



Cavanaugh Macdonald
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**Report of the Actuary on the Annual Valuation
of the Charlotte Firefighters' Retirement System**

Prepared as of July 1, 2020





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

October 22, 2020

Board of Trustees
Charlotte Firefighters' Retirement System
428 East Fourth Street
Suite 205
Charlotte, NC 28202

Dear Members of the Board:

We are pleased to submit herewith the results of the annual actuarial valuation of the City of Charlotte Firefighters' Retirement System prepared as of July 1, 2020. The purpose of this report is to provide a summary of the funded status of the System as of July 1, 2020 and to recommend rates of contribution. In performing the valuation, we relied on data provided by the System. While not verifying the data at source, the actuary performed tests for consistency and reasonability.

The asset values used to determine unfunded liabilities are not market values but less volatile market related values. A smoothing technique is applied to market values to determine the market related values. The unfunded liability amounts using the market value of assets would be different. The interest rate used for determining liabilities is based on the expected return on assets. Therefore, liability amounts in the report cannot be used to assess a settlement of the obligation.

The promised benefits of the System are included in the actuarially calculated contribution rates which are developed using the entry age cost method. A five-year smoothed market value of plan assets was used for the actuarial value of assets. Consistent with the Board's funding policy, gains and losses are reflected in the unfunded accrued liability that is being amortized by regular annual contributions as a level percentage of payroll, on the assumption that payroll will increase by 2.50% annually. The actuarially determined employer contribution rate based upon the Board's adopted funding policy is 28.91% of payroll for the fiscal year ending June 30, 2022. It is important to note that the employer statutory contribution rate is equal to 12.65% leaving a contribution shortfall of 16.26% of payroll.

The plan's unfunded liability was projected to be \$123,176,239 as of June 30, 2020. The actual unfunded liability is \$178,523,381. The increase of \$55,347,142 in the unfunded liability is due to four sources. The first is a demographic assumption loss of \$2,865,043. The second is an increase of \$7,337,682 due to higher than anticipated salary increases. The third is an increase of \$9,695,554 due to an investment loss. The final factor was an increase of \$35,448,863 due to assumption changes related to revised economic and demographic assumptions.

Since the previous valuation various economic and demographic assumptions have been revised to reflect the results of the experience investigation for the five-year period ending June 30, 2019. These revised assumptions were adopted by the Board on May 28, 2020.

Separate reports will be issued to provide the disclosure information required under GASB Statements No. 67 and 68.



We have prepared the Schedule of Active Member Valuation Data, Schedule of Retired Members and Beneficiaries Added to and Removed from Rolls, the Solvency Test and the Analysis of Financial Experience for the actuarial section of the Annual Report and the Schedule of Funding Progress and Trend Information for the financial section of the Annual Report.

In order to prepare the results in this report we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

We note that as we are preparing this report, the world is amid a pandemic. We have considered available information, but do not believe that there is yet sufficient data to warrant the modification of any of our assumptions. We will continue to monitor the situation and advise the Board in the future of any adjustments that we believe would be appropriate.

This is to certify that the independent consulting actuary is a Member of the American Academy of Actuaries and has experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the System and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

Future actuarial results may differ significantly from the current results 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. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

We trust that the report will meet the approval of the Board and will furnish the desired information concerning the financial condition of the System.

Respectfully submitted,

A handwritten signature in blue ink that reads 'Todd B. Green' followed by a horizontal flourish.

Todd B. Green, ASA, FCA, MAAA
President

A handwritten signature in blue ink that reads 'Cathy Turcot'.

Cathy Turcot
Principal and Managing Director



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**CHARLOTTE FIREFIGHTERS' RETIREMENT SYSTEM
REPORT OF THE ACTUARY
ON THE ANNUAL VALUATION
PREPARED AS OF JULY 1, 2020**

SECTION I – SUMMARY OF PRINCIPAL RESULTS

1. For convenience of reference, the principal results of the current and preceding valuations are summarized below.

Valuation Date	July 1, 2020	July 1, 2019
Active members:		
Number	1,067	1,047
Annualized compensation	\$82,532,520	\$77,040,854
Retired members and beneficiaries:		
Number	765	750
Annual allowances	\$39,098,752	\$37,719,709
Number of terminated vested members*	16	15
Assets:		
Market Value	\$558,040,204	\$558,868,579
Actuarial Value	580,144,234	566,041,931
Unfunded actuarial accrued liability	\$178,523,381	\$118,345,234
Funded Ratio	76.5%	82.7%
Fiscal Year Ending	June 30, 2022	June 30, 2021
City actuarially determined employer contribution rate (ADEC):		
Normal (including expenses of 0.75%)	13.87%	11.41%
Accrued liability	<u>15.04</u>	<u>9.63</u>
Total	28.91%	21.04%
Employer Statutory contribution rate	12.65%	12.65%
Member contribution rate	12.65%	12.65%

2. The major benefit and contribution provisions of the System as reflected in the valuation are summarized in Schedule G. There have been no changes since the previous valuation.
3. Schedule E of this report outlines the full set of actuarial assumptions and methods used in the valuation. Since the previous valuation various economic and demographic assumptions have



been revised to reflect the results of the experience investigation for the five-year period ending June 30, 2019. These revised assumptions were adopted by the Board on May 28, 2020 and are summarized in the table below.

