

IN THE SUPREME COURT OF OHIO

**THE STATE OF OHIO, ex rel.
EDWARD SIEDLE**

*

CASE NO.

*

RELATOR

Original Action in Mandamus

*

-vs-

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**STATE TEACHERS' RETIREMENT
SYSTEM OF OHIO, et al.**

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RESPONDENTS

AFFIDAVIT EXHIBITS 3 AND 4

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Investment
Cost Effectiveness Analysis
(for the 5 years ending December 31, 2016)

STRS Ohio

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Key takeaways

Returns

- Your 5-year net total return was 9.7% was in the top quartile of the U.S. public universe. This compares to the U.S. Public median of 8.7% and the peer median of 8.8%.
- Your 5-year policy return was 9.9%. This was above the U.S. Public median of 8.4% and above the peer median of 8.4%.

Value added

- Your 5-year net value added was -0.2%. This was below the U.S. Public median of 0.2% and below the peer median of 0.2%.

Cost

- Your investment cost for benchmarking purposes of 40.4 bps was below your benchmark cost of 47.9 bps. This suggests that your fund was low cost compared to your peers.
- Your fund was low cost because you had a lower cost implementation style and you paid less than peers for similar services.

Risk

- Your asset risk of 10.4% was above the U.S. Public median of 9.9% and the peer median of 10.2%.

This benchmarking report compares your cost and return performance to CEM's extensive pension database.

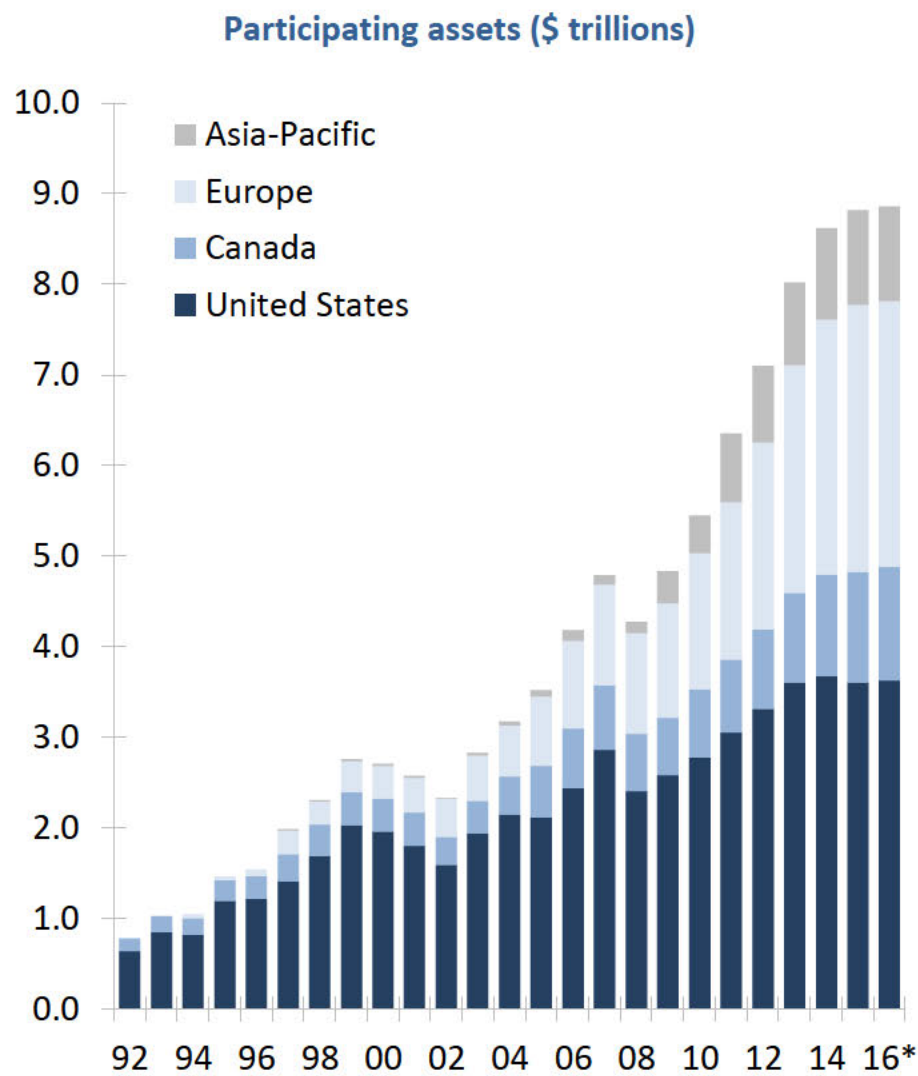
- 167 U.S. pension funds participate. The median U.S. fund had assets of \$8.7 billion and the average U.S. fund had assets of \$21.7 billion. Total participating U.S. assets were \$3.6 trillion.

- 76 Canadian funds participate with assets totaling \$1.3 trillion.

- 56 European funds participate with aggregate assets of \$2.8 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Denmark, Switzerland and the U.K.

- 7 Asia-Pacific funds participate with aggregate assets of \$1.0 trillion. Included are funds from Australia, New Zealand, China and South Korea.

The most meaningful comparisons for your cost and return performance are to the custom peer group.

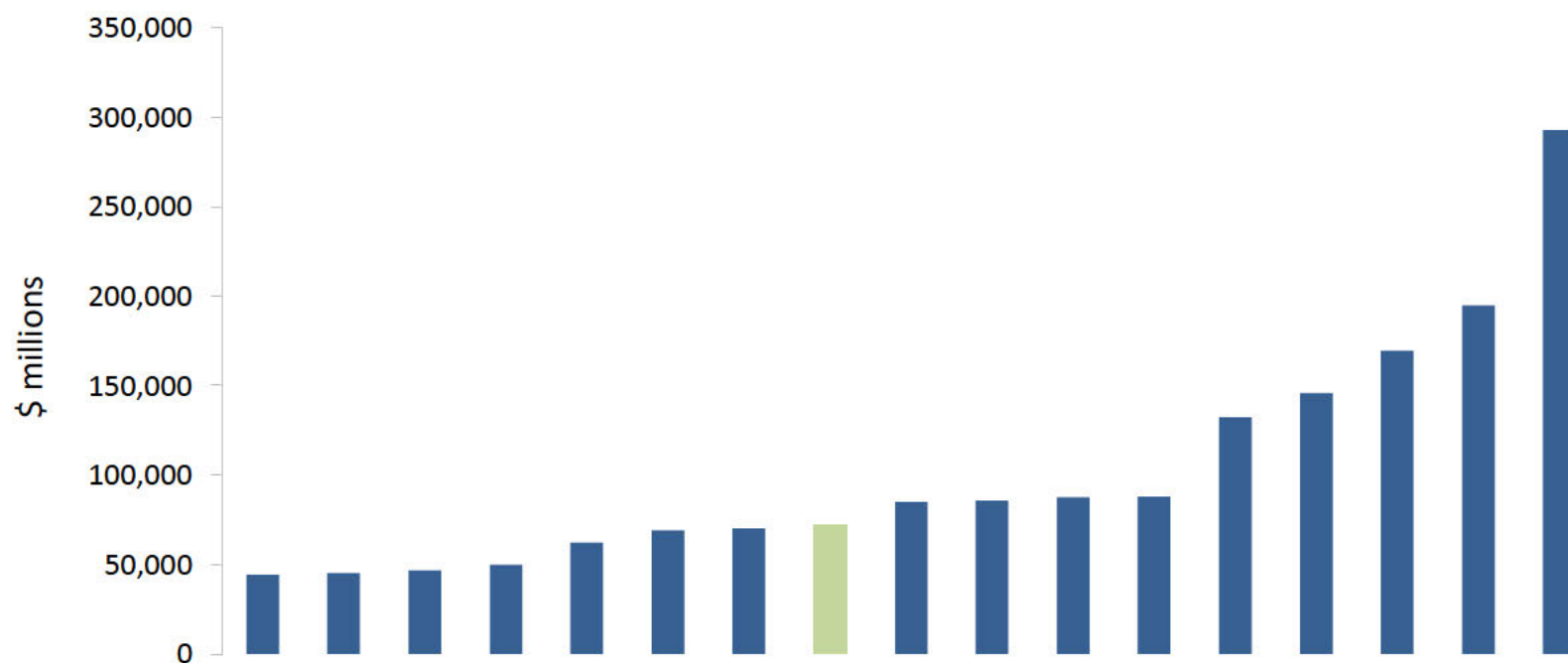


* 2016 reflects both received and expected data.

The most valuable comparisons for cost performance are to your custom peer group because size impacts costs.

Peer group for STRS Ohio

- 17 U.S. public sponsors from \$44 billion to \$293 billion
- Median size of \$85 billion versus your \$72 billion



To preserve client confidentiality, given potential access to documents as permitted by the Freedom of Information Act, we do not disclose your peers' names in this document.

What gets measured gets managed, so it is critical that you measure and compare the right things:

1. Returns

Why do total returns differ from other funds? What was the impact of your policy mix decisions versus implementation decisions?

2. Net value added

Are your implementation decisions adding value (i.e., mostly the effectiveness of active management, as well as the amount of active management versus passive management)?

3. Costs

Are your costs reasonable? Costs matter and can be managed.

4. Risk

What is the risk of your policy mix?

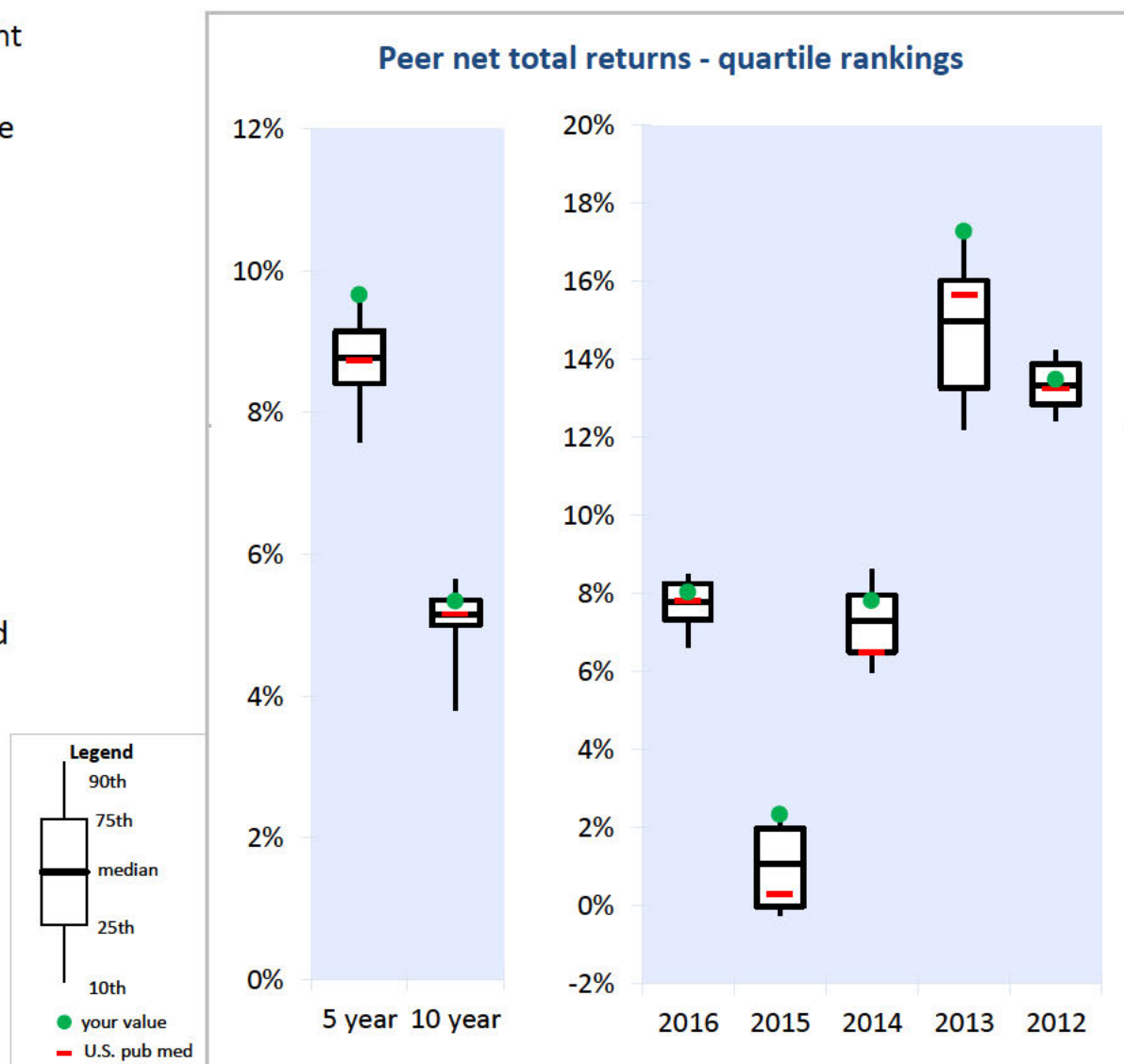
Your 5-year net total return of 9.7% was above the peer median of 8.8%.

Total returns, by themselves, provide little insight into the reasons behind relative performance. Therefore, we separate total return into its more meaningful components: policy return and value added.

	Your 5-year
Net total fund return	9.7%
- Policy return	9.9%
= Net value added	-0.2%

This approach enables you to understand the contribution from both policy mix decisions (which tend to be the board's responsibility) and implementation decisions (which tend to be management's responsibility).

The median 5-year net total return of the U.S. public universe was 8.7%.



Your 5-year policy return of 9.9% was above the peer median of 8.4%.

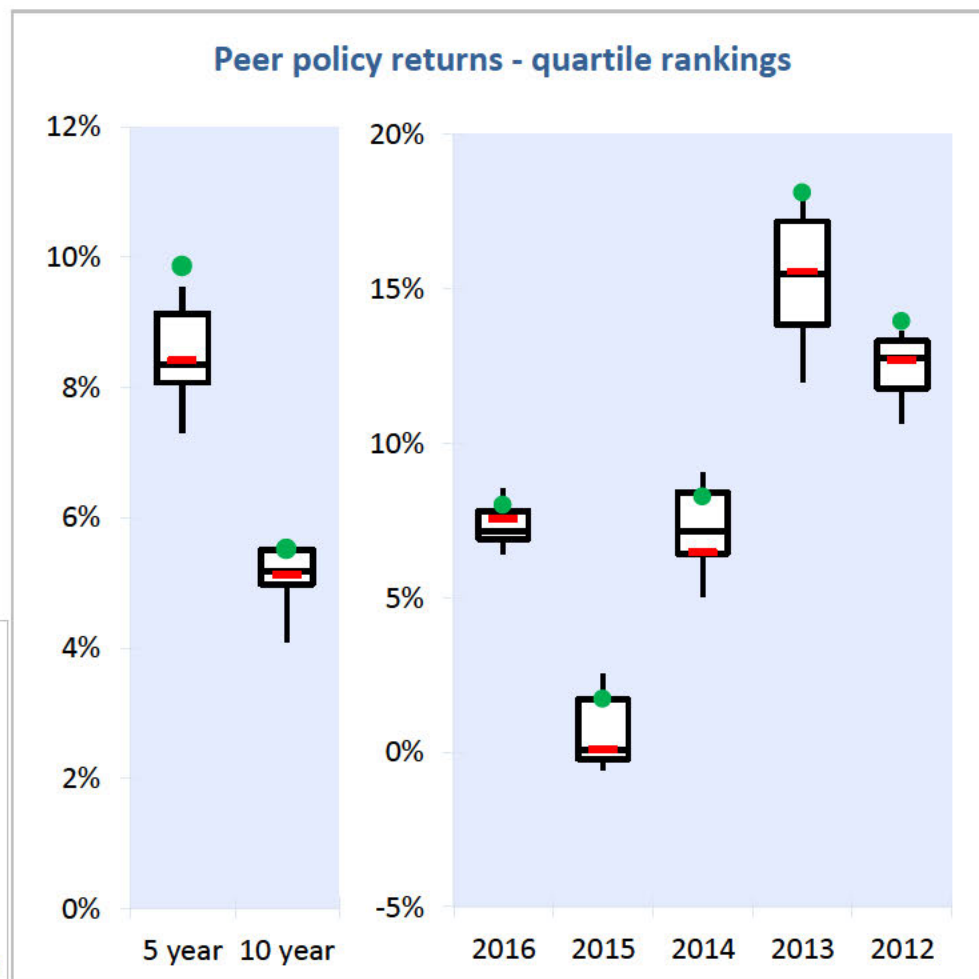
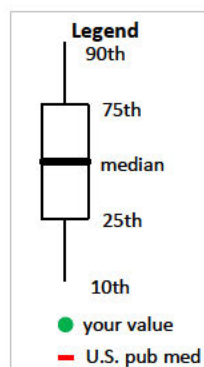
Your policy return is the return you could have earned passively by indexing your investments according to your policy mix.

Having a higher or lower relative policy return is not necessarily good or bad. Your policy return reflects your investment policy, which should reflect your:

- Long term capital market expectations
- Liabilities
- Appetite for risk

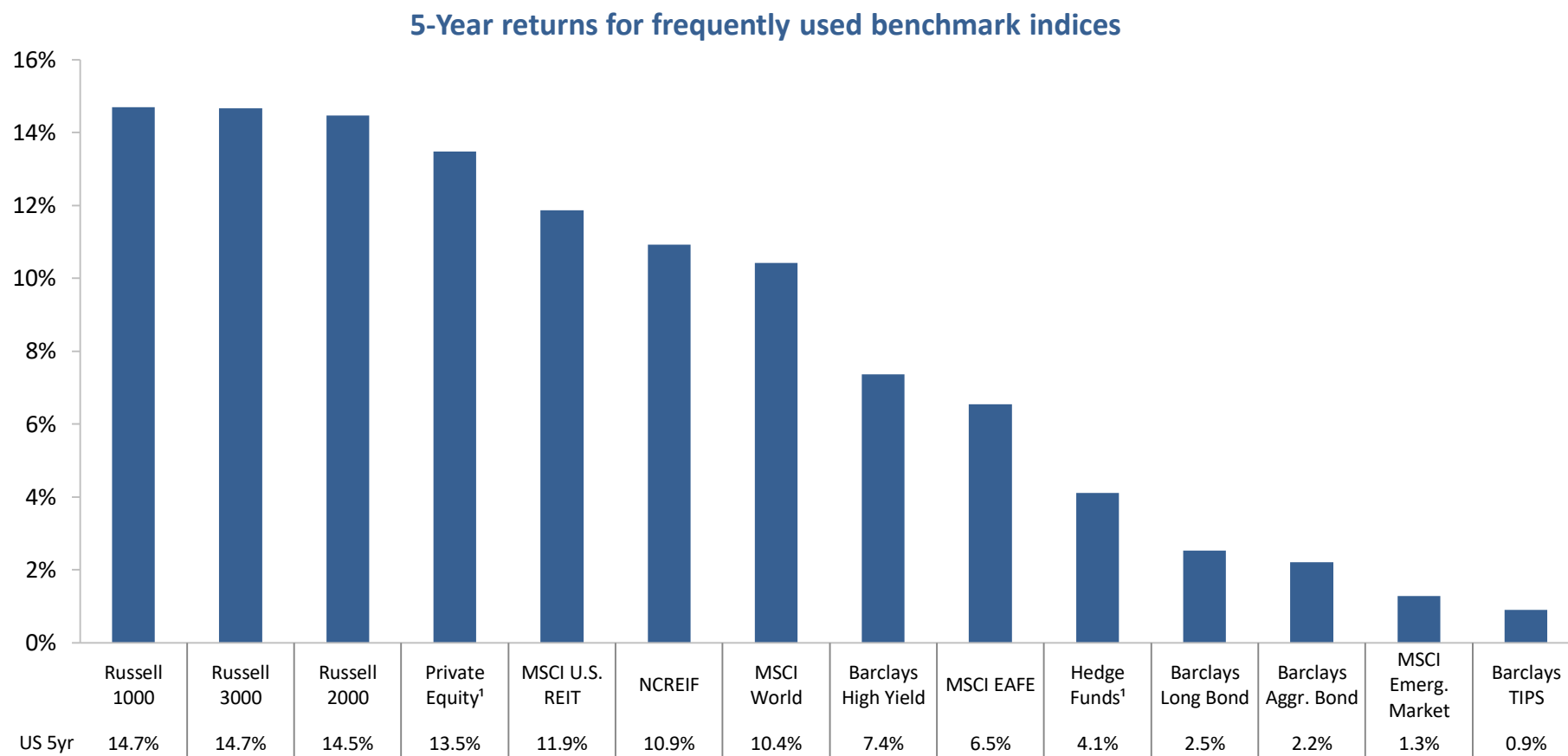
Each of these three factors is different across funds. Therefore, it is not surprising that policy returns often vary widely between funds.

The median 5-year policy return of the U.S. public universe was 8.4%.



To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 10.4%, 0.6% higher than your actual 5-year policy return of 9.9%. Mirroring this, your 5-year total fund net value added would be 0.6% lower. Refer to the Research section pages 6-7 for details.

Differences in policy returns are caused by differences in benchmarks and policy mix. The top performing asset classes for the 5 years ending 2016 were U.S. stock.



1. The private equity benchmark is the average of the default private equity benchmark returns applied to U.S. participants. The hedge fund and real estate benchmarks are the averages of benchmark returns reported by U.S. participants.

Your 5-year policy return was above the peer median primarily because of:

- The positive impact of your higher weight in one of the better performing asset classes of the past 5 years: U.S. Stock.
- The positive impact of your lower weight in one of the poorer performing asset classes of the past 5 years: Fixed Income.

5-year average policy mix

	Your Fund	Peer Avg.	U.S. Public Avg.
U.S. Stock	33%	19%	23%
Global Stock	0%	13%	8%
Non-US Stock	25%	16%	19%
Total Stock	58%	48%	50%
U.S. Bonds	18%	16%	17%
Cash	1%	1%	0%
Other Fixed Income ¹	0%	9%	9%
Total Fixed Income	19%	25%	26%
Real Estate incl. REITS	10%	10%	8%
Total Alternatives	13%	15%	13%
Total	100%	100%	100%

1. Other fixed income includes Inflation Indexed, High Yield, Long and Global bonds. Total above may not add due to rounding.

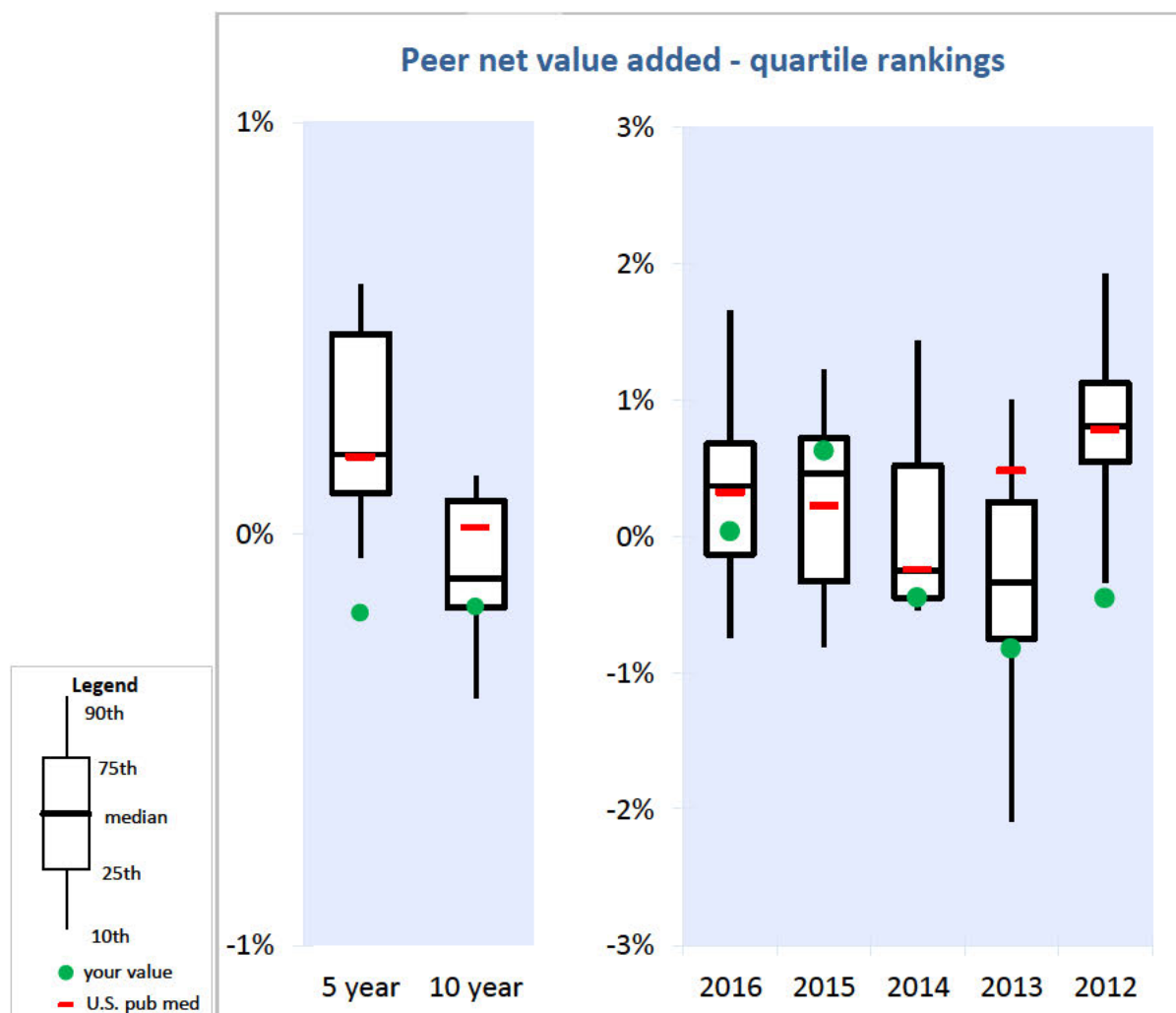
Net value added is the component of total return from active management. Your 5-year net value added was -0.2%.

Net value added equals total net return minus policy return.

Value added for STRS Ohio

Year	Net Return	Policy Return	Net value Added
2016	8.0%	8.0%	0.0%
2015	2.3%	1.7%	0.6%
2014	7.8%	8.3%	(0.5%)
2013	17.3%	18.1%	(0.8%)
2012	13.5%	13.9%	(0.5%)
5-year	9.7%	9.9%	(0.2%)

Your 5-year net value added of -0.2% compares to a median of 0.2% for your peers and 0.2% for the U.S. Public universe.



Your value added was impacted by your choice of benchmarks for private equity. CEM suggests using lagged, investable benchmarks for private equity (see Research section, pages 6-7, for reasons why). If your fund used the private equity benchmark suggested by CEM, your 5-year total fund value added would have been 0.6% lower.

Your investment costs were \$252.9 million or 35.5 basis points in 2016.

Asset management costs by asset class and style (\$000s)	Internal Management			External Mgmt Active base fees	Total
	Passive	Active	Overseeing of external		
U.S. Stock - Large Cap	64	10,873	557	2,234	13,728
U.S. Stock - Small Cap		250	62	8,862	9,173
Stock - EAFE		3,138	369	18,582	22,089
Stock - Emerging		2,578	250	5,834	8,662
Stock - ACWIxU.S.		430	23	5,445	5,898
Stock - Global		452			452
Fixed Income - U.S.		2,317			2,317
Fixed Income - Emerging			228	3,181	3,409
Fixed Income - High Yield			206	3,666	3,872
Cash		266			266
Global TAA			29	1,191	1,220
Hedge Funds - Direct			302	31,993	32,295
REITs	89				89
Real Estate		16,632			16,632
Real Estate - LPs			447	16,808	17,255
Infrastructure - Fund of Funds			60	1,817	1,877
Natural Resources		97			97
Natural Resources - LPs			93	6,426	6,519
Diversified Private Equity			21	2,651	2,672
LBO			903	32,702	33,604
LBO - Fund of Funds			355	14,979	15,334
Venture Capital			347	16,649	16,996
Venture Capital - Fund of Funds			124	6,069	6,193
Other Private Equity		28	177	24,063	24,268
Other Private Equity - Co-investments			233		233
Overlay Programs		127	325		452
Total					245,606 34.5bp
Oversight, custodial and other costs ¹					
Oversight & consulting					4,578
Trustee & custodial					2,090
Audit					166
Other					418
Total oversight, custodial & other costs					7,252 1.0bp
Total investment costs (excl. transaction costs & private asset performance fees)					252,858 35.5bp

* Internal investment costs were 6.0 bps while external investment costs were 28.5 bps.

Of the total investment management costs of 35.5 bps, external manager fees for alternative and real estate investments were 21.8 bps; other investment costs for internal assets, external equity and external fixed income investments that were used to arrive at the net of fee Total Fund return were 13.7 bps.

Footnotes

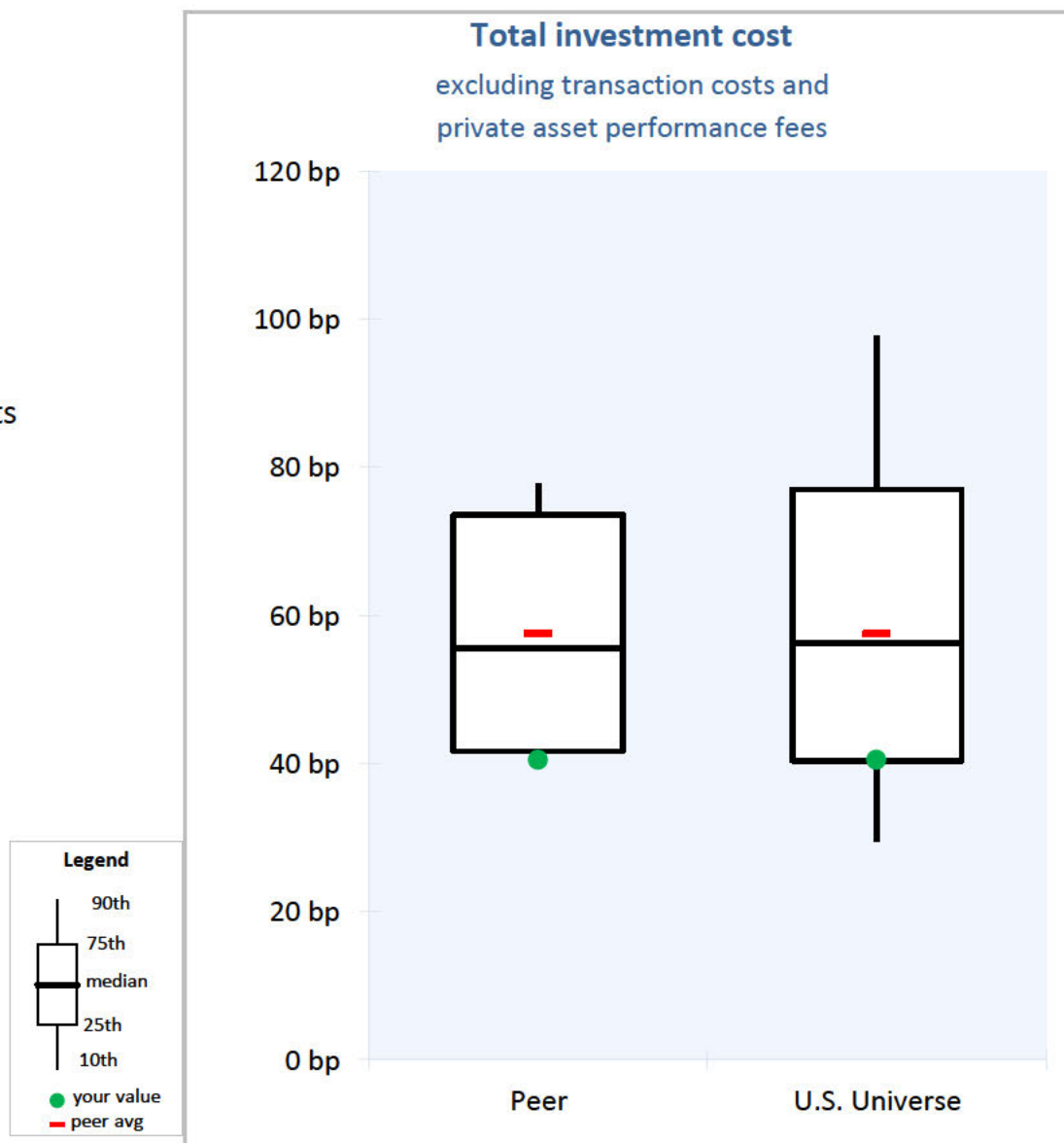
¹ Excludes non-investment costs, such as PBGC premiums and preparing checks for retirees.

Your total investment cost of 40.4 bps was below the peer median of 55.6 bps, and third lowest in the peer group.

For the comparison to the peer group, CEM has included your 35.5 bps in costs from page 10 and added hedge fund performance fees and private equity management fee offsets.

Differences in total investment cost are often caused by asset mix, particularly holdings of the highest cost asset classes: real estate (excl REITS), infrastructure, hedge funds and private equity. These high cost assets equaled 23% of your fund's assets at the end of 2016 versus a peer average of 27%.

Therefore, to assess whether your costs are high or low given your unique asset mix and size, CEM calculates a benchmark cost for your fund. This analysis is shown on the following page.



Benchmark cost analysis suggests that, after adjusting for fund size and asset mix, your fund was low cost by 7.5 basis points in 2016.

Your benchmark cost is an estimate of what your cost would be given your actual asset mix and the median costs that your peers pay for similar services. It represents the cost your peers would incur if they had your actual asset mix.

Your total cost of 40.4 bp was below your benchmark cost of 47.9 bp. Thus, your cost savings was 7.5 bp.

Your cost versus benchmark

	\$000s	basis points
Your total investment cost	287,912	40.4 bp
Your benchmark cost	341,316	47.9 bp
Your excess cost	(53,404)	(7.5) bp

Your fund was low cost because you had a lower cost implementation style and you paid less than peers for similar services.

Reasons for your low cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Lower cost implementation style		
• Less external active management (more lower cost passive and internal)	(53,352)	(7.5)
• More fund of funds	6,417	0.9
• More overlays	218	0.0
• Other style differences	4,768	0.7
	(41,950)	(5.9)
2. Paying less than peers for similar services		
• External investment management costs	(14,221)	(2.0)
• Internal investment management costs	5,087	0.7
• Oversight, custodial & other costs	(2,320)	(0.3)
	(11,454)	(1.6)
Total savings	(53,404)	(7.5)

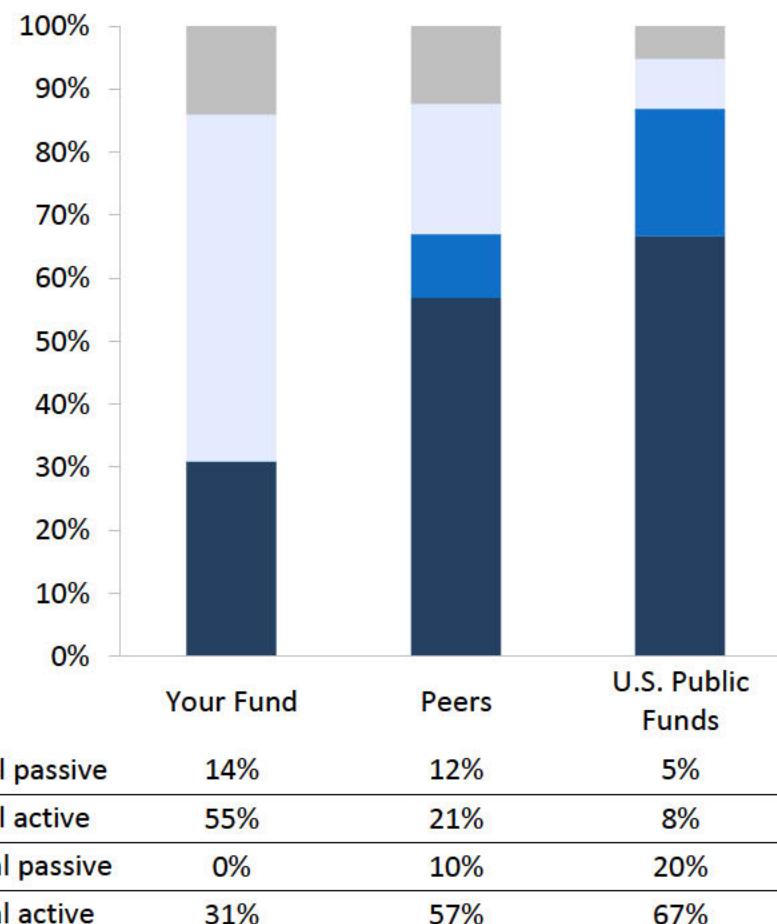
Differences in cost performance are often caused by differences in implementation style.

Implementation style is defined as the way in which your fund implements asset allocation. It includes internal, external, active, passive and fund of funds styles.

The greatest cost impact is usually caused by differences in the use of:

- External active management because it tends to be much more expensive than internal or passive management. You used less external active management than your peers (your 31% versus 57% for your peers).
- Within external active holdings, fund of funds usage because it is more expensive than direct fund investment. You had similar amounts in fund of funds. Your 8% of hedge funds, real estate and private equity in fund of funds compared to 5% for your peers.

Implementation style¹



1. The graph above does not take into consideration the impact of derivatives. The values in the graph are calculated using average holdings.

If your internally managed assets were managed externally and you paid peer median costs, your costs would have been higher by approximately \$101 million.

Additional External Investment Management Costs: Assuming STRS Ohio no longer had internal holdings and paid peer median external costs.

	STRS Ohio		Peer Median External Cost	Difference	
	Average holdings in \$mils	Internal Cost		in bps	Savings in \$000s
U.S. Stock - Large Cap - Passive	8,770	0.1	1.0	(0.9)	(794)
U.S. Stock - Large Cap - Active	10,325	10.5	25.6	(15.1)	(15,558)
U.S. Stock - Small Cap - Active	802	3.1	65.6	(62.4)	(5,006)
Stock - EAFE - Active	5,624	5.6	34.6	(29.0)	(16,299)
Stock - Emerging - Active	1,959	13.2	57.3	(44.2)	(8,656)
Stock - ACWIxU.S. - Active	2,860	1.5	44.3	(42.8)	(12,226)
Stock - Global - Active	657	6.9	38.7	(31.9)	(2,095)
Fixed Income - U.S. - Active	9,257	2.5	14.7	(12.2)	(11,326)
Cash - Active	1,477	1.8	n/a		0
REITs - Passive	1,214	0.7	1.6	(0.8)	(101)
Global TAA - Active	398	30.7	46.9	(16.3)	(647)
Real Estate ex-REITs - Active	5,675	29.3	56.1	(26.8)	(15,197)
Natural Resources - Active	416	2.3	98.8	(96.4)	(4,009)
Other Private Equity - Active	862	1.5	107.1	(105.5)	(9,101)
Total impact				(14.2) bp	(101,016)

Differences in implementation style saved you 6.0 bp relative to your peers.

Calculation of the cost impact of differences in implementation style

Asset class	Your avg holdings in \$mils	% External active			Premium vs passive & internal ¹	Cost/ (savings)	
		You	Peer average	More/ (less)		\$000s	bps
	(A)			(B)	(C)	(A X B X C)	
U.S. Stock - Large Cap	20,120						
U.S. Stock - Small Cap	1,978						
Stock - EAFE	11,121						
Stock - Emerging	2,935						
Stock - ACWIxU.S.	4,084						
Stock - Global	657						
Fixed Income - U.S.	9,257						
Fixed Income - Emerging	734						
Fixed Income - High Yield	873						
Global TAA	398						
REITs	1,214						
Infrastructure	83						
Real Estate ex-REITs	7,237						
Partnerships, as a proportion of external:	1,563						
Natural Resources	983						
Partnerships, as a proportion of external:	567						
Diversified Private Equity	166						
LBO	4,464						
Venture Capital	1,446						
Other private equity	2,584						
Impact of less/more external active vs. lower cost styles						(53,352)	(7.5) bp
				<u>Fund of funds % of LPs</u>	<u>vs. direct LP¹</u>		
Hedge Funds	2,021						
Infrastructure - LPs	83						
Performance Fee Impact (on NAV):	106						
Real Estate ex-REITs - LPs	1,563						
Natural Resources - LPs	567						
Diversified Private Equity - LPs	166						
LBO - LPs	4,464						
Venture Capital - LPs	1,446						
Impact of less/more fund of funds vs. direct LPs						5,739	0.8 bp
<u>Overlays and other</u>							
Impact of higher use of portfolio level overlays						218	0.0 bp
Impact of mix of internal passive, internal active, and external passive ³						4,768	0.7 bp
Total impact of differences in implementation style						(42,627)	(6.0) bp

Footnotes

1. The cost premium is the additional cost of external active management relative to the average of other lower cost implementation styles - internal passive, internal active and external passive.
2. A cost premium listed as 'N/A' indicates that there was not enough peer data in one or both styles to calculate the premium.
3. The 'Impact of mix of internal passive, internal active and external passive' quantifies the net cost impact of differences in cost between, and your relative use of, these 'low-cost' styles.

The net impact of paying more/less for external asset management costs saved 2.0 bps.

Cost impact of paying more/(less) for external asset management

	Your avg holdings in \$mils	Cost in bps			Cost/ (savings) in \$000s
	(A)	Your Fund	Peer median	More/ (less) (B)	(A X B)
U.S. Stock - Large Cap - Active	1,025	27.2			
U.S. Stock - Small Cap - Active	1,177	75.8			
Stock - EAFE - Active	5,497	34.5			
Stock - Emerging - Active	976	62.4			
Stock - ACWIxU.S. - Active	1,225	44.6			
Fixed Income - Emerging - Active	734	46.4			
Fixed Income - High Yield - Active	873	44.4			
Global TAA - Active	398	30.7			
Hedge Funds - Active	2,021	160.1 ¹			
Performance Fees:	2,021	111.3			
Infrastructure - Fund of Fund	83	225.9			
Real Estate ex-REITs - Limited Partnership	1,563	114.4			
Natural Resources - Limited Partnership	567	115.2			
Diversified Private Equity - Active	166	164.7			
LBO - Active	3,484	126.0			
LBO - Fund of Fund	980	156.8			
Venture Capital - Active	1,173	147.1			
Venture Capital - Fund of Fund	273	227.3			
Other Private Equity - Active	2,398	107.1			
<i>Notional</i>					
Derivatives/Overlays - Currency - Hedge	4,148	0.8			
Total impact of paying more/less for external management					(14,221)
Total in bps					(2.0) bp

*Universe median used as peer data was insufficient.

¹ You paid performance fees in these asset classes.

The net impact of paying more/less for internal asset management costs added 0.7 bps.

Cost impact of paying more/(less) for internal asset management

	Your avg holdings in \$mils	Cost in bps			Cost/ (savings) in \$000s
		Your Fund	Peer median	More/ (less)	
	(A)			(B)	(A X B)
U.S. Stock - Large Cap - Passive	8,770	0.1			
U.S. Stock - Large Cap - Active	10,325	10.5			
U.S. Stock - Small Cap - Active	802	3.1			
Stock - EAFE - Active	5,624	5.6			
Stock - Emerging - Active	1,959	13.2			
Stock - ACWIxU.S. - Active	2,860	1.5			
Stock - Global - Active	657	6.9			
Fixed Income - U.S. - Active	9,257	2.5			
REITs - Passive	1,214	0.7			
Real Estate ex-REITs - Active	5,675	29.3			
Natural Resources - Active	416	2.3			
Other Private Equity - Active	185	1.5			
<i>Notional</i>					
Derivatives/Overlays - Currency - Hedge	6,069	0.2			
Total impact of paying more/less for internal management					5,087
Total in bps					0.7 bp

'Insufficient' indicates insufficient peer and universe data to do meaningful comparisons.

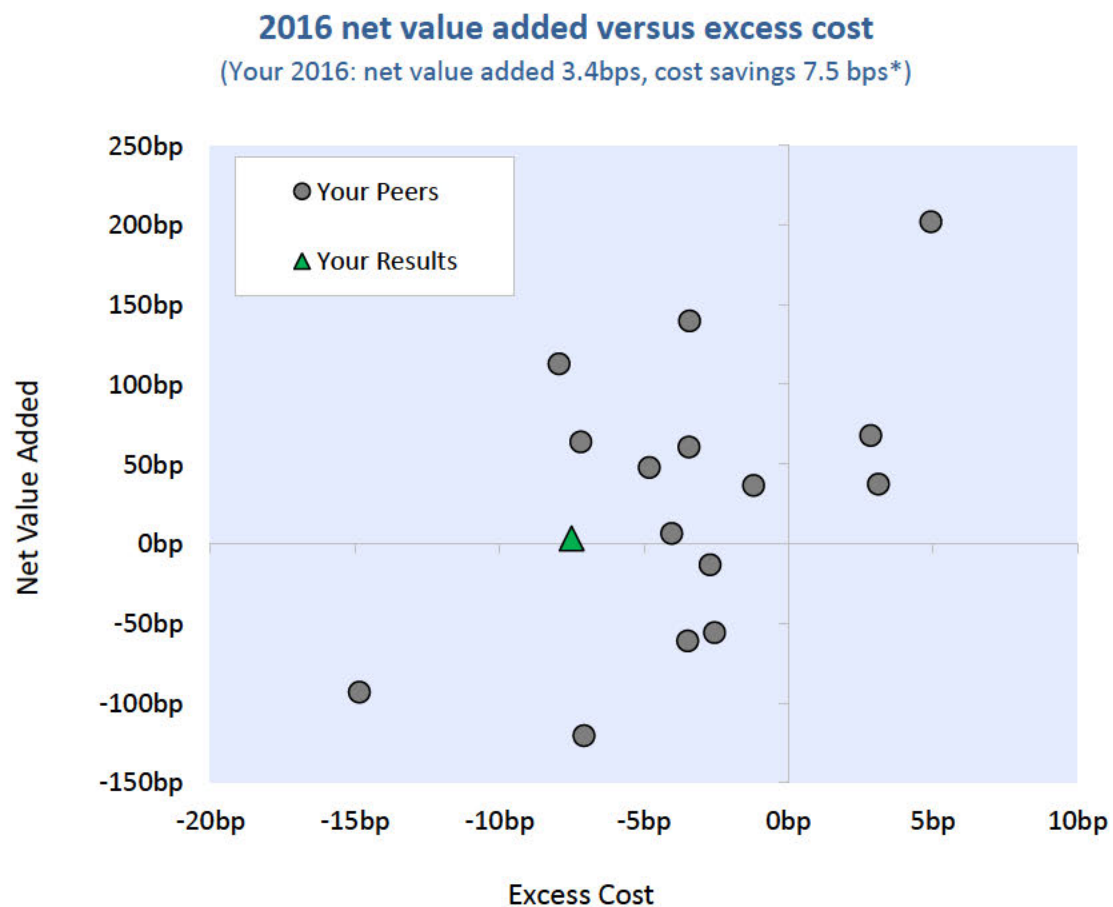
*Universe median used as peer data was insufficient.

The net impact of differences in oversight, custodial & other costs saved 0.3 bps.

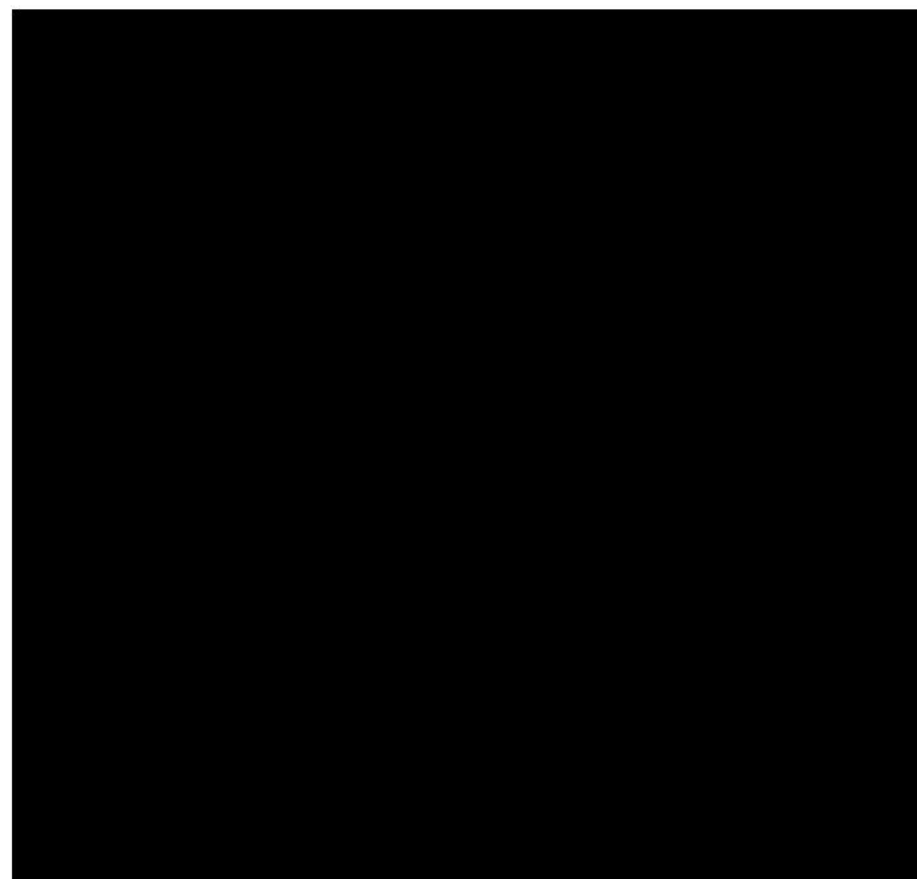
Cost impact of differences in oversight, custodial & other costs

	Your avg holdings in \$mils	Cost in bps			Cost/ (savings) in \$000s
		Your fund	Peer median	More/ (less)	
	(A)			(B)	(A X B)
Oversight & consulting	71,209	0.6	■	■	■
Custodial	71,209	0.3	■	■	■
Audit	71,209	0.0	■	■	■)
Other	71,209	0.1	■	■	■
Total					(2,320)
Total in bps					(0.3) bp

Your 2016 performance placed in the positive value added, low cost quadrant of the cost effectiveness chart.

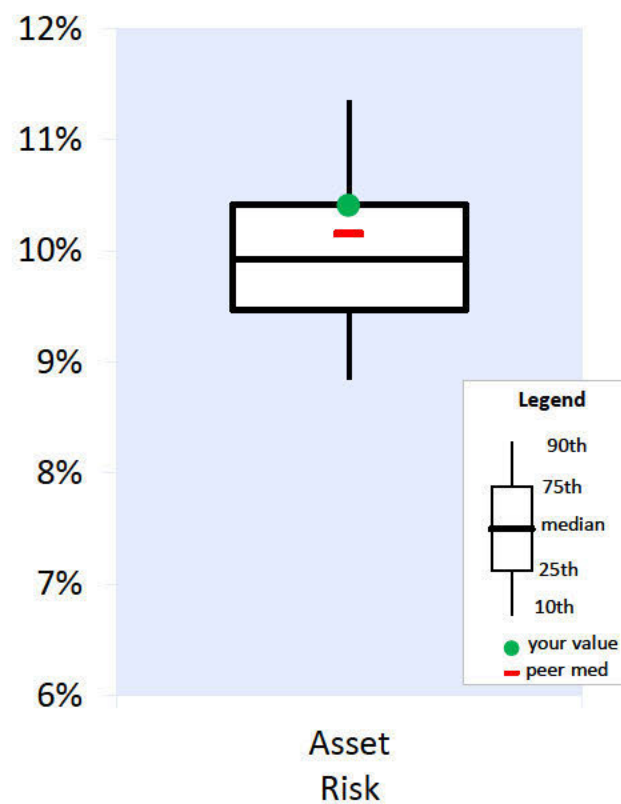


Comparison of risk levels



○ Global ○ U.S. ● Peers ▲ You — Linear (U.S.)

U.S. Public Asset risk at December 31, 2016



Your asset risk of 10.4% was above the U.S. Public median of 9.9% and the peer median of 10.2%. Asset risk is the standard deviation of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your policy mix.

Key takeaways

Returns

- Your 5-year net total return was 9.7% was in the top quartile of the U.S. public universe. This compares to the U.S. Public median of 8.7% and the peer median of 8.8%.
- Your 5-year policy return was 9.9%. This was above the U.S. Public median of 8.4% and above the peer median of 8.4%.

Value added

- Your 5-year net value added was -0.2%. This was below the U.S. Public median of 0.2% and below the peer median of 0.2%.

