



**Municipal Pensions
Oversight Board**

**City of Charleston
West Virginia
Firemen's Pension and Relief Fund**

GASB 68 Actuarial Information for the
Measurement Period Ending
June 30, 2020

Bolton

Submitted by:

James Ritchie, ASA, EA, FCA, MAAA
Senior Consulting Actuary
443.573.3924
jritchie@boltonusa.com

Jordan McClane, FSA, EA, FCA, MAAA
Actuary
667.218.6935
jmclane@boltonusa.com



Employee Benefits, Actuarial & Investment Consulting

October 27, 2020

Honorable Victor Grigoraci
City Treasurer
City of Charleston
501 Virginia Street, East
Charleston, WV 25301

Retiree Robert "Scott" Fisher
Pension Board Secretary
City of Charleston
Firemen's Pension and Relief Fund

Re: City of Charleston Firemen's Pension and Relief Fund
GASB 68 Actuarial Information for the Measurement Period Ending June 30, 2020

Dear Victor,

The following report contains the GASB 67 and GASB 68 actuarial information for the City of Charleston Firemen's Pension and Relief Fund to be included in the City's financial statements for FY 2020. The GASB 67 information has been provided as of June 30, 2020 (the GASB 68 measurement date for FY 2020).

Methodology, Reliance and Certification

This report is prepared for the City. The report contains the actuarial information to be included with the City's financial statements for the year ending June 30, 2020 (the City's fiscal year end date) as required by GASB 68. This information has been prepared for use in the financial statements of the City. This information is not intended for, nor should it be used for, any additional purposes.

The total pension liability is based on the July 1, 2019 actuarial valuation rolled forward to June 30, 2020. The methods, assumptions, and participant data used are detailed in the July 1, 2019 actuarial valuation report with the exception of the actuarial cost method. These calculations are based on the Entry Age Normal cost method as required by GASB 67. The calculation of the Actuarially Determined Contribution (ADC) for the fiscal year ending June 30, 2020 is contained in the July 1, 2018 valuation report. The discount rate assumption may have changed if a blended rate was used for GASB purposes. The ADC and blended rate determination are based on the Plan using the Conservation funding policy as described in WV Code §8-22-20. Under this funding policy, the City makes contributions to two separate accounts: the Benefit Payment Account and the Accumulation Account. The Benefit Payment Account is used to pay benefits on a pay-as-you-go basis while the Accumulation Account cannot be used to pay benefits and expenses until assets equal or exceed actuarial liabilities.

The included calculations are based on a blended discount rate of 3.34%. A long-term expected rate of investment return of 4.50% has been blended with the 2.45% yield corresponding to the 20-year maturity on a municipal general obligation AA bond yield curve published on Fidelity's Fixed Income Market Data webpage as of June 30, 2020. We assumed benefits are discounted at the municipal bond rate when paid from the Benefit Payment Account and at the long-term rate of return when paid from the Accumulation Account. The development of the blended discount rate is included within this report.

Methodology, Reliance and Certification (cont.)

The included calculations assume that the members and the City will continue to make all required contributions in accordance with the City's funding policy.

This is a deterministic valuation in that it is based on a single set of assumptions. This set of assumptions is one possible basis for our calculations. Other assumptions may be equally valid. The future is uncertain and the plan's actual experience will differ from the assumptions; the differences may be significant or material because the results are very sensitive to the assumptions made and, in some cases, to the interaction between the assumptions. We may consider that some factors are not material to the valuation of the plan and may not provide a specific assumption for those factors. We may have used other assumptions in the past. We will likely consider changes in assumptions at a future date.

The City is responsible for selecting the plan's funding policy based on four methods allowed for under state law. The actuarial valuation methods are chosen by the actuary in accordance with actuarial standards of practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries and as required by GASB 67 & 68. The MPOB selects the asset valuation methods and assumptions; these selections are reviewed by a qualified actuary no less than every five years. The actuary shall provide a report to the Board with recommendations on any changes to the actuarial process. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in this report. The City and MPOB are solely responsible for communicating to Bolton Partners, Inc. any changes required thereto.

The City could reasonably ask how the valuation would change if we used a different assumption set or if plan experience exhibited variations from our assumptions. This report does not contain such an analysis. That type of analysis would be a separate assignment.

The cost of this plan is determined by the benefits promised by the plan, the plan's participant population, the investment experience of the plan and many other factors. An actuarial valuation is a budgeting tool for the City or, in this case, a measure of accounting expense. It does not affect the cost of the plan. As the experience of the plan evolves, it is normal for the level of contributions and expense of the plan to change.

We make every effort to ensure that our calculations are accurately performed. These calculations are complex. Despite our best efforts, we may make a mistake. We reserve the right to correct any potential errors by amending the results of this report or by including the corrections in a future valuation report.

Because modeling all aspects of a situation is not possible or practical, we may use summary information, estimates, or simplifications of calculations to facilitate the modeling of future events in an efficient and cost-effective manner. We may also exclude factors or data that are immaterial in our judgment. Use of such simplifying techniques does not, in our judgment, affect the reasonableness of valuation results for the plan.

This report is based on plan provisions, census data, and asset data submitted by the City. We have relied on this information for purposes of preparing this report, but have not performed an audit. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying information. The plan sponsor is solely responsible for the validity and completeness of this information.



Methodology, Reliance and Certification (cont.)

