**PROPOSED CHANGES IN ACTUARIAL
ASSUMPTIONS AND METHODS
USED IN DETERMINING EMPLOYER CONTRIBUTIONS
FOR FISCAL YEARS BEGINNING
ON AND AFTER JULY 1, 2018
FOR THE NEW YORK CITY POLICE PENSION FUND**

prepared by the

New York City
Office of the Actuary
January 2, 2019

January 2, 2019

Board of Trustees
New York City Police Pension Fund
233 Broadway, Room 2501
New York, NY 10279

Dear Trustees:

This report presents proposed changes in actuarial assumptions and methods used in determining Employer Contributions for Fiscal Years beginning on and after July 1, 2018 for the New York City Police Pension Fund (2019 A&M).

The following appendices and tables are attached to this letter in support of the proposed 2019 A&M:
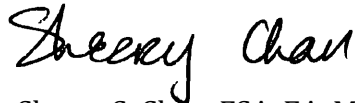
- Appendix A summarizes the proposed changes in assumptions and methods.

- Appendix B presents tables of proposed assumptions to be used in determing the Final 2019 Employer Contribution and subsequent Employer Contributions.

- Appendix C contains a draft Resolution to collectively adopt the proposed 2019 A&M.

I, Sherry S. Chan, am the Chief Actuary for, and independent of, the New York City Retirement Systems and Pension Funds. I am a Fellow of the Society of Actuaries, an Enrolled Actuary under the Employee Retirement Income and Security Act of 1974 (ERISA), a Member of the American Academy of Actuaries, and a Fellow of the Conference of Consulting Actuaries. I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. To the best of my knowledge, the results contained herein have been prepared in accordance with generally accepted actuarial principles and procedures and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

Board of Trustees
New York City Police Pension Fund
January 2, 2019
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If you have any questions, please contact Mr. Michael J. Samet, or me.

Best Regards,

Sherry Chan

Sherry S. Chan, FSA, EA, MAAA, FCA
Chief Actuary

SC/mm

Att.

cc: Mr. Kevin Holloran - New York City Police Pension Fund
        Mr. Anderson Huynh - New York City Office of the Actuary
        Ms. Marlene Markoe-Boyd - New York City Office of the Actuary
        Mr. Sam Rumley - New York City Office of the Actuary
        Mr. Michael Samet - New York City Office of the Actuary
        Keith Snow, Esq. - New York City Office of the Actuary

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Appendix A

<center>**Appendix A**</center>

<center>**PROPOSED CHANGES IN ACTUARIAL ASSUMPTIONS AND METHODS USED
IN DETERMINING EMPLOYER CONTRIBUTIONS FOR
FISCAL YEARS BEGINNING ON AND AFTER JULY 1, 2018
FOR THE NEW YORK CITY POLICE PENSION FUND**</center>

In accordance with the Administrative Code of the City of New York (ACCNY) and with appropriate practice, the Actuary is to periodically review actuarial assumptions for adoption by the Board of Trustees used in determining employer contributions.

This Report proposes, collectively, changes to certain actuarial assumptions and methods to be used in determining employer contributions payable to the New York City Police Pension Fund (POLICE) for Fiscal Years beginning on and after July 1, 2018 (i.e. beginning Fiscal Year 2019).

These proposals have been designed to provide for responsible financing of POLICE while being reasonably consistent with the concepts of intergenerational equity. This Report reflects the best judgment of the Actuary regarding the appropriate financing of POLICE and takes into account the most recent actuarial experience study and recommendations prepared by Bolton, Inc. (Bolton) in their 10-year experience study ending on June 30, 2017 (Bolton Experience Study).

The Actuary generally agrees with most of the recommendations made by Bolton on demographic and economic assumptions, but has refined those recommendations where the Actuary desires to smooth some of the recommended values.

The Actuary also generally agrees with the recommended action by Bolton to keep the Actuarial Interest Rate (AIR) and Consumer Price Inflation (CPI) assumptions unchanged. The Actuary continues to monitor market conditions and other factors that may affect these assumed rates to assess whether any future adjustments are warranted.

In summary, the Actuary proposes the following actions with respect to the current actuarial assumptions and methods of POLICE used in determining employer contributions for Fiscal Years beginning on and after July 1, 2018 (i.e. beginning in Fiscal Year 2019).

<center>1</center>

Demographic Assumptions

- **Termination**: Decrease the current probabilities of Termination based on the findings outlined in the Bolton Experience Study and on the experience expected by the Actuary.

- **Active Service Ordinary Mortality**: Retain the current probabilities of active service Ordinary Mortality based on the findings outlined in the Bolton Experience Study and on the experience expected by the Actuary.

- **Active Service Accidental Mortality**: Retain the current probabilities of active service Accidental Mortality based on the findings outlined in the Bolton Experience Study and on the experience expected by the Actuary.

- **Active Service Ordinary Disability**: Decrease the current probabilities of active service Ordinary Disability based on the findings outlined in the Bolton Experience Study and on the experience expected by the Actuary.

- **Active Service Accidental Disability**: Decrease the current probabilities of active service Accidental Disability for both World Trade Center (WTC) eligible and non-WTC eligible members based on the findings outlined in the Bolton Experience Study and on the experience expected by the Actuary.

- **Service Retirement**: Revise the current probabilities of Service Retirement in the first year of eligibility to generally reduce the expected number of such retirements, but retain the current probabilities of Service Retirement after the first year of eligibility and of Early Service Retirement based on the findings outlined in the Bolton Experience Study and on the experience expected by the Actuary.

- **Post-Retirement Mortality**: Revise the existing Base Tables to reflect the findings outlined in the Bolton Experience Study. The Base Tables are adjusted to Calendar Year 2012 expectations as that represents the midpoint of the 10-year experience study. The Valuation Tables are further adjusted by reflecting the application of Mortality Improvement Scale MP-2018 and the Base Tables recommended by Bolton.

Economic Assumptions

- **CPI Assumption**: Retain the current CPI assumption of 2.5% per year.

- **AIR Assumption**: Retain the current AIR assumption of 7.0% per annum, net of Investment Expenses.

- **Salary Scale Assumption**: Retain the current General Wage Increase component of 3.0%, but increase the Merit Increase component of the Salary Scale based on the findings outlined in the Bolton Experience Study and on the experience expected by the Actuary.

