



Maryland Transit Administration Pension Plan

Actuarial Valuation

As of July 1, 2019

Date of Report: October 10, 2019

Bolton

Submitted by:

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Employee Benefits, Actuarial & Investment Consulting

October 10, 2019

Heidi Tarleton
Deputy Chief Financial Officer
Maryland Transit Administration
6 St. Paul Street, 8th Floor
Baltimore, MD 21202

Dear Heidi:

The following sets forth the actuarial valuation of the Maryland Transit Administration Pension Plan as of July 1, 2019. Section 1 of the report provides the executive summary while Sections 2 through 6 contain the development of the actuarially determined contribution for the 2020 fiscal year along with a summary of the census and asset data, plan provisions, assumptions and actuarial methods. Section 7 provides a glossary of many of the terms used in this report. The appendices of the report provide information for financial reporting as well as a 10-year projection of benefit payments and an actuarial certification.

We are available to answer any questions regarding the material in this report or to provide explanations or further details as appropriate. The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report. We are not aware of any direct or material indirect financial interest or relationship, including investments or other services that could create a conflict of interest, that would impair the objectivity of our work.

Respectfully submitted,

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Section I. Executive Summary

Background

Bolton Partners, Inc. has prepared the following report that sets forth the actuarially determined contribution for FYE 2020 for the Maryland Transit Administration Pension Plan.

Actuarially Determined Contribution (ADC)

While the actuarially determined contribution has decreased from \$64.6 million to \$55.2 million, the results are close to expected and the actuarial loss is less than 1 percent of the liability. The decrease was largely due to two factors. A large initial base that was set up in 2002 became fully amortized, which decreased the amortization charge and ADC by \$12.6 million. All remaining amortization bases were consolidated as of 7/1/2019 to be paid over 25 years. This resetting of the amortization period decreased the ADC by \$10.4 million.

These decreases in the ADC were partially offset by the asset smoothing method and contributions to the plan which increased the ADC by \$2.6 million. There was also an increase in the ADC due to the plan change for the Local 1300 Union, which granted COLAs to retirees and beneficiaries through 2021. The COLA amendment increased the ADC by \$10.8 million. Although the ADC decreased, there was a large loss of over \$17 million due to the actual FYE 2019 contribution being less than the ADC.

Actuarially Determined Contribution	FYE 2019	FYE 2020
Actuarially Determined Contribution	\$64,648,783	\$55,213,341
Percent of total base payroll ¹	43.55%	36.87%

Employee Contribution Treatment

Asset information was provided by the State Retirement Agency (SRA) and the MTA. Employee contributions were instituted in July 2016. At the time SRA recommended reimbursing MTA for the monthly pension benefit payments net of the employee contributions rather than accepting the employee contributions from MTA and then simultaneously reimbursing MTA for the full amount of the payments. The effect on the assets of the Plan would have been the same. The FYE 2017 and FYE 2018 financial statements properly reflected the employee contributions and total plan assets. In FYE 2019 MTA contributed one lump sum amount equal to the employee contributions for FYE 2017, FYE 2018 and an estimated amount for FYE 2019. The FYE 2019 actual employee contributions were less than the estimated amount. The employee contributions for FYE 2017 and FYE 2018 paid to SRA by MTA in FYE 2019 were overpayments to the trust based on the previous treatment mentioned above. Therefore, MTA is due a refund in FYE 2020 for this amount along with a refund for the excess of the estimated FYE 2019 employee contributions over the actual amount.

¹ Although the ADC is shown here as a percentage of base payroll, Plan benefits are based on total remuneration including overtime, limited to 2,392 pay hours in each calendar year.



Section I. Executive Summary

Summary of Plan Results

	7/1/2018	7/1/2019	% Change
Participant Counts			
Active	2,638	2,642	0.15%
Participants Receiving a Benefit	1,933	1,950	0.88%
Terminated Vested Participants	521	550	5.57%
Total	5,092	5,142	0.98%
Annual Base Pay of Active Members	\$148,444,632	\$149,767,952	0.89%
Assets and Liabilities			
Actuarial Liability	\$735,810,303	\$789,044,109	7.23%
Actuarial Value of Assets	<u>\$316,454,023</u>	<u>\$339,002,828</u>	7.13%
Unfunded Actuarial Liability ²	\$419,356,280	\$450,041,281	7.32%
Funded Ratio	43.01%	42.96%	(0.10%)
Contributions			
Employer Normal Cost	\$8,614,037	\$8,831,433	2.52%
Amortization Payment	<u>\$56,034,746</u>	<u>\$46,381,908</u>	(17.23%)
Actuarially Determined Contribution	\$64,648,783	\$55,213,341	(14.59%)
Assumed Payment Date	09/01/2018	09/01/2019	

Experience Analysis

The following factors affected the actuarially determined contribution:

- The final installment of the initial amortization base established in the July 1, 2002 valuation was recognized in the FYE 2019 ADC, and therefore, it is not included in the amortization component of the FYE 2020 ADC. This decreased the ADC by \$12.6 million.
- Effective July 1, 2019, all existing amortization bases were consolidated to be paid over a 25-year period. This resulted in a decrease to the ADC of \$10.4 million.
- The asset smoothing method and contributions to the plan which increased the ADC by \$2.6 million
- Lowering the discount rate from 7.50% to 7.45% to keep in line with the State assumption and incorporating all the assumption changes discussed in the experience study report dated August 16, 2019 increased the by ADC \$0.2 million.
- The bargained COLA's for the Local 1300 Union participants increased the ADC by \$10.8 million.

² The increase in the Unfunded Actuarial Liability is largely due to actual employer contributions being lower than the ADC. It accounts for over \$17 million of the over \$23 million increase in the UAL.



Section I. Executive Summary

Demographic Assumptions

The demographic assumptions were reviewed as part of the experience study, report dated August 16, 2019. All changes that were proposed in the experience study were incorporated into this valuation. A detailed summary of these assumptions can be found in Section 6.

Economic Assumptions

The economic assumptions were reviewed as part of the experience study and are discussed in the report dated August 16, 2019. All changes that were proposed in the report were incorporated into this valuation. A detailed summary of these assumptions can be found in Section 6.

Changes in Method, Assumptions, and Plan Amendments

The following changes to actuarial assumptions, methods, and plan provisions are reflected in this valuation:

- As discussed above, all demographic and economic assumptions evaluated in the experience study report dated August 16, 2019 have been updated to the study's proposed assumptions.
- Effective July 1, 2019 all prior amortization bases were consolidated and amortized over 25 years.
- COLA awards were granted for Local 1300 Union retirees and beneficiaries who have been receiving payments for at least 13 months on August 1, 2018, August 1, 2019, August 1, 2020, and August 1, 2021.
- All Local 1300 Union employees will contribute 3% of earnings to the plan effective July 1, 2019 and 4% of earnings to the plan effective July 1, 2020.