The valuation was completed using both proprietary and third-party models (including software and tools). We have tested these models to ensure they are used for their intended purposes, within their known limitations, and without any known material inconsistencies unless otherwise stated.

The City is solely responsible for selecting the plan's investment policies, asset allocations and individual investments. Bolton Partners, Inc.'s actuaries have not provided any investment advice to the City.

The information in this report was prepared for the internal use of the City, the plan and their auditors in connection with our actuarial valuations of the pension plan as required by GASB 68. This report may not be used for any other purpose; Bolton Partners, Inc. is not responsible for the consequences of any unauthorized use or the reliance on this information by any other party.

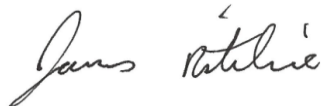
The calculation of actuarial liabilities for valuation purposes is based on a current estimate of future benefit payments. The calculation includes a computation of the "present value" of those estimated future benefit payments using an assumed discount rate; the higher the discount rate assumption, the lower the estimated liability will be. For purposes of estimating the liabilities (future and accrued) in this report, an assumption based on the expected long-term rate of return on plan investments is used. If the plan is expected to become insolvent, the return assumption is blended with a long-term municipal bond rate. Using a lower discount rate assumption, such as a rate corresponding to long term bond yields, could substantially increase the estimated present value of future and accrued liabilities.

This report provides certain financial calculations for use by the auditor. These values have been computed in accordance with our understanding of generally accepted actuarial principles and practices and fairly reflect the actuarial position of the plan. The various actuarial assumptions and methods which have been used are, in our opinion, appropriate for the purposes of this report.

The report is conditioned on the assumption of an ongoing plan and is not meant to present the actuarial position of the plan in the case of plan termination. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions, changes in economic or demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status), and changes in plan provisions or applicable law.

The undersigned enrolled actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. The July 1, 2019 actuarial valuation report contains information that is integral to the results contained herein and a copy may be provided upon request.

Sincerely,



James Ritchie, ASA, EA, FCA, MAAA



Jordan McClane, FSA, EA, FCA, MAAA



City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Net Pension Liability of the Employer

The components of the net pension liability of the Employer at June 30, 2020, were as follows:

Total pension liability	\$ 238,241,616
Plan fiduciary net position	(23,647,016)
Employer's net pension liability	<u>\$ 214,594,600</u>
Plan fiduciary net position as a percentage of the total pension liability	9.93%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of July 1, 2019 rolled forward to June 30, 2020 using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.75 percent
Salary increases	Rates vary by years of service
Single discount rate (BOY)	3.71%
Single discount rate (EOY)	3.34%
Investment rate of return (BOY)	4.50%, net of pension plan investment expense, including inflation
Investment rate of return (EOY)	4.50%, net of pension plan investment expense, including inflation
Long-term municipal bond rate (BOY)	3.13%
Long-term municipal bond rate (EOY)	2.45%
Mortality	RP-2014 Blue Collar Mortality Table with generational projection using Scale MP-2014
Year Fund is projected to be fully funded	2046
Year assets are expected to be depleted for a closed plan	N/A

The above is a summary of key actuarial assumptions. Full descriptions of the actuarial assumptions are available in the July 1, 2019 actuarial valuation report.

Sensitivity of the net pension liability to changes in the discount rate

	1% Decrease 2.34%	Current Discount Rate 3.34%	1% Increase 4.34%
Employer's net pension liability	\$ 257,410,604	\$ 214,594,600	\$ 181,192,490

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Changes in the Net Pension Liability

	Total Pension Liability (a)	Increase (Decrease) Plan Fiduciary Net Position (b)	Net Pension Liability (a) - (b)
Balances at 6/30/19	\$ 218,420,916	\$ 22,233,766	\$ 196,187,150
Changes for the year:			
Service cost	4,064,952		4,064,952
Interest	7,955,978		7,955,978
Changes of benefit terms	-		-
Differences between expected and actual experience	2,442,355		2,442,355
Changes of assumptions	13,305,537		13,305,537
Contributions - employer (including Premium Tax Allocation)		8,442,090	(8,442,090)
Contributions - member		603,480	(603,480)
Net investment income		321,619	(321,619)
Benefit payments, including refunds of member contributions	(7,948,122)	(7,948,122)	-
Administrative expense		(5,817)	5,817
Other		-	-
Net Changes	<u>19,820,700</u>	<u>1,413,250</u>	<u>18,407,450</u>
Balances at 6/30/20	<u>\$ 238,241,616</u>	<u>\$ 23,647,016</u>	<u>\$ 214,594,600</u>
Return on Investments		1.4%	

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Components of Employer's Pension Expense for the Fiscal Year Ended June 30, 2020

Note	Description	Amount
A	Service cost	\$ 4,064,952
B	Interest on the total pension liability	7,955,978
A	Changes of benefit terms	-
C	Differences between expected and actual experience	1,027,403
C	Changes of assumptions	17,016,847
A	Employee contributions	(603,480)
D	Projected earnings on pension plan investments	(1,025,080)
C	Differences between expected and actual earnings on plan investments	(237,400)
A	Pension plan administrative expense	5,817
A	Other changes in fiduciary net position	-
Total Pension Expense		\$ 28,205,037

Notes:

A Provided in the Changes in Net Pension Liability exhibit.