Summary of Revised Assumptions	
Economic Assumptions	
Salary	Composed of Price Inflation component, Wage Inflation component and Merit/Promotion Scale
Price Inflation	Changed annual rate of inflation assumption from 3.00% to 2.50%.
Wage Inflation	Changed current annual rate of wage inflation assumption from 0.75% to 1.25%
Merit/Promotion Scale	No change.
Investment Rate of Return	Composed of Inflation component (2.50% from above) and Real Rate of Return component.
Real Rate of Investment Return	Changed to 4.75%, resulting in a reduction from 7.50% to 7.25% net investment return assumption.
Payroll Growth	Changed from 3.00% to 2.50%.
Demographic Assumptions	
Withdrawal	Changed current assumption.
Retirement	Changed current assumption.
Base Mortality	Healthy Retiree – Pub-2010 Safety Retiree Headcount-Weighted Below Median Mortality Table adjusted by 87.5% for males Disabled – Pub-2010 Safety Disabled Retiree Headcount-Weighted Mortality Table Actives – Pub-2010 Safety Employee Headcount-Weighted Mortality Table
Mortality Projection	Mortality rates are projected using generational improvement with Scale MP-2019
Disability	No change
Unused Sick Leave	No change
Unused Annual Leave	Increased the assumed additional service at retirement from $\frac{2}{3}$ year to 1 year
Marriage Assumption	No change
Actuarial Method	
Amortization Method	Changed to layered closed amortization approach
All others	No change

4. The entry age actuarial cost method was used to prepare the valuation. Schedule F contains a brief description of the actuarial cost method.
5. Comments on the valuation results as of July 1, 2020 are given in Section IV and further discussion of the contributions is set out in Section V.



SECTION II – MEMBERSHIP DATA

1. Data regarding the membership of the System for use as a basis of the valuation were furnished by the City. The valuation included 1,067 active members with annualized compensation totaling \$82,532,520.
2. The following table shows the number of retired members and beneficiaries as of July 1, 2020 together with the amount of their annual retirement benefits payable under the System as of that date.

**THE NUMBER AND ANNUAL BENEFITS OF
RETIRED MEMBERS AND BENEFICIARIES
AS OF JULY 1, 2020**

GROUP	NUMBER*	ANNUAL RETIREMENT BENEFITS
Service Retirements	677	\$37,102,921
Disability Retirements	38	998,093
Beneficiaries of Deceased Members	<u>50</u>	<u>997,738</u>
Total	765	<u>\$39,098,752</u>

*In addition, there are 16 terminated members entitled to deferred vested benefits.



3. Table 1 of Schedule H shows the distribution by age and years of membership service of the number of active members included in the valuation, while Table 2 shows the number and annual benefits of retired members and beneficiaries included in the valuation, distributed by age. Table 3 shows the schedule of active member valuation data and Table 4 shows the schedule of retired members and beneficiaries added to and removed from the rolls.

SECTION III – ASSETS

As of July 1, 2020, the total market value of assets amounted to \$558,040,204. The actuarial value of assets used for the current valuation was \$580,144,234. Schedule C shows the development of the actuarial value of assets as of July 1, 2020. Schedule D shows the allocation of the System's assets and the market value of assets for three years.

SECTION IV – COMMENTS ON VALUATION

1. Schedule B of this report contains the valuation balance sheet which shows the present and prospective assets and liabilities of the System as of July 1, 2020. The valuation was prepared in accordance with the actuarial assumptions set forth in Schedule E and the actuarial cost method which is described in Schedule F.
2. The valuation balance sheet shows that the System has total prospective liabilities of \$978,285,538 of which \$408,800,644 is for the prospective benefits payable on account of present retired members, beneficiaries of deceased members, and terminated members entitled to deferred benefits, and \$569,484,894 is for the prospective benefits payable on account of present active members. Against these liabilities, the System has a total present actuarial value of assets of \$580,144,234 as of July 1, 2020. The difference of \$398,141,304 between the total liabilities and the total present assets represents the present value of future contributions.
3. The contributions to the System consist of normal contributions and accrued liability contributions. The valuation indicates that normal contributions at the rate of 25.77% of payroll are required under the entry age method. Of this amount, 12.65% is paid by the members and the remaining 13.12% is required by the City.



4. Prospective normal contributions at the rate of 25.77% have a present value of \$219,617,923. When this amount is subtracted from \$398,141,304, which is the present value of the total future contributions to be made, there remains \$178,523,381 as the amount of unfunded accrued liability contributions. The development of the unfunded accrued liability is shown in Schedule A.

