LCRA RETIREMENT PLAN

ACTUARIAL VALUATION

AS OF

JANUARY 1, 2020

Rudd and Wisdom, Inc.

Rudd and Wisdom, Inc.

CONSULTING ACTUARIES

May 8, 2020

LCRA Retirement Benefits Board of Trustees
Lower Colorado River Authority
Post Office Box 220
Austin, Texas 78767

Re: Actuarial Valuation as of January 1, 2020

Dear Trustees:

Enclosed is the Actuarial Valuation of the Lower Colorado River Authority (LCRA) Retirement Plan as of January 1, 2020. The purpose of this report is to present the actuarial condition of the plan as of January 1, 2020 and to recommend the LCRA contributions for the plan year beginning one year later on January 1, 2021.

Recommended Contributions

In order for a public employee retirement plan to have an adequate contribution arrangement, contributions must be made that are sufficient to pay the plan’s normal cost and to amortize the plan’s unfunded actuarial accrued liability (UAAL) over a reasonable period of time. The LCRA Board of Directors amended the plan to close it to new entrants effective May 1, 2012. Given the closed group of employee participants, we recommended in the April 1, 2012 actuarial valuation report that the amortization of the UAAL should switch from level percent of participant payroll contributions to level dollar contributions over a closed 25-year period. We now recommend that amortization contributions for the plan be based on the same level dollar UAAL amortization method but that the closed amortization period be reset at 20 years as of January 1, 2020.

To facilitate timely budgeting of LCRA’s contributions, there is a one-year delay between the actuarial valuation date and the effective date of our actuarially determined recommended contribution. Based on the January 1, 2019 actuarial valuation, our recommended contribution for the 2020 plan year was an annual amount of $23,699,007, which is $911,500.27 biweekly. This amount is expected to pay the normal cost for 2020 and to fund the UAAL with a level dollar amount. For the 2021 plan year, our recommended contribution is $944,941.46 biweekly, which is an annual total of $24,568,478. This recommended amount is based on this actuarial valuation as of January 1, 2020 and is expected to pay the normal cost for 2021 and to fund the UAAL with a level dollar amount over the remaining 19 years of the period ending in 2039.

With the recommended annual aggregate biweekly contributions of $24,568,478 for the 2021 plan year in this report, we are of the opinion that the LCRA Retirement Plan has an adequate contribution arrangement that is expected to fund the benefits of the plan on a sound actuarial basis. We further believe that this recommended contribution is consistent with our responsibilities as Plan Actuary described in Sections 6.02 and 6.03 of the LCRA Retirement Plan document. Furthermore, our recommended contributions are based on an amortization period for the UAAL within the preferred range according to the Texas Pension Review Board guidelines for pension funding (10 to 25 years).

Plan Provisions

Plan provisions reflected in this valuation are the same as those reflected in the prior actuarial valuation, including the closing of the plan to new entrants effective May 1, 2012. All current plan provisions are outlined and summarized in Section V of this report.

Review of Actuarial Assumptions

As a part of each actuarial valuation, we review the actuarial assumptions used in the prior actuarial valuation. Last year, we recommended new mortality assumptions based on a recently released study of public plans mortality by the Society of Actuaries. Periodically at your request, we perform a detailed experience study for the purpose of making appropriate adjustments. The most recent such study was completed in 2016 prior to the April 1, 2016 actuarial valuation. It documented a five-year experience study for the 2011-2015 plan years and included a review of all actuarial assumptions and recommendations of actuarial assumptions for the April 1, 2016 actuarial valuation.

For this January 1, 2020 actuarial valuation, we prepared a report of our review of actuarial assumptions dated January 30, 2020. In it, we recommended reducing the investment return assumption from 7.25% to 7% per year. For all other assumptions, we recommended using the same assumptions as we used for the prior actuarial valuation. All actuarial assumptions and methods are described in Section IV of this report.

Changes in the Unfunded Actuarial Accrued Liability

In comparing this year's valuation to last year's valuation, the UAAL increased $23,095,237 from $182,885,080 to $205,980,317 for the following reasons:

- The passing of one year with the experience following the assumptions would have resulted in a decrease in the UAAL of $1,573,593 because the recommended contributions available to amortize the UAAL were more than the assumed interest on the UAAL for the plan year.

- LCRA made contributions in 2019 in excess of the recommended contributions. Those contributions with assumed interest reduced the UAAL by $3,113,589.

- The investment rate of return for 2019, net of all investment-related expenses paid by the plan, was 15.86% based on the unaudited market value of assets for the plan year ending December 31, 2019. However, based on the smoothed actuarial value of assets from last year's valuation to this valuation, the net investment rate of return was 4.48%. Since that rate of return is less than the assumed rate of 7.25%, the UAAL was increased by $11,683,187 due to the adverse actuarial investment experience.

- The actual salary increases in 2019 were somewhat more than assumed, which increased the UAAL by $604,759.

- All other actuarial experience in 2019 (retirement, termination, and mortality experience) resulted in a net $490,734 increase in the UAAL.

- The change in the investment return assumption increased the UAAL by $15,003,739.

Sensitivity of Results to Changes in the Investment Return Assumption

How sensitive is the recommended contribution for the 2021 plan year to the investment return assumption? The table below shows the recommended contribution components as of January 1, 2021 and the total if paid biweekly with 6%, 7%, and 8% as the investment return assumption and all other assumptions unchanged. Comparisons to the recommended amount based on 7% are in the last two lines.