B Based on the following calculation:

	Amount for Period (a)	Portion of Period (b)	Interest Rate (c)	Projected Earnings (a) x (b) x (c)
Beginning total pension liability	\$ 218,420,916	100%	3.71%	\$ 8,103,416
Service cost (End of Year)	4,064,952	0%	3.71%	-
Benefit payments, including refunds of employee contributions	(7,948,122)	50%	3.71%	(147,438)
Total interest on the total pension liability				\$ 7,955,978

C Provided in the Schedules of Deferrals.

D Based on the following calculation:

	Amount for Period (a)	Portion of Period (b)	Projected Rate of Return (c)	Projected Earnings (a) x (b) x (c)
Beginning plan fiduciary net position	\$ 22,233,766	100%	4.50%	\$ 1,000,519
Employer contributions	8,442,090	50%	4.50%	189,947
Employee contributions	603,480	50%	4.50%	13,578
Benefit payments, including refunds of employee contributions	(7,948,122)	50%	4.50%	(178,833)
Administrative expense and other	(5,817)	50%	4.50%	(131)
Total Projected Earnings				\$ 1,025,080

City of Charleston, West Virginia Firemen’s Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

At June 30, 2020, the Employer reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	\$ 1,221,177	\$ -
Changes of assumptions	6,652,768	-
Net difference between projected and actual earnings on pension plan investments	-	65,923
Total	\$ 7,873,945	\$ 65,923

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:	
2021	\$ 7,631,774
2022	(43,460)
2023	79,015
2024	140,693
2025	-
Thereafter	-

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Changes in the Employer's Net Pension Liability and Related Ratios
 Last 10 Fiscal Years

Total pension liability	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Service cost	\$ 4,064,952	\$ 4,191,779	\$ 3,812,937	\$ 4,558,952	\$ 3,402,390	\$ 3,160,914	\$ 3,139,576	\$ -	\$ -	\$ -
Interest	7,955,978	8,242,853	8,083,617	7,563,985	7,426,782	7,516,367	7,715,345	-	-	-
Changes of benefit terms	-	-	-	-	-	-	-	-	-	-
Differences between expected and actual experience	2,442,355	230,664	(1,328,621)	(352,450)	(1,147,647)	(3,217,247)	-	-	-	-
Changes of assumptions	13,305,537	21,564,458	(1,797,321)	(15,608,155)	27,065,406	8,277,173	6,693,190	-	-	-
Benefit payments, including refunds of member contributions	(7,948,122)	(7,600,235)	(7,425,842)	(7,238,403)	(7,075,905)	(6,859,784)	(6,943,758)	-	-	-
Net change in total pension liability	19,820,700	26,629,519	1,344,770	(11,076,071)	29,671,026	8,877,423	10,604,353	-	-	-
Total pension liability - beginning	218,420,916	191,791,397	190,446,627	201,522,698	171,851,672	162,974,249	152,369,897	-	-	-
Total pension liability - ending (a)	\$ 238,241,616	\$ 218,420,916	\$ 191,791,397	\$ 190,446,627	\$ 201,522,698	\$ 171,851,672	\$ 162,974,250	\$ -	\$ -	\$ -
Plan fiduciary net position	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Contributions - employer (including Premium Tax Allocation)	\$ 8,442,090	\$ 8,035,292	\$ 7,843,092	\$ 7,685,081	\$ 6,906,802	\$ 6,561,849	\$ 6,735,846	\$ -	\$ -	\$ -
Contributions - member	603,480	509,721	525,870	574,505	580,188	592,996	603,333	-	-	-
Net investment income	321,619	1,232,322	1,409,712	1,717,125	695,679	622,444	1,317,995	-	-	-
Benefit payments, including refunds of member contributions	(7,948,122)	(7,600,235)	(7,425,842)	(7,238,403)	(7,075,905)	(6,859,784)	(6,943,758)	-	-	-
Administrative expense	(5,817)	(301)	(6,890)	(7,603)	(9,741)	(5,864)	(8,132)	-	-	-
Other	-	(5,400)	203	-	-	-	-	-	-	-
Net change in plan fiduciary net position	\$ 1,413,250	\$ 2,171,399	\$ 2,346,145	\$ 2,730,705	\$ 1,097,023	\$ 911,641	\$ 1,705,284	\$ -	\$ -	\$ -
Plan fiduciary net position - beginning	22,233,766	20,062,367	17,716,222	14,985,517	13,888,494	12,976,853	11,271,569	-	-	-
Plan fiduciary net position - ending (b)	\$ 23,647,016	\$ 22,233,766	\$ 20,062,367	\$ 17,716,222	\$ 14,985,517	\$ 13,888,494	\$ 12,976,853	\$ -	\$ -	\$ -
Employer's net pension liability - ending (a)-(b)	\$ 214,594,600	\$ 196,187,150	\$ 171,729,030	\$ 172,730,405	\$ 186,537,181	\$ 157,963,178	\$ 149,997,396	\$ -	\$ -	\$ -
Plan fiduciary net position as a percentage of the total pension liability	9.93%	10.18%	10.46%	9.30%	7.44%	8.08%	7.96%	0.00%	0.00%	0.00%
Covered payroll	\$ 6,147,535	\$ 6,419,737	\$ 6,725,992	\$ 7,038,745	\$ 7,273,171	\$ 7,364,910	\$ 7,872,875	\$ -	\$ -	\$ -
Employer's net pension liability as a percentage of covered payroll	3490.74%	3056.00%	2553.21%	2453.99%	2564.73%	2144.81%	1905.24%	0.00%	0.00%	0.00%
Expected average remaining service years of all participants	2.00	2.00	2.61	2.88	3.18	3.38	3.71	-	-	-

Notes to Schedule:

Benefit changes: There were no changes for FY2020.

