City of Franklin Pension Plan
Asset Allocation Study
August 2016
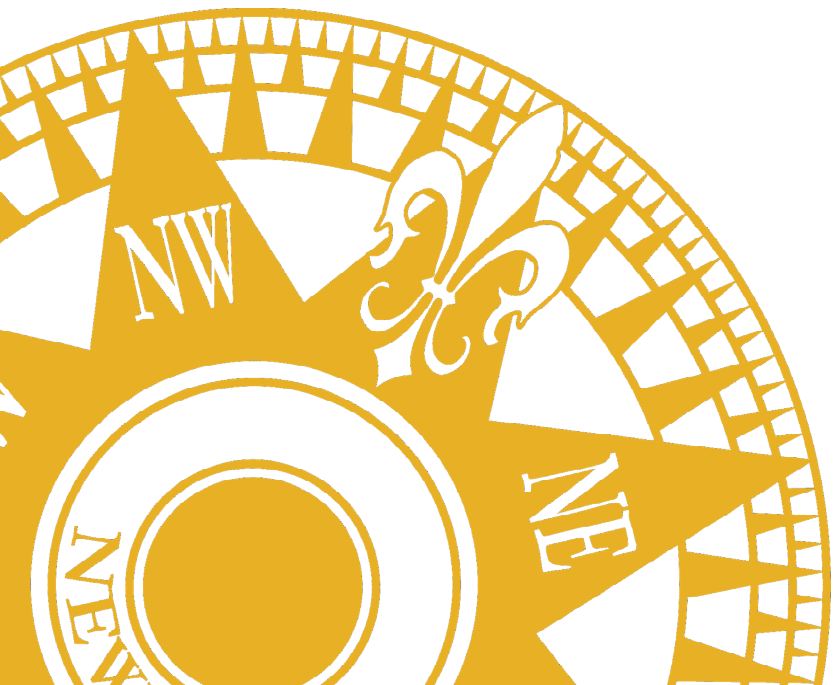
DAHABASSOCIATES

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August 22, 2016

Ladies and Gentlemen:

Attached you will find our asset allocation study for the City of Franklin Pension Plan. In Table 1 the Current Target Mix is displayed with four alternatives. We believe these alternatives may offer moderately better prospects for meeting the actuarial assumption of 7.5% without drastically altering the City's strategy. The study uses a Monte Carlo simulation to estimate the chance of earning the Plan's actuarial assumption. The goal is to identify alternatives that offer the best possibility of achieving an appropriate tradeoff between return and risk within the specified portfolio limits, and is not intended to identify a single optimal allocation.

We used the actuarial report dated January 1, 2016 to project the next 20 years of cash flows. The model ran different mixes in three return scenarios and against the 7.5% actuarial assumption.   Asset classes and ranges used are in Table 2. Key asset class returns in the three return scenarios are shown in Table 3. Tradeoffs involved in moving the allocation between risk assets and safety assets are shown in Table 4. Detailed results for the current allocation and 11 alternatives are in Table 5.

Modeled return gets the biggest boost by reducing the fixed income allocation from the current 25% to 20%. If the Trustees are uncomfortable with reducing fixed income, we recommend sticking with the Current Target Mix. If fixed income can be reduced, we recommend consideration be given to Mix 436 and Mix 214. Each implies a different view of the return environment.

Table 1
Current Target and Alternatives

Asset Mix	Current Target	Mix 444	Mix 422	Mix 436	Mix 214
Domestic Large Cap Growth	10%	10%	10%	10%	5%
Domestic Large Cap Value	15%	25%	25%	25%	25%
Domestic SMid Cap	15%	15%	5%	10%	20%
Foreign Developed Market	15%	10%	15%	15%	5%
Foreign Emerging Market	10%	10%	10%	10%	10%
Private Real Estate	5%	5%	10%	5%	10%
Timber	5%	5%	5%	5%	5%
Fixed Income	25%	20%	20%	20%	20%
Total	100%	100%	100%	100%	100%
Performance Statistics 10-Year Scenario					
Chance to Beat Assumption	40.5%	43.2%	41.1%	40.7%	45.0%
Mean Return	7.6%	7.9%	7.6%	7.7%	7.9%
Standard Deviation	13.2%	14.0%	13.2%	14.0%	13.2%

Statistics shown for the selected mixes in Table 1 are those for the 10-Year Return Scenario only. Each of the three return scenarios employed in this study uses different performance statistics. The 10-Year Scenario is intermediate in its return expectations. The percent chance of beating the 7.5% assumption is higher in the 20-Year Scenario but lower in the Projection Scenario across all asset mixes, as indicated in Table 5.

Here is a summary of the changes from the current allocation in the suggested mixes.

> Mix 444: 5% from foreign developed equity and 5% from fixed income to large cap value.
> Mix 422: 10% from smid cap to large cap value, and 5% from fixed income to real estate.
> Mix 436 5% from smid cap value and 5% from fixed income to large cap value.
> Mix 214 5% from domestic large cap growth and 5% from fixed income to domestic large cap value.

Criteria used to pick selected mixes are based on the following beliefs about the 3-5 year return environment:

- Value equity is likely to out perform growth equity. Value equity has under performed growth equity since the financial crisis, but out performs over most long time periods.

- Foreign equity, particularly emerging market equity, is attractively valued relative to domestic equity. Domestic equity is now at the top of its historic valuation range; profit margins for domestic companies appear to have peaked.

- Domestic fixed income is unlikely to perform well given current interest rates, which for many classes of government bonds have never been lower.

Beliefs about the return environment are based on educated guesses combining historical returns and current valuation levels.

STUDY INPUTS

Cash Flow Projections

Our study began with the Plan's June 30, 2016 market value. We used the latest actuarial report from January 1, 2016 as the source for the contributions, benefit payments, administrative expenses, and the return assumption of 7.5%. We assumed a growth rate of 3.0% to approximate the effect of inflation on contributions and administrative expenses. The cash flows we calculated with help from the actuary are listed on p.10.

Asset Classes and Ranges

We used the following asset classes and ranges. Should the Trustees wish to consider additional asset classes or values outside these ranges, we can rerun the study.

Table 2
Asset Classes and Allowed Ranges Used in Study

Asset Class	Range
Domestic Large Cap Growth Equity	5% - 20%
Domestic Large Cap Value Equity	5% - 25%
Domestic SMid Cap Core Equity	5% - 15%
Foreign Developed Equity	5% - 20%
Foreign Emerging Market Equity	5% - 15%
Private Real Estate	0% - 10%
Timber	5%
Core Domestic Fixed Income	20% - 40%

The model runs every possible combination of assets within these ranges in 5% increments. For example, 20% domestic large cap growth equity is allowed, but 25% is not because it exceeds the range, and 17% is not because it is not a 5% increment. The model ran almost 850 mixes based on these asset classes and ranges.

The ranges selected have implications for the mixes considered. In general, we did not allow the model to consider any asset allocation we would not be willing to recommend. Should the Trustees wish to see results for values outside these ranges, or for asset classes not included in the study, we would be happy to rerun the model with these changes.

In setting minimum values for asset classes, we forced the model to use certain asset classes it might have further reduced or eliminated based on the various return scenarios.

Fixed income and developed foreign equity are examples of asset classes the model tends not to use. Despite poor return prospects for fixed income, we are reluctant to go below a 20% fixed income allocation. Fixed income adds stability in an extremely bad year like 2008. Also, using less than 20% fixed income would place the Fund's allocation outside the norm for public funds. Foreign developed equity has had poor returns since 2007 for a variety of reasons. We believe it is likely to have better relative returns going forward. Also, to eliminate developed foreign equity entirely would violate the principle of diversity explained in the risk section below.

In setting maximum values we have limited the upper end of the range for some asset classes that the model tends to favor. This includes emerging market equity and private real estate. Emerging market equity is extremely volatile and could under perform for long periods of time in certain economic scenarios. An allocation above 10% for emerging market equity would be outside the norm for a small public fund. Private real estate carries high fees and illiquidity in some economic environments, separate issues not considered in the model. In limiting private real estate to 10% we are cognizant of what other funds do, and how any asset allocation decision might be viewed by various groups who monitor the Fund's performance.

We believe timber has good valuation prospects as the United States emerges from the financial crisis. Increasing the timber allocation might be another way to improve return if the Trustees were comfortable with the illiquidity that it implies.

Return Scenarios

The model can call on a variety of return scenarios to select returns for each asset class. We used three return scenarios for this study: the historical 20-Year Scenario (actual returns and statistics for the 20 years ended December 2015); the historical 10-Year Scenario (actual returns and statistics for the 10 years ended December

2015); and the Projection Scenario (projected returns for the next 5-10 years, an average of large brokerage and consulting firms representing the current Wall Street consensus).

Returns for three key asset classes in each of the three scenarios are listed in Table 3. We have selected these asset classes to show how the three return scenarios differ.   Returns for all asset classes in each return scenario used in this study, plus several others that were not used, are on pages 10-12.

Table 3
Key Differences in Return Scenarios

	20-Year Scenario	10-Year Scenario	Projection Scenario
S&P 500	9.9%	9.1%	7.0%
EAFE Equity	7.0%	6.1%	7.1%
BC Aggregate	5.4%	4.6%	3.1%
60/40 Return	8.1%	7.3%	5.4%

The 20-year scenario is the most optimistic, the Projection Scenario the most pessimistic, and the 10-Year Scenario in between. To emphasize the difference, a simple portfolio of 60% domestic stocks/40% domestic bonds has a median return of 8.1% in the 20-year scenario and would probably meet the 7.5% hurdle. However, it only has a median return of 7.3% in the 10-Year Scenario and therefore slightly less than a 50% chance of making a 7.5% assumption. In the Projection Scenario, the median return of 5.4% means a 60/40 domestic portfolio would likely fall short of the assumption.

Of note, developed foreign equity returns are less than domestic equity returns in the two historical scenarios, but slightly more in the Projection Scenario. Emerging market returns are significantly higher.

STUDY OUTPUTS

The table below shows output data for a simple portfolio containing two assets, equity (S&P 500) and fixed income (BC Aggregate). We used the 20-Year Return Scenario. (Note: starting value and cash flows are not from this study.) The first mix has more equity and less fixed income than the second. We present these results to show how changes in the asset allocation affect performance statistics.

Table 4
Sample Mix Statistics, 20-Year Scenario

	Mix #	S&P 500	BC Agg	Mean	Std. Dev.	Sharpe	Beat %	50% TV	75% TV	95% TV
Mix 1 High Return	1	80	20	**10.6%**	15.2%	0.52	**70%**	$94.5mm	$35.7mm	-$13.3mm
Mix 2 Low Volatility	2	40	60	8.5%	**8.0%**	**0.71**	63%	$60.4mm	$34.9mm	$6.9mm

Mix 1/High Return is 80% S&P 500 (SP500) and 20% Barclay's Aggregate (BC Agg). Mix 2/Low Volatility is 40% SP500, 60% BCAgg. Note how the performance statistics change. For Mix 1, the mean return is 10.6% and the standard deviation is 15.2%. For Mix 2, mean return declines to 8.5%, but the standard deviation declines even more, to 8.0%.

More broadly, moving money from risk assets (all categories of equity) to safety assets (in this study fixed income, real estate and timber), reduces mean return but also reduces risk as measured by standard deviation. The distribution of returns for Mix 1 has higher highs and lower lows. What we desire in an asset mix is a high mean return and a low standard deviation. But if one mix has a higher mean while the other has a lower standard deviation, how do we choose?

Other statistics help to compare the two mixes based on both measures. We believe the best such statistic is the percent chance that a mix will achieve the actuarial assumption. This is labeled as Beat % in Table 4.

Mix 1 achieves the actuarial assumption 70% of the time, Mix 2 only 63% of the time. We find this statistic most closely correlates with the typical Plan Sponsor's risk, and rely on it above others. Based on that statistic alone we would choose Mix 1. But that is not the entire story.

The other three statistics are the most difficult to understand but provide a more exact description of the probability distribution of returns. The easiest way to understand them is to think about flipping a coin 10 times. Let's say heads is a good outcome and tails a bad outcome, so you want the cumulative number heads out of 10 flips to be as high as possible. If you flip a coin 10 times there are 11 possible numbers for cumulative heads, from 0 (tails every time) to 10 (heads every time). The most likely outcome is to get heads 5 times (the median). The percentage chance of getting any particular outcome decreases as you move from the median, 5, toward the extremes (heads or tails 10 times in a row.).

In funding a pension plan we tend to think about the odds differently. We don't think about the odds of getting one particular number. We think about shortfalls, so we ask the question like this: what is the chance of getting heads *at least* 5 times. The fewer times we need heads, the better our chances. The chance of getting heads *at least* 5 times means 5 times *or more,* and this occurs about 50% of the time. The chance of getting heads *at least* 3 times is higher, about 75%. The chance of getting heads *at least* 1 time is very high. The lower we set the threshold for heads, the more we can count on the outcome. We can be pretty sure of getting heads *at least* 3 times; we can be very sure of getting heads *at least* once.

That's what the last three statistics do. In the 50% TV statistics, TV stands for terminal value, the value of the pension fund at the end of 20 years. For Mix 1, there is a 50% chance of having $94.5 million *or more* at the end of 20 years. But what can we count on? What can be we certain of? We can't be completely certain of any positive outcome. We could get tails every time. But we can be pretty certain – 75% certain, to be exact -- that Mix 1 will deliver *at least* $35.7mm at the end of 20 years. But what does the negative number for the 95% terminal value mean? The negative number means that, somewhere along the way during those 20 years, in extremely bad markets, the fund can run out of money using Mix 1. And that's where these statistics produce a more precise description of the performance difference between the two mixes. This more precise description provides a rationale for choosing Mix 2 over Mix 1 even though Mix 1 has a higher Beat %.

Mix 1 dominates Mix 2 through the 75% confidence level. If you choose Mix 1, you will have more money than you will with Mix 2 75% of the time. The gap between the two increases as the confidence level falls; at 50%, that gap is $34.1mm, and at the 25% confidence level (not shown) it would be even higher. However, shortly after the confidence level rises above 75%, Mix 2 dominates Mix 1. By the time you get to the 95% confidence level, Mix 2 has a positive value of $6.9mm while Mix 1 has hit zero.

Mix 1 is better than Mix 2 in 75% of the outcomes, but in about 25% of the outcomes, Mix 2 is equal to or better than Mix 1, and those outcomes are the bad ones. If you are willing to sacrifice the upside that you will earn about 75% of the time to avoid running out of money in a worst case scenario, Mix 2 is a better choice.

STATISTICS

The following is a simple explanation of the statistics listed above.

Mean:	average annual return (geometric mean)
Standard deviation:	variation around the mean value, measure of short-term risk
Sharpe ratio:	combines mean and standard deviation in one statistic; return per unit risk
% to beat:	chance the mix has to beat the actuarial assumption of 7.625%
50% terminal value:	minimum value mix will achieve in 20 years/ 50% certainty
75% terminal value:	minimum value mix will achieve in 20 years/ 75% certainty
95% terminal value:	minimum value mix will achieve in 20 years/ 95% certainty

RISK

Until now we have described risk in terms of the actuarial assumption. We actually believe risk has four parts.

- **Long-term risk, the chance that we will not make the actuarial assumption.**
  The model captures long-term risk in the Beat % statistic measured over 20 years, and in the terminal values with different percent certainty. Long-term risk is the greatest concern for most Plan Sponsors.

- **Short-term risk, the chance of having a very poor return in any given year.**
  This is captured in the standard deviation. A short-term decline in portfolio value can place pressure on the Plan Sponsor by increasing the required contribution, even if the Plan recovers in the following year. For a public plan, a single bad year can place strain on the city budget when other needs are most critical. Referring to Table 4, Mix 2 has a *much* lower standard deviation relative to Mix 1, and therefore a *much* lower chance of producing an extremely bad outcome in any one year, even though it has a moderately lower chance of making the actuarial assumption over a 20-year period.

- **Entity risk, the unique aspects of the Plan Sponsor's situation.**
  Entity risk is captured in the actuarial assumption and in the funding ratio. An entity that is 100% funded with an actuarial assumption of 5% should think differently about risk than one with a 50% funded ratio and an 8% assumption. Trustees should also consider the political environment in which the Plan operates, and how the poor performance of an allocation might influence the willingness of the funding source to continue its support.

- **Unknown risk.**
  Not everything that can happen has happened, and that which has not happened may escape the imagination. As an example, the housing crisis of 2008 was not widely understood until after it was well underway. We believe the best way to deal with unknown risk is to prefer diversify to concentration. Equity has out performed fixed income during every 20-year period on record, but the next 20 years could be different.

RECOMMENDATION

In Table 5 we have listed selected mixes for the Trustees to consider. We have selected the mix in each return scenario with the best chance of beating the actuarial assumption, and an alternative mix among the better performers with lower volatility. Those are the first six mixes. In each case we show the performance statistics in all three return scenarios. After listing these six, we show four mixes representing variants on the best performing mix in the Projection Scenario. One way to distinguish among the choices is to ask two questions. First, are you willing to reduce fixed income below 25%? Second, which return scenario do you view as being most likely over the next 3-5 years?

The standard institutional portfolio model is 60% equity/40% fixed income. In an attempt to reduce fixed income exposure we have already lowered the 40% fixed income allocation to 35%. We have also taken 10% of that 35% and put it into bond substitutes, timber and real estate. Most of the modeled advantage in all scenarios presented comes from taking an additional 5% from fixed income. If you are uncomfortable with further reduction in fixed income, we are left with the Current Target and Mix 421. The difference is that Mix 421 moves 10% from smid cap to large cap value in an attempt to capitalize on the anticipated out performance of value. In this instance the differences are so slight we would advise staying with the current allocation.

If you can agree to lower the bond allocation to 20%, then other options are available. The key question then is: which return scenario describes the likely relationship between asset classes over the next 3-5 years (the time until we next do an asset allocation study)? The logic behind using the Projection Scenario as the best guide is: value is likely to out perform growth, foreign equity is likely to out perform domestic equity, and bond returns are likely to be among the worst for any 10-year period on record. If you agree with this logic, we favor Mix 436 as having the best chance for success. If you believe in the more robust returns for domestic equity represented in the 20-Year Scenario, then Mix 214 appears to offer the best return prospects.

CONCLUSION

In recommending three mixes – the Current Target, Mix 436, and Mix 214 -- we are trying to increase modeled return while taking risks we believe the city of Franklin will find acceptable. The Trustees may consider other options, and may even wish to consider changing some of the constraints applied to the asset classes. We are happy to do additional modeling. Also, we do not believe this decision needs to be rushed. Following a prudent process is more important than reaching a quick decision.

