



TOWN OF BRANFORD VOLUNTEER FIRE DEPARTMENT PENSION PLAN

ACTUARIAL VALUATION REPORT

JANUARY 1, 2017





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Executive Summary

	January 1, 2017	January 1, 2015
Number of members		
Active employees	208	203
Terminated vested members	0	0
Retired, disabled and beneficiaries	18	17
Total	226	220
Covered employee payroll	N/A	N/A
Average plan salary	N/A	N/A
Actuarial present value of future benefits	1,461,858	1,318,099
Actuarial accrued liability	1,256,486	1,120,645
Plan assets		
Market value of assets	911,748	534,163
Actuarial value of assets	954,218	540,595
Unfunded accrued liability	302,268	580,050
Funded ratio	75.9%	48.2%
Actuarially determined employer contribution (ADEC)		
Fiscal year ending	2019	2017
ADEC	59,050	86,184
Fiscal year ending	2020	2018
ADEC	59,640	86,184



Valuation Results and Highlights

Purpose of the Valuation

The purpose of the valuation is to develop the Actuarially Determined Employer Contribution (ADEC).

The ultimate cost of a pension plan is based primarily on the level of benefits promised by the plan. The pension fund's investment earnings serve to reduce the cost of plan benefits and expenses. Thus,

$$\text{Ultimate cost} = \text{Benefits Paid} + \text{Expenses Incurred} - \text{Investment Return} - \text{Employee Contributions}$$

The actuarial cost method distributes this ultimate cost over the working lifetime of current plan participants. By means of this budgeting process, costs are allocated to both past and future years, and a cost is assigned to the current year. The current year's allocated cost, or normal cost, is the building block upon which the actuarially determined employer contribution is developed. The January 1, 2017 valuation produces the contributions for the fiscal years ending 2019 and 2020.

Information Available in the Valuation Report

The Executive Summary is intended to emphasize the notable results of the valuation from the perspective of the Plan Sponsor. Supporting technical detail is documented in Results of the Valuation, Supporting Exhibits and Description of Actuarial Methods and Assumptions. A concise summary of the principal provisions of the Plan is outlined in Summary of Plan Provisions.

Changes Reflected in the Valuation

The actuarial assumptions listed below have been changed in this year's valuation. See the Actuarial Methods and Assumptions for a complete description of the changes.

- Investment rate of return
- Mortality
- Inflation

Cash Contribution for Fiscal Years Ending 2019 and 2020

The Town cost is:	2019 Fiscal Year	2020 Fiscal Year
	\$59,050	\$59,640

Liability Experience During Period Under Review

The plan experienced a net actuarial loss on liabilities of \$91 since the prior valuation.



Asset Experience During Period Under Review

	2015 Fiscal Year	2016 Fiscal Year
Market Value Basis	-4.1%	6.8%
Actuarial Value Basis	4.2%	5.1%

The Actuarial Value of assets, rather than the Market Value, is used to determine plan contributions. The Actuarial Value spreads the asset volatility over 5 years, thereby smoothing out fluctuations that are inherent in the Market Value.



Certification

This report presents the results of the January 1, 2017 Actuarial Valuation for Town of Branford Volunteer Fire Department Pension Plan (the Plan) for the purpose of estimating the funded status of the Plan and determining the Actuarially Determined Employer Contributions (ADECs) for the fiscal years ending June 30, 2019 and June 30, 2020. This report is intended to satisfy the requirements of Connecticut General Statute 7-450a. This report may not be appropriate for any other purpose.

The valuation has been performed in accordance with generally accepted actuarial principles and practices. It is intended to comply with all applicable Actuarial Standards of Practice.

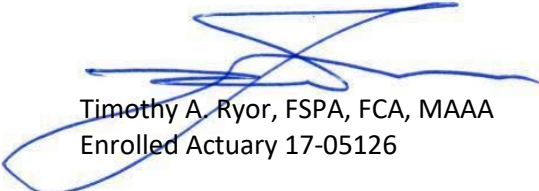
I certify that the actuarial assumptions and methods that were selected by me and represent my best estimate of anticipated actuarial experience under the Plan.

In preparing this valuation, I have relied on employee data provided by the Plan Sponsor, and on asset and contribution information provided by the Trustee. I have audited neither the employee data nor the financial information, although I have reviewed them for reasonableness.

The results in this valuation report are based on the Plan as summarized in the *Summary of Plan Provisions* section of this report and the actuarial assumptions and methods detailed in the *Description of Actuarial Methods and Assumptions* section of this report.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as, but not limited to, 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. Due to the limited scope of this report, an analysis of the potential range of such future measurements has not been performed.

I have no relationship with the employer or the Plan that would impair, or appear to impair, my objectivity in performing the work presented in this report. I am a member of the American Academy of Actuaries and meet its Qualification Standards to render the actuarial opinion contained herein.



