



Employees Retirement Plan of the Town of Hamden

**Actuarial Valuation and Review as of
July 1, 2018**

This report has been prepared at the request of the Board of Trustees to assist in administering the Plan. This valuation report may not otherwise be copied or reproduced in any form without the consent of the Board of Trustees and may only be provided to other parties in its entirety, unless expressly authorized by Segal. The measurements shown in this actuarial valuation may not be applicable for other purposes.

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30 Waterside Drive, Suite 300 Farmington, CT 06032-3069
T 860.678.3000 www.segalco.com

January 25, 2019

Retirement Board, Employees Retirement Plan of the Town of Hamden
c/o Mayor Curt Balzano Leng
2750 Dixwell Avenue
Hamden, CT 06518-3320

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of July 1, 2018. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for the year ending June 30, 2019.

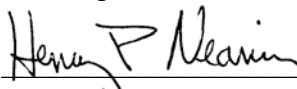
This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Retirement Plan. The census information and financial information on which our calculations were based was prepared by the staff of the Town of Hamden and the financial information was provided by Novak Francella, LLC. That assistance is gratefully acknowledged.

The actuarial calculations were directed under the supervision of Deborah K. Brigham, FCA, ASA, MAAA, Enrolled Actuary. Ms. Brigham is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate. Further, in our opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the Plan.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

By: 
Henry P. Nearing, FCA, MAAA, EA
Vice President and Consulting Actuary

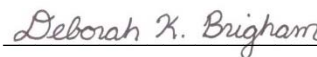

Deborah K. Brigham, FCA, ASA, MAAA, EA
Senior Vice President and Consulting Actuary

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Section 1: Actuarial Valuation Summary

Purpose and Basis

This report was prepared by Segal Consulting to present a valuation of the Plan as of July 1, 2018. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits and to provide information for required disclosures under Governmental Accounting Standards Board (GASB) Statements No. 67 and 68. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligations. 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; and changes in plan provisions or applicable law.

The contribution requirements presented in this report are based on:

- The benefit provisions of the Retirement Plan, as administered by the Board;
- The characteristics of covered active participants, inactive vested participants, and retired participants and beneficiaries as of June 30, 2018, provided by the Board;
- The assets of the Plan as of June 30, 2018, provided by the Auditor;
- Economic assumptions regarding future salary increases and investment earnings;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc., and
- The funding policy adopted by the Town, in accordance with Section 7-374c of the Connecticut General Statutes and Public Act 18-169.

Significant Issues

1. Segal Consulting (“Segal”) strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance. The Town of Hamden’s funding policy anticipates an actuarially recommended contribution (ARC¹) each year equal to the normal cost plus a payment on the unfunded actuarial accrued liability. The unfunded liability is amortized over a closed 30-year period, with 26 years remaining as of the valuation date. (This period was set to match the period of the \$125 million pension deficit funding bond issuance in February 2015.) The amortization assumes 2% annual increases in the payments, based on the Town’s expected budgetary increases. Although the unfunded liability will increase in the early years of the 30-year period, this policy does ultimately target full funding.
2. At the Town’s request, in May 2018 the Connecticut General Assembly adopted revisions to the Pension Statute to allow Hamden to contribute 55% of its ARC for the fiscal year ended June 30, 2018, rather than 80% as previously required by law. Actual Town contributions made during the year totaled \$12,650,000, 57.6% of the ARC calculated in the July 1, 2017 actuarial valuation.
3. The ARC for the upcoming year is \$22,605,704. The updated Pension Statute requires the Town to contribute either 70% of this amount or \$3 million more than the prior year, whichever is less. Therefore, the Town should contribute at least \$15,650,000 for the fiscal year ending June 30, 2019. Next year’s required contribution will be 85% of the ARC calculated in the July 1, 2019 actuarial valuation, or \$3 million more than the amount contributed this year, if less. Hamden will be required to contribute 100% of its ARC in the fiscal years ending June 30, 2021 and thereafter. The fact that the Town is contributing less than 100% of the ARC now means that required contributions will be higher in the future.
4. The unfunded actuarial accrued liability is \$292,834,824, which is an increase of \$7,542,161 since the prior valuation. Contributions during the fiscal year ending June 30, 2018 were insufficient to reduce the unfunded liability.
5. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 36.03%, compared to the prior year funded ratio of 36.84%. Prior to the 2015 bond issuance, the funded ratio was down to 10.33%. If the Town meets its contribution requirements in the future, the funded status should improve over time. This ratio is one measure of funding status, and its history is a measure of funding progress. Using the market value of assets, the funded ratio is 35.96%, down from 36.25% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan’s benefit obligation or the need for or the amount of future contributions.

¹ The term ‘ARC’ is a reference to the actuarially recommended contribution as defined in the Connecticut Pension Statute. The same acronym was used by GASB for the annual required contribution under GASB Statements 25 and 27, which have been superseded by Statements 67 and 68. The actuarially determined contribution (ADC) under Statements 67 and 68 is the same as the ARC for this Plan.

6. This year's actuarial loss from investment and other experience is \$596,144, or 0.13% of actuarial accrued liability.
7. The rate of return on the market value of assets was 7.84% for the plan year ended June 30, 2018. The return on the actuarial value of assets was 6.22% for the same period, due to the recognition of prior years' investment gains and losses. This resulted in an actuarial loss when measured against the assumed rate of return of 7.00%. Given the low fixed income interest rate environment, target asset allocation, expectations of future investment returns for various classes, and Plan liquidity needs, we advise the Board to continue to monitor actual and anticipated investment returns relative to the assumed long-term rate of return on investments of 7.00%. Had the assumed rate been lowered to 6.50% and reflected in this valuation, the full ARC would be more than \$1.3 million higher, at \$23,930,398. We will continue to monitor the Town's investment experience in future valuations.
8. The following Plan changes were negotiated with the Service Employees, and are included for the first time in this valuation:
 - Inflation-based cost-of-living adjustments (COLAs) for Town employees are limited to 1.75% per year for retirements on or after July 1, 2018.
 - COLAs for Board of Education employees are limited to 1.75% per year for retirements on or after September 1, 2018.
 - The employee contribution rate for Town employees increased from 8.00% to 8.50% effective July 1, 2018, and will increase to 9.00% effective July 1, 2019.
 - The employee contribution rate for Board of Education employees increased from 8.00% to 8.50% effective September 1, 2018, and will increase to 9.00% effective July 1, 2019.

As a result of these plan changes, the employer normal cost decreased by 4.7% and the actuarial accrued liability decreased by 0.6%. The total impact was a decrease in the recommended contribution of \$327,827.

9. This report constitutes an actuarial valuation for the purpose of determining the actuarially determined contribution (ADC) under the Plan's funding policy; the ADC is set equal to the ARC determined in accordance with State law. The information contained in Section 5 provides the accounting information for GASB Statements No. 67 and No. 68, for inclusion in the plan and employer's financial statements as of June 30, 2018.
10. The Net Pension Liability (NPL) is equal to the difference between the Total Pension Liability (TPL) and the Plan's fiduciary net position (equal to the market value of assets). The NPL as of 2018 is \$293,144,263.
11. This actuarial report as of July 1, 2018 is based on financial and demographic data as of June 30, 2018. Changes subsequent to that date are not reflected and will affect future actuarial costs of the plan.
12. Since the actuarial valuation results are dependent on a given set of assumptions, there is a risk that emerging results may differ significantly as actual experience proves to be different from the assumptions. We have included a discussion of various risks that may affect the Plan in Section 2.

Summary of Key Valuation Results

		2018	2017
Contributions for plan year beginning July 1:	• Recommended employer contributions	\$22,605,704	\$21,974,384
	• Actual employer contributions	--	12,650,000
Actuarial accrued liability for plan year beginning July 1:	• Retired participants and beneficiaries	\$308,257,006	\$302,896,025
	• Inactive vested participants	3,320,140	2,756,533
	• Active participants	146,162,107	146,067,661
	• Total	457,739,253	451,720,219
	• Normal cost including administrative expenses for plan year beginning July 1	4,622,760	4,893,199
Assets for plan year beginning July 1:	• Market value of assets (MVA)	\$164,594,990	\$163,730,102
	• Actuarial value of assets (AVA)	164,904,429	166,427,556
	• Actuarial value of assets as a percentage of market value of assets	100.19%	101.65%
Funded status for plan year beginning July 1:	• Unfunded actuarial accrued liability on market value of assets	\$293,144,263	\$287,990,117
	• Funded percentage on MVA basis	35.96%	36.25%
	• Unfunded actuarial accrued liability on actuarial value of assets	\$292,834,824	\$285,292,663
	• Funded percentage on AVA basis	36.03%	36.84%
	• Amortization period on an AVA basis	26	27
Key assumptions:	• Net investment return	7.00%	7.00%
	• Inflation rate	2.25%	2.25%
	• Annual increase for level percent funding	2.00%	2.00%
GASB information:	• Discount rate	7.00%	7.00%
	• Total pension liability	\$457,739,253	\$451,720,219
	• Plan fiduciary net position	164,594,990	163,730,102
	• Net pension liability	293,144,263	287,990,117
	• Plan fiduciary net position as a percentage of total pension liability	35.96%	36.25%
	• Pension expense	\$12,756,381	\$12,692,637
Demographic data for plan year beginning July 1:	• Number of retired participants and beneficiaries	744	742
	• Number of inactive vested participants	28	24
	• Number of active participants	349	370
	• Total salary	\$26,088,216	\$26,805,022
	• Average salary	74,751	72,446