Projection of Expected Benefit Payments

The projection of expected benefit payments is shown in Appendix 3.

Sources of Information

The July 1, 2019 participant data and market value of assets were provided by, or at the direction of, the MTA. While we have reviewed this data for consistency and completeness, we have not audited this data.

Actuarial Statement

We are available to answer any questions on the material in this report or to provide explanations or further details as appropriate. As noted in the Actuarial Certification in Appendix 5, we believe that the actuarial assumptions and methods used in this report are reasonable and appropriate for the purposes of this report, and fairly present the current financial situation of the Plan.



Section II. Actuarial Costs

Liabilities

Below is a summary of the actuarial accrued liability of future benefits expected to be paid from the Plan.

Unfunded Liability

<hr/>	
1. Actuarial accrued liability at July 1, 2019	
a. Active participants	\$ 369,725,128
b. Vested terminated participants	23,798,026
c. Retired participants, QDRO's, and beneficiaries	329,966,347
d. Disabled participants and disabled beneficiaries	<u>65,554,608</u>
e. Total	789,044,109
2. Actuarial asset value at July 1, 2019	339,002,828
3. Unfunded actuarial liability at July 1, 2019 (1.e. - 2.)	450,041,281
4. Funded ratio on July 1, 2019 (2. ÷ 1.e)	42.96%



Section II. Actuarial Costs

Reconciliation of Unfunded Liability

1. Unfunded actuarial liability at July 1, 2018	\$ 419,356,280
2. Normal cost at July 1, 2018	8,510,831
3. Interest on (1. + 2.) to June 30, 2019 at 7.50% per annum	32,090,033
4. Expected contribution	64,648,783
5. Interest on contribution to June 30, 2019 at 7.50% (contribution is assumed to be made as of September 1st)	4,016,003
6. Projected unfunded actuarial liability at July 1, 2019 (1. + 2. + 3. - 4. -5.)	391,292,358
7. Change in unfunded actuarial liability due to changes in plan (Increased contributions for Local 1300 employees)	261,181
8. Change in unfunded actuarial liability due to changes in actuarial assumptions (discount rate, decrement change)	208,201
9. Change in unfunded actuarial liability due to COLA's for Local 1300 Union through 2021	29,831,247
10. Expected unfunded actuarial liability at July 1, 2019 (6. + 7. + 8. + 9.)	421,592,987
11. Actual unfunded actuarial liability at July 1, 2019	450,041,281
12. Actuarial gain/(loss) at July 1, 2019 (10. - 11.)	(28,448,294)



Section II. Actuarial Costs

Normal Cost

Normal Cost	7/1/2018	7/1/2019
1. Retirement benefits	\$ 7,661,313	\$ 8,090,608
2. Vested termination benefits	659,563	678,005
3. Preretirement death benefits	153,865	178,371
4. Disability benefits	2,811,505	2,543,108
5. Employee Contributions	(2,775,415)	(2,763,793)
6. Total normal cost (1. + 2. + 3. + 4. + 5.)	8,510,831	8,726,299
7. Interest on normal cost to September 1	<u>103,206</u>	<u>105,134</u>
8. Projected normal cost for plan year (6. + 7.)	8,614,037	8,831,433

Actuarially Determined Contribution

The breakdown of the actuarially determined contribution into normal cost and amortization payment is illustrated below.

Contributions are assumed to be made on September 1. The amortization payment for the unfunded actuarial liability is determined assuming payment as of September 1 of each year and the normal cost, which is determined as of July 1 is adjusted to September 1 as well.

Actuarially Determined Contribution	FYE 2019	FYE 2020
1. Normal cost	\$ 8,614,037	\$ 8,831,433
2. Amortization amount	<u>56,034,746</u>	<u>46,381,908</u>
3. Actuarially determined contribution (1. + 2.)	64,648,783	55,213,341
4. Base payroll ³	148,444,632	149,767,952
5. Contribution as a percentage of base payroll	43.55%	36.87%

³ Although the ADC is shown here as a percentage of base payroll, Plan benefits are based on total remuneration including overtime, limited to 2,392 pay hours in each calendar year.



Section II. Actuarial Costs

Amortizations

Description	Date Established	Initial Amount	Initial Amortization Years	7/1/2019 Outstanding Balance	Remaining Amortization Years	9/1/2019 Amortization Amount
Initial	7/01/2019	391,292,358	25	391,292,358	25	32,917,951
Plan Amendment (COLA Award)	7/01/2019	29,831,247	3	29,831,247	3	10,794,698
Assumption Change	7/01/2019	208,201	20	208,201	20	19,163
Plan Amendment	7/01/2019	261,181	12	261,181	12	31,719
Experience Loss	7/01/2019	28,448,294	20	28,448,294	20	2,618,377
Total				450,041,281		46,381,908



Section III. Valuation Assets

Reconciliation of Assets

Below is a reconciliation of assets from the prior valuation date of July 1, 2018 to the current valuation date of July 1, 2019.

	7/01/2018 to 6/30/2019
(1) Beginning of year assets	
(a) Beginning of year assets	\$298,446,827
(b) Market Value Adjustment	0
(c) Adjusted beginning of year assets	\$298,446,827
(2) Additions	
(a) Employer contributions	\$41,597,059
(b) Employee contributions ⁴	3,005,759
(c) Investment income & Dividends	18,083,636
(d) Increase/(Decrease) in Market Value of Investments ⁵	12,939,994
(e) Total receipts [(a) + (b) + (c) + (d)]	\$75,626,448
(3) Deductions	
(a) Benefit payments	\$42,723,850
(b) Administrative expenses	2,325,372
(c) Investment expenses	0
(d) Total disbursements [(a) + (b) + (c)]	\$45,049,222
(4) Net increase [2(e) – 3(d)]	\$30,577,226
(5) Net assets [1(c) + 4]	\$329,024,053
(6) Refund Due⁶	\$6,719,636
(7) Market Value of Assets as of July 1, 2019 [5 – 6]	\$322,304,417

⁴ Assumes employee contributions were contributed to the trust during 2019.

⁵ includes the overpayments in FYE 2019 for the FYE 2017, FYE 2018, and FYE 2019 employee contributions to be refunded and reflected on Line 6

⁶ The refund due to the plan is comprised of FYE 2017 employee contributions in the amount of \$3,094,029, FYE 2018 employee contributions in the amount of \$3,315,683, and overpayments in employee contributions for FYE 2019 in the amount of \$309,924.



