East Bay Municipal Utility District Employees' Retirement System

Actuarial Valuation and Review of Pension Plan Benefits

As of June 30, 2020

Segal

Segal

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January 15, 2021

Ms. Sophia Skoda
Director of Finance
East Bay Municipal Utility District
375 Eleventh Street
Oakland, CA 94607-4240

Dear Sophia:

We are pleased to submit this Actuarial Valuation and Review as of June 30, 2020 for only the pension plan. The Review of Contribution Rates and Funding Status for the health insurance benefit (HIB) plan is provided in a separate report. This report summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for fiscal year 2021/2022.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Plan. The census information and financial information on which our calculations were based was prepared by the East Bay Municipal Utility District Employees' Retirement System (EBMUDERS). That assistance is gratefully acknowledged.

The actuarial calculations were directed under my supervision. I am a member of the American Academy of Actuaries and I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate. Further, in our opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the Plan.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

Segal

Andy Yeung

Andy Yeung, ASA, MAAA, FCA, EA
Vice President and Actuary

JRC/jl

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Section 1: Actuarial Valuation Summary

Purpose and Basis

This report was prepared by Segal to present a valuation of the East Bay Municipal Utility District Employees' Retirement System ("the System") as of June 30, 2020. The valuation was performed to determine whether the assets and contribution rates are sufficient to provide the prescribed benefits. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of current Plan assets to cover the estimated cost of settling the Plan's accrued benefit obligations.

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; and changes in plan provisions or applicable law.

The contribution requirements presented in this report are based on:

- The benefit provisions of the Plan, as administered by the Board;
- The characteristics of covered active members, inactive vested members, and retired members and beneficiaries as of June 30, 2020, provided by EBMUDERS;
- The assets of the Plan as of June 30, 2020, provided by EBMUDERS;
- Economic assumptions regarding future salary increases and investment earnings adopted by the Board for the June 30, 2020 valuation;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc. adopted by the Board for the June 30, 2020 valuation; and
- The funding policy adopted by the Board.

One of the general goals of an actuarial valuation is to establish contributions which fully fund the System's liabilities, and which, as a percentage of payroll, remain as level as possible for each generation of active members. Annual actuarial valuations measure the progress toward this goal, as well as test the adequacy of the contribution rates.

Section 1: Actuarial Valuation Summary

In preparing this valuation, we have employed generally accepted actuarial methods and assumptions to evaluate the System's liabilities and future contribution requirements. Our calculations are based upon member data and financial information provided to us by the System's staff. This information has not been audited by us, but it has been reviewed and found to be consistent, both internally and with prior year's information.

The contribution requirements are determined as a percentage of payroll. The System's employer rates provide for both Normal Cost and a contribution to amortize any unfunded or overfunded actuarial accrued liabilities. In this valuation, we have applied the funding policy adopted by the Board on September 20, 2012.[1] Details of the funding policy are provided in *Section 4, Exhibit I* starting on page 63.

A schedule of current amortization balances and payments may be found in *Section 3, Exhibit G* starting on page 50. A graphical projection of the Unfunded Actuarial Accrued Liability (UAAL) amortization balances and payments has been included in *Section 3, Exhibit H* starting on page 52. In the aggregate, the total payment from all the UAAL layers was the same as amortizing the entire UAAL over a period of about 17 years.

The rates calculated in this report may be adopted by the Board for the fiscal year that extends from July 1, 2021 through June 30, 2022.

[1] The individual elements to be included in a formal funding policy were approved by the Board at the September 20, 2012 meeting. A draft of a formal Actuarial Funding Policy was presented by Segal at the March 19, 2015 Board meeting, and we understand that the policy was adopted at the May 21, 2015 Board meeting.

Valuation Highlights

1. The results of this valuation reflect the changes in the economic and non-economic actuarial assumptions as recommended by Segal and adopted by the Board for the June 30, 2020 valuation. These changes were documented in our Actuarial Experience Study Report (dated November 12, 2020) and are also outlined in *Section 4*, *Exhibit I* of this report. These assumption changes resulted in an increase in the combined (1955/1980 Plan and 2013 Tier) employer contribution rate of 4.53% of payroll, and in increase in 2013 Tier employee rate of 0.66% of payroll. These assumption changes increased the UAAL by $104.8 million.

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2. The funded ratio measured on a valuation value of assets basis decreased from 75.9% at June 30, 2019 to 73.7% at June 30, 2020. The funded ratio if measured on a market value of assets basis decreased from 76.6% to 71.5%. The UAAL increased from $563.7 million as of June 30, 2019 to $666.3 million as of June 30, 2020. The increase in the UAAL is primarily due to (a) the lower than expected return on the valuation value of assets (after smoothing), (b) other actuarial losses, and (c) changes in actuarial assumptions, offset somewhat by (d) actual contributions more than expected as a result of the Board's action to carry over the higher total employer contribution rates as originally determined in the June 30, 2016 valuation, (e) lower than expected salary increases for continuing actives, and (f) lower than expected benefits for current retirees and beneficiaries resulting from corrections to COLA benefits made by the System to certain payees on a prospective basis. A reconciliation of the System's UAAL is provided in *Section 2, Subsection E*.

3. The employer contribution rates that Segal recommended for the 2020/2021 Fiscal Year ("recommended rates") were provided in the June 30, 2019 valuation report. Based on the concern that a review of the actuarial assumptions was to be performed prior to this June 30, 2020 valuation and the results of that review would be expected to increase the overall cost of the plan, the Board decided to carry over unchanged for the 2020/2021 Fiscal Year ("adopted rates") the higher total (Pension and HIB Plans) employer contribution rates previously adopted for the 2019/2020 Fiscal Year, as originally determined in the June 30, 2016 valuations.

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4. The adopted and recommended aggregate employer rates from the June 30, 2019 valuation are 35.43% and 34.81%, respectively. The aggregate employer rate calculated in this valuation has increased from the recommended rate of 34.81% of payroll to 39.06% of payroll. The increase in the employer rate was primarily due to (a) the lower than expected return on the valuation value of assets (after smoothing), (b) other actuarial losses, and (c) changes in actuarial assumptions, offset somewhat by (d) lower than expected salary increases for continuing actives, (e) lower than expected benefits for current retirees and beneficiaries resulting from corrections to COLA benefits made by the System to certain payees on a prospective basis, (f) amortizing the prior year's UAAL over a larger than expected projected total payroll, and (g) actual contributions more than expected as a result of the Board's action to carry over the higher total employer contribution rates as originally determined in the June 30, 2016 valuation.

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5. The aggregate member rate calculated in this valuation has increased from 8.69% of payroll as June 30, 2019 to 8.93% of payroll as of June 30, 2020. The increase in the employee rate for the members in the 2013 Tier was due to changes in assumptions. As this is

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the first valuation after the implementation of the 2013 Tier that the employee rate for that Tier is required to be adjusted, we requested and received directions from the System subsequent to the release of our Actuarial Experience Study Report on the implementation of the relevant statues. A detailed description of the process can be found in *Section 4, Exhibit I*. A reconciliation of the System's aggregate member rate is provided in *Section 2, Subsection F*.

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6. As indicated in *Section 2, Subsection B* of this report, the total net unrecognized investment loss as of June 30, 2020 is $56.7 million for the assets for the pension and HIB plans (note that in the previous valuation, this amount was a net deferred gain of $15.4 million). This net investment loss will be recognized in the determination of the actuarial value of assets for funding purposes in the next few years. This implies that earning the assumed rate of investment return of 7.00% per year (net of expenses) on a market value basis will produce investment losses on the actuarial value of assets after June 30, 2020.

   The net deferred loss of $56.7 million represents 3.1% of the market value of assets as of June 30, 2020. Unless offset by future investment gains or other favorable experience, the recognition of the net $56.7 million market loss is expected to have an impact on the System's future funded percentage and contribution rate requirements. This potential impact may be illustrated as follows:

   - If the pension plan portion of the net deferred loss were recognized immediately and entirely in the valuation value of assets, the funded percentage would decrease from 73.7% to 71.5%.

     For comparison purposes, if the pension plan portion of the net deferred gain were recognized immediately and entirely in the valuation value of assets in the June 30, 2019 valuation, the funded percentage would have increased from 75.9% to 76.6%.

   - If the pension plan portion of the net deferred loss were recognized immediately and entirely in the valuation value of assets, the aggregate employer rate (payable at the end of each pay period) would increase from 39.06% to about 40.8% of payroll.

     For comparison purposes, if the pension plan portion of the net deferred gain were recognized immediately and entirely in the valuation value of assets in the June 30, 2019 valuation, the aggregate employer rate (payable at the end of each pay period) would have decreased from 35.15% of payroll to about 34.6% of payroll.

7. The actuarial valuation report as of June 30, 2020 is based on financial information as of that date. Changes in the value of assets subsequent to that date are not reflected. Declines in asset values will increase the actuarial cost of the plan, while increases will decrease the actuarial cost of the plan.

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8. Actuarial Standard of Practice No. 51 (ASOP 51) requires actuaries to identify and assess risks that "may reasonably be anticipated to significantly affect the plan's future financial condition." Examples of key risks listed that are particularly relevant to EBMUDERS are asset/liability mismatch risk, investment risk, and longevity risk. The standard also requires an actuary to consider if there is any ongoing contribution risk to the plan, however it does not require the actuary to evaluate the particular ability or willingness of contributing entities to make contributions when due, nor does it require the actuary to assess the likelihood or consequences of future changes in applicable law.

The actuary's initial assessment can be strictly a qualitative discussion about potential adverse experience and the possible effect on future results, but it may also include quantitative numerical demonstrations where informative. The actuary is also encouraged to consider a recommendation as to whether a more detailed assessment or risk report would be significantly beneficial for the intended user in order to examine particular financial risks. When making that recommendation, the actuary will take into account such factors as the plan's design, risk profile, maturity, size, funded status, asset allocation, cash flow, possible insolvency and current market conditions.

Since the actuarial valuation results are dependent on a fixed set of assumptions and data as of a specific date, there is risk that emerging results may differ, perhaps significantly, as actual experience is fluid and will not exactly track current assumptions. This potential divergence may have a significant impact on the future financial condition of the plan. A copy of the stand-alone risk assessment report associated with the June 30, 2020 valuation, including quantitative analyses recommended by Segal in consultation with the System's staff, will be available in the first quarter of 2021. In the interim, we have included a brief discussion of key risks that may affect the System in *Section 2, Subsection J*.

9. It is important to note that this actuarial valuation is based on plan assets as of June 30, 2020. Due to the COVID-19 pandemic, market conditions have changed significantly during 2020. The Plan's funded status does not reflect short-term fluctuations of the market, but rather is based on the market values on the last day of the Plan Year. While it is impossible to determine how the pandemic will continue to affect market conditions prior to next year's valuation, Segal is available to prepare projections of potential outcomes upon request.

Summary of Key Valuation Results

		June 30, 2020		June 30, 2019 (Adopted Rates)[1]	
		Total Rate	Estimated Annual Dollar Amount[2]	Total Rate	Estimated Annual Dollar Amount[2]
Employer Contribution Rates: ***(payable at the end of each pay period)***	• 1955/1980 Plan	42.37%	$60,240,263	37.86%	$53,828,095
	• 2013 Tier	33.32%	27,400,703	31.24%	25,690,216
	• Combined	39.06%	$87,640,966	35.43%	$79,518,311
Average Member Contribution Rates: ***(payable at the end of each pay period)***	• 1955/1980 Plan	8.66%[3]	$12,312,501	8.66%[3]	$12,312,501
	• 2013 Tier	9.41%	7,738,314	8.75%	7,195,563
	• Combined	8.93%	$20,050,815	8.69%	$19,508,064

[1] The recommended employer contribution rates from the June 30, 2019 valuation were 37.29% for the 1955/1980 Plan, 30.52% for the 2013 Tier, and 34.81% for the two plans combined (based on the June 30, 2020 projected annual compensation, as detailed in footnote 2, below).

[2] Estimated based on June 30, 2020 projected annual compensation of $224,411,694 (that is, $142,176,689 for the 1955/1980 Plan and $82,235,005 for the 2013 Tier).

[3] The rate of 8.66% payable during the fiscal years 2020/2021 and 2021/2022 is calculated by taking the total employee rate payable beginning April 18, 2016 (i.e., 8.75%), less the HIB employee contribution rate of 0.09%.

Summary of Key Valuation Results (continued)

		June 30, 2020	June 30, 2019
Actuarial Accrued Liability:	• Retired members and beneficiaries	$1,594,477,229	$1,467,355,838
	• Inactive vested members	46,192,075	49,348,988
	• Active members	894,568,907	824,068,246
	• Total Actuarial Accrued Liability (AAL)	$2,535,238,211	$2,340,773,072
	• Normal Cost for plan year beginning June 30	52,212,279	46,124,490
Assets:	• Valuation value of pension plan assets (VVA) [1]	$1,868,917,204	$1,777,065,164
	• Market value of pension plan assets (MVA)[1]	1,813,591,000	1,792,124,000
	• Actuarial value of pension plan and HIB plan assets	1,914,278,036	1,817,562,986
	• Market value of pension plan and HIB plan assets	1,857,609,000	1,832,965,000
	• Actuarial value of total plan assets as a percentage of market value of total plan assets	103.1%	99.2%
Funded status:	• Unfunded Actuarial Accrued Liability (UAAL) on VVA basis	$666,321,007	$563,707,908
	• Funded ratio on VVA basis	73.7%	75.9%
	• UAAL on MVA basis	$721,647,211	$548,649,072
	• Funded ratio on MVA basis	71.5%	76.6%
Key assumptions:	• Net investment return	7.00%	7.00%
	• Price Inflation	2.75%	2.75%
	• Payroll growth increase	3.25%	3.25%

[1] Net of HIB plan assets.

Summary of Key Valuation Results (continued)

		June 30, 2020	June 30, 2019	Change From Prior Year
Demographic data:	**Active Members:**			
	• Number of members	1,903	1,847	3.0%
	• Average age	47.3	47.6	-0.3
	• Average service	11.7	12.0	-0.3
	• Total projected compensation	$224,411,694	$212,350,940	5.7%
	• Average projected compensation	$117,925	$114,971	2.6%
	Retired Members and Beneficiaries:			
	• Number of members:			
	– Service retired	1,534	1,483	3.4%
	– Disability retired	54	59	-8.5%
	– Beneficiaries	317	302	5.0%
	– Total	1,905	1,844	3.3%
	• Average age	70.6	70.3	0.3
	• Average monthly benefit	$5,211	$5,024	3.7%
	Inactive Vested Members:			
	• Number of members[1]	312	303	3.0%
	• Average Age	49.0	49.1	-0.1
	Total Members:	4,120	3,994	3.2%

[1] Includes inactive members due a refund of member contributions.

Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal relies on a number of input items. These include:

Plan of benefits	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant data	An actuarial valuation for a plan is based on data provided to the actuary by the System. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Assets	The valuation is based on the Market Value of Assets as of the valuation date, as provided by the System. The System uses a "Actuarial Value of Assets" that differs from market value to gradually reflect year-to-year changes in the Market Value of Assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, termination, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan's assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results that does not mean that the previous assumptions were unreasonable.
Models	Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuary.