SECTION V – CONTRIBUTIONS PAYABLE

1. The contributions consist of a normal contribution and an accrued liability contribution as determined by actuarial valuation.
2. The normal contribution rate is calculated as the level percentage of payroll which, if applied for the average member during the entire period of his anticipated covered service, would be required to meet the cost of all benefits payable on his behalf. On the basis of the valuation, the normal contribution rate was determined to be 25.77%.
3. Section 24 of Title V of the Charlotte Firefighters' Retirement System Act states that each member shall contribute an amount equal to the Member's Compensation multiplied by 12.65%.
4. The City normal contribution rate is equal to the difference between the normal contribution rate of 25.77% and the member contribution rate of 12.65%, or 13.12% of payroll. An additional 0.75% is required for expenses, making the total City normal rate 13.87% of payroll.
5. Section 25 of Title V of the Charlotte Firefighters' Retirement System Act states that the City of Charlotte shall contribute an amount equal to the Member's Compensation multiplied by 12.65%. These contributions are not sufficient to fund the system in an actuarially sound manner.
6. As part of the experience investigation performed as of June 30, 2019, the Board adopted a closed layered amortization method for the UAL. This method provides that the UAL as of June 30, 2019 (Transitional UAL) will be amortized as a level percent of payroll over a closed 30-year period. In each subsequent valuation, additional increases or decreases in the UAL will determine a New Incremental UAL. Each New Incremental UAL will be amortized as a level percent of payroll over a separate closed period from the valuation date it is measured according to the following:



- Experience gains and losses amortized over a closed 15-year period,
- Changes to assumptions and methods amortized over a closed 30-year period,
- Plan changes/benefit improvements amortized over a closed 20-year period, and
- Exceptional plan changes/benefit improvements amortized over a closed 5-year period.

Total payroll is assumed to grow 2.50% annually. For the ten-year period ended July 1, 2020, payroll has grown by 3.40%. On this basis, we have determined the accrued liability contribution rate to be 15.04% of payroll. Schedule I of this report shows amortization schedules for all bases as of July 1, 2020.

- The employer statutory contribution rate is equal to 12.65% which is not sufficient to fund the System within the parameters defined by the Board adopted funding policy.
- The following table shows the components of the total UAAL and the derivation of the UAAL contribution rate:

TOTAL UAAL AND UAAL CONTRIBUTION RATE

	Remaining Balance UAAL	Remaining Amortization Period	Amortization Payment
Transitional	\$119,852,750	29	\$7,259,776
New Incremental 7/1/2020-Experience	\$23,221,768	15	\$2,085,605
New Incremental 7/1/2020-Assumptions	<u>\$35,448,863</u>	30	<u>\$2,112,821</u>
Total	\$178,523,381		\$11,458,203
Total Amortization Payment Adjusted for Timing			\$12,726,602
Projected Payroll			\$84,595,833
UAAL Contribution Rate			15.04%



8. Therefore the total actuarially determined employer contribution (ADEC) rate beginning July 1, 2021 is 28.91% of payroll. The following table summarizes the employer contributions which were determined by the July 1, 2020 valuation and are recommended for use.

**CITY ACTUARIALLY DETERMINED EMPLOYER CONTRIBUTIONS (ADEC)
FOR FISCAL YEAR ENDING JUNE 30, 2022**

CONTRIBUTION	PERCENTAGE OF ACTIVE MEMBERS' COMPENSATION
Normal (including expenses of 0.75%)	13.87%
Accrued Liability	<u>15.04</u>
Total	28.91%
Statutory Employer Contribution	12.65%
Contribution Shortfall	16.26%



SECTION VI – ACCOUNTING INFORMATION

The information required under the Governmental Accounting Standards Board (GASB) Statements No. 67 and 68 for the Plan and the City will be issued in separate reports. We are providing the following information for the informational purposes only.

- The following is a distribution of the number of employees by type of membership:

**NUMBER OF ACTIVE AND RETIRED PARTICIPANTS
AS OF JULY 1, 2020**

GROUP	NUMBER
Retired participants and beneficiaries currently receiving benefits	765
Terminated participants and beneficiaries entitled to benefits but not yet receiving benefits	16
Active Participants	<u>1,067</u>
Total	1,848

- The schedule of funding progress is shown below.

SCHEDULE OF FUNDING PROGRESS
(dollar amounts in thousands)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll ((b - a) / c)
7/01/2015	\$467,545	\$504,486	\$36,941	92.7%	\$65,821	56.1%
7/01/2016 ¹	490,864	564,546	73,682	86.9	66,797	110.3
7/01/2017	520,579	604,169	83,590	86.2	70,610	118.4
7/01/2018	548,685	626,518	77,834	87.6	71,781	108.4
7/01/2019	566,042	684,387	118,345	82.7	77,041	153.6
7/01/2020 ¹	580,144	758,667	178,523	76.5	82,533	216.3

¹Economic and demographic assumptions were changed due to an experience review.