- **Overtime Assumptions**: Increase the current Baseline Overtime and Dual Service Overtime assumptions, but retain the current Dual Disability Overtime assumptions based on the findings outlined in the Bolton Experience Study and on the experience expected by the Actuary.

Actuarial Methods

The Actuary is proposing no changes to the Actuarial Cost Method, the periods used to amortize changes in the Unfunded Accrued Liability, the Actuarial Asset Valuation Method, or the treatment of Administrative Expenses. The only method change is a technical change to the normal cost calculation under the One-Year Lag Methodology as recommended by Bolton.

Financial Impact

All estimates of employer contributions and changes in employer contributions presented herein have been developed using the Preliminary Fiscal Year 2019 Employer Contribution.

The overall impact of implementing the proposed 2019 A&M would decrease the Final Fiscal Year 2019 Employer Contribution to POLICE by approximately $10 million from the Preliminary Fiscal Year 2019 Employer Contribution. **Please note that the change in the Final Fiscal Year 2019 Employer Contribution could differ from this amount due to other refinements in actuarial calculations**.

Appendix B

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF TERMINATION

Years of Service	Current	Proposed
0	4.000%	3.000%
1	3.000%	2.250%
2	2.000%	1.500%
3	2.000%	1.500%
4	2.000%	1.500%
5	2.000%	1.500%
6	1.800%	1.350%
7	1.600%	1.200%
8	1.400%	1.050%
9	1.200%	0.900%
10	1.000%	0.750%
11	0.800%	0.600%
12	0.600%	0.450%
13	0.500%	0.380%
14	0.400%	0.300%
15	0.300%	0.230%
16	0.200%	0.150%
17	0.200%	0.150%
18	0.200%	0.150%
19	0.200%	0.150%
20	N/A	N/A

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF MORTALITY FOR ACTIVE MEMBERS

Age	Ordinary (Current & Proposed)		Accidental (Current & Proposed)
	Males	Females	Both Genders
15	0.040%	0.030%	0.010%
16	0.040%	0.030%	0.010%
17	0.040%	0.030%	0.010%
18	0.040%	0.030%	0.010%
19	0.040%	0.030%	0.010%
20	0.040%	0.030%	0.010%
21	0.040%	0.030%	0.010%
22	0.040%	0.030%	0.010%
23	0.040%	0.030%	0.010%
24	0.040%	0.030%	0.010%
25	0.040%	0.030%	0.010%
26	0.040%	0.030%	0.010%
27	0.040%	0.030%	0.010%
28	0.040%	0.030%	0.010%
29	0.040%	0.030%	0.010%
30	0.040%	0.030%	0.010%
31	0.040%	0.030%	0.011%
32	0.040%	0.030%	0.012%
33	0.040%	0.030%	0.013%
34	0.040%	0.030%	0.014%
35	0.040%	0.030%	0.015%
36	0.042%	0.032%	0.016%
37	0.044%	0.034%	0.017%
38	0.046%	0.036%	0.018%
39	0.048%	0.038%	0.019%
40	0.050%	0.040%	0.020%
41	0.060%	0.046%	0.021%
42	0.070%	0.052%	0.022%
43	0.080%	0.058%	0.023%
44	0.090%	0.064%	0.024%
45	0.100%	0.070%	0.025%
46	0.110%	0.076%	0.026%
47	0.120%	0.082%	0.027%
48	0.130%	0.088%	0.028%
49	0.140%	0.094%	0.029%
50	0.150%	0.100%	0.030%
51	0.160%	0.110%	0.031%
52	0.170%	0.120%	0.032%
53	0.180%	0.130%	0.033%
54	0.190%	0.140%	0.034%
55	0.200%	0.150%	0.035%
56	0.220%	0.160%	0.036%
57	0.240%	0.170%	0.037%
58	0.260%	0.180%	0.038%
59	0.280%	0.190%	0.039%
60	0.300%	0.200%	0.040%
61	0.320%	0.220%	0.041%
62	0.340%*	0.240%*	0.042%*
63	N/A	N/A	N/A

*Proposed probabilities are N/A for Tier 3 and Tier 3 Revised members.

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF ORDINARY DISABILITY
FOR ACTIVE MEMBERS

Age	Current	Proposed
15	0.0450%	0.0360%
16	0.0450%	0.0360%
17	0.0450%	0.0360%
18	0.0450%	0.0360%
19	0.0450%	0.0360%
20	0.0500%	0.0400%
21	0.0550%	0.0440%
22	0.0600%	0.0480%
23	0.0650%	0.0520%
24	0.0700%	0.0560%
25	0.0750%	0.0600%
26	0.0800%	0.0640%
27	0.0850%	0.0680%
28	0.0900%	0.0720%
29	0.0950%	0.0760%
30	0.1000%	0.0800%
31	0.1050%	0.0840%
32	0.1100%	0.0880%
33	0.1150%	0.0920%
34	0.1200%	0.0960%
35	0.1250%	0.1000%
36	0.1300%	0.1040%
37	0.1350%	0.1080%
38	0.1400%	0.1120%
39	0.1450%	0.1160%
40	0.1500%	0.1200%
41	0.1550%	0.1240%
42	0.1600%	0.1280%
43	0.1650%	0.1320%
44	0.1700%	0.1360%
45	0.1750%	0.1400%
46	0.1800%	0.1440%
47	0.1850%	0.1480%
48	0.1900%	0.1520%
49	0.1950%	0.1560%
50	0.2000%	0.1600%
51	0.2500%	0.2000%
52	0.3000%	0.2400%
53	0.4000%	0.3200%
54	0.6000%	0.4800%
55	0.8000%	0.6400%
56	1.0000%	0.8000%
57	2.0000%	1.6000%
58	3.0000%	2.4000%
59	4.0000%	3.2000%
60	6.0000%	4.8000%
61	8.0000%	6.4000%
62	10.0000%	8.0000%*
63	N/A	N/A

*N/A for Tier 3 and Tier 3 Revised members.

