Ohio State Highway Patrol Retirement System

Annual Actuarial Valuation Report

December 31, 2016

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August 24, 2017

Retirement Board
Ohio State Highway Patrol Retirement System
Columbus, Ohio

Ladies and Gentlemen:

The results of the regular annual **actuarial valuation as of December 31, 2016** of the Ohio State Highway Patrol Retirement System (HPRS), as established by Chapter 5505 of the Revised Code, are presented in this report.

The purposes of the valuation are as follows:

- Measure the financial position of HPRS;
- Assist the Board in establishing employer and employee contribution rates necessary to fund the benefits provided by HPRS;
- Determine the number of years required to amortize the pension unfunded actuarial accrued liabilities based upon established contribution rates; and
- Provide actuarial reporting and disclosure information for the System's financial report, and analyze the experience of the System over the past year.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as: plan experience differing from that anticipated by the economic and 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 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.

Your Executive Director furnished the member statistical data required for the valuation, together with pertinent data on financial operations. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the data.

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Your attention is directed particularly to the summary of results, comments and recommendations on pages 3 through 5.

The actuarial calculations were performed in accordance with accepted actuarial procedures. The calculations were based upon provisions of the Retirement System described in Section A.

The financial assumptions used in making the valuations are shown in Section F of this report. Assumptions concerning future experience are needed for computing employer contribution rates. As time passes and actual experience develops, assumed and actual experiences are compared. From time to time one or more of the assumptions about the future are changed by the Board after consulting with the actuary. The assumptions used in performing the 2016 valuation were adopted by the Board in conjunction with a five-year experience investigation for the period ending December 31, 2014.

The cooperation of the Executive Director and staff in furnishing materials requested for this valuation, and the complete and excellent condition of the records, is acknowledged with appreciation.

The signing actuaries are independent of the plan sponsor.

Mita D. Drazilov and Brian B. Murphy 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 contained herein.

Respectfully submitted,

Mita Drazilov

Mita D. Drazilov, ASA, FCA, MAAA

Brian B Murphy

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MDD/BBM:dj

December 31, 2016
Summary of Results, Comments and Recommendations

Ohio Revised Code Section 5505.15 provides in part as follows:

> (B) The state shall annually pay into the employer accumulation fund, in monthly or less frequent installments as the state highway patrol retirement board requires, the employer contribution. The employer contribution shall be an amount equal to twenty-six and one-half percent of the total salaries paid to contributing members.

With the enactment of Senate Bill 345, the Board has the discretion to set the member contribution rate and the Cost of Living Allowance (COLA) percentage to comply with the amortization requirement of Section 5505.121 of the Revised Code. Based upon Board action at the August 2017 Board meeting, the results presented in this report are based upon a member contribution rate of 12.5% and a COLA rate of 1.25% for all future calendar years. In addition, at the June 2017 Board meeting, the Board voted to allocate 4.0% of the 26.50% of payroll employer contribution rate to the retiree health program for calendar year 2017, and 0.0% thereafter. The purpose of this report is to provide information on the results of the December 31, 2016 actuarial valuation based upon these decisions.

The **total employer contribution rate** is 26.50% of payroll, as established by Statute. The breakdown between employer, employee, pension and health used for this valuation is shown below:

	Contribution Rates Expressed as a % of Active Payroll (Calendar Year 2017)		
	Retirement, Survivor & Disability Allowances	**Post-Retirement Health Care***	**Totals**
Employer	22.50%	4.00%	26.50%
Employee	12.50%	0.00 %	12.50%
Totals	**35.00%**	**4.00%**	**39.00%**

* *For purposes of this report, based upon Board action at its June 2017 Board meeting, the retiree health rate is presumed to be 4.0% for calendar year 2017 and 0% for calendar year 2018 and beyond.*

December 31, 2016
Summary of Results, Comments and Recommendations (Continued)

Items of significant importance for the December 31, 2016 actuarial valuation include:

1. The rate of investment return on a market value basis for the calendar year was below the actuarial assumed investment return rate of 7.75% that was in effect in calendar year 2016. The market value rate of return for calendar year 2016 was approximately 6.6%. This figure will generally differ from other reported return figures due to restated audited asset figures, approximate formulas and treatment of System expenses. The funding value rate of return for calendar year 2016 was approximately 7.1%. The funding value of assets currently exceeds the market value of assets by approximately $47.9 million.

2. Experience during calendar year 2016 in the retiree health plan was favorable after taking into consideration the Medicare Part D Retiree Drug Subsidy and prescription drug rebates (i.e., actual employer paid claims were less than expected). In addition to the favorable experience, due to changes to member premiums beginning with calendar year 2018 and the Board adoption of a 4.0% retiree health contribution rate for calendar year 2017, the retiree health plan is expected to remain solvent until 2028, compared with 2026 last year.

This valuation indicates that a total employer contribution rate allocation to the pension program of 22.50% in 2017 and 26.50% thereafter produces a 29-year amortization period for the pension program. The calculations reflect a 4.0% employer rate allocation to the retiree health program for calendar year 2017 and 0.0% thereafter, and are based upon the Funding Value of Assets.

December 31, 2016
Summary of Results, Comments and Recommendations
(Concluded)

Comment on Post-Retirement Health Care: If all assumptions are met exactly and contribution rates and benefit provisions continue at their present levels, the retiree health program will run out of money and benefits will cease in about 2028. At that time, the rate of benefit payout is projected to exceed 13.0% of payroll. This situation cannot continue indefinitely. **Further changes to the retiree health plan (i.e., in addition to those made recently) and/or further increases in employer contribution rates and/or member premiums will need to be a part of the future if the program is to continue. These changes/contribution increases are likely to be significant.**

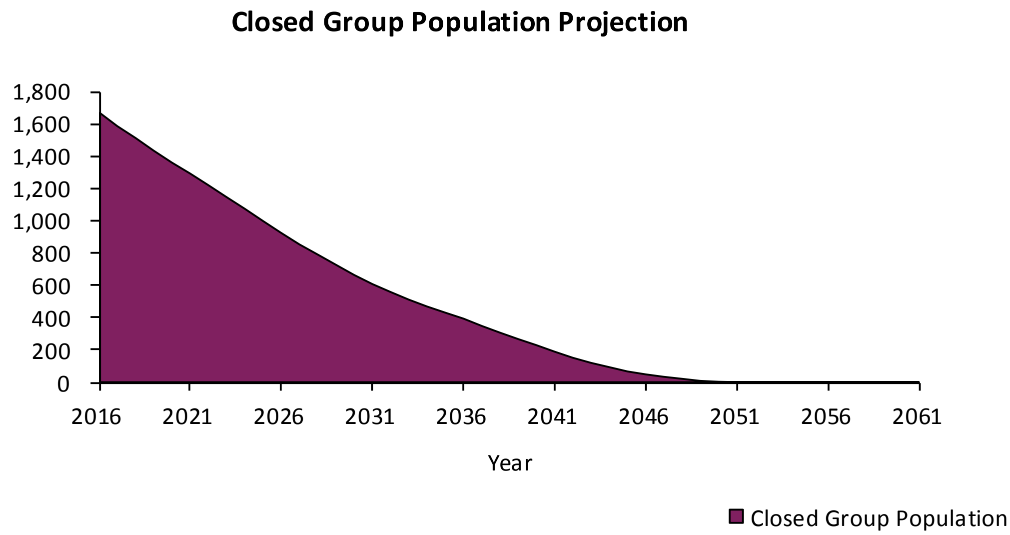
Recommendation: The following reserve transfers are recommended as of December 31, 2016:

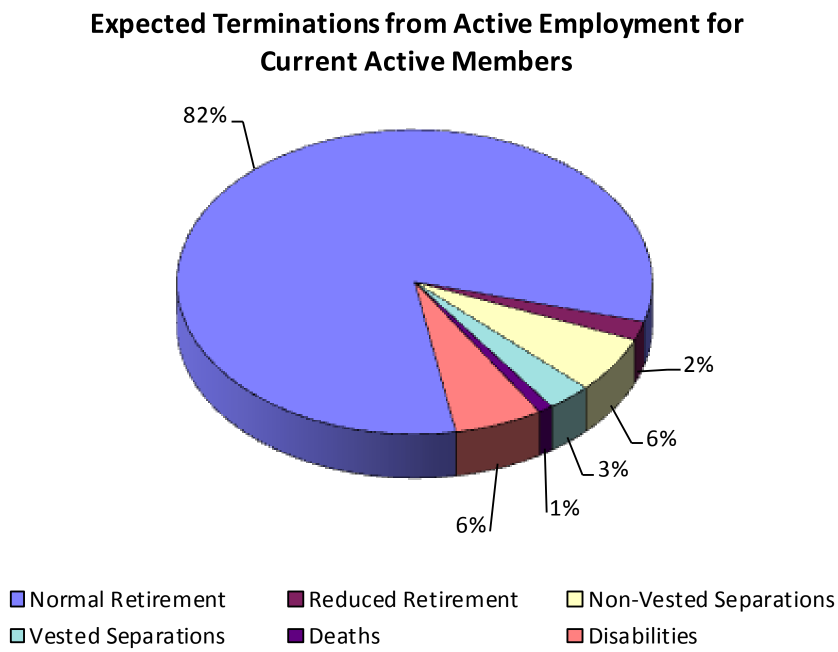
Transfer To (From)	Total Amount
Pension Reserve Fund:	$39,116,665
Survivor Benefit Fund:	39,320,095
Total	**$78,436,760**

The reserve funds from which the transfers are made are determined as follows: First, the accumulated contributions of members who retired or died with survivor benefits payable prior to January 1, 2017 should be transferred from the Employees' Savings Fund if this has not already been done. The remainder of the transfer should then be taken from the Income Fund or the Employer's Accumulation Fund, as the Board deems appropriate. The purpose of these transfers is to ensure that all pension benefits are fully funded by the appropriate reserve funds.

Conclusion: Based upon the results of the December 31, 2016 regular annual actuarial valuation, the unfunded actuarial accrued liabilities of the pension program are expected to be amortized over a 29-year period. With regard to the Retiree Health Plan, solvency to 2028 is an unfavorable result, since most people presently near retirement will live beyond that date. In addition, given the volatility of health care costs, the Plan may become insolvent sooner than 2028. A combination of contribution increases and continued cost containment measures including plan redesign will be important for the Retiree Health Plan. **These changes/contribution increases are likely to be significant.**

Expected Development of Present Population
December 31, 2016





The charts above show the expected future development of the present population in simplified terms. The Retirement System presently covers 1,670 active members. Eventually, 6% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. 87% of the present population is expected to receive monthly retirement benefits either by retiring directly from active service, or by separating from service without withdrawing contributions. 7% of the present population is expected to become eligible for death-in-service or disability benefits. Within 13 years, over half of the covered membership is expected to consist of new hires.

Other Observations

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

Given the pension plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.75% on the actuarial value of assets), it is expected that:

(1) The employer normal cost as a percentage of pay will remain level,
(2) The unfunded actuarial accrued liabilities will be fully amortized after 29 years, and
(3) The funded status of the plan will increase gradually towards a 100% funded ratio.

When selecting a contribution allocation procedure, the following three items should be considered, including the balance amongst the three items:

(1) Benefit security,
(2) Intergenerational equity, and
(3) Contribution stability and predictability

Generally, given the nature of public employee retirement systems (e.g., level contribution financing objective and perceived ongoing nature of the plan or plan sponsor), intergenerational equity and contribution stability and predictability have received more consideration than benefit security when contribution allocation procedures are selected. However, given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

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 obligation to an unrelated third party in a market value type transaction.
(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will 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% is not synonymous with no required future contributions. If the funded status were 100%, 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) and potential future losses could result in future unfunded liability contributions.
(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

SECTION A

RETIREMENT, SURVIVOR AND DISABILITY ALLOWANCES

Retirement, Survivor, and Disability Allowances
Benefits and Conditions Valued
December 31, 2016

Age & Service Pension: A member may retire at age 52 to age 60, provided he has 20 or more years of service, or at age 48 with 25 or more years of contributing service. The member's pension equals the sum of 2-1/2% of final average salary [average of salaries during highest 5 years (3 years prior to January 1, 2015)] times years of service not in excess of 20, 2-1/4% of final average salary times years of service in excess of 20 but not in excess of 25 and 2% of final average salary times years of service in excess of 25. The maximum pension payable is 79.25% of the member's final average salary. A member must retire upon attainment of age 60 or completion of 20 years of service, whichever occurs later.

Reduced Retirement: A member who has acquired at least 20 but less than 25 years of service and is between the ages of 48 and 52 is eligible to receive a Pension computed in the same manner as an Age & Service pension but reduced as follows:

Age	Percent of Age & Service Pension
48	75%
49	80
50	86
51	93
52	100

Deferred Pension: A member who has acquired 20 years of service and retires is eligible to receive a pension computed in the same manner as an Age & Service Pension at the attainment of age 52. A reduced benefit is payable if the retirant elects to receive a benefit after age 48 and prior to age 52. The reduction is waived for members with 25 or more years of service. A member, who has acquired 15 years of service and who voluntarily resigns or is discharged, is eligible to receive a pension equal to 1-1/2% of final average salary multiplied by total service. The pension shall begin the first month after attainment of age 55, provided the member does not withdraw his accumulated contributions from the employees' savings fund.

Disability Pension:

A. **In-the-Line-of-Duty:** A member who is permanently disabled with a duty-related injury is eligible to receive a pension that is the larger of (i) 61.25% of average final salary, or (ii) the Age & Service Pension.

B. **Off-Duty:** A member who is permanently disabled with a non-duty related injury or illness is eligible to receive a pension that is the larger of (i) 50% of average annual salary, or (ii) the Age & Service Pension.

Retirement, Survivor, and Disability Allowances Benefits and Conditions Valued December 31, 2016 (Continued)

Survivor's Benefits: The spouse of a deceased retirant (other than a deferred retirant) is eligible to receive a pension of $900 a month, or 50% of the computed monthly pension the retirant was receiving, whichever is greater. The surviving spouse of an active member or of a deferred retirant who *was not* yet eligible for an immediate pension benefit is eligible to receive a pension of $900 per month. The surviving spouse of an active member or of a deferred retirant who *was* eligible for an immediate pension benefit is eligible to receive $900 per month or 50% of the immediate benefit for which the retiree was eligible, whichever is greater. The benefit terminates upon death. Each surviving child of a deceased member or retirant is eligible for a pension of $150 a month until attainment of age 18, marriage, or death. The benefit may be continued to age 23 if the child is a full-time student. Each surviving child regardless of age, who was totally dependent upon the deceased member or retirant at his death because of physical or mental disability is eligible to receive a pension of $150 per month until his death or recovery from the disability. If there is no spouse or surviving children, each dependent parent is eligible to receive a pension of $150 a month. Additionally, a $5,000 lump sum benefit is payable upon the death of the retirant.

Minimum Benefit: All members who retired with an Age & Service Pension or Disability Benefit are eligible to receive a minimum benefit of $1,050 per month.

Members' Contributions to the Fund: Members contribute a certain percentage of the member's annual salary. The percentage shall not be less than 10.0% of salary but not more than 14.0%. The State Highway Patrol Retirement System shall establish and may adjust the rate as it considers necessary to meet the amortization period requirement. For the December 31, 2016 valuation, the assumed member contribution rate is 12.5%.

State Contributions: The state contributes the remaining amount necessary to finance the Retirement System on an actuarial basis. By statute, the state's contribution rate can be neither less than the member contribution rate, nor more than three times the member rate. The employer contribution shall be an amount equal to 26.50 percent (22.50 percent for calendar year 2017) of the total salaries paid to contributing members.

Post-Retirement Increases: The basic benefit for all retirants is increased by 1.25 percent each year starting at age 60 (age 53 for members retired or entered the DROP prior to 1/7/2013). The retirant must have also been receiving monthly benefits for at least twelve months. Benefit recipients receiving survivor benefits prior to 1/7/2013 are eligible for the increase after receiving benefits for twelve months. Disability members retired prior to 1/7/2013 are eligible for the increase after receiving benefits for sixty months or age 53 whichever occurs first. The Board may adjust the cost of living adjustment annually. The Board's determination shall be based on the annual actuarial valuation. If the Board determines that an increase may be made, the increase shall not exceed 3 percent of the eligible member's basic benefit.

PLUS: A qualified member may elect a partial lump sum benefit of not less than 6 times the monthly amount payable to the member as a single lifetime pension and not more than 60 times that amount.

Retirement, Survivor, and Disability Allowances
Benefits and Conditions Valued
December 31, 2016
(Concluded)

***Deferred Retirement Option Program (DROP)**:* Members are eligible for a one-time election to "DROP in" upon attainment of unreduced retirement eligibility. The primary features of the DROP include:

a) During participation in the DROP, members continue to make contributions based upon the member contribution rate. While participating in the DROP, 100% of members' contributions, up to 10% of payroll, are deposited to their DROP account.

b) 100% of the member's computed benefit (based upon service and salary at time of DROP), including any scheduled post-retirement increases is credited to the member's DROP account.

c) The DROP account is credited with interest annually based upon a rate of return earned on a selected group of fixed income type investments.

d) A member who "DROPs in" must stay in the DROP for a minimum period of time based on age at time of "DROPing in". A minimum participation period of 3 years for members who "DROP in" prior to age 52 and 2 years for members who "DROP in" on or after age 52. After a maximum of 8 years in the DROP program or attaining age 60, the member who entered the DROP program must retire.

e) If the member "DROPs in", the member's annual benefit when the member "DROPs out" (i.e. retires) is based upon the benefit calculations at time of the "DROP in", including any post-retirement increases that may have accrued during the DROP participation period.

f) If, during participation in the DROP, a member becomes disabled due to a duty related injury/illness, the member can choose to 1) have a disability pension benefit calculated based on the assumption that participation in the DROP did not occur, or 2) the member can elect to accept the age/service pension benefit achieved through DROP participation plus the accumulation in the DROP account. Duty disability benefit recipients will not suffer the loss of accumulated interest for early departure from the DROP.

g) Once a member elects to participate in the DROP, their contributions are committed for the minimum period (2 or 3 years). If the member voluntarily discontinues DROP participation prior to the minimum participation period, the member will not receive any interest accumulated in the DROP account but will receive all accumulated pension benefits and pension contributions deposited into the DROP account at the end of the minimum participation period.

Sample Benefit Computation for Members

Assumed data in connection with this sample retirement is shown below:

	Data	Description
A.	$60,000	Final Average Compensation
B.	27	Years of Credited Service
C.	50	Age of Retirant
D.	50%	Percentage to continue to spouse after retirant's death (this is automatic)

Sample Computation Steps

E. Benefit Formula:	0.0250 x 20 x $60,000 =	$30,000
	0.0225 x 5 x $60,000 =	$ 6,750
	0.0200 x 2 x $60,000 =	$ 2,400
		$39,150

Benefit Payable to:

F. Retirant while spouse is alive (E)	$39,150
G. Spouse after retirant's death (D x E)	$19,575
H. Retirant after spouse's death (E)	$39,150

Projected Benefits to Member

Year of Retirement	Amount Payable*	
	COLA Beginning at Age 53	COLA Beginning at Age 60
First	$39,150	$39,150
Second	39,150	39,150
Third	39,150	39,150
Fourth	39,639	39,150
Fifth	40,129	39,150
Sixth	40,618	39,150
Seventh	41,108	39,150
Eighth	41,597	39,150
Ninth	42,086	39,150
Tenth	42,576	39,150
Eleventh	43,065	39,639

* *Cost of Living Adjustment (COLA) is subject to change annually. The basic benefit for all retirants is increased by 1.25% of the original amount each year starting at age 60 (age 53 for members retired or entered the DROP prior to 1/7/2013).*

Retirement Survivor & Disability Allowances
Computed Employer Contributions to Support Benefits

Contributions for	Contributions Expressed as Percents of Payroll	
Valuation Date - December 31	**2016**	**2015**
Normal Cost:		
Age & Service Benefits	14.29%	14.27%
Disability Benefits	2.38%	2.36%
Survivor Benefits	0.10%	0.11%
Separation Benefits	1.01%	1.01%
Administrative Expenses	1.20%	1.20%
Purchase of Military Service	0.75%	0.75%
Total Normal Cost	19.73%	19.70%
Less Member Contributions	12.50%	12.50%
Employer Normal Cost	7.23%	7.20%
Unfunded Actuarial Accrued Liabilities	19.27%	19.30%
Amortization Period	29	30
PENSION EMPLOYER CONTRIBUTION RATE	26.50% *	26.50% **

** 22.50% employer pension contribution rate in 2017 (4.0% to retiree health) and 26.50% thereafter (0.0% to retiree health).*

***22.50% employer pension contribution rate in 2016 (4.0% to retiree health) and 26.50% thereafter (0.0% to retiree health).*

The amortization period is computed and is the period of years over which the Board established pension employer contribution rate and the employee contribution rate will finance the unfunded liabilities. With the amortization periods shown above, the unfunded liability is expected to rise in dollar amount for several years before beginning to decline, although it is expected to decline steadily as a percentage of payroll (see page A-7).

