CITY OF RIVERSIDE
MISCELLANEOUS AND SAFETY PLANS

Pension Obligation Bond Study
Based on CalPERS 6/30/18 Valuation

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April 1, 2020

Contents

POB Summary

	Option 2a	Option 3a	Option 3b
■ POB and Contribution			
● Total POB	$352,250,000	$439,095,000	$439,095,000
● Cost of Issuance	(1,436,468)	(1,649,045)	(1,649,045)
● CalPERS Contribution	350,813,532	437,445,955	437,445,955
■ CalPERS Allocation			
● Miscellaneous Plan	$154,629,918	$207,576,617	$207,576,617
● Safety Plan	196,183,614	229,869,338	229,869,338
● Total	350,813,532	437,445,955	437,445,955

POB Summary

	Option 2a	Option 3a	Option 3b
■ UAAL Percent Paid Off[1]			
● Miscellaneous Plan	49%	66%	66%
● Safety Plan	60%	70%	70%
● Total	55%	68%	68%
■ Average POB Duration			
● Miscellaneous Plan	10.6	9.6	9.5
● Safety Plan	13.4	11.4	13.5
● Total	12.2	10.5	11.6

[1] Based on projected June 30, 2020 unfunded liability assuming 7% annual return for 18/19 and 19/20, and 7% discount rate

POB Summary

	Option 2a	Option 3a	Option 3b
■ Average Interest Rate			
● Miscellaneous Plan	2.77%	2.47%	3.46%
● Safety Plan	3.07%	2.62%	3.58%
● Total	2.95%	2.55%	3.53%

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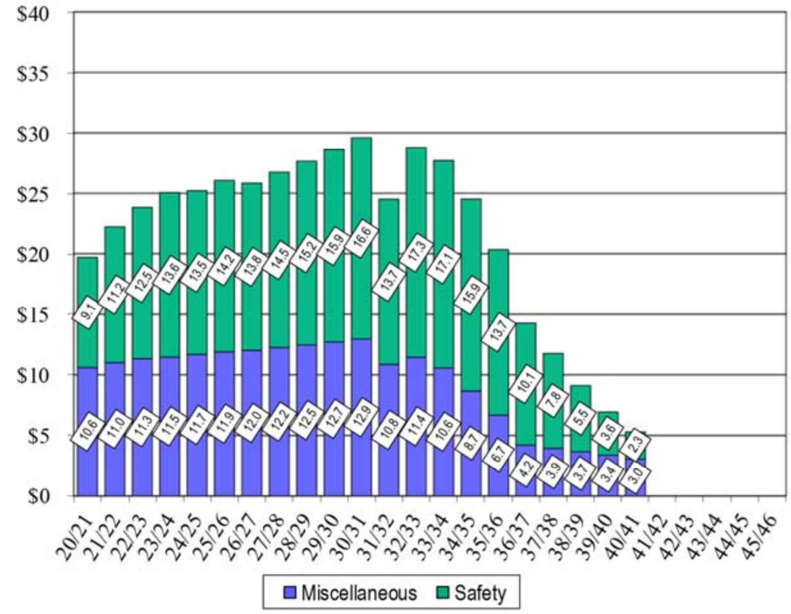
Option 2a
Miscellaneous Plan Bases to be Paid Off

	Amortization Years	6/30/20 Balance	2020/21 Payments
Assumption Change 2009	11	$38,953,472	$ 4,449,324
Special (Gain)/Loss 2009	21	24,848,702	1,781,537
Assumption Change 2014	16	78,127,462	7,429,078
Method Change 2018	20	12,700,282	236,792
Total		154,629,918	13,896,731

Option 2a
Safety Plan Bases to be Paid Off

	Amortization Years	6/30/20 Balance	2020/21 Payments
Arnett Case 2003	5	$ 72,978	$ 16,346
Benefit Change 2003	4	5,785,655	1,588,333
Benefit Change 2004	6	4,850,670	923,225
Assumption Change 2009	11	13,436,571	1,534,745
Special (Gain)/Loss 2009	21	18,471,506	1,324,322
Assumption Change 2011	13	14,411,857	1,445,766
Assumption Change 2014	16	53,055,391	5,044,995
Assumption Change 2016	18	19,881,580	1,082,450
Assumption Change 2017	19	22,047,465	803,970
Method Change 2018	20	6,570,652	122,507
Assumption Change 2018	20	37,599,289	701,025
Total		196,183,614	14,587,684

Option 2a
Debt Service
(in $millions)



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Option 3a

Miscellaneous Plan Bases to be Paid Off

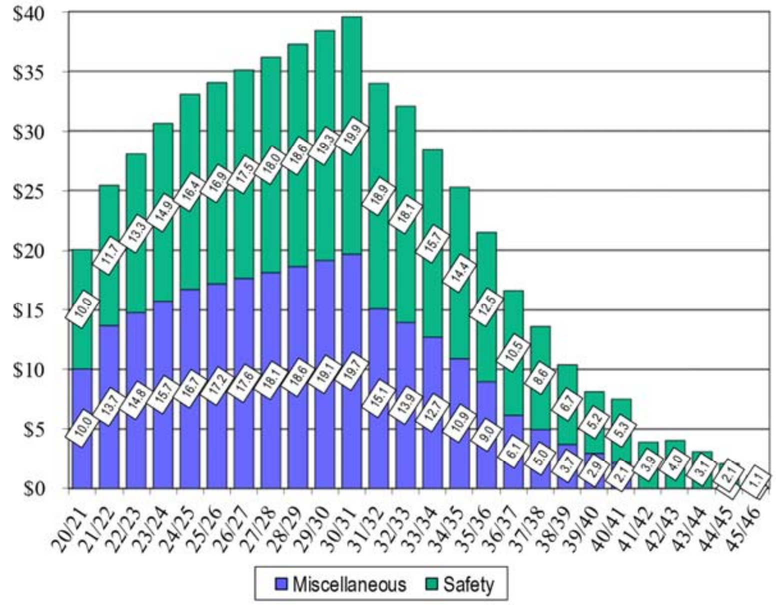
	Amortization Years	6/30/20 Balance	2020/21 Payments
Assumption Change 2009	11	$ 38,953,472	$ 4,449,324
Special (Gain)/Loss 2009	21	24,848,702	1,781,537
Assumption Change 2014	16	78,127,462	7,429,078
Assumption Change 2016	18	26,035,125	1,417,478
Method Change 2018	20	12,700,282	236,792
Assumption Change 2018	20	26,911,574	501,756
Total		207,576,617	15,815,965

Option 3a

Safety Plan Bases to be Paid Off

	Amortization Years	6/30/20 Balance	2020/21 Payments
Arnett Case 2003	5	$ 72,978	$ 16,346
Assumption Change 2009	11	13,436,571	1,534,745
Special (Gain)/Loss 2009	21	18,471,506	1,324,322
Assumption Change 2011	13	14,411,857	1,445,766
Assumption Change 2014	16	53,055,391	5,044,995
(Gain)/Loss 2015	27	44,322,049	2,318,224
Assumption Change 2016	18	19,881,580	1,082,450
Assumption Change 2017	19	22,047,465	803,970
Method Change 2018	20	6,570,652	122,507
Assumption Change 2018	20	37,599,289	701,025
Total		229,869,338	14,394,350