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF ACCIDENTAL DISABILITY
FOR TIER 1 & 2 ACTIVE MEMBERS
ELIGIBLE FOR WTC BENEFITS

Age	Current	Proposed
15	0.280%	0.168%
16	0.280%	0.168%
17	0.280%	0.168%
18	0.280%	0.168%
19	0.280%	0.168%
20	0.300%	0.180%
21	0.320%	0.192%
22	0.340%	0.204%
23	0.360%	0.216%
24	0.380%	0.228%
25	0.400%	0.240%
26	0.520%	0.312%
27	0.640%	0.384%
28	0.760%	0.456%
29	0.880%	0.528%
30	1.000%	0.600%
31	1.200%	0.720%
32	1.400%	0.840%
33	1.600%	0.960%
34	1.800%	1.080%
35	2.000%	1.200%
36	2.100%	1.260%
37	2.200%	1.320%
38	2.300%	1.380%
39	2.400%	1.440%
40	2.500%	1.500%
41	2.600%	1.560%
42	2.700%	1.620%
43	2.800%	1.680%
44	2.900%	1.740%
45	3.000%	1.800%
46	3.200%	1.920%
47	3.400%	2.040%
48	3.600%	2.160%
49	3.800%	2.280%
50	4.000%	2.400%
51	4.400%	2.640%
52	4.800%	2.880%
53	5.200%	3.120%
54	5.600%	3.360%
55	6.000%	3.600%
56	6.800%	4.080%
57	7.600%	4.560%
58	8.400%	5.040%
59	9.200%	5.520%
60	10.000%	6.000%
61	12.000%	7.200%
62	14.000%	8.400%*
63	N/A	N/A

*N/A for Tier 3 and Tier 3 Revised members.

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF ACCIDENTAL DISABILITY
FOR TIER 1 & 2 ACTIVE MEMBERS
NOT ELIGIBLE FOR WTC BENEFITS
AND
TIER 3 & TIER 3 REVISED ENHANCED PLAN
ACTIVE MEMBERS

Age	Current	Proposed
15	0.140%	0.098%
16	0.140%	0.098%
17	0.140%	0.098%
18	0.140%	0.098%
19	0.140%	0.098%
20	0.150%	0.105%
21	0.160%	0.112%
22	0.170%	0.119%
23	0.180%	0.126%
24	0.190%	0.133%
25	0.200%	0.140%
26	0.260%	0.182%
27	0.320%	0.224%
28	0.380%	0.266%
29	0.440%	0.308%
30	0.500%	0.350%
31	0.600%	0.420%
32	0.700%	0.490%
33	0.800%	0.560%
34	0.900%	0.630%
35	1.000%	0.700%
36	1.050%	0.735%
37	1.100%	0.770%
38	1.150%	0.805%
39	1.200%	0.840%
40	1.250%	0.875%
41	1.300%	0.910%
42	1.350%	0.945%
43	1.400%	0.980%
44	1.450%	1.015%
45	1.500%	1.050%
46	1.600%	1.120%
47	1.700%	1.190%
48	1.800%	1.260%
49	1.900%	1.330%
50	2.000%	1.400%
51	2.200%	1.540%
52	2.400%	1.680%
53	2.600%	1.820%
54	2.800%	1.960%
55	3.000%	2.100%
56	3.400%	2.380%
57	3.800%	2.660%
58	4.200%	2.940%
59	4.600%	3.220%
60	5.000%	3.500%
61	6.000%	4.200%
62	7.000%	4.900%*
63	N/A	N/A

*N/A for Tier 3 and Tier 3 Revised members.

NEW YORK CITY POLICE PENSION FUND

**PROBABILITIES OF ACCIDENTAL DISABILITY
FOR TIER 3 & TIER 3 REVISED NON-ENHANCED PLAN
ACTIVE MEMBERS**

Age	Current	Proposed
15	0.140%	0.098%
16	0.140%	0.098%
17	0.140%	0.098%
18	0.140%	0.098%
19	0.140%	0.098%
20	0.150%	0.105%
21	0.160%	0.112%
22	0.170%	0.119%
23	0.180%	0.126%
24	0.190%	0.133%
25	0.200%	0.140%
26	0.260%	0.182%
27	0.320%	0.224%
28	0.380%	0.266%
29	0.440%	0.308%
30	0.500%	0.350%
31	0.600%	0.420%
32	0.700%	0.490%
33	0.800%	0.560%
34	0.900%	0.630%
35	1.000%	0.700%
36	1.040%	0.728%
37	1.080%	0.756%
38	1.120%	0.784%
39	1.160%	0.812%
40	1.200%	0.840%
41	1.220%	0.854%
42	1.240%	0.868%
43	1.260%	0.882%
44	1.280%	0.896%
45	1.300%	0.910%
46	1.340%	0.938%
47	1.380%	0.966%
48	1.420%	0.994%
49	1.460%	1.022%
50	1.500%	1.050%
51	1.600%	1.120%
52	1.700%	1.190%
53	1.800%	1.260%
54	1.900%	1.330%
55	2.000%	1.400%
56	2.200%	1.540%
57	2.400%	1.680%
58	2.600%	1.820%
59	2.800%	1.960%
60	3.000%	2.100%
61	3.200%	2.240%
62	3.500%	2.450%*
63	N/A	N/A

*N/A for Tier 3 and Tier 3 Revised members.

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF UNREDUCED SERVICE RETIREMENT
FOR THOSE ELIGIBLE FOR FULL COLA/ESCALATION

