

# Bay County Employees' Retirement System

Annual Actuarial Valuation Report  
for Bay-Arenac Behavioral Health Authority  
December 31, 2016



# Contents

<b>Section</b>	<b>Page</b>	
		<b>Introduction</b>
A	1-2	<b>Executive Summary</b>
B		<b>Valuation Results and Comments</b>
	1	Financial Objective
	2	Computed Contributions
	3	Determining Dollar Contributions
	4	Determination of Unfunded Accrued Liability
	5	Comments
	6	Disclosures
	7	Experience Gain/(Loss)
	8	Investment Gain/(Loss)
	9	Assets and Accrued Liabilities
	10	Computed Contributions - Comparative Statement
C		<b>Summary of Benefit Provisions and Valuation Data</b>
	1-2	Brief Summary of Plan Provisions
	3-4	Reported Financial Information
	5-7	Retired Life Data
	8	Inactive Member Data
	9-11	Active Member Data
D		<b>Actuarial Cost Methods and Actuarial Assumptions</b>
	1	Valuation Methodology
	2-6	Actuarial Assumptions
	7	Miscellaneous and Technical Assumptions
E		<b>Financial Reporting</b>
	1	Schedule of Funding Progress
	2	Schedule of Employer Contributions

September 29, 2017

Board of Trustees  
Bay County Employees'  
Retirement System  
Bay City, Michigan

**Re: Bay-Arenac Behavioral Health Authority Actuarial Valuation as of December 31, 2016**

Dear Board Members:

The results of the December 31, 2016 Annual Actuarial Valuation of the Bay County Employees' Retirement System – Bay-Arenac Behavioral Health Authority (BABH) are presented in this report.

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.

The computed contribution rate shown on page A-1 may be considered as a minimum contribution rate that complies with Board's funding policy. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. 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.

The purposes of the valuation are to measure the System's funding progress, and to determine the employer contribution rate for the calendar year ending December 31, 2018. This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

The findings in this report are based on data and other information through December 31, 2016. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

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

The valuation was based upon information furnished by the County, concerning Retirement System benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the County.


In addition, this report was prepared using certain assumptions approved by the Board, as described in the section of this report entitled Actuarial Cost Methods and Actuarial Assumptions.

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

James D. Anderson and Shana M. Neeson 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.

The signing actuaries are independent of the plan sponsor.

Respectfully submitted,

  
James D. Anderson, FSA, EA, MAAA

  
Shana M. Neeson, ASA, MAAA

JDA/SMN:bd



## **SECTION A**

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### **EXECUTIVE SUMMARY**

## 1. Required Employer Contributions - Calendar Year Beginning *January 1, 2018*

The computed employer contributions **exclusive of employer paid "member" contributions** are as follows:

Division	Valuation Year	Contribution Rate	
		12/31/2015	12/31/2016
	<b>Calendar Year</b>	<b>1/1/2017</b>	<b>1/1/2018</b>
BABH		8.95 %	9.27 %

## 2. Funded Ratio Comparison

The funding percentage for BABH is shown below.

Division	Funded Ratio	
	12/31/2015	12/31/2016
BABH	96 %	97 %

This year valuation assets represent 96.9% of accrued liabilities; last year the ratio was 96.4%. If the valuation results were based on market value of assets instead of smoothed funding value, the funded percent of the plan would be 96.5%.

## 3. Reasons for Change

There are three general reasons why contribution rates change from one valuation to the next. The first is a change in the benefits or eligibility conditions of the plan. The second is a change in the valuation assumptions used to predict future occurrences. The third is the difference during the year between the plan's actual experience and what the assumptions predicted.

As a result of the Experience Study performed earlier this year, various assumptions and methods used in the actuarial valuation were changed. Please refer to the report on the Experience Study as well as the assumptions section of this report for details on which assumptions were revised for this valuation.

There were no changes in benefits.

#### **4. 2016 Plan Experience**

The aggregate experience during 2016 was favorable, with an overall gain/(loss) of \$1,834,407. The detailed gain/(loss) information is shown on page B-7.

Investment return on the market value of assets for calendar year 2016 exceeded the assumed rate of return for the valuation. However, the asset smoothing method only recognizes 20% of a given year's investment gain or loss. Partial recognition of gains and losses from prior years along with this year's gain resulted in an overall gain on the funding value of assets. In addition to the investment experience gain, there was a non-investment gain due to greater member termination than expected.

#### **5. Retiree Reserve Balance**

The retiree accrued liabilities are larger than the reported retiree reserve balances. For detail see Comment A on page B-5.

#### **6. Looking Ahead**

Investment income greater than or less than expected based on the investment return assumption, is recognized over a 5-year period under the current asset valuation method. As of December 31, 2016, the funding value of assets was 100% of market value. Due to investment performance during the previous five years, unrecognized investment gains and losses exist that are scheduled to be recognized over the next four years. This is expected to put downward pressure on the required contribution amounts calculated in the 2017 valuation and upward pressure on the required contribution amounts calculated in the 2018 and 2019 valuations.

## **SECTION B**

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### **VALUATION RESULTS AND COMMENTS**



## Financial Objective

The financial objective of the Retirement System is to establish and receive contributions, expressed as a percentage of active member payroll, which will remain approximately level from year-to-year and will not have to be increased for future generations of citizens.

Your annual actuarial valuations determine how well the objective is being met.

The Board of Trustees of the Bay County Employees' Retirement System confirms that the System provides for payment of the required employer contribution as described in Section 20m of Michigan Public Act No. 728 of 2002.

## Contribution Rates

The Retirement System is supported by contributions from the employers, by member contributions and by the investment income earned on System assets. For some divisions, the required member contributions are paid by the Employer either through contributions to the System or by transferring funds from the employer reserves to the employee reserves. In addition, the Employer provides an actuarially determined contribution.

Member and Employer contributions cover both: i) normal cost, and ii) the financing of the unfunded accrued liability over a period of future years. The normal cost is the portion of System costs allocated to the current year by the valuation method described on page D-1. The unfunded accrued liability is the portion of System costs not covered by present System assets and future normal costs.

The contribution requirements for the calendar year beginning January 1, 2018 are presented on page B-2.

## Contributions to Provide Benefits Member Portion and Employer Portion Calendar Year Beginning January 1, 2018

Contributions for	% of Active Payroll BABH
Normal cost of benefits:	
Age & service	9.96 %
Disability	0.34
Death-in-service	0.26
Total	10.56
Member contributions <sup>#</sup> :	
Total	4.00
Future refunds	0.60
Available for pensions	3.40
Administrative expenses	0.50
Employer normal cost	7.66
Unfunded accrued liability ERIP <sup>^</sup>	1.28
Unfunded accrued liability	0.33
<b>Computed Employer Rate</b>	<b>9.27 %</b>

<sup>#</sup> The member contributions are paid by the employer, either by directly contributing to the Retirement System or by transferring funds from employer reserves to employee reserves.