Option 3a
Debt Service
(in $millions)



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Option 3b

Miscellaneous Plan Bases to be Paid Off
(same as Option 3a)

	Amortization Years	6/30/20 Balance	2020/21 Payments
Assumption Change 2009	11	$ 38,953,472	$ 4,449,324
Special (Gain)/Loss 2009	21	24,848,702	1,781,537
Assumption Change 2014	16	78,127,462	7,429,078
Assumption Change 2016	18	26,035,125	1,417,478
Method Change 2018	20	12,700,282	236,792
Assumption Change 2018	20	26,911,574	501,756
Total		207,576,617	15,815,965

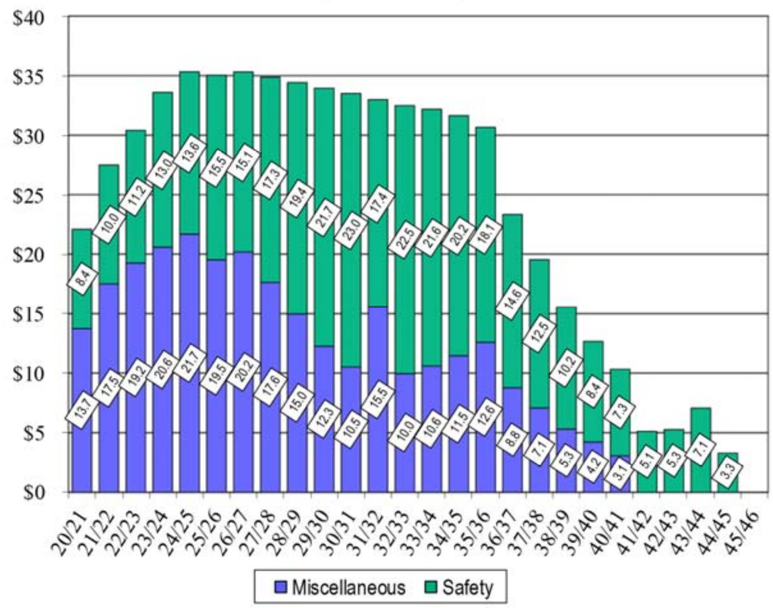
Option 3b

Miscellaneous Plan Bases to be Paid Off
(same as Option 3a)

	Amortization Years	6/30/20 Balance	2020/21 Payments
Arnett Case 2003	5	$ 72,978	$ 16,346
Assumption Change 2009	11	13,436,571	1,534,745
Special (Gain)/Loss 2009	21	18,471,506	1,324,322
Assumption Change 2011	13	14,411,857	1,445,766
Assumption Change 2014	16	53,055,391	5,044,995
(Gain)/Loss 2015	27	44,322,049	2,318,224
Assumption Change 2016	18	19,881,580	1,082,450
Assumption Change 2017	19	22,047,465	803,970
Method Change 2018	20	6,570,652	122,507
Assumption Change 2018	20	37,599,289	701,025
Total		229,869,338	14,394,350

PROPOSED 2020 POB OPTION 3b

Option #3b
Debt Service
(in $millions)



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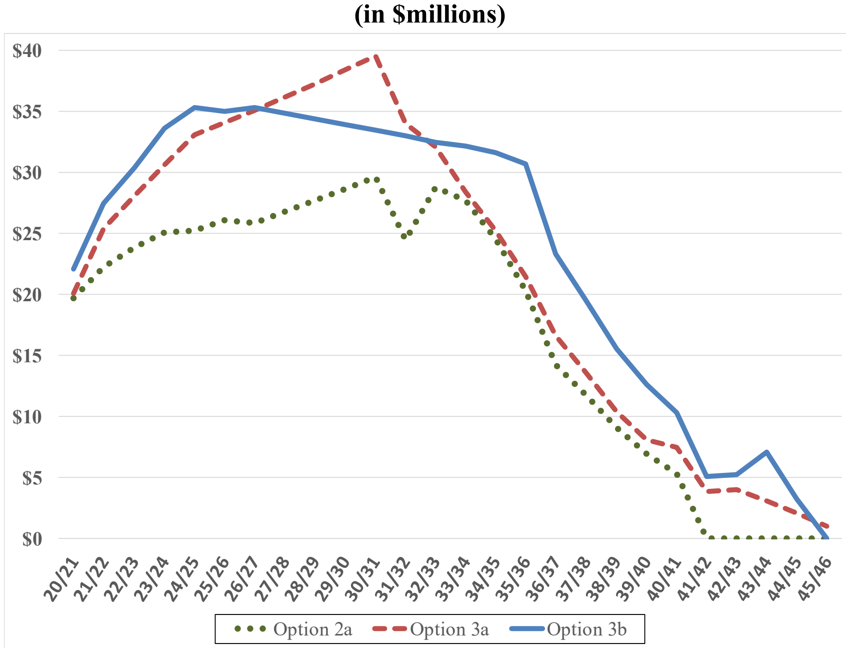
PROPOSED 2020 POB DEBT SERVICE SUMMARY

All Options
Debt Service (Miscellaneous + Safety)
(in $millions)



CONTRIBUTION PROJECTIONS – MISCELLANEOUS

- Market Value Investment Return:
  - June 30, 2019 6.7%[2]
  - Future returns based on stochastic analysis using 1,000 trials

Single Year Returns at[3]	25th Percentile	50th Percentile	75th Percentile
Current Investment Mix	**0.1%**	**7.0%**	**14.8%**
Ultimate Investment Mix	**0.8%**	**6.0%**	**11.4%**

  - Assumes investment returns will, generally be 6.5% (as compared to 7.0%) over the next 9 years and higher beyond that.
- Discount Rate decreases due to Risk Mitigation policy
- No Other: Gains/Losses, Method/Assumption Changes, Benefit Improvements
- Different from CalPERS projection

[2] Gross return based on July 2019 CalPERS press release

[3] Nth percentile means N percentage of our trials result in returns lower than the indicated rates.