3. Additional information as of July 1, 2020 follows:

Valuation date	7/01/2020
Actuarial cost method	Entry age
Amortization period	Level Percent of Pay, Closed
Remaining amortization period	15 – 30 years
Asset valuation method	Five-year smoothed market value
Actuarial assumptions:	
Investment rate of return (includes inflation)	7.25%
Projected salary increases (includes inflation)	3.75 – 9.00%
Inflation	2.50%
Cost-of-living adjustments	None



SECTION VII – EXPERIENCE

1. As an aid to the Board in adopting service and mortality tables, we have prepared an experience investigation for the five-year period ending June 30, 2019. The valuation was based on the assumptions adopted by the Board at the May 28, 2020 Board meeting as a result of that investigation.
2. The following tables show the estimated change in the unfunded accrued liability from various factors that resulted in an increase of \$60,178,147 in the unfunded accrued liability from \$118,345,234 to \$178,523,381 during the fiscal year ending June 30, 2020.

ANALYSIS OF FINANCIAL EXPERIENCE – RECONCILIATION OF UNFUNDED ACCRUED LIABILITY

1. Unfunded Accrued Liability June 30, 2019	\$118,345,234
2. Normal Cost (including Expenses)	17,682,198
3. Actual Contributions	22,220,000
4. Interest [(1 + 2) x 7.50% - (3 x 7.50% x 0.5)]	<u>9,368,807</u>
5. Expected Unfunded Accrued Liability June 30, 2020 [1 + 2 - 3 + 4]	\$123,176,239
6. Actual Unfunded Accrued Liability June 30, 2020	\$178,523,381
7. (Gain)/Loss [6 - 5]	\$55,347,142

ANALYSIS OF FINANCIAL EXPERIENCE – (GAINS)/LOSSES BY SOURCE

Recognized Asset (Gain)/Loss	\$9,695,554
Liability (Gain)/Loss	2,865,043
Salary Increases	7,337,682
Amendments (COLA)	0
Assumption and Method Changes*	<u>35,448,863</u>
Total (Gain)/Loss	\$55,347,142

*Impact of new assumptions adopted as a result of the experience investigation as of June 30, 2019



SECTION VIII – RISK

1. Measuring pension obligations and actuarially determined contributions requires the use of assumptions regarding future economic and demographic experience. Whenever assumptions are made about future events, there is risk that actual experience will differ from expected. Actuarial valuations include the risk that actual future measurements will deviate from expected future measurements due to actual experience that is different than the actuarial assumptions.
2. The primary areas of risk in this actuarial valuation are:
 - Investment Risk – the potential that investment returns will be different than expected.
 - Longevity and Other Demographic Risks – the potential that mortality or other demographic experience will be different than expected.
 - Interest Rate Risk – To the extent market rates of interest affect the expected return on assets, there is a risk of change to the discount rate which determines the present value of liabilities and actuarial valuation results.
 - Contribution Risk – The potential that actual contributions are different than the actuarially determined contributions.
3. Annual actuarial valuations are performed for CFRS which re-measure the assets and liabilities and compute a new actuarially determined contribution. CFRS also has experience studies performed every five years to analyze the discrepancies between actuarial assumptions and actual experience and determine if the actuarial assumptions need to be changed. Annual actuarial valuations and periodic experience studies are practical ways to monitor and reassess risk.



SCHEDULE A

**DEVELOPMENT OF THE UNFUNDED ACTUARIAL ACCRUED LIABILITY
AS OF JULY 1, 2020**

(1)	Present value of prospective benefits:	
(a)	Present active members	\$569,484,894
(b)	Present retired members, beneficiaries and former members entitled to deferred vested benefits	<u>408,800,644</u>
(c)	Subtotal	978,285,538
(2)	Present value of future System and member normal contributions before expenses	<u>219,617,923</u>
(3)	Actuarial accrued liabilities 1(c) – (2)	758,667,615
(4)	Actuarial value of assets	<u>580,144,234</u>
(5)	Unfunded actuarial accrued liability (3) – (4)	\$ 178,523,381



SCHEDULE B

VALUATION BALANCE SHEET

The present and prospective assets and liabilities of the System as of July 1, 2020:

<u>ACTUARIAL LIABILITIES</u>		
Present value of prospective benefits payable on account of present retired members, beneficiaries of deceased members, and terminated members entitled to deferred benefits		\$408,800,644
Present value of prospective benefits payable on account of present active members		<u>569,484,894</u>
Total liabilities		<u>\$978,285,538</u>
<u>PRESENT AND PROSPECTIVE ASSETS</u>		
Actuarial value of assets		\$580,144,234
Present value of future contributions		
City and member normal contributions	\$219,617,923	
Unfunded accrued liability contributions	<u>178,523,381</u>	
Total prospective contributions		<u>398,141,304</u>
Total assets		<u>\$978,285,538</u>