Retirement, Survivor, & Disability Allowances
Method of Financing Future Benefits for Present Active Members
December 31, 2016

Normal cost and the allocation of present values between service rendered before and after the valuation date were determined using an individual entry-age actuarial cost method having the following characteristics:

(i) The annual normal costs for each individual active member, payable from the date of employment to the date of retirement, are sufficient to accumulate the value of the member's benefit at the time of retirement; and

(ii) each annual normal cost is a constant percentage of the member's year-by-year projected covered pay.

Actuarial Accrued Liabilities, $1,127,927,927, less pension assets of $763,667,712 resulted in unfunded actuarial accrued liabilities of $364,260,215, which were amortized as a level percent of payroll over 29 years. The characteristics of this method are illustrated on the following page. Actuarial accrued liabilities represent the portion of present values not covered by future normal cost contributions.

Retirement, Survivor, and Disability Allowances Financing Unfunded Actuarial Accrued Liabilities Which Were Calculated Using a Payroll Growth Assumption of 3.50% and an Investment Return Assumption of 7.75% Compounded Annually

Level % of Payroll Amortization:
Closed Amortization
($ Thousands)

Year	Active Employee Payroll	Unfunded Actuarial Accrued Liability	Annual UAL Contributions Dollars	Annual UAL Contributions % of Payroll	UAAL as % of Payroll
1	$ 112,596	$ 364,260	$ 21,697	19.27%	323.5%
2	116,537	369,968	22,457	19.27%	317.5%
3	120,616	375,330	23,243	19.27%	311.2%
4	124,838	380,292	24,056	19.27%	304.6%
5	129,207	384,794	24,898	19.27%	297.8%
6	133,729	388,771	25,770	19.27%	290.7%
7	138,410	392,151	26,672	19.27%	283.3%
8	143,254	394,857	27,605	19.27%	275.6%
9	148,268	396,804	28,571	19.27%	267.6%
10	153,457	397,899	29,571	19.27%	259.3%
11	158,828	398,041	30,606	19.27%	250.6%
12	164,387	397,119	31,677	19.27%	241.6%
13	170,141	395,014	32,786	19.27%	232.2%
14	176,096	391,595	33,934	19.27%	222.4%
15	182,259	386,720	35,121	19.27%	212.2%
16	188,638	380,234	36,351	19.27%	201.6%
17	195,240	371,969	37,623	19.27%	190.5%
18	202,073	361,743	38,939	19.27%	179.0%
19	209,146	349,358	40,302	19.27%	167.0%
20	216,466	334,598	41,713	19.27%	154.6%
21	224,042	317,230	43,173	19.27%	141.6%
22	231,883	297,001	44,684	19.27%	128.1%
23	239,999	273,636	46,248	19.27%	114.0%
24	248,399	246,836	47,866	19.27%	99.4%
25	257,093	216,279	49,542	19.27%	84.1%
26	266,091	181,615	51,276	19.27%	68.3%
27	275,404	142,465	53,070	19.27%	51.7%
28	285,043	98,418	54,928	19.27%	34.5%
29	295,020	49,029	50,893	17.25%	16.6%
30	305,346	0	0	0.00%	0.0%

An increasing "UAAL as a % of Payroll" indicates that the amortization payment is insufficient to amortize the Unfunded Actuarial Accrued Liability (UAAL) and the fund is expected to run out of money at some point. A decreasing "UAAL as a % of Payroll" indicates that the amortization payment is sufficient to amortize the UAAL. A level "UAAL as a % of Payroll" indicates that the amortization payment is sufficient only to pay the "real" interest on the UAAL.

A load of $4,504,000 was included in the pension actuarial accrued liability to reflect the fact that the retiree health contribution rate for calendar year 2017 is 4.0% of payroll.

Retirement, Survivor, and Disability Allowances
Actuarial Present Value of Future Benefits
Present Retired Lives and Vested Deferred Cases
December 31, 2016

Benefits Payable	Number	Monthly Amount	Actuarial Value
From Pension Reserve Fund:			
Regular Retirements	1,173	$4,435,109	$592,890,277
Disability Retirements	130	383,663	52,642,651
Total Benefits Payable from Pension Reserve Fund	1,303	4,818,772	645,532,928
From Survivor Benefit Fund:			
Surviving Spouses, Dependent Children & Dependent Parents	277	386,101	39,320,095
Total Benefits Payable from Survivor Benefit Fund	277	386,101	39,320,095
Total Retirement Benefits Payable	1,580	5,204,873	684,853,023
Total Vested Deferred Benefits Payable	10	31,655	4,083,772
Grand Total	**1,590**	**$5,236,528**	**$688,936,795**

Retirement, Survivor, and Disability Allowances
Development of Actuarial Accrued Liabilities
December 31, 2016

Actuarial Present Value, December 31, of	(1) Total Actuarial Present Value	(2) Portion Covered By Future Normal Cost Contributions	(3) Actuarial Accrued Liabilities (1) - (2)
Age & service allowances based on service rendered before and likely to be rendered after valuation date	$ 587,143,911	$ 151,417,206	$ 435,726,705
Disability allowances likely to be paid to present active members who become totally and permanently disabled	27,835,239	23,906,886	3,928,353
Survivor benefits likely to be paid to spouses and children of present active members who die before retiring	1,357,551	887,849	469,702
Separation benefits (refunds of contributions and deferred allowances likely to be paid on behalf of present active members)	8,980,256	10,113,884	(1,133,628)
Retirement benefits likely to be paid to current retirants and beneficiaries and to present inactive members	688,936,795	0	688,936,795
Total	$ 1,314,253,752	$ 186,325,825	$ 1,127,927,927
Member portion	240,713,318	125,443,925	115,269,393
Employer portion	$ 1,073,540,434	$ 60,881,900	$ 1,012,658,534

Retirement, Survivor, and Disability Allowances
Summary Statement of System Resources and Obligations
December 31, 2016

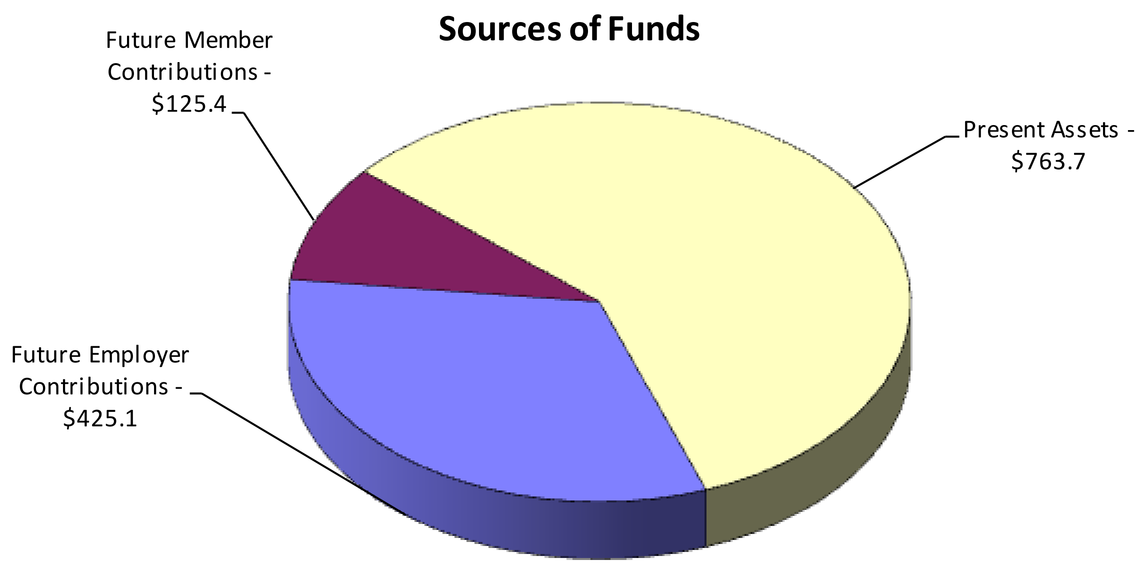
Present Resources and Expected Future Resources

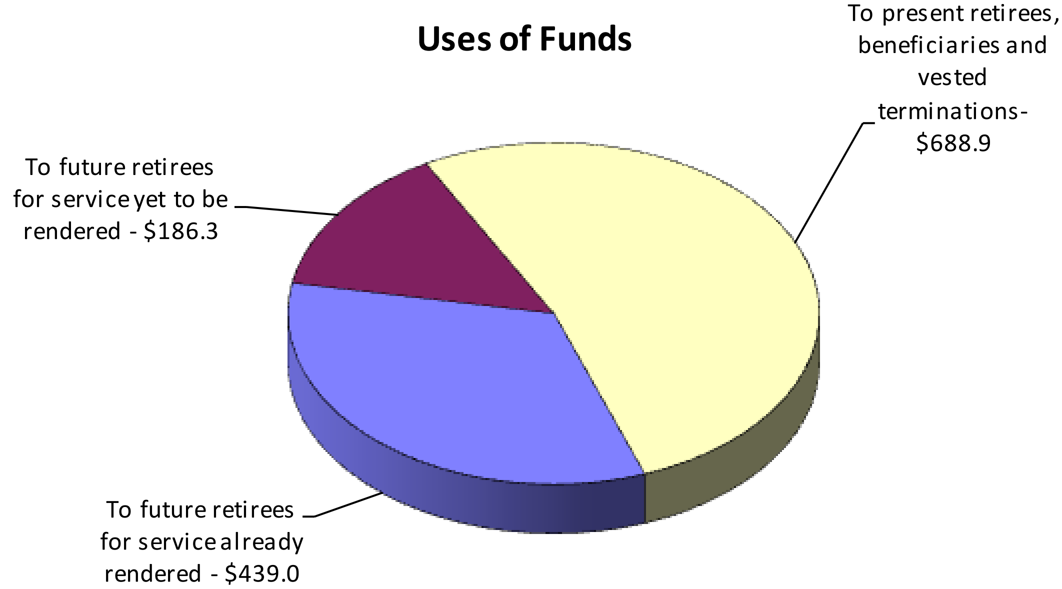
A. Present valuation assets		
1. Net assets from system financial statements	$ 824,015,063	
2. Market value adjustment	47,934,785	
3. Health assets	108,282,136	
4. Valuation assets: 1 + 2 - 3		$ 763,667,712
B. Actuarial present value of expected future employer contributions		
1. For normal costs	60,881,900	
2. For unfunded actuarial accrued liability	364,260,215	
3. Total		425,142,115
C. Actuarial present value of expected future member contributions		125,443,925
D. Total Present and Expected Future Resources		$ 1,314,253,752

Actuarial Present Value of Expected Future Benefit Payments

A. To retirants and beneficiaries	$ 684,853,023
B. To terminated members	4,083,772
C. To present active members	
1. Allocated to service rendered prior to valuation date (actuarial accrued liability)	438,991,132
2. Allocated to service likely to be rendered after valuation date	186,325,825
3. Total	625,316,957
D. Total Actuarial Present Value of Expected Future Benefit Payments	$ 1,314,253,752

Retirement, Survivor, and Disability Allowances
Financing $1,314.2 Million of Benefit Promises
December 31, 2016





Retirement, Survivor, and Disability Allowances
Comparative Statement

Valuation Date December 31	No.	Annual Payroll	Actuarial Accrued Liabilities			Unfunded/ Payroll	% Funded	Funding Years
			Total	Funded	Unfunded			
1997 *	1,445	$ 62,233,299	$ 496,917,335	$ 460,667,112	$ 36,250,223	0.6	92.7%	17
1998	1,446	65,153,864	532,956,745	509,859,924	23,096,821	0.4	95.7%	10
1999 *	1,445	66,017,381	577,010,085	546,510,779	30,499,306	0.5	94.7%	20
2000 #	1,489	69,028,285	594,222,603	570,039,631	24,182,972	0.4	95.9%	8
2001	1,520	76,344,002	636,715,458	551,279,438	85,436,020	1.1	86.6%	31
2002 #	1,548	78,997,065	663,069,805	527,604,456	135,465,349	1.7	79.6%	32
2003	1,542	81,737,962	702,799,017	545,981,513	156,817,504	1.9	77.7%	32
2004 *	1,562	81,757,707	734,464,371	569,858,387	164,605,984	2.0	77.6%	34
2005 #	1,573	83,408,155	773,856,164	591,922,200	181,933,964	2.2	76.5%	35
2006 *	1,592	85,878,329	807,760,712	653,493,046	154,267,666	1.8	80.9%	28
2007	1,597	93,752,908	866,255,394	700,860,707	165,394,687	1.8	80.9%	27
2008	1,544	94,301,538	904,522,377	603,265,803	301,256,574	3.2	66.7%	N/A
2009	1,547	94,824,789	940,084,346	620,356,505	319,727,841	3.4	66.0%	N/A
2010 #	1,537	94,767,852	1,017,770,449	630,971,500	386,798,949	4.1	62.0%	N/A
2011	1,520	93,126,449	1,047,699,686	623,360,121	424,339,565	4.6	59.5%	N/A
2012 *	1,645	98,117,403	966,310,485	658,428,914	307,881,571	3.1	68.1%	30
2013 #	1,613	98,519,844	989,101,470	690,605,582	298,495,888	3.0	69.8%	30
2014	1,622	99,211,756	1,012,752,337	712,285,604	300,466,733	3.0	70.3%	29
2015 #	1,621	99,983,224	1,078,984,597	739,848,920	339,135,677	3.4	68.6%	30
2016	**1,670**	**108,788,871**	**1,127,927,927**	**763,667,712**	**364,260,215**	**3.3**	**67.7%**	**29**

* *Plan amended.*

\# *Revised actuarial assumptions or methods.*

While no one or two numeric indices can fully describe the financial condition of a retirement plan, ***the ratio of unfunded actuarial accrued liabilities to active member payroll ("Unfunded/Payroll" above) is significant***. Unfunded actuarial accrued liabilities represent a kind of debt, while active member payroll represents the Plan's capacity to collect contributions to pay toward debt --- thus ***the ratio is a relative index of condition***. ***The lower the ratio, the greater the financial strength, and vice-versa***.

Changes in Average Pay

Year	Number of Members	Total Payroll	Average Pay	% Change from Prior Year in Average Pay	N.A.E.+	CPI
2002	1,548	$78,997,065	$51,032	1.6%	1.0%	2.4%
2003	1,542	81,737,962	53,008	3.9%	2.4%	1.9%
2004	1,562	81,757,707	52,342	(1.3)%	4.6%	3.3%
2005	1,573	83,408,155	53,025	1.3%	3.7%	3.4%
2006	1,592	85,878,329	53,944	1.7%	4.6%	2.6%
2007	1,597	93,752,908	58,706	8.8%	4.5%	4.1%
2008	1,544	94,301,538	61,076	4.0%	2.3%	0.1%
2009	1,547	94,824,789	61,296	0.4%	(1.5)%	2.7%
2010	1,537	94,767,852	61,658	0.6%	2.4%	1.5%
2011	1,520	93,126,449	61,267	(0.6)%	3.1%	3.0%
2012	1,645	98,117,403	59,646	(2.6)%	3.1%	1.7%
2013	1,613	98,519,844	61,079	2.4%	1.3%	1.5%
2014	1,622	99,211,756	61,166	0.1%	3.5%	0.8%
2015	1,621	99,983,224	61,680	0.8%	3.5%	0.7%
2016	1,670	108,788,871	65,143	5.6%	N/A	2.1%
			10-Year Average	1.9%	2.5% *	1.8%

+ National Average Earnings published by the Social Security Administration.
** 9-year average.*

Over long periods of time, the change in average pay is an approximate measure of the impact of inflation and "Across the Board" pay increases on member pays. In years when the number of members decreases, the change in average pay may tend to be greater than actual pay increases experienced by members. In years when the number of members increases the change in average pay may tend to be less than actual pay increases experienced by members.

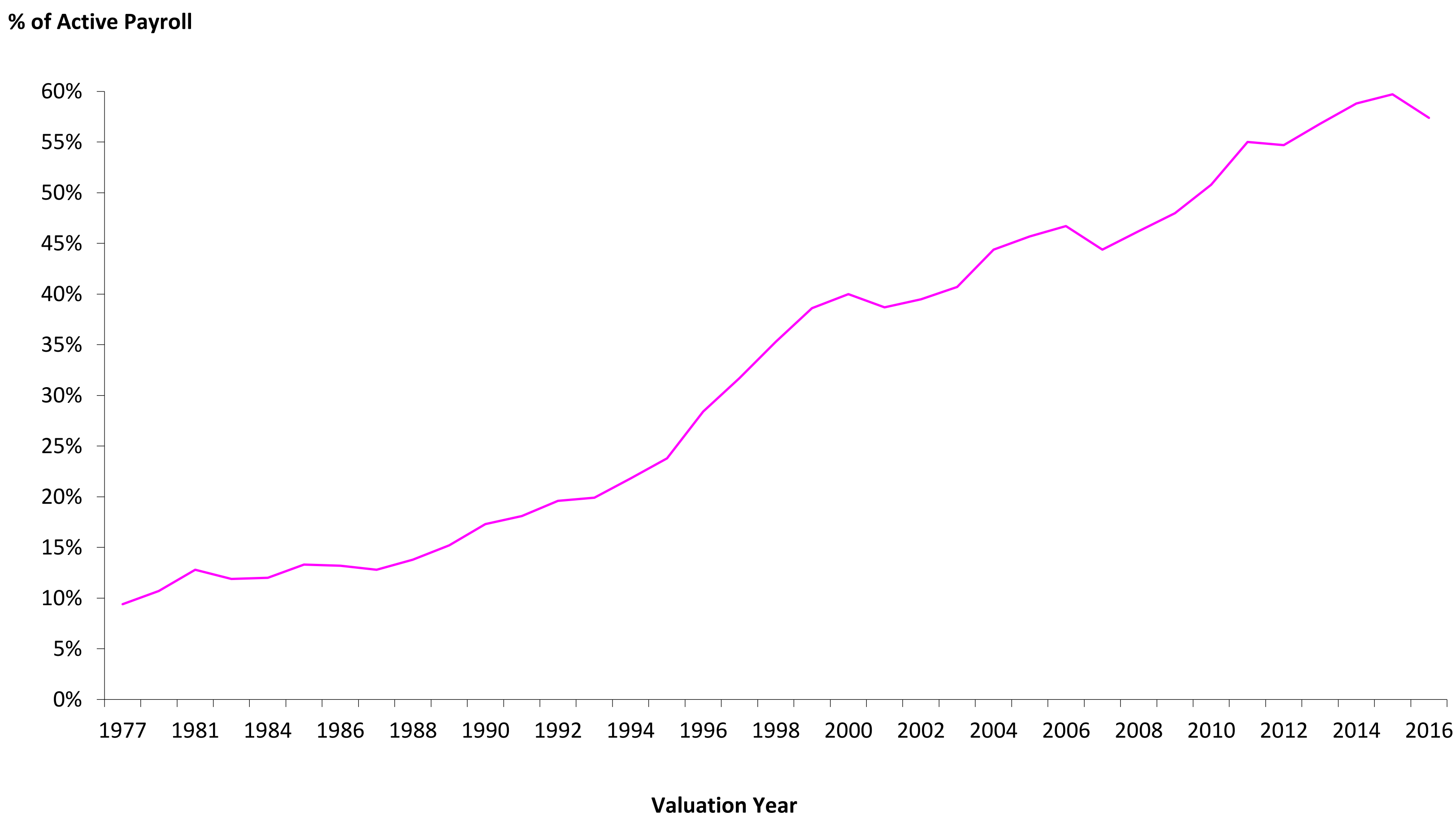
Retirement, Survivor, and Disability Benefits in Pay Status
Comparative Statement

Valuation Date December 31	Number of People	Monthly Pensions	Active Payroll	Average Amount	% of Active Member Pays
1997 *	984	$ 1,645,613	$ 62,233,299	$ 1,672	31.7%
1998	1,060	1,914,091	65,153,864	1,806	35.3%
1999 *	1,123	2,123,471	66,017,381	1,891	38.6%
2000 #	1,174	2,300,464	69,028,285	1,960	40.0%
2001	1,207	2,460,308	76,344,002	2,038	38.7%
2002	1,231	2,603,108	78,997,065	2,115	39.5%
2003	1,253	2,770,149	81,737,962	2,211	40.7%
2004	1,282	3,023,341	81,757,707	2,358	44.4%
2005 #	1,301	3,177,731	83,408,155	2,443	45.7%
2006 *	1,337	3,341,805	85,878,329	2,499	46.7%
2007	1,359	3,470,329	93,752,908	2,554	44.4%
2008	1,371	3,628,092	94,301,538	2,646	46.2%
2009	1,385	3,793,054	94,824,789	2,739	48.0%
2010 #	1,424	4,011,554	94,767,852	2,817	50.8%
2011	1,465	4,270,807	93,126,449	2,915	55.0%
2012 *	1,497	4,470,542	98,117,403	2,986	54.7%
2013 #	1,523	4,667,280	98,519,844	3,065	56.8%
2014	1,558	4,857,703	99,211,756	3,118	58.8%
2015 #	1,548	4,976,942	99,983,224	3,215	59.7%
2016	**1,580**	**5,204,873**	**108,788,871**	**3,294**	**57.4%**

* *Plan amended.*
\# *Revised actuarial assumptions or methods.*

Pensions expressed as a % of payroll exceed contribution income by a considerable margin. This is a normal and expected condition in a funded plan such as HPRS, but it does have implications for cash flow and investment planning.