CONTRIBUTION PROJECTIONS – MISCELLANEOUS

- New hire assumptions:
  - 92.5% of 2019/20 new hires are PEPRA members and 7.5% are Classic members
  - Percentage of PEPRA member future hires to increase from 92.5% to 100% over 3 years
- 6/30/18 employee distribution:

Benefit Tier	Count	6/30/18 Payroll
2.7%@55 FAE1	944	$79,314,600
2.7%@55 FAE3	159	11,869,200
2%@62 FAE3 (PEPRA)	504	28,986,300

Contribution Projections – Miscellaneous

- Tier 1 Employer Paid Member Contributions (EPMC):
  - SEIU: 2% prior to January 1, 2019, 1% from January 1, 2019 through January 1, 2020, and 0% thereafter
  - Unrepresented: 6% from January 1, 2018 through January 1, 2019, 4% from January 1, 2019 through January 1, 2020, 2% from January 1, 2020 through January 1, 2021, and 0% thereafter
  - Elected Officials: 8%
  - IBEW: 4% from November 1, 2018 through November 1, 2019, 2% from November 1, 2019 through November 1, 2020, and 0% thereafter
  - Combined: 1.8% for 2019/20, 0.5% for 2020/21 and 0% for 2021/22 and thereafter

Contribution Projections – Miscellaneous

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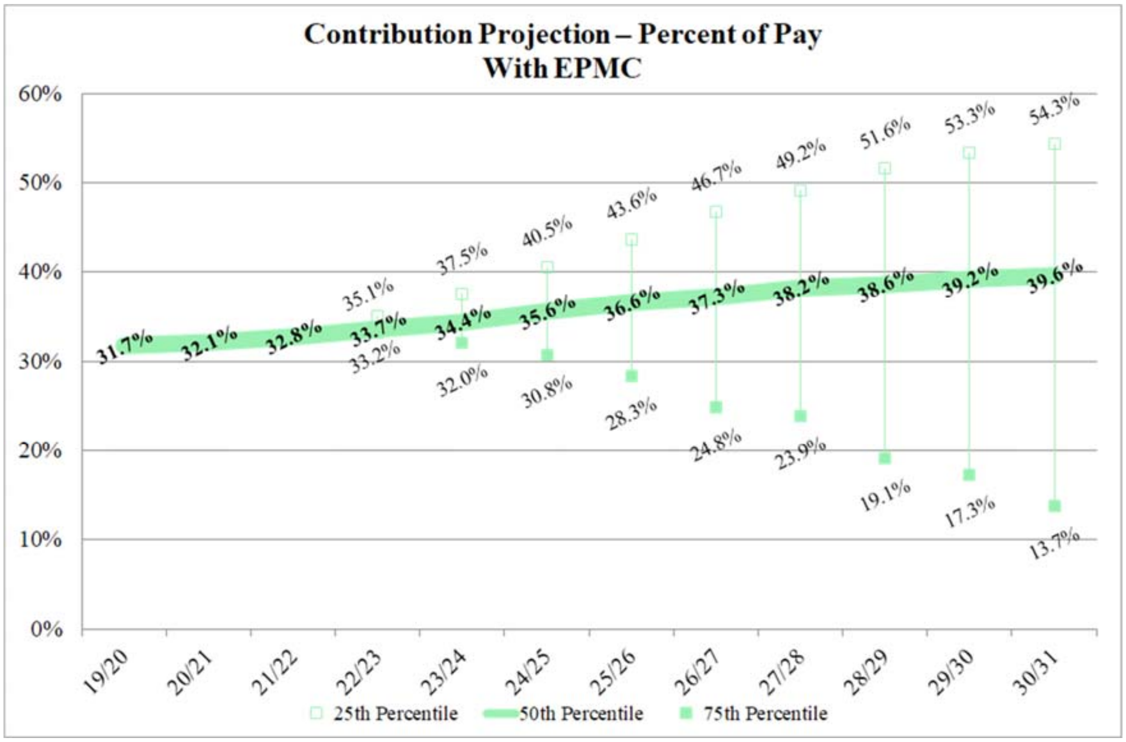
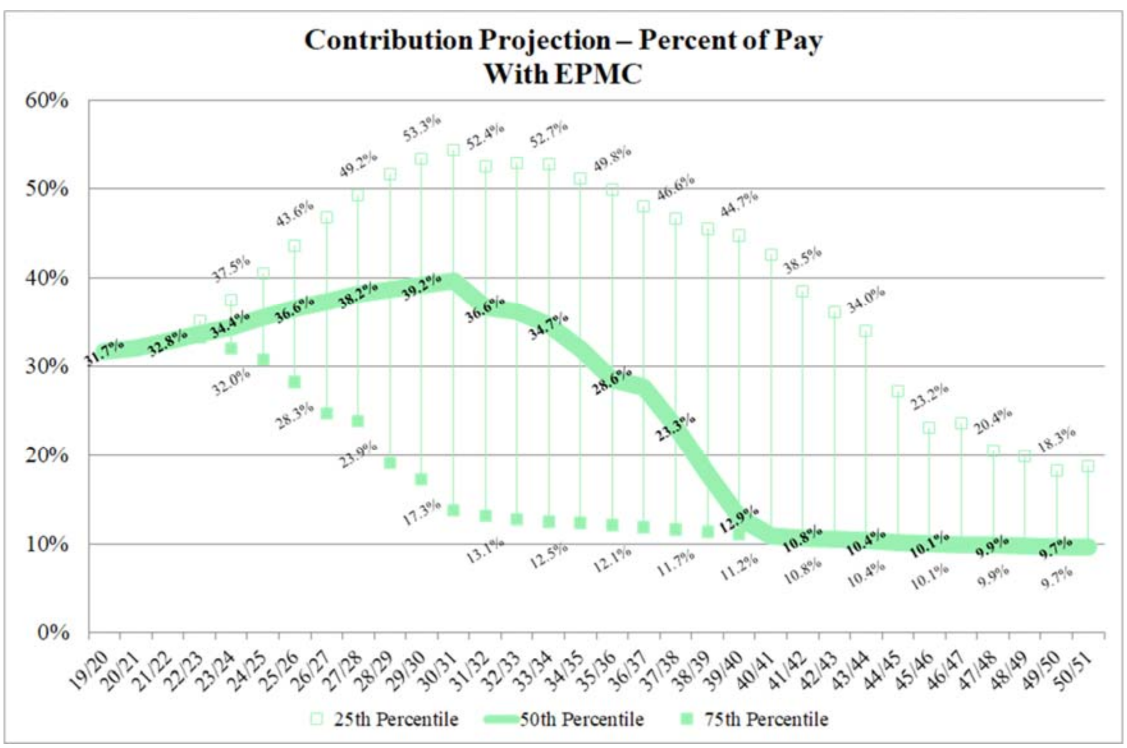
CONTRIBUTION PROJECTIONS – MISCELLANEOUS



CONTRIBUTION PROJECTIONS – MISCELLANEOUS



CONTRIBUTION PROJECTIONS – SAFETY

- Market Value Investment Return:
  - June 30, 2019 — 6.7%[4]
  - Future returns based on stochastic analysis using 1,000 trials

Single Year Returns at[5]	25th Percentile	50th Percentile	75th Percentile
Current Investment Mix	**0.1%**	**7.0%**	**14.8%**
Ultimate Investment Mix	**0.8%**	**6.0%**	**11.4%**

  - Assumes investment returns will, generally be 6.5% (as compared to 7.0%) over the next 9 years and higher beyond that.
- Discount Rate decreases due to Risk Mitigation policy
- No Other: Gains/Losses, Method/Assumption Changes, Benefit Improvements
- Different from CalPERS projection

4 Gross return based on July 2019 CalPERS press release
5 Nth percentile means N percentage of our trials result in returns lower than the indicated rates.

