement
    - Reflects the actuary's professional judgement
    - Reflects historical and current (economic or non-economic) data as of the measurement date
    - Reflects estimates of future experience
    - Should be unbiased
- Nyhart did not review the assumptions for reasonableness. Nyhart performed a cursory review of the actuarial assumptions and methods as they pertained to the relevant replication computations.
- The assumptions developed by the System Actuary based on the 2015 experience study for the System are reasonable representations of System experience over the period. This conclusion is based on a review of the assumption study report presented by the System Actuary, and the data and conclusions contained in the report. Replication of the results of the experience study is outside of the scope of this review.
- The assumptions developed in the 2015 experience study were used in the June 30, 2016 valuation by the System Actuary.

Actuarial Assumptions and Methods

Conclusions (cont):

- The actuarial cost method, asset valuation method, and funding policies used in the June 30, 2016 valuation by the System Actuary are consistent with Nyhart's understanding of the actuarial policies established by INPRS.

As a result of our review, we offer the following recommended revisions to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- The only situation where we found the current assumptions were not used in the valuation was the White Collar Mortality Table used by the System Actuary differs slightly from the table published by the Society of Actuaries. The System Actuary is aware of the discrepancy and will update the assumption for next year's valuation. The impact is less than 0.4% decrease in liability.

As a result of our review, we offer the following additional considerations to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- None.

Actuarial Accrued Liability and Normal Cost

The following analysis was performed by Nyhart to review the Actuarial Accrued Liability and Normal Cost of the System as determined by the System Actuary:

- Calculate the Actuarial Accrued Liability and Normal Cost for the System in total based on the census data provided and the assumptions and System provisions described in the System Actuary's Actuarial Valuation Report.
- Confirm that the roll-forward methodology used by the System Actuary to estimate benefit obligations on the June 30, 2016 measurement date from the June 30, 2015 census data and liability valuation date is consistent with standard practices.
- Review the individual liability of sample lives requested by Nyhart and provided by the System Actuary.

To provide some context on the replication results below, we generally expect to be within a smaller range on the calculation of the present value of future benefits (PVFB) (within 1%-2%) and within a wider range on the calculation of the actuarial accrued liability and normal cost (within 5%). The wider range on the latter items is because there tends to be more variability in the methodologies used to allocate the total liability (PVFB) to past and future years of service. However, this wider range would not apply to this Plan since the benefits for all members are fixed and applying the Unit Credit cost method results in the same liability as the PVFB.

Total System Liability Replication:

		Nyhart		System Actuary
		June 30, 2015		**June 30, 2015**
Unit Credit Accrued Liability:				
Pension (Retiree/Beneficiary/Disabled)	$	3,295,818	$	3,299,938
Pension Active and Inactive		810,006		810,107
Total Accrued Liability	$	4,105,824	$	4,110,045
Difference ($)	*$*	*(4,221)*		
Difference (%)		*(0.10)%*		
Unit Credit Normal Cost	$	0	$	0
Difference ($)	*$*	*0*		
Difference (%)		*N/A*		

Actuarial Accrued Liability and Normal Cost

Review of Liability Roll-Forward:

The June 30, 2016 valuation is based on census data as of June 30, 2015 and a valuation of benefit obligations on the census collection date. The resulting obligations are then rolled forward to June 30, 2016 at the valuation interest rate and using actual distributions during the period, and further adjusted for any material events during the period.

The table below shows Nyhart's replication of the liability roll-forward. Results of the review of the liability roll-forward are summarized under conclusions on the following pages.

Liability, Normal Cost and Payroll Roll-Forward

		Nyhart June 30, 2015 to June 30, 2016		System Actuary June 30, 2015 to June 30, 2016
1. Total Accrued Liability, beginning of year	$	4,105,824	$	4,110,045
2. ASA Account balance, beginning of year		N/A		N/A
3. Accrued Liability, Net of ASA Account Balance, Beginning of year [(1) – (2)]		4,105,824		4,110,045
4. Normal Cost		0		0
5. Actual Benefit Payments		359,165		359,165
6. Actual Transfers		0		0
7. Actual ASA Annuitizations		N/A		N/A
8. Expected Interest [0.0675 * ((3) + (4) - 0.5*(5) + 0.5*(6) +0.5*(7))]		265,022		265,306
9. Total Accrued Liability, Net of ASA Account Balance, end of year [(3) + (4) - (5) + (6) + (7) + (8)]		4,011,681		4,016,186
10. ASA Account Balance, end of year		N/A		N/A
11. Total Accrued Liability, end of year		4,011,681		4,016,186
Difference ($)	*$*	*(4,505)*		
Difference (%)		*(0.11%)*		
12. Normal Cost for Fiscal 2017	$	0	$	0
Difference ($)	*$*	*0*		
Difference (%)		*0.00%*		
13. Payroll for Fiscal 2017	$	N/A	$	N/A
Difference ($)	*$*	*N/A*		
Difference (%)		*N/A*		

Actuarial Accrued Liability and Normal Cost

Review of Sample Lives:

Sample lives produced from the System Actuary's valuation system were requested and reviewed.