Section 1: Actuarial Valuation Summary

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

The actuarial valuation is prepared at the request of the System. Segal is not responsible for the use or misuse of its report, particularly by any other party.
An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan. Future contribution requirements may differ from those determined in the valuation because of: • Differences between actual experience and anticipated experience; • Changes in actuarial assumptions or methods; • Changes in statutory provisions; and • Differences between the contribution rates determined by the valuation and those adopted by the Board.[1]
Some actuarial results in this report are not rounded, but that does not imply precision.
If EBMUDERS is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan's provisions, but they may be subject to alternative interpretations. The System should look to their other advisors for expertise in these areas.

As Segal has no discretionary authority with respect to the management or assets of the Plan, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Plan.

[1] EBMUDERS has a proven track-record of adopting at least the Actuarially Determined Contributions as determined by the valuation and based on the Board's Actuarial Funding Policy.

Section 2: Actuarial Valuation Results

A. Member Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered members, including active members, inactive vested members, retired members and beneficiaries.

This section presents a summary of significant statistical data on these member groups.

More detailed information for this valuation year and the preceding valuation can be found in *Section 3, Exhibits A, B,* and *C*.

Member Population: 2011 – 2020

Year Ended June 30	Active Members	Inactive Vested Members[1]	Retired Members and Beneficiaries	Total Non-Actives	Ratio of Non-Actives to Actives	Ratio of Retired Members and Beneficiaries to Actives
2011	1,702	226	1,325	1,551	0.91	0.78
2012	1,703	224	1,361	1,585	0.93	0.80
2013	1,666	232	1,440	1,672	1.00	0.86
2014	1,715	237	1,497	1,734	1.01	0.87
2015	1,762	239	1,563	1,802	1.02	0.89
2016	1,789	248	1,630	1,878	1.05	0.91
2017	1,802	267	1,713	1,980	1.10	0.95
2018	1,828	284	1,779	2,063	1.13	0.97
2019	1,847	303	1,844	2,147	1.16	1.00
2020	1,903	312	1,905	2,217	1.17	1.00

[1] Includes inactive members due a refund of member contributions.

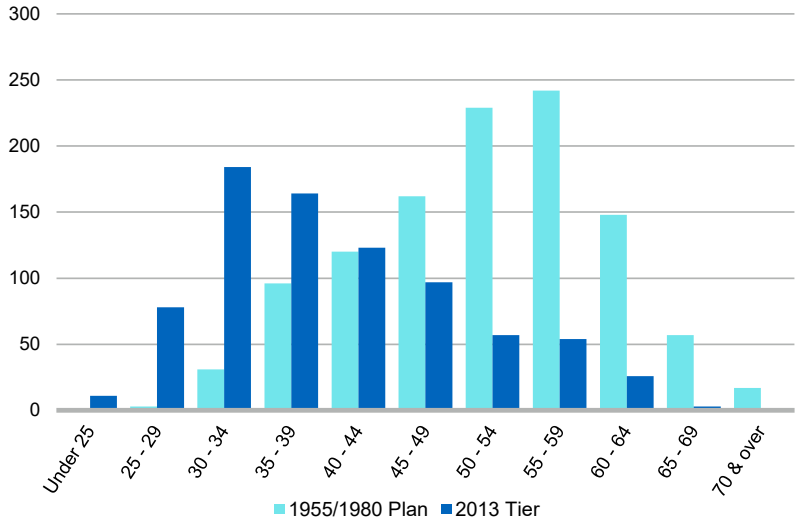
Active Members

Plan costs are affected by the age, years of service and compensation of active members. In this year's valuation, there were 1,903 active members with an average age of 47.3, average years of service of 11.7 years and average compensation of $117,925. The 1,847 active members in the prior valuation had an average age of 47.6, average service of 12.0 years and average compensation of $114,971.

Among the active members, there were none with unknown age information.

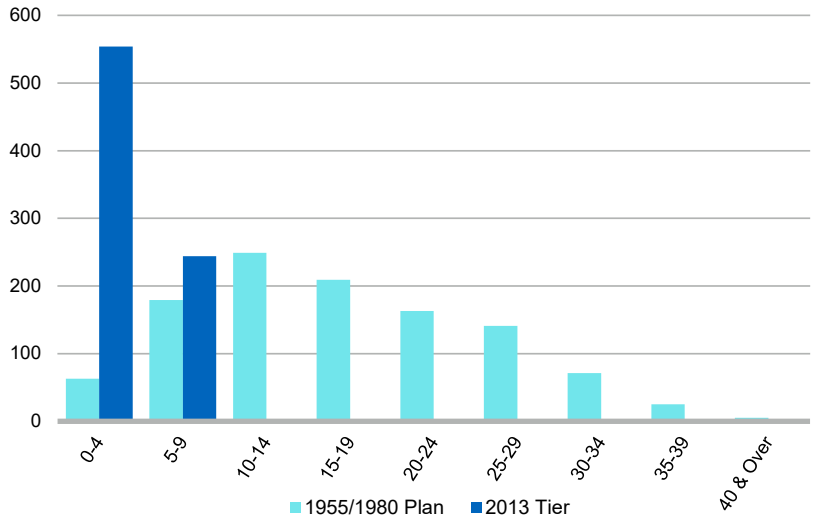
Distribution of Active Members as of June 30, 2020

Actives by Age



Average age	47.3
Prior year average age	47.6
Difference	-0.3

Actives by Years of Service



Average years of service	11.7
Prior year average years of service	12.0
Difference	-0.3

Inactive Members

In this year's valuation, there were 312 members with a vested right to a deferred or immediate vested benefit or a refund of contributions, versus 303 in the prior valuation.

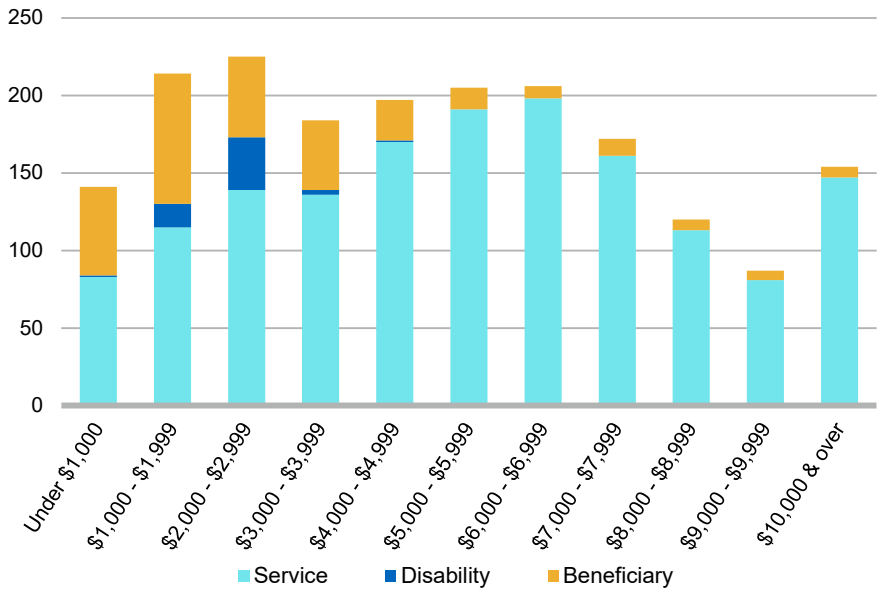
Retired Members and Beneficiaries

As of June 30, 2020, 1,588 retired members and 317 beneficiaries were receiving total monthly benefits of $9,926,391. For comparison, in the previous valuation, there were 1,542 retired members and 302 beneficiaries receiving monthly benefits of $9,264,209.

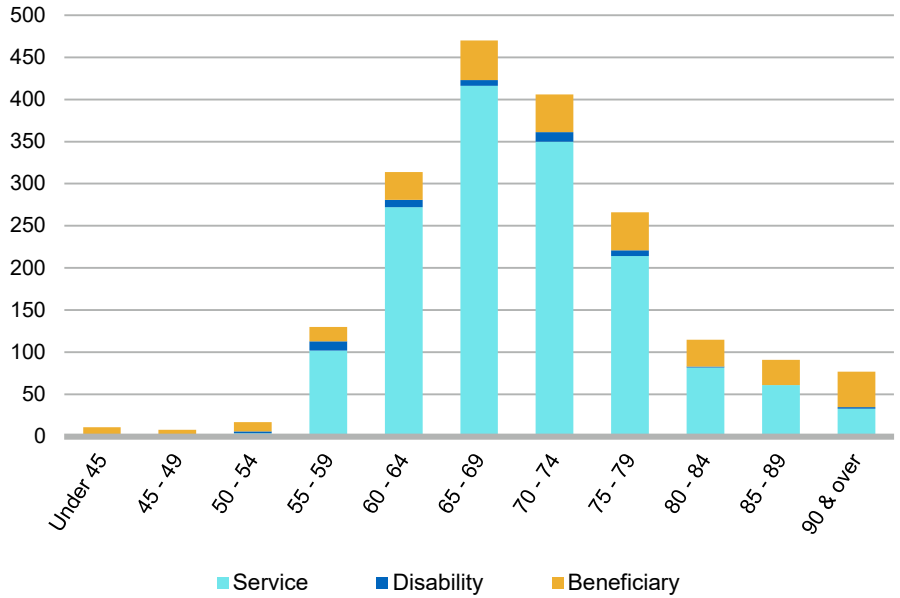
As of June 30, 2020, the average monthly benefit for retired members and beneficiaries is $5,211, compared to $5,024 in the previous valuation. The average age for retired members and beneficiaries is 70.6 in the current valuation, compared with 70.3 in the prior valuation.

Distribution of Retired Members and Beneficiaries as of June 30, 2020

Retired Members and Beneficiaries by Type and Monthly Amount



Retired Members and Beneficiaries by Type and Age



Historical Plan Population

The chart below demonstrates the progression of the active population over the last ten years. The chart also shows the growth among the retired population over the same time period.

Member Data Statistics: 2011 – 2020

	Active Members			Retired Members and Beneficiaries		
Year Ended June 30	Count	Average Age	Average Service	Count	Average Age	Average Monthly Amount
2011	1,702	49.6	14.9	1,325	70.8	$3,684
2012	1,703	49.9	15.1	1,361	70.7	3,832
2013	1,666	49.7	14.9	1,440	70.3	4,007
2014	1,715	49.3	14.3	1,497	70.3	4,183
2015	1,762	48.8	13.7	1,563	70.1	4,360
2016	1,789	48.5	13.3	1,630	70.1	4,499
2017	1,802	48.0	12.8	1,713	70.1	4,649
2018	1,828	47.8	12.4	1,779	70.2	4,841
2019	1,847	47.6	12.0	1,844	70.3	5,024
2020	1,903	47.3	11.7	1,905	70.6	5,211

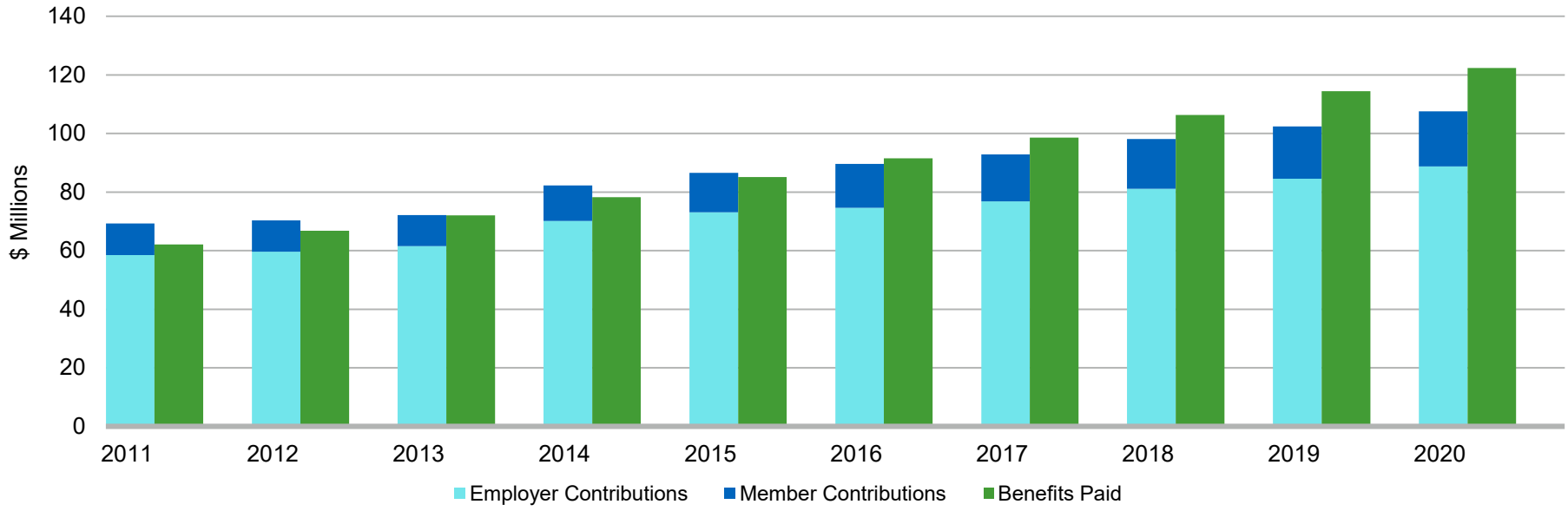
B. Financial Information

Retirement plan funding anticipates that, over the long term, both contributions and investment earnings (less investment fees and administrative expenses) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Additional financial information, including a summary of transactions for the valuation year, is presented in *Section 3, Exhibits D, E* and *F*.