<sup>^</sup> Unfunded accrued liability associated with the Early Retirement Incentive Program (ERIP).

Unfunded actuarial accrued liabilities were amortized as a level percent of member payroll over a closed period of 26 years. The increase in unfunded actuarial accrued liability associated with the ERIP was amortized over a period of 10 years starting with the contribution for the calendar year beginning January 1, 2015.

**The procedure for determining dollar contribution amounts** is shown on page B-3.

Page B-4 displays the unfunded accrued liabilities (asset surpluses) that are amortized by the contribution rates shown above.

## Determining Dollar Contributions

For any period of time, the percent-of-payroll contribution rates need to be converted to dollar amounts. We recommend one of the following procedures:

- (1) Contribute dollar amounts for a period which are equal to the employer's percent-of-payroll contribution requirement multiplied by the covered active member payroll for the period. Adjustments should be made as necessary to exclude items of pay that are not covered compensation for Retirement System benefits and to include non-payroll payments that are covered compensation; or
- (2) Contribute the dollars based on the table shown below.

<u>Group:</u>	<u>BABH</u>
Contribution:	\$1,048,375

This amount is based on the payroll information provided for the valuation.

## Timing of Contribution Payments

The contribution requirements in this report anticipate regular payments throughout the year. Examples would be at each payroll date or in 12 monthly installments. If the employer contribution pattern is significantly different, an adjustment to the costs may be appropriate. For example, a lump sum contribution at the beginning of the year is available for investment throughout the year and, therefore, ought to be somewhat smaller than 12 monthly payments. Similarly, a lump sum contribution at the end of the year will not generate any investment income that year.

## Determination of Unfunded Accrued Liability

	BABH
A. Accrued liability	
1. For retirees and beneficiaries	\$ 30,422,314
2. For vested terminated members	2,641,149
3. For present active members	
a. Value of expected future benefit payments	29,098,965
b. Value of future normal costs	10,360,763
c. Active member liability: (a) - (b)	18,738,202
4. Total actuarial accrued liability	51,801,665
B. Valuation assets	50,204,835
C. Unfunded accrued liability (Excess assets)*: (A.4) - (B)	1,596,830
D. Funding ratio: (B) / (A.4)	96.9%

\* The outstanding unfunded accrued liability balance associated with the ERIP is \$1,037,287 as of December 31, 2016.

## Comments

**Comment A:** We developed the value of anticipated future benefit payments to retired members and their beneficiaries. We then compared this accrued liability to the reported value of the retirement reserve account. The figures below compare the retired liabilities and reserves.

Division	Retiree Accrued Liability	Reported Retiree Reserve	Unfunded Retiree Liability
BABH	\$30,422,314.00	\$26,625,097.98	\$3,797,216.02

As of the valuation date, there is a shortfall in the retiree reserve. This valuation anticipates that the difference between the accrued liability and the reported reserve will be transferred from the Retirement System employer reserve to the retiree reserve effective January 1, 2017 to fully fund the retiree accrued liability.

**Comment B:** Contribution rates increased during the year from 8.95% to 9.27% primarily due to changes in the actuarial assumptions. This was partially offset by favorable investment performance and from greater member termination than expected.

**Comment C:** The chart on page B-7 shows the experience gain/(loss) for 2016. Non-investment experience during 2016 was favorable. The development of the investment gain/(loss) is shown on page B-8.

**Comment D:** The introduction of GASB Statements No. 67 and No. 68 served to completely disconnect pension accounting from pension funding. This means that the Annual Required Contribution is no longer applicable. As part of good governance, we would be happy to supply the Board with a draft funding policy for consideration. In particular, this document would codify methods, assumptions and other key items related to pension funding, including perhaps a minimum contribution equal to a percentage of the normal cost for plans that are currently overfunded.

# Disclosures

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

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.25% on the actuarial value of assets), then the following outcomes are expected:

1. The employer normal cost as a percentage of pay is expected to remain level as a percentage of payroll.
2. The unfunded liability is expected to be paid off in approximately 26 years, which is the number of years remaining in the closed amortization schedule of the unfunded liability. The unfunded liability associated with the ERIP is expected to be paid off in approximately 8 years, which is the number of years remaining in the closed ERIP amortization schedule of the unfunded liability.
3. The funded status of the plan is expected to reach a 100% funded ratio in approximately 26 years, which is the number of years remaining in the closed amortization schedule of the unfunded liability.

## 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 regards 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.
2. The measurement is inappropriate for assessing the need for or the amount of future employer 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.

## Determination of Experience Gain/(Loss) Year Ended December 31, 2016

Actual experience will never (except by coincidence) exactly match assumed experience. It is hoped that gains and losses will cancel each other over a period of years, but sizable year-to-year fluctuations are common. Detail on the determination of the experience gain/(loss) is shown below:

	<b>BABH</b>
(1) UAAL at start of year	\$ 1,729,366
(2) Normal cost for the year 2016	1,216,803
(3) Actual employer & employee contributions	(1,759,589)
(4) Net interest accrual on (1), (2) and (3)	109,593
(5) Expected UAAL before changes: (1) + (2) + (3) + (4)	1,296,173
(6) Change from benefit changes	-
(7) Change from revised actuarial assumptions and methods	2,135,064
(8) Expected UAAL after changes: (5) + (6) + (7)	3,431,237
(9) Actual UAAL at end of year	1,596,830
(10) Gain/(Loss): (8) - (9)	1,834,407
(11) Actuarial accrued liabilities at start of year	48,624,039
(12) Gain/(Loss) as a percent of actuarial accrued liabilities at start of year: (10)/(11)	3.8%