Timothy A. Ryor, FSPA, FCA, MAAA
Enrolled Actuary 17-05126

December 12, 2017

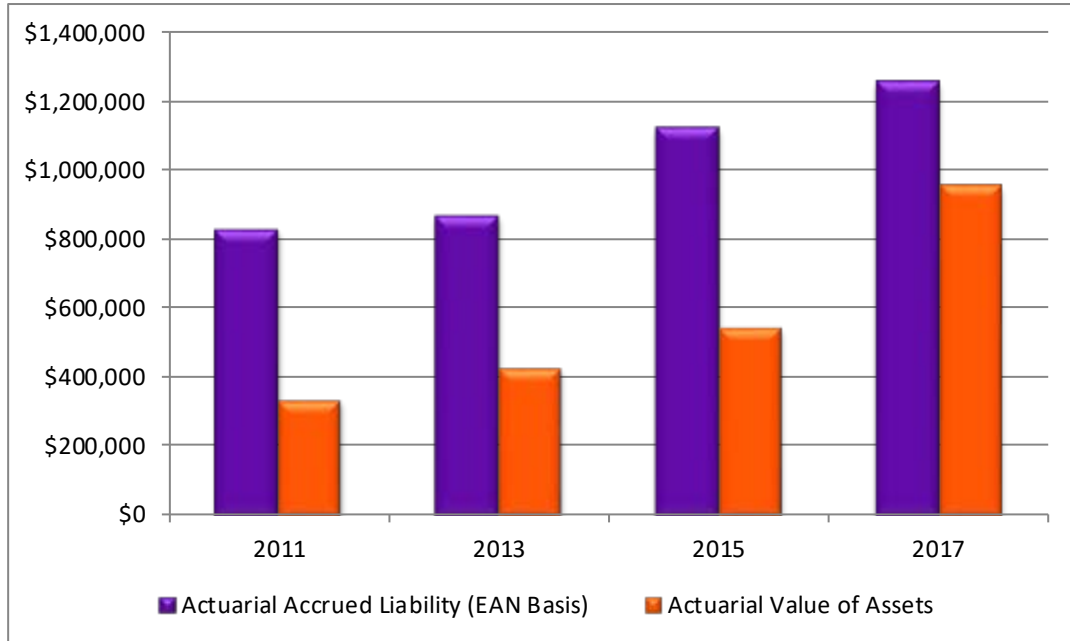


Development of Unfunded Accrued Liability and Funded Ratio

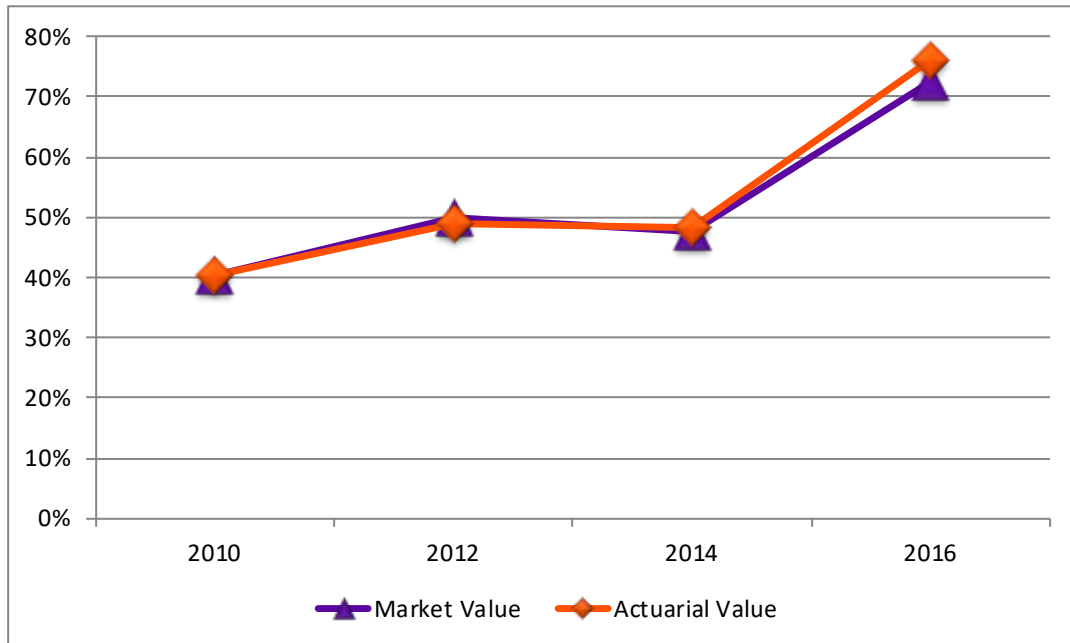
	January 1, 2017	January 1, 2015
Actuarial accrued liability for inactive members		
Retired, disabled and beneficiaries	\$340,672	\$321,405
Terminated vested members	0	0
Total	340,672	321,405
Actuarial accrued liability for active employees	915,814	799,240
Total actuarial accrued liability	1,256,486	1,120,645
Actuarial value of assets	954,218	540,595
Unfunded accrued liability	302,268	580,050
Funded ratio	75.9%	48.2%