Development of the Recommended Contribution By Group

	Service (Town)	Service (Board of Ed)	Guardian	Total
1. Normal cost:				
a. Total normal cost	\$931,079	\$734,954	\$2,841,727	\$4,507,760
b. Projected administrative expenses	33,135	18,553	63,312	115,000
c. Projected employee contributions	<u>529,017</u>	<u>381,219</u>	<u>1,094,369</u>	<u>2,004,605</u>
d. Town normal cost: (a) + (b) – (c)	\$435,197	\$372,288	\$1,810,670	\$2,618,155
2. Accrued liability:				
a. Active employees	\$33,967,775	\$23,634,302	\$88,560,030	\$146,162,107
b. Vested terminated	2,349,816	896,894	73,430	3,320,140
c. Retirees	78,747,888	45,015,775	132,392,994	256,156,657
d. Beneficiaries	7,920,511	2,802,108	7,286,327	18,008,946
e. Disability retirees	<u>8,900,788</u>	<u>1,499,998</u>	<u>23,690,617</u>	<u>34,091,403</u>
f. Total accrued liability	\$131,886,778	\$73,849,077	\$252,003,398	\$457,739,253
3. Assets at actuarial value	47,513,325	26,604,753	90,786,351	164,904,429
4. Unfunded accrued liability: (2f) - (3)	\$84,373,453	\$47,244,324	\$161,217,047	\$292,837,824
5. Payment on unfunded accrued liability:				
a. Factor	15.233482	15.233482	15.233482	15.233482
b. Payment	\$5,538,685	\$3,101,348	\$10,583,072	\$19,223,105
c. Amortization years	26	26	26	26
d. Interest rate (adjusted for amortization with 2% annual growth)	4.90%	4.90%	4.90%	4.90%
6. Annual Town cost for 2018-2019 Fiscal Year				
a. Recommended contribution at beginning of year: (1d) + (5b)	\$5,973,882	\$3,473,636	\$12,393,742	\$21,841,260
b. Recommended contribution at middle of year: (6a) x 1.035	6,182,968	3,595,213	12,827,523	22,605,704

Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal Consulting (“Segal”) relies on a number of input items. These include:

Plan of benefits	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant data	An actuarial valuation for a plan is based on data provided to the actuary by the Town. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the auditor. The Town uses an “actuarial value of assets” that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

- The actuarial valuation is prepared at the request of the Town. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- Actuarial results in this report are not rounded, but that does not imply precision.
- If the Town is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan's provisions, but they may be subject to alternative interpretations. The Town should look to their other advisors for expertise in these areas.

As Segal Consulting has no discretionary authority with respect to the management or assets of the Plan, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Plan.

Section 2: Actuarial Valuation Results

Participant Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive vested participants, retired participants and beneficiaries.

The Plan was closed to new entrants in 2007, and therefore the number of active participants is declining. As shown on the next page, the average age, service and salary of the active population in the Plan are increasing.

More detailed information for this valuation year and the preceding valuation can be found in *Section 3, Exhibits A, B, and C.*

PARTICIPANT POPULATION: 2004 – 2018

Year Ended June 30	Active Participants	Inactive Vested Participants*	Retired Participants and Beneficiaries**	Total Non- Actives	Ratio of Non-Actives to Actives
2004	640	18	617	635	0.99
2006	628	19	657	676	1.08
2008	638	21	645	666	1.04
2010	568	27	664	691	1.22
2012	509	30	704	734	1.44
2014	437	24	737	761	1.74
2015	425	22	726	748	1.76
2016	408	24	722	746	1.83
2017	370	24	742	766	2.07
2018	349	28	744	772	2.21

*Excludes terminated participants due a refund of employee contributions

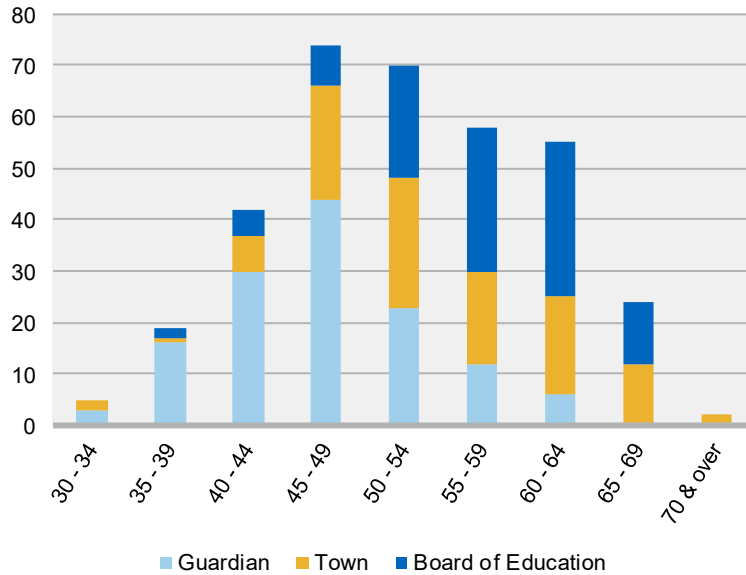
**Includes disabled retirees and former spouses of participants who are receiving benefits under qualified domestic relations orders

Active Participants

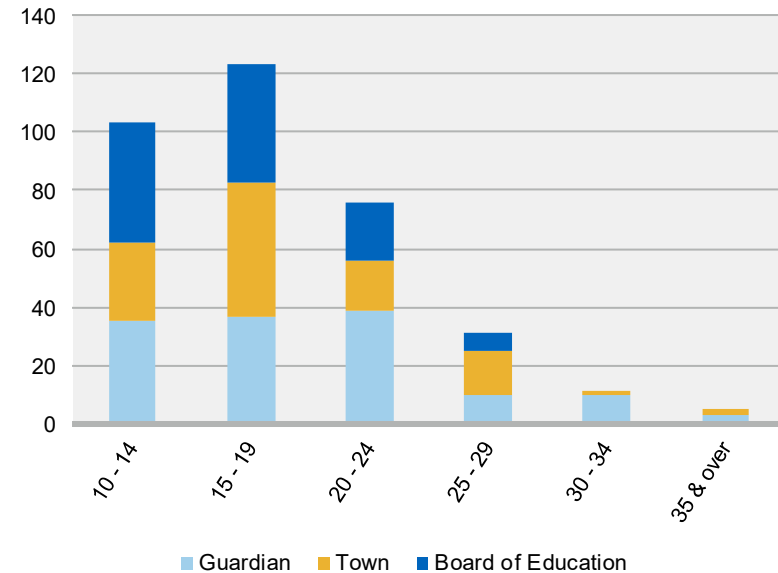
Plan costs are affected by the age, years of credited service and salaries of active participants. In this year's valuation, there were 349 active participants with an average age of 52.8, average years of credited service of 18.5 years and average salary of \$74,751. The 370 active participants in the prior valuation had an average age of 52.1, average service of 17.6 years and average salary of \$72,446.

Distribution of Active Participants as of June 30, 2018

ACTIVES BY AGE



ACTIVES BY YEARS OF CREDITED SERVICE



Inactive Participants

In this year's valuation, there were 28 participants with a vested right to a deferred or immediate vested benefit.

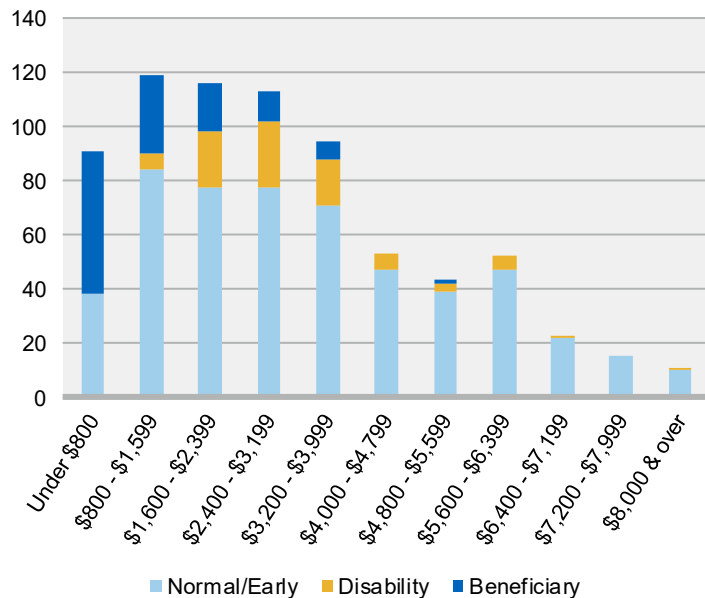
Retired Participants and Beneficiaries

As of June 30, 2018, 626 retired participants and 118 beneficiaries were receiving total monthly benefits of \$2,222,978. For comparison, in the previous valuation, there were 624 retired participants and 118 beneficiaries receiving monthly benefits of \$2,146,407.

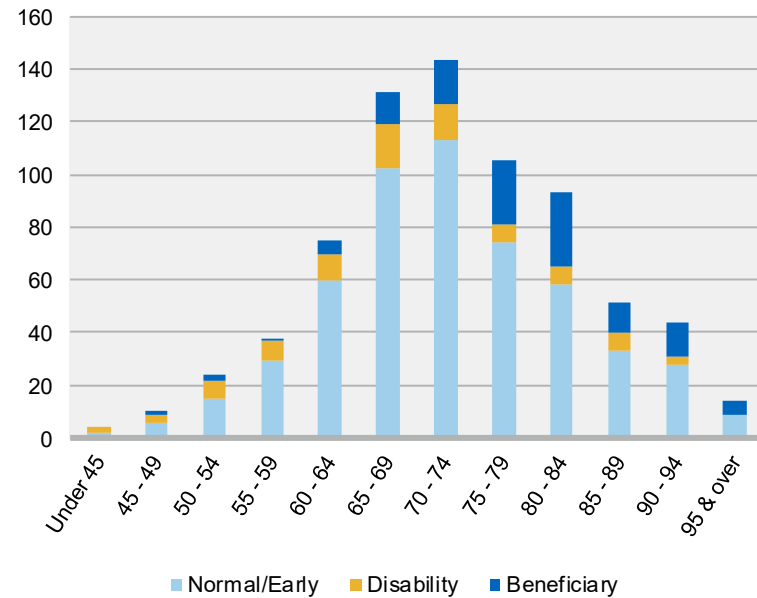
As of June 30, 2018, the average monthly benefit for retirees and beneficiaries is \$2,988, compared to \$2,893 in the previous valuation. The average age for retirees and beneficiaries is 72.6 in the current valuation, compared with 72.1 in the prior valuation.