Sincerely,

Barry Bryant, CFA
Managing Director
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Table 5
Selected Mixes

	Target	Mix 214	Mix 50	Mix 769	Mix 470	Mix 183	Mix 779	Mix 444	Mix 422	Mix 436	Mix 421
	Current Target	Best Mix 20 Year Scenario	Least Volatile 20 Year Scenario	Best Mix 10 Year Scenario	Least Volatile 10 Year Scenario	Best Mix Projection Scenario	Least Volatile Projection Scenario	High Domestic Equity	High Real Estate	Moderate Small Cap	High Fixed Income
ASSET CLASS											
Large Cap Growth	10	5	5	20	15	5	20	10	10	10	10
Large Cap Value	15	25	10	10	5	25	15	25	25	25	25
Small Cap Equity	15	20	20	20	15	5	5	15	5	10	5
Foreign EAFE	15	5	5	10	5	20	10	10	15	15	15
Foreign EM	10	10	5	5	5	10	10	10	10	10	10
Real Estate	5	10	10	10	10	10	10	5	10	5	5
Timber	5	5	5	5	5	5	5	5	5	5	5
Fixed Income	25	20	40	20	40	20	25	20	20	20	25
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
CHANCE BEAT 7.50%											
20-year scenario	60.8%	72.1%	66.5%	66.8%	63.5%	63.1%	62.9%	64.8%	63.9%	61.7%	59.6%
10-year scenario	40.5%	45.0%	36.6%	48.6%	39.6%	37.9%	44.4%	43.2%	41.1%	40.7%	38.3%
Projection scenario	7.5%	10.2%	1.1%	7.6%	0.7%	12.8%	7.4%	11.8%	12.0%	12.9%	10.1%
Sum	**108.8%**	**127.4%**	**104.2%**	**123.0%**	**103.9%**	**113.7%**	**114.7%**	**119.9%**	**117.0%**	**115.3%**	**108.0%**
MEAN											
20-year scenario	8.9%	9.7%	8.6%	9.4%	8.5%	9.0%	9.0%	9.3%	9.1%	9.1%	8.8%
10-year scenario	7.6%	7.9%	7.2%	8.2%	7.3%	7.4%	7.8%	7.9%	7.6%	7.7%	7.4%
Projection scenario	5.9%	5.9%	5.0%	5.8%	5.1%	6.1%	5.9%	6.1%	6.1%	6.2%	6.0%
STANDARD DEVIATION											
20-year scenario	11.8%	11.6%	8.4%	12.2%	8.8%	11.7%	11.6%	12.5%	11.9%	12.5%	11.7%
10-year scenario	13.2%	13.2%	9.3%	13.0%	9.3%	13.2%	12.3%	14.0%	13.2%	14.0%	13.0%
Projection scenario	5.5%	6.2%	5.0%	5.7%	4.6%	6.0%	5.3%	6.0%	5.8%	5.9%	5.8%
TERMINAL VALUE @ 75%											
20-year scenario	$303.0	$353.3	$338.8	$326.6	$327.0	$310.4	$312.9	$316.5	$313.8	$303.3	$298.5
10-year scenario	$219.7	$236.5	$246.5	$247.7	$255.1	$210.2	$240.3	$224.9	$220.0	$214.2	$215.9
Projection scenario	$226.5	$220.9	$195.5	$222.0	$201.6	$233.0	$230.9	$229.2	$235.6	$234.5	$230.1

PROJECTED CASH FLOW

A	B	C	D	E	F	G	H
Year (6/30/xxxx)	Beginning Market Value	BMV * 7.5% GR (B*1.075)	Contributions	Benefit Payments	Expenses	Ending Value (C+D+E+F)	Net Cash Flow (D+E+F)
2016	**$87,974,458**	**$94,572,542**	$3,888,628	($3,810,996)	($54,716)	**$94,650,174**	**$22,916**
2017	$94,650,174	$101,748,938	$4,250,000	($4,540,000)	($56,357)	$101,458,938	**($346,357)**
2018	$101,458,938	$109,068,358	$4,640,000	($4,830,000)	($58,048)	$108,878,358	**($248,048)**
2019	$108,878,358	$117,044,235	$5,040,000	($5,310,000)	($59,790)	$116,774,235	**($329,790)**
2020	$116,774,235	$125,532,302	$5,470,000	($5,660,000)	($61,583)	$125,342,302	**($251,583)**
2021	**$125,342,302**	**$134,742,975**	**$5,930,000**	**($6,080,000)**	**($63,431)**	**$134,592,975**	**($213,431)**
2022	$134,592,975	$144,687,448	$6,400,000	($6,590,000)	($65,334)	$144,497,448	**($255,334)**
2023	$144,497,448	$155,334,757	$6,900,000	($7,030,000)	($67,294)	$155,204,757	**($197,294)**
2024	$155,204,757	$166,845,113	$7,410,000	($7,600,000)	($69,313)	$166,655,113	**($259,313)**
2025	$166,655,113	$179,154,247	$7,950,000	($8,140,000)	($71,392)	$178,964,247	**($261,392)**
2026	**$178,964,247**	**$192,386,566**	**$8,510,000**	**($8,660,000)**	**($73,534)**	**$192,236,566**	**($223,534)**
2027	$192,236,566	$206,654,308	$9,080,000	($9,240,000)	($75,740)	$206,494,308	**($235,740)**
2028	$206,494,308	$221,981,381	$9,670,000	($9,810,000)	($78,012)	$221,841,381	**($218,012)**
2029	$221,841,381	$238,479,485	$10,280,000	($10,250,000)	($80,352)	$238,509,485	**($50,352)**
2030	$238,509,485	$256,397,696	$10,890,000	($10,730,000)	($82,763)	$256,557,696	**$77,237**
2031	**$256,557,696**	**$275,799,523**	**$11,520,000**	**($11,200,000)**	**($85,246)**	**$276,119,523**	**$234,754**
2032	$276,119,523	$296,828,487	$12,150,000	($11,720,000)	($87,803)	$297,258,487	**$342,197**
2033	$297,258,487	$319,552,874	$12,790,000	($12,250,000)	($90,437)	$320,092,874	**$449,563**
2034	$320,092,874	$344,099,839	$13,430,000	($12,840,000)	($93,150)	$344,689,839	**$496,850**
2035	$344,689,839	$370,541,577	$14,070,000	($13,270,000)	($95,945)	$371,341,577	**$704,055**
2036	**$371,341,577**	**$399,192,196**	**$14,700,000**	**($13,700,000)**	**($98,823)**	**$400,192,196**	**$901,177**

ASSUMPTIONS:
Cells shaded in gold represent figures that were given by Milliman.
Cells that are shaded blue represent figures that have been extracted from the Fund's corresponding performance report.
Actuarial investment return assumption rate is 7.5% (pg 10 of the Fund's 6/1/15 actuarial report).
Expenses are assumed to increase at a rate of 3% per annum.

STATISTICAL SUMMARY OF ASSET CLASSES
STATISTICS AS OF DECEMBER 31, 2015

20-Year Period Historical Statistics						
Asset Class	Index Used	Mean	SD	Alpha	Beta	Corr.
Large Cap Core Equity	S&P 500*	9.930	18.270	0.000	1.000	1.000
Core Fixed Income	Barclays Capital Aggregate Bond Index*	5.400	3.500	0.000	1.000	1.000
Cash	90 Day US Treasury Bill*	1.000	2.170	0.000	1.000	1.000
PIMCO All-Asset	PIMCO All-Asset	7.450	6.980	4.903	0.267	0.450
Large Cap Core Equity	Russell 1000	10.120	18.370	0.140	1.000	1.000
Large Cap Growth Equity	Russell 1000 Growth	10.130	21.900	-1.380	1.160	0.970
Large Cap Value Equity	Russell 1000 Value	9.990	16.730	1.520	0.850	0.930
Mid Cap Core Equity	Russell Midcap	12.120	18.970	2.770	0.940	0.910
Mid Cap Growth Equity	Russell Midcap Growth	11.620	23.750	-0.130	1.180	0.910
Mid Cap Value Equity	Russell Midcap Value	12.290	18.180	4.380	0.800	0.800
Small Cap Core Equity	Russell 2000	9.770	18.870	1.120	0.870	0.840
Small Cap Growth Equity	Russell 2000 Growth	8.910	22.930	-1.700	1.070	0.850
Small Cap Value Equity	Russell 2000 Value	10.870	18.390	4.350	0.660	0.650
Int'l Equity	MSCI EAFE	6.980	20.160	-2.150	0.920	0.830
Emerging Markets	MSCI Emerging Mkts Free	10.620	33.140	1.630	0.900	0.500
Real Estate	NCREIF NFI-ODCE Index	10.140	11.090	9.070	0.110	0.180
Timberland	NCREIF Timberland Index	7.850	6.840	7.010	0.080	0.230
Farmland	NCREIF Farmland Index	12.920	7.240	12.830	0.010	0.020
High Yield FI	CSFB High Yield Index	9.070	14.780	3.290	0.490	0.410
Private Equity	Cambridge US Private Equity Index	15.090	15.190	8.430	0.670	0.810
Int'l Fixed Income	Barclays Global Aggregate Ex USD	4.130	9.100	-0.730	0.900	0.350

*PLEASE NOTE THAT THESE ARE BASE MARKET INDICES

STATISTICAL SUMMARY OF ASSET CLASSES
STATISTICS AS OF DECEMBER 31, 2015

10-Year Period Historical Statistics						
Asset Class	Index Used	Mean	SD	Alpha	Beta	Corr.
Large Cap Core Equity	S&P 500*	9.130	17.990	0.000	1.000	1.000
Core Fixed Income	Barclays Capital Aggregate Bond Index*	4.560	2.900	0.000	1.000	1.000
Cash	90 Day US Treasury Bill*	1.120	1.800	0.000	1.000	1.000
PIMCO All Asset	PIMCO All Asset	4.640	10.820	0.717	0.424	0.706
Large Cap Core Equity	Russell 1000	9.340	18.510	-0.040	1.030	1.000
Large Cap Growth Equity	Russell 1000 Growth	10.650	19.480	1.030	1.050	0.970
Large Cap Value Equity	Russell 1000 Value	8.040	18.420	-1.100	1.000	0.980
Mid Cap Core Equity	Russell Midcap	10.660	21.960	-0.220	1.190	0.980
Mid Cap Growth Equity	Russell Midcap Growth	11.200	23.380	-0.180	1.250	0.960
Mid Cap Value Equity	Russell Midcap Value	9.990	20.920	-0.360	1.130	0.970
Small Cap Core Equity	Russell 2000	8.850	19.980	-0.780	1.050	0.950
Small Cap Growth Equity	Russell 2000 Growth	10.460	21.870	-0.170	1.170	0.960
Small Cap Value Equity	Russell 2000 Value	7.360	18.940	-1.290	0.950	0.900
Int'l Equity	MSCI EAFE	7.510	21.180	-2.510	1.060	0.890
Emerging Markets	MSCI Emerging Mkts Free	9.910	34.640	-2.250	1.330	0.690
Real Estate	NCREIF NFI-ODCE Index	7.730	14.600	6.830	0.100	0.120
Timberland	NCREIF Timberland Index	7.120	6.510	7.740	-0.070	-0.190
Farmland	NCREIF Farmland Index	14.570	4.760	14.570	0.000	0.000
High Yield FI	CSFB High Yield Index	9.070	14.780	3.290	0.490	0.410
Private Equity	Cambridge US Private Equity Index	12.220	13.200	6.460	0.630	0.860
Int'l Fixed Income	Barclays Global Aggregate Ex USD	3.230	5.250	-2.230	1.200	0.660

*PLEASE NOTE THAT THESE ARE BASE MARKET INDICES

STATISTICAL SUMMARY OF ASSET CLASSES
STATISTICS AS OF DECEMBER 31, 2015

5 to 10-Year Projection Statistics**						
Asset Class	Index Used	Mean	SD	Alpha	Beta	Corr.
Large Cap Core Equity	S&P 500*	7.032	16.500	-	-	-
Core Fixed Income	Barclays Capital Aggregate Bond Index*	3.136	5.280	-	-	-
Cash	90 Day US Treasury Bill*	1.950	1.025	-	-	-
PIMCO All-Asset	PIMCO All-Asset***	5.050	10.900			
Large Cap Core Equity	Russell 1000	7.100	15.900	-	-	-
Large Cap Growth Equity	Russell 1000 Growth	7.032	16.500	-	-	-
Large Cap Value Equity	Russell 1000 Value	8.450	16.300	-	-	-
Mid Cap Core Equity	Russell Midcap	5.513	18.600	-	-	-
Mid Cap Growth Equity	Russell Midcap Growth	-	-	-	-	-
Mid Cap Value Equity	Russell Midcap Value	-	-	-	-	-
Small Cap Core Equity	Russell 2000	7.715	20.450	-	-	-
Small Cap Growth Equity	Russell 2000 Growth	-	-	-	-	-
Small Cap Value Equity	Russell 2000 Value	-	-	-	-	-
Int'l Equity	MSCI EAFE	6.817	17.500	-	-	-
Emerging Markets	MSCI Emerging Mkts Free	9.046	24.620	-	-	-
Real Estate	NCREIF NFI-ODCE Index	5.580	9.950	-	-	-
Timberland	NCREIF Timberland Index	4.500	5.400	-	-	-
Farmland	NCREIF Farmland Index	5.000	7.500	-	-	-
High Yield FI	CSFB High Yield Index	4.700	10.850	-	-	-
Private Equity	Cambridge US Private Equity Index	8.916	22.200	-	-	-
Int'l Fixed Income	Barclays Global Aggregate Ex USD	2.080	5.633	-	-	-

*PLEASE NOTE THAT THESE ARE BASE MARKET INDICES
**PROJECTION STATISTICS ARE A BLEND OF THOSE PROVIDED BY BNY MELLON, JP MORGAN, GOLDMAN SACHS, NEPC, AND AON HEWITT
***STATISTICS SHOWN FOR PIMCO ALL-ASSET ARE THE FUNDS STATISTICS SINCE INCEPTION
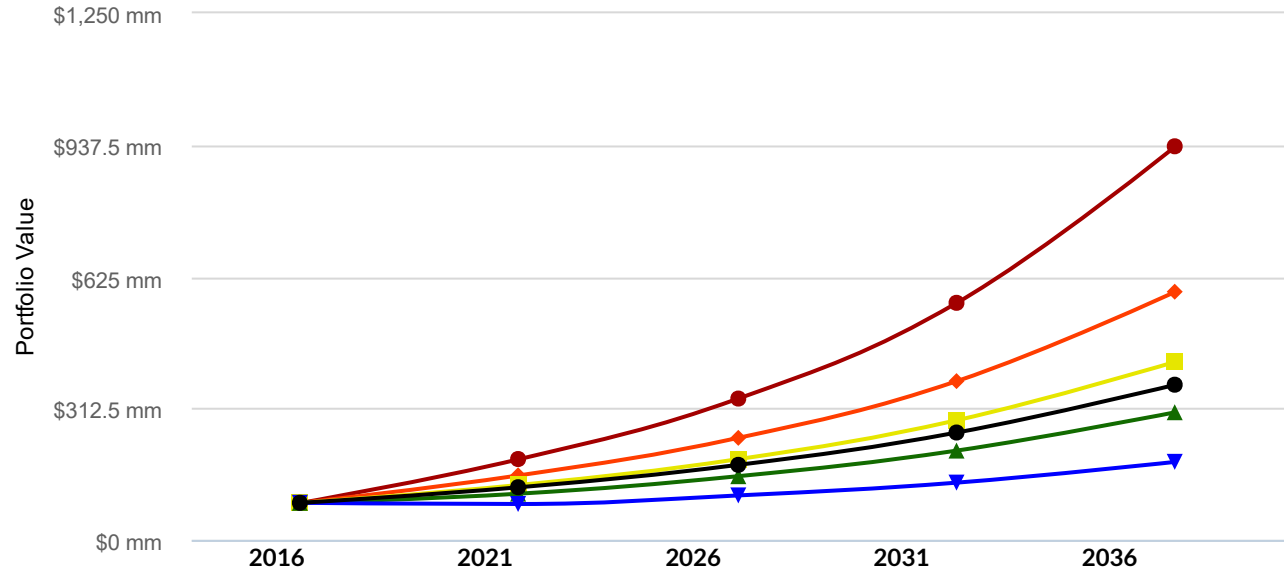
20-Year Scenario
Asset Allocation Charts

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 10.0%

LCV: 15.0%

SMIDC: 15.0%

EAFE: 15.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 25.0%
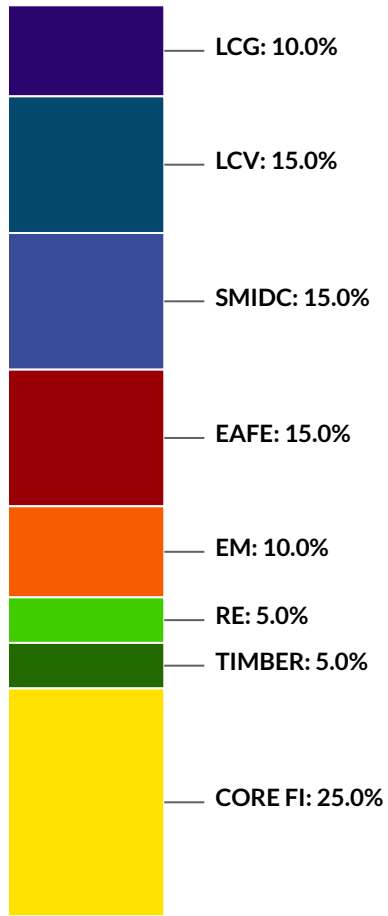
Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$192 mm	$335 mm	$563 mm	$934 mm
25%	$88 mm	$153 mm	$242 mm	$377 mm	$589 mm
50%	$88 mm	$131 mm	$192 mm	$284 mm	$423 mm
75%	$88 mm	$110 mm	$151 mm	$212 mm	$303 mm
95%	$88 mm	$85 mm	$106 mm	$136 mm	$185 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm
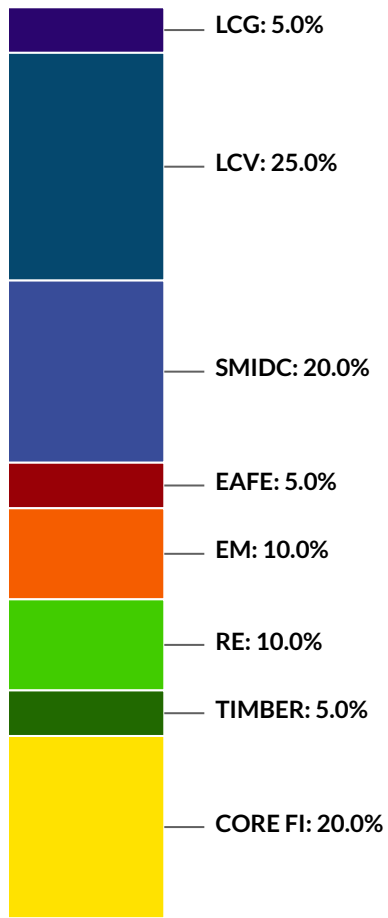
Statistics

Beginning Value:	$88 mm	Mean Return:	8.86%
75% Year-20 Value:	$303 mm	Standard Deviation:	11.80
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.55
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	61%