Actuarial Accrued Liability vs. Actuarial Value of Assets



Funded Ratio



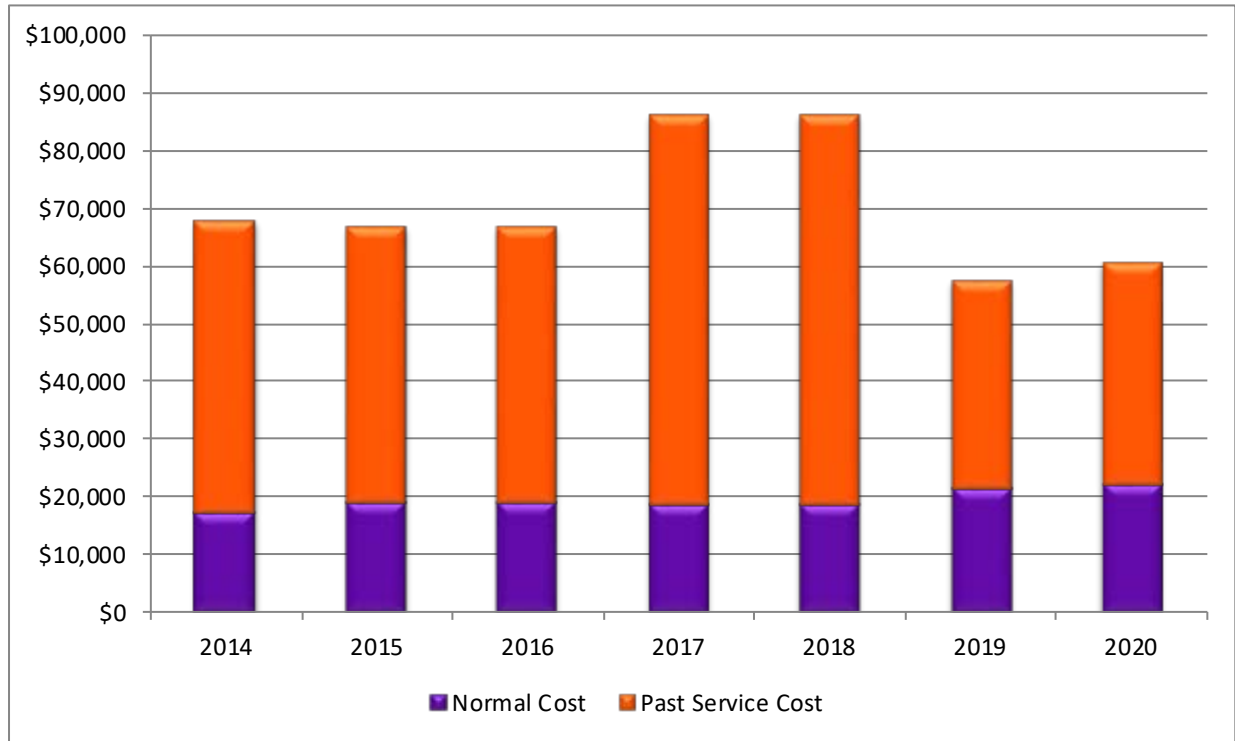


Determination of Normal Cost and Actuarially Determined Employer Contribution

	January 1, 2017	January 1, 2015
Gross normal cost	\$19,977	\$18,559
Town's normal cost	19,977	18,559
Amortization of unfunded accrued liability	<u>35,176</u>	<u>61,987</u>
Contribution before adjustment as of the valuation date	55,153	80,546
Contribution rounded to nearest \$10	55,150	80,550
Fiscal year ending	2019	2017
Adjustment for interest and inflation	3,900	5,634
Actuarially determined employer contribution	59,050	86,184
Fiscal year ending	2020	2018
Adjustment for interest and inflation	590	0
Actuarially determined employer contribution	59,640	86,184



Actuarially Determined Employer Contribution





Determination of Actuarial Gain/Loss

The Actuarial Gain/Loss is the difference between the expected unfunded accrued liability and the actual unfunded accrued liability, without regard to any changes in actuarial methods, actuarial assumptions or plan provisions. This can also be referred to an Experience Gain/Loss, since it reflects the difference between what was expected and what was actually experienced.