Distribution of Pensioners as of June 30, 2018

PENSIONERS BY TYPE AND MONTHLY AMOUNT



PENSIONERS BY TYPE AND AGE



Historical Plan Population

The chart below demonstrates the progression of the active population over the last ten years. (As noted previously, the plan is closed to new entrants.) The chart also shows the changes among the retired population over the same time period.

PARTICIPANT DATA STATISTICS: 2004 – 2018

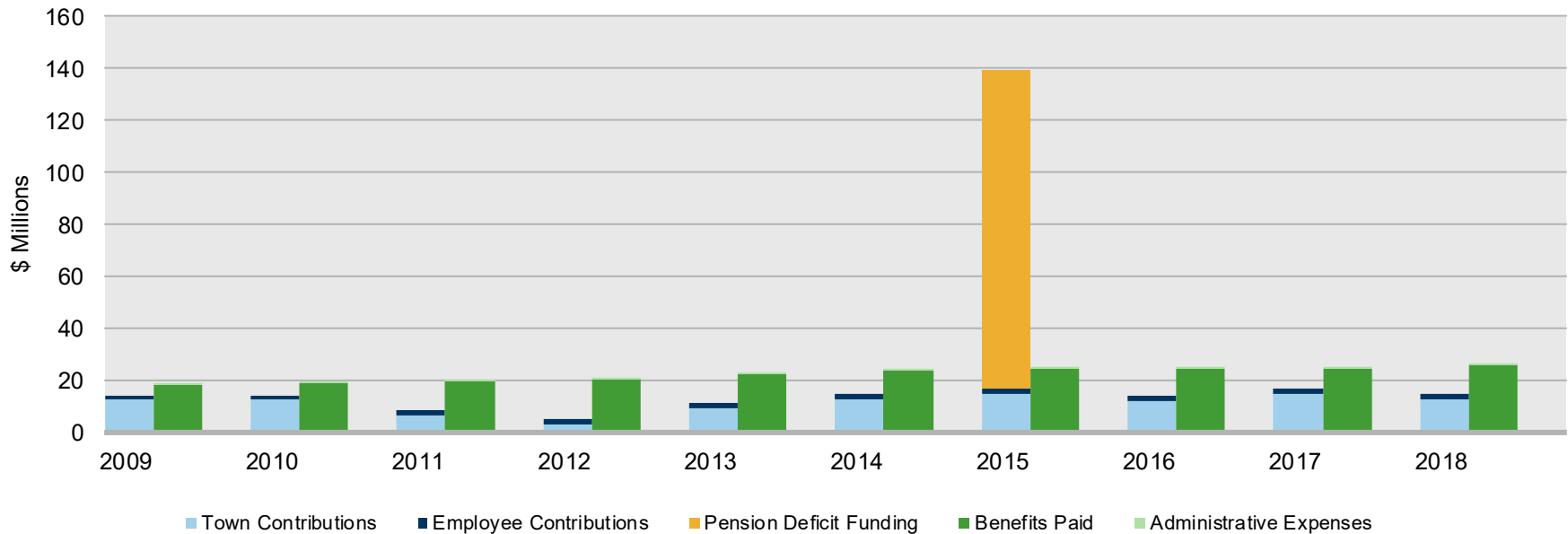
Year Ended June 30	Active Participants			Retired Participants and Beneficiaries		
	Count	Average Age	Average Service	Count	Average Age	Average Monthly Amount
2004	640	46.6	11.6	617	70.6	\$1,729
2006	628	46.1	10.5	657	69.7	2,102
2008	638	47.5	11.4	645	70.6	2,445
2010	568	48.7	13.1	664	71.1	2,608
2012	509	49.7	14.3	704	71.7	2,585
2014	437	50.2	15.2	737	71.5	2,721
2015	425	51.1	16.0	726	71.5	2,780
2016	408	52.0	16.8	722	71.9	2,839
2017	370	52.1	17.6	742	72.1	2,893
2018	349	52.8	18.5	744	72.6	2,988

Financial Information

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and investment earnings (less investment fees) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Additional financial information, including a summary of transactions for the valuation year, is presented in *Section 3, Exhibits D, E and F*.

COMPARISON OF CONTRIBUTIONS WITH BENEFITS AND EXPENSES FOR YEARS ENDED JUNE 30, 2009 – 2018



Note: The net contributions for the year ended June 30, 2015 include \$122,303,087 in funds from a pension deficit bond issuance.

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

DETERMINATION OF ACTUARIAL VALUE OF ASSETS FOR YEAR ENDED JUNE 30, 2018

1.	Market value of assets, June 30, 2018			\$164,594,990
2.	Calculation of unrecognized return	Original Amount*	Percent Deferred	Unrecognized Amount**
(a)	Year ended June 30, 2018	\$1,331,066	80%	\$1,064,853
(b)	Year ended June 30, 2017	6,517,353	60%	3,910,413
(c)	Year ended June 30, 2016	-9,625,872	40%	-3,850,348
(d)	Year ended June 30, 2015	-7,171,787	20%	-1,434,357
(e)	Year ended June 30, 2014	3,664,498	0%	<u>0</u>
(f)	Total unrecognized return			-309,439
3.	Preliminary actuarial value: (1) - (2f)			\$164,904,429
4.	Adjustment to be within 20% corridor			0
5.	Final actuarial value of assets as of June 30, 2018: (3) + (4)			<u>164,904,429</u>
6.	Actuarial value as a percentage of market value: (5) ÷ (1)			100.2%
7.	Amount deferred for future recognition: (1) - (5)			-\$309,439

*Total return minus expected return on a market value basis

**Recognition at 20% per year over five years

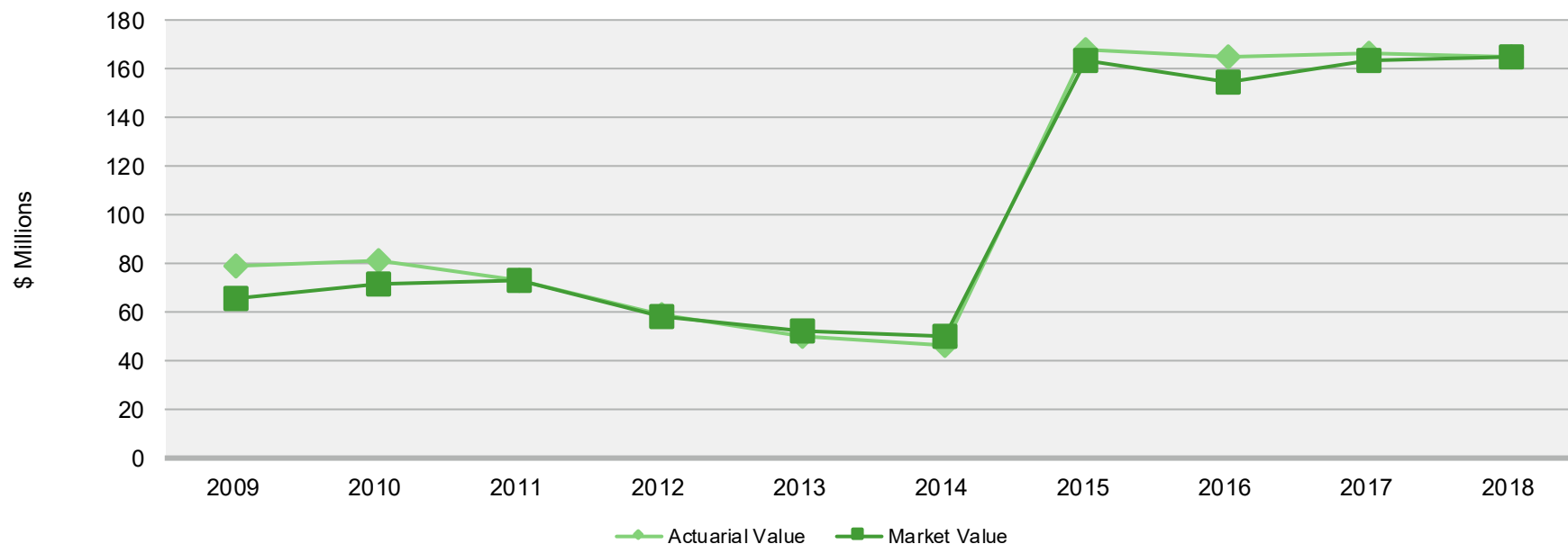
***Deferred return as of June 30, 2018 recognized in each of the next four years:

(a)	Amount recognized on June 30, 2019	-\$1,789,847
(b)	Amount recognized on June 30, 2020	-355,490
(c)	Amount recognized on June 30, 2021	1,569,684
(d)	Amount recognized on June 30, 2022	266,213

Both the actuarial value and market value of assets are representations of the Plan’s financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the Plan’s liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

The chart below provides a ten-year history of the Plan’s assets. As of the 2014 valuation date, the market value of assets was \$50.1 million and the funded ratio was 10.33%. In March of 2015, the Plan received \$122.3 million in funding through a pension deficit funding bond issuance. The current funded ratio is 36.03%, and is scheduled to increase if the Town complies with funding requirements.

ACTUARIAL VALUE OF ASSETS VS. MARKET VALUE OF ASSETS AS OF JUNE 30, 2009 – 2018



Actuarial Experience

To calculate any actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), any contribution requirement will decrease from the previous year. On the other hand, any contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total loss is \$596,144, which includes \$1,245,771 from investment losses that were partially offset by \$649,627 in gains from all other sources. The net experience variation from individual sources other than investments was only 0.14% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

ACTUARIAL EXPERIENCE FOR YEAR ENDED JUNE 30, 2018

1	Net loss from investments*	-\$1,245,771
2	Net gain from administrative expenses	1,550
3	Net gain from other experience	648,077
4	Net experience loss: 1 + 2 + 3	-\$596,144

* Details on next page.

Investment Experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Plan's investment policy. The rate of return on the market value of assets was 7.84% for the year ended June 30, 2018.

For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.00%. The actual rate of return on an actuarial basis for the 2018 plan year was 6.22%. Since the actual return for the year was less than the assumed return, the Plan experienced an actuarial loss during the year ended June 30, 2018 with regard to its investments.