DAHAB ASSOCIATES
2016

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 5.0%

LCV: 25.0%

SMIDC: 20.0%

EAFE: 5.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 20.0%

Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$197 mm	$357 mm	$624 mm	$1,069 mm
25%	$88 mm	$158 mm	$259 mm	$417 mm	$679 mm
50%	$88 mm	$135 mm	$206 mm	$317 mm	$490 mm
75%	$88 mm	$114 mm	$163 mm	$238 mm	$353 mm
95%	$88 mm	$90 mm	$116 mm	$157 mm	$219 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm
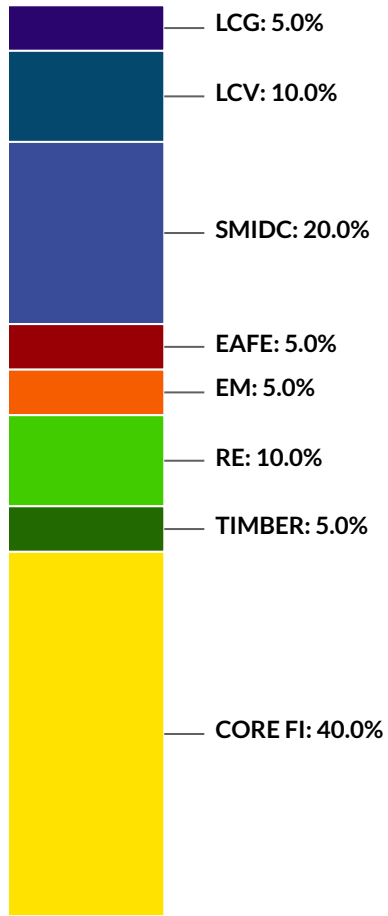
Statistics

Beginning Value:	$88 mm	Mean Return:	9.65%
75% Year-20 Value:	$353 mm	Standard Deviation:	11.64
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.62
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	72%

DAHAB ASSOCIATES
2016

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 5.0%

LCV: 10.0%

SMIDC: 20.0%

EAFE: 5.0%

EM: 5.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 40.0%

Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$172 mm	$287 mm	$462 mm	$750 mm
25%	$88 mm	$146 mm	$227 mm	$349 mm	$541 mm
50%	$88 mm	$130 mm	$193 mm	$286 mm	$428 mm
75%	$88 mm	$116 mm	$162 mm	$233 mm	$339 mm
95%	$88 mm	$97 mm	$127 mm	$171 mm	$241 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm
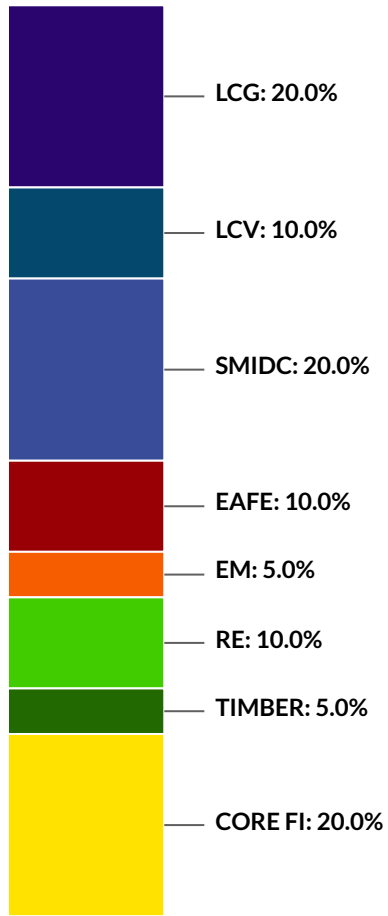
Statistics

Beginning Value:	$88 mm	**Mean Return:**	8.62%
75% Year-20 Value:	$339 mm	**Standard Deviation:**	8.36
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.74
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	67%

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

Portfolio Value Over Time
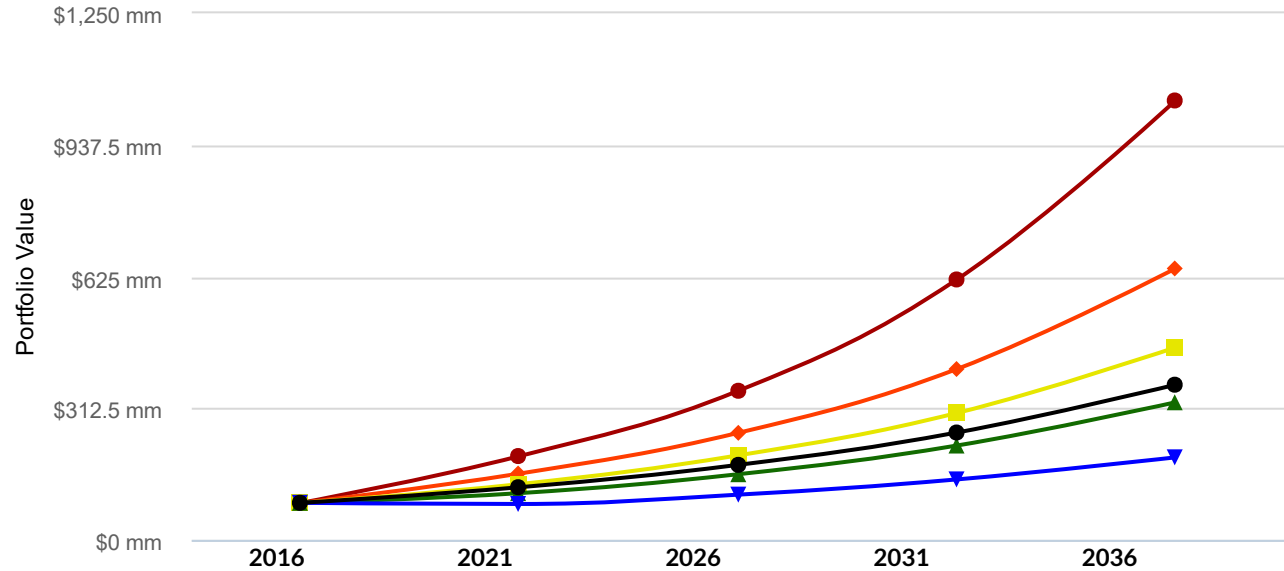
	2016	2021	2026	2031	2036
5%	$88 mm	$199 mm	$354 mm	$618 mm	$1,043 mm
25%	$88 mm	$157 mm	$254 mm	$406 mm	$644 mm
50%	$88 mm	$132 mm	$201 mm	$301 mm	$457 mm
75%	$88 mm	$111 mm	$156 mm	$224 mm	$327 mm
95%	$88 mm	$85 mm	$107 mm	$144 mm	$196 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Legend:
- LCG: 20.0%
- LCV: 10.0%
- SMIDC: 20.0%
- EAFE: 10.0%
- EM: 5.0%
- RE: 10.0%
- TIMBER: 5.0%
- CORE FI: 20.0%

Statistics

Beginning Value:	$88 mm	**Mean Return:**	9.35%
75% Year-20 Value:	$327 mm	**Standard Deviation:**	12.18
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.57
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	67%

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 15.0%

LCV: 5.0%

SMIDC: 15.0%

EAFE: 5.0%

EM: 5.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 40.0%
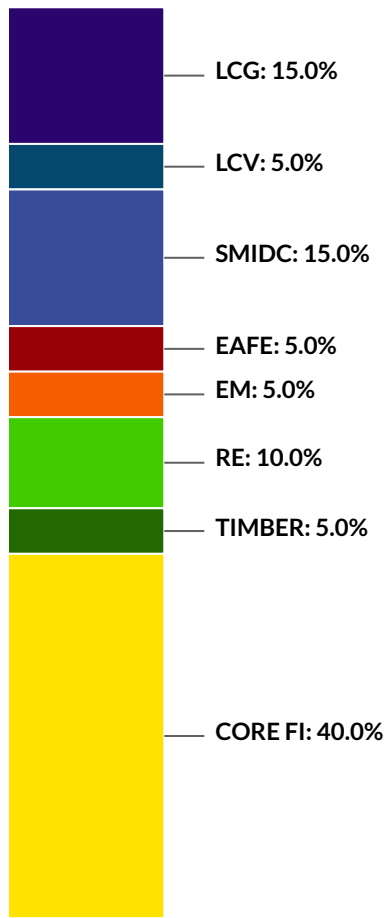
Portfolio Value Over Time

Portfolio Value

	2016	2021	2026	2031	2036
5%	$88 mm	$174 mm	$289 mm	$471 mm	$762 mm
25%	$88 mm	$146 mm	$226 mm	$347 mm	$533 mm
50%	$88 mm	$129 mm	$190 mm	$281 mm	$416 mm
75%	$88 mm	$114 mm	$159 mm	$226 mm	$327 mm
95%	$88 mm	$95 mm	$123 mm	$164 mm	$226 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	8.52%
75% Year-20 Value:	$327 mm	Standard Deviation:	8.78
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.70
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	64%

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 5.0%

LCV: 25.0%

SMIDC: 5.0%

EAFE: 20.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 20.0%

Portfolio Value Over Time

Portfolio Value

$1,250 mm

$937.5 mm

$625 mm

$312.5 mm

$0 mm

	2016	2021	2026	2031	2036
5%	$88 mm	$192 mm	$336 mm	$568 mm	$938 mm
25%	$88 mm	$153 mm	$245 mm	$383 mm	$597 mm
50%	$88 mm	$130 mm	$193 mm	$288 mm	$431 mm
75%	$88 mm	$110 mm	$152 mm	$216 mm	$310 mm
95%	$88 mm	$85 mm	$106 mm	$140 mm	$190 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	**Mean Return:**	8.97%
75% Year-20 Value:	$310 mm	**Standard Deviation:**	11.74
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.56
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	63%

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 20.0%

LCV: 15.0%

SMIDC: 5.0%

EAFE: 10.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 25.0%

Portfolio Value Over Time

Portfolio Value

$1,250 mm

$937.5 mm

$625 mm

$312.5 mm

$0 mm
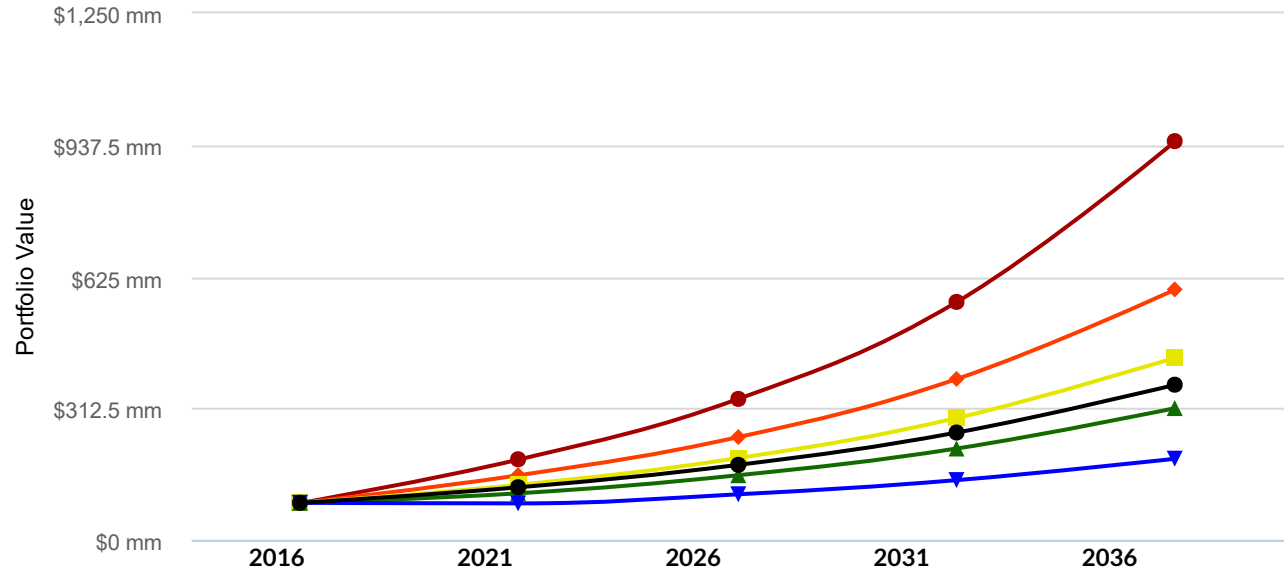
	2016	2021	2026	2031	2036
5%	$88 mm	$191 mm	$335 mm	$565 mm	$947 mm
25%	$88 mm	$154 mm	$244 mm	$382 mm	$595 mm
50%	$88 mm	$131 mm	$194 mm	$289 mm	$433 mm
75%	$88 mm	$111 mm	$154 mm	$217 mm	$313 mm
95%	$88 mm	$87 mm	$108 mm	$142 mm	$193 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	8.96%
75% Year-20 Value:	$313 mm	Standard Deviation:	11.55
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.57
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	63%

DAHAB ASSOCIATES

2016

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 10.0%

LCV: 25.0%

SMIDC: 15.0%

EAFE: 10.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 20.0%

Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$200 mm	$358 mm	$618 mm	$1,041 mm
25%	$88 mm	$157 mm	$254 mm	$404 mm	$640 mm
50%	$88 mm	$133 mm	$198 mm	$297 mm	$450 mm
75%	$88 mm	$110 mm	$154 mm	$218 mm	$316 mm
95%	$88 mm	$85 mm	$106 mm	$139 mm	$187 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	9.28%
75% Year-20 Value:	$316 mm	Standard Deviation:	12.49
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.55
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	65%

DAHABASSOCIATES

2016

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 10.0%

LCV: 25.0%

SMIDC: 5.0%

EAFE: 15.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 20.0%

Portfolio Value Over Time

Portfolio Value

$1,250 mm

$937.5 mm

$625 mm

$312.5 mm

$0 mm
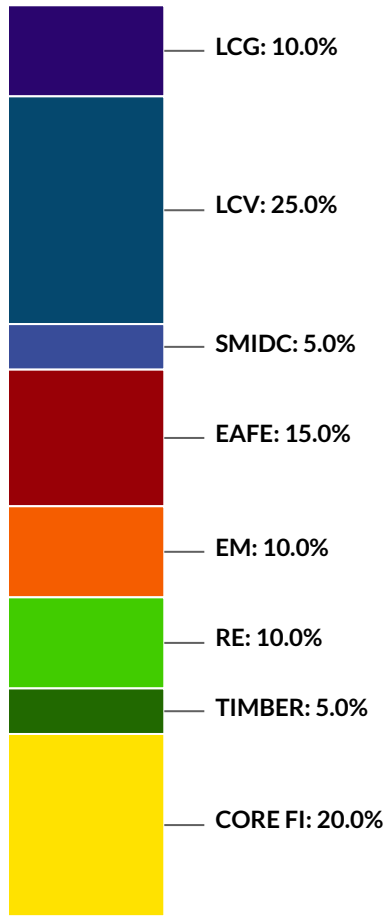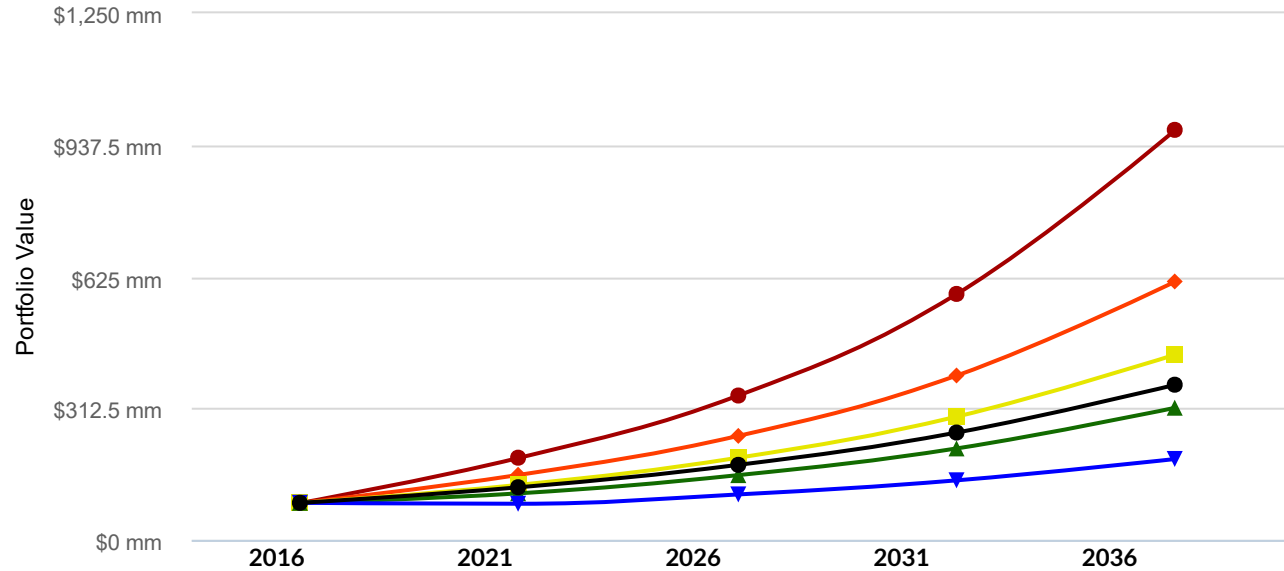
	2016	2021	2026	2031	2036
5%	$88 mm	$195 mm	$343 mm	$584 mm	$973 mm
25%	$88 mm	$155 mm	$247 mm	$390 mm	$613 mm
50%	$88 mm	$131 mm	$195 mm	$293 mm	$440 mm
75%	$88 mm	$111 mm	$154 mm	$217 mm	$314 mm
95%	$88 mm	$86 mm	$108 mm	$141 mm	$192 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	9.08%
75% Year-20 Value:	$314 mm	Standard Deviation:	11.86
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.56
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	64%

DAHAB ASSOCIATES

2016

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

Legend:
- LCG: 10.0%
- LCV: 25.0%
- SMIDC: 10.0%
- EAFE: 15.0%
- EM: 10.0%
- RE: 5.0%
- TIMBER: 5.0%
- CORE FI: 20.0%
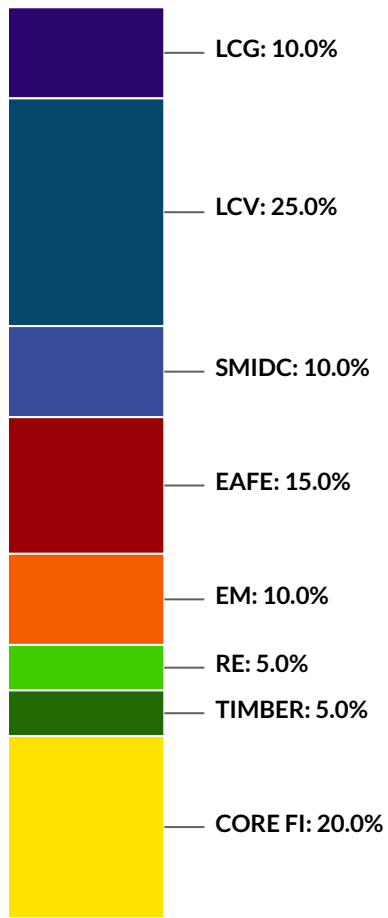
Portfolio Value Over Time
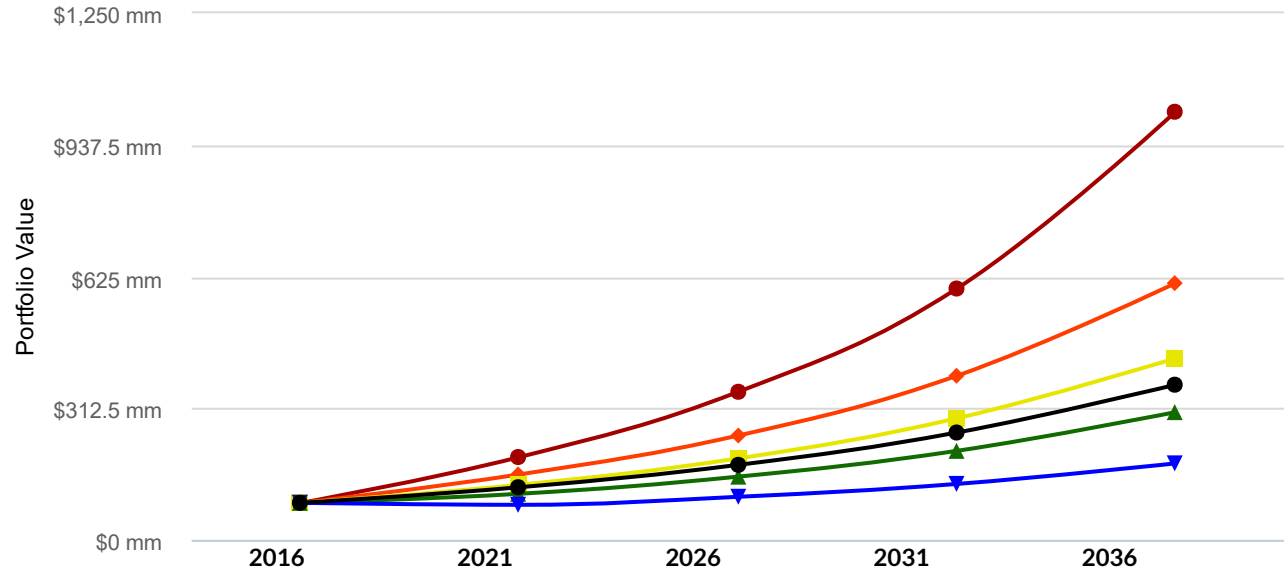
	2016	2021	2026	2031	2036
5%	$88 mm	$197 mm	$352 mm	$597 mm	$1,016 mm
25%	$88 mm	$155 mm	$248 mm	$390 mm	$610 mm
50%	$88 mm	$131 mm	$193 mm	$289 mm	$431 mm
75%	$88 mm	$109 mm	$150 mm	$211 mm	$303 mm
95%	$88 mm	$83 mm	$102 mm	$133 mm	$182 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	9.06%
75% Year-20 Value:	$303 mm	Standard Deviation:	12.51
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.53
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	62%

