



O'Sullivan
Associates Inc.

Roofers Local 149 (Detroit)

Actuarial Valuation as of
June 1, 2019

March 2020

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1. Certification of Results

This report was prepared on behalf of Roofers Local 149 (Detroit) based on employee data, asset statements and Plan documents provided by the Plan Sponsor or its representatives. We relied upon the data as submitted, without formal audit. However, the data was tested for reasonableness, and we have no reason to believe that any other information which would have had a material effect on the results of this valuation was overlooked.

Therefore, to the best of our knowledge and belief, the information presented in this report is complete and accurate, and in our opinion, each assumption used represents our best estimate of anticipated experience under the Plan.

Our work is in accordance with generally accepted actuarial principles and practices. The report was prepared on behalf of the Trustees to help them administer the Fund and meet the Form 5500 filing requirements. The calculations within may not be applicable for other purposes. Forecasts within are consistent with one set of assumptions and are no guarantee of future performance.

Certified by:



Craig A. Voelker, FSA, MAAA, EA
Enrolled Actuary No.: 17-05537

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2. Valuation Summary

(A) Long-Term Funding

Projected annual contributions of \$10.63 million (or \$12.50 per hour) exceed the total funding cost of \$7.98 million (or \$9.39 per hour). This leaves a positive margin of \$2.64 million (or \$3.11 per hour). Therefore, the Plan is meeting its funding policy of paying off the unfunded liability over 15 years, assuming an asset return of 7.50% annually.

(B) Margin

The margin has increased from last year's primarily due to passage of time, an increase in the contribution rate, and assumption changes related to mortality and expenses. This was partially offset by negative asset experience and an increase in the accrual rate. The net effect on the margin is a positive change of \$0.51. The Margin is explained in detail in Section 4.

(C) Pension Protection Act

As of June 1, 2019, the Plan was certified in the "Green" Zone (neither Endangered nor Critical Status) because the combined Plan is at least 80% funded, and the Credit Balance is not expected to fail this year or within the next six years.

(D) Minimum Funding Requirement

The Plan is not projected to fail the government's ERISA minimum funding standard minimum funding standard after applying the effect of the automatic extension of the amortization bases, assuming all experience emerges as expected, and there are no future changes in assumptions.

(E) Assumptions

The following assumptions were changed since the prior valuation:

- All mortality tables were changed from using Scale MP-2016 generational mortality improvement to use Scale MP-2018 generational mortality improvement.
- The expense assumption changed from \$650,000 to \$500,000, increasing by 3.0% annually.

(F) Plan Provisions

The accrual rate increased from 5 cents to 7.5 cents per hour worked on or after June 1, 2019.

3. Summary of Key Funding Measures

1. Current	As of June 1	
	2019	2018
<u>Assets</u>		
a at Market	\$ 220,543,261	\$ 223,771,718
b at Actuarial	\$ 232,704,281	\$ 228,073,115
c Actuarial / Market (b/a)	105.5%	101.9%
<u>Present Values</u>		
d Vested Benefits	\$ 273,597,834	\$ 269,910,931
e Accrued Benefits (Accrued Liability)	\$ 278,881,389	\$ 275,386,161
<u>Funding Percentages</u>		
f Vested at market (a/d)	80.6%	82.9%
g Vested at actuarial (b/d)	85.1%	84.5%
h Accrued at market (a/e)	79.1%	81.3%
i Accrued at actuarial (b/e)	83.4%	82.8%
<u>For Plan Years Ending as of May 31</u>		
2. Prospective	2020	2019
<u>Contributions</u>		
a Minimum Required	\$ -	\$ -
b Anticipated	\$ 10,625,000	\$ 9,775,000
c Actual	tbd	\$ 11,892,677
d Maximum Deductible	\$ 448,550,693	\$ 434,954,117
e Credit Balance	\$ 14,053,361 *	\$ 17,220,389
f Minimum to preserve Credit Balance	\$ 11,149,175 *	\$ 13,688,108
	<i>* Estimated</i>	
<u>Costs</u>		
g Cost of benefits earned in year	\$ 2,923,875	\$ 2,383,195
h Amortization of Unfunded Liability	<u>5,059,623</u>	<u>5,184,088</u>
i Total Cost (g+h)	\$ 7,983,498	\$ 7,567,283
j Margin (b-i)	\$ 2,641,502	\$ 2,207,717
<u>3. Assumptions</u>		
a Interest rate per annum	7.50%	7.50%
b Total Hours	850,000	850,000

4. Plan Cost

4.1. Cost and Margin

There are only two component costs to funding the Pension Plan: the cost of benefits earned in the year, and the amortization of the unfunded liability. The sum of the two costs expressed in dollars per month of covered work provides a useful way of expressing the Plan's funding cost.

In the context above, margin is the amount by which the anticipated contributions differ from the Plan's projected funding cost.

The costs below are calculated consistent with a funding policy of paying off the unfunded liability over 15 years and assumes a 7.50% interest assumption. The margin, found on Line G below, is positive and indicates that the current benefits are affordable on a long-term basis.

There are many actuarial measures and statistics to measure the state of the Plan's funding. The margin is designed to provide a single simplified statistic for a Trustee to get a sense for the strength of *future* funding. As long as the margin is positive it is a strong indication that the current benefits are affordable on a long-term basis. If negative it is an indication that the overall funding may need to be improved before benefits are affordable.

	<u>\$/Year</u>	<u>\$/Hour</u>	<u>% of Cont.</u>
A. Total projected contribution	\$ 10,625,000	\$ 12.50	100.0%
B. Level payment of With. Liab. receivables	-	-	0.0%
C. Total contributions (A+B)	\$ 10,625,000	\$ 12.50	100.0%
 <u>Funding Costs</u>			
D. Cost of benefits	\$ 2,923,875	\$ 3.44	27.5%
E. Amortization of Unfunded Liability	<u>5,059,623</u>	<u>5.95</u>	<u>47.6%</u>
F. Total funding cost (D+E)	\$ 7,983,498	\$ 9.39	75.1%
G. Margin (C - F)	\$ 2,641,502	\$ 3.11	24.9%

Note: The 15-year period for amortizing the Plan's unfunded liability is an ongoing one, in that it is reset at 15 years each time the annual actuarial valuation is completed.

4.2. Margin Detail

A. As of June 1		<u>2019</u>		
1. Actuarial liability	\$	278,881,389		
2. Actuarial value of assets		<u>232,704,281</u>	83.4%	
3. Unfunded actuarial liability (1-2)	\$	46,177,108		
4. Normal cost	\$	2,312,159		
5. Expenses		<u>500,000</u>		
6. Total cost of benefits (4+5)	\$	2,812,159		
7. Amortization of unfunded liability	\$	4,866,304		
8. Present value of with. liab. payments	\$	-		
B. Anticipated Contribution Income*			<u>\$/Hour</u>	<u>% of Cont.</u>
1. Hours		850,000		
2. Contribution rate	\$	<u>12.50</u>		
3. Total Hourly contributions (1x2)	\$	10,625,000	\$ 12.50	100.0%
4. Level payment of With. Liab. receivables		<u>-</u>	<u>-</u>	<u>0.0%</u>
5. Total projected contribution	\$	10,625,000	\$ 12.50	100.0%
C. Funding Costs		<u>\$/Year</u>	<u>\$/Hour</u>	<u>% of Cont.</u>
1. Cost of benefits	\$	2,923,875	\$ 3.44	27.5%
2. Amortization of Unfunded Liability		<u>5,059,623</u>	<u>5.95</u>	<u>47.6%</u>
3. Total funding costs	\$	7,983,498	\$ 9.39	75.1%
D. Margin (B5-C3) (at actuarial)	\$	2,641,502	\$ 3.11	24.9%
E. Margin (at market)	\$	1,309,019	\$ 1.54	12.3%

* Assumes contributions and costs are paid at the end of the month.

4.3. Reconciliation of Margin

	<u>\$/Year</u>	<u>\$ /Hour</u>	<u>% of Cont.</u>
A. Margin as of June 1, 2018	\$ 2,207,717	\$ 2.60	22.6%
B. Effect of:			
1. Contribution increase	\$ 850,000	\$1.00	8.7%
2. Plan amendments	(801,344)	(0.94)	-7.5%
3. Change in Withd. Pmts.	-	-	0.0%
4. Passage of time	<u>688,496</u>	<u>0.81</u>	<u>7.0%</u>
5. Subtotal	\$ 737,152	\$ 0.87	8.2%
C. Actuarial Experience			
1. Demographic	\$ 79,086	\$ 0.09	-2.0%
2. Expense	27,970	0.03	0.3%
3. Asset	<u>(665,576)</u>	<u>(0.78)</u>	<u>-6.8%</u>
4. Subtotal	\$ (558,520)	\$ (0.66)	-8.6%
D. Methods and Assumptions			
1. Change in employment	\$ -	\$ -	0.0%
2. Change in Admin. Expense	155,959	0.18	1.6%
3. Other Assumption related	99,194	0.12	1.0%
4. Method Change	<u>-</u>	<u>-</u>	<u>0.0%</u>
5. Subtotal	\$ 255,153	\$ 0.30	2.6%
E. Total Change in Margin	\$ 433,785	\$ 0.51	2.3%
F. Margin as of June 1, 2019	\$ 2,641,502	\$ 3.11	24.9%