	Investment Return Assumption		
	6%	7%	8%
Cost as of January 1, 2021			
• Normal cost	$ 6,259,419	$ 5,152,199	$ 4,284,246
• Administrative expenses	300,000	300,000	300,000
• UAAL cost	22,900,923	18,272,680	13,753,995
• Total	$29,460,342	$23,724,879	$18,338,241
Total paid biweekly	$30,360,996	$24,568,478	$19,081,184
• Increase amount	$ 5,792,518		$ (5,487,294)
• Relative increase	23.6%		22.3%

Variability in Future Actuarial Measurement

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 current economic or demographic assumptions;

- Increases or decreases expected as part of the natural operation of the methodology used for these measurements;
- Changes in economic or demographic assumptions; and

- Changes in plan provisions.

Analysis of the potential range of such future measurements resulting from the possible sources of measurement variability is provided under the 6% and 8% investment return scenarios above. These scenarios were designed to assess the risk of changing the investment return assumption in the future. We could perform other sensitivity analysis in a subsequent report if desired by the Board of Trustees.

Summary

As a result of our January 1, 2020 actuarial valuation of the LCRA Retirement Plan, we recommend annual aggregate biweekly contributions of $24,568,478 for the 2021 plan year, which will pay the normal cost and amortize the UAAL over the remaining 19 years of the closed 20-year amortization period ending in 2039. Our recommended funding policy is expected to be an adequate contribution arrangement to fund the benefits of the plan on a sound actuarial basis. The actuarial valuation of the plan reported herein has been performed both in accordance with appropriate actuarial methodology and standards of practice and in accordance with guidelines established by the Texas Pension Review Board applicable to public employee retirement systems.

Respectfully submitted,

RUDD AND WISDOM, INC.

Ronald W. Tobleman, F.S.A. CFA, CFP®, ChFC, CASL

Mark R. Fenlaw

Mark R. Fenlaw, F.S.A.

RWT/MRF:ph

Enclosures

cc: Dionne Walker, LCRA Mgr. Compensation and Benefits
Vic Ramirez, LCRA Legal Services
Laura Flores, LCRA Sr. Benefits Specialist
Julie Rogers, LCRA Controller
Todd Brewer, LCRA Accountant Lead
Nicki Riley, LCRA General Accounting Manager
Devin Tierney, LCRA Senior Accountant

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Section I – Certification of Actuarial Valuation as of January 1, 2020

At the request of the LCRA Retirement Benefits Board of Trustees, we have performed an actuarial valuation of the LCRA Retirement Plan as of January 1, 2020. The purpose of this report is to present the actuarial condition of the plan as of January 1, 2020 and to recommend a contribution for the plan year ending December 31, 2021 which is part of a funding policy expected to be an adequate contribution arrangement.

We have based our valuation on employee and pensioner census data as of January 1, 2020 and asset information for the plan year ending December 31, 2019 provided by LCRA Human Resources and Accounting. We have relied on the accuracy of the unaudited preliminary asset information provided. We have used the actuarial methods and assumptions described in Section IV of this report. The actuarial valuation has been performed on the basis of the plan benefits described in Section V.

To the best of our knowledge, no material biases exist with respect to any imperfections in the census data provided. We have not audited the data provided but have reviewed it for reasonableness and consistency relative to the census data received for the January 1, 2019 actuarial valuation.

All current employees eligible to participate in the plan as of the valuation date and all other individuals who have a current or deferred vested benefit under the plan have been included in the valuation. Further, all plan benefits have been considered in the development of plan costs.

To the best of our knowledge, the actuarial information supplied in this report is complete and accurate. In our opinion the assumptions used, in the aggregate and individually, are reasonably related to the experience of the plan and to reasonable expectations. The assumptions represent a reasonable estimate of anticipated experience of the plan over the long-term future, and their selection complies with the applicable actuarial standards of practice.

We hereby certify that we are members of the American Academy of Actuaries who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Mark R. Fenlaw

Mark R. Fenlaw, F.S.A.
Enrolled Actuary Number 20-5526
Member of American Academy of Actuaries

Ronald W. Tobleman, F.S.A.
Enrolled Actuary Number 20-2917
Member of American Academy of Actuaries