Section III. Valuation Assets

Calculation of Actuarial Asset Value

The actuarial asset value represents a “smoothed” value developed by the actuary to reduce the volatile results that could develop due to short-term fluctuations in the market value of assets. The actuarial value of assets is equal to the expected actuarial value of assets, plus one-fifth of the difference between the actual market value and the expected actuarial value of assets.

1. Actuarial Value of Assets as of July 1, 2018	\$ 316,454,023
2. Contributions for the 2018 - 2019 plan year	41,597,059
3. Employee Contributions for the 2018 - 2019 plan year	3,005,759
4. Benefit payments during the 2018 - 2019 plan year	42,723,850
5. Expected return at 7.50% interest	24,844,440
6. Expected assets as of June 30, 2019 (1. + 2. + 3. – 4. + 5.)	343,177,431
7. Market value of assets as of June 30, 2019	322,304,417
8. Asset gain/(loss) for 2018 - 2019 (7. – 6.)	(20,873,014)
9. Actuarial asset value as of July 1, 2019 (6. + (8. x 20%))	\$ 339,002,828
10. Actuarial asset value as a percentage of market value (9. / 7.)	105.18%



Section IV. Valuation Data

Counts

The following table summarizes the counts, ages and benefit information for plan participants used in this valuation. The previous valuation's data statistics have been provided for comparison purposes.

	July 1, 2018	July 1, 2019
(1) Actives		
(a) Number	2,638	2,642
(b) Average age	48.22	48.45
(c) Average service ⁷	12.89	13.37
(d) Average base salary	\$ 56,272	\$ 56,687
(2) Service retirements and beneficiaries		
(a) Number	1,497	1,480
(b) Average age	71.65	72.43
(c) Total monthly benefits	\$2,804,835	\$2,882,070
(3) Disability retirements		
(a) Number	415	449
(b) Average age	64.84	64.55
(c) Total monthly benefits	\$ 444,941	\$ 511,745
(4) Vested terminations (including deferred transfers)		
(a) Number	521	550
(b) Average age	54.42	55.00
(c) Total monthly benefits	\$ 334,120	\$ 371,451
(5) QDRO participants		
(a) Number	21	21
(b) Average age	65.48	66.48
(c) Total monthly benefits	\$ 19,532	\$ 19,546

⁷ Does not include .4 years of additional service added to all participants' years of service to account for sick leave and prior military service.



Section IV. Valuation Data

Active Age/Service Distribution including Compensation

Shown below is the distribution of active participants based on age and service. The compensation shown is the average projected base pay for the plan year beginning July 1, 2019.

	Years of Service									Total	
	Under 1	1 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 +		
Under 25	2	11	0	0	0	0	0	0	0	0	13
	44,824	41,916	0	0	0	0	0	0	0	0	42,363
25 - 29	13	65	13	1	0	0	0	0	0	0	92
	39,827	42,901	52,910	61,277	0	0	0	0	0	0	44,081
30 - 34	17	133	82	48	0	0	0	0	0	0	280
	36,908	43,096	59,360	59,352	0	0	0	0	0	0	50,270
35 - 39	12	102	50	101	26	0	0	0	0	0	291
	40,437	43,200	57,338	60,322	61,216	0	0	0	0	0	53,068
40 - 44	8	68	52	82	66	14	0	0	0	0	290
	37,029	43,715	56,433	61,025	61,808	61,423	0	0	0	0	55,678
45 - 49	17	74	58	70	73	49	3	0	0	0	344
	37,620	44,440	58,893	61,546	61,863	61,910	66,174	0	0	0	56,396
50 - 54	7	57	59	76	96	67	37	19	1	1	419
	35,764	43,523	59,770	59,008	61,776	63,282	64,482	65,282	64,875	58,720	
55 - 59	9	28	45	79	90	73	53	48	11	11	436
	38,205	42,041	59,068	60,001	61,346	63,181	64,852	62,777	65,237	60,139	
60 - 64	1	16	30	57	62	46	38	44	42	42	336
	37,066	45,553	59,085	58,710	61,544	63,721	63,715	64,012	66,593	61,507	
65 - 69	0	2	13	21	24	15	13	17	15	15	120
	0	55,338	58,520	57,849	63,907	62,490	59,847	62,012	61,030	60,875	
70 +	0	1	2	3	2	2	2	1	8	8	21
	0	39,832	55,349	56,465	64,043	58,874	64,147	45,718	70,125	61,942	
Total	86	557	404	538	439	266	146	129	77	77	2,642
	38,222	43,423	58,418	59,982	61,768	62,902	64,034	63,334	65,660	65,660	56,687

Averages	
Age:	48.45
Service:	13.37



Section IV. Valuation Data

Age Distribution of Inactive Participants Currently Receiving Benefits

Age	Beneficiary		Disabled		QDRO		Retiree		Total	
	Count	Benefit	Count	Benefit	Count	Benefit	Count	Benefit	Count	Benefit
Under 35	2	1,416	2	613	0	0	0	0	5	2,029
35 - 39	2	2,044	1	569	0	0	0	0	3	2,613
40 - 44	3	2,682	13	8,157	0	0	0	0	16	10,839
45 - 49	4	3,559	19	13,829	0	0	0	0	23	17,388
50 - 54	4	4,871	36	29,832	1	722	4	6,750	44	42,174
55 - 59	9	9,725	62	71,577	1	767	39	97,128	111	179,196
60 - 64	24	26,756	81	97,956	5	5,036	119	317,257	229	447,005
65 - 69	32	36,655	93	121,576	9	9,306	297	646,803	431	814,339
70 - 74	42	53,628	68	88,357	3	2,951	337	705,303	450	850,238
75 - 79	40	40,325	45	51,346	1	445	253	486,330	339	578,447
80 - 84	23	27,182	18	17,550	1	320	126	244,255	168	289,306
85 - 89	11	8,995	9	9,398	0	0	68	113,257	88	131,649
90 - 94	7	6,207	1	688	0	0	26	33,308	34	40,203
95 & over	1	430	1	298	0	0	7	7,207	9	7,935
Total	204	224,473	449	511,745	21	19,546	1,276	2,657,597	1,950	3,413,361

Age Distribution of Inactive Deferred Vested Participants

Age	Normal Retirement	
	Count	Benefit
Under 35	24	11,210
35 - 39	28	15,880
40 - 44	30	20,167
45 - 49	64	49,533
50 - 54	88	71,248
55 - 59	114	83,288
60 - 64	121	75,698
65 - 69	59	32,509
70 - 74	14	9,619
75 & over	8	2,299
Total	550	371,451



Section V. Summary of Principal Plan Provisions

Following is a summary of the major plan provisions used in the valuation of this Plan. The Maryland Transit Administration is solely responsible for the validity, accuracy, and comprehensiveness of this information. If any of the plan provisions shown below are not accurate and complete, the valuation results may differ significantly from those shown in this report and may require a revision of this report. Moreover, these plan provisions may be susceptible to different interpretations, each of which could be reasonable, and the different interpretations could lead to different valuation results.