INVESTMENT EXPERIENCE

	Year Ended June 30, 2018		Year Ended June 30, 2017	
	Market Value	Actuarial Value	Market Value	Actuarial Value
1 Net investment income	\$12,388,835	\$10,000,820	\$17,069,663	\$9,520,541
2 Average value of assets	157,968,129	160,665,583	150,747,282	160,993,858
3 Rate of return: 1 ÷ 2	7.84%	6.22%	11.32%	5.91%
4 Assumed rate of return	7.00%	7.00%	7.00%	7.00%
5 Expected investment income: 2 × 4	11,057,769	11,246,591	10,552,310	11,269,570
6 Actuarial gain/(loss): 1 - 5	<u>\$1,331,066</u>	<u>-\$1,245,771</u>	<u>\$6,517,353</u>	<u>-\$1,749,029</u>

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the actual market value investment return for the last 20 years, including averages over select time periods. Prior to 2007, the actuarial value and the market value were equal.

INVESTMENT RETURN – ACTUARIAL VALUE VS. MARKET VALUE: 1999 - 2018

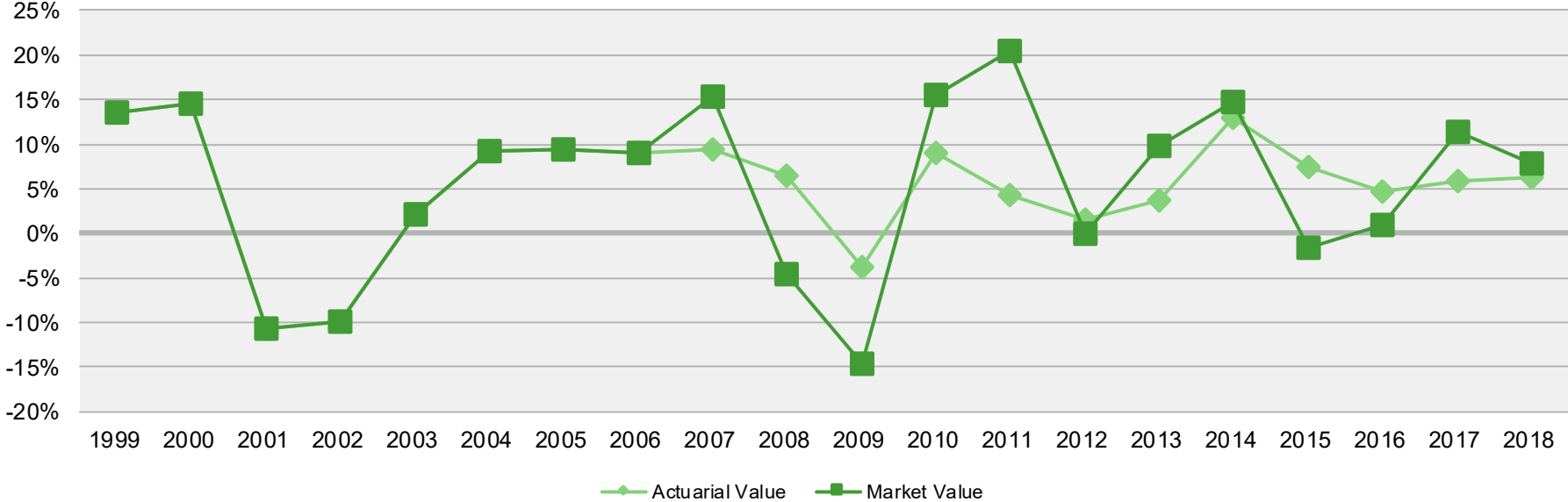
Year Ended June 30	Actuarial Value Investment Return		Market Value Investment Return		Year Ended June 30	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
1999	\$15,086,191	13.47%	\$15,086,191	13.47%	2009	-\$3,223,225	-3.84%	-\$11,596,521	-14.64%
2000	17,568,404	14.57	17,568,404	14.57	2010*	6,884,458	8.98	9,919,425	15.61
2001	-13,930,971	-10.71	-13,930,971	-10.71	2011	3,232,260	4.27	13,450,252	20.50
2002	-10,712,998	-9.92	-10,712,998	-9.92	2012	1,040,920	1.59	13,171	0.02
2003	1,896,234	2.14	1,896,234	2.14	2013	1,935,758	3.63	5,127,934	9.78
2004	7,522,329	9.26	7,522,329	9.26	2014	5,916,442	13.05	6,996,801	14.70
2005	7,454,887	9.38	7,454,887	9.38	2015	5,998,416	7.52	-1,355,734	-1.63
2006	7,127,032	9.01	7,127,032	9.01	2016	7,711,484	4.75	1,468,812	0.93
2007*	2,928,694	9.44	12,167,710	15.27	2017	9,520,541	5.91	17,069,663	11.32
2008	5,387,042	6.55	-3,979,378	-4.58	2018	10,000,820	6.22	12,388,835	7.84
Total	\$40,326,844		\$40,199,440			\$49,017,873		\$53,482,638	
							Most recent five-year average return	6.43%	6.12%
							Most recent ten-year average return	5.08%	5.79%
							Most recent 15-year average return	5.81%	6.30%
							Most recent 20-year average return	4.64%	4.96%

Note: Each year's yield is weighted by the average asset value in that year.

* The actuarial rates of return in 2007 and 2010 reflects changes in asset method.

As described earlier in this section, the actuarial asset valuation method gradually recognizes fluctuations in the market value rate of return. The goal of this is to stabilize the actuarial rate of return and to produce more level pension plan costs.

MARKET AND ACTUARIAL RATES OF RETURN FOR YEARS ENDED JUNE 30, 1999 - 2018



Administrative Expenses

Administrative expenses for the year ended June 30, 2018 totaled \$117,526 compared to the assumption of \$115,000 (\$119,076 when adjusted for timing). This resulted in a gain of \$1,550 for the year. We have maintained the assumption of \$115,000 for the current year.

Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among participants,
- retirement experience (earlier or later than projected),
- mortality (more or fewer deaths than projected),
- the number of disability retirements (more or fewer than projected),
- salary increases (greater or smaller than projected), and
- cost-of-living adjustments (COLAs) higher or lower than anticipated.

The net gain from this other experience for the year ended June 30, 2018 amounted to \$648,077, which is 0.14% of the actuarial accrued liability.

Changes in the Actuarial Accrued Liability

The actuarial accrued liability as of July 1, 2018 is \$457,739,253, an increase of \$6,019,034, or 1.3%, from the actuarial accrued liability as of the prior valuation date. The liability is expected to grow each year with normal cost and interest, and to decline due to benefit payments made. Additional fluctuations can occur due to actual experience that differs from expected (as discussed in the previous subsection).

Actuarial Assumptions

- There are no assumption changes reflected in this report.
- Details on actuarial assumptions and methods are in *Section 4, Exhibit I*.

Plan Provisions

- The following Plan changes were negotiated with the Service Employees since the prior valuation:
 - Inflation-based cost-of-living adjustments (COLAs) for Town employees are limited to 1.75% per year for retirements on or after July 1, 2018.
 - COLAs for Board of Education employees are limited to 1.75% per year for retirements on or after September 1, 2018.
 - The employee contribution rate for Town employees increased from 8.00% to 8.50% effective July 1, 2018, and will increase to 9.00% effective July 1, 2019.
 - The employee contribution rate for Board of Education employees increased from 8.00% to 8.50% effective September 1, 2018, and will increase to 9.00% effective July 1, 2019.
- These changes decreased the actuarial accrued liability by 0.6% and decreased the employer normal cost by 4.7%.
- A summary of plan provisions is in *Section 4, Exhibit II*.

Development of Unfunded Actuarial Accrued Liability

DEVELOPMENT FOR YEAR ENDED JUNE 30, 2018

1	Unfunded actuarial accrued liability at beginning of year	\$285,292,663
2	Normal cost at beginning of year (including administrative expenses)	4,893,199
3	Total contributions	-14,770,410
4	Interest	
	• For whole year on 1 + 2	\$20,313,010
	• For half year on 3	<u>-616,684</u>
	Total interest	<u>19,696,326</u>
5	Expected unfunded actuarial accrued liability	\$295,111,778
6	Changes due to:	
	• Net experience gains and losses	\$596,144
	• Plan provisions	<u>-2,873,098</u>
	Total changes	<u>-\$2,276,954</u>
7	Unfunded actuarial accrued liability at end of year	<u>\$292,834,824</u>

Recommended Contribution

The recommended contribution is equal to the employer normal cost payment and a payment on the unfunded actuarial accrued liability. As of July 1, 2018, the recommended contribution is \$22,605,704.

The recommended contribution is based on a closed 30-year amortization with 2% annual increases expected. The period was set to match the period of the pension deficit funding bond issuance, and the 2% growth is tied to the Town's expected budgetary increases. As of July 1, 2018 there are 26 years remaining on the amortization schedule.

The contribution requirement as of July 1, 2018 are based on the data previously described, the actuarial assumptions and Plan provisions described in *Section 4*, including all changes affecting future costs adopted at the time of the actuarial valuation, actuarial gains and losses, and changes in the actuarial assumptions.

RECOMMENDED CONTRIBUTION FOR YEAR BEGINNING JULY 1

	2018	2017
1. Total normal cost	\$4,507,760	\$4,778,199
2. Administrative expenses	115,000	115,000
3. Expected employee contributions	<u>2,004,605</u>	<u>2,042,231</u>
4. Employer normal cost: (1) + (2) - (3)	\$2,618,155	\$2,850,968
5. Actuarial accrued liability	\$457,739,253	\$451,720,219
6. Actuarial value of assets	<u>164,904,429</u>	<u>166,427,556</u>
7. Unfunded actuarial accrued liability: (5) - (6)	292,834,824	285,292,663
8. Payment on unfunded actuarial accrued liability	19,223,105	18,380,321
9. Adjustment for timing*	<u>764,444</u>	<u>743,095</u>
10. Total recommended contribution: (4) + (8) + (9)	<u>22,605,704</u>	<u>\$21,974,384</u>

*Recommended contributions are assumed to be paid at the middle of every year.

Reconciliation of Recommended Contribution

The chart below details the changes in the recommended contribution from the prior valuation to the current year’s valuation.