Section II – Summary of Actuarial Valuations

	January 1, 2019	January 1, 2020
1. **Participant Census at Valuation Date**		
a. Actives	1,049	962
b. Vested terminated deferred benefit	80	73
c. Disabled deferred benefit	11	14
d. Retirees and beneficiaries in pay status	922	953
e. Total	2,062	2,002
2. **Projected Participant Compensation for Plan Year Following the Valuation Date**	$ 106,462,088	$ 101,791,728
3. **Actuarial Present Value of Future Benefits**		
a. Active participants	$ 270,886,320	$ 267,449,794
b. Vested terminated deferred benefit	5,730,591	5,506,472
c. Disabled deferred benefit	1,346,379	3,061,815
d. Retirees and beneficiaries	380,580,937	404,456,889
e. Total	$ 658,544,227	$ 680,474,970
4. **Actuarial Present Value of Future Normal Cost**	$ 43,639,382	$ 42,992,524
5. **Actuarial Accrued Liability (Item 3e – Item 4)**	$ 614,904,845	$ 637,477,446
6. **Actuarial Value of Assets**	$ 432,019,765	$ 431,497,129
7. **Unfunded Actuarial Accrued Liability (UAAL) (Item 5 – Item 6)**	$ 182,885,080	$ 205,980,317
8. **Recommended Annual LCRA Contributions as of Valuation Date**		
a. Normal cost	$ 5,580,714	$ 5,463,965
b. Administrative expenses	300,000	300,000
c. UAAL amortization[1]	17,259,165	18,171,107
d. Total	$ 23,139,879	$ 23,935,072
9. **Recommended Annual LCRA Contributions Paid Biweekly**[2]	$ 23,699,007	$ 24,568,478
10. **UAAL Amortization Period in Years**[3]	18	20
11. **Funded Ratio (Item 6 ÷ Item 5)**[4]	70.3%	67.7%

1 Level annual amount required to amortize Item 7 over the period of years in Item 10.
2 Payable in the plan year beginning one year after the valuation date, determined according to method described in Section IV(A).
3 Level dollar amortization.
4 The funded ratio is not appropriate for assessing either the need for or the amount of future contributions or the adequacy of the funding policy. Using the market value of assets instead of the actuarial value of assets for item 11 would have resulted in funded ratios of 63.1% as of January 1, 2019 and 67.3% as of January 1, 2020.

Section III – Plan Asset Information

A. Statement of Changes in Assets for the Plan Year Ending December 31, 2019

	Unaudited[1]
Additions	
1. Contributions	
a. Employer	$ 23,446,084
b. Employees	248,981
c. Total	$ 23,695,065
2. Investment Income	
a. Interest and dividends	$ 2,674,239
b. Net appreciation in fair value	59,535,425
c. Total	$ 62,209,664
Total Additions	**$ 85,904,729**
Deductions	
3. Benefit Payments	$ 42,896,190
4. Expenses	
a. Investment-related	$ 2,176,820
b. Administrative	254,491
c. Total	$ 2,431,311
Total Deductions	**$ 45,327,501**
Net Increase in Assets	**$ 40,577,228**
Market Value of Assets (Plan Net Position)	
Beginning of Year	$ 388,300,639 [2]
End of Year	$ 428,877,867
Rate of Return Net of Investment-Related Expenses	
Market Value of Assets	15.86%
Actuarial Value of Assets	4.48%

1 Preliminary statement of changes from LCRA Accounting was adjusted to use the beginning of year amount equal to last year's unaudited assets end of year amount.

2 This is the unaudited amount used for the prior actuarial valuation.

B. Development of Actuarial Value of Assets

Plan Year Ending	12/31/2019	12/31/2018	12/31/2017	12/31/2016	3/31/2016
1. Market Value of Assets as of beginning of year	$ 388,300,639	$ 424,481,299	$ 403,845,152	$ 399,620,527	$ 414,996,161
2. Employer Contributions	23,446,084	23,893,109	22,892,640	15,099,077	20,891,685
3. Buyback and OCS Contributions	248,981	326,237	238,425	620,319	860,448
4. Benefit Payments and Administrative Expenses[1]	(43,150,681)	(38,340,845)	(44,842,093)	(27,485,491)	(37,979,053)
5. Expected Investment Return [2]	27,446,530	30,262,990	28,491,749	21,409,475	30,501,362
6. Expected Market Value of Assets as of end of year	$ 396,291,553	$ 440,622,790	$ 410,625,873	$ 409,263,907	$ 429,270,603
7. Actual Market Value of Assets as of end of year	428,877,867	388,300,639	424,481,299	403,845,152	399,620,527
8. Actuarial Investment Gain/(Loss)	$ 32,586,314	$ (52,322,151)	$ 13,855,426	$ (5,418,755)	$ (29,650,076)
9. Market Value Rate of Return Net of Expenses	15.86%	(5.28)%	10.78%	4.06%	0.21%

1 Administrative expenses are included because the investment return assumption was net of investment-related expenses for those years.

2 Assuming uniform distribution for contributions and monthly benefit payments during the plan year. Expected annual investment return was 7.50% for plan year ending March 31, 2016, and for the plan years ending December 31, 2016, 2017, 2018, and 2019 was the annual rate of 7.25% (5.44% for the short plan year in 2016). A weighted average investment period was determined for all lump sum benefit payments in plan year ending March 31, 2016, with uniform distribution assumed in other years.

Plan Year Ending	Investment Gain/(Loss)	Deferred Percentage	Deferred Gain/(Loss) Amount as of 12/31/2019
12/31/2019	$ 32,586,314	80%	$ 26,069,051
12/31/2018	(52,322,151)	60%	(31,393,290)
12/31/2017	13,855,426	45%	5,542,170
12/31/2016	(5,418,755)	25%	(1,354,689)
3/31/2016	(29,650,076)	5%	(1,482,504)
Total			$ (2,619,262)

Actuarial Value of Assets as of December 31, 2019	
10. Market Value of Assets as of December 31, 2019	$ 428,877,867
11. Deferred Gain/(Loss) to be recognized in future	(2,619,262)
12. Preliminary Value (Item 10 - Item 11)	$ 431,497,129
13. 80% of Market Value as of December 31, 2019 (minimum)	$ 343,102,294
14. 120% of Market Value as of December 31, 2019 (maximum)	$ 514,653,440
15. Actuarial Value as of December 31, 2019	$ 431,497,129
16. Write up (down) of assets under this method (Item 15 - Item 10)	$ 2,619,262