City of Franklin Pension Plan

Asset Allocation

20-Year Scenario

LCG: 10.0%

LCV: 25.0%

SMIDC: 5.0%

EAFE: 15.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 25.0%
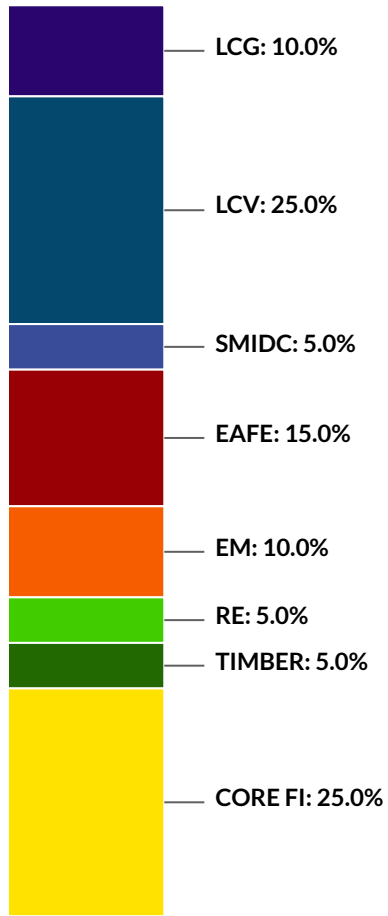
Portfolio Value Over Time
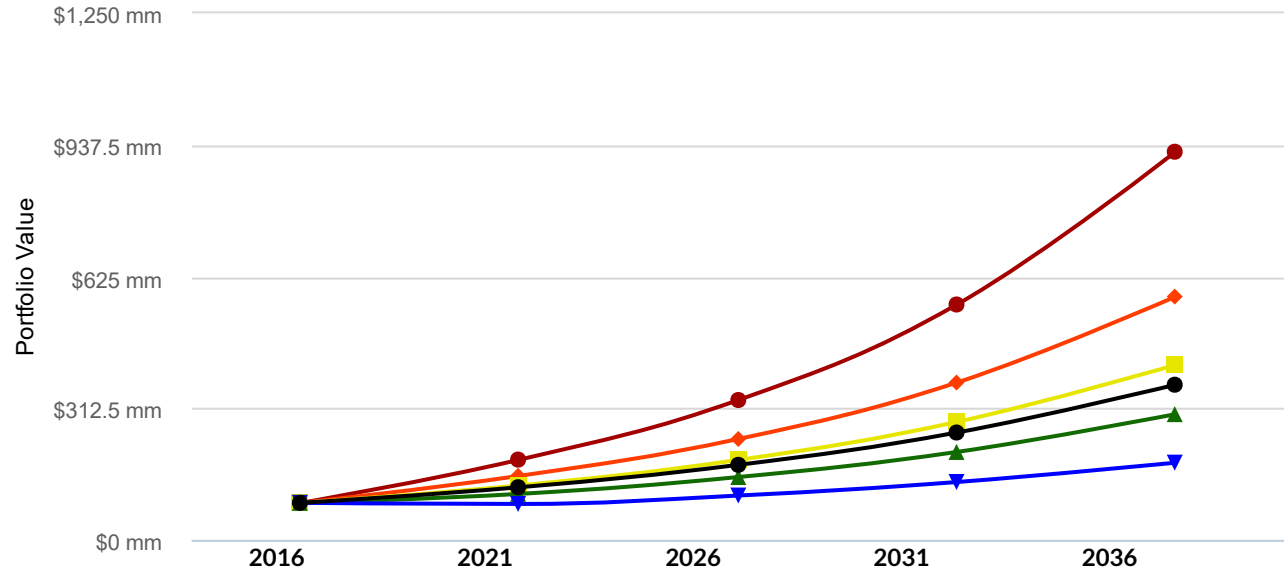
	2016	2021	2026	2031	2036
5%	$88 mm	$191 mm	$332 mm	$559 mm	$922 mm
25%	$88 mm	$152 mm	$240 mm	$374 mm	$578 mm
50%	$88 mm	$129 mm	$190 mm	$280 mm	$415 mm
75%	$88 mm	$109 mm	$149 mm	$209 mm	$298 mm
95%	$88 mm	$85 mm	$105 mm	$137 mm	$183 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	**Mean Return:**	8.77%
75% Year-20 Value:	$298 mm	**Standard Deviation:**	11.74
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.54
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	60%

DAHABASSOCIATES
2016

10-Year Scenario
Asset Allocation Charts

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 10.0%

LCV: 15.0%

SMIDC: 15.0%

EAFE: 15.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 25.0%
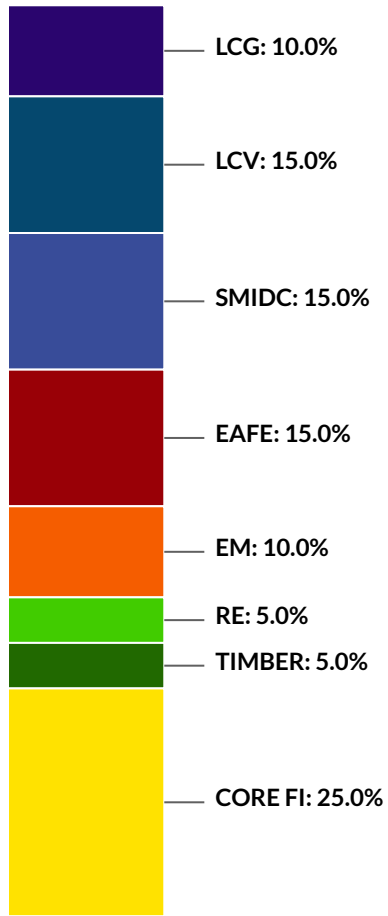
Portfolio Value Over Time
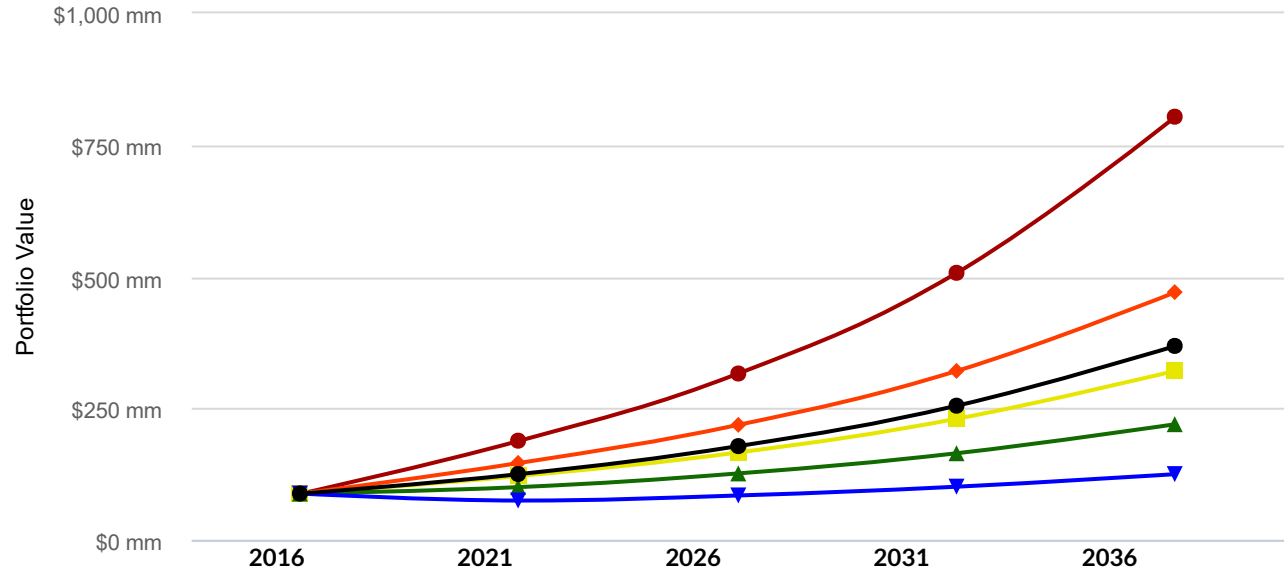
	2016	2021	2026	2031	2036
5%	$88 mm	$188 mm	$316 mm	$507 mm	$804 mm
25%	$88 mm	$146 mm	$218 mm	$321 mm	$471 mm
50%	$88 mm	$121 mm	$166 mm	$230 mm	$321 mm
75%	$88 mm	$100 mm	$126 mm	$165 mm	$220 mm
95%	$88 mm	$75 mm	$84 mm	$101 mm	$125 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	7.56%
75% Year-20 Value:	$220 mm	Standard Deviation:	13.19
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.49
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	40%

DAHAB ASSOCIATES

2016

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 5.0%

LCV: 25.0%

SMIDC: 20.0%

EAFE: 5.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 20.0%
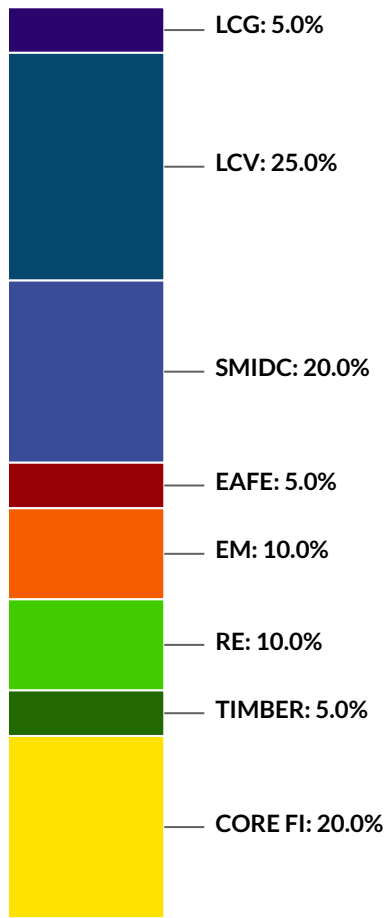
Portfolio Value Over Time
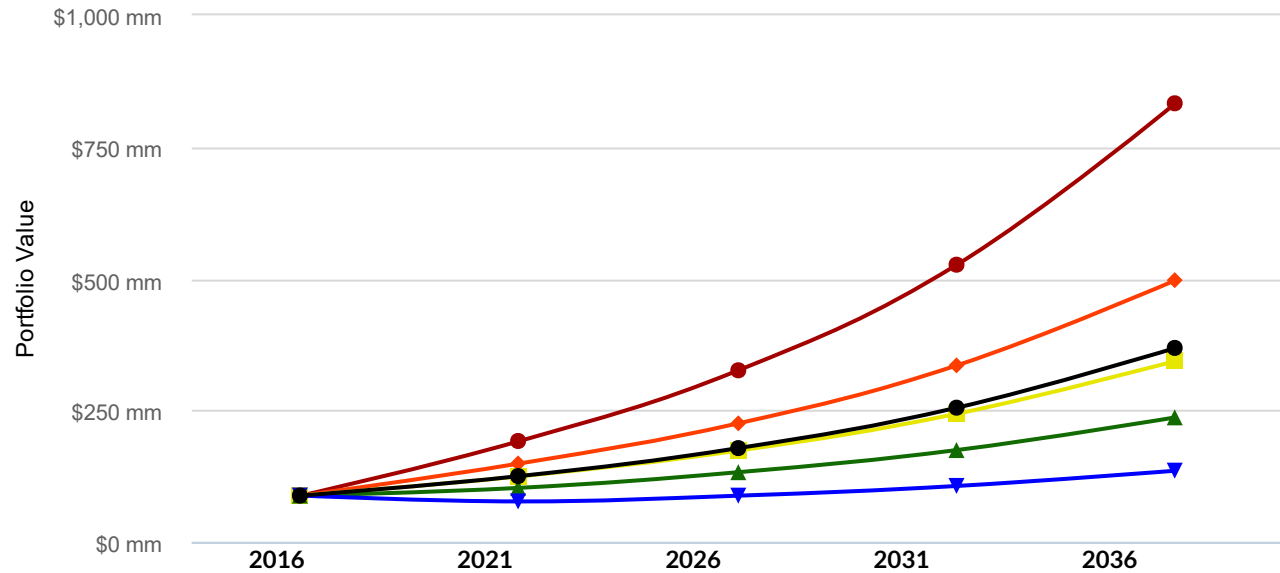
	2016	2021	2026	2031	2036
5%	$88 mm	$192 mm	$326 mm	$526 mm	$833 mm
25%	$88 mm	$149 mm	$225 mm	$335 mm	$497 mm
50%	$88 mm	$124 mm	$173 mm	$243 mm	$344 mm
75%	$88 mm	$103 mm	$132 mm	$174 mm	$237 mm
95%	$88 mm	$77 mm	$88 mm	$106 mm	$135 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	7.91%
75% Year-20 Value:	$237 mm	Standard Deviation:	13.22
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.51
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	45%

DAHAB ASSOCIATES
2016

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 5.0%

LCV: 10.0%

SMIDC: 20.0%

EAFE: 5.0%

EM: 5.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 40.0%
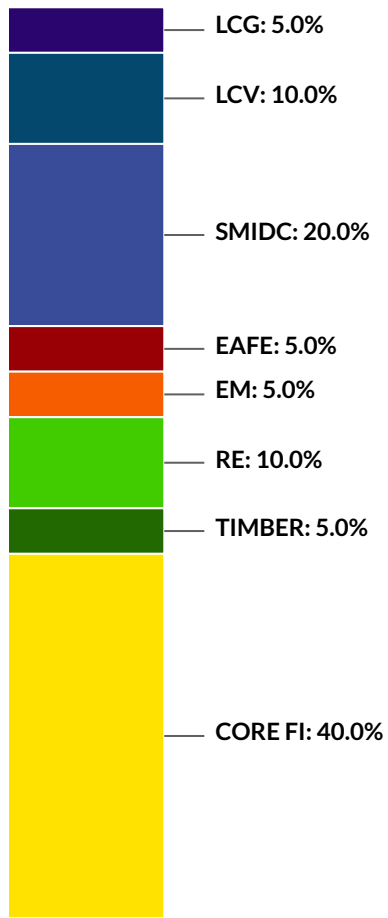
Portfolio Value Over Time

Portfolio Value
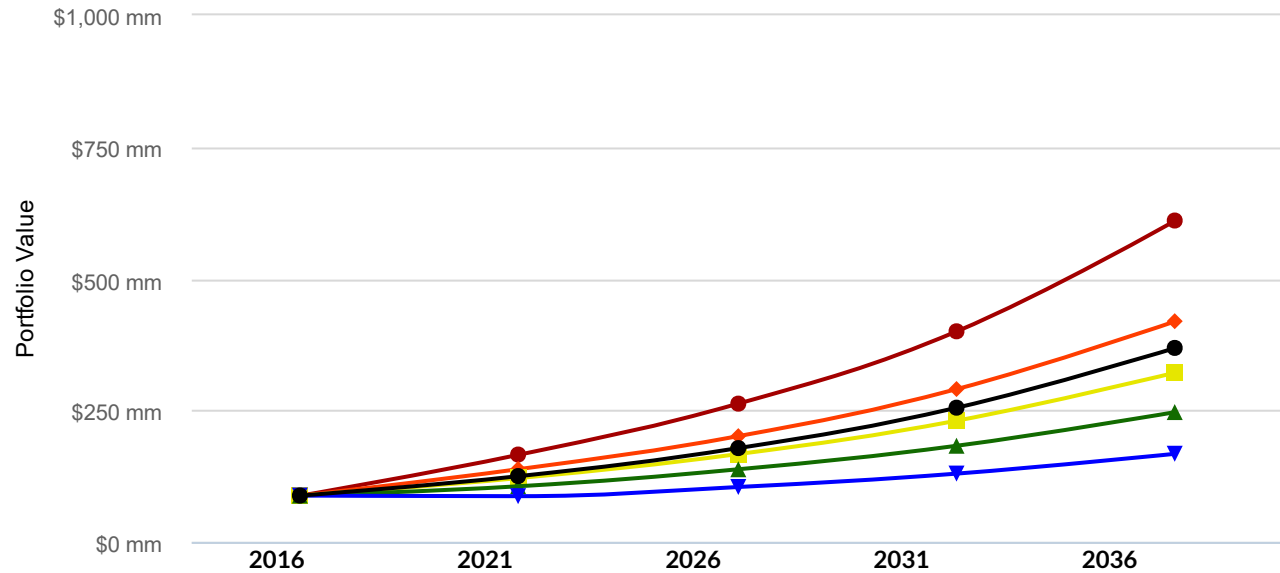
	2016	**2021**	**2026**	**2031**	**2036**
5%	$88 mm	$166 mm	$263 mm	$400 mm	$610 mm
25%	$88 mm	$138 mm	$201 mm	$290 mm	$419 mm
50%	$88 mm	$121 mm	$167 mm	$230 mm	$322 mm
75%	$88 mm	$106 mm	$138 mm	$183 mm	$247 mm
95%	$88 mm	$87 mm	$104 mm	$130 mm	$167 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	**Mean Return:**	7.16%
75% Year-20 Value:	$247 mm	**Standard Deviation:**	9.29
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.65
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	37%