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

Comparison of Contributions Made with Benefits
for Years Ended June 30, 2011 – 2020
(Pension and HIB Plans)



Section 2: Actuarial Valuation Results

Determination of Actuarial Value of Assets for Year Ended June 30, 2020

1	**Market Value of Assets**					
	(a) Pension plan					**$1,813,591,000**
	(b) HIB plan					**44,018,000**
	(c) Total					**$1,857,609,000**
2	Calculation of unrecognized return	**Actual Return**	**Expected Return**	**Investment Gain/(Loss)**	**Percent Deferred**	**Deferred Return**
a)	Year ended June 30, 2016	$12,894,000	$105,466,650	$(92,572,650)	0%	$0
b)	Year ended June 30, 2017	200,254,000	102,606,314	97,647,686	20	19,529,537
c)	Year ended June 30, 2018	148,798,000	116,619,368	32,178,632	40	12,871,452
d)	Year ended June 30, 2019	91,744,000	122,306,135	(30,562,135)	60	(18,337,281)
e)	Year ended June 30, 2020	39,376,000	127,791,930	(88,415,930)	80	(70,732,744)
f)	Total unrecognized return[1]					$(56,669,036)
3	**Preliminary Actuarial Value of Assets: (1c) - (2f)**					**$1,914,278,036**
4	Adjustment to be within 30% corridor of market value					0
5	**Final Actuarial Value of Assets: 3 + 4**:					**$1,914,278,036**
6	Actuarial Value of Assets as a percentage of Market Value of Assets: **5 ÷ 1c**					103.1%
7	**Valuation Value of Pension Plan Assets: 1a ÷ 1c x 5**					**$1,868,917,204**

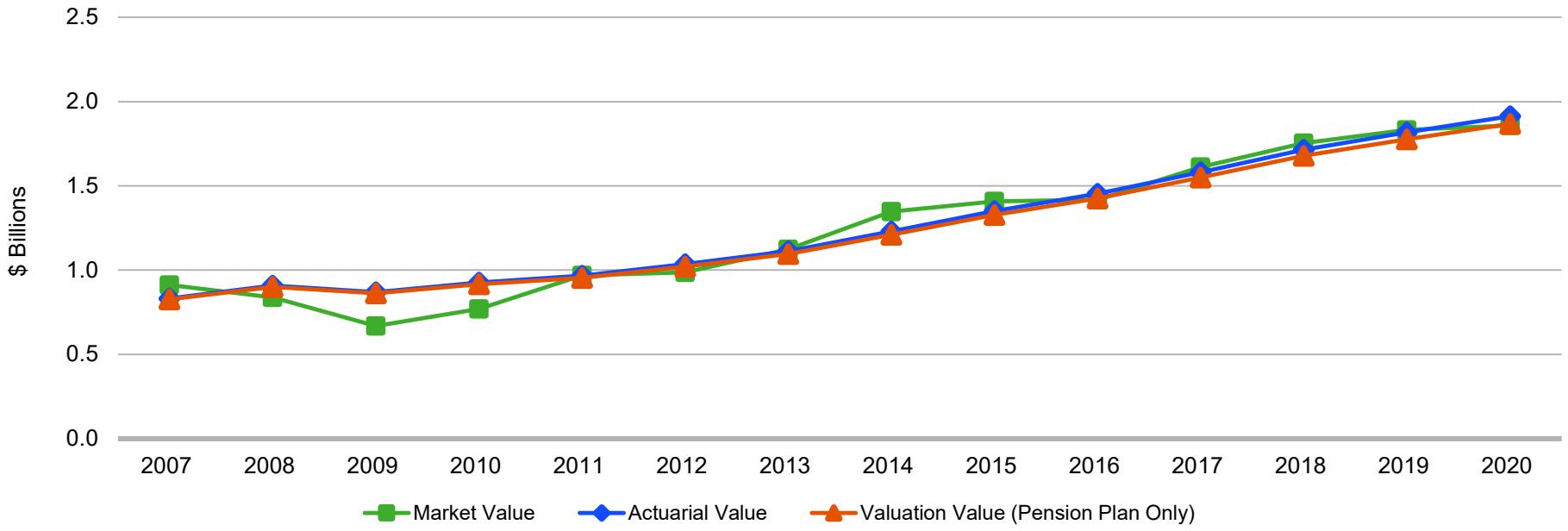
[1] Deferred return as of June 30, 2020 that will be recognized in each of the next four years (amounts may not total exactly due to rounding):

(a)	Amount recognized on June 30, 2021	$2,169,651
(b)	Amount recognized on June 30, 2022	(17,359,887)
(c)	Amount recognized on June 30, 2023	(23,795,613)
(d)	Amount recognized on June 30, 2024	(17,683,186)
(e)	Total unrecognized return as of June 30, 2020	$(56,669,036)

Section 2: Actuarial Valuation Results

The Market Value, Actuarial Value and Valuation Value of Assets are representations of the Plan's financial status. As investment gains and losses are gradually taken into account, the Actuarial Value of Assets tracks the Market Value of Assets. The Valuation Value of Assets is the actuarial value, excluding HIB assets. The Valuation Value of Assets is significant because the Plan's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the Unfunded Actuarial Accrued Liability is an important element in determining the contribution requirement.

Market Value, Actuarial Value, and Valuation Value (Pension Plan Only) of Assets as of June 30, 2007 – 2020



C. Actuarial Experience

To calculate any actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), the actuarially determined contribution will decrease from the previous year. On the other hand, the actuarially determined contribution will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years. There are no assumption changes reflected in this report.

The total loss is $5.3 million, which includes $14.9 million from investment losses, a gain of $3.4 million from contribution experience and $6.2 million in gains from all other sources. The net experience variation from individual sources other than investments and contributions was 0.24% of the Actuarial Accrued Liability. A discussion of the major components of the actuarial experience is on the following pages.

Actuarial Experience for Year Ended June 30, 2020

1	Net loss from investments[1]	$(14,892,666)
2	Actual contributions more than expected as a result of the Board's action to carry over the higher total employer contribution rates as originally determined in the June 30, 2016 valuation	3,412,112
3	Net gain from other experience[2]	6,199,241
4	**Net experience loss:[3] 1 + 2 + 3**	**$(5,281,313)**

[1] Details on next page.

[2] See *Subsection E* for further details.

[3] The net loss is attributed to actual liability experience from July 1, 2019 through June 30, 2020 compared to the projected experience based on the actuarial assumptions as of June 30, 2019. Does not include the effect of plan or assumption changes as of June 30, 2020, if any.

Investment Experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Plan's investment policy. The rate of return on the Market Value of Assets was 2.16% for the year ended June 30, 2020.

For valuation purposes, the assumed rate of return on the Valuation Value of Assets is 7.00% (for the June 30, 2019 valuation). The actual rate of return on a valuation value basis (after smoothing) for the 2019/2020 plan year was 6.16%. Since the actual return for the year was less than the assumed return, the Plan experienced an actuarial loss during the year ended June 30, 2020 with regard to its investments.

Investment Experience for Year Ended June 30, 2020

		Valuation Value (pension plan assets only)	Actuarial Value (includes pension and HIB plan assets)	Market Value (includes pension and HIB plan assets)
1	Net investment income	$108,905,040	$111,447,050	$39,376,000
2	Average value of assets	1,768,538,664	1,810,196,986	1,825,599,000
3	Rate of return: 1 ÷ 2	6.16%	6.16%	2.16%
4	Assumed rate of return	7.00%	7.00%	7.00%
5	Expected investment income: 2 x 4	$123,797,706	$126,713,789	$127,791,930
6	**Actuarial gain/(loss): 1 - 5**	**$(14,892,666)**	**$(15,266,739)**	**$(88,415,930)**

Section 2: Actuarial Valuation Results

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on a valuation value, actuarial value, and market value basis for the last ten years.

Investment Return – Valuation Value, Actuarial Value and Market Value: 2011 – 2020[1]

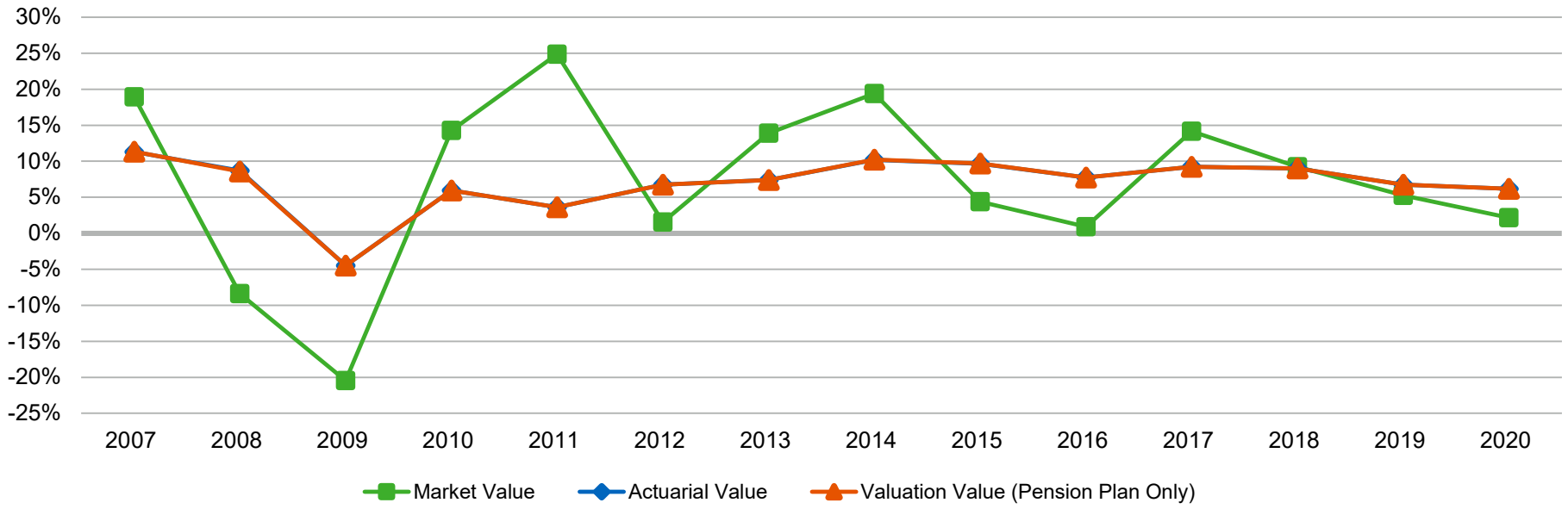
Year Ended June 30	Valuation Value Investment Return		Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent	Amount	Percent
2011	$33,223,487	3.62%	$33,642,654	3.62%	$191,970,000	24.85%
2012	64,558,352	6.75%	65,488,807	6.76%	15,202,000	1.57%
2013	75,506,213	7.40%	76,545,489	7.39%	137,318,000	13.91%
2014	112,077,589	10.22%	113,600,558	10.19%	218,575,000	19.41%
2015	117,145,293	9.68%	118,952,917	9.67%	58,937,000	4.37%
2016	102,598,231	7.74%	104,468,421	7.74%	12,894,000	0.92%
2017	131,217,766	9.23%	133,617,292	9.22%	200,254,000	14.15%
2018	139,184,681	9.01%	141,900,834	9.00%	148,798,000	9.25%
2019	112,719,164	6.74%	115,218,143	6.74%	91,744,000	5.25%
2020	108,905,040	6.16%	111,447,050	6.16%	39,376,000	2.16%
Most recent 5-year geometric average return		**7.77%**		**7.77%**		**6.24%**
Most recent 10-year geometric average return		**7.64%**		**7.63%**		**9.31%**

[1] Market Value and Actuarial Value of Assets are for the pension plan and the HIB plan. Valuation Value of Assets are for the pension plan only.

Section 2: Actuarial Valuation Results

Section 2, Subsection B described the actuarial asset valuation method that gradually recognizes fluctuations in the market value rate of return. The goal of this is to stabilize the actuarial rate of return and to produce more level pension plan costs.

Market, Actuarial and Valuation (Pension Plan Only) Rates of Return for Years Ended June 30, 2007 – 2020



Contributions

Contributions for the year ended June 30, 2020, when adjusted for timing, totaled $99.7 million, compared to the projected amount of $96.3 million (also adjusted for timing). This resulted in a gain of $3.4 million for the year, when adjusted for timing.

Non-Investment Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among participants,
- retirement experience (earlier or later than projected),
- mortality (more or fewer deaths than projected),
- the number of disability retirements (more or fewer than projected), and
- salary increases (greater or smaller than projected).
- cost-of-living adjustments (COLAs; higher or lower than anticipated).

The net gain from this other experience for the year ended June 30, 2020 amounted to $6.2 million, which is 0.24% of the Actuarial Accrued Liability. This gain was mainly due to the effect of lower than expected benefits for current retirees and beneficiaries resulting from corrections to COLA benefits made by the System to certain payees on a prospective basis and lower than expected individual salary increases for actives. See Subsection E for a detailed development of the Unfunded Actuarial Accrued Liability.

D. Other Changes in the Actuarial Accrued Liability

The Actuarial Accrued Liability as of June 30, 2020 is $2.535 billion, an increase of $194.5 million, or 8.3%, from the liability as of the prior valuation date. The Actuarial Accrued Liability is expected to grow each year with Normal Cost and interest, and to decline due to benefit payments made. Additional fluctuations can occur due to actual experience that differs from expected (as discussed in the previous subsection).

Actuarial Assumptions

There were assumption changes reflected in this report based on the Actuarial Experience Study (dated November 12, 2020) covering the period July 1, 2016 through June 30, 2020.

- The changes in actuarial assumptions increased the Actuarial Accrued Liability by $104.8 million (a 4.3% increase) and increased the total Normal Cost by $4.3 million (an 8.9% increase). The effect on the employer contribution rate was an increase of 4.53% of payroll (payable at the end of each pay period). There was an increase in the 2013 Tier member rate of 0.66% of payroll (payable at the end of each pay period).

Details on actuarial assumptions and methods are in *Section 4, Exhibit I*.

Plan Provisions

The following change has been reflected since the prior valuation:

- There were no changes in plan provisions since the prior valuation.

A summary of plan provisions is in *Section 4, Exhibit II*.

E. Development of Unfunded Actuarial Accrued Liability

Development for Year Ended June 30, 2020

1	**Unfunded actuarial accrued liability at beginning of year**		**$563,707,908**
2	Total Normal Cost at beginning of year		46,124,490
3	Expected employer and member contributions at beginning of year		(89,994,965)
4	Interest		36,388,621
5	Expected Unfunded Actuarial Accrued Liability at end of year		$556,226,054
6	Changes due to:		
	a. Investment loss on smoothed value of assets	$14,892,666	
	b. Actual contributions more than expected as a result of the Board's action to carry over the higher total employer contribution rates as originally determined in the June 30, 2016 valuation	(3,412,112)	
	c. Gain due to lower than expected salary increases for continuing active members	(1,582,200)	
	d. Gain due to lower than expected benefits for current retirees and beneficiaries resulting from corrections to COLA benefits made by the System to certain payees on a prospective basis	(5,881,066)	
	e. Other losses on demographic experience	1,264,025	
	f. Increase due to new actuarial assumptions	104,813,640	
	Total changes		$110,094,953
7	**Unfunded Actuarial Accrued Liability at end of year**		**$666,321,007**

Note: The "net gain from other experience" of $6,199,241 from Subsection C is equal to the sum of items 6c, 6d, and 6e.

F. Recommended Contribution

The recommended contribution is equal to the employer Normal Cost payment and a payment on the Unfunded Actuarial Accrued Liability. As of June 30, 2020, the average recommended employer contribution is 39.06% of compensation, payable at the end of each pay period.

The Board sets the funding policy used to calculate the recommended contribution based on layered amortization periods. See *Section 4, Exhibit I* for further details on the funding policy.

The contribution requirement as of June 30, 2020 is based on the data previously described, the actuarial assumptions and Plan provisions described in *Section 4*, including all changes affecting future costs adopted at the time of the actuarial valuation, actuarial gains and losses, and changes in the actuarial assumptions.

Average Recommended Employer Contribution for Year Ended June 30

		2020		2019 (Recommended Rates)	
All Tiers Combined		**Amount**	**% of Projected Compensation**	**Amount**	**% of Projected Compensation**
1	Total Normal Cost	$54,012,504	24.07%	$47,722,108	22.47%
2	Expected member Normal Cost contributions	20,050,815	8.93%	18,449,867	8.69%
3	Employer Normal Cost: **1 – 2**	$33,961,689	15.14%	$29,272,241	13.78%
4	Actuarial Accrued Liability	2,535,238,211		2,340,773,072	
5	Valuation Value of Assets	1,868,917,204		1,777,065,164	
6	Unfunded Actuarial Accrued Liability: **4 – 5**	$666,321,007		$563,707,908	
7	Payment on Unfunded Actuarial Accrued Liability	53,679,277	23.92%	45,379,396	21.37%
8	Total average recommended employer contribution: **3 + 7**	$87,640,966	39.06%	$74,651,637	35.15%
9	Projected compensation	$224,411,694		$212,350,940	

Note: Contributions are assumed to be paid at the end of each pay period.