Section IV – Actuarial Methods and Assumptions

A. Actuarial Methods

1. Actuarial Cost Method

The Entry Age Normal actuarial cost method is used in determining the contribution requirements for the plan. The actuarial cost method is the procedure by which the actuary annually identifies a series of annual contributions which, along with current assets and future investment earnings, will fund the expected plan benefits. The Entry Age Normal cost method compares the excess of the present value of expected future plan benefits over the current value of plan assets. This difference represents the expected present value of current and future contributions that will be paid into the plan. The contributions are divided into two components: an annual normal cost (or current cost) and the remainder for amortizing the unfunded actuarial accrued liability.

The normal cost for the plan is the sum of normal costs for each active participant, recognizing whether each one is a Pension Participant or a Cash Balance Participant. Each active participant's normal cost is the current annual contribution in a series of annual contributions which, if made throughout the participant's total period of employment, would fund his expected benefits. Each participant's normal cost is calculated to be an annual constant percentage of his expected compensation in each year of employment.

The plan's current actuarial accrued liability is the excess of the actuarial present value of expected future benefits over the actuarial present value of all future remaining normal cost contributions. (The present value of expected future benefits and the present value of future normal costs for each active participant reflect whether he is a Pension Participant or a Cash Balance Participant.) The unfunded actuarial accrued liability (UAAL) is the amount by which the actuarial accrued liability exceeds the current plan assets. The UAAL is recalculated each time a valuation is performed. Experience gains and losses, which represent deviations of the UAAL from its expected value based on the prior valuation, are determined at each valuation and are amortized as part of the newly calculated UAAL.

2. Amortization Method

The UAAL is being amortized over a 20-year closed period that began in 2020 and will end December 31, 2039, with level dollar payments in accordance with LCRA’s funding policy recommended by Rudd and Wisdom, Inc.

3. Actuarial Value of Assets Method

The preliminary market value of assets is adjusted to uniformly spread actuarial gains or losses (as measured by actual market value investment return vs. assumed investment return) over a five-year period. The total adjustment amount shall be limited as necessary such that the actuarial value of assets shall not be less than 80% of market value nor greater than 120% of market value.

4. Method of Determining the Recommended Contributions for 2021

To reflect the one-year lag between the actuarial valuation date and the effective date of the recommended contribution for the year beginning then, the UAAL was projected to January 1, 2021, assuming the 2020 plan year biweekly contributions will be the $23,699,007 amount recommended for 2020 in the January 1, 2019 actuarial valuation. The projected UAAL would be amortized over the 19 years remining as of January 1, 2021 by annual payments of $18,272,680. The projected January 1, 2021 normal cost of $5,152,199 plus assumed administrative expenses of $300,000 bring the total annual contribution to $23,724,879. The equivalent amount contributed biweekly is $24,568,478 or $944,941.46 biweekly.

B. Actuarial Assumptions

We review the actuarial assumptions as a part of each actuarial valuation. Periodically we perform a detailed study or review or analysis of specific assumptions. The year of the most recent detailed study or review or analysis, relied on for our overall review this year or the year of the most recent change, is indicated parenthetically after each assumption name.

1. Mortality (2019): Active and retired participants of the plan are expected to exhibit mortality in accordance with the following published mortality tables, projected for mortality improvement generationally using the projection scale MP-2018:

   a. Pre-retirement Mortality: PubG-2010(A) for employees (sex distinct)
   b. Post-retirement Mortality: PubG-2010(A) for retirees (sex distinct)
   c. Post-disability Mortality: PubG-2010(A) for retirees (sex distinct)

2. Termination (2016):

   a. Active pension participants are assumed to terminate their employment for causes other than death, disability or retirement in accordance with annual rates per 1,000 participants as illustrated below.

Years of Service	**Entry Age Group**								
	20	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**
0	250	150	150	150	135	135	135	100	150
5	70	70	85	85	85	90	90	100	150
10	45	45	60	60	60	65	80	100	
15	15	15	25	25	40				
20	15	10	10						
25	10								
30									

   b. Active cash balance participants are assumed to terminate their employment for causes other than death, disability or retirement in accordance with annual rates per 1,000 participants as illustrated below:

Years of Service	**Entry Age Group**								
	20	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**
0	250	150	150	150	135	135	135	100	150
5	70	70	85	85	85	90	90	100	150
10	45	45	60	60	60	65	80	100	
15	15	15	25	25	40				
20	15	10	10	10					
25	10	10	10						
30	10	10							
35	10								

3. Investment Return (2020): Current and future plan assets are assumed to reflect an annual investment return of 7% net of investment-related expenses. See item B.14 for general administrative expenses.