Age	Current			Proposed	
	Years of Service Since First Eligible			**Years of Service Since First Eligible**	
	Year 1	Year 2	Ultimate	Year 1	Ultimate
19	0.00%	0.00%	0.00%	0.00%	0.00%
20	0.00%	0.00%	0.00%	0.00%	0.00%
21	0.00%	0.00%	0.00%	0.00%	0.00%
22	0.00%	0.00%	0.00%	0.00%	0.00%
23	0.00%	0.00%	0.00%	0.00%	0.00%
24	0.00%	0.00%	0.00%	0.00%	0.00%
25	0.00%	0.00%	0.00%	0.00%	0.00%
26	0.00%	0.00%	0.00%	0.00%	0.00%
27	0.00%	0.00%	0.00%	0.00%	0.00%
28	0.00%	0.00%	0.00%	0.00%	0.00%
29	0.00%	0.00%	0.00%	0.00%	0.00%
30	0.00%	0.00%	0.00%	0.00%	0.00%
31	0.00%	0.00%	0.00%	0.00%	0.00%
32	0.00%	0.00%	0.00%	0.00%	0.00%
33	0.00%	0.00%	0.00%	0.00%	0.00%
34	0.00%	0.00%	0.00%	0.00%	0.00%
35	0.00%	0.00%	0.00%	0.00%	0.00%
36	60.00%	0.00%	0.00%	45.00%	0.00%
37	60.00%	15.00%	0.00%	45.00%	10.00%
38	60.00%	15.00%	10.00%	45.00%	10.00%
39	60.00%	15.00%	10.00%	45.00%	10.00%
40	60.00%	15.00%	10.00%	45.00%	10.00%
41	60.00%	15.00%	10.00%	45.00%	10.00%
42	60.00%	15.00%	10.00%	45.00%	10.00%
43	60.00%	15.00%	10.00%	45.00%	10.00%
44	60.00%	15.00%	10.00%	45.00%	10.00%
45	60.00%	15.00%	10.00%	45.00%	10.00%
46	60.00%	15.00%	11.00%	45.00%	11.00%
47	60.00%	15.00%	12.00%	45.00%	12.00%
48	60.00%	15.00%	13.00%	45.00%	13.00%
49	60.00%	15.00%	14.00%	45.00%	14.00%
50	60.00%	15.00%	15.00%	45.00%	15.00%
51	60.00%	15.00%	15.00%	45.00%	15.00%
52	60.00%	15.00%	15.00%	45.00%	15.00%
53	60.00%	15.00%	15.00%	45.00%	15.00%
54	60.00%	15.00%	15.00%	45.00%	15.00%
55	60.00%	15.00%	15.00%	45.00%	15.00%
56	60.00%	15.00%	15.00%	45.00%	15.00%
57	60.00%	15.00%	15.00%	45.00%	15.00%
58	60.00%	15.00%	15.00%	45.00%	15.00%
59	60.00%	15.00%	15.00%	45.00%	15.00%
60	60.00%	20.00%	20.00%	45.00%	20.00%
61	60.00%	30.00%	30.00%	45.00%	30.00%
62	60.00%	50.00%	50.00%	45.00%*	50.00%*
63	100.00%	100.00%	100.00%	100.00%	100.00%

*100% for Tier 3 and Tier 3 Revised members.

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF EARLY SERVICE RETIREMENT
FOR
TIER 3 AND TIER 3 REVISED MEMBERS

Years of Service	Current & Proposed	
	Reduced Service Retirement	Unreduced Before Full Escalation
20	5.00%	N/A
21	2.00%	N/A
22	N/A	5.00%
23	N/A	2.00%
24	N/A	2.00%

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF MORTALITY FOR SERVICE RETIREES
BASE TABLE
MALES

Age	Current	Proposed	Age	Current	Proposed
15	N/A	0.0100%	68	1.8009%	1.4988%
16	N/A	0.0135%	69	2.0410%	1.6917%
17	N/A	0.0181%	70	2.2892%	1.8929%
18	N/A	0.0217%	71	2.5456%	2.1028%
19	0.0306%	0.0240%	72	2.8106%	2.3212%
20	0.0320%	0.0251%	73	3.1257%	2.5833%
21	0.0332%	0.0268%	74	3.4508%	2.8558%
22	0.0341%	0.0284%	75	3.7857%	3.1397%
23	0.0351%	0.0301%	76	4.1303%	3.4343%
24	0.0357%	0.0315%	77	4.4850%	3.7415%
25	0.0361%	0.0327%	78	5.0530%	4.2304%
26	0.0369%	0.0342%	79	5.6378%	4.7399%
27	0.0374%	0.0354%	80	6.2394%	5.2682%
28	0.0385%	0.0371%	81	6.7457%	5.7202%
29	0.0404%	0.0394%	82	7.2517%	6.1782%
30	0.0435%	0.0427%	83	8.1970%	7.0179%
31	0.0501%	0.0492%	84	9.1421%	7.8631%
32	0.0569%	0.0556%	85	10.0872%	8.7167%
33	0.0638%	0.0616%	86	11.0322%	9.5810%
34	0.0705%	0.0669%	87	11.9773%	10.4516%
35	0.0779%	0.0724%	88	13.5010%	11.8437%
36	0.0832%	0.0755%	89	15.0245%	13.2486%
37	0.0882%	0.0779%	90	16.5479%	14.6752%
38	0.0938%	0.0808%	91	18.3120%	16.3354%
39	0.1005%	0.0845%	92	20.0893%	18.0374%
40	0.1093%	0.0901%	93	21.8705%	19.7642%
41	0.1235%	0.1003%	94	23.6944%	21.5622%
42	0.1374%	0.1106%	95	25.5955%	23.4692%
43	0.1509%	0.1212%	96	27.5396%	25.3619%
44	0.1641%	0.1323%	97	29.3904%	27.1816%
45	0.1769%	0.1439%	98	31.2340%	29.0095%
46	0.1895%	0.1563%	99	32.8923%	30.6920%
47	0.2017%	0.1693%	100	34.3180%	32.1584%
48	0.2135%	0.1827%	101	35.8628%	33.7521%
49	0.2251%	0.1964%	102	37.1685%	35.1259%
50	0.2364%	0.2104%	103	38.3040%	36.3671%
51	0.3089%	0.2802%	104	39.2003%	37.3834%
52	0.3796%	0.3506%	105	39.7886%	38.1051%
53	0.4485%	0.4209%	106	40.0000%	38.4698%
54	0.5157%	0.4903%	107	40.0000%	38.6325%
55	0.5521%	0.5297%	108	40.0000%	38.8076%
56	0.6083%	0.5857%	109	40.0000%	38.9794%
57	0.6646%	0.6387%	110	100.0000%	50.0000%
58	0.7208%	0.6875%	111	N/A	50.0000%
59	0.7770%	0.7316%	112	N/A	50.0000%
60	0.8333%	0.7720%	113	N/A	50.0000%
61	0.9277%	0.8439%	114	N/A	50.0000%
62	1.0256%	0.9155%	115	N/A	50.0000%
63	1.1271%	0.9888%	116	N/A	50.0000%
64	1.2323%	1.0644%	117	N/A	50.0000%
65	1.3410%	1.1433%	118	N/A	50.0000%
66	1.4532%	1.2263%	119	N/A	50.0000%
67	1.5691%	1.3135%	120	N/A	100.0000%