Changes of assumptions: The discount rate changed from 3.71% to 3.34%.

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Schedule of Employer Contributions
 Last 10 Fiscal Years

	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Actuarially determined contribution	\$ 12,798,513	\$ 12,736,724	\$ 10,930,487	\$ 10,712,117	\$ 10,373,813	\$ 8,533,617	\$ 8,544,824	\$ 8,644,534	\$ -	\$ -
Contributions in relation to the actuarially determined contribution										
Employer provided	6,489,575	6,253,683	6,107,953	5,974,752	5,300,143	5,004,065	5,191,340	4,935,630	-	-
State provided	1,952,515	1,781,609	1,735,139	1,710,329	1,606,659	1,557,784	1,544,506	1,958,353	-	-
Contribution deficiency (excess)	<u>\$ 4,356,423</u>	<u>\$ 4,701,432</u>	<u>\$ 3,087,395</u>	<u>\$ 3,027,036</u>	<u>\$ 3,467,011</u>	<u>\$ 1,971,768</u>	<u>\$ 1,808,978</u>	<u>\$ 1,750,551</u>	<u>\$ -</u>	<u>\$ -</u>
Covered payroll	\$ 6,147,535	\$ 6,419,737	\$ 6,725,992	\$ 7,038,745	\$ 7,273,171	\$ 7,364,910	\$ 7,872,875	\$ 8,867,736	\$ -	\$ -
Contributions as a percentage of covered employee payroll	137.32%	125.17%	116.61%	109.18%	94.96%	89.10%	85.56%	77.74%	N/A	N/A

Notes to Schedule

Valuation date:

Actuarially determined contribution amounts are calculated as of the beginning of the fiscal year (July 1) for the year immediately following the fiscal year. Actuarial valuations are performed every year.

Methods and assumptions used to determine contribution rates:

Actuarial cost method	Entry Age Normal
Amortization method	Level Dollar
Remaining amortization period	31.5 years
Asset valuation method	Market Value
Inflation	2.75 percent
Salary increases	Rates vary by years of service
Investment rate of return	4.50%, net of pension plan investment expense, including inflation
Retirement age	Rates vary by age
Mortality	RP-2014 Blue Collar Mortality Table with generational projection using Scale MP-2014

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
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Schedule of Differences between Projected and Actual Earnings on Pension Plan Investments

In conformity with paragraph 33b of Statement 68, the effects of differences between projected and actual earnings on pension plan investments are recognized in pension expense using a systematic and rational method over a closed five-year period, beginning in the current reporting period. The following table illustrates the application of this requirement.

Increase (Decrease) in Pension Expense Arising from the Recognition of Differences between Projected and Actual Earnings on Plan Investments											
Year	Differences between Projected and Actual Earnings on Pension Plan Investments	Recognition Period (Years)	2016	2017	2018	2019	2020	2021	2022	2023	2024
2016	\$ 23,853	5	\$ 4,771	4,771	4,771	4,771	4,769				
2017	(993,557)	5		\$ (198,711)	(198,711)	(198,711)	(198,711)	(198,713)			
2018	(612,367)	5			\$ (122,473)	(122,473)	(122,473)	(122,473)	(122,475)		
2019	(308,385)	5				\$ (61,677)	(61,677)	(61,677)	(61,677)	(61,677)	
2020	703,461	5					\$ 140,692	140,692	140,692	140,692	140,693
Net increase (decrease) in pension expense							\$ (237,400)	\$ (242,171)	\$ (43,460)	\$ 79,015	\$ 140,693

Deferred Outflows of Resources and Deferred Inflows of Resources Arising from Differences between Projected and Actual Earnings on Pension Plan Investments

Year	Investment Earnings Less than Projected (a)	Investment Earnings Greater Than Projected (b)	Amounts Recognized in Pension Expense Through June 30, 2020 (c)	Balances at June 30, 2020	
				Deferred Outflows of Resources (a) - (c)	Deferred Inflows of Resources (b) - (c)
2016	\$ 23,853	\$ -	\$ 23,853	\$ -	\$ -
2017	-	993,557	794,844	-	198,713
2018	-	612,367	367,419	-	244,948
2019	-	308,385	123,354	-	185,031
2020	703,461	-	140,692	562,769	-
				\$ 562,769	\$ 628,692

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Schedule of Differences between Expected and Actual Experience

In conformity with paragraph 33a of Statement 68, the effects of differences between expected and actual experience are recognized in pension expense, beginning in the current reporting period, using a systematic and rational method over a closed period equal to the average of the remaining service lives of all employees that are provided with pensions through the pension plan (active and inactive employees), determined as of the beginning of the measurement period. The following table illustrates the application of this requirement.