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 20.0%

LCV: 10.0%

SMIDC: 20.0%

EAFE: 10.0%

EM: 5.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 20.0%
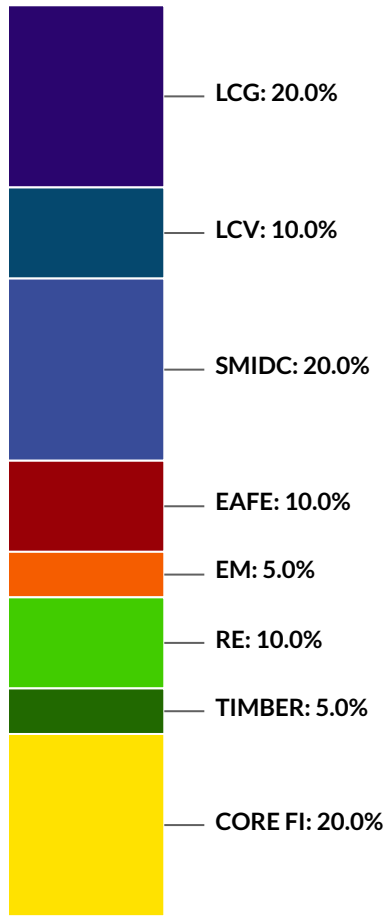
Portfolio Value Over Time
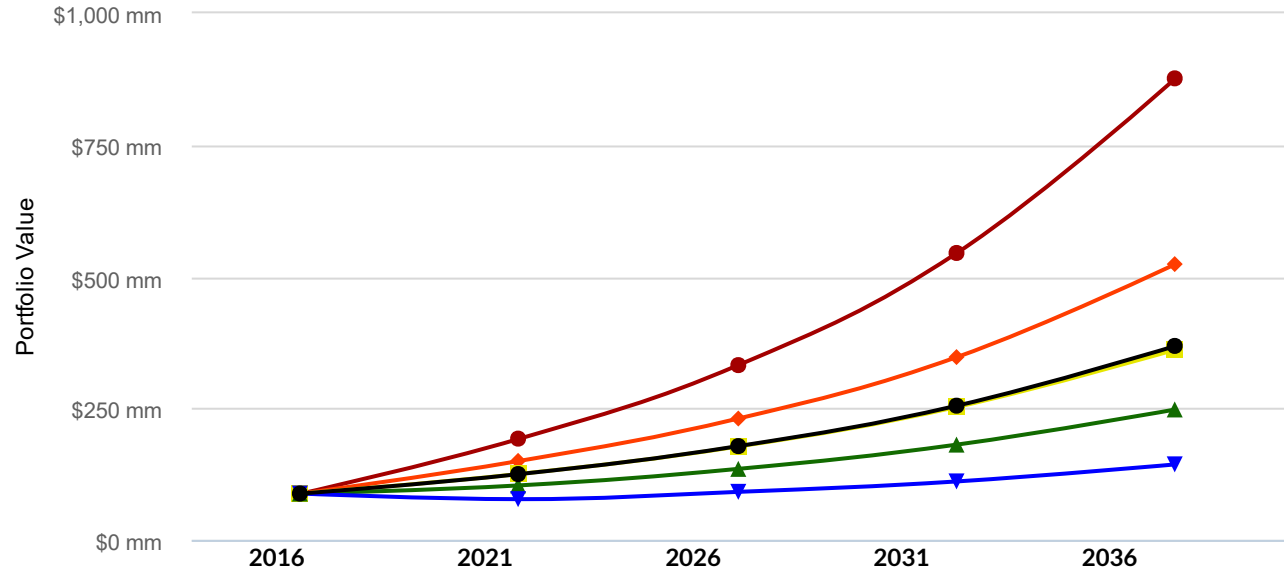
	2016	2021	2026	2031	2036
5%	$88 mm	$192 mm	$332 mm	$545 mm	$877 mm
25%	$88 mm	$150 mm	$230 mm	$347 mm	$524 mm
50%	$88 mm	$125 mm	$177 mm	$252 mm	$361 mm
75%	$88 mm	$104 mm	$135 mm	$181 mm	$248 mm
95%	$88 mm	$77 mm	$91 mm	$111 mm	$143 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	**Mean Return:**	8.16%
75% Year-20 Value:	$248 mm	**Standard Deviation:**	12.99
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.54
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	49%

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 15.0%

LCV: 5.0%

SMIDC: 15.0%

EAFE: 5.0%

EM: 5.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 40.0%
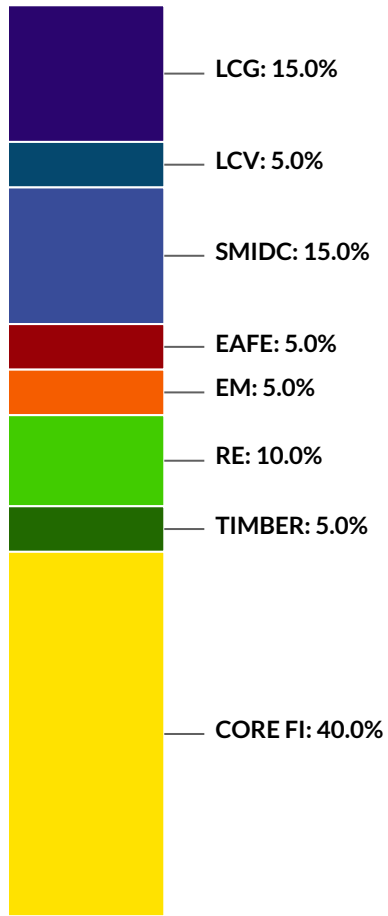
Portfolio Value Over Time
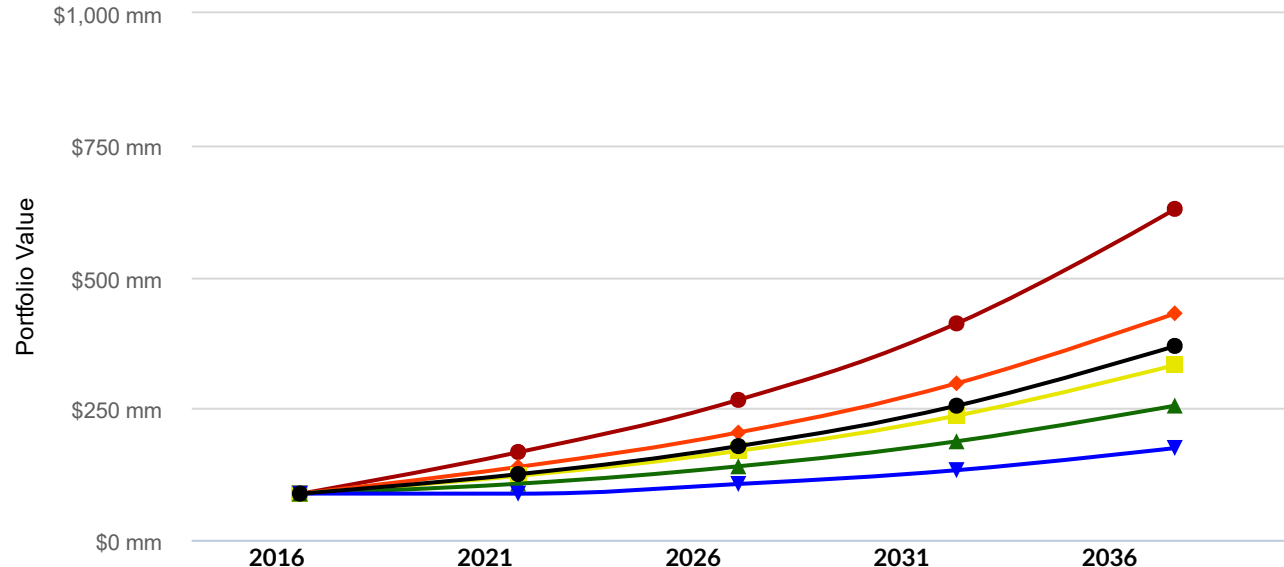
	2016	2021	2026	2031	2036
5%	$88 mm	$167 mm	$266 mm	$411 mm	$629 mm
25%	$88 mm	$139 mm	$204 mm	$297 mm	$430 mm
50%	$88 mm	$122 mm	$169 mm	$236 mm	$332 mm
75%	$88 mm	$107 mm	$140 mm	$187 mm	$255 mm
95%	$88 mm	$88 mm	$106 mm	$132 mm	$175 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	**Mean Return:**	7.34%
75% Year-20 Value:	$255 mm	**Standard Deviation:**	9.28
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.67
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	40%

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 5.0%

LCV: 25.0%

SMIDC: 5.0%

EAFE: 20.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 20.0%
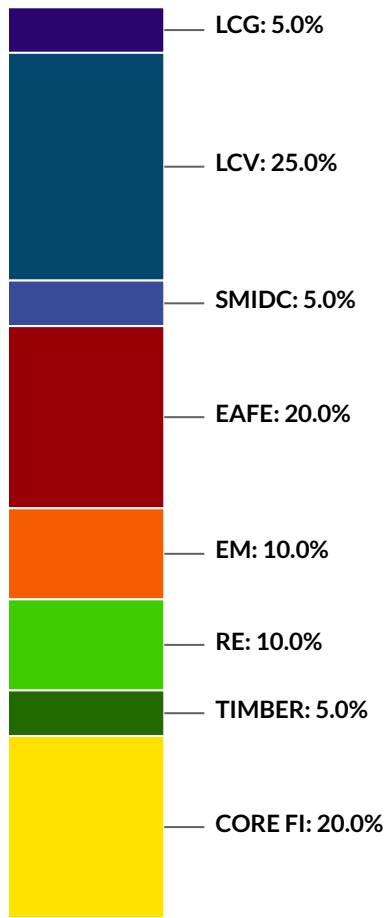
Portfolio Value Over Time
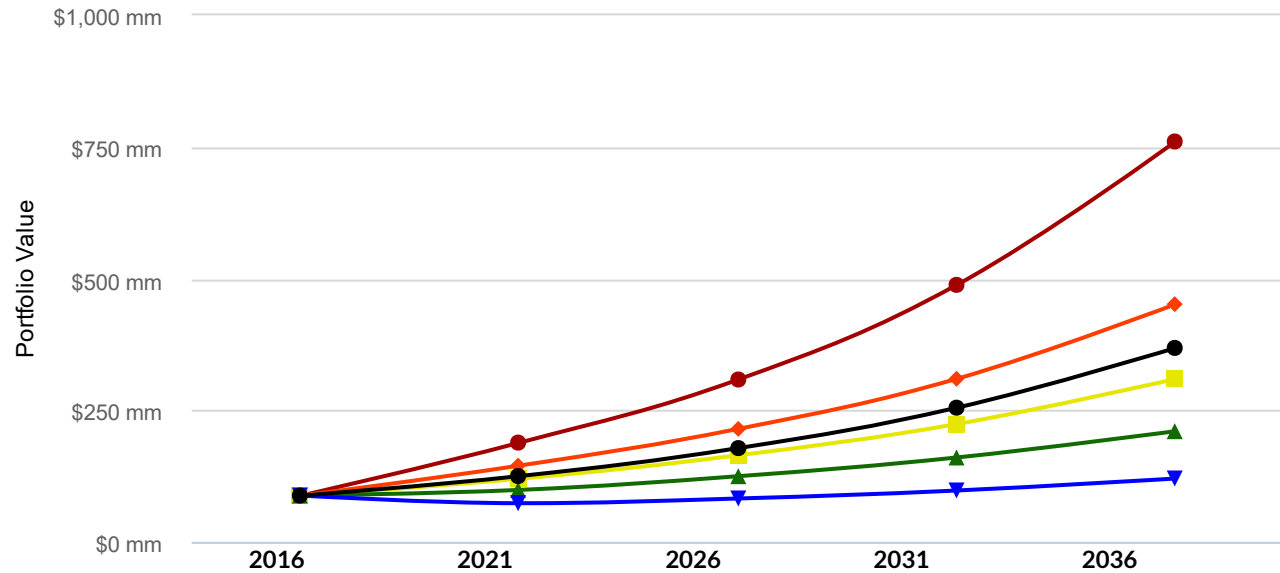
	2016	2021	2026	2031	2036
5%	$88 mm	$189 mm	$308 mm	$488 mm	$760 mm
25%	$88 mm	$145 mm	$215 mm	$310 mm	$451 mm
50%	$88 mm	$120 mm	$165 mm	$224 mm	$309 mm
75%	$88 mm	$99 mm	$125 mm	$160 mm	$210 mm
95%	$88 mm	$73 mm	$82 mm	$98 mm	$120 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	7.36%
75% Year-20 Value:	$210 mm	Standard Deviation:	13.22
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.47
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	38%

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 20.0%

LCV: 15.0%

SMIDC: 5.0%

EAFE: 10.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 25.0%
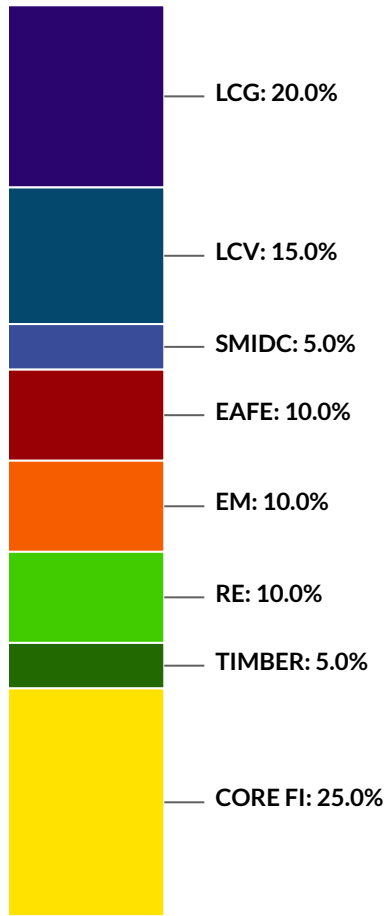
Portfolio Value Over Time
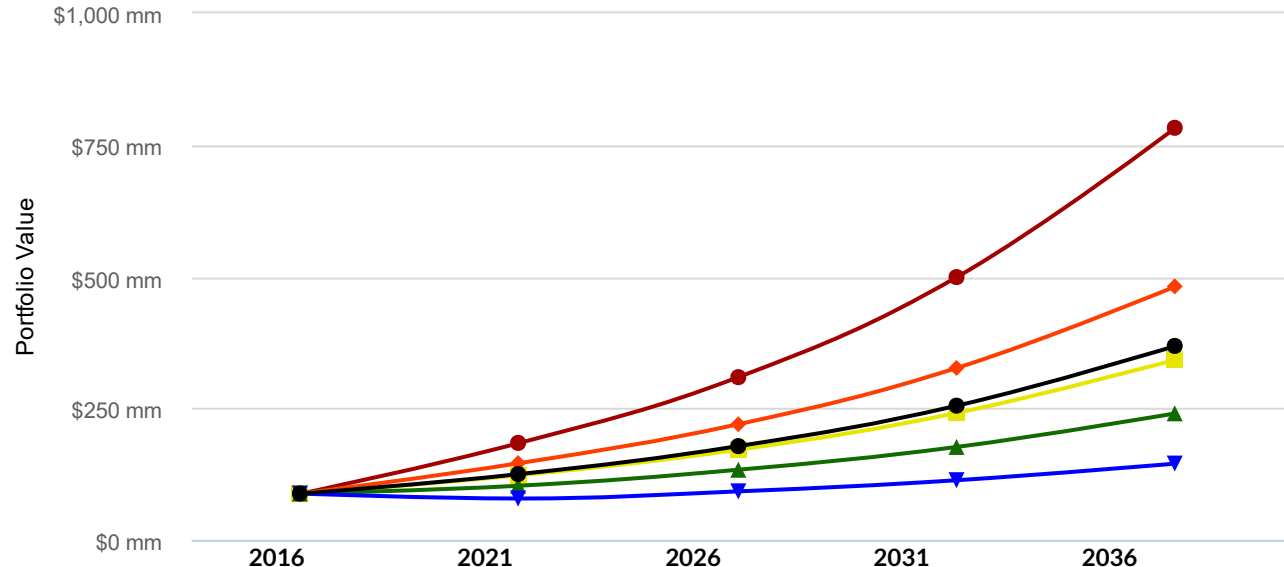
	2016	2021	2026	2031	2036
5%	$88 mm	$184 mm	$309 mm	$499 mm	$783 mm
25%	$88 mm	$146 mm	$220 mm	$327 mm	$481 mm
50%	$88 mm	$123 mm	$171 mm	$241 mm	$342 mm
75%	$88 mm	$103 mm	$133 mm	$177 mm	$240 mm
95%	$88 mm	$79 mm	$92 mm	$113 mm	$145 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	**Mean Return:**	7.77%
75% Year-20 Value:	$240 mm	**Standard Deviation:**	12.30
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.54
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	44%

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 10.0%	
LCV: 25.0%	
SMIDC: 15.0%	
EAFE: 10.0%	
EM: 10.0%	
RE: 5.0%	
TIMBER: 5.0%	
CORE FI: 20.0%	
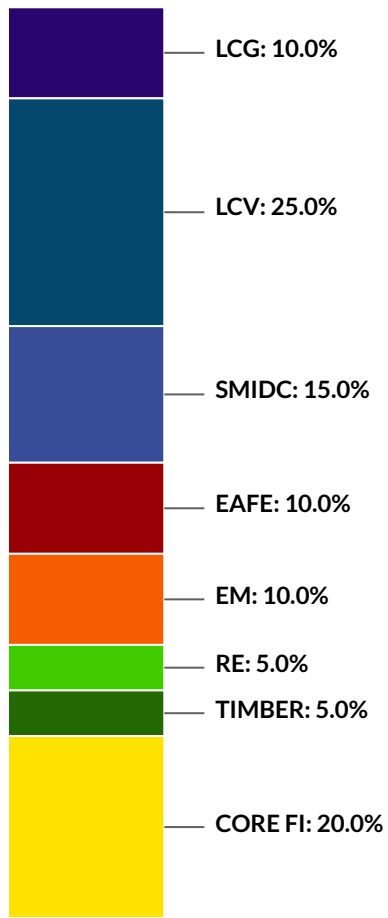
Portfolio Value Over Time
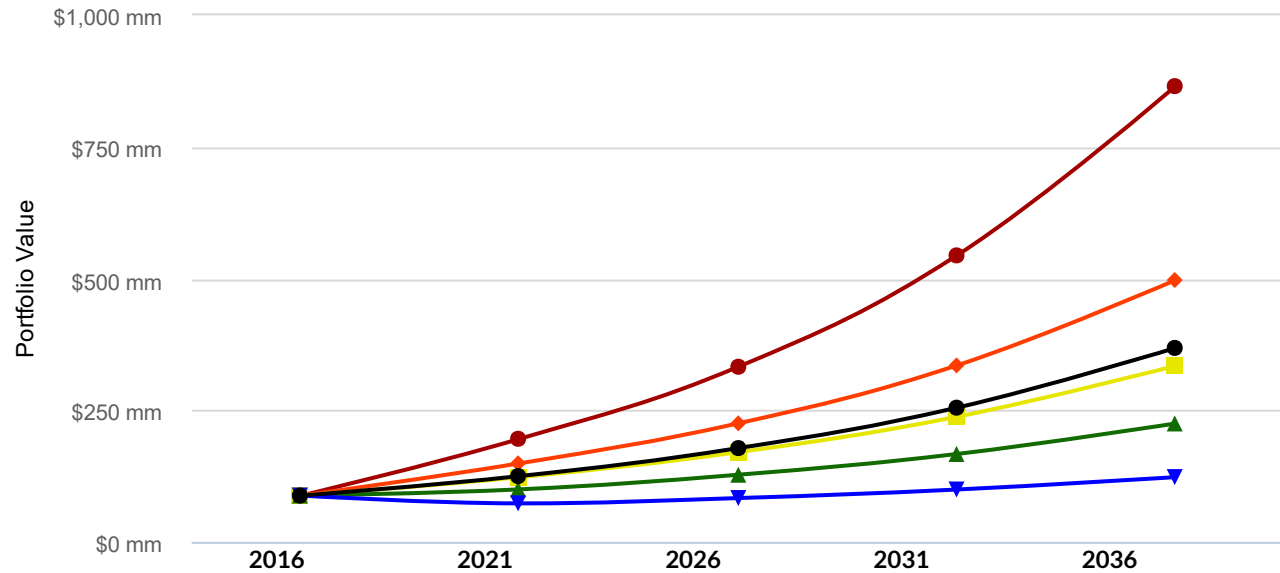
	2016	2021	2026	2031	2036
5%	$88 mm	$196 mm	$333 mm	$544 mm	$866 mm
25%	$88 mm	$149 mm	$225 mm	$335 mm	$497 mm
50%	$88 mm	$123 mm	$170 mm	$238 mm	$334 mm
75%	$88 mm	$100 mm	$128 mm	$167 mm	$225 mm
95%	$88 mm	$73 mm	$83 mm	$99 mm	$123 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