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF MORTALITY FOR SERVICE RETIREES
BASE TABLE
FEMALES

Age	Current	Proposed	Age	Current	Proposed
15	N/A	0.0084%	68	1.2698%	1.0632%
16	N/A	0.0103%	69	1.3845%	1.1644%
17	N/A	0.0112%	70	1.4949%	1.2629%
18	N/A	0.0131%	71	1.7156%	1.4563%
19	0.0175%	0.0140%	72	1.9444%	1.6586%
20	0.0177%	0.0142%	73	2.1807%	1.8689%
21	0.0180%	0.0150%	74	2.4250%	2.0889%
22	0.0181%	0.0158%	75	2.6936%	2.3314%
23	0.0185%	0.0168%	76	2.9956%	2.6045%
24	0.0189%	0.0179%	77	3.2873%	2.8700%
25	0.0196%	0.0191%	78	3.6283%	3.1787%
26	0.0204%	0.0204%	79	3.9587%	3.4795%
27	0.0213%	0.0217%	80	4.3248%	3.8105%
28	0.0224%	0.0231%	81	4.9022%	4.3289%
29	0.0237%	0.0247%	82	5.5029%	4.8678%
30	0.0254%	0.0265%	83	6.1272%	5.4288%
31	0.0304%	0.0316%	84	6.6646%	5.9122%
32	0.0350%	0.0360%	85	7.1646%	6.3661%
33	0.0393%	0.0398%	86	8.0498%	7.1650%
34	0.0431%	0.0427%	87	8.9781%	8.0050%
35	0.0470%	0.0455%	88	9.9063%	8.8541%
36	0.0502%	0.0474%	89	10.7693%	9.6498%
37	0.0540%	0.0497%	90	11.7626%	10.5687%
38	0.0580%	0.0521%	91	13.3393%	12.0267%
39	0.0626%	0.0551%	92	14.8446%	13.4340%
40	0.0677%	0.0588%	93	16.3499%	14.8636%
41	0.0736%	0.0633%	94	18.0157%	16.4543%
42	0.0817%	0.0702%	95	19.3799%	17.7952%
43	0.0918%	0.0792%	96	20.6789%	19.0707%
44	0.1039%	0.0907%	97	21.8558%	20.2419%
45	0.1185%	0.1052%	98	22.7651%	21.1759%
46	0.1356%	0.1228%	99	23.3951%	21.8544%
47	0.1544%	0.1427%	100	23.6519%	22.1859%
48	0.1752%	0.1652%	101	24.4834%	23.0680%
49	0.1941%	0.1865%	102	25.4498%	24.0803%
50	0.2042%	0.1992%	103	26.6044%	25.2770%
51	0.2135%	0.2104%	104	27.9055%	26.6309%
52	0.2210%	0.2186%	105	29.3116%	28.0912%
53	0.2279%	0.2250%	106	30.7811%	29.6244%
54	0.2924%	0.2863%	107	32.2725%	31.1943%
55	0.3529%	0.3409%	108	33.7441%	32.7579%
56	0.4119%	0.3910%	109	35.1544%	34.2712%
57	0.4707%	0.4376%	110	100.0000%	50.0000%
58	0.5071%	0.4613%	111	N/A	50.0000%
59	0.5622%	0.5005%	112	N/A	50.0000%
60	0.6179%	0.5393%	113	N/A	50.0000%
61	0.6743%	0.5785%	114	N/A	50.0000%
62	0.7268%	0.6152%	115	N/A	50.0000%
63	0.7795%	0.6536%	116	N/A	50.0000%
64	0.8732%	0.7279%	117	N/A	50.0000%
65	0.9653%	0.8032%	118	N/A	50.0000%
66	1.0673%	0.8884%	119	N/A	50.0000%
67	1.1669%	0.9736%	120	N/A	100.0000%

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF MORTALITY FOR DISABLED RETIREES
BASE TABLE
MALES

Age	Current	Proposed	Age	Current	Proposed
15	N/A	0.0138%	68	2.2753%	1.8368%
16	N/A	0.0187%	69	2.5301%	2.0342%
17	N/A	0.0252%	70	2.8106%	2.2544%
18	N/A	0.0301%	71	3.1257%	2.5045%
19	0.0438%	0.0334%	72	3.4508%	2.7644%
20	0.0456%	0.0347%	73	3.8088%	3.0535%
21	0.0473%	0.0371%	74	4.1556%	3.3359%
22	0.0497%	0.0402%	75	4.5123%	3.6300%
23	0.0518%	0.0431%	76	5.1148%	4.1253%
24	0.0545%	0.0467%	77	5.7067%	4.6178%
25	0.0573%	0.0503%	78	6.3156%	5.1289%
26	0.0605%	0.0544%	79	6.8279%	5.5682%
27	0.0638%	0.0586%	80	7.3400%	6.0116%
28	0.0678%	0.0633%	81	8.2467%	6.7832%
29	0.0720%	0.0681%	82	9.1975%	7.6009%
30	0.0767%	0.0730%	83	10.1484%	8.4279%
31	0.0820%	0.0781%	84	11.0322%	9.2040%
32	0.0876%	0.0830%	85	12.0498%	10.1002%
33	0.0960%	0.0898%	86	13.6650%	11.5115%
34	0.1013%	0.0933%	87	15.1155%	12.7944%
35	0.1078%	0.0972%	88	16.6479%	14.1662%
36	0.1159%	0.1019%	89	18.4227%	15.7578%
37	0.1259%	0.1080%	90	20.2106%	17.3856%
38	0.1381%	0.1153%	91	22.0026%	19.0388%
39	0.1577%	0.1286%	92	23.6944%	20.6360%
40	0.1772%	0.1417%	93	25.7499%	22.5718%
41	0.1968%	0.1550%	94	27.7058%	24.4562%
42	0.2164%	0.1690%	95	29.3904%	26.1404%
43	0.2360%	0.1838%	96	31.4223%	28.0695%
44	0.2554%	0.1997%	97	33.0905%	29.6855%
45	0.2750%	0.2170%	98	34.3180%	30.9177%
46	0.2847%	0.2279%	99	36.0787%	32.6552%
47	0.2931%	0.2387%	100	37.3923%	33.9880%
48	0.3003%	0.2492%	101	38.3040%	34.9681%
49	0.3824%	0.3237%	102	39.2003%	35.9346%
50	0.4574%	0.3948%	103	39.7886%	36.6434%
51	0.5251%	0.4620%	104	40.0000%	37.3834%
52	0.5858%	0.5249%	105	40.0000%	38.1051%
53	0.6073%	0.5528%	106	40.0000%	38.4698%
54	0.6387%	0.5891%	107	40.0000%	38.6325%
55	0.6727%	0.6260%	108	40.0000%	38.8076%
56	0.7296%	0.6814%	109	40.0000%	38.9794%
57	0.7817%	0.7288%	110	100.0000%	50.0000%
58	0.8333%	0.7710%	111	N/A	50.0000%
59	0.9334%	0.8525%	112	N/A	50.0000%
60	1.0319%	0.9273%	113	N/A	50.0000%
61	1.1340%	1.0007%	114	N/A	50.0000%
62	1.2398%	1.0735%	115	N/A	50.0000%
63	1.3410%	1.1411%	116	N/A	50.0000%
64	1.4621%	1.2250%	117	N/A	50.0000%
65	1.5787%	1.3055%	118	N/A	50.0000%
66	1.7900%	1.4653%	119	N/A	50.0000%
67	2.0286%	1.6473%	120	N/A	100.0000%