4.4. Development of Plan Asset Values

4.4.1. Market Value of Assets

A. As of June 1, 2018	\$	223,771,718
B. Contributions	\$	11,892,677
C. Investment income:		
1. Interest and dividends	\$	5,541,524
2. Realized/unrealized gain/(loss)		(1,441,946)
3. Investment fees		<u>(1,159,475)</u>
4. Sub-Total	\$	2,940,103
D. Distributions:		
1. Benefit payments	\$	(17,640,683)
2. Administrative expenses		<u>(420,554)</u>
3. Sub-Total	\$	(18,061,237)
E. As of June 1, 2019	\$	220,543,261
F. Average invested assets (A+.5 x (B + D3))	\$	220,687,438
G. Rate of return (C4 ÷ F)		1.3%

4.4.2. Actuarial Value of Assets

Ending May. 31	A.	B.			C.			D.	E.	F.	G.
	Unexpected Amount	Percentage			Development of amount Recognized / Unrecognized			(Recognized)	(Recognized)	(Unrecognized)	
		Past	Cur.	Fut.	Past	Current	Future				
2015	\$ 147,322	80%	20%	0%	\$ 117,858	\$ 29,464	\$ -				
2016	(20,812,593)	60%	20%	20%	(12,487,555)	(4,162,519)	(4,162,519)				
2017	2,099,374	40%	20%	40%	839,750	419,875	839,749				
2018	3,418,189	20%	20%	60%	683,637	683,638	2,050,914				
2019	(13,611,455)	0%	20%	80%	-	(2,722,291)	(10,889,164)				
Totals	\$ (28,759,163)		100%		\$ (10,846,310)	\$ (5,751,833)	\$ (12,161,020)				
								H. Market value as of 5/31/2019		\$ 220,543,261	
								I. Preliminary actuarial value of assets (H-Total of G)		232,704,281	
								J. 80% of market value		176,434,609	
								K. 120% of market value		264,651,913	
								L. Actuarial value as of 5/31/2019		\$ 232,704,281	

4.4.3. Actuarial Asset Gain/(Loss)

A. As of June 1, 2018	\$	228,073,115
B. Contributions	\$	11,892,677
C. Investment income:		
1. Expected (net of expenses)	\$	16,551,559
2. Recognized current (see Section 4.4.2)		(5,751,833)
3. Forced Recognition		-
4. Subtotal	\$	<u>10,799,726</u>
D. Distributions:		
1. Benefit payments	\$	(17,640,683)
2. Administrative expenses		<u>(420,554)</u>
3. Sub-Total	\$	<u>(18,061,237)</u>
E. As of June 1, 2019	\$	232,704,281
F. Average invested assets (A+.5 x (B + D3))	\$	224,988,835
G. Actual rate of return (C4 ÷ F)		4.8%
H. Expected rate of return		7.5%
I. Gain (Loss) (G-H)		-2.7%
J. Gain (Loss) (I x F)	\$	(6,074,437)

4.4.4. Total Gain/(Loss)

A. Unfunded liability (UAL) at 6/1/2018	\$	47,313,046
B. Annual cost of benefits and exp.at 6/1/2018		2,292,137
C. Less contributions		(11,892,677)
D. Interest on A, B, and C		<u>3,316,916</u>
E. Expected unfunded as of 6/1/2019, (A+B+C+D)	\$	41,029,422
F. Preliminary unfunded as of 6/1/2019		<u>47,013,933</u>
G. Total gain/(loss), (E-F)	\$	(5,984,511)
H. Asset experience (see above)	\$	(6,074,437)
I. Expense experience		255,268
J. Demographic experience		<u>(165,342)</u>
K. Total (see above)	\$	<u>(5,984,511)</u>

4.5. Historical Information

4.5.1. Gain/(Loss)

Plan Year	Ending			Total
May. 31	Assets	Expense	Demographic	Gain/(Loss)
2006	\$ -	\$ -	\$ 1,512,400	\$ 1,512,400
2007	1,705,000	-	(754,000)	951,000
2008	1,824,705	-	(607,605)	1,217,100
2009	(15,162,010)	-	(15,237,790)	(30,399,800)
2010	(2,860,551)	36,545	2,814,721	(9,285)
2011	(6,678,378)	421	(596,878)	(7,274,835)
2012	(11,326,727)	3,531	699,661	(10,623,535)
2013	(6,599,698)	(43,556)	(853,704)	(7,496,958)
2014	5,705,521	(2,469)	(437,230)	5,265,822
2015	5,511,733	11,221	(689,650)	4,833,304
2016	(2,160,680)	(52,209)	(3,370,661)	(5,583,550)
2017	1,384,786	(173,409)	4,695,184	5,906,561
2018	(1,360,166)	(31,634)	(1,122,882)	(2,514,682)
2019	(6,074,437)	255,268	(165,342)	(5,984,511)
7 year average	\$ (513,277)	\$ (5,255)	\$ (277,755)	\$ (796,288)

Gain/loss analysis is one of the most important tools available to an actuary to ensure that their model of the Plan's funding is accurate. The exhibit above shows the total gain/(loss) broken down into three assumption categories: assets, expense, and demographic.

The gain/(loss) on assets is very unpredictable due to the unpredictable returns on the market value of assets. Moreover, the gain/(loss) on assets is greatly influenced by the smoothing method. The pattern of asset gains is discussed later in this report.

After itemizing the gain/(loss) on assets and expenses, what remains is the gain/(loss) on all the other demographic assumptions including retirement, turnover, disability, and mortality rates. Over time, to remain confident in the future funding, it is important that the gains and losses on the demographic assumptions average zero, or at least a relatively small number.

Experience prior to 2010 has been estimated from past actuarial reports.

For the last seven years the Plan has averaged a modest loss on demographic assumptions and experienced both losses and gains. We have updated Plan mortality and expense assumptions as shown in Section 7.3. We will continue to monitor this experience and recommend further assumption changes as necessary.

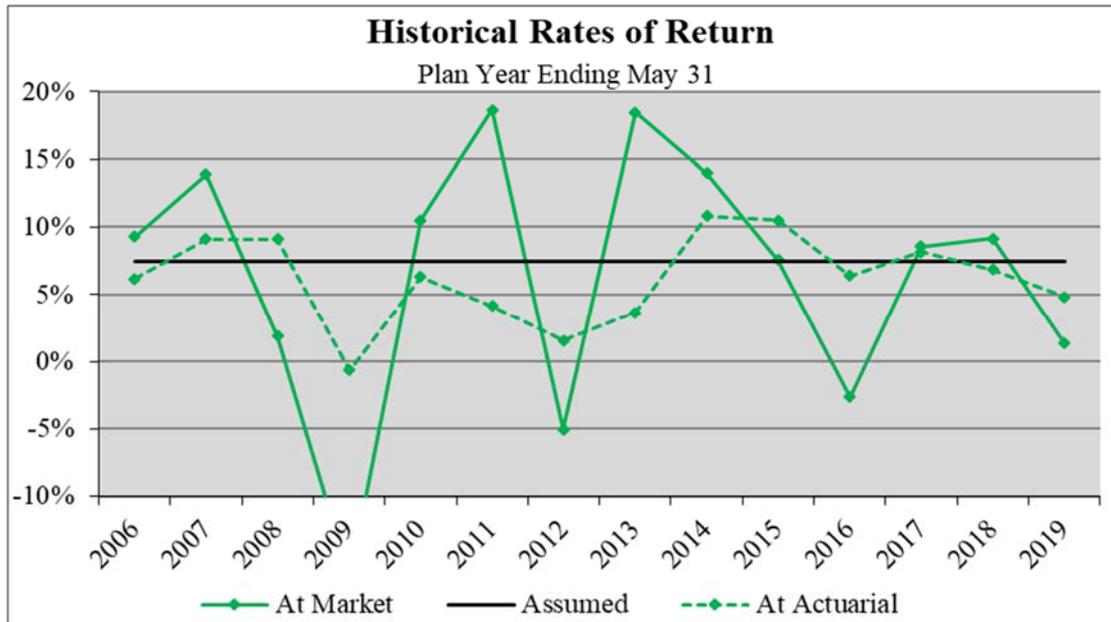
4.5.2. Asset Information

Rates of Return

Plan Year Ending May. 31				Market		<u>Rates of Return</u>	
	Contributions	Benefits	Expenses	Investment Income	Market Value of Assets	At Market	At Actuarial
2009	\$ 5,111,964	\$ (8,749,338)	\$ (342,173)	\$ (27,701,019)	\$ 143,124,704	-16.0%	-0.7%
2010	4,670,996	(9,837,183)	(321,382)	14,751,231	152,388,366	10.5%	6.3%
2011	5,958,896	(11,168,252)	(334,574)	27,894,017	174,738,453	18.6%	4.2%
2012	6,803,596	(12,226,727)	(346,469)	(8,609,089)	160,359,764	-5.0%	1.6%
2013	5,942,032	(13,412,116)	(408,366)	28,902,778	181,384,092	18.5%	3.7%
2014	7,012,641	(14,046,686)	(419,394)	24,838,538	198,769,191	14.0%	10.9%
2015	9,229,512	(14,614,586)	(431,762)	14,836,880	207,789,235	7.6%	10.5%
2016	10,807,268	(15,165,745)	(521,250)	(5,411,390)	197,498,118	-2.6%	6.4%
2017	12,068,358	(15,868,524)	(642,450)	16,745,135	209,800,637	8.6%	8.2%
2018	12,307,670	(16,643,604)	(658,915)	18,965,930	223,771,718	9.1%	6.9%
2019	11,892,677	(17,640,683)	(420,554)	2,940,103	\$ 220,543,261	1.3%	4.8%
Totals	\$ 91,805,610	\$(149,373,444)	\$ (4,847,289)	\$ 108,153,114			