CONTRIBUTION PROJECTIONS – SAFETY

- New hire assumptions:
  - 92.5% of 2019/20 new hires are PEPRA members and 7.5% are Classic members
  - Percentage of PEPRA member future hires to increase from 92.5% to 100% over 3 years
- 6/30/18 employee distribution:

Benefit Tier	Count	6/30/18 Payroll
3%@50 FAE1 (Fire)	2	$ 375,000
3%@50 FAE1 (Fire)	157	19,705,900
3%@55 FAE3 (Fire)	16	1,414,600
2.7%@57 FAE3 (Fire PEPRA)	41	3,483,700
3%@50 FAE1 (Police)	252	34,102,600
3%@50 FAE3 (Police)	42	4,242,900
2.7%@57 FAE3 (Police PEPRA)	58	4,636,400

CONTRIBUTION PROJECTIONS – SAFETY

- Tier 1 Employer Paid Member Contributions (EPMC):
  - 9% for all years
- Tier 1 Employee Cost Sharing
  - RPOA, RPOA Supervisory, and RPAA: 3% from January 1, 2019 through January 1, 2020, 4.5% from January 1, 2020 through January 1, 2021, 6% thereafter
  - RCFA: 2.5% from January 1, 2019 through January 1, 2020, 5% from January 1, 2020 through January 1, 2021, 7% from January 1, 2021 through December 30, 2021, and 8% thereafter
  - Combined: 3.8% for 2019/20, 5.5% for 2020/21, 6.6% for 2021/22, 6.8% for 2022/23 and thereafter

CONTRIBUTION PROJECTIONS – SAFETY

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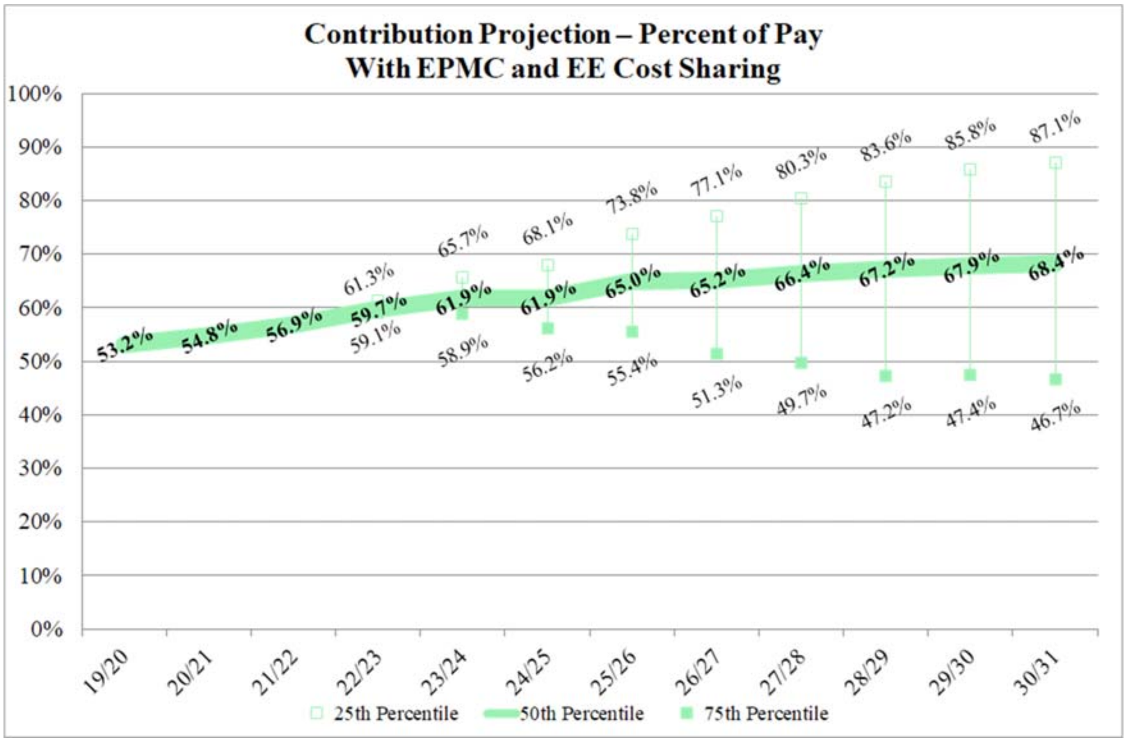
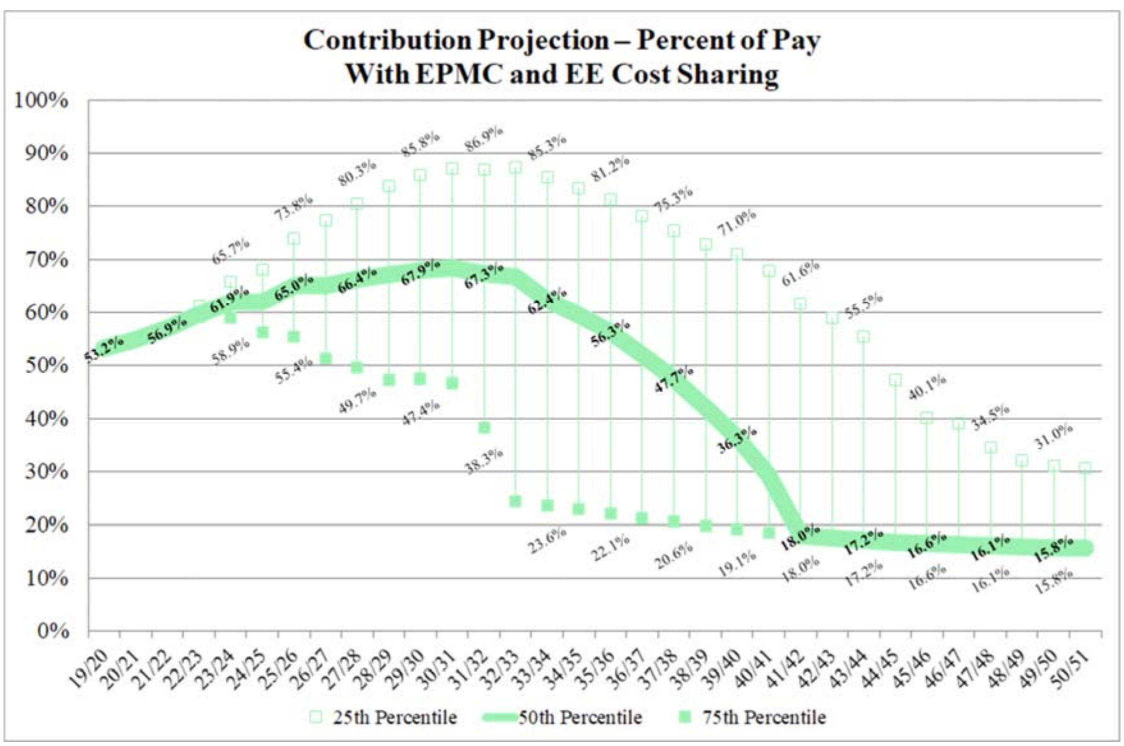
CONTRIBUTION PROJECTIONS – SAFETY