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF MORTALITY FOR DISABLED RETIREES
BASE TABLE
FEMALES

Age	Current	Proposed	Age	Current	Proposed
15	N/A	0.0095%	68	1.4949%	1.2141%
16	N/A	0.0117%	69	1.7053%	1.3912%
17	N/A	0.0127%	70	1.9327%	1.5837%
18	N/A	0.0148%	71	2.1676%	1.7848%
19	0.0205%	0.0159%	72	2.4104%	1.9944%
20	0.0216%	0.0168%	73	2.6774%	2.2258%
21	0.0229%	0.0185%	74	2.9776%	2.4880%
22	0.0243%	0.0205%	75	3.3072%	2.7766%
23	0.0258%	0.0227%	76	3.6503%	3.0785%
24	0.0273%	0.0251%	77	3.9587%	3.3525%
25	0.0289%	0.0274%	78	4.3248%	3.6752%
26	0.0307%	0.0298%	79	4.9022%	4.1794%
27	0.0326%	0.0322%	80	5.5029%	4.7030%
28	0.0348%	0.0348%	81	6.1272%	5.2484%
29	0.0371%	0.0374%	82	6.6646%	5.7185%
30	0.0395%	0.0400%	83	7.2080%	6.1948%
31	0.0422%	0.0425%	84	8.1476%	7.0110%
32	0.0451%	0.0450%	85	9.0871%	7.8321%
33	0.0485%	0.0476%	86	9.9662%	8.6046%
34	0.0511%	0.0491%	87	10.8343%	9.3702%
35	0.0546%	0.0512%	88	11.8337%	10.2595%
36	0.0584%	0.0534%	89	13.3393%	11.5941%
37	0.0630%	0.0563%	90	14.8446%	12.9378%
38	0.0677%	0.0590%	91	16.3606%	14.3081%
39	0.0736%	0.0629%	92	17.5097%	15.3704%
40	0.0817%	0.0688%	93	18.6970%	16.4875%
41	0.0918%	0.0766%	94	19.9353%	17.6613%
42	0.1039%	0.0865%	95	21.0632%	18.7606%
43	0.1185%	0.0992%	96	22.0663%	19.7397%
44	0.1356%	0.1148%	97	22.9669%	20.6328%
45	0.1544%	0.1330%	98	23.5709%	21.2676%
46	0.1752%	0.1538%	99	23.8964%	21.8544%
47	0.1973%	0.1769%	100	23.9165%	22.1859%
48	0.2205%	0.2017%	101	24.4834%	23.0680%
49	0.2486%	0.2316%	102	25.4498%	24.0803%
50	0.2788%	0.2637%	103	26.6044%	25.2770%
51	0.3003%	0.2870%	104	27.9055%	26.6309%
52	0.3463%	0.3323%	105	29.3116%	28.0912%
53	0.3840%	0.3677%	106	30.7811%	29.6244%
54	0.4418%	0.4196%	107	32.2725%	31.1943%
55	0.5040%	0.4722%	108	33.7441%	32.7579%
56	0.5578%	0.5135%	109	35.1544%	34.2712%
57	0.5831%	0.5258%	110	100.0000%	50.0000%
58	0.6179%	0.5452%	111	N/A	50.0000%
59	0.6743%	0.5823%	112	N/A	50.0000%
60	0.7268%	0.6153%	113	N/A	50.0000%
61	0.7795%	0.6486%	114	N/A	50.0000%
62	0.8732%	0.7169%	115	N/A	50.0000%
63	0.9653%	0.7851%	116	N/A	50.0000%
64	1.0673%	0.8630%	117	N/A	50.0000%
65	1.1669%	0.9419%	118	N/A	50.0000%
66	1.2698%	1.0252%	119	N/A	50.0000%
67	1.3845%	1.1204%	120	N/A	100.0000%