RECONCILIATION OF RECOMMENDED CONTRIBUTION FROM JULY 1, 2017 TO JULY 1, 2018

	Amount
Recommended Contribution as of July 1, 2017	\$21,974,384
• Effect of contributions less than recommended contribution	646,511
• Effect of expected change in amortization payment due to level percent amortization method	380,472
• Effect of plan amendments	-327,827
• Effect of investment loss	84,641
• Effect of other gains and losses on accrued liability	-44,137
• Net effect of other changes, including composition and number of participants	<u>-108,340</u>
Total change	\$631,320
Recommended Contribution as of July 1, 2018	\$22,605,704

History of Employer Contributions

A history of the most recent years of contributions is shown below.

HISTORY OF EMPLOYER CONTRIBUTIONS: 2010 – 2019

Fiscal Year Ended June 30	Actuarially Determined Contribution (ADC)*	Actual Employer Contribution	Percent Contributed
2010	\$18,911,433	\$12,500,000	66.10%
2011	19,088,623	6,550,000	34.31%
2012	19,850,851	3,040,000	15.31%
2013	27,145,128	9,340,000	34.41%
2014	27,688,031	12,500,000	45.15%
2015	29,536,050	14,768,025	50.00%
2016	21,998,113	12,100,000	55.00%
2017	21,067,247	14,747,073	70.00%
2018	21,974,384	12,650,000	57.57%
2019	22,605,704	--	--

*Prior to 2012, this amount was the Annual Required Contribution (ARC)

Risk

Since the actuarial valuation results are dependent on a given set of assumptions and data as of a specific date, there is a risk that emerging results may differ significantly as actual experience differs from the assumptions.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a brief discussion of some risks that may affect the Plan. Upon request, a more detailed assessment of the risks can be provided to enable a better understanding of the risks specific to your Plan.

➤ **Contribution Risk (the risk that actual contributions will be different from the actuarially recommended contribution)**

Contributions below the actuarially recommended contribution, or ARC, may be the most significant risk that the Plan currently faces. Since 2001, the Town has contributed between 0% and 72% of the ARC each year. Funding shortfalls and economic downturns over the last two decades led to a significant unfunded liability and increasing pension costs, and the full ARC of \$22.6 million for the fiscal year ending June 30, 2019 is equivalent to almost 10% of Hamden's total budget.

As discussed in Section 1 of this report, the 2018 updates to Connecticut's Pension Statute allow the Town to continue to contribute less than 100% of the ARC through 2020. The Town will be required to contribute 100% of the ARC annually beginning with the fiscal year ending June 30, 2021.

Town contributions for the year ended June 30, 2018 totaled \$12,650,000, compared to the actuarially recommended contribution of \$21,974,384. This resulted in a loss of \$9,525,009 for the year, when adjusted for timing, directly increasing the unfunded liability and future pension costs.

➤ **Investment Risk (the risk that returns will be different than expected)**

The market value rate of return over the last 20 years has ranged from a low of -14.64% to a high of 20.50%. As long as the assets cover a relatively low percentage of the Plan's liabilities, actual investment returns have a modest impact on the contributions requirements. However, as the funded ratio improves, the impact of the returns that are considerably higher or lower than assumed rate could be significant.

➤ **Longevity Risk (the risk that mortality experience will be different than expected)**

The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the recommended contribution.

- Demographic Risk (the risk that participant experience will be different than assumed)

Examples of this risk include:

- Actual retirements occurring earlier or later than assumed. The value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply.
- More or less active participant turnover than assumed.

GFOA Solvency Test

The Actuarial Accrued Liability represents the present value of benefits earned, calculated using the plan's actuarial cost method. The Actuarial Value of Assets reflects the financial resources available to liquidate the liability. The portion of the liability covered by assets reflects the extent to which accumulated plan assets are sufficient to pay future benefits, and is shown for liabilities associated with employee contributions, pensioner liabilities, and other liabilities. The Government Finance Officers Association (GFOA) recommends that the funding policy aim to achieve a funded ratio of 100 percent.

GFOA SOLVENCY TEST AS OF JUNE 30

	2018	2017
Actuarial accrued liability (AAL)		
• Active member contributions	\$26,974,531	\$25,517,040
• Retirees and beneficiaries	308,257,006	302,896,025
• Active and inactive members (employer-financed)	122,507,716	123,307,154
Total	\$457,739,253	\$451,720,219
Actuarial value of assets	\$164,904,429	\$166,427,556
Cumulative portion of AAL covered		
• Active member contributions	100.00%	100.00%
• Retirees and beneficiaries	44.75%	46.52%
• Active and inactive members (employer-financed)	0.00%	0.00%

Section 3: Supplemental Information

EXHIBIT A – TABLE OF PLAN COVERAGE

Category	Year Ended June 30		Change From Prior Year
	2018	2017	
Active participants in valuation:			
• Number	349	370	-5.7%
• Average age	52.8	52.1	0.7
• Average years of credited service	18.5	17.6	0.9
• Total salary	\$26,088,216	\$26,805,022	-2.7%
• Average salary	74,751	72,446	3.2%
• Account balances (without interest)	21,336,853	20,369,090	4.8%
• Total active vested participants	349	370	-5.7%
Inactive vested participants	28	24	16.7%
Retired participants			
• Number in pay status	541	539	0.4%
• Average age	72.2	71.8	0.4
• Average monthly benefit	\$3,335	\$3,234	3.1%
Disabled participants:			
• Number in pay status	85	85	0.0%
• Average age	68.3	67.5	0.8
• Average monthly benefit	\$3,140	\$2,979	5.4%
Beneficiaries:			
• Number in pay status	118	118	0.0%
• Average age	78.3	77.6	0.7
• Average monthly benefit	\$1,288	\$1,270	1.4%

**EXHIBIT B – PARTICIPANTS IN ACTIVE SERVICE AS OF JUNE 30, 2018
BY AGE, YEARS OF CREDITED SERVICE, AND AVERAGE SALARY**

Age	Years of Credited Service								
	Total	10-14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over	
30 - 34	5	5	--	--	--	--	--	--	--
	\$84,050	\$84,050	--	--	--	--	--	--	--
35 - 39	19	14	5	--	--	--	--	--	--
	88,363	92,440	\$76,946	--	--	--	--	--	--
40 - 44	42	15	18	9	--	--	--	--	--
	85,876	88,590	81,483	\$90,139	--	--	--	--	--
45 - 49	74	13	28	23	10	--	--	--	--
	84,675	67,385	87,165	91,390	\$84,735	--	--	--	--
50 - 54	70	17	20	14	14	5	--	--	--
	74,277	53,988	61,039	93,107	86,873	\$108,221	--	--	--
55 - 59	58	17	21	13	2	4	1	--	--
	66,093	54,739	62,441	70,245	--	--	--	--	--
60 - 64	55	17	21	11	1	2	3	--	--
	62,110	55,576	57,003	62,271	--	--	--	--	--
65 - 69	24	5	10	5	3	--	--	1	--
	63,208	52,873	67,790	67,644	--	--	--	--	--
70 & over	2	--	--	1	1	--	--	--	--
	--	--	--	--	--	--	--	--	--
Total	349	103	123	76	31	11	4	1	1
	\$74,751	\$67,736	\$70,724	\$82,146	\$82,831	\$105,584	--	--	--

EXHIBIT C – RECONCILIATION OF PARTICIPANT DATA

	Active Participants	Inactive Vested Participants	Disableds	Retired Participants	Beneficiaries	Total
Number as of July 1, 2017	370	24	85	539	118	1,136
• New participants	0	N/A	N/A	N/A	N/A	0
• Terminations	-4	4	N/A	N/A	N/A	0
• Retirements	-16	0	N/A	16	N/A	0
• New disabilities	-2	0	2	N/A	N/A	0
• Return to work	1	-1	0	0	N/A	0
• Deceased	0	0	-2	-17	-5	-24
• New beneficiaries	0	0	0	0	6	6
• New QDROS	N/A	N/A	N/A	2	N/A	2
• Data adjustments	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>-1</u>	<u>1</u>
Number as of July 1, 2018	349	28	85	541	118	1,121

EXHIBIT D – SUMMARY STATEMENT OF INCOME AND EXPENSES ON A MARKET VALUE BASIS

	Year Ended June 30, 2018	Year Ended June 30, 2017
Net assets at market value at the beginning of the year	\$163,730,102	\$154,834,124
Contribution income:		
• Employer contributions	\$12,650,000	\$14,747,073
• Employer contributions	2,120,410	2,042,495
• Less administrative expenses	<u>-117,526</u>	<u>-102,711</u>
<i>Net contribution income</i>	\$14,652,884	\$16,686,857
Investment income:		
• Interest, dividends and other income	\$2,592,494	\$2,799,733
• Asset appreciation	10,185,740	14,699,610
• Less investment fees	<u>-389,399</u>	<u>-429,680</u>
<i>Net investment income</i>	<u>\$12,388,835</u>	<u>\$17,069,663</u>
Total income available for benefits	\$27,041,719	\$33,756,520
Less benefit payments	-\$26,176,831	-\$24,860,542
Change in reserve for future benefits	\$864,888	\$8,895,978
Net assets at market value at the end of the year	\$164,594,990	\$163,730,102

EXHIBIT E – SUMMARY STATEMENT OF PLAN ASSETS

	June 30, 2018	June 30, 2017
Cash equivalents	\$3,057,957	\$6,005,959
Total accounts receivable	205,016	31,115
Investments:		
• Mutual funds	\$104,541,149	\$107,151,169
• Common stock	36,837,863	32,029,478
• Equity real estate	<u>20,225,503</u>	<u>18,602,686</u>
Total investments at market value	\$161,604,515	\$157,783,333
Total assets	\$164,867,488	\$163,820,407
Total accounts payable	-272,498	-90,305
Net assets at market value	\$164,594,990	\$163,730,102
Net assets at actuarial value	\$164,904,429	\$166,427,556