Cost and cost effectiveness

- Your investment cost for benchmarking purposes of 40.4 bps was below your benchmark cost of 47.9 bps. This suggests that your fund was low cost compared to your peers.
- Your fund was low cost because you had a lower cost implementation style and you paid less than peers for similar services.

Risk

- Your asset risk of 10.4% was above the U.S. Public median of 9.9% and the peer median of 10.2%.

2

Research and Trends

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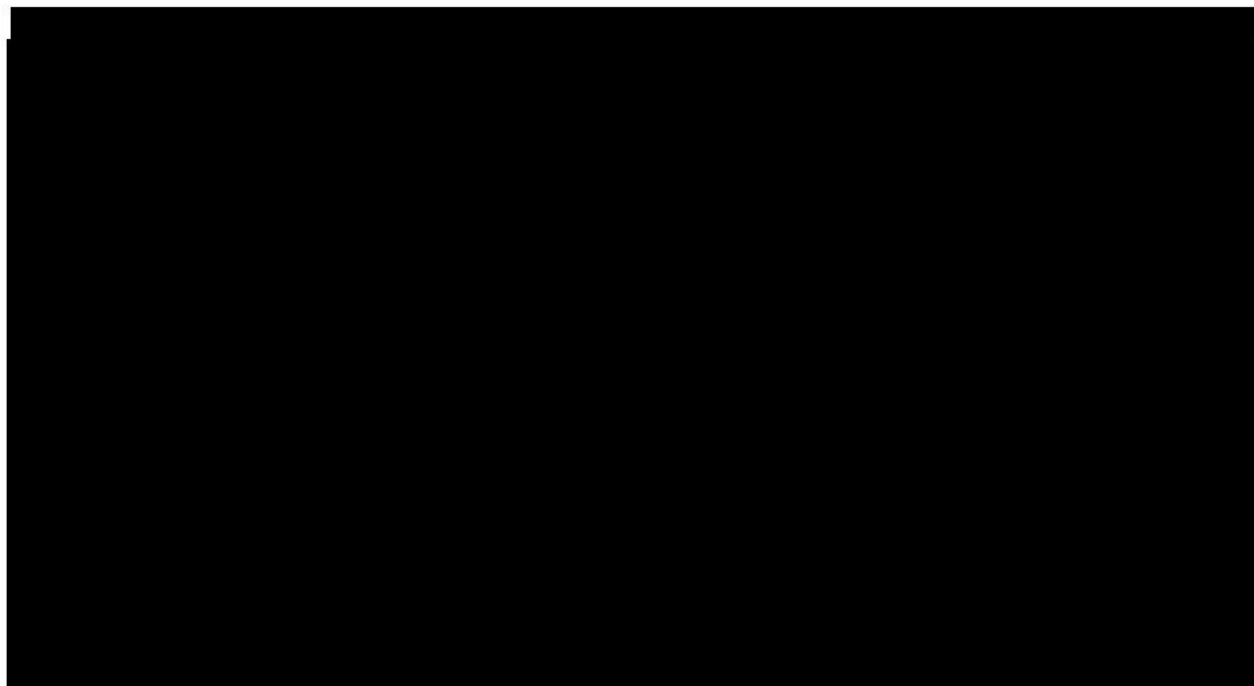
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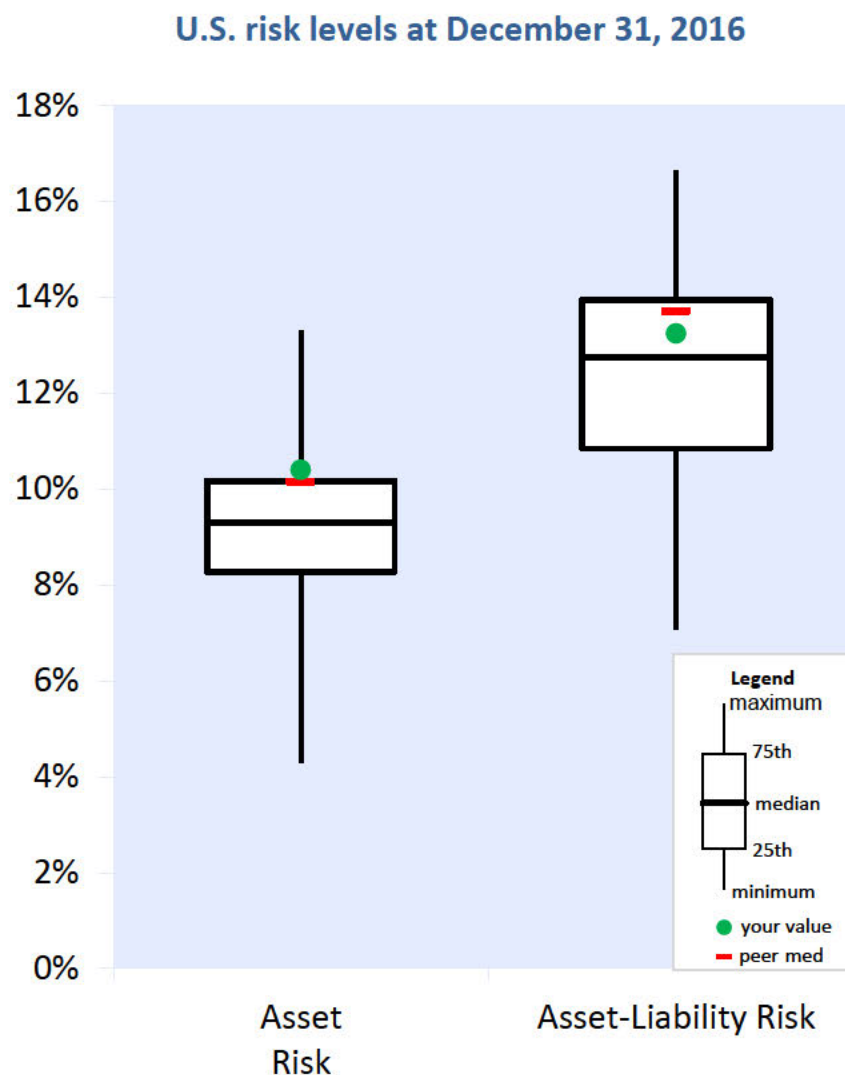
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Risk by type

Your asset risk of 10.4% was above the U.S. median of 9.3%. Asset risk is the standard deviation of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your policy mix.

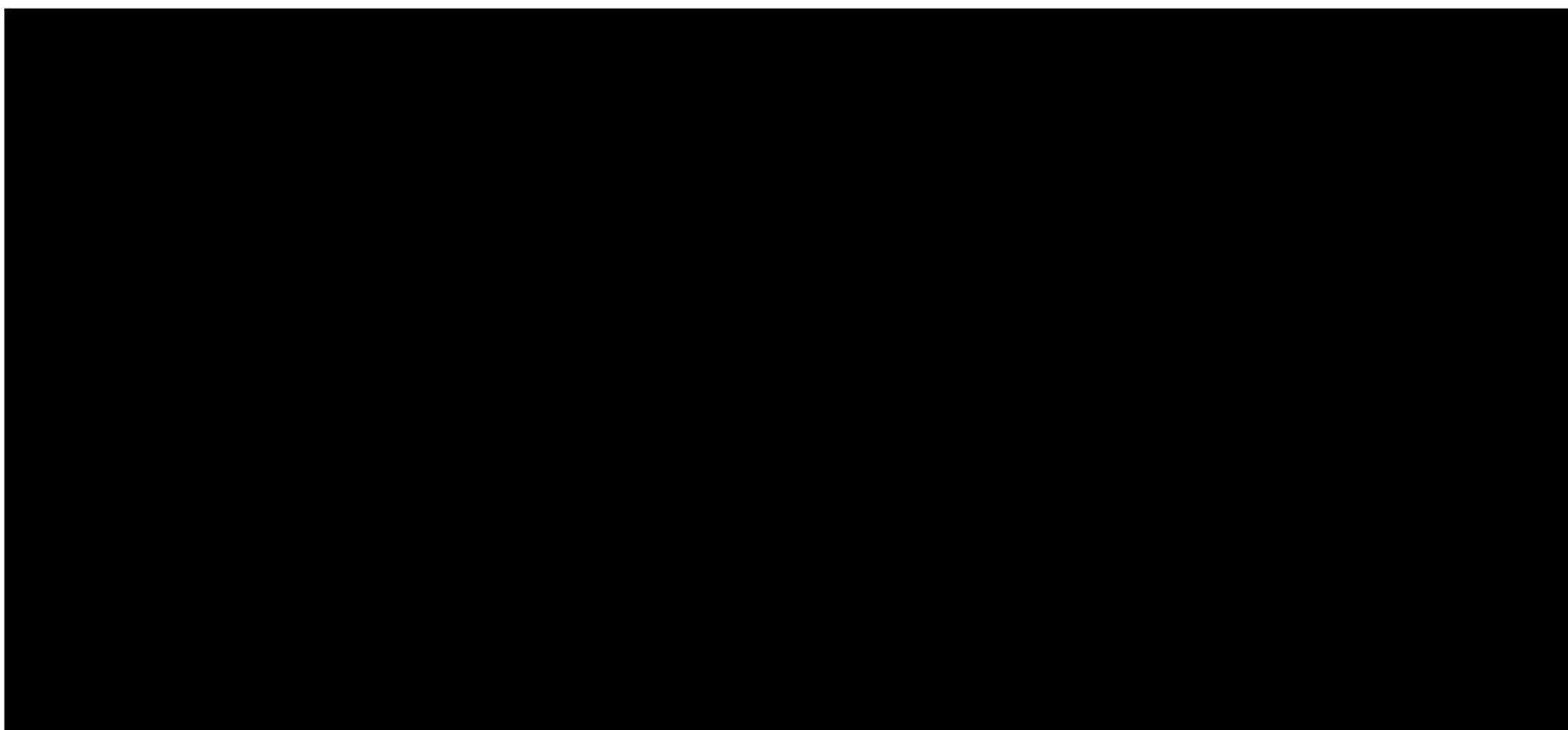
Asset-liability risk is the standard deviation of funded status caused by market factors. It is a function of the standard deviations of your asset risk, your marked-to-market liabilities and the correlation between the two.



Risk versus return

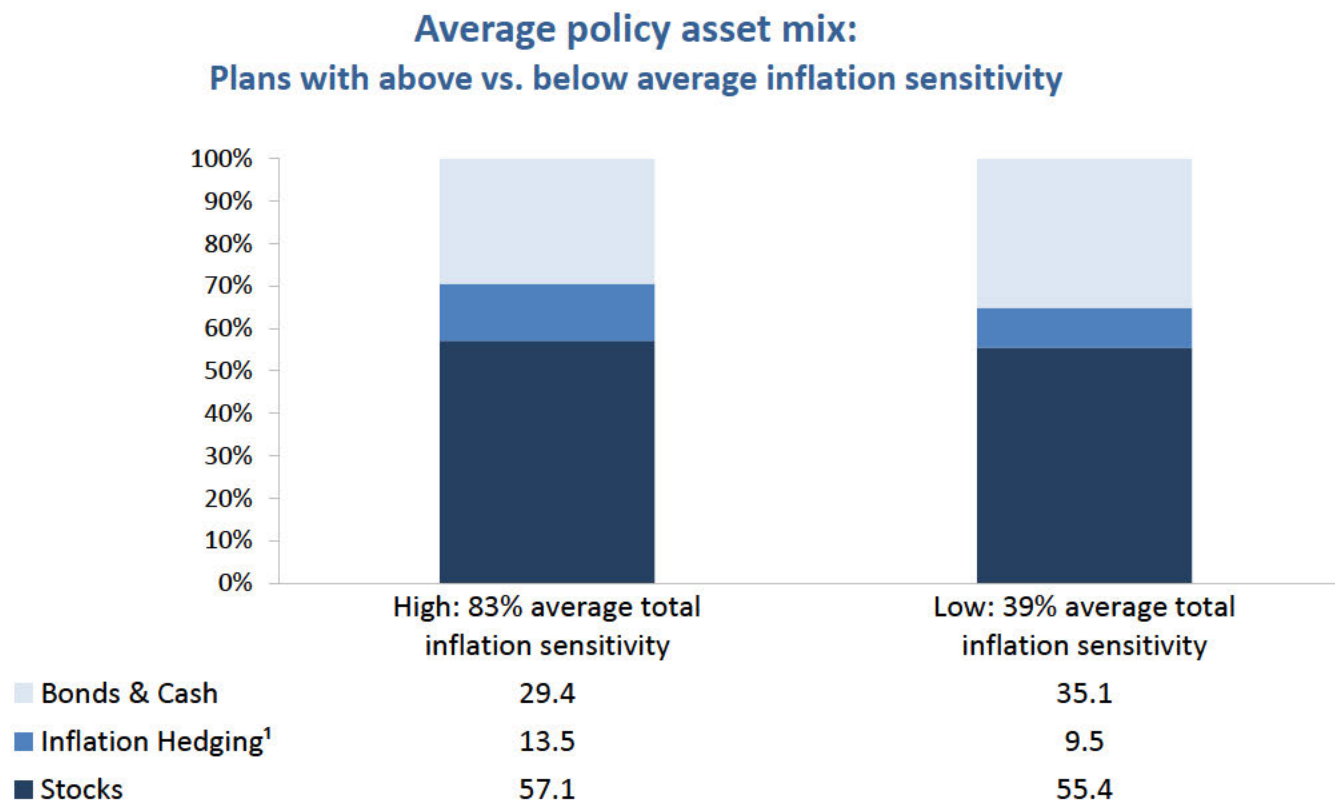
Higher asset-liability risk was associated with positive changes in marked-to-market funded status.

Higher asset risk was associated with higher policy returns.



Impact of inflation sensitivity on policy asset mix decisions

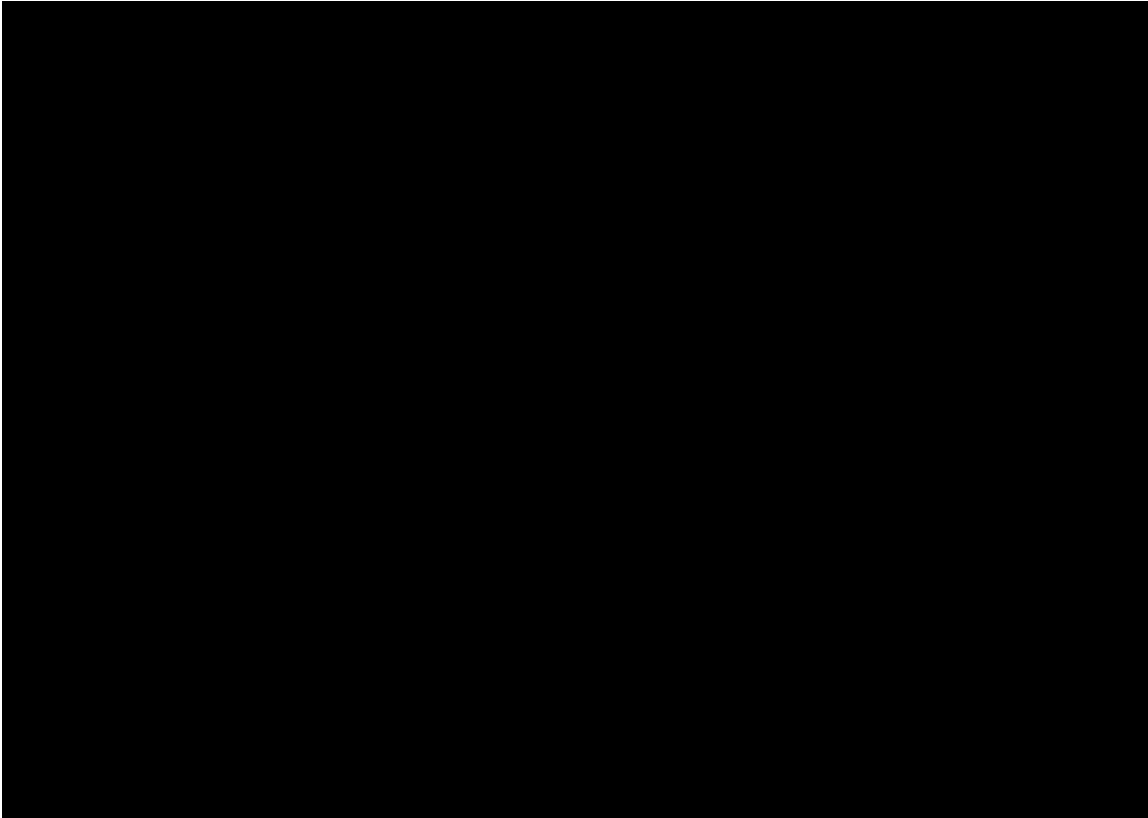
One would expect plans with more inflation sensitivity to have more inflation hedging assets and fewer nominal bonds than plans with less inflation sensitivity. Although this is true, the difference is small: inflation hedging assets represent 13.5% of assets at plans with high inflation sensitivity versus 9.5% at plans with lower inflation sensitivity.



1. Inflation hedge assets include inflation-indexed bonds, commodities, real estate & REITs, infrastructure and natural resources.



Reasons for the increase in costs include:

- Allocation to the more expensive asset classes - hedge funds, real assets and private equity- increased from 14% to 23% on average.
 - Changes in implementation style have had a minor impact.
- 

1. This analysis is based on 79 U.S. funds with 10 consecutive years of data.

_____.

Age Group	Percentage of Respondents
18-29	85%
30-49	75%
50-64	65%
65+	50%

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	Asset mix ³	Returns ⁴
1. 100% in the market	100% in the market	100% in the market
2. 90% in the market, 10% in the risk-free rate	90% in the market, 10% in the risk-free rate	90% in the market, 10% in the risk-free rate
3. 80% in the market, 20% in the risk-free rate	80% in the market, 20% in the risk-free rate	80% in the market, 20% in the risk-free rate
4. 70% in the market, 30% in the risk-free rate	70% in the market, 30% in the risk-free rate	70% in the market, 30% in the risk-free rate
5. 60% in the market, 40% in the risk-free rate	60% in the market, 40% in the risk-free rate	60% in the market, 40% in the risk-free rate
6. 50% in the market, 50% in the risk-free rate	50% in the market, 50% in the risk-free rate	50% in the market, 50% in the risk-free rate
7. 40% in the market, 60% in the risk-free rate	40% in the market, 60% in the risk-free rate	40% in the market, 60% in the risk-free rate
8. 30% in the market, 70% in the risk-free rate	30% in the market, 70% in the risk-free rate	30% in the market, 70% in the risk-free rate
9. 20% in the market, 80% in the risk-free rate	20% in the market, 80% in the risk-free rate	20% in the market, 80% in the risk-free rate
10. 10% in the market, 90% in the risk-free rate	10% in the market, 90% in the risk-free rate	10% in the market, 90% in the risk-free rate
11. 0% in the market, 100% in the risk-free rate	0% in the market, 100% in the risk-free rate	0% in the market, 100% in the risk-free rate

3

Description of peer group and universe

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- trends from 2012 to 2016	6
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Actual mix from 2012 to 2016	8
Policy mix from 2012 to 2016	9

Peer group

Your peer group is comprised of 17 U.S. public funds, with assets ranging from \$44.1 billion to \$292.9 billion versus your \$71.7 billion. The median size is \$85.1 billion.

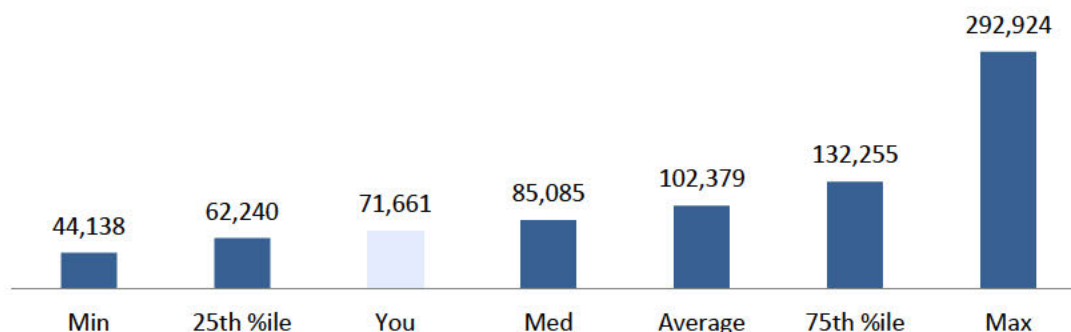
In order to preserve client confidentiality, we do not disclose your peers' names in this document due to the Freedom of Information Act. Your peer group consist of plans with the following characteristics:

Peer Group Characteristics - 2016

	Your Plan	Peers	U.S. Public
<u>Plan Assets (\$ billions)</u>			
Range	71.7	44.1 - 292.9	1.3 - 292.9
Median		85.1	17.4
<u># of Plans</u>			
Public	1	17	59
<u>Implementation style</u>			
% External active	31.1	57.0	66.5
% External passive	0.1	10.0	20.4
% Internal active	54.6	20.5	7.8
% Internal passive	14.1	12.5	5.3
<u>Asset mix</u>			
% Stock	57.6	44.8	46.5
% Fixed Income	16.8	25.1	26.1
% Real Assets	12.9	13.1	11.5
% Private Equity	9.3	11.3	8.5
% Hedge Funds & Other	3.4	5.7	5.2

Your peer group is selected such that your fund size is usually close to the median of your peer group. Size is the primary criteria for choosing your peer group, because size greatly impacts how much you pay for services. Generally, the larger your fund, the smaller your unit operating costs (i.e., the economies of scale impact).

Total fund assets (\$ millions) - you versus peers

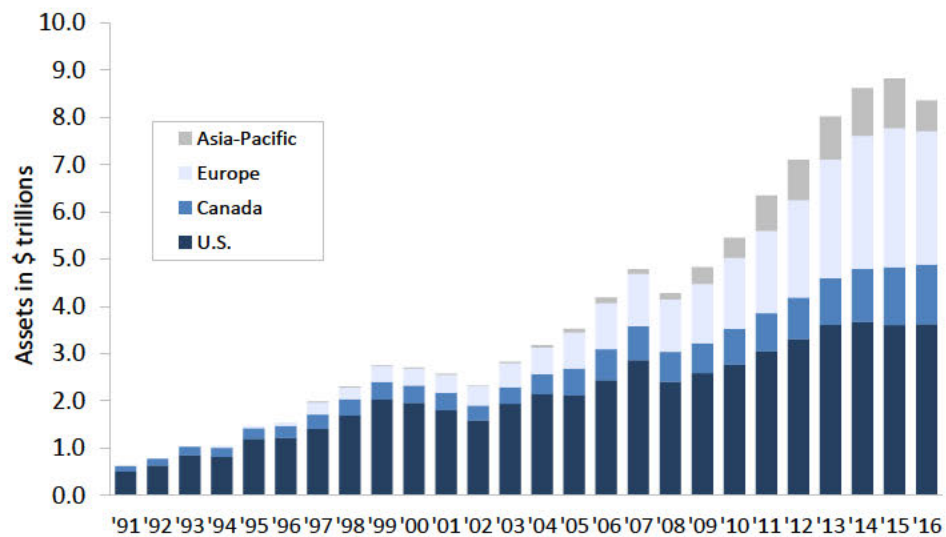


CEM global universe

CEM has been providing investment benchmarking solutions since 1991. The 2016 survey universe is comprised of 306 funds representing \$8.4 trillion in assets. The breakdown by region is as follows:

- 167 U.S. pension funds with aggregate assets of \$3.6 trillion.
- 76 Canadian pension funds with aggregate assets of \$1,257 billion.
- 56 European pension funds with aggregate assets of \$2.8 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Denmark, Switzerland and the UK.
- 7 Asia-Pacific pension funds with aggregate assets of \$648 billion.

CEM global universe



Universe subsets

CEM's global survey universe is comprised of 306 funds with total assets of \$8.4 trillion. Your fund's returns and costs are compared to the following two subsets of the global universe:

- **Peers** - Your peer group is comprised of 17 U.S. public funds ranging in size from \$44.1 - \$292.9 billion. The peer median of \$85.1 billion compares to your \$71.7 billion.
- **U.S. Public** - The U.S. Public universe is comprised of 59 funds ranging in size from \$1.3 - \$292.9 billion. The median fund is \$17.4 billion.

Universe subsets by number of funds and assets

		U.S. by type				Global by country				
		Corp.	Public	Other	Total	U.S.	Canada	Europe	Asia-Pacific	Total
Peer group¹										
<u># of funds</u>										
2016	17	98	59	10	167	167	76	56	7	306
2015	17	101	63	10	174	174	80	60	12	326
2014	17	98	66	13	177	177	89	145	12	423
2013	17	112	65	15	192	192	90	153	10	445
2012	17	120	68	14	202	202	89	143	14	448
<u># of funds with uninterrupted data for:</u>										
1 yr	17	98	59	10	167	167	76	56	7	306
2 yrs	17	81	55	10	146	146	62	38	7	253
3 yrs	17	75	53	9	137	137	58	34	7	236
4 yrs	17	70	48	8	126	126	55	33	6	220
5 yrs	17	67	47	7	121	121	53	25	6	205
6 yrs	17	66	45	7	118	118	48	21	6	193
<u>Total assets (\$ billions)</u>										
2016	1,740	1,011	2,481	136	3,628	3,628	1,257	2,827	648	8,359
2015	1,702	964	2,508	130	3,601	3,601	1,228	2,943	1,047	8,819
2014	1,706	1,034	2,508	163	3,674	3,674	1,121	2,814	1,011	8,619
2013	1,619	1,045	2,396	163	3,604	3,604	990	2,512	915	8,021
2012	1,456	1,005	2,210	97	3,311	3,311	878	2,061	849	7,099
<u>2016 asset distribution (\$ billions)</u>										
Avg	102.4	10.3	42.0	13.6	21.7	21.7	16.5	50.5	92.6	27.3
Max	292.9		292.9		292.9	292.9				
75th %ile	132.3		49.3		23.5	23.5				
Median	85.1		17.4		8.7	8.7				
25th %ile	62.2		6.7		2.8	2.8				
Min	44.1		1.3		0.2	0.2				

1. Peer group statistics are for your 2016 peer group only as your peer group may have included different funds in prior years.

Implementation style, actual mix and policy mix by universe subset

Implementation style, actual mix and policy mix - 2016
(as a % of year-end assets)

	Your fund	Peer group	U.S. by type				Global by country				
			Corp.	Public	Other	Total	U.S.	Canada	Europe	Asia-Pacific	Total
<u>Implementation style</u>											
External active	29.7	55.5	74.5	63.5	68.4	70.2	70.2	63.6	45.0	38.8	63.2
Fund of funds	1.5	1.5	3.3	3.0	3.3	3.2	3.2	1.9	3.3	1.9	2.9
External passive	0.1	10.0	16.8	20.4	20.8	18.3	18.3	12.6	25.8	12.2	18.1
Internal active	54.6	20.5	3.8	7.8	2.3	5.1	5.1	16.8	21.4	33.1	11.6
Internal passive	<u>14.1</u>	<u>12.5</u>	<u>1.6</u>	<u>5.3</u>	<u>5.3</u>	<u>3.1</u>	<u>3.1</u>	<u>5.1</u>	<u>3.3</u>	<u>13.9</u>	<u>3.9</u>
Total	100	100	100	100	100	100	100	100	99	100	100
<u>Actual asset mix</u>											
Stock	57.6	44.8	38.9	46.5	43.0	41.8	41.8	45.0	40.0	40.1	42.2
Fixed income	16.8	25.1	44.0	26.1	34.4	37.1	37.1	36.5	43.2	36.5	38.1
Global TAA	0.6	1.3	1.9	2.1	1.4	2.0	2.0	0.7	0.1	0.7	1.3
Real assets	12.9	13.1	5.2	11.5	10.3	7.7	7.7	11.8	8.7	16.0	9.1
Hedge funds	2.8	4.4	5.7	5.2	4.1	5.5	5.5	2.7	2.0	2.4	4.1
Private equity	<u>9.3</u>	<u>11.3</u>	<u>4.3</u>	<u>8.5</u>	<u>6.8</u>	<u>5.9</u>	<u>5.9</u>	<u>3.2</u>	<u>2.9</u>	<u>4.3</u>	<u>4.7</u>
Total	100	100	100	100	100	100	100	100	97	100	99
<u>Policy asset mix</u>											
Stock	57.0	46.2	39.1	46.5	45.0	42.1	42.1	44.6	41.1	48.4	42.7
Fixed income	19.0	24.8	44.1	25.2	32.8	36.7	36.7	38.0	43.8	31.0	38.2
Global TAA	0.0	0.9	1.8	1.9	2.1	1.8	1.8	0.9	0.1	0.7	1.3
Real assets	10.0	13.1	4.9	12.4	10.6	7.9	7.9	12.1	4.1	15.0	8.4
Hedge funds	0.0	3.7	5.2	4.8	3.4	5.0	5.0	1.5	2.0	1.2	3.5
Private equity	<u>14.0</u>	<u>11.4</u>	<u>4.9</u>	<u>9.2</u>	<u>6.2</u>	<u>6.5</u>	<u>6.5</u>	<u>2.9</u>	<u>3.4</u>	<u>3.7</u>	<u>5.0</u>
Total	100	100	100	100	100	100	100	100	94	100	99

Implementation style, actual mix and policy mix trends

Implementation style, actual mix and policy mix - 2012 to 2016
(as a % of year-end assets)

	Your fund					Peer average ¹					U.S. Public average ¹				
	2016	2015	2014	2013	2012	2016	2015	2014	2013	2012	2016	2015	2014	2013	2012
<u>Implementation style</u>															
External active	31.1	30.5	28.1	25.2	25.7	57.0	56.6	55.8	55.5	55.5	63.8	64.0	63.6	63.4	64.7
External passive	0.1	0.0	0.0	0.0	0.0	10.0	10.7	10.9	10.9	10.9	21.0	20.9	20.9	20.8	20.0
Internal active	54.6	55.6	58.5	62.7	63.0	20.5	20.5	21.0	21.3	21.7	9.4	9.4	9.3	9.5	9.0
Internal passive	<u>14.1</u>	<u>13.9</u>	<u>13.4</u>	<u>12.1</u>	<u>11.3</u>	<u>12.5</u>	<u>12.1</u>	<u>12.3</u>	<u>12.3</u>	<u>11.9</u>	<u>5.9</u>	<u>5.8</u>	<u>6.3</u>	<u>6.3</u>	<u>6.3</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<u>Actual asset mix</u>															
Stock	57.6	57.3	56.8	55.7	57.1	44.8	45.7	47.5	48.8	47.2	46.8	47.5	49.2	51.1	49.5
Fixed income	16.8	17.9	21.3	24.2	21.7	25.1	25.2	25.6	25.7	27.4	26.0	26.6	26.6	26.5	28.1
Global TAA	0.6	0.5	0.0	0.0	0.0	1.3	1.2	0.8	0.7	0.6	1.7	1.6	1.6	1.4	1.4
Real assets	12.9	12.4	10.5	9.8	10.9	13.1	12.4	10.9	10.3	10.3	11.4	10.5	9.4	8.4	8.3
Hedge funds	2.8	2.9	2.8	2.2	2.1	4.4	4.6	4.4	4.0	3.2	5.1	5.4	5.4	5.1	4.6
Private equity	<u>9.3</u>	<u>9.0</u>	<u>8.6</u>	<u>8.0</u>	<u>8.2</u>	<u>11.3</u>	<u>10.9</u>	<u>10.6</u>	<u>10.6</u>	<u>11.3</u>	<u>8.9</u>	<u>8.4</u>	<u>7.8</u>	<u>7.5</u>	<u>8.0</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<u>Policy asset mix</u>															
Stock	57.0	57.0	57.0	58.0	61.0	46.2	46.6	46.4	47.1	48.0	46.9	48.1	48.4	49.3	49.6
Fixed income	19.0	19.0	19.0	19.0	19.0	24.8	24.3	25.0	26.0	26.3	25.2	25.1	25.4	26.7	27.6
Global TAA	0.0	0.0	0.0	0.0	0.0	0.9	1.1	1.1	0.7	0.6	1.3	1.4	1.5	1.5	1.4
Real assets	10.0	10.0	10.0	10.0	10.0	13.1	12.8	11.9	11.8	11.5	12.3	11.1	10.7	9.8	9.5
Hedge funds	0.0	0.0	0.0	0.0	0.0	3.7	3.7	4.0	3.3	2.9	4.6	4.8	4.8	3.9	3.5
Private equity	<u>14.0</u>	<u>14.0</u>	<u>14.0</u>	<u>13.0</u>	<u>10.0</u>	<u>11.4</u>	<u>11.5</u>	<u>11.5</u>	<u>11.2</u>	<u>10.7</u>	<u>9.7</u>	<u>9.5</u>	<u>9.3</u>	<u>8.9</u>	<u>8.3</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

1. Trends are based on the 47 U.S. Public and 17 peer funds with 5 consecutive years of data ending 2016.

Implementation style by asset class

Implementation style impacts your costs, because external active management tends to be more expensive than internal or passive (or indexed) management and fund-of-funds usage is more expensive than direct fund investment.

Implementation style by asset class - 2016 (as a % of average assets)

	Your fund %					Peer average %					U.S. Public average %				
	External			Internal		External			Internal		External			Internal	
	Active	FOFs	Index	Active	Index	Active	FOFs	Index	Active	Index	Active	FOFs	Index	Active	Index
U.S. Stock - Broad/All						21.7	21.4	13.4	43.4		30.6	51.4	4.2	13.7	
U.S. Stock - Large Cap	5.1		0.0	51.3	43.6	16.6	25.5	25.0	32.9		30.3	46.8	6.5	16.3	
U.S. Stock - Mid Cap						35.7	4.3	53.2	6.7		60.5	2.7	11.6	25.2	
U.S. Stock - Small Cap	59.5		0.0	40.5	0.0	66.6	6.0	17.5	9.9		81.6	10.6	3.9	3.9	
Stock - EAFE	49.4		0.0	50.6	0.0	48.3	21.4	12.8	17.5		51.7	33.1	6.4	8.8	
Stock - ACWIxU.S.	30.0		0.0	70.0	0.0	67.5	25.6	6.7	0.1		63.4	35.8	0.8	0.0	
Stock - Emerging	33.2		0.0	66.8	0.0	67.8	13.8	9.4	9.0		77.5	14.2	4.3	4.1	
Stock - Global	0.0		0.0	100.0	0.0	75.0	1.5	22.0	1.4		69.4	20.6	4.2	5.8	
Stock - Other						14.4	8.5	45.4	31.7		82.1	3.2	8.7	6.0	
Total Stock	24.2		0.0	54.4	21.4	40.7	19.6	17.0	22.7		49.9	35.9	4.7	9.5	
Fixed Income - U.S.	0.0		0.0	100.0	0.0	33.3	4.5	57.9	4.3		62.4	13.2	23.1	1.3	
Fixed Income - U.S. Gov't						86.7	0.0	13.3	0.0		18.8	78.3	2.9	0.0	
Fixed Income - U.S. Credit						100.0	0.0	0.0	0.0		100.0	0.0	0.0	0.0	
Fixed Income - Long Bonds						6.8	0.0	11.7	81.5		79.1	0.0	2.5	18.3	
Fixed Income - EAFE						54.1	0.0	45.9	0.0		88.1	0.0	11.9	0.0	
Fixed Income - Emerging	100.0		0.0	0.0	0.0	93.9	4.6	1.5	0.0		97.0	2.5	0.5	0.0	
Fixed Income - Global						8.9	0.0	91.1	0.0		73.6	2.0	24.4	0.0	
Fixed Income - Inflation Indexed						13.8	24.0	32.8	29.4		44.0	32.5	9.5	14.0	
Fixed Income - High Yield	100.0		0.0	0.0	0.0	96.8	0.0	3.2	0.0		97.5	1.8	0.8	0.0	
Fixed Income - Mortgages						16.9	1.5	81.6	0.0		18.8	1.3	74.1	5.8	
Fixed Income - Private Debt						56.9	0.0	43.1	0.0		88.6	0.0	11.4	0.0	
Fixed Income - Other						90.2	0.1	4.5	5.2		91.3	2.8	3.9	2.1	
Cash	0.0		0.0	100.0	0.0	29.3	0.0	70.7	0.0		46.8	0.0	53.2	0.0	
Total Fixed Income	13.0		0.0	87.0	0.0	40.2	4.4	48.2	7.2		65.5	11.9	20.1	2.5	
Commodities						68.5	0.0	15.6	15.8		83.4	6.5	3.0	7.2	
Infrastructure	0.0	100.0	n/a	0.0	n/a	89.1	7.0	n/a	3.9	n/a	92.3	4.2	n/a	3.5	n/a
Natural Resources	56.6	0.0	n/a	43.4	n/a	94.0	0.0	n/a	6.0	n/a	98.6	0.0	n/a	1.4	n/a
REITs	0.0	0.0	0.0	0.0	100.0	68.2	0.0	3.4	6.4	22.0	74.7	0.0	15.2	1.6	8.5
Real Estate ex-REITs	15.9	0.0	n/a	84.1	n/a	91.2	0.7	n/a	8.1	0.0	94.5	2.0	n/a	3.5	0.0
Other Real Assets			n/a		n/a	100.0	0.0	n/a	0.0	n/a	98.3	0.0	n/a	1.7	n/a
Total Real Assets	19.0	0.0	0.0	67.5	13.5	91.0	0.0	0.2	7.2	1.6	94.5	0.0	1.4	3.0	1.0
Hedge Funds	100.0	0.0	n/a	0.0	n/a	84.8	15.2	n/a	0.0	n/a	72.9	27.1	n/a	0.0	n/a
Global TAA	100.0	0.0	n/a	0.0	n/a	86.5	0.0	n/a	13.5	n/a	94.8	0.0	n/a	5.2	n/a
Diversified Private Equity	100.0	0.0	n/a	0.0	n/a	93.1	6.7	n/a	0.2	n/a	79.6	20.3	n/a	0.1	n/a
Venture Capital	80.8	19.2	n/a	0.0	n/a	73.7	26.3	n/a	0.0	n/a	66.3	30.5	n/a	3.2	n/a
LBO	78.6	21.4	n/a	0.0	n/a	95.9	4.1	n/a	0.0	n/a	97.0	3.0	n/a	0.0	n/a
Other Private Equity	86.7	0.0	n/a	13.3	n/a	97.6	0.0	n/a	2.4	n/a	98.8	0.0	n/a	1.2	n/a
Total Private Equity	85.3	12.2	n/a	2.5	n/a	93.8	6.0	n/a	0.2	n/a	85.7	14.1	n/a	0.2	n/a
Total Fund - Avg. Holdings	29.4	1.4	0.0	55.1	14.0	55.4	1.5	10.1	20.7	12.3	63.7	2.9	20.2	7.9	5.2
Total Fund - Yr.-End Holdings	29.7	1.5	0.1	54.6	14.1	55.5	1.5	10.0	20.5	12.5	63.5	3.0	20.4	7.8	5.3

Actual mix

Actual asset mix - 2012 to 2016
(as a % of year-end assets)

	Your fund %					Peer average %					U.S. Public average %				
	2016	2015	2014	2013	2012	2016	2015	2014	2013	2012	2016	2015	2014	2013	2012
Employer Stock															
U.S. Stock - Broad/All						8.1	7.9	8.1	8.1	7.0	7.3	6.9	6.6	9.3	7.1
U.S. Stock - Large Cap	28.3	28.2	28.7	28.5	30.9	11.9	12.4	12.8	12.4	13.2	13.3	14.1	15.4	14.0	15.1
U.S. Stock - Mid Cap						0.5	0.5	0.5			0.7	0.9	0.8	0.2	0.1
U.S. Stock - Small Cap	2.9	2.7	2.7	2.8	3.6	1.8	2.2	2.5	3.2	3.2	2.3	2.9	3.2	4.2	4.4
Stock - EAFE	15.4	15.8	15.3	15.7	16.9	10.7	10.6	10.7	11.2	10.7	6.1	6.7	6.8	8.0	7.3
Stock - ACWIxU.S.	5.9	5.6	5.1	3.9		3.5	3.8	4.0	4.5	4.4	8.0	8.2	8.2	8.5	7.9
Stock - Emerging	4.3	3.9	3.9	3.8	4.8	4.6	4.2	4.3	4.4	4.6	2.9	3.0	3.2	3.2	3.4
Stock - Global	0.7	1.1	1.1	1.1	0.9	3.3	3.7	3.9	4.1	3.5	5.2	4.1	4.0	3.8	3.8
Stock - Other						0.5	0.5	0.6	0.8	0.7	0.8	1.0	1.2	0.8	0.6
Total Stock	57.6	57.3	56.8	55.7	57.1	44.8	45.7	47.5	48.8	47.2	46.5	47.7	49.3	52.0	49.7
Fixed Income - U.S.	12.3	13.7	15.1	17.3	14.6	13.2	13.2	13.5	14.0	16.1	13.9	14.2	14.2	15.2	17.3
Fixed Income - U.S. Gov't						0.5	0.5	0.4			0.6	0.6	0.2	0.0	0.0
Fixed Income - U.S. Credit						0.0	0.1	0.3			0.0	0.3	0.1	0.0	0.0
Fixed Income - Long Bonds						0.7	0.8	0.8	0.7	0.7	0.9	1.0	1.0	0.7	0.2
Fixed Income - EAFE						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Fixed Income - Emerging	1.0	1.0	1.2	1.0	0.9	1.2	1.1	0.9	0.6	0.6	1.0	0.9	0.9	0.8	0.8
Fixed Income - Global						1.7	1.9	2.0	2.9	2.3	1.8	1.8	1.8	1.8	2.1
Fixed Income - Inflation Indexed						1.8	2.2	2.1	1.9	1.9	1.8	1.9	1.8	1.7	2.0
Fixed Income - High Yield	1.1	1.3	1.7	1.2	1.2	1.4	1.4	1.3	1.2	1.7	1.6	1.5	1.6	1.6	2.0
Fixed Income - Mortgages						0.4	0.4	0.4	0.3	0.5	0.1	0.2	0.2	0.2	0.2
Fixed Income - Private Debt						0.6	0.5	0.5	0.4	0.3	0.7	0.7	0.6	0.2	0.2
Fixed Income - Other						1.5	1.3	1.3	1.2	0.9	1.1	1.0	1.0	0.7	0.7
Cash	2.4	1.8	3.4	4.8	4.9	2.1	1.8	2.0	2.3	2.4	2.5	2.3	2.4	2.6	1.9
Total Fixed Income	16.8	17.9	21.3	24.2	21.7	25.1	25.2	25.6	25.7	27.4	26.1	26.5	26.0	25.8	27.7
Commodities						0.4	0.4	0.6	0.6	0.6	0.7	0.5	0.6	0.5	0.6
Infrastructure	0.2	0.1	0.1	0.1	0.1	0.3	0.3	0.2	0.2	0.1	0.4	0.3	0.3	0.2	0.3
Natural Resources	1.4	1.3	0.5	0.4	0.6	0.8	0.6	0.5	0.3	0.2	0.9	0.6	0.5	0.4	0.3
REITs	1.8	1.6	1.5	1.3	1.5	0.7	0.7	0.6	0.7	0.7	0.8	0.8	0.9	0.7	0.7
Real Estate ex-REITs	9.7	9.3	8.4	7.9	8.7	10.0	9.7	8.7	8.3	8.5	7.8	7.4	6.4	6.2	6.3
Other Real Assets						1.0	0.8	0.3	0.2	0.2	1.0	0.8	0.6	0.4	0.3
Total Real Assets	12.9	12.4	10.5	9.8	10.9	13.1	12.4	10.9	10.3	10.3	11.5	10.4	9.4	8.5	8.6
Hedge Funds	2.8	2.9	2.8	2.2	2.1	4.4	4.6	4.4	4.0	3.2	5.2	5.5	5.4	5.1	4.7
Global TAA	0.6	0.5				1.3	1.2	0.8	0.7	0.6	2.1	1.7	2.4	1.3	1.5
Div. Private Equity	0.1	0.1	4.7	4.6	5.0	7.8	7.8	8.0	8.5	9.1	6.3	5.6	5.2	5.4	5.8
Venture Capital	1.6	1.6	1.4	1.2	1.3	0.5	0.5	0.4	0.3	0.3	0.4	0.5	0.4	0.3	0.3
LBO	4.5	4.5				2.1	2.1	1.9	1.4	1.6	1.3	1.6	1.5	1.3	1.3
Other Private Equity	3.1	2.7	2.5	2.2	1.9	0.8	0.4	0.3	0.3	0.3	0.5	0.5	0.4	0.4	0.4
Total Private Equity	9.3	9.0	8.6	8.0	8.2	11.3	10.9	10.6	10.6	11.3	8.5	8.2	7.6	7.4	7.8
Total Fund	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Count	1	1	1	1	1	17	17	17	17	17	59	63	66	65	68
Median Assets (\$ billions)	71.7	70.8	73.5	72.4	65.8	85.1	79.7	78.4	73.5	65.8	17.4	16.8	16.4	15.7	14.0

Policy mix

Policy asset mix - 2012 to 2016
(as a % of average assets)

	Your fund %					Peer average %					U.S. Public average %				
	2016	2015	2014	2013	2012	2016	2015	2014	2013	2012	2016	2015	2014	2013	2012
Employer Stock															
U.S. Stock - Broad/All						13.1	13.3	10.8	10.3	11.8	10.2	10.4	9.2	11.0	10.8
U.S. Stock - Large Cap	31.0	31.0	31.0	33.0	38.0	4.5	4.3	6.3	7.7	6.9	9.3	9.5	11.4	9.9	11.2
U.S. Stock - Mid Cap								0.2			0.3	0.4	0.4	0.2	0.1
U.S. Stock - Small Cap						0.5	0.3	0.5	1.3	1.2	1.4	1.6	1.7	2.2	2.7
Stock - EAFE	20.8	20.8	20.8	20.0	18.4	6.9	6.8	6.8	8.6	7.6	4.6	5.1	5.3	7.1	7.0
Stock - ACWIxU.S.						4.7	4.6	4.9	4.0	5.6	8.7	9.0	9.4	7.7	8.6
Stock - Emerging	5.2	5.2	5.2	5.0	4.6	2.8	2.3	2.1	3.2	2.4	2.1	2.2	2.0	2.2	2.0
Stock - Global						13.5	14.5	14.5	11.7	12.1	9.2	8.9	8.0	8.6	6.7
Stock - Other						0.2	0.4	0.4	0.3	0.4	0.6	0.7	0.7	0.4	0.2
Total Stock	57.0	57.0	57.0	58.0	61.0	46.2	46.6	46.4	47.1	48.0	46.5	47.9	48.1	49.3	49.3
Fixed Income - U.S.	18.0	18.0	18.0	18.0	18.0	16.3	16.5	15.2	15.7	16.3	15.2	15.7	16.0	18.1	19.2
Fixed Income - U.S. Gov't						0.1	0.0				0.5	0.5			
Fixed Income - U.S. Credit												0.2			
Fixed Income - Long Bonds						0.6	0.6	0.6	0.8	0.8	1.7	1.6	1.5	1.1	0.2
Fixed Income - EAFE									0.1	0.1	0.1	0.1	0.1	0.2	0.1
Fixed Income - Emerging						0.8	0.8	0.6	0.5	0.5	0.9	0.9	0.9	0.7	0.8
Fixed Income - Global						1.6	1.8	2.8	2.6	2.5	1.5	1.6	1.9	1.3	2.0
Fixed Income - Inflation Indexed						2.2	2.0	2.4	2.4	2.3	2.7	2.6	2.6	2.5	1.8
Fixed Income - High Yield						1.3	1.2	1.4	1.5	1.6	1.9	1.7	1.8	2.1	1.9
Fixed Income - Mortgages						0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Fixed Income - Private Debt						0.5	0.4	0.4	0.2	0.0	0.8	0.7	0.5	0.1	0.1
Fixed Income - Other						0.9	0.7	0.7	1.2	1.3	0.7	0.5	0.6	0.6	0.7
Cash	1.0	1.0	1.0	1.0	1.0	0.1	0.3	0.8	0.9	0.9	-1.0	-0.9	-0.8	-0.1	0.7
Total Fixed Income	19.0	19.0	19.0	19.0	19.0	24.8	24.3	25.0	26.0	26.3	25.2	25.2	25.2	26.7	27.5
Commodities						0.6	0.6	0.6	0.6	0.7	1.2	1.0	1.1	0.9	0.7
Infrastructure						0.3	0.2	0.2	0.2	0.3	0.6	0.3	0.4	0.4	0.5
Natural Resources						0.7	0.6	0.6	0.6	0.2	1.0	0.7	0.5	0.7	0.4
REITs	1.5	1.5	1.5	1.5	1.5	0.4	0.5	0.8	0.8	0.9	0.6	0.7	0.7	0.6	0.7
Real Estate ex-REITs	8.5	8.5	8.5	8.5	8.5	9.8	9.9	9.4	9.1	8.8	7.6	7.4	7.3	6.8	6.7
Other Real Assets						1.2	1.1	0.4	0.5	0.6	1.3	0.9	0.9	0.5	0.6
Total Real Assets	10.0	10.0	10.0	10.0	10.0	13.1	12.8	11.9	11.8	11.5	12.4	11.0	10.9	10.0	9.7
Hedge Funds						3.7	3.7	4.0	3.3	2.9	4.8	5.0	5.2	4.3	4.0
Global TAA						0.9	1.1	1.1	0.7	0.6	1.9	1.7	2.1	1.2	1.3
Div. Private Equity			14.0	13.0	10.0	8.7	9.2	10.5	10.2	10.0	7.2	7.0	7.0	6.8	6.6
Venture Capital						0.3	0.2	0.2	0.2	0.1	0.3	0.2	0.3	0.2	0.2
LBO	14.0	14.0				2.1	2.1	0.7	0.8	0.7	1.2	1.5	1.0	1.1	1.1
Other Private Equity						0.4	0.0	0.0	0.0	0.0	0.5	0.4	0.4	0.3	0.3
Total Private Equity	14.0	14.0	14.0	13.0	10.0	11.4	11.5	11.5	11.2	10.7	9.2	9.1	8.6	8.4	8.1
Total Fund	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Count	1	1	1	1	1	17	17	17	17	17	59	63	66	65	68

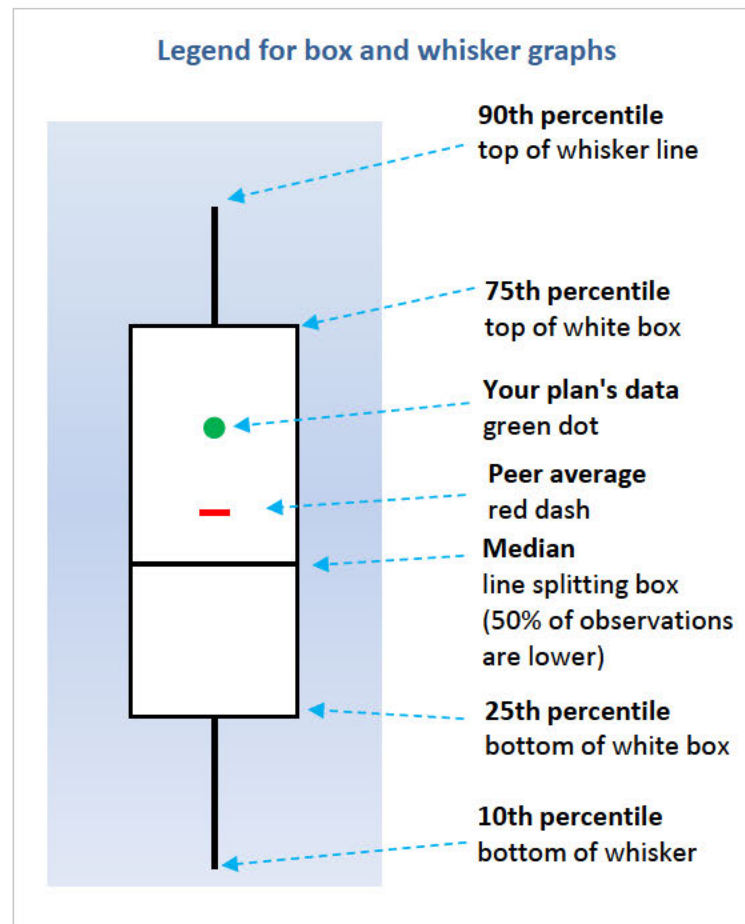
4

Returns, Benchmarks and Value Added

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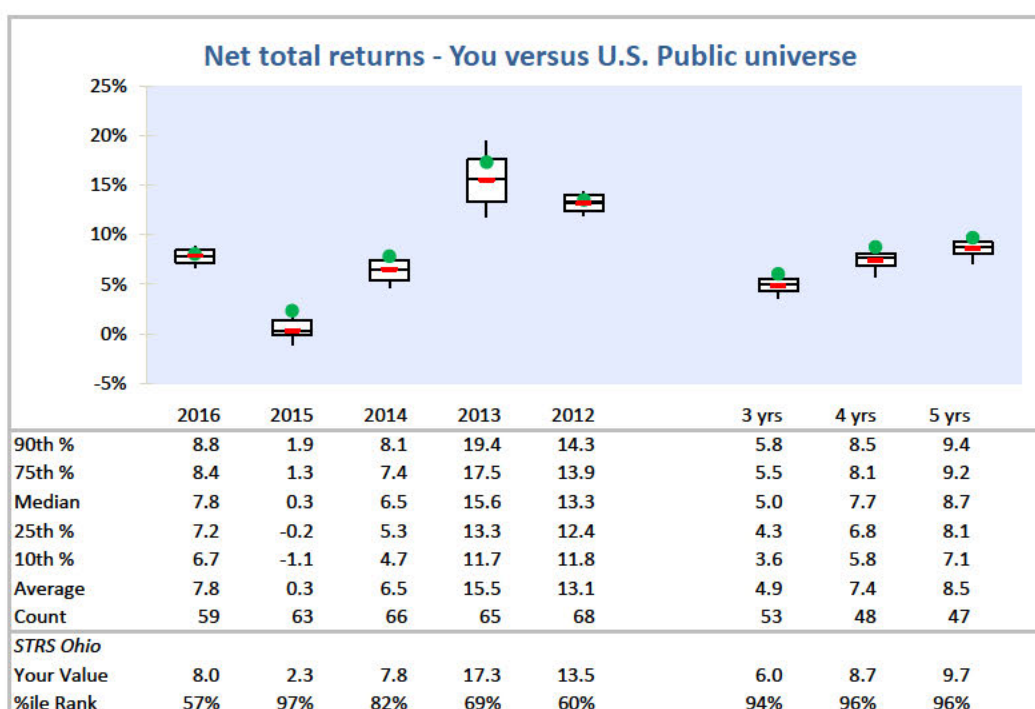
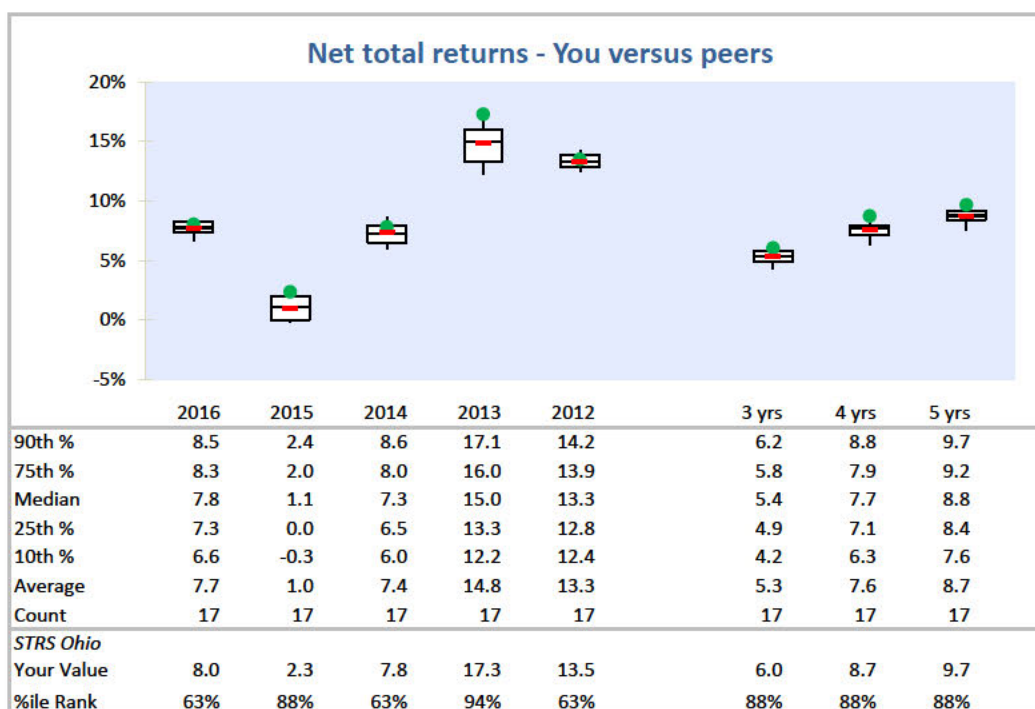
Interpreting box and whisker graphs

Box and whisker graphs are used extensively in this report because they show visually where you rank relative to all observations. At a glance you can see which quartile your data falls in.