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF MORTALITY FOR BENEFICIARIES
BASE TABLE
MALES

Age	Current	Proposed	Age	Current	Proposed
15	N/A	0.0105%	68	2.1936%	1.8256%
16	N/A	0.0142%	69	2.3389%	1.9386%
17	N/A	0.0191%	70	2.4842%	2.0542%
18	N/A	0.0222%	71	2.7068%	2.2359%
19	0.0306%	0.0240%	72	2.9339%	2.4230%
20	0.0320%	0.0251%	73	3.1659%	2.6165%
21	0.0332%	0.0268%	74	3.4024%	2.8157%
22	0.0341%	0.0284%	75	3.6438%	3.0220%
23	0.0351%	0.0301%	76	4.2007%	3.4928%
24	0.0357%	0.0315%	77	4.7694%	3.9787%
25	0.0361%	0.0327%	78	5.3501%	4.4792%
26	0.0369%	0.0342%	79	5.9428%	4.9963%
27	0.0374%	0.0354%	80	6.5473%	5.5282%
28	0.0385%	0.0371%	81	7.1996%	6.1051%
29	0.0404%	0.0394%	82	7.8517%	6.6894%
30	0.0435%	0.0427%	83	8.5037%	7.2805%
31	0.0504%	0.0495%	84	9.1559%	7.8749%
32	0.0575%	0.0562%	85	9.8079%	8.4753%
33	0.0648%	0.0625%	86	11.0698%	9.6136%
34	0.0719%	0.0682%	87	12.3771%	10.8005%
35	0.0799%	0.0743%	88	13.7297%	12.0443%
36	0.0860%	0.0780%	89	15.1278%	13.3397%
37	0.0926%	0.0818%	90	16.5712%	14.6958%
38	0.1000%	0.0861%	91	18.4052%	16.4185%
39	0.1091%	0.0917%	92	20.2054%	18.1416%
40	0.1209%	0.0997%	93	21.9737%	19.8574%
41	0.1717%	0.1394%	94	23.7565%	21.6187%
42	0.2203%	0.1774%	95	25.7255%	23.5884%
43	0.2668%	0.2143%	96	27.6098%	25.4266%
44	0.3111%	0.2507%	97	29.4231%	27.2119%
45	0.3533%	0.2875%	98	31.2455%	29.0202%
46	0.3887%	0.3207%	99	32.8638%	30.6654%
47	0.4209%	0.3534%	100	34.3180%	32.1584%
48	0.4499%	0.3849%	101	35.8628%	33.7521%
49	0.4756%	0.4150%	102	37.1685%	35.1259%
50	0.4980%	0.4431%	103	38.3040%	36.3671%
51	0.5684%	0.5156%	104	39.2003%	37.3834%
52	0.6418%	0.5928%	105	39.7886%	38.1051%
53	0.7182%	0.6740%	106	40.0000%	38.4698%
54	0.7975%	0.7583%	107	40.0000%	38.6325%
55	0.8797%	0.8440%	108	40.0000%	38.8076%
56	0.9396%	0.9048%	109	40.0000%	38.9794%
57	0.9993%	0.9604%	110	100.0000%	50.0000%
58	1.0591%	1.0101%	111	N/A	50.0000%
59	1.1189%	1.0536%	112	N/A	50.0000%
60	1.1786%	1.0919%	113	N/A	50.0000%
61	1.3009%	1.1835%	114	N/A	50.0000%
62	1.4200%	1.2676%	115	N/A	50.0000%
63	1.5358%	1.3473%	116	N/A	50.0000%
64	1.6484%	1.4238%	117	N/A	50.0000%
65	1.7577%	1.4985%	118	N/A	50.0000%
66	1.9030%	1.6059%	119	N/A	50.0000%
67	2.0483%	1.7146%	120	N/A	100.0000%

NEW YORK CITY POLICE PENSION FUND

PROBABILITIES OF MORTALITY FOR BENEFICIARIES
BASE TABLE
FEMALES

Age	Current	Proposed	Age	Current	Proposed
15	N/A	0.0092%	68	1.5930%	1.3605%
16	N/A	0.0112%	69	1.6707%	1.4332%
17	N/A	0.0122%	70	1.7416%	1.5007%
18	N/A	0.0133%	71	1.9340%	1.6745%
19	0.0175%	0.0143%	72	2.1220%	1.8463%
20	0.0177%	0.0145%	73	2.3059%	2.0157%
21	0.0180%	0.0153%	74	2.4854%	2.1838%
22	0.0181%	0.0161%	75	2.6609%	2.3492%
23	0.0185%	0.0171%	76	3.0053%	2.6652%
24	0.0189%	0.0183%	77	3.3498%	2.9831%
25	0.0196%	0.0195%	78	3.6942%	3.3011%
26	0.0204%	0.0208%	79	4.0386%	3.6207%
27	0.0213%	0.0221%	80	4.3831%	3.9391%
28	0.0224%	0.0236%	81	4.9279%	4.4386%
29	0.0237%	0.0252%	82	5.4831%	4.9473%
30	0.0254%	0.0270%	83	6.0487%	5.4665%
31	0.0312%	0.0330%	84	6.6246%	5.9942%
32	0.0366%	0.0384%	85	7.2110%	6.5354%
33	0.0418%	0.0431%	86	8.2234%	7.4659%
34	0.0466%	0.0471%	87	9.2358%	8.3995%
35	0.0518%	0.0511%	88	10.2481%	9.3428%
36	0.0563%	0.0542%	89	11.2605%	10.2918%
37	0.0617%	0.0579%	90	12.2729%	11.2477%
38	0.0674%	0.0618%	91	14.0131%	12.8868%
39	0.0741%	0.0666%	92	15.6962%	14.4887%
40	0.0812%	0.0719%	93	17.3412%	16.0801%
41	0.0883%	0.0775%	94	18.8767%	17.5854%
42	0.0980%	0.0859%	95	20.3531%	19.0626%
43	0.1100%	0.0968%	96	21.5243%	20.2474%
44	0.1247%	0.1111%	97	22.5407%	21.2937%
45	0.1422%	0.1287%	98	23.2572%	22.0663%
46	0.1626%	0.1501%	99	23.6605%	22.5443%
47	0.1854%	0.1748%	100	23.6704%	22.6473%
48	0.2102%	0.2022%	101	24.4834%	23.5294%
49	0.2367%	0.2319%	102	25.4498%	24.5619%
50	0.2646%	0.2633%	103	26.6044%	25.7825%
51	0.2983%	0.2999%	104	27.9055%	27.1635%
52	0.3346%	0.3376%	105	29.3116%	28.6530%
53	0.3736%	0.3762%	106	30.7811%	30.2169%
54	0.4156%	0.4151%	107	32.2725%	31.8182%
55	0.4608%	0.4540%	108	33.7441%	33.4131%
56	0.5300%	0.5132%	109	35.1544%	34.9566%
57	0.6048%	0.5735%	110	100.0000%	50.0000%
58	0.6846%	0.6353%	111	N/A	50.0000%
59	0.7688%	0.6981%	112	N/A	50.0000%
60	0.8572%	0.7631%	113	N/A	50.0000%
61	0.9519%	0.8329%	114	N/A	50.0000%
62	1.0318%	0.8908%	115	N/A	50.0000%
63	1.1100%	0.9493%	116	N/A	50.0000%
64	1.1932%	1.0146%	117	N/A	50.0000%
65	1.2814%	1.0876%	118	N/A	50.0000%
66	1.3758%	1.1681%	119	N/A	50.0000%
67	1.4817%	1.2609%	120	N/A	100.0000%