Retirement, Survivor, and Disability Allowances Being Paid
Expressed as a % of Active Member Payroll
December 31, 2016



Short-Term Solvency Test

The HPRS financing objective is to pay for the benefits through contributions that remain approximately level from year-to-year as a percent of member payroll. If the contributions to the System are level in concept and soundly executed, the System will *pay all promised benefits when due – the ultimate test of financial soundness.*

Short-term solvency test is one means of checking a system's progress under its funding program. In a short-term solvency test, the plan's present assets (cash and investments) are compared with: 1) Active member contributions on deposit; 2) The liabilities for future benefits to present retired lives; 3) The liabilities for service already rendered by active members. In a system that has been following the discipline of level percent financing, the liabilities for active member contributions on deposit (1) and the liabilities for future benefits to present retired lives (2) will be fully covered by present assets (except in rare circumstances). In addition, the liabilities for service already rendered by active members (3) will be partially covered by the remainder of the present assets. Generally, if the system has been using level cost financing, the funded portion of Column 3 will increase over time.

Accrued Liabilities and Assets Allocated to Retirement, Survivor and Disability Allowances

Valuation Year	(1) Active Member Contributions	(2) Retirants, Beneficiaries & Vested Deferreds	(3) Active Members (Employer Financed Portion)	Valuation Assets	Portion of Accrued Liabilities Covered by Reported Assets		
					(1)	(2)	(3)
1996	$ 52,297,873	$ 218,164,080	$ 184,052,234	$ 411,316,254	100%	100%	77%
1997 *	53,264,614	260,095,357	183,557,364	460,667,112	100%	100%	80%
1998	53,797,385	291,066,407	188,092,953	509,859,924	100%	100%	88%
1999 *	55,558,145	333,340,728	188,111,212	546,510,779	100%	100%	84%
2000 #	59,455,707	358,422,165	176,344,731	570,039,631	100%	100%	86%
2001	63,969,216	374,228,361	198,517,881	551,279,438	100%	100%	57%
2002 #	68,794,904	391,098,788	203,176,113	527,604,456	100%	100%	33%
2003	73,358,075	412,818,959	216,621,983	545,981,513	100%	100%	28%
2004 *	77,100,466	445,084,791	212,279,114	569,858,387	100%	100%	22%
2005 #	77,779,569	463,476,318	232,600,277	591,922,200	100%	100%	22%
2006 *	82,720,940	482,998,754	242,041,018	653,493,046	100%	100%	36%
2007	89,279,853	509,179,659	267,795,882	700,860,707	100%	100%	38%
2008	94,749,356	511,626,943	298,146,078	603,265,803	100%	99%	0%
2009	101,131,517	528,087,050	310,865,779	620,356,505	100%	98%	0%
2010 #	104,503,065	583,714,389	329,552,995	630,971,500	100%	90%	0%
2011	104,701,161	618,984,073	324,014,452	623,360,121	100%	84%	0%
2012 *	108,311,937	586,311,106	271,687,442	658,428,914	100%	94%	0%
2013 #	113,334,067	601,342,081	274,425,322	690,605,582	100%	96%	0%
2014	117,441,639	622,719,141	272,591,557	712,285,604	100%	96%	0%
2015 #	122,286,821	662,562,480	294,135,296	739,848,920	100%	93%	0%
2016	**127,311,764**	**688,936,795**	**311,679,368**	**763,667,712**	**100%**	**92%**	**0%**

** Plan amendment.*
 # Assumption or method change.

Summary of Unfunded Actuarial Accrued Liabilities

Each time a new benefit is added which applies to service already rendered, an "unfunded actuarial accrued liability" is created. In addition, if actual financial experiences are less favorable than assumed financial experiences, the difference is added to unfunded actuarial accrued liabilities.

In an inflationary economy, the value of the dollar is decreasing. This environment results in employee pays increasing in dollar amounts resulting in unfunded actuarial accrued liabilities increasing in dollar amounts, all at a time when the actual substance of these items may be decreasing. Looking at just dollar amounts of unfunded actuarial accrued liabilities can be misleading. Unfunded actuarial accrued liabilities divided by active employee payroll provides an index, which aids understanding. The smaller ratio of unfunded liabilities to active member payroll, the stronger the system. Observation of this relative index over a period of years will give an indication of whether the system is becoming financially stronger or weaker.

Summary of Assets and Actuarial Accrued Liabilities for Retirement, Survivor, and Disability Allowances

Valuation Year	Actuarial Accrued Liability (AAL)	Valuation Assets	Unfunded Actuarial Accrued Liability (UAAL)	Ratio of Assets to AAL	Active Member Payroll	UAAL as a % of Active Member Payroll
1996	$ 454,514,187	$411,316,254	$ 43,197,933	90.5%	$59,239,349	72.9%
1997 *	496,917,335	460,667,112	36,250,223	92.7%	62,233,299	58.2%
1998	532,956,745	509,859,924	23,096,821	95.7%	65,153,864	35.4%
1999 *	577,010,085	546,510,779	30,499,306	94.7%	66,017,381	46.2%
2000 #	594,222,603	570,039,631	24,182,972	95.9%	69,028,285	35.0%
2001	636,715,458	551,279,438	85,436,020	86.6%	76,344,002	111.9%
2002 #	663,069,805	527,604,456	135,465,349	79.6%	78,997,065	171.5%
2003	702,799,017	545,981,513	156,817,504	77.7%	81,737,962	191.9%
2004 *	734,464,371	569,858,387	164,605,984	77.6%	81,757,707	201.3%
2005 #	773,856,164	591,922,200	181,933,964	76.5%	83,408,155	218.1%
2006 *	807,760,712	653,493,046	154,267,666	80.9%	85,878,329	179.6%
2007	866,255,394	700,860,707	165,394,687	80.9%	93,752,908	176.4%
2008	904,522,377	603,265,803	301,256,574	66.7%	94,301,538	319.5%
2009	940,084,346	620,356,505	319,727,841	66.0%	94,824,789	337.2%
2010 #	1,017,770,449	630,971,500	386,798,949	62.0%	94,767,852	408.2%
2011	1,047,699,686	623,360,121	424,339,565	59.5%	93,126,449	455.7%
2012 *	966,310,485	658,428,914	307,881,571	68.1%	98,117,403	313.8%
2013 #	989,101,470	690,605,582	298,495,888	69.8%	98,519,844	303.0%
2014	1,012,752,337	712,285,604	300,466,733	70.3%	99,211,756	302.9%
2015 #	1,078,984,597	739,848,920	339,135,677	68.6%	99,983,224	339.2%
2016	**1,127,927,927**	**763,667,712**	**364,260,215**	**67.7%**	**108,788,871**	**334.8%**

* *Plan amendment.*
# *Assumption or method change.*

The figures on this page do not include liabilities and assets related to post-retirement Health Care and Medicare reimbursement.

Schedule of Employer Contributions
for Compliance with Applicable GASB Statements

Year Ended December 31	Actual Contributions	Percent of Required Contributed
2000	$13,210,189	100%
2001	13,901,313	100%
2002	14,923,893	100%
2003	16,361,339	100%
2004	17,205,610	100%
2005	18,467,789	100%
2006	19,263,941	98%
2007	19,956,700	92%
2008	20,302,216	96%
2009	20,453,914	102%
2010	21,211,944	93%
2011	22,966,338	85%
2012	23,766,361	78%
2013	22,908,182	65%
2014	22,325,421	75%
2015	22,895,242	100%
2016	**25,383,684**	**100%**

This information is presented in draft form for review by the System's auditor. Please let us know if there are any changes so that we may maintain consistency with the System's financial statements.

The amounts reported in this schedule do not include contributions for post-employment Health Care benefits.

Notes to Trend Data
for Compliance with Applicable GASB Statements

The information presented in the required supplementary schedules was determined as part of the actuarial valuation at the dates indicated. Additional information as of the latest actuarial valuation follows:

Valuation Date	December 31, 2016
Actuarial Cost Method	Entry Age
Amortization Method	Level Percent Closed
Remaining Amortization Period	29 years for retirement allowances in determining the Annual Required Contribution
Asset Valuation Method	4-year smoothed market 20 % Corridor
Actuarial Assumptions:	
Investment Rate of Return	7.75%
Projected Salary Increases	3.8% - 13.5%
Includes Wage Inflation at	3.5%

Other Requested CAFR Information

As of December 31, 2016, the actuarial present value of credited projected benefits for current employees is shown below:

	Actuarial Present Value of Credited Projected Benefits
Current Employees	
Accumulated employee contributions including allocated investment income	$ 127,311,764
Employer - financed vested	218,552,490
Employer - financed non-vested	28,587,313

As of December 31, 2016, there were 788 vested active members and 882 non-vested active members.

Summary of Risk Measures

Valuation Date December 31,	Funded Ratio Based on AVA	Funded Ratio Based on MVA	UAAL Amortization Period	Total UAAL / Total Payroll	Total Actuarial Value of Assets / Total Payroll	Total AAL / Total Payroll	Standard Deviation of Investment Return / Total Payroll
2006 *	81 %	85 %	28	1.8	7.6	9.4	**
2007	81	83	27	1.8	7.5	9.2	**
2008	67	56	N/A	3.2	6.4	9.6	**
2009	66	63	N/A	3.4	6.5	9.9	**
2010 #	62	64	N/A	4.1	6.7	10.7	**
2011	60	58	N/A	4.6	6.7	11.3	**
2012 *	68	67	30	3.1	6.7	9.8	**
2013 #	70	74	30	3.0	7.0	10.0	**
2014	70	73	29	3.0	7.2	10.2	98 %
2015 #	69	65	30	3.4	7.4	10.8	92
2016	68	64	29	3.3	7.0	10.4	87

* *Plan amendment.*

\# *Assumption or method change.*

** *Unavailable*

Funded ratio: The funded ratio is expected to trend toward 100% by December 31, 2046 based upon the current amortization period.

UAAL Amortization Period: The statutory amortization period is expected to decrease by one year each year.

UAAL / Total Payroll: The ratio of the unfunded actuarial accrued liability to payroll is expected to trend toward to 0% by December 31, 2046.

Funding Value of Assets / Total Payroll: As the funded ratio increases, this ratio is expected to converge to the ratio of Total AAL / Payroll.

Total AAL / Total Payroll: Total AAL / Total Payroll is expected to grow as the system matures.

Standard Deviation of Investment Return / Total Payroll: This measure illustrates the impact of a one standard deviation change in investment return as a percent of payroll. Investment return experience other than expected ultimately affects the employer contribution rates. The higher the ratio of this risk metric, the greater the expected volatility in employer contribution rates. Absent changes in investment policy, this metric is expected to increase as the assets grow to 100% of the AAL.

SECTION B

POST-RETIREMENT HEALTH CARE AND MEDICARE REIMBURSEMENT

Post-Retirement Health Care and Medicare Reimbursement Provisions Evaluated and/or Considered

Benefits Provided

Since July 1, 1974, the Retirement System has made Health Care available for every benefit recipient and eligible dependent under a hospitalization and health care policy administered by Aetna and Medical Mutual of Ohio. This Plan is secondary to Medicare or any other Health Care coverage. Depending on Medicare coverage, members are enrolled in either the fully-insured Medicare Advantage plan or the self-insured plan. Each year the Board establishes participant premium rates, any necessary co-payments for the retirant, spouse, or dependent children, and any other changes in plan design for the following calendar year. The member premiums for calendar years 2017 and 2018 used for valuation purposes are as follows (please note that 2018 premiums were based upon estimates provided by Staff on May 31, 2017):

Premium Scale for Members or Spouses Ineligible for Medicare

2017

	Monthly Premium		
Age	**Retiree**	**Spouse**	**Retiree/Spouse**
65+	$ 99	$165	$264
60-64	$132	$165	$297
56-59	$182	$215	$397
52-55	$248	$297	$545
Under 52	$281	$330	$611

2018

	Monthly Premium		
Age	**Retiree**	**Spouse**	**Retiree/Spouse**
60+	$150	$200	$ 350
56-59	$185	$275	$ 460
52-55	$345	$395	$ 740
<52	$595	$645	$1,240

Premium Scale for Members or Spouses Eligible for Medicare

	Monthly Premium		
Calendar Year	**Retiree**	**Surviving Spouse**	**Spouse**
2017	$25	$ 91	$165
2018	$60	$125	$195

Benefits Provided (Continued)

The dependent child premium is $100 for each child.

Effective January 1, 2015, a benefit recipient who is re-employed at least thirty hours each week may secure primary medical and/or prescription coverage through the employer or the state highway patrol retirement system. Alternatively, the benefit recipient may elect to secure primary coverage through a spouse's employment. If the benefit recipient is re-employed and secures primary coverage through the state highway patrol retirement system, he or she shall pay a premium set by the Board. For 2017, the amount is $400. If the benefit recipient is re-employed less than thirty hours per week, the benefit recipient may apply to the Board for an exemption to the $400 premium. An exemption may also be granted for seasonal employees. If the exemption is granted, the benefit recipient will pay the normal premium amount for his or her age.

After calendar year 2018, member and spouse premiums presented on B-1 are assumed to increase by the health trend assumption shown on page B-10.

Basic Plan coverage provides for a portion of payment of all reasonable and customary hospital expenses. All hospital admissions must be pre-certified prior to an elective admission. Emergency confinements require notification within 48 hours following admission. If a covered person is in a network area, he or she must use a preferred provider for the maximum benefit.

All other medical expenses are covered at the rate of 80% of reasonable and customary charges.

Designated surgical procedures require a second opinion. Designated outpatient procedures must be pre-certified. For in-network activity, the annual out-of-pocket maximum is $1,500 per individual or $3,000 per family (out of network amounts are $5,000 and $10,000, respectively) for Medical Mutual. Each covered person not eligible for Medicare must meet a $500 annual deductible ($1,000 for out of network). For in-network activity for members in the insured Medicare Advantage, the annual out-of-pocket maximum is $2,000 per individual. Members in the insured Medicare Advantage plan do not have a deductible requirement.

A mail-order prescription drug plan is also available. Each 90-day prescription submitted via mail order has a co-payment of $10.00 for generic and $30.00 for brands. Each 34-day prescription has a co-payment of $5.00 for generic and $15.00 for brands. Members will be responsible for the full cost of non-formulary drugs.

Post-Retirement Health Care and Medicare Reimbursement Provisions Evaluated and/or Considered (Concluded)

Administration: The medical program is administered by AETNA and Medical Mutual of Ohio for hospital-medical-surgical coverage and by ESI for retail/mail order prescription drug coverage.

Stop Loss Coverage: The non-Medicare population is fully self-insured and stop loss coverage is maintained.

Medicare Part B Reimbursements: None.

Dental/Vision: Premiums for benefit recipients are deducted from benefit payments. The Dental/Vision member premium amounts are as follows:

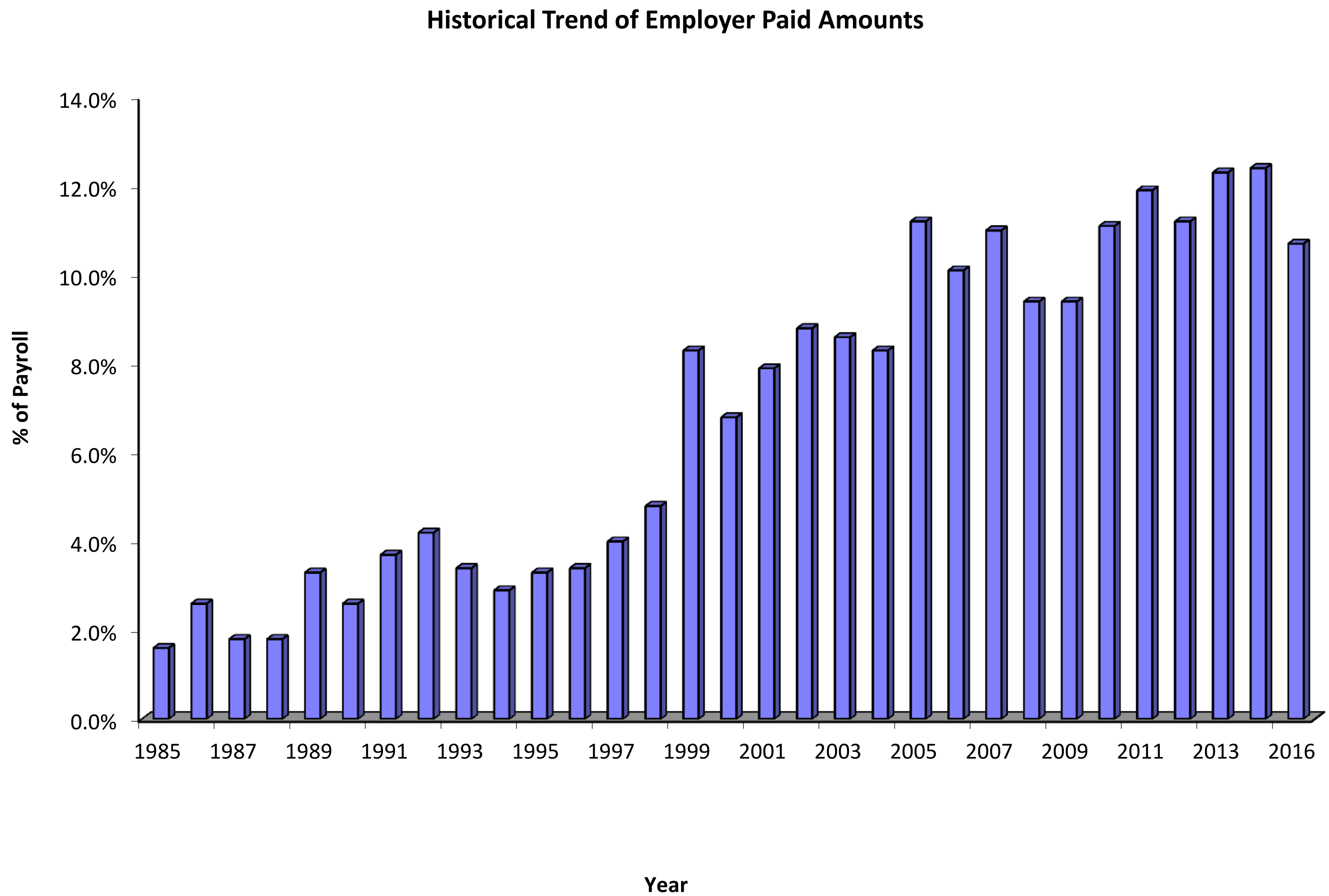
	Premium Scale for Dental/Vision	
	Monthly Premium	
	Retiree	Spouse
Dental	$5	$20
Vision	$5	$ 5