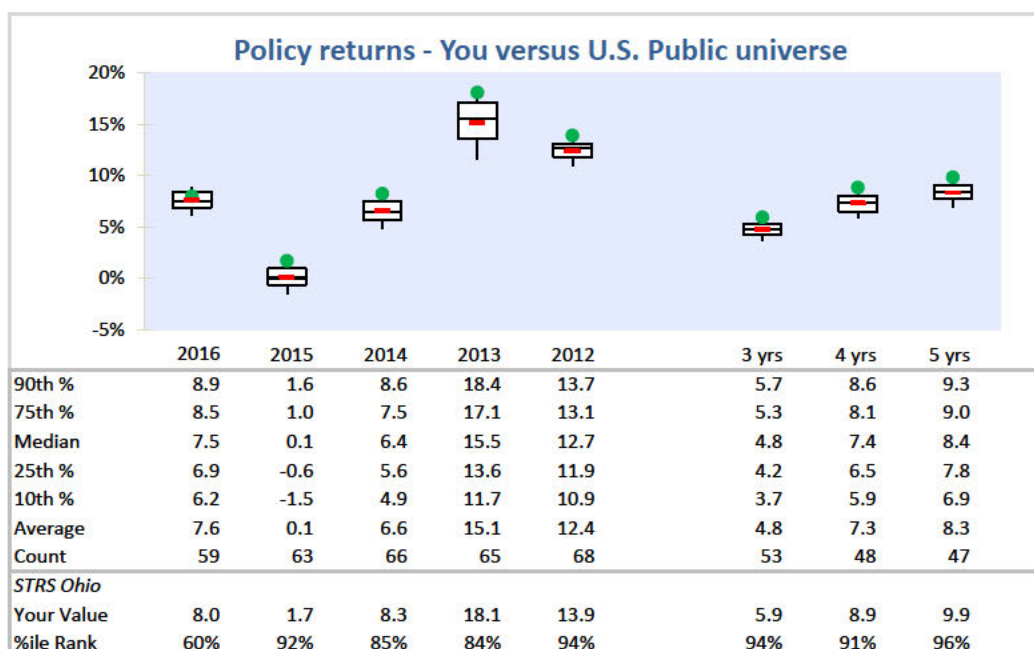
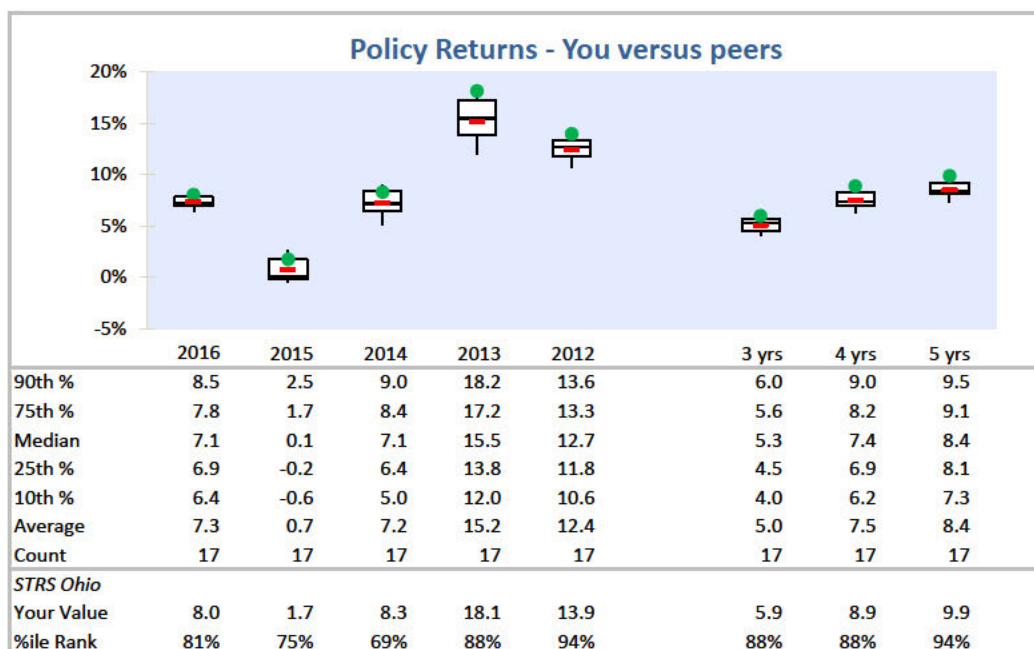
Net total returns

Your 5-year net total return of 9.7% was among the highest in your peer group and among the highest in the U.S. Public universe. Comparisons of total return do not help you understand the reasons behind relative performance. To understand the relative contributions from policy asset mix decisions and implementation decisions we separate total return into its more meaningful components - policy return and implementation value added.



Policy returns

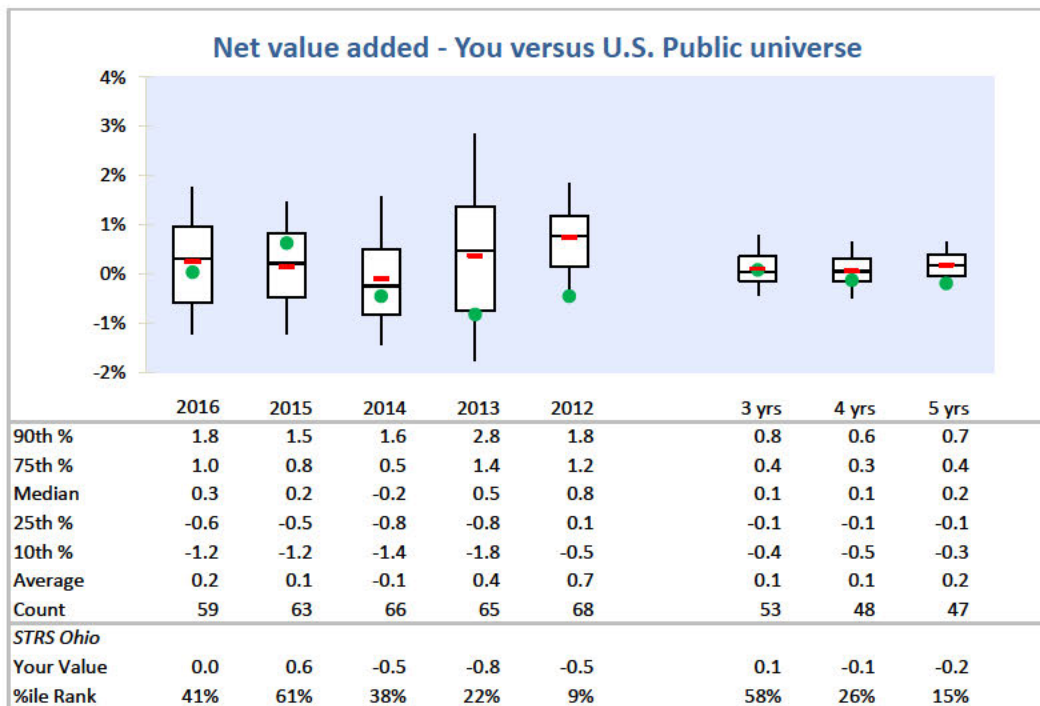
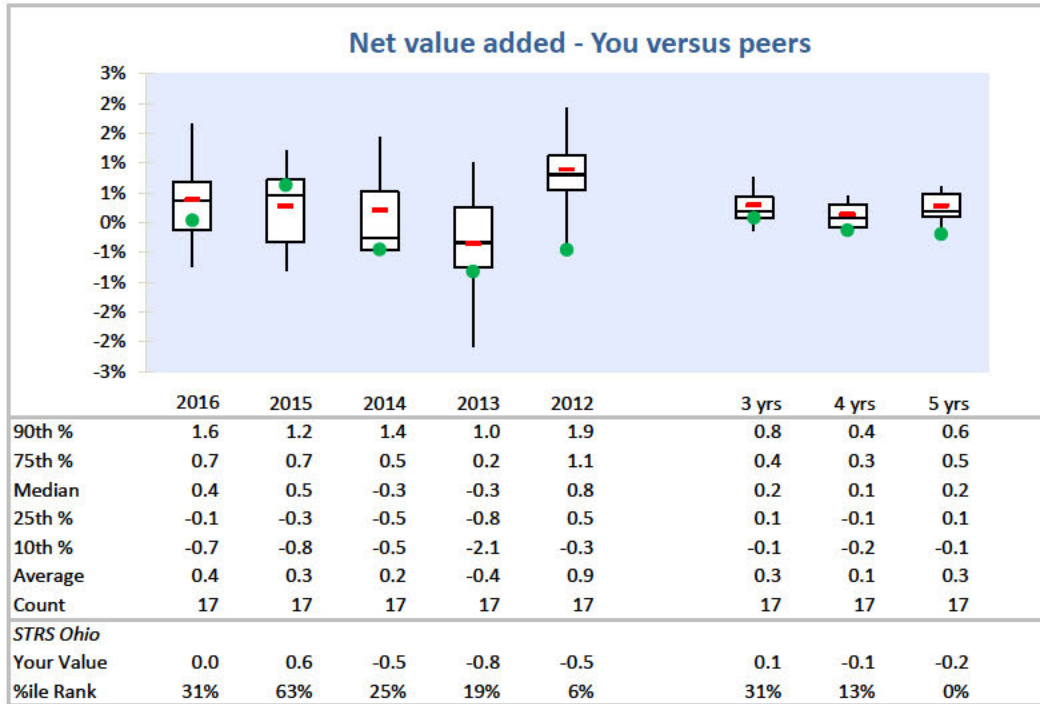
Your 5-year policy return of 9.9% was among the highest in your peer group and among the highest in the U.S. Public universe. Policy return is the return you would have earned had you passively implemented your policy asset mix decision through your benchmark portfolios.



To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 10.4%, 0.6% higher than your actual 5-year policy return of 9.9%. Mirroring this, your 5-year total fund net value added would be 0.6% lower. Refer to the Research section pages 6-7 for details.

Net value added

Your 5-year net value added of -0.2% was below the peer median and below the median of the U.S. Public universe. Net value added is the difference between your net total return and your policy return.



Net returns by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2016	2015	2014	2013	2012	5-yr	2016	2015	2014	2013	2012	5-yr	2016	2015	2014	2013	2012	5-yr
U.S. Stock - Broad/All							11.2	-0.1	10.9	33.9	16.3	13.9	11.3	-0.4	10.9	33.4	16.2	13.7
U.S. Stock - Large Cap	10.6	1.0	12.4	31.1	15.6	13.7	11.4	1.1	12.8	33.2	16.1	14.5	11.2	1.0	12.6	33.5	16.2	14.4
U.S. Stock - Mid Cap							12.6	-1.9	9.0				12.5	-2.7	8.7	38.6	20.5	14.7
U.S. Stock - Small Cap	17.2	-2.2	4.3	42.2	14.6	14.3	18.7	-3.2	5.8	39.4	16.5	14.6	18.8	-3.5	5.1	38.9	16.1	14.2
Stock - EAFE	4.8	3.5	1.1	25.3	16.3	9.8	3.2	-0.1	-3.4	23.5	17.6	7.7	3.0	0.3	-3.9	23.3	17.4	7.5
Stock - Emerging	13.6	-12.0	-1.7	-1.3	20.0	3.1	11.4	-14.1	-1.0	-2.5	19.4	2.0	10.1	-13.7	-1.3	-1.5	18.8	1.9
Stock - ACWIxU.S.	7.5	-0.9	0.4	17.6			3.8	-2.1	-2.5	18.1	17.8	6.6	3.5	-2.6	-3.6	18.9	17.9	6.4
Stock - Global	8.8	-1.3	3.7	24.5	16.1	10.0	8.0	-0.7	5.0	25.7	16.2	10.5	7.5	-1.2	3.8	24.1	15.3	9.6
Stock - Other							9.9	-4.0	3.3	15.7	13.1	7.3	9.9	-5.5	3.1	19.1	12.6	7.5
Stock - Total	9.2	0.4	6.8	27.0	16.1	11.5	8.9	-1.5	5.2	25.9	16.9	10.7	8.9	-1.6	5.0	26.5	16.9	10.7
Fixed Income - U.S.	2.7	1.0	5.5	-1.6	4.6	2.4	3.7	0.4	7.1	-2.2	6.6	3.0	3.7	0.3	5.8	-1.5	7.0	3.0
Fixed Income - U.S. Gov't							-0.4	0.6	1.0				0.1	0.9	3.7	-5.0	4.2	0.7
Fixed Income - U.S. Credit							6.0	-1.8	4.4				6.0	-2.0	6.5	-1.2	10.5	3.9
Fixed Income - EAFE							7.7	-8.6	-3.0	-5.2	0.2	-1.9	5.6	-8.1	-1.3	-3.1	0.9	-1.3
Fixed Income - Emerging	15.3	0.6	1.5	-4.8	18.6	5.9	11.0	-3.1	-0.3	-6.3	17.5	3.4	10.9	-5.0	-0.5	-7.6	16.7	2.5
Fixed Income - Global							4.4	-0.9	3.9	0.7	5.8	2.8	5.7	-2.1	3.5	-0.6	8.5	2.9
Fixed Income - Long Bonds							3.3	-3.4	16.5	-3.9	12.9	4.8	3.2	-3.8	22.3	-7.5	10.2	4.4
Fixed Income - Inflation Indexed							4.2	-2.1	4.2	-7.3	7.5	1.2	5.8	-1.6	4.7	-7.3	7.6	1.7
Fixed Income - High Yield	16.9	-4.5	2.1	8.2	14.9	7.2	12.6	-2.9	4.7	6.7	16.7	7.3	11.9	-3.1	3.3	7.0	15.7	6.7
Fixed Income - Mortgages							1.9	3.7	8.4	4.5	9.2	5.5	2.9	3.7	7.2	5.0	11.9	6.1
Fixed Income - Private Debt							7.4	1.6	4.9	6.2	8.4	5.7	6.1	1.2	2.7	7.5	7.3	4.9
Fixed Income - Other							6.2	-0.3	4.7	6.7	10.0	5.4	5.8	0.0	5.5	8.0	12.3	6.2
Cash	0.5	0.1	0.1	0.1	0.1	0.2	2.5	-0.6	0.6	0.4	1.0	0.8	1.1	0.0	0.3	0.2	0.6	0.4
Fixed Income - Total	4.8	0.6	5.0	-1.0	6.1	3.1	4.6	-0.4	6.1	-1.5	7.3	3.2	4.7	-0.5	5.4	-1.2	7.9	3.2
Commodities							12.5	-31.9	-17.2	-9.8	-1.3	-10.8	11.6	-26.5	-16.7	-7.3	0.2	-8.7
Infrastructure	5.4	5.4	17.4	3.5	28.6	11.7	8.4	5.3	23.6	7.7	7.7	10.3	9.0	4.2	12.3	9.8	6.4	8.3
REITs	8.8	3.2	30.5	1.8	17.8	11.9	5.1	3.1	19.4	5.0	25.0	11.2	4.9	2.1	19.7	4.3	21.2	10.1
Natural Resources	-4.1	2.0	7.7	7.5	-23.0	-2.7	3.6	-7.0	8.8	7.8	-1.5	2.2	6.9	-5.6	10.8	6.3	1.8	3.9
Real Estate ex-REITs	9.3	12.2	14.8	11.2	14.2	12.3	9.4	13.6	13.9	12.5	10.8	12.0	8.6	13.0	12.4	12.5	10.3	11.3
Other Real Assets							7.6	-5.9	2.5	1.2	1.1	1.2	11.6	-11.0	5.2	10.3	4.1	3.7
Real Assets - Total	8.7	10.2	16.1	9.7	14.6	11.8	9.3	10.3	12.7	10.4	11.1	10.7	8.7	7.9	11.1	10.4	10.0	9.6
Hedge Funds	3.4	-0.6	3.3	11.4	7.4	4.9	0.9	-0.3	4.7	10.5	6.3	4.3	2.2	-0.1	4.6	9.9	6.4	4.5
Global TAA	8.1	-2.6					8.3	-3.6	6.8	2.7	11.7	5.1	8.6	-4.5	5.4	2.0	10.7	4.3
Diversified Private Equity	6.7	9.9	18.9	20.0	16.3	14.2	7.5	8.5	16.0	16.7	14.9	12.7	8.5	8.1	15.5	17.6	13.1	12.5
LBO	6.7	9.9					7.5	6.5	14.7	16.4	11.7	11.3	9.9	8.7	14.4	18.1	13.0	12.8
Venture Capital	3.0	11.8	17.9	10.4	13.2	11.2	3.5	12.5	23.5	12.8	12.5	12.8	4.8	13.0	17.9	16.1	8.7	12.0
Other Private Equity	4.2	2.9	13.5	16.5	14.6	10.2	6.7	7.8	12.0	15.5	1.7	8.6	7.9	6.8	15.0	15.5	8.6	10.7
Private Equity - Total	5.3	8.3	17.2	17.5	15.5	12.6	7.7	8.7	16.7	17.1	14.4	12.8	8.6	8.8	15.5	17.3	12.7	12.5
Total Fund Return	8.0	2.3	7.8	17.3	13.5	9.7	7.7	1.0	7.4	14.8	13.3	8.7	7.8	0.3	6.5	15.5	13.1	8.5

You were not able to provide full year returns for all of the components of returns shown in italics. The default is to set the unavailable return equal to the benchmark return.

Benchmark returns by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2016	2015	2014	2013	2012	5-yr	2016	2015	2014	2013	2012	5-yr	2016	2015	2014	2013	2012	5-yr
U.S. Stock - Broad/All							12.4	0.5	12.8	33.3	16.3	14.6	12.4	0.7	12.7	33.2	16.3	14.6
U.S. Stock - Large Cap	12.7	0.5	12.6	33.6	16.4	14.7	12.1	0.9	13.2	33.1	16.3	14.7	12.2	1.1	13.2	32.9	16.2	14.7
U.S. Stock - Mid Cap							13.1	-2.4	12.1				12.5	-2.0	10.8	33.9	17.7	14.0
U.S. Stock - Small Cap	21.3	-4.4	4.9	38.8	16.4	14.5	19.8	-3.9	6.1	38.6	17.0	14.6	20.2	-3.4	6.0	37.9	16.9	14.7
Stock - EAFE	5.0	0.4	0.8	23.1	16.4	8.8	2.8	-1.3	-3.6	22.4	17.1	7.0	2.3	-1.0	-4.2	22.1	17.2	6.8
Stock - Emerging	11.2	-14.9	-2.2	-2.3	18.6	1.4	11.1	-14.9	-1.7	-2.6	18.1	1.4	10.8	-14.5	-1.9	-1.7	18.2	1.6
Stock - ACWIxU.S.	6.4	-2.8	0.2	17.6			4.9	-4.4	-3.3	17.1	17.1	5.9	4.5	-4.8	-3.7	16.4	17.1	5.5
Stock - Global	7.9	-2.4	4.2	22.8	16.1	9.4	8.0	-1.6	3.8	22.1	16.5	9.4	7.8	-1.7	3.4	22.2	15.0	9.0
Stock - Other							12.3	-4.0	2.9	15.7	12.0	7.5	9.4	-6.3	1.1	18.2	12.6	6.6
Stock - Total	9.8	-1.0	6.9	26.9	16.6	11.4	9.3	-2.0	4.7	25.1	16.6	10.4	9.4	-2.0	5.1	25.5	16.6	10.5
Fixed Income - U.S.	3.9	0.4	5.6	-1.3	5.5	2.8	2.7	0.4	6.7	-2.6	5.4	2.5	2.8	0.4	6.1	-2.0	5.0	2.4
Fixed Income - U.S. Gov't							-0.2	0.7	0.8				0.2	0.8	3.7	-5.1	2.0	0.3
Fixed Income - U.S. Credit							3.7	0.2	5.8				3.7	-0.7	6.3	-2.0	4.2	2.2
Fixed Income - EAFE							7.8	-6.5	-5.4	-4.8	1.5	-1.6	7.8	-6.0	-3.0	-3.8	2.0	-0.7
Fixed Income - Emerging	9.9	1.3	4.8	-4.1	17.9	5.7	10.0	-3.1	1.5	-6.5	17.4	3.5	9.9	-5.2	0.2	-6.5	16.9	2.7
Fixed Income - Global							5.4	-0.7	3.2	0.0	4.8	2.5	4.5	-0.9	3.7	-1.6	4.0	1.9
Fixed Income - Long Bonds							3.3	-1.0	18.2	-6.4	5.1	3.5	3.6	-1.9	20.1	-10.0	4.6	2.8
Fixed Income - Inflation Indexed							4.4	-2.1	3.9	-5.5	7.3	1.5	5.8	-1.7	4.7	-6.6	7.2	1.7
Fixed Income - High Yield	17.1	-4.5	2.5	7.4	15.8	7.4	14.6	-3.5	2.5	6.7	13.5	6.6	15.1	-3.9	2.3	6.6	13.9	6.6
Fixed Income - Mortgages							3.2	1.6	4.7	-0.3	7.1	3.2	3.1	2.0	4.4	0.2	7.3	3.3
Fixed Income - Private Debt							9.8	0.3	4.7	6.2	10.1	6.2	11.0	-0.7	4.3	6.5	5.7	5.3
Fixed Income - Other							6.6	0.1	5.6	3.2	8.3	4.7	6.8	0.4	5.8	5.4	8.0	5.3
Cash	0.3	0.1	0.0	0.1	0.1	0.1	0.3	0.1	0.0	0.2	0.2	0.2	0.4	0.1	0.1	0.1	0.2	0.2
Fixed Income - Total	3.9	0.4	5.6	-1.3	5.5	2.8	4.0	-0.3	6.5	-2.3	6.0	2.7	5.0	-0.3	7.3	-2.5	6.0	3.0
Commodities							11.5	-24.1	-19.2	-4.5	0.5	-8.1	11.3	-22.8	-16.6	-5.1	0.4	-7.3
Infrastructure	5.3	6.1	13.5	16.5	14.6	11.1	6.7	4.7	7.4	7.4	7.3	6.7	7.2	5.0	6.5	6.8	7.1	6.5
REITs	8.5	3.2	30.1	2.5	18.1	12.0	6.4	3.1	21.4	3.1	24.1	11.2	6.7	2.9	20.7	3.2	22.7	10.9
Natural Resources	5.3	6.1	13.5	16.5	14.6	11.1	5.8	-0.7	8.8	8.4	8.2	6.0	7.0	-0.5	7.0	7.6	7.2	5.6
Real Estate ex-REITs	8.0	13.3	11.8	11.0	10.5	10.9	8.8	13.7	11.6	11.8	10.7	11.3	8.5	13.5	11.7	11.6	11.0	11.3
Other Real Assets							6.6	5.1	6.3	7.5	6.1	6.3	12.0	-8.8	5.1	10.3	5.6	4.6
Real Assets - Total	8.1	11.8	14.6	9.7	11.7	11.1	8.5	9.8	10.3	9.8	10.6	9.8	8.8	7.0	8.7	9.2	10.2	8.8
Hedge Funds	5.3	6.1	13.5	16.5	14.6	11.1	3.1	1.3	4.2	9.1	7.5	5.0	3.1	1.3	4.0	9.3	5.9	4.7
Global TAA	5.3	6.1					7.2	0.9	5.1	9.4	10.7	6.6	6.7	0.6	5.1	10.0	9.6	6.3
Diversified Private Equity ¹	5.3	6.1	13.5	16.5	14.6	11.1	7.2	4.3	16.6	29.3	12.8	13.7	6.5	5.2	15.3	30.4	12.9	13.7
LBO ¹	5.3	6.1					9.1	2.7	14.8	32.3	13.9	14.1	8.6	5.1	14.6	31.4	12.5	14.1
Venture Capital ¹	5.3	6.1	13.5	16.5	14.6	11.1	9.1	3.4	13.6	30.0	16.0	14.1	7.9	6.0	14.6	30.2	13.7	14.1
Other Private Equity ¹	5.3	6.1	13.5	16.5	14.6	11.1	7.6	3.0	16.4	27.5	14.7	13.5	8.5	6.3	13.2	30.7	14.8	14.4
Private Equity ¹ - Total	5.3	6.1	13.5	16.5	14.6	11.1	7.2	4.3	16.6	29.3	12.8	13.7	6.7	5.4	15.2	30.2	12.9	13.8
Total Policy Return	8.0	1.7	8.3	18.1	13.9	9.9	7.3	0.7	7.2	15.2	12.4	8.4	7.6	0.1	6.6	15.1	12.4	8.2

1. To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 10.4%, 0.6% higher than your actual 5-year policy return of 9.9%. Mirroring this, your 5-year total fund net value added would be 0.6% lower. Refer to the Research section pages 6-7 for details.

Net value added by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2016	2015	2014	2013	2012	5-yr	2016	2015	2014	2013	2012	5-yr	2016	2015	2014	2013	2012	5-yr
U.S. Stock - Broad/All							-1.1	-0.6	-1.8	0.5	0.0	-0.7	-1.1	-1.2	-1.7	0.2	-0.1	-0.8
U.S. Stock - Large Cap	-2.1	0.5	-0.2	-2.5	-0.8	-0.9	-0.7	0.2	-0.4	0.1	-0.3	-0.2	-1.0	-0.1	-0.5	0.6	-0.1	-0.2
U.S. Stock - Mid Cap							-0.5	0.5	-3.1				0.1	-0.7	-2.1	4.7	2.8	0.7
U.S. Stock - Small Cap	-4.1	2.2	-0.6	3.4	-1.7	-0.2	-1.1	0.7	-0.3	0.8	-0.5	-0.1	-1.4	-0.1	-1.0	1.0	-0.8	-0.5
Stock - EAFE	-0.2	3.2	0.3	2.2	-0.1	1.1	0.4	1.2	0.3	1.2	0.5	0.7	0.7	1.3	0.3	1.2	0.2	0.7
Stock - Emerging	2.4	3.0	0.5	0.9	1.4	1.7	0.3	0.8	0.7	0.1	1.2	0.6	-0.7	0.8	0.6	0.2	0.6	0.3
Stock - ACWIxU.S.	1.1	1.9	0.1	0.0			-0.9	2.7	0.6	2.1	0.7	0.8	-0.9	2.2	0.1	2.7	0.9	0.9
Stock - Global	0.9	1.1	-0.5	1.7	-0.1	0.6	0.0	0.9	1.2	3.6	-0.3	1.0	-0.2	0.3	0.4	2.1	0.2	0.5
Stock - Other							-0.5	0.0	0.5	0.0	1.1	-0.2	1.3	0.9	2.0	0.3	-0.6	0.9
Stock - Total	-0.5	1.4	-0.1	0.1	-0.5	0.1	-0.5	0.5	0.4	0.8	0.3	0.3	-0.5	0.4	-0.2	1.0	0.2	0.2
Fixed Income - U.S.	-1.2	0.6	0.0	-0.2	-0.9	-0.4	0.9	0.0	0.4	0.4	1.2	0.6	0.9	-0.2	-0.3	0.5	2.0	0.6
Fixed Income - U.S. Gov't							-0.2	-0.1	0.2				-0.1	0.2	0.0	0.1	2.2	0.4
Fixed Income - U.S. Credit							2.3	-2.0	-1.4				2.3	-1.2	0.2	0.8	6.3	1.6
Fixed Income - EAFE							-0.1	-2.1	2.4	-0.4	-1.2	-0.3	-2.3	-2.1	1.7	0.7	-1.1	-0.6
Fixed Income - Emerging	5.5	-0.6	-3.2	-0.7	0.7	0.2	0.9	0.0	-1.8	0.1	0.1	-0.1	1.0	0.2	-1.0	-1.1	-0.3	-0.2
Fixed Income - Global							-1.0	-0.2	0.7	0.8	1.0	0.3	1.2	-1.2	-0.3	1.0	4.5	1.0
Fixed Income - Long Bonds							0.0	-2.4	-1.7	2.5	7.8	1.2	-0.9	-1.7	3.3	1.5	5.6	1.5
Fixed Income - Inflation Indexed							-0.2	0.0	-0.3	-1.8	0.2	-0.3	0.0	0.0	-0.2	-0.9	0.4	-0.1
Fixed Income - High Yield	-0.3	0.0	-0.4	0.7	-0.9	-0.2	-2.1	0.6	2.2	0.0	3.2	0.8	-3.2	0.9	0.7	0.4	1.6	0.2
Fixed Income - Mortgages							-1.3	2.1	3.7	4.7	2.1	2.3	-0.2	1.8	2.8	4.8	4.5	2.7
Fixed Income - Private Debt							-2.4	1.3	0.2	0.0	-1.6	-0.5	-3.3	1.7	-1.6	1.0	1.6	-0.4
Fixed Income - Other							-0.4	-0.4	-0.8	3.5	1.6	0.7	-0.5	-0.4	0.1	2.2	3.8	1.0
Cash	0.1	0.0	0.0	0.0	0.0	0.1	2.2	-0.7	0.6	0.3	0.8	0.6	0.7	-0.1	0.2	0.1	0.4	0.3
Fixed Income - Total	0.9	0.2	-0.5	0.3	0.6	0.3	0.6	-0.1	-0.4	0.8	1.4	0.5	-0.3	-0.3	-1.9	1.2	1.9	0.1
Commodities							1.2	-7.9	2.8	-5.4	-1.8	-2.7	0.6	-3.3	1.3	-2.3	-0.2	-1.3
Infrastructure	0.1	-0.7	3.9	-13.0	14.0	0.6	1.7	0.7	16.2	0.3	0.4	3.7	1.8	-0.8	5.9	3.0	-0.7	1.8
REITs	0.3	0.0	0.3	-0.6	-0.2	-0.1	-1.2	0.1	-2.0	1.9	0.9	-0.1	-1.8	-0.8	-1.0	1.1	-0.7	-0.8
Natural Resources	-9.4	-4.1	-5.8	-9.0	-37.7	-13.8	-2.2	-6.3	0.0	-0.6	-9.7	-3.9	-0.4	-4.7	3.7	-1.6	-5.4	-1.7
Real Estate ex-REITs	1.3	-1.2	3.0	0.2	3.7	1.4	0.7	-0.1	2.3	0.6	0.2	0.7	0.1	-0.5	0.7	0.8	-0.7	0.1
Other Real Assets							1.0	-11.0	-3.8	-6.3	-5.0	-5.1	-0.3	-2.7	0.1	-1.1	-1.8	-0.8
Real Assets - Total	0.7	-1.6	1.6	0.0	3.0	0.7	0.8	0.5	2.3	0.6	0.5	0.9	-0.1	1.0	2.4	1.2	-0.2	0.9
Hedge Funds	-1.9	-6.7	-10.3	-5.0	-7.3	-6.2	-1.9	-1.5	0.4	1.4	-1.2	-0.6	-1.0	-1.4	0.5	0.6	0.5	-0.1
Global TAA	2.8	-8.7					1.1	-4.5	1.7	-6.7	1.0	-1.5	1.9	-5.1	0.4	-8.0	1.1	-2.0
Diversified Private Equity ¹	1.4	3.8	5.4	3.5	1.6	3.1	0.4	4.2	-0.5	-12.6	2.1	-1.0	2.0	2.8	0.1	-12.8	0.2	-1.3
LBO ¹	1.4	3.8					-1.5	3.8	-0.1	-15.9	-2.2	-2.8	1.3	3.6	-0.1	-13.3	0.5	-1.3
Venture Capital ¹	-2.3	5.7	4.4	-6.1	-1.4	0.1	-5.6	9.1	9.9	-17.2	-3.5	-1.3	-3.0	7.0	3.3	-14.1	-5.0	-2.2
Other Private Equity ¹	-1.1	-3.2	0.0	0.0	0.0	-0.9	-0.6	4.9	-4.5	-12.0	-13.0	-4.9	-0.4	0.6	2.8	-15.2	-7.1	-3.7
Private Equity ¹ - Total	0.0	2.2	3.7	1.1	0.9	1.5	0.5	4.4	0.1	-12.2	1.6	-0.9	1.8	3.5	0.3	-12.9	-0.2	-1.2
Total fund	0.0	0.6	-0.5	-0.8	-0.5	-0.2	0.4	0.3	0.2	-0.4	0.9	0.3	0.2	0.1	-0.1	0.4	0.7	0.3

Total net value add is determined by both actual and policy allocation. It is the outcome of total net return (page 6) minus total benchmark return (page 7).

Aggregate net returns are an asset weighted average of all categories that the fund has an actual allocation to. Aggregate benchmark returns are a policy weighted average and includes only those categories that are part of your policy fund's mix.

You were not able to provide full year returns for all of the components of returns of asset classes with values shown in italics. The default is to set the unavailable return equal to the benchmark return.

1. To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 10.4%, 0.6% higher than your actual 5-year policy return of 9.9%. Mirroring this, your 5-year total fund net value added would be 0.6% lower. Refer to the Research section pages 6-7 for details.

Category		Value	Unit
Category 1	Item 1.1	100	%
Category 1	Item 1.2	85	%
Category 1	Item 1.3	70	%
Category 1	Item 1.4	60	%
Category 1	Item 1.5	50	%
Category 1	Item 1.6	40	%
Category 1	Item 1.7	30	%
Category 1	Item 1.8	20	%
Category 2	Item 2.1	90	%
Category 2	Item 2.2	75	%
Category 2	Item 2.3	65	%
Category 2	Item 2.4	55	%
Category 2	Item 2.5	45	%
Category 2	Item 2.6	35	%
Category 2	Item 2.7	25	%
Category 2	Item 2.8	15	%
Category 3	Item 3.1	80	%
Category 3	Item 3.2	70	%
Category 3	Item 3.3	60	%
Category 3	Item 3.4	50	%
Category 3	Item 3.5	40	%
Category 3	Item 3.6	30	%
Category 3	Item 3.7	20	%
Category 3	Item 3.8	10	%
Category 4	Item 4.1	70	%
Category 4	Item 4.2	60	%
Category 4	Item 4.3	50	%
Category 4	Item 4.4	40	%
Category 4	Item 4.5	30	%
Category 4	Item 4.6	20	%
Category 4	Item 4.7	10	%
Category 4	Item 4.8	5	%
Category 5	Item 5.1	60	%
Category 5	Item 5.2	50	%
Category 5	Item 5.3	40	%
Category 5	Item 5.4	30	%
Category 5	Item 5.5	20	%
Category 5	Item 5.6	10	%
Category 5	Item 5.7	5	%
Category 5	Item 5.8	2	%
Category 6	Item 6.1	50	%
Category 6	Item 6.2	40	%
Category 6	Item 6.3	30	%
Category 6	Item 6.4	20	%
Category 6	Item 6.5	10	%
Category 6	Item 6.6	5	%
Category 6	Item 6.7	2	%
Category 6	Item 6.8	1	%
Category 7	Item 7.1	40	%
Category 7	Item 7.2	30	%
Category 7	Item 7.3	20	%
Category 7	Item 7.4	10	%
Category 7	Item 7.5	5	%
Category 7	Item 7.6	2	%
Category 7	Item 7.7	1	%
Category 7	Item 7.8	0.5	%
Category 8	Item 8.1	30	%
Category 8	Item 8.2	20	%
Category 8	Item 8.3	10	%
Category 8	Item 8.4	5	%
Category 8	Item 8.5	2	%
Category 8	Item 8.6	1	%
Category 8	Item 8.7	0.5	%
Category 8	Item 8.8	0.2	%
Category 9	Item 9.1	20	%
Category 9	Item 9.2	10	%
Category 9	Item 9.3	5	%
Category 9	Item 9.4	2	%
Category 9	Item 9.5	1	%
Category 9	Item 9.6	0.5	%
Category 9	Item 9.7	0.2	%
Category 9	Item 9.8	0.1	%
Category 10	Item 10.1	10	%
Category 10	Item 10.2	5	%
Category 10	Item 10.3	2	%
Category 10	Item 10.4	1	%
Category 10	Item 10.5	0.5	%
Category 10	Item 10.6	0.2	%
Category 10	Item 10.7	0.1	%
Category 10	Item 10.8	0.05	%

[illegible]

[illegible]

Your policy return and value added calculation - 2016

2016 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
U.S. Stock - Large Cap	31.0%	Russell 1000 (Russell 3000 for total Dom Equity)	12.7%	10.6%	-2.1%
U.S. Stock - Small Cap		Russell 2000	21.3%	17.2%	-4.1%
Stock - EAFE	20.8%	MSCI World xUS 50% Hedged Net	5.0%	4.8%	-0.2%
Stock - Emerging	5.2%	MSCI Emerging Market net	11.2%	13.6%	2.4%
Stock - ACWIxU.S.		International Blended Benchmark	6.4%	7.5%	1.1%
Stock - Global		MSCI ACWI net	7.9%	8.8%	0.9%
Fixed Income - U.S.	18.0%	Barclays Universal for total FI (Barclays Aggregate Inc	3.9%	4.8%	0.9%
Fixed Income - Emerging		Barclays Emerging Market	9.9%	15.3%	5.5%
Fixed Income - High Yield		Barclays US Corp High Yield	17.1%	16.9%	-0.3%
Cash	1.0%	US 90 day T bill	0.3%	0.5%	0.1%
Infrastructure		Custom (Alternative Investment Actual Return)	5.3%	5.4%	0.1%
REITs	1.5%	Your REIT benchmark	8.5%	8.8%	0.3%
Natural Resources		Custom (Alternative Investment Actual Return)	5.3%	-4.1%	-9.4%
Real Estate ex-REITs	8.5%	NCREIF NPI	8.0%	9.3%	1.3%
Hedge Funds		Custom (Alternative Investment Actual Return)	5.3%	3.4%	-1.9%
Global TAA		Custom (Alternative Investment Actual Return)	5.3%	8.1%	2.8%
Diversified Private Equity		Custom (Alternative Investment Actual Return)	5.3%	6.7%	1.4%
LBO	14.0%	Custom (Alternative Investment Actual Return)	5.3%	6.7%	1.4%
Venture Capital		Custom (Alternative Investment Actual Return)	5.3%	3.0%	-2.3%
Other Private Equity		Custom (Alternative Investment Actual Return)	5.3%	4.2%	-1.1%
Total	100.0%				
Net Actual Return (reported by you)					8.0%
Calculated Policy Return = sum of (policy weights X benchmark returns)				7.8%	
Adjustment to reflect rebalancing and overlay impacts				0.2%	
Policy Return					<u>8.0%</u>
Net Value Added (Net Return - Policy Return)					0.0%

Your policy return and value added calculations - 2012 to 2015

2015 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
U.S. Stock - Large Cap	31.0%	Russell 1000 (Rus	0.5%	1.0%	0.5%
U.S. Stock - Small Cap		Russell 2000	-4.4%	-2.2%	2.2%
Stock - EAFE	20.8%	MSCI World xUS	0.4%	3.5%	3.2%
Stock - Emerging	5.2%	MSCI Emerging M	-14.9%	-12.0%	3.0%
Stock - ACWIxU.S.		International Bler	-2.8%	-0.9%	1.9%
Stock - Global		MSCI ACWI net	-2.4%	-1.3%	1.1%
Fixed Income - U.S.	18.0%	Barclays Universa	0.4%	0.6%	0.2%
Fixed Income - Emerging		Barclays Emergin	1.3%	0.6%	-0.6%
Fixed Income - High Yield		Barclays US Corp	-4.5%	-4.5%	0.0%
Cash	1.0%	US 90 day T bill	0.1%	0.1%	0.0%
Infrastructure		Custom (Alternati	6.1%	5.4%	-0.7%
REITs	1.5%	Your REIT benchn	3.2%	3.2%	0.0%
Natural Resources		Custom (Alternati	6.1%	2.0%	-4.1%
Real Estate ex-REITs	8.5%	NCREIF NPI	13.3%	12.2%	-1.2%
Hedge Funds		Custom (Alternati	6.1%	-0.6%	-6.7%
Global TAA		Custom (Alternati	6.1%	-2.6%	-8.7%
Diversified Private Equity		Custom (Alternati	6.1%	9.9%	3.8%
LBO	14.0%	Custom (Alternati	6.1%	9.9%	3.8%
Venture Capital		Custom (Alternati	6.1%	11.8%	5.7%
Other Private Equity		Custom (Alternati	6.1%	2.9%	-3.2%
Total	100.0%				
Net Return (reported by you)					2.3%
Calculated policy return (sum: Policy weights x benchmarks)				1.6%	
Adjustment to reflect rebalancing and overlay impacts				<u>0.1%</u>	
Policy Return					<u>1.7%</u>
Net Value Added (Net Return - Policy Return)					0.6%

2013 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
U.S. Stock - Large Cap	33.0%	Russell 1000 (Rus	33.6%	31.1%	-2.5%
U.S. Stock - Small Cap		Russell 2000	38.8%	42.2%	3.4%
Stock - EAFE	20.0%	MSCI World xUS	23.1%	25.3%	2.2%
Stock - Emerging	5.0%	MSCI Emerging M	-2.3%	-1.3%	0.9%
Stock - ACWIxU.S.		International Bler	17.6%	17.6%	0.0%
Stock - Global		MSCI ACWI	22.8%	24.5%	1.7%
Fixed Income - U.S.	18.0%	Barclays Universa	-1.3%	-1.0%	0.3%
Fixed Income - Emerging		Barclays Emergin	-4.1%	-4.8%	-0.7%
Fixed Income - High Yield		Barclays US Corp	7.4%	8.2%	0.7%
Cash	1.0%	US 90 day T bill	0.1%	0.1%	0.0%
Infrastructure		Custom (Alternati	16.5%	3.5%	-13.0%
REITs	1.5%	Your REIT benchn	2.5%	1.8%	-0.6%
Natural Resources		Custom (Alternati	16.5%	7.5%	-9.0%
Real Estate ex-REITs	8.5%	NCREIF NPI	11.0%	11.2%	0.2%
Hedge Funds		Custom (Alternati	16.5%	11.4%	-5.0%
Diversified Private Equity	13.0%	Custom (Alternati	16.5%	20.0%	3.5%
Venture Capital		Custom (Alternati	16.5%	10.4%	-6.1%
Other Private Equity		Custom (Alternati	16.5%	16.5%	0.0%
Total	100.0%				
Net Return (reported by you)					17.3%
Calculated policy return (sum: Policy weights x benchmarks)				18.5%	
Adjustment to reflect rebalancing and overlay impacts				<u>-0.4%</u>	
Policy Return					<u>18.1%</u>
Net Value Added (Net Return - Policy Return)					-0.8%

2014 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
U.S. Stock - Large Cap	31.0%	Russell 1000 (Rus	12.6%	12.4%	-0.2%
U.S. Stock - Small Cap		Russell 2000	4.9%	4.3%	-0.6%
Stock - EAFE	20.8%	MSCI World xUS	0.8%	1.1%	0.3%
Stock - Emerging	5.2%	MSCI Emerging M	-2.2%	-1.7%	0.5%
Stock - ACWIxU.S.		International Bler	0.2%	0.4%	0.1%
Stock - Global		MSCI ACWI Net	4.2%	3.7%	-0.5%
Fixed Income - U.S.	18.0%	Barclays Universa	5.6%	5.0%	-0.5%
Fixed Income - Emerging		Barclays Emergin	4.8%	1.5%	-3.2%
Fixed Income - High Yield		Barclays US Corp	2.5%	2.1%	-0.4%
Cash	1.0%	US 90 day T bill	0.0%	0.1%	0.0%
Infrastructure		Custom (Alternati	13.5%	17.4%	3.9%
REITs	1.5%	Your REIT benchn	30.1%	30.5%	0.3%
Natural Resources		Custom (Alternati	13.5%	7.7%	-5.8%
Real Estate ex-REITs	8.5%	NCREIF NPI	11.8%	14.8%	3.0%
Hedge Funds		Custom (Alternati	13.5%	3.3%	-10.3%
Global TAA					
Diversified Private Equity	14.0%	Custom (Alternati	13.5%	18.9%	5.4%
LBO					
Venture Capital		Custom (Alternati	13.5%	17.9%	4.4%
Other Private Equity		Custom (Alternati	13.5%	13.5%	0.0%
Total	100.0%				
Net Return (reported by you)					7.8%
Calculated policy return (sum: Policy weights x benchmarks)				8.28%	
Adjustment to reflect rebalancing and overlay impacts				<u>0.0%</u>	
Policy Return					<u>8.3%</u>
Net Value Added (Net Return - Policy Return)					-0.5%

2012 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
U.S. Stock - Large Cap	38.0%	Russell 1000 (Rus	16.4%	15.6%	-0.8%
U.S. Stock - Small Cap		Russell 2000	16.4%	14.6%	-1.7%
Stock - EAFE	18.4%	MSCI World xUS	16.4%	16.3%	-0.1%
Stock - Emerging	4.6%	MSCI Emerging M	18.6%	20.0%	1.4%
Stock - ACWIxU.S.					
Stock - Global		MSCI ACWI	16.1%	16.1%	-0.1%
Fixed Income - U.S.	18.0%	Barclays Universa	5.5%	6.1%	0.6%
Fixed Income - Emerging		Barclays Emergin	17.9%	18.6%	0.7%
Fixed Income - High Yield		Barclays US Corp	15.8%	14.9%	-0.9%
Cash	1.0%	US 90 day T bill	0.1%	0.1%	0.0%
Infrastructure		Custom (Alternati	14.6%	28.6%	14.0%
REITs	1.5%	Your REIT benchn	18.1%	17.8%	-0.2%
Natural Resources		Custom (Alternati	14.6%	-23.0%	-37.7%
Real Estate ex-REITs	8.5%	NCREIF NPI	10.5%	14.2%	3.7%
Hedge Funds		Custom (Alternati	14.6%	7.4%	-7.3%
Diversified Private Equity	10.0%	Custom (Alternati	14.6%	16.3%	1.6%
Venture Capital		Custom (Alternati	14.6%	13.2%	-1.4%
Other Private Equity		Custom (Alternati	14.6%	14.6%	0.0%
Total	100.0%				
Net Return (reported by you)					13.5%
Calculated policy return (sum: Policy weights x benchmarks)				13.7%	
Adjustment to reflect rebalancing and overlay impacts				<u>0.2%</u>	
Policy Return					<u>13.9%</u>
Net Value Added (Net Return - Policy Return)					-0.5%

Profit/Loss on overlay programs

Overlay type	Your fund		Peer median				U.S. Public median			
	2016	2015	2016		2015		2016		2015	
	bps	bps	bps	#	bps	#	bps	#	bps	#
Int. Discretionary Currency			3	2	3	2	3	2	3	2
Ext. Discretionary Currency			-1	2	3	2	-1	2	3	2
Internal Global TAA			0	1	0	1	0	1	0	1
External Global TAA										
Internal PolicyTilt TAA										
External PolicyTilt TAA										
Internal Commodities										
External Commodities							203	1	-455	1
Internal Long/Short										
External Long/Short										
Internal Other			0	2	1	2	0	2	1	2
External Other			18	1	1	1	18	3	0	3
Total Profit/Loss			0	6	0	6	4	9	0	9

Profit/loss in basis points was calculated using total fund average holdings. This was done to measure the impact of the program at the total fund level.