Reconciliation of Average Recommended Employer Contribution Rate

The chart below details the changes in the average recommended employer contribution rate from the prior valuation to the current year's valuation.

Reconciliation from June 30, 2019 to June 30, 2020

	Contribution Rate	Estimated Annual Dollar Amount[1]
Average Adopted Employer Contribution Rate as of June 30, 2019	**35.43%**	**$79,518,311**
Average Recommended Employer Contribution Rate as of June 30, 2019	**34.81%**	**$78,115,811**
1. Effect of investment return less than expected on smoothed value of assets	0.47%	$1,054,735
2. Effect of individual salary increases lower than expected for continuing active members	(0.05)%	(112,206)
3. Effect lower than expected benefits for current retirees and beneficiaries resulting from corrections to COLA benefits made by the System to certain payees on a prospective basis	(0.19)%	(426,382)
4. Effect of amortizing prior year's UAAL over a larger than expected projected total payroll	(0.45)%	(1,009,853)
5. Effect of actual contributions more than expected as a result of the Board's action to carry over the higher total employer contribution rates as originally determined in the June 30, 2016 valuation	(0.11)%	(246,853)
6. Effect of other demographic experience losses on accrued liability	0.05%	99,864
7. Effect of assumptions changes	4.53%	10,165,850
Total change	4.25%[2]	$9,525,155
Average Recommended Employer Contribution as of June 30, 2020	**39.06%**	**$87,640,966**

[1] Based on June 30, 2020 projected compensation of $224,411,694.

[2] The total change from the adopted employer contribution rate as of June 30, 2019 to the recommended employer contribution rate as of June 30, 2020 is 3.63% or $8,122,655.

Reconciliation of Average Recommended Member Contribution Rate

The chart below details the changes in the average recommended member contribution rate from the prior valuation to the current year's valuation.

Reconciliation from June 30, 2019 to June 30, 2020

	Contribution Rate	Estimated Annual Dollar Amount[1]
Average Recommended Member Contribution as of June 30, 2019	**8.69%**	**$19,508,064**
1. Effect of changes in member demographics	0.00%	$0
2. Effect of change in assumptions changes	0.24%[2]	542,751[2]
Total changes	0.24%	$542,751
Average Recommended Member Contribution as of June 30, 2020	**8.93%**	**$20,050,815**

[1] Based on June 30, 2020 projected compensation of $224,411,694.

[2] There is no change in the 1955/1980 Plan member rate. There is an increase in the 2013 Tier member rate of 0.66% or $542,751.

Recommended Employer Contribution Rate (% of payroll; payable at the end of each pay period)

	June 30, 2020 Actuarial Valuation		June 30, 2019 Actuarial Valuation (Adopted Rates)	
	Contribution Rate	Estimated Annual Dollar Amount[1]	Contribution Rate	Estimated Annual Dollar Amount[1]
1955/1980 Plan				
Total Normal Cost	27.11%	$38,544,100	24.58%	$34,947,030
Expected Employee Contributions	-8.66%[2]	-12,312,501	-8.66%[2]	-12,312,501
Employer Normal Cost	18.45%	$26,231,599	15.92%	$22,634,529
UAAL	23.92%	34,008,664	21.94%[3]	31,193,566
Total Employer Contribution	**42.37%**	**$60,240,263**	**37.86%**	**$53,828,095**
2013 Tier				
Total Normal Cost	18.81%	$15,468,404	17.90%	$14,720,066
Expected Employee Contributions	-9.41%[4]	-7,738,314	-8.75%	-7,195,563
Employer Normal Cost	9.40%[4]	$7,730,090	9.15%	$7,524,503
UAAL	23.92%	19,670,613	22.09%[3]	18,165,713
Total Employer Contribution	**33.32%**	**$27,400,703**	**31.24%**	**$25,690,216**
Combined				
Total Normal Cost	24.07%	$54,012,504	22.13%	$49,667,096
Expected Employee Contributions	-8.93%	-20,050,815	-8.69%	-19,508,064
Employer Normal Cost	15.14%	$33,961,689	13.44%	$30,159,032
UAAL	23.92%	53,679,277	21.99%	49,359,279
Total Employer Contribution	**39.06%**	**$87,640,966**	**35.43%**	**$79,518,311**

[1] Amounts are based on the following June 30, 2020 projected annual payroll:

1955/1980 Plan	$142,176,689
2013 Tier	82,235,005
Combined	$224,411,694

[2] The rate of 8.66% payable during the fiscal years 2020/2021 and 2021/2022 is calculated by taking the total employee rate payable beginning April 18, 2016 (i.e., 8.75%), less the HIB employee contribution rate of 0.09%.

[3] The adopted UAAL rates for the June 30, 2019 valuation for the 1955/1980 Plan and the 2013 Tier are not the same since the Board decided to carry over unchanged the higher employer contribution rates from the June 30, 2017 valuations for the June 30, 2019 valuations. For the Pension Plan, the employer normal cost rates for the 2019 valuation remain the same as those rates actuarially determined for that valuation in order to reflect the most recent demographic information, and the UAAL rates represent the difference between the total rates and the normal cost rates, which produces said variance in the UAAL rates.

[4] The method that we used to develop the employer and employee normal cost rates for the 2013 Tier can be found in Section 4, Exhibit I.

Recommended Employer Contribution Rate (% of payroll; payable at the end of each pay period; continued)

	June 30, 2020 Actuarial Valuation		June 30, 2019 Actuarial Valuation (Recommended Rates)	
	Contribution Rate	Estimated Annual Dollar Amount[1]	Contribution Rate	Estimated Annual Dollar Amount[1]
1955/1980 Plan				
Total Normal Cost	27.11%	$38,544,100	24.58%	$34,947,030
Expected Employee Contributions	-8.66%[2]	-12,312,501	-8.66%[2]	-12,312,501
Employer Normal Cost	18.45%	$26,231,599	15.92%	$22,634,529
UAAL	23.92%	34,008,664	21.37%	30,383,158
Total Employer Contribution	**42.37%**	**$60,240,263**	**37.29%**	**$53,017,687**
2013 Tier				
Total Normal Cost	18.81%	$15,468,404	17.90%	$14,720,066
Expected Employee Contributions	-9.41%[3]	-7,738,314	-8.75%	-7,195,563
Employer Normal Cost	9.40%[3]	$7,730,090	9.15%	$7,524,503
UAAL	23.92%	19,670,613	21.37%	17,573,621
Total Employer Contribution	**33.32%**	**$27,400,703**	**30.52%**	**$25,098,124**
Combined				
Total Normal Cost	24.07%	$54,012,504	22.13%	$49,667,096
Expected Employee Contributions	-8.93%	-20,050,815	-8.69%	-19,508,064
Employer Normal Cost	15.14%	$33,961,689	13.44%	$30,159,032
UAAL	23.92%	53,679,277	21.37%	47,956,779
Total Employer Contribution	**39.06%**	**$87,640,966**	**34.81%**	**$78,115,811**

[1] Amounts are based on the following June 30, 2020 projected annual payroll:

1955/1980 Plan	$142,176,689
2013 Tier	82,235,005
Combined	$224,411,694

[2] The rate of 8.66% payable during the fiscal years 2020/2021 and 2021/2022 is calculated by taking the total employee rate payable beginning April 18, 2016 (i.e., 8.75%), less the HIB employee contribution rate of 0.09%.

[3] The method that we used to develop the employer and employee normal cost rates for the 2013 Tier can be found in Section 4, Exhibit I.

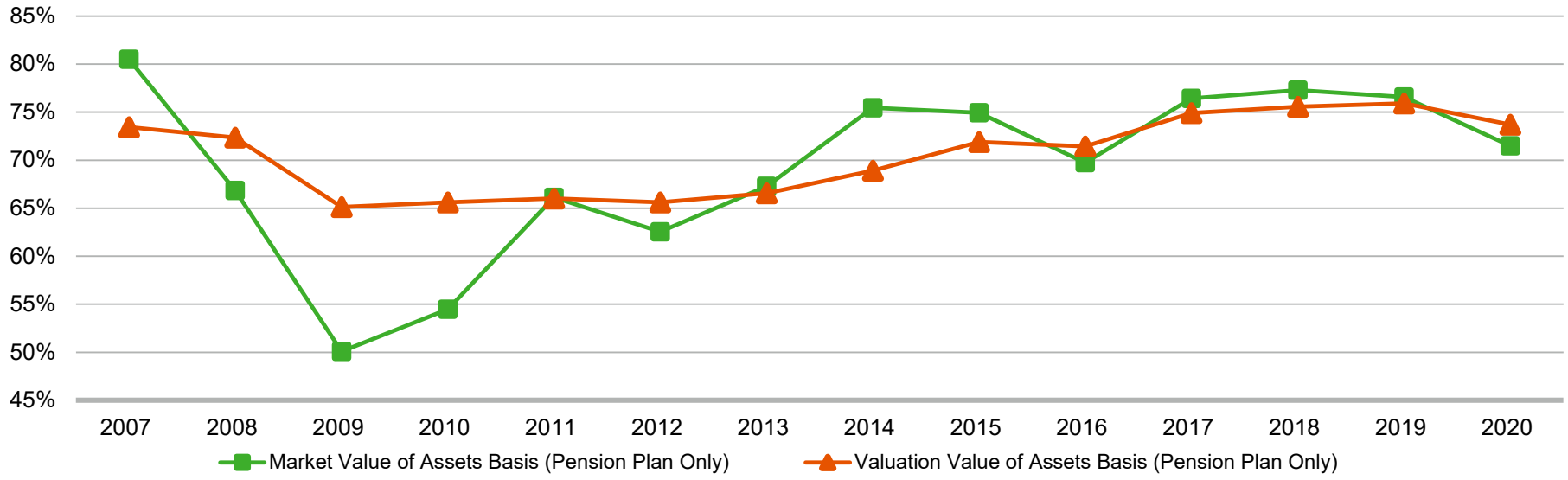
G. Funded Status

A commonly reported piece of information regarding the Plan's financial status is the funded ratio. These ratios compare the Valuation Value of Assets and the Market Value of Assets to the Actuarial Accrued Liability of the Plan. Higher ratios indicate a relatively well-funded plan, while lower ratios may indicate recent changes to actuarial assumptions, funding of the plan below actuarial requirements, poor asset performance, or a variety of other causes.

The chart below depicts a history of the funded ratio for the Plan. The chart on the next page shows the Plan's schedule of funding progress for the last ten years.

The funded status measures shown in this valuation are appropriate for assessing the need for or amount of future contributions. However, they are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligations. As the chart below shows, the measures are different depending on whether the Valuation Value or Market Value of Assets is used.

Funded Ratio for Years Ended June 30, 2007 – 2020



Section 2: Actuarial Valuation Results

Schedule of Funding Progress for Years Ended June 30, 2011 – 2020 (Dollar amounts in thousands)

Actuarial Valuation Date as of June 30,	Valuation Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded/ (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (%) (a) / (b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll (%) [(b) - (a)] / (c)
2011	$954,719	$1,446,039	$491,320	66.0%	$159,505	308.0%
2012	1,021,546	1,556,696	535,150	65.6	158,847	336.9
2013	1,095,847	1,646,534	550,687	66.6	159,246	345.8
2014	1,210,321	1,756,706	546,385	68.9	167,196	326.8
2015	1,327,113	1,845,912	518,799	71.9	174,899	296.6
2016	1,425,785	1,995,863	570,078	71.4	183,971	309.9
2017	1,549,213	2,068,015	518,802	74.9	184,859	280.6
2018	1,678,417	2,220,977	542,560	75.6	202,995	267.3
2019	1,777,065	2,340,773	563,708	75.9	212,351	265.5
2020	1,868,917	2,535,238	666,321	73.7	224,412	296.9

H. Actuarial Balance Sheet

An overview of the Plan's funding is given by an Actuarial Balance Sheet. In this approach, first the amount and timing of all future payments that will be made by the Plan for current participants is determined. Then these payments are discounted at the valuation interest rate to the date of the valuation, thereby determining the present value, referred to as the Actuarial Present Value of Future Benefits of the Plan.

Second, this Actuarial Present Value of Future Benefits is compared to the assets. The "assets" for this purpose include the net amount of assets already accumulated by the Plan, the present value of future member contributions, the present value of future employer Normal Cost contributions, and the present value of future employer amortization payments for the Unfunded Actuarial Accrued Liability.

Actuarial Balance Sheet

	Year Ended	
	June 30, 2020	**June 30, 2019**
Actuarial Present Value of Future Benefits		
• Present value of benefits for retired members and beneficiaries	$1,594,477,229	$1,467,355,838
• Present value of benefits for inactive vested members	46,192,075	49,348,988
• Present value of benefits for active members	1,341,098,424	1,198,778,097
Total Actuarial Present Value of Future Benefits	**$2,981,767,728**	**$2,715,482,923**
Current and future assets		
• Total Valuation Value of Assets	$1,868,917,204	$1,777,065,164
• Present value of future contributions by members	173,419,951	156,472,262
• Present value of future employer contributions for:		
– Entry age Normal Cost	273,109,566	218,237,589
– Unfunded Actuarial Accrued Liability	666,321,007	563,707,908
Total of current and future assets	**$2,981,767,728**	**$2,715,482,923**

I. Volatility Ratios

Retirement plans are subject to volatility in the level of required contributions. This volatility tends to increase as retirement plans become more mature.

The Asset Volatility Ratio (AVR), which is equal to the Market Value of Assets divided by total payroll, provides an indication of the potential contribution volatility for any given level of investment volatility. A higher AVR indicates that the plan is subject to a greater level of contribution volatility. This is a current measurement since it is based on the current level of assets.

The current AVR is about 8.1. This means that a 1% asset gain or loss (relative to the assumed investment return) translates to about 8.1% of one-year's payroll. Since actuarial gains and losses are amortized over 20 years, there would be a 0.6% of payroll decrease/(increase) in the required contribution for each 1% asset gain/(loss).

The Liability Volatility Ratio (LVR), which is equal to the Actuarial Accrued Liability divided by payroll, provides an indication of the longer-term potential for contribution volatility for any given level of investment volatility. This is because, over an extended period of time, the plan's assets should track the plan's liabilities.

The LVR also indicates how volatile contributions will be in response to changes in the Actuarial Accrued Liability due to actual experience or to changes in actuarial assumptions. The current LVR is about 11.3. This is about 40% higher than the AVR. Therefore, we would expect that contribution volatility will increase over the long term.

The chart below shows how the asset and liability volatility ratios have varied over time.