Geometric Average

5-Year	4.7%	7.3%
11-Year	5.4%	5.6%

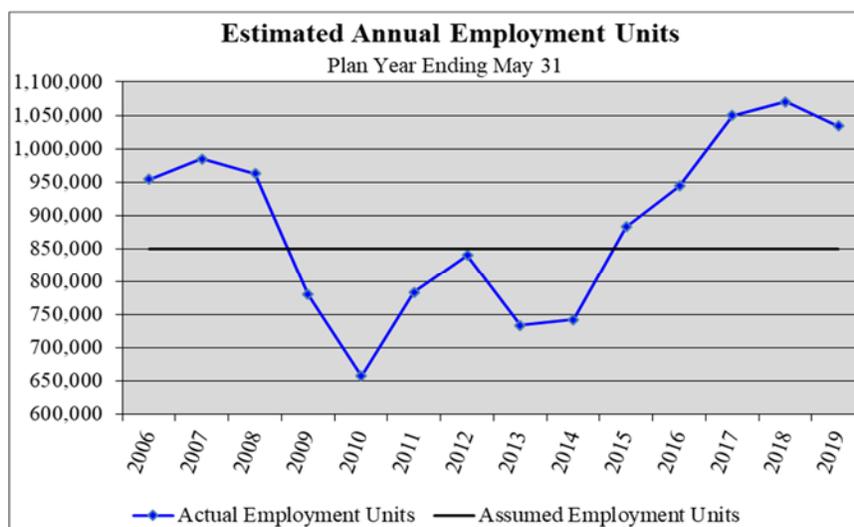


4.5.3. Employment

Plan Year Ending May 31	Contribution Income	Weighted Average Contribution Rate	Employment Units for Valuation*
2006			953,799
2007			984,699
2008			962,847
2009			780,453
2010	\$ 4,670,996	\$ 7.10	657,887
2011	5,958,896	7.60	784,065
2012	6,803,596	8.10	839,950
2013	5,942,032	8.10	733,584
2014	7,012,641	9.45	742,078
2015	9,229,512	10.45	883,207
2016	10,807,268	11.45	943,866
2017	12,068,358	11.50	1,049,422
2018	12,307,670	11.50	1,070,232
2019	\$ 11,892,677	\$ 11.50	1,034,146

	Average
5-Year	996,175
14-Year	887,160

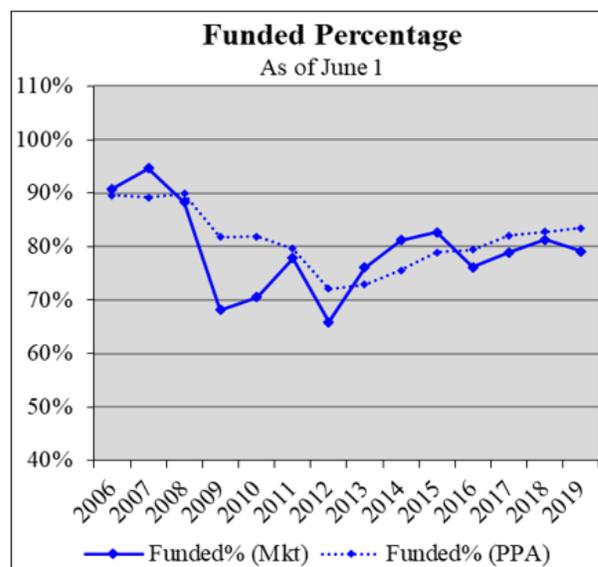
The employment assumption is 850,000 total employment units annually. Our assumption is set to resemble a long term average. The employment units prior to 2009 are estimated based upon the prior actuary's valuation reports.



*Total employment units for the valuation is derived by dividing actual contributions by last year's projected contribution rate, and will not necessarily match reported hours by the Fund Office.

4.5.4. Funded Percentage at Market

As of June 1	Market Value of Assets	Present Value of Accrued Benefits	Funded Percentage
2006	\$ 157,000,000	\$ 173,000,000	90.8%
2007	175,000,000	185,000,000	94.6%
2008	174,805,270	198,000,000	88.3%
2009	143,124,704	210,000,000	68.2%
2010	152,388,366	215,938,339	70.6%
2011	174,738,453	224,469,464	77.8%
2012	160,359,764	243,368,205	65.9%
2013	181,384,092	238,625,199	76.0%
2014	198,769,191	244,754,779	81.2%
2015	207,789,235	251,369,112	82.7%
2016	197,498,118	259,418,048	76.1%
2017	209,800,637	265,790,026	78.9%
2018	223,771,718	275,386,161	81.3%
2019	\$ 220,543,261	\$ 278,881,389	79.1%



The Funded Percentage is a statistic commonly followed by Trustees. It provides an alternative measure of the Plan's current level of funding. The funded percentage above compares the market value of assets to the value of benefits accrued as of the valuation date.

The fact that the Funded Percentage is under 100% means that there are unfunded accumulated benefits when valuing the Plan on an ongoing basis. It does not necessarily imply that the Plan is under-funded on a long term basis because it makes no consideration of future contributions relative to future costs. The margin is the best single statistic to get a sense of how well funded the Plan is on a long-term basis.

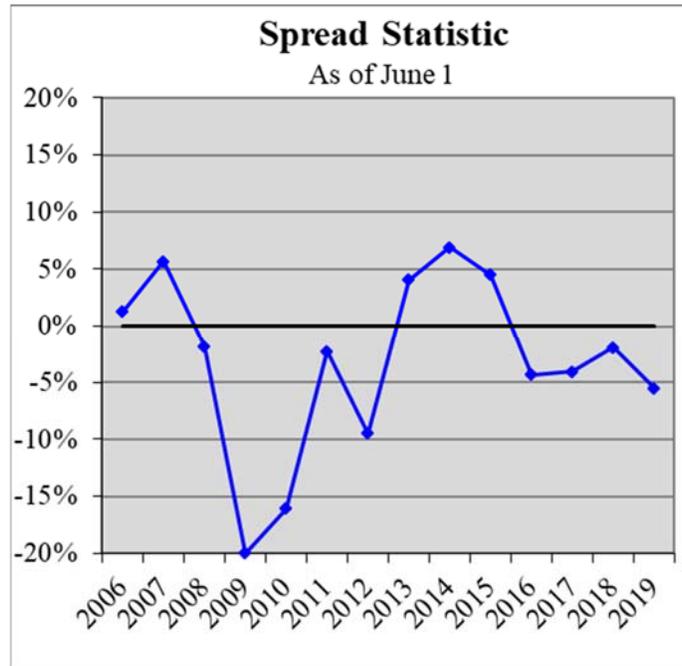
Moreover, the funded percentage is not a measure of funding on a Plan termination basis. That would require a different interest assumption.

The Funded Percentage as per the Pension Protection Act, treating Detroit as if it was its own entity uses the actuarial value of assets and is 83.4% as of June 1, 2019.

** Prior to 2008 the market value of assets was estimated from prior actuary reports. Prior to 2010 the present value of accrued benefits was estimated. The present value of accrued benefits in 2010 and 2011 are the liabilities calculated using traditional unit credit as required by the PPA.*

4.5.5. Actuarial Value of Assets Expressed as a % of Market Value

As of June 1	Actuarial Value of Assets	Actuarial Assets as % of Market
2006	\$ 155,000,000	98.7%
2007	165,000,000	94.3%
2008	178,000,000	101.8%
2009	171,749,645	120.0%
2010	176,921,994	116.1%
2011	178,631,688	102.2%
2012	175,595,112	109.5%
2013	173,991,156	95.9%
2014	185,013,071	93.1%
2015	198,365,817	95.5%
2016	206,019,857	104.3%
2017	218,246,918	104.0%
2018	228,073,115	101.9%
2019	\$ 232,704,281	105.5%



The three primary measures that help an actuary assess how well funded a plan is on a long-term basis are:

1. Margin,
2. Gain/loss analysis and an assessment of assumptions, and
3. Spread, defined as the difference between the market and actuarial value of assets expressed as a percentage of the market value of assets.

The margin and assumptions were covered in earlier sections.

The third factor is the Spread statistic. When positive it represents a cushion to help offset potential future unfavorable investment experience. Conversely, when the actuarial value is greater than the market value the Spread turns negative. When this is the case future investment returns over and above the assumed return are necessary over time to restore the market value of assets equal to the actuarial value.

Currently the Spread is -5.5%.