Post-Retirement Health Care and Medicare Reimbursement

Year	Covered Lives	Amounts Paid to Vendors (Including Medicare Part B): Medical	Drugs	Medicare Part B	Dental	Vision	Wellness	Total	Retiree/Spouse Premiums and Other Adjustments	Net Paid by OHPRS	Per Covered Life	Valuation Payroll	% of Payroll
1985	697	$ 427,361	$ 60,015	$ 28,272				$ 515,648		$ 515,648	$ 740	$ 32,500,428	1.6%
1986	715	787,245	80,911	30,457				898,613		898,613	1,257	34,757,277	2.6%
1987	731	559,832	115,544	38,037				713,413		713,413	976	39,938,912	1.8%
1988	761	522,747	145,847	57,461				726,055		726,056	954	40,674,634	1.8%
1989	810	1,043,650	186,795	77,869				1,308,314	$ 97,864	1,406,178	1,736	43,053,057	3.3%
1990	925	1,009,153	213,716	77,363				1,300,232	(94,251)	1,205,981	1,304	45,679,355	2.6%
1991	976	1,267,327	251,004	86,740				1,605,071	180,583	1,785,654	1,830	48,488,406	3.7%
1992	1,045	1,643,276	298,493	97,117				2,038,886	76,046	2,114,932	2,024	50,235,996	4.2%
1993	1,081	1,553,628	299,410	118,109				1,971,147	(90,525)	1,880,622	1,740	55,781,585	3.4%
1994	1,133	1,239,008	320,360	141,384				1,700,752	3,314	1,704,066	1,504	58,116,787	2.9%
1995	1,225	1,512,523	364,096	149,440				2,026,059	(66,834)	1,959,225	1,599	59,825,356	3.3%
1996	1,379	1,353,932	491,525	155,769				2,001,226	21,382	2,022,608	1,467	59,239,349	3.4%
1997	1,499	1,623,640	849,321	166,743				2,639,704	(140,526)	2,499,178	1,667	62,233,299	4.0%
1998	1,602	2,147,334	1,122,248	171,223				3,440,805	(311,917)	3,128,888	1,953	65,153,864	4.8%
1999	1,772	3,315,914	1,364,990	197,606				4,878,510	619,894	5,498,404	3,103	66,017,381	8.3%
2000	1,848	3,190,885	1,684,300	203,157				5,078,342	(358,082)	4,720,260	2,554	69,028,285	6.8%
2001	1,900	3,730,167	1,960,825	231,046				5,922,038	138,317	6,060,355	3,190	76,344,002	7.9%
2002	1,943	4,147,534	2,431,297	260,772	$194,893	$ 80,909		7,115,405	(200,021)	6,915,384	3,559	78,997,065	8.8%
2003	1,912	4,256,046	2,681,414	290,506	209,429	82,097		7,519,492	(507,642)	7,011,850	3,667	81,737,962	8.6%
2004	1,928	4,074,972	2,710,367	347,585	230,994	84,136		7,448,054	(641,707)	6,806,347	3,530	81,757,707	8.3%
2005	1,958	6,015,277	2,980,755	422,045	364,139	124,658		9,906,874	(552,570)	9,354,304	4,777	83,408,155	11.2%
2006	2,078	4,999,822	2,832,743	503,034	408,667	127,266		8,871,532	(198,141)	8,673,391	4,174	85,878,328	10.1%
2007	2,085	6,580,455	3,513,662	572,127	464,402	130,029		11,260,675	(980,539)	10,280,136	4,931	93,752,908	11.0%
2008	2,103	5,087,073	3,274,896	632,293	453,002	121,599	$ 79,679	9,648,542	(784,381)	8,864,161	4,215	94,301,538	9.4%
2009	2,095	4,983,739	3,430,089	673,450	495,272	133,296	86,007	9,801,853	(902,320)	8,899,533	4,248	94,824,789	9.4%
2010	2,166	6,380,294	3,709,855	713,317	453,276	133,141	57,747	11,447,630	(911,076)	10,536,554	4,865	94,767,852	11.1%
2011	2,269	6,755,757	4,053,343	770,183	528,824	157,600	95,210	12,360,917	(1,268,402)	11,092,515	4,889	93,126,449	11.9%
2012	2,310	6,393,584	4,301,087	839,451	594,292	149,962	24,604	12,302,980	(1,277,430)	11,025,550	4,773	98,117,403	11.2%
2013	2,359	7,872,163	4,110,260	896,970	612,575	158,197	53,440	13,703,605	(1,562,609)	12,140,996	5,147	98,519,844	12.3%
2014	2,356	7,624,000	4,722,043	874,164	619,286	167,660	48,728	14,055,881	(1,747,403)	12,308,478	5,224	99,211,756	12.4%
2015	2,400	7,087,732	5,245,815	601,860	593,016	162,417	68,263	13,759,103	(2,397,055)	11,362,048	4,734	99,983,224	11.4%
2016	**2,399**	**7,331,598**	**6,115,492**	**311,820**	**621,659**	**182,959**	**31,455**	**14,594,983**	**(2,918,533)**	**11,676,450**	**4,867**	**108,788,871**	**10.7%**

Separate information for dental and vision was not available for years prior to 2002. Revenue related to the Medicare Part D Retiree Drug Subsidy and prescription drug rebates are not reflected in the results presented above. If these amount were reflected, the revenue paid by OHPRS would be $10,462,961 which would be 9.4% of payroll for calendar year 2016.

Post-Retirement Health Care and Medicare Reimbursement



Assumptions for Health Care Coverages
December 31, 2016

Development of Health Care Rates: Based on the 2016 retired life data, the HPRS portion of the total health care rates was developed as follows:

		HPRS Monthly Rates [Age 59 Central Age (57 for 2016)]	
		This Year Gross Rate	**Prior Year Gross Rate**
A.	One-person without Medicare	$ 793.43	$ 679.81
B.	One-person with Medicare*	252.24	214.21
C.	Two-persons without Medicare	1,586.86	1,359.62
D.	Two-persons with Medicare*	504.48	428.42
E.	Child	344.52	368.64
F.	Medicare Part B Reimbursement**	0.00	30.00

* *Does not include Medicare Part B monthly premium. Includes a reduction to the premium due to Medicare Part D reimbursements and retiree drug subsidies.*

** *The Medicare Part B premium is $30 monthly for 2016 and $0 monthly thereafter.*

The above rates are estimates that are suitable for the purpose of this valuation. Use of the above rates for any other purpose would require review. Pre-Medicare rates are lower than would be expected when compared with other retired groups. This may be attributable to a higher than average amount of coordination of benefit claims for younger HPRS retirees. Many younger retirees likely have other employment. Please see page B-7 for age specific rates used for valuation purposes. Employment related primary coverages for recipients and dependents have been reflected in the age based specific premium rates.

James E. Pranschke is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to certify the per capita retiree health care rates shown above and on page B-7 as well as the trend rates presented on page B-10.

James E. Pranschke

James E. Pranschke, FSA, MAAA

Assumptions for Health Care Coverages
Age Specific HPRS Monthly Gross Rates

Age	Gross Rate		Age	Gross Rate		Age	Gross Rate	
	Male	Female		Male	Female		Male	Female
16	$ 219.01	$ 220.70	51	$ 518.96	$ 625.12	86	$ 410.48	$ 418.35
17	217.48	230.84	52	548.63	645.62	87	408.81	419.46
18	210.71	237.46	53	579.51	665.58	88	407.17	420.30
19	200.00	241.59	54	611.74	685.15	89	405.68	420.89
20	187.59	245.48	55	645.40	704.68	90	404.37	421.03
21	175.78	251.68	56	680.48	724.70	91	403.23	420.44
22	166.28	262.21	57	716.94	745.80	92	402.19	418.78
23	160.15	278.08	58	754.62	768.56	93	401.16	415.70
24	157.74	299.22	59	793.43	793.43	94	400.04	410.90
25	158.82	324.68	60	833.57	820.78	95	398.76	404.14
26	162.82	352.88	61	875.43	850.81	96	397.26	395.21
27	169.01	381.99	62	919.30	883.56	97	395.50	383.99
28	176.70	410.17	63	965.36	918.87	98	393.46	370.46
29	185.33	435.81	64	1,013.64	956.60	99	393.46	370.46
30	194.47	457.62	65	333.01	314.10	100	393.46	370.46
31	203.80	474.75	66	338.61	321.82	101	393.46	370.46
32	213.15	486.89	67	344.38	329.40	102	393.46	370.46
33	222.55	494.27	68	350.32	336.84	103	393.46	370.46
34	232.19	497.57	69	356.46	344.08	104	393.46	370.46
35	242.30	497.83	70	362.77	351.04	105	393.46	370.46
36	253.09	496.24	71	369.02	357.67	106	393.46	370.46
37	264.63	493.95	72	374.94	363.94	107	393.46	370.46
38	276.84	491.99	73	380.32	369.81	108	393.46	370.46
39	289.53	491.08	74	385.19	375.23	109	393.46	370.46
40	302.57	491.66	75	389.63	380.19	110	393.46	370.46
41	315.95	493.80	76	393.80	384.76	111	393.46	370.46
42	329.81	497.51	77	397.87	389.12	112	393.46	370.46
43	344.38	502.91	78	401.89	393.41	113	393.46	370.46
44	359.90	510.26	79	405.70	397.69	114	393.46	370.46
45	376.67	519.86	80	409.03	401.88	115	393.46	370.46
46	395.10	532.01	81	411.58	405.78	116	393.46	370.46
47	415.57	546.84	82	413.12	409.25	117	393.46	370.46
48	438.35	564.20	83	413.59	412.28	118	393.46	370.46
49	463.44	583.60	84	413.13	414.84	119	393.46	370.46
50	490.47	604.21	85	412.01	416.86	120	393.46	370.46

Assumptions for Health Care Coverages
December 31, 2016

Eligibility for Medicare Coverage: All benefit recipients were assumed to be eligible for Medicare on attainment of age 65.

Health Care Inflation: If the price for any product or service were to increase faster than wages for an indefinite period, eventually that product or service would be priced out of the market and either the product or service would not be offered or substituted with an affordable product or service. For this reason, health care inflation was assumed to equal wage inflation in the long term. The assumed point in time when health care inflation reduces to wage growth inflation is uncertain. Our assumptions are based on an approximate 5 to 10-year horizon. Short-term assumptions are described on page B-10.

Retiree health valuations require an assumption about how the health costs that the System is absorbing will change over the years. This assumption includes more than just "health inflation." It includes the impact of:

- The introduction of new procedures and medications and how they are priced.
- The utilization of services and products by covered retirees and their dependents and how that utilization changes over the years.

Retiree health valuations use a health cost trend assumption that changes over the years. The near term rates reflect the fact that currently employers are seeing sharp increases in the cost of health goods and services. If this trend is projected to continue for years to come, it implies that years from now virtually all our expenditures will be for health care. The seemingly more reasonable alternative is that in the not too distant future inflation in medical expenses will decrease to a level at or near wage inflation. It is on this basis that we project premium rates will continue to exceed wage inflation for the next 5 - 10 years, but by less each year until leveling off at an ultimate rate, assumed to be 4.0% in this valuation.

The trend assumption is established by reviewing the System's historical trends and evaluating its relationship with national trends. Comparative trends obtained from a variety of resources including trend surveys from major insurers and benefit consulting groups. This information is added to information we have collected from analysis done in conjunction with many retiree health valuations we have completed for other clients.

This analysis is done separately for the prescription drug program and the remainder of the medical benefits since the trends and forces driving the trends are quite different in these two segments. Review of the System's recent experience indicates trends typical of our comparative trends for both prescription drug and medical. The trends used in this valuation are found on page B-10.

Post-Retirement Health Premium and Medicare Reimbursement Selection of Assumptions December 31, 2016

In order to prepare actuarial studies of the coverages, it is necessary to make assumptions regarding future events such as:

1. When people will retire and how long people will live after retirement.
2. Whether or not people will quit employment prior to eligibility for a benefit.
3. Whether or not people will die in service or become disabled.
4. Rates of Investment Return and pay increases.
5. The proportion of retirees electing coverage for a spouse after retirement.
6. Rates of increase in health care premium.
7. Effect of managed care program on future claims.

Regarding items 1 through 4, the assumptions from the regular December 31, 2016 valuations were used. For current retirees, actual health care coverage elections were used. For future retirees, it was assumed that 90% of males and 50% of females who retire and elect healthcare coverage would also elect coverage for a spouse at retirement, and that coverage would be available to surviving spouses of deceased retirees and active members.

For purposes of the solvency projections, an investment return assumption of 7.75% was chosen by default to be the same rate used in the Pension Plan valuations. It is uncertain how much longer retiree health fund assets can be invested in the same manner as pension assets given the current solvency period of the retiree health fund. For purposes of GASB Statements No. 43 and No. 45 reporting, an investment return assumption of 5.0% was used.

Post-Retirement Health Premium and Medicare Reimbursement Selection of Assumptions December 31, 2016 (Concluded)

Three alternate assumptions for near term health care cost increases were considered and are shown below. A brief description of each of the alternate assumptions follows:

Alternate A (Optimistic): The Alternate A assumption assumes that the employer share of per capita costs would increase at 6% next year, 5.75% the second year, 5.5% the third year, 5.25% the fourth year, 5% the fifth year, 4.75% the sixth year, 4.5% the seventh year, 4.25% the eighth year and no faster than 4% per year thereafter.

Alternate B (Intermediate): In the middle of the range of probable conditions is the view that short-term health care trends will rise somewhat over the next few years before declining to the level of overall GDP growth. This is the assumption set upon which Governmental Accounting Standards Board (GASB) Statements No. 43 and No. 45 information is based.

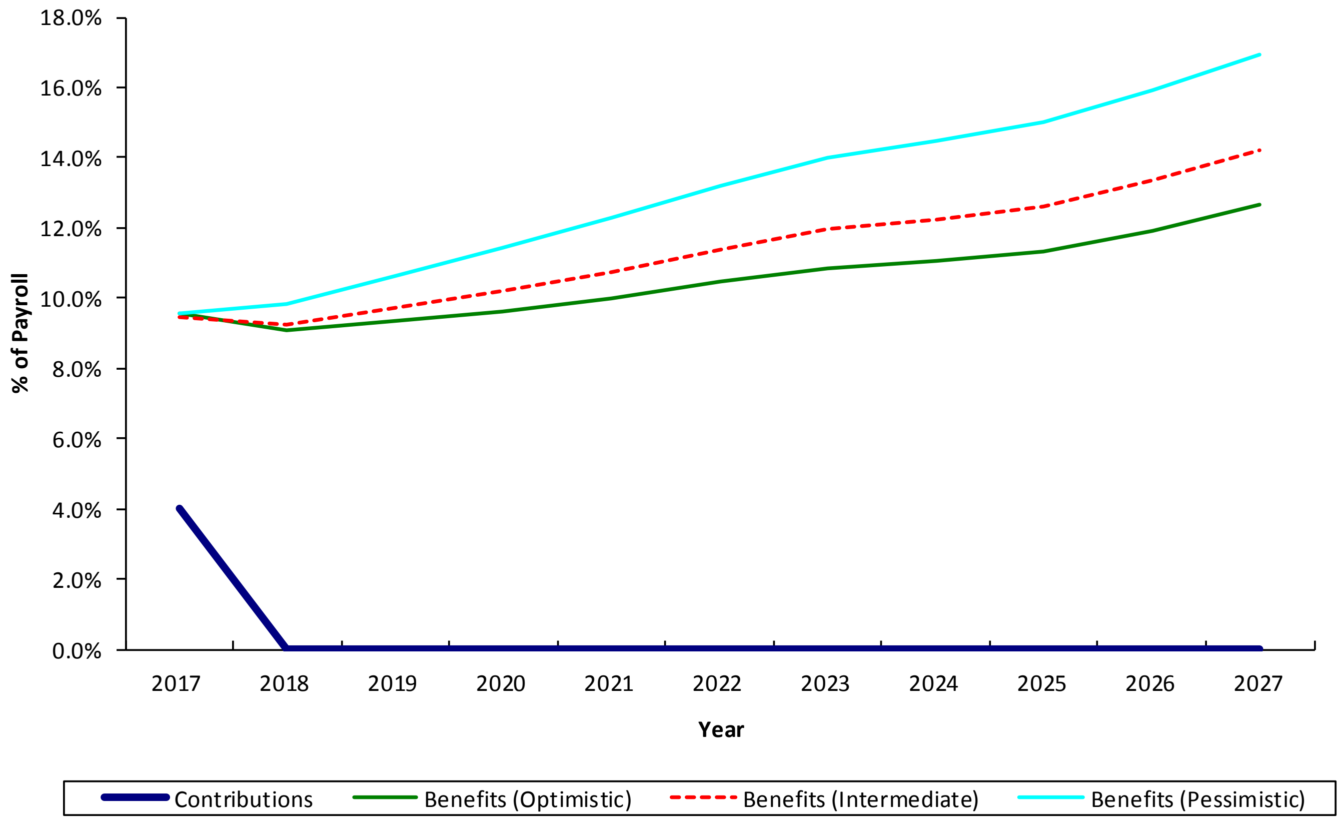
Alternate C (Pessimistic): This scenario envisions poorer experience than the other two.

	Health Trend Assumption		
	Medical and Prescription Drug		
Year	Alt. A Optimistic	Alt. B Intermediate	Alt. C Pessimistic
2017			
2018	6.00%	9.00%	12.00%
2019	5.75%	8.25%	11.00%
2020	5.50%	7.50%	10.00%
2021	5.25%	7.00%	9.00%
2022	5.00%	6.50%	8.00%
2023	4.75%	6.00%	7.00%
2024	4.50%	5.50%	6.25%
2025	4.25%	5.00%	5.50%
2026	4.00%	4.50%	4.75%
2027	4.00%	4.00%	4.00%
2028	4.00%	4.00%	4.00%
2029	4.00%	4.00%	4.00%
2030	4.00%	4.00%	4.00%
2031 & Later	4.00%	4.00%	4.00%

Post-Retirement Health Care and Medicare Reimbursement
Projected Benefits
December 31, 2016

Year Ended 12/31	Projected Benefits as a % of Payroll		
	Alt. A Optimistic	Alt. B Intermediate	Alt. C Pessimistic
2017	9.4%	9.4%	9.4%
2018	9.1%	9.2%	9.8%
2019	9.4%	9.7%	10.6%
2020	9.6%	10.2%	11.4%
2021	10.0%	10.7%	12.3%
2022	10.4%	11.4%	13.2%
2023	10.9%	11.9%	14.0%
2024	11.0%	12.3%	14.5%
2025	11.3%	12.6%	15.0%
2026	11.9%	13.4%	15.9%
2031	15.2%	17.0%	20.2%
2036	16.4%	18.3%	21.8%
2041	15.5%	17.3%	20.5%
2046	15.3%	17.3%	20.3%
2051	16.7%	19.2%	22.2%
2056	18.6%	21.6%	24.8%
2061	19.7%	22.6%	26.2%
2066	20.0%	22.8%	26.5%
2071	19.6%	22.4%	26.0%
2076	19.6%	22.6%	26.0%

Contributions vs. Benefit Payouts



The above chart assumes that there will be assets sufficient to pay the benefits. Under the intermediate assumptions, unless significant investment gains and/or contribution increases arise, the retiree health fund is expected to run out of money in 2028 based upon the Board established retiree health employer contribution rate of 4.0% of payroll for calendar year 2017 and 0.0% thereafter. At that point, the retiree health plan would become “pay as you go.” Benefits would have to be reduced well below the present levels, because benefits paid out could not exceed contribution income. Given the assumed contribution level, benefits would actually have to be completely eliminated.

Post-Retirement Health Care and Medicare Reimbursement
GASB Statement No. 43/No. 45 Reporting
Alternative B: Intermediate Health Trend

Determination of the Annual Required Contribution for the Period July 1, 2017 to June 30, 2018	Contributions Expressed as Percents of Payroll
Normal Cost	14.88%
UAL Payment (30-year amortization)	10.95%
Total (Annual Required Contribution)	**25.83%**

Accrued Health and Medicare Reimbursement Liabilities, $403,703,018 were more than applicable assets of $108,282,136.

The calculations above show the employer's Annual Required Contribution (ARC) for the year ended June 30, 2017. The System's ARC for the year ended December 31, 2016 will be ½ of 28.78% and ½ of the 25.83% shown above.

GASB Statement No. 43/No. 45
Notes to Trend Data

The information presented in the required supplementary schedules was determined as part of the actuarial valuation at the dates indicated. Additional information as of the latest actuarial valuation follows:

Valuation Date	December 31, 2016
Actuarial Cost Method	Entry Age
Amortization Method	Level Percent Open
Remaining Amortization Period	30 years for retiree health benefits in determining the Annual Required Contribution
Asset Valuation Method	4-year smoothed market 20 % Corridor
Actuarial Assumptions:	
Investment Rate of Return	5.0%
Projected Salary Increases	3.8% - 13.5%
Includes Wage Inflation at	3.5%
Health Trend	Intermediate Trend (See Page B-10)

Post-Retirement Health and Medicare Reimbursement
Results with Alternate Health Inflation Assumptions
December 31, 2016

Optimistic, Intermediate and Pessimistic assumption sets were described on page B-10. For each assumption set, four questions are asked.