A successful replication of liabilities for the System in total does not necessarily provide enough information to conclude that the System provisions and assumptions disclosed in the valuation report are accurately used in the valuation of benefit obligations. For example, an error or omission that inflates liabilities by 5% can be offset by a separate error or omission that results in a 5% liability reduction. The net result of the two errors can produce a reasonable match.

Sample lives provide details on the benefits and liabilities calculated at each age for every benefit offered under the System. Review of the sample valuation output and replication of individual results can provide the details that might get missed when only reviewing the System in total. Six samples representing a thorough cross-section of participants of varying age, gender, years of service, and status were reviewed in detail. The following sample lives were chosen for review:

No.	System	PID	Description
1	LEDB	388154	Active participant, age 64 with 29 years of service and pay of $54,510
2	LEDB	575514	Active participant, age 58 with 29 years of service and pay of $56,634
3	LEDB	106236	Deferred vested participant, age 76 with 17 years of service
4	LEDB	639569	Deferred vested participant, age 74 with 1 year of service
5	LEDB	584790	Beneficiary, age 54 with monthly benefit of $105
6	LEDB	546744	Retiree, age 78 with 50% joint and survivor form of payment and monthly benefit of $1,061

We reviewed the valuation output for the sample lives above provided by the System Actuary. We compared the assumptions used and the benefits calculated against those summarized in the valuation report. We also ran the same individuals through our valuation software used to match total System results and compared individual liability results for consistency. Results of the review showed consistency between the System Actuary and our individual liabilities. We achieved a very close match on the computation of the present value of future benefits, and were consistently close on the Unit Credit liabilities and normal cost.

Actuarial Accrued Liability and Normal Cost

Results of our individual member valuations were consistent with System Actuary, as shown in the tables below:

As of June 30, 2015								
	Present Value of Future Benefits				Unit Credit - Actuarial Accrued Liability			
No.	Nyhart	System Actuary	Diff. ($)	Diff. (%)	Nyhart	System Actuary	Diff. ($)	Diff. (%)
1	$17,627	$17,622	$5	0.03%	$17,249	$17,218	$31	0.18%
2	15,685	15,659	26	0.17%	14,088	14,043	45	0.32%
3	80,840	80,840	0	0.00%	80,840	80,840	0	0.00%
4	6,329	6,329	0	0.00%	6,329	6,329	0	0.00%
5	18,248	18,248	0	0.00%	18,248	18,248	0	0.00%
6	117,626	117,626	0	0.00%	117,626	117,626	0	0.00%
Tot.	$256,355	$256,324	$31	0.01%	$254,380	$254,304	$76	0.03%

Conclusions:

- The total System liability replication is well within a reasonable expectation for matching liability results and well within the actuarial standards generally used as a guideline for that purpose. Replication of accrued liability and normal cost within 5% are generally considered to be an acceptable match. Our match produced an accrued liability that is 0.11% lower than the System Actuary. The Plan does not have a Normal Cost.
- The total System replication was performed based on Nyhart's independent coding of the System provisions and assumptions summarized in the System Actuary's valuation report. We used the sample lives provided to by the System Actuary to help interpret how to use the data provided and for general guidance, but we did not attempt to replicate or rely on the coding used to produce the sample lives in our match.
- We have replicated the roll-forward of liabilities from the June 30, 2015 valuation date to June 30, 2016 performed by the System Actuary and confirm that the interest adjustments and other adjustment used are consistent with our methodology and standard actuarial practices.
- Our review of the sample lives confirm that the assumptions and provisions summarized in the System Actuary's report were generally used in the liability calculations. We matched the liabilities of all sample lives within a reasonable percentage.
- The total System replication did not attempt to match the System Actuary's results by status code (e.g. retired, disabled, beneficiary) or by active decrement source (e.g. retirement, death, disability, termination) since liabilities at that level of detail were not contained in the System Actuary's report. We do not believe that disclosure of liabilities at that level of detail are necessary in the valuation report.

Actuarial Accrued Liability and Normal Cost

As a result of our review, we offer the following recommended revisions to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- None.

As a result of our review, we offer the following additional considerations to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- The System Actuary assumes all future retirements elect to receive the System's normal form of payment upon retirement, namely the 50% joint and survivor annuity. The 50% survivor annuity comes at no additional cost to the participant, so is not actuarially equivalent to the life annuity form. While assuming all participants elect the 50% joint and survivor annuity is a conservative assumption, the System could see a reduction in liability if optional forms are valued. The addition of the optional forms may be something to consider adding to the valuation.