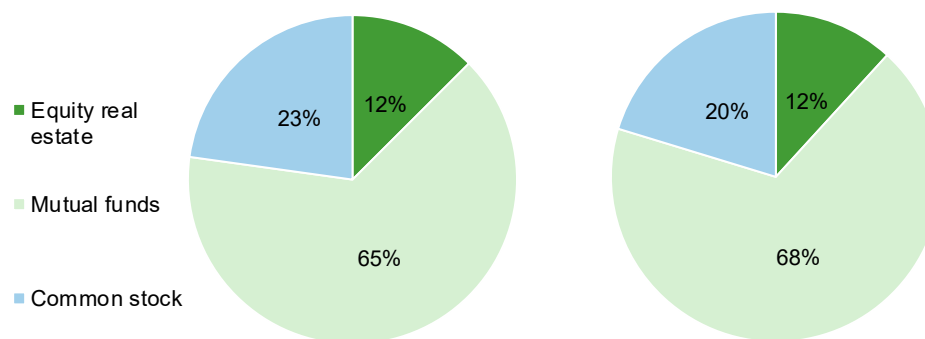


EXHIBIT F – DEVELOPMENT OF THE FUND THROUGH JUNE 30, 2018

Year Ended June 30	Employer Contributions	Employee Contributions	Pension Deficit Funding	Net Investment Return*	Admin. Expenses	Benefit Payments	Market Value of Assets at Year-End	Actuarial Value of Assets at Year-End	Actuarial Value as a Percent of Market Value
2009	\$12,500,000	\$1,983,963	\$0	-\$11,596,521	\$106,880	\$18,101,394	\$65,737,492	\$78,884,991	120.0%
2010	12,500,000	1,968,410	0	9,919,425	100,740	18,784,600	71,239,987	81,352,519	114.2%
2011	6,550,000	2,053,140	0	13,450,252	113,089	19,762,293	73,417,997	73,312,537	99.9%
2012	3,040,000	2,138,782	0	13,171	103,868	20,586,244	57,919,838	58,842,127	101.6%
2013	9,340,000	2,153,222	0	5,127,934	101,595	22,346,744	52,092,655	49,822,768	95.6%
2014	12,500,000	2,181,831	0	6,996,801	76,352	23,582,140	50,112,795	46,762,549	93.3%
2015	14,768,025	2,232,086	122,303,087	-1,355,734	109,273	24,325,333	163,625,653	167,629,557	102.4%
2016	12,100,000	2,195,488	0	1,468,812	118,719	24,437,110	154,834,124	165,080,700	106.6%
2017	14,747,073	2,042,495	0	17,069,663	102,711	24,860,542	163,730,102	166,427,556	101.6%
2018	12,650,000	2,120,410	0	12,388,835	117,526	26,176,831	164,594,990	164,904,429	100.2%

* On a market basis, net of investment fees

EXHIBIT G – DEFINITION OF PENSION TERMS

The following list defines certain technical terms for the convenience of the reader:

Actuarial Accrued Liability for Actives:	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial Accrued Liability for Pensioners and Beneficiaries:	The single-sum value of lifetime benefits to existing pensioners and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial Cost Method:	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the recommended contribution.
Actuarial Gain or Loss:	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.
Actuarially Equivalent:	Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV):	The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits:	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation:	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).
Actuarial Value of Assets (AVA):	The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.
Actuarially Determined:	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
Actuarially Determined Contribution (ADC):	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment. For Hamden, the ADC is the same as the Actuarially Recommended Contribution (ARC) defined in State law.
Amortization Method:	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization Payment:	The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Assumptions or Actuarial Assumptions:	The estimates upon which the cost of the Fund is calculated, including: <u>Investment return</u> - the rate of investment yield that the Fund will earn over the long-term future; <u>Mortality rates</u> - the death rates of employees and pensioners; life expectancy is based on these rates; <u>Retirement rates</u> - the rate or probability of retirement at a given age or service; <u>Disability rates</u> - the probability of disability retirement at a given age; <u>Withdrawal rates</u> - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; <u>Salary increase rates</u> - the rates of salary increase due to inflation and productivity growth.
Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Open Amortization Period.
Decrements:	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.
Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
Funded Ratio:	The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

GASB 67 and GASB 68:	Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.
Investment Return:	The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Net Pension Liability (NPL):	The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.
Normal Cost:	That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated.
Open Amortization Period:	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the actuarial assumptions are realized.
Plan Fiduciary Net Position:	Market value of assets.
Total Pension Liability (TPL):	The actuarial accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.
Unfunded Actuarial Accrued Liability:	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

Section 4: Actuarial Valuation Basis

EXHIBIT I – ACTUARIAL ASSUMPTIONS AND ACTUARIAL COST METHOD

Rationale for Assumptions	Current data is reviewed in conjunction with each annual valuation. Based on professional judgment, past experience and future expectations, no assumptions were changed this year.	
Net Investment Return:	7.00%	The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment, in consultation with the Town and its asset advisor. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes as provided by Segal Marco Advisors, as well as the Plan's target asset allocation.
Salary Increases:	2.50%	The salary scale assumption was set based on a review of collective bargaining agreements for the employees and input from the Town's Finance Department.
Cost-of-Living Increases:	2.25% for active Guardians and 1.75% for active Service Employees 2.25% for current retirees with dates of retirement after December 1, 1982; 3.00% for earlier retirees 2.25% is the long-term inflation assumption for the Plan; the Service Employee assumption reflects a negotiated COLA cap.	
Administrative Expenses:	\$115,000	The annual administrative expenses were based on historical and current data, adjusted to reflect estimated future experience and professional judgment.
Mortality Rates:	<i>Healthy</i> RP-2000 Combined Healthy Mortality Table, projected 24 years with Scale BB <i>Disabled</i> RP-2000 Disabled Retiree Table, projected 24 years with Scale BB	The RP-2000 mortality tables, projected to the 2018 valuation date, reasonably reflect the projected mortality experience of the Plan as of the measurement date. The additional projection of seven years is a provision made for future mortality improvement. The mortality rates were based on historical and current demographic data, adjusted to reflect estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of deaths and the projected number based on the prior years' assumption over the most recent three years.

Termination Rates Before Retirement:

Age	Rate (%) for Service Employees			
	Mortality		Disability*	Withdrawal
	Male	Female	All Lives	All Lives
30	0.04	0.02	0.11	11.11
35	0.07	0.04	0.15	7.05
40	0.10	0.07	0.22	3.38
45	0.14	0.11	0.36	0.80
50	0.20	0.16	0.61	0.00
55	0.34	0.25	1.01	0.00
60	0.59	0.42	1.63	0.00

* 25% of disabilities are assumed to be service-related.

Age	Rate (%) for Guardian Employees			
	Mortality		Disability*	Withdrawal
	Male	Female	All Lives	All Lives
30	0.04	0.02	0.22	3.70
35	0.07	0.04	0.29	2.35
40	0.10	0.07	0.44	1.13
45	0.14	0.11	0.72	0.27
50	0.20	0.16	1.21	0.00
55	0.34	0.25	2.02	0.00
60	0.59	0.42	3.25	0.00

* 75% of disabilities are assumed to be service-related.

The termination and disability rates were based on historical and current demographic data, adjusted to reflect estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and disability retirements and the projected number based on the prior years' assumption over the most recent three years.

Retirement Rates:	Service Employees		Guardian Employees	
	Age	Retirement Probability (%)	Age	Retirement Probability (%)
	55-61	5.00	60-64	25.00
	62-64	15.00	65	100.00
	65	75.00	<i>10% added at the first eligibility for 20 years of service, until age 60.</i>	
	66-69	50.00		
	70	100.00		
<i>20% added at the first eligibility for 30 years of service.</i>				
The retirement rates were based on historical and current demographic data, adjusted to reflect estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements by age and the projected number based on the prior years' assumption over the most recent three years.				
Retirement Age for Inactive Vested Participants:	Age 62 The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements and the projected number based on the prior years' assumption over the most recent three years.			
Unknown Data for Participants:	Same as those exhibited by Participants with similar known characteristics. If not specified, Participants are assumed to be male.			
Percent Married:	80% of males and 60% of females			
Age of Spouse:	Females three years younger than males			
Actuarial Value of Assets:	Market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the actual and expected market returns, and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.			
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the age at the time the participant commenced employment. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by compensation.			
Justification for Change in Actuarial Assumptions:	The COLA assumption for active Service Employees was lowered from 2.25% to 1.75%, in conjunction with a negotiated cap effective July 1, 2018 for Town employees and September 1, 2018 for Board of Education employees.			

EXHIBIT II – SUMMARY OF PLAN PROVISIONS

This exhibit summarizes the major provisions of the Retirement Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year:	July 1 through June 30
Plan Status:	Closed to new entrants
Eligibility:	Employee of the Town of Hamden and classified as either a “Service” or “Guardian” employee. Participants must make the mandatory employee contributions and be regularly scheduled to work more than 20 hours per week. Participation in the Plan closed to Guardian employees on July 1, 2006 and to all other employees on July 1, 2007.