NEW YORK CITY POLICE PENSION FUND

ANNUAL RATES OF MERIT AND SALARY INCREASE

Years of Service	Current		Proposed	
	Merit Increase	Salary Increase*	Merit Increase	Salary Increase*
0	0.00%	3.00%	0.00%	3.00%
1	4.00%	7.00%	5.00%	8.00%
2	10.00%	13.00%	11.00%	14.00%
3	12.00%	15.00%	14.00%	17.00%
4	18.00%	21.00%	20.00%	23.00%
5	33.00%	36.00%	38.00%	41.00%
6	1.40%	4.40%	1.60%	4.60%
7	1.60%	4.60%	1.80%	4.80%
8	1.80%	4.80%	2.00%	5.00%
9	3.20%	6.20%	3.60%	6.60%
10	2.00%	5.00%	2.30%	5.30%
11	1.90%	4.90%	2.20%	5.20%
12	1.80%	4.80%	2.10%	5.10%
13	1.70%	4.70%	2.00%	5.00%
14	2.90%	5.90%	3.30%	6.30%
15	1.50%	4.50%	1.70%	4.70%
16	1.40%	4.40%	1.60%	4.60%
17	1.30%	4.30%	1.50%	4.50%
18	1.20%	4.20%	1.40%	4.40%
19	2.40%	5.40%	2.70%	5.70%
20	1.00%	4.00%	1.20%	4.20%
21	0.90%	3.90%	1.00%	4.00%
22	0.80%	3.80%	0.90%	3.90%
23	0.70%	3.70%	0.80%	3.80%
24	0.60%	3.60%	0.70%	3.70%
25	0.50%	3.50%	0.60%	3.60%
26	0.50%	3.50%	0.50%	3.50%
27	0.50%	3.50%	0.50%	3.50%
28	0.50%	3.50%	0.50%	3.50%
29	0.50%	3.50%	0.50%	3.50%
30+	0.50%	3.50%	0.50%	3.50%

*Salary Increase is the General Wage Increase of 3.00% plus the Merit Increase.

NEW YORK CITY POLICE PENSION FUND

BASELINE OVERTIME ASSUMPTIONS

Years of Service	Current	Proposed
0-22	15.00%	17.00%
23	14.00%	16.00%
24	13.00%	15.00%
25	12.00%	14.00%
26	11.00%	13.00%
27	10.00%	12.00%
28	9.00%	10.00%
29	8.00%	9.00%
30	7.00%	8.00%
31+	6.00%	7.00%

NEW YORK CITY POLICE PENSION FUND

DUAL SERVICE OVERTIME ASSUMPTIONS

Years of Service	Tier 1 & Tier 2		Tier 3 & Tier 3 Revised	
	Current	Proposed	Current	Proposed
0-22	18.00%	21.00%	17.00%	20.00%
23	17.00%	20.00%	16.00%	18.00%
24	16.00%	18.00%	15.00%	17.00%
25	15.00%	17.00%	14.00%	16.00%
26	14.00%	16.00%	13.00%	15.00%
27	13.00%	15.00%	12.00%	14.00%
28	12.00%	14.00%	11.00%	13.00%
29	11.00%	13.00%	10.00%	12.00%
30	10.00%	12.00%	9.00%	10.00%
31	9.00%	10.00%	8.00%	9.00%
32+	8.00%	9.00%	7.00%	9.00%

NEW YORK CITY POLICE PENSION FUND

DUAL DISABILITY OVERTIME ASSUMPTIONS

Years of Service	Tier 1 & Tier 2 Current & Proposed	Tier 3 & Tier 3 Revised Current & Proposed
0-15	8.00%	12.00%
16	9.00%	12.00%
17	10.00%	13.00%
18	11.00%	13.00%
19	12.00%	14.00%
20	12.00%	14.00%
21	12.00%	14.00%
22	12.00%	14.00%
23	11.00%	13.00%
24	10.00%	12.00%
25	9.00%	11.00%
26	8.00%	10.00%
27	7.00%	9.00%
28	6.00%	8.00%
29	6.00%	7.00%
30+	6.00%	6.00%

Appendix C

APPENDIX C

DRAFT RESOLUTION

PROPOSED CHANGES IN
ACTUARIAL ASSUMPTIONS AND METHODS

The following Resolution is presented to the Board of Trustees of the New York City Police Pension Fund (POLICE) for consideration and adoption:

WHEREAS, Bolton, Inc. (Bolton) has recommended updating certain assumptions and methods based on a study of actuarial experience of the five actuarially-funded New York City Pension Fund and Retirement Systems; and

WHEREAS, The Actuary has reviewed the recommendations made by Bolton and has proposed changes in certain actuarial assumptions and methods as presented in a Report dated January 2, 2019 entitled "Proposed Changes in Actuarial Assumptions and Methods used in Determining Employer Contributions for Fiscal Years Beginning on and After July 1, 2018 for the New York City Police Pension Fund"; and

WHEREAS, Certain components of the Actuary's proposed changes require action by the Retirement Board; and

WHEREAS, The Board has reviewed the Actuary's proposed changes in actuarial assumptions and methods; now therefore, be it

RESOLVED, That the Board accepts the Actuary's January 2, 2019 Report and supports the proposed changes in actuarial assumptions and methods; and be it further

RESOLVED, That the Board adopts those actuarial assumptions requiring Board approval (i.e. the demographic and economic assumptions presented as Appendix B of the January 2, 2019 Report); and be it further

RESOLVED, That the Board requests that the Corporation Counsel develop, with the review and assistance of the Actuary, and that the New York State Legislature and Governor enact, legislation to continue components of the Actuary's proposed changes in actuarial assumptions and methods that require legislation (e.g. Actuarial Interest Rate).

Respectfully Submitted:

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Kevin Holloran
Executive Director