## Development of Valuation Investment Gain/(Loss) Year Ended December 31, 2016

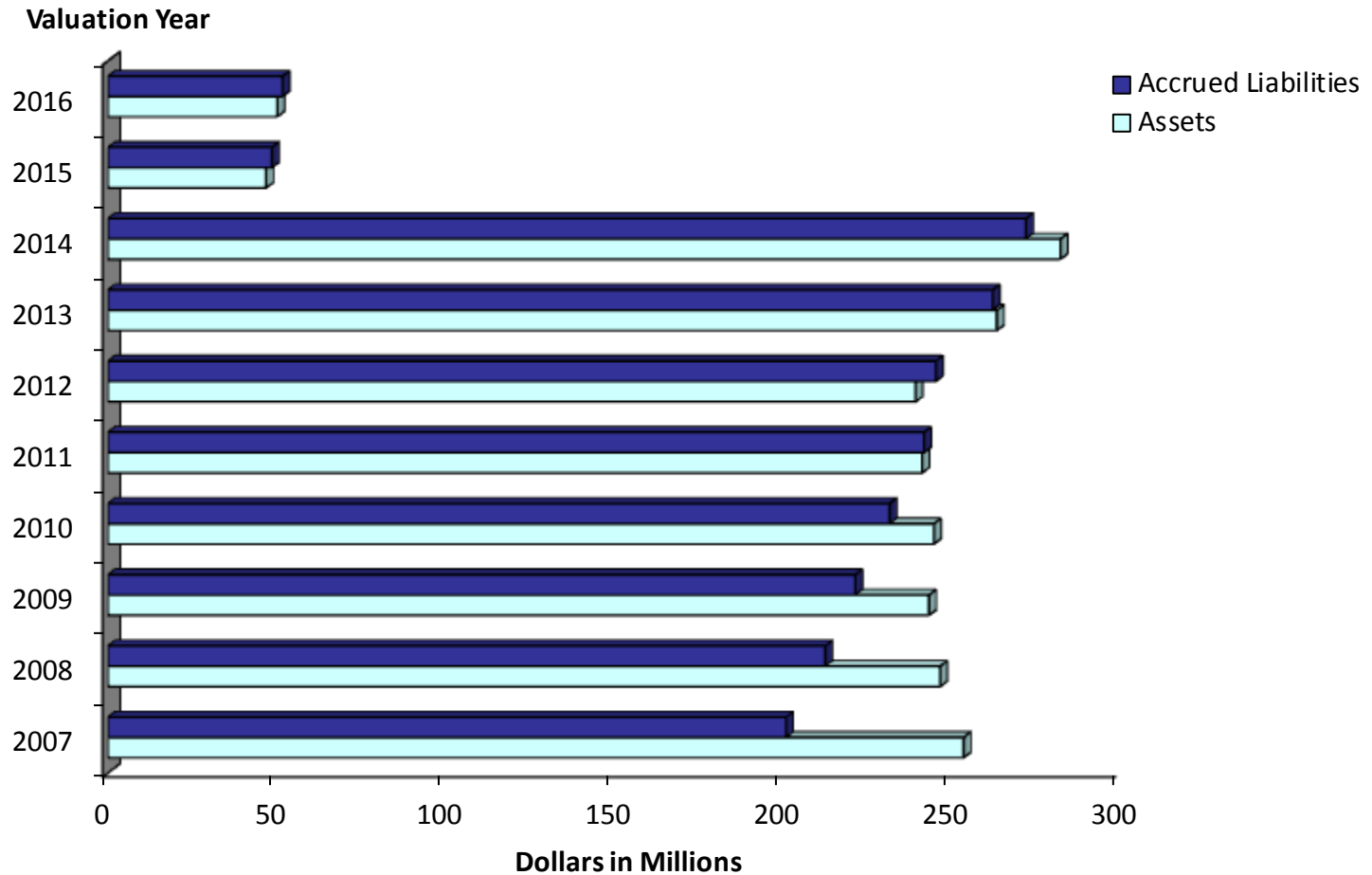
We anticipate an average return on valuation assets of 7.25% for future years. The chart below details the development of the investment gain/(loss) for the entire Bay County Employees' Retirement System, including BABH.

(1) Total 2016 valuation investment income:	\$ 28,718,626
(2) Average valuation assets:	290,015,380
(3) Expected investment income: $(.075) \times (2)$	21,751,154
(4) Gain/(Loss): $(1) - (3)$	6,967,472
(5) Valuation rate of return for 2016: $(1) / (2)$	9.90 %

Please note that this analysis uses asset values and investment income as defined for the actuarial valuation. It is not, therefore, appropriate as a measure of manager performance.



## Assets and Accrued Liabilities



*For Valuation Years prior to 2015, the results displayed are for the entire Retirement System (including BABH). Beginning with the Valuation Year 2015, the results displayed are for BABH.*

2007 assets equaled 126.2% of accrued liabilities.

2016 assets equaled 96.9% of accrued liabilities.

## Computed Contributions - Comparative Statement

Valuation Date	Valuation Payroll			Annual Dollar Requirement	Employer Requirements as Percents of Valuation Payroll@						
	Total	Average	% Incr.		General County	DWS+	Library+	BABH+	Medical Care Facility	Sheriff's Department	Road Commission
12/31/1997 #	\$32,216,234	\$28,739	3.2 %	\$ 248,762	0.00 %				0.00 %	0.00 %	9.15 %
12/31/1998 #	34,308,505	29,885	4.0	45,010	0.00				0.00	0.00	1.67
12/31/1999 #	35,763,978	31,072	4.0	0	0.00				0.00	0.00	0
12/31/2000 #	38,314,967	32,090	3.3	0	0.00				0.00	0.00	0.00
12/31/2001 #*	39,761,644	33,218	3.5	0	0.00	0.00 %	0.00 %	0.00 %	0.00	0.00	0.00
12/31/2002	41,331,916	33,658	1.3	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/31/2003 *	43,053,950	35,175	4.5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/31/2004 #	43,550,999	36,202	2.9	405,110	0.00	0.00	0.68	1.11	0.00	0.00	8.19
12/31/2005	43,104,046	36,010	(0.5)	588,948	0.00	0.00	1.60	2.53	0.00	0.00	9.34
12/31/2006 #	42,024,045	37,455	4.0	644,945	0.00	0.00	0.00	3.24	0.00	0.00	10.82
12/31/2007 #	44,687,752	39,269	4.8	688,871	0.00	0.00	0.00	3.70	0.00	0.00	9.17
12/31/2008	46,482,897	39,695	1.1	1,578,548	0.00	4.44	0.00	6.95	2.32	0.00	14.13
12/31/2009 ^	47,244,573	40,208	1.3	2,443,118	0.00	7.40	2.74	8.83	5.05	0.00	17.64
12/31/2010	47,090,560	40,771	1.4	3,074,891	1.19	11.71	6.91	9.08	7.36	0.00	18.05
12/31/2011 #	48,583,176	41,702	2.3	4,289,438	4.08	13.77	9.89	10.17	9.57	0.00	20.78
12/31/2012 *	48,571,798	41,444	(0.6)	4,038,100	3.87	15.75	9.26	10.01	7.22	0.55	21.32
12/31/2013 #§	44,535,708	39,447	(4.8)	4,477,504	0.03	15.72	\$ 89,491	27.04	4.20	0.00	19.14
12/31/2014	46,494,417	40,081	1.6	2,535,295	0.00	14.16	34,265	11.36	2.87	0.00	18.09
12/31/2015	10,331,351	46,961	N/A	990,514				8.95			
12/31/2016 *	10,608,566	48,221	2.7	1,048,375				9.27			

For Valuation Dates prior to 2015, the results displayed are for the entire Retirement System (including BABH). Beginning with the 2015 Valuation Date, the results displayed are for BABH.

+ Prior to 12/31/2001 included with General County.

# Retirement System amended.

\* Revised actuarial assumptions or methods.

^ Implementation of a one year lag between valuation date and first day of the calendar year to which the contributions apply.

@ Beginning with the 2013 valuation, the Library contribution is calculated as a level dollar amount, since the Library is closed to future hires.