Question 1. How long will the Health Care fund remain solvent if the present employer contribution rate allocation, "Funding Level 1", is not changed?
Question 2. What is the lowest employer contribution rate, "Funding Level 2", that would maintain the solvency of the fund for 20 years?
Question 3. What is the lowest employer contribution rate, "Funding Level 3", that would maintain the solvency of the fund for 30 years?
Question 4. What is the lowest employer contribution rate, "Funding Level 4", that would maintain the solvency of the fund indefinitely?

The answers to these questions are summarized below. In reviewing the answers, it is important to keep in mind that the alternates are intended to be helpful in understanding the range of potential outcomes. They are not predictions.

	Funding Level 1			Funding Level 2			Funding Level 3			Funding Level 4		
	Employer Rate Allocation			Lowest Employer Rate to Maintain Solvency of Fund for 20 Years			Lowest Employer Rate to Maintain Solvency of Fund for 30 Years			Lowest Employer Rate to Maintain Solvency of Fund Indefinitely		
Assumption Set	%*	Fund Solvent Until	Prior Valuation %*	%	Fund Solvent Until	Prior Valuation %	%	Fund Solvent Until	Prior Valuation %	%	Fund Solvent Until	Prior Valuation %
A (Optimistic)	0.00%	2029	0.00%	4.90%	2037	5.80%	7.10%	2047	8.30%	10.50%	Indefinitely	12.20%
B (Intermediate)	0.00%	2028	0.00%	6.30%	2037	7.40%	8.50%	2047	10.20%	12.40%	Indefinitely	14.40%
C (Pessimistic)	0.00%	2027	0.00%	8.30%	2037	9.30%	10.70%	2047	12.20%	14.90%	Indefinitely	16.90%

** The employer contribution rate is 4.0% for the first year and 0.0% thereafter.*

The above results show that:

- Under the optimistic assumptions, the employer rate will need to be raised prior to 2029 in order to maintain the solvency of the fund. The ultimate rate needed to support the plan would be 10.50% of payroll if the increase were made today.
- Under the intermediate assumptions, the employer rate will need to be raised prior to 2028 in order to maintain the solvency of the fund. The ultimate rate needed to support the plan would be 12.40% of payroll if the increase were made today.
- Under the pessimistic assumptions, the employer rate will need to be raised prior to 2027 in order to maintain the solvency of the fund. The ultimate rate needed to support the plan would be 14.90% of payroll if the increase were made today.

The following pages show projected fund activity based upon Alternate Assumptions A, B and C, and Funding Levels 1, 2, 3 and 4.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Optimistic Assumptions: A
Funding Level 1
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$108,282	$4,502	$ 10,615	$ (6,162)	7.75%	$8,156	$110,276	$110,276	4.00%	9.54%
2018	110,276	0	10,315	(10,315)	7.75%	8,152	108,113	104,457	0.00%	9.08%
2019	108,113	0	10,953	(10,953)	7.75%	7,960	105,120	98,131	0.00%	9.36%
2020	105,120	0	11,626	(11,626)	7.75%	7,702	101,196	91,273	0.00%	9.63%
2021	101,196	0	12,455	(12,455)	7.75%	7,366	96,107	83,752	0.00%	10.00%
2022	96,107	0	13,408	(13,408)	7.75%	6,935	89,634	75,469	0.00%	10.44%
2023	89,634	0	14,363	(14,363)	7.75%	6,397	81,668	66,437	0.00%	10.86%
2024	81,668	0	15,067	(15,067)	7.75%	5,753	72,354	56,870	0.00%	11.04%
2025	72,354	0	15,921	(15,921)	7.75%	4,998	61,431	46,651	0.00%	11.31%
2026	61,431	0	17,333	(17,333)	7.75%	4,098	48,196	35,363	0.00%	11.94%
2027	48,196	0	19,012	(19,012)	7.75%	3,008	32,192	22,822	0.00%	12.68%
2028	32,192	0	20,662	(20,662)	7.75%	1,704	13,234	9,065	0.00%	13.33%
2029	13,234	0	22,375	(22,375)	7.75%	169	(8,972)	(5,938)	0.00%	13.94%

Funding Level 1 is the present contribution rate for post-retirement Health Care and Medicare reimbursement. The fund remains solvent until 2029 in this projection.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Optimistic Assumptions: A
Funding Level 2
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$ 108,282	$ 5,451	$ 10,615	$ (5,161)	7.75%	$ 8,194	$ 111,315	$111,315	4.90%	9.54%
2018	111,315	5,564	10,315	(4,751)	7.75%	8,445	115,009	109,532	4.90%	9.08%
2019	115,009	5,735	10,953	(5,218)	7.75%	8,714	118,505	107,488	4.90%	9.36%
2020	118,505	5,914	11,626	(5,712)	7.75%	8,966	121,759	105,180	4.90%	9.63%
2021	121,759	6,103	12,455	(6,352)	7.75%	9,193	124,600	102,509	4.90%	10.00%
2022	124,600	6,292	13,408	(7,116)	7.75%	9,384	126,868	99,404	4.90%	10.44%
2023	126,868	6,482	14,363	(7,881)	7.75%	9,531	128,518	95,902	4.90%	10.86%
2024	128,518	6,685	15,067	(8,382)	7.75%	9,639	129,775	92,229	4.90%	11.04%
2025	129,775	6,896	15,921	(9,025)	7.75%	9,712	130,462	88,302	4.90%	11.31%
2026	130,462	7,115	17,333	(10,218)	7.75%	9,720	129,964	83,776	4.90%	11.94%
2027	129,964	7,346	19,012	(11,666)	7.75%	9,626	127,924	78,534	4.90%	12.68%
2028	127,924	7,597	20,662	(13,065)	7.75%	9,414	124,273	72,660	4.90%	13.33%
2029	124,273	7,863	22,375	(14,512)	7.75%	9,076	118,837	66,173	4.90%	13.94%
2030	118,837	8,135	24,168	(16,033)	7.75%	8,596	111,400	59,078	4.90%	14.56%
2031	111,400	8,421	26,069	(17,648)	7.75%	7,958	101,710	51,370	4.90%	15.17%
2032	101,710	8,731	27,928	(19,197)	7.75%	7,148	89,661	43,128	4.90%	15.67%
2033	89,661	9,058	29,660	(20,602)	7.75%	6,160	75,219	34,459	4.90%	16.04%
2034	75,219	9,400	31,353	(21,953)	7.75%	4,989	58,255	25,416	4.90%	16.34%
2035	58,255	9,760	32,855	(23,095)	7.75%	3,631	38,791	16,118	4.90%	16.49%
2036	38,791	10,137	33,974	(23,837)	7.75%	2,094	17,048	6,746	4.90%	16.42%
2037	17,048	10,524	34,915	(24,391)	7.75%	388	(6,955)	(2,621)	4.90%	16.26%

Funding Level 2 is the lowest funding level that will keep the fund solvent for 20 years.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Optimistic Assumptions: A
Funding Level 3
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$ 108,282	$ 7,899	$ 10,615	$ (2,713)	7.75%	$ 8,288	$ 113,857	$113,857	7.10%	9.54%
2018	113,857	8,062	10,315	(2,253)	7.75%	8,738	120,342	116,272	7.10%	9.08%
2019	120,342	8,310	10,953	(2,643)	7.75%	9,225	126,924	118,485	7.10%	9.36%
2020	126,924	8,569	11,626	(3,057)	7.75%	9,720	133,587	120,488	7.10%	9.63%
2021	133,587	8,843	12,455	(3,612)	7.75%	10,215	140,190	122,167	7.10%	10.00%
2022	140,190	9,116	13,408	(4,292)	7.75%	10,700	146,598	123,432	7.10%	10.44%
2023	146,598	9,392	14,363	(4,971)	7.75%	11,171	152,798	124,301	7.10%	10.86%
2024	152,798	9,686	15,067	(5,381)	7.75%	11,636	159,053	125,014	7.10%	11.04%
2025	159,053	9,993	15,921	(5,928)	7.75%	12,100	165,225	125,474	7.10%	11.31%
2026	165,225	10,309	17,333	(7,024)	7.75%	12,536	170,737	125,275	7.10%	11.94%
2031	182,499	12,203	26,069	(13,866)	7.75%	13,613	182,246	112,588	7.10%	15.17%
2036	166,615	14,688	33,974	(19,286)	7.75%	12,175	159,504	82,967	7.10%	16.42%
2041	121,221	17,749	38,631	(20,882)	7.75%	8,596	108,935	47,709	7.10%	15.45%
2046	44,066	21,441	46,059	(24,618)	7.75%	2,473	21,921	8,083	7.10%	15.25%
2047	21,921	22,240	48,072	(25,832)	7.75%	710	(3,201)	(1,140)	7.10%	15.35%

Funding Level 3 is the lowest funding level that will keep the fund solvent for 30 years.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Optimistic Assumptions: A
Funding Level 4
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$ 108,282	$ 11,681	$ 10,615	$1,069	7.75%	$ 8,433	$ 117,784	$117,784	10.50%	9.54%
2018	117,784	11,922	10,315	1,607	7.75%	9,190	128,581	124,233	10.50%	9.08%
2019	128,581	12,289	10,953	1,336	7.75%	10,016	139,933	130,629	10.50%	9.36%
2020	139,933	12,673	11,626	1,047	7.75%	10,885	151,865	136,974	10.50%	9.63%
2021	151,865	13,077	12,455	622	7.75%	11,793	164,280	143,161	10.50%	10.00%
2022	164,280	13,482	13,408	74	7.75%	12,735	177,089	149,104	10.50%	10.44%
2023	177,089	13,890	14,363	(473)	7.75%	13,706	190,322	154,827	10.50%	10.86%
2024	190,322	14,325	15,067	(742)	7.75%	14,722	204,302	160,580	10.50%	11.04%
2025	204,302	14,778	15,921	(1,143)	7.75%	15,790	218,949	166,272	10.50%	11.31%
2026	218,949	15,246	17,333	(2,087)	7.75%	16,889	233,751	171,510	10.50%	11.94%
2031	292,378	18,046	26,069	(8,023)	7.75%	22,352	306,707	189,478	10.50%	15.17%
2036	364,153	21,722	33,974	(12,252)	7.75%	27,753	379,654	197,479	10.50%	16.42%
2041	453,883	26,248	38,631	(12,383)	7.75%	34,702	476,202	208,556	10.50%	15.45%
2046	582,610	31,708	46,059	(14,351)	7.75%	44,603	612,862	225,992	10.50%	15.25%
2051	744,652	37,916	60,173	(22,257)	7.75%	56,859	779,254	241,940	10.50%	16.66%
2056	918,769	44,970	79,820	(34,850)	7.75%	69,871	953,790	249,333	10.50%	18.64%
2061	1,095,391	53,437	100,332	(46,895)	7.75%	83,098	1,131,594	249,066	10.50%	19.71%
2066	1,282,365	63,621	120,931	(57,310)	7.75%	97,190	1,322,245	245,039	10.50%	19.96%
2076	1,753,915	89,770	167,598	(77,828)	7.75%	132,950	1,809,037	237,666	10.50%	19.60%
2086	2,288,842	126,372	252,737	(126,365)	7.75%	172,550	2,335,027	217,474	10.50%	21.00%
2096	2,634,498	178,538	358,051	(179,513)	7.75%	197,304	2,652,289	175,119	10.50%	21.06%
2106	2,564,721	251,821	494,987	(243,166)	7.75%	189,460	2,511,015	117,533	10.50%	20.64%
2116	1,191,359	354,914	712,011	(357,097)	7.75%	78,665	912,927	30,293	10.50%	21.06%

Funding Level 4 is the lowest funding level that will keep the fund solvent indefinitely, i.e., throughout the entire 100-year projection period assuming all assumptions are realized.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Intermediate Assumptions: B
Funding Level 1
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$108,282	$4,502	$ 10,615	$ (6,113)	7.75%	$8,158	$110,327	$110,327	4.00%	9.43%
2018	110,327	0	10,727	(10,727)	7.75%	8,140	107,740	104,097	0.00%	9.22%
2019	107,740	0	11,673	(11,673)	7.75%	7,903	103,970	97,057	0.00%	9.71%
2020	103,970	0	12,628	(12,628)	7.75%	7,574	98,916	89,217	0.00%	10.18%
2021	98,916	0	13,753	(13,753)	7.75%	7,140	92,303	80,437	0.00%	10.73%
2022	92,303	0	15,017	(15,017)	7.75%	6,579	83,865	70,612	0.00%	11.36%
2023	83,865	0	16,276	(16,276)	7.75%	5,877	73,466	59,765	0.00%	11.94%
2024	73,466	0	17,228	(17,228)	7.75%	5,034	61,272	48,159	0.00%	12.25%
2025	61,272	0	18,322	(18,322)	7.75%	4,047	46,997	35,690	0.00%	12.62%
2026	46,997	0	20,028	(20,028)	7.75%	2,876	29,845	21,898	0.00%	13.37%
2027	29,845	0	21,970	(21,970)	7.75%	1,472	9,347	6,626	0.00%	14.20%
2028	9,347	0	23,870	(23,870)	7.75%	(189)	(14,712)	(10,077)	0.00%	14.92%

Funding Level 1 is the present contribution rate for post-retirement Health Care and Medicare reimbursement. The fund remains solvent until 2028 in this projection.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Intermediate Assumptions: B
Funding Level 2
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$ 108,282	$ 7,091	$ 10,615	$(3,524)	7.75%	$ 8,257	$ 113,015	$113,015	6.30%	9.43%
2018	113,015	7,332	10,727	(3,395)	7.75%	8,629	118,249	114,250	6.30%	9.22%
2019	118,249	7,572	11,673	(4,101)	7.75%	9,007	123,155	114,967	6.30%	9.71%
2020	123,155	7,818	12,628	(4,810)	7.75%	9,360	127,705	115,183	6.30%	10.18%
2021	127,705	8,074	13,753	(5,679)	7.75%	9,680	131,706	114,774	6.30%	10.73%
2022	131,706	8,330	15,017	(6,687)	7.75%	9,951	134,970	113,641	6.30%	11.36%
2023	134,970	8,587	16,276	(7,689)	7.75%	10,166	137,447	111,813	6.30%	11.94%
2024	137,447	8,860	17,228	(8,368)	7.75%	10,332	139,411	109,576	6.30%	12.25%
2025	139,411	9,144	18,322	(9,178)	7.75%	10,453	140,686	106,839	6.30%	12.62%
2026	140,686	9,437	20,028	(10,591)	7.75%	10,498	140,593	103,157	6.30%	13.37%
2027	140,593	9,747	21,970	(12,223)	7.75%	10,428	138,798	98,397	6.30%	14.20%
2028	138,798	10,082	23,870	(13,788)	7.75%	10,229	135,239	92,631	6.30%	14.92%
2029	135,239	10,435	25,840	(15,405)	7.75%	9,892	129,726	85,851	6.30%	15.60%
2030	129,726	10,797	27,901	(17,104)	7.75%	9,399	122,021	78,021	6.30%	16.28%
2031	122,021	11,178	30,085	(18,907)	7.75%	8,733	111,847	69,097	6.30%	16.96%
2032	111,847	11,590	32,221	(20,631)	7.75%	7,879	99,095	59,149	6.30%	17.51%
2033	99,095	12,023	34,207	(22,184)	7.75%	6,831	83,742	48,295	6.30%	17.92%
2034	83,742	12,477	36,146	(23,669)	7.75%	5,584	65,657	36,584	6.30%	18.25%
2035	65,657	12,955	37,870	(24,915)	7.75%	4,135	44,877	24,160	6.30%	18.42%
2036	44,877	13,455	39,155	(25,700)	7.75%	2,494	21,671	11,272	6.30%	18.33%
2037	21,671	13,967	40,245	(26,278)	7.75%	674	(3,933)	(1,977)	6.30%	18.15%

Funding Level 2 is the lowest funding level that will keep the fund solvent for 20 years.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Intermediate Assumptions: B
Funding Level 3
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY		% of Payroll	
							Nominal $	Real $	Contrib.	Benefits
2017	$ 108,282	$ 9,568	$ 10,615	$(1,047)	7.75%	$ 8,352	$ 115,587	$115,587	8.50%	9.43%
2018	115,587	9,892	10,727	(835)	7.75%	8,926	123,678	119,496	8.50%	9.22%
2019	123,678	10,216	11,673	(1,457)	7.75%	9,529	131,750	122,990	8.50%	9.71%
2020	131,750	10,548	12,628	(2,080)	7.75%	10,131	139,801	126,092	8.50%	10.18%
2021	139,801	10,893	13,753	(2,860)	7.75%	10,725	147,666	128,682	8.50%	10.73%
2022	147,666	11,238	15,017	(3,779)	7.75%	11,300	155,187	130,663	8.50%	11.36%
2023	155,187	11,586	16,276	(4,690)	7.75%	11,848	162,345	132,068	8.50%	11.94%
2024	162,345	11,954	17,228	(5,274)	7.75%	12,380	169,451	133,187	8.50%	12.25%
2025	169,451	12,337	18,322	(5,985)	7.75%	12,903	176,369	133,937	8.50%	12.62%
2026	176,369	12,732	20,028	(7,296)	7.75%	13,389	182,462	133,878	8.50%	13.37%
2031	195,115	15,082	30,085	(15,003)	7.75%	14,547	194,659	120,257	8.50%	16.96%
2036	176,392	18,153	39,155	(21,002)	7.75%	12,867	168,257	87,520	8.50%	18.33%
2041	124,783	21,926	44,649	(22,723)	7.75%	8,801	110,861	48,552	8.50%	17.31%
2046	36,957	26,438	53,733	(27,295)	7.75%	1,820	11,482	4,234	8.50%	17.28%
2047	11,482	27,419	56,266	(28,847)	7.75%	(214)	(17,579)	(6,263)	8.50%	17.44%

Funding Level 3 is the lowest funding level that will keep the fund solvent for 30 years.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Intermediate Assumptions: B
Funding Level 4
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$ 108,282	$ 13,958	$ 10,615	$ 3,343	7.75%	$ 8,520	$ 120,145	$120,145	12.40%	9.43%
2018	120,145	14,431	10,727	3,704	7.75%	9,453	133,302	128,794	12.40%	9.22%
2019	133,302	14,904	11,673	3,231	7.75%	10,455	146,988	137,215	12.40%	9.71%
2020	146,988	15,388	12,628	2,760	7.75%	11,497	161,245	145,434	12.40%	10.18%
2021	161,245	15,892	13,753	2,139	7.75%	12,578	175,962	153,341	12.40%	10.73%
2022	175,962	16,395	15,017	1,378	7.75%	13,690	191,030	160,842	12.40%	11.36%
2023	191,030	16,902	16,276	626	7.75%	14,829	206,485	167,976	12.40%	11.94%
2024	206,485	17,438	17,228	210	7.75%	16,011	222,706	175,045	12.40%	12.25%
2025	222,706	17,997	18,322	(325)	7.75%	17,247	239,628	181,976	12.40%	12.62%
2026	239,628	18,574	20,028	(1,454)	7.75%	18,516	256,690	188,341	12.40%	13.37%
2031	324,697	22,002	30,085	(8,083)	7.75%	24,855	341,469	210,953	12.40%	16.96%
2036	409,540	26,482	39,155	(12,673)	7.75%	31,254	428,121	222,690	12.40%	18.33%
2041	517,584	31,986	44,649	(12,663)	7.75%	39,628	544,549	238,489	12.40%	17.31%
2046	672,968	38,569	53,733	(15,164)	7.75%	51,575	709,379	261,582	12.40%	17.28%
2051	866,792	46,091	71,420	(25,329)	7.75%	66,207	907,670	281,810	12.40%	19.21%
2056	1,071,243	54,708	95,282	(40,574)	7.75%	81,469	1,112,138	290,727	12.40%	21.60%
2061	1,278,630	65,036	118,793	(53,757)	7.75%	97,037	1,321,910	290,955	12.40%	22.65%
2066	1,505,906	77,436	142,278	(64,842)	7.75%	114,226	1,555,290	288,227	12.40%	22.78%
2076	2,093,664	109,191	199,154	(89,963)	7.75%	158,816	2,162,517	284,105	12.40%	22.62%
2086	2,769,899	153,747	301,696	(147,949)	7.75%	209,005	2,830,955	263,663	12.40%	24.33%
2096	3,294,795	217,255	423,816	(206,561)	7.75%	247,442	3,335,676	220,240	12.40%	24.19%
2106	3,502,268	306,338	588,176	(281,838)	7.75%	260,640	3,481,070	162,938	12.40%	23.81%
2116	2,481,774	431,811	847,222	(415,411)	7.75%	176,441	2,242,804	74,421	12.40%	24.33%