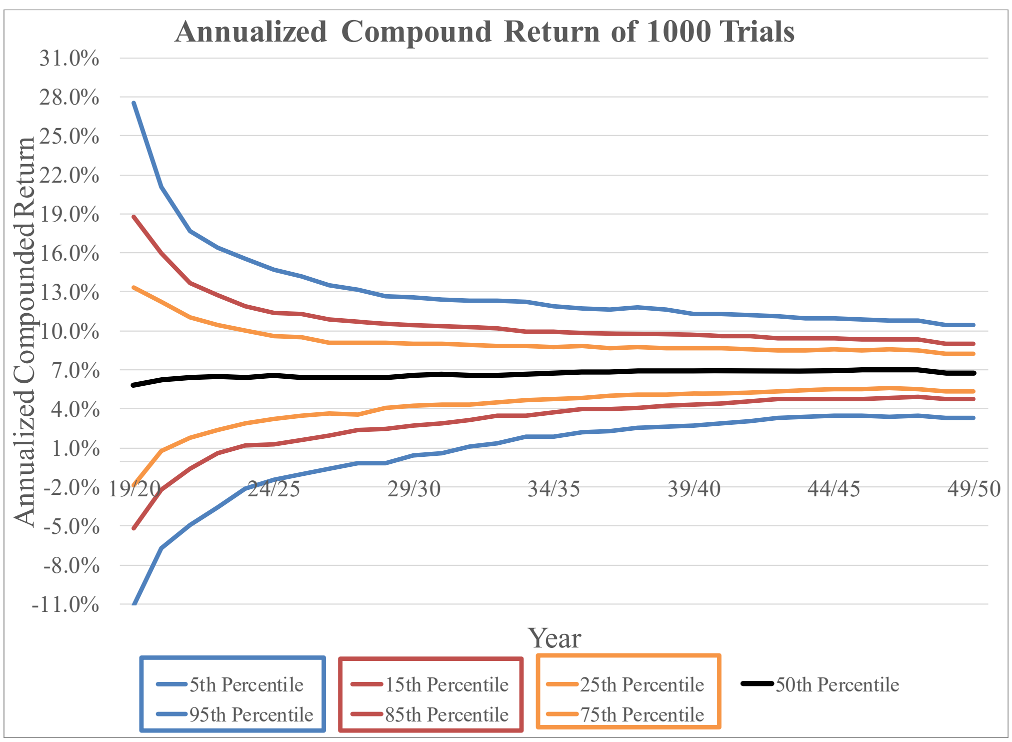
CONTRIBUTION PROJECTIONS – SAFETY



- Capital Market Assumptions:

Asset Class	Target Asset Allocation	Geometric Real Average Return	Standard Deviation	Geometric Nominal Average Return
● Public Equity	50%	4.82%	17.84%	7.44%
● Private Equity	8%	6.70%	25.50%	9.37%
● Income	28%	1.47%	4.24%	4.00%
● Real Assets	13%	4.30%	12.55%	6.91%
● Liquidity	1%	0.06%	0.97%	2.57%
● Total	100%			

- Assumptions based on study of investment consultant and investment bank 2017 short and long-term capital market assumptions adjusted in some cases for long-term trends in investment returns
- No adjustment for recent COVID 19 market downturn
- Inflation 2.5%



POB ANALYSIS ASSUMPTIONS

- 9 Year Compounded Annualized returns[6]:

50th Percentile[7]	6.42%
33th Percentile	4.63
30th Percentile	4.26
25th Percentile	3.61
20th Percentile	2.96
15th Percentile	2.38

- 20 Year Compounded Annualized returns:

50th Percentile	6.93%
33th Percentile	5.66
30th Percentile	5.46
25th Percentile	5.07
20th Percentile	4.73
15th Percentile	4.22

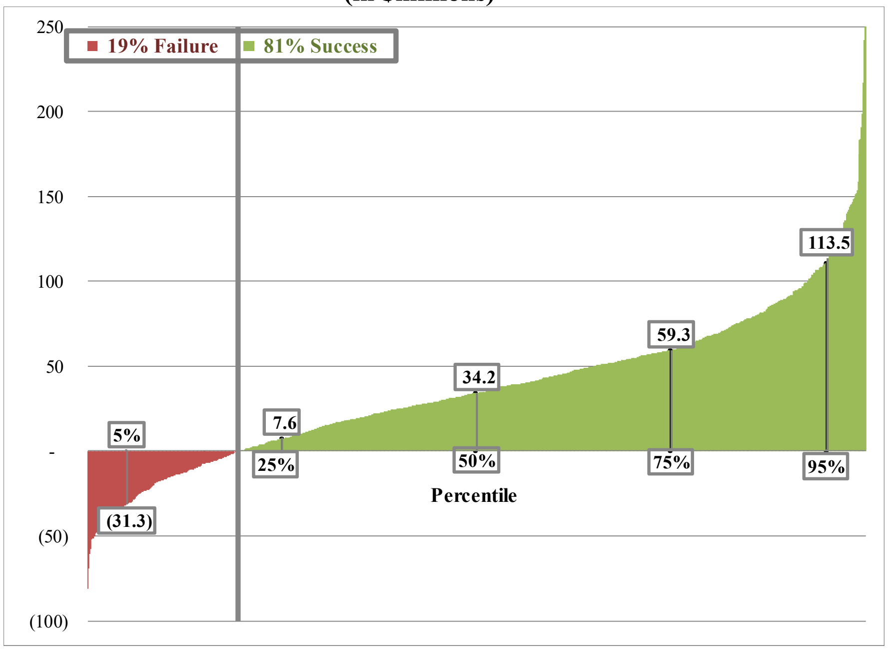
6 Based on capital market assumptions shown previously net of 0.15% adjustment for administrative expenses.
7 N^{th} percentile means N percentage of our trials result in returns lower than the indicated rates.