Development of the Actuarial Value of Assets

		Nyhart June 30, 2015 thru June 30, 2016	System Actuary June 30, 2015 thru June 30, 2016
1.	Market Value of Assets, beginning of year	$ 3,175,268	$ 3,175,268
2.	Market Value of Assets, end of year	$ 2,919,061	$ 2,919,061
3.	Expected Earnings		
	a. Expected Earnings on Market Value	$ 214,331	$ 214,331
	b. Receipts with Expected Earnings	142,244	142,244
	c. Disbursements with Expected Earnings	(371,287)	(371,287)
	d. Total [(a) + (b) + (c)]	$ (14,712)	$ (14,712)
4.	Expected Market Value of Assets, end of year, [(1) + (3d)]	$ 3,160,556	$ 3,160,556
5.	Current Year Market Value Gain/(Loss) [(2) – (4)]	$ (241,495)	$ (241,495)
6.	Deferred Recognition of Investment Gain/(Loss)		
	a. Current Fiscal Year (80% of (5))	$ (193,196)	$ (193,196)
	b. Current Fiscal Year - 1 (60%)	(181,510)	(181,510)
	c. Current Fiscal Year - 2 (40%)	63,554	63,554
	d. Current Fiscal Year - 3 (20%)	(10,933)	(10,933)
	e. Total [(a) + (b) + (c) + (d)]	$ (322,085)	$ (322,085)
7.	Preliminary Actuarial Value, end of year [(2) – (6e)]	$ 3,241,146	$ 3,241,146
	a. 80% of Market Value, end of year	2,335,249	2,335,249
	b. 120% of Market Value, end of year	3,502,873	3,502,873
8.	Actuarial Value, end of year	$ 3,241,146	$ 3,241,146
9.	Actuarial Value as a % of Market Value	111.0%	111.0%
10.	Actuarial Value Net Rate of Return	3.9%	3.9%

Development of the Actuarial Value of Assets

Conclusions:

- The Actuarial Standard of Practice (ASOP) No. 44 governs the selection and use of asset valuation methods for pension valuations. ASOP 44 recommends the asset smoothing method satisfies each of the following conditions. The asset smoothing methodology utilized by the System meets these recommendations.
    - The actuarial value of assets method should produce smoothed values sometimes greater than and sometimes less than the market value of assets
    - The actuarial value of assets should fall within a reasonable range around market value
    - The differences between actuarial value of assets and market value of assets are recognized within a reasonable period of time

  We believe the 5-year asset smoothing method with 20% corridor adopted by INPRS satisfies the criteria under ASOP 44.
- The actuarial value of assets developed by the System Actuary is consistent with the 5-year smoothing period and 20% corridor method disclosed in the System Actuary's Valuation Report.
- The market value of assets on June 30, 2016, and the contributions, distributions, and expenses during fiscal 2016 used to develop the actuarial value of assets were consistent with the amounts reported in the INPRS financial statements.
- The expected return assumption of 6.75% is disclosed as net of administrative expenses in the assumption section of the report. The System Actuary includes administrative expenses in the disbursements category when calculating the expected return on assets used to develop the actuarial value of assets. This is consistent with the net return as disclosed.

As a result of our review, we offer the following recommended revisions to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- None.

As a result of our review, we offer the following additional considerations to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- Consider separating the disbursements shown in the report into benefit payments and administrative expenses in order to provide more transparency that the return is net of administrative expenses.

Calculated Employer Contribution Rate:

This section of the report replicates the calculation of the employer contribution rate based on the funding policy as disclosed in the System Actuary's report. Please note that the liabilities and normal cost used in the replication are those determined by the System Actuary.

	Nyhart	System Actuary
	June 30, 2016	June 30, 2016
Normal Cost	$ 0	$ 0
Amortization of Unfunded Accrued Liability		
Unfunded Accrued Liability (UAL)	$ 775,040	$ 775,040
Unamortized UAL from Prior Years	0	0
Net Unamortized UAL	$ 775,040	775,040
Amortization Factor (5-years, level dollar)	4.4064	4.4064
Current Year Amortization Payment	$ 175,889	$ 175,889
Payments Established in Prior Years	0	0
Total Amortization Payments	$ 175,889	$ 175,889
Provision for Expenses	$ 60,638	$ 60,638

Amortization Schedule of Unfunded Accrued Liability (System Actuary):

Year	Remaining Amount	Remaining Period	Amortization Amount
6/30/2016	$ 775,040	5	$ 175,889
	$ 775,040		$ 175,889

Calculated Employer Contribution Rate

Conclusions:

- As part of its funding policy, the Board has adopted the methods used for determining the actuarially determined contributions of the System. The methods include the Unit Credit actuarial cost method for computing the actuarial accrued liability, a five-year smoothing method for computing the actuarial value of assets, and level-dollar closed amortization methods for including payment towards the unfunded actuarial accrued liability.