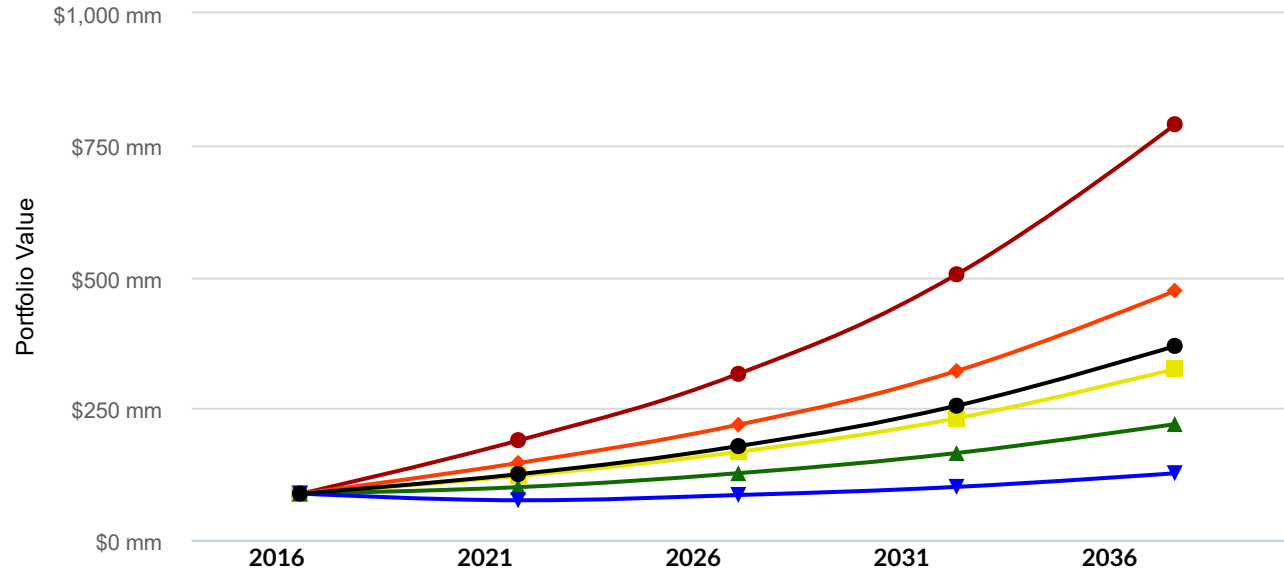|			
Beginning Value:	$88 mm	Mean Return:	7.87%
75% Year-20 Value:	$225 mm	Standard Deviation:	13.99
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.48
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	43%

DANABASSOCIATES
2016

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 10.0%

LCV: 25.0%

SMIDC: 5.0%

EAFE: 15.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 20.0%
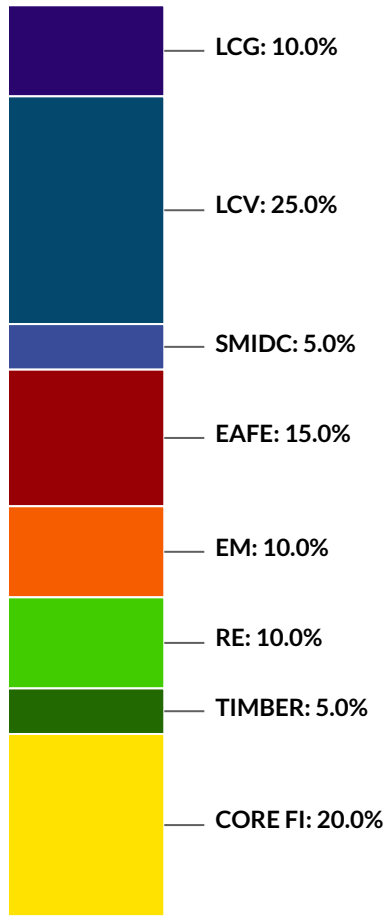
Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$189 mm	$315 mm	$504 mm	$789 mm
25%	$88 mm	$146 mm	$219 mm	$321 mm	$473 mm
50%	$88 mm	$122 mm	$167 mm	$231 mm	$325 mm
75%	$88 mm	$100 mm	$127 mm	$165 mm	$220 mm
95%	$88 mm	$75 mm	$85 mm	$101 mm	$127 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	**Mean Return:**	7.59%
75% Year-20 Value:	$220 mm	**Standard Deviation:**	13.16
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.49
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	41%

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 10.0%

LCV: 25.0%

SMIDC: 10.0%

EAFE: 15.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 20.0%
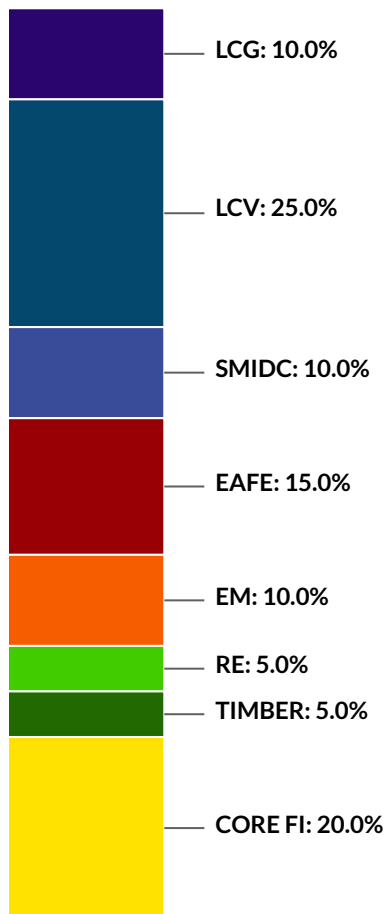
Portfolio Value Over Time
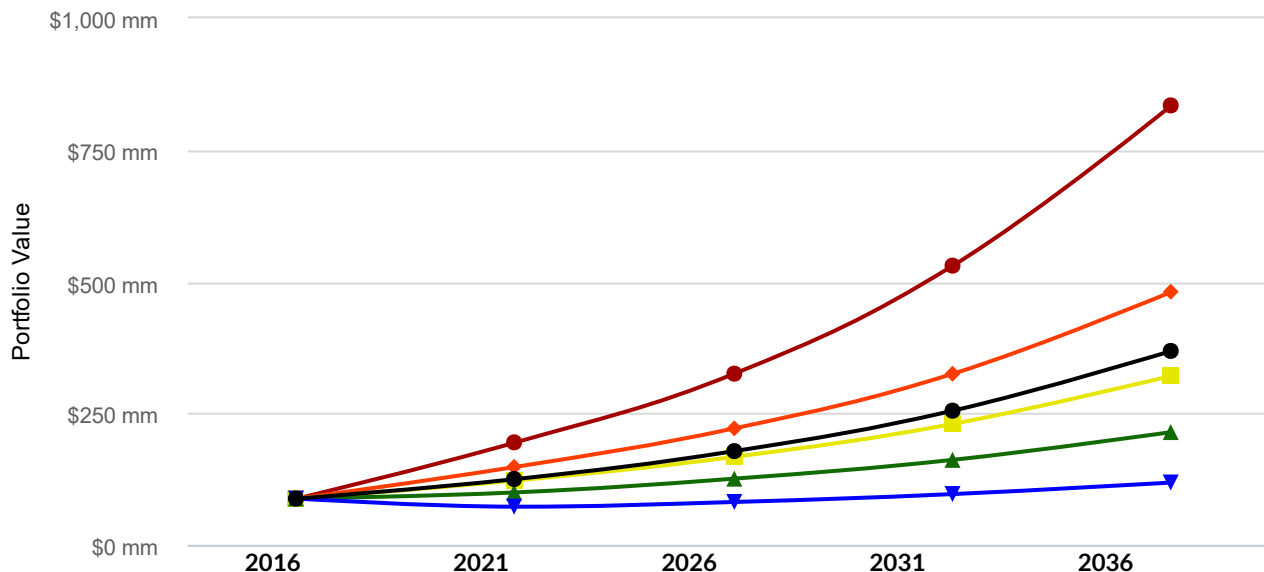
	2016	2021	2026	2031	2036
5%	$88 mm	$195 mm	$325 mm	$530 mm	$835 mm
25%	$88 mm	$148 mm	$221 mm	$325 mm	$481 mm
50%	$88 mm	$122 mm	$167 mm	$230 mm	$321 mm
75%	$88 mm	$100 mm	$126 mm	$162 mm	$214 mm
95%	$88 mm	$72 mm	$81 mm	$96 mm	$118 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	**Mean Return:**	7.66%
75% Year-20 Value:	$214 mm	**Standard Deviation:**	13.98
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.47
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	41%

City of Franklin Pension Plan

Asset Allocation

10-Year Scenario

LCG: 10.0%

LCV: 25.0%

SMIDC: 5.0%

EAFE: 15.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 25.0%
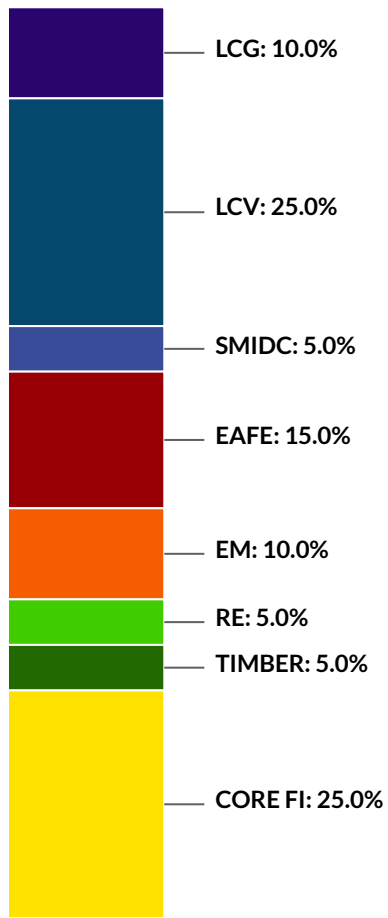
Portfolio Value Over Time
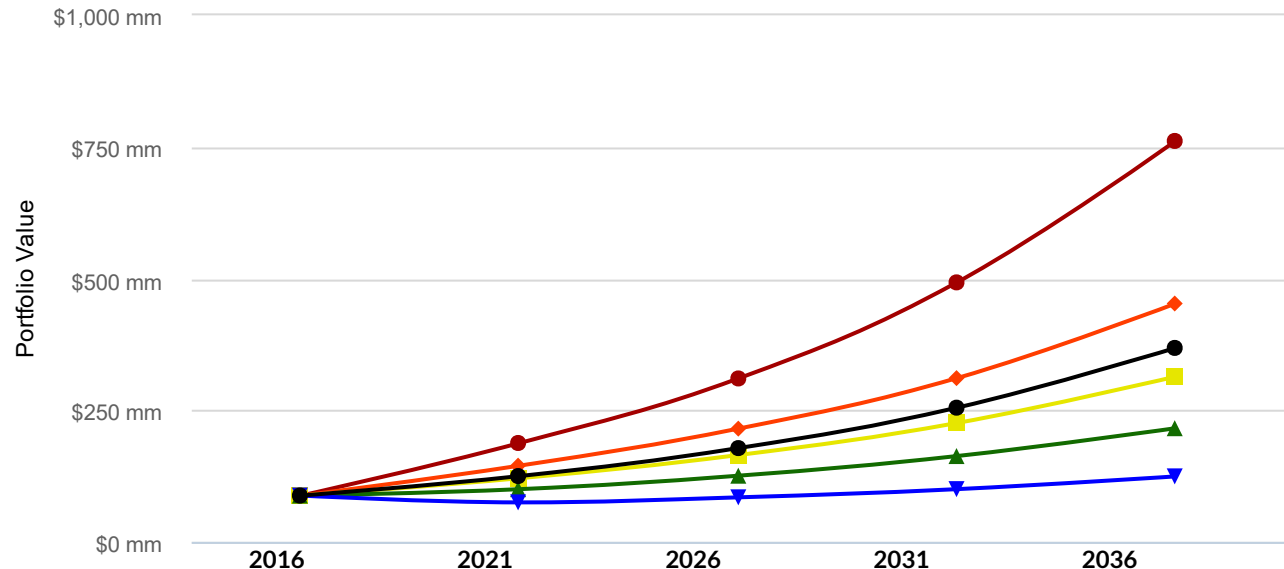
	2016	2021	2026	2031	2036
5%	$88 mm	$188 mm	$310 mm	$493 mm	$761 mm
25%	$88 mm	$145 mm	$215 mm	$311 mm	$453 mm
50%	$88 mm	$121 mm	$165 mm	$226 mm	$314 mm
75%	$88 mm	$100 mm	$126 mm	$163 mm	$216 mm
95%	$88 mm	$75 mm	$85 mm	$100 mm	$124 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

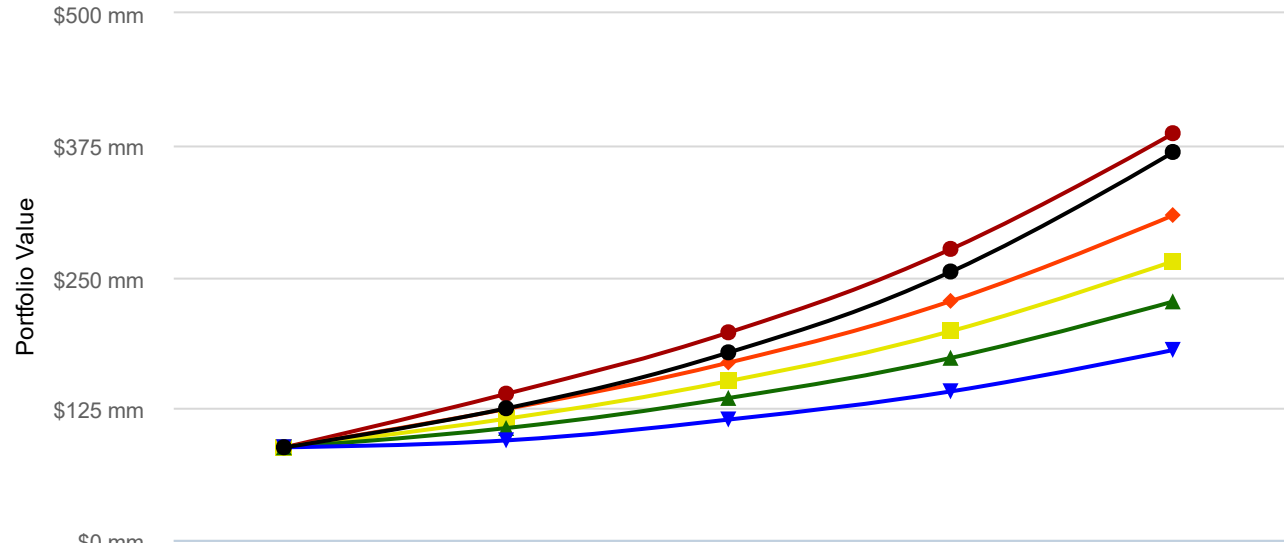|			
Beginning Value:	$88 mm	Mean Return:	7.41%
75% Year-20 Value:	$216 mm	Standard Deviation:	13.01
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.48
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	38%

PROJECTION SCENARIO ASSET ALLOCATION CHARTS

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario
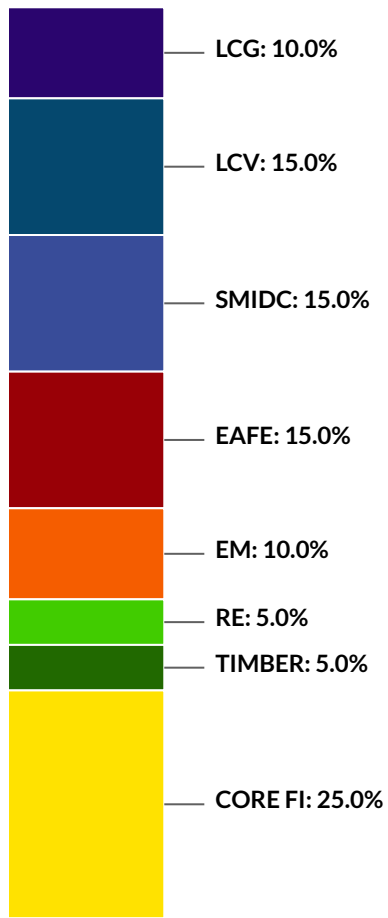
Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$139 mm	$197 mm	$276 mm	$386 mm
25%	$88 mm	$124 mm	$168 mm	$227 mm	$308 mm
50%	$88 mm	$115 mm	$151 mm	$198 mm	$265 mm
75%	$88 mm	$106 mm	$135 mm	$173 mm	$227 mm
95%	$88 mm	$94 mm	$114 mm	$141 mm	$180 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Asset Allocation Legend:
- LCG: 10.0%
- LCV: 15.0%
- SMIDC: 15.0%
- EAFE: 15.0%
- EM: 10.0%
- RE: 5.0%
- TIMBER: 5.0%
- CORE FI: 25.0%

Statistics

Beginning Value:	$88 mm	**Mean Return:**	5.87%
75% Year-20 Value:	$227 mm	**Standard Deviation:**	5.48
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.72
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	8%