POB ANALYSIS ASSUMPTIONS

- POB Cost Reduction (success) or Increase (failure) calculated as the present value of:
  - Employer CalPERS contributions without POB for 30 years, minus
  - Employer CalPERS contributions with POB & debt service for 30 years, plus
  - CalPERS assets with POB minus assets without POB after 30 years
- Discount rate for cash flow differences 3.0%
- Discount rate for asset difference at 30 years 7.0%
- Investment return assumptions include lower (than expected) returns for next 9 years followed by higher (than expected) returns
- PEPRA requires employer contributions be not less than Normal Cost
- Risk Mitigation Strategy **not** included

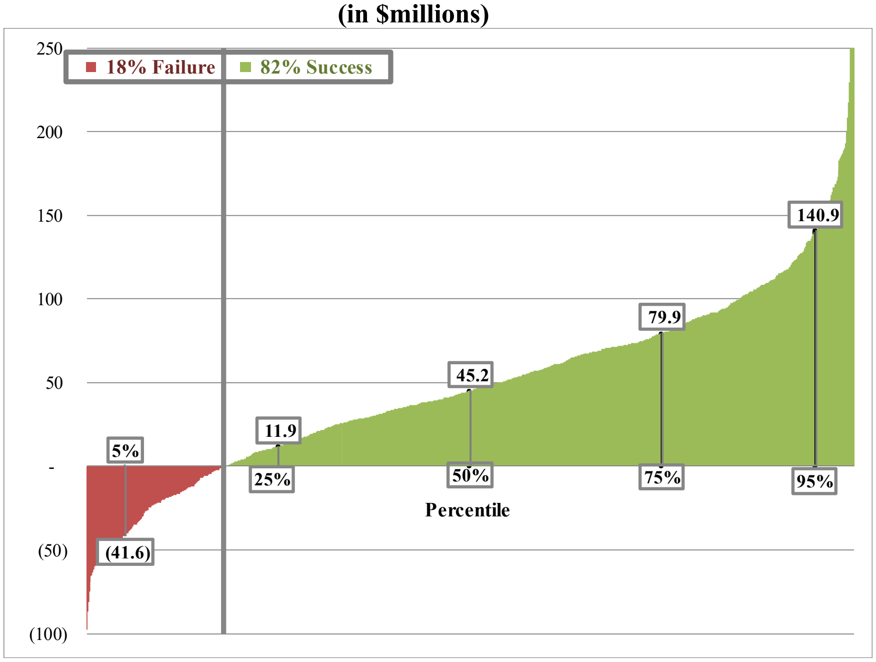
POB ANALYSIS OPTION 2a

Present Value of Contributions
Miscellaneous Plan
(in $millions)



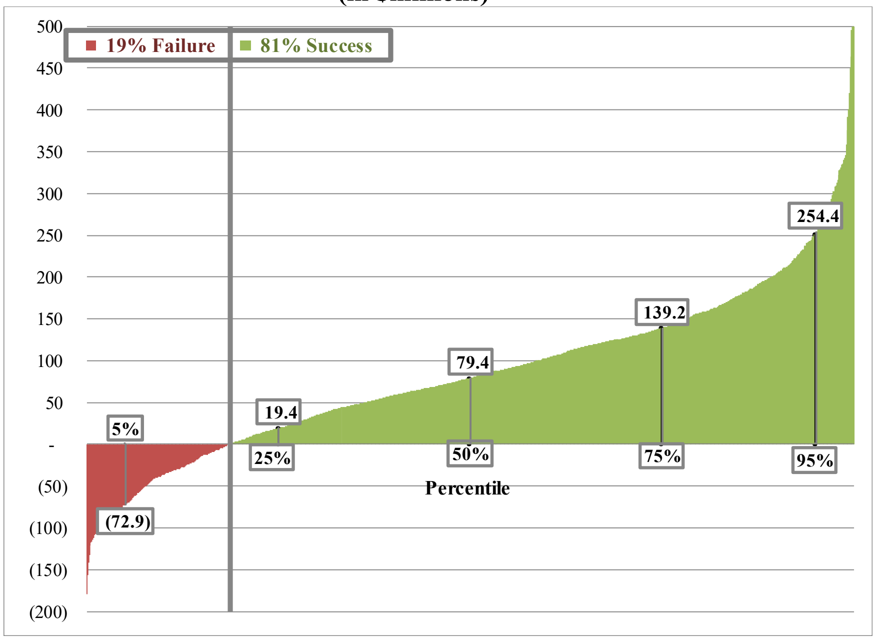
POB ANALYSIS OPTION 2a

Present Value of Contributions
Safety Plan
(in $millions)



POB ANALYSIS OPTION 2a

Present Value of Contributions
Combined Miscellaneous and Safety Plan
(in $millions)



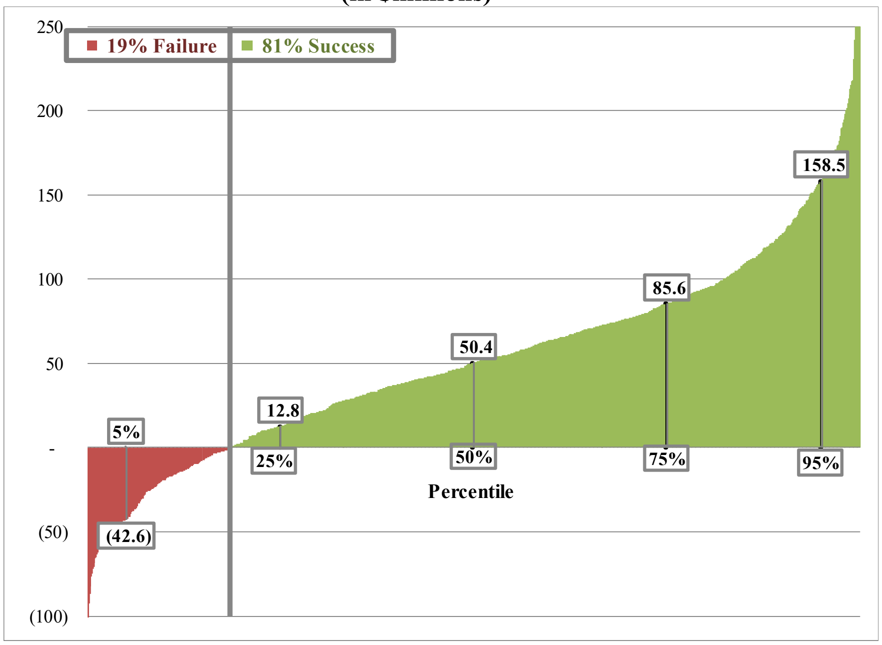
POB ANALYSIS OPTION 2a

Summary

Plan	POB Interest Rate	Likelihood of Success
Miscellaneous	2.77%	81%
Safety	3.07%	82%
Combined	2.95%	81%