Actuarial Gain / Loss	
Expected unfunded accrued liability January 1, 2017	
Expected unfunded accrued liability January 1, 2016	
Unfunded accrued liability January 1, 2015	\$580,050
Gross normal cost January 1, 2015	18,559
Town and employee contributions for 2015	(68,000)
Interest at 7.00% to January 1, 2016	39,648
Expected unfunded accrued liability January 1, 2016	570,257
Expected unfunded accrued liability January 1, 2017	
Expected unfunded accrued liability January 1, 2016	570,257
Expected gross normal cost January 1, 2016	19,116
Town and employee contributions for 2016	(366,000)
Interest at 7.00% to January 1, 2017	24,931
Expected unfunded accrued liability January 1, 2017	248,304
Actuarial (gain) / loss January 1, 2017	30,516
Actual unfunded accrued liability January 1, 2017, prior to plan provision, assumption and method changes	278,820
Sources of (gain) / loss	
Assets	30,425
Liabilities	91
Total (gain) / loss	30,516
Assumption and method changes since prior valuation	23,448
Actual unfunded accrued liability January 1, 2017, after plan provision, assumption and method changes	302,268



Development of Asset Values

Summary of Fund Activity		
	Market Value	Actuarial Value
1. Beginning value of assets January 1, 2016		
Trust assets	\$537,215	\$589,478
2. Contributions		
Town contributions during year	366,000	366,000
Employee contributions during year	0	0
Total for plan year	366,000	366,000
3. Disbursements		
Benefit payments during year	42,351	42,351
Administrative expenses during year	0	0
Total for plan year	42,351	42,351
4. Net investment return		
Interest and dividends	21,805	N/A
Realized and unrealized gain / (loss)	31,685	N/A
Expected return	N/A	52,465
Recognized gain / (loss)	N/A	(11,374)
Required adjustment due to corridor	N/A	0
Reversal of prior year required adjustment	N/A	0
Investment-related expenses	(2,606)	N/A
Total for plan year	50,884	41,091
5. Ending value of assets January 1, 2017		
Trust assets: (1) + (2) - (3) + (4)	911,748	954,218
6. Approximate rate of return	6.8%	5.1%



Relationship of Actuarial Value to Market Value

1. Market value 1/1/2017	\$911,748
2. Gain / (loss) not recognized in actuarial value 1/1/2017	(42,470)
3. Preliminary actuarial value 1/1/2017: (1) - (2)	954,218
4. Preliminary actuarial value as a percentage of market value: (3) ÷ (1)	104.7%
5. Gain / (loss) recognized for corridor minimum / maximum	N/A
6. Actuarial value 1/1/2017 after corridor minimum / maximum: (3) + (5)	954,218
7. Actuarial value as a percentage of market value: (6) ÷ (1)	104.7%

Development of Market Value Gain / Loss for 2016 Plan Year

1. Market value 1/1/2016	\$537,215
2. Town contributions	366,000
3. Employee contributions	0
4. Benefit payments	42,351
5. Administrative expenses	0
6. Expected return at 7.00%	52,465
7. Expected value 1/1/2017: (1) + (2) + (3) - (4) - (5) + (6)	913,329
8. Market value 1/1/2017	911,748
9. Market value gain / (loss) for 2016 plan year: (8) - (7)	(1,581)

Recognition of Gain / Loss in Actuarial Value

Year	(a) Gain / (loss)	(b) Total recognized as of 1/1/2016	(c) Recognized in current year: 20% of (a)	(d) Total recognized as of 1/1/2017: (b) + (c)	(e) Not recognized as of 1/1/2017: (a) - (d)
2012	\$12,721	\$10,176	\$2,545	\$12,721	\$0
2013	9,235	5,541	1,847	7,388	1,847
2014	(16,473)	(6,590)	(3,295)	(9,885)	(6,588)
2015	(60,774)	(12,155)	(12,155)	(24,310)	(36,464)
2016	(1,581)	0	(316)	(316)	(1,265)
Total			(11,374)		(42,470)



Summary of Fund Activity		
	Market Value	Actuarial Value
1. Beginning value of assets January 1, 2015		
Trust assets	\$534,163	\$540,595
2. Contributions		
Town contributions during year	68,000	68,000
Employee contributions during year	0	0
Total for plan year	68,000	68,000
3. Disbursements		
Benefit payments during year	42,351	42,351
Administrative expenses during year	0	0
Total for plan year	42,351	42,351
4. Net investment return		
Interest and dividends	1,649	N/A
Realized and unrealized gain / (loss)	(22,812)	N/A
Expected return	N/A	38,177
Recognized gain / (loss)	N/A	(14,943)
Required adjustment due to corridor	N/A	0
Reversal of prior year required adjustment	N/A	0
Investment-related expenses	(1,434)	N/A
Total for plan year	(22,597)	23,234
5. Ending value of assets January 1, 2016		
Trust assets: (1) + (2) - (3) + (4)	537,215	589,478
6. Approximate rate of return	-4.1%	4.2%