Plan year

July 1 – June 30

Effective date of plan

January 8, 1950

Eligibility requirements

Any employee who is a member of The Amalgamated Transit Union, Local 1300, or the Office & Professional Employees International Union, Local No. 2, who is not included in the Maryland State Retirement and Pension System.

Any employee who is a member of the Police Local Union No. 1859, who is not included in the Law Enforcement Officers' Pension System (LEOPS) offered by the Maryland State Retirement and Pension System.

Any management employee who transferred from any of the bargaining units above. For purposes of this Plan, management employees are classified as Local 1300 employees

Eligible employees become participants immediately upon employment.

Normal form

Life annuity.

Vesting

The following table summarizes the vesting requirements for each bargaining unit:

Years of Service	Local 1300 & Management	Local 2	Police Local 1859
5	Hired before 5/18/2013	Hired before 7/1/2012	Hired before 1/1/2012
	Hired on or after 5/18/2013 and before 7/1/2016	Hired on or after 7/1/2012 and before 7/1/2016	Hired on or after 1/1/2012 and before 10/27/2017
7		Hired on or after 7/1/2016	Hired on or after 10/27/2017
10	Hired on or after 7/1/2016	Hired on or after 7/1/2016	Hired on or after 10/27/2017

Participants are considered 100% vested upon the attainment of early or normal retirement eligibility.



Section V. Summary of Principal Plan Provisions

Normal retirement date

First of the month coincident with or immediately following the earlier of:

- a. Attainment of age 65 and fully vested (as described above) or
- b. Attainment of age 52 with 30 years of service.

Normal retirement benefit

A monthly income payable for life that is equal to 1.70% of Average Compensation times years of service.

The above described benefit cannot be less than \$625 per month at age 65 with 25 years of service for Management, Local 2, and Local 1300 and \$450 per month for Local 1859.

The benefit is offset by a fixed amount for a group of former Allamerica Financial Program members.

Management members are also entitled to Minimum Alternate Benefits, if they are greater than the Plan benefit.

Compensation

Remuneration received as an MTA employee including overtime if eligible. Effective July 1, 2016 for Local 2 and Local 1300 and October 27, 2017 for Local 1859, participants' credited earnings shall not exceed the first 2,392 pay hours in any calendar year.

Average annual compensation

Average annual compensation is the average of the member's pensionable earnings for the three years over the last ten years of credited service that produces the highest average. Effective July 1, 2016 for Local 2 and Local 1300 and October 27, 2017 for Local 1859, credited earnings shall not exceed 2,392 pay hours in any calendar year.

Early retirement benefit eligibility

Attainment of age 55 with age plus years of service equal to at least 85.

Early retirement benefit

Normal Retirement Benefit calculated using credited service on the date of retirement (DOR), reduced by 4/12% each month preceding age 65 (if ≥ 60 at DOR) and 5/12% for each month preceding age 65 (if < 60 at DOR).



Section V. Summary of Principal Plan Provisions

Disability retirement eligibility

Vested, and certification by the State Medical Director.

Disability benefit

Normal Retirement Benefit based on Average Annual Compensation and years of creditable service at termination date, but not less than the amounts in the table below:

Years of Service	Minimum Monthly Benefit
100% Vesting	\$200
10	\$360
20	\$720

Termination benefits

Vested participants shall receive a benefit computed in the same manner as the Normal Retirement Benefit but the benefit is based on credited service, average compensation, and the benefit formula in effect on the date of termination. The benefit is paid monthly beginning at age 65 for the life of the member.

Pre-Retirement death benefit eligibility

Death of participant before commencement of benefits and after eligibility for normal or early retirement.

Pre-Retirement death benefit

The spouse will receive an allowance of 75% (50% for Police Local Union No. 1859) of the normal or early retirement benefit the member would have received if they had retired on the day before death and elected a 75% (50% for Police Local Union No. 1859) joint and survivor benefit.

Optional forms

- 50%, 75%, or 100% joint and survivor
- 50%, 75%, or 100% joint and survivor with pop-up option
- Partial lump sum of 5%, 10%, or 15% of accrued benefit plus a 50%, 75%, or 100% joint and survivor annuity.

Year of creditable service

Credited Service includes service with MTA, plus one month of service for every 20 days of unused sick leave. Part-time employees are credited service at the rate of one month for each 173 hours of work.

Section V. Summary of Principal Plan Provisions

COLA Increases

Pensions of retirees and beneficiaries, excluding members who retire from deferred vested status, who have been receiving payments for at least 13 months shall be granted a COLA on each of the following dates: 8/1/2014, 8/1/2015, 8/1/2016, 8/1/2017, and 8/1/2018. The Local 1300 union will also receive a COLA on each of the following dates: 8/1/2019, 8/1/2020, and 8/1/2021. The Local 1859 union will also receive a COLA on 8/1/2019. The percentage increase is equal to the increase in the Consumer Price Index (CPI-U, U.S. City Average, 1967=100) for the preceding fiscal year (July 1 to June 30), subject to a maximum increase of 3% annually.

Employee Contributions

Effective July 1, 2016 for Local 2 and Local 1300 and effective October 27, 2017 for Local 1859, employees shall contribute 2% of pensionable earnings to the MTA Pension Plan. Local 1300 participants contribution will increase to 3% effective July 1, 2019 and 4% effective July 1, 2020. Contributions shall continue until such time as the plan actuary certifies that the market value funded ratio equals or exceeds 100%. Once the 100% funded ratio is reached, employee contributions shall cease. If the funded ratio falls below 95%, employee contributions shall resume until the funded ratio returns to 100%. Employees who separate before becoming eligible for a Normal, Early, Disability, or Deferred Vested pension benefit shall be entitled to a return of their contributions plus interest computed at 5.0% compounded annually.

Changes in plan provisions since prior valuation

- The Local 1300 union will receive a COLA on each of the following dates: 8/1/2018, 8/1/2019, 8/1/2020, and 8/1/2021
- All Local 1300 employees will contribute 3% of earnings to the plan effective July 1, 2019 and 4% effective July 1, 2020.