  Actuarial Standards of Practice (ASOP) No. 4 provides guidance on measuring pension obligations. The standard addresses actuarial cost methods and contribution allocation procedures. Under the standard, the actuary should select an actuarial cost method that meets the following criteria:

  · The period over which normal costs are allocated for a participant should begin no earlier than the date of employment and should not extend beyond the last assumed retirement age. The period may be applied to each individual participant or to groups of participants on an aggregate basis.

  · The attribution of normal costs should bear a reasonable relationship to some element of the plan's benefit formula or the participant's compensation or service. The attribution basis may be applied on an individual or group basis.

  · Expenses should be considered when assigning periodic costs or actuarially determined contributions to time periods.

  · The sum of the actuarial accrued liability and the actuarial present value of future normal costs should equal the actuarial present value of projected benefits and expenses, to the extent expenses are included in the actuarial accrued liability and normal cost.

  Additionally, under ASOP 4, when selecting a cost allocation procedure or contribution allocation procedure, the actuary should consider factors such as the timing and duration of expected benefit payments and the nature and frequency of plan amendments. In addition, the actuary should consider relevant input received from the principal, such as a desire for stable or predictable periodic costs or actuarially determined contributions, or a desire to achieve a target funding level within a specified time frame. When selecting a contribution allocation procedure, the actuary should select a contribution allocation procedure that, in the actuary's professional judgment, is consistent with the plan accumulating adequate assets to make benefit payments when due, assuming that all actuarial assumptions will be realized and that the plan sponsor or other contributing entity will make actuarially determined contributions when due.

  The Unit Credit cost method and contribution allocation procedure used by the System are in line with the recommendations of ASOP 4.

- The amortization payments for the individual years included in the amortization schedules are consistent with the disclosed unamortized unfunded liabilities, the remaining amortization periods, a 6.75% interest rate assumption, and the level dollar closed amortization policy adopted by INPRS.
- The remaining amortization years as disclosed in the amortization schedules are consistent with the INPRS policy of a 5-year fresh start at June 30, 2016 to decrease the amortization period for annual gains and losses from 30 years to 5 years.
- The calculated contribution rate developed by the System's Actuary is consistent with the methods described in the assumption section of the report and with Nyhart's understanding of the Funding policies developed by INPRS.

Calculated Employer Contribution Rate

As a result of our review, we offer the following recommended revisions to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- None.

As a result of our review, we offer the following additional considerations to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- None.

Actuarial Valuation Report

The actuarial report of the System Actuary has been reviewed for completeness and adherence to the Actuarial Standards for presenting actuarial results.

Conclusions:

- The report presented by the System Actuary is in compliance with Actuarial Standards. Actuarial Standards of Practice (ASOP) No. 41 provides guidance to actuaries with respect to actuarial communication. The actuarial report should state the actuarial findings and identify the methods, procedures, assumptions and data used with sufficient clarity. The following are additional requirements for actuarial communications as recommended by ASOP 41.
    - Principal and Scope of Engagement – actuary should identify the client or employer and make clear the scope of the assignment and limitations or constraints of results
    - Form and Content – actuary should ensure the communication is appropriate to the particular circumstances
    - Clarity – actuarial communication should be clear and use appropriate language, taking into account the intended users
    - Timing of Communication – results should be presented within a reasonable time period
    - Identification of Responsible Actuary – report should clearly identify the actuary responsible for the results and identify the party responsible for each material assumption and method
    - Additional Disclosures – report should include cautions regarding possible uncertainty or risk, any conflicts of interest, reliance on other sources for data or information, and any relevant subsequent events after findings have been communicated
- The summary of plan provisions and assumptions and methods used in the valuation is concise, yet thorough.
- Cindy Fraterrigo, Brandon Robertson, and Antonio DeSario of PwC signed the actuarial valuation reports. Ms. Cindy Fraterrigo and Mr. Antonio Desario are both a Fellow of the Society of Actuaries, an Enrolled Actuary, and a Member of the American Academy of Actuaries. Mr. Brandon Robertson is an Associate of the Society of Actuaries, an Enrolled Actuary, and a Member of the American Academy of Actuaries. We verified their credentials on the Society of Actuary's website. The actuaries meet the "Qualification Standards of Actuaries Issuing Statements of Actuarial Opinion in the United States" relating to pension plans. As such, the actuaries qualify as specialists upon whose work we would normally rely on.

As a result of our review, we offer the following recommended revisions to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- None.

As a result of our review, we offer the following additional considerations to INPRS and the System Actuary for implementation in the next actuarial valuation of the Legislators' Retirement System:

- None.