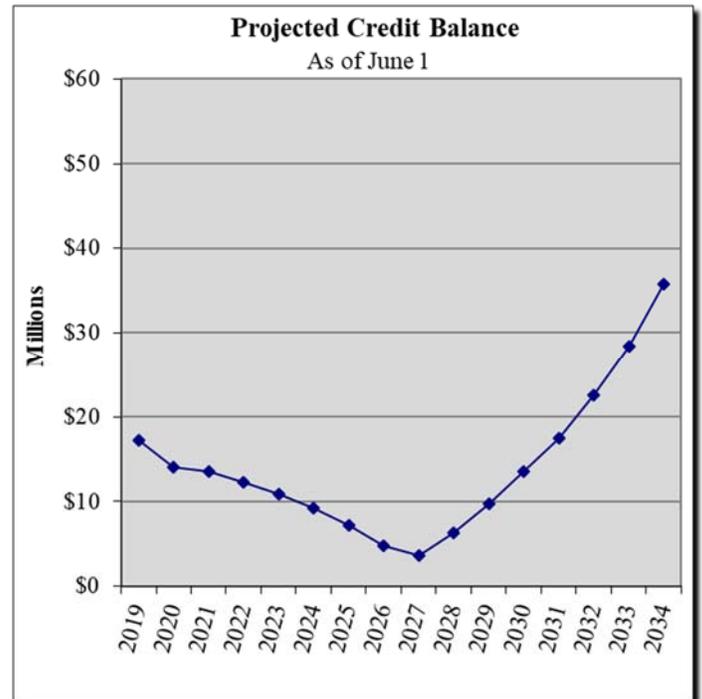
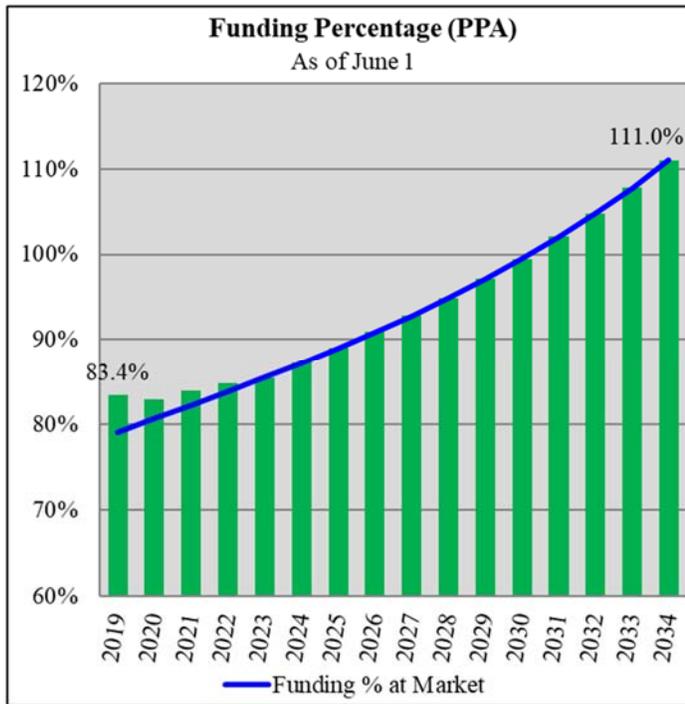
* Estimated prior to 2009

4.6. Pension Protection Act: Rehabilitation Plan

Initial Critical Zone Certification:	June 1, 2012
Adoption Period:	08/29/2012 – 5/31/2014
Rehabilitation Period:	06/01/2014 – 5/31/2024
Emergence Date:	May 31, 2015
Initial Endangered Zone Certification:	June 1, 2015
Adoption Period:	08/29/2015 – 5/31/2017
Funding Improvement Period:	06/01/2017 – 5/31/2027
5/31/2027 Funding Benchmark:	86.1%
Initial non-Endangered (Green Zone) Certification:	6/1/2017

As of June 1, 2019, the Plan is in the Green zone, or non-endangered status, because it's funded percentage is above 80% and it is not projected to have a funding deficiency in the next seven years.

The charts below show our projected PPA Funding Percentage and credit balance. The projections assume there are no gains or losses on demographic assumptions and the market value of assets returns the assumed rate of 7.5%. Note the credit balance includes the effect of the automatic five-year amortization base extension.



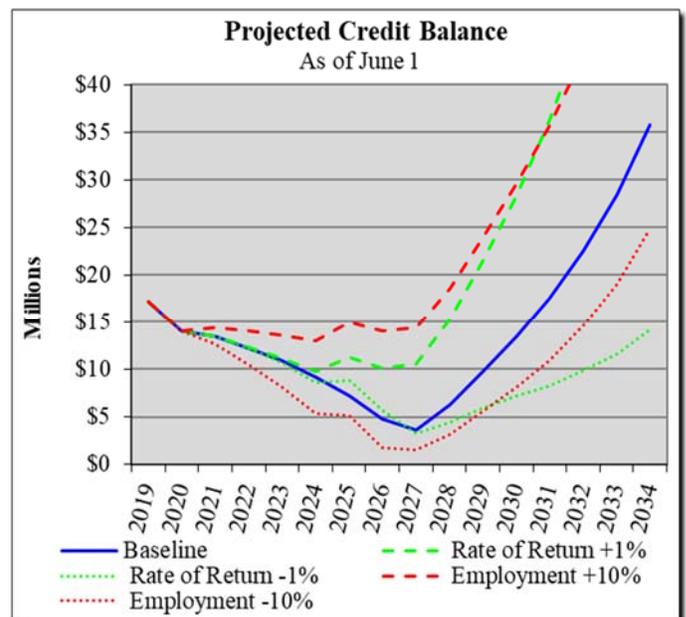
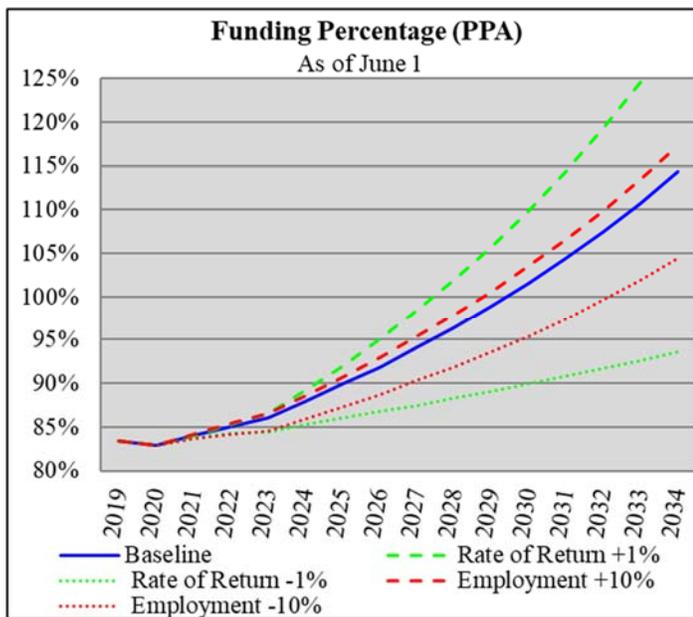
4.7. Sensitivity Testing

We have performed the following stress tests on the Plan to measure the employment and investment risk the Plan faces:

Assumptions for Plan Years beginning June 1, 2020 and thereafter

<u>Risk</u>	<u>Scenario Description</u>
Investment	Rate of Return of:
Test 1	(1.00% than assumed)
Test 2	(-1.00% than assumed)
Employment	Annual Employment of:
Test 3	(10.00% than assumed)
Test 4	(-10.00% than assumed)

The following charts show the effect of these stress tests on the projection of the Plan's Funding Percentage and Credit Balance. As seen in the Funding Percentage chart below the Plan is more sensitive to changes in the asset returns compared to decreases in employment.



5. Data Summary

5.1. Flow of Lives

	Actives	Inactive Vested	Disabled	Retired & Beneficiaries	Total
Beginning of year.....	710	521	51	774	2,056
To inactive vested.....	(29)	29	0	0	0
To inactive non-vested...	(83)	0	0	0	(83)
Returned to work.....	11	(11)	0	0	0
New entrants.....	102	0	0	0	102
To retired.....	(19)	(25)	0	44	0
To disabled.....	0	0	0	0	0
New Alternate Payees...	0	0	0	3	3
Deaths.....	0	(2)	(1)	(41)	(44)
New Beneficiaries.....	0	0	0	15	15
Data Corrections.....	0	0	0	3	3
End of year.....	692	512	50	798	2,052