§ Contribution reflects an advanced payment of the BABH unfunded ERIP liability.

## SECTION C

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### **SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA**

## Brief Summary of Plan Provisions as of December 31, 2016

Division		Retirement Eligibility		
No.	Name	Normal	Early	Deferred
23	Behavioral Health AFSCME	Age 55 with 30 yrs of svc or age 60 with 8/62 with 10 <sup>~</sup> yrs of svc	Age 55 with 8/10 <sup>~</sup> yrs of svc	8/10 <sup>~</sup> yrs of svc
24	Behavioral Health General	Age 55 with 30 yrs of svc or age 60 with 8/62 with 10 <sup>&amp;</sup> yrs of svc	Age 55 with 8/10 <sup>&amp;</sup> yrs of svc	8/10 <sup>&amp;</sup> yrs of svc

~ 10 yrs of svc (age 62 with 10 yrs of svc) for members hired on or after 10/1/2014.

& 10 yrs of svc (age 62 with 10 yrs of svc) for members hired after 1/1/2015.

Eligibility	Amount
	<b>NORMAL RETIREMENT</b>
See chart above.	<p>Total service times FAC times:</p> <ul style="list-style-type: none"> <li>2.00% for division 23 hired before 10/1/2014</li> <li>2.25% for division 24 hired on or before 1/1/2015</li> <li>1.60% for division 23 hired on or after 10/1/2014</li> <li>1.60% for division 24 hired after 1/1/2015</li> </ul> <p>Maximum County-financed is 75% of FAC.</p> <p>Type of FAC - Highest 5 years. Some lump sums included.</p>
	<b>EARLY RETIREMENT</b>
See chart above.	Normal retirement reduced to the actuarial equivalent of a pension at normal retirement age (age 62 for division 23 hired on or after 10/1/2014 and division 24 hired after 1/1/2015, age 60 for all others).
	<b>DEFERRED RETIREMENT</b>
Service condition as indicated in the chart above. Benefit begins at age 60 (age 62 for division 23 hired on or after 10/1/2014 and division 24 hired after 1/1/2015) or reduced at age 55.	Computed as a normal retirement but based on service and final average compensation at time of termination.
	<b>NON-DUTY DEATH-IN-SERVICE</b>
10 or more years of credited service at any age.	Computed as a normal retirement but actuarially reduced in accordance with a 100% joint and survivor election.

# Brief Summary of Plan Provisions as of December 31, 2016 (Concluded)

## Eligibility

## Amount

### DUTY DEATH-IN-SERVICE

No age or service requirements. Benefits begin upon termination of Worker's Compensation.

To the spouse, a refund of accumulated contributions plus a benefit equal to the Worker's Compensation amount. Unmarried children under 18 and parents receive a benefit equal to the Worker's Compensation amount.

### NON-DUTY DISABILITY

10 or more years of credited service.

Computed as a normal retirement. Worker's Compensation payments may be offset.

### DUTY DISABILITY

No age or service requirements.

Computed as a normal retirement with additional service credit granted to age 55. Worker's Compensation payments may be offset.

### POST-RETIREMENT COST-OF-LIVING ADJUSTMENTS

One-time increases have been granted.

### MEMBER CONTRIBUTIONS

4% of annual compensation.

The employer pays the member contribution either by directly contributing to the Retirement System or by transferring funds from the employer to the employee reserves.

### EMPLOYER CONTRIBUTIONS

Actuarially determined amounts which, together with member contributions, are sufficient to cover both: i) normal costs of the plan, and ii) financing of unfunded accrued liabilities over a selected period of future years.

**Reported Financial Information**  
**Year Ended December 31, 2016**  
**Bay County Employees' Retirement System (in Total)**  
**(Market Value)**

**Revenues and Disbursements during 2016**

**Revenues:**

a. Employee contributions	\$ 2,275,749	
b. Employer contributions	3,201,872	
c. Investment income	24,476,867	
d. Miscellaneous income	<u>0</u>	
e. Total		\$29,954,488

**Disbursements:**

a. Benefits paid	\$ 16,953,468	
b. Refunds of member contributions	268,593	
c. Administrative expenses	341,927	
d. Investment expenses	<u>1,837,755</u>	
e. Total		<u>\$19,401,743</u>

**Reserve Increase:**

Total revenues minus total disbursements	<u><u>\$10,552,745</u></u>
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**Assets and Reserves as of December 31, 2016**

**Assets:**

a. Cash & equivalents <sup>#</sup>	\$ (398,935)
b. Short term investments	9,132,283
c. Stocks	205,474,886
d. Bonds	74,758,157
e. Real Estate	22,215,298
f. Other <sup>^</sup>	<u>319,285</u>
Total	<u><u>\$311,500,974</u></u>

**Reserve Accounts:**

a. Employee contributions	\$ 28,652,944
b. Reserve for benefits now being paid	151,008,843
c. Reserve for future benefits	131,839,187
Total	<u><u>\$311,500,974</u></u>

<sup>#</sup> Adjusted for accruals net of payables and deferred inflows of resources.

<sup>^</sup> Adjusted for deferred outflow of resources.

## Development of Valuation Assets Bay County Employees' Retirement System (in Total) December 31, 2016

	2015	2016	2017	2018	2019	2020
1. Beginning of Year Assets						
a) Market Value	\$308,140,893	\$300,948,229				
b) Valuation Assets	282,166,070	296,058,563				
2. End of Year Market Value Assets	300,948,229	311,500,974				
3. Net Additions to Market Value						
a) Net Contributions	7,186,980	5,477,621				
b) Net Investment Income = (3d) - (3a) - (3c)	2,326,388	22,639,112				
c) Benefit Payments, Refunds, and Admin. Expenses	(16,706,032)	(17,563,988)				
d) Total Additions to Market Value = (2) - (1a)	(7,192,664)	10,552,745				
4. Average Valuation Assets = (1b) + .5 x [(3a) + (3c)]	277,406,544	290,015,380				
5. Expected Income at Valuation Rate = 7.5% x (4)	20,805,491	21,751,154				
6. Gain/(Loss) = (3b) - (5)	(18,479,103)	887,958				
7. Phased-In Recognition of Investment Return						
a) Current Year: 0.2 x (6)	(3,695,821)	177,592				
b) First Prior Year	760,386	(3,695,821)	\$ 177,592			
c) Second Prior Year	7,666,474	760,386	(3,695,821)	\$ 177,592		
d) Third Prior Year	2,058,840	7,666,474	760,386	(3,695,821)	\$ 177,592	
e) Fourth Prior Year	(4,183,825)	2,058,841	7,666,475	760,386	(3,695,819)	\$ 177,590
f) Total Recognized Investment Gain	2,606,054	6,967,472	4,908,632	(2,757,843)	(3,518,227)	177,590
8. Change in Valuation Assets (3a) + (3c) + (5) + (7f)	13,892,493	16,632,259				
9. End of Year Assets						
a) Market Value = (2)	300,948,229	311,500,974				
b) Valuation Assets = (1b) + (8)	296,058,563	312,690,822				
c) Difference Between Market & Valuation Assets	4,889,666	(1,189,848)	(6,098,480)	(3,340,637)	177,590	0
10. Recognized Rate of Return = [(5) + (7f)] / (4)	8.44 %	9.90 %				
11. Market Rate of Return = 2 x (3b) / [(1a) + (2) - (3b)]	0.77 %	7.68 %				
12. Market Value of Assets for BABH	47,669,180	50,013,796				
13. Funding Value of Assets for BABH	46,894,673	50,204,835				