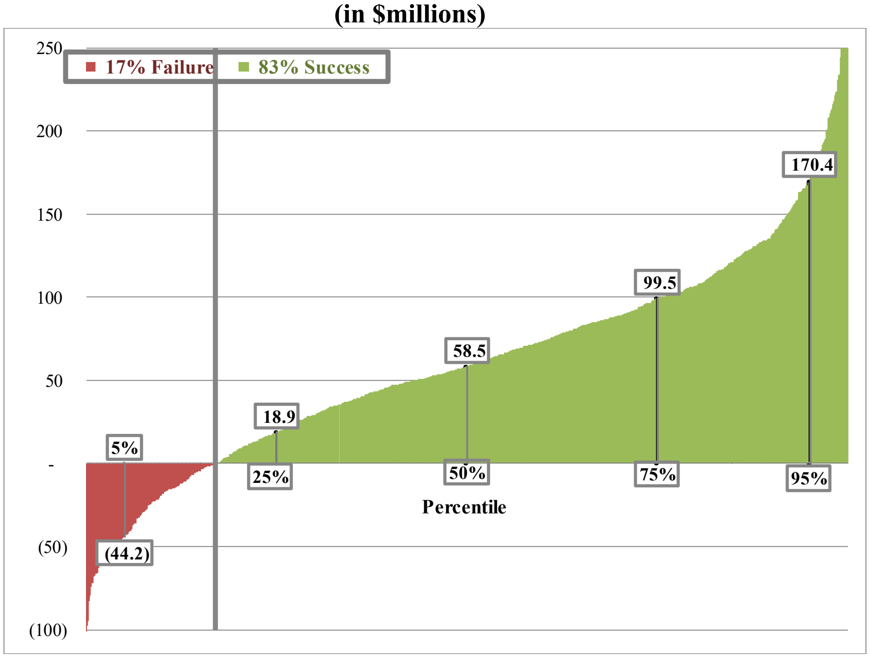
POB ANALYSIS OPTION 3a

<u>Present Value of Contributions</u>
Miscellaneous Plan
(in $millions)

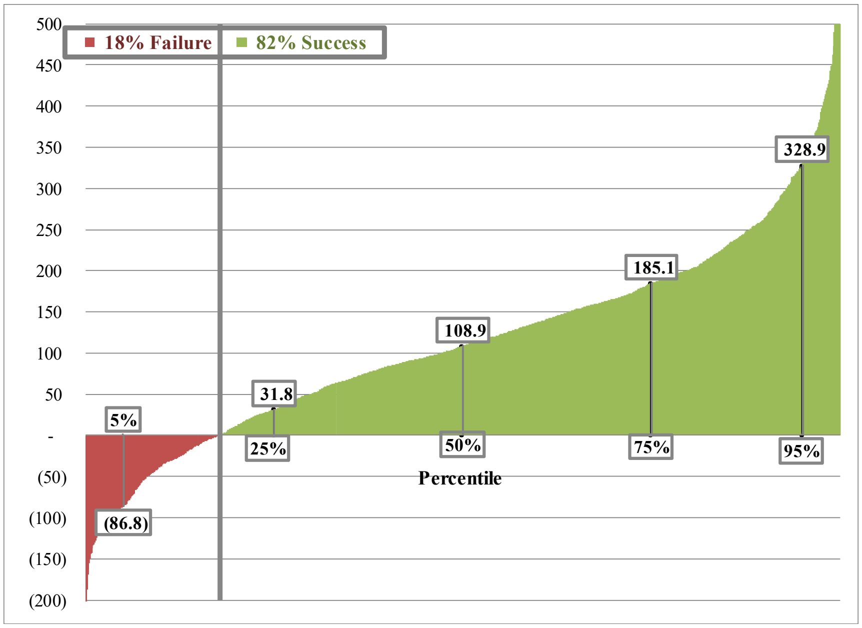


POB ANALYSIS OPTION 3a

<u>Present Value of Contributions</u>
Safety Plan
(in $millions)



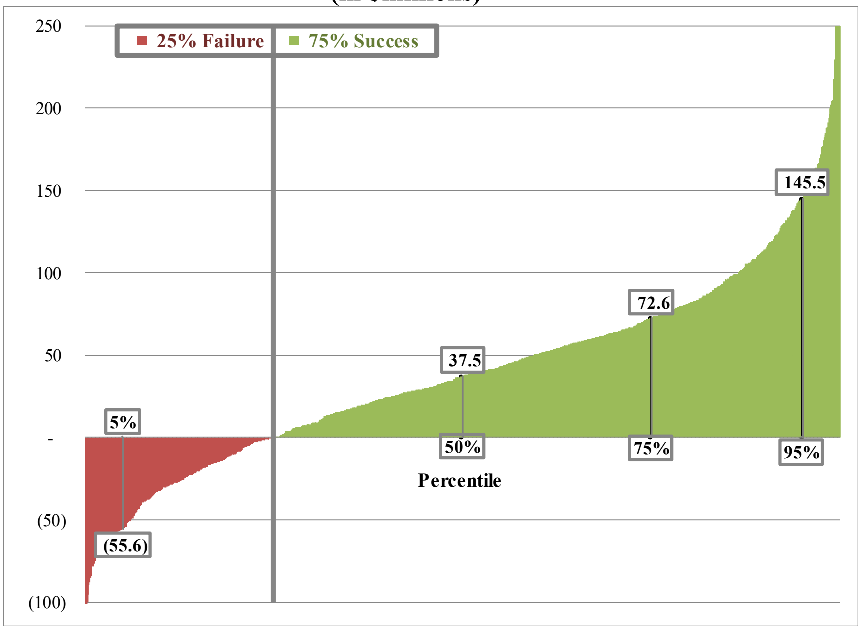
Present Value of Contributions
Combined Miscellaneous and Safety Plan
(in $millions)



Summary

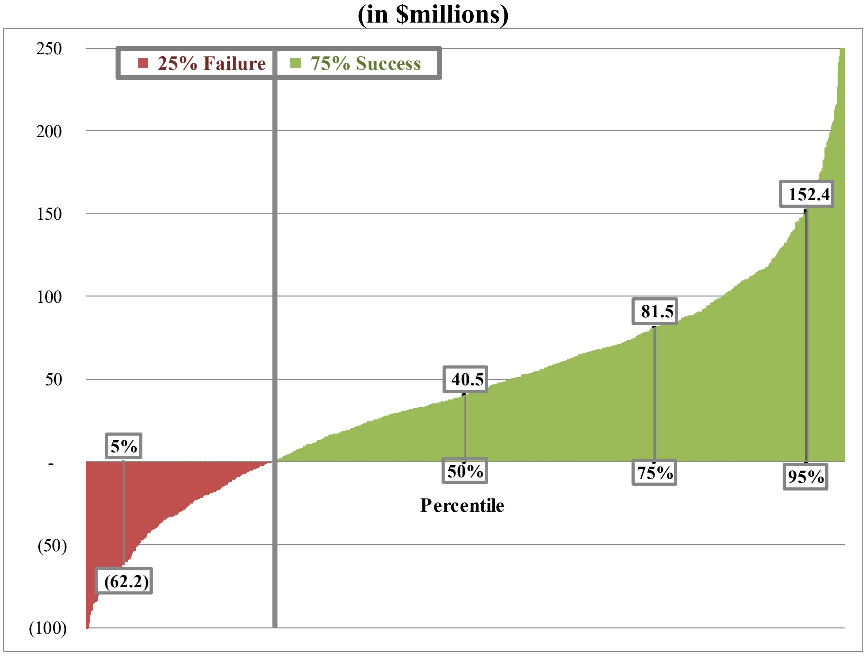
Plan	POB Interest Rate	Likelihood of Success
Miscellaneous	2.47%	81%
Safety	2.62%	83%
Combined	2.55%	82%