Funding Level 4 is the lowest funding level that will keep the fund solvent indefinitely, i.e., throughout the entire 100-year projection period assuming all assumptions are realized.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Pessimistic Assumptions: C
Funding Level 1
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY		% of Payroll	
							Nominal $	Real $	Contrib.	Benefits
2017	$108,282	$4,502	$ 10,615	$ (6,168)	7.75%	$8,156	$110,270	$110,270	4.00%	9.54%
2018	110,270	0	11,140	(11,140)	7.75%	8,120	107,250	103,623	0.00%	9.81%
2019	107,250	0	12,447	(12,447)	7.75%	7,836	102,639	95,815	0.00%	10.63%
2020	102,639	0	13,781	(13,781)	7.75%	7,427	96,285	86,844	0.00%	11.42%
2021	96,285	0	15,293	(15,293)	7.75%	6,877	87,869	76,573	0.00%	12.28%
2022	87,869	0	16,939	(16,939)	7.75%	6,162	77,092	64,909	0.00%	13.19%
2023	77,092	0	18,541	(18,541)	7.75%	5,265	63,816	51,914	0.00%	14.02%
2024	63,816	0	19,756	(19,756)	7.75%	4,190	48,250	37,924	0.00%	14.48%
2025	48,250	0	21,102	(21,102)	7.75%	2,932	30,080	22,843	0.00%	14.99%
2026	30,080	0	23,116	(23,116)	7.75%	1,447	8,411	6,171	0.00%	15.92%
2027	8,411	0	25,354	(25,354)	7.75%	(318)	(17,261)	(12,237)	0.00%	16.91%

Funding Level 1 is the present contribution rate for post-retirement Health Care and Medicare reimbursement. The fund remains solvent until 2027 in this projection.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Pessimistic Assumptions: C
Funding Level 2
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$108,282	$ 9,234	$ 10,615	$ (1,384)	7.75%	$ 8,339	$115,237	$115,237	8.30%	9.54%
2018	115,237	9,424	11,140	(1,716)	7.75%	8,865	122,386	118,247	8.30%	9.81%
2019	122,386	9,714	12,447	(2,733)	7.75%	9,380	129,033	120,454	8.30%	10.63%
2020	129,033	10,017	13,781	(3,764)	7.75%	9,856	135,125	121,875	8.30%	11.42%
2021	135,125	10,337	15,293	(4,956)	7.75%	10,283	140,452	122,396	8.30%	12.28%
2022	140,452	10,657	16,939	(6,282)	7.75%	10,645	144,815	121,930	8.30%	13.19%
2023	144,815	10,980	18,541	(7,561)	7.75%	10,934	148,188	120,551	8.30%	14.02%
2024	148,188	11,324	19,756	(8,432)	7.75%	11,162	150,918	118,620	8.30%	14.48%
2025	150,918	11,682	21,102	(9,420)	7.75%	11,336	152,834	116,064	8.30%	14.99%
2026	152,834	12,051	23,116	(11,065)	7.75%	11,421	153,190	112,400	8.30%	15.92%
2027	153,190	12,444	25,354	(12,910)	7.75%	11,378	151,658	107,513	8.30%	16.91%
2028	151,658	12,869	27,538	(14,669)	7.75%	11,192	148,181	101,496	8.30%	17.76%
2029	148,181	13,319	29,800	(16,481)	7.75%	10,853	142,553	94,339	8.30%	18.57%
2030	142,553	13,780	32,164	(18,384)	7.75%	10,344	134,513	86,008	8.30%	19.37%
2031	134,513	14,265	34,670	(20,405)	7.75%	9,644	123,752	76,452	8.30%	20.17%
2032	123,752	14,790	37,113	(22,323)	7.75%	8,737	110,166	65,757	8.30%	20.83%
2033	110,166	15,343	39,383	(24,040)	7.75%	7,618	93,744	54,063	8.30%	21.30%
2034	93,744	15,922	41,594	(25,672)	7.75%	6,283	74,355	41,431	8.30%	21.68%
2035	74,355	16,532	43,558	(27,026)	7.75%	4,728	52,057	28,025	8.30%	21.87%
2036	52,057	17,171	45,023	(27,852)	7.75%	2,969	27,174	14,135	8.30%	21.76%
2037	27,174	17,826	46,266	(28,440)	7.75%	1,018	(248)	(125)	8.30%	21.54%

Funding Level 2 is the lowest funding level that will keep the fund solvent for 20 years.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Pessimistic Assumptions: C
Funding Level 3
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$108,282	$11,904	$10,615	$ 1,286	7.75%	$ 8,441	$118,009	$118,009	10.70%	9.54%
2018	118,009	12,149	11,140	1,009	7.75%	9,184	128,202	123,867	10.70%	9.81%
2019	128,202	12,523	12,447	76	7.75%	9,939	138,217	129,027	10.70%	10.63%
2020	138,217	12,914	13,781	(867)	7.75%	10,679	148,029	133,514	10.70%	11.42%
2021	148,029	13,327	15,293	(1,966)	7.75%	11,397	157,460	137,217	10.70%	12.28%
2022	157,460	13,739	16,939	(3,200)	7.75%	12,081	166,341	140,055	10.70%	13.19%
2023	166,341	14,155	18,541	(4,386)	7.75%	12,724	174,679	142,101	10.70%	14.02%
2024	174,679	14,598	19,756	(5,158)	7.75%	13,340	182,861	143,727	10.70%	14.48%
2025	182,861	15,060	21,102	(6,042)	7.75%	13,941	190,760	144,865	10.70%	14.99%
2026	190,760	15,536	23,116	(7,580)	7.75%	14,494	197,674	145,040	10.70%	15.92%
2031	212,080	18,390	34,670	(16,280)	7.75%	15,813	211,613	130,731	10.70%	20.17%
2036	191,505	22,136	45,023	(22,887)	7.75%	13,966	182,584	94,972	10.70%	21.76%
2041	135,393	26,748	51,265	(24,517)	7.75%	9,555	120,431	52,744	10.70%	20.51%
2046	41,948	32,312	61,252	(28,940)	7.75%	2,143	15,151	5,587	10.70%	20.28%
2047	15,151	33,516	63,939	(30,423)	7.75%	10	(15,262)	(5,438)	10.70%	20.41%

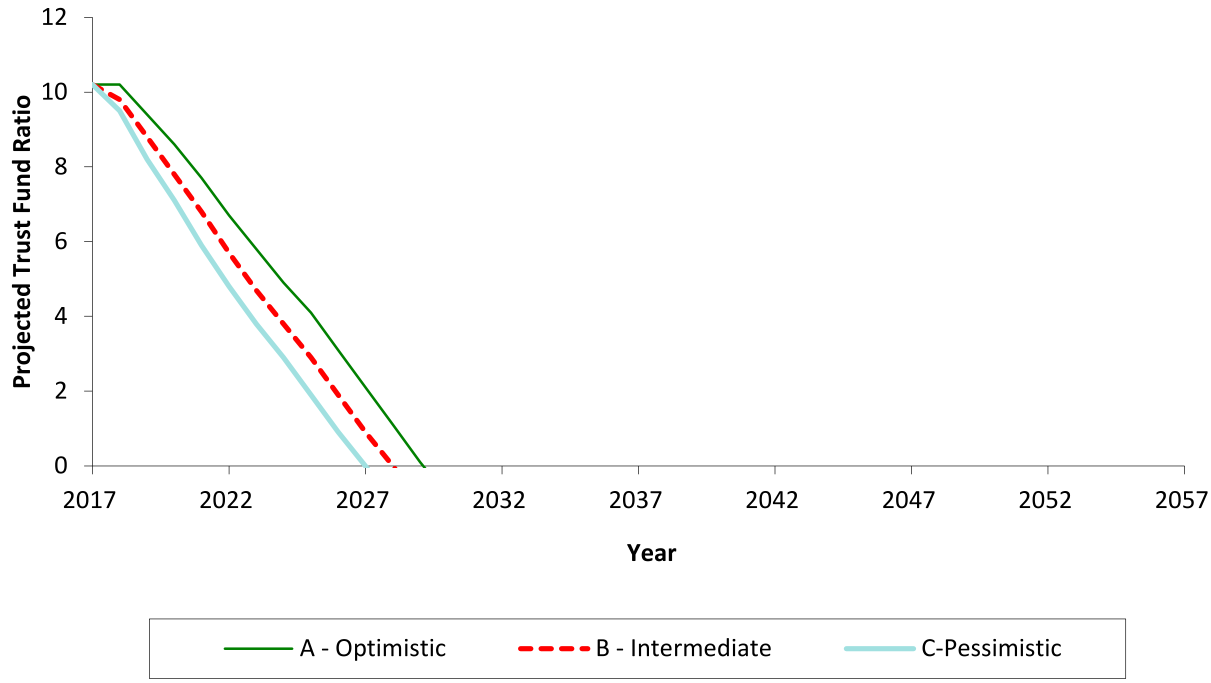
Funding Level 3 is the lowest funding level that will keep the fund solvent for 30 years.

Post-Retirement Health Care & Medicare Reimbursement
Cash Flow Projection
Pessimistic Assumptions: C
Funding Level 4
($ in Thousands)

Calendar Year	Fund Balance BOY	Contributions	Benefits	Net	Investment Return %	Investment Return $	Fund Balance EOY Nominal $	Fund Balance EOY Real $	% of Payroll Contrib.	% of Payroll Benefits
2017	$ 108,282	$ 16,576	$ 10,615	$ 5,958	7.75%	$ 8,620	$ 122,860	$ 122,860	14.90%	9.54%
2018	122,860	16,918	11,140	5,778	7.75%	9,743	138,381	133,701	14.90%	9.81%
2019	138,381	17,439	12,447	4,992	7.75%	10,916	154,289	144,030	14.90%	10.63%
2020	154,289	17,983	13,781	4,202	7.75%	12,118	170,609	153,880	14.90%	11.42%
2021	170,609	18,558	15,293	3,265	7.75%	13,347	187,221	163,152	14.90%	12.28%
2022	187,221	19,131	16,939	2,192	7.75%	14,594	204,007	171,768	14.90%	13.19%
2023	204,007	19,711	18,541	1,170	7.75%	15,855	221,032	179,810	14.90%	14.02%
2024	221,032	20,328	19,756	572	7.75%	17,152	238,756	187,660	14.90%	14.48%
2025	238,756	20,971	21,102	(131)	7.75%	18,499	257,124	195,263	14.90%	14.99%
2026	257,124	21,634	23,116	(1,482)	7.75%	19,870	275,512	202,152	14.90%	15.92%
2031	347,810	25,608	34,670	(9,062)	7.75%	26,608	365,356	225,710	14.90%	20.17%
2036	435,519	30,825	45,023	(14,198)	7.75%	33,209	454,530	236,426	14.90%	21.76%
2041	546,323	37,247	51,265	(14,018)	7.75%	41,804	574,109	251,435	14.90%	20.51%
2046	707,204	44,995	61,252	(16,257)	7.75%	54,186	745,133	274,766	14.90%	20.28%
2051	910,440	53,804	80,008	(26,204)	7.75%	69,556	953,792	296,130	14.90%	22.16%
2056	1,128,028	63,815	106,019	(42,204)	7.75%	85,807	1,171,631	306,279	14.90%	24.75%
2061	1,347,606	75,830	133,101	(57,271)	7.75%	102,248	1,392,583	306,511	14.90%	26.15%
2066	1,580,193	90,282	160,303	(70,021)	7.75%	119,785	1,629,957	302,064	14.90%	26.46%
2076	2,173,409	127,388	222,338	(94,950)	7.75%	164,806	2,243,265	294,713	14.90%	26.01%
2086	2,854,782	179,328	335,124	(155,796)	7.75%	215,284	2,914,270	271,422	14.90%	27.84%
2096	3,315,955	253,354	474,516	(221,162)	7.75%	248,523	3,343,316	220,744	14.90%	27.91%
2106	3,313,105	357,345	656,321	(298,976)	7.75%	245,324	3,259,453	152,565	14.90%	27.37%
2116	1,795,170	503,640	943,938	(440,298)	7.75%	122,276	1,477,148	49,015	14.90%	27.93%

Funding Level 4 is the lowest funding level that will keep the fund solvent indefinitely, i.e., throughout the entire 100-year projection period assuming all assumptions are realized.

Post-Retirement Health Care & Medicare Reimbursement
Projected Trust Fund Ratios Based on
0.00% Employer Contribution Rate
(4.0% for Calendar Year 2017)
December 31, 2016



The ***trust fund ratio*** is the ratio of the fund balance at the beginning of the year to the projected benefit payout during the year. It is one measure of the Plan's ability to pay benefits. A trust fund ratio on the order of about 15 to 25 is expected in a plan that is funding health care payouts as a level percentage of payroll. Given the experience of the last several years, very few, if any plans, are likely to be able to report such a trust fund ratio.

Approximate IRC Section 401(h) Computation
($ in Thousands)

Year	(1) Covered Pay	(2) Pension EANC %	(3) Pension PUCNC %	(4) Pension PUCNC $	(5) Health Contribution	(6) (4) + (5)	(7) Sum of (5)	(8) Sum of (6)	(9) IRC Ratio (7) / (8)
1990	$45,640	22.75%	23.66%	$ 10,798.4	$1,835.5	$12,633.9	$ 8,761.7	$ 63,353.5	13.8%
1991	48,586	22.15%	23.04%	11,194.2	2,165.1	13,359.3	10,926.8	76,712.8	14.2%
1992	50,255	22.15%	23.04%	11,578.8	2,542.7	14,121.5	13,469.5	90,834.3	14.8%
1993	54,715	22.36%	23.25%	12,721.2	2,563.5	15,284.7	16,033.0	106,119.0	15.1%
1994	58,341	22.36%	23.25%	13,564.3	3,053.4	16,617.7	19,086.4	122,736.7	15.6%
1995	56,833	23.79%	24.74%	14,060.5	3,122.0	17,182.5	22,208.4	139,919.2	15.9%
1996	60,909	23.79%	24.74%	15,068.9	2,860.8	17,929.7	25,069.2	157,848.9	15.9%
1997	61,714	24.47%	25.45%	15,706.2	2,548.8	18,255.0	27,618.0	176,103.9	15.7%
1998	65,848	24.45%	25.55%	16,824.2	2,719.5	19,543.7	30,337.5	195,647.6	15.5%
1999	69,030	24.96%	26.08%	18,003.0	3,278.9	21,281.9	33,616.4	216,929.5	15.5%
2000	68,505	24.96%	26.08%	17,866.1	3,254.0	21,120.1	36,870.4	238,049.6	15.5%
2001	74,140	23.10%	23.63%	17,519.3	3,521.7	21,041.0	40,392.1	259,090.6	15.6%
2002	79,594	23.14%	23.71%	18,871.7	3,780.7	22,652.4	44,172.8	281,743.0	15.7%
2003	80,641	21.88%	22.72%	18,321.6	3,395.7	21,717.3	47,568.5	303,460.3	15.7%
2004	81,931	21.91%	22.83%	18,704.8	2,867.6	21,572.4	50,436.1	325,032.7	15.5%
2005	85,828	21.68%	22.59%	19,388.5	3,006.4	22,394.9	53,442.5	347,427.6	15.4%
2006	87,563	20.99%	21.83%	19,115.0	3,384.8	22,499.8	56,827.3	369,927.4	15.4%
2007	95,032	20.78%	21.92%	20,831.0	4,575.1	25,406.1	61,402.4	395,333.5	15.5%
2008	93,029	20.81%	21.89%	20,364.0	4,668.0	25,032.0	66,070.4	420,365.5	15.7%
2009	93,339	21.21%	22.92%	21,393.3	4,794.7	26,188.0	70,865.1	446,553.5	15.9%
2010	92,226	21.23%	23.25%	21,445.7	3,699.8	25,145.5	74,564.9	471,699.0	15.8%
2011	92,790	21.72%	24.03%	22,297.8	2,418.4	24,716.2	76,983.3	496,415.2	15.5%
2012	96,022	21.80%	24.19%	23,227.8	2,553.0	25,780.8	79,536.3	522,196.0	15.2%
2013	100,250	18.23%	20.37%	20,418.9	4,718.7	25,137.6	84,255.0	547,333.6	15.4%
2014	100,569	18.13%	21.00%	21,117.3	5,859.3	26,976.6	90,114.3	574,310.2	15.7%
2015	101,751	18.13%	21.01%	21,375.1	5,637.4	27,012.5	95,751.7	601,322.7	15.9%
2016	**112,811**	**19.70%**	**21.55%**	**24,305.2**	**5,944.6**	**30,249.8**	**101,696.3**	**631,572.5**	**16.1%**

The approximate computations above indicate compliance with IRC Section 401(h) because the ratio in Column 9 is below 25%. The ratio in Column 9 would appear lower if the computations were extended farther into the past.

SECTION C

GAIN/LOSS ANALYSIS

Gain (Loss) Analysis

Purpose of Gain/Loss Analysis. Regular actuarial valuations provide information about the composite change in unfunded actuarial accrued liabilities -- whether or not the liabilities are increasing or decreasing, and by how much.

However, valuations do not show the portion of the change attributable to each risk area within the Retirement System: the rate of investment income on plan assets; the rates of withdrawal of active members who leave covered employment; the rates of mortality; the rates of disability; the rates of salary increases; the assumed ages at actual retirement. In an actuarial valuation, assumptions are made as to what these rates will be for the next year and for decades in the future.

The objective of a gain and loss analysis is to determine the portion of the change in unfunded actuarial accrued liabilities attributable to each risk area.

The fact that actual experience differs from assumed experience is to be expected. The future cannot be predicted with precision. Changes in the valuation assumption for a risk area should be made when the differences between assumed and actual experience have been observed to be sizable and persistent. One year's gain and loss analysis may or may not be indicative of ***long-term trends, which are the basis of financial assumptions***.

Development of Total Gain (Loss)
January 1, 2016 to December 31, 2016

Unfunded Accrued Liabilities (UAL), January 1	$339,135,677
Normal Cost	20,149,707
Contributions	39,841,382
Interest	25,519,963
Expected UAL Before Any Changes	344,963,965
Effect of Changes in Assumptions and Benefits	0
Expected UAL After All Changes	344,963,965
Actual UAL	364,260,215
Gain (Loss) for Year from Financial Experience	**$ (19,296,250)**

This page measures the actual gain or loss for the year after adjusting for the effect of benefit and assumption changes.

Analysis of Financial Experience
for the Year Ended December 31, 2016 and 2015

Gains and Losses in Pension Accrued Liabilities Resulting from Differences Between Assumed Experience and Actual Experience

Type of Activity	Gain or (Loss) for Year Ended 12/31 2016	2015
Age & Service Retirements. If members retire at older ages or with lower final average pay than assumed, there is a gain. If younger ages or higher average pays, a loss.	**$ 244,658**	$ (365,491)
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	**76,712**	419,882
Death-in-Service Benefits. If more liabilities are released by death-in-service claims than assumed, there is a gain. If smaller releases, a loss.	**402,882**	(50,114)
Withdrawal From Employment. If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	**1,912,187**	1,272,449
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	**(11,313,936)**	6,155,599
Investment Income. If there is greater investment return on pension assets than assumed, there is a gain. If less return, a loss.	**(4,839,839)**	1,471,554
Other. Miscellaneous gains and losses resulting from data adjustments, timing of financial transactions, valuation methods, DROP account interest crediting, etc.	**(5,778,914)**	5,683,114
Gain (or Loss) During Year from Experience	**$ (19,296,250)**	$ 14,586,993
Non-Recurring Items (Effect of Benefit/Assumption Changes)	**0**	(48,811,895)
Composite Gain (or Loss) During Year	**$ (19,296,250)**	$ (34,224,902)

Investment Gain (Loss)
Development of Portion Attributable to Retirement, Survivor and Disability Allowances
January 1, 2016 to December 31, 2016

Assets, Beginning of Year	$739,848,920
Net Cash Flow	(27,609,781)
Assumed Investment Return	56,268,412
Expected Assets End of Year	$768,507,551
Actual Assets End of Year	763,667,712
Gain (Loss) for Year	**$(4,839,839)**

The total investment gain (loss) was ($5,411,535), including the gain (loss) on health assets.