## Retirees and Beneficiaries Comparative Schedule

Year Ended	Added to Rolls*		Removed from Rolls		Rolls End of Year		% Incr. in	Average	Discounted	
	No.	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances <sup>#</sup>	Annual Allowances	Allowance	Total	Average
12/31/1992	15	\$ 157,350	4	\$ 8,780	345	\$ 1,889,717	8.5 %	\$ 5,477	\$ 18,909,686	\$ 54,811
12/31/1993	27	306,059	3	16,365	369	2,179,407	15.3	5,906	21,666,249	58,716
12/31/1994	18	131,596	14	50,875	373	2,260,128	3.7	6,059	22,112,422	59,283
12/31/1995	24	261,820	12	31,551	386	2,490,397	10.2	6,452	24,080,999	62,386
12/31/1996	29	404,810	7	55,615	408	2,839,592	14.0	6,960	27,838,060	68,231
12/31/1997	28	392,818	8	44,327	428	3,188,083	12.3	7,449	31,558,085	73,734
12/31/1998	24	393,550	7	46,973	445	3,534,660	10.9	7,943	34,794,848	78,191
12/31/1999	23	295,915 @	29	83,717	439	3,746,858	6.0	8,535	36,670,326	83,531
12/31/2000	46	645,474	27	201,656	458	4,190,676	11.8	9,150	40,970,172	89,455
12/31/2001	31	732,306 @	13	45,724	476	4,877,258	16.4	10,246	46,616,261	97,933
12/31/2002	34	464,636	18	126,234	492	5,215,660	6.9	10,601	49,634,941	100,884
12/31/2003	37	514,935	17	72,960	512	5,657,635	8.5	11,050	53,369,747	104,238
12/31/2004	95	2,073,773	16	133,099	591	7,598,309	34.3	12,857	74,362,328	125,825
12/31/2005	43	786,641	26	170,645	608	8,214,306	8.1	13,510	80,594,476	132,557
12/31/2006	39	844,464	24	579,276	623	8,479,494	3.2	13,611	85,797,333	137,716
12/31/2007	29	423,246	14	93,660	638	8,809,080	3.9	13,807	88,063,580	138,031
12/31/2008	47	725,060	26	204,104	659	9,330,036	5.9	14,158	92,573,860	140,476
12/31/2009	58	1,303,182	34	338,544	683	10,294,674	10.3	15,073	102,921,818	150,691
12/31/2010	46	1,166,301	24	210,133	705	11,250,842	9.3	15,959	112,893,161	160,132
12/31/2011	51	953,802	16	199,264	740	12,005,380	6.7	16,223	119,532,453	161,530
12/31/2012	58	1,114,368	12	127,382	786	12,992,366	8.2	16,530	126,736,278	161,242
12/31/2013	98	2,545,500	1	20,928	883	15,516,938	19.4	17,573	153,936,777	174,334
12/31/2014	35	826,083	2	10,254	916	16,332,767	5.3	17,831	159,912,340	174,577
12/31/2015	3	82,645	2	9,425	120	2,800,532	N/A	23,338	29,345,292	244,544
12/31/2016	4	96,939	2	34,334	122	2,863,137	2.2	23,468	30,422,314	249,363

For Years Ended prior to 2015, the results displayed are for the entire Retirement System (including BABH). Beginning with the Year Ended 2015, the results displayed are for BABH.

\* Includes survivors of deceased retirees and annual allowance adjustments.

@ Includes one-time benefit increases.

# Annual Allowances based on pre-change age amount for members with applicable pension benefit types.



## Retirees and Beneficiaries December 31, 2016 Tabulated by Type of Pension Paid

Type of Pensions Being Paid	BABH
Regular	57
A - 10-Year Certain	8
B - 100% J & S	32
C - 50% J & S	11
Social Security Equated	
- Regular	4
- 10-Year Certain	1
- 100% J & S	2
- 50% J & S	1
Survivor	6
<b>Total Pensions Being Paid</b>	<b>122</b>

## Retirees and Beneficiaries December 31, 2016 Tabulated by Attained Age\*

Attained Age	BABH	
	No.	Annual Allowances
40 - 44	1	\$ 15,148
45 - 49	1	16,094
50 - 54	6	120,396
55 - 59	19	611,199
60 - 64	41	1,002,261
65 - 69	30	649,406
70 - 74	11	224,074
75 - 79	8	190,680
82	1	8,129
84	1	3,289
87	1	3,817
91	1	15,350
93	1	3,294
<b>Totals</b>	<b>122</b>	<b>\$2,863,137</b>

\* Annual Allowances based on pre-change age amount for members with applicable pension benefit types.

