Maryland Transit Administration Pension Plan

Actuarial Valuation

As of July 1, 2020

Date of Report: November 5, 2020

Submitted by:

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November 5, 2020

Glenn Davis
Chief Financial Officer
Maryland Transit Administration
6 St. Paul Street, 8th Floor
Baltimore, MD 21202

Dear Glenn:

The following sets forth the actuarial valuation of the Maryland Transit Administration Pension Plan as of July 1, 2020. Section 1 of the report provides the executive summary while Sections 2 through 6 contain the development of the actuarially determined contribution for the 2021 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 2021 for the Maryland Transit Administration Pension Plan.

Actuarially Determined Contribution (ADC)

The actuarially determined contribution has increased from $55.2 million to $58.8 million. The largest component of the increase was due to greater than expected salary increases largely due to Local 1300 which, due to the timing of the contract ratification, reflected an additional year of salary increases due to a retroactive payment in FY20. Other increases include granting of COLA's to retirees and beneficiaries in the Local 2 Union through 2022 and lowering of the discount rate from 7.45% to 7.40% to keep in line with the State Assumption. See chart below for a full reconciliation of the change in the ADC.

Actuarially Determined Contribution	FYE 2020	FYE 2021
Actuarially Determined Contribution	$55,213,341	$58,841,684
Percent of total base payroll[1]	36.87%	37.30%

Experience Analysis

The following table reconciles the Actuarially Determined Contribution by the factors that affected the cost:

Comparison of Current and Previous Valuation's Actuarially Determined Contribution (ADC) (in Thousands)	
Reconciliation of Actuarially Determined Contribution	
ADC for FYE 2020	$55,213
Expected Increase/(Decrease)	235
Increase/(Decrease) due to Actual vs. Expected Contribution	961
Increase/(Decrease) due Actual vs. Expected Rate of Return on Assets	238
Increase/(Decrease) due to Demographic Experience	263
Increase/(Decrease) due to Salary Increases Greater than Expected	1,046
Increase/(Decrease) due to Local 2 Plan Changes	314
Increase/(Decrease) due to Lowering Discount Rate to 7.40%	572
ADC for FYE 2021	$58,842

[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

Reconciliation of Funded Status and Unfunded Actuarial Liability

The following table reconciles the plans UAL and Funded Percentage from the prior valuation to the current valuation.

Comparison of Current and Previous Valuation's Unfunded Liability and Funded Status (UAL In Thousands)		
Reconciliation	**UAL**	**Funded %**
FYE 2020	450,041	42.96%
Expected Increase/(Decrease)	(15,716)	3.47%
Increase/(Decrease) due to Actual vs. Expected Contribution	10,481	-1.29%
Increase/(Decrease) due Actual vs. Expected Rate of Return on Assets	3,700	-0.46%
Increase/(Decrease) due to Demographic Experience	10,751	-0.58%
Increase/(Decrease) due to Salary Increases Greater than Expected	9,280	-0.49%
Increase/(Decrease) due to Local 2 Plan Changes	1,108	-0.06%
Increase/(Decrease) due to Lowering Discount Rate to 7.40%	4,675	-0.25%
FYE 2021	474,320	43.30%

Summary of Plan Results

	7/1/2019	7/1/2020	% Change
Participant Counts			
Active	2,642	2,615	(1.02%)
Participants Receiving a Benefit	1,950	2,005	2.82%
Terminated Vested Participants	550	518	(5.82%)
Total	**5,142**	**5,138**	**(0.08%)**
Annual Base Pay of Active Members	$149,767,952	$157,761,162	5.34%
Assets and Liabilities			
Actuarial Liability	$789,044,109	$836,613,531	6.03%
Actuarial Value of Assets	$339,002,828	$362,292,739	6.87%
Unfunded Actuarial Liability	$450,041,281	$474,320,792	5.39%
Funded Ratio	42.96%	43.30%	0.79%
Contributions			
Employer Normal Cost	$8,831,433	$8,644,208	(2.12%)
Amortization Payment	$46,381,908	$50,197,476	8.23%
Actuarially Determined Contribution	$55,213,341	$58,841,684	6.57%
Assumed Payment Date	09/01/2019	09/01/2020	

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:

- Local 2 Union active employees went from contributing 2% of pay to 3% of pay effective 7/1/2020 and 4% of pay effective 7/1/2021.
- Local 2 Union inactive participants are now assumed to receive a 2.1% COLA in 2020, 2021, and 2022
- The discount rate was lowered from 7.45% to 7.40%