Guardian Plan Provisions

Normal Pension – Guardians:	
<i>Age and service requirements</i>	The earlier of age 60 or the completion of 20 years of Credited Service
<i>Amount</i>	2.5% of Average Annual Compensation per year of Credited Service for the first 20 years, plus 3% of Average Annual Compensation per year for Credited Service for the next 5 years, plus 2% of Average Annual Compensation per year of Credited Service in excess of 25 years to a maximum of 35 years. Effective July 1, 2006, no Employee shall receive more than 80% based on the above formula. Prior to June 30, 2006, a participant can receive more than 80% if they have the required years of service and were hired before July 1, 1981. Such participant's benefits shall be frozen as of June 30, 2006. Average Annual Compensation is defined as the twelve consecutive month period immediately prior to termination or, if greater, the highest one plan year of annual compensation in the last ten years. Includes regular base salary, longevity payments, holiday pay and Workers' Compensation payments. A participant's minimum retirement benefit shall not be less than sixty-hundredths (60/100) of one percent (1%) of Average Annual Compensation per year of Credited Service, or \$3.25 per year of Credited Service, whichever is greater.
Early Retirement – Guardians:	
<i>Age requirement</i>	Within five (5) years of the Employee's Normal Retirement Date
<i>Service requirement</i>	15 years of Credited Service
<i>Amount</i>	Normal pension accrued, unreduced for early retirement

<p>Non-Service Connected Disability Retirement – Guardians:</p> <p><i>Age requirement</i></p> <p><i>Service requirement</i></p> <p><i>Amount</i></p>	<p>None</p> <p>10 years of Credited Service</p> <p>The greater of (a) 30% of Average Annual Compensation if hired on or after July 1, 1981 (25% of Average Annual Compensation if hired on or after July 1, 1987); or (b) Normal pension accrued. Employees hired prior to July 1, 1981 have a minimum benefit of 50% of Average Annual Compensation.</p>
<p>Service-Connected Disability Retirement – Guardians:</p> <p><i>Age requirement and service requirement</i></p> <p><i>Amount</i></p>	<p>None</p> <p>The greater of (a) 50% of Average Annual Compensation; or (b) Normal pension accrued.</p>
<p>Vesting – Guardians:</p> <p><i>Age requirement</i></p> <p><i>Service requirement</i></p> <p><i>Amount</i></p>	<p>None</p> <p>50% with 10 years of Credited Service, increasing 10% per year of Credited Service to 100% with 15 years of Credited Service.</p> <p>Normal pension accrued, multiplied by vested percentage, payable at Normal Retirement Date or, if earlier, the first full month following the month the Participant would have completed 20 years of Credited Service.</p> <p>If a member elects a refund of his Employee Contributions, he/she forfeits his/her vested benefit.</p>
<p>Pre-Retirement Death Benefits – Guardians:</p> <p><i>Status</i></p> <p><i>Age and service requirements</i></p> <p><i>Survivor's benefit</i></p> <p><i>Surviving children's benefit</i></p> <p><i>Lump-sum death benefit</i></p> <p><i>Burial allowance</i></p>	<p>Active member at the time of death</p> <p>None</p> <p>Greater of (a) 50% of Average Annual Compensation at death; or (b) 50% of the benefit the Employee would have received had he retired the day before his death, payable to spouse until death or remarriage</p> <p>25% of Average Annual Compensation payable to dependent children up to age 18</p> <p>\$5,000 payable to spouse or dependent children if the Employee's death is service-related and if death occurs within one year of the date of injury</p> <p>\$5,000</p>

Post-Retirement Death Benefits – Guardians	
<i>Survivors' benefit</i>	50% of the benefit that the retiree was receiving at the time of death, payable to spouse until death or remarriage
<i>Lump-sum death benefit</i>	Same as the pre-retirement lump-sum death benefit, if death occurs within one year of termination of employment
<i>Burial allowance</i>	\$5,000
Cost of Living Increase – Guardians	Based on changes in the Consumer Price Index, with a maximum of 3%, paid on each May 1 for those Participants who retired prior to January 1. Participants with pension start dates of December 1, 1982 or earlier receive 3% regardless of the Consumer Price Index.
Employee Contributions – Guardians	8.50% of Annual Compensation. Interest accrues at 5.00% per year. Contributions cease after 35 years of service.

Service Employee Plan Provisions

Normal Retirement – Service Employees	
<i>Age and service requirements</i>	The earlier of age 65, the completion of 30 years of Credited Service; or age 55 and completion of 20 years of Credited Service.
<i>Amount</i>	2.5% of Average Annual Compensation per year of Credited Service for the first 20 years plus 2.0% of the Average Annual Compensation in excess of 20, to a maximum of 35 years, not to exceed 85% of Average Annual compensation for Employees hired after July 1, 1978. For members hired prior to July 1, 1978, the maximum pension amount may exceed 85% of Average Annual Compensation, but shall be frozen as of June 30, 2008. Average Annual Compensation is defined as the average of Compensation earned during the most recent 24-month period immediately prior to termination or if greater, the average of the highest two consecutive Plan Years of annual Compensation paid to the member out of the last 10 years. Average Annual Compensation includes regular base salary, longevity payments, and any Workers' Compensation payments. A participant's minimum retirement benefit shall not be less than sixty-hundredths (60/100) of one percent (1%) of Average Annual Compensation per year of Credited Service, or \$3.25 per year of Credited Service, whichever is greater.
Early Retirement – Service Employees	
<i>Age requirement</i>	55
<i>Service requirement</i>	10 years
<i>Amount</i>	Normal pension accrued, reduced by 0.60% per month for the first five years preceding age 65 and 0.30% per month for the next five years.

<p>Disability Retirement – Service Employees</p> <p><i>Age requirement</i></p> <p><i>Service requirement</i></p> <p><i>Amount</i></p>	<p>None</p> <p>For a non-service connected Disability pension, 15 years of Credited Service (10 years of Credited Service for Employees hired prior to July 1, 1991). For a service-connected Disability pension, there is no service requirement.</p> <p>The greater of (a) 50% Average Annual Compensation; or (b) Normal pension accrued</p>
<p>Vesting – Service Employees</p> <p><i>Age requirement</i></p> <p><i>Service requirement</i></p> <p><i>Amount</i></p>	<p>None</p> <p>10 years of Credited Service</p> <p>Normal pension accrued, payable at Normal Retirement Date</p> <p>If a member elects a refund of his/her Employee Contributions, he/she forfeits his/her vested benefit.</p>
<p>Pre-Retirement Death Benefits – Service Employees</p> <p><i>Status</i></p> <p><i>Service requirement</i></p> <p><i>Survivor’s benefit</i></p> <p><i>Surviving children’s benefit</i></p> <p><i>Lump-sum death benefit</i></p> <p><i>Burial allowance</i></p>	<p>Active member at the time of death</p> <p>5 years of Credited Service</p> <p>Greater of (a) 50% of Average Annual Compensation at death; or (b) 50% of the benefit the Employee would have received had he retired the day before his death, payable to spouse until death or remarriage</p> <p>25% of Average Annual Compensation payable to dependent children up to age 18</p> <p>\$5,000 payable to spouse or dependent children if the Employee’s death is service-related and if death occurs within one year of the date of injury</p> <p>\$5,000</p>
<p>Post-Retirement Death Benefits – Service Employees</p> <p><i>Survivor’s benefit</i></p> <p><i>Lump-sum death benefit</i></p> <p><i>Burial allowance</i></p>	<p>The surviving spouse of a member who retires on or after July 1, 1991 is entitled to 50% of the annual retirement benefit that the retiree was receiving at the time of death payable to spouse until death or remarriage</p> <p>Same as the pre-retirement lump-sum death benefit, if death occurs within one year of termination of employment</p> <p>\$5,000</p>

Cost of Living Increase – Service Employees	Based on changes in the Consumer Price Index, with a maximum of 3%, paid on each May 1 for those Participants who retired prior to January 1. Participants with pension start dates of December 1, 1982 or earlier receive 3% regardless of the Consumer Price Index. For Town employees who retire on or after July 1, 2018 and Board of Education employees who retire on or after September 1, 2018, the maximum annual increase is 1.75%.
Employee Contributions – Service Employees	8.00% of Annual Compensation, increasing to 8.50% effective July 1, 2018 for Town employees and September 1, 2018 for Board of Education employees. 9.00% effective July 1, 2019 for all Service Employees. Interest accrues at 5.00% per year. Contributions cease after 35 years of service.
Optional Forms of Benefits:	Life Annuity with 120 months guaranteed; 50% or 75% Husband-and-Wife Pension with Pop-Up; 66-2/3% or 100% Joint and Survivor Pension.
Changes in Plan Provisions:	The following Plan changes are reflected for the first time in this valuation: <ul style="list-style-type: none"> • Inflation-based cost-of-living adjustments (COLAs) for Town employees are limited to 1.75% per year for retirements on or after July 1, 2018. • Inflation-based COLAs for Board of Education employees are limited to 1.75% per year for retirements on or after September 1, 2018. • The employee contribution rate for Town employees increased from 8.00% to 8.50% effective July 1, 2018, and will increase to 9.00% effective July 1, 2019. • The employee contribution rate for Board of Education employees increased from 8.00% to 8.50% effective September 1, 2018, and will increase to 9.00% effective July 1, 2019.

Section 5: GASB Information

EXHIBIT 1 – GENERAL INFORMATION

At June 30, 2018, pension plan membership consisted of the following:

Inactive employees or beneficiaries currently receiving benefits	744
Inactive employees entitled to but not yet receiving benefits	28
Active employees	349
Total	1,121

The Retirement Plan is closed to new entrants.

Town Contributions: Town contributions are made in accordance with Public Act 18-169, which revised the Pension Statute provisions applicable to the Employees Retirement Plan. The Town is required to contribute 70% of the actuarially recommended contribution (ARC), or \$15,650,000 if less, for the year ending June 30, 2019, and 85% of the ARC or an amount \$3,000,000 more than the prior year, if less, for the year ending June 30, 2020. The Town will be required to contribute 100% of its ARC in subsequent years.

Employee Contributions: Guardian employees contribute 8.50% of annual compensation. Town employees contribute 8.50% of annual compensation effective July 1, 2018, increasing to 9.00% on July 1, 2019. Board of Education employees contribute 8.00%, increasing to 8.50% effective September 1, 2018 and to 9.00% on July 1, 2019.

Benefits provided: See Section 4, Exhibit II for a summary of plan provisions.

EXHIBIT 2 – NET PENSION LIABILITY

The components of the net pension liability at June 30, 2018 were as follows:

Total pension liability	\$457,739,253
Plan fiduciary net position	164,594,990
Net pension liability	293,144,263
Plan fiduciary net position as a percentage of the total pension liability	35.96%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of June 30, 2018, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.25%
Salary increases	2.50%
Investment rate of return	7.00%, net of pension plan investment expense, including inflation
Cost-of-living adjustments	2.25% (1.75% for active Service Employees)

Healthy mortality rates were based on the sex-distinct RP-2000 Combined Healthy Mortality Table, projected 24 years with Scale BB. Disabled mortality rates were based on the sex-distinct RP-2000 Disabled Retiree Mortality Table, projected 24 years with Scale BB.