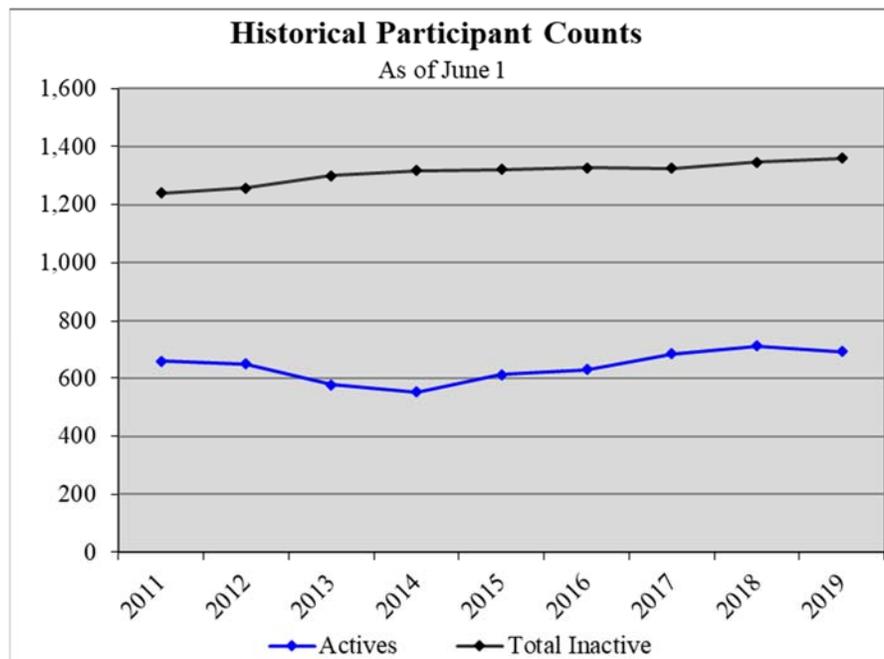
5.2. Historical Participation

Plan Year						Total	Ratio	
Ending	Active	Inactive		Retired	Beneficiary**	Inactive	Total	Inactives
May. 31		Vested	Disabled*					to Actives
2007	802	1,473	0	487	0	1,960	2,762	2.44
2008	810	1,326	0	530	0	1,856	2,666	2.29
2009	822	1,154	0	545	0	1,699	2,521	2.07
2010	735	1,115	0	571	0	1,686	2,421	2.29
2011	658	630	0	611	0	1,241	1,899	1.89
2012	648	605	0	653	0	1,258	1,906	1.94
2013	576	618	65	617	0	1,300	1,876	2.26
2014	551	614	59	645	0	1,318	1,869	2.39
2015	612	592	54	675	0	1,321	1,933	2.16
2016	630	569	54	704	0	1,327	1,957	2.11
2017	683	540	50	736	0	1,326	2,009	1.94
2018	710	521	51	774	0	1,346	2,056	1.90
2019	692	512	50	655	143	1,360	2,052	1.97

*Prior to 2013, Disabled Participants were included in the Retired field.

**Prior to 2019, Beneficiaries were included in the Retired field.

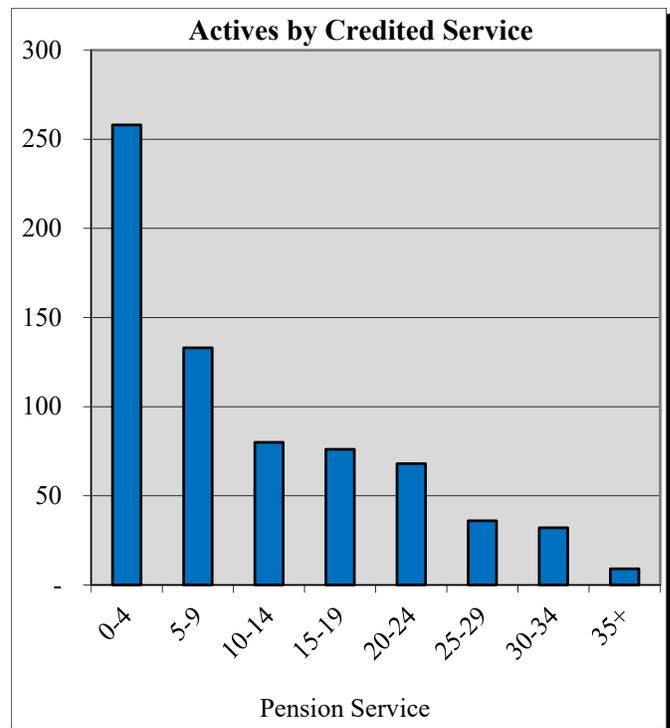
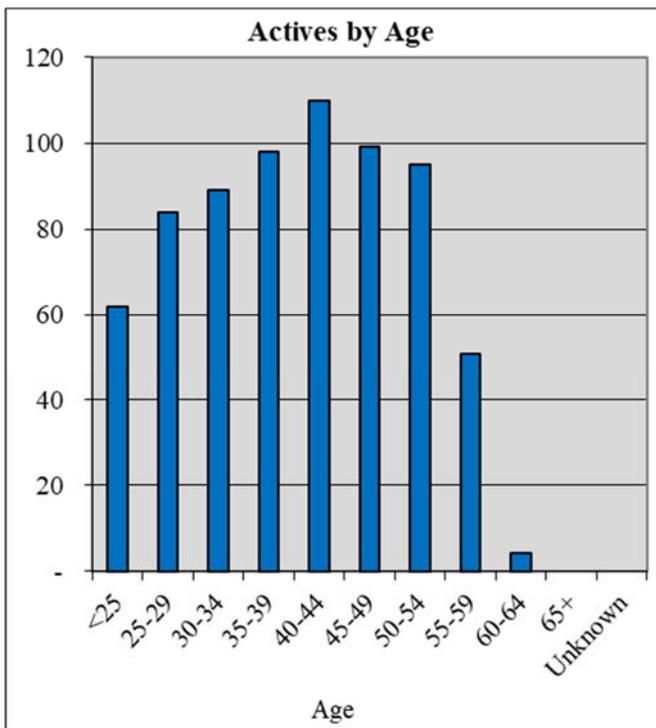
*** From 2007 through 2010, included non-vested participants without a permanent break in service.



5.3. Actives by Age and Credited Service

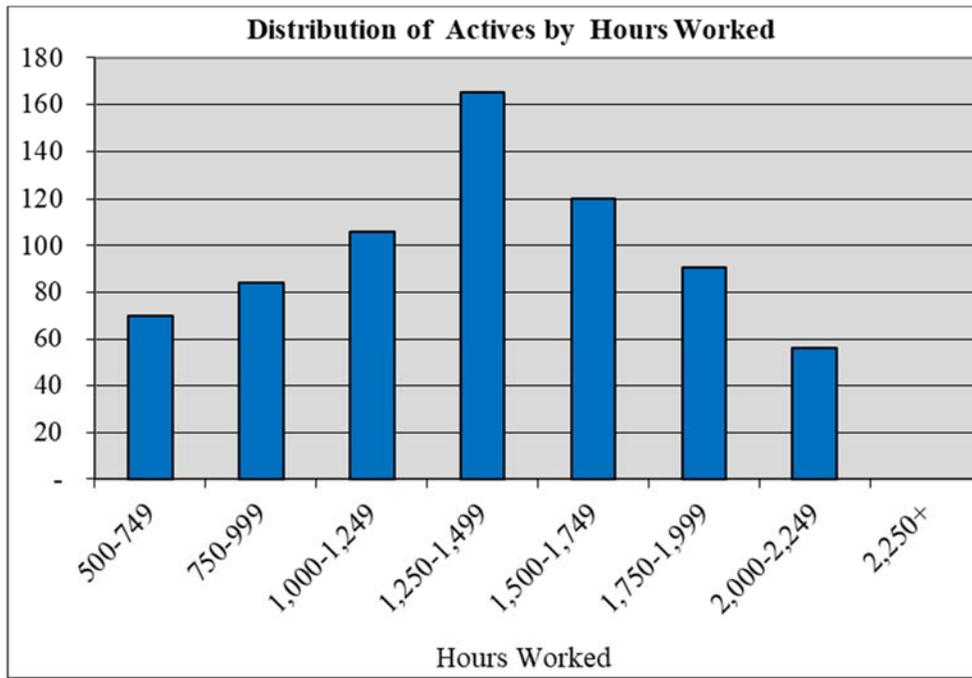
Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
<25	58	4	-	-	-	-	-	-	62
25-29	54	25	5	-	-	-	-	-	84
30-34	48	24	15	2	-	-	-	-	89
35-39	30	29	18	19	2	-	-	-	98
40-44	23	21	23	21	20	2	-	-	110
45-49	22	15	9	14	23	15	1	-	99
50-54	17	7	4	10	15	12	24	6	95
55-59	5	7	6	9	8	7	6	3	51
60-64	1	1	-	1	-	-	1	-	4
65+	-	-	-	-	-	-	-	-	-
Unknown	-	-	-	-	-	-	-	-	-
Total	258	133	80	76	68	36	32	9	692

The average age of the actives is 40.1, and the average amount of Credited Service is 10.7 years.



5.4. Distribution of Hours Worked by Actives

Hours	
Worked	Count
500-749	70
750-999	84
1,000-1,249	106
1,250-1,499	165
1,500-1,749	120
1,750-1,999	91
2,000-2,249	56
2,250+	-
Total	692