Projection of Expected Benefit Payments

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

Sources of Information

The July 1, 2020 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

1.	Actuarial accrued liability at July 1, 2020	
	a. Active participants	$ 409,481,509
	b. Vested terminated participants	21,884,518
	c. Retired participants, QDRO's, and beneficiaries	340,772,446
	d. Disabled participants and disabled beneficiaries	64,475,058
	e. Total	836,613,531
2.	Actuarial asset value at July 1, 2020	362,292,739
3.	Unfunded actuarial liability at July 1, 2020 (1.e. - 2.)	474,320,792
4.	Funded ratio on July 1, 2020 (2. ÷ 1.e)	43.30%

Section II. Actuarial Costs

Reconciliation of Unfunded Liability

1. Unfunded actuarial liability at July 1, 2019	$ 450,041,281
2. Normal cost at July 1, 2019	8,726,299
3. Interest on (1. + 2.) to June 30, 2020 at 7.45% per annum	34,178,185
4. Expected contribution	55,213,341
5. Interest on contribution to June 30, 2020 at 7.45% (contribution is assumed to be made as of September 1st)	3,407,140
6. Projected unfunded actuarial liability at July 1, 2020 (1. + 2. + 3. - 4. -5.)	434,325,284
7. Change in unfunded actuarial liability due to changes in plan	1,108,193
8. Change in unfunded actuarial liability due to change in discount rate	4,675,175
9. Expected unfunded actuarial liability at July 1, 2020 (6. + 7. + 8.)	440,108,652
10. Actual unfunded actuarial liability at July 1, 2020	474,320,792
11. Actuarial gain/(loss) at July 1, 2020 (9. - 10.)*	(34,212,140)

*The components of the Actuarial gain/(loss) are summarized in the following table:

Actuarial Gain/(Loss)	
Gain/(Loss) due to Actual vs. Expected Contribution	10,481
Gain/(Loss) due Actual vs. Expected Rate of Return on Assets	3,700
Gain/(Loss) due to Demographic Experience	10,751
Gain/(Loss) due to Salary Increases Greater than Expected	9,280
Total Gain/(Loss)	**34,212**

Section II. Actuarial Costs

Normal Cost

Normal Cost	7/1/2019	7/1/2020
1. Retirement benefits	$ 8,090,608	$ 8,094,560
2. Vested termination benefits	678,005	648,176
3. Preretirement death benefits	178,371	177,942
4. Disability benefits	2,543,108	2,527,670
5. Employee Contributions	(2,763,793)	(2,906,382)
6. Total normal cost (1. + 2. + 3. + 4. + 5.)	8,726,299	8,541,966
7. Interest on normal cost to September 1	105,134	102,242
8. Projected normal cost for plan year (6. + 7.)	8,831,433	8,644,208

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 2020	FYE 2021
1. Normal cost	$ 8,831,433	$ 8,644,208
2. Amortization amount	46,381,908	50,197,476
3. Actuarially determined contribution (1. + 2.)	55,213,341	58,841,684
4. Base payroll[2]	149,767,952	157,761,162
5. Contribution as a percentage of base payroll	36.87%	37.30%

[2] 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	7/1/2020 Outstanding Balance	Remaining Amortization Years	9/1/2020 Amortization Amount
Initial	7/01/2019	391,292,358	25	385,494,366	24	32,789,611
Plan Amendment (COLA Award)	7/01/2019	29,831,247	3	20,592,851	2	10,791,440
Assumption Change	7/01/2019	208,201	20	203,366	19	19,100
Plan Amendment	7/01/2019	261,181	12	246,963	11	31,653
Experience Loss	7/01/2019	28,448,294	20	27,787,738	19	2,609,760
Assumption Change (lowering DR to 7.40%)	7/01/2020	4,675,175	20	4,675,175	20	428,830
Plan Amendment (COLA Award)	7/01/2020	1,059,019	3	1,059,019	3	383,016
Plan Amendment (EE Cont Inc.)	7/01/2020	49,174	12	49,174	12	5,959
Experience Loss	7/01/2020	34,212,140	20	34,212,140	20	3,138,107
Total				**474,320,792**		**50,197,476**

Section III. Valuation Assets

Reconciliation of Assets

Below is a reconciliation of assets from the prior valuation date of July 1, 2019 to the current valuation date of July 1, 2020.

		7/01/2019 to 6/30/2020
(1)	**Beginning of year assets**	
	(a) Beginning of year assets	$322,304,417
	(b) Market Value Adjustment	0
	(c) Adjusted beginning of year assets	**$322,304,417**
(2)	**Additions**	
	(a) Employer contributions	$43,249,926
	(b) Employee contributions	4,609,744
	(c) Investment income & Dividends	20,125,256
	(d) Increase/(Decrease) in Market Value of Investments	(7,293,444)
	(e) Total receipts [(a) + (b) + (c) + (d)]	$60,691,482
(3)	**Deductions**	
	(a) Benefit payments	$44,432,068
	(b) Administrative expenses	2,651,571
	(c) Investment expenses	0
	(d) Total disbursements [(a) + (b) + (c)]	**$47,083,639**
(4)	Net increase [2(e) – 3(d)]	$13,607,843
(5)	**Net assets [1(c) + 4]**	**$335,912,260**
(6)	**Refund Due**	0
(7)	**Market Value of Assets as of July 1, 2020 [5 – 6]**	$335,912,260