SOLVENCY TEST
(dollar amounts in millions)

Valuation Date	Aggregate Accrued Liabilities For			Reported Assets	Portion of Accrued Liabilities Covered by Reported Assets		
	(1) Active Member Contributions	(2) Retirees and Beneficiaries	(3) Active Members (Employer Financed Portion)		(1)	(2)	(3)
7/1/20 ²	\$97.8	\$408.8	\$252.1	\$580.1	100%	100%	29.2%
7/1/19	92.7	384.3	207.4	566.0	100	100	42.9
7/1/18	94.9	340.1	191.6	548.7	100	100	59.3
7/1/17	92.8	328.2	183.2	520.6	100	100	54.4
7/1/16 ¹	92.2	297.9	174.4	490.9	100	100	57.8
7/1/15	89.8	261.1	153.6	467.5	100	100	75.9
7/1/14	89.6	235.5	153.1	425.2	100	100	65.4
7/1/13	87.7	216.9	147.0	381.3	100	100	52.2
7/1/13	84.8	202.8	144.3	367.2	100	100	55.2
7/1/11	77.9	191.7	139.3	366.1	100	100	69.3

¹Economic and demographic assumptions were changed as of July 1, 2016 due to an experience review.

²Economic and demographic assumptions were changed as of July 1, 2020 due to an experience review.



SCHEDULE C

DEVELOPMENT OF THE ACTUARIAL VALUE OF ASSETS

(1)	Actuarial Value of Assets as of July 1, 2019	\$566,041,931
(2)	Market Value of Assets as of July 1, 2020	558,040,204
(3)	Market Value of Assets as of July 1, 2019	558,868,579
(4)	Net Cash Flow During Plan Year	
	(a) Contributions	22,220,000
	(b) Benefit Payments and Administrative Expenses	<u>40,201,000</u>
	(c) Net Cash Flow (a) – (b)	(17,981,000)
(5)	Investment Return (2) – (3) – (4c)	17,152,625
(6)	Expected Investment Return [(3) x 7.50%] + [(4)c x 7.50% x 0.5]	41,240,856
(7)	Investment Gain/(Loss) for Phased-In Recognition (5) – (6)	(24,088,231)
(8)	Recognized Amounts for Plan Year	
	(a) Current Year 0.20 x (7)	(4,817,646)
	(b) First Prior Year	(3,582,883)
	(c) Second Prior Year	1,705,348
	(d) Third Prior Year	4,504,501
	(e) Fourth Prior Year	<u>(6,966,873)</u>
	(f) Total Recognized Investment Gain/(Loss)	(9,157,553)
(9)	Actuarial Value of Assets as of July 1, 2020 (1) + (4)(c) + (6) + (8)(f)	<u>\$580,144,234</u>
(10)	Rate of Return on Actuarial Value	5.76%
(11)	Rate of Return on Market Value	3.12%



SCHEDULE D

ASSET INFORMATION

Reconciliation of Market value of Assets
(In Thousands)

	<u>Years Ended June 30</u>	
	<u>2020</u>	<u>2019</u>
Market Value of Assets - Beginning of Year	<u>\$558,868</u>	<u>\$551,892</u>
ADDITIONS:		
Contributions:		
Member	10,770	10,610
Employer	11,450	10,193
Total Contributions	<u>22,220</u>	<u>20,803</u>
Investment Income (loss):		
Net Appreciation (depreciation) in fair value of investments	13,084	19,113
Interest	2,789	2,721
Dividends	4,259	3,961
Other	0	5
Total Investment Income	<u>20,132</u>	<u>25,800</u>
Less Investment Expense	<u>2,916</u>	<u>2,870</u>
Net Investment Income (loss)	<u>17,216</u>	<u>22,930</u>
Total Additions	<u>39,436</u>	<u>43,733</u>
DEDUCTIONS:		
Benefits	38,642	35,709
Refunds	887	416
Administration	672	583
Depreciation	63	49
Total Deductions	<u>40,264</u>	<u>36,757</u>
Change in Net Assets	(828)	6,976
Market Value of Assets - End of Year	<u><u>\$558,040</u></u>	<u><u>\$558,868</u></u>

Allocation of Market Value of Assets

	June 30, 2020	June 30, 2019	June 30, 2018
Cash	\$ 143,071	\$ 127,164	\$ 136,298
Cash Equivalents	7,773,555	6,837,223	6,438,484
Fixed Income Investments	94,428,701	91,348,222	84,689,622
Equity Investments	454,940,382	459,939,506	460,097,119
Other	267,585	293,025	266,832
Accrued Income	608,845	666,578	575,010
Accrued Contributions	654,804	374,442	358,535
Accrued Liabilities/Expenses	(776,740)	(717,581)	(669,405)
Total Market Value	<u><u>\$ 558,040,204</u></u>	<u><u>\$ 558,868,579</u></u>	<u><u>\$ 551,892,495</u></u>



SCHEDULE E

OUTLINE OF ACTUARIAL ASSUMPTIONS AND METHODS

The assumptions and methods used in the valuation were selected by the Actuary and adopted by the Board June 1, 2020.