5.5. New Pensioners

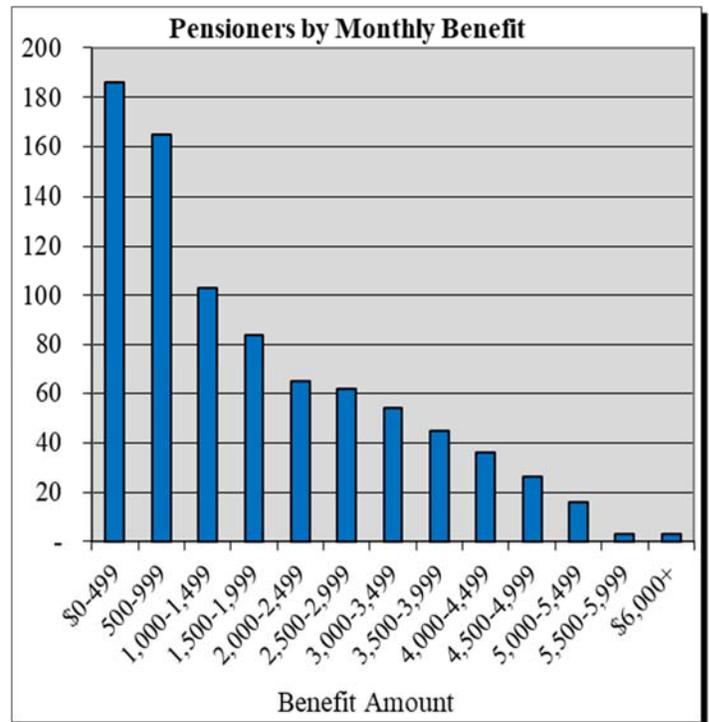
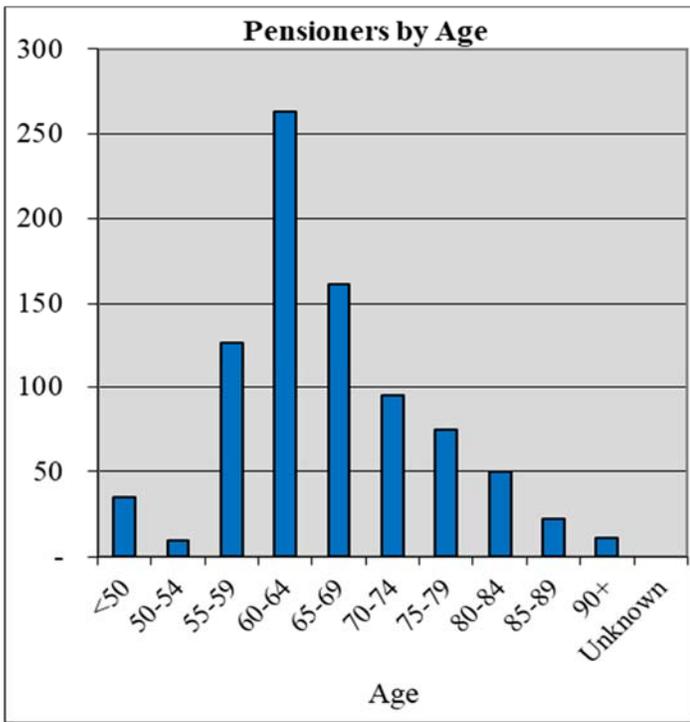
Class	Number	Range of Monthly Pension			
		Average Age	Minimum	Average	Maximum
Normal	11	62.8	\$ 391	\$ 1,880	\$ 4,374
Unreduced Early	9	56.4	2,388	3,517	4,975
Reduced Early	<u>27</u>	<u>60.4</u>	<u>245</u>	<u>945</u>	<u>1,978</u>
Sub Total	47	60.2	\$ 245	\$ 1,656	\$ 4,975
Alternate Payee	3	60.5	\$ 586	\$ 895	\$ 1,100
Disability	-	-	-	-	-
Survivor	<u>15</u>	<u>65.8</u>	<u>201</u>	<u>1,415</u>	<u>3,611</u>
Sub Total	18	64.9	\$ 201	\$ 1,329	\$ 3,611
Total	65	61.5	\$ 201	\$ 1,566	\$ 4,975

5.6. All Pensioners

Class	Number	Range of Monthly Pension			
		Average Age	Minimum	Average	Maximum
Normal	125	71.4	\$ 91	\$ 1,623	\$ 4,551
Unreduced Early	217	65.2	906	3,575	6,409
Reduced Early	<u>286</u>	<u>65.2</u>	<u>906</u>	<u>3,575</u>	<u>6,409</u>
Sub Total	628	66.4	\$ 91	\$ 3,187	\$ 6,409
Alternate Payee	27	16.0	\$ 147	\$ 693	\$ 1,991
Disability	50	59.6	606	2,247	5,266
Survivor	<u>143</u>	<u>73.0</u>	<u>18</u>	<u>821</u>	<u>4,605</u>
Sub Total	220	63.0	\$ 18	\$ 1,130	\$ 5,266
Total	848	64.8	\$ 18	\$ 1,778	\$ 6,409

5.7. Distribution of Monthly Pensions

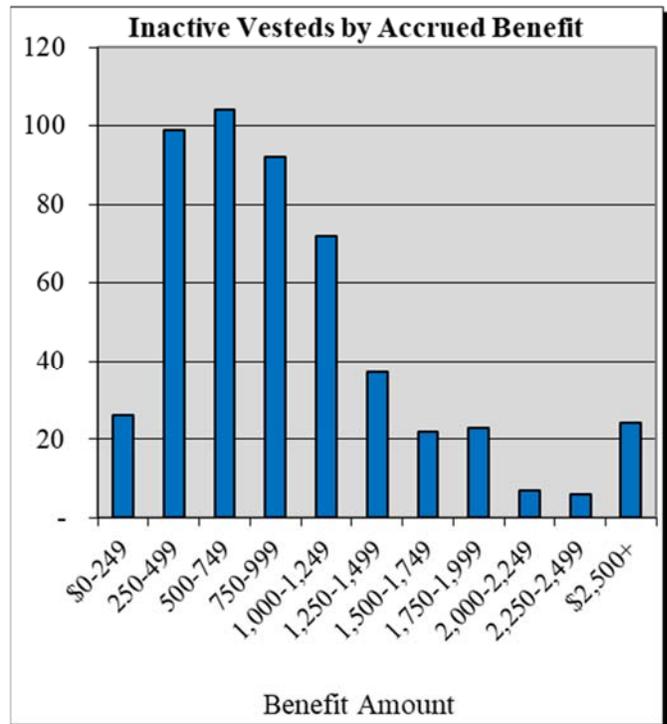
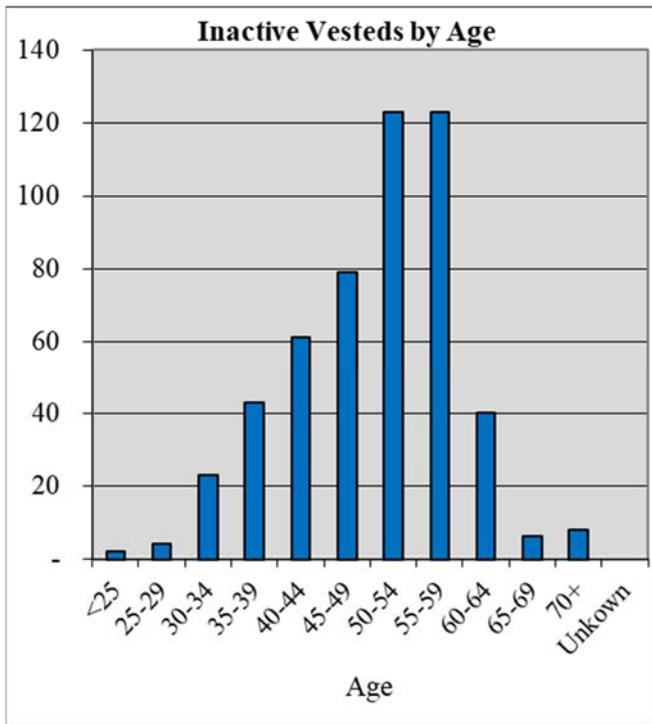
Age	\$0-499	500-999	1,000-	1,500-	2,000-	2,500-	3,000-	3,500-	4,000-	4,500-	5,000-	5,500-	\$6,000+	Total
			1,499	1,999	2,499	2,999	3,499	3,999	4,499	4,999	5,499			
<50	15	10	5	4	-	1	-	-	-	-	-	-	-	35
50-54	4	1	-	2	1	1	-	-	-	-	-	-	-	9
55-59	9	16	17	9	9	11	15	15	12	6	7	-	1	127
60-64	38	60	26	33	20	17	15	16	14	14	6	3	1	263
65-69	27	29	21	15	14	16	18	6	7	4	3	-	1	161
70-74	28	22	10	8	5	8	3	8	2	1	-	-	-	95
75-79	24	11	12	8	9	6	3	-	1	1	-	-	-	75
80-84	23	10	6	3	6	2	-	-	-	-	-	-	-	50
85-89	12	3	4	2	1	-	-	-	-	-	-	-	-	22
90+	6	3	2	-	-	-	-	-	-	-	-	-	-	11
Unknown	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	186	165	103	84	65	62	54	45	36	26	16	3	3	848



5.8. Distribution of Inactive Vested Participants

Age	\$0-249	250-499	500-749	750-999	1,000-1,249	1,250-1,499	1,500-1,749	1,750-1,999	2,000-2,249	2,250-2,499	\$2,500+	Total
<25	2	-	-	-	-	-	-	-	-	-	-	2
25-29	3	1	-	-	-	-	-	-	-	-	-	4
30-34	5	11	3	2	1	-	-	1	-	-	-	23
35-39	3	16	9	6	4	3	-	2	-	-	-	43
40-44	2	11	11	12	11	6	2	3	3	-	-	61
45-49	3	7	17	11	17	7	6	5	2	2	2	79
50-54	4	15	33	21	18	10	4	9	1	1	7	123
55-59	1	20	19	31	18	9	6	3	1	1	14	123
60-64	-	11	9	8	3	2	4	-	-	2	1	40
65-69	-	5	1	-	-	-	-	-	-	-	-	6
70+	3	2	2	1	-	-	-	-	-	-	-	8
Unkown	-	-	-	-	-	-	-	-	-	-	-	-
Total	26	99	104	92	72	37	22	23	7	6	24	512

The average age of the inactive vesteds is 50.5, and the average accrued benefit is \$983.