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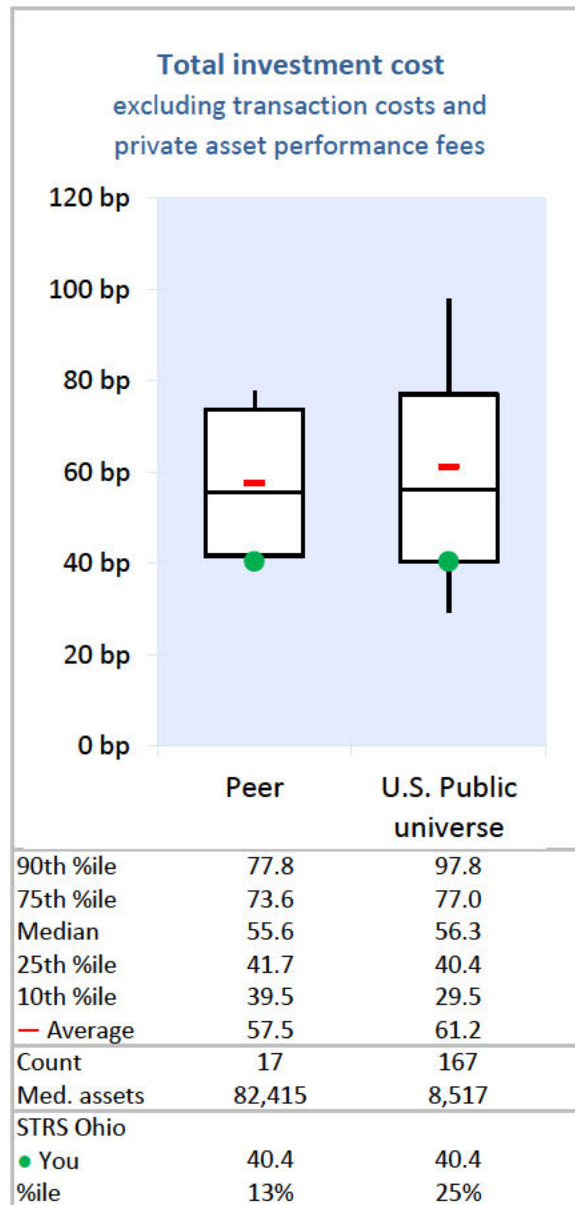
Total cost and benchmark cost

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Comparisons of total investment cost

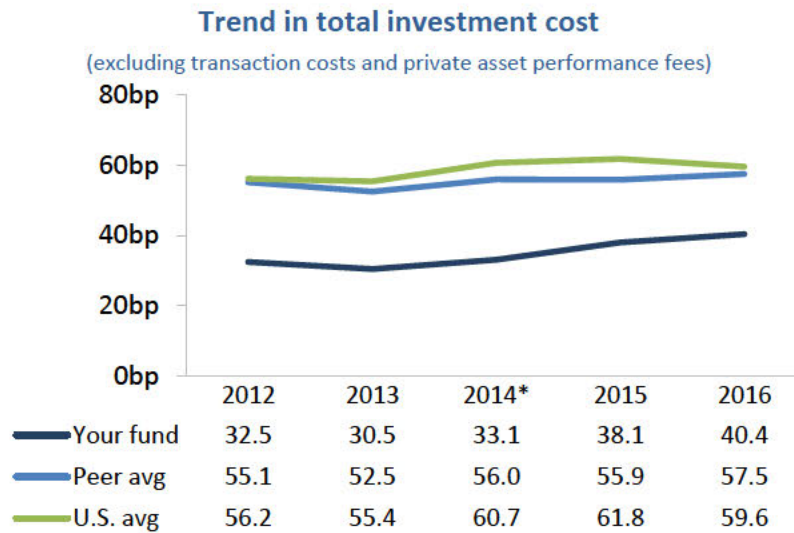
Your total investment cost, excluding transaction costs and private asset performance fees, of 40.4 bps was below the peer median of 55.6 bps.

Differences in total investment cost are often caused by two factors that are usually outside of management's control: asset mix and fund size. Therefore, to assess whether your fund's total investment cost is high or low given your unique asset mix and size, CEM calculates a benchmark cost for your fund. Benchmark cost analysis begins on page 7 of this section.



Trend in total investment cost

Your total investment cost, excluding transaction costs and private asset performance fees, increased from 32.5 bps in 2012 to 40.4 bps in 2016.



Trend analysis is based on the 121 U.S. funds and the 17 peer funds with 5 or more consecutive years of data.

* Starting in 2014 hedge fund performance fees are being included for all participants. This is one reason for the uptick in costs relative to 2013. Default underlying fund of fund fees are based on peer median data and default performance fees are based on universe median data.

Thus, to the extent that peers/universe adjust prior years' data and/or there is a change in peer group and the universe, your fund's prior years' costs may be different from what was shown in your previous CEM report. We are rethinking this methodology for next year.

Types of costs included in your total investment cost

The table below outlines the types of costs included in your total investment cost.

Asset class	<u>Internal</u>		<u>External</u>			
	In-house total cost	Transaction costs	Manager base fees	Monitoring & other costs	Perform. fees (active only)	Transaction costs
<u>Public</u>						
(Stock, Fixed income, commodities, REITs)	✓	✗	✓	✓	✓	✗
Derivatives/Overlays	✓	✗	✓	✓	✓	✗
<u>Hedge funds & Global TAA</u>						
Hedge Funds	n/a	n/a	✓	✓	✓	✗
Global TAA	✓	✗	✓	✓	✓	✗
<u>Private equity</u>						
(Diversified private equity, venture capital, LBO, other private equity)	✓	✗	✓*	✓	✗	✗
<u>Private real assets</u>						
(Infrastructure, natural resources, real estate ex-REITs, other real assets)	✓	✗	✓*	✓	✗	✗

*For limited partnerships, external manager base fees represent gross contractual management fees.

- ✓ indicates cost is included.
- ✗ indicates cost is excluded.
- Green shading indicates that the cost type has been newly added for the 2014 data year.
- CEM currently excludes external private asset performance fees and all transaction costs from your total cost because only a limited number of participants are currently able to provide complete data.

Detailed breakdown of your total investment cost

Your 2016 total investment cost, excluding transaction costs and private asset performance fees, was 40.4 bp or \$287.9 million.

Your investment costs

	Internal		External Passive		External Active			Total		
	Passive	Active	Fees	Monitoring & Other	Base Fees	Perform. Fees ¹	Monitoring & Other	\$000s	bps	% of Total
Asset management										
U.S. Stock - Large Cap	64	10,873			2,234		557	13,728		5%
U.S. Stock - Small Cap		250			8,862		62	9,173		3%
Stock - EAFE		3,138			18,582		369	22,089		8%
Stock - Emerging		2,578			5,834		250	8,662		3%
Stock - ACWIxU.S.		430			5,445		23	5,898		2%
Stock - Global		452						452		0%
Fixed Income - U.S.		2,317						2,317		1%
Fixed Income - Emerging					3,181		228	3,409		1%
Fixed Income - High Yield					3,666		206	3,872		1%
Cash		266						266		0%
REITs	89							89		0%
Real Estate ex-REITs		16,632						16,632		6%
Real Estate ex-REITs - LPs					17,432		447	17,879		6%
Infrastructure - Fund of Funds					496		60	556		0%
Underlying Fund of Fund Fees					1,321			1,321		0%
Natural Resources		97						97		0%
Natural Resources - LPs					6,439		93	6,532		2%
Hedge Funds					32,054	22,495	302	54,851		19%
Global TAA					1,191	0	29	1,220		0%
Diversified Private Equity					2,715		21	2,736		1%
LBO					43,001		903	43,904		15%
LBO - Fund of Funds					6,702		355	7,057		2%
Underlying Fund of Fund Fees					8,310			8,310		3%
Venture Capital					16,911		347	17,258		6%
Venture Capital - Fund of Funds					1,677		124	1,801		1%
Underlying Fund of Fund Fees					4,392			4,392		2%
Other Private Equity		28			25,265		177	25,470		9%
Other Private Equity - Co-investments							233	233		0%
Overlay Programs		127			0	0	325	452		0%
Total asset management costs excluding private asset performance fees								280,660	39.4bp	97%
Oversight, custodial & other asset related costs										
Oversight of the Fund								4,578		2%
Trustee & Custodial								2,090		1%
Audit								166		0%
Other								418		0%
Total oversight, custodial & other costs								7,252	1.0bp	3%
Total investment costs excluding transaction costs and private asset performance fees								287,912	40.4bp	100%

¹ Starting in 2014, CEM changed its methodology to include performance fees on hedge funds in total cost used for comparison and benchmarking. Performance fees for real estate, infrastructure, natural resources and private equity are excluded.

Changes in your investment costs

The table below shows how your investment costs have changed from year to year by asset class.

Change in your investment costs (2016 - 2012)

	Investment costs (\$000s)					Change (\$000s)				Change (%)			
	2016	2015	2014	2013	2012	2016	2015	2014	2013	2016	2015	2014	2013
Asset management													
U.S. Stock - Large Cap	13,728	14,245	12,970	12,939	12,630	-517	1,275	31	309	-4%	10%	0%	2%
U.S. Stock - Small Cap	9,173	9,330	9,658	9,827	11,039	-157	-328	-169	-1,212	-2%	-3%	-2%	-11%
Stock - EAFE	22,089	23,022	22,371	20,301	18,334	-933	651	2,070	1,967	-4%	3%	10%	11%
Stock - Emerging	8,662	8,177	8,780	9,689	9,120	486	-604	-908	569	6%	-7%	-9%	6%
Stock - ACWIxU.S.	5,898	5,480	2,416	409	0	418	3,064	2,007	409	8%	127%	491%	
Stock - Global	452	457	423	409	211	-5	34	14	198	-1%	8%	3%	94%
Fixed Income - U.S.	2,317	2,413	2,650	2,702	3,000	-96	-236	-53	-298	-4%	-9%	-2%	-10%
Fixed Income - Emerging	3,409	3,757	3,793	2,915	2,562	-348	-36	878	353	-9%	-1%	30%	14%
Fixed Income - High Yield	3,872	4,705	4,288	3,405	3,399	-833	417	882	6	-18%	10%	26%	0%
Cash	266	269	266	256		-3	3	9	256	-1%	1%	4%	
REITs	89	0	16	328	344	89	-16	-312	-16		-100%	-95%	-5%
Real Estate ex-REITs	16,632	16,561	14,192	12,476	12,720	71	2,370	1,715	-244	0%	17%	14%	-2%
Real Estate ex-REITs - LPs	17,879	18,382	18,281	21,220	24,491	-502	101	-2,940	-3,271	-3%	1%	-14%	-13%
Infrastructure - Fund of Funds	556	541	557	602	590	15	-15	-45	11	3%	-3%	-7%	2%
Underlying Fund of Fund Fees	1,321	1,946	1,249	1,069	1,468	-625	697	180	-399	-32%	56%	17%	-27%
Natural Resources	97	110	0	0	0	-13	110			-12%			
Natural Resources - LPs	6,532	7,761	5,101	4,774	3,852	-1,229	2,660	327	922	-16%	52%	7%	24%
Hedge Funds	54,851	45,583	55,340	23,345	20,784	9,268	-9,757	31,995	2,562	20%	-18%	137%	12%
Global TAA	1,220	706	0	0	0	515	706			73%			
Diversified Private Equity	2,736	1,441	30,699	34,338	32,407	1,296	-29,258	-3,639	1,931	90%	-95%	-11%	6%
LBO	43,904	43,082	0	0	0	822	43,082			2%			
LBO - Fund of Funds	7,057	6,184	0	0	0	873	6,184			14%			
Underlying Fund of Fund Fees	8,310	11,206	0	0	0	-2,896	11,206			-26%			
Venture Capital	17,258	15,939	13,996	16,969	18,334	1,320	1,942	-2,973	-1,365	8%	14%	-18%	-7%
Venture Capital - Fund of Funds	1,801	1,581	1,130	1,112	0	219	451	18	1,112	14%	40%	2%	
Underlying Fund of Fund Fees	4,392	3,665	2,824	2,372	0	727	841	452	2,372	20%	30%	19%	
Other Private Equity	25,470	20,356	11,111	9,762	10,423	5,114	9,245	1,349	-661	25%	83%	14%	-6%
Other Private Equity - Co-investments	233	0	0	0	0	233	0			447805%			
Overlay Programs	452	457	175	100	29	-5	282	75	71	-1%	161%	75%	243%
Total excl. private asset perf. fees	280,660	267,355	235,635	204,377	200,910	13,304	31,721	31,258	3,466	5%	13%	15%	2%
Oversight, custodial & other asset related costs													
Oversight of the Fund	4,578	4,539	3,804	4,073	4,236	39	735	-269	-163	1%	19%	-7%	-4%
Trustee & Custodial	2,090	2,150	1,673	1,438	1,438	-60	477	235		-3%	29%	16%	0%
Audit	166	158	136	119	173	8	22	17	-54	5%	16%	14%	-31%
Other	418	375	339	327	173	43	36	12	154	12%	11%	4%	89%
Total oversight, custodial & other costs	7,252	7,222	5,952	5,957	6,020	30	1,270	-5	-63	0%	21%	0%	-1%
Total investment costs ¹	287,912	274,578	241,587	210,333	206,930	13,334	32,991	31,254	3,403	5%	14%	15%	2%
Total in basis points	40.4bp	38.1bp	33.1bp	30.5bp	32.5bp								

¹ Starting in 2014, CEM changed its methodology to include performance fees on hedge funds in total cost used for comparison and benchmarking. Performance fees for real estate, infrastructure, natural resources and private equity are excluded.

Total cost versus benchmark cost

Your fund's total investment cost, excluding transaction costs and private asset performance fees, was 7.5 bps below your benchmark cost of 47.9 bps. This implies that your fund was low cost by 7.5 bps compared to the peer median, after adjusting for your fund's asset mix.

Your cost versus benchmark

	\$000s	bps
Your fund's total investment cost excluding transaction costs and illiquid asset performance fees	287,912	40.4 bp
- Your fund's benchmark	341,316	47.9 bp
= Your fund's cost savings	-53,404	-7.5 bp

Your benchmark cost is an estimate of your total costs assuming that you paid the peer median cost for each of your investment mandates and fund oversight. The calculation of your benchmark cost is shown on the following page.

The reasons why your fund's total cost was below your benchmark are summarized in the table below. Details of each of the impacts below are provided on pages 9 to 12.

Reasons why your fund was low cost

	Cost/-Savings impact	
	\$000s	bps
<u>Differences in implementation style:</u>		
External active vs. low cost styles	-53,352	-7.5 bp
Fund of funds vs. external direct	6,417	0.9 bp
Mix of internal and passive styles	4,768	0.7 bp
Style impact of overlays	218	0.0 bp
Total style impact	-41,950	-5.9 bp
<u>Paying more/-less for similar services:</u>		
External investment management	-20,952	-2.9 bp
Internal investment management	5,087	0.7 bp
Oversight, custodial and other	-2,320	-0.3 bp
Total impact of paying more /-less	-18,185	-2.6 bp
Total savings	-53,404	-7.5 bp

Benchmark cost calculation

Your 2016 benchmark cost was 47.9 basis points or \$341.3 million. It equals your holdings for each asset class multiplied by the peer median cost for the asset class. The peer median cost is the style weighted average for all implementation styles (i.e., internal passive, internal active, external passive, external active).

Calculation of your 2016 benchmark cost

Asset class	Your avg. assets or fee basis	Weighted peer median cost ¹	Benchmark
	(A)	(B)	(A X B)
	\$mils		\$'000s
Asset management costs			
U.S. Stock - Large Cap	20,120	6.3 bp	12,631
U.S. Stock - Small Cap	1,978	44.9 bp	8,874
Stock - EAFE	11,121	18.0 bp	20,050
Stock - Emerging	2,935	41.0 bp	12,030
Stock - ACWIxU.S.	4,084	30.7 bp	12,541
Stock - Global	657	30.8 bp	2,024
Fixed Income - U.S.	9,257	6.6 bp	6,129
Fixed Income - Emerging	734	34.3 bp	2,520
Fixed Income - High Yield	873	35.7 bp	3,117
Cash	1,477	1.8 bp	266
Infrastructure (excl. perf. fees)	83	129.3 bp	1,075
REITs	1,214	22.7 bp	2,759
Real Estate ex-REITs (excl. perf. fees)	7,237	72.9 bp	52,733
Natural Resources (excl. perf. fees)	983	93.4 bp	9,181
Hedge Funds	2,021	230.0 bp	46,493
Global TAA	398	46.9 bp	1,867
Diversified Private Equity (excl. perf. fee)	166	166.5 bp	2,767
LBO (excl. perf. fees)	4,464	171.3 bp	76,452
Venture Capital (excl. perf. fees)	1,446	207.3 bp	29,967
Other Private Equity (excl. perf. fees)	2,584	105.3 bp	27,196
Overlay Programs ²	71,209	0.2 bp	1,073
Benchmark for asset management	71,209	46.6 bp	331,743
Oversight, custody and other costs			
Oversight of the Fund	71,209	0.5 bp	3,752
Trustee & Custodial	71,209	0.2 bp	1,774
Consulting	71,209	0.4 bp	3,172
Audit	71,209	0.0 bp	188
Other	71,209	0.1 bp	686
Benchmark for oversight, custody & other		1.3 bp	9,573
Total benchmark cost		47.9 bp	341,316

1. The weighted peer median cost for asset management is the style-weighted average of the peer median costs for all implementation styles (i.e., internal passive, internal active, external passive, external active, fund of fund). It excludes performance fees on private assets. The style weights by asset class for your fund and the peers are shown on page 17 of this section.

2. Total fund average holdings is used as the base when calculating the relative cost impact of the overlay programs.

[illegible]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Cost impact of overlays

As summarized on the previous page, the style impact of overlays cost you 0.0 bps. If you use more overlays than your peers, or more expensive types of overlays, then it increases your relative cost.

Calculation of the cost impact of differences in the use of portfolio level overlays

[illegible]

1 [REDACTED]

Cost impact of lower cost styles

[illegible]

1. Cost/-savings for each asset class equals non-external active holdings within each asset class X cumulative impact from the three lower cost styles. By formula: [(peer median cost for the style - peer weighted average cost of lower cost styles) X (your weight for the style - peer weight for the style)]. Peer median costs for each style are shown on page 18.

Cost impact of paying more/-less for similar services

Differences in what you paid relative to your peers for similar asset management and related oversight and support services saved you 1.6 bps.

Calculation of the cost impact of paying more/-less

[illegible]

*Universe median used as peer data was insufficient.

Summary of why you are high or low cost by asset class

The table below summarizes where you are high and low cost by asset class. It also quantifies how much is due to differences in implementation style (i.e., differences in the mix of external active, external passive, internal active, internal passive and fund of fund usage) and how much is due to paying more or less for similar services (i.e., same asset class and style).

Summary of why you are high or low cost by asset class

	Your cost ¹	Benchmark = peer weighted median cost ¹	More/-less	Your average assets (or fee basis ³)	More/-less in \$'000s		
	(A)	(B)	(C = A - B)	(D)	Due to Impl. style	Due to paying more/less	Total More/-less (C X D)
Asset management costs							
U.S. Stock - Large Cap	6.8 bp	6.3 bp	0.5 bp	20,120	-2,902	3,998	1,096
U.S. Stock - Small Cap	46.4 bp	44.9 bp	1.5 bp	1,978	-714	1,014	300
Stock - EAFE	19.9 bp	18.0 bp	1.8 bp	11,121	2,154	-115	2,039
Stock - Emerging	29.5 bp	41.0 bp	-11.5 bp	2,935	-4,539	1,171	-3,368
Stock - ACWIxU.S.	14.4 bp	30.7 bp	-16.3 bp	4,084	-6,692	48	-6,644
Stock - Global	6.9 bp	30.8 bp	-23.9 bp	657	-1,572	0	-1,572
Fixed Income - U.S.	2.5 bp	6.6 bp	-4.1 bp	9,257	-3,712	-99	-3,811
Fixed Income - Emerging	46.4 bp	34.3 bp	12.1 bp	734	0	889	889
Fixed Income - High Yield	44.4 bp	35.7 bp	8.7 bp	873	72	683	755
Cash	1.8 bp	1.8 bp	0.0 bp	1,477	0	0	0
Infrastructure (excl. perf. fees)	225.9 bp	129.3 bp	96.6 bp	83	526	276	803
REITs	0.7 bp	22.7 bp	-22.0 bp	1,214	-2,568	-101	-2,670
Real Estate ex-REITs (excl. perf. fees)	47.7 bp	72.9 bp	-25.2 bp	7,237	-23,222	5,001	-18,221
Natural Resources (excl. perf. fees)	67.4 bp	93.4 bp	-26.0 bp	983	-3,623	1,071	-2,552
Hedge Funds (excl. perf. fees)	160.1 bp	155.4 bp	4.7 bp	2,021	-2,235	3,185	950
• Performance fees	111.3 bp	74.6 bp	36.6 bp	2,021	677	6,731	7,408
Global TAA	30.7 bp	46.9 bp	-16.3 bp	398	0	-647	-647
Diversified Private Equity (excl. perf. fees)	164.7 bp	166.5 bp	-1.8 bp	166	-73	42	-30
LBO (excl. perf. fees)	132.8 bp	171.3 bp	-38.5 bp	4,464	6,073	-23,254	-17,181
Venture Capital (excl. perf. fees)	162.2 bp	207.3 bp	-45.1 bp	1,446	1,600	-8,115	-6,516
Other Private Equity (excl. perf. fees)	99.5 bp	105.3 bp	-5.8 bp	2,584	-1,419	-74	-1,493
Overlay Programs ²	0.1 bp	0.2 bp	-0.1 bp	71,209	218	-838	-620
Total asset management	39.4 bp	46.6 bp	-7.2 bp	71,209	-41,950	-9,134	-51,083
Oversight, custody and other costs							
Oversight of the Fund			0.1 bp	71,209	n/a	826	826
Trustee & Custodial			0.0 bp	71,209	n/a	315	315
Consulting			-0.4 bp	71,209	n/a	-3,172	-3,172
Audit			0.0 bp	71,209	n/a	-22	-22
Other			0.0 bp	71,209	n/a	-267	-267
Total oversight, custody & other	1.0 bp	1.3 bp	-0.3 bp	71,209	n/a	-2,320	-2,320
Total	40.4 bp	47.9 bp	-7.5 bp	71,209	-41,950	-11,454	-53,404

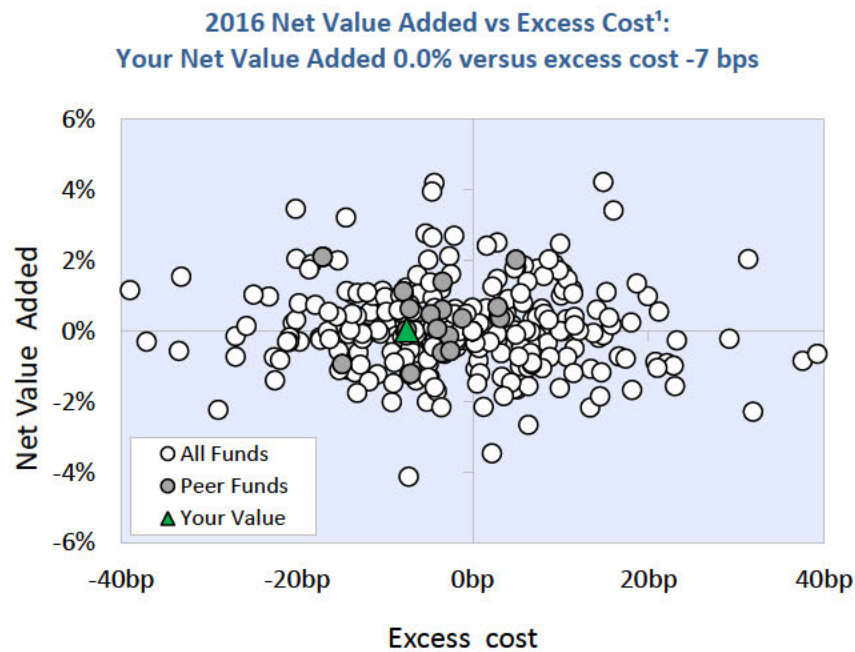
1. The weighted peer median cost for asset management is the style-weighted average of the peer median costs for all implementation styles (i.e., internal passive, internal active, external passive, external active, fund of fund). It excludes performance fees on private assets. The style weights by asset class for your fund and the peers are shown on page 17 of this section.

2. Total fund average holdings is used as the base when calculating the relative cost impact of the overlay programs.

Your cost effectiveness ranking

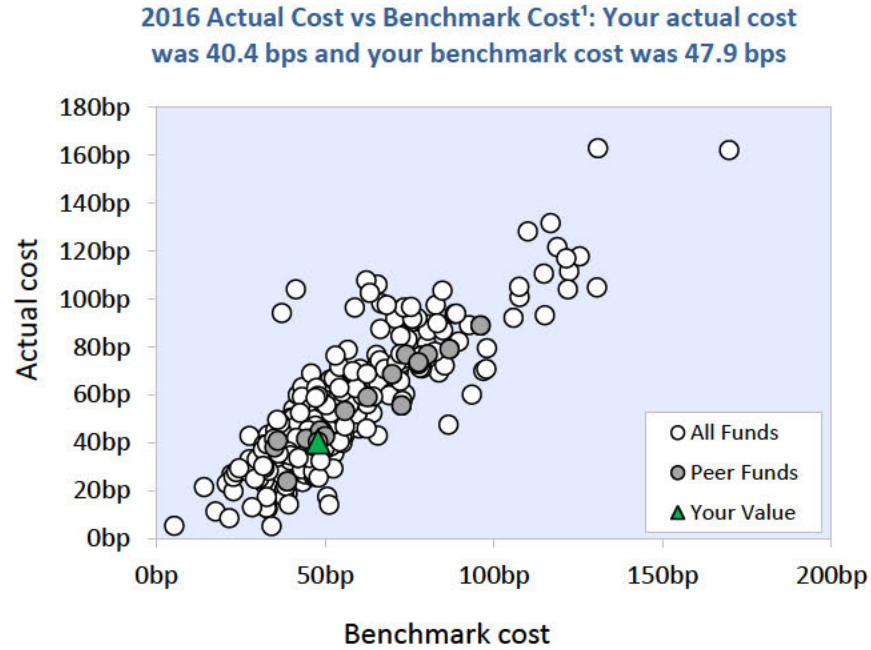
Being high or low cost is neither good nor bad. The more important question is, are you receiving sufficient value for your excess cost? At the total fund level, we provide insight into this question by combining your value added and your excess cost to create a snapshot your cost effectiveness performance relative to that of the survey universe.

For the 2016 year, your fund ranked in the positive value added, low cost quadrant.



1. Benchmark cost and excess cost calculations are based on regression analysis (see Appendix B in this section) for all funds except your fund. Your fund's benchmark cost is based on peer-median costs (per page 7 of this section).

Actual cost versus benchmark cost



1. Benchmark cost calculations are based on regression analysis (see Appendix B in this section) for all funds except your fund. Your fund's benchmark cost is based on peer-median costs (per page 7 of this section).

Appendix A: Benchmarking methodology formulas and data

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Appendix A: Benchmarking methodology formulas and data (page 2 of 2)

c) 2016 cost data used to calculate weighted peer median costs and impact of mix differences.

[illegible]¹Universe median used as peer data was insufficient.

*Performance fees are included.

d) 2016 Style weights used to calculate the weighted peer median costs and impact of mix differences.

Style Weights	You (%)						Peer average (%)					
	Internal Passive	Internal Active	External Passive	External Active	Limited Partner.	Fund of Funds	Internal Passive	Internal Active	External Passive	External Active	Limited Partner.	Fund of Funds
U.S. Stock - Large Cap	43.6%	51.3%	0.0%	5.1%			32.9%	25.0%	25.5%	16.6%		
U.S. Stock - Small Cap	0.0%	40.5%	0.0%	59.5%			9.9%	17.5%	6.0%	66.6%		
Stock - EAFE	0.0%	50.6%	0.0%	49.4%			17.5%	12.8%	21.4%	48.3%		
Stock - Emerging	0.0%	66.8%	0.0%	33.2%			9.0%	9.4%	13.8%	67.8%		
Stock - ACWIxU.S.	0.0%	70.0%	0.0%	30.0%			0.1%	6.7%	25.6%	67.5%		
Stock - Global	0.0%	100.0%	0.0%	0.0%			1.4%	22.0%	1.5%	75.0%		
Fixed Income - U.S.	0.0%	100.0%	0.0%	0.0%			4.3%	57.9%	4.5%	33.3%		
Fixed Income - Emerging	0.0%	0.0%	0.0%	100.0%			0.0%	1.5%	4.6%	93.9%		
Fixed Income - High Yield	0.0%	0.0%	0.0%	100.0%			0.0%	3.2%	0.0%	96.8%		
Cash		100.0%		0.0%			Excluded	Excluded	Excluded	Excluded	Excluded	Excluded
Infrastructure		0.0%		0.0%	0.0%	100.0%		2.9%		14.2%	78.3%	4.6%
REITs	100.0%	0.0%	0.0%	0.0%			22.0%	6.4%	3.4%	68.2%		
Real Estate ex-REITs		78.4%		0.0%	21.6%	0.0%		7.1%		38.3%	53.9%	0.7%
Natural Resources		42.3%		0.0%	57.7%	0.0%		3.6%		18.7%	77.8%	0.0%
Hedge Funds				100.0%		0.0%				84.8%		15.2%
Global TAA		0.0%		100.0%				13.5%		86.5%		
Diversified Private Equity		0.0%		100.0%		0.0%		0.1%		94.6%		5.3%
LBO		0.0%		78.0%		22.0%		0.0%		94.7%		5.3%
Venture Capital		0.0%		81.2%		18.8%		0.0%		94.7%		5.3%
Other Private Equity		7.2%		92.8%				1.8%		98.2%		

The above data was adjusted as noted when there were insufficient peers, or for other reasons where direct comparisons were inappropriate.

Appendix B: Regression based benchmarks

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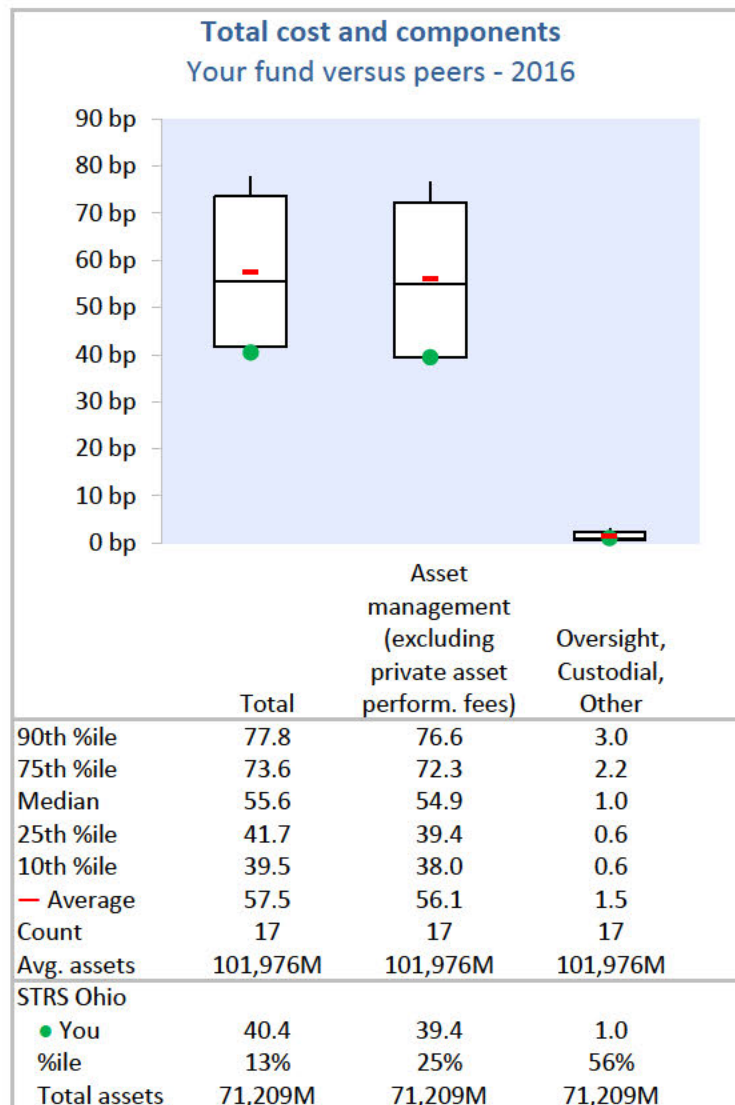
Cost comparisons

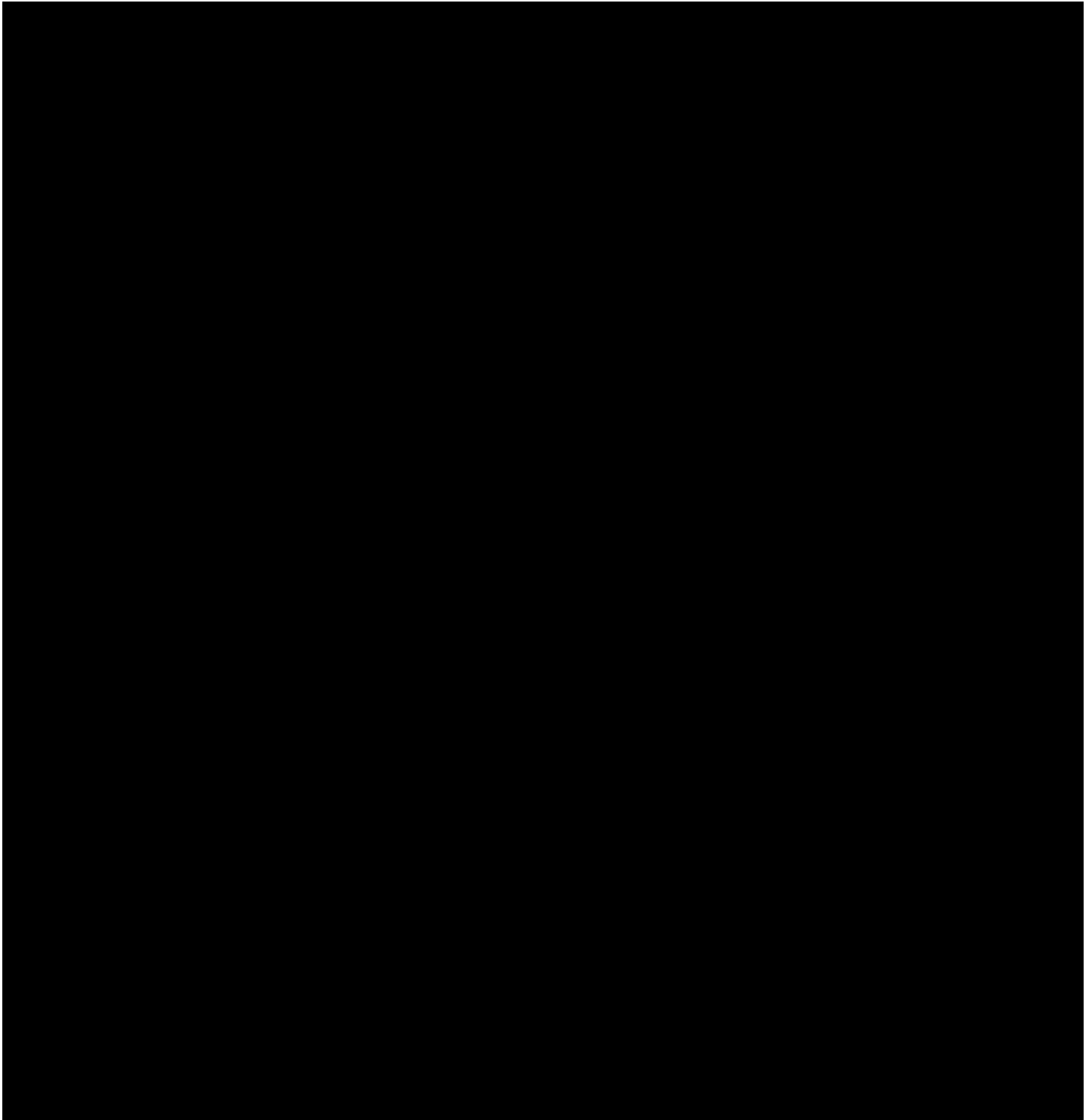
Total fund cost	2
Governance, operations & support	3
Public asset classes	
- Stock	4
- Fixed Income	13
- Commodities	25
- REITs	26
Real asset classes	
- Real estate ex-REITs	27
- Infrastructure	28
- Natural resources	29
- Other real assets	30
Private equity	
- Diversified private equity	31
- LBO	32
- Venture capital	33
- Other private equity	34
Global TAA	35
Hedge Funds	36
Overlays	37

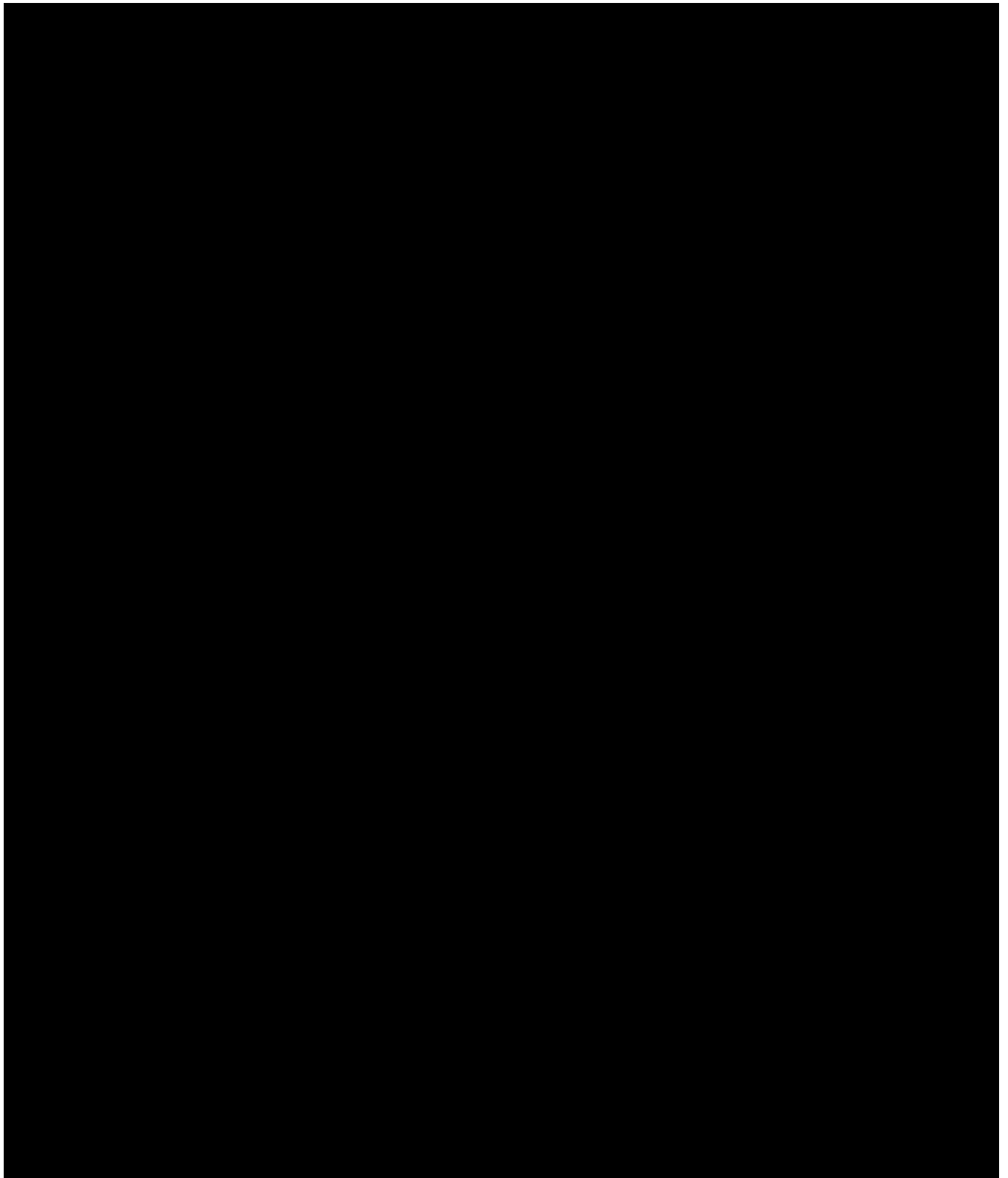
Total fund cost

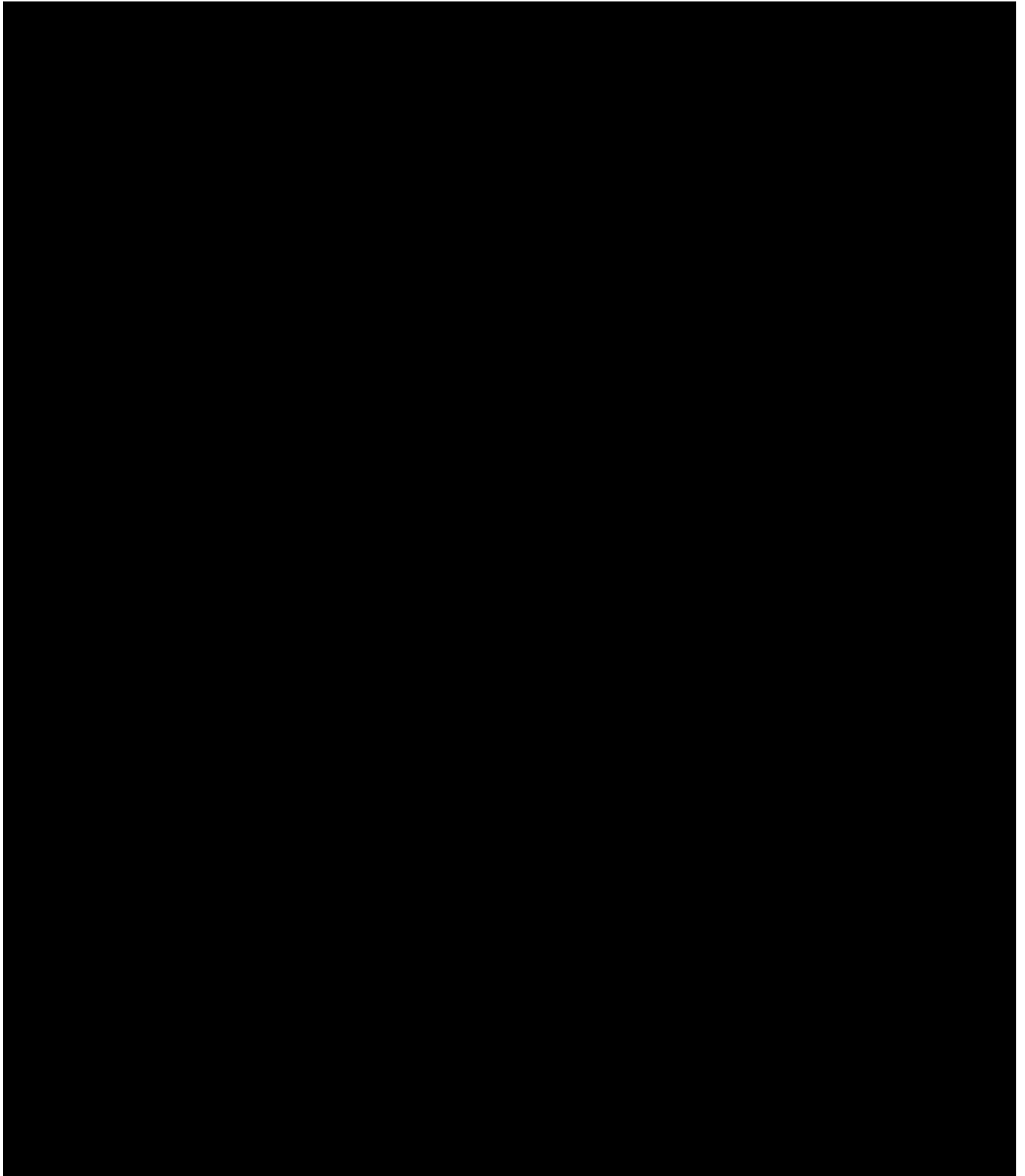
Total costs are benchmarked in the previous section. In this section, your fund's costs are compared on a line-item basis to your peers. This enables you to understand better why you may be a high or low cost fund and it also identifies and quantifies major cost differences that may warrant further investigation.

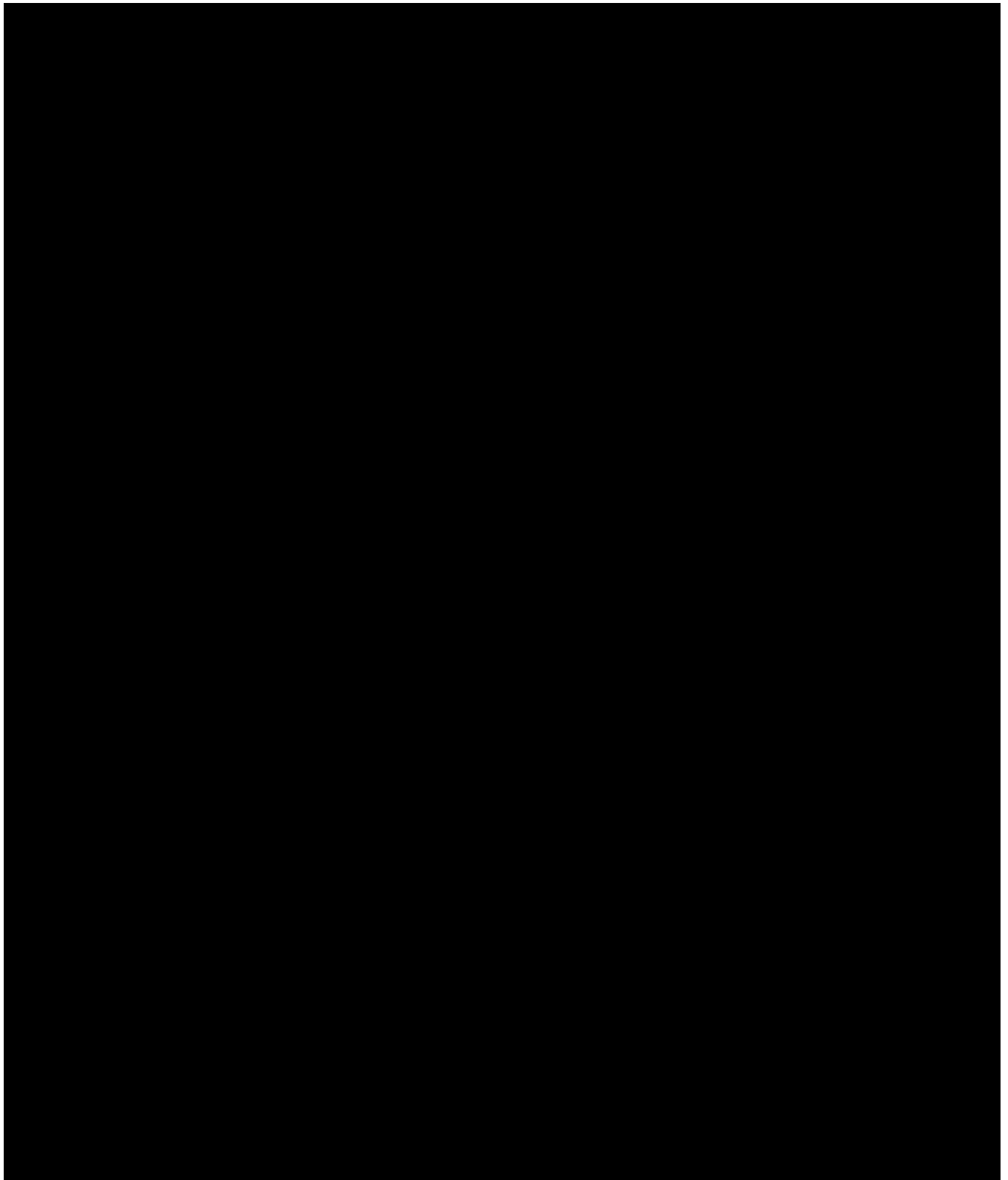
The 25th to 75th percentile range is the most relevant since higher and lower values may include outliers caused by unusual circumstances, such as performance-based fees. Count refers to the number of funds in your peer group that have costs in this category. It enables you to gauge the statistical significance.