4. Earnings Progression (2017): The increase in the levels of participant compensation is assumed to occur at annual rates as illustrated below, with an ultimate rate of 3.25% (2.5% inflation plus 0.75% productivity), the general wage increase part of the assumption, for years of service beyond the last year shown:

Years of Service	Entry Age Group								
	20	25	30	35	40	45	50	55	60
0	9.75%	8.55%	7.55%	6.85%	6.25%	5.75%	5.25%	4.25%	3.75%
5	6.65	5.75	5.05	4.65	4.25	3.85	3.45	3.25	3.25
10	4.95	4.45	3.95	3.45	3.25	3.25	3.25		
15	3.95	3.45	3.25	3.25					
20	3.25	3.25							

5. Retirement Rates (2016):

a. Active pension participants eligible for early, normal or late retirement are assumed to retire in accordance with annual rates per 1,000 participants as illustrated below. Shaded rates are rates of retirement with the purchase of Optional Credited Service (OCS).

Attained Age	Entry Age Group (Central Age)								
	20	25	30	35	40	45	50	55	60
45	20								
46	20								
47	20	30							
48	20	30							
49	70	30	30						
50	100	30	30						
51	100	130	30						
52	150	130	30	40					
53	150	130	30	40					
54	150	130	30	40					
55	100	100	200	40	50	50			
56	100	100	200	40	50	50	80		
57	100	100	180	150	120	50	80		
58	100	100	180	150	120	50	80		
59	100	100	180	150	120	50	80		
60	150	150	150	150	150	150	150		
61	150	150	150	150	150	150	150	150	
62	250	250	250	250	250	250	150	150	
63	200	200	200	200	200	200	150	150	
64	200	200	200	200	200	200	150	150	
65	500	500	500	500	500	500	500	500	500
66	200	200	200	200	200	200	200	200	200
67	200	200	200	200	200	200	200	200	200
68	200	200	200	200	200	200	200	200	200
69	200	200	200	200	200	200	200	200	200
70	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

b. Active cash balance participants at least age 55 with at least 15 years of service (or age 65 with at least 5 years of service) are assumed to retire in accordance with annual rates per 1,000 participants as illustrated below. Cash balance participants cannot purchase OCS. Any retirements before age 55 by the Rule of 80 are effectively anticipated by the assumed rates of termination.

Attained Age	Entry Age Group								
	20	25	30	35	40	45	50	55	60
55	50	50	50	40	30				
56	50	50	50	40	30				
57	50	50	50	40	30				
58	50	50	50	40	30				
59	50	50	50	40	30				
60	100	100	100	80	60	40			
61	100	100	100	80	60	40			
62	150	150	150	150	150	150			
63	150	150	150	150	150	150			
64	150	150	150	150	150	150			
65	400	400	400	400	400	400	300	200	200
66	150	150	150	150	150	150	100	100	100
67	150	150	150	150	150	150	100	100	100
68	150	150	150	150	150	150	100	100	100
69	150	150	150	150	150	150	100	100	100
70	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

6. Disability (2016): Active participants are expected to become disabled as defined under the plan in accordance with annual rates as illustrated below:

Attained Age	Disabilities per 1,000 Participants
35	0.24
40	0.56
45	0.92
50	1.65
55	2.92
60	3.73

7. Recognition of IRC Section 415 Limitations (2017): The dollar benefit limitations under IRC Section 415(b) have been reflected in the determination of plan costs. Increases in Section 415(b) dollar limit are projected to increase at 3.25% per year, the same as the general wage increase assumption in Item B.4.

8. Additional Credited Service Due to Unused Sick Leave (2016): Aggregate benefits paid for pension participants are expected to be increased by 2% as a result of unused sick leave conversion to credited service.

9. Inflation Component in Earnings Progression and Investment Return Assumptions (2020): 2.5%

10. Assumed Form of Payment (2016):

    a. Pension participants: Twenty-five percent (25%) of retirement payments for active participants who are eligible for immediate monthly benefits are assumed to be paid in the form of a single lump sum payment. The remaining seventy-five percent (75%) of such retirement payments are assumed to be paid in the normal form annuity (10 years certain and life). Active participants who terminate employment before they are eligible for immediate monthly benefits are assumed to receive their benefit in the form of a single lump sum payment at the time of termination of employment. The same 25%/75% assumption is used for disabled pension participants with their benefit deferred to normal retirement age.

    b. Cash balance participants: All active participants are assumed to receive their benefits in the form of a single lump sum payment, the normal form. The same single lump sum payment assumption is used for disabled cash balance participants with their benefit deferred to normal retirement age.

    c. Retirees retiring just before the valuation date who have not made an affirmative election: All such retirees, if any, are assumed to elect a single lump sum payment.

    d. To the extent optional forms of payment are elected and conversions are determined under an actuarial basis which differs from the basis used in the valuation, actuarial gains or losses will occur. These gains or losses are expected to be very small and will be recognized through the valuation process for those new retirees making an optional election since the prior valuation.

11. Lump Sum Interest Rate (2017): 6.75% per year for determining actuarially equivalent lump sums to be selected by pension participants retiring in the future. The unisex mortality basis for determining actuarially equivalent optional benefits is in the plan document and is shown in item 10 of Section V, the outline of the plan provisions.

12. Projected Compensation (2017): For the plan year first following the valuation date, the assumed compensation for each active participant is the actual gross pay in the calendar year immediately preceding the date of the actuarial valuation increased by the assumed annual rate of earnings progression determined by the participant's age at hire and current years of service.

13. Total Projected Compensation (2016): For the plan year first following the valuation date, the total projected compensation is the sum of the assumed compensation for the first plan year following the valuation date for all active participants on the valuation date.