Increase (Decrease) in Pension Expense Arising from the Recognition of Differences between Expected and Actual Experience																			
Year	Differences between Expected and Actual Experience	Recognition Period (Years)	Prior	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Thereafter
Prior	-	-																	
2011	-	-																	
2012	-	-																	
2013	-	-																	
2014	-	3,711,956																	
2015	(3,217,247)	3,378,746						\$ (952,201)	(952,201)	(952,201)	(360,644)								
2016	(1,147,647)	3,180,437							\$ (360,846)	(360,846)	(360,846)	(65,109)							
2017	(352,450)	2,882,103								\$ (122,289)	(122,289)	(107,872)							
2018	(1,328,621)	2,606,381									\$ (509,757)	(509,757)	(309,107)						
2019	230,664	2,000,000										\$ 115,332	115,332						
2020	2,442,355	2,000,000											\$ 1,221,178	1,221,177					
Net increase (decrease) in pension expense													\$ 1,027,403	\$ 1,221,177	\$ -	\$ -	\$ -	\$ -	\$ -

Deferred Outflows of Resources and Deferred Inflows of Resources Arising from Differences between Expected and Actual Experience

Year	Experience Losses (a)	Experience Gains (b)	Amounts Recognized in Pension Expense Through June 30, 2020 (c)	Balances at June 30, 2020	
				Deferred Outflows of Resources (a) - (c)	Deferred Inflows of Resources (b) - (c)
Prior	\$ -	\$ -	\$ -	\$ -	\$ -
2011	-	-	-	-	-
2012	-	-	-	-	-
2013	-	-	-	-	-
2014	-	-	-	-	-
2015	-	3,217,247	3,217,247	-	-
2016	-	1,147,647	1,147,647	-	-
2017	-	352,450	352,450	-	-
2018	-	1,328,621	1,328,621	-	-
2019	230,664	-	230,664	-	-
2020	2,442,355	-	1,221,178	1,221,177	-
				\$ 1,221,177	\$ -

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Schedule of Changes of Assumptions

In conformity with paragraph 33a of Statement 68, the effects of changes of assumptions should be recognized in pension expense, beginning in the current reporting period, using a systematic and rational method over a closed period equal to the average of the remaining service lives of all employees that are provided with pensions through the pension plan (active and inactive employees), determined as of the beginning of the measurement period. The following table illustrates the application of this requirement.

Increase (Decrease) in Pension Expense Arising from the Effects of Changes of Assumptions																			
Year	Changes of Assumptions	Recognition Period (Years)	Prior	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Thereafter
Prior	\$ -	-																	-
2011	-	-																	-
2012	-	-																	-
2013	-	-																	-
2014	6,693,190	3,711,956					\$ 1,803,144	1,803,144	1,803,144	1,283,758									
2015	8,277,173	3,378,746						\$ 2,449,777	2,449,777	2,449,777	927,842								
2016	27,065,406	3,180,437							\$ 8,509,965	8,509,965	8,509,965	1,535,511							
2017	(15,608,155)	2,882,103								\$ (5,415,544)	(5,415,544)	(4,777,067)							
2018	(1,797,321)	2,606,381									\$ (689,585)	(689,585)	(418,151)						
2019	21,564,458	2,000,000										\$ 10,782,229	10,782,229						
2020	13,305,537	2,000,000											\$ 6,652,769	6,652,768					
Net increase (decrease) in pension expense													\$ 17,016,847	\$ 6,652,768	\$ -	\$ -	\$ -	\$ -	\$ -

Deferred Outflows of Resources and Deferred Inflows of Resources Arising from Changes of Assumptions

Year	Increases in the Total Pension Liability (a)	Decreases in the Total Pension Liability (b)	Amounts Recognized in Pension Expense Through June 30, 2020 (c)	Balances at June 30, 2020	
				Deferred Outflows of Resources (a) - (c)	Deferred Inflows of Resources (b) - (c)
Prior	\$ -	\$ -	\$ -	\$ -	\$ -
2011	-	-	-	-	-
2012	-	-	-	-	-
2013	-	-	-	-	-
2014	6,693,190	-	6,693,190	-	-
2015	8,277,173	-	8,277,173	-	-
2016	27,065,406	-	27,065,406	-	-
2017	-	15,608,155	15,608,155	-	-
2018	-	1,797,321	1,797,321	-	-
2019	21,564,458	-	21,564,458	-	-
2020	13,305,537	-	6,652,769	6,652,768	-
				\$ 6,652,768	\$ -

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Projection of Pension Plan's Fiduciary Net Position