Relationship of Actuarial Value to Market Value

1. Market value 1/1/2016	\$537,215
2. Gain / (loss) not recognized in actuarial value 1/1/2016	(52,263)
3. Preliminary actuarial value 1/1/2016: (1) - (2)	589,478
4. Preliminary actuarial value as a percentage of market value: (3) ÷ (1)	109.7%
5. Gain / (loss) recognized for corridor minimum / maximum	N/A
6. Actuarial value 1/1/2016 after corridor minimum / maximum: (3) + (5)	589,478
7. Actuarial value as a percentage of market value: (6) ÷ (1)	109.7%

Development of Market Value Gain / Loss for 2015 Plan Year

1. Market value 1/1/2015	\$534,163
2. Town contributions	68,000
3. Employee contributions	0
4. Benefit payments	42,351
5. Administrative expenses	0
6. Expected return at 7.00%	38,177
7. Expected value 1/1/2016: (1) + (2) + (3) - (4) - (5) + (6)	597,989
8. Market value 1/1/2016	537,215
9. Market value gain / (loss) for 2015 plan year: (8) - (7)	(60,774)

Recognition of Gain / Loss in Actuarial Value

Year	(a) Gain / (loss)	(b) Total recognized as of 1/1/2015	(c) Recognized in current year: 20% of (a)	(d) Total recognized as of 1/1/2016: (b) + (c)	(e) Not recognized as of 1/1/2016: (a) - (d)
2011	(\$19,412)	(\$15,528)	(\$3,884)	(\$19,412)	\$0
2012	12,721	7,632	2,544	10,176	2,545
2013	9,235	3,694	1,847	5,541	3,694
2014	(16,473)	(3,295)	(3,295)	(6,590)	(9,883)
2015	(60,774)	0	(12,155)	(12,155)	(48,619)
Total			(14,943)		(52,263)