Average Age at Retirement: 58.1 years

Average Age Now: 65.1 years

## Inactive Members December 31, 2016

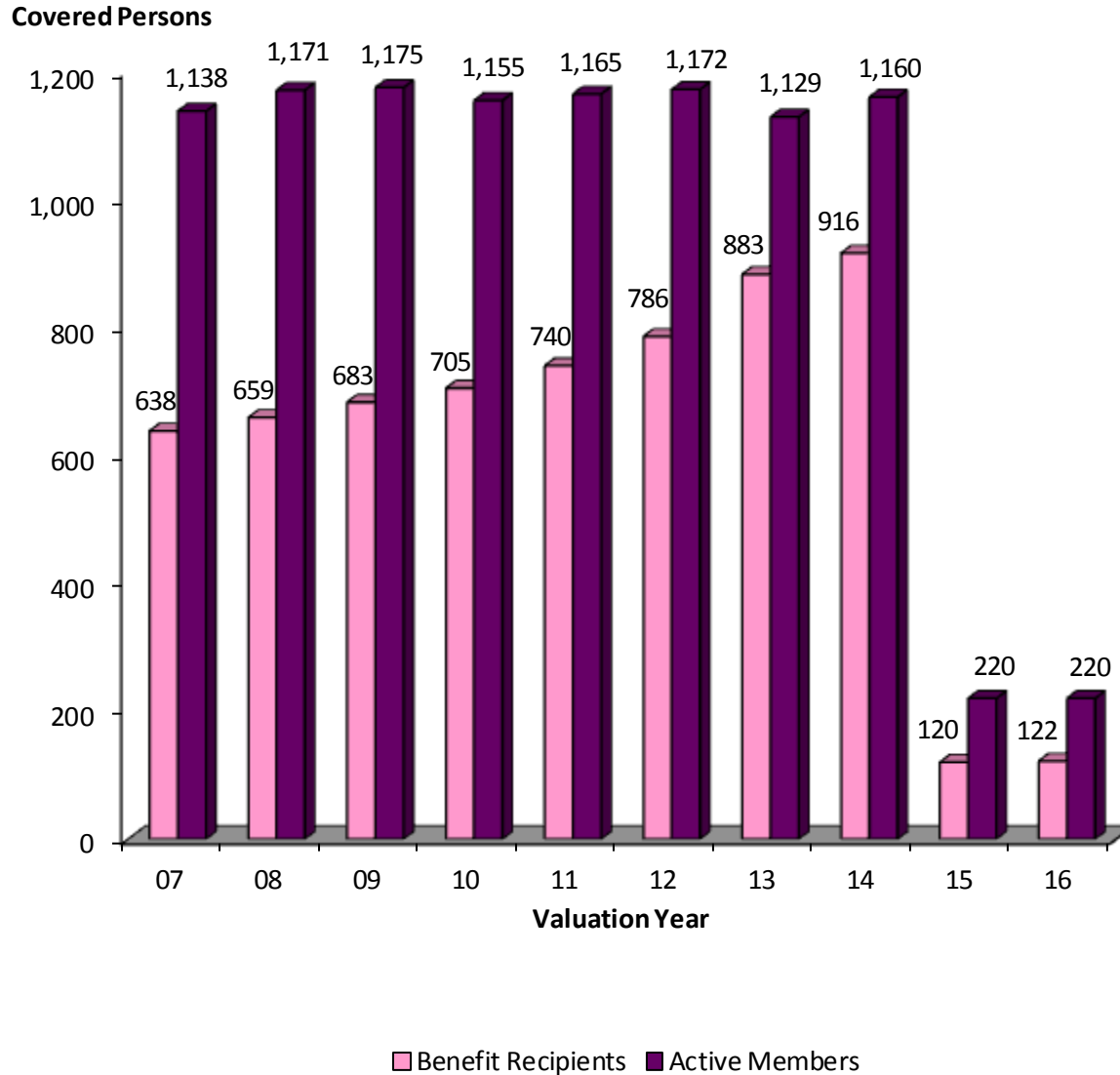
**An inactive member** is a person who has left County employment with entitlement to a retirement allowance after attaining voluntary retirement age. There were 29 inactive members as of December 31, 2016.

The schedule below is an age distribution of the inactive members.

### Tabulated by Attained Age

Attained Age	No.	Estimated Deferred Allowances
36	1	\$ 9,084
38	1	15,804
42	1	6,302
44	2	22,296
46	2	26,193
48	1	12,828
49	3	58,152
50	2	22,032
51	2	14,339
52	1	8,100
53	3	44,390
54	1	15,199
56	3	39,068
57	1	7,282
58	1	18,236
59	3	34,797
63	1	19,781
<b>Total</b>	<b>29</b>	<b>\$373,883</b>

## Active Members and Benefit Recipients



*For Valuation Years prior to 2015, the results displayed are for the entire Retirement System (including BABH). Beginning with the 2015 Valuation Year, the results displayed are for BABH.*

## Active Members December 31, 2016 Comparative Schedule

Valuation Date	Active Members								Valuation Payroll	Age	Average	
	Gen.	DWS	Library	BABH	M.C.F.	Sheriff's	Road	Total			Service	Pay
12/31/1997	688				283	76	74	1,121	\$32,216,234	43.1	10.0 yrs	\$28,739
12/31/1998	713				286	77	72	1,148	34,308,505	43.4	10.1	29,885
12/31/1999	718				284	76	73	1,151	35,763,978	43.7	10.4	31,072
12/31/2000	742				300	77	75	1,194	38,314,967	43.4	10.0	32,090
12/31/2001	465	40	63	180	296	78	75	1,197	39,761,644	43.8	10.3	33,218
12/31/2002	465	42	64	195	308	80	74	1,228	41,331,916	44.0	10.5	33,658
12/31/2003	456	41	67	206	302	76	76	1,224	43,053,950	44.7	10.7	35,175
12/31/2004	427	41	72	208	303	76	76	1,203	43,550,999	44.3	10.3	36,202
12/31/2005	429	41	74	211	293	75	74	1,197	43,104,046	44.7	10.5	36,010
12/31/2006	412	41	30	205	292	75	67	1,122	42,024,045	45.0	11.1	37,455
12/31/2007	415	39	39	216	288	74	67	1,138	44,687,752	45.3	11.3	39,269
12/31/2008	410	38	42	235	305	75	66	1,171	46,482,897	45.3	11.4	39,695
12/31/2009	407	39	45	253	297	76	58	1,175	47,244,573	45.1	11.3	40,208
12/31/2010	389	37	45	261	295	74	54	1,155	47,090,560	45.4	11.4	40,771
12/31/2011	378	38	44	274	298	77	56	1,165	48,583,176	45.3	11.2	41,702
12/31/2012	365	39	42	276	319	75	56	1,172	48,571,798	45.0	11.1	41,444
12/31/2013	351	36	41	219	350	76	56	1,129	44,535,708	44.1	10.6	39,447
12/31/2014	365	40	36	220	361	79	59	1,160	46,494,417	43.8	10.4	40,081
12/31/2015				220					10,331,351	43.8	8.6	46,961
12/31/2016				220					10,608,566	44.1	9.0	48,221

*For Valuation Dates prior to 2015, the results displayed are for the entire Retirement System (including BABH). Beginning with the 2015 Valuation Date, the results displayed are for BABH.*

## BABH Active Members December 31, 2016 by Age and Years of Service

Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24	4							4	\$ 110,410
25-29	17							17	637,618
30-34	22	10	1					33	1,334,351
35-39	9	10	5					24	1,114,031
40-44	11	15	5	4				35	1,854,358
45-49	5	12	7	5	2			31	1,589,454
50-54	6	4	4	7	3	6	2	32	1,682,805
55-59	4	12	3	4		3	1	27	1,567,584
60	2	2		2			1	7	302,821
61		1					1	2	83,881
62				1		1		2	79,121
63			1					1	35,435
64		1						1	54,652
65	1	3						4	162,045
<b>Totals</b>	<b>81</b>	<b>70</b>	<b>26</b>	<b>23</b>	<b>5</b>	<b>10</b>	<b>5</b>	<b>220</b>	<b>\$10,608,566</b>

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 44.1 years

Service: 9.0 years

Annual Pay: \$48,221

## SECTION D

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### **ACTUARIAL COST METHODS AND ACTUARIAL ASSUMPTIONS**

## Valuation Methodology

**Normal Cost/Accrued Liability.** Normal cost and the allocation of actuarial 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 date of hire to the member's projected date of retirement, are sufficient to accumulate the actuarial present value of the member's anticipated 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.