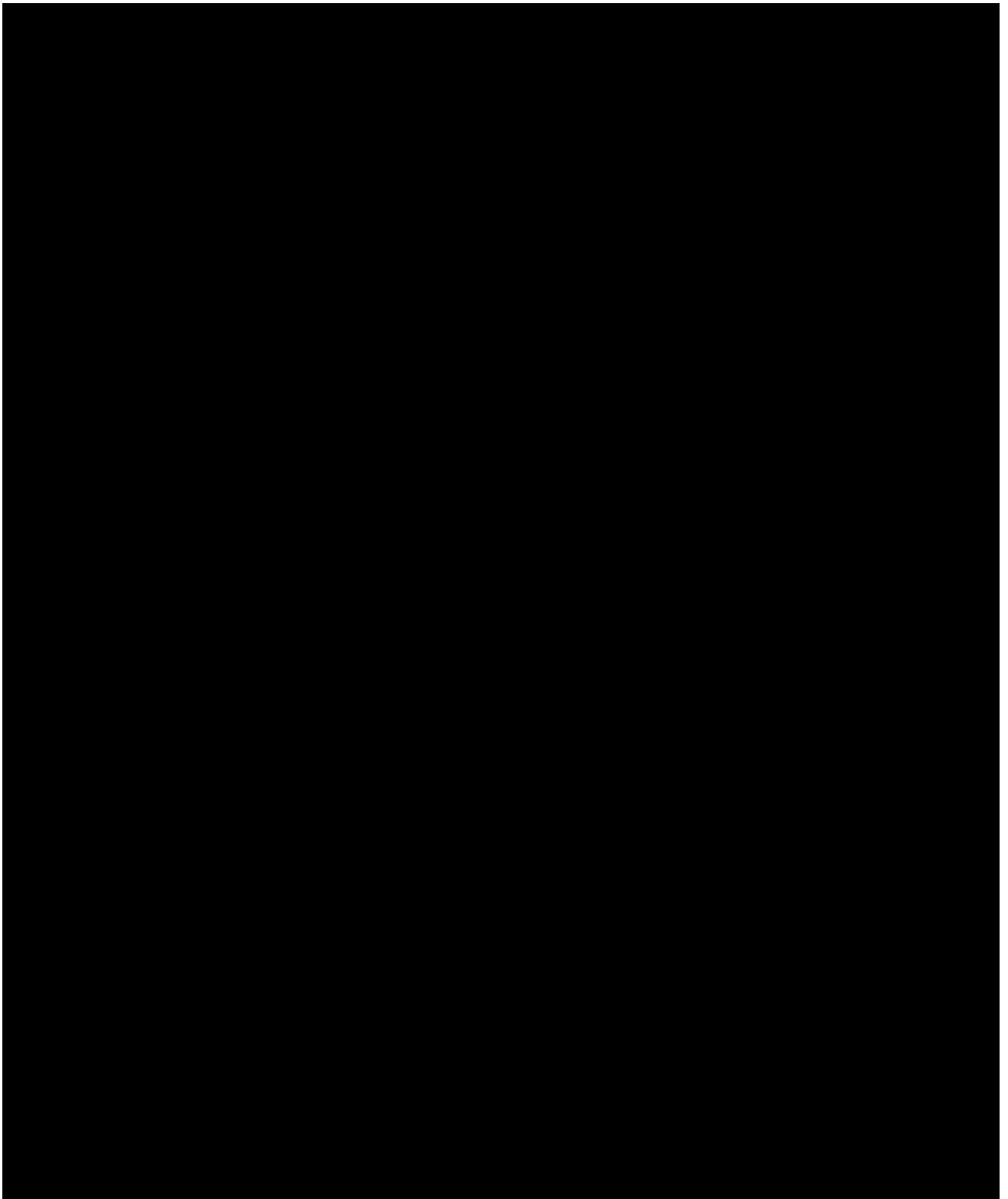


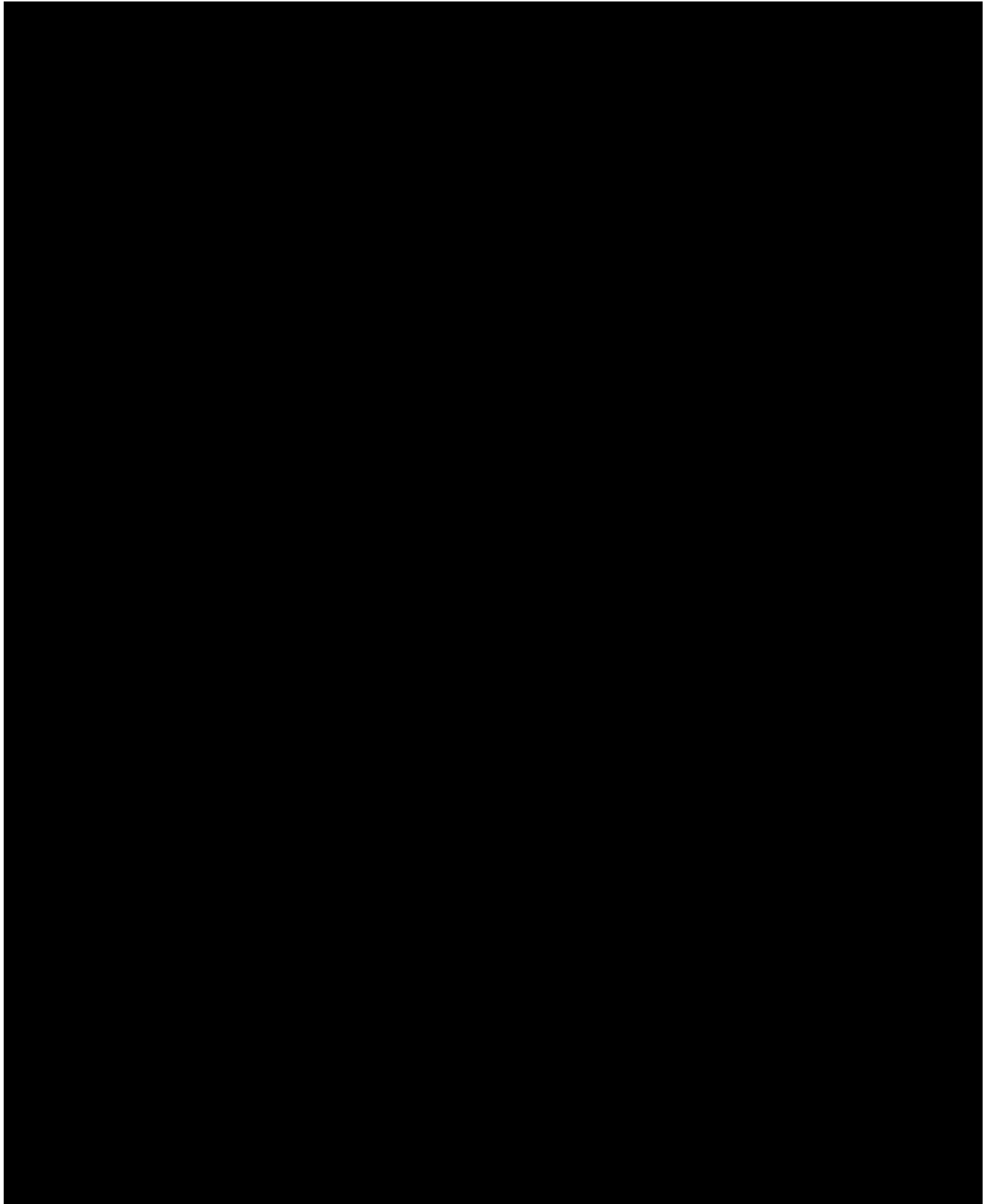


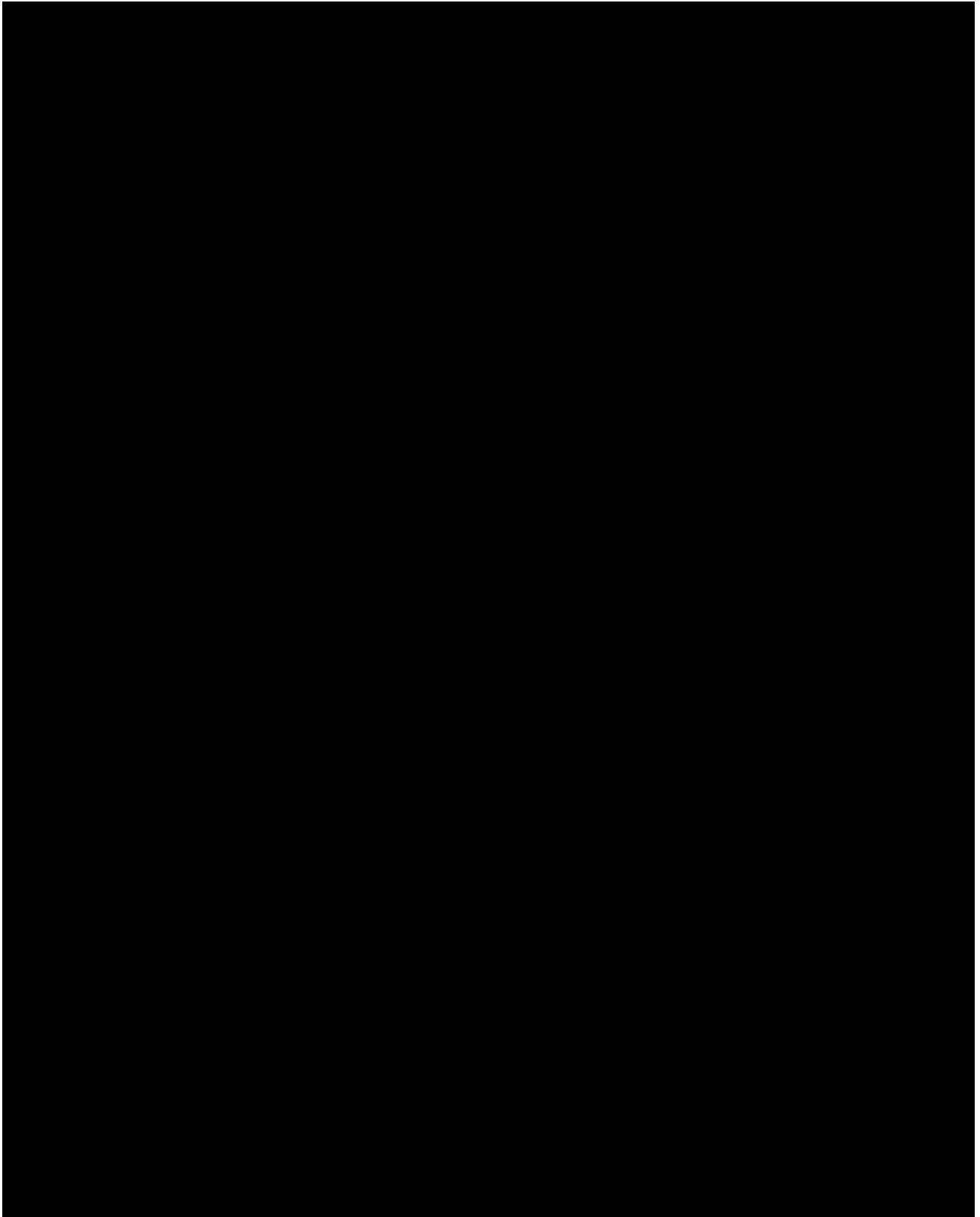


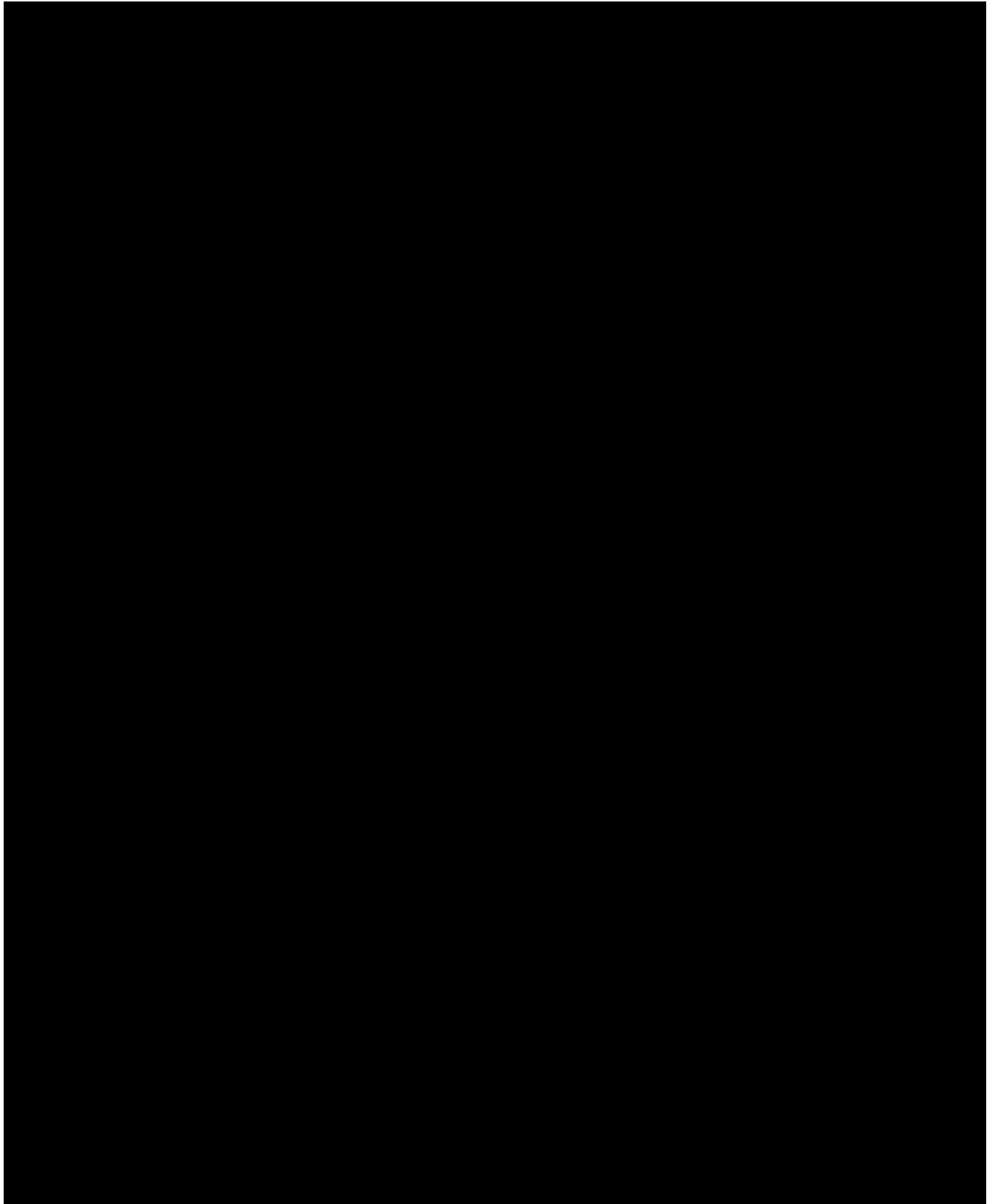


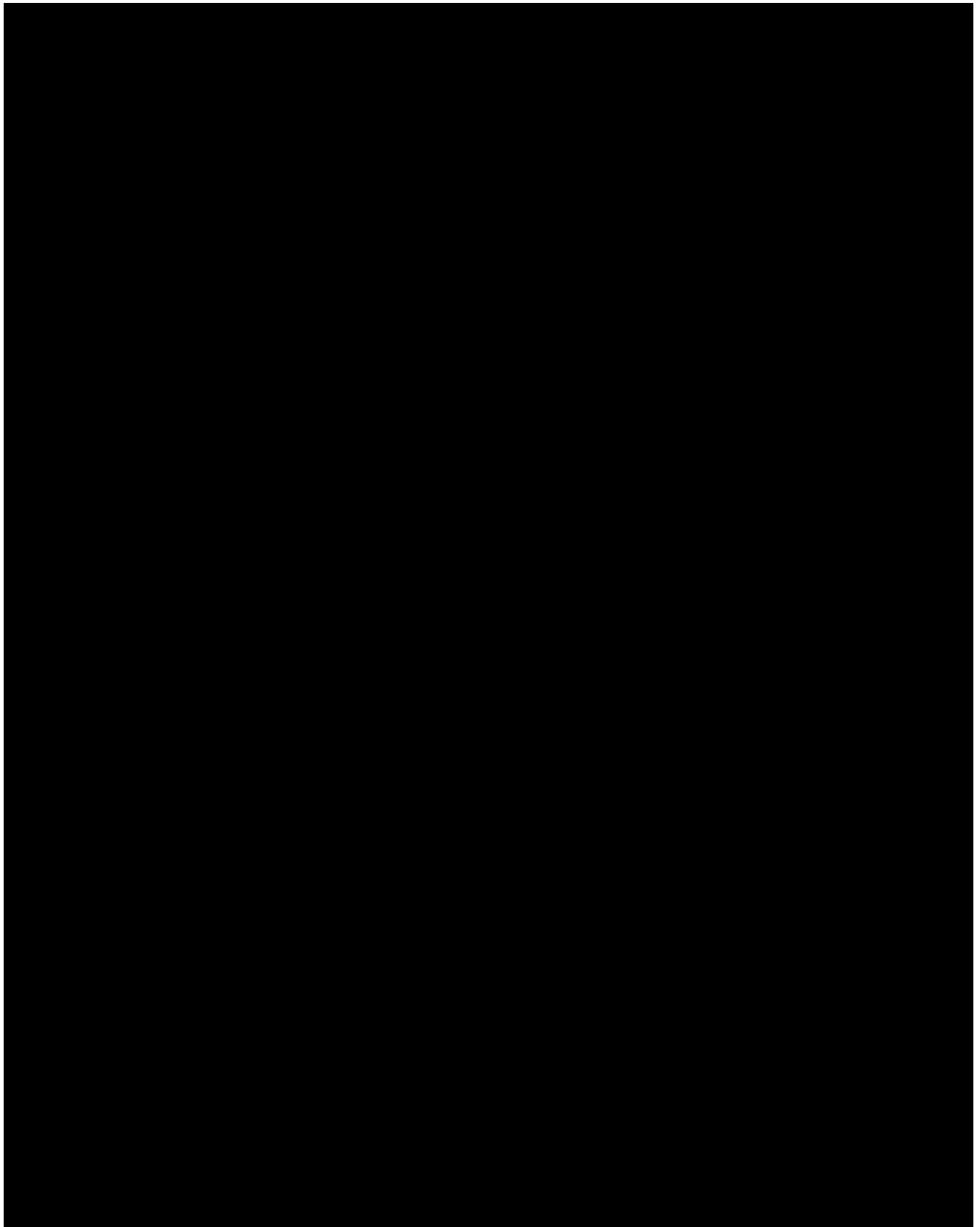


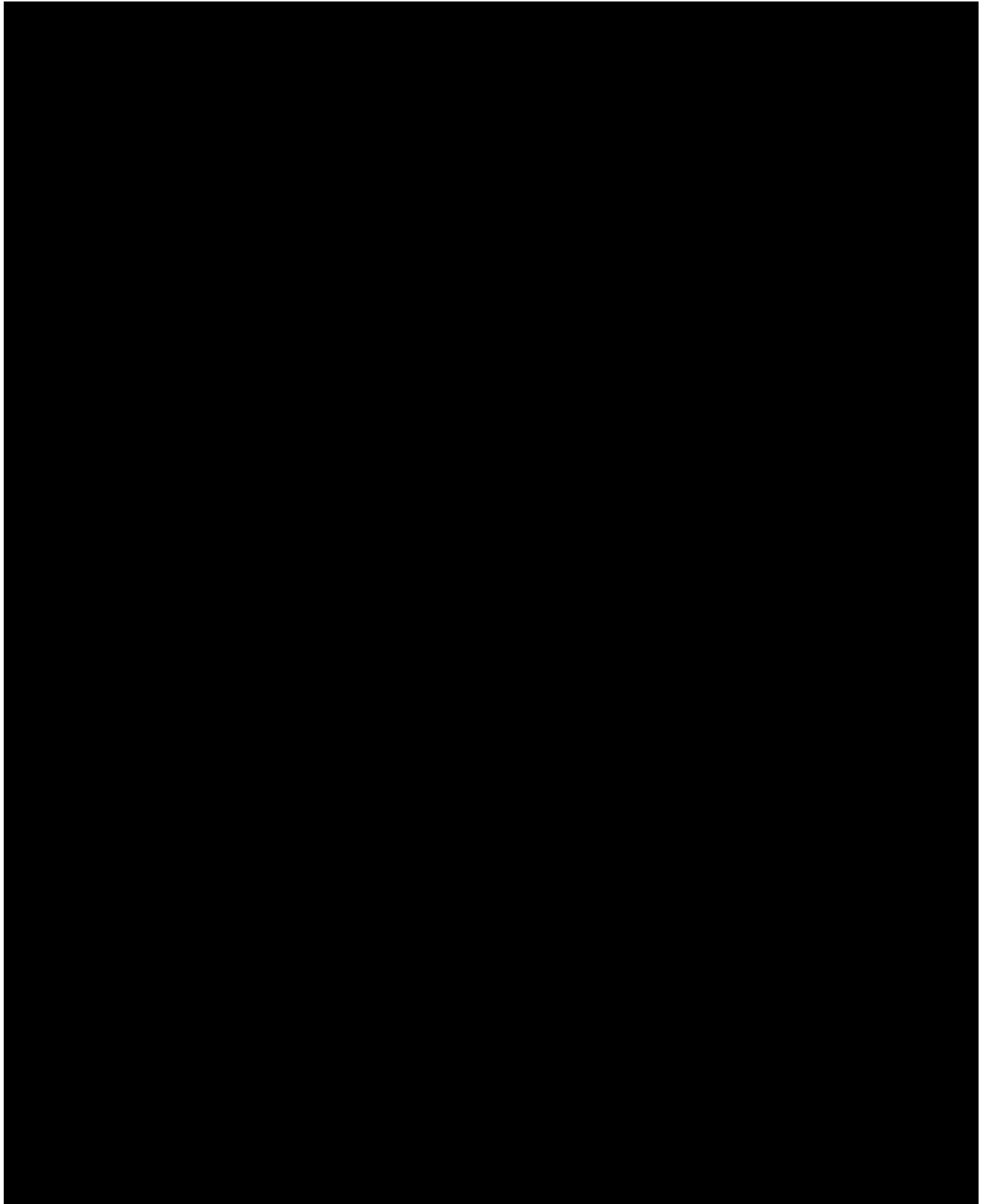


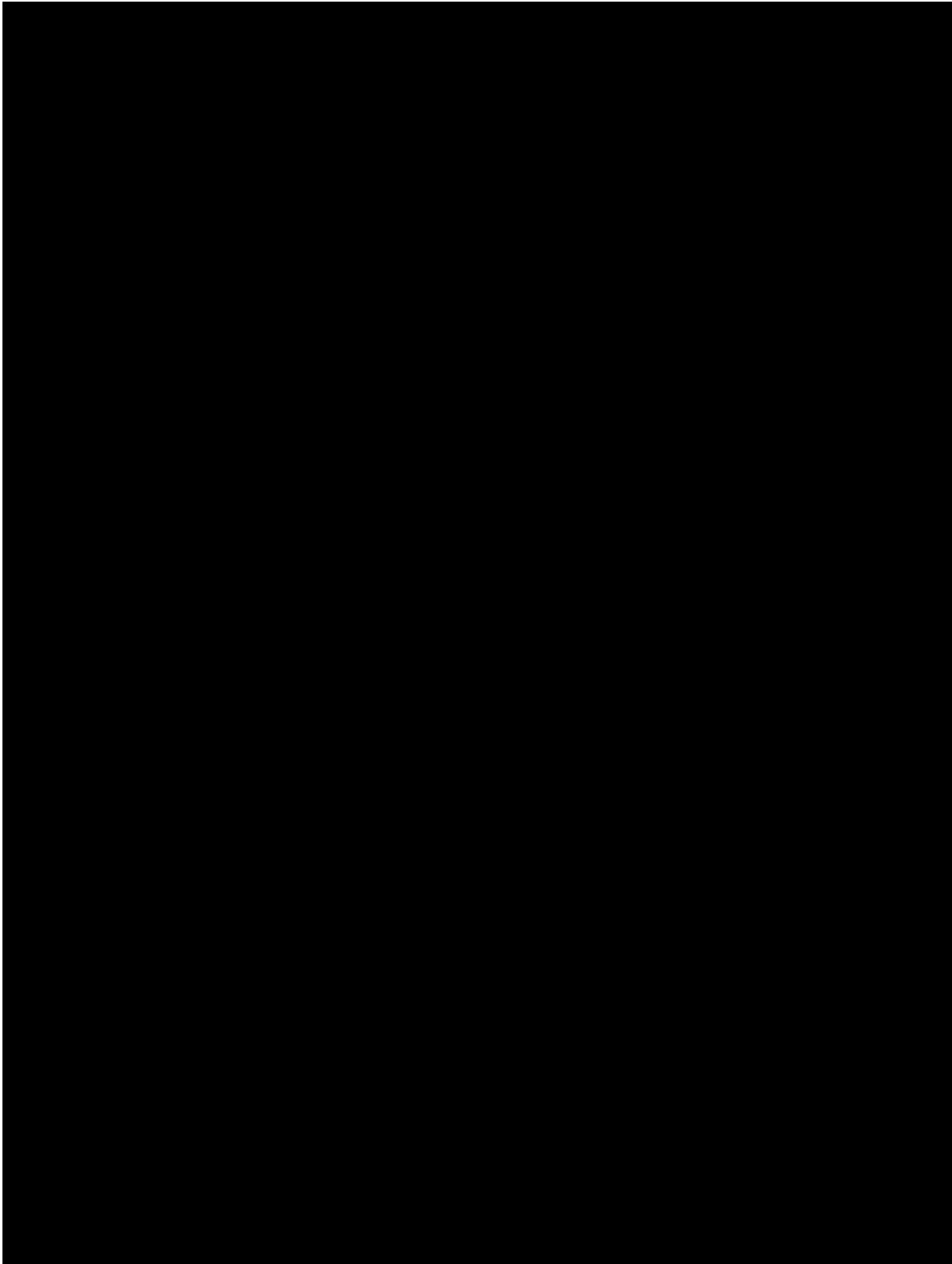


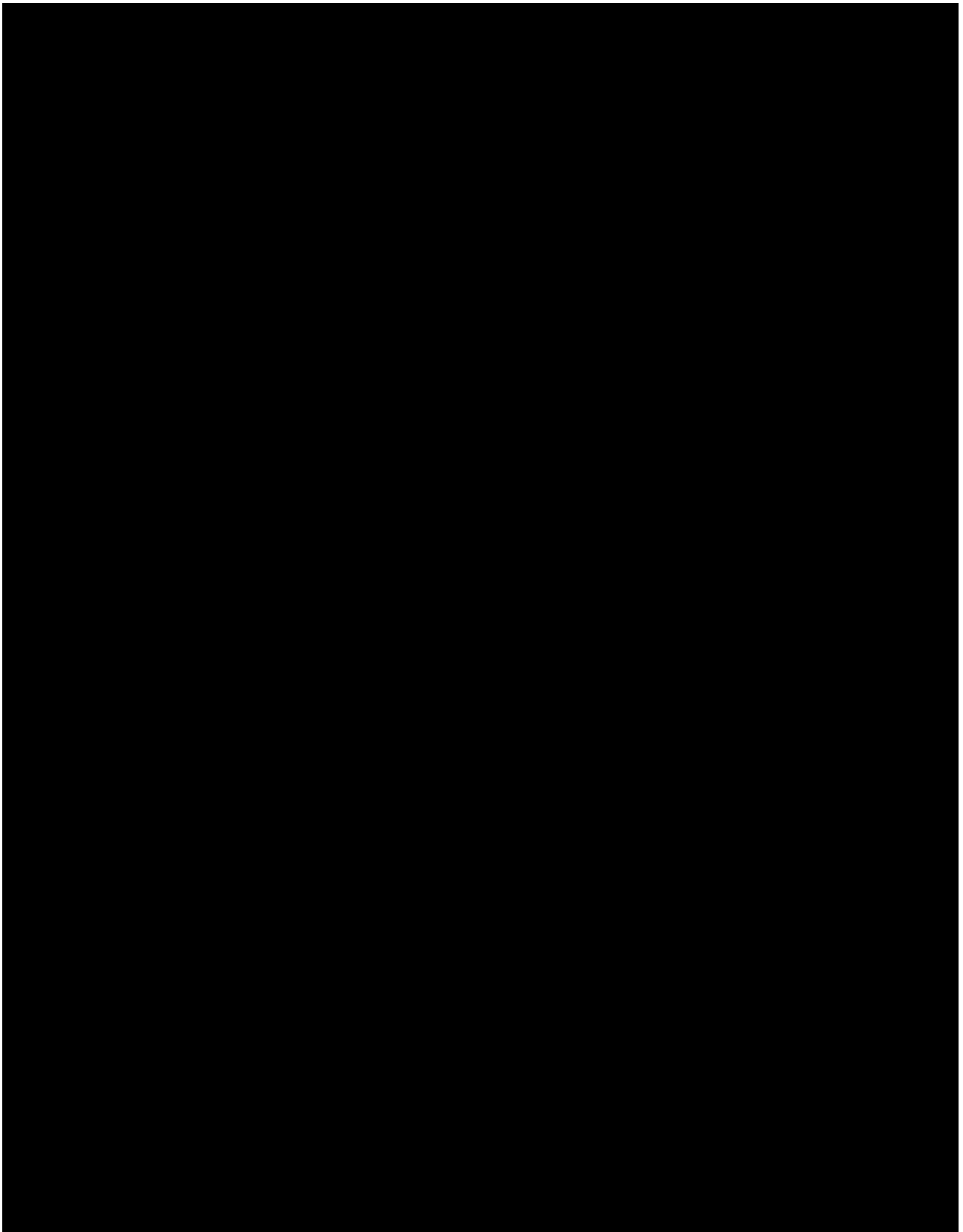


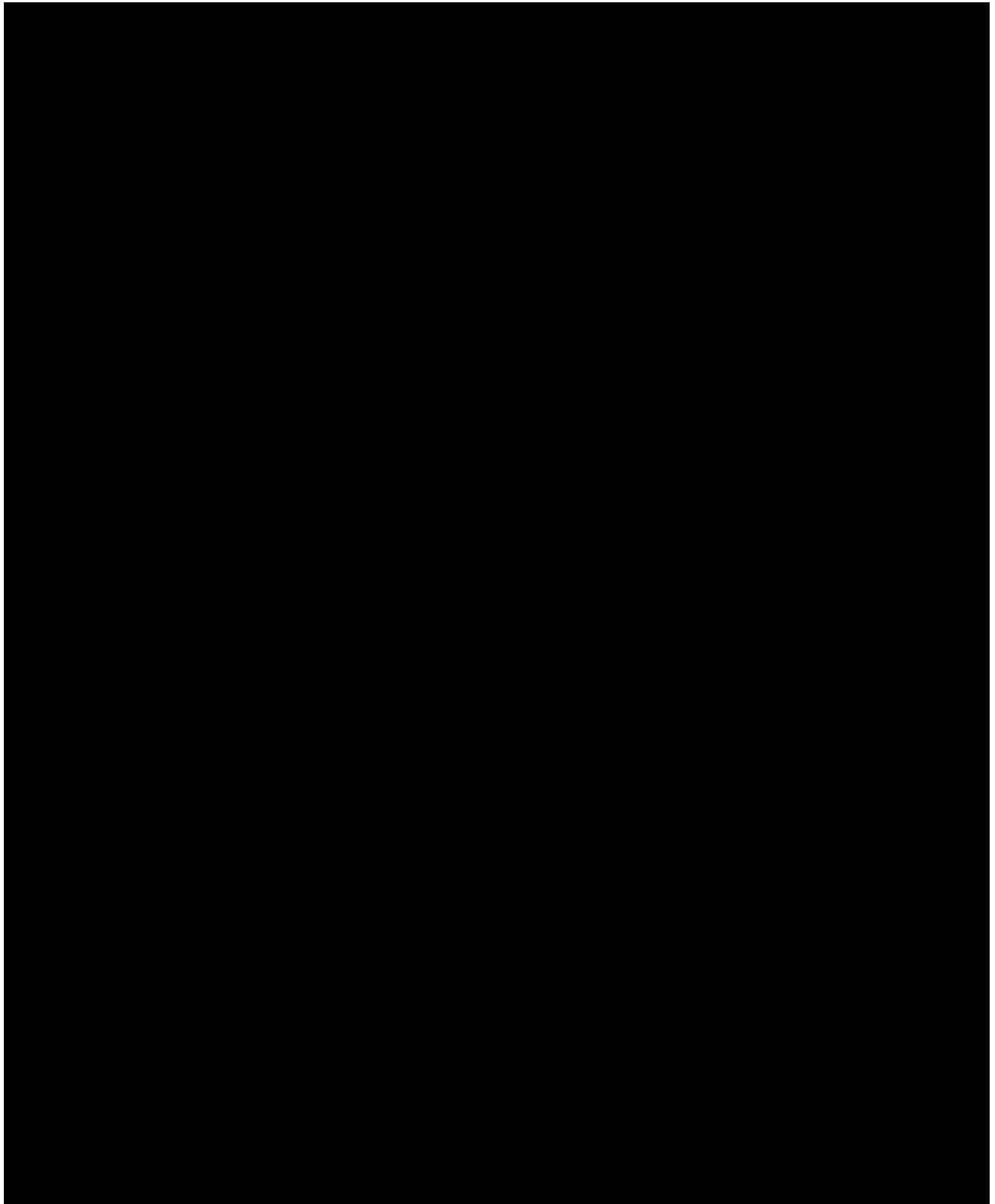


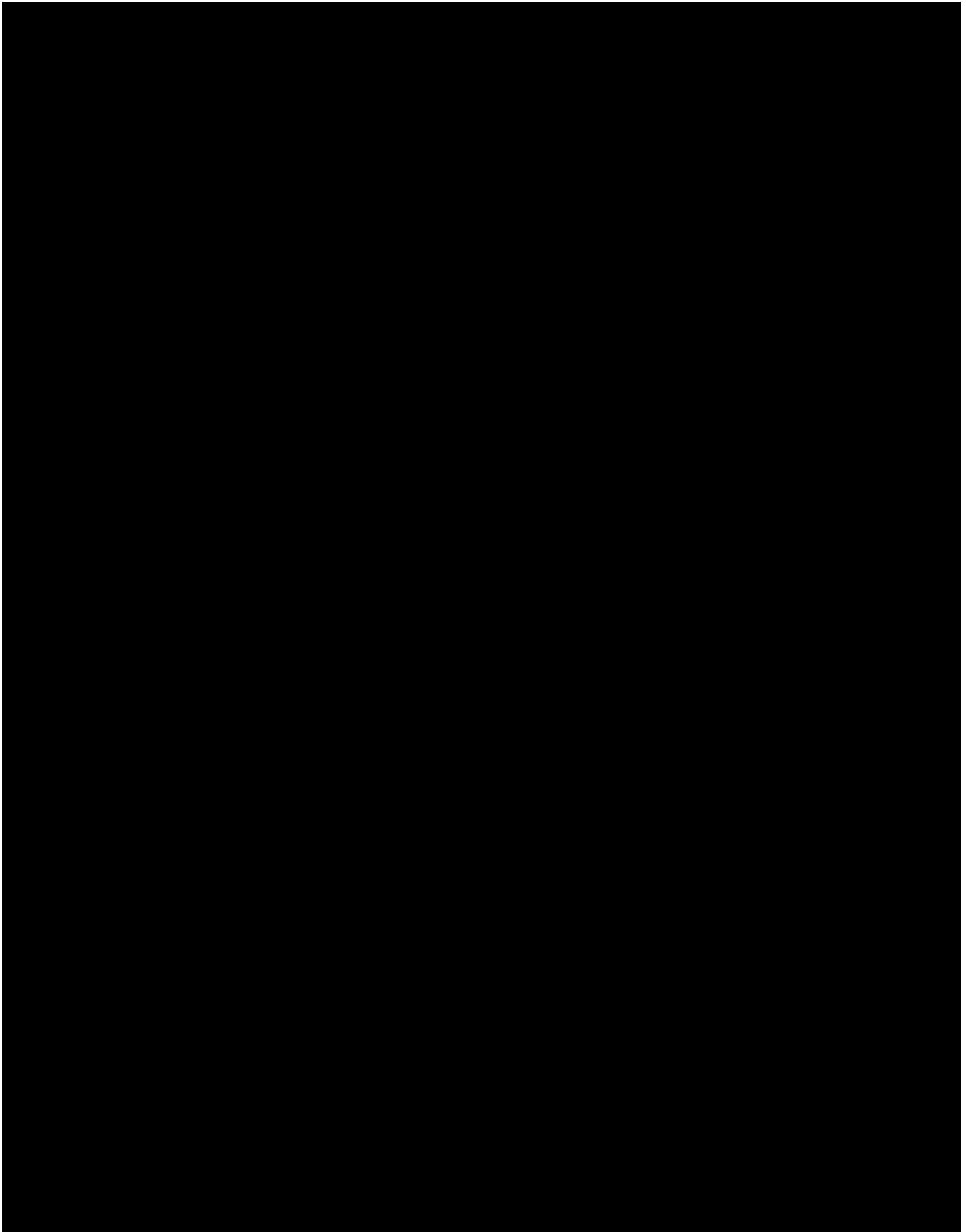


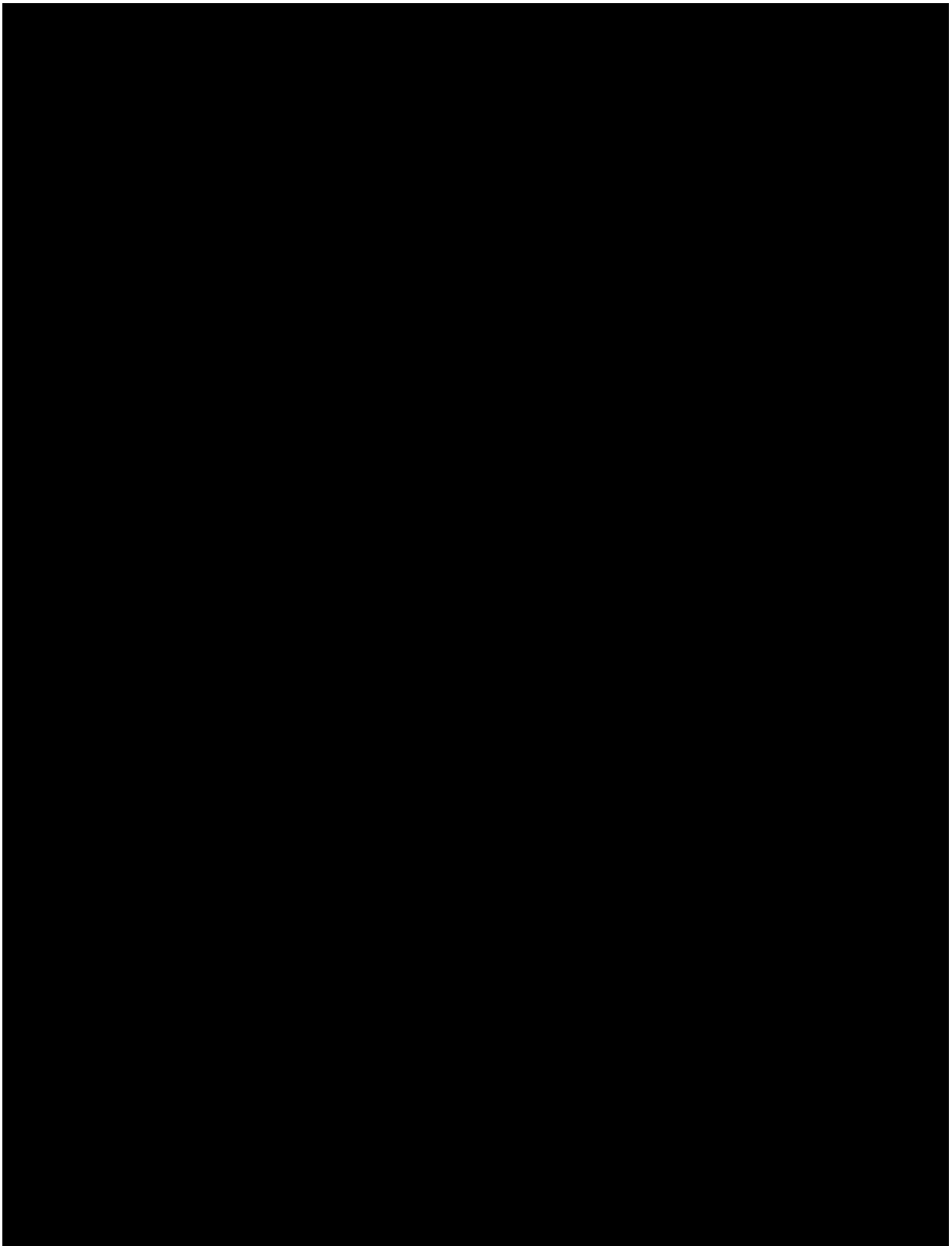


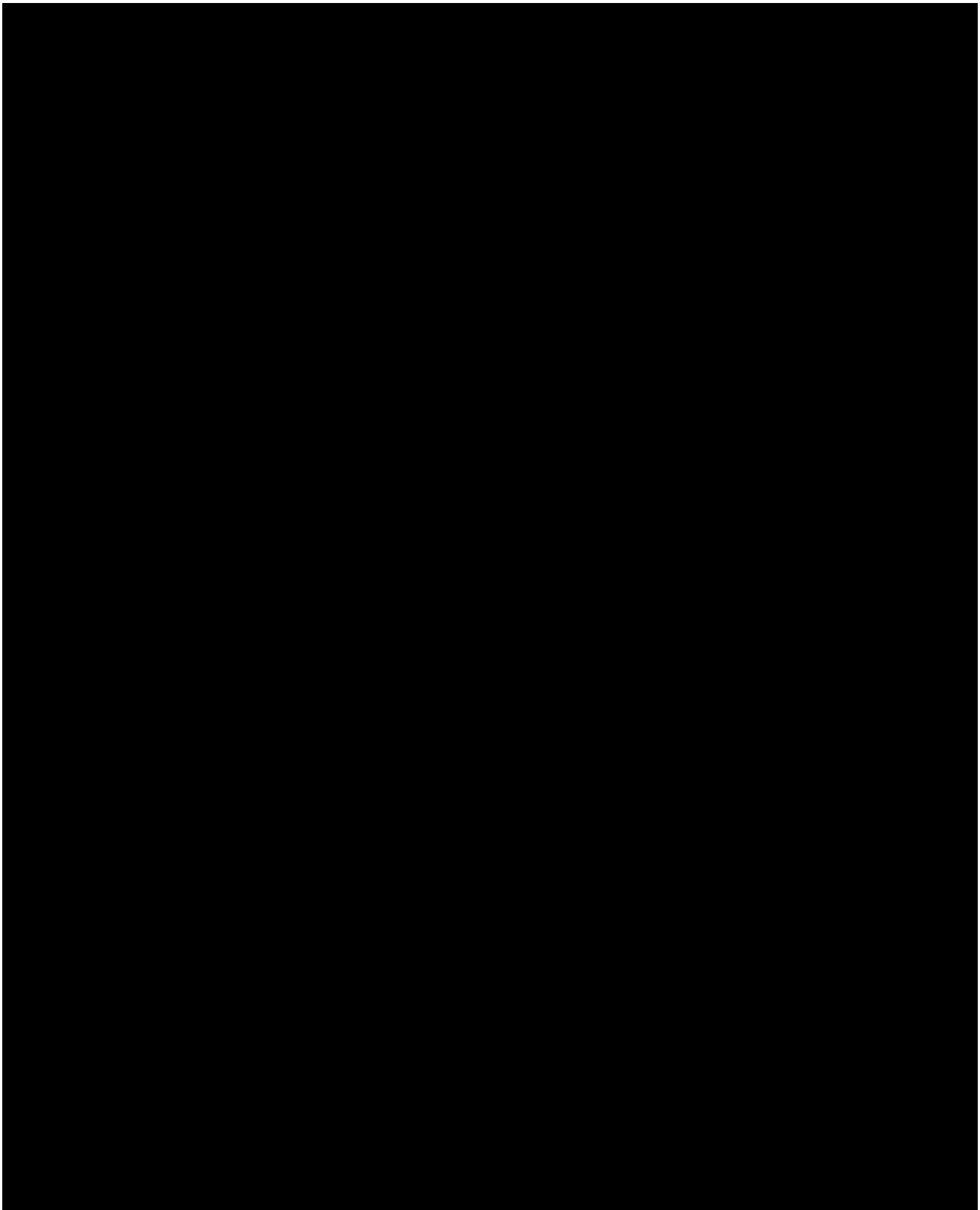


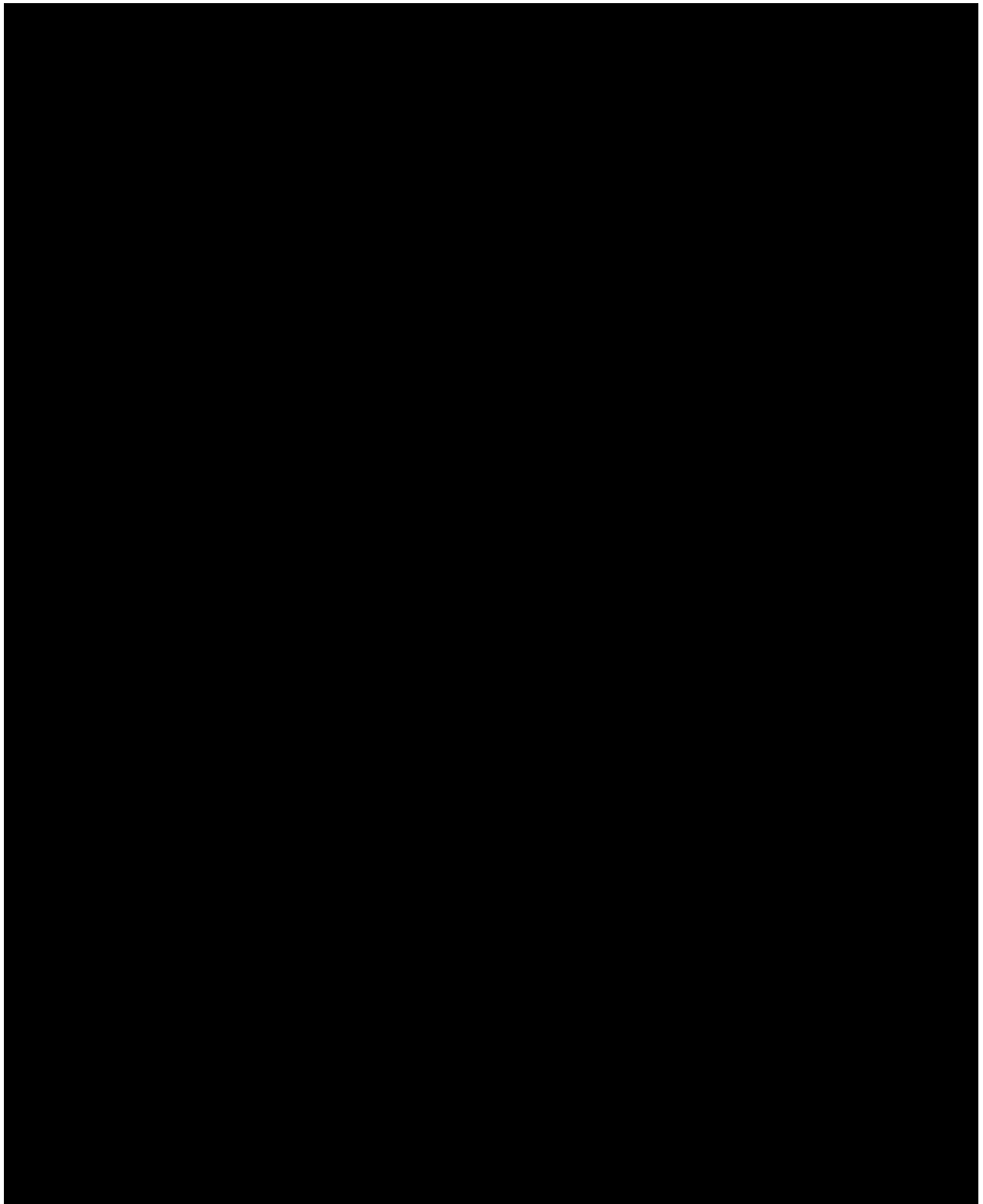


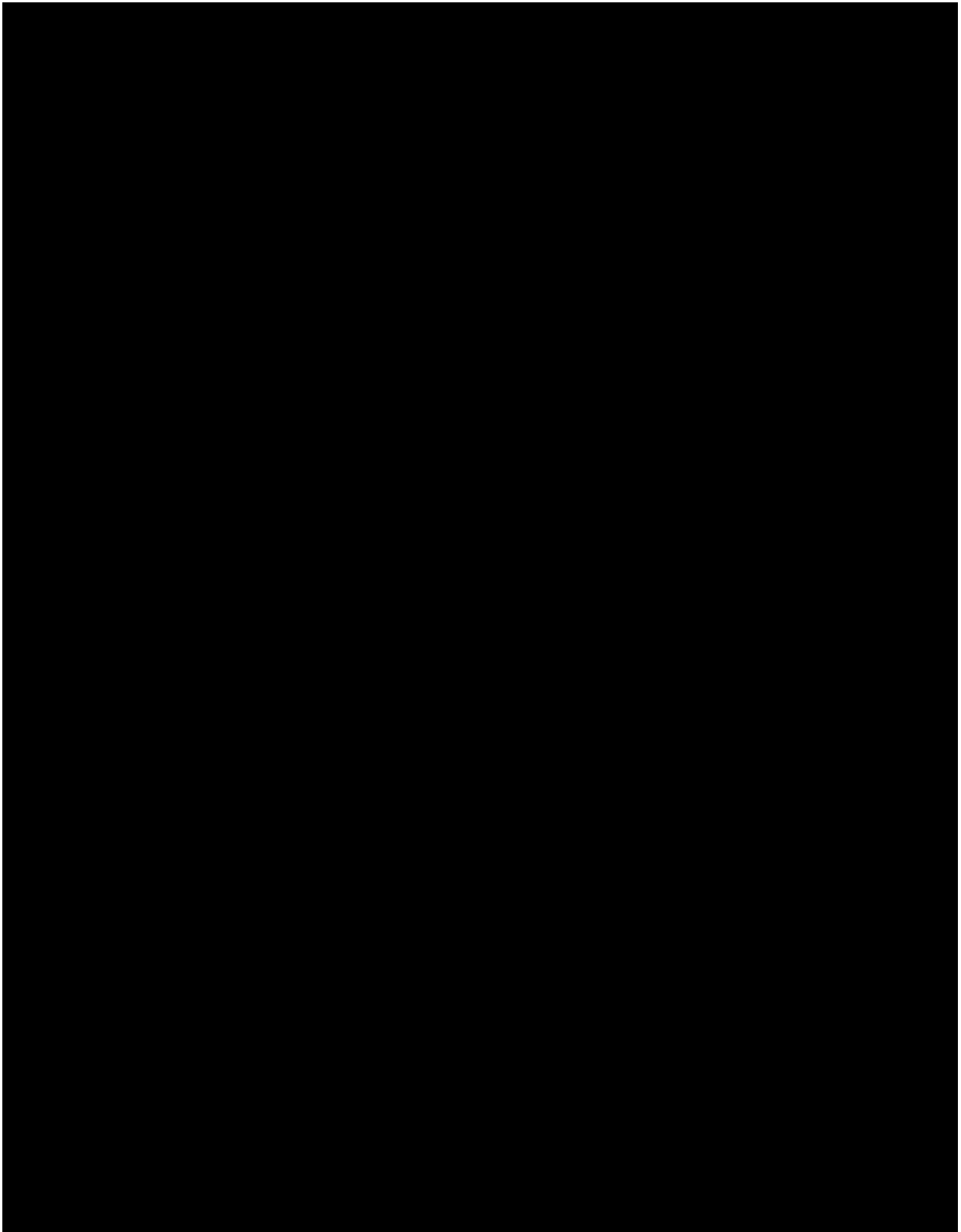


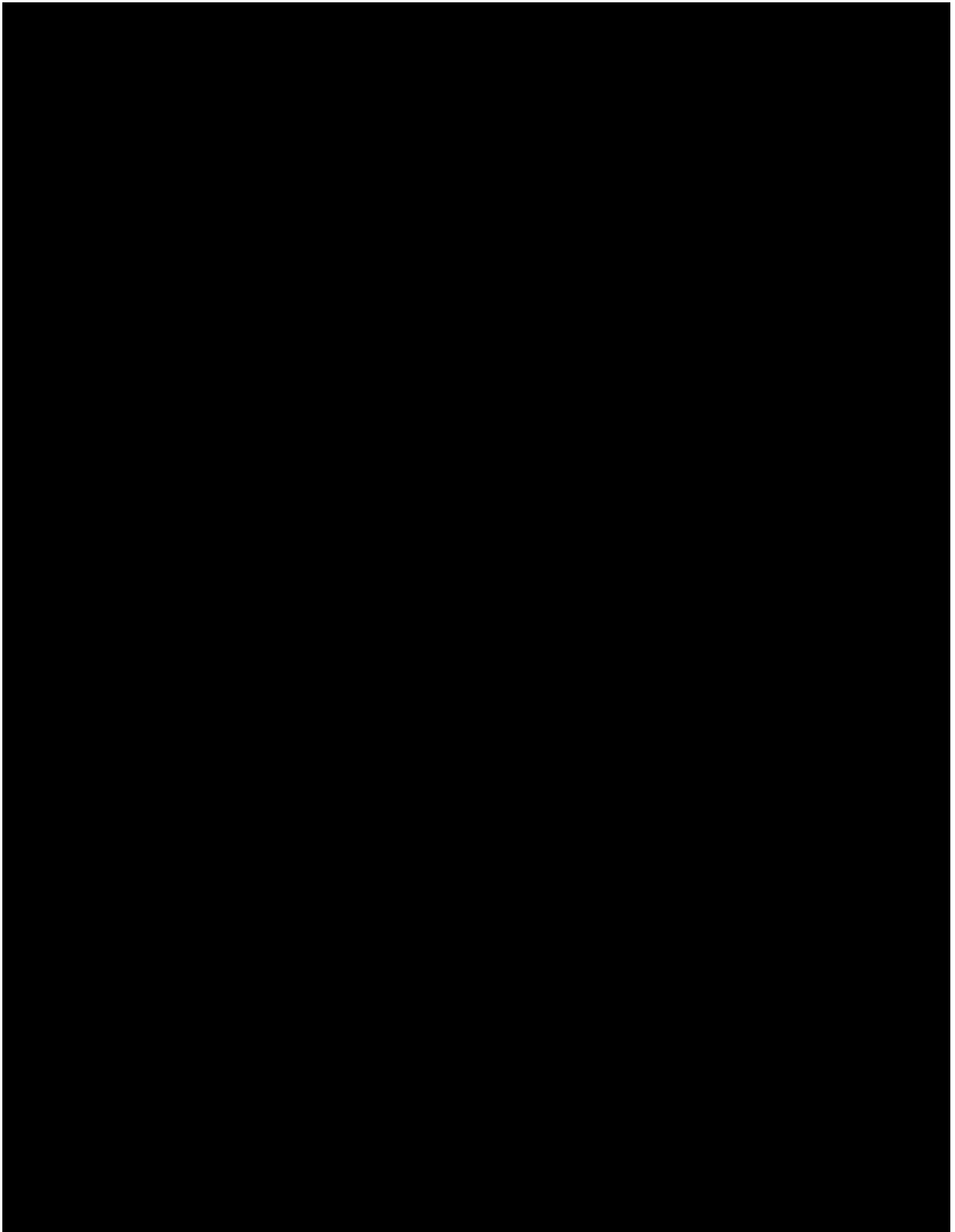


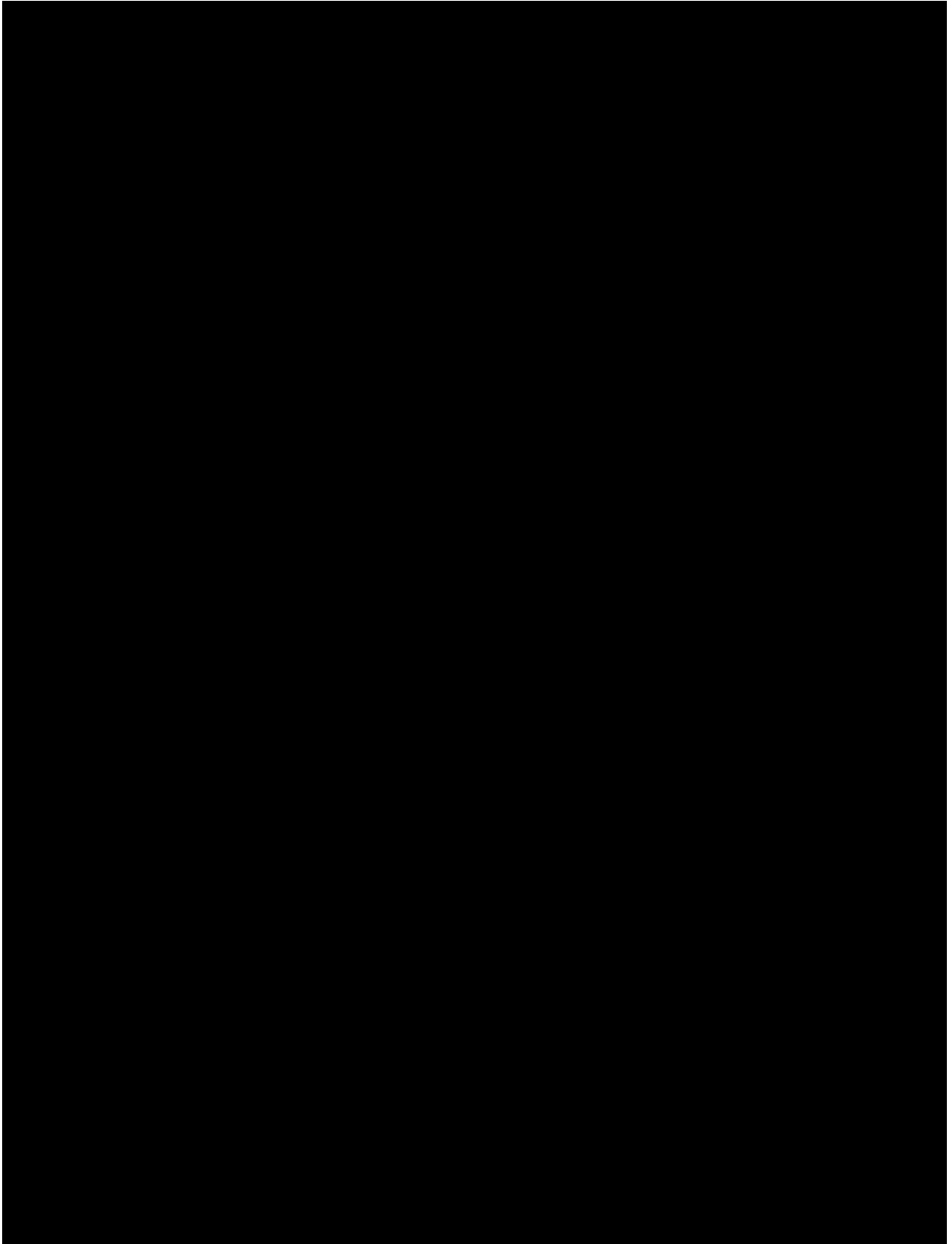


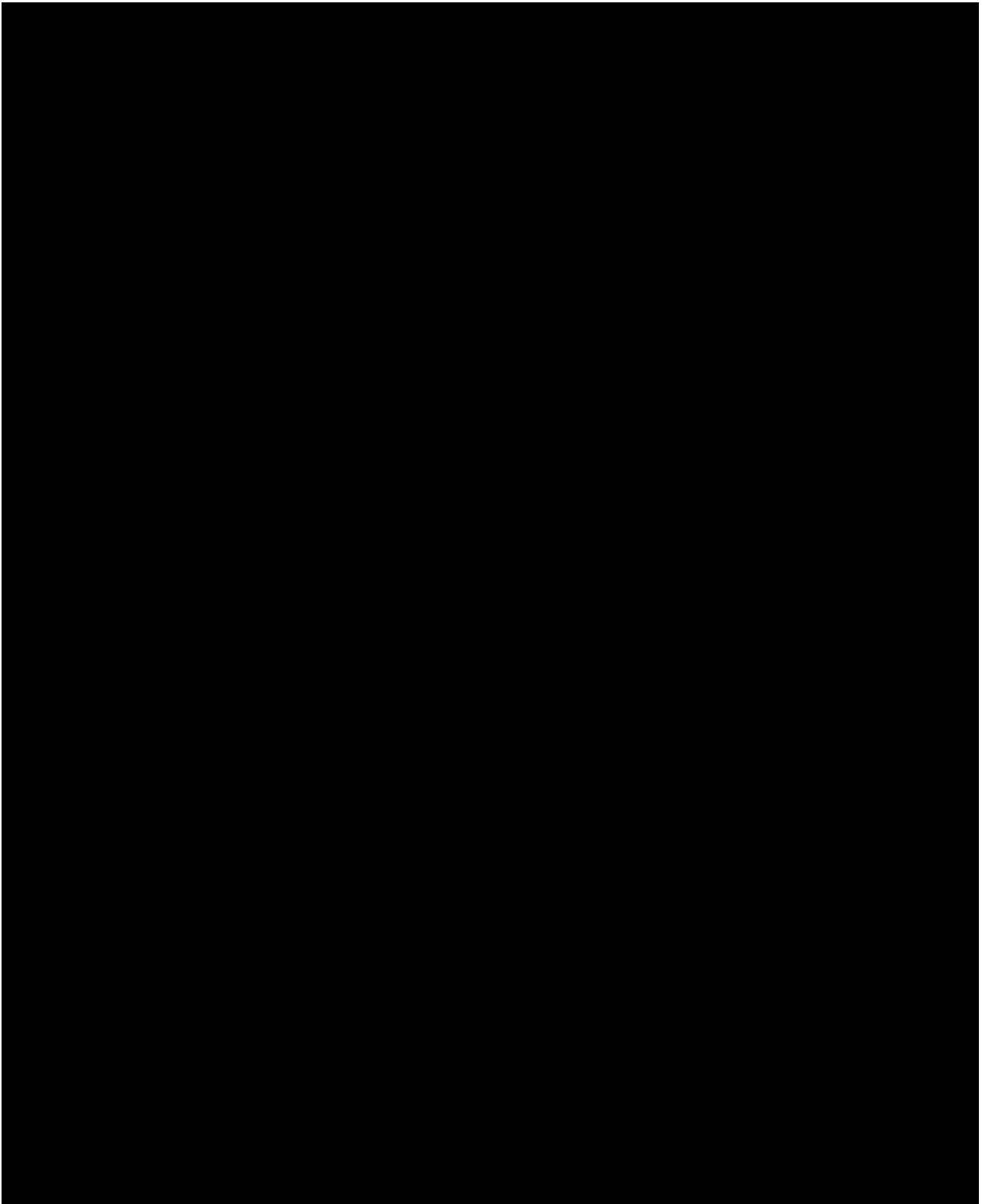


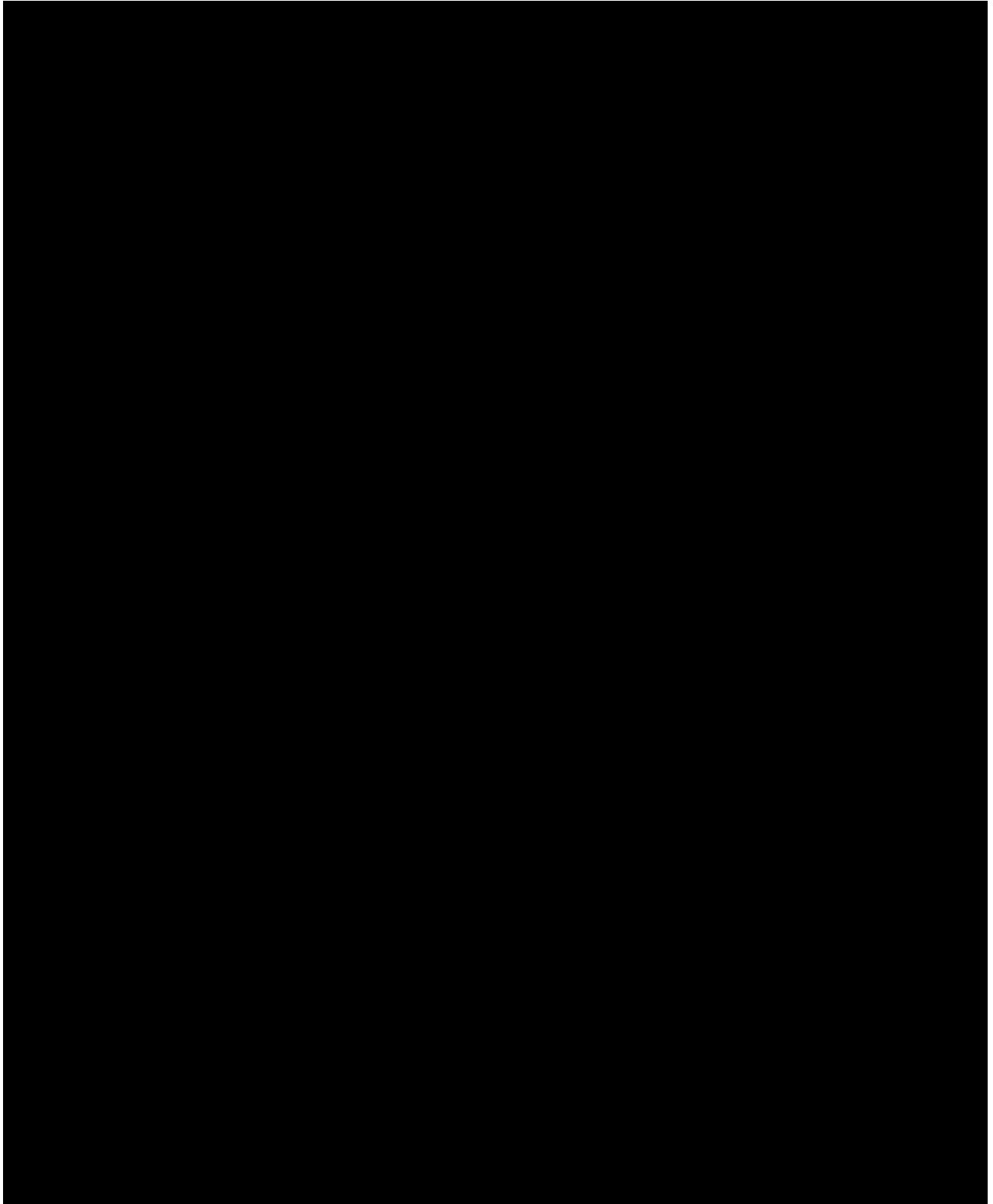


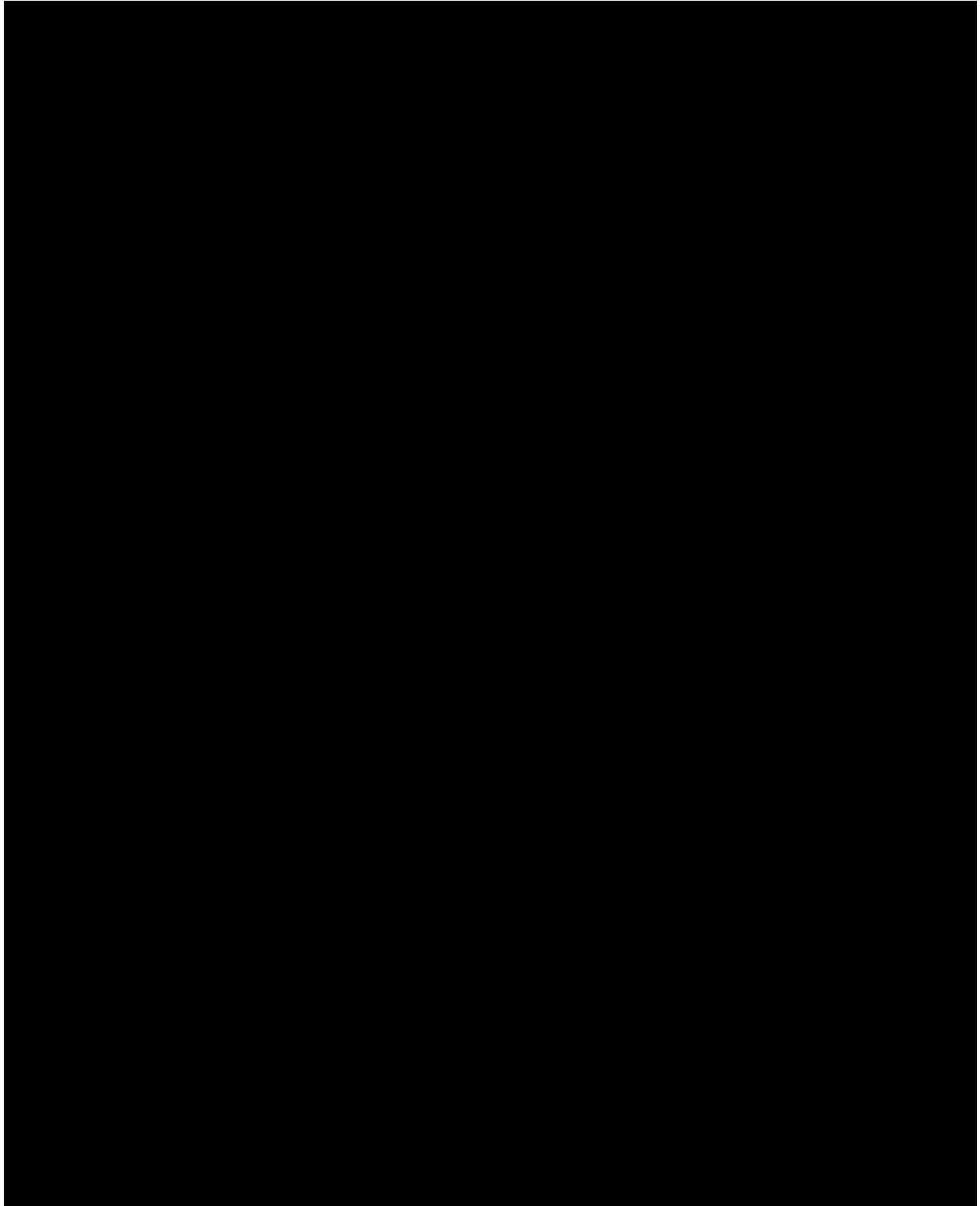


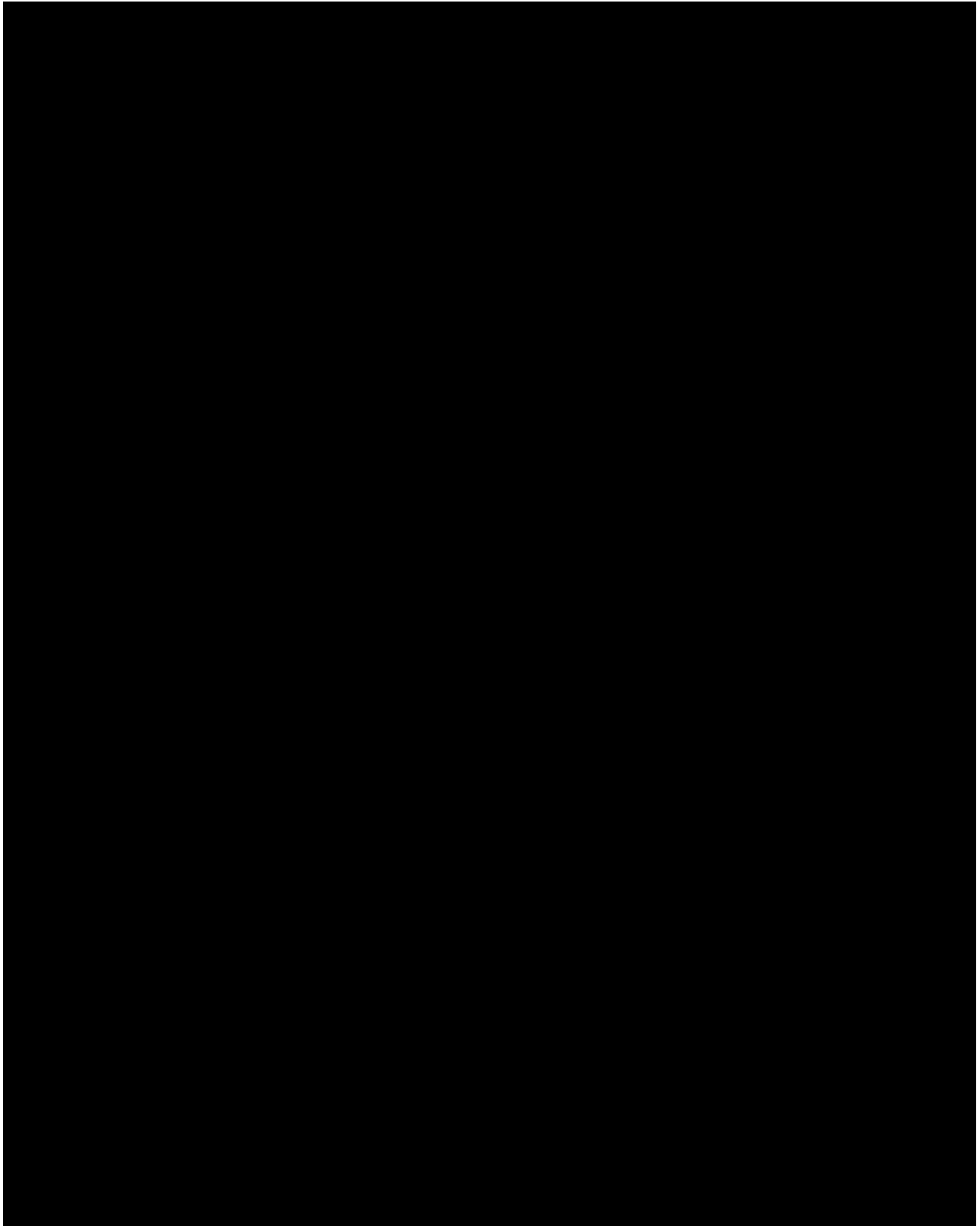


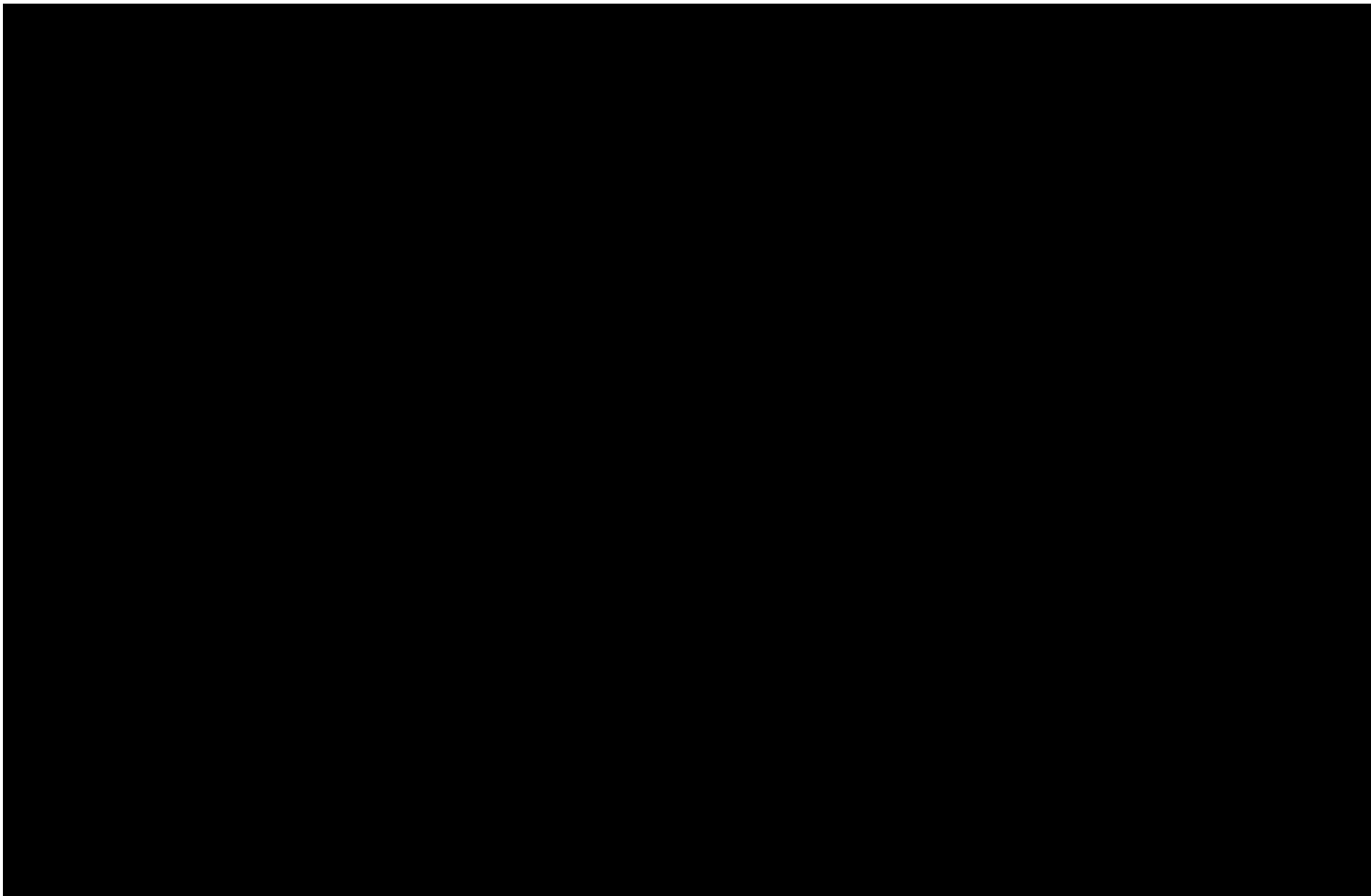


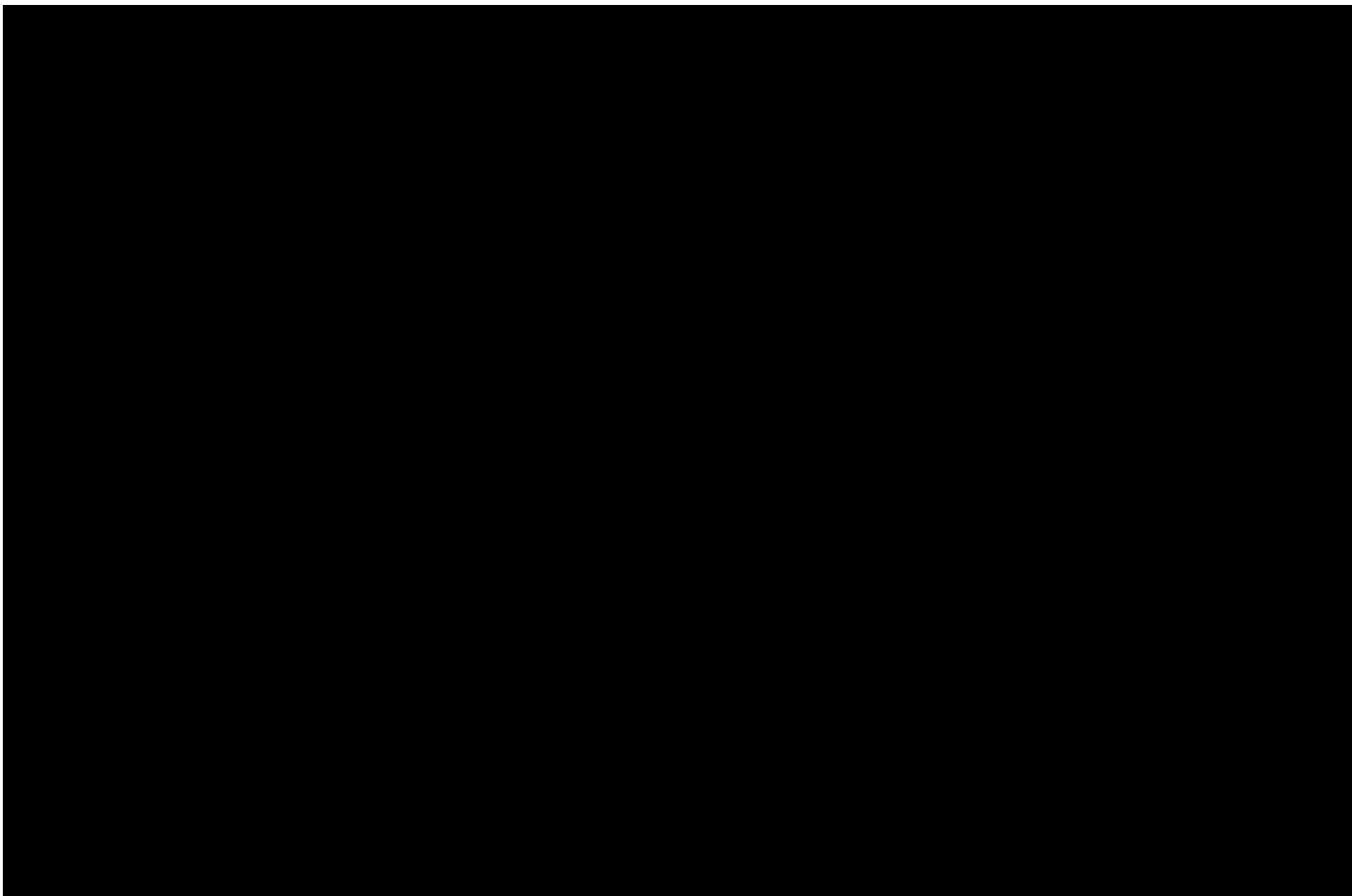


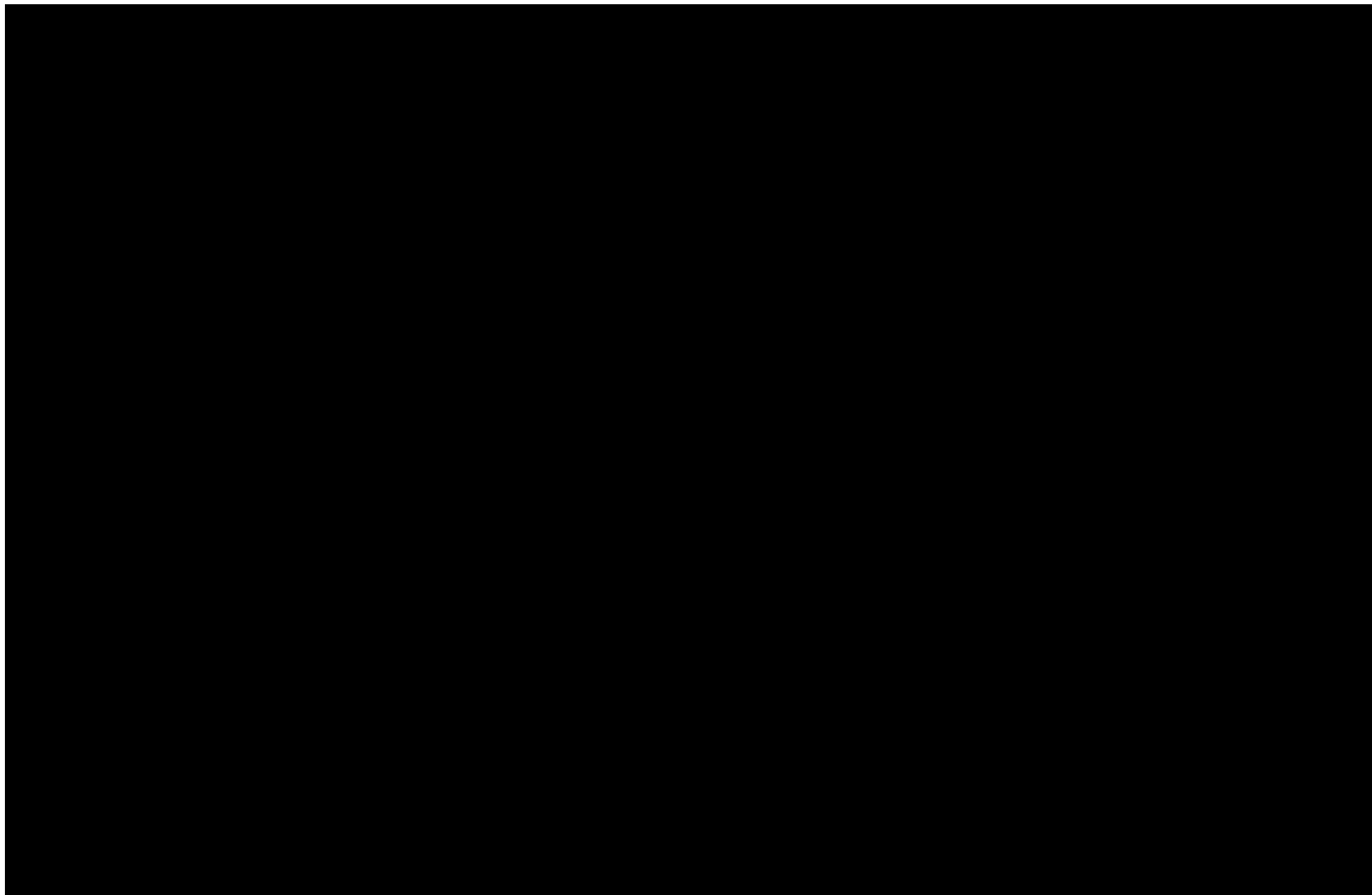


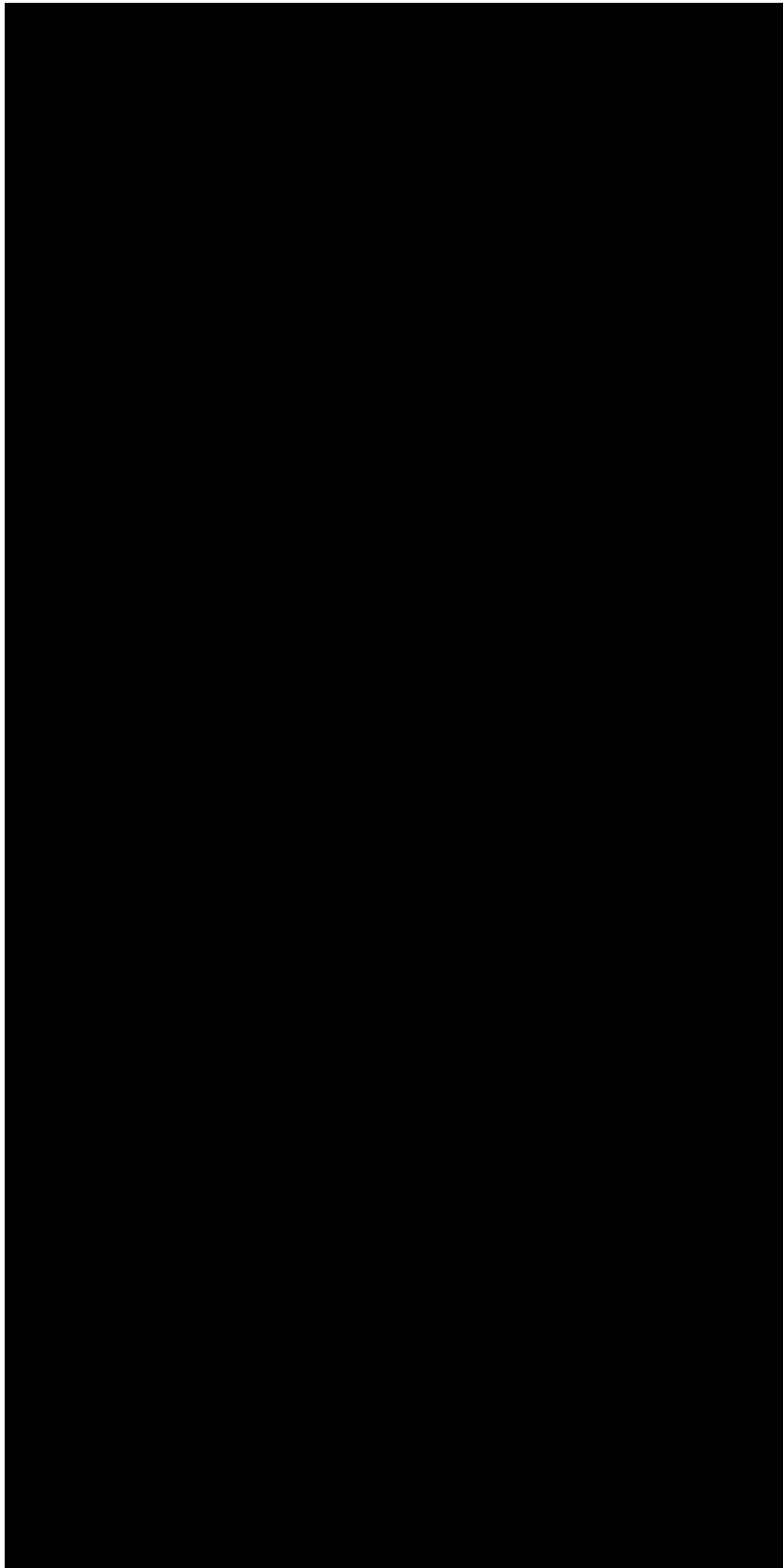


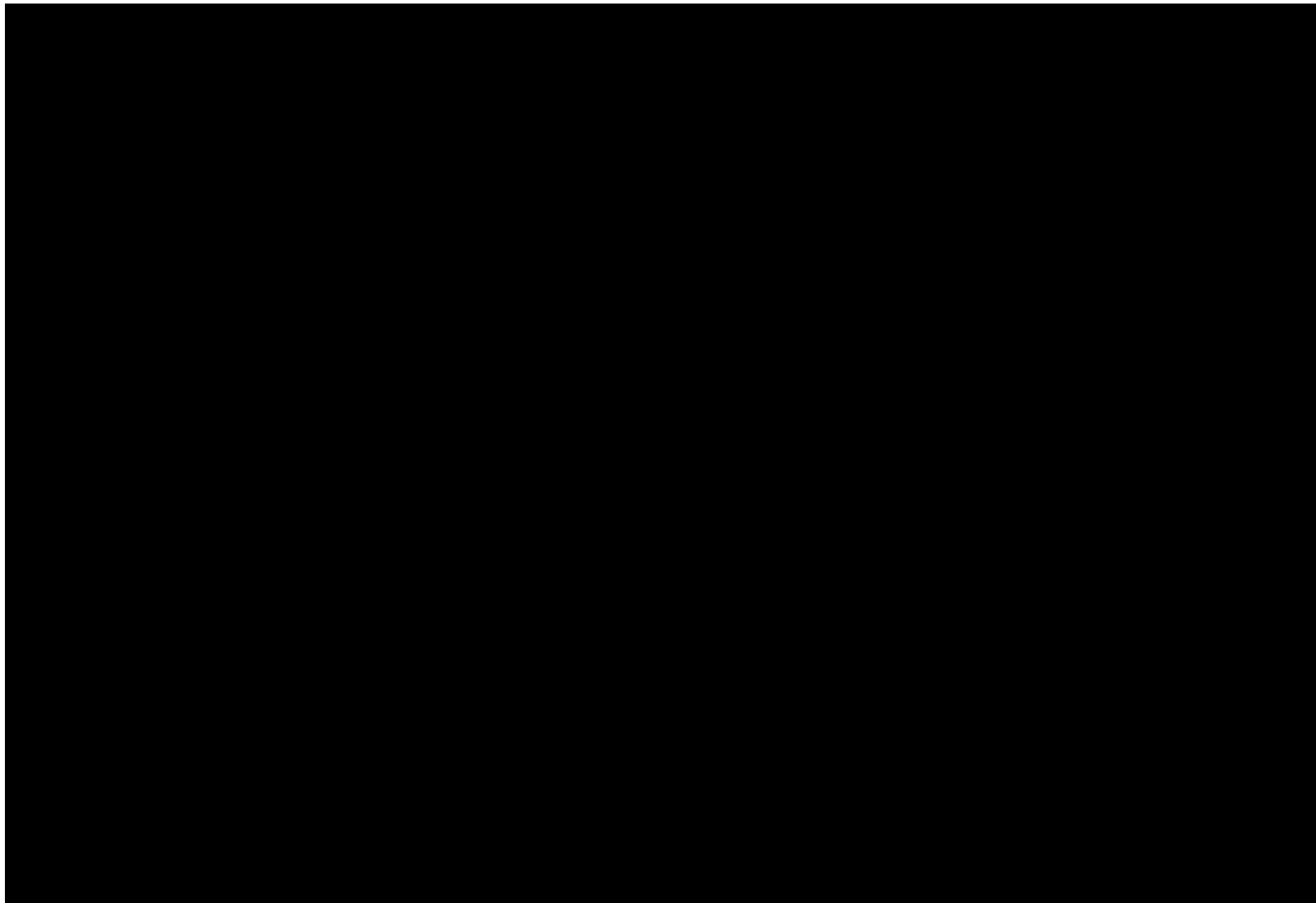


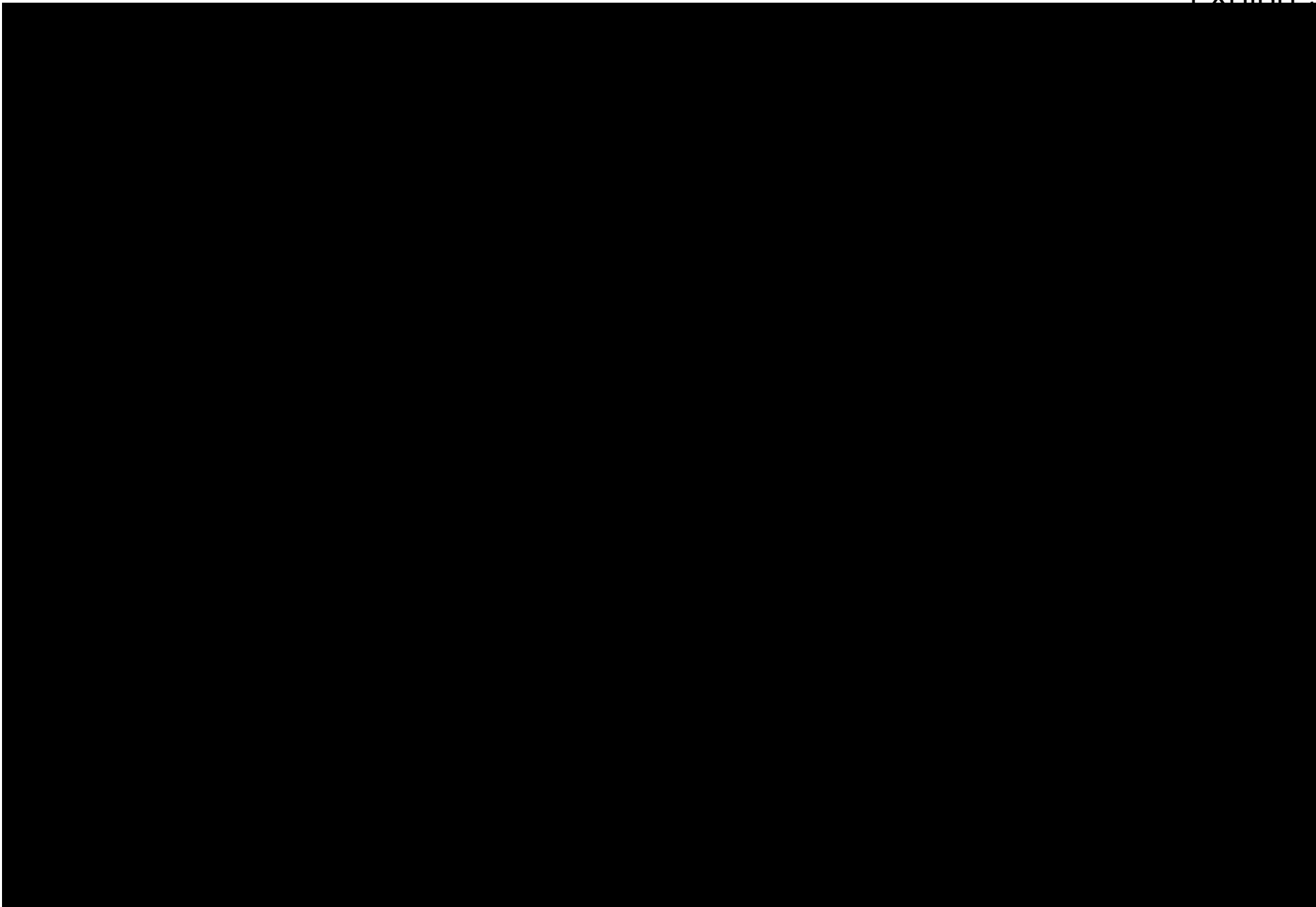


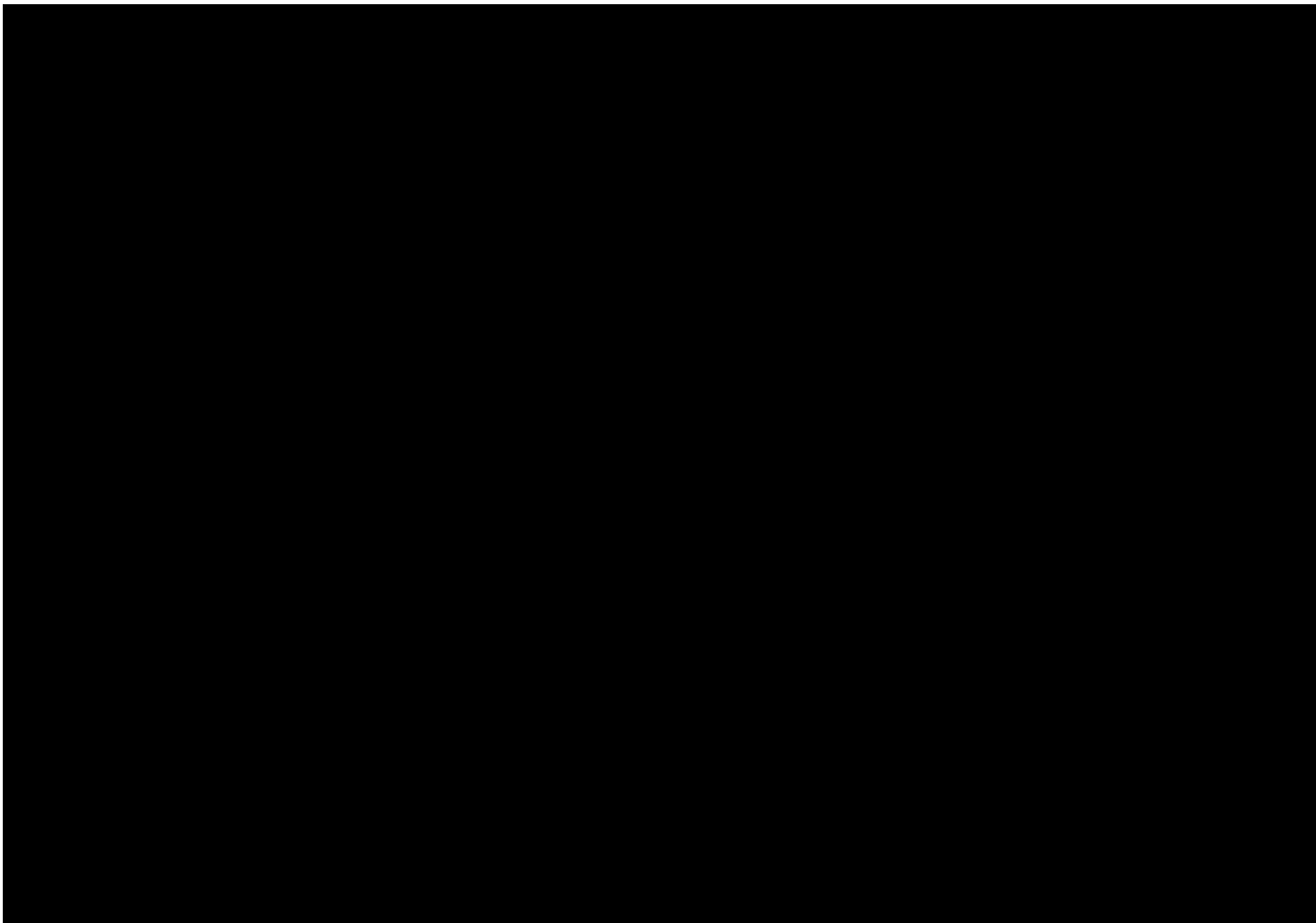


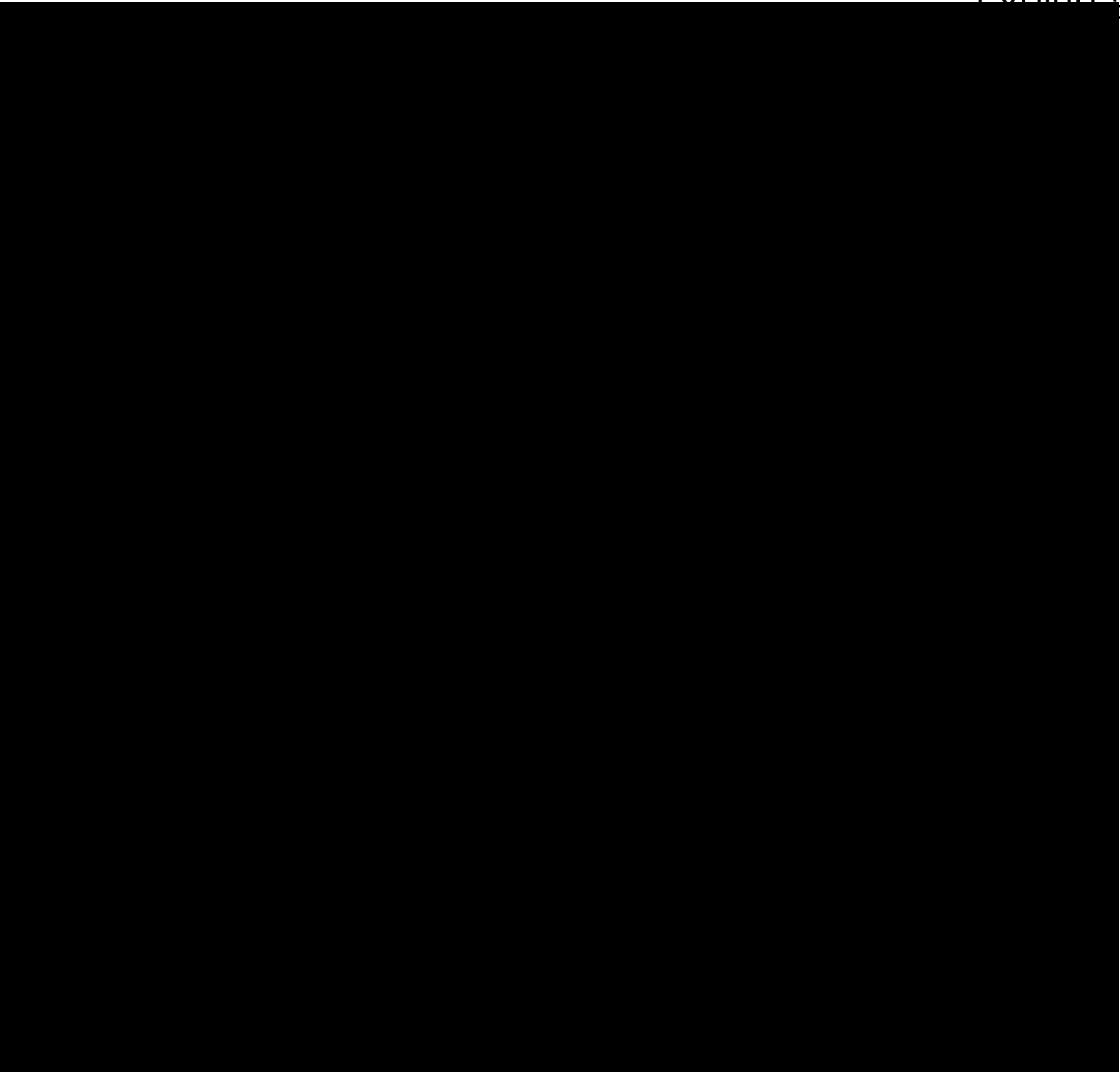


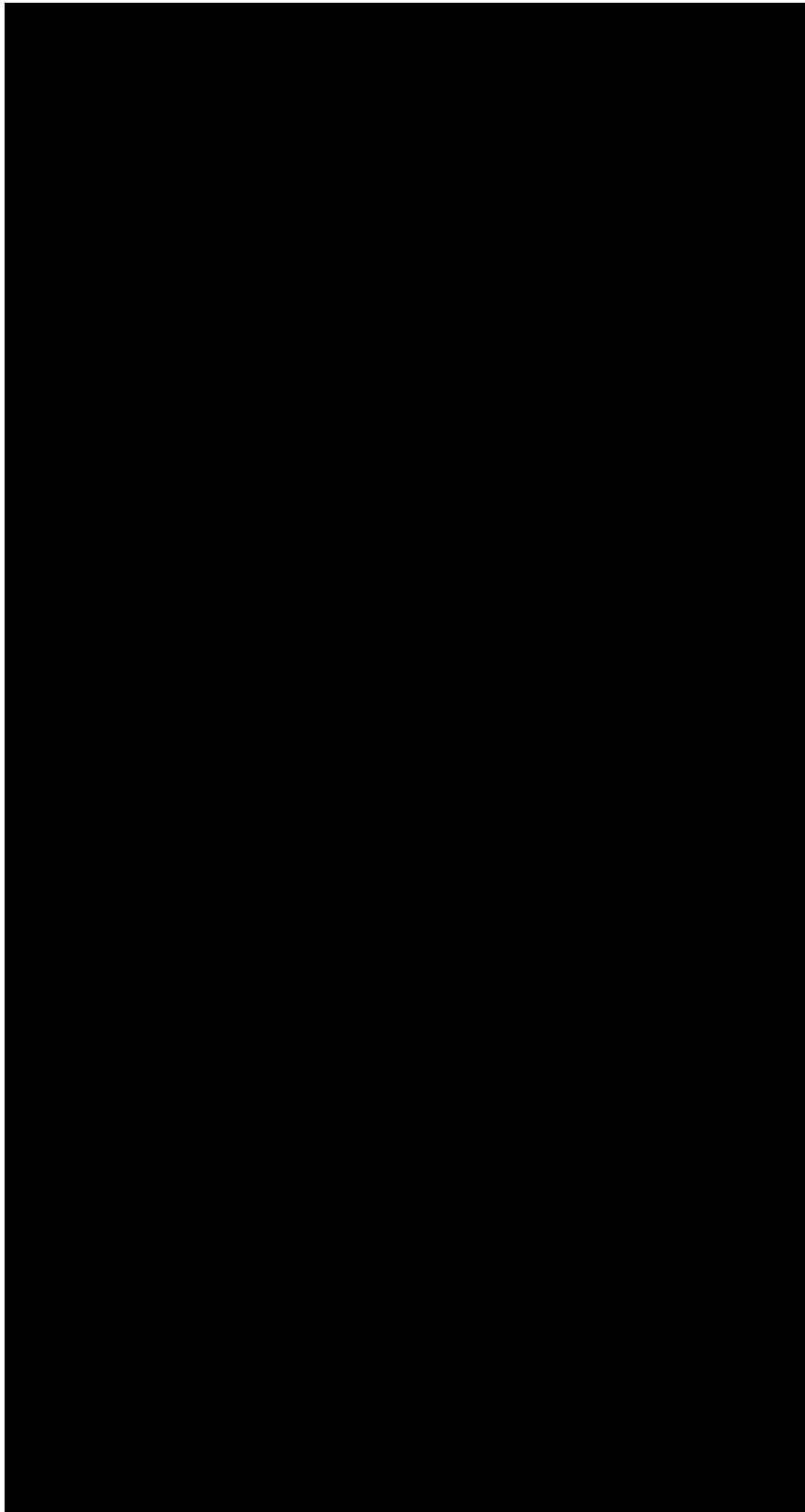


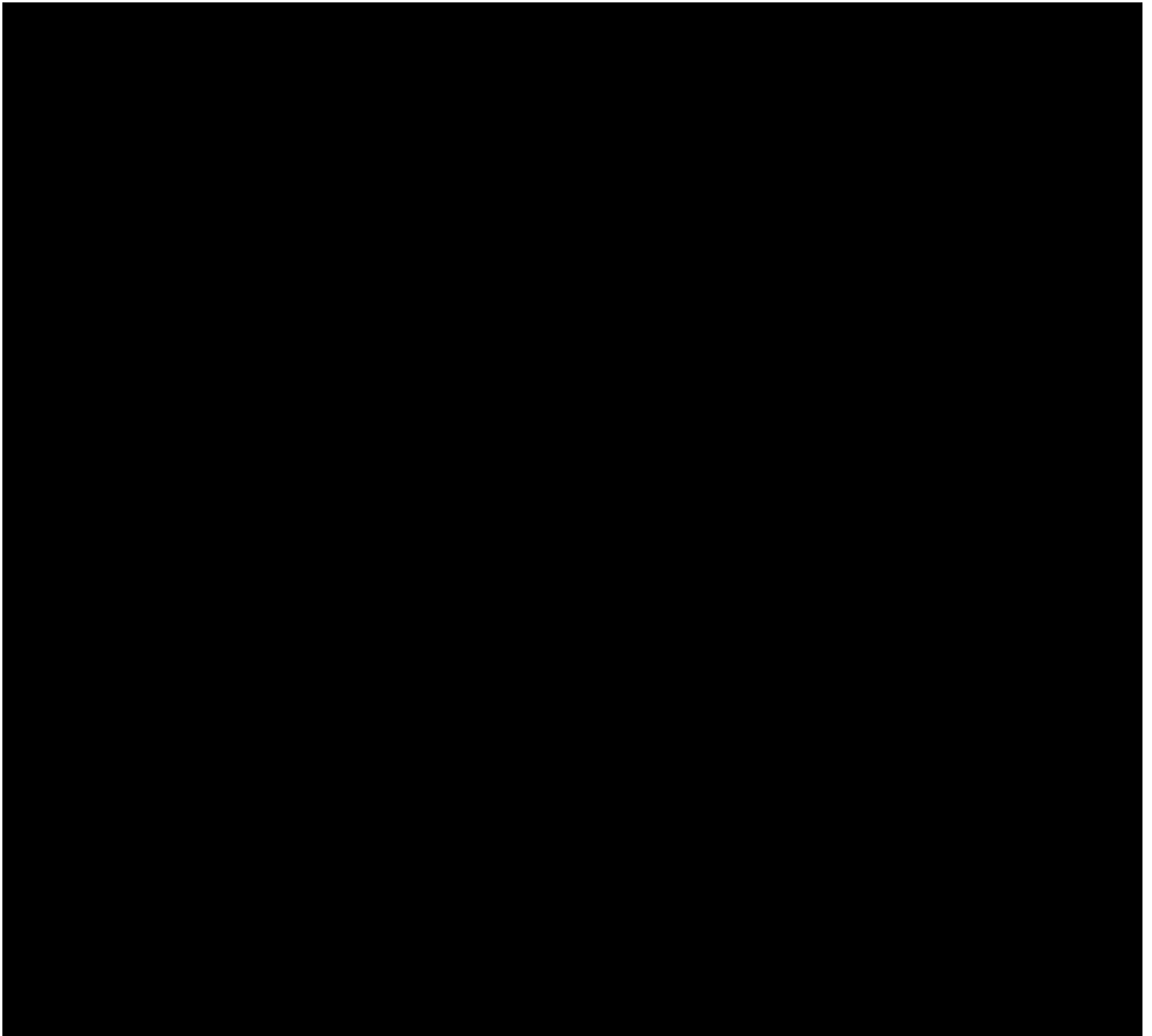


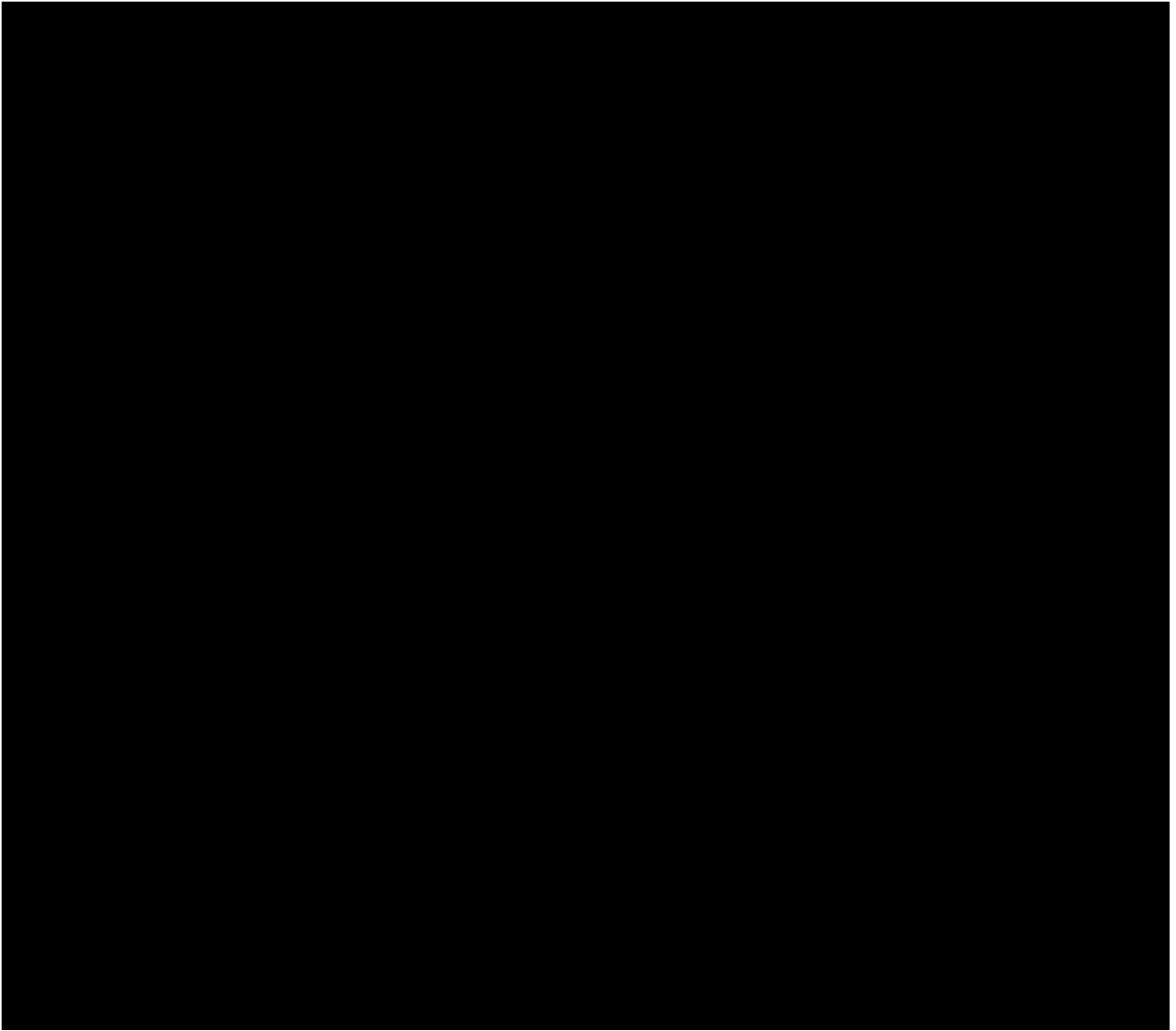


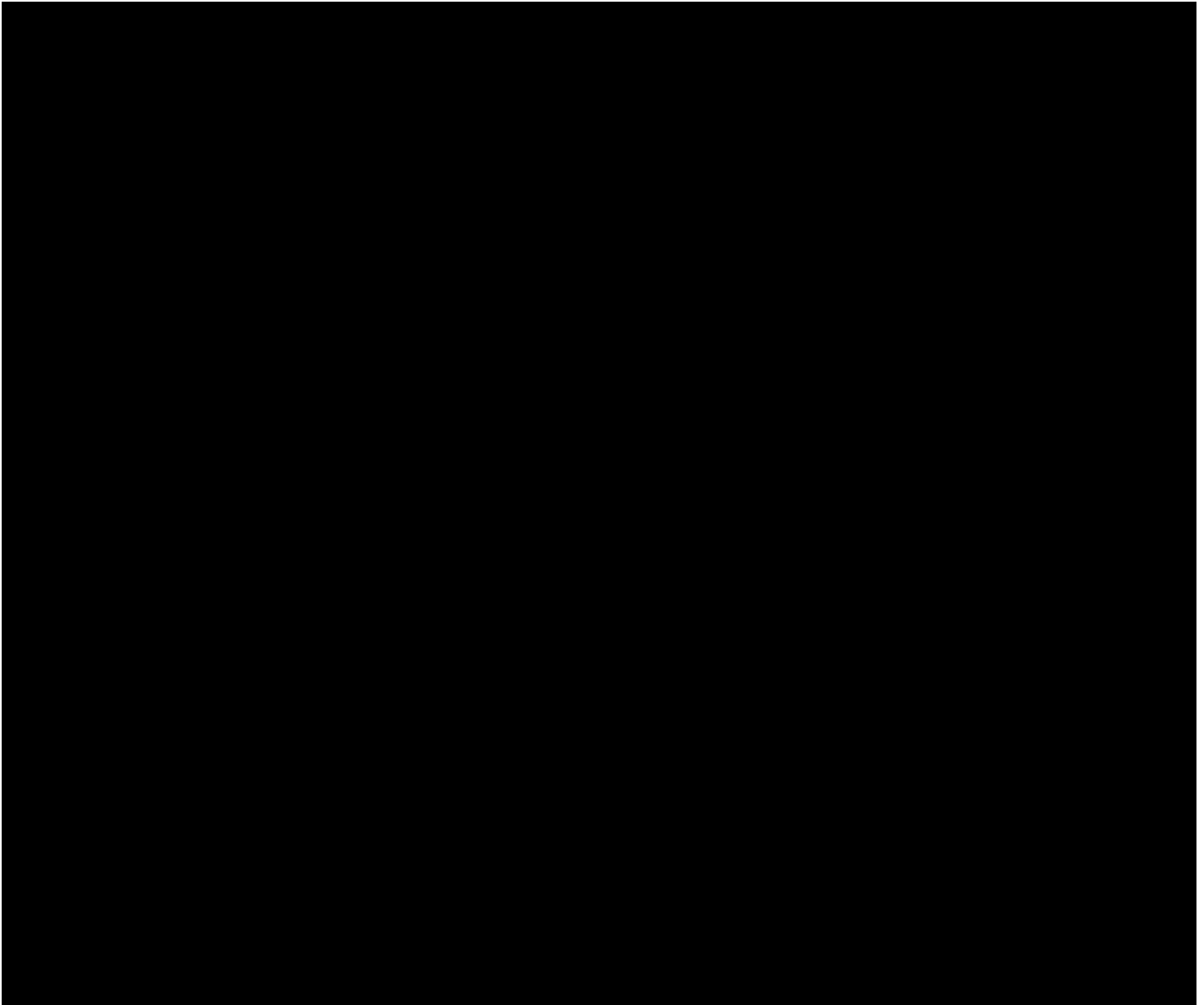


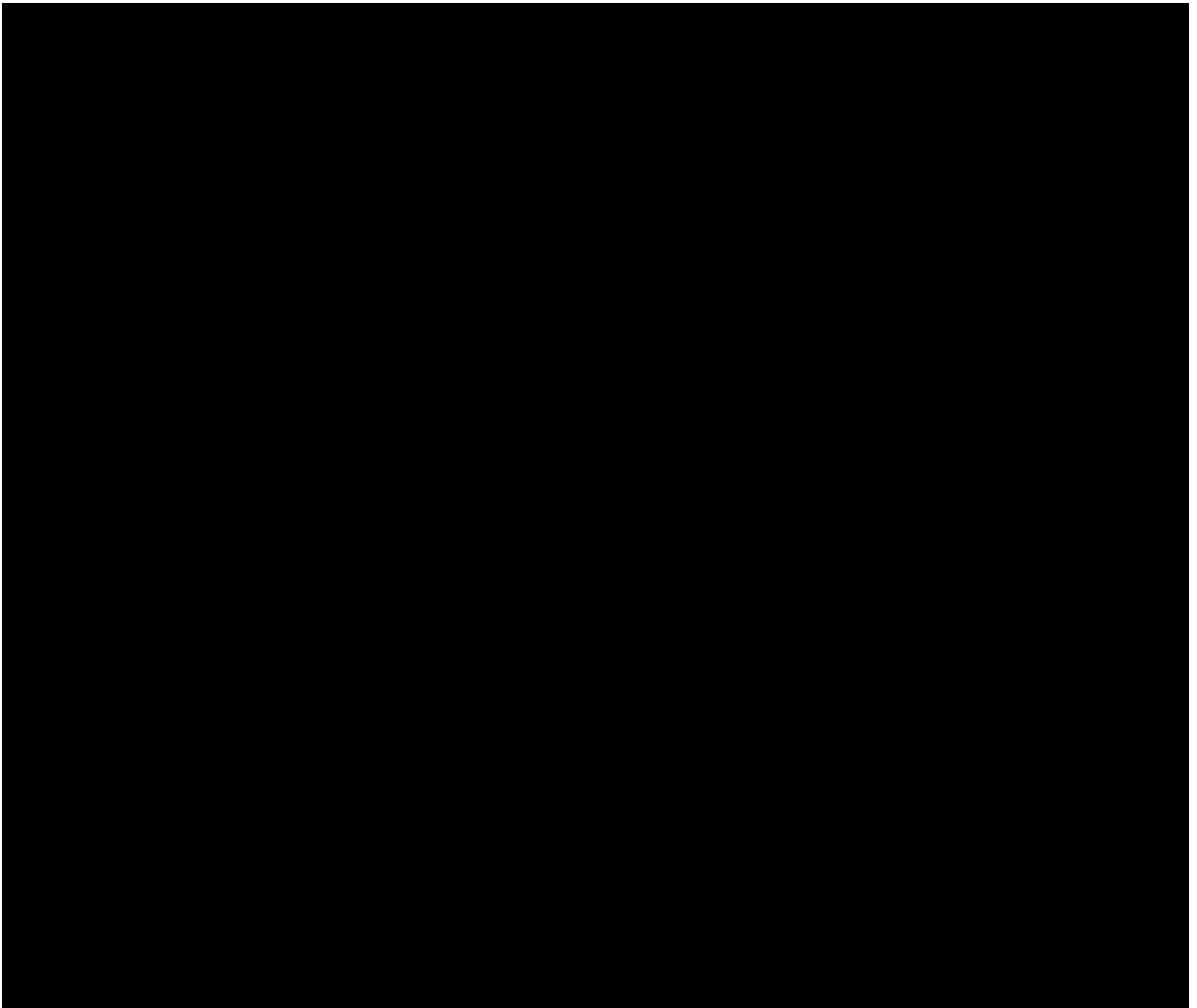










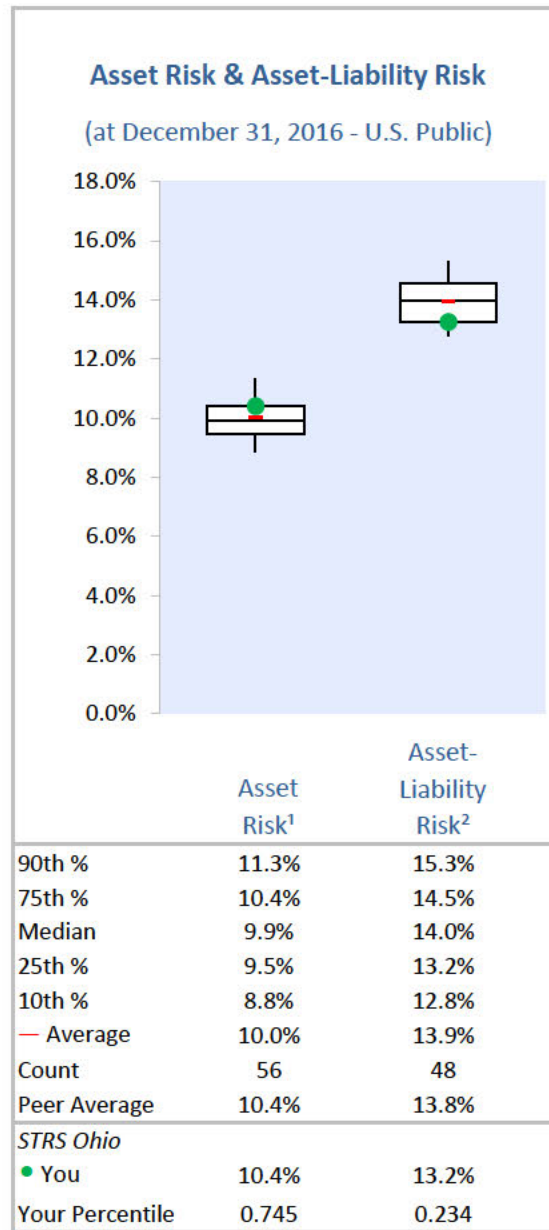


7

Risk

Comparison of your risk levels to the U.S. Public universe	2
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Comparison of your risk levels to the U.S. Public universe



1 Asset risk is the expected volatility of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your asset mix policy. It is expressed as an annual standard deviation.

2 Asset-liability risk is the expected volatility of surplus returns. Surplus returns are the changes in a plan's marked-to-market funded status caused by market factors. Asset liability risk is a function of the volatility of policy returns (asset risk), the volatility of surplus returns (surplus risk) and the correlation between policy returns and surplus returns.

Calculation of asset risk

Before considering the benefit of diversification, the weighted average risk of the asset classes in your asset mix policy was 13.9%.

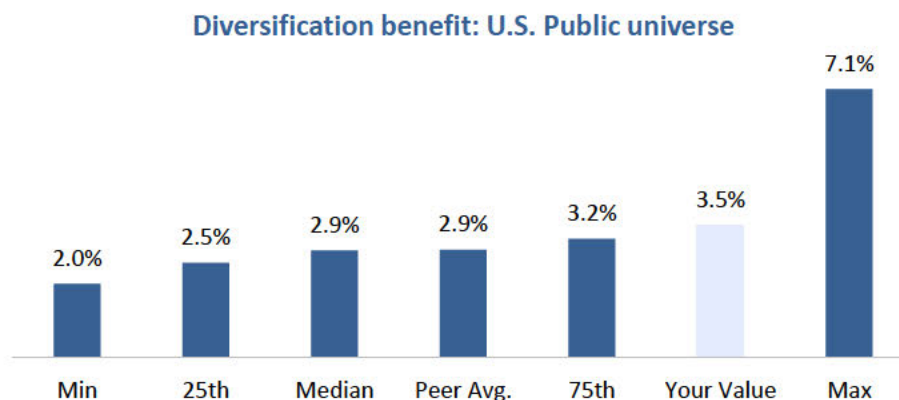
Calculation of your weighted asset class risk

Asset Class	Policy weight	Risk ¹	Weighted risk
	(A)	(B)	(A X B)
Stock: U.S. Large Cap	31.0%	14%	4.3%
Stock: EAFE (Currency Hedged)	10.4%	12%	1.3%
Stock: EAFE	10.4%	17%	1.7%
Stock: Emerging	5.2%	22%	1.1%
Bonds: U.S.	18.0%	6%	1.0%
Bonds: Cash	1.0%	1%	0.0%
REITs	1.5%	21%	0.3%
Real Estate	8.5%	12%	1.1%
Private Equity: LBO	14.0%	23%	3.2%
Weighted Total			13.9%

1. Risk is the standard deviation of returns for the asset class based on standard benchmarks used by CEM. See page 15 of this section for benchmark details.

Reduction in asset risk due to diversification

Your asset risk is less than your weighted asset risk because of the benefit of diversification. Diversification reduces risk because when one asset class has a negative return, it might be offset by another asset class with a positive return. The lower the correlation between your policy asset classes, the greater the diversification benefit. The correlation between your policy asset classes is shown on page 17 of this section.



The benefit of diversification equals weighted asset risk minus asset risk.

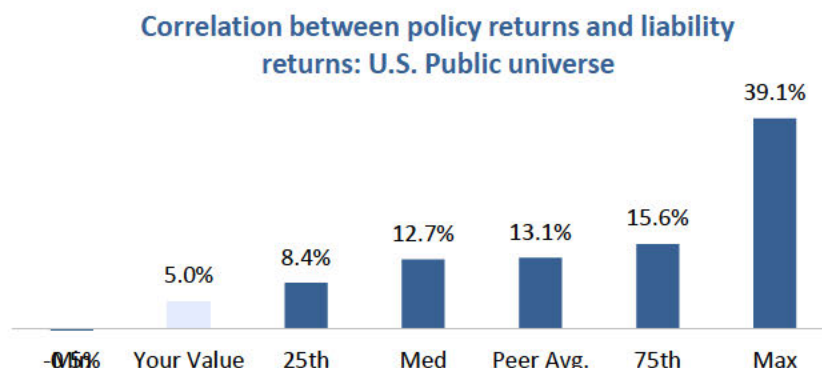
Components of asset risk

	You	Peer median*	Peer average	U.S. Public median*	U.S. Public average
Weighted asset risk	13.9%	13.2%	13.3%	12.8%	12.9%
Benefit of diversification	3.5%	2.9%	2.9%	2.9%	2.9%
Asset risk	10.4%	10.2%	10.4%	9.9%	10.0%

* Comparisons of components of asset risk should be interpreted with caution because it is not always possible to separate the diversification benefit from the weighted asset risk. For example, global stock as an asset class includes the diversification benefit of its geographic components within its asset risk.

Asset-liability risk

Your plan would not have any asset-liability risk if your assets perfectly matched your liabilities. If they matched, then the correlation between asset returns and liability returns would be 100%. If liabilities increased, assets would increase by a like amount (and vice versa). Thus higher correlation between your asset returns and liability returns reduces your asset-liability risk.



In addition to the correlation between asset returns and liability returns, asset-liability risk is also a function of the volatility of asset returns (asset risk) and the volatility of liability returns¹ (liability risk = $\sqrt{R_A^2 + R_L^2 - 2\rho_{AL}R_AR_L}$).

Components of asset-liability risk

	You	Peer median	Peer average	U.S. Public median	U.S. Public average
Asset risk (R_A)	10.4%	10.2%	10.4%	9.9%	10.0%
Liability risk (R_L)	8.7%	10.9%	10.5%	11.1%	11.0%
Correlation between policy returns and liability returns (ρ_{AL})	5.0%	13.0%	13.1%	12.7%	12.7%
Asset-liability risk	13.2%	13.7%	13.8%	14.0%	13.9%

1. Liability returns equal the changes in your marked-to-market liabilities caused by market factors. These are assumed to equal the return on your liability proxy portfolio (see next page).

Liability proxy portfolio

Your liability proxy portfolio is the portfolio of nominal and inflation-indexed bonds that best matches the sensitivity of your liabilities to changes in real and nominal interest rates.

Comparisons of liability proxy portfolio

	Your fund		Peer average		U.S. Public	
	Duration	% of Assets	Duration	% of Assets	Duration	% of Assets
Inflation Indexed Bonds	10.0	22%	11.4	61%	12.5	67%
Nominal Bonds	11.0	78%	14.0	39%	13.7	33%
Total		100%		100%		100%

Your liability proxy portfolio is a tool that:

- Helps you understand how the unsmoothed market value of your liabilities responds to changes in real and nominal interest rates.
- Helps you make better asset mix policy decisions by providing an understanding of which assets will decrease your asset-liability risk (i.e., assets that behave similarly to the neutral asset mix) and which assets will increase your risk.
- Helps you understand how your liabilities are different from your peers. Differences in liabilities mean that the same asset will have different risk / reward characteristics for different funds. For example, the risk of a nominal bond for a fund with 100% inflation sensitivity is much higher than it is for a fund with less than 100% inflation sensitivity.

Asset-liability risk could theoretically be eliminated if your actual asset mix matched the liability proxy portfolio. However, we recognize that this is neither an option nor a goal for most funds because:

- The supply of inflation-indexed assets is limited. These assets are required to match the obligations of pension liabilities.
- This low-risk strategy also has a lower expected return, implying either higher future funding costs or lower future benefits.

The methodology and formula used to determine your liability proxy portfolio are provided on pages 11-13 of this section.

Liability risk

Differences in liability risk are due to differences in inflation sensitivity and member demographics.

A plan's inflation sensitivity depends on:

a) The type of plan