The long-term expected rate of return on pension plan investments was determined using a building-block method in which expected future real rates of return (expected returns, net of inflation) are developed for each major asset class. These returns are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage, adding expected inflation and subtracting expected investment expenses and a risk margin. The target allocation and projected arithmetic real rates of return for each major asset class, after deducting inflation, but before investment expenses, used in the derivation of the long-term expected investment rate of return assumption are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*
Domestic Equity	30%	6.40%
International Equity	10%	7.40%
Fixed Income	40%	1.75%
Global Tactical Asset Allocation	10%	4.10%
Real Estate	10%	5.10%
Total	100%	

* Real rates of return are net of inflation

Discount rate: The blended discount rate used to measure the total pension liability is 7.00%. The projection of cash flows used to determine the discount rate assumes plan member contributions will be made at the current negotiated contribution rates:

- Guardians: 8.50% of annual compensation
- Town Employees: 8.50% of annual compensation, increasing to 9.00% effective July 1, 2019
- Board of Education employees: 8.00% of annual compensation, increasing to 8.50% effective September 1, 2018 and to 9.00% effective July 1, 2019.

Town contributions are assumed to be \$15,650,000 for the fiscal year ending June 30, 2019, \$18,650,000 for the fiscal year ending June 30, 2020, and 100% of the actuarially determined contribution thereafter. The actuarially determined contribution is equal to the total normal cost plus a 30-year closed amortization of the unfunded actuarial accrued liability, beginning July 1, 2014 (26 years remaining). Amortization payments are expected to grow by 2% annually. Based on these assumptions, the Retirement Plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on Retirement Plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

EXHIBIT 3 – CHANGES IN NET PENSION LIABILITY AND SENSITIVITY TO DISCOUNT RATES

	Total Pension Liability (TPL) (a)	Fiduciary Net Position (FNP) (b)	Net Pension Liability (NPL) (a) - (b)
Balances at June 30, 2017	\$451,720,219	\$163,730,102	\$287,990,117
Changes for the year:			
Service cost	\$5,112,673	--	\$5,112,673
Interest	30,704,226	--	30,704,226
Change of benefit terms	-2,873,098	--	-2,873,098
Change of assumptions	--	--	--
Differences between expected and actual experience	-747,936	--	-747,936
Contributions – employer	--	\$12,650,000	-12,650,000
Contributions – employee	--	2,120,410	-2,120,410
Net investment income	--	12,388,835	-12,388,835
Benefit payments, including refunds of employee contributions	-26,176,831	-26,176,831	--
Administrative expense	--	<u>-117,526</u>	<u>117,526</u>
Net changes	\$6,019,034	\$864,888	\$5,154,146
Balances at June 30, 2018	<u>\$457,739,253</u>	<u>\$164,594,990</u>	<u>\$293,144,263</u>

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability of the Town, calculated using the discount rate of 7.00%, as well as what the Town’s net pension liability would be if it were calculated using a discount rate that is one-percentage-point lower (6.00%) or one-percentage-point higher (8.00%) than the current rate:

	1% Decrease (6.00%)	Current Discount (7.00%)	1% Increase (8.00%)
Net pension liability	\$346,411,385	\$293,144,263	\$248,556,895

EXHIBIT 4 – PENSION EXPENSE AND DEFERRED OUTFLOWS/INFLOWS RELATED TO PENSIONS

For the year ended June 30, 2018, the Town recognized pension expense of \$12,756,381.

Pension Expense for the Year Ended June 30, 2018	
Service cost	\$5,112,673
Interest on TPL	30,704,226
Employee contributions	-2,120,410
Administrative expenses	117,526
Expected return on assets	-11,057,769
Expensed portion of current year period differences between expected and actual experience in TPL	-373,968
Expensed portion of current year period assumption changes	- -
Current year plan changes	-2,873,098
Expensed portion of current year period differences between projected and actual investment earnings	-266,213
Current year recognition of deferred inflows established in prior years	3,808,599
Current year recognition of deferred outflows established in prior years	<u>-10,295,185</u>
Total expense	<u>\$12,756,381</u>

At June 30, 2018, the Town reported deferred outflows and inflows of resources related to pensions from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	\$0	\$373,968
Net difference between projected and actual earnings on pension plan investments	309,440	0
Assumption changes	<u>0</u>	<u>0</u>
Total	\$309,440	\$373,968

Amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows:

Year Ended June 30	
2019	\$1,415,879
2020	355,490
2021	-1,569,684
2022	-266,213
Thereafter	0

Additional detail on these deferred outflows and inflows is shown below.

	Initial Year	Outstanding Balance at June 30, 2017	Amount Recognized During FYE June 30, 2018	Outstanding Balance at June 30, 2018	To Be Recognized June 30, 2019	To Be Recognized June 30, 2020	To Be Recognized June 30, 2021	To Be Recognized June 30, 2022
Fiscal Year Outflows								
Investment loss	2015	\$2,868,714	\$1,434,357	\$1,434,357	\$1,434,357	--	--	--
Liability loss	2016	449,068	449,068	--	--	--	--	--
Investment loss	2016	5,775,522	1,925,174	3,850,348	1,925,174	\$1,925,174	--	--
Total Outflows		\$9,093,304	\$3,808,599	\$5,284,705	\$3,359,531	\$1,925,174	--	--
Fiscal Year Inflows								
Assumption change	2016	-\$8,890,734	-\$8,890,734	--	--	--	--	--
Liability gain	2017	-100,980	-100,980	--	--	--	--	--
Investment gain	2017	-5,213,884	-1,303,471	-\$3,910,413	-\$1,303,471	-\$1,303,471	-\$1,303,471	--
Liability gain	2018	--	-373,968	-373,968	-373,968	--	--	--
Investment gain	2018	--	-266,213	-1,064,852	-266,213	-266,213	-266,213	-\$266,213
Plan change	2018	--	-2,873,098	--	--	--	--	--
Total Inflows		-\$14,205,598	-\$13,808,464	-\$5,349,233	-\$1,943,652	-\$1,569,684	-\$1,569,684	-\$266,213
Total		-\$5,112,294	-\$9,999,865	-\$64,528	\$1,415,879	\$355,490	-\$1,569,684	-\$266,213

Note: In accordance with Paragraph 71 of GASB Statement 68, the difference between projected and actual earnings on investments is recognized over a closed five-year period. Assumption changes and the difference between expected and actual total pension liability experience are each recognized over a closed period equal to the average of the expected remaining service lives of all employees that are provided with pensions through the pension plan (active employees and inactive employees), determined as of the beginning of the measurement period. For 2018, the period is two years (rounded).

EXHIBIT 5 – SCHEDULE OF CHANGES IN NET PENSION LIABILITY

	2018	2017
Total pension liability		
• Service cost	\$5,112,673	\$5,224,667
• Interest	30,704,226	30,036,397
• Change of benefit terms	-2,873,098	0
• Differences between expected and actual experience	-747,936	-204,960
• Changes of assumptions	0	0
• Benefit payments, including refunds of employee contributions	-26,176,831	-24,860,542
Net change in total pension liability	\$6,019,034	\$10,198,562
Total pension liability – beginning	<u>451,720,219</u>	<u>441,521,657</u>
Total pension liability – ending	<u>\$457,739,253</u>	<u>\$451,720,219</u>
Plan fiduciary net position		
• Contributions – employer	\$12,650,000	\$14,747,073
• Contributions – employee	2,120,410	2,042,495
• Net investment income	12,388,835	17,069,663
• Benefit payments, including refunds of employee contributions	-26,176,831	-24,860,542
• Administrative expense	-117,526	-102,711
Net change in plan fiduciary net position	\$864,888	\$8,895,978
Plan fiduciary net position – beginning	<u>163,730,102</u>	<u>154,834,124</u>
Plan fiduciary net position – ending	<u>\$164,594,990</u>	<u>\$163,730,102</u>
Net pension liability	<u>\$293,144,263</u>	<u>\$287,990,117</u>
Plan fiduciary net position as a percentage of the total pension liability	35.96%	36.25%
Covered employee payroll	\$26,088,216	\$26,805,022
Net pension liability as percentage of covered employee payroll	1,123.67%	1,074.39%

Notes to Schedule:

Benefit changes: Effective July 1, 2018 for active Town employees and September 1, 2018 for active Board of Education employees, the inflationary cost-of-living adjustments on benefits after retirement is limited to 1.75% per year. The contribution rate for Town employees increased from 8.00% of annual compensation to 8.50% effective July 1, 2018, and to 9.00% effective July 1, 2019. The contribution rate for Board of Education employees increased from 8.00% of annual compensation to 8.50% effective September 1, 2018, and to 9.00% effective July 1, 2019.

Change of Assumptions: There have been no changes in assumptions in the last two years.

EXHIBIT 6 – SCHEDULE OF EMPLOYER CONTRIBUTIONS

Year Ended June 30	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions	Contribution Deficiency (Excess)	Covered- Employee Payroll	Contributions as a Percentage of Covered Employee Payroll
2014	\$27,688,031	\$12,500,000	\$15,188,031	\$29,347,110	42.59%
2015	29,536,050	14,768,025	14,768,025	28,992,189	50.94%
2016	21,998,113	12,100,000	9,898,113	28,397,008	42.61%
2017	21,067,247	14,747,073	6,320,174	26,805,022	55.02%
2018	21,974,384	12,650,000	9,324,384	26,088,216	48.49%

Notes to Schedule:

Methods and assumptions used to determine contribution rates for the year ended June 30, 2018:

Valuation date	Actuarially determined contribution is calculated using a July valuation date as of the beginning of the fiscal year in which contributions are reported
Actuarial cost method	Entry age normal
Amortization method	Level percent with 2% annual increases, closed period
Remaining amortization period	27 years remaining as of July 1, 2017
Asset valuation method	Market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the actual market return and the expected return on the actuarial value, and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
Investment rate of return	7.00%, including inflation, net of pension plan investment expense
Inflation rate	2.25%
Projected salary increases	2.50%
Cost-of-living adjustments	2.25%
Retirement rates	See Section 4, Exhibit I for a summary of this assumption
Mortality:	
Pre-retirement	RP-2000 Combined Healthy Mortality Table, projected 24 years with Scale BB
Healthy annuitant	RP-2000 Combined Healthy Mortality Table, projected 24 years with Scale BB
Disabled	RP-2000 Disabled Retiree Table, projected 24 years with Scale BB