14. General Administrative Expenses (2016): The expenses paid from plan assets for other than investment-related expenses are assumed to be $300,000 per year and are treated as part of the recommended contributions.

Section V – Outline of Principal Plan Eligibility and Benefit Provisions as of January 1, 2020

1. Identifying Data

   a. Plan name: Lower Colorado River Authority Retirement Plan
   b. Type of plan: Defined benefit pension benefits for closed group hired before January 1, 2002 with cash balance benefits for closed group hired after December 31, 2001 and before May 1, 2012 and for employees hired earlier who opted in
   c. Plan sponsor: Lower Colorado River Authority
   d. Plan Year: April 1 - March 31 through March 31, 2016; calendar year beginning January 1, 2017; short plan year April 1 - December 31, 2016

2. Participation

   a. Minimum Age: none
   b. Maximum Age at Hire: none
   c. Service: n/a for Pension participants (no new participants after January 1, 2002); three consecutive months of Credited Service for Cash Balance participants (no new participants after May 1, 2012)
   d. Employee Classification: All employees working 1,000 or more hours per plan year
   e. Entry Date: n/a for Pension participants; monthly anniversary date coincident with or first following completion of service requirement for Cash Balance Participants

3. Contributions

   a. Participant: none required
   b. Employer: all amounts necessary to adequately finance plan benefits

4. Eligibility for Retirement

   a. Normal Retirement: age 65 plus 5 full years of credited service or satisfaction of Rule of 80
   b. Early Retirement: age 55 plus 15 full years of credited service
   c. Disability: continuously receiving a benefit from the LCRA Long Term Disability Income Plan until eligible for early or normal retirement

5. Retirement Benefit Monthly Amounts

   a. Normal Retirement for Pension Participants: 1.75% of average monthly compensation per year of credited service plus 0.40% of average monthly compensation in excess of integration level per year of credited service
   b. Late Retirement for Pension Participants: same as Normal Retirement
   c. Early Retirement for Pension Participants: amount equal to monthly normal retirement benefit accrued at early retirement date reduced ½% for every month early retirement precedes the earlier of (a) normal retirement age or (b) attainment of date where age and credited service total to 80 years. There is no reduction, however, if total of age and credited service is 80 or more years.

d. Cash Balance Account for Cash Balance Participants: The Cash Balance Account consists of a Beginning Balance, monthly Contribution Credits and monthly interest credits. The Beginning Balance is zero unless Option B under the Retirement Choice Program was elected prior to January 1, 2002. The Beginning Balance is the pension plan lump sum value, if any, as of December 31, 2001 or, if greater, the transition value determined as of December 31, 2001. The transition value was based upon Credited Service and Compensation averaged over 60 months of employment. Contribution Credits are equal to 4% of Compensation paid during each month of participation. Interest credits are added at the end of each month to the Cash Balance Account based on an annual effective interest rate of 7%.

e. Disability: for Pension Participants, amount payable at normal retirement age assuming continuation of service and compensation from date of disability to normal retirement age; for Cash Balance Participants, amount payable at normal retirement age assuming continuation of service, but no future compensation is recognized.

6. <u>Payment Options for Pension Participants</u>

a. The normal form of monthly payment is 10 years certain and life.
b. Other actuarially equivalent monthly payment forms are available.
c. Effective January 1, 2002, a 100% lump sum payment option or a 50% lump sum payment plus 50% monthly payment option is available.

7. <u>Payment Options for Cash Balance Participants</u>

a. The normal form of payment is a 100% lump sum payment.
b. If the participant has an account balance of at least $5,000 and is at least age 55 with at least 15 years of service (or age 65 with at least 5 years of service), monthly payment forms equivalent to the Cash Balance Account are available options.
c. The 50% lump sum payment plus 50% monthly payment option is available if the participant meets the requirements in b.

8. <u>Vested Termination Benefits</u>

a. Benefit: for Pension Participants, entitlement to vested percentage of accrued normal retirement benefit at normal retirement age; for Cash Balance Participants, entitlement to vested percentage of account balance upon termination.

b. Vesting Schedule:

Full Years of Credited Service	Vesting Percent
less than 3	0%
3 or more	100

A Pension Participant is always 100% vested in the portion of the accrued normal retirement benefit attributable to any employee contributions.

c. Accrued Normal Retirement Benefit for Pension Participants: a monthly benefit payable in the normal form of payment beginning at normal retirement age; the amount of the accrued benefit is determined when a participant terminates employment and is calculated using the normal retirement benefit formula but using only years of credited service and compensation credited at date of termination

9. Pre-retirement Death Benefits

For Pension Participants, payment of benefit which is actuarially equivalent to the present value of the participant's vested accrued normal retirement benefit or, if greater, the present value of an immediately available early retirement benefit. For Cash Balance Participants, payment of Cash Balance Account balance if vested. Such death benefit will be paid to the beneficiary in a lump sum unless the deceased Cash Balance Participant met the eligibility requirement to choose a monthly payment option (item 7 above).