Final and highest average plans have more inflation sensitivity than career average plans. Conversely, career average plans have more inflation sensitivity than flat benefit plans. Your plan type is final average.

Plan type	# of plans	% of Total
Flat Benefit	-	0%
Career Average	-	0%
Final/Highest/Best Avg	52	95%
Other	3	5%
Total	55	100%

b) Contractual inflation protection for retired members

Your retired members get 0% contractual inflation protection. Your retiree inflation protection is subject to a cap of 2% per year, varies with retirement date.

Retiree inflation protection	# of plans		
	Corporate	Public	Other
0%	115	25	6
>0% and <50%	5	0	0
50%	0	2	0
>50% and <100%	2	8	0
100%	95	55	3
Total	217	90	9

c) Member demographics

Member demographics impacts both inflation sensitivity and the duration of plan liabilities. The survey asks for your plan's percentage of liabilities that relate to retired members from your actuarial reports. If you did not provide this number, then it is estimated (see page 12 of this section). Your percentage of liabilities that relate to retired members was 74%.

Membership Breakdown			
	Your fund	Peer Average	U.S. Average
Active Members	55%	57%	56%
Retired Members	45%	43%	44%
Total	100%	100%	100%

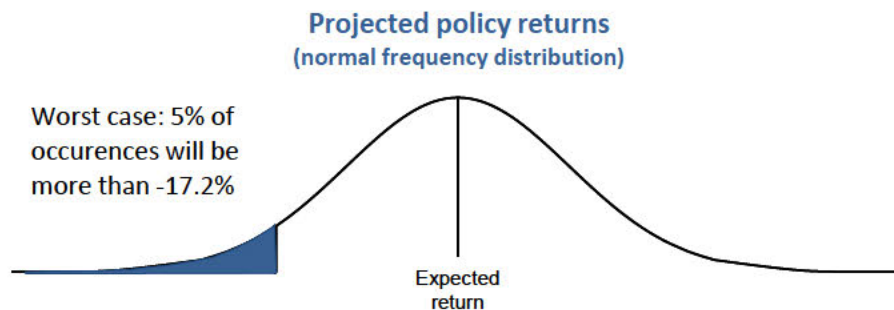
Projected worst case scenarios

We can convert your asset risk and asset-liability risk into worst case outcomes for policy returns and funded status if we make the following simplifying assumptions:

- a) Returns are normally distributed.
- b) Historic return volatility and correlations will continue in the future.
- c) No change in your policy asset mix or liabilities.

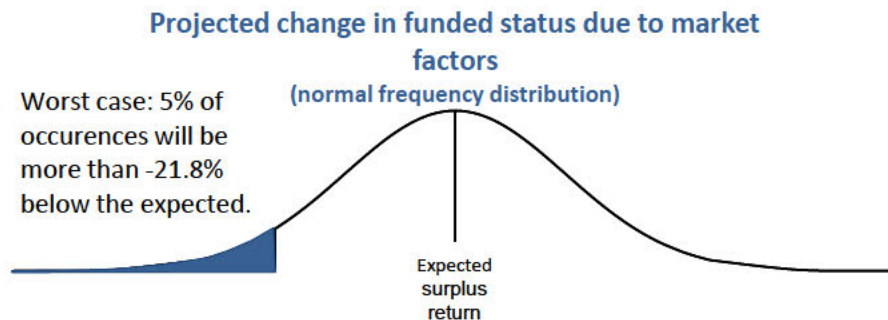
a) Worst case policy returns

Every year there is a 5% probability that your policy return will be worse than your expected policy return by more than -17.2% (-17.2% equals $-1.65 \times$ your asset risk of 10.4%). -17.2% is the starting point of worst case outcomes. They could be much worse.



b) Worst case impact on funded status

Every year, there is a 5% probability that changes in your mark-to-market funded status caused by market factors ("Surplus Returns") will be worse than expected by more than -21.8%. (-21.8% equals $-1.65 \times$ your asset-liability risk of 13.2%). -21.8% is the starting point of worst case outcomes. They could be much worse.



Historic worst case scenarios during the past 5 years

a) Historic worst case policy returns

During the past 5 years, your lowest policy return was 1.7% in 2015.

Historic policy returns - U.S. Public universe

	2016	2015	2014	2013	2012
90th %	8.9%	1.6%	8.6%	18.4%	13.7%
75th %	8.5%	1.0%	7.5%	17.1%	13.1%
Median	7.5%	0.1%	6.4%	15.5%	12.7%
25th %	6.9%	-0.6%	5.6%	13.6%	11.9%
10th %	6.2%	-1.5%	4.9%	11.7%	10.9%
Average	7.6%	0.1%	6.6%	15.1%	12.4%
Count	59	63	66	65	68
Peer Avg	7.3%	0.7%	7.2%	15.2%	12.4%
Your Value	8.0%	1.7%	8.3%	18.1%	13.9%

b) Historic worst case changes in funded status

During the past 5 years, your worst change in marked-to-market funded status caused by market factors ("Surplus Returns") was -6.1% in 2014.

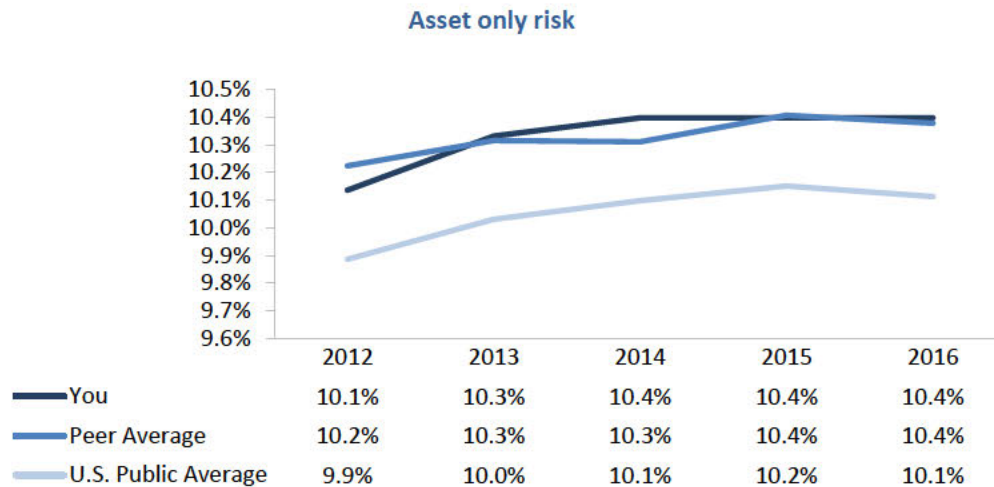
Historic changes in funded status caused by market factors - U.S. Public universe

	2016	2015	2014	2013	2012
90th %	4.9%	4.6%	-4.9%	36.8%	10.5%
75th %	4.4%	3.4%	-6.2%	33.3%	9.8%
Median	2.7%	2.2%	-7.9%	30.8%	7.9%
25th %	1.4%	0.8%	-9.6%	27.3%	5.9%
10th %	0.1%	-0.3%	-11.2%	25.7%	5.0%
Average	2.8%	2.1%	-8.0%	30.6%	7.9%
Count	51	56	56	54	59
Peer Avg	3.1%	2.5%	-7.4%	29.4%	8.1%
Your Value	5.1%	1.8%	-6.1%	25.8%	10.2%

Risk Trends - 2012 to 2016

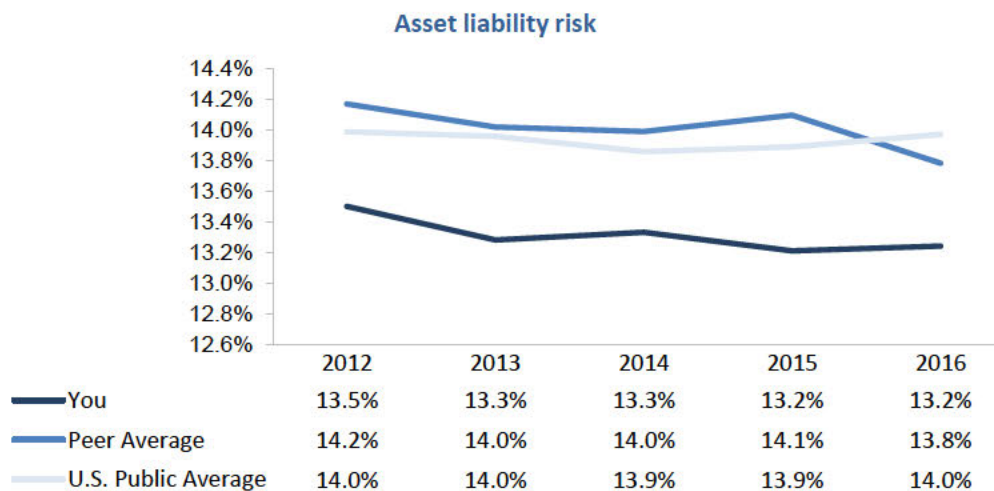
a) Asset risk trends

Asset risk will only change if policy asset mix changes. Between 2012 and 2016 the asset risk for your fund increased from 10.1% to 10.4%.



b) Asset-liability risk trends

Asset-liability risk will change if policy asset mix changes, or if the nature of your liabilities changes. Between 2012 and 2016 the asset-liability risk for your fund decreased from 13.5% to 13.2%.



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Appendix B - Methodology used to calculate asset and asset-liability risk

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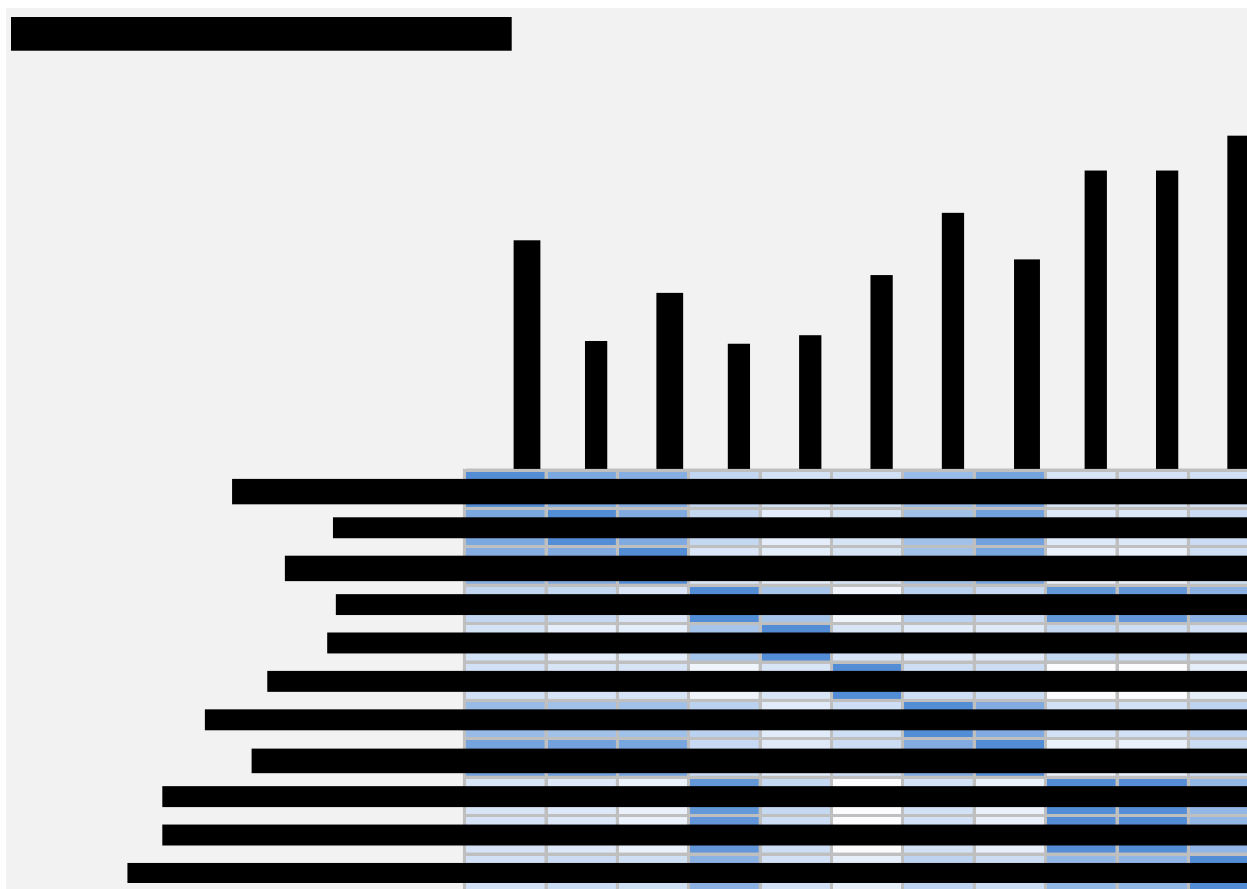
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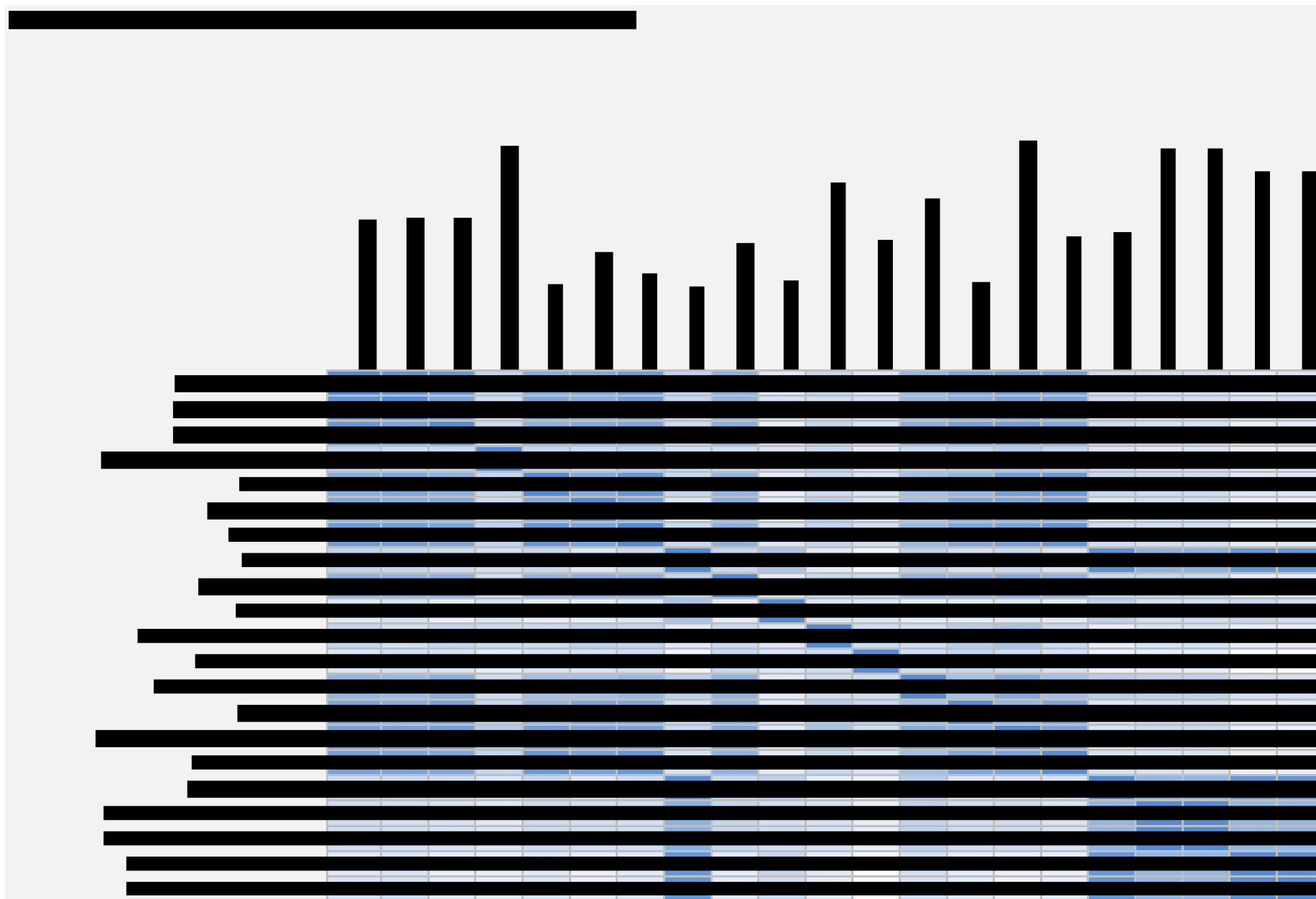
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8

Appendices

Appendix A - Data Summary

Appendix A2 - Enhanced survey data & mapping to regular survey

Appendix B - Data quality

Appendix C - Glossary of terms

Appendix A - Data Summary

STRS Ohio

Plan Info	2016	2015	2014
Contact	Lynn Hoover	Lynn Hoover	Lynn Hoover
Type of fund (corporate, public, other)	Public	Public	Public
Total fund size (mils) as at December 31	71,661.0	70,756.0	73,655.0
Asset-class level holdings provided on survey are: year end or average?	Year End	Year End	Year End
Total return for year ended	8.03%	2.33%	7.95%
Is the return net or gross?	Net of all investment costs	Net of all investment costs	Net of a specified amount
If net, what do you normally deduct?			131,800
Total fund policy or benchmark return	8.00%	1.71%	8.26%

Ancillary Data	2016	2015	2014
What is your hedging policy for:			
Foreign Holdings	50%	50%	50%
What were your actuarial fees in 000s?	266	247	244
How many plan members/beneficiaries do you have:			
Active?	195,440	189,731	194,451
Active (no-accrual)?	135,738	135,215	134,844
Retired?	157,938	158,116	152,208
Other?	17,627	17,453	17,036
What type of plan(s) do you have?	Final Average	Final Average	Final Average
To what extent are your retired members' benefits indexed to inflation?			
Contractual %			
Ad hoc %			
If the indexation is subject to a cap, describe the cap	2% per year, var	2% per year, var	2% per year, vari
What % of the plan's liabilities pertain to retired members?	74	75	72
Actuarial valuation assumptions for funding purposes:			
Liability discount rate	7.8	7.8	7.8
Salary progression rate	3.5	3.5	3.5
What was your actuarial assumption for expected rate of return?	7.8	7.8	7.8

Appendix A - Data Summary: Policy Weights and Benchmarks

STRS Ohio

Asset Class		Policy Weight	Benchmark	
			Description	Return
U.S. Stock - Large Cap	2016	31.0	Russell 1000 (Russell 3000 for total Dom Equity)	12.7
	2015	31.0	Russell 1000 (Russell 3000 for total Dom Equity)	0.5
	2014	31.0	Russell 1000 (Russell 3000 for total Dom Equity)	12.6
U.S. Stock - Small Cap	2016		Russell 2000	21.3
	2015		Russell 2000	-4.4
	2014		Russell 2000	4.9
Stock - EAFE	2016	20.8	MSCI World xUS 50% Hedged Net	5.0
	2015	20.8	MSCI World xUS 50% Hedged Net	0.4
	2014	20.8	MSCI World xUS 50% Hedged Net	0.8
Stock - Emerging	2016	5.2	MSCI Emerging Market net	11.2
	2015	5.2	MSCI Emerging Market net	-14.9
	2014	5.2	MSCI Emerging Market Net	-2.2
Stock - ACWIxU.S.	2016		International Blended Benchmark	6.4
	2015		International Blended Benchmark	-2.8
	2014		International Blended Benchmark	0.2
Stock - Global	2016		MSCI ACWI net	7.9
	2015		MSCI ACWI net	-2.4
	2014		MSCI ACWI Net	4.2
Fixed Income - U.S.	2016	18.0	Barclays Universal for total FI (Barclays Aggregate Index not appropriate for US FI segment)	3.9
	2015	18.0	Barclays Universal for total FI (Barclays Aggregate Index not appropriate for US FI segment)	0.4
	2014	18.0	Barclays Universal for total FI (Barclays Aggregate Index not appropriate for US FI segment)	5.6
Fixed Income - Emerging	2016		Barclays Emerging Market	9.9
	2015		Barclays Emerging Market	1.3
	2014		Barclays Emerging Market	4.8