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, 2019	$ 339,002,828
2.	Contributions for the 2019 - 2020 plan year	43,249,926
3.	Employee Contributions for the 2019 - 2020 plan year	4,609,744
4.	Benefit payments during the 2019 - 2020 plan year	44,432,068
5.	Expected return at 7.45% interest	26,457,429
6.	Expected assets as of June 30, 2020 (1. + 2. + 3. – 4. + 5.)	368,887,859
7.	Market value of assets as of June 30, 2020	335,912,260
8.	Asset gain/(loss) for 2019 - 2020 (7. – 6.)	(32,975,599)
9.	Actuarial asset value as of July 1, 2020 (6. + (8. x 20%))	$ 362,292,739
10.	Actuarial asset value as a percentage of market value (9. / 7.)	107.85%

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, 2019	July 1, 2020
(1)	**Actives**		
	(a) Number	2,642	2,615
	(b) Average age	48.45	48.92
	(c) Average service[3]	13.37	13.94
	(d) Average base salary	$ 56,687	$ 60,329
(2)	**Service retirements and beneficiaries**		
	(a) Number	1,480	1,543
	(b) Average age	72.43	72.85
	(c) Total monthly benefits	$2,882,070	$3,014,511
(3)	**Disability retirements**		
	(a) Number	449	442
	(b) Average age	64.55	64.69
	(c) Total monthly benefits	$ 511,745	$ 510,177
(4)	**Vested terminations (including deferred transfers)**		
	(a) Number	550	518
	(b) Average age	55.00	55.08
	(c) Total monthly benefits	$ 371,451	$ 340,135
(5)	**QDRO participants**		
	(a) Number	21	20
	(b) Average age	66.48	67.25
	(c) Total monthly benefits	$ 19,546	$ 19,465

[3] 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, 2020.

	Years of Service									
	Under 1	1 - 4	5 -9	10 -14	15 - 19	20 - 24	25 - 29	30 - 34	35 +	Total
Under 25	4	6	0	0	0	0	0	0	0	10
	42,541	48,838	0	0	0	0	0	0	0	46,320
25 - 29	14	51	6	0	0	0	0	0	0	71
	39,431	45,675	55,824	0	0	0	0	0	0	45,302
30 - 34	24	120	86	35	0	0	0	0	0	265
	41,315	46,841	61,633	63,864	0	0	0	0	0	53,389
35 - 39	16	90	62	93	24	0	0	0	0	285
	39,238	46,786	61,339	63,200	64,531	0	0	0	0	56,379
40 - 44	6	75	56	87	65	18	0	0	0	307
	38,418	47,056	61,539	63,698	64,965	65,574	0	0	0	59,123
45 - 49	10	72	57	69	72	55	7	0	0	342
	40,098	46,356	63,114	65,317	65,956	64,658	66,334	0	0	60,270
50 - 54	4	58	67	59	89	67	28	15	0	387
	41,636	47,976	62,337	63,645	65,078	67,384	66,871	66,710	0	62,172
55 - 59	7	28	42	86	89	77	55	46	9	439
	42,117	48,077	62,540	62,936	66,026	66,104	68,852	67,120	70,111	64,127
60 - 64	1	25	31	51	69	50	34	52	40	353
	39,666	48,369	60,586	63,425	65,700	67,405	66,811	66,736	69,224	64,522
65 - 69	0	0	16	21	23	14	13	16	17	120
	0	0	64,520	60,845	65,669	67,963	61,982	67,189	67,622	65,019
70 +	0	0	2	6	6	4	4	6	8	36
	0	0	46,956	60,244	67,008	64,787	67,564	55,614	73,906	64,215
Total	**86**	**525**	**425**	**507**	**437**	**285**	**141**	**135**	**74**	**2,615**
	40,396	**46,969**	**61,858**	**63,516**	**65,525**	**66,394**	**67,171**	**66,423**	**69,470**	**60,329**