Active Member Population Reconciliation
January 1, 2016 to December 31, 2016

	Actual	Expected
Active Members Beginning of Year	1,621	
Plus New Hires	148	
Minus Retirements	39	40.3
Minus Deaths	3	0.6
Minus Disabilities	6	7.4
Minus Other Terminations	55	26.2
Returned to Active Status	4	
Plus or Minus Data Correction	0	
Active Members End of Year	**1,670**	

SECTION D

FINANCIAL INFORMATION

Current Asset Information
Furnished for the Valuation
December 31, 2016

Balance Sheet

Current Assets (Market Value)*		Fund Balance	
Cash & Short-Term Investments	$ 17,557,498	Employees' Savings Fund	$ 115,269,393
Fixed Income	146,395,098	Employer Accumulation Fund	102,329,407
Stocks	421,374,737	Pension Reserve Fund	606,416,263
Real Estate	30,851,775	Survivors Benefit Fund	0
Alternatives	204,311,078	Health Care Fund	102,329,407
Other Short-Term	82,522	Income Fund	(102,329,407)
Deferred Outflows - Pension	322,129		
Accruals & Receivables	(22,075,861)		
Total Current Assets	**$ 798,818,976**	**Total Fund Balance**	**$ 824,015,063**

** Does not include $25,196,087 for DROP Account Balances*

Revenues and Expenditures

	Year Ended December 31, 2016	2015
Net Assets Held in Trust for Pension		
and Postemployment Health Care Benefits	$ 782,167,640	$ 825,399,760
DROP Liabilities	23,477,120	22,615,829
Total	$ 805,644,760	$ 848,015,589
Revenues**		
Employee contributions		
For non-DROP members	13,016,853	12,711,676
For DROP members	1,084,318	974,616
Employer contributions (net)	30,251,338	27,750,506
Investment income (net)		
Non-DROP investment income	54,678,109	(5,112,383)
DROP investment income	(1,420,223)	(589,539)
Miscellaneous	0	0
Total	97,610,395	35,734,876
Expenditures		
Benefit payments		
Retirees and Beneficiaries	59,842,451	59,772,972
From DROP account	5,792,987	6,330,281
Health insurance	10,242,961	9,793,515
Refund of member contributions	1,730,725	857,626
Administrative expenses	1,545,968	1,241,311
Death benefit	85,000	110,000
Total	79,240,092	78,105,705
Net Addition to Assets	18,370,303	(42,370,829)
Net Assets Held in Trust for Pension		
and Postemployment Health Care Benefits	$ 798,818,976	$ 782,167,640
DROP Liabilities	25,196,087	23,477,120
Total	**$ 824,015,063**	**$ 805,644,760**

*** Revenues include transfers to and from systems.*

CAFR Asset Information Furnished for the Valuation
December 31, 2016

Additions by Source

	Pension Benefits					Other Postemployment Benefits		
	Contributions		Net Investment	Transfers from		Employer	Net Investment	
Year	Member*	Employer	Income	Other Systems	Total	Contributions	Income	Total
2007	$8,901,454	$19,956,700	$ 51,176,733	$ 717,017	$ 80,751,904	$4,575,072	$ 10,475,428	$ 15,050,500
2008	9,666,665	20,302,216	(207,368,115)	632,894	(176,766,340)	4,667,972	(30,809,552)	(26,141,580)
2009	9,503,526	20,453,914	109,523,583	1,009,422	140,490,445	4,794,710	21,030,418	25,825,128
2010	9,221,920	21,211,944	72,158,093	329,335	102,921,292	3,699,814	17,734,416	21,434,230
2011	9,278,533	22,966,338	(16,039,272)	608,366	16,813,965	2,418,411	(2,746,073)	(327,662)
2012	9,641,772	23,766,361	63,783,964	557,316	97,749,413	2,553,023	10,199,419	12,752,442
2013	10,037,246	22,908,182	115,874,530	1,353,520	150,173,478	4,718,651	17,893,377	22,612,028
2014	11,577,268	22,325,421	45,104,959	586,929	79,594,577	5,859,320	6,799,267	12,658,587
2015	13,686,292	22,895,242	(5,649,718)	947,265	31,879,081	5,637,420	(647,032)	4,990,388
2016	**14,101,171**	**25,383,684**	**46,423,126**	**773,206**	**86,681,187**	**5,944,616**	**6,834,760**	**12,779,376**

* *Does not include service purchases.*

Deductions by Type

	Pension Benefits					Other Postemployment Benefits		
Year	Benefits#	Refunds	Transfers to Other Systems	Administrative	Total	Benefits	Administrative	Total
2007	$44,741,510	$ 98,628	$ 330,539	$ 605,165	$ 45,775,842	$ 10,652,642	$ 97,101	$ 10,749,743
2008	43,455,149	570,827	282,987	613,447	44,922,410	8,864,161	98,082	8,962,243
2009	46,009,029	1,076,685	406,147	758,818	48,250,679	8,899,533	123,210	9,022,743
2010	49,106,165	476,936	566,615	637,943	50,787,659	10,536,554	106,450	10,643,004
2011	57,288,210	451,682	1,797,986	948,319	60,486,197	11,092,515	159,271	11,251,786
2012	57,110,650	179,614	377,994	859,477	58,527,735	11,025,550	137,943	11,163,493
2013	61,528,826	943,433	467,462	909,929	63,849,650	12,140,996	140,676	12,281,672
2014	64,525,978	2,177,476	165,945	1,031,473	67,900,872	12,308,478	156,176	12,464,654
2015	66,213,253	857,626	160,888	1,084,161	68,315,928	11,362,048	157,150	11,519,198
2016	**65,720,438**	**1,730,725**	**416,679**	**1,352,722**	**69,220,564**	**11,676,450**	**193,246**	**11,869,696**

 # Includes death benefits.

Development of Funding Value of Retirement System Assets
December 31, 2016

		2014	2015	2016	2017	2018	2019
A.	Funding Value From Prior Year	$ 792,689,505	$ 816,098,411	**$ 846,399,059**			
B.	Market Value End of Year	848,610,417	805,644,760	**824,015,063**			
C.	Market Value Beginning of Year	836,722,779	848,610,417	**805,644,760**			
D.	Non-Investment Net Cash Flow	(38,828,939)	(35,427,596)	**(33,341,615)**			
E.	Investment Return:						
	E1. Market Total: B - C - D	50,716,577	(7,538,061)	**51,711,918**			
	E2. Assumed Rate	8.0%	8.0%	**7.75%**			
	E3. For Immediate Recognition	61,862,003	63,870,769	**64,303,939**			
	E4. Amount for Phased-In Recognition E1-E3	(11,145,426)	(71,408,830)	**(12,592,021)**			
F.	Phased-In Recognition of Investment Return:						
	F1. Current Year: 25% x E4	(2,786,357)	(17,852,208)	**(3,148,005)**			
	F2. First Prior Year	18,375,035	(2,786,357)	**(17,852,208)**	$ (3,148,005)		
	F3. Second Prior Year	4,121,007	18,375,035	**(2,786,357)**	(17,852,208)	$ (3,148,005)	
	F4. Third Prior Year	(19,333,843)	4,121,005	**18,375,035**	(2,786,355)	(17,852,206)	$ (3,148,006)
	F5. Total Recognized Phased-In	$ 375,842	$ 1,857,475	**$ (5,411,535)**	$ (23,786,568)	$ (21,000,211)	$ (3,148,006)
G.	Funding Value End of Year:						
	G1. Preliminary Funding Value End of Year: A + D + E3 + F5	$ 816,098,411	$ 846,399,059	**$ 871,949,848**			
	G2. Corridor Percent	20%	20%	**20%**			
	G3. Upper Corridor Limit: (100% + G2) x B	1,018,332,500	966,773,712	**988,818,076**			
	G4. Lower Corridor Limit: (100% - G2) x B	678,888,334	644,515,808	**659,212,050**			
	G5. Funding Value End of Year	$ 816,098,411	$ 846,399,059	**$ 871,949,848**			
H.	Difference between Market Value and Funding Value	$ 32,512,006	$ (40,754,299)	**$ (47,934,785)**	$ (24,148,217)	$ (3,148,006)	$ -
I.	Funding Value Rate of Return	8.0 %	8.2 %	**7.1 %**			
J.	Market Value Rate of Return	6.2 %	(0.9)%	**6.6 %**			

The asset valuation method recognizes assumed investment income (line E2) fully each year. Differences between actual and expected investment income (line E3) are phased-in over a closed 4-year period. When investment markets are performing well, Funding Value will tend to lag market value. When investment markets are performing poorly, Funding Value will tend to exceed market value. From a Funding standpoint, the asset valuation method is *neutral*.

Separation of Assets between Pension and Health
December 31, 2016

		Pension	Health	Total
A.	Market Value Beginning of Year	$704,225,033	$ 101,419,727	$805,644,760
B.	Member Contributions			
	B1. Pension Contributions	13,016,853		13,016,853
	B2. DROP Contributions	1,084,318		1,084,318
	B3. Retiree Health Contributions		2,918,533	2,918,533
C.	Other Contributions			
	C1. Employer Contributions	25,383,684	4,511,127	29,894,811
	C2. Transfers	356,527		356,527
	C3. Medicare Part D Reimbursement		1,433,489	1,433,489
D.	Benefits Paid			
	D1. Pension Benefits	59,842,451		59,842,451
	D2. Benefit Payments from DROP Account	5,792,987		5,792,987
	D3. HPRS Paid Retiree Health Benefits		11,364,630	11,364,630
	D4. HPRS Paid Medicare Part B Benefits		311,820	311,820
	D5. Member Paid Retiree Health Benefits		2,918,533	2,918,533
E.	Refunds of Member Contributions	1,730,725	0	1,730,725
F.	Death Benefits	85,000	0	85,000
G.	Net External Cash Flow (B + C - D - E - F)	(27,609,781)	(5,731,834)	(33,341,615)
H.	Other Changes in Market Value	45,070,404	6,641,514	51,711,918
I.	Market Value End of Year (A + G + H)	721,685,656	102,329,407	824,015,063
J.	Funding Value Adjustment	41,982,056	5,952,729	47,934,785
K.	**Funding Value End of Year** **(I + J)**	**$763,667,712**	**$108,282,136**	**$871,949,848**

Line J is allocated in proportion to Line I.

SECTION E

SUMMARY OF MEMBER DATA

Active Members as of December 31, 2016
by Attained Age and Years of Service*

Attained	Years of Service to Valuation Date							Totals	
Age	0-4	5-9	10-14	15-19	20-24	25-29	30 Up	No.	Payroll
20-24	115							115	$ 4,680,720
25-29	227	19						246	12,373,042
30-34	95	83	35					213	12,184,179
35-39	27	34	135	82	2			280	18,891,083
40		4	15	36	1			56	3,972,870
41		4	11	43	2			60	4,234,975
42	2	3	15	40	16			76	5,569,207
43		4	10	31	22			67	4,884,750
44		2	10	25	24	2		63	4,545,011
45			8	23	31	6		68	5,136,217
46	1		5	26	30	10		72	5,251,402
47			12	12	37	16		77	5,742,960
48			3	11	28	16	1	59	4,342,000
49			1	8	22	18	2	51	3,979,791
50		1		7	15	16	5	44	3,454,823
51				2	9	9	4	24	2,030,757
52				6	7	11	4	28	2,049,575
53				1	5	10	8	24	1,910,451
54		1		1	1	8	2	13	976,265
55					4	9	7	20	1,589,070
56					2		4	6	395,464
57					1	2		3	200,955
58							2	2	179,056
59							2	2	134,792
60							1	1	79,456
Totals	**467**	**155**	**260**	**354**	**259**	**133**	**42**	**1,670**	**$ 108,788,871**

** Includes 129 DROP members.*

While not used in the valuations, the following group averages are computed and shown for their general interest.

Age: 38.3 years

Service: 13.4 years

Annual Pay: $65,143

Active Members
by Ages of Entry into Service
December 31, 2016

Entry Age Nearest Birthday	Number	Cumulative Number	Percent	Cumulative Percent
Less than 18	0	0	0.00%	0.00%
18	18	18	1.08%	1.08%
19	49	67	2.93%	4.01%
20	95	162	5.69%	9.70%
21	185	347	11.08%	20.78%
22	242	589	14.49%	35.27%
23	213	802	12.75%	48.02%
24	191	993	11.44%	59.46%
25	169	1,162	10.12%	69.58%
26	110	1,272	6.59%	76.17%
27	91	1,363	5.45%	81.62%
28	69	1,432	4.13%	85.75%
29	56	1,488	3.35%	89.10%
30	45	1,533	2.70%	91.80%
31	35	1,568	2.09%	93.89%
32	42	1,610	2.52%	96.41%
33	30	1,640	1.79%	98.20%
34	19	1,659	1.14%	99.34%
35	1	1,660	0.06%	99.40%
36	0	1,660	0.00%	99.40%
37	5	1,665	0.30%	99.70%
38	1	1,666	0.06%	99.76%
39	0	1,666	0.00%	99.76%
40 & Up	4	1,670	0.24%	100.00%
Total	**1,670**			

Active DROP Members as of December 31, 2016
by Attained Age and Years of Service

Attained Ages	DROP			
	No.	Annual Benefit	Annual Pay	DROP Account Balance
48	15	$ 706,733	$ 1,172,701	$ 403,420
49	15	766,080	1,254,053	1,161,205
50	13	632,267	1,133,220	1,482,011
51	13	678,098	1,229,185	1,834,257
52	21	888,841	1,609,943	2,948,114
53	15	680,294	1,211,851	2,518,130
54	15	623,630	1,152,897	2,766,396
55	13	551,297	1,027,465	3,241,056
56	4	168,044	266,878	883,856
57	2	124,116	179,056	998,643
58	2	89,978	134,792	480,054
59	1	55,595	79,456	485,990
Totals	**129**	**$ 5,964,972**	**$ 10,451,499**	**$ 19,203,131**

Average Age: 52.3 yrs.
Average Age at DROP: 49.6 yrs.

Average Service: 28.5 yrs.
Average Service at DROP: 24.6 yrs.

Average Annual Pay: $81,019

Age and Service Pensions Being Paid December 31, 2016 by Attained Ages

Attained Ages	Number	Monthly Pensions	Number Married	Average Age of Spouse
48 & Under	5	$ 19,622	2	43
49	11	37,048	4	50
50	11	36,444	6	48
51	19	75,904	11	53
52	22	81,141	15	49
53	29	107,011	18	50
54	25	88,773	15	52
55	29	118,980	23	54
56	38	147,313	32	55
57	51	203,561	42	54
58	47	182,355	36	56
59	35	140,721	30	56
60	36	146,537	32	59
61	49	196,349	44	58
62	34	143,120	29	61
63	23	103,966	22	61
64	36	158,573	33	60
65	44	174,795	38	62
66	44	175,464	37	63
67	37	152,206	32	65
68	50	191,896	44	66
69	67	257,786	56	66
70	46	183,169	41	68
71	37	147,927	33	68
72	51	194,325	49	69
73	34	122,930	31	71
74	47	163,215	40	70
75	33	120,128	29	71
76	23	81,415	20	73
77	22	86,694	18	75
78	23	69,491	22	75
79	21	72,839	20	75
80	13	39,986	11	76
81	11	33,343	10	79
82	8	25,192	6	78
83	7	18,431	4	78
84	10	28,037	10	79
85 & Over	45	108,422	31	80
Totals	**1,173**	**$ 4,435,109**	**976**	

Disability Pensions Being Paid December 31, 2016
by Attained Age

Attained Ages	Number	Monthly Pensions	Number Married	Average Age of Spouse
29	1	$ 1,924		
30	1	2,298		N/A
31	1	5,505	1	34
34	1	2,023		N/A
36	2	4,844	2	36
37	1	3,444		N/A
38	4	10,825	2	38
39	1	1,928		N/A
41	1	2,404		N/A
42	3	7,677	2	40
43	1	2,342	1	42
44	6	17,383	4	45
45	6	16,531	5	35
46	4	11,189	3	44
47	3	9,565	3	42
48	6	17,193	3	50
49	5	13,854	4	41
50	5	13,184	3	50
51	4	11,783	3	56
52	6	19,787	2	50
53	4	12,217	4	50
54	5	18,209	3	48
55	3	12,564	3	56
56	6	18,051	5	55
57	5	15,563	4	52
58	6	17,482	4	57
59	6	19,928	3	59
60	4	12,903	3	59
61	2	7,067	2	63
63	3	9,306	3	61
64	3	8,447	2	63
65	3	9,836	3	63
66	1	1,961	1	61
67	2	5,986	2	65
68	6	14,295	5	65
69	1	2,693	1	69
70	2	5,825	1	59
72	2	5,987	1	74
73	2	4,406	2	72
79	1	3,353	0	N/A
87	1	1,901	1	83
Totals	**130**	**$383,663**	**91**	

Dependents Being Paid as of December 31, 2016
Tabulated by Attained Age

Attained Ages	Number	Monthly Pensions
14 & Under	5	$ 750
15	1	188
16	2	360
17	3	531
18	2	375
19	2	398
20	1	210
21	3	513
29	1	1,872
30	1	1,098
36	1	150
37	1	1,125
39	3	3,060
43	1	1,291
44	1	1,360
46	2	2,614
48	1	1,435
50	2	3,172
51	1	1,335
52	4	4,301
54	4	5,522
55	1	2,551
56	1	2,107
57	2	2,192
58	1	1,215
59	3	4,727
60	1	1,082
61	3	5,404
62	3	3,892
63	2	3,348
64	4	8,221
65	7	10,453
66	4	6,403
67	8	15,679
68	6	9,896
69	11	17,064
70-79	72	119,547
80-89	87	115,878
90 & Over	19	24,782
Totals	**277**	**$386,101**

Active Member Valuation Data, 2007 to 2016

Actuarial Valuation as of December 31	Number of Active Members	Annual Payroll	Average Annual Salary	% Increase in Average Pay
2007	1,597	$93,752,908	$58,706	8.8 %
2008	1,544	94,301,538	61,076	4.0
2009	1,547	94,824,789	61,296	0.4
2010	1,537	94,767,852	61,658	0.6
2011	1,520	93,126,449	61,267	(0.6)
2012	1,645	98,117,403	59,646	(2.6)
2013	1,613	98,519,844	61,079	2.4
2014	1,622	99,211,756	61,166	0.1
2015	1,621	99,983,224	61,680	0.8
2016	**1,670**	**108,788,871**	**65,143**	**5.6**

Retirants and Beneficiaries Valuation Data, 2007 to 2016

Actuarial Valuation as of December 31	Added to Rolls		Removed from Rolls		Number of People	Total Monthly Benefits	Average Benefit
	No.	Monthly Benefits	No.	Monthly Benefits			
2007	53	$ 184,644	31	$56,120	1,359	$ 3,470,329	$2,554
2008	45	211,061	33	53,298	1,371	3,628,092	2,646
2009	45	207,598	31	42,636	1,385	3,793,054	2,739
2010	64	259,964	25	41,464	1,424	4,011,554	2,817
2011	73	327,709	32	68,456	1,465	4,270,807	2,915
2012	79	281,692	47	81,957	1,497	4,470,542	2,986
2013	61	267,055	35	70,317	1,523	4,667,280	3,065
2014	66	250,714	31	60,291	1,558	4,857,703	3,118
2015	73	258,562	83 *	139,323	1,548	4,976,942	3,215
2016	**69**	**298,031**	**37**	**70,100**	**1,580**	**5,204,873**	**3,294**

* *Includes Alternate Payee records, which were combined with Participant records beginning with the December 31, 2015 valuation.*

Of the 1,580 retirants and beneficiaries as of December 31, 2016, 1,173 are service retirees, 130 are disability retirees and 277 are survivor beneficiaries. The average monthly benefits are $3,781 for service retirees, $2,951 for disability retirees and $1,394 for survivor beneficiaries.

Number of Retired Lives Covered by AETNA & Other Carriers
Comparative Schedule

	Census Date											
	12/16	**12/15**	**12/14**	**12/13**	**12/12**	**12/11**	**12/10**	**12/09**	**12/08**	**12/07**	**12/06**	**12/05**
Recipients:												
w/o Medicare A	**654**	685	645	672	702	NA	732	692	762	751	779	806
Medicare A	**821**	780	753	717	669	NA	596	580	398	503	522	437
Spouses:												
w/o Medicare A	**287**	302	325	330	355	NA	365	368	518	372	420	375
Medicare A	**386**	372	360	338	305	NA	257	267	232	242	156	187
Dependent Children	**251**	261	273	302	279	NA	216	165	167	154	168	127
Orphans	**0**	0	0	0	0	NA	0	23	26	63	33	26
Totals	**2,399**	2,400	2,356	2,359	2,310	2,269	2,166	2,095	2,103	2,085	2,078	1,958

A summary of recipients and dependents covered by AETNA, Medicare Advantage and Medical Mutual of Ohio follows:

	AETNA		Medicare Advantage		Medical Mutual		
	Network	Non-Network	Network	Non-Network	Network	Non-Network	Totals
2003	815	486			546	65	1,912
2004	783	494			568	83	1,928
2005	767	505			588	98	1,958
2006	1,279	22			749	28	2,078
2007	1,264	25			723	73	2,085
2008	1,262	2			818	21	2,103
2009	1,260	0			835	0	2,095
2010	190	0	819	0	1,157	0	2,166
2011	197	0	891	0	1,181	0	2,269
2012	183	0	975	0	1,152	0	2,310
2013	162	0	1,056	0	1,141	0	2,359
2014	0	0	1,114	0	1,242	0	2,356
2015	0	0	1,152	0	1,248	0	2,400
2016	**0**	**0**	**1,207**	**0**	**1,192**	**0**	**2,399**

Deferred Pensions as of December 31, 2016
Tabulated by Attained Age

Attained Ages	Number	Annual Pensions
46	4	$124,632
47	3	122,607
48	1	47,203
49	1	32,711
51	1	52,705
Totals	**10**	**$379,858**

A ***deferred retirant*** is a member who has left active service with at least 15 (and in most cases 20) years of service credit, and has not withdrawn his accumulated contributions. Such members are entitled to a pension upon attaining eligibility age.