INVESTMENT RATE OF RETURN: 7.25% per year, compounded annually, including 2.50% inflation.

SALARY INCREASES: Representative values of the assumed annual rates of salary increases are as follows:

<u>Years of Service</u>	<u>Rate*</u>
≤ 5	9.00%
6	7.25
7	7.00
8	6.50
9	5.50
10 - 14	4.75
15	4.25
16+	3.75

*Includes price inflation of 2.50% and wage inflation component of 1.25%

SEPARATIONS FROM ACTIVE SERVICE: For death rates, the Pub-2010 Safety Employee Headcount-Weighted Mortality Table projected generationally with projection Scale MP-2019 was used. Representative values of the assumed annual rates of separation from active service are as follows:

<u>Years of Service</u>	<u>Annual Rate of</u>		
	<u>Withdrawal</u>	<u>Age</u>	<u>Disability*</u>
0-5	1.40%	20	0.04%
6-10	0.80	25	0.04
11-15	0.60	30	0.06
16-25	0.30	35	0.16
26+	0.00	40	0.29
		45	0.43
		50	0.70
		55	1.00

*65% of the disabilities are assumed to be in the line of duty.



Annual Rate of Retirement

Age	Age 60 with 5 Years but with less than 25 Years of Service	25 Years of Service*	26-29 Years of Service	30 Years of Service
< 50		7%		50%
50		45	35%	50
51 – 59		45	35	50
60 – 64	45%	45	45	50
65	100	100	100	100

DEATHS AFTER RETIREMENT: The Pub-2010 Safety Retiree Headcount-Weighted Below Median Mortality Table adjusted by 87.5% for males projected generationally with Scale MP-2019 is used for the period after service retirement. The Pub-2010 Safety Disabled Retiree Headcount-Weighted Mortality Table projected generationally with Scale MP-2019 is used for the period after disability retirement.

EXPENSES: 0.75% of payroll.

PERCENT MARRIED: 100% of active members are assumed to be married with the male three years older than his spouse.

ASSETS: Actuarial value, as developed in Schedule B. The actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected actuarial value of assets, based on the assumed valuation rate of return. The amount recognized each year is 20% of the difference between market value and expected actuarial value.

VALUATION METHOD: Entry age actuarial cost method. See Schedule F for a brief description of this method.

UNUSED SICK AND VACATION DAYS: 17.3% load on Final Average Salary at Retirement for cashed-in vacation and sick days. In addition, 1 year added to credited service at retirement.

PAYROLL GROWTH ASSUMPTION: 2.50% per year.



SCHEDULE F

ACTUARIAL COST METHOD

1. The valuation is prepared on the projected benefit basis, under which the present value, at the interest rate assumed to be earned in the future (currently 7.25%), of each member's expected benefits at retirement or death is determined, based on age, service and sex. The calculations take into account the probability of a member's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service, disability or survivor's benefit. The present value of the expected benefits payable on account of the active members is added to the present value of the expected future payments to retired members and beneficiaries to obtain the present value of all expected benefits payable from the System on account of the present group of members and beneficiaries.
2. The employer contributions required to support the benefits of the System are determined following a level funding approach, and consist of a normal contribution and an accrued liability contribution.
3. The normal contribution is determined using the entry age actuarial cost method. Under this method, a calculation is made to determine the level percentage of payroll which, if applied for the average new member during the entire period of his anticipated covered service, would be required in addition to the contributions of the member to meet the cost of all benefits payable on his behalf.
4. The unfunded accrued liability is determined by subtracting the present value of prospective employer normal contributions and member contributions, together with the current actuarial value of assets held, from the present value of expected benefits to be paid from the System.



SCHEDULE G

**SUMMARY OF MAIN SYSTEM PROVISIONS
AS INTERPRETED FOR VALUATION PURPOSES**

Member	An employee of the Charlotte Fire Department who is subject to the provisions of the Civil Service Act.
Membership Service Credit	Service for all periods of employment with the Charlotte Fire Department for which contributions have been paid.
Final Average Salary	A member's average monthly compensation for the highest 2 consecutive years within the last 5 years of membership service. Salary in the final year includes cashed-in vacation and sick days.
Accrued Benefit	The monthly amount of retirement benefits earned by a member as of any date computed on his Final Average Salary and Membership Service Credit at that date.
Service Retirement Benefit	
Eligibility	Age 50 and 25 years of membership service credit, age 60 and 5 years of membership service credit or 30 years of membership service credit.
Benefit	Monthly benefit is 2.6% of final average salary multiplied by years of membership service credit. The minimum monthly benefit is \$902.75.
Early Retirement Benefit	
Eligibility	25 years of membership service credit.
Benefit	Accrued benefit reduced by 3% for each year member is under age 50.
In the Line of Duty Disability Retirement Benefit	
Eligibility	No requirements.
Benefit	78% of final average salary or normal retirement benefit if greater.
Not in the Line of Duty Disability Retirement Benefit	
Eligibility	10 years of service.
Benefit	39% of final average salary plus 1.95% of such salary for each year of membership service credit in excess of 10 years, not less than \$902.75 per month.