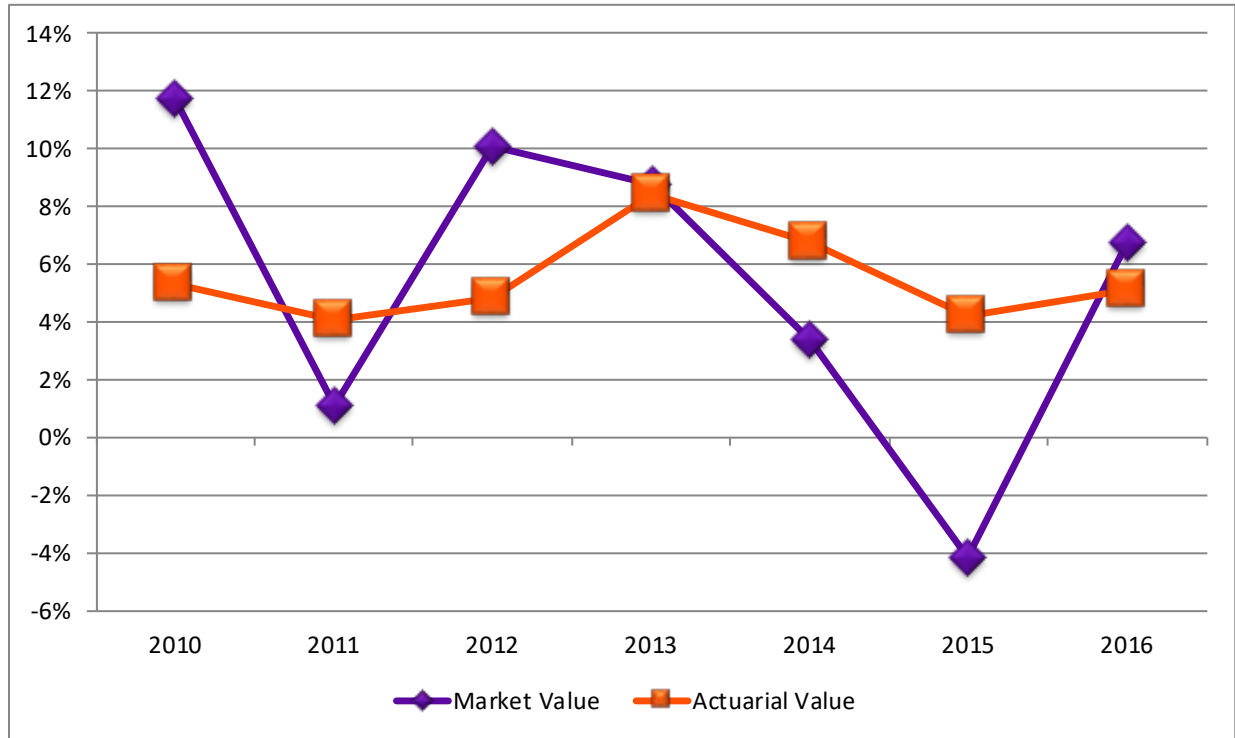


Rate of Return on Market Value of Assets				
Period Ending December 31	Average Annual Effective Rate of Return			
	1 Year	3 Years	5 Years	10 Years
2007	6.9%	7.2%	7.3%	3.1%
2008	-16.0%	-0.1%	2.0%	0.2%
2009	15.1%	1.1%	3.6%	0.4%
2010	11.8%	2.6%	5.1%	2.6%
2011	1.1%	9.2%	3.2%	3.3%
2012	10.1%	7.6%	3.8%	5.5%
2013	8.8%	6.6%	9.3%	5.6%
2014	3.4%	7.4%	6.9%	5.3%
2015	-4.1%	2.5%	3.7%	4.4%
2016	6.8%	1.9%	4.8%	4.0%

Rate of Return on Actuarial Value of Assets				
Period Ending December 31	Average Annual Effective Rate of Return			
	1 Year	3 Years	5 Years	10 Years
2007	7.1%	4.3%	3.8%	N/A
2008	1.9%	4.4%	2.6%	1.4%
2009	3.6%	4.2%	3.7%	1.3%
2010	5.3%	3.6%	4.4%	1.6%
2011	4.1%	4.3%	4.4%	2.3%
2012	4.9%	4.7%	3.9%	3.9%
2013	8.4%	5.8%	5.2%	3.9%
2014	6.7%	6.7%	5.9%	4.8%
2015	4.2%	6.4%	5.6%	5.0%
2016	5.1%	5.3%	5.9%	5.1%



Actual Rate of Return on Assets





Target Allocation and Expected Rate of Return January 1, 2017

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*	Weighting
US Large Cap	14.00%	5.00%	0.70%
US Mid/Small Cap	12.00%	5.75%	0.69%
International Equities (Unhedged)	5.00%	5.50%	0.28%
Emerging International Equities	6.00%	6.25%	0.38%
Core Bonds	45.00%	2.25%	1.01%
High-Yield Bonds	8.00%	3.50%	0.28%
Real Estate (Core)	8.00%	5.25%	0.42%
Cash	2.00%	0.75%	0.02%
	100.00%		3.78%
Long-Term Inflation Expectation			2.75%
Long-Term Expected Nominal Return			6.53%

**Long-Term Returns are provided by HHIA. The returns are geometric means.*

The long-term expected rate of return on pension plan investments was determined using a building block method in which best-estimate ranges of expected future real rates of return are developed. Best estimates of the real rates of return for each major asset class are included in the pension plan's target asset allocation.

The information above is based on geometric means and does not reflect additional returns through investment selection, asset allocation and rebalancing. The results support a rate between 6.50% and 7.00%. An expected rate of return of 6.75% was used.



Amortization of Unfunded Liability

Schedule of Amortization Bases				
	Date established	Amortization installment	Years remaining	Present value of remaining installments as of January 1, 2017
2017 base	January 1, 2017	35,176	12	302,268