Volatility Ratios for Years Ended June 30, 2011 – 2020

Year Ended June 30	Asset Volatility Ratio	Liability Volatility Ratio
2011	6.0	9.1
2012	6.1	9.8
2013	7.0	10.3
2014	7.9	10.5
2015	7.9	10.6
2016	7.6	10.8
2017	8.6	11.2
2018	8.5	10.9
2019	8.4	11.0
2020	8.1	11.3

J. Risk Assessment

Since the actuarial valuation results are dependent on a fixed set of assumptions and data as of a specific date, there is risk that emerging results may differ, perhaps significantly, as actual experience is fluid and will not exactly track current assumptions. This potential divergence may have a significant impact on the future financial condition of the plan.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a concise discussion of some of the primary risks that may affect the Plan's future financial condition. We recommend a more detailed assessment of the risks to provide the Board with a better understanding of the risks inherent in the Plan that can inform both financial preparation and future decision making. This assessment would enable us to work with the Board to highlight and illustrate particular risks or potential future outcomes they may be interested in discussing and could include scenario testing, sensitivity testing, stress testing and stochastic modeling. As noted in the valuation highlights section of this report, the results of our more detailed risk assessment will be provided in a separate stand-alone report in the first quarter of 2021. We anticipate including within that report investment return scenarios that demonstrate the effects of short-term market volatility on funded status and contribution rates, which may aid in illustrating the effect on the plan of market volatility that can result from events such as COVID-19.

This section provides descriptions and basic assessments of the primary risks that are likely to have an ongoing influence on the Plan's financial health, as well as a discussion of historical trends and maturity measures:

Risk Assessments

- Asset/Liability Mismatch Risk (the potential that future plan experience does not affect asset and liability values in the same way, causing them to diverge)

  The most significant asset/liability mismatch risk to the Plan is investment risk, as discussed below. In fact, investment risk has the potential to impact asset/liability mismatch in two ways. The first mismatch is evident in annual valuations: when asset values deviate from assumptions, they are typically independent from liability changes. The second mismatch can be caused when systemic asset deviations from assumptions may signal the need for an assumption change, which causes liability values and contribution rates to move in the opposite direction from any changes in the expected experience of asset growth rates.

  Asset/liability mismatch can also be caused by demographic assumption risk such as longevity, which affects liabilities but have no impact on asset levels. This risk is also discussed below.

- Investment Risk (the risk that investment returns will be different than expected)

  The investment return assumption is a long-term, static assumption for valuation purposes even though in reality market experience can be quite volatile in any given year. That volatility can cause significant changes in the financial condition of the Plan, affecting both

funded status and contribution rates. The inherent year-to-year volatility is reduced by smoothing through the Actuarial Value of Assets, however investment experience can still have a sizable impact. As discussed in *Section 2, Subsection I, Volatility Ratios*, on page 36, a 1% asset gain or loss (relative to the assumed investment return) translates to about 8.1% of one-year's payroll. Since actuarial gains and losses are amortized over 20 years, there would be a 0.6% of payroll decrease/(increase) in the required contribution for each 1% asset gain/(loss).

The year-by-year market value rate of return over the last 10 years has ranged from a low of 0.92% to a high of 24.85%.

- Longevity Risk (the risk that mortality experience will be different than expected)

  The actuarial valuation includes current life expectancy assumptions and an expectation of future improvement in life expectancy, which are significant assumptions given the relatively long duration of liabilities for pension plans. Emerging plan experience that does not match these expectations will result in increases or decreases in the actuarially determined contribution over time. This risk can be reduced by using tables appropriate for the Plan (public experience tables) that are weighted by benefit levels, and by using generational mortality projections. Effective with this valuation, the Board has adopted mortality tables based on public plan experience that are weighted by benefits and include generational mortality projections.

- Other Risks

  In addition to longevity, the valuation includes a variety of other assumptions that are unlikely to match future experience exactly. One example is projected salary scales over time. As salary is central to the determination of benefits paid in retirement, deviations from the projected salary scales could have a material impact on the benefits anticipated for each member. Examples of demographic assumptions include retirement, termination and disability assumptions, and will likely vary in significance for different pension plans.

Some plans also carry significant contribution risk, defined as the potential for actual future contributions deviating from expected future contributions. However, the employer has a proven track-record of making at least the Actuarially Determined Contributions based on the Board's Actuarial Funding Policy, so contribution risk is minimal.

Evaluation of Historical Trends

Past experience can help demonstrate the sensitivity of key results to the Plan's actual experience. Over the past ten years:

- The funded percentage on the Valuation Value of Assets basis has increased from 66.0% to 73.7%. This is primarily due to contributions made to amortize the UAAL under the Board's actuarial funding policy. For a more detailed history see *Section 2, Subsection G, Funded Status* starting on page 33.

- The average geometric investment return on the Actuarial Value of Assets over the most recent 10-year period was 6.63%. This includes a high of a 10.19% return and a low of 3.62%. The average over the last 5 years was 7.77%. For more details see the Investment Return table in *Section 2, Subsection C* on page 23.
- The primary source of new UAAL was the strengthening of assumptions through multiple assumption changes. For example, the assumption changes in:
  - 2012 included a change in the discount rate from 8.00% to 7.75% and a strengthening of the mortality assumption, adding $53.4 million in unfunded liability;
  - 2016 included a change in the discount rate from 7.50% to 7.25%, adding $52.6 million in unfunded liability;
  - 2018 included a change in the discount rate from 7.25% to 7.00%, adding $12.5 million in unfunded liability; and
  - 2020 included the use of amount-weighted mortality tables projected generationally to better reflect future mortality improvement, adding $104.8 million in unfunded liability.

  For more details on unfunded liability changes see *Section 3, Exhibit H, Table of Amortization Bases* starting on page 50. A graphical representation of historical changes in UAAL by source will be included in the stand-alone risk assessment report.
- The plan's funding policy effectively deals with these unfunded liabilities over time. This can be seen most clearly in the *Section 3, Exhibit I, Projection of UAAL Balances and Payments* provided on pages 52 and 53.

Maturity Measures

In the last 10 years the ratio of retired members and beneficiaries to active members has increased from 0.78 to 1.00. An increased ratio indicates that the plan has grown in maturity over time. This is to be expected, but is also informative for understanding plan sensitivity to particular risks. For more details see *Section 2, Subsection A, Member Data* on page 14.

As pension plans mature, the cash needed to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities. For the prior year, benefits paid were $14.7 million more than contributions received.[1] Plans with high levels of negative cash flows may have a need for a larger allocation to income generating assets, which can create a drag on investment return. However, this plan currently has relatively low levels of negative cash flows. For more details on historical cash flows see the Comparison of Contributions Made with Benefits in *Section 2, Subsection B* on page 18.

A further discussion of plan maturity measures and how they relate to changes in assets and liabilities is included in *Section 2, Subsection I, Volatility Ratios* on page 36.

[1] Under the Retirement Board's actuarial funding policy, current assets plus the present value of future (employer and member) contributions will always be equal to the present value of benefits expected to be paid by the System. Based on the understanding that the present value of future contributions includes both the amounts required to pay the ongoing normal cost and any unfunded liabilities, it appears that the minimum contribution limit pursuant to Section 12335 of the Public Utilities Code does not apply.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage

Total Plan

Category	Year Ended June 30 2020	2019	Change From Prior Year
Active members in valuation:			
• Number	1,903	1,847	3.0%
• Average age	47.3	47.6	-0.3
• Average years of service	11.7	12.0	-0.3
• Total projected compensation	$224,411,694	$212,350,940	5.7%
• Average projected compensation	$117,925	$114,971	2.6%
• Account balances	$213,966,904	$200,907,500	6.5%
• Total active vested members	1,286	1,236	4.0%
Inactive vested members:			
• Number[1]	312	303	3.0%
• Average Age	49.0	49.1	-0.1
Retired members:			
• Number in pay status	1,534	1,483	3.4%
• Average age	70.2	69.9	0.3
• Average monthly benefit	$5,763	$5,567	3.5%
Disabled members:			
• Number in pay status	54	59	-8.5%
• Average age	65.8	66.0	-0.2
• Average monthly benefit	$2,304	$2,243	2.7%
Beneficiaries:			
• Number in pay status	317	302	5.0%
• Average age	73.4	73.3	0.1
• Average monthly benefit	$3,034	$2,901	4.6%

[1] Includes inactive members due a refund of member contributions.

Exhibit A: Table of Plan Coverage (continued)

1955/1980 Plan

Category	Year Ended June 30 2020	Year Ended June 30 2019	Change From Prior Year
Active members in valuation:			
• Number	1,105	1,174	-5.9%
• Average age	52.3	51.8	0.5
• Average years of service	17.5	17.2	0.3
• Total projected compensation	$142,176,689	$145,378,597	-2.2%
• Average projected compensation	$128,667	$123,832	3.9%
• Account balances	$189,095,552	$183,426,221	3.1%
• Total active vested members	1,042	1,102	-5.4%
Inactive vested members:			
• Number[1]	217	224	-3.1%
• Average Age	51.8	51.5	0.3
Retired members:			
• Number in pay status	1,532	1,483	3.3%
• Average age	70.2	69.9	0.3
• Average monthly benefit	$5,770	$5,567	3.6%
Disabled members:			
• Number in pay status	54	59	-8.5%
• Average age	65.8	66.0	-0.2
• Average monthly benefit	$2,304	$2,243	2.7%
Beneficiaries:			
• Number in pay status	317	302	5.0%
• Average age	73.4	73.3	0.1
• Average monthly benefit	$3,034	$2,901	4.6%

[1] Includes inactive members due a refund of member contributions.

Exhibit A: Table of Plan Coverage (continued)

2013 Tier

Category	Year Ended June 30 2020	Year Ended June 30 2019	Change From Prior Year
Active members in valuation:			
• Number	798	673	18.6%
• Average age	40.5	40.3	0.2
• Average years of service	3.6	3.1	0.5
• Total projected compensation	$82,235,005	$66,972,343	22.8%
• Average projected compensation	$103,051	$99,513	3.6%
• Account balances	$24,871,352	$17,481,279	42.3%
• Total active vested members	244	134	82.1%
Inactive vested members:			
• Number[1]	95	79	20.3%
• Average Age	42.6	42.2	0.4
Retired members:			
• Number in pay status	2	N/A	N/A
• Average age	71.0	N/A	N/A
• Average monthly benefit	$594	N/A	N/A
Disabled members:			
• Number in pay status	N/A	N/A	N/A
• Average age	N/A	N/A	N/A
• Average monthly benefit	N/A	N/A	N/A
Beneficiaries:			
• Number in pay status	N/A	N/A	N/A
• Average age	N/A	N/A	N/A
• Average monthly benefit	N/A	N/A	N/A

[1] Includes inactive members due a refund of member contributions.

Exhibit B: Members in Active Service as of June 30, 2020 by Age, Years of Service, and Average Projected Compensation

Total Plan

	Years of Service									
Age	**Total**	**0 – 4**	**5 – 9**	**10 – 14**	**15 – 19**	**20 – 24**	**25 – 29**	**30 – 34**	**35 – 39**	**40 & over**
Under 25	11	11	- -	- -	- -	- -	- -	- -	- -	- -
	$88,682	$88,682	- -	- -	- -	- -	- -	- -	- -	- -
25 - 29	81	63	18	- -	- -	- -	- -	- -	- -	- -
	100,614	98,142	$109,268	- -	- -	- -	- -	- -	- -	- -
30 - 34	215	152	59	4	- -	- -	- -	- -	- -	- -
	103,207	97,678	116,473	$117,617	- -	- -	- -	- -	- -	- -
35 - 39	260	133	86	34	7	- -	- -	- -	- -	- -
	111,528	101,249	118,269	125,136	$157,912	- -	- -	- -	- -	- -
40 - 44	243	84	82	42	29	6	- -	- -	- -	- -
	119,889	105,647	120,514	131,025	138,465	$143,000	- -	- -	- -	- -
45 - 49	259	73	66	36	48	27	8	1	- -	- -
	118,239	106,386	114,662	120,559	129,303	132,854	$126,465	$144,738	- -	- -
50 - 54	286	49	40	50	46	43	39	16	3	- -
	125,870	108,613	121,519	123,846	128,571	125,104	138,182	155,512	$150,895	- -
55 - 59	296	36	43	53	38	44	49	28	5	- -
	127,372	103,666	116,177	130,748	127,651	136,994	134,026	141,559	127,098	- -
60 - 64	174	13	27	23	25	24	32	20	7	3
	122,298	110,268	107,455	130,068	117,832	118,235	129,067	122,413	151,554	$176,937
65 - 69	60	2	2	6	12	13	9	4	10	2
	121,477	108,475	126,291	120,895	114,685	117,155	134,587	113,315	125,093	139,512
70 & over	18	1	- -	1	4	6	4	2	- -	- -
	115,179	126,291	- -	141,090	116,999	125,219	96,638	99,989	- -	- -
Total	**1,903**	**617**	**423**	**249**	**209**	**163**	**141**	**71**	**25**	**5**
	$117,925	**$102,015**	**$116,950**	**$126,700**	**$128,624**	**$128,615**	**$132,596**	**$136,592**	**$135,999**	**$161,967**

Exhibit B: Members in Active Service as of June 30, 2020 by Age, Years of Service, and Average Projected Compensation (continued)

1955/1980 Plan

	Years of Service									
Age	**Total**	**0 – 4**	**5 – 9**	**10 – 14**	**15 – 19**	**20 – 24**	**25 – 29**	**30 – 34**	**35 – 39**	**40 & over**
Under 25	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
25 – 29	3	1	2	- -	- -	- -	- -	- -	- -	- -
	$111,734	$97,439	$118,881	- -	- -	- -	- -	- -	- -	- -
30 – 34	31	6	21	4	- -	- -	- -	- -	- -	- -
	118,868	104,036	123,344	$117,617	- -	- -	- -	- -	- -	- -
35 – 39	96	14	41	34	7	- -	- -	- -	- -	- -
	126,105	113,699	125,715	125,136	$157,912	- -	- -	- -	- -	- -
40 – 44	120	12	31	42	29	6	- -	- -	- -	- -
	132,191	121,826	129,824	131,025	138,465	$143,000	- -	- -	- -	- -
45 – 49	162	11	31	36	48	27	8	1	- -	- -
	126,945	133,284	122,865	120,559	129,303	132,854	$126,465	$144,738	- -	- -
50 – 54	229	10	22	50	46	43	39	16	3	- -
	130,888	128,329	130,637	123,846	128,571	125,104	138,182	155,512	$150,895	- -
55 – 59	242	6	19	53	38	44	49	28	5	- -
	132,795	112,926	130,752	130,748	127,651	136,994	134,026	141,559	127,098	- -
60 – 64	148	2	12	23	25	24	32	20	7	3
	125,667	111,188	119,271	130,068	117,832	118,235	129,067	122,413	151,554	$176,937
65 – 69	57	1	- -	6	12	13	9	4	10	2
	122,230	148,009	- -	120,895	114,685	117,155	134,587	113,315	125,093	139,512
70 & over	17	- -	- -	1	4	6	4	2	- -	- -
	114,525	- -	- -	141,090	116,999	125,219	96,638	99,989	- -	- -
Total	**1,105**	**63**	**179**	**249**	**209**	**163**	**141**	**71**	**25**	**5**
	$128,667	**$120,202**	**$126,286**	**$126,700**	**$128,624**	**$128,615**	**$132,596**	**$136,592**	**$135,999**	**$161,967**

Exhibit B: Members in Active Service as of June 30, 2020 by Age, Years of Service, and Average Projected Compensation (continued)