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

Portfolio Value Over Time

LCG: 5.0%

LCV: 25.0%

SMIDC: 20.0%

EAFE: 5.0%

EM: 10.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 20.0%
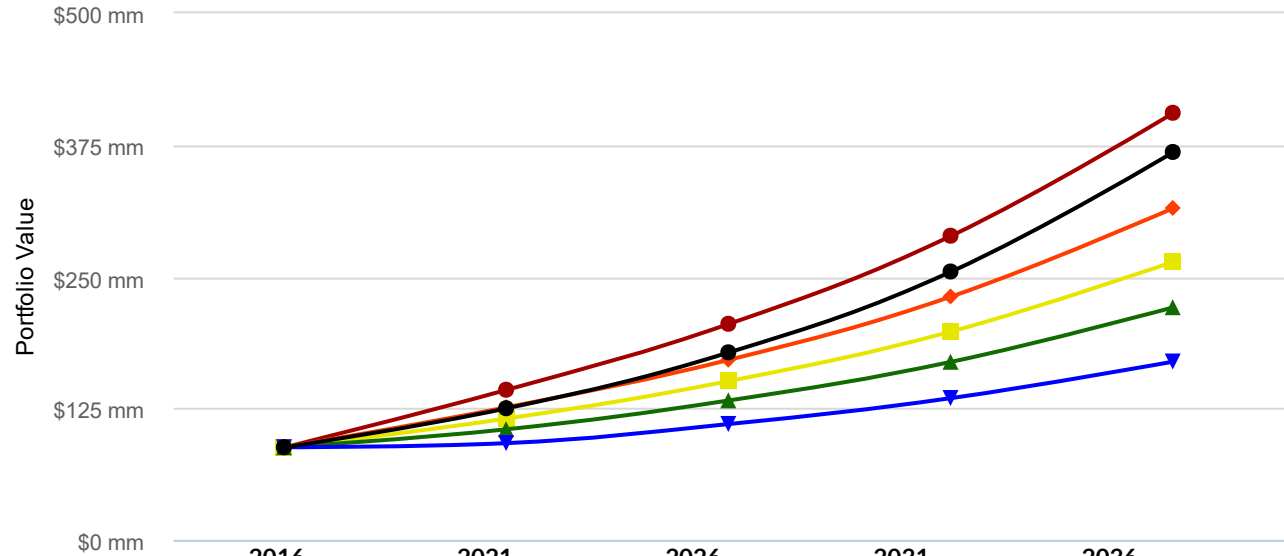
	2016	2021	2026	2031	2036
5%	$88 mm	$143 mm	$205 mm	$289 mm	$406 mm
25%	$88 mm	$126 mm	$171 mm	$231 mm	$315 mm
50%	$88 mm	$115 mm	$151 mm	$198 mm	$264 mm
75%	$88 mm	$105 mm	$132 mm	$169 mm	$221 mm
95%	$88 mm	$92 mm	$110 mm	$135 mm	$169 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

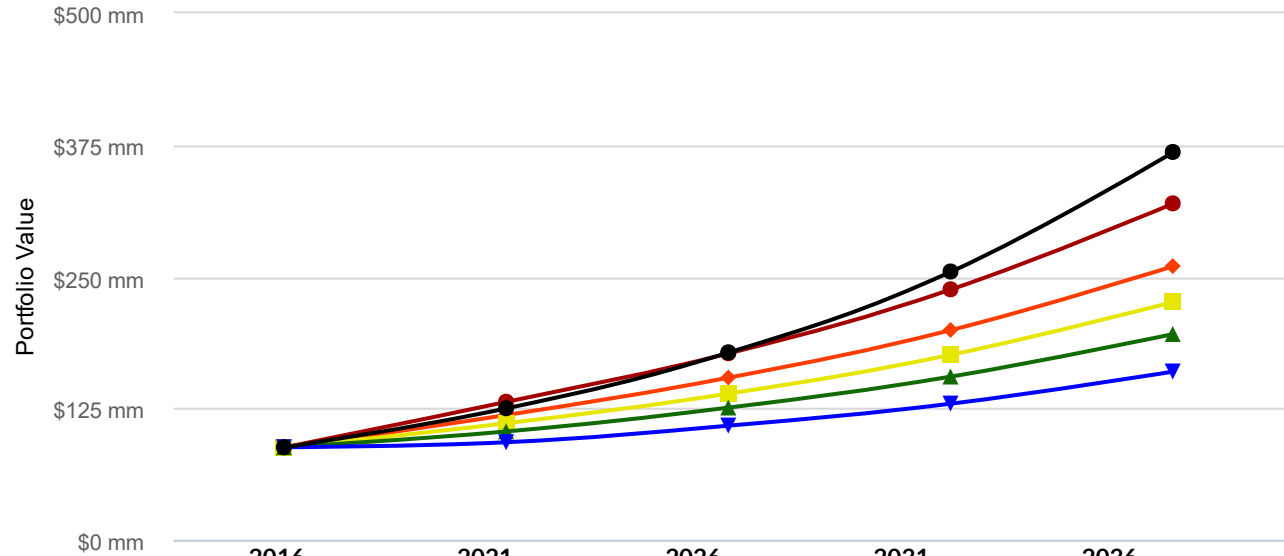|			
Beginning Value:	$88 mm	Mean Return:	5.90%
75% Year-20 Value:	$221 mm	Standard Deviation:	6.22
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.64
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	10%

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

LCG: 5.0%

LCV: 10.0%

SMIDC: 20.0%

EAFE: 5.0%

EM: 5.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 40.0%

Portfolio Value Over Time

Portfolio Value

$500 mm

$375 mm

$250 mm

$125 mm

$0 mm

	2016	2021	2026	2031	2036
5%	$88 mm	$131 mm	$177 mm	$238 mm	$320 mm
25%	$88 mm	$119 mm	$154 mm	$199 mm	$260 mm
50%	$88 mm	$111 mm	$139 mm	$176 mm	$226 mm
75%	$88 mm	$103 mm	$126 mm	$155 mm	$196 mm
95%	$88 mm	$93 mm	$109 mm	$129 mm	$160 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

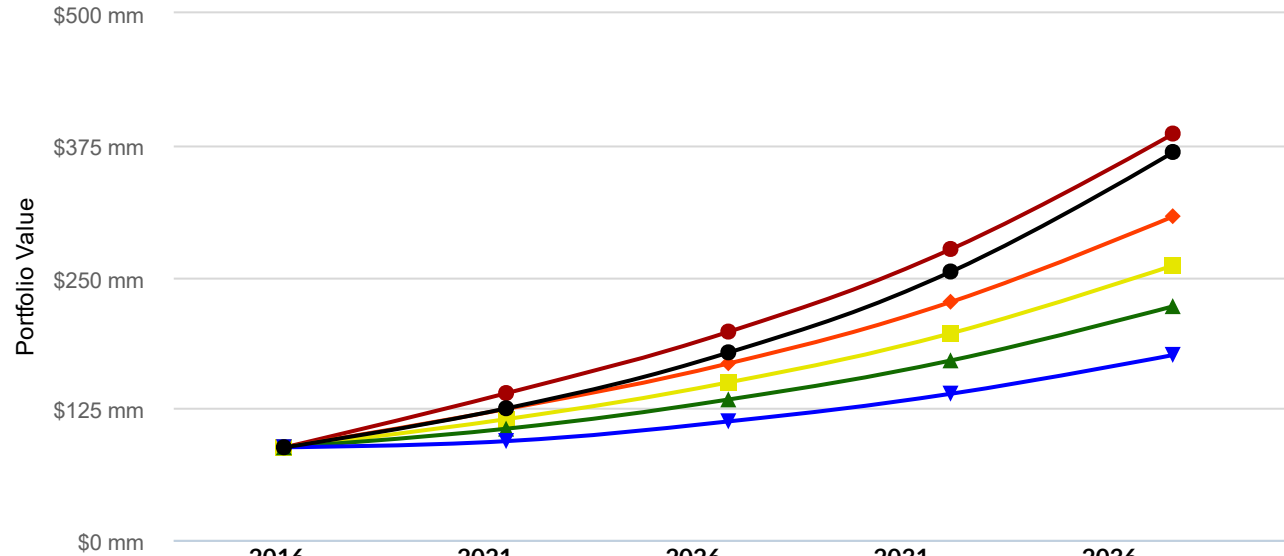|			
Beginning Value:	$88 mm	Mean Return:	5.02%
75% Year-20 Value:	$196 mm	Standard Deviation:	4.95
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.62
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	1%

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$139 mm	$198 mm	$276 mm	$386 mm
25%	$88 mm	$124 mm	$168 mm	$226 mm	$307 mm
50%	$88 mm	$115 mm	$150 mm	$196 mm	$261 mm
75%	$88 mm	$106 mm	$133 mm	$171 mm	$222 mm
95%	$88 mm	$94 mm	$113 mm	$139 mm	$176 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Legend:
- **LCG: 20.0%**
- **LCV: 10.0%**
- **SMIDC: 20.0%**
- **EAFE: 10.0%**
- **EM: 5.0%**
- **RE: 10.0%**
- **TIMBER: 5.0%**
- **CORE FI: 20.0%**

Statistics

Beginning Value:	$88 mm	**Mean Return:**	5.82%
75% Year-20 Value:	$222 mm	**Standard Deviation:**	5.71
Required Year-20 Value:	$368 mm	**Sharpe Ratio:**	0.68
Actuarial Rate:	7.5%	**Likelihood to Beat 7.5%:**	8%

DAHAB ASSOCIATES

2016

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

Portfolio Value Over Time

LCG: 15.0%

LCV: 5.0%

SMIDC: 15.0%

EAFE: 5.0%

EM: 5.0%

RE: 10.0%

TIMBER: 5.0%

CORE FI: 40.0%
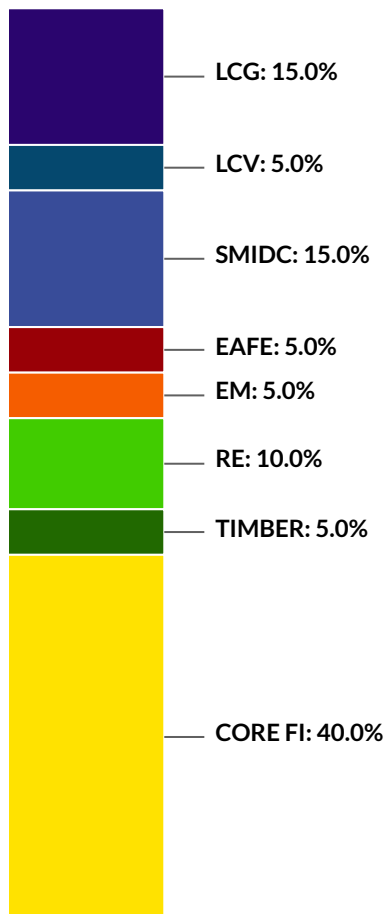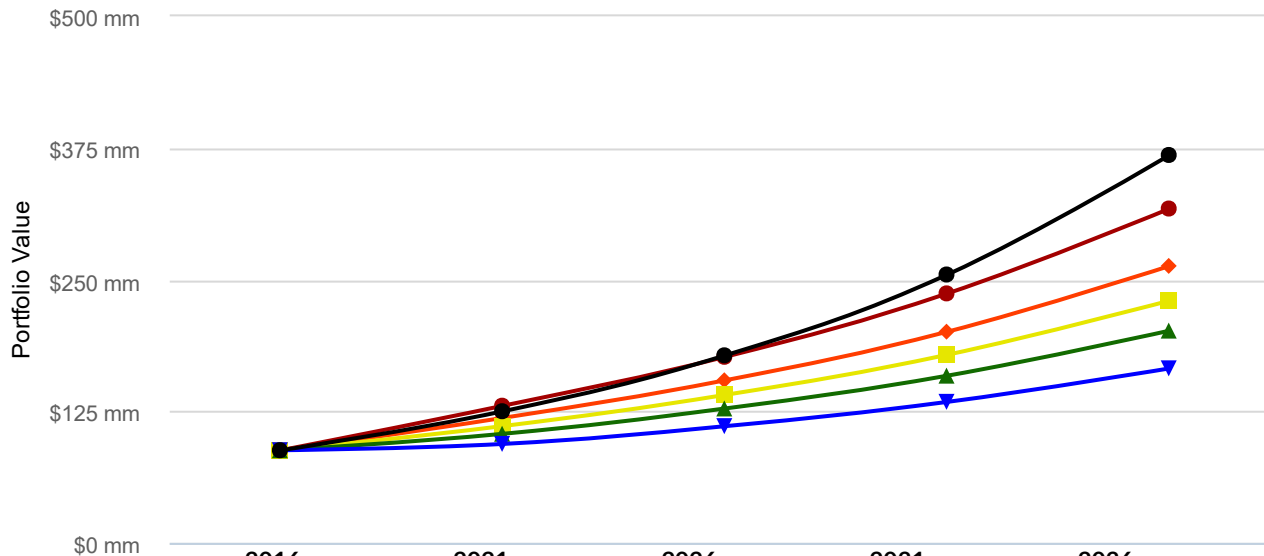
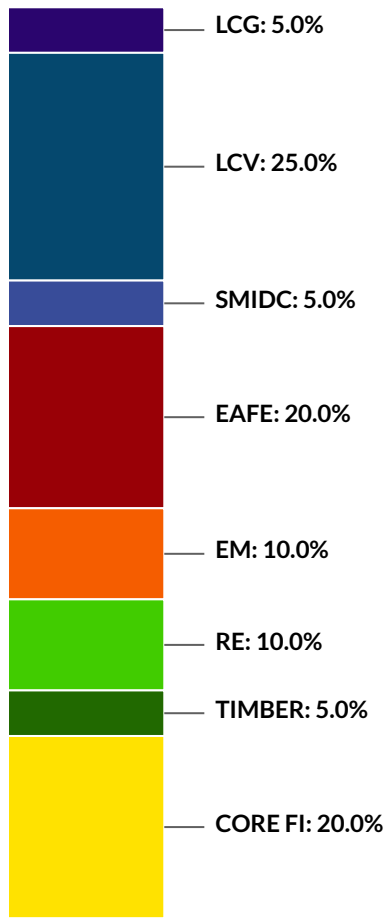|	2016	2021	2026	2031	2036
5%	$88 mm	$130 mm	$177 mm	$237 mm	$318 mm
25%	$88 mm	$119 mm	$154 mm	$201 mm	$263 mm
50%	$88 mm	$111 mm	$141 mm	$179 mm	$230 mm
75%	$88 mm	$104 mm	$128 mm	$159 mm	$202 mm
95%	$88 mm	$94 mm	$111 mm	$134 mm	$166 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

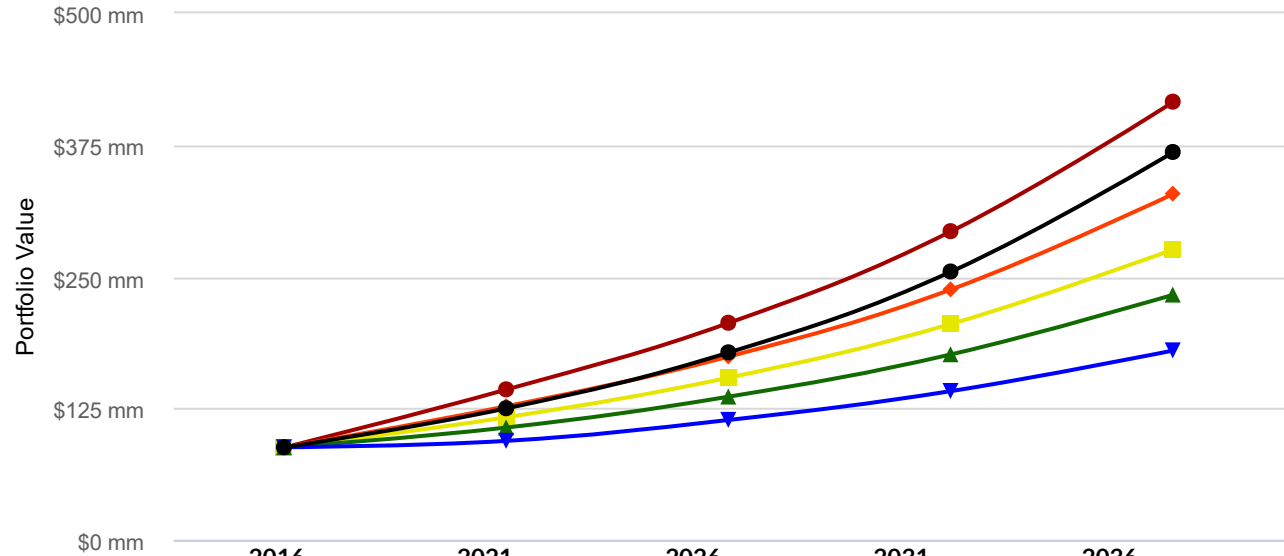|			
Beginning Value:	$88 mm	Mean Return:	5.10%
75% Year-20 Value:	$202 mm	Standard Deviation:	4.64
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.68
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	1%

DAHAB ASSOCIATES

2016

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

- LCG: 5.0%
- LCV: 25.0%
- SMIDC: 5.0%
- EAFE: 20.0%
- EM: 10.0%
- RE: 10.0%
- TIMBER: 5.0%
- CORE FI: 20.0%

Portfolio Value Over Time

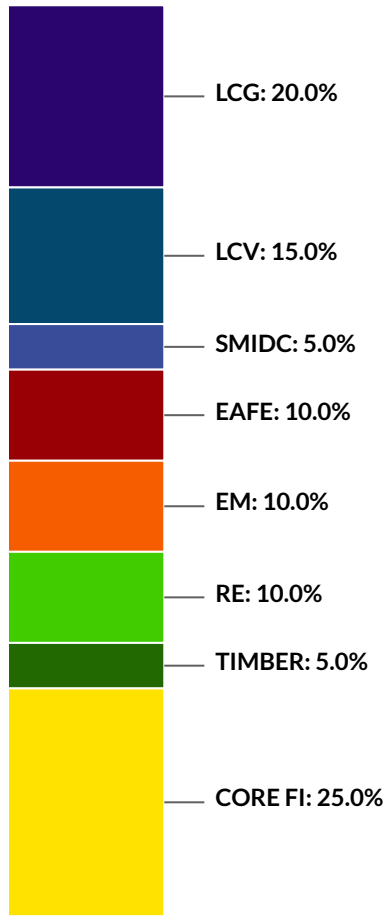|	2016	2021	2026	2031	2036
5%	$88 mm	$143 mm	$206 mm	$293 mm	$416 mm
25%	$88 mm	$127 mm	$174 mm	$238 mm	$329 mm
50%	$88 mm	$117 mm	$154 mm	$205 mm	$276 mm
75%	$88 mm	$107 mm	$136 mm	$176 mm	$233 mm
95%	$88 mm	$94 mm	$114 mm	$141 mm	$180 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