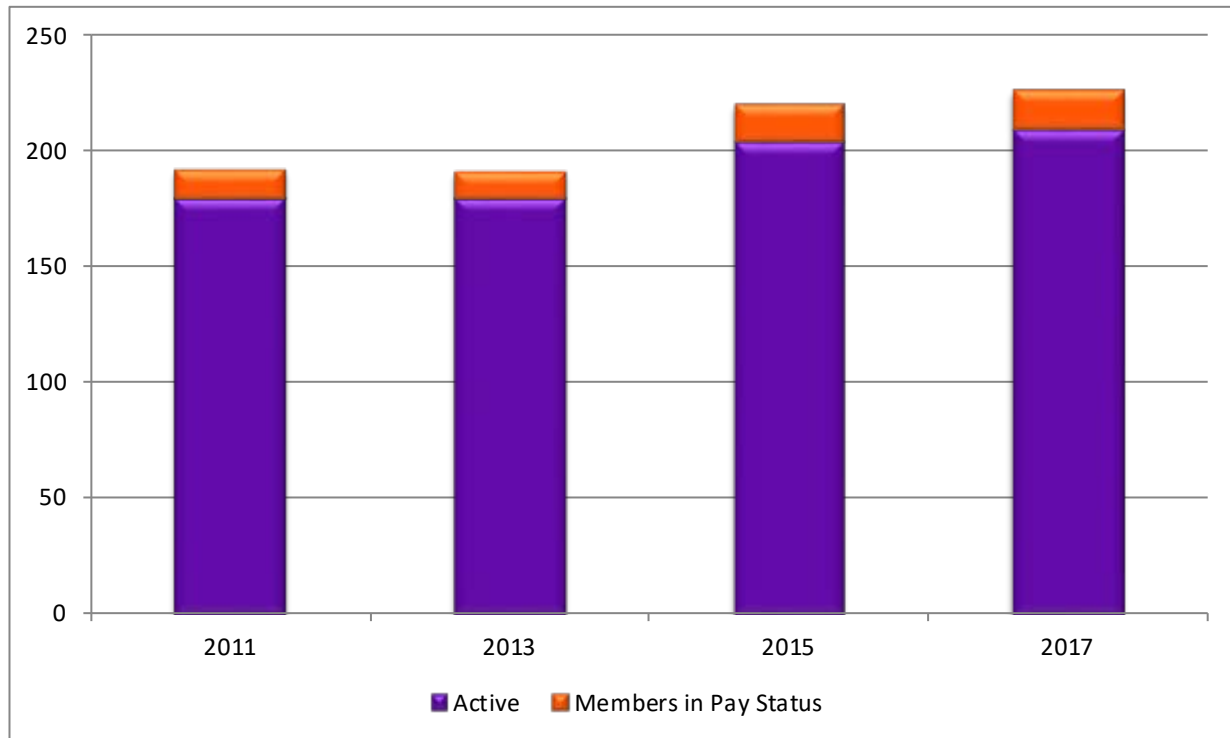
Member Data

The data reported by the Plan Sponsor for this valuation includes 208 active employees who met the Plan's minimum age and service requirements as of January 1, 2017.

Member Data				
	Active	Terminated vested	Members in pay status	Total
Total members January 1, 2015	203	0	17	220
Adjustments	0	0	0	0
Retirements	-2	0	+2	0
Disabilities	0	N/A	0	0
Terminations				
Vested	0	0	N/A	0
Lump sum payments	0	0	N/A	0
Deaths				
With death benefit	0	0	0	0
Without death benefit	0	0	-1	-1
Transfers	0	0	N/A	0
Rehires	0	0	N/A	0
New beneficiaries	N/A	N/A	0	0
New entrants	+7	N/A	N/A	+7
Total members January 1, 2017	208	0	18	226



Member Counts by Status





Member Data			
	Active	Terminated vested	Members in pay status
Average age			
January 1, 2015	40.2	N/A	75.2
January 1, 2017	41.2	N/A	75.0
Average service			
January 1, 2015	16.0	N/A	N/A
January 1, 2017	17.2	N/A	N/A
Total annual benefits			
January 1, 2015	N/A	N/A	\$40,792
January 1, 2017	N/A	N/A	43,132



Active Member Count by Age and Years of Service

Attained age	Completed Years of Credited Service										
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 and over	All years
Under 25		15	4								19
25 to 29		3	12	12							27
30 to 34		2	10	11	6						29
35 to 39		2		6	9	7					24
40 to 44		4	3	2	6	9	1				25
45 to 49			1	2	5	4	7	5			24
50 to 54			1	6	3	2	3	7	2		24
55 to 59			1	2	2	3	1	1	5	6	21
60 to 64				1		1	1		4	1	8
65 to 69						1	1	1			3
70 & over		1	1			1				1	4
All ages		27	33	42	31	28	14	14	11	8	208



Description of Actuarial Methods

Asset Valuation Method

The Actuarial Value of assets used in the development of plan contributions phases in the recognition of differences between the actual return on Market Value and expected return on Market Value over a 5-year period at 20% per year. The Actuarial Value is adjusted, if necessary, to be within the range of 80% and 120% of the Market Value of assets.

Actuarial Cost Method

- A. Changes in Actuarial Cost Method: None.
- B. Description of Current Actuarial Cost Method:

Basic cost method: Entry Age Normal (level percentage of salary)

Normal Cost: Under this method, the total normal cost is the sum of amounts necessary to fund each active member's normal retirement benefit if paid annually from entry age to assumed retirement age. Entry age is the age at which the employee would have been first eligible for the plan, if it had always been in effect. The normal cost for each participant is expected to remain a level percentage of the employee's salary. The normal cost for the plan is the difference between the total normal cost for the year and the anticipated member contributions for that year.

Past Service Liability: The present value of future benefits that relates to service before the valuation date is the total past service liability. The unfunded past service liability is the difference between the total past service liability and any assets (including accumulated member contributions). This amount is amortized over 30 years on a closed basis from 1999.

Experience Gains and Losses: All experience gains and losses (the financial effect of the difference between the actual experience during the prior period and the result expected by the actuarial assumptions for that prior period) appear directly in the past service liability and are amortized at the same rate the plan is amortizing the remaining unfunded past service liability.