2013 Tier

		Years of Service								
Age	**Total**	**0 – 4**	**5 – 9**	**10 – 14**	**15 – 19**	**20 – 24**	**25 – 29**	**30 – 34**	**35 – 39**	**40 & over**
Under 25	11	11	- -	- -	- -	- -	- -	- -	- -	- -
	$88,682	$88,682	- -	- -	- -	- -	- -	- -	- -	- -
25 – 29	78	62	16	- -	- -	- -	- -	- -	- -	- -
	100,187	98,153	$108,067	- -	- -	- -	- -	- -	- -	- -
30 – 34	184	146	38	- -	- -	- -	- -	- -	- -	- -
	100,568	97,417	112,676	- -	- -	- -	- -	- -	- -	- -
35 – 39	164	119	45	- -	- -	- -	- -	- -	- -	- -
	102,995	99,785	111,484	- -	- -	- -	- -	- -	- -	- -
40 – 44	123	72	51	- -	- -	- -	- -	- -	- -	- -
	107,887	102,951	114,856	- -	- -	- -	- -	- -	- -	- -
45 – 49	97	62	35	- -	- -	- -	- -	- -	- -	- -
	103,700	101,614	107,396	- -	- -	- -	- -	- -	- -	- -
50 – 54	57	39	18	- -	- -	- -	- -	- -	- -	- -
	105,711	103,558	110,375	- -	- -	- -	- -	- -	- -	- -
55 – 59	54	30	24	- -	- -	- -	- -	- -	- -	- -
	103,069	101,815	104,638	- -	- -	- -	- -	- -	- -	- -
60 – 64	26	11	15	- -	- -	- -	- -	- -	- -	- -
	103,121	110,101	98,002	- -	- -	- -	- -	- -	- -	- -
65 – 69	3	1	2	- -	- -	- -	- -	- -	- -	- -
	107,174	68,940	126,291	- -	- -	- -	- -	- -	- -	- -
70 & over	1	1	- -	- -	- -	- -	- -	- -	- -	- -
	126,291	126,291	- -	- -	- -	- -	- -	- -	- -	- -
Total	**798**	**554**	**244**	**- -**	**- -**	**- -**	**- -**	**- -**	**- -**	**- -**
	$103,051	**$99,946**	**$110,101**	**- -**	**- -**	**- -**	**- -**	**- -**	**- -**	**- -**

Exhibit C: Reconciliation of Member Data

	Active Members	Inactive Vested Members[1]	Retired Members	Disabled Members	Beneficiaries	Total
Number as of June 30, 2019	**1,847**	**303**	**1,483**	**59**	**302**	**3,994**
• New members	151	0	0	0	0	151
• Terminations – with vested rights	-22	22	0	0	0	0
• Contribution refunds	-4	-3	0	0	0	-7
• Retirements	-72	-13	85	0	0	0
• New disabilities	0	0	0	0	0	0
• Return to work	4	-3	-1	0	0	0
• Died with or without beneficiary	-1	-1	-33	-5	15[2]	-25
• Data adjustments	0	7[3]	0	0	0	7
Number as of June 30, 2020	**1,903**	**312**	**1,534**	**54**	**317**	**4,120**

[1] Includes inactive members due a refund of member contributions.

[2] This is the net increase in the number of beneficiaries after subtracting the number of beneficiaries who died (13) during the year.

[3] All 7 members were hired and terminated employment during fiscal 2019/2020.

Exhibit D: Summary Statement of Income and Expenses on a Market Value Basis for all Pension Plan and HIB Plan Assets

	Year Ended June 30, 2020		Year Ended June 30, 2019	
Net assets at market value at the beginning of the year		**$1,832,965,000**		**$1,753,240,000**
Contribution income:				
• Employer contributions	$88,734,000		$84,551,000	
• Member contributions	18,885,000		17,865,000	
Net contribution income		$107,619,000		$102,416,000
Investment income:				
• Interest, dividends and other income	$32,691,000		$30,325,000	
• Asset appreciation	13,939,000		69,141,000	
• Less investment and administrative fees	(7,254,000)		(7,722,000)	
Net investment income		$39,376,000		$91,744,000
Total income available for benefits		**$146,995,000**		**$194,160,000**
Less benefit payments:				
• Benefits paid	$(121,889,000)		$(114,168,000)	
• Refund of contributions	(462,000)		(267,000)	
Net benefit payments		$(122,351,000)		$(114,435,000)
Change in net assets at market value		**$24,644,000**		**$79,725,000**
Net assets at market value at the end of the year		**$1,857,609,000**		**$1,832,965,000**

Note: Results may be slightly off due to rounding.

Exhibit E: Summary Statement of Plan Assets

	June 30, 2020		June 30, 2019	
Cash equivalents:		$57,852,000		$42,729,000
Accounts receivable:				
• Brokers, securities sold	$475,000		$1,647,000	
• Employer and member contributions	2,730,000		2,031,000	
• Interest and dividends	4,707,000		4,300,000	
Total accounts receivable		$7,912,000		$7,978,000
Investments:				
• Equities	$1,247,252,000		$1,234,667,000	
• Fixed income investments	463,388,000		463,013,000	
• Real estate	95,649,000		98,133,000	
• Securities lending collateral	80,731,000		48,857,000	
• Other assets	575,000		560,000	
Total investments at market value		$1,887,595,000		$1,845,230,000
Total assets		$1,953,359,000		$1,895,937,000
Accounts payable:				
• Accounts payable and accrued expenses	$(2,396,000)		$(2,757,000)	
• Payables to brokers, securities purchased	(12,623,000)		(11,358,000)	
• Securities lending collateral	(80,731,000)		(48,857,000)	
Total accounts payable		$(95,750,000)		$(62,972,000)
Net assets at market value		**$1,857,609,000**		**$1,832,965,000**
Net assets at actuarial value		**$1,914,278,036**		**$1,817,562,986**
Net assets at valuation value (Pension Plan Only)		**$1,868,917,204**		**$1,777,065,164**

Note: Results may be slightly off due to rounding.

Exhibit F: Development of the Fund through June 30, 2020 for all Pension Plan and HIB Plan Assets

Year Ended June 30	Employer Contributions	Member Contributions	Net Investment Return[1]	Benefit Payments	Market Value of Assets at Year-End	Actuarial Value of Assets at Year-End	Actuarial Value as a Percent of Market Value
2011	$58,481,000	$10,850,000	$191,970,000	$62,114,000	$968,239,000	$966,766,525	99.8%
2012	59,651,000	10,723,000	15,202,000	66,843,000	986,972,000	1,035,786,332	104.9%
2013	61,567,000	10,566,000	137,318,000	72,095,000	1,124,328,000	1,112,369,821	98.9%
2014	70,117,000	12,133,000	218,575,000	78,265,000	1,346,888,000	1,229,955,379	91.3%
2015	73,141,000	13,427,000	58,937,000	85,184,000	1,407,209,000	1,350,292,296	96.0%
2016	74,672,000	14,925,000	12,894,000	91,571,000	1,418,129,000	1,452,786,717	102.4%
2017	76,860,000	16,018,000	200,254,000	98,617,000	1,612,644,000	1,580,665,009	98.0%
2018	81,096,000	17,079,000	148,798,000	106,377,000	1,753,240,000	1,714,363,843	97.8%
2019	84,551,000	17,865,000	91,744,000	114,435,000	1,832,965,000	1,817,562,986	99.2%
2020	88,734,000	18,885,000	39,376,000	122,351,000	1,857,609,000	1,914,278,036	103.1%

[1] On a market value basis, net of investment fees and administrative expenses.

Exhibit G: Table of Amortization Bases

Type	Date Established	Initial Amount	Initial Period	Outstanding Balance	Years Remaining	Annual Payment[1]
Experience Gain	06/30/2000	$(10,871,830)	30	$(10,680,694)	10	$(1,247,509)
Change in Assumptions	06/30/2000	8,629,891	30	8,478,172	10	990,253
Plan Amendments	06/30/2000	13,607,265	30	13,368,039	10	1,561,391
3.5% Retiree COLA Assumption	06/30/2000	27,057,441	30	26,581,751	10	3,104,757
Experience Loss	06/30/2001	2,292,281	30	2,338,395	11	252,484
Experience Loss	06/30/2002	26,232,251	30	27,560,783	12	2,773,559
Plan Amendments	06/30/2002	5,111,914	30	5,370,805	12	540,487
Experience Loss	06/30/2003	43,692,270	30	46,956,668	13	4,434,595
Plan Amendments	06/30/2003	67,138,578	30	72,154,723	13	6,814,303
Experience Loss	06/30/2004	32,731,232	30	35,774,293	14	3,189,117
New Assumption / Domestic Partners	06/30/2004	(9,812,646)	30	(10,724,941)	14	(956,080)
Experience Loss	06/30/2005	26,910,233	30	29,763,049	15	2,517,071
Remove Limit Pension Base	06/30/2005	27,315,928	30	30,074,444	15	2,543,406
Experience Loss	06/30/2006	14,160,133	30	15,779,778	16	1,271,530
Experience Gain	06/30/2007	(3,098,126)	30	(3,465,472)	17	(267,086)
Experience Gain	06/30/2008	(7,800,585)	30	(8,729,140)	18	(645,627)
Change in Assumptions	06/30/2008	51,413,374	30	57,533,460	18	4,255,308
Experience Loss	06/30/2009	114,894,458	30	128,244,264	19	9,129,946
Experience Loss	06/30/2010	3,039,098	30	3,374,654	20	231,867
Change in Assumptions	06/30/2010	8,098,499	30	8,992,679	20	617,872
Experience Loss	06/30/2011	4,428,038	30	4,883,402	21	324,604
Experience Gain	06/30/2012	(15,668,764)	20	(14,134,521)	12	(1,422,417)
Change in Assumptions	06/30/2012	53,400,521	25	54,354,908	17	4,189,159

[1] Beginning of year payment, reflecting level percentage of payroll.

Exhibit G: Table of Amortization Bases (continued)

Type	Date Established	Initial Amount	Initial Period	Outstanding Balance	Years Remaining	Annual Payment[1]
Experience Loss	06/30/2013	$10,858,322	20	$10,051,612	13	$949,276
Experience Gain	06/30/2014	(26,406,581)	20	(24,939,371)	14	(2,223,233)
Change in Assumptions	06/30/2014	18,421,049	25	18,827,841	19	1,340,389
Experience Gain	06/30/2015	(28,955,525)	20	(27,827,091)	15	(2,353,347)
Experience Gain	06/30/2016	(1,408,751)	20	(1,371,672)	16	(110,529)
Change in Assumptions	06/30/2016	52,595,760	25	53,661,295	21	3,566,912
Experience Gain	06/30/2017	(50,022,788)	20	(49,203,466)	17	(3,792,135)
Experience Loss	06/30/2018	14,053,082	20	13,917,168	18	1,029,346
Change in Assumptions	06/30/2018	12,484,391	25	12,625,385	23	790,414
Experience Loss	06/30/2019	26,728,885	20	26,634,854	19	1,896,184
Experience Loss	06/30/2020	5,281,313	20	5,281,313	20	362,870
Change in Assumptions	06/30/2020	104,813,640	25	104,813,640	25	6,224,797
Total				**$666,321,007**		**$51,883,934**

Note: The equivalent single amortization period is about 17 years.

[1] Beginning of year payment, reflecting level percentage of payroll.

Exhibit H: Projection of UAAL Balances and Payments

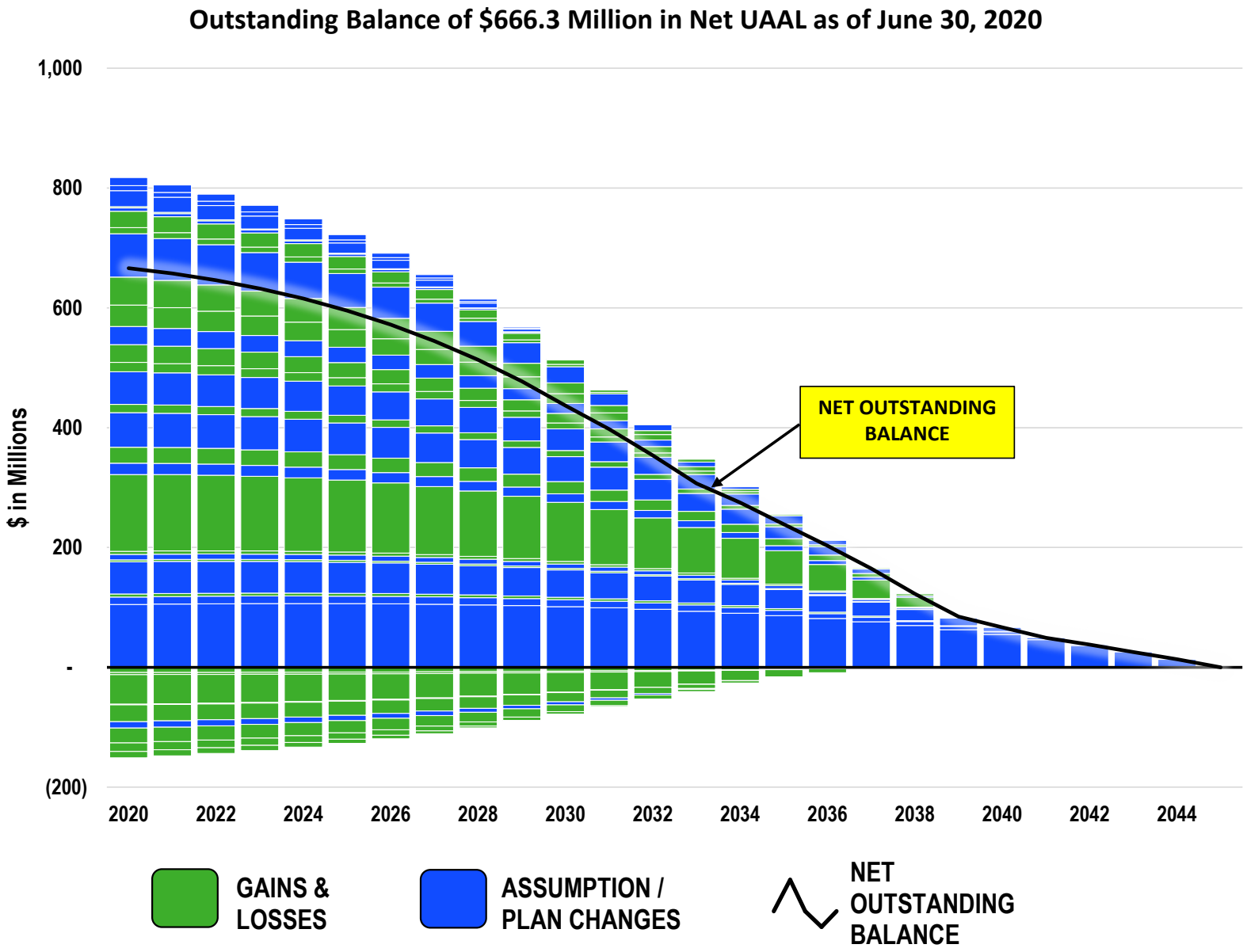


Exhibit H: Projection of UAAL Balances and Payments (continued)