Fixed Income - High Yield	2016		Barclays US Corp High Yield	17.1
	2015		Barclays US Corp High Yield	-4.5
	2014		Barclays US Corp High Yield	2.5
Cash	2016	1.0	US 90 day T bill	0.3
	2015	1.0	US 90 day T bill	0.1
	2014	1.0	US 90 day T bill	0.0
Global TAA	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
	2014			
Hedge Funds	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
	2014		Custom (Alternative Investment Actual Return)	13.5
REITs	2016	1.5	Your REIT benchmark	8.5
	2015	1.5	Your REIT benchmark	3.2
	2014	1.5	Your REIT benchmark	30.1
Infrastructure	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
	2014		Custom (Alternative Investment Actual Return)	13.5
Real Estate ex-REITs	2016	8.5	NCREIF NPI	8.0
	2015	8.5	NCREIF NPI	13.3
	2014	8.5	NCREIF NPI	11.8
Natural Resources	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
	2014		Custom (Alternative Investment Actual Return)	13.5
Diversified Private Equity	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
	2014	14.0	Custom (Alternative Investment Actual Return)	13.5
LBO	2016	14.0	Custom (Alternative Investment Actual Return)	5.3
	2015	14.0	Custom (Alternative Investment Actual Return)	6.1
	2014			
Venture Capital	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
	2014		Custom (Alternative Investment Actual Return)	13.5
Other Private Equity	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
	2014		Custom (Alternative Investment Actual Return)	13.5

Appendix A - Data Summary: Public Market Assets, Returns and Costs

STRS Ohio

Asset Class			Assets (millions) and Annual Gross Returns							Investment Fees / Costs in 000s									
			Internally Managed				Externally Managed			Internally Managed				Externally Managed					
			Indexed		Active		Active			Indexed		Active		Active					
			Assets	Return	Assets	Return	Assets	Return	# of mgrs	000s	bps¹	000s	bps¹	Base Fees³	Perform Fees	Internal & Other³	Total 000s	bps¹	
U.S. Stock - Large Cap	2016	8,868.0	11.3	10,342.4	10.2	1,046.3	9.8	1	64.0	0.1	10,873.1	10.5	2,233.7		556.7	2,790.4	27.2		
	2015	8,672.3	2.4	10,308.3	-0.1	1,003.0	2.5	1	40.6	0.0	11,892.8	11.0	2,168.3		143.1	2,311.4	23.3		
	2014	8,757.0	13.3	11,364.0	11.7	981.0	13.1	1	38.5	0.0	10,519.9	9.4	2,055.0		356.5	2,411.5	26.1		
U.S. Stock - Small Cap	2016			824.9	22.0	1,252.0	14.8	6			249.8	3.1	8,861.7		61.8	8,923.6	75.8		
	2015			778.8	-2.4	1,101.3	-1.2	6			293.3	3.6	8,895.4		141.4	9,036.9	80.6		
	2014			844.0	6.5	1,140.0	3.8	6			155.0	2.1	9,386.0		116.8	9,502.8	75.2		
Stock - EAFE	2016			5,589.9	4.5	5,463.5	5.6	3			3,137.9	5.6	18,582.3		368.8	18,951.1	34.5		
	2015			5,658.2	1.8	5,529.7	5.6	3			2,833.8	5.1	19,934.8		253.7	20,188.4	35.8		
	2014			5,523.7	1.0	5,761.7	1.6	3			2,480.6	4.4	19,588.0		302.5	19,890.5	35.1		
Stock - Emerging	2016			2,061.8	14.6	1,030.7	12.6	3			2,577.8	13.2	5,834.4		250.1	6,084.5	62.4		
	2015			1,856.3	-10.5	920.4	-13.7	3			2,594.9	14.2	5,317.9		263.8	5,581.7	56.0		
	2014			1,810.0	-2.4	1,073.0	0.4	3			1,951.2	11.1	6,245.0		584.2	6,829.2	64.2		
Stock - ACWIxU.S.	2016			2,988.9	9.1	1,243.3	4.1	2			429.5	1.5	5,445.3		22.9	5,468.2	44.6		
	2015			2,730.5	-1.8	1,206.1	2.0	2			433.2	1.6	5,022.1		24.2	5,046.3	46.0		
	2014			2,775.0	0.5	990.0	n/a	2			418.7	1.5	1,993.0		4.2	1,997.2	38.5		
Stock - Global	2016			536.0	8.8						452.5	6.9							
	2015			778.8	-1.2						457.4	5.8							
	2014			788.0	3.7						422.9	5.5							
Fixed Income - U.S.	2016			8,787.2	2.7						2,317.2	2.5							
	2015			9,726.0	1.0						2,413.4	2.3							
	2014			11,082.0	5.5						2,649.7	2.2							
Fixed Income - Emerging	2016					737.3	15.8	2					3,180.6		228.3	3,408.9	46.4		
	2015					731.4	1.1	2					3,586.6		170.3	3,756.9	47.1		
	2014					864.0	2.0	2					3,742.0		51.1	3,793.1	47.9		
Fixed Income - High Yield	2016					792.0	17.3	2					3,666.2		205.8	3,872.0	44.4		
	2015					953.9	-4.0	2					4,427.6		277.5	4,705.1	43.1		
	2014					1,229.0	2.5	2					4,185.0		102.6	4,287.6	40.8		
Cash	2016			1,679.5	0.5						266.0	1.8							
	2015			1,274.8	0.1						268.6	1.4							
	2014			2,480.0	0.1						265.9	0.9							
Global TAA	2016					412.0	8.4	1					1,191.4		28.8	1,220.2	30.7		
	2015					383.8	-2.2	1					678.1		27.6	705.6	36.8		
	2014																		
REITs	2016	1,262.4	8.8						89.1	0.7									
	2015	1,166.2	3.2																
	2014	1,098.0	30.5						16.5	0.3									
Hedge Funds	2016					2,003.9	5.0	11					32,054.3	22,495.0	302.1	54,851.5	271.3		
	2015					2,039.1	-0.6	11					35,310.0	9,973.0	300.3	45,583.2	223.0		
	2014					2,050.0	3.3	11					32,279.0	22,798.0	263.3	32,542.3	306.1		

1. Cost in basis points = total cost / average of beginning and end of year holdings

Appendix A - Data Summary: Private Market Assets, Returns and Costs

STRS Ohio

Asset Class		Assets (millions) and Annual Returns								# Ext Mgrs	Investment Fees / Costs in 000s¹															
		Internal & Co-Inv		External		Fund of Funds					Internal & Co-Inv		External				Fund of Funds									
				Amt fees based on	Assets	Return	Amt fees based on	Assets	Return				Base Fees	Perform Fees	Total¹ 000s	bps (% of fee basis)	Underlying² Fees	Base Fees	Perform Fees	Internal & Other	Total¹ 000s	bps (% of fee basis)				
Infrastructure	2016						82.7	107.5	5.3	1																
	2015						83.6	105.5	5.6	1																
	2014						100.0	100.0	17.7	1																
Real Estate ex-REITs	2016	5,794.6	9.1							39	16,632.4	29.3														
	2015	5,554.9	13.0							37	16,561.4	30.9														
	2014	5,177.0	14.8							18	14,191.5	28.7														
											Under	Oversight														
	2016						1,526.4	1,131.1	13.5					17,431.8		447.4	17,879.3	114.4								
	2015						1,599.0	1,008.5	11.0					17,938.0		443.5	18,381.5	122.5								
	2014						1,401.0	1,009.0	18.0					17,902.0		378.9	18,280.9	119.1								
Natural Resources		Direct																								
	2016	375.8	-3.4							12	97.0	2.3														
	2015	455.9	3.0							10	109.7	2.5														
	2014									6																
	2016						589.4	604.6	-3.4					6,439.0		93.3	6,532.2	115.2								
	2015						544.8	478.1	3.0					7,659.5		101.7	7,761.2	149.9								
	2014						491.0	351.0	9.2					5,014.0		87.1	5,101.1	113.7								
Diversified Private Equity	2016						257.0	97.0	6.8	7				2,715.0		21.5	2,736.5	164.7								
	2015						75.3	60.3	9.9	7				1,429.9		10.9	1,440.7	191.3								
	2014						6,288.0	2,893.0	18.9	78				30,261.0		437.5	30,698.5	50.9	7,965.0	5,367.0		17.9	13,349.9	123.0		
LBO	2016						3,630.2	2,510.6	6.8	84				43,001.0		902.9	43,903.9	126.0	8,310.5	6,701.6		355.3	15,367.4	156.8		
	2015						3,337.4	2,550.5	9.9	95				42,751.8		330.2	43,082.0	129.1	11,206.1	5,965.6		218.0	17,389.7	180.1		
	2014																									
Venture Capital	2016						1,141.0	914.5	3.1	70				16,911.0		347.4	17,258.4	147.1	4,391.9	1,677.4		123.6	6,192.9	227.3		
	2015						1,205.5	919.9	11.9	63				15,584.7		354.0	15,938.7	107.5	3,664.6	1,562.2		19.3	5,246.1	238.5		
	2014						1,761.0	880.0	17.9	30				13,485.0		511.4	13,996.4	79.6	2,824.0	1,126.0		4.0	3,954.0	232.6		
Other Private Equity	2016	883.5	4.6				1,948.1	1,323.7	4.0	32	261.0	1.5	25,265.0		177.0	25,442.0	147.8									
	2015	841.1	4.1				1,494.6	1,095.3	2.4	32	118.0	8.1	19,370.8		867.1	20,237.9	110.0									
	2014	1,145.0	13.5				2,185.0	722.0	13.5		142.9	1.3	10,511.0		456.7	10,967.7	58.3									

1. Cost in basis points = total cost / average of beginning and end of year holdings. Total cost excludes private asset performance fees because of comparability issues.