Present Value of Contributions
Miscellaneous Plan
(in $millions)



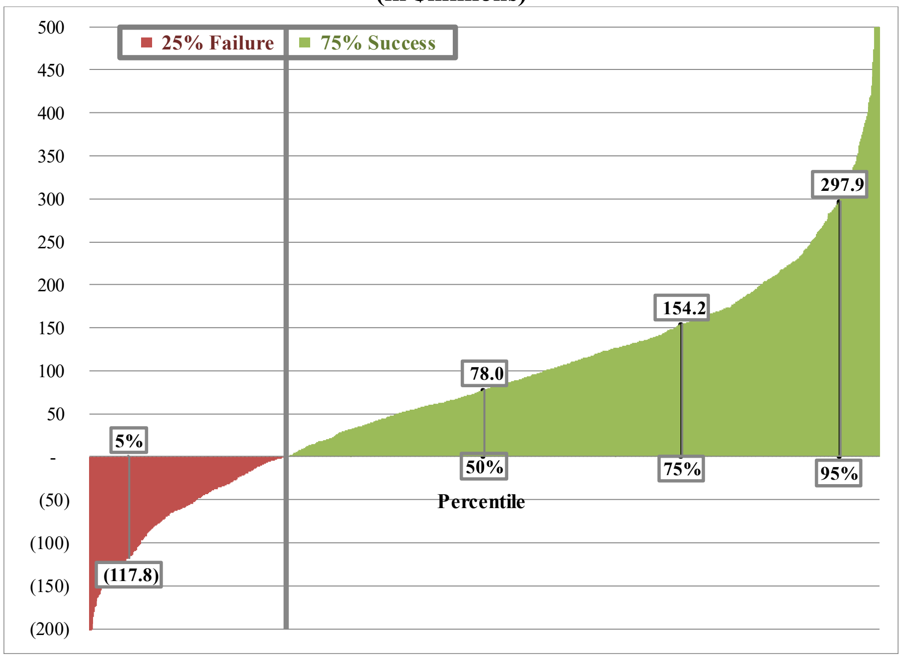
POB ANALYSIS OPTION 3b

Present Value of Contributions
Safety Plan
(in $millions)



POB ANALYSIS OPTION 3b

Present Value of Contributions
Combined Miscellaneous and Safety Plan
(in $millions)



POB ANALYSIS OPTION 3b

Summary

Plan	POB Interest Rate	Likelihood of Success
Miscellaneous	3.46%	75%
Safety	3.58%	75%
Combined	3.53%	75%

POB Analysis Summary

Option 2a
(in $millions)

	Miscellaneous	Safety	Total
■ POB Interest Rate	2.77%	3.07%	2.95%
■ Success			
● Portion of Outcomes	81%	82%	81%
● Expected Outcome	$50.9	$65.0	$116.1
■ Failure			
● Portion of Outcomes	19%	18%	19%
● Expected Outcome	$(21.0)	$(28.2)	$(48.7)
■ Total			
● Portion of Outcomes	100%	100%	100%
● Expected Outcome	$36.9	$48.2	$85.2

POB Analysis Summary

Option 3a
(in $millions)

	Miscellaneous	Safety	Total
■ POB Interest Rate	2.47%	2.62%	2.55%
■ Success			
● Portion of Outcomes	81%	83%	82%
● Expected Outcome	$71.6	$80.7	$152.3
■ Failure			
● Portion of Outcomes	19%	17%	18%
● Expected Outcome	$(27.8)	$(30.4)	$(58.2)
■ Total			
● Portion of Outcomes	100%	100%	100%
● Expected Outcome	$53.1	$61.7	$114.8

POB ANALYSIS SUMMARY

Option 3b
(in $millions)

	Miscellaneous	Safety	Total
■ POB Interest Rate	3.46%	3.58%	3.53%
■ Success			
● Portion of Outcomes	75%	75%	75%
● Expected Outcome	$64.3	$69.6	$133.7
■ Failure			
● Portion of Outcomes	25%	25%	25%
● Expected Outcome	$(31.5)	$(36.2)	$(68.1)
■ Total			
● Portion of Outcomes	100%	100%	100%
● Expected Outcome	$40.2	$43.7	$83.8

ACTUARIAL CERTIFICATION

This report presents analysis on the City of Riverside CalPERS pension plans. The purpose of this report is to provide the City:

- Projections of likely future contributions and the impact of investment volatility
- Pension Obligation Bond (POB) analysis, including anticipated benefits, risks and volatility.

Our POB analysis focuses on the significant inherent investment risk. The economic benefit to the City is measured by the present value of the difference in contributions plus debt service with, and without the POB. Our analysis uses the 3 proposed 2020 POBs summarized in the first section of this report.

With respect to the POB analysis in this report for the combined Miscellaneous and Safety plans:

- The likelihood of success is approximately 81%, 82% and 75% for Options 2a, 3a, and 3b, respectively (with 19%, 18%, and 25% likelihood of failure, respectively). This information is on pages 35, 39, and 43.
- While the median present value economic benefit to the City is approximately $79.4 million, $108.9 million and $78.0 million, the extreme outcomes (as measured by the 5th percentile investment returns) are economic losses of $72.9 million, $86.8 million , and $117.8 million. This information is on pages 35, 39, and 43.
- The overall expected (mean) present value economic benefit is $85.2 million, $114.8 million and $83.8 million for Options 2a, 3a, and 3b, respectively. This information is on pages 45-47. However, using this single metric does not quantify risk. For example, for Option 3b, there is a 25% probability of a present value economic loss (page 47), with an expected loss of $68.1 million.

The calculations and projections in this report are based on information contained in the City's June 30, 2018 CalPERS actuarial valuation reports. We reviewed this information for reasonableness, but do not make any representation on the accuracy of the CalPERS reports. We are not financial advisors – the City should consult with qualified financial advisors to evaluate a POB.

Actuarial Certification

Investment risk is not the only consideration in issuing a POB. The Government Finance Officers Association advisory paper recommends agencies do not issue POBs for a number of reasons, including, but not limited to, investment risk.

Future investment returns and volatility are based on Bartel Associates Capital Market model (as summarized on page 29), which results in long term returns summarized on pages 30-31.

To the best of our knowledge, this report is complete and accurate and has been conducted using generally accepted actuarial principles and practices. As members of the American Academy of Actuaries meeting the Academy Qualification Standards, we certify the actuarial results and opinions herein.

Respectfully submitted,

Doug Pryor, ASA, EA, MAAA
Vice President
Bartel Associates, LLC
April 1, 2020

Bianca Lin, FSA, EA, FSA, MAAA
Assistant Vice President
Bartel Associates, LLC
April 1, 2020