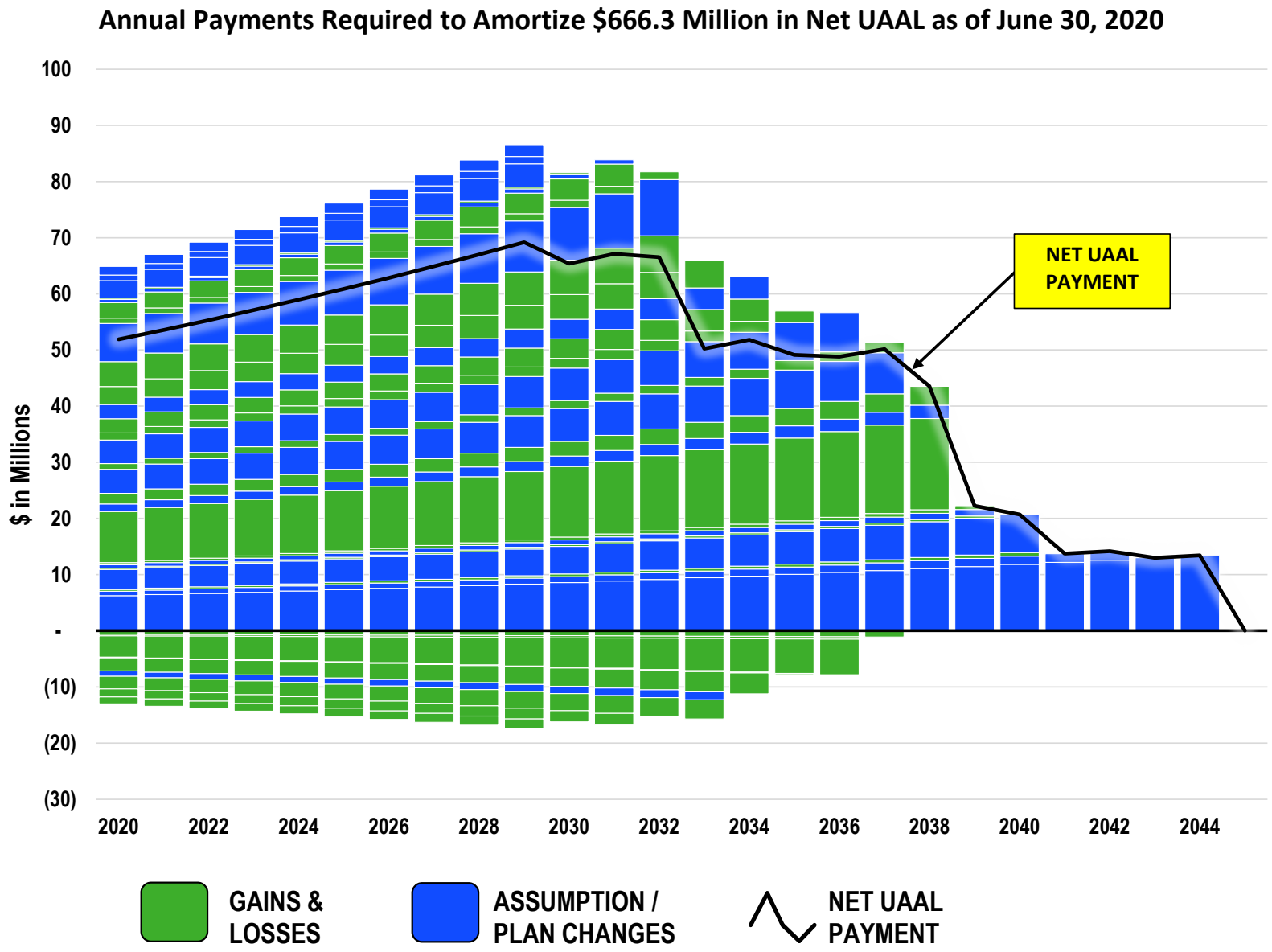


Exhibit I: Definition of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Actuarial Accrued Liability for Actives:	The equivalent of the accumulated Normal Costs allocated to the years before the Valuation Date.
Actuarial Accrued Liability for Pensioners and Beneficiaries:	The single-sum value of lifetime benefits to existing pensioners and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial Cost Method:	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the Actuarially Determined Contribution.
Actuarial Gain or Loss:	A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.
Actuarially Equivalent:	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV):	The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Section 3: Supplemental Information

Actuarial Present Value of Future Plan Benefits:	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive 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.
Actuarial Valuation:	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).
Actuarial Value of Assets (AVA):	The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.
Actuarially Determined:	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
Actuarially Determined Contribution (ADC):	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
Amortization Method:	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization Payment:	The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Section 3: Supplemental Information

Assumptions or Actuarial Assumptions:	The estimates upon which the cost of the Fund is calculated, including: Investment return - the rate of investment yield that the Fund will earn over the long-term future; Mortality rates - the death rates of employees and pensioners; life expectancy is based on these rates; Retirement rates - the rate or probability of retirement at a given age or service; Disability rates – the probability of disability retirement at a given age; Withdrawal rates - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; Salary increase rates - the rates of salary increase due to inflation and productivity growth.
Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Open Amortization Period.
Decrements:	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.
Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
Funded Ratio:	The ratio of the Actuarial Value of Assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the Market Value of Assets (MVA), rather than the AVA.
Investment Return:	The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.

Section 3: Supplemental Information

Normal Cost:	That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment with respect to an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated.
Open Amortization Period:	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the actuarial assumptions are realized.
Unfunded Actuarial Accrued Liability:	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.
Valuation Value of Assets:	The Actuarial Value of Assets reduced by the value of non-valuation reserves.

Section 4: Actuarial Valuation Basis

Exhibit I: Actuarial Assumptions and Methods

Rationale for Assumptions:	The information and analysis used in selecting each assumption that has a significant effect on this actuarial valuation is shown in the July 1, 2016 through June 30, 2020 Actuarial Experience Study report dated November 12, 2020. Unless otherwise noted, all actuarial assumptions and methods shown below apply to both tiers. These assumptions were adopted by the Board.
Economic Assumptions:	
Net Investment Return:	7.00%; net of administrative and investment expenses. Based on the Actuarial Experience Study referenced above, expected administrative and investment expenses represent about 0.34% of the average Market Value of Assets.
Employee Contribution Crediting Rate:	7.00%, compounded semi-annually.
Consumer Price Index:	Increase of 2.75% per year. Retiree COLA increases due to CPI are subject to a 2.75% maximum change per year (for members with a sufficient COLA bank, withdrawals from the bank can be made to increase the retiree COLA up to 3% per year).
Payroll Growth:	Inflation of 2.75% per year plus real "across the board" salary increases of 0.50% per year, used to amortize the Unfunded Actuarial Accrued Liability as a level percentage of payroll.
Increase in Internal Revenue Code Section 401(a)(17) Compensation Limit:	Increase of 2.75% per year from the valuation date.
Increase in California Government Code Section 7522.10 Compensation Limit:	Increase of 2.75% per year from the valuation date.

Section 4: Actuarial Valuation Basis

Salary Increases:

The annual rate of compensation increase includes: inflation at 2.75%, plus "across the board" salary increases of 0.50% per year, plus the following merit and promotion increases:

Merit and Promotion Increases

Time from Hire (Years)	Rate (%)
Less than 1	6.25
1 – 2	6.00
2 – 3	5.00
3 – 4	3.75
4 – 5	2.50
5 – 6	1.50
6 – 7	1.25
7 – 8	1.25
8 – 9	1.00
9 – 10	1.00
10 & Over	0.75

Demographic Assumptions:

Post-Retirement Mortality Rates:

Healthy Members:

- Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Tables with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020.

Disabled Members:

- Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Tables with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020

Beneficiaries:

- Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Tables with rates increased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2020

The Pub-2010 mortality tables and adjustments as shown above reasonably reflect the mortality experience as of the measurement date. These mortality tables were adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

Section 4: Actuarial Valuation Basis

Pre-Retirement Mortality Rates:

Pub-2010 General Employee Amount-Weighted Above-Median Mortality Tables, projected generationally with the two-dimensional mortality improvement scale MP-2020

	Rate (%)	
Age	**Male**	**Female**
20	0.04	0.01
25	0.02	0.01
30	0.03	0.01
35	0.04	0.02
40	0.06	0.03
45	0.09	0.05
50	0.13	0.08
55	0.19	0.11
60	0.28	0.17
65	0.41	0.27

Generational projections beyond the base year (2010) are not reflected in the above mortality rates.

Disability Incidence:

Age	**Rate (%)**
25	0.000
30	0.006
35	0.022
40	0.084
45	0.150
50	0.170
55	0.182
60	0.220
65	0.288

Disabilities rates are applicable after eight years of service.

Termination:

Less Than Five Years of Service

Years of Service	Rate (%)
Less than 1	6.75
1 – 2	4.25
2 – 3	4.00
3 – 4	3.50
4 – 5	2.50

Five or More Years of Service

Age	Rate (%)
25	2.34
30	2.24
35	2.14
40	2.04
45	1.85
50	1.60
55	1.35
60	1.10

No termination is assumed after a member is eligible for retirement (as long as a retirement rate is present).

Section 4: Actuarial Valuation Basis

Retirement Rates:

Age	Rate (%)		
	1955/1980 Plan		
	Unreduced Pension[1]	Reduced Pension	2013 Tier
52	0.00	0.00	1.75
53	0.00	0.00	1.75
54	55.00	7.00	2.75
55	16.00	7.00	4.75
56	16.00	7.00	5.75
57	16.00	7.00	5.75
58	16.00	7.00	5.75
59	16.00	7.00	7.75
60	16.00	7.00	7.75
61	16.00	12.00	10.25
62	16.00	N/A[2]	18.00
63	16.00	N/A	15.00
64	16.00	N/A	9.00
65	16.00	N/A	23.75
66	27.00	N/A	23.75
67	27.00	N/A	32.50
68	27.00	N/A	35.00
69	27.00	N/A	38.75
70 & Over	100.00	N/A	100.00

[1] For example, a 1955/1980 Plan member age 54 with 30 or more years of service would receive the full 2.60% per year of service accrual.

[2] For ages 62 and over, all 1955/1980 Plan members who are eligible for retirement receive the full 2.60% per year of service accrual.

Section 4: Actuarial Valuation Basis

Retirement Age for Inactive Vested Members:	59 1955/1980 Plan non-reciprocal members who are currently terminated with less than five years of service and are not vested are assumed to retire at age 65 if they decide to leave their contributions on deposit.
Reciprocity:	15% of members who terminate with a vested benefit are assumed to enter a reciprocal system. For reciprocals, 4.00% compensation increases are assumed per annum.
Future Benefit Accruals:	1.0 year of service per year of employment, plus 0.038 years of additional service to anticipate conversion of unused sick leave for each year of employment. As directed by EBMUDERS, this assumption has been applied to active members in the 1955/1980 Plan and the 2013 Tier.
Unknown Data for Members:	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Percent Married/Domestic Partnership:	For all active and inactive members, 85% of male members and 60% of female members are assumed to be married or with domestic partner at pre-retirement death or retirement.
Age and Gender of Spouse/Domestic Partner:	For all active and inactive members, male members are assumed to have a female spouse who is 2 years younger than the member and female members are assumed to have a male spouse who is 3 years older than the member.
Form of Payment:	At retirement, members with spouses or domestic partners are assumed to elect the following form of payment (single members are assumed to elect the Unmodified option):

Form of Payment	Election Percentage
Unmodified or Option 1	50%
Option 2 (100% Continuance)	10%
Option 3 (50% Continuance)	20%
Option 4 (25% Continuance)	20%

Actuarial Funding Policy:	
Actuarial Cost Method:	Entry Age Cost Method. Entry Age is the age at the member's hire date. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are based on costs allocated as a level percentage of compensation, as if the current benefit formula for each individual has always been in effect (i.e., "replacement life within a tier").

Section 4: Actuarial Valuation Basis

Actuarial Value of Assets:	Market value of assets (MVA) less unrecognized returns in each of the last five years. Unrecognized returns are equal to the difference between the actual market returns and the expected returns on the market value, and are recognized over a five-year period. The actuarial value of assets (AVA) is limited by a 30% corridor; the AVA cannot be less than 70% of MVA, nor greater than 130% of MVA.
Valuation Value of Assets:	The proportion of the Actuarial Value of Assets allocated to the pension plan, based on the proportion of the MVA attributable to the pension plan.
Amortization Policy:	Prior to July 1, 2011, the UAAL from plan changes, assumption changes, and experience gains/losses were amortized over separate decreasing 30-year periods. On or after July 1, 2011, any new UAAL resulting from plan changes are amortized over separate decreasing 15-year periods; assumption and method changes are amortized over separate decreasing 25-year periods; and experience gains/losses are amortized over separate decreasing 20-year periods.
Other Actuarial Methods:	
Employer Contributions:	Employer contributions consist of two components: *Normal Cost* The annual contribution rate that, if paid annually from a member's first year of membership through the year of retirement, would accumulate to the amount necessary to fully fund the member's retirement-related benefits. Accumulation includes annual crediting of interest at the assumed investment earnings rate. The contribution rate is expressed as a level percentage of the member's compensation. *Contribution to the Unfunded Actuarial Accrued Liability (UAAL)* The annual contribution rate that, if paid annually over the UAAL amortization period, would accumulate to the amount necessary to fully fund the UAAL. Accumulation includes annual crediting of interest at the assumed investment earning rate. The contribution (or rate credit in the case of a negative UAAL) is calculated to remain as a level percentage of future active member payroll (including payroll for new members as they enter the System) assuming a constant number of active members. In order to remain as a level percentage of payroll, amortization payments (credits) are scheduled to increase at the annual rate of 3.25% (i.e., 2.75% inflation plus 0.50% across-the-board salary increase). The amortization policy is described above. The recommended employer contributions are provided in *Section 2, Subsection F.*

Section 4: Actuarial Valuation Basis

Member Contributions:

1955/1980 Plan Members

Employee contribution rates for 1955/1980 Plan members are prescribed in the Ordinance. Effective April 17, 2006, the rate of member retirement contributions is 6.83%, and 6.74% of that rate is allocated to pay pension benefits. The rest, or 0.09%, is used to pay HIB benefits. The Board of Directors may adjust the employee rates solely pursuant to the terms of a negotiated collective bargaining agreement or memorandum of understanding with employee bargaining units.

Based on bargaining unit contract negotiations in 2013, members are contracted to pay the following employee rates (as a percentage of pay) beginning April 22, 2013:

	Member Rate		
Effective Date	(a) Total	(b) HIB Plan	(c) = (a) – (b) Pension Plan
April 17, 2006(1)	6.83%[1]	0.09%	6.74%
April 22, 2013	7.33%	0.09%	7.24%
April 21, 2014	7.83%	0.09%	7.74%
April 20, 2015	8.33%	0.09%	8.24%
April 18, 2016	8.75%	0.09%	8.66%

[1] Pursuant to the Ordinance.

2013 Tier Members

Pursuant to Section 7522.30(a) of the California Government Code, 2013 Tier members are required to contribute at least 50% of the Normal Cost rate. In addition, Section 7522.30(c) requires that the initial employee contribution rate be rounded to the nearest quarter of 1 percent, unless a greater contribution rate has been agreed to pursuant to Section 7522.30(e). In preparing the initial Normal Cost rates, we assumed that exactly 50% of the Normal Cost would be paid by the new members and we took into account only the requirements of Section 7522.30(c), but not requirements of Section 7522.30(e). In particular, the total Normal Cost rate of 17.56% was determined in the first CalPEPRA valuation, and this total rate has been used through the June 30, 2019 valuation to determine the 50% of the Normal Cost (rounded to one quarter of 1 percent) paid by the employees, or 8.75%.