**Amortization of Unfunded Actuarial Accrued Liabilities.** Unfunded Actuarial Accrued Liabilities (UAAL) or asset surpluses were amortized as level percent-of-payroll contributions (principal and interest combined) as follows: If the liabilities exceed the assets (unfunded liabilities), the difference is amortized over a closed period of 26 years; if the assets exceed the liabilities (overfunding) the difference is amortized over an open period of 20 years. The amortization method was first adopted for the December 31, 2016 actuarial valuation. The increase in UAAL associated with the Early Retirement Incentive Program was amortized over a closed period of 10 years starting with the contribution for the calendar year beginning January 1, 2015. The UAAL payment reflects any payments expected to be made between the valuation date and the date contributions determined by this report are scheduled to begin. Active member payroll was assumed to increase 3.25% for the purpose of determining the level-percent contributions.

### Schedule of Amortizations for Development of Required Employer Contributions - Calendar Year Beginning January 1, 2018 Attributable to Gains, Losses, and Plan Amendments

Description	Unfunded (Overfunded)	Amortization Years		Amortization Charge/(Credit)
		Initial	Remaining	% of Pay
Valuation	\$ 559,543	30	26	0.33%
ERIP	1,037,287	10	7	1.28%
<b>Total</b>	<b>\$ 1,596,830</b>			<b>1.61%</b>

**Asset valuation method.** The actuarial value equals:

- (a) Actuarial value of assets from the previous valuation, plus
- (b) employer and member contributions since the last valuation, minus
- (c) benefit payments and refunds since the last valuation, plus
- (d) estimated investment income at the assumed investment return, plus
- (e) portion of gain/(loss) recognized in the current valuation.

For the above purpose, gain/(loss) is defined as the excess during the period of the investment return on the market value of assets over the expected investment income. Twenty percent of the difference is recognized over a 5-year period in the actuarial value of assets. This method was first adopted for the December 31, 2003 actuarial valuation.



## Actuarial Assumptions Used for the Valuation

The rationale for the assumptions used in this valuation is included in the 5-year experience study ending December 31, 2015, issued August 1, 2017. All assumptions are expectations of future experience, not market measures.

**Investment Return** (net of investment expenses).

4.0% per year in excess of pay inflation. If pay inflation matches the assumption of 3.25%, this implies a 7.25% rate of return. This assumption was first adopted for the December 31, 2016 actuarial valuation and is used to equate the value of payments due at different points in time. Approximate rates of investment return, for the purpose of comparisons with assumed rates, are shown below for the Bay County Employees' Retirement System (in total). Actual increases in average active member pay for the Bay County Employees' Retirement System (in total) are also shown for comparative purposes.

	Year Ended December 31					5-Year Average*
	2016	2015	2014	2013	2012	
Rate of Investment Return	9.9 %	8.4 %	11.3 %	13.4 %	2.1 %	9.0 %
Average Increase in Pay <sup>#</sup>	<u>4.5</u>	<u>7.1</u>	<u>8.0</u>	<u>2.5</u>	<u>2.4</u>	<u>4.9</u>
Real Rate of Return	5.4	1.3	3.3	10.9	(0.3)	4.1

\* Compound rate of increase.

# Based on employees active during both years, for the Bay County Employees' Retirement System (in total).

The nominal rate of return was computed using the approximate formula  $i = I \text{ divided by } 1/2 (A + B - I)$ , where I is actual investment income net of expenses, A is the beginning of year asset value, and B is the end of year asset value.

Please note that this analysis uses asset values and investment income as defined for the actuarial valuation which deals with market value changes on a gradual basis.

These rates of return should not be used for measurement of an investment advisor's performance or for comparisons with other systems.

**Rates of price inflation** are not specifically used for this valuation. However, a rate of price inflation of 2.50% would be consistent with other assumptions in this report. This assumption was first adopted for the December 31, 2016 actuarial valuation.

**Pay Projections.** These assumptions are used to project current pays to those upon which benefits will be based. In addition to the Merit and Longevity rates shown in the table, members are also assumed to receive a base increase of 3.25%.

Years of Service	Annual Rate of Pay Increase for Merit & Longevity
	BABH
1	3.00%
2	2.25%
3	1.50%
4	1.50%
5	0.75%
6+	0.75%

If the number of active members remains constant, the total active member payroll will increase by about the level of pay inflation (assumed to be 3.25% per year). This increasing payroll was recognized in amortizing unfunded actuarial accrued liabilities. The payroll growth assumptions were first adopted for the December 31, 2016 actuarial valuation.

Changes actually experienced in pays have averaged as follows, for the Bay County Employees' Retirement System (in total):

Year Ended December 31					5-Year Average*
2016	2015	2014	2013	2012	
4.5%	7.1%	8.0%	2.5%	2.4%	4.9%

\* Compound rate of increase.

**Lump sum payments.** Lump sum payments for unused sick leave and vacation were assumed to increase final average compensation by 4.5%. The lump sum payment assumption was first adopted for the December 31, 2016 actuarial valuation.

**Mortality.** The mortality rates utilized are based upon the RP-2014 tables, as extended, and include a margin for future mortality improvements projected using a fully generational improvement scale. The mortality assumptions were first adopted for the December 31, 2016 actuarial valuation. The tables used were as follows:

- **Healthy Pre-Retirement:** The RP-2014 Employee Generational Mortality Tables, with blue-collar adjustments and extended via cubic spline. This table is adjusted backwards to 2006 with the MP-2014 scale, resulting in a base year of 2006 with future mortality improvements assumed each year using scale MP-2016.
- **Healthy Post-Retirement:** The RP-2014 Healthy Annuitant Generational Mortality Tables, with blue-collar adjustments and extended via cubic spline. This table is adjusted backwards to 2006 with the MP-2014 scale, resulting in a base year of 2006 with future mortality improvements assumed each year using scale MP-2016.
- **Disability Retirement:** The RP-2014 Disabled Mortality Table, extended via cubic spline. This table is adjusted backwards to 2006 with the MP-2014 scale, resulting in a base year of 2006 with future mortality improvements assumed each year using scale MP-2016.

Sample Ages	Healthy Pre-Retirement Future Life Expectancy (Years)^		Healthy Post-Retirement Future Life Expectancy (Years)^		Disabled Retirement Future Life Expectancy (Years)^	
	Men	Women	Men	Women	Men	Women
	50	34.76	40.07	33.26	36.30	24.33
55	29.72	34.96	28.49	31.39	21.21	25.00
60	24.90	29.99	23.97	26.69	18.22	21.48
65	20.44	25.13	19.72	22.20	15.37	18.04
70	16.35	20.40	15.77	17.92	12.60	14.65
75	12.60	15.89	12.16	13.96	9.96	11.49
80	9.24	11.65	9.01	10.46	7.58	8.77

^ Based on retirements in 2016. Retirements in future years will reflect improvements in life expectancy.