Deferred Vested
Retirement Benefit

Eligibility

5 years of service. Member contributions not withdrawn.

Benefit

Accrued benefit payable at age 60. A member may choose a refund of contributions with 4% interest in lieu of this benefit.

Termination Benefit

If a member is terminated with less than 5 years of membership service credit, he is entitled to a return of his accumulated contributions.

Death Benefit

If a member dies in service, his beneficiary is entitled to receive a lump sum equal to the return of the member's accumulated contributions, plus those contributions made by the City on his behalf, plus interest of 4% per year. In lieu of the lump sum, his beneficiary may elect an annuity which is the actuarial equivalent of the lump sum. If the deceased member was eligible for a service or early retirement on the day before death, the spouse may elect to receive the actuarial equivalent monthly benefit under the 66-2/3% Joint and Survivor Option.

Optional Forms of Benefit

- (1) 10 year certain and life annuity.
- (2) 100%, 75%, 66-2/3% or 50% joint and survivorship annuity.
- (3) Joint and survivorship annuity with a pop-up provision.

Contributions

The City and the members each contribution 12.65%.



SCHEDULE H

TABLES OF MEMBERSHIP DATA

TABLE 1

**DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND SERVICE GROUPS
AS OF JULY 1, 2020**

Attained Age	Completed Years of Service									Total
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 & Over	
Under 25 Total Pay	7	20	1							28 \$1,496,269
25 to 29 Total Pay	20	65	34							119 \$6,943,264
30 to 34 Total Pay	14	90	75	58	1					238 \$15,977,973
35 to 39 Total Pay	5	26	40	72	50	1				194 \$15,064,965
40 to 44 Total Pay	3	6	16	37	91	44				197 \$17,015,114
45 to 49 Total Pay	2	1	3	18	55	71	20			170 \$15,273,475
50 to 54 Total Pay				5	13	52	18	3		91 \$8,132,114
55 to 59 Total Pay				1	2	16	5	2		26 \$2,298,522
60 to 64 Total Pay						3		1		4 \$330,824
65 to 69 Total Pay										0 \$0
70 & up Total Pay										0 \$0
Total Count Total Pay	51	208	169	191	212	187	43	6	0	1,067 \$82,532,520

Average Age: 39.3
Average Service: 12.7



TABLE 2
NUMBER OF RETIRED MEMBERS AND BENEFICIARIES
AND THEIR BENEFITS BY AGE

<u>Attained Age</u>	<u>Number of Members</u>	<u>Total Annual Benefits</u>	<u>Average Annual Benefits</u>
50 & Under	27	\$ 1,445,204	\$53,526
51 - 55	111	7,216,244	65,011
56 - 60	145	8,334,030	57,476
61 - 65	146	7,888,774	54,033
66 - 70	125	5,909,863	47,279
71 - 75	98	3,702,813	37,784
76 - 80	55	2,343,023	42,600
Over 80	<u>58</u>	<u>2,258,801</u>	<u>38,945</u>
Total	765	\$39,098,752	\$51,109

TABLE 3
SCHEDULE OF ACTIVE MEMBER VALUATION DATA

<u>Valuation Date</u>	<u>Number Prior Year</u>	<u>Exits</u>	<u>New Entrants & Rehires</u>	<u>Number Current Year</u>	<u>Annual Payroll</u>	<u>Annual Average Pay</u>	<u>% Increase in Average Pay</u>
7/1/2020	1,047	32	52	1,067	\$82,532,520	\$77,350	5.1%
7/1/2019	1,058	63	52	1,047	77,040,854	73,582	8.5%
7/1/2018	1,037	31	52	1,058	71,781,041	67,846	-0.4%
7/1/2017	1,030	56	63	1,037	70,610,001	68,091	5.0%
7/1/2016	1,029	46	47	1,030	66,796,597	64,851	1.4%
7/1/2015	1,027	59	61	1,029	65,820,571	63,966	2.3%
7/1/2014	1,026	43	44	1,027	64,190,190	62,503	2.6%
7/1/2013	1,028	36	34	1,026	62,523,240	60,939	2.4%
7/1/2012	1,028	32	32	1,028	61,158,264	59,492	3.5%
7/1/2011	1,031	30	27	1,028	59,086,270	57,477	0.3%
7/1/2010	991	25	65	1,031	59,079,990	57,304	-0.2%