Pursuant to Section 7522.30(d), we have compared the total Normal Cost rates between the current valuation and the initial CalPEPRA valuation since a rate increase (or decrease) of less than 1% of payroll would result in no change to the members' rate. Effective with the June 30, 2020 valuation, the total Normal Cost rate was determined to be 18.81%, which is a change of more than 1% of payroll compared to the rate of 17.56% that was determined in the first CalPEPRA valuation. This is the first time since the first CalPEPRA valuation that the change in the total Normal Cost rate has exceeded the 1% of payroll threshold. Consequently, the member contribution rate for 2013 Tier members has been increased to 9.41%, which is 50% of the total Normal Cost rate.

	As stated in our Actuarial Experience Study Report dated November 12, 2020, once the 1% threshold has been exceeded an adjustment to the members' rate is required. Upon consulting with the Retirement System, the final member contribution rate is calculated without the quarter of 1 percent rounding based on the Retirement System's direction that the rounding does not apply after the initial calculation. However, the rate paid by the employee is rounded to the nearest one/one hundredth of one percent (two decimals) consistent with the rounding methods used throughout this report to ensure that the employees are paying at least 50% of the Normal Cost. Accumulation for all members includes crediting of interest at the assumed investment earnings rate. The member contribution rates are provided in *Section 2, Subsection F*.
Internal Revenue Code Section 415:	Section 415 of the Internal Revenue Code (IRC) specifies the maximum benefits that may be paid to an individual from a defined benefit plan and the maximum amounts that may be allocated each year to an individual's account in a defined contribution plan. A qualified pension plan may not pay benefits in excess of the Section 415 limits. The ultimate penalty for non-compliance is disqualification: active members could be taxed on their vested benefits and the IRS may seek to tax the income earned on the plan's assets. In particular, Section 415(b) of the IRC limits the maximum annual benefit payable at the Normal Retirement Age to a dollar limit of $160,000 indexed for inflation. That limit is $230,000 for 2020. Normal Retirement Age for these purposes is age 62. These are the limits in simplified terms. They must be adjusted based on each participant's circumstances, for such things as age at retirement, form of benefits chosen and after tax contributions. Benefits for members in the non-CalPEPRA plan in excess of the limits may be paid through a qualified governmental excess plan that meets the requirements of Section 415(m). Legal Counsel's review and interpretation of the law and regulations should be sought on any questions in this regard. Contribution rates determined in this valuation have not been reduced for the Section 415 limitations. Actual limitations will result in gains as they occur.

Justification for Change in Actuarial Assumptions: Based on the July 1, 2016 through June 30, 2020 Actuarial Experience Study, the following actuarial assumptions were changed. Previously, these assumptions were:

Economic Assumptions

Salary Increases: The annual rate of compensation increase includes: inflation at 2.75%, plus "across the board" salary increases of 0.50% per year, plus the following merit and promotion increases:

Merit and Promotion Increases

Years of Service	Rate (%)
Less than 1	6.00
1 – 2	5.00
2 – 3	4.00
3 – 4	3.00
4 – 5	2.00
5 – 6	1.00
6 – 7	0.80
7 & Over	0.50

Demographic Assumptions:

Post-Retirement Mortality Rates:

Healthy Members and All Beneficiaries

- **Males:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table, set forward two years, projected 20 years with the two-dimensional mortality improvement scale MP-2015.
- **Females:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table, set forward one year, projected 20 years with the two-dimensional mortality improvement scale MP-2015.

Disabled Members

- **Males:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table, set forward nine years, projected 20 years with the two-dimensional mortality improvement scale MP-2015.
- **Females:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table, set forward nine years, projected 20 years with the two-dimensional mortality improvement scale MP-2015.

The above mortality tables contain a margin slightly less than 20% for males and females combined, based on actual to expected deaths, as a provision to reflect future mortality improvement, based on a review of mortality experience as of the measurement date.

Justification for Change in Actuarial Assumptions:

Based on the July 1, 2016 through June 30, 2020 Actuarial Experience Study, the following actuarial assumptions were changed. Previously, these assumptions were:

Pre-Retirement Mortality Rates:

- **Males:** Headcount-Weighted RP-2014 Employee Mortality Table, set forward two years, projected 20 years with the two-dimensional mortality improvement scale MP-2015.
- **Females:** Headcount-Weighted RP-2014 Employee Mortality Table, set forward one year, projected 20 years with the two-dimensional mortality improvement scale MP-2015.

	Rate (%)	
Age	**Male**	**Female**
20	0.04	0.01
25	0.04	0.02
30	0.05	0.02
35	0.05	0.03
40	0.07	0.04
45	0.11	0.07
50	0.19	0.12
55	0.33	0.19
60	0.58	0.27
65	0.96	0.39

Disability Incidence:

	Rate (%)	
Age	**Male**	**Female**
25	0.000	0.000
30	0.006	0.030
35	0.016	0.068
40	0.068	0.212
45	0.160	0.330
50	0.200	0.380
55	0.200	0.460
60	0.230	0.560
65	0.310	0.660

Disabilities rates are applicable after eight years of service.

Section 4: Actuarial Valuation Basis

Justification for Change in Actuarial Assumptions: Based on the July 1, 2016 through June 30, 2020 Actuarial Experience Study, the following actuarial assumptions were changed. Previously, these assumptions were:

Termination:

Ordinary Withdrawal

Less Than Five Years of Service

Years of Service	Rate (%)	
	Male	Female
Less than 1	2.25	3.00
1 – 2	1.00	2.50
2 – 3	0.75	2.25
3 – 4	0.50	2.00
4 – 5	0.25	1.25

Five or More Years of Service

Age	Rate (%)	
	Male	Female
25	0.230	0.640
30	0.205	0.540
35	0.180	0.440
40	0.155	0.340
45	0.130	0.240
50	0.105	0.140
55	0.080	0.085
60	0.055	0.060

Vested Termination

Age	Rate (%)	
	Male	Female
25	6.40	7.00
30	5.40	6.40
35	3.50	4.80
40	2.20	3.40
45	1.70	2.40
50	0.96	1.40
55	0.48	0.70
60	0.34	0.50

Section 4: Actuarial Valuation Basis

Justification for Change in Actuarial Assumptions:	Based on the July 1, 2016 through June 30, 2020 Actuarial Experience Study, the following actuarial assumptions were changed. Previously, these assumptions were:
Retirement Rates:	

Retirement Rates (%)

	1955/1980 Plan		2013 Tier	
Age	**Male**	**Female**	**Male**	**Female**
52	0.00	0.00	2.00	1.00
53	0.00	0.00	2.00	1.00
54[1]	6.00	6.00	3.00	2.00
55	7.00	7.00	5.00	4.00
56	7.00	8.00	6.00	5.00
57	9.00	8.00	6.00	5.00
58	10.00	9.00	6.00	5.00
59	10.00	12.00	8.00	7.00
60	13.00	13.00	8.00	7.00
61	13.00	19.00	10.00	11.00
62	25.00	19.00	19.00	15.00
63	20.00	17.00	16.00	12.00
64	15.00	17.00	8.00	12.00
65	25.00	17.00	26.00	17.00
66	25.00	30.00	25.00	20.00
67	20.00	30.00	35.00	25.00
68	25.00	30.00	35.00	35.00
69	40.00	30.00	40.00	35.00
70 & Over	100.00	100.00	100.00	100.00

[1] The rate for 1955/1980 Plan members age 54 with 30 or more years of service (i.e., eligible for unreduced benefits) is 50% for males and females.

Reciprocity:	30% of members who terminate with a vested benefit are assumed to enter a reciprocal system. For reciprocals, 3.75% compensation increases are assumed per annum
Future Benefit Accruals:	1.0 year of service per year of employment, plus 0.036 years of additional service to anticipate conversion of unused sick leave for each year of employment. As directed by EBMUDERS, this assumption has been applied to active members in the 1955/1980 Plan and the 2013 Tier.
Percent Married/Domestic Partnership:	The percent married/domestic partnership at retirement is assumed to be 80% for male members and 50% for female members.

Section 4: Actuarial Valuation Basis

Justification for Change in Actuarial Assumptions:	Based on the July 1, 2016 through June 30, 2020 Actuarial Experience Study, the following actuarial assumptions were changed. Previously, these assumptions were:
Age and Gender of Spouse/Domestic Partner:	Female (or male) spouses/domestic partners are 3 years younger (or older) than the members. Spouses/domestic partners of active and inactive members are assumed to be the opposite sex of the member.

Exhibit II: Summary of Plan Provisions

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year:	July 1 through June 30
Census Date:	June 30
Membership Eligibility:	
1955/1980 Plan	All employees who first become members before January 1, 2013.
2013 Tier	All employees who first become members on or after January 1, 2013.
Final Compensation for Benefit Determination:	
1955/1980 Plan	Highest two consecutive years of compensation earnable (FAS2).
2013 Tier	Highest thirty-six consecutive months of pensionable compensation (FAS3).
Compensation Limit:	
1955/1980 Plan	IRC Section 401(a)(17) compensation limit applies to all employees who began membership in EBMUDERS on or after January 1, 1996.
2013 Tier	$126,291 for 2020
Service:	Years of service (Yrs) are generally based on a member's employment during a period of time in which retirement contributions are deducted from their compensation.
Normal or Unreduced Retirement Eligibility:	
Age and Service Requirement	
1955/1980 Plan	Age 65; Age 62 with 5 years of service; Age 59 with 20 years of service; Age 54 with 30 years of service; Other combinations of age and service between ages 54 and 59.
2013 Tier	Age 67 with 5 years of service (for unreduced benefit).

Section 4: Actuarial Valuation Basis

Early Retirement Eligibility:	
Age and Service Requirement	
1955/1980 Plan	Age 54 with 5 years of service.
2013 Tier	Age 52 with 5 years of service.
Benefit Formula:	
1955/1980 Plan:	
1955 Formula	2.42% (2.82% if member is credited with District Service on or after January 1, 2004) times Final Compensation per year of service including all service extension credit.
1955/80 Formula	2.42% (2.82% if member is credited with District Service on or after January 1, 2004) times Final Compensation per year of service up to August 1, 1980 including all service extension credit, plus 2.20% (2.60% if member is credited with District Service on or after January 1, 2004) times Final Compensation per year of service after August 1, 1980. Applies to members who elected to convert to the 1980 Formula in 1980.
1955/90 Formula	2.42% (2.82% if member is credited with District Service on or after January 1, 2004) times Final Compensation per year of service up to January 1, 2000 including all service extension credit, plus 2.20% (2.60% if member is credited with District Service on or after January 1, 2004) times Final Compensation per year of service after January 1, 2000. Applies to members who elected to convert to the 1980 Formula in 1989.
1980 Formula	2.20% (2.60% if member is credited with District Service on or after January 1, 2004) times Final Compensation per year of service including all service extension credit. Applies to all members hired on or after January 1, 1980.
Service Extension Credit	2.42% (2.82% if member is credited with District Service on or after January 1, 2004) for members with any service under the 1955 Formula or 2.20% (2.60% if member is credited with District Service on or after January 1, 2004) for members with service only under the 1980 Formula times Final Compensation per year of Service Extension Credit. Service extension credit is the number of unused sick leave days credited to a member at the time of retirement converted on a 260-day basis. The number of such days is then doubled for the benefit calculation and for service retirements to meet the early retirement provision of the Ordinance.
Benefit Adjustments	Reduced by 3% per year under the age of eligibility for an unreduced benefit, based on service at retirement, for retirements before age 63 (before age 62 commencing November 1, 2000). Effective July 1, 1999, Service Extension Credit is included in the years of service calculation of service for determining eligibility for unreduced retirement.

Section 4: Actuarial Valuation Basis

Benefit Formula: (continued)		
2013 Tier:	**Retirement Age**	**Benefit Formula**
	52	1.00% x FAS3 x Yrs
	55	1.30% x FAS3 x Yrs
	60	1.80% x FAS3 x Yrs
	62	2.00% x FAS3 x Yrs
	65	2.30% x FAS3 x Yrs
	67 & Over	2.50% x FAS3 x Yrs
Disability:		
Eligibility	Eight years of service (not available for Directors).	
Benefit	Greater of: 1.5% times Final Compensation per year of service. One-third of Final Compensation.	
Vesting:		
Requirements	Five years of service, must leave contributions on deposit, reciprocal service counts for vesting purposes.	
Pre-Retirement Death:		
Eligibility	Eligible for retirement.	
Benefit	50% of the unmodified service retirement benefit to eligible surviving spouse/surviving domestic partner plus the lump sum payment of accumulated retirement contributions OR	
Eligibility	None.	
Benefit	Lump sum payment of accumulated retirement contributions.	
Post-Retirement Death Benefit:	50% of the unmodified service retirement benefit to surviving spouse or registered domestic partner (tied to the implementation of the AB 205 legislation).	

Section 4: Actuarial Valuation Basis

Post-Retirement Cost of Living Benefits:

Payable July 1 of each year, the basic minimum COLA benefit is the lesser of 3% and the actual change in the cost of living index.

Excess of the actual change of cost of living index over 3% is accumulated in individual retiree COLA banks.

Withdrawals from the bank are made in years when the index increases less than 3%.

Increases of up to 5% are granted in years when the Retirement Board determines that the System is more than 85% funded on a Projected Benefit Obligation basis. In those years when the System is more than 85% funded and the cost of living index exceeds 5%, any excess cost of living over 5% is accumulated in the COLA bank.

Effective October 1, 2000, in those years when the system is more than 85% funded on a Projected Benefit Obligation basis and the cost of living is less than 4%, withdrawals from the bank are made to allow cost of living increases up to 4%.

Member Contributions:

1955/1980 Plan

Effective April 17, 2006, retirement system members contribute at a rate of 6.83% of pay, as prescribed in the Ordinance. Based on bargaining unit contract negotiations in 2013, members are contracted to pay the following employee rates (as a percentage of pay) beginning April 22, 2013:

	Member Rate		
Effective Date	(a) Total	(b) HIB Plan	(c) = (a) – (b) Pension Plan
April 17, 2006[1]	6.83%[1]	0.09%	6.74%
April 22, 2013	7.33%	0.09%	7.24%
April 21, 2014	7.83%	0.09%	7.74%
April 20, 2015	8.33%	0.09%	8.24%
April 18, 2016	8.75%	0.09%	8.66%

[1] Pursuant to the Ordinance.

2013 Tier

Initial member contribution rate is set at 50% of the total 2013 Tier Normal Cost rate, rounded to the nearest quarter of 1%. Once established, the member contribution rate will be adjusted annually to reflect the change in the 2013 Tier Normal Cost rate, but only if the change is more than 1% of payroll.

Changes in Plan Provisions:

There have been no changes in plan provisions since the last valuation.

Note: The summary of major plan provisions is designed to outline principal plan benefits as interpreted for purposes of the actuarial valuation. If the System should find the plan summary not in accordance with the actual provisions, the System should alert the actuary so they can both be sure the proper provisions are valued.

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