SECTION F

ASSUMPTIONS USED IN THE VALUATION

Summary of Valuation Method and Assumptions
December 31, 2016

The actuarial assumptions used in the valuation are shown in this section of the report. The assumptions were established for the December 31, 2015 actuarial valuation, following a 5-year experience study covering the period January 1, 2010 through December 31, 2014. They were adopted by the Board after obtaining the advice of the Actuary and other professionals. The assumptions represent estimates of future experience.

Economic Assumptions

The investment return rate used in making the valuations was 7.75% per year, compounded annually (net after investment expenses). The real rate of return is defined to be the portion of total investment return, which is more than the wage inflation rate. Considering other financial assumptions, the 7.75% investment return rate translates to an assumed real rate of return of 4.25% over the wage inflation rate of 3.50%. In order to assume a 4.25% real return over wage inflation, it would be necessary to realize about a 5.0% real return over the assumed price inflation of 2.75%, after accounting for investment expenses and the difference between wage increases and price increases. The economic assumptions were last reviewed as part of the 5-year experience study for the period January 1, 2010 through December 31, 2014.

Pay increase assumptions for individual active members are shown for sample ages on page F-5. Part of the assumed increase at each age is for merit and/or seniority, and the other 3.50% recognizes changes in wage levels due to broad economic effects, including inflation and real wage growth.

The active member payroll is assumed to increase 3.50% annually, which is the portion of the individual pay increase assumptions attributable to broad economic effects.

The number of active members is assumed to continue at the present number.

Non-Economic Assumptions

The healthy retiree mortality tables**,** for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Healthy Annuitant Mortality Table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables. This assumption was last reviewed and updated as part of the 5-year experience study for the period January 1, 2010 through December 31, 2014.

The disabled retiree mortality tables**,** for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Disabled Mortality Table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables. This assumption was last reviewed and updated as part of the 5-year experience study for the period January 1, 2010 through December 31, 2014.

The probabilities of age and service retirement are shown on page F-5.

The probabilities of withdrawal from service, disability and death-in-service are shown for sample ages on page F-5. The pre-retirement mortality tables used were the RP-2014 employees mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables. Fifty percent of disability retirements are assumed to be non-duty related and fifty percent are assumed to be duty related. This assumption was last reviewed and updated as part of the 5-year experience study for the period January 1, 2010 through December 31, 2014.

The entry age normal actuarial cost method of valuation was used in determining liabilities and normal cost. For GASB Statement Nos. 67 and 68 purposes, the DROP entry date is assumed to be the date of retirement for normal cost purposes.

> Differences in the past between assumed experience and actual experience (“actuarial gains and losses”) become part of actuarial accrued liabilities.
>
> Unfunded actuarial accrued liabilities are amortized to produce payments (principal & interest), which are level percent of payroll contributions.

Employer contributions were assumed to be ***paid in equal installments*** throughout the employer fiscal year.

Non-Economic Assumptions (Concluded)

Present assets (cash & investments) were used with a market value adjustment that spreads differences between actual and assumed return over a closed four-year period for funding valuation purposes. Funding value is not permitted to deviate from market value by more than 20%. Details of the method may be found in the body of the funding valuation report on page D-3. Assets may be used in the valuation prior to the final audit. For GASB Statement Nos. 67 and 68 purposes, the market value of assets is used.

The data about persons now covered and about present assets were furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA) who has experience performing public plan valuations.

Single Life Retirement Values*
(7.75% Interest)

Sample Attained Ages	Present Value of $1 Monthly for Life		Future Life Expectancy (years)	
	Men	Women	Men	Women
50	$141.36	$144.00	35.01	36.73
55	135.35	138.27	30.22	31.78
60	127.87	130.81	25.65	26.99
65	118.35	121.43	21.27	22.43
70	106.37	109.80	17.09	18.12
75	92.11	95.95	13.25	14.16
80	76.22	80.24	9.86	10.63

** Applicable to calendar year 2016. Values for future years are determined using the MP-2015 projection scale.*

The present values shown above are for illustrative purposes only and do not include the value of future post-retirement increases.

Separations from Active Employment & Salary Scale

Sample Ages	Percent of Active Members Separating Within Next Year					Salary Increase Assumptions for an Individual Member			
	Disability	Death*				Service	Merit & Seniority	Base (Economic)	Increase Next Year
		Men	Women	Service	Other				
20	0.08%	0.0340%	0.0174%	1	10.00%	1-2	10.00%	3.50%	13.50%
25	0.08%	0.0419%	0.0168%	2-5	4.00%	3-5	3.00%	3.50%	6.50%
30	0.23%	0.0412%	0.0208%	6-15	1.00%	6-10	1.00%	3.50%	4.50%
35	0.42%	0.0490%	0.0305%	16-20	0.75%	11 & Up	0.30%	3.50%	3.80%
40	0.70%	0.0581%	0.0451%	21 & up	0.50%				
45	0.85%	0.0889%	0.0691%						
50	1.13%	0.1593%	0.1084%						
55	1.32%	0.2720%	0.1723%						

* *Applicable to calendar year 2016. Rates in future years are determined by the above rates and the MP-2015 projection scale.*

Probabilities of Age & Service Retirement		
Retirement Ages	Percents of Eligible Members Retiring Within Next Year with an Unreduced Benefit	Percents of Eligible Members Retiring Within Next Year with a Reduced Benefit
48	30%	3.0%
49	15%	2.0%
50	15%	2.0%
51	15%	2.0%
52	15%	
53	15%	
54	10%	
55	30%	
56	25%	
57	30%	
58	30%	
59	40%	
60 & Over	100%	

In addition, it was assumed that 100% of eligible members age 55 and older would retire upon attaining 34 years of service. A member was assumed eligible for unreduced retirement at age 48 or greater with 25 or more years of service or age 52 or greater with 20 or more years of service. A member was assumed eligible for reduced retirement at age 48 or greater with 20 or more years of service.

It was assumed that members eligible to DROP would either retire or “DROP in” at first eligibility for unreduced retirement. 100% of members still working 8 years after first reaching retirement eligibility are assumed to retire.

Additions to and Removals from Active Membership
Actual and Expected Numbers

Year Ended December 31	Number Added During Year		Retirement		Disability Retirement		Death-in-Service		Other Terminations		Active Members
	A	E	A	E	A	E	A	E	A	E	
2007	53	65.9	17	36.7	4	6.7	3	0.8	24	21.7	1,597
2008	9	71.8	27	44.8	4	6.9	0	0.8	31	19.3	1,544
2009	49	74.5	21	50.0	10	7.0	0	0.9	15	16.6	1,547
2010	51	79.7	39	54.5	4	7.1	1	0.9	17	17.2	1,537
2011	74	61.4	50	36.8	5	7.2	1	1.0	35	16.4	1,520
2012	204	63.9	37	38.8	10	7.2	1	1.0	31	16.9	1,645
2013	54	67.1	34	36.5	7	7.2	0	0.9	45	22.5	1,613
2014	84	62.3	40	36.2	3	7.4	1	0.8	31	17.9	1,622
2015	92	62.8	44	36.4	4	7.4	1	0.8	44	18.2	1,621
2016	**152**	**74.5**	**39**	**40.3**	**6**	**7.4**	**3**	**0.6**	**55**	**26.2**	**1,670**
Total	**822**	**683.9**	**348**	**411.0**	**57**	**71.5**	**11**	**8.5**	**328**	**192.9**	

A: Actual
E: Expected

The following pages summarize the removals from active membership by age group and years of accrued service.

Age and Service Retirements
During Calendar Year 2016

Age Group	Years of Accrued Service				
	15-19	20-24	25-29	30 Plus	Total
Under 20					
20-24					
25-29					
30-34					
35-39					
40-44					
45					
46					
47					
48			2		2
49		1	2		3
50			4		4
51			7		7
52		1	2		3
53			5		5
54			2		2
55			2		2
56		1	5		6
57			1	1	2
58					
59			1	1	2
60 & Over		1			1
Totals		**4**	**33**	**2**	**39**

Disability Retirements
During Calendar Year 2016

Age Group	Years of Accrued Service							
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Total
Under 20								
20-24								
25-29	1							1
30-34		1						1
35-39		1		1				2
40-44				1				1
45-49			1					1
50 & Over								
Totals	**1**	**2**	**1**	**2**				**6**

Death-in-Service Terminations
During Calendar Year 2016

Age Group	Years of Accrued Service							
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Total
Under 20								
20-24								
25-29								
30-34								
35-39				1				1
40-44								
45-49						1		1
50 & Over						1		1
Totals				**1**		**2**		**3**

Withdrew and Eligible for Deferred Benefit Terminations
During Calendar Year 2016

Age Group	Years of Accrued Service							
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Total
Under 20								
20-24								
25-29								
30-34								
35-39								
40-44								
45-49					1	3		4
50 & Over					1			1
Totals					**2**	**3**		**5**

Withdrew and Pending Contributions Termination
During Calendar Year 2016

Age Group	Years of Accrued Service 0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Total
Under 20								
20-24								
25-29								
30-34								
35-39								
40-44								
45-49								
50 & Over								
Totals								

Withdrew and Refunded Terminations
During Calendar Year 2016

Age Group	Years of Accrued Service 0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Total
Under 20								
20-24	12							12
25-29	14	1						15
30-34	6	3						9
35-39	2	4	2					8
40-44				1				1
45-49				3	1	1		5
50 & Over								
Totals	**34**	**8**	**2**	**4**	**1**	**1**		**50**

Miscellaneous and Technical Assumptions

Administrative Expenses:	For administrative expenses, a 1.20% of payroll load is added to the normal cost.
Marriage Assumption:	85% of active participants are assumed to be married for purposes of death-in-service benefits and for purposes of retiring with the automatic joint and survivor benefit.
Pay Increase Timing:	Beginning of year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Other:	Disability and turnover decrements do not operate during retirement eligibility. For death-in-service, two children are assumed to receive benefits for a 10-year period.
Miscellaneous Loading Factors:	A load of 0.75% of payroll is used to measure the effect of military service purchases. A load of $4,504,000 was included in the pension actuarial accrued liability to reflect the fact that the retiree health contribution rate for calendar year 2017 is 4.0% of payroll.

SECTION G

FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

Financial Principles and Operational Techniques of the Retirement System

Promises Made, and To Be Paid For. As each year is completed, the Retirement System in effect hands an "IOU" to each member then acquiring a year of service credit -- the "IOU" says: "The Ohio State Highway Patrol Retirement System owes you one year's worth of retirement benefits, payments in cash commencing when you qualify for retirement."

The principal related financial question is: When shall the money required to cover the "IOU" be contributed? This year, when the benefit of the member's service is received? Or, some future year when the "IOU" becomes a cash demand?

The objective of level percent-of-payroll financing is that this year's taxpayers contribute the money to cover the IOUs being handed out this year. By following this objective, ***the employer contribution rate will remain approximately level from year-to-year*** --- and will not have to be increased for future generations of taxpayers.

(There are systems which have a design for deferring contributions to future taxpayers, lured by a lower contribution rate now and putting aside the consequence that the contribution rate must then relentlessly grow much greater over decades of time.)

An inevitable by-product of the level-cost design is the accumulation of reserve assets, for decades, and the income produced when the assets are invested. ***Invested assets are a by-product and not the objective***. Investment income becomes the third contributor for benefits to employees, and is interlocked with the contribution amounts required from employees and employer.

Translated to actuarial terminology, this level-cost objective means that the contribution rates must total at least the following:

> ***Normal Cost*** (the value assigned to service being rendered this year)
> . . . plus . . .
> ***Interest on Unfunded Actuarial Accrued Liabilities*** (the difference between liabilities for service already rendered and the accrued assets of the Retirement System).

Computing Contributions To Support System Benefits From a given schedule of benefits and from the employee data and asset data furnished by the system, the actuary determines the contribution rates to support the benefits, by means of ***an actuarial valuation***.

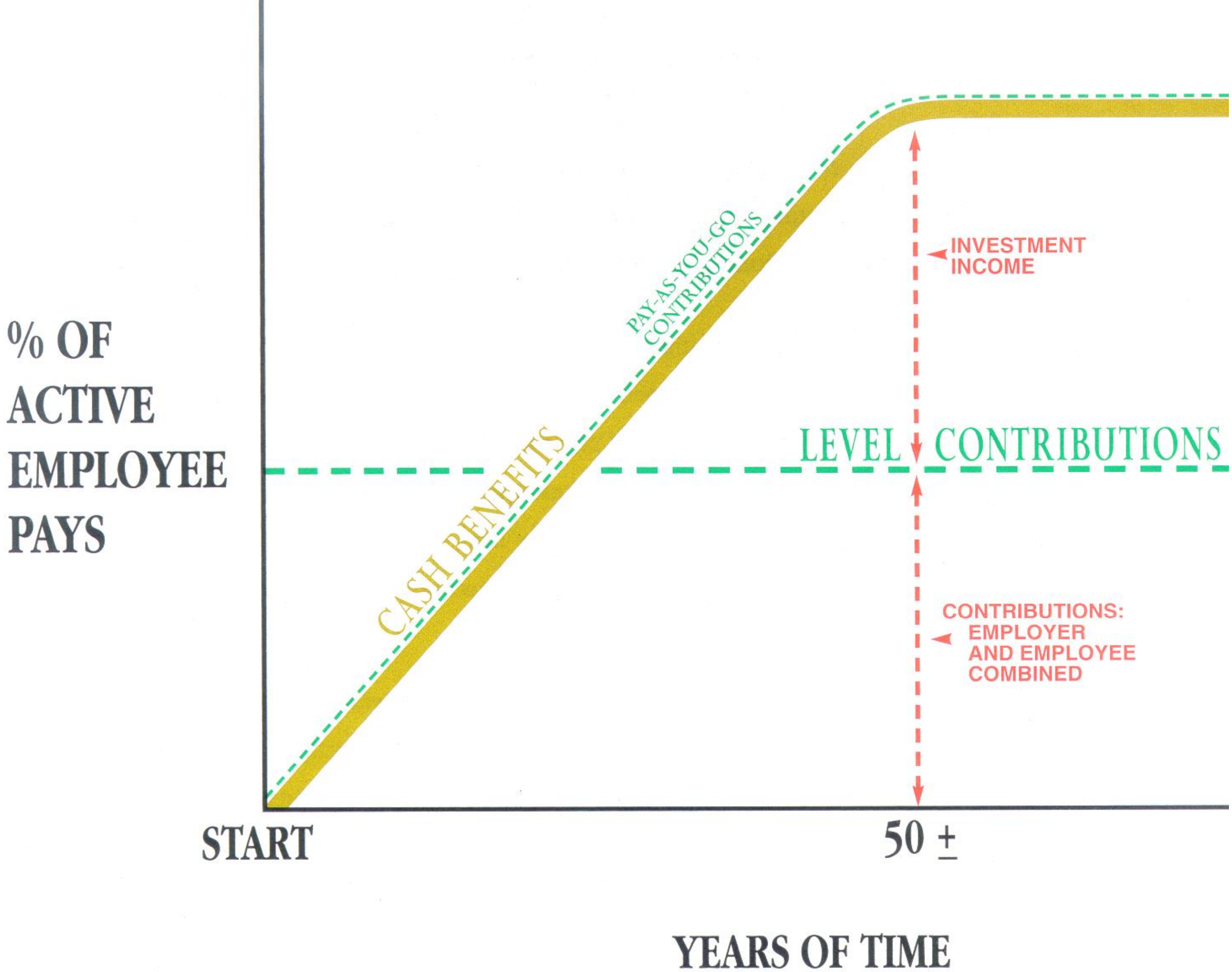
An actuarial valuation has a number of ingredients such as: the rate of investment return which plan assets will earn; the rates of withdrawal of active members who leave covered employment; the rates of mortality; the rates of disability; the rates of pay increases and the assumed age or ages at actual retirement.

In an actuarial valuation the actuary must assume what the above rates will be, for the next year and for decades in the future. Only the subsequent actual experience of the plan can indicate the degree of accuracy of the assumptions.

(Concluded on Next Page)

Financial Principles and Operational Techniques of the Retirement System (Concluded)

Reconciling Differences Between Assumed Experience and Actual Experience Once actual experience has occurred and has been observed, it will not coincide exactly with assumed experience, regardless of the skill of the actuary and the many calculations made. Most retirement systems cope with such differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is ***continuing adjustments to the financial position***.



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits.

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

- Economic Risk Areas
  - Rates of investment return
  - Rates of pay increase
  - Changes in active member group size
- Non-Economic Risk Areas
  - Ages at actual retirement
  - Rates of mortality
  - Rates of withdrawal of active members (turnover)
  - Rates of disability

Actuarial Valuation Process

The ***actuarial valuation*** is the mathematical process by which the contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

A. ***Covered people data*** furnished by plan administrator, including:
   Retired lives now receiving benefits
   Former employees with vested benefits not yet payable
   Active employees

B. + ***Asset data*** (cash & investments), furnished by the plan administrator

C. + ***Benefit provisions*** which specify eligibility and amounts of pensions

D. + ***Assumptions concerning future experience in various risk areas***, which are established by the Retirement Board after consulting with the actuary

E. + ***The funding method*** for employer contributions (the long-term, planned pattern for employer contributions)

F. + ***Mathematically combining the assumptions, the funding method, and the data***

G. = Determination of:
   Plan Financial Position and/or
   New Employer Contribution Rate

Meaning of “Unfunded Actuarial Accrued Liabilities”

“Actuarial accrued liabilities” are ***the portion of the present value of plan promises to pay benefits in the future that are not covered by future normal cost contributions***. A liability has been established (“accrued”) because the service has been rendered but the resulting monthly cash benefit may not be payable until years in the future. Actuarial accrued liabilities are the result of complex mathematical calculations, which are made by the plan’s actuary.

If “actuarial accrued liabilities” exceed the plan’s accrued assets (cash & investments), the difference is ***“unfunded actuarial accrued liabilities.”*** This is the usual condition. If the plan’s assets equaled the plan’s “actuarial accrued liabilities,” then the plan would be termed “fully funded.” This is an unusual condition.

Each time a plan adds a new benefit, which applies to service already rendered, an “actuarial accrued liability” is created, which is also an “unfunded actuarial accrued liability” because the plan can’t print instant cash to cover the value of the new benefit promises. Payment for such unfunded actuarial accrued liabilities is spread over a period of years, commonly in the 15-30 year range.

Unfunded actuarial accrued liabilities can occur in another way: if actual plan experience is less favorable than assumed plan experience, the difference is added to unfunded actuarial accrued liabilities. In plans where benefits are directly related to an employee’s pay near time of retirement, unfunded actuarial accrued liabilities rose dramatically during the 1970’s. Unexpected rates of pay increase created additional actuarial accrued liabilities, which could not be matched by reasonable investment results. More recent experience has generally been more favorable with some reductions in unfunded actuarial accrued liabilities.

The existence of unfunded actuarial accrued liabilities is not bad, but the changes from year to year in the amount of unfunded actuarial accrued liabilities are important, --- “bad” or “good” or somewhere in between.

Even though unfunded actuarial accrued liabilities don’t constitute a bill payable immediately, it is important that policy-makers prevent the amount from becoming unreasonably high and ***it is vital for plans to have a sound method for making payments toward them*** so that they are controlled.

GRS Retirement Consulting

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August 24, 2017

Mr. Mark R. Atkeson, Executive Director
Ohio State Highway Patrol Retirement System
Mettler Toledo Building
1900 Polaris Parkway, Suite 201
Columbus, OH 43240

Dear Mark:

Enclosed are 4 bound copies of the December 31, 2016 actuarial valuation of the Ohio State Highway Patrol Retirement System.

Sincerely,

Mita Drazilov

Mita D. Drazilov, ASA, FCA, MAAA

MDD:dks:dj
Enclosures

cc: Schneider Downs
Attn: Mr. Matt McNeal (+1 report copy)