2. Default for fees paid to underlying partnerships have been applied.

Appendix A - Data Summary: Oversight, Custodial and Other Costs

STRS Ohio

Oversight, Custodial and Other Costs			
		000s	bps
Oversight of the fund assets ¹	2016	4,578.3	0.6bp
	2015	4,539.4	0.6bp
	2014	3,804.1	0.5bp
Custodial total	2016	2,090.0	0.3bp
	2015	2,149.9	0.3bp
	2014	1,673.0	0.2bp
Custodial foreign (if available)	2016		
	2015		
	2014		
Custodial domestic (if available)	2016		
	2015		
	2014		
Consulting / performance measurement	2016		
	2015		
	2014		
Audit	2016	165.9	0.0bp
	2015	158.3	0.0bp
	2014	136.0	0.0bp
Other (legal etc)	2016	418.1	0.1bp
	2015	374.8	0.1bp
	2014	339.0	0.0bp
Total	2016	7,252.3	1.0bp
	2015	7,222.4	1.0bp
	2014	5,952.1	0.8bp

Summary of All Asset Management Costs			
		000s	bps
Investment Management Costs	2016	280,207.4	39.4bp
	2015	266,898.0	37.0bp
	2014	235,459.6	32.3bp
Overlay Costs	2016	452.5	0.1bp
	2015	457.4	0.1bp
	2014	175.2	0.0bp
Oversight, Custodial & Other Costs	2016	7,252.3	1.0bp
	2015	7,222.4	1.0bp
	2014	5,952.1	0.8bp
Total	2016	287,912.1	40.4bp
	2015	274,577.8	38.1bp
	2014	241,587.0	33.1bp

1. Oversight includes the salaries and benefits of executives and their staff responsible for overseeing the entire fund or multiple asset classes and the fees / salaries of the board or investment committee. All costs associated with the above including fees / salaries, travel, director's insurance and attributed overhead should be included.

Appendix A - Data Summary: Overlays

STRS Ohio

Overlays																
	Notional amount (mils)	Market value (mils)	Profit/ Loss (000s)	Cost (000s)	% of Notion. (bps)	Duration (years)	Notional amount (mils)	Market value (mils)	Profit/ Loss (000s)	Base fees (000s)	Perf. fees (000s)	Over- sight (000s)	Total (000s)	% of Notion. (bps)	Duration (years)	

Appendix A - Data Summary - Enhanced Survey Data and Mapping to Regular Survey - Mapped Data

Data after the mapping process from enhanced survey to regular is shown below. The below data is used through the rest of this report.

Investment Costs by Asset Class and Style (\$000s)									
	Internal		External Passive		External Active			Total	
	Passive	Active	Fees	Monitoring & Other	Base Fees	Perform. Fees	Monitoring & Other	000s	% of Total
U.S. Stock - Large Cap	64	10,873			2,234		557	13,728	5%
U.S. Stock - Small Cap		250			8,862		62	9,173	3%
Stock - EAFE		3,138			18,582		369	22,089	8%
Stock - Emerging		2,578			5,834		250	8,662	3%
Stock - ACWIxU.S.		430			5,445		23	5,898	2%
Stock - Global		452						452	0%
Fixed Income - U.S.		2,317						2,317	1%
Fixed Income - Emerging					3,181		228	3,409	1%
Fixed Income - High Yield					3,666		206	3,872	1%
Cash		266						266	0%
Infrastructure - Fund of Funds					496		60	556	0%
Infrastructure - Fund of Funds REITs	89				1,321			1,321	0%
Real Estate ex-REITs		16,632						89	0%
Real Estate ex-REITs - LPs					17,432		447	16,632	6%
Natural Resources		97						17,879	6%
Natural Resources - LPs					6,439		93	97	0%
Hedge Funds					32,054	22,495	302	6,532	2%
Global TAA					1,191	0	29	32,356	11%
Diversified Private Equity					2,715		21	1,220	0%
LBO					43,001		903	2,736	1%
LBO - Fund of Funds					6,702		355	43,904	15%
LBO - Fund of Funds					8,310			7,057	2%
Venture Capital					16,911		347	8,310	3%
Venture Capital - Fund of Funds					1,677		124	17,258	6%
Venture Capital - Fund of Funds					4,392			1,801	1%
Other Private Equity		261			25,265		177	4,392	2%
Overlay Programs		127			0		325	25,703	9%
Total investment management costs - Internal & Monitoring								452	0%
Total investment management fees (excluding performance in private assets)								42,454	15%
Total investment management costs					39.4bp			215,711	75%
								280,660	97%
Oversight, Custodial & Other Asset Related Costs (\$000s)									
Oversight of the Fund								4,578	2%
Trustee & Custodial								2,090	1%
Audit								166	0%
Other								418	0%
Total oversight, custodial & other costs							1.0bp	7,252	3%
Total cost for STRS Ohio							40.4bp	287,912	100%

*Default cost used. Refer to Appendix A.

Costs in blue come from the following page.

Costs in purple are from a two-step process shown over the next two pages.

Appendix A - Data Summary - Enhanced Survey Mapping to Regular Survey

Activity	Cost per Enhanced Survey	# of FTE	Step 1: Attribution of Oper. & Support	Cost with Attribution
Front Office				
internal fixed income	1,807	8.0	944	2,751
Internal liquidity reserves	148	1.0	118	266
internal reit	66	0.2	24	89
internal real estate (directly held)	11,795	41.0	4,837	16,632
internal real estate indirect	329	1.0	118	447
internal alternative investments	87	2.3	271	358
internal passive domestic equity	40	0.2	24	64
internal active large & mid cap	8,067	28.5	3,363	11,430
internal active small cap	135	1.5	177	312
internal developed	2,592	7.8	914	3,507
internal emerging	2,091	6.3	737	2,828
internal global quant	334	1.0	118	452
external alternative investments	1,822	5.0	590	2,412
internal Global ex US (ACWI ex US)	334	1.0	118	452
Currency hedge (from internal developed)	334	1.0	118	452
Total front office	29,983	105.7	12,471	42,454
Governance, Operations and Support				
Board, CEO & assistants re: investments (A)	1,066	2.0	236	1,302
CIO, Investment strategy, asset allocation (B)	2,450	7.0	826	3,276
Oversight of the fund per regular CEM survey (A + B)				4,578
Custodial fees	2,090	n/a	n/a	2,090
Internal Audit	166	1.0	n/a	166
Legal services	418	1.0	n/a	418
Risk management	242	0.4	-242	0
Performance reporting and data management	2,067	3.0	-2,067	0
Investment operations - ex private markets			0	0
Investment operations - private markets			0	0
Compliance	159	1.0	-159	0
Information Technology	6,678	39.0	-6,678	0
Public relations and internal communication	291	2.0	-291	0
Finance, external reporting & tax	483	3.0	-483	0
Human resources	477	2.0	-477	0
Building, utilities and office services	2,316	16.0	-2,316	0
Non-specific allocated overhead	99	8.0	-99	0
Total cost excluding external manager fees	48,983	191.1	723	49,706

How CEM mapped the above costs to the regular survey

CEM attributed both front office and back office costs to the CEM asset classes by style using the following methodology:

Step 1 - CEM attributed operations and support costs to front office & oversight pro rata based on FTE.

Step 2 - CEM attributes the fully loaded cost (shown in green) to all of the CEM asset classes that the team manages (see next page). The attribution preserves the relative cost ratios versus the CEM universe for each of the asset classes that the team manages.

Appendix A - Data Summary - Enhanced Survey Mapping of Internal Teams

Front Office	Cost with Attribution from Step 1	Responsibilities by CEM asset class	Step 2 Attribution to Asset Classes
internal fixed income	2,751	Fixed Income - U.S.	2,317
		Monitoring Fixed Income - Emerging	228
		Monitoring Fixed Income - High Yield	206
Internal liquidity reserves	266	Cash	266
internal reit	89	Passive REITs	89
internal real estate (directly held)	16,632	Real Estate ex-REITs	16,632
internal real estate indirect	447	Monitoring LP Real Estate ex-REITs	447
internal alternative investments	358	Natural Resources	97
		Other Private Equity	233
		Other Private Equity	28
internal passive domestic equity	64	Passive U.S. Stock - Large Cap	64
internal active large & mid cap	11,430	U.S. Stock - Large Cap	10,873
		Monitoring U.S. Stock - Large Cap	557
internal active small cap	312	U.S. Stock - Small Cap	250
		Monitoring U.S. Stock - Small Cap	62
internal developed	3,507	Stock - EAFE	3,138
		Monitoring Stock - EAFE	369
internal emerging	2,828	Stock - Emerging	2,578
		Monitoring Stock - Emerging	250
internal global quant	452	Stock - Global	452
external alternative investments	2,412	Monitoring Infrastructure - Fund of Funds	60
		Monitoring LP Natural Resources	93
		Monitoring Hedge Funds	302
		Monitoring Global TAA	29
		Monitoring Diversified Private Equity	21
		Monitoring Venture Capital - Fund of Funds	124
		Monitoring Venture Capital	347
		Monitoring LBO - Fund of Funds	355
		Monitoring LBO	903
		Monitoring Other Private Equity	177
internal Global ex US (ACWI ex US)	452	Stock - ACWIxU.S.	430
		Monitoring Stock - ACWIxU.S.	23
Currency hedge (from internal developed)	452	Passive Derivatives/Overlays - Currency	127
		Monitoring Passive Derivatives/Overlays - Currency	325
Total Front Office	42,454		42,454

Front Office team **costs**, including allocated operations and support costs (see prior page), are attributed to the asset classes managed or overseen by the team. These attributions, shown in **purple**, are then inserted back into the regular survey.

Appendix A - Data Summary - Enhanced Survey Definitions

Costs - Attribute 100% of costs excluding manager fees and transaction costs including:

- (i) **Salaries and benefits** of FTE
- (ii) **General & administrative**: travel, supplies, staff education, publications and reference materials, etc.
- (iii) **Consulting** and other third party fees

FTE - Includes full time permanent salaried employees, include the FTE of long and short term contract individuals dedicated to your organization that are working onsite or working full-time for your fund on a project or in a role supervised by your staff. Do not include FTE at external consultants or service providers if they are not being supervised by your staff, even if they are dedicated to serving your organization.

Activity Definitions

1. Front Office consists of investment-decision making staff, including traders, analysts, portfolio managers and staff selecting and monitoring external managers, their immediate assistants and their management below the CIO level. Include third party fees for advice at the asset-class or security level such as manager search consultants, private equity consultants, and investment specific legal and due diligence fees that are not treated as transaction costs.

Do NOT include:

- (i) External manager fees. These are collected separately on the holdings tabs.
- (ii) Costs that relate to activities defined as Governance, Operations and Support in the table such as: board consultants, CIO, asset allocation and risk policy consultants, or other services (such as building, utilities and office services, information technology and human resources).

a. Board, CEO & assistants re: investments: Include only the proportion of the costs (fees paid to Board directors, travel, director insurance, CEO and CEO's direct assistants) equal to their proportion of time spent on investments and investment governance support. Exclude time spent on non-investment activities such as benefit administration, sales, marketing, new product development.

b. CIO, Investment strategy, asset allocation: Include 100% of CIO FTE and costs including his/her direct assistants, total fund asset allocation strategy, tactical deviations from the mix, economic political or other research, etc.

c. Risk management: Developing and implementing risk controls for operational and investment risk including surplus risk, factor exposures, credit, counterparty, etc. Excludes the cost of IT/IS risk systems. These belong in IT/IS.

d. Internal Audit: Independent review of business processes. Excludes external auditor fees. These belong in Finance, external reporting & tax

e. Responsible investing, corporate governance: Policy setting and coordination across asset classes for sustainable, socially and/or environmentally responsible investing, and for corporate governance.

f. Client account management: Client service & reporting related to investing client assets, including client Board meetings, strategic client advice (ALM, risk, client portfolio construction).

g. Custodial fees: should be reported gross before any reductions relating to securities lending or other revenues credited against fees.

h. Data, valuation & performance analytics: Valuation and performance measurement of securities, funds, portfolios, risk, compliance, client reporting and other analysis and reporting. Include costs of data, dealing with data vendors and cleaning data.

Appendix A - Data Summary - Enhanced Survey Definitions (page 2)

i. Investment operations: Listed security operations including trade settlement, custodial bank monitoring and reconciliation, cash management and corporate actions, private asset class, derivatives and swap administration, COO. If the COO or CFO is responsible for multiple activities (i.e., Valuations and performance analytics, investment operation and finance) then split their FTE between the activities based on time spent.

j. Compliance: Monitoring, training on and dealing with regulatory infractions. Includes securities and pension regulation. Excludes compliance related to benefit administration.

k. IT/IS systems: IT management and strategy, architecture, data center, database and application management and maintenance, development, user services, network, telecommunications, etc. Also include the costs of purchasing and maintaining the following systems/software applications: portfolio management, risk management, trade processing/order execution management, compliance monitoring, performance analytics, fund accounting system. Exclude the pro rata

l. Public relations and internal communication: External communication with entities such as regulators and media. Internal communication to staff. Excludes member and employer communication, marketing and sales.

m. Finance, external reporting & tax: Financial statements, external auditor fees, general accounting, budgeting, tax reporting, procurement and accounts payable. CFO. If the CFO or COO is responsible for multiple activities (i.e., finance and IT) then split their FTE between the activities based on time spent.

n. Legal services: General counsel, corporate secretary, legal counsel of any kind, even those specializing in real estate or private equity, paralegals, legal assistants and all FTE involved in legal analysis and advice. Investment related legal fees and costs, such as the legal fees to close private equity transactions, should be included under 'Front Office' if not treated as a transaction cost. Exclude amounts that pertain to non-investment activities such as benefit administration.

o. Human resources: Human resources staff and consulting, including recruitment, training, career development, induction, disciplinary action, developing HR policies and procedures, etc.
Exclude: Amounts that relate to non investment activities such as benefit administration and both severance and recruitment fees and activity specific training (these should be included in the Front Office Cost Centers table).

p. Building, utilities and office services: Building occupancy costs including rent, lease, amortization of leaseholds and depreciation of buildings, office services such as reception, mailroom, cleaning and maintenance, building insurance, utilities. Include satellite offices. Exclude the pro rata portion that relates to non-investment activities such as benefit administration, sales, marketing, new product development.

Appendix B - Data quality

The value of the information contained in these reports is only as good as the quality of the data received. CEM's procedures for checking and improving the data include the following.

Improved survey clarity

Twenty years of feedback from survey participants has led to improved definitions and survey clarity. In addition to immediate feedback from participants, CEM has hosted user workshops to solicit additional feedback and to resolve issues, such as trade-offs between more information and effort on the part of participants.

Computer and desktop verification

Survey responses are compared to norms for the survey universe and to each sponsor's prior year data when available. This typically results in questions generated by our online survey engine as well as additional follow-up to clarify responses or with additional questions.

In addition to these procedures, data quality continues to improve for the following reasons:

Learning curve -

This is CEM's 26th year of gathering this data and experience is teaching the firm and the participants how to do a better job.

Growing universe -

As our universe of respondents continues to increase in size, so does our confidence in the results as unbiased errors tend to average themselves out.

Any suggestions on how to further improve data quality are welcome.

Currency Conversions

For reports where either the peer group or report universe includes funds from multiple countries, we have converted the returns back to the base currency of the fund we prepared the report for. For example, for a Euro zone fund with peers from the U.S. we converted U.S. returns to Euro based on the currency return for the year using December 31 spot rates.

Appendix C - Glossary of terms

Average cost

- Calculated by dividing actual annual costs by the average of beginning and end-of-year holdings. If beginning-of-year holdings are not available, they are estimated using end-of-year holdings before the effect of this year's return on investment.

Benchmark return

- Rate of return on a portfolio of investable assets (such as the S&P500) designated as the benchmark portfolio against which the fund measures its own performance for that asset class.

F statistics

- Measure of the statistical significance of the regression coefficients taken as a group. Generally, regression equations with 5 coefficients and sample sizes greater than 20 are statistically significant if its F statistic is greater than 3.

Global TAA

- Fully funded segregated asset pool dedicated to active asset allocation.

Impact coefficient

- Estimate of the impact on the dependent variable in a regression of a change in the value of a given explanatory variable

Level of significance

- Degree to which sample data explains the universe from which they are extracted.

N-year peers

- Subset of peer group that have participated in our study for at least the consecutive n years.

Oversight of the fund

- Resources devoted to the oversight of the fund.

Overlay

- Derivative based program (unfunded other than margin requirements), designed to enhance total portfolio return (such as a tactical asset allocation program) or to achieve some specific mandate such as currency hedging.

Passive proportion

- Proportion of assets managed passively, i.e., indexed to broad capital market benchmarks or dedicated to replicate market benchmarks.

Policy mix

- Reflects long-term policy or target asset weights. Policy asset mix is often established by a fund's investment committee or board and is determined by such long term considerations as liability structure, risk tolerance and long term capital markets prospects.

Policy return

- The return you would have earned if you had passively implemented your policy mix decision through your benchmark portfolios. Your policy return equals the sum of your policy weights multiplied by your asset class benchmarks for each asset class.

R squared (coefficient of determination)

- The percentage of the differences in the dependent variable explained by the regression equation. For example, an R squared of 1 means 100% of the differences are explained and an R squared of 0 means that none of the differences are explained.

Value added

- the difference between your total actual return and your policy return. It is a measure of actual value produced over what could have been earned passively.

Investment
Cost Effectiveness Analysis
(for the 5-year period ending December 31, 2017)

STRS Ohio



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Prepared October 26, 2018. Although the information in this report has been based upon and obtained from sources we believe to be reliable, CEM Benchmarking Inc. ("CEM") does not guarantee its accuracy or completeness. The information contained herein is proprietary and confidential and may not be disclosed to third parties without the express written mutual consent of both CEM and STRS Ohio.

Key takeaways

Returns

- Your 5-year net total return of 10.1% was in the top decile of the U.S. public universe. This compares to the U.S. Public median of 9.0% and the peer median of 9.0%.
- Your 5-year policy return was 10.1%. This was above the U.S. Public median of 8.8% and above the peer median of 8.8%.

Value added

- Your 5-year net value added was 0.0%. This was slightly below both the U.S. Public median and the peer median of 0.2%.

Cost

- Your investment cost of 40.4 bps was below your benchmark cost of 50.3 bps. This suggests that your fund was low cost compared to your peers.
- Your fund was low cost because you had a lower cost implementation style and you paid less than peers for similar services.

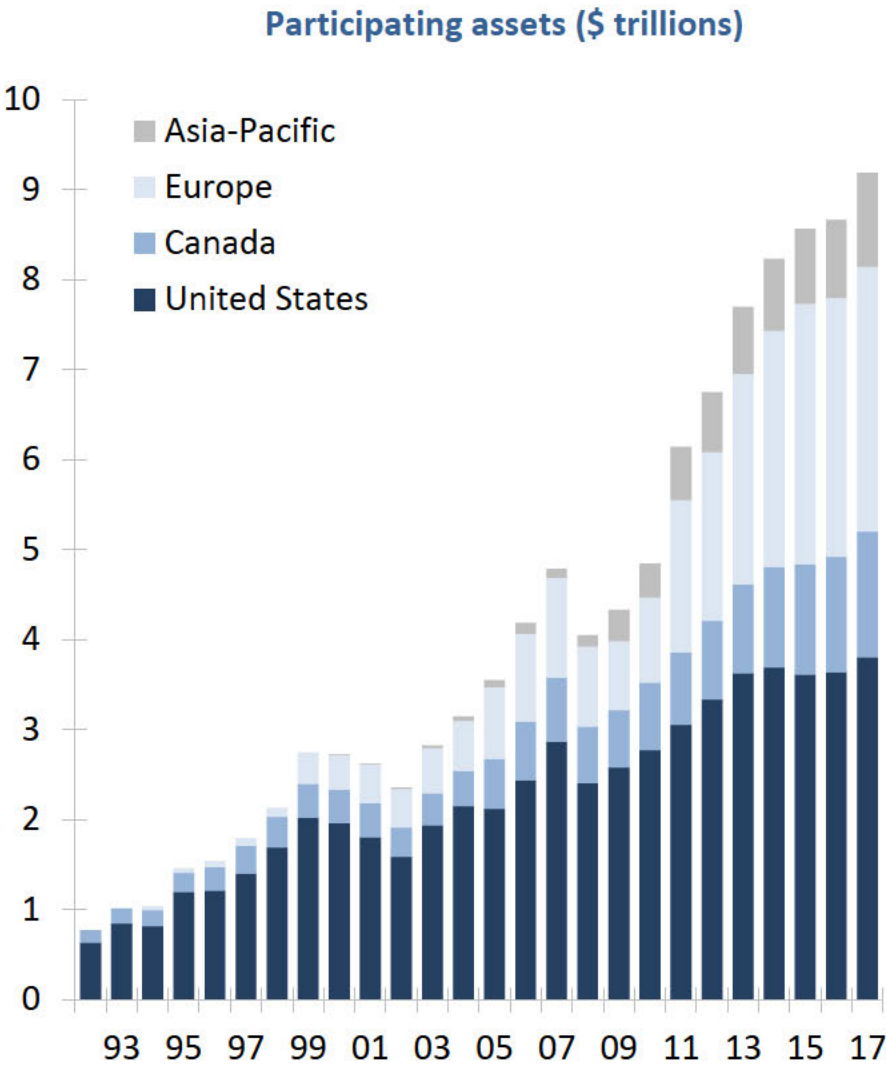
Risk

- Your asset risk of 11.0% was above the U.S. Public median of 10.5%.

This benchmarking report compares your cost and return performance to the 293 funds in CEM's extensive pension database.

- 162 U.S. pension funds participate. The median U.S. fund had assets of \$9.6 billion and the average U.S. fund had assets of \$23.5 billion. Total participating U.S. assets were \$3.8 trillion.
- 77 Canadian funds participate with assets totaling \$1.4 trillion.
- 43 European funds participate with aggregate assets of \$2.9 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Ireland, Denmark and the U.K.
- 8 Asia-Pacific funds participate with aggregate assets of \$1.0 trillion. Included are funds from Australia, New Zealand, China and South Korea.

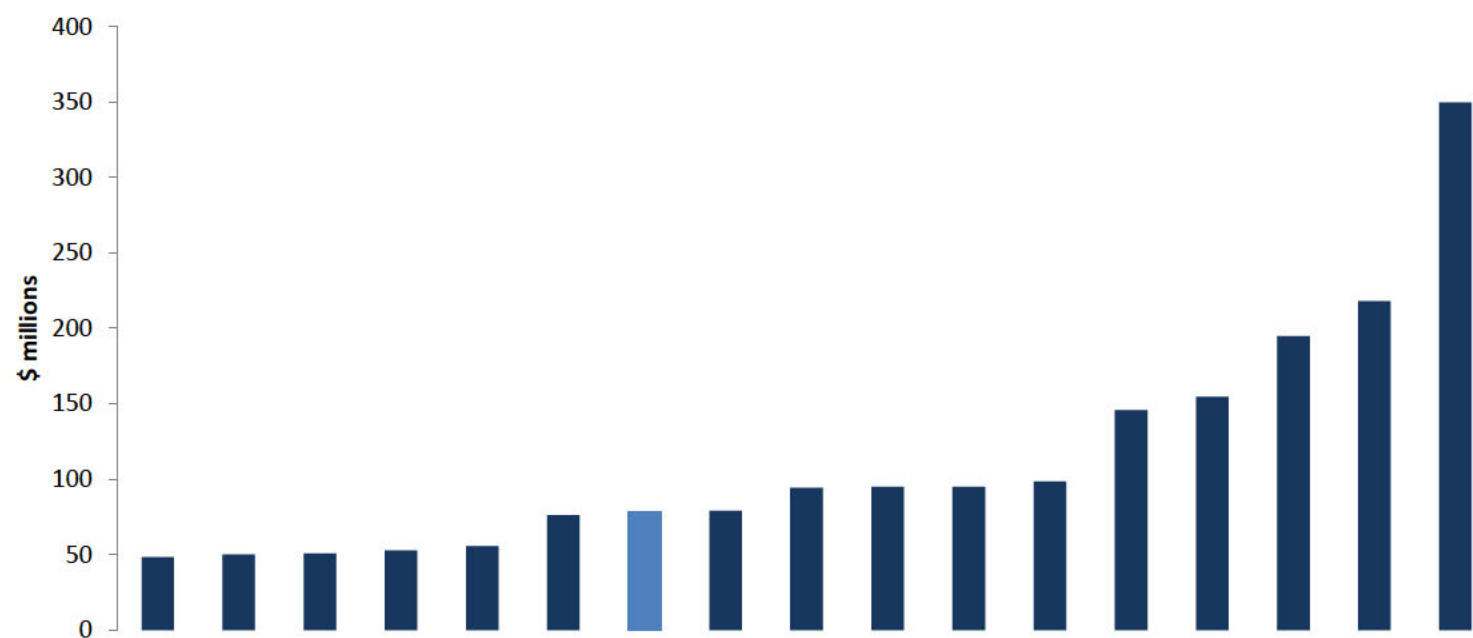
The most meaningful comparisons for your returns and value added are to the custom peer group.



The most valuable comparisons for cost performance are to your custom peer group because size impacts costs.

Peer group for STRS Ohio

- 17 U.S. Public public sponsors from \$48 billion to \$350 billion
- Median size of \$94 billion versus your \$78 billion



To preserve client confidentiality, given potential access to documents as permitted by the Freedom of Information Act, we do not disclose your peers' names in this document.

What gets measured gets managed, so it is critical that you measure and compare the right things:

1. Returns

Why do total returns differ from other funds? What was the impact of your policy mix decisions versus implementation decisions?

2. Net value added

Are your implementation decisions adding value (i.e., mostly the effectiveness of active management, as well as the amount of active management versus passive management)?

3. Costs

Are your costs reasonable? Costs matter and can be managed.

4. Cost effectiveness

Net implementation value added versus excess cost. Does paying more get you more?

5. Risk

What is the risk of your policy mix?

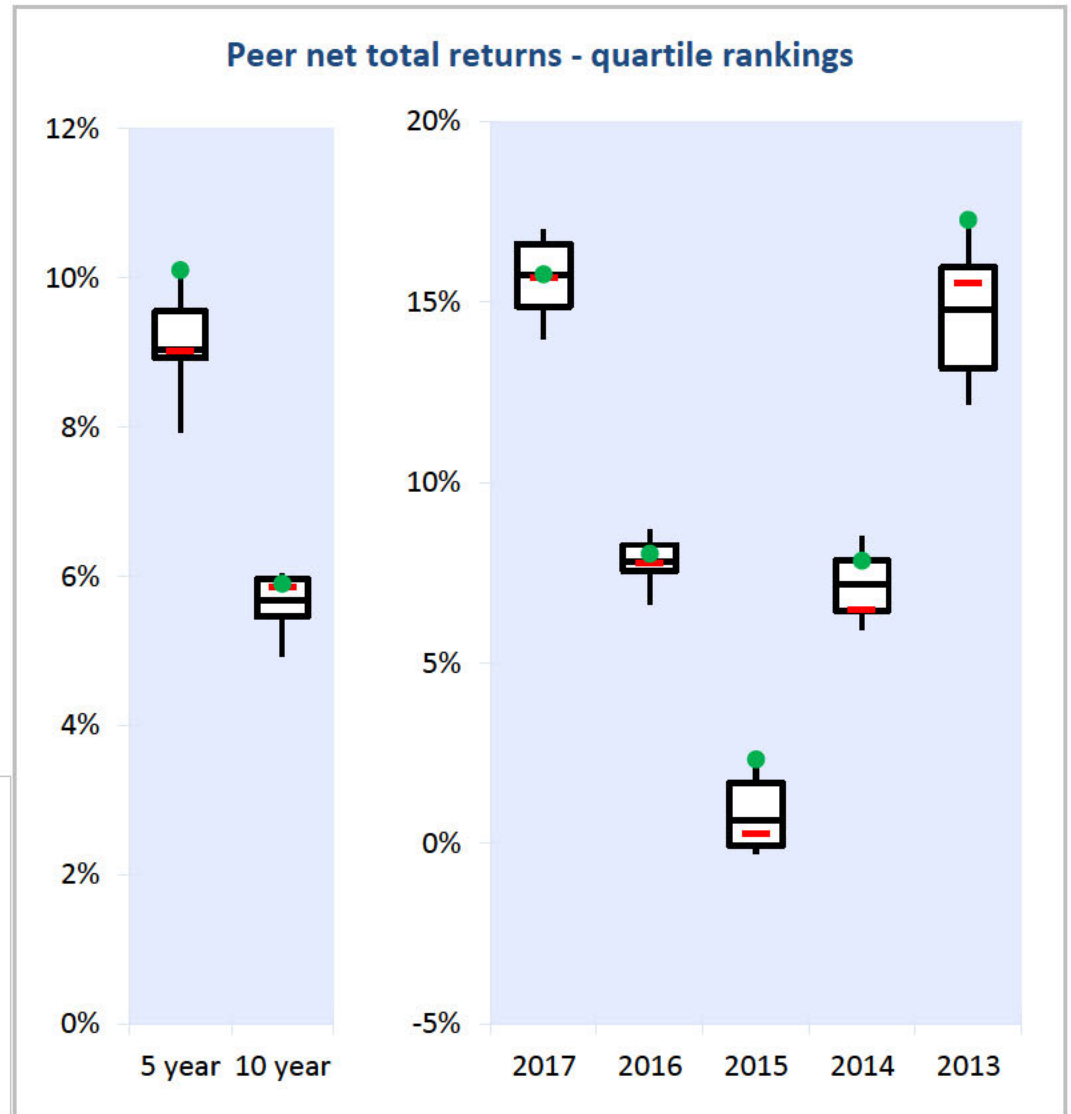
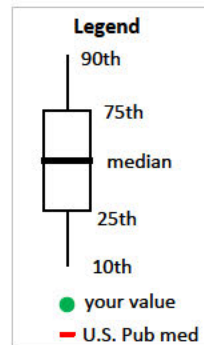
Your 5-year net total return of 10.1% was above the peer median of 9.0%.

Total returns, by themselves, provide little insight into the reasons behind relative performance. Therefore, we separate total return into its more meaningful components: policy return and value added.

	Your 5-year
Net total fund return	10.1%
- Policy return	10.1%
= Net value added	0.0%

This approach enables you to understand the contribution from both policy mix decisions (which tend to be the board's responsibility) and implementation decisions (which tend to be management's responsibility).

The median 5-year net total return for the U.S. public universe was 9.0%.



Your 5-year policy return of 10.1% was above the peer median of 8.8%.

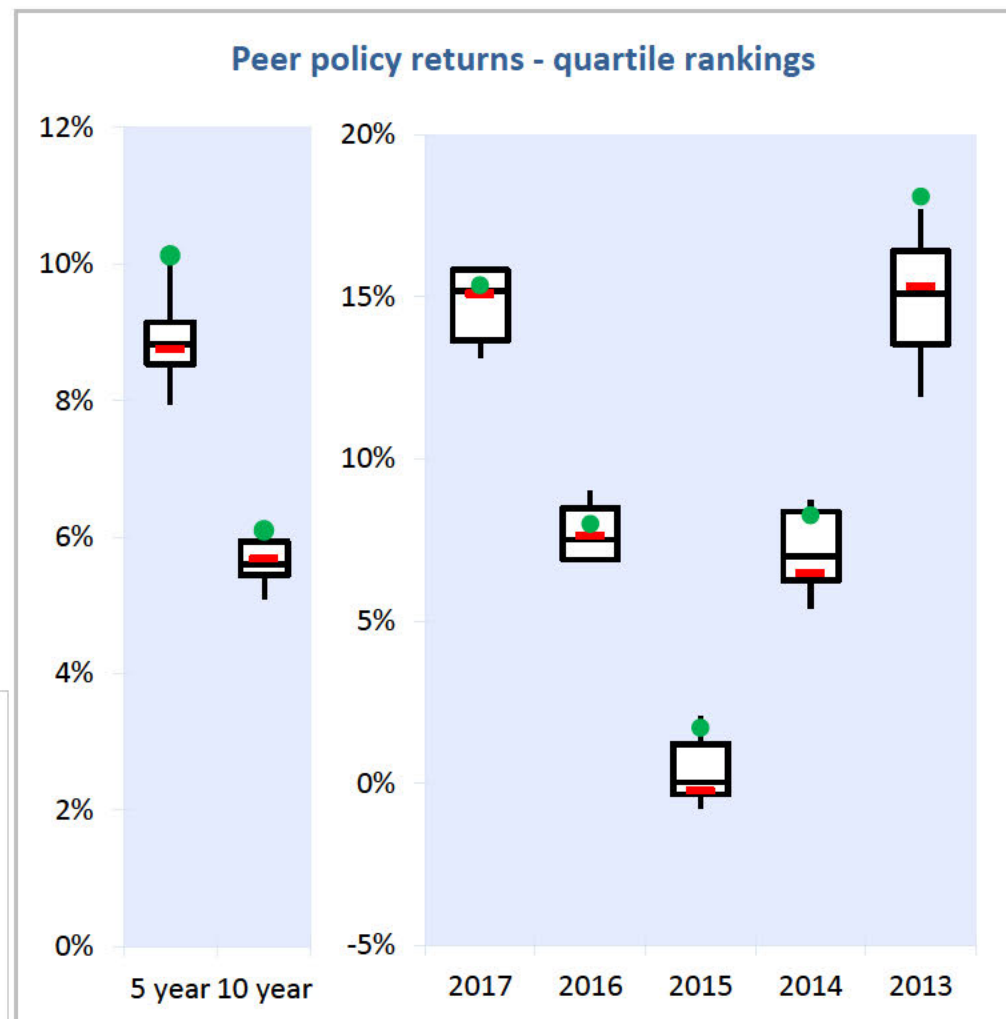
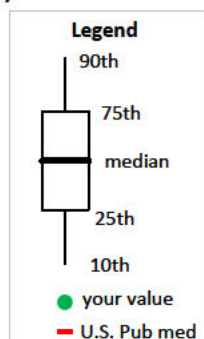
Your policy return is the return you could have earned passively by indexing your investments according to your policy mix.

Having a higher or lower relative policy return is not necessarily good or bad. Your policy return reflects your investment policy, which should reflect your:

- Long term capital market expectations
- Liabilities
- Appetite for risk

Each of these three factors is different across funds. Therefore, it is not surprising that policy returns often vary widely between funds.

The median 5-year policy return for the U.S. public universe was 8.8%.



For peer group comparison purposes, CEM uses a private equity benchmark that reflects lagged, investable public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 10.7%, 0.6% higher than your actual 5-year policy return of 10.1%.

Your 5-year policy return of 10.1% was above the Peer median of 8.8% primarily because of:

- The positive impact of your higher weight in one of the better performing asset classes of the past 5 years: U.S. Stock.
- The positive impact of your lower weight in one of the poorer performing asset classes of the past 5 years: Fixed Income.

5-year average policy mix¹

	Your Fund	Peer Avg.	U.S. Public Avg.
U.S. Stock	31%	17%	22%
Global Stock	0%	15%	9%
Non-U.S. Stock	26%	15%	17%
Total Stock	57%	47%	48%
U.S. Bonds	18%	16%	17%
Cash	1%	0%	0%
Other Fixed Income ¹	0%	9%	9%
Total Fixed Income	19%	26%	26%
Risk Parity	0%	1%	1%
Real Estate incl. REITS	10%	10%	8%
Total Alternatives	14%	16%	17%
Total	100%	100%	100%

1. 5-year weights are based only on plans with 5 years of continuous data

2. Other fixed income includes Inflation Indexed, High Yield, Long and Global bonds.

3. A value of 'n/a' is shown if asset class return are not available for the full 5 years or if they are broad and incomparable.

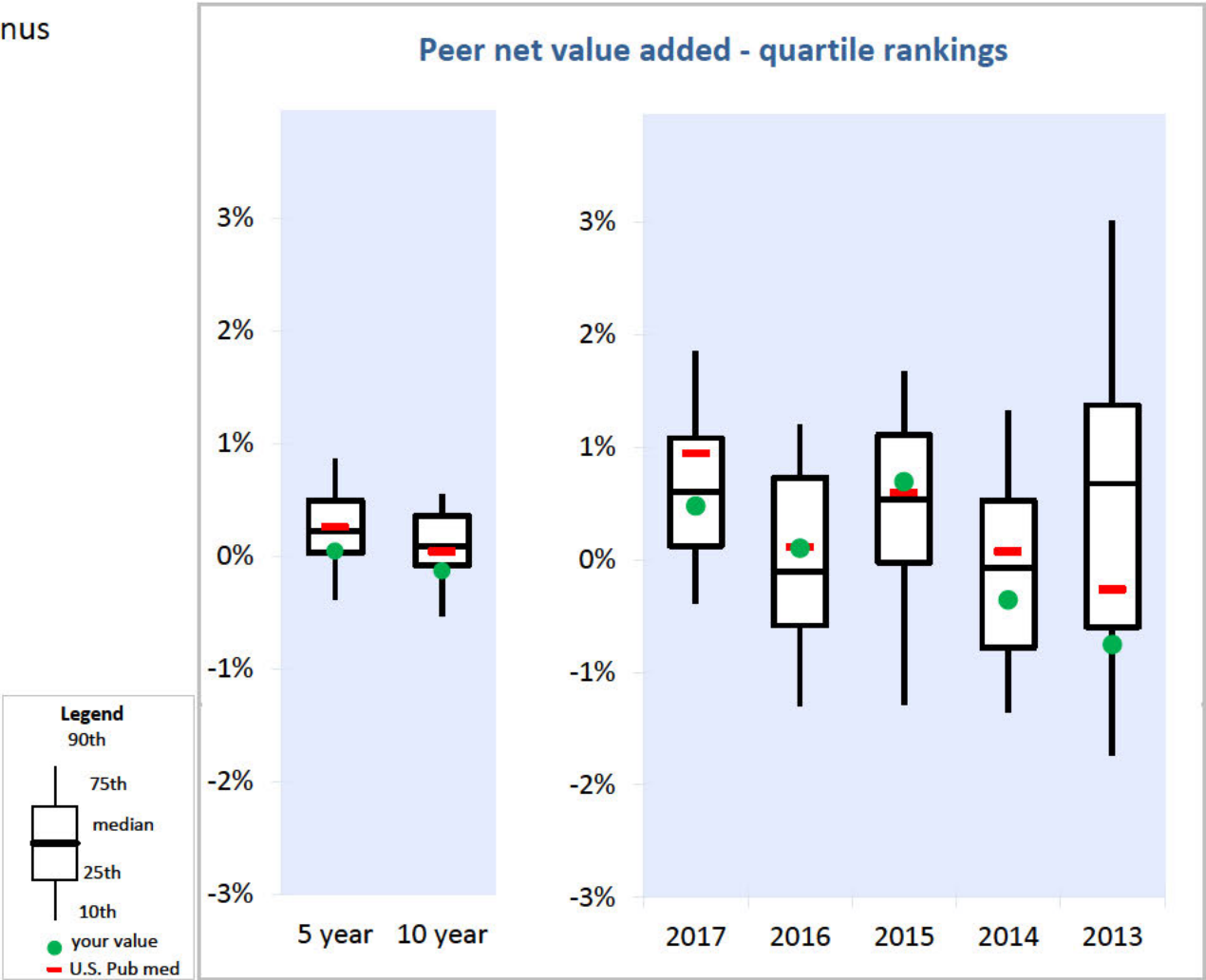
Net value added is the component of total return from active management. Your 5-year net value added was 0.0%.

Net value added equals total net return minus policy return.

Value added for STRS Ohio

Year	Net Return	Policy Return	Net value Added
2017	15.8%	15.4%	0.4%
2016	8.0%	8.0%	0.0%
2015	2.3%	1.7%	0.6%
2014	7.8%	8.3%	-0.4%
2013	17.3%	18.1%	-0.8%
5-Year	10.1%	10.1%	0.0%

Your 5-year net value added of 0.0% compares to a median of 0.2% for your peers and 0.2% for the U.S. Public universe.



Your investment costs were \$267.9 million or 35.7 basis points in 2017.

Asset management costs by asset class and style (\$000s)	Internal Management*			External Active base fees	Total
	Passive	Active	Overseeing of external		
Stock - U.S. Large Cap	72	12,590	227	2,466	15,356
Stock - U.S. Small Cap		346	75	9,643	10,064
Stock - EAFE		3,597	242	19,870	23,709
Stock - Emerging		2,697	263	6,402	9,362
Stock - Global		495			495
Stock - ACWI x U.S.		475	20	6,122	6,617
Fixed Income - U.S.		3,305			3,305
Fixed Income - Emerging			156	3,436	3,592
Fixed Income - High Yield			165	3,146	3,312
Cash		286			286
REITs	94				94
Global TAA			37	1,335	1,372
Hedge Fund - External Not Fund of Fund			291	26,931	27,222
Real Estate ex-REITs ¹		17,182			17,182
Real Estate - LPs ¹			464	16,472	16,936
Infrastructure - FoFs ¹			13	1,227	1,239
Natural Resources ¹		303			303
Natural Resources - LPs ¹			69	6,707	6,777
Diversified Private Equity - LPs ¹			40	3,086	3,126
LBO - LPs ¹			791	36,848	37,640
LBO - FoFs ¹			794	17,653	18,446
Venture Capital - LPs ¹			252	16,771	17,023
Venture Capital - FoFs ¹			75	6,001	6,076
Private Credit - LPs ¹			114	6,506	6,619
Other Private Equity - LPs ¹		46	348	22,980	23,374
Other Private Equity - Co-Invest. ¹			53		53
Derivatives/Overlays	330		165		495
Total excluding private asset performance fees					260,074 34.7bp
Oversight, custodial and other costs²					
Oversight & consulting					4,812
Trustee & custodial					2,412
Audit					168
Other					477
Total oversight, custodial & other costs					7,870 1.0bp
Total investment costs (excl. transaction costs & private asset performance fees)					267,944 35.7bp

*Internal investment costs were 6.2 bps while external investment costs were 28.5 bps. Of the total investment management costs of 35.7 bps, external manager fees for alternative and real estate investments were 21.7 bps; other investment costs for internal assets, external equity and external fixed income investments that were used to arrive at the net of fee Total Fund return were 14.1 bps.

Footnotes 1. Total cost excludes carry/performance fees for hedge funds, real estate, infrastructure, natural resources and private equity. Performance fees are included for the public market asset classes.

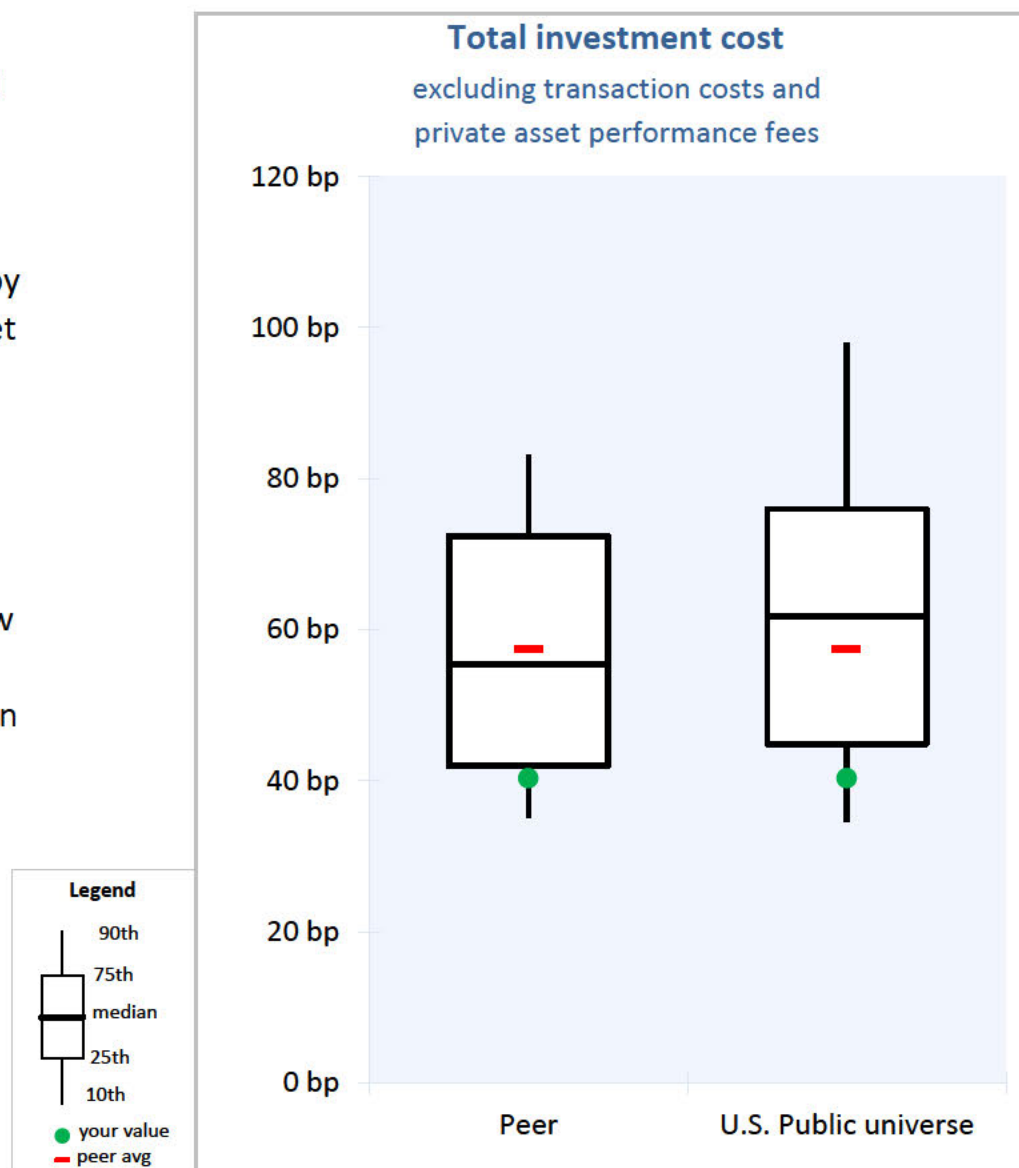
2. Excludes non-investment costs, such as benefit insurance premiums and preparing checks for retirees.

Your total investment cost of 40.4 bps was below the peer median of 55.4 bps.

For the comparison to the peer group, CEM has included your 35.7 bps in costs from page 9 and added hedge fund performance fees and private equity management fee offsets.

Differences in total investment cost are often caused by asset mix, particularly holdings of the highest cost asset classes: real estate (excl REITS), infrastructure, hedge funds and private equity. These high cost assets equaled 21% of your funds assets at the end of 2017 versus a peer average of 26%.

Therefore, to assess whether your costs are high or low given your unique asset mix and size, CEM calculates a benchmark cost for your fund. This analysis is shown on the following page.



Benchmark cost analysis suggests that, after adjusting for fund size and asset mix, your fund was low cost by 9.9 basis points in 2017.

Your benchmark cost is an estimate of what your cost would be given your actual asset mix and the median costs that your peers pay for similar services. It represents the cost your peers would incur if they had your actual asset mix.

Your total cost of 40.4 bp was below your benchmark cost of 50.3 bp. Thus, your cost savings was 9.9 bp.

Your cost versus benchmark

	\$000s	basis points
Your total investment cost	302,574	40.4 bp
Your benchmark cost	377,066	50.3 bp
Your excess cost	(74,493)	(9.9) bp

Your fund was low cost because you had a lower cost implementation style and you paid less than peers for similar services.

Reasons for your low cost status

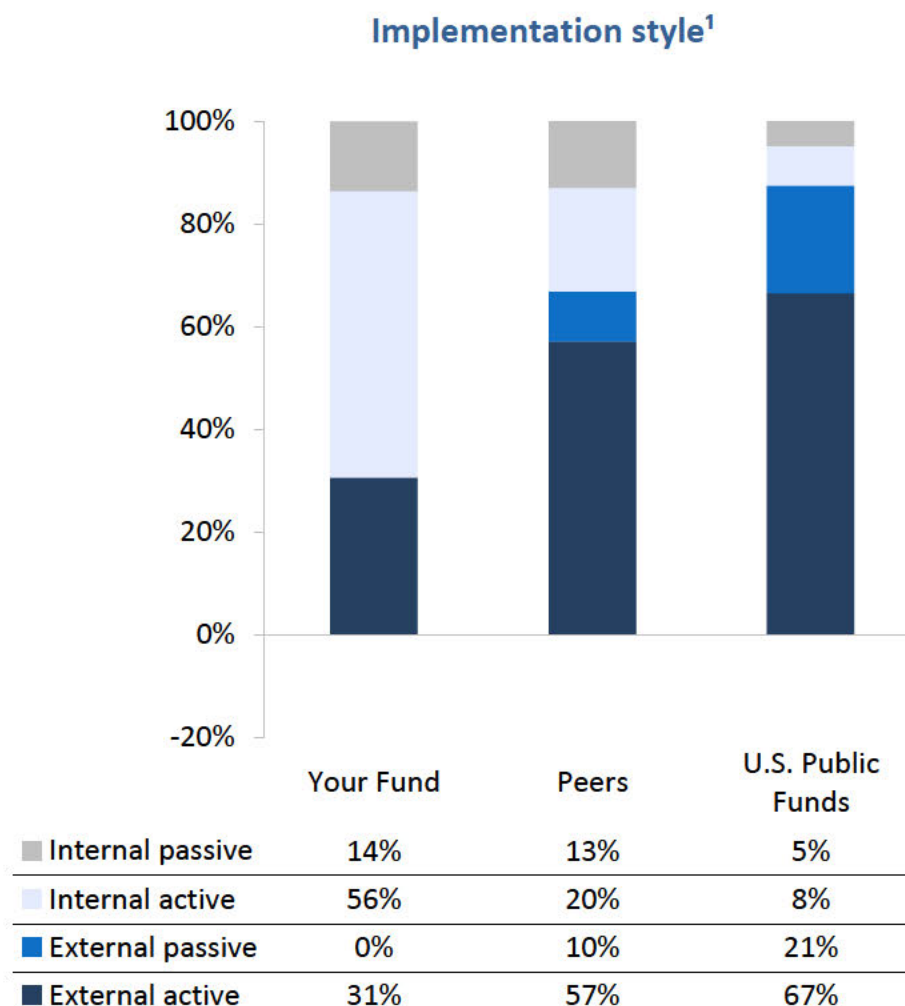
	Excess Cost/ (Savings)	
	\$000s	bps
1. Lower cost implementation style		
• Less external active management (more lower cost passive and internal)	(56,099)	(7.5)
• More partnerships as a percentage of external	3,486	0.5
• Use of fund of funds	(368)	(0.0)
• Less overlays	(1,478)	(0.2)
• Other style differences	6,483	0.9
	(47,975)	(6.4)
2. Paying less than peers for similar services		
• External investment management costs	(31,822)	(4.2)
• Internal investment management costs	4,665	0.6
• Oversight, custodial & other costs	640	0.1
	(26,518)	(3.5)
Total savings	(74,493)	(9.9)

Differences in cost performance are often caused by differences in implementation style.

Implementation style is defined as the way in which your fund implements asset allocation. It includes internal, external, active, passive and fund of funds styles.

The greatest cost impact is usually caused by differences in the use of:

- External active management because it tends to be much more expensive than internal or passive management. You used less external active management than your peers (your 31% versus 57% for your peers).
- Within external active holdings, fund of funds usage because it is more expensive than direct fund investment. You had similar amounts in fund of funds. Your 7% of hedge funds, real estate and private equity in fund of funds compared to 4% for your peers.



1. The graph above does not take into consideration the impact of derivatives. The values in the graph above are calculated using average holdings.

If your internally managed assets were managed externally and you paid the peer median costs, your costs would have been higher by approximately \$95 million.

Additional external investment management costs: assuming STRS Ohio no longer had internal holdings and paid peer median external costs

		STRS Ohio		Peer	Difference	
	Style	Avg holdings in \$mils	Internal cost	median external cost	in bps	Savings \$000s
Stock - U.S. Large Cap	passive	9,206	0.1	0.9	(0.8)	(766)
Stock - U.S. Large Cap	active	10,483	12.0	23.8	(11.7)	(12,315)
Stock - U.S. Small Cap	active	834	4.2	65.5	(61.3)	(5,113)
Stock - EAFE	active	5,627	6.4	33.6	(27.2)	(15,320)
Stock - Emerging	active	2,222	12.1	56.4	(44.3)	(9,838)
Stock - Global	active	585	8.5	43.6	(35.1)	(2,054)
Stock - ACWI x U.S.	active	3,100	1