Description of Actuarial Assumptions

Changes in Actuarial Assumptions

The valuation reflects changes in the actuarial assumptions listed below. (The assumptions used before and after these changes are more fully described in the next section.)

- Investment rate of return
- Mortality
- Inflation

The assumptions indicated were changed to represent the Enrolled Actuary's current best estimate of anticipated experience of the plan.

Investment rate of return (net of investment-related and administrative expenses)

6.75%. (Prior: 7.00%)

The assumption was changed to better reflect anticipated experience.

Inflation

2.75%.

This assumption is based on long term historical inflation numbers. While near term averages have been lower, we do not believe this trend will continue indefinitely and expect that there will be a reversion to the long-term average.

The assumption was changed to better reflect expected experience.

Mortality

RPH-2014 Mortality Table adjusted to 2006 total dataset, headcount-weighted, projected to the measurement date with Scale MP-2017.

(Prior: RPH 2014 Mortality Table adjusted to 2006 total dataset, headcount-weighted, projected to the measurement date with Scale MP-2015.)

Mortality Improvement

Projected to date of decrement using Scale MP-2017 (generational).

Prior: Projected to date of decrement using Scale MP-2015 (generational).

We have selected this mortality assumption because it is based on the latest published pension mortality study released by the Society of Actuaries appropriate for this plan. The headcount-weighted table was used since benefits are not based on pay.

The mortality assumption was updated to better reflect actual experience.



Retirement age

Age	Rate
65	50%
66	25%
67	25%
68	25%
69	25%
70	100%

Termination prior to retirement

Sample termination rates are as follows:

Table T-3

Age	Rate
20	6.6%
25	5.3%
30	4.8%
35	4.5%
40	3.8%
45	3.2%
50	1.5%

Disability

None.

The actuarial assumptions in regards to rates of decrement shown above are based on standard tables modified for certain plan features such as eligibility for full and early retirement where applicable and input from the plan sponsor.

Administrative expenses

None. Expenses are assumed to be paid directly by the Town.

Pre-Retirement Spouse Benefit, Disability Benefits and Termination Benefits

Costed explicitly.

Accrual of Service

35% of Active Employees will qualify for service credit each year.

The assumption changes increased liabilities by about 2.0%.



Summary of Plan Provisions

This exhibit summarizes the major provisions of the Plan. It is not intended to be, nor should it be interpreted as a complete statement of all plan provisions. To the extent that this summary does not accurately reflect the plan provisions, then the results of this valuation may not be accurate.

Effective Date

Original: January 1, 1991.

Last Amendment: February 20, 2002.

Service

All years of service with the Fire Department from date of membership to early retirement, termination of employment, or Retirement Date.

Credited Service

No credit prior to January 1, 1991, except active Firefighters with at least 10 years of firefighting service will receive credit for 5 years of service. Maximum years of credited service equals 30.

Based on requirements for credit established by the Committee:

1991 and 1992

40% of calls of member's company

24 drills (company or town)

or

52 calls (Fire or EMS)

24 drills

1993 and after

Minimum of 100 points

Min. 36 fire or EMS calls	1 point each =	36
Min. 8 town drills*	4 points each =	32
Min. 16 company drills	2 points each =	<u>32</u>
		100 points

Sanctioned parade may be substituted for a fire call.

**Town drill may be substituted for a company drill when the minimum is reached (at 2 points per drill). A minimum of 12 will be held. A (sanctioned) parade may be substituted for a fire call. Drills must be approved by Training Division.*

Normal Form of Annuity

Life Annuity.

Normal Retirement Date

The first day of the month coinciding with or next following the Participant's 65th birthday and the completion of five years of Credited Service after January 1, 1991.



Pension Benefits

Eligibility for Plan Participation: Meet the requirements for an Active Firefighter.

Normal Retirement Benefit Formula: \$15.00 a month for each year of Credited Service, up to a maximum of twenty years, plus \$5.00 a month for each year in excess of 20, maximum \$350 per month.

Early Retirement

Eligibility: None.

Postponed Retirement

Benefit based on Credited Service at actual retirement.

Disability

Eligibility: After 15 years of Credited Service and become totally and permanently disabled as a result of injuries incurred in the line of duty.

Benefit: \$250 per month commencing on the Participant's Normal Retirement Date.

Pre-Retirement Spouse Benefit

Eligibility: After 20 years of Credited Service and any death.

Benefit: 50% of pension benefit at death. Benefit commences on the first day of January following the date of Participant's death.

Vesting

Eligibility: Ten years of Credited Service (at least five years after January 1, 1991) or 100% at Normal Retirement Date, with five years of Credited Service, earned on and after January 1, 1991.

Benefit Formula: Benefit accrued to date of termination.