TABLE 4

**SCHEDULE OF RETIRED MEMBERS AND BENEFICIARIES
ADDED TO AND REMOVED FROM ROLLS**

<u>Year Ended</u>	<u>Rolls – Beginning of Year</u>		<u>Added to Rolls</u>		<u>Removed from Rolls</u>		<u>Rolls – End of Year</u>		<u>% Increase in Annual Allowances</u>	<u>Average Annual Allowances</u>
	<u>No.</u>	<u>Annual Allowances</u>	<u>No.</u>	<u>Annual Allowances</u>	<u>No.</u>	<u>Annual Allowances</u>	<u>No.</u>	<u>Annual Allowances</u>		
7/1/2020	750	\$37,719,709	26	\$1,797,008	11	\$417,965	765	\$39,098,752	3.7%	\$51,109
7/1/2019	697	33,569,732	66	4,586,146	13	436,169	750	37,719,709 *	12.4%	50,293
7/1/2018	684	32,289,898	26	1,699,726	13	419,892	697	33,569,732	4.0%	48,163
7/1/2017	647	29,422,479	52	3,411,374	15	543,955	684	32,289,898	9.7%	47,207
7/1/2016	615	27,388,370	46	2,517,541	14	483,432	647	29,422,479	7.4%	45,475
7/1/2015	575	24,864,206	52	2,879,892	12	355,728	615	27,388,370	10.2%	44,534
7/1/2014	546	23,015,232	42	2,222,162	13	373,188	575	24,864,206	8.0%	43,242
7/1/2013	522	21,528,876	33	1,745,808	9	259,452	546	23,015,232	6.9%	42,152
7/1/2012	505	20,386,139	28	1,478,178	11	335,441	522	21,528,876	5.6%	41,243
7/1/2011	492	19,428,912	22	1,180,748	9	223,521	505	20,386,139	4.9%	40,369
7/1/2010	477	18,461,651	22	1,136,772	7	169,511	492	19,428,912	5.2%	39,490

* Includes benefit increases due to Kurzel lawsuit



SCHEDULE I

AMORTIZATION OF UAAL

<u>Valuation Date</u>	<u>Total UAAL</u>	
	<u>Balance</u>	<u>Annual Amortization Payment</u>
7/1/2020	178,523,381	11,458,203
7/1/2021	179,177,404	11,744,658
7/1/2022	179,571,620	12,038,274
7/1/2023	179,679,514	12,339,231
7/1/2024	179,472,453	12,647,712
7/1/2025	178,919,535	12,963,904
7/1/2026	177,987,414	13,288,002
7/1/2027	176,640,120	13,620,202
7/1/2028	174,838,861	13,960,707
7/1/2029	172,541,820	14,309,725
7/1/2030	169,703,922	14,667,468
7/1/2031	166,276,597	15,034,155
7/1/2032	162,207,520	15,410,009
7/1/2033	157,440,331	15,795,259
7/1/2034	151,914,339	16,190,140
7/1/2035	145,564,204	13,574,316
7/1/2036	141,559,155	13,913,673
7/1/2037	136,899,779	14,261,515
7/1/2038	131,529,538	14,618,053
7/1/2039	125,387,567	14,983,504
7/1/2040	118,408,357	15,358,092
7/1/2041	110,521,409	15,742,044
7/1/2042	101,650,869	16,135,596
7/1/2043	91,715,131	16,538,985
7/1/2044	80,626,416	16,952,460
7/1/2045	68,290,318	17,376,272
7/1/2046	54,605,314	17,810,678
7/1/2047	39,462,247	18,255,945
7/1/2048	22,743,759	18,712,344
7/1/2049	4,323,693	4,323,693
7/1/2050	0	0



SCHEDULE J

ESTIMATED PROJECTED BENEFIT PAYMENTS*

<u>Year End</u>	<u>Total Projected Benefits</u>
2020	\$40,025,996
2021	\$41,632,791
2022	\$43,723,359
2023	\$46,219,816
2024	\$48,585,535
2025	\$51,001,241
2026	\$53,893,066
2027	\$56,947,990
2028	\$60,007,968
2029	\$62,892,317
2030	\$65,827,803
2031	\$69,168,397
2032	\$72,225,778
2033	\$75,360,679
2034	\$78,632,930
2035	\$82,031,795
2036	\$85,477,655
2037	\$88,908,450
2038	\$92,037,171
2039	\$95,109,006
2040	\$98,662,318
2041	\$102,387,460
2042	\$106,436,308
2043	\$110,450,094
2044	\$114,303,271
2045	\$117,777,519
2046	\$120,147,722
2047	\$121,308,994
2048	\$121,422,171
2049	\$120,759,007

*Amounts shown are the cash flows for current members only, based on the current benefit structure and assuming that all actuarial assumptions are met each year. To the extent that actual experience deviates from that expected, results will vary. Amounts are shown in future nominal dollars and have not been discounted to the valuation date.