Fiscal Year	Number (BOY)		Benefit Payment Account						Accumulation Account						Accrued Liability	Unfunded Liability	Funded Ratio	
	Active	Non-Active	Assets (BOY)	Net Benefit Pmts and Expenses	Employer Contributions	Employee Contributions	44.58% of Premium Tax Allocation	Investment Income	Transfer (To)/From Accumulation Account	Assets (BOY)	Net Benefit Pmts and Expenses	Employer Contributions	1.50% of Pay Employee Contributions	55.42% of Premium Tax Allocation				Investment Income
2021	96	247	\$ (618,870)	\$ 8,394,548	\$ 7,137,850	\$ 381,519	\$ 875,179	\$ (27,849)	\$ 646,719	\$ 24,265,886	\$ -	\$ -	\$ 87,977	\$ 1,088,117	\$ 1,118,136	\$ 203,617,092	\$ 177,703,695	13%
2022	86	254	\$ -	\$ 8,736,217	\$ 7,475,517	\$ 363,820	\$ 896,880	\$ -	\$ -	\$ 25,913,397	\$ -	\$ -	\$ 83,904	\$ 1,115,099	\$ 1,192,784	\$ 206,850,074	\$ 178,544,890	14%
2023	79	258	\$ -	\$ 9,145,771	\$ 7,877,057	\$ 346,116	\$ 922,598	\$ -	\$ -	\$ 28,305,184	\$ -	\$ -	\$ 79,809	\$ 1,147,073	\$ 1,301,034	\$ 209,658,212	\$ 178,825,112	15%
2024	70	263	\$ -	\$ 9,504,390	\$ 8,229,628	\$ 325,739	\$ 949,023	\$ -	\$ -	\$ 30,833,100	\$ -	\$ -	\$ 75,111	\$ 1,179,927	\$ 1,415,417	\$ 212,051,199	\$ 178,547,644	16%
2025	63	267	\$ -	\$ 9,851,418	\$ 8,570,532	\$ 304,712	\$ 976,174	\$ -	\$ -	\$ 33,503,555	\$ -	\$ -	\$ 70,258	\$ 1,213,685	\$ 1,536,231	\$ 214,014,827	\$ 177,691,098	17%
2026	56	270	\$ -	\$ 10,237,942	\$ 8,955,822	\$ 278,048	\$ 1,004,072	\$ -	\$ -	\$ 36,323,729	\$ -	\$ -	\$ 64,094	\$ 1,248,371	\$ 1,663,773	\$ 215,439,128	\$ 176,139,161	18%
2027	48	275	\$ -	\$ 10,661,212	\$ 9,365,520	\$ 248,890	\$ 1,046,802	\$ -	\$ -	\$ 39,299,967	\$ -	\$ -	\$ 57,373	\$ 1,301,498	\$ 1,798,737	\$ 216,248,905	\$ 173,791,330	20%
2028	41	278	\$ -	\$ 10,991,044	\$ 9,689,305	\$ 225,125	\$ 1,076,614	\$ -	\$ -	\$ 42,457,575	\$ -	\$ -	\$ 51,902	\$ 1,338,562	\$ 1,941,532	\$ 216,559,546	\$ 170,769,975	21%
2029	35	279	\$ -	\$ 11,279,465	\$ 9,967,973	\$ 204,247	\$ 1,107,245	\$ -	\$ -	\$ 45,789,571	\$ -	\$ -	\$ 47,089	\$ 1,376,646	\$ 2,092,212	\$ 216,409,306	\$ 167,103,788	23%
2030	30	280	\$ -	\$ 11,601,060	\$ 10,282,842	\$ 179,500	\$ 1,138,718	\$ -	\$ -	\$ 49,305,518	\$ -	\$ -	\$ 41,364	\$ 1,415,777	\$ 2,251,173	\$ 215,714,208	\$ 162,700,376	25%
2031	25	281	\$ -	\$ 11,935,186	\$ 10,613,279	\$ 150,850	\$ 1,171,057	\$ -	\$ -	\$ 53,013,832	\$ -	\$ -	\$ 34,758	\$ 1,455,984	\$ 2,418,795	\$ 214,408,036	\$ 157,484,667	27%
2032	20	282	\$ -	\$ 12,249,529	\$ 10,921,011	\$ 124,233	\$ 1,204,285	\$ -	\$ -	\$ 56,923,369	\$ -	\$ -	\$ 28,623	\$ 1,497,297	\$ 2,595,507	\$ 212,502,131	\$ 151,457,335	29%
2033	15	282	\$ -	\$ 12,495,963	\$ 11,139,198	\$ 102,101	\$ 1,254,664	\$ -	\$ -	\$ 61,044,796	\$ -	\$ -	\$ 23,524	\$ 1,559,934	\$ 2,782,252	\$ 210,079,643	\$ 144,669,137	31%
2034	12	281	\$ -	\$ 12,738,122	\$ 11,367,120	\$ 80,801	\$ 1,290,201	\$ -	\$ -	\$ 65,410,506	\$ -	\$ -	\$ 18,604	\$ 1,604,118	\$ 2,979,582	\$ 207,131,175	\$ 137,118,365	34%
2035	9	279	\$ -	\$ 12,924,960	\$ 11,537,338	\$ 60,906	\$ 1,326,716	\$ -	\$ -	\$ 70,012,810	\$ -	\$ -	\$ 14,028	\$ 1,649,517	\$ 3,187,594	\$ 203,702,835	\$ 128,838,886	37%
2036	6	277	\$ -	\$ 13,018,161	\$ 11,605,871	\$ 48,055	\$ 1,364,235	\$ -	\$ -	\$ 74,863,949	\$ -	\$ -	\$ 11,072	\$ 1,696,164	\$ 3,406,868	\$ 199,924,090	\$ 119,946,037	40%
2037	5	273	\$ -	\$ 13,086,601	\$ 11,646,186	\$ 37,630	\$ 1,402,785	\$ -	\$ -	\$ 79,978,053	\$ -	\$ -	\$ 8,663	\$ 1,744,095	\$ 3,638,015	\$ 195,825,932	\$ 110,457,106	44%