Section VI. Valuation Assumptions and Methods

Economic Assumptions

Investment Rate of Return

The assumed annual net rate of return on investment (including appreciation and depreciation, realized and unrealized) is 7.45% (net of investment expenses). (7.50% for the prior year)

Salary Scale

Salaries are assumed to increase for individuals by 3.10% per year due to inflation, plus the following service based percentages due to merit and longevity:

Years of Service	Management	Maintenance/ Operators	All Others
0 – 5	0.50%	6.00%	4.00%
6 – 20	0.50%	0.25%	3.00%
21 – 29	0.50%	0.25%	1.00%
30+	0.50%	0.00%	0.50%

Pay increases are assumed to occur during the middle of the fiscal year.

Payroll Growth

The rate of annual growth of participant payroll is assumed to be 3.10%.

Inflation

Inflation as measured by the Consumer Price Index (CPI) will increase at the rate of 3.10% per year.

Cost-of-Living Adjustments

A 2.10% Cost-of-Living adjustment is assumed for the Local 1300 union as of August 1, 2018, August 1, 2019, August 1, 2020, and August 1, 2021. There are no other Cost-of-Living adjustments assumed for purposes of this valuation.



Section VI. Valuation Assumptions and Methods

Demographic Assumptions

Mortality

For Healthy Participants: RP-2014 Blue Collar table, fully generational, projected using scale MP-2018.

For Disabled Participants: RP-2014 Disabled table, fully generational, projected using scale MP-2018.

Projection to the year of the valuation is assumed to be current experience. The generational projection beyond the year of the valuation is assumed to account for future mortality improvements.

Retirement Rates

Retirement Rates are shown below:

Age	Management	Maintenance	All Others
< 52	0%	0%	0%
52	15%	5%	8%
53	15%	5%	8%
54	15%	5%	8%
55	15%	5%	8%
56	15%	5%	8%
57	20%	5%	8%
58	20%	5%	8%
59	20%	5%	8%
60	20%	10%	10%
61	20%	10%	20%
62	25%	15%	20%
63	25%	15%	20%
64	25%	20%	20%
65	25%	25%	20%
66	25%	25%	25%
67	25%	25%	25%
68	25%	25%	25%
69	25%	25%	25%
70	100%	25%	25%
71	100%	25%	15%
72	100%	20%	15%
73	100%	20%	15%
74	100%	20%	15%
>= 75	100%	100%	100%



Section VI. Valuation Assumptions and Methods

Demographic Assumptions

Termination of employment

Withdrawal Rates are shown below:

Years of Service	Management	Maintenance	Operators	All Others
0	33.00%	15.00%	17.00%	20.00%
1	25.00%	7.00%	12.00%	20.00%
2	18.00%	5.00%	5.50%	15.00%
3	15.00%	5.00%	5.50%	10.00%
4	12.50%	5.00%	5.00%	6.00%
5	10.00%	4.00%	3.50%	6.00%
6	5.50%	3.00%	2.50%	6.00%
7	5.50%	0.50%	2.50%	6.00%
8	5.50%	0.50%	2.50%	4.00%
9	5.50%	0.50%	2.50%	4.00%
10	5.50%	0.50%	1.50%	4.00%
11	5.50%	0.00%	1.50%	4.00%
12	5.50%	0.00%	1.50%	4.00%
13	5.50%	0.00%	1.50%	2.00%
14	5.50%	0.00%	1.50%	2.00%
15	3.50%	0.00%	1.50%	2.00%
16	3.50%	0.00%	1.50%	2.00%
17	3.50%	0.00%	1.50%	2.00%
18	3.50%	0.00%	1.50%	2.00%
19	3.50%	0.00%	1.50%	2.00%
20	1.50%	0.00%	1.00%	0.00%
21	1.50%	0.00%	1.00%	0.00%
22	1.50%	0.00%	1.00%	0.00%
23	1.50%	0.00%	1.00%	0.00%
24	1.50%	0.00%	1.00%	0.00%
25+	0.00%	0.00%	0.00%	0.00%

Section VI. Valuation Assumptions and Methods

Demographic Assumptions

Disability Rates

Disability Rates are shown below:

Age	Annual Percentage of Disablement
20	0.19%
30	0.27%
40	0.46%
50	0.65%
60	1.98%

Marital status and age of spouse

85% of plan members are assumed to be married. Male spouses are assumed to be three years older than their wives.

Form of payment

All participants are assumed to elect payment in the form of a single life annuity.

Cost Method

The actuarial valuation is completed on the basis of the entry age normal cost method calculated on an individual basis with level dollar normal cost. The unfunded actuarial accrued liability (UAAL) is amortized with level payments over:

- Effective July 1, 2019, all existing amortization bases were consolidated to be paid over 25 years.
- 20 years for experience gains and losses after 2002
- 20 years for assumption and method changes
- COLA awards are amortized over the life of the contract in which they are negotiated
- Benefit awards and plan changes are amortized over the expected future working lifetime of the entire active population

Method for Determining Actuarial Value of Assets

The actuarial asset value represents a “smoothed” value developed by the actuary to reduce the volatile results which could develop due to short-term fluctuations in the market value of assets. The actuarial value of assets is equal to the expected actuarial value of assets, plus one-fifth of the difference between the actual market value and the expected actuarial value of assets. This method may result in a bias that is above or below the market value of assets.

Section VI. Valuation Assumptions and Methods

Other Assumptions

- An additional 0.4 years of service is assumed for all members to account for sick leave conversion and prior military time.
- An additional pay load is assumed to account for expected overtime. For Local 1300 members (as well as management personnel who bargain with the Local 1300 Union), the amount is assumed to be 15% of their salary, and for all others, the load is assumed to be 10% of salary. No overtime pay load is assumed for management members who are not in the Local 1300 Union.
- Part-time members are assumed to accrue one-half year of service credit each year.
- A 1% load is applied for retirees who have elected a joint and survivor option that includes a pop-up provision.
- The management personnel who bargain under the Local 1300 Union and are subject to the same plan provisions and benefits were identified for purposes of this valuation through a list provided by the MTA.
- Benefit service was calculated using the Pension Eligibility date provided in the data.
- There were 30 people who terminated after attaining 100% vesting. Their retirement benefit was estimated for purposes of this valuation.
- The Job code field provided on the data was used to determine employees in the maintenance group classification as follows:

Job Code – Maintenance Employees		
Repairman - Catenary	Repairman-Plumber	Janitor Rail
Repairman - Elect/Mech	Repairman-Welder	Leadman - Repairman A
Repairman - Facilities	Rep-Electrician-Skld	Leadman - Technician
Repairman - Locksmith	Rep-Hvac-Skld	Repairman - Bus
Repairman - Machinist	Rep-Locksmith-Skld	Repairman - Rail
Repairman - Syst Maint	Rep-Mason/Carp-Skld	Repairman B - Bus
Repairman - Track/Way	Rep-Plumber-Skld	Repairman B - Rail
Repairman Heavy Equip	Rep-Welder-Skld	Repairman C - Bus
Repairman Mason Carpen	Cleaner – Rail	Repairman C - Rail
Repairman Mechanic	Cleaner – Bus	Shipping Clerk
Repairman Rail Car Mnt	Cleaner B – Bus	Storeroom Attendant
Repairman-Electrician	Janitor – Bus	Technician - Bus
Repairman-Hvac	Janitor Bus	Technician - Rail



Section VI. Valuation Assumptions and Methods

Changes in Assumptions and Cost Method

- The assumption for the discount rate/investment return (net of investment expenses) was lowered from 7.50% to 7.45%.
- The decrement assumptions for mortality, termination, retirement, and disability were updated based on an experience study completed August 16, 2019.
- The salary scale, payroll growth, and inflation assumptions were updated based on the experience study completed August 16, 2019.
- COLA's were assumed to be paid for the Local 1300 union on 8/1/2018, 8/1/2019, 8/1/2020, and 8/1/2021.
- Effective July 1, 2019, all existing amortization bases were consolidated to be paid over 25 years. Future experience and assumption changes are assumed to be amortized over 20 years.

Section VII. Glossary

Accumulated Plan Benefits Actuarial Gain or Loss:

Amortization payment/credit actuarial present value.

Actuarial Accrued Liability (AAL):

The difference between the Actuarial Present Value of Future Benefits and the Actuarial Present Value of Future Normal Costs or the portion of the present value of future benefits allocated to service before the valuation date in accordance with the actuarial cost method.

Actuarial Asset Valuation Method:

The method of determining the value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the Actuarially Determined Contribution (ADC).

Actuarial Cost Method:

A procedure for allocating the Actuarial Present Value of Future Benefits and the Actuarial Present Value of Future Normal Costs and the Actuarial Accrued Liability. Also known as the “funding method”.

Actuarial Present Value of Future Benefits (APVFB):

The Actuarial Present Value of amounts that are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.

Aggregate Cost Method:

An actuarial cost method that spreads the cost of all future benefits in excess of plan assets as a level percentage of future salary or service. The actuarial accrued liability is set to the value of assets in this method.

Actuarially Determined Contributions of the Employer(s) (ADC):

The employer’s periodic contributions to a pension plan, calculated in accordance with the parameters.

Cost-of-Living Adjustment (COLA):

The annual increase in the amount of a retired participant’s benefit, intended to adjust the benefit for inflation.

Covered Group:

Plan members who are included in an actuarial valuation.

Deferred Retirement Option Program (DROP):

A program allowing a participant, who is eligible to retire, to continue working for a fixed period of time, while accumulating the benefit payments he would have received if he had retired on his entry to DROP.



Section VII. Glossary

Demographic Assumption:

The assumptions regarding the future population of pension participants. This includes retirement, termination, disability, and mortality assumptions.

Economic Assumptions:

The assumptions regarding future economic factors, including COLA, salary improvement, change in average wages, changes in Social Security benefits, and investment returns.

Employer's Contributions:

The Contributions made in relation to the actuarially determined contributions of the employer (ADC). An employer has made a contribution in relation to the ADC if the employer has (a) made payments of benefits directly to or on behalf of a retiree or beneficiary, (b) made premium payments to an insurer, or (c) irrevocably transferred assets to a trust, or an equivalent arrangement, in which plan assets are dedicated to providing benefits to retirees and their beneficiaries in accordance with the terms of the plan and are legally protected from creditors of the employer(s) or plan administrator.

Entry Age Normal (EAN) Cost Method:

An actuarial cost method that spreads the cost for each individual's expected benefits over their career, either as a level percentage of pay or service. The actuarial accrued liability is the accumulated value of all past normal cost, and the unfunded accrued liability (surplus) is the excess of the AAL over the value of assets.

Expenses:

Plan expenses paid by the plan are divided into administrative and investment related expenses.

Funded Ratio:

The actuarial value of assets expressed as a percentage of the plan's actuarial accrued liability.

GASB:

Government Accounting Standards Board

GASB No. 25 and GASB No. 27:

These are the government accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 27 sets the accounting rules for the employers that sponsor or contribute to public retirement systems while Statement No. 25 sets the rules for the systems themselves.

GASB No. 67 and GASB No. 68:

The government standards that replaced GASB 25 and 27. They are effective for plan years beginning after June 14, 2013 and employer fiscal years beginning after June 14, 2014.

Investment Return Assumption or Investment Rate of Return (Discount Rate):

The rate used to adjust a series of future payments to reflect the time value of money.

Section VII. Glossary

Level Percentage of Projected Payroll Amortization Method:

Amortization payments are calculated so that they are a constant percentage of the projected payroll of active plan members over a given number of years. The dollar amount of the payments generally will increase over time as payroll increases due to inflation; in dollars adjusted for inflation, the payments can be expected to remain level.

Normal Cost or Normal Actuarial Cost:

The portion of the Actuarial Present Value of pension plan benefits and expenses that is allocated to a valuation year by the Actuarial Cost Method.

Pay-as-you-go (PAYG):

A method of financing a benefits plan under which the contributions to the plan are generally made at about the same time and in about the same amount as benefit payments and expenses becoming due.

Payroll Growth Rate:

An actuarial assumption with respect to future increases in total covered payroll attributable to inflation; used in applying the level percentage of projected payroll amortization method.

Plan Liabilities:

Obligations payable by the plan at the reporting date, primarily including, benefits and refunds due and payable to plan members and beneficiaries, and accrued investment and administrative expenses. Plan liabilities do not include actuarial accrued liabilities for benefits that are not due and payable at the reporting date.

Plan Members:

The individuals covered by the terms of a Pension or OPEB plan. The plan membership generally includes employees in active service, terminated employees who have accumulated benefits but are not yet receiving them, and retired employees and beneficiaries currently receiving benefits.

Projected Unit Credit (PUC) Funding Method:

An actuarial cost method that spreads the employee's benefit over their career, as a level percentage of service. The normal cost is the present value of the portion of the benefit assigned to the current year. The actuarial accrued liability is the accumulated value of all past normal cost, and the unfunded accrued liability (surplus) is the excess of the AAL over the value of assets.

Post-employment:

The period between termination of employment and retirement as well as the period after retirement.