10. Basis of Actuarial Equivalence

8% (plus or minus an annual adjustment rounded to the nearest 0.5% based on the average 30-year U.S. bond yield) and the RP-2000 Combined Healthy Male Mortality Table projected to 2018 with Scale AA and the RP-2000 Combined Healthy Female Mortality Table projected to 2018 with Scale AA (75% male and 25% female for employees and 25% male and 75% female for spouses, joint pensioners and beneficiaries) for monthly benefits and lump sum payments

11. Integration Level for Pension Participants

Monthly amount of $3,300.00 for termination in 2020 or later

12. Average Monthly Compensation for Pension Participants

Plan compensation averaged over 60 consecutive months of highest total plan compensation

13. Unused Sick Leave for Pension Participants

Accumulated unused sick leave is added to credited service in the determination of accrued benefits at the rate of 173 1/3 hours equals 1 month of credited service

14. Buyback Credited Service for Pension Participants

In special circumstances initiated under pre-1984 plan provisions, prior periods of employment with the plan sponsor or other employers were credited by purchasing such service via buyback contributions paid by the participant to the plan.

15. Optional Credited Service for Pension Participants

Eligible Pension Participants may purchase additional credited service on a cost neutral basis to the plan (assuming the purchaser would have otherwise worked until eligible to retire); spousal beneficiaries of Pension Participants who die within five years of becoming eligible for early retirement may also purchase additional credited service. Purchases of additional credited service can be for satisfying eligibility requirements only or for both satisfying eligibility requirements and increasing the benefit amount. However, additional credited service cannot be purchased for service beyond attainment of Rule of 80 or normal retirement date (either attained or projected as may be applicable).

Section VI – Participant Census Summary

A. Participant Data Comparison

	Prior Year 01/01/2019	Current Year 01/01/2019
1. **Active Participant Count**		
a. Pension	381	334
b. Cash balance participants	668	628
c. Total	1,049	962
2. **Age, Salary and Service of Active Participants**		
a. Average attained age	48.7 years	49.3 years
b. Aggregate projected annual salary	$ 106,462,088	$ 101,791,728
c. Number of actives included in Item 2b	1,043	956
d. Average projected annual salary[1]	$ 102,073	$ 106,477
e. Average benefit service earned	17.0 years	17.7 years
3. **Immediate Retirement Benefits**		
a. Retirees and beneficiaries in pay status	922	953
b. Aggregate monthly benefit	$ 2,772,343	$ 2,897,913
c. Average monthly benefit	$ 3,007	$ 3,041

[1] Average salary = Item 2b ÷ Item 2c. Item 2b excludes the salary for the actives who are assumed to be retired because of being age 70 or above as of the valuation date (the difference between Item 1c and Item 2c). Item 2b also excludes the salary in excess of the maximum compensation that may be recognized for benefits under the Internal Revenue Code for a qualified plan.

B. Number of Employees by Attained Age and Service

LCRA Retirement Plan Active Participant Profile
All Employees By Count and Percentages (Attained Age)
As of January 1, 2020

CURRENT AGE	CURRENT YEARS OF BENEFIT SERVICE <6	6<=T<10	10<=T<15	15<=T<20	20<=T<25	25<=T<30	30<=T<35	>=35	ROW TOTALS
X<22.5	0	0	0	0	0	0	0	0	0 0.00%
22.5<=X<27.5	0	1	0	0	0	0	0	0	1 0.10%
27.5<=X<32.5	0	15	4	0	0	0	0	0	19 1.98%
32.5<=X<37.5	0	21	58	3	0	0	0	0	82 8.52%
37.5<=X<42.5	0	22	75	50	8	0	0	0	155 16.11%
42.5<=X<47.5	0	23	49	67	28	3	0	0	170 17.67%
47.5<=X<52.5	0	16	44	65	36	8	2	0	171 17.78%
52.5<=X<57.5	0	7	29	33	28	9	26	14	146 15.18%
X>=57.5	0	24	29	62	33	10	32	28	218 22.66%
COLUMN TOTALS & PERCENTS	0 0.00%	129 13.41%	288 29.94%	280 29.11%	133 13.82%	30 3.12%	60 6.24%	42 4.36%	962 100.00%

AVERAGE AGE AT HIRE = 31.50
AVERAGE SERVICE = 17.70
AVERAGE ATTAINED AGE = 49.31

C. Number of Employees by Entry Age and Service

LCRA Retirement Plan Active Participant Profile
All Employees By Count and Percentages (Entry Age)
As of January 1, 2020

AGE AT HIRE	<6	6<=T<10	10<=T<15	15<=T<20	20<=T<25	25<=T<30	30<=T<35	>=35	ROW TOTALS
	CURRENT YEARS OF BENEFIT SERVICE								
X<22.5	0	13	22	28	14	8	16	26	127 13.20%
22.5<=X<27.5	0	17	89	65	40	8	26	14	259 26.92%
27.5<=X<32.5	0	24	47	64	30	8	17	2	192 19.96%
32.5<=X<37.5	0	25	49	44	27	4	1	0	150 15.59%
37.5<=X<42.5	0	18	45	38	14	2	0	0	117 12.16%
42.5<=X<47.5	0	8	18	27	8	0	0	0	61 6.34%
47.5<=X<52.5	0	13	15	12	0	0	0	0	40 4.16%
52.5<=X<57.5	0	8	2	2	0	0	0	0	12 1.25%
X>=57.5	0	3	1	0	0	0	0	0	4 0.42%
COLUMN TOTALS	0	129	288	280	133	30	60	42	962
& PERCENTS	0.00%	13.41%	29.94%	29.11%	13.82%	3.12%	6.24%	4.36%	100.00%