Averages	
Age:	48.92
Service:	13.94

Section IV. Valuation Data

Age Distribution of Inactive Participants Currently Receiving Benefits

	Beneficiary		Disabled		QDRO		Retiree		Total	
Age	Count	Benefit	Count	Benefit	Count	Benefit	Count	Benefit	Count	Benefit
Under 35	0	0	4	1,742	0	0	0	0	5	1,742
35 - 39	4	3,810	3	2,312	0	0	0	0	3	6,122
40 - 44	4	3,048	11	7,581	0	0	0	0	16	10,629
45 - 49	4	3,610	17	12,498	0	0	0	0	23	16,108
50 - 54	3	3,047	34	31,565	1	722	3	4,030	44	39,363
55 - 59	9	10,607	55	57,746	1	801	36	90,518	111	159,673
60 - 64	25	31,225	84	101,325	5	5,261	106	281,065	229	418,875
65 - 69	29	32,580	91	127,202	6	5,895	305	640,786	431	806,463
70 - 74	52	68,456	70	87,533	5	5,986	378	821,475	450	979,850
75 - 79	40	45,337	45	52,340	1	465	241	472,299	339	570,441
80 - 84	33	35,719	20	20,399	1	334	137	262,319	168	318,771
85 - 89	13	12,505	5	5,107	0	0	70	132,958	88	150,569
90 - 94	8	7,839	2	2,525	0	0	31	42,154	34	52,518
95 & over	2	1,482	1	302	0	0	10	11,242	9	13,026
Total	**226**	**255,665**	**442**	**510,177**	**20**	**19,465**	**1,317**	**2,758,846**	**1,950**	**3,544,152**

Age Distribution of Inactive Deferred Vested Participants

	Normal Retirement	
Age	Count	Benefit
Under 35	22	10,688
35 - 39	27	14,836
40 - 44	32	20,241
45 - 49	47	33,708
50 - 54	87	68,796
55 - 59	117	89,559
60 - 64	120	69,103
65 - 69	43	22,095
70 - 74	14	8,135
75 & over	9	2,974
Total	**518**	**340,135**

Section IV. Participant Information

Participant Reconciliation

Shown below is the reconciliation of participants between the prior and current valuation date.

	Active Participants	Inactive Participants With Deferred Benefits	Inactive Participants Receiving Benefits	Total
Participants in Last Valuation	2,642	550	1,950	5,142
Retired	(45)	(33)	78	0
Vested Termination	(19)	19	0	0
Nonvested Termination	(43)	0	0	(43)
Disabled	(17)	0	17	0
Deceased	(6)	(1)	(64)	(71)
New Participants	84	0	0	84
Rehired	19	(17)	(2)	0
New Beneficiary	0	0	26	26
Data Adjustments	0	0	0	0
Participants in This Valuation	2,615	518	2,005	5,138

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
7	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
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. Local 1300 union and Local 2 union will receive a COLA on 8/1/2019, 8/1/2020, and 8/1/2021. The Local 2 union will also receive a COLA on 8/1/2022. 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. Local 2 participants contribution will increase to 3% effective July 1, 2020 and 4% effective July 1, 2021. 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 2 union will receive a COLA on each of the following dates: 8/1/2019, 8/1/2020, 8/1/2021, and 8/1/2022
- All Local 2 employees will contribute 3% of earnings to the plan effective July 1, 2020 and 4% effective July 1, 2021.

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, 2020, and August 1, 2021 and for the Local 2 union as of August 1, 2020, August 1, 2021, and August 1, 2022 . 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 6 people who terminated after attaining 100% vesting and their retirement benefit was not provided. 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 7.45% to 7.40%.
- COLA's were assumed to be paid for the Local 2 union on 8/1/2019, 8/1/2020, 8/1/2021, and 8/1/2022.

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)
7/1/2011	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%
7/1/2020	362,292,739	836,613,531	43.3%	474,320,792	157,761,162	300.7%

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
06/30/2012	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	41,597,059	64.34%
06/30/2020	55,213,341	43,249,926	78.33%
06/30/2021	58,841,684	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	7.40% net of investment expenses for FYE 2021
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. Local 2 union participants are assumed to receive a COLA on each of the following dates: 8/1/2019, 8/1/2020, 8/1/2021, and 8/1/2022

Appendix 3

Benefit Payment Projection

The following table shows the estimated benefit payments from July 1, 2020 through June 30, 2030.

Fiscal Year Ending	Benefits
2021	46,836,000
2022	50,169,000
2023	52,481,000
2024	54,745,000
2025	56,991,000
2026	59,276,000
2027	61,647,000
2028	63,786,000
2029	66,030,000
2030	68,151,000

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	7/1/2018	7/1/2019	7/1/2020	Conservative Measures
Retiree Liability as a Percent of Total Liability	50%	50%	48%	<50%
Assets to Payroll[4] (Asset Volatility Ratio)	2.0	2.2	2.1	<5
Liabilities to Payroll (Liability Volatility Ratio)	5.0	5.3	5.3	<5
Benefit Payments to Contributions[5]	0.8	1.0	0.9	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 2.1 indicates that a 1% asset gain/loss can be related to about 2.1% 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.

4 The payroll number represents base pay, not including overtime.
5 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 valuation was completed using both proprietary and third-party models (including software and tools). We have tested these models to ensure they are used for their intended purposes, within their known limitations, and without any known material inconsistencies unless otherwise stated.

The 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

Thomas Vicente, FSA, EA