Salary Improvement:

An actuarial assumption regarding the increase in employees' salaries, reflecting cost-of-living, merit, and longevity increases.



Section VII. Glossary

Select and Ultimate Rates:

Actuarial assumptions that contemplate different rates for successive years. Instead of a single assumed rate with respect to, for example, the investment return assumption, the actuary may apply different rates for the early years of a projection and a single rate for all subsequent years. For example, if an actuary applies an assumed investment return of 8 percent for year 2000, 7.5 percent for 2001, and 7 percent for 2002 and thereafter, then 8 percent and 7.5 percent are select rates, and 7 percent is the ultimate rate.

Unfunded Actuarial Accrued Liabilities:

The excess of the present value of prospective pension benefits, as of the date of a pension plan valuation, over the sum of (1) the actuarial value of the assets of the plan and (2) the present value of future normal costs determined by any of several actuarial cost methods. For plans that define an accrued liability, this amount equals the excess of the accrued liability over plan assets.

Vested Plan Benefits:

All benefits to which current participants have a vested right. They are based on pay and service through the valuation date. A participant has a vested right to a benefit if he/she would still be eligible to receive that benefit if their employment was terminated on the valuation date.



Appendix 1

Summary of Funding Progress

Valuation Date	(1) Actuarial Value of Assets	(2) Actuarial Accrued Liability	(3) Percentage Funded (1) / (2)	(4) Unfunded Actuarial Accrued Liability (2) - (1)	(5) Annual Covered Base Payroll	(6) Unfunded Actuarial Accrued Liability as a Percentage of Base Payroll (4) / (5)
7/1/2010	162,755,825	426,040,805	38.2%	263,284,980	145,028,614	181.5%
7/1/2011	187,917,728	433,637,216	43.3%	245,719,488	147,474,199	166.6%
7/1/2012	200,259,694	451,288,292	44.4%	251,028,598	152,276,494	164.9%
7/1/2013	210,736,651	495,100,701	42.6%	284,364,050	137,596,326	206.7%
7/1/2014	230,072,392	515,327,523	44.6%	285,255,131	135,544,813	210.5%
7/1/2015	248,469,522	557,256,179	44.6%	308,786,657	137,427,168	224.7%
7/1/2016	268,413,355	670,528,571	40.0%	402,115,216	137,153,770	293.2%
7/1/2017	290,605,477	706,246,613	41.2%	415,641,136	145,833,561	285.0%
7/1/2018	316,454,023	735,810,303	43.0%	419,356,280	148,444,632	282.5%
7/1/2019	339,002,828	789,044,109	43.0%	450,041,281	149,767,952	300.5%

Analysis of the dollar amounts of net assets available for benefits, actuarial accrued liability, and unfunded actuarial accrued liability in isolation can be misleading. Expressing the net assets available for benefits as a percentage of the actuarial accrued liability provides one indication of funding status on a going-concern basis. Analysis of this percentage over time indicates whether the Plan is becoming financially stronger or weaker. Generally, the greater this percentage, the stronger the Plan. Trends in unfunded actuarial accrued liability and annual covered payroll are both affected by inflation. Expressing the unfunded actuarial accrued liability as a percentage of annual covered payroll approximately adjusts for the effects of inflation and aids analysis of the MTA's progress made in accumulating sufficient assets to pay benefits when due. Generally, the smaller this percentage, the stronger the Plan.



Appendix 2

Schedule of Employer Contributions

Plan Year Ending	Actuarially Determined Contribution	Actual Contribution	Percent Contributed
06/30/2011	33,928,274	47,528,274	140.1%
06/30/2012	32,859,285	32,859,285	100.0%
06/30/2013	34,582,249	29,518,757	85.4%
06/30/2014	39,748,933	39,748,933	100.0%
06/30/2015	40,807,270	35,400,000	86.75%
06/30/2016	44,736,075	40,997,059	91.64%
06/30/2017	62,217,185	40,997,059	65.89%
06/30/2018	66,495,406	40,997,059	61.65%
06/30/2019	64,648,783	48,316,695	74.74%
06/30/2020	55,213,341	TBD	TBD

The information presented in the required supplementary schedules was determined as part of the actuarial valuations at the dates indicated.

Actuarial cost method	Entry Age Normal, Level Dollar
Asset valuation method	5 Year open period smoothing (Actual Market Value vs. Expected Actuarial Value)
Actuarial assumptions:	
Investment rate of return	7.45% net of investment expenses for FYE 2020
Projected salary increase	Refer to Actuarial Assumptions
Post-retirement cost-of-living adjustments	Local 1300 Union participants are assumed to receive a COLA on each of the following dates: 8/1/2018, 8/1/2019, 8/1/2020, and 8/1/2021.



Appendix 3

Benefit Payment Projection

The following table shows the estimated benefit payments from July 1, 2019 through June 30, 2029.

Fiscal Year Ending	Benefits
2020	44,739,000
2021	47,636,000
2022	50,510,000
2023	52,537,000
2024	54,502,000
2025	56,526,000
2026	58,622,000
2027	60,719,000
2028	62,716,000
2029	64,787,000

Appendix 4

ASOP 51 Disclosure

Actuarial Standard of Practice No. 51 *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions* is effective for actuarial valuations after November 2018. The standard requires actuaries to provide information so that users of the report can better understand the potential for future results to vary from the results presented in this report and identify risks on the plan's future financial condition. This standard does not require the assessment to be based on numerical calculations.

Examples of risk common to most public plans include the following (generally listed from greatest to least risk):

- Investment risk: The potential that investment returns will be different than expected. The Trustees are well aware of this risk.
- Contribution risk: Most commonly this is associated with the potential that actual future contributions are not made in accordance with the plan's actuarially based funding policy. When this occurs, it can create negative long-term problems.
- Longevity and other demographic risks: The potential that mortality or other demographic experience will be different than expected.
- Asset/liability mismatch risk: The potential that changes in asset values are not matched by changes in the value of liabilities.
- Cash flow risks: The potential that contributions coming into the plan will not cover benefit payments. While common in well-funded plans, this still requires the use of interest, dividends or principal to cover benefit payments. When assets need to be sold (or more cash held) it can be an issue. Poorly funded plans with DROP lump sum payments can be a particular issue.

One item left off this list is "interest rate risk" (i.e., the potential that interest rates will be different than expected). This risk is common in corporate ERISA plans where funding is based on bond rates. Interest rates on bonds are still an important consideration when setting an expected return assumption and can change over time.

There are some plan maturity measures that are significant to understanding the risks associated with the plan. The following table shows four commonly used measures of the relative riskiness of a pension plan, relative to the plan sponsor and the employee group covered by the plan.