2038	3	269	\$ -	\$ 13,108,561	\$ 11,637,605	\$ 28,560	\$ 1,442,396	\$ -	\$ -	\$ 85,368,826	\$ -	\$ -	\$ 6,579	\$ 1,793,343	\$ 3,881,650	\$ 191,452,664	\$ 100,402,266	48%
2039	3	265	\$ -	\$ 13,098,974	\$ 11,593,999	\$ 21,879	\$ 1,483,096	\$ -	\$ -	\$ 91,050,398	\$ -	\$ -	\$ 5,037	\$ 1,843,946	\$ 4,138,412	\$ 186,842,621	\$ 89,804,828	52%
2040	2	260	\$ -	\$ 13,076,885	\$ 11,466,789	\$ 14,825	\$ 1,595,271	\$ -	\$ -	\$ 97,037,793	\$ -	\$ -	\$ 3,411	\$ 1,983,414	\$ 4,410,912	\$ 181,997,185	\$ 78,561,655	57%
2041	1	255	\$ -	\$ 13,012,540	\$ 11,362,854	\$ 9,535	\$ 1,640,151	\$ -	\$ -	\$ 103,435,530	\$ -	\$ -	\$ 2,195	\$ 2,039,212	\$ 4,700,025	\$ 176,962,075	\$ 66,785,113	62%
2042	1	249	\$ -	\$ 12,911,431	\$ 11,218,834	\$ 6,333	\$ 1,686,264	\$ -	\$ -	\$ 110,176,962	\$ -	\$ -	\$ 1,457	\$ 2,096,546	\$ 5,004,649	\$ 171,781,250	\$ 54,501,636	68%
2043	0	244	\$ -	\$ 12,785,032	\$ 10,980,981	\$ 4,169	\$ 1,799,882	\$ -	\$ -	\$ 117,279,614	\$ -	\$ -	\$ 960	\$ 2,237,808	\$ 5,327,401	\$ 166,481,267	\$ 41,635,484	75%
2044	0	238	\$ -	\$ 12,641,079	\$ 10,788,331	\$ 2,396	\$ 1,850,352	\$ -	\$ -	\$ 124,845,783	\$ -	\$ -	\$ 551	\$ 2,300,558	\$ 5,669,265	\$ 161,077,544	\$ 28,261,387	82%
2045	0	232	\$ -	\$ 12,474,143	\$ 10,570,388	\$ 1,545	\$ 1,902,210	\$ -	\$ -	\$ 132,816,157	\$ -	\$ -	\$ 356	\$ 2,365,033	\$ 6,029,363	\$ 155,595,554	\$ 14,384,645	91%
2046	0	225	\$ -	\$ 12,290,838	\$ 10,334,282	\$ 1,056	\$ 1,955,494	\$ -	\$ 6	\$ 141,210,909	\$ -	\$ -	\$ 243	\$ 2,431,282	\$ 6,408,598	\$ 150,051,026	\$ -	100%
2047	0	219	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 150,051,026	\$ 12,095,936	\$ 13,422	\$ 624	\$ -	\$ 6,483,445	\$ 144,452,581	\$ -	100%
2048	0	213	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 144,452,581	\$ 11,884,733	\$ 12,586	\$ 418	\$ -	\$ 6,236,191	\$ 138,817,043	\$ -	100%
2049	0	206	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 138,817,043	\$ 11,662,121	\$ 11,453	\$ 160	\$ -	\$ 5,987,515	\$ 133,154,050	\$ -	100%
2050	0	199	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 133,154,050	\$ 11,426,721	\$ 10,745	\$ -	\$ -	\$ 5,737,899	\$ 127,475,973	\$ -	100%
2051	0	193	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 127,475,973	\$ 11,178,339	\$ 10,708	\$ -	\$ -	\$ 5,487,912	\$ 121,796,254	\$ -	100%
2052	0	186	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 121,796,254	\$ 10,918,686	\$ 10,603	\$ -	\$ -	\$ 5,238,100	\$ 116,126,271	\$ -	100%
2053	0	179	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 116,126,271	\$ 10,647,962	\$ 10,485	\$ -	\$ -	\$ 4,988,973	\$ 110,477,767	\$ -	100%
2054	0	172	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 110,477,767	\$ 10,366,502	\$ 10,352	\$ -	\$ -	\$ 4,741,050	\$ 104,862,667	\$ -	100%
2055	0	166	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 104,862,667	\$ 10,074,521	\$ 10,266	\$ -	\$ -	\$ 4,494,866	\$ 99,293,278	\$ -	100%
2056	0	159	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 99,293,278	\$ 9,772,066	\$ 10,104	\$ -	\$ -	\$ 4,250,970	\$ 93,782,286	\$ -	100%
2057	0	152	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 93,782,286	\$ 9,459,439	\$ 9,925	\$ -	\$ -	\$ 4,009,928	\$ 88,342,700	\$ -	100%
2058	0	145	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 88,342,700	\$ 9,136,963	\$ 9,728	\$ -	\$ -	\$ 3,772,318	\$ 82,987,783	\$ -	100%
2059	0	138	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 82,987,783	\$ 8,804,974	\$ 9,513	\$ -	\$ -	\$ 3,538,730	\$ 77,731,052	\$ -	100%
2060	0	131	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 77,731,052	\$ 8,463,858	\$ 9,279	\$ -	\$ -	\$ 3,309,763	\$ 72,586,236	\$ -	100%