AVERAGE AGE AT HIRE = 31.50
AVERAGE SERVICE = 17.70
AVERAGE ATTAINED AGE = 49.31

D. Average Compensation by Attained Age and Service

LCRA Retirement Plan Active Participant Profile
Average Compensation - All Employees By Count and Percentages (Attained Age)
As of January 1, 2020

CURRENT AGE	CURRENT YEARS OF BENEFIT SERVICE <7	7<=T<10	10<=T<15	15<=T<20	20<=T<25	25<=T<30	30<=T<35	>=35	ROW TOTALS
X<22.5	0	0	0	0	0	0	0	0	0
									0.00%
22.5<=X<27.5	0	99,824	0	0	0	0	0	0	99,824
									0.10%
27.5<=X<32.5	0	99,949	84,069	0	0	0	0	0	96,606
									1.85%
32.5<=X<37.5	0	90,519	97,196	100,061	0	0	0	0	95,591
									7.91%
37.5<=X<42.5	0	86,897	102,700	107,976	113,996	0	0	0	102,742
									16.06%
42.5<=X<47.5	0	118,869	98,879	107,239	110,488	110,934	0	0	107,003
									18.34%
47.5<=X<52.5	0	106,088	95,711	105,982	94,842	91,942	84,556	0	100,096
									17.26%
52.5<=X<57.5	0	119,772	92,846	109,722	102,860	98,311	104,413	113,565	104,256
									15.35%
X>=57.5	0	97,801	91,357	102,460	104,788	160,209	111,467	105,741	105,215
									23.13%
COLUMN AVGS.	0	100,998	97,480	106,236	103,444	118,508	107,513	108,349	103,081
& PERCENTS	0.00%	13.14%	28.31%	30.00%	13.87%	3.59%	6.50%	4.59%	100.00%

AVERAGE ANNUAL PAYRATE = 103,081

Section VII – Summary of Participant Data

A. Participant Data Reconciliation

	Active Participants[1]	Current Payment Status	Vested Terminated[3]	Disabled Participants	Total
1. As of January 1, 2019	1,049	922	80	11	2,062
2. Change of status					
a. normal retirement	0	4	(4)	0	0
b. late retirement	(5)	5	0	0	0
c. early retirement	(40)	30	(1)	(1)	(12)
d. disability	(5)	0	0	5	0
e. death	(1)	(3)	0	0	(4)
f. nonvested termination	0	0	0	0	0
g. vested termination	(8)	0	8	0	0
h. completion of payment	(28)	(5)	(10)	(1)	(44)
i. rehires	0	0	0	0	0
j. other	0	0	0	0	0
k. net changes	(87)	31	(7)	3	(60)
3. New participants	0	0	0	0	0
4. As of January 1, 2020	962	953	73	14	2,002

[1] includes any participant who might be beyond Normal Retirement Date
[2] includes deceased participants whose beneficiaries are receiving benefits
[3] includes deceased participants whose beneficiaries are entitled to receive benefits

Section VIII – Glossary of Actuarial Terms

Actuarial Accrued Liability
That portion, as determined by the particular actuarial cost method used, of the Actuarial Present Value of future pension plan benefits as of the Valuation Date that is not provided for by the Actuarial Present Value of future Normal Costs.

Actuarial Assumptions
Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, termination, disablement and retirement; changes in compensation; rates of investment earnings and asset appreciation; and other relevant items.

Actuarial Gain (Loss)
A measure of the difference between actual experience and that expected based on the Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with the particular actuarial cost method used.

Actuarial Present Value
The value of an amount or series of amounts payable or receivable at various times, determined as of a given date (the Valuation Date) by the application of the Actuarial Assumptions.

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 pension plan.

Actuarial Value of Assets
The value of cash, investments and other property belonging to a pension plan, as determined by a method and used by the actuary for the purpose of an Actuarial Valuation.

Entry Age Normal Actuarial Cost Method
An actuarial cost method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a Valuation Date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability. Under this method, Actuarial Gains (Losses), as they occur, reduce (increase) the Unfunded Actuarial Accrued Liability.

Normal Cost
That portion of the Actuarial Present Value of pension plan benefits that is allocated to a valuation year by the actuarial cost method.

Plan Year
Beginning in 2017, a 12-month period beginning January 1 and ending December 31. Prior to that, plan years ended on March 31.

Projected Benefits	Those pension plan benefit amounts that are expected to be paid at various future times according to the Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future qualified service.
Unfunded Actuarial Accrued Liability	The excess, if any, of the Actuarial Accrued Liability over the Actuarial Value of Assets.
Unfunded Actuarial Accrued Liability Cost	The level percent of annual projected compensation to amortize the Unfunded Actuarial Accrued Liability over a selected or solved for period of years.
Valuation Date	The date upon which the Normal Cost, Actuarial Accrued Liability and Actuarial Value of Assets are determined. Generally, the Valuation Date will coincide with the beginning or ending of a Plan Year.
Years to Amortize the Unfunded Actuarial Accrued Liability	The period is selected or solved for in each Actuarial Valuation as the number of years, beginning with the Valuation Date, to amortize the Unfunded Actuarial Accrued Liability with a level dollar amount each year.