6. Disclosures

6.1. ASC 960 Present Value of Accumulated Plan Benefits

	<u>Accumulated Benefits</u>	<u>Operational Expenses</u>	<u>Total</u>
A. Present Value of Vested Benefits:			
1. Participants currently receiveing benefits	\$ 188,717,997	\$ 6,421,264	\$ 195,139,261
2. Other vested benefits	<u>84,879,837</u>	<u>2,888,097</u>	<u>87,767,934</u>
3. Subtotal vested benefits	\$ 273,597,834	\$ 9,309,361	\$ 282,907,195
B. Present Value of Non-Vested Benefits	<u>5,283,555</u>	<u>179,777</u>	<u>5,463,332</u>
C. Present Value of Accumulated Plan Benefits (A3+B)	\$ 278,881,389	\$ 9,489,138	\$ 288,370,527

6.2. Reconciliation of Changes in Present Value of Accumulated Benefits

	<u>Accumulated Benefits</u>	<u>Operational Expenses</u>	<u>Total</u>
A. Present Value at Prior Valuation Date	\$ 275,386,161	\$ 10,089,861	\$ 285,476,022
B. Changes During the Year Due to:			
1. Benefits accumulated and net gains	1,980,300	70,865	2,051,165
2. Benefits paid	(17,640,683)	(420,554)	(18,061,237)
3. Assumption changes	(836,825)	(1,007,774)	(1,844,599)
4. Method changes	-	-	-
5. Plan Amendments	-	-	-
6. Passage of time	<u>19,992,436</u>	<u>756,740</u>	<u>20,749,176</u>
7. Total change	\$ 3,495,228	\$ (600,723)	\$ 2,894,505
C. Present Value at Current Valuation Date (A + B7)	\$ 278,881,389	\$9,489,138	\$ 288,370,527

6.3. Minimum Required Contributions

Rules for determining minimum required and maximum deductible contributions are set forth in IRC Sections 412 and 404, respectively. Since deductibility may be affected by factors not considered here, the deductibility and timing of contributions should be reviewed with tax counsel.

A Plan's Credit Balance represents a cumulative measure of all prior contributions (since the initial ERISA effective date) against all prior minimum requirements. If cumulative contributions exceed cumulative minimums, then the Funding Standard Account will maintain a Credit Balance which can be used to offset any current year minimum requirements.

The minimum contribution requirement for the fiscal year ending December 31, 2019 is \$0.

6.4. Maximum Deductible Contribution

The maximum allowable deduction for the fiscal year ending December 31, 2019 is \$448,550,693.

To be deductible for a given fiscal year, a contribution should be made by the time the tax return for that fiscal year is filed with the IRS (including extensions). Specific advice on the deductibility of contributions and timing should be reviewed with your tax counsel.

6.5. Current Liability at Beginning of Plan Year

Current liability is the present value of accrued benefits under the Plan using actuarial assumptions as prescribed by the Retirement Protection Act of 1994 (RPA '94). The liability is determined using the same assumptions used to determine the Plan's funding requirements, except for the interest rate and mortality table. These values are used for specific, prescribed purposes.

RPA '94 Information

1d(2)(a) Current liability.....	\$	481,691,666
1d(2)(b) Exp. Incr. in CL due to benefits accruing.....		6,323,277
1d(2)(c) Exp. Rel. from "RPA '94" CL for the plan year		-
1d(3) Exp. disbursements for the plan year.....	\$	17,640,683

2. Operational Information

a. Current value of assets (see Sch MB instructions)	\$	220,543,261
b. "RPA '94" current liability/part. Count	<u>No. of Part.</u>	<u>Current liability</u>
(1) Retired and beneficiaries	848	\$ 293,200,834
(2) Terminated vested	512	73,476,306
(3) Active		
(a) Non-vested benefits		13,670,756
(b) Vested benefits		<u>101,343,770</u>
(c) Total active	692	<u>\$ 115,014,526</u>
(4) Total	2,052	\$ 481,691,666
c. If % is less than 70%, enter such percentage.....		45.8%

7. Government (5500) Reporting

7.1. Illustration Supporting Actuarial Certification of Status (Line 4b)

Based on the following actuarial measures, the Roofers Local 149 (Detroit) is not in “Critical” or “Endangered” status as per the Pension Protection Act.

- 1 Funded Percentage..... Greater than 80%
- 2 Date of projected funded deficiency..... Not within the next seven years

Below is a ten year projection of the Plan’s Funded Percentage and Credit Balance supporting the Actuarial Certification.

Plan Year Ending May. 31	Funded %	Credit Balance
2020	82.9%	\$ 14,053,361
2021	84.1%	13,950,821
2022	85.1%	13,160,463
2023	86.0%	12,320,020
2024	87.9%	11,174,938
2025	89.9%	9,729,639
2026	91.9%	8,009,211
2027	94.1%	7,488,288
2028	96.4%	10,823,364
2029	98.9%	\$ 15,156,119

7.2. Documentation Regarding Progress under Funding Improvement or Rehabilitation Plan (Line 4c)

For the Plan Year the Plan was not in “Critical” or “Endangered Status” and therefore was not subject to a Funding Improvement or Rehabilitation Plan.

7.3. Statement of Actuarial Assumptions/Methods (Line 6)

These are the assumptions used for the ongoing valuation calculations, unless otherwise noted.

Measurement Date	May 31, 2019	
Mortality	Pre-Decrement:	RP-2014 Blue Collar Employee
	Post-Decrement:	RP-2014 Blue Collar Annuitant
	Post-Disablement:	RP-2014 Disabled Annuitant

All tables use Scale MP-2018 generational mortality improvement.

Disability and Termination Rates	Disability		Termination			
			Completed Years of Employment			
	Age	Male	Female	< 1	1 - 2	2+
	20	0.13%	0.15%	50%	25%	7%
	25	0.13	0.15	50	25	7
	30	0.13	0.15	50	20	6
	35	0.13	0.15	50	15	5
	40	0.26	0.45	50	10	5
	45	0.51	0.58	50	10	5
	50	0.96	0.89	50	6	1.5
	55	0.96	1.35	50	6	0
	60	1.74%	1.53%	0%	0%	0%

Retirement Rates

Active	Age	For those eligible for unreduced	For those not eligible for unreduced
		Early Retirement	Early Retirement
	<55	.60	N/A
	55-56	.60	.05
	57	.70	.10
	58	.80	.15
	59	.90	.20
	60	1.00	.33
	61	1.00	.50
	62	1.00	1.00

Inactive Vested	Under 30 years of Credited Service	Immediately upon eligibility for an unreduced benefit
	30 or more years of Credited Service	Age 55, or immediately if older

Future Employment:	850,000 total employment units
--------------------	--------------------------------

Unknown Data for Participants:	Active participants with missing dates of birth are assumed to be age 40. Other missing information was assumed to be the same as those exhibited by participants with similar known characteristics. If not specified, participants are assumed to be male.
Definition of Active	500 hours of contributions, unless retired as of the valuation date.
Percent Married:	80% for males and 70% for females
Age of Spouse:	Females 3 years younger than males
Net Investment Return:	7.50%
Expenses:	\$500,000, annually increasing 3.0% per year
Actuarial Value of Assets:	The 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 market value, and is recognized over a five-year period. The actuarial value is further adjusted, if necessary, to be within 20% of the market value.
Actuarial Cost Method	Unit Credit Actuarial Cost Method. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by service.

RPA '94 Current Liability Assumptions

Interest	3.08%
Mortality	Mortality prescribed under IRS Regulations 1.431(c)(6)-1 and 1.430(h)(3)-1

Rationale for Assumptions

Demographic	The demographic rates utilized are standard tables that approximate recent historical demographic experience, and adjusted to reflect anticipated future experience and professional judgment. A comparison of actual vs. expected decrements, and aggregate liability gain/loss analysis were used to validate the demographic assumptions.
Administrative Expense and Employment	The Administrative Expense and Employment assumptions approximate recent historical experience, and adjusted to reflect anticipated future experience and professional judgment. When appropriate we include the expectations of Trustees and co-professionals for these assumptions.
Investment Return	The investment return assumption is a long-term estimate that is based on historical experience, future market expectations, and professional judgment. We have utilized the investment manager's capital market expectations, and have compared those expectations with a broader market survey.

7.4. Justification for Change in Actuarial Assumptions (Line 11)

The following assumptions were changed from the previous valuation to better reflect anticipated Plan experience.

- All mortality tables were changed from using Scale MP-2016 generational mortality improvement to use Scale MP-2018 generational mortality improvement.
- The expense assumption changed from \$650,000 to \$500,000, increasing by 3.0% annually.