City of Charleston, West Virginia Firemen's Pension and Relief Fund
 Actuarial Information to Include in the Financial Statements
 for the June 30, 2020 Measurement Date



Projection of Pension Plan's Fiduciary Net Position

Fiscal Year	Projected BP	"Funded" Portion of BP	"Unfunded" Portion of BP	PV of "Funded" Portion of BP	PV of "Unfunded" Portion of BP	PV of BP Using a Single DR
2020	\$ 7,948,122	\$ -	\$ 7,948,122	\$ -	\$ 7,852,511	\$ 7,818,677
2021	\$ 8,386,115	\$ -	\$ 8,386,115	\$ -	\$ 8,087,101	\$ 7,983,017
2022	\$ 8,727,628	\$ -	\$ 8,727,628	\$ -	\$ 8,215,166	\$ 8,039,702
2023	\$ 9,137,024	\$ -	\$ 9,137,024	\$ -	\$ 8,394,849	\$ 8,144,904
2024	\$ 9,495,509	\$ -	\$ 9,495,509	\$ -	\$ 8,515,584	\$ 8,191,000
2025	\$ 9,842,375	\$ -	\$ 9,842,375	\$ -	\$ 8,615,572	\$ 8,215,917
2026	\$ 10,228,763	\$ -	\$ 10,228,763	\$ -	\$ 8,739,677	\$ 8,262,600
2027	\$ 10,651,867	\$ -	\$ 10,651,867	\$ -	\$ 8,883,539	\$ 8,326,392
2028	\$ 10,981,561	\$ -	\$ 10,981,561	\$ -	\$ 8,939,483	\$ 8,306,779
2029	\$ 11,269,874	\$ -	\$ 11,269,874	\$ -	\$ 8,954,790	\$ 8,249,453
2030	\$ 11,591,331	\$ -	\$ 11,591,331	\$ -	\$ 8,989,959	\$ 8,210,637
2031	\$ 11,925,318	\$ -	\$ 11,925,318	\$ -	\$ 9,027,810	\$ 8,174,308
2032	\$ 12,239,522	\$ -	\$ 12,239,522	\$ -	\$ 9,044,091	\$ 8,118,634
2033	\$ 12,485,851	\$ -	\$ 12,485,851	\$ -	\$ 9,005,476	\$ 8,014,458
2034	\$ 12,727,872	\$ -	\$ 12,727,872	\$ -	\$ 8,960,502	\$ 7,905,863
2035	\$ 12,914,608	\$ -	\$ 12,914,608	\$ -	\$ 8,874,539	\$ 7,762,689
2036	\$ 13,007,709	\$ -	\$ 13,007,709	\$ -	\$ 8,724,759	\$ 7,566,051
2037	\$ 13,076,051	\$ -	\$ 13,076,051	\$ -	\$ 8,560,857	\$ 7,360,080
2038	\$ 13,097,955	\$ -	\$ 13,097,955	\$ -	\$ 8,370,130	\$ 7,134,226
2039	\$ 13,088,237	\$ -	\$ 13,088,237	\$ -	\$ 8,163,904	\$ 6,898,617
2040	\$ 13,066,100	\$ -	\$ 13,066,100	\$ -	\$ 7,955,193	\$ 6,664,450
2041	\$ 13,001,712	\$ -	\$ 13,001,712	\$ -	\$ 7,726,687	\$ 6,417,360
2042	\$ 12,900,566	\$ -	\$ 12,900,566	\$ -	\$ 7,483,239	\$ 6,161,722
2043	\$ 12,774,136	\$ -	\$ 12,774,136	\$ -	\$ 7,232,699	\$ 5,904,217
2044	\$ 12,630,159	\$ -	\$ 12,630,159	\$ -	\$ 6,980,166	\$ 5,649,072
2045	\$ 12,463,206	\$ -	\$ 12,463,206	\$ -	\$ 6,723,180	\$ 5,394,305
2046	\$ 12,279,939	\$ -	\$ 12,279,939	\$ -	\$ 6,465,903	\$ 5,143,271
2047	\$ 12,085,036	\$ 12,085,036	\$ -	\$ 3,602,052	\$ -	\$ 4,898,111
2048	\$ 11,873,840	\$ 11,873,840	\$ -	\$ 3,386,701	\$ -	\$ 4,657,034
2049	\$ 11,651,296	\$ 11,651,296	\$ -	\$ 3,180,121	\$ -	\$ 4,422,114
2050	\$ 11,415,976	\$ 11,415,976	\$ -	\$ 2,981,715	\$ -	\$ 4,192,820
2051	\$ 11,167,631	\$ 11,167,631	\$ -	\$ 2,791,245	\$ -	\$ 3,969,097
2052	\$ 10,908,083	\$ 10,908,083	\$ -	\$ 2,608,969	\$ -	\$ 3,751,600
2053	\$ 10,637,477	\$ 10,637,477	\$ -	\$ 2,434,686	\$ -	\$ 3,540,334
2054	\$ 10,356,150	\$ 10,356,150	\$ -	\$ 2,268,226	\$ -	\$ 3,335,350
2055	\$ 10,064,255	\$ 10,064,255	\$ -	\$ 2,109,373	\$ -	\$ 3,136,622
2056	\$ 9,761,962	\$ 9,761,962	\$ -	\$ 1,957,909	\$ -	\$ 2,944,118
2057	\$ 9,449,514	\$ 9,449,514	\$ -	\$ 1,813,630	\$ -	\$ 2,757,814
2058	\$ 9,127,235	\$ 9,127,235	\$ -	\$ 1,676,340	\$ -	\$ 2,577,699
2059	\$ 8,795,461	\$ 8,795,461	\$ -	\$ 1,545,842	\$ -	\$ 2,403,749
2060	\$ 8,454,579	\$ 8,454,579	\$ -	\$ 1,421,943	\$ -	\$ 2,235,939