**Administration Expenses.** Non-investment administration expenses are assumed to average 0.5% of payroll annually. The administrative expenses assumption was first adopted for the December 31, 2016 actuarial valuation. This assumption was changed as a result of the experience study.

**Active Member Group Size.** The number of active members was assumed to remain constant. This assumption is unchanged from the previous valuation.

**Rates of separation from active membership.** The rates do not apply to members eligible to retire and do not include separation on account of death or disability. This assumption measures the probabilities of members remaining in employment. This assumption was first adopted for the December 31, 2016 actuarial valuation.

Sample Ages	Years of Service	% of Active Members Separating within Next Year
		BABH
ALL	0	16.50%
	1	9.90
	2	9.90
	3	8.80
	4	8.80
20	5 & Over	8.25
25		8.25
30		7.70
35		7.70
40		4.40
45		3.30
50		2.20
55		2.20
60	2.20	

**Rates of Disability.** These rates represent the probabilities of active members becoming disabled. This assumption was first adopted for the December 31, 2016 actuarial valuation.

Percent Becoming Disabled within Next Year	
Sample Ages	BABH
20	0.07 %
25	0.07
30	0.07
35	0.07
40	0.19
45	0.25
50	0.46
55	0.84
60	1.33

We assumed that 85% of disabilities are non-duty related and 15% are duty related.

**Rates of Retirement.** These rates are used to measure the probabilities of an eligible member retiring during the next year.

Retirement Ages	Percent of Active Members Retiring within Next Year
	BABH
55	15 %
56	10
57	10
58	10
59	10
60	25
61	20
62	10
63	10
64	10
65	25
66	10
67	10
68	10
69	10
70	100

The following table shows the rates of retirement for the 55 & 8 and/or 55 & 10 Early Retirement provision:

Retirement Ages	55 & 8 and/or 55 & 10 Early Retirement
	BABH
55	5 %
56	5
57	5
58	5
59	5
60	5
61	5

The retirement assumptions were first adopted for the December 31, 2012 actuarial valuation.

## Miscellaneous and Technical Assumptions

<b>Marriage Assumption:</b>	100% of males and 100% of females are assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses.
<b>Pay Increase Timing:</b>	Six months after the valuation date.
<b>Decrement Timing:</b>	Decrements of all types are assumed to occur mid-year.
<b>Eligibility Testing:</b>	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.
<b>Benefit Service:</b>	Exact fractional service is used to determine the amount of benefit payable.
<b>Decrement Relativity:</b>	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
<b>Decrement Operation:</b>	Disability and death-in-service decrements do not operate during the first 5 years of service. Disability and withdrawal do not operate during retirement eligibility.
<b>Normal Form of Benefit:</b>	The assumed normal form of benefit is straight life form.
<b>Loads:</b>	Lump sum payments for unused sick leave and vacation. For current retirees who elected a joint and survivor form of payment with a pop-up and retired prior to January 1, 2013 or who elected a social security equated joint and survivor form of payment with a pop-up the liabilities are loaded 2% because the pop-up benefits are not provided in the data.
<b>Incidence of Contributions:</b>	Contributions are assumed to be received continuously throughout the year based upon the computed percent-of-payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
<b>Data Adjustment:</b>	Payroll was annualized for new entrants.

## **SECTION E**

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### **FINANCIAL REPORTING**

## Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b) – (a)	Funded Ratio (a)/(b)	Covered Payroll (c)	UAAAL as a Percentage of Covered Payroll [(b) – (a)] / (c)
12/31/2007 *	\$253,492,248	\$200,933,482	\$(52,558,766)	126.2 %	\$44,687,752	none
12/31/2008	246,577,567	212,530,757	(34,046,810)	116.0	46,482,897	none
12/31/2009	243,271,514	221,407,973	(21,863,541)	109.9	47,244,573	none
12/31/2010 *	244,728,050	231,625,254	(13,102,796)	105.7	47,090,560	none
12/31/2011 *	241,207,722	241,791,817	584,095	99.8	48,583,176	1.20 %
12/31/2012 #	239,280,740	245,269,867	5,989,127	97.6	48,571,798	12.33
12/31/2013 *	263,364,669	262,118,015	(1,246,654)	100.5	44,535,708	none
12/31/2014	282,166,070	271,995,030	(10,171,040)	103.7	46,494,417	none
12/31/2015	46,894,673	48,624,039	1,729,366	96.4	10,331,351	16.74 %
12/31/2016 #	50,204,835	51,801,665	1,596,830	96.9	10,608,566	15.05

*For Actuarial Valuation Dates prior to 2015, the results displayed are for the entire Retirement System (including BABH). Beginning with the 2015 Actuarial Valuation Date, the results displayed are for BABH.*

\* Plan amended.

# Certain assumptions or methods revised.

Actuarial Cost Method

Individual Entry Age Normal Cost.

Amortization Method

Level percent-of-payroll

Amortization periods

26 years closed for groups that are underfunded (unfunded accrued liability is positive). 10 years closed for BABH ERIP starting with the contribution for the calendar year beginning January 1, 2015.

Asset Valuation Method

Market value with 5-year smoothing of gains and losses.

Principal Actuarial Assumptions  
(last revised for the 12/31/2016 valuation):

- Net Investment Return	7.25%
- Projected Salary Increases	3.25% pay inflation plus merit and longevity
- Price Inflation	2.50%
- Cost-of-Living Adjustments	None



## Schedule of Employer Contributions

Plan Year Ended December 31	Fiscal Year Ended December 31	Annual Required Contribution
2007	2008	\$ 688,871
2008	2009	1,578,548
2009 <sup>^</sup>	2011	2,443,118
2010	2012	3,074,891
2011	2013	4,289,438
2012	2014	4,038,100
2013 <sup>§</sup>	2015	4,477,504
2014	2016	2,535,295
2015	2017	990,514
2016	2018	1,048,375

*For Plan Years Ended prior to December 31, 2015, the results displayed are for the entire Retirement System (including BABH). Beginning with the Plan Year Ended December 31, 2015, the results displayed are for BABH.*

<sup>^</sup> *Implementation of a one year lag between valuation date and first day of the calendar year to which the contributions apply.*

<sup>§</sup> *Annual Required Contribution reflects an advanced payment of the BABH unfunded ERIP liability.*


October 2, 2017

Ms. Katie Meeth  
Retirement Administrator/Accountant  
Bay County Employees' Retirement System  
515 Center Avenue  
Bay City, Michigan 48708

Dear Ms. Meeth:

Enclosed please find 20 copies of the December 31, 2016 report of the Annual Actuarial Valuation for the Bay-Arenac Behavioral Health Authority.

Sincerely,



James D. Anderson, FSA, EA, MAAA

JDA:bd  
Enclosures

cc: Mark Buis (GRS)  
Shana Neeson (GRS)  
Jerry Desloover (Rehman, Robson)