7.5. Summary of Plan Provisions (Line 6)

Plan Year:	June 1 through May 31
Pension Credit Year	June 1 through May 31
Participation	Begins earliest June 1 or December 1 after earning 1 year of Credited Service
Year of Credited Service	One year of Credited Service for 500 hours of contributions or 1,000 hours of service.
Vesting Years	One Vesting Year for each Year of Credited Service.
Normal Retirement	

Eligibility **Benefit accrued prior to 6/1/2005**
 Age 60 & 5 years of covered employment

On and after 6/1/2005
 Age 65 & 5 years of covered employment

Amount Sum of the following:

<u>Accrual Period</u>	<u>Benefit</u>
Pre 6/1/1962	\$2.00 for each Year of Credited Service. Maximum 10 years
6/1/1962 – 5/31/2003	4.0% of contributions
6/1/2003 – 5/31/2006	\$0.1315 per hour worked
6/1/2006 – 5/31/2008	\$0.1340 per hour worked
6/1/2008 – 5/31/2009	Greater of: ➤ \$0.1340 per hour worked from 6/1/2008 to 9/30/2008 ➤ \$0.1285 per hour worked from 6/1/2008 to 5/31/2009
6/1/2009 – 6/30/2009	\$0.1285 per hour worked
7/1/2009 – 5/31/2013	\$0.01 per hour worked
6/1/2013 – 5/31/2019	\$0.05 per hour worked
On and after 6/1/2019	\$0.075 per hour worked

Normal Form If married: Reduced 50% J&S (Husband & Wife Form)
 If rejected, or if not married: Life

Early Retirement

Eligibility Age 55 with 10 years of Credited Service

Amount For Active Participants:
 Normal retirement benefit, reduced 6% for each year of age less than 60,

For Inactive Participants:
 Full actuarial reduction from Normal Retirement Age, with sample rates as follows:

Actual Retirement	Normal Retirement Age	
	<u>Age</u>	<u>60</u>
55	59.1057%	33.1021%
58	80.5858%	45.1321%
60	100.000%	56.0050%

Early Enhanced

Eligibility For Active Participants:

- Age 55 with 30 years of credited service, or
- Credited Service and age equal to or greater than 88 as of 5/31/2013

For Inactive Vested Participants:

- Age 55 with 30 years of credited service

Amount For Active Participants: Unreduced

For Inactive Vested Participants: Reduced 6% from age 60

Disability: None, effective 6/1/2013

Vesting:

Eligibility 5 years of Credited Service

Amount Normal (or Early) benefit

Pre-Retirement Death Benefit

Eligibility 5 years of Credited Service

Amount To spouse: 50% of the actuarially reduced benefit the participant would have received had he retired the day before he died and elected the 50% J&S option. If the participant died prior to eligibility for a Normal or Early Retirement pension, the spouse's benefit is deferred to the date participant would have been eligible for a Normal or Early Retirement pension.

Lump Sum None, effective 9/28/2012, due to Critical Status

Post-Retirement As per the annuity form selected.
 Death Benefit

Optional Forms Optional form available in an actuarially equivalent amount:
 > 50 % J&S (“**Husband & Wife Form**”) (for married participants only)
 > 75% J&S (for married participants only)
 > 100% J&S (for married participants only)
 > *Lump Sum – Eliminated effective 9/28/2012, due to Critical Status*

Sample Option Form Reductions Participant: Age 62, Spouse: Age 59
 • 50% J&S: 90.6788%
 • 75% J&S: 86.6408%
 • 100% J&S: 82.9471%

Recent Plan Changes

<u>Effective</u>	<u>Plan Change</u>
2019	Benefits accrued on and after 5/31/2019 equal \$0.075 per hour worked
2014	Terminated vested participants with 30 or more years of Credited Service may retire early with a reduction of 6% per year for each year prior to age 60.
2013	Benefits accrued after 5/31/2013 equal \$5.00 per 100 hours worked Disability benefits were eliminated Rule of 88 was eliminated for participants not already eligible for it as of 5/31/2013 Early retirement for Inactive Participants is subject to a full actuarial reduction from Normal Retirement Age All joint and survivor options are subject to a full actuarial reduction Lump sums were eliminated
2009	Benefits accrued after 6/30/2009 equal \$1.00 per 100 hours worked
2009	Benefits accrued after 5/31/2009 equal \$0.1285 per hour worked
2008	Benefits accrued after 5/31/2008 equal greater of: > \$0.1340 per hour worked from 6/1/2008 to 9/30/2008 > \$0.1285 per hour worked from 6/1/2008 to 5/31/2009
2006	Benefits accrued after 5/31/2006 equal \$0.1340 per hour worked
2003	Benefits accrued after 5/31/2003 equal \$0.1315 per hour worked

7.6. Contribution Rates

Approx. Effective <u>Date</u>	Hourly Contribution <u>Rate</u>
6/1/2006	\$ 5.60
6/1/2007	6.10
6/1/2008	6.55
6/1/2009	7.10
6/1/2010	7.60
6/1/2011	8.10
6/1/2012	8.10
6/1/2013	9.45
6/1/2014	10.45
6/1/2015	11.45
6/1/2016	11.50
6/1/2017	11.50
6/1/2018	11.50
6/1/2019	\$ 12.50

7.7. Schedule of Projection of Expected Benefit Payments (Line 8b(1))

Plan	
Year	Expected
Ending	Benefit
<u>May. 31</u>	<u>Payments</u>
2020	\$ 18,434,514
2021	19,264,067
2022	20,130,950
2023	21,036,843
2024	21,562,764
2025	22,101,833
2026	22,654,379
2027	23,220,738
2028	23,801,256
2029	\$ 23,920,262

7.8. Schedule of Active Participant Data (Line 8b(2))

Age	0-1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+
<25	-	58	4	-	-	-	-	-	-	-
25-29	-	54	25	5	-	-	-	-	-	-
30-34	-	48	24	15	2	-	-	-	-	-
35-39	-	30	29	18	19	2	-	-	-	-
40-44	-	23	21	23	21	20	2	-	-	-
45-49	-	22	15	9	14	23	15	1	-	-
50-54	-	17	7	4	10	15	12	24	6	-
55-59	-	5	7	6	9	8	7	6	3	-
60-64	-	1	1	-	1	-	-	1	-	-
65-69	-	-	-	-	-	-	-	-	-	-
70+	-	-	-	-	-	-	-	-	-	-

7.9. Schedule of Funding Standard Account Bases (Lines 9c and 9h)

Amortization Charges as of 6/1/2019

<u>Year</u> <u>Established</u>	<u>Base Type</u>	<u>Outstanding</u> <u>Balance</u>	<u>Years</u> <u>Remaining</u>	<u>Amortization</u> <u>Amount</u>
1980	Plan Amendment	\$ 170,676	1	\$ 170,676
1990	Plan Amendment	656,004	1	656,004
1991	Plan Amendment	174,048	2	90,169
1992	Plan Amendment	1,211,521	3	433,372
1993	Plan Amendment	707,650	4	196,541
1994	Plan Amendment	154,247	5	35,465
1995	Plan Amendment	458,707	6	90,907
1996	Plan Amendment	117,265	7	20,595
1996	Plan Amendment	563,129	7	98,901
1997	Plan Amendment	2,172,503	8	345,028
1997	Assumption Change	2,569,092	8	408,012
1998	Plan Amendment	6,927,374	9	1,010,218
1999	Plan Amendment	2,776,826	10	376,320
2000	Plan Amendment	3,772,438	11	479,705
2001	Plan Amendment	1,328,347	12	159,745
2002	Plan Amendment	2,884,927	13	330,262
2003	Plan Amendment	2,916,136	14	319,547
2004	Plan Amendment	929,665	15	97,971
2004	Assumption Change	2,535,751	15	267,226
2005	Experience Loss	1,364,774	1	1,364,774
2006	Plan Amendment	168,081	17	16,574
2007	Plan Amendment	1,840,740	18	176,418
2008	Plan Amendment	70,727	5	16,262
2008	Plan Amendment	114,361	4	31,762
2009	Experience Loss	13,933,650	5	3,203,634
2010	Experience Loss	6,054	6	1,200
2010	Change Funding Method	1,191,639	1	1,191,639
2011	Experience Loss	5,169,815	7	907,965
2011	Assumption Change	1,288,508	7	226,298
2012	Experience Loss	8,123,079	8	1,290,074
2012	Assumption Change	10,066,088	8	1,598,654
2013	Experience Loss	5,417,651	9	790,056
2014	Plan Amendment	635,794	10	86,164
2015	Assumption Change	916,554	11	116,549
2016	Experience Loss	4,892,911	12	588,414
2017	Assumption Change	5,986,845	13	685,364
2018	Experience Loss	2,418,402	14	265,006
2018	Assumption Change	4,026,051	14	441,170
2019	Experience Loss	<u>5,984,511</u>	15	<u>630,669</u>
Total Charges		\$106,642,541		\$ 19,215,310

Amortization Credits as of 6/1/2019

Year Established	Base Type	Outstanding Balance	Years Remaining	Amortization Amount
1991	Assumption Change	\$ (631,181)	2	\$ (326,997)
2001	Assumption Change	(452,641)	12	(54,434)
2005	Plan Amendment	(3,016,376)	16	(306,944)
2006	Experience Gain	(307,646)	2	(159,383)
2007	Experience Gain	(280,182)	3	(100,224)
2008	Experience Gain	(461,805)	4	(128,260)
2009	Assumption Change	(3,457,516)	5	(794,954)
2009	Plan Amendment	(12,659,873)	5.08	(2,872,724)
2012	Change Funding Method	(157,149)	3	(56,214)
2013	Plan Amendment	(7,446,198)	9	(1,085,878)
2014	Experience Gain	(4,094,770)	10	(554,931)
2015	Experience Gain	(4,005,574)	11	(509,351)
2017	Experience Gain	(5,437,308)	13	(622,454)
2019	Assumption Change	(836,825)	15	(88,188)
Total Credits		\$ (43,245,044)		\$ (7,660,936)
Net Charge/(Credit)		\$ 63,397,497		\$ 11,554,374