Appendix 4

ASOP 51 Disclosure

Risk Measure	7/1/2017	7/1/2018	7/1/2019	Conservative Measures
Retiree Liability as a Percent of Total Liability	49%	50%	50%	<50%
Assets to Payroll ⁸ (Asset Volatility Ratio)	1.9	2.0	2.2	<5
Liabilities to Payroll (Liability Volatility Ratio)	4.8	5.0	5.3	<5
Benefit Payments to Contributions ⁹	0.9	0.8	1.0	1 - 3

The Asset Volatility Ratio (AVR) is equal to the market value of assets (MVA) divided by payroll. A higher AVR implies that the plan is exposed to greater contribution volatility. The current AVR of 2.2 indicates that a 1% asset gain/loss can be related to about 2.2% of the annual payroll. The plan currently amortizes asset gains/losses over a period of 20 years. This would result in a change in the MTA's contribution of about 0.2% of payroll for each 1.0% change in market assets.

The Liability Volatility Ratio (LVR) is equal to the Actuarial Accrued Liability (AAL) divided by payroll. A higher LVR implies that the plan is exposed to greater contribution volatility due to changes in liability measurements. The current LVR of 5.3 indicates that a 1% liability gain/loss can be related to about 5.3% of the annual payroll. The plan currently amortizes liability gains/losses over a period of 20 years. This would result in a change in the MTA's contribution of about 0.5% of payroll for each 1.0% change in AAL. As the plan approaches a 100% funded level, the AVR will converge to the LVR.

The use of payroll in these risk measures is an easily available substitute for the employer's revenue and often reflects the employer's ability to afford the plan. As shown in the table above, the Plan is not considered "low risk" in all ratios but is converging towards it. Each of these measures are a measure of plan maturity. The ratios are generally outside of the "conservative" range because the plan is becoming more mature. Mature plans present more risk to plan sponsors because changes to the liability or assets will result in large changes in the unfunded liability as compared to the overall size of the employer as measured by payroll.

⁸ The payroll number represents base pay, not including overtime.

⁹ For the year ending on the date shown.

Appendix 4

ASOP 51 Disclosure

If the plan or employer were interested in doing more quantitative assessment of risks, the following are example of tests that could be performed:

Scenario Test—A process for assessing the impact of one possible event, or several simultaneously or sequentially occurring possible events, on a plan’s financial condition.

Sensitivity Test—A process for assessing the impact of a change in an actuarial assumption on an actuarial measurement.

Stochastic Modeling—A process for generating numerous potential outcomes by allowing for random variations in one or more inputs over time for the purpose of assessing the distribution of those outcomes.

Stress Test—A process for assessing the impact of adverse changes in one or relatively few factors affecting a plan’s financial condition.



Appendix 5

Actuarial Certification

This actuarial valuation sets forth our calculation of an estimate of the liabilities of the Maryland Transit Administration Pension Plan, together with a comparison of these liabilities with the value of the plan assets, as submitted by the Maryland Transit Administration (MTA). This calculation and comparison with assets is applicable for the valuation date only. The future is uncertain, and the Plan may become better funded or more poorly funded in the future. This valuation does not provide any guarantee that the Plan will be able to provide the promised benefits in the future.

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 those assumptions; these differences may be significant or material because these 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.

Different assumptions or scenarios within the range of possibilities may also be reasonable and results based on those assumptions would be different. As a result of the uncertainty inherent in a forward looking projection over a very long period of time, no one projection is uniquely "correct" and many alternative projections of the future could also be regarded as reasonable. Two different actuaries could, quite reasonably, arrive at different results based on the same data and different views of the future. A "sensitivity analysis" shows the degree to which results would be different if you substitute alternative assumptions within the range of possibilities for those utilized in this report. We have not been engaged to perform such a sensitivity analysis and thus the results of such an analysis are not included in this report. At the MTA's request, Bolton Partners, Inc. is available to perform such a sensitivity analysis.

MTA is responsible for selecting the Plan's funding policy, actuarial valuation methods, asset valuation methods, and assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in this report. The MTA is solely responsible for communicating to Bolton Partners, Inc. any changes required thereto.

MTA 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. This type of analysis would be a separate assignment.

In addition, decisions regarding benefit improvements, benefit changes, the trust's investment policy, and similar issues should not be based on this valuation. These are complex issues and other factors should be considered when making such decisions. These other factors might include the anticipated vitality of the local economy and future growth expectations, as well as other economic and financial factors.



Appendix 5

Actuarial Certification

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 MTA. It does not affect the cost of the Plan. Different funding methods provide for different timing of contributions to the Plan. As the experience of the Plan evolves, it is normal for the level of contributions to the Plan to change. If a contribution is not made for a particular year, either by deliberate choice or because of an error in a calculation, that contribution can be made in later years. We will not be responsible for contributions that are made at a future time rather than an earlier time. The Plan sponsor is responsible for funding the cost of the Plan.

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 MTA. 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.

MTA 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 MTA.

The information in this report was prepared for the internal use of the MTA and its auditors in connection with our actuarial valuations of the pension plan. It is neither intended nor necessarily suitable for other purposes. Bolton Partners, Inc. is not responsible for the consequences of any other use or the reliance upon this report by any other party.

The only purpose of this report is to:

- Provide the recommended employer contribution for the 2020 fiscal year.

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 report by any other party.



Appendix 5

Actuarial Certification

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, you selected an assumption based on the expected long-term rate of return on Plan investments. Using a lower discount rate assumption, such as a rate based on long-term bond yields, could substantially increase the estimated present value of future and accrued liabilities.

Because valuations are a snapshot in time and are based on estimates and assumptions that are not precise and will differ from actual experience, contribution calculations are inherently imprecise. There is no uniquely “correct” level of contributions for the coming plan year.

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.



Appendix 5

Actuarial Certification

The MTA should notify Bolton Partners, Inc. promptly after receipt of this report if the MTA disagrees with anything contained in the report or is aware of any information that would affect the results of the report that has not been communicated to Bolton Partners, Inc. or incorporated therein. The report will be deemed final and acceptable to the MTA unless the MTA promptly provides such notice to Bolton Partners, Inc.

The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. They are currently compliant with the Continuing Professional Development Requirement of the Society of Actuaries. We are not aware of any direct or material indirect financial interest or relationship, including investments or other services, that could create a conflict of interest that would impair the objectivity of our work.

We are available to answer any questions on the material in this report to provide explanations or further details as appropriate.

Kevin Binder, FSA, EA, MAAA

Jordan McClane, FSA, EA