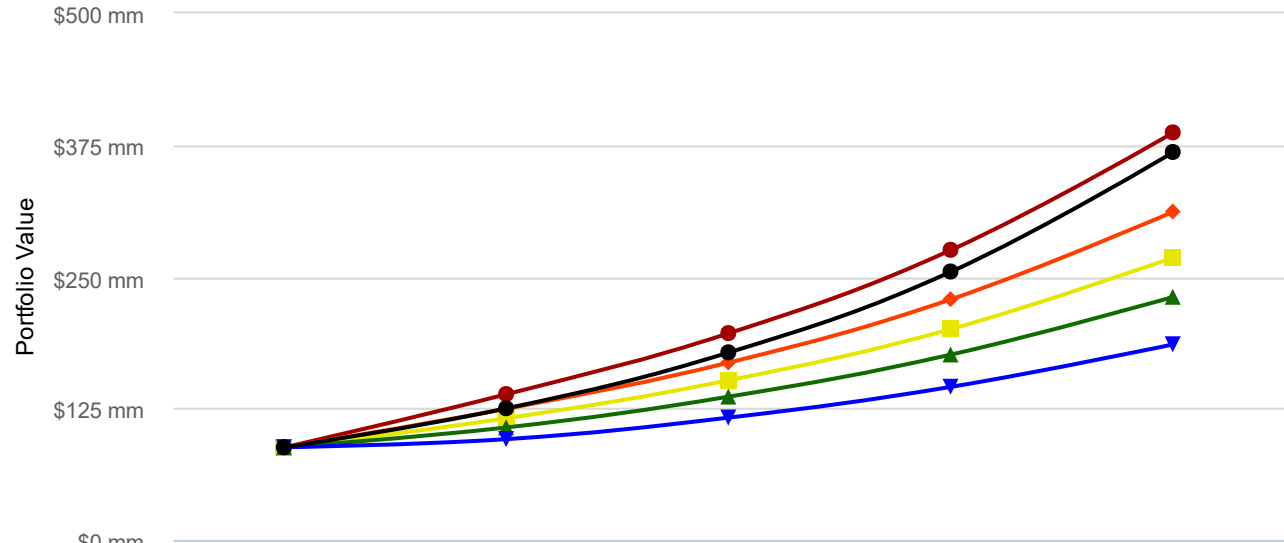|			
Beginning Value:	$88 mm	Mean Return:	6.13%
75% Year-20 Value:	$233 mm	Standard Deviation:	6.01
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.69
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	13%

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$138 mm	$196 mm	$275 mm	$387 mm
25%	$88 mm	$125 mm	$169 mm	$229 mm	$312 mm
50%	$88 mm	$116 mm	$152 mm	$200 mm	$268 mm
75%	$88 mm	$107 mm	$136 mm	$176 mm	$231 mm
95%	$88 mm	$96 mm	$116 mm	$145 mm	$186 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Legend:
- LCG: 20.0%
- LCV: 15.0%
- SMIDC: 5.0%
- EAFE: 10.0%
- EM: 10.0%
- RE: 10.0%
- TIMBER: 5.0%
- CORE FI: 25.0%

Statistics
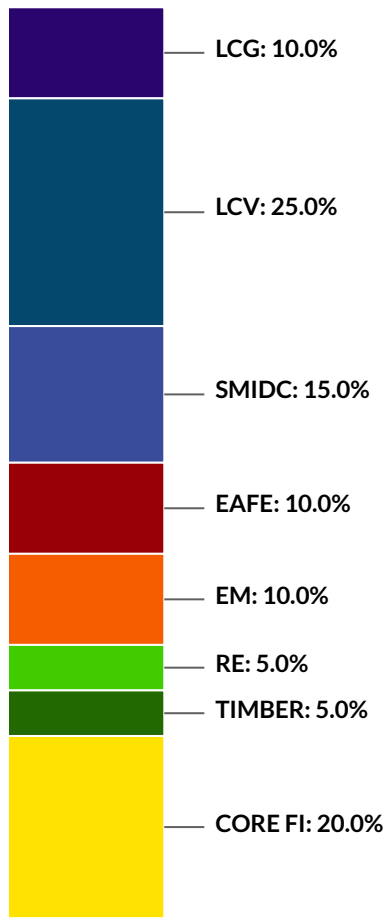
|			
Beginning Value:	$88 mm	Mean Return:	5.94%
75% Year-20 Value:	$231 mm	Standard Deviation:	5.29
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.75
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	7%

DAHAB ASSOCIATES
2016

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

Portfolio Value Over Time

LCG: 10.0%

LCV: 25.0%

SMIDC: 15.0%

EAFE: 10.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 20.0%

Portfolio Value
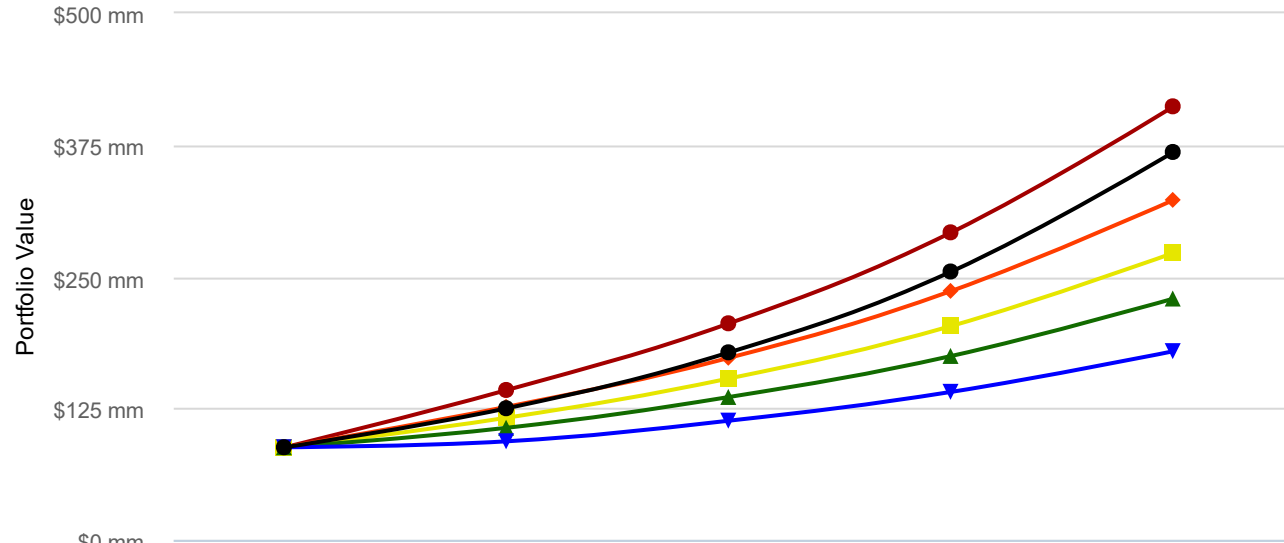
	2016	2021	2026	2031	2036
5%	$88 mm	$142 mm	$206 mm	$292 mm	$412 mm
25%	$88 mm	$126 mm	$173 mm	$236 mm	$323 mm
50%	$88 mm	$116 mm	$153 mm	$203 mm	$273 mm
75%	$88 mm	$106 mm	$136 mm	$175 mm	$229 mm
95%	$88 mm	$94 mm	$113 mm	$141 mm	$179 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics
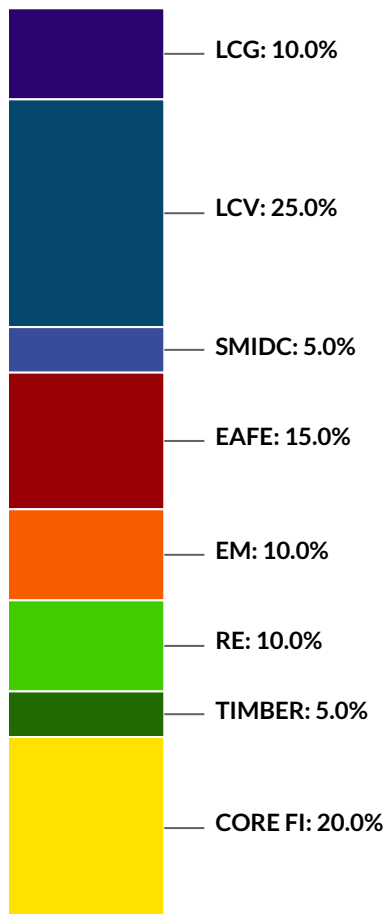
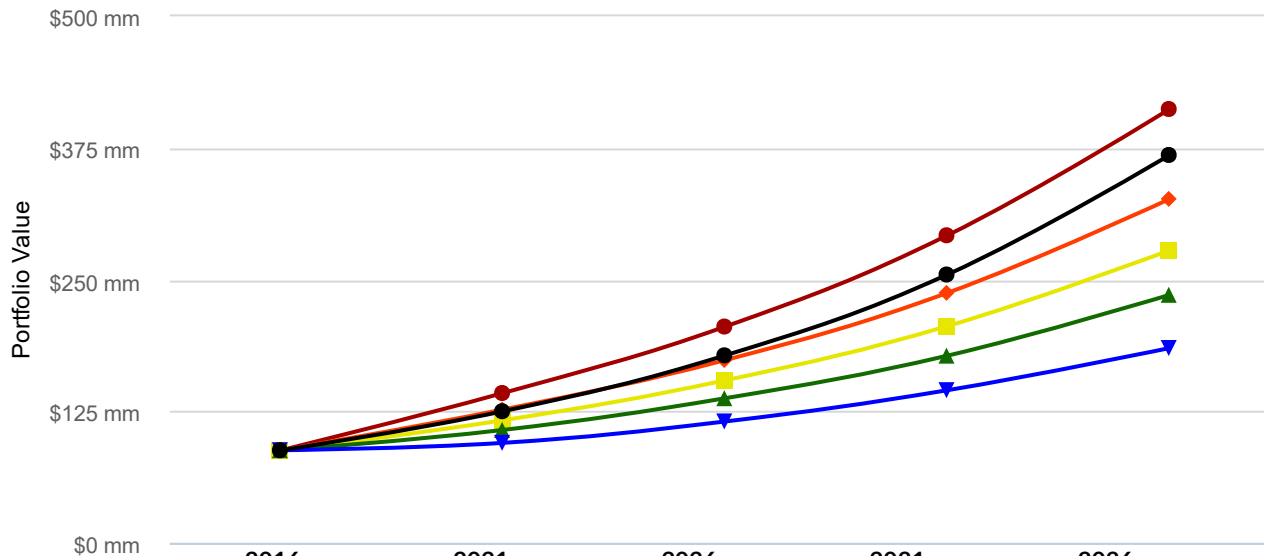|			
Beginning Value:	$88 mm	Mean Return:	6.06%
75% Year-20 Value:	$229 mm	Standard Deviation:	5.99
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.69
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	12%

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

Portfolio Value Over Time

LCG: 10.0%
LCV: 25.0%
SMIDC: 5.0%
EAFE: 15.0%
EM: 10.0%
RE: 10.0%
TIMBER: 5.0%
CORE FI: 20.0%

Portfolio Value

$500 mm
$375 mm
$250 mm
$125 mm
$0 mm

	2016	2021	2026	2031	2036
5%	$88 mm	$142 mm	$205 mm	$292 mm	$412 mm
25%	$88 mm	$127 mm	$174 mm	$237 mm	$327 mm
50%	$88 mm	$116 mm	$154 mm	$206 mm	$278 mm
75%	$88 mm	$107 mm	$137 mm	$178 mm	$236 mm
95%	$88 mm	$95 mm	$115 mm	$145 mm	$185 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

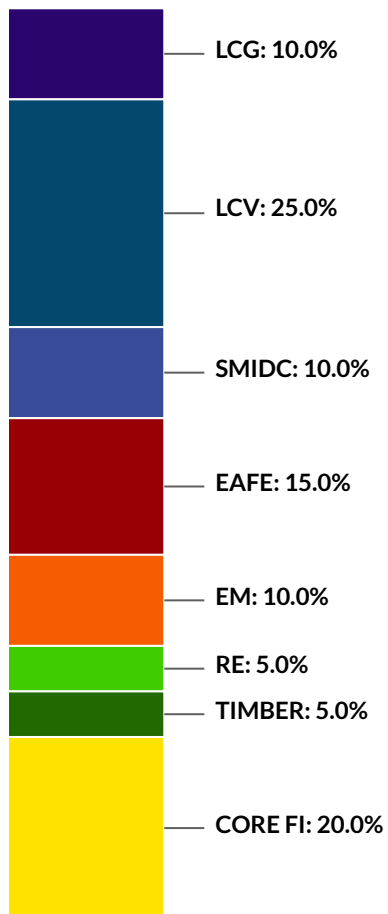## Statistics

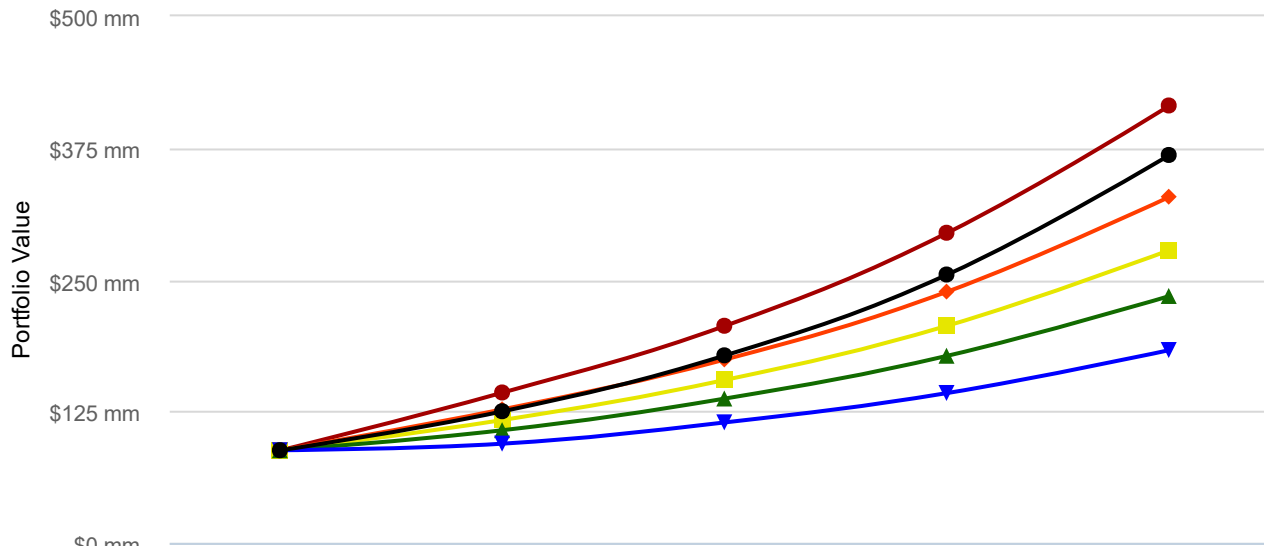|			
Beginning Value:	$88 mm	Mean Return:	6.14%
75% Year-20 Value:	$236 mm	Standard Deviation:	5.78
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.73
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	12%

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

Portfolio Value Over Time

LCG: 10.0%

LCV: 25.0%

SMIDC: 10.0%

EAFE: 15.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 20.0%

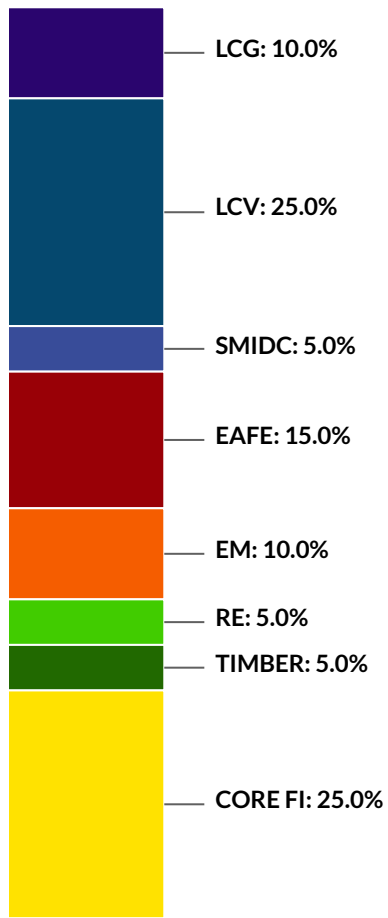|	2016	2021	2026	2031	2036
5%	$88 mm	$143 mm	$206 mm	$295 mm	$415 mm
25%	$88 mm	$127 mm	$174 mm	$239 mm	$329 mm
50%	$88 mm	$117 mm	$155 mm	$206 mm	$278 mm
75%	$88 mm	$107 mm	$137 mm	$178 mm	$234 mm
95%	$88 mm	$94 mm	$114 mm	$142 mm	$183 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

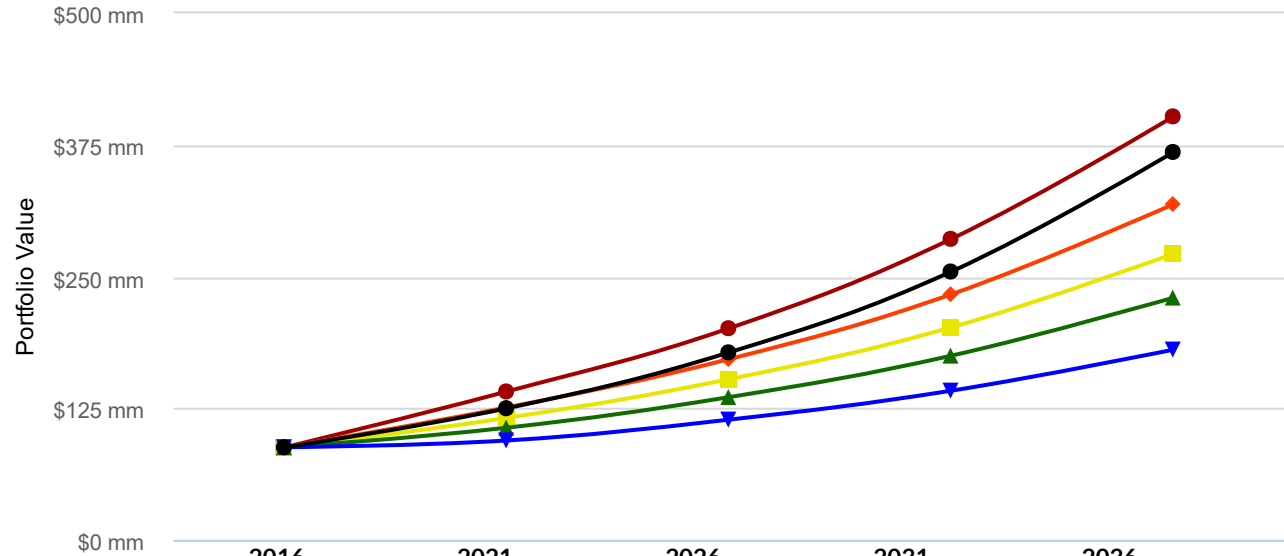|			
Beginning Value:	$88 mm	Mean Return:	6.15%
75% Year-20 Value:	$234 mm	Standard Deviation:	5.92
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.71
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	13%

DAHAB ASSOCIATES
2016

City of Franklin Pension Plan

Asset Allocation

Custom Projection Scenario

LCG: 10.0%

LCV: 25.0%

SMIDC: 5.0%

EAFE: 15.0%

EM: 10.0%

RE: 5.0%

TIMBER: 5.0%

CORE FI: 25.0%

Portfolio Value Over Time

	2016	2021	2026	2031	2036
5%	$88 mm	$141 mm	$201 mm	$286 mm	$402 mm
25%	$88 mm	$126 mm	$172 mm	$233 mm	$319 mm
50%	$88 mm	$116 mm	$153 mm	$202 mm	$272 mm
75%	$88 mm	$107 mm	$136 mm	$175 mm	$230 mm
95%	$88 mm	$94 mm	$114 mm	$142 mm	$181 mm
7.5%	$88 mm	$125 mm	$178 mm	$255 mm	$368 mm

Statistics

Beginning Value:	$88 mm	Mean Return:	6.02%
75% Year-20 Value:	$230 mm	Standard Deviation:	5.75
Required Year-20 Value:	$368 mm	Sharpe Ratio:	0.71
Actuarial Rate:	7.5%	Likelihood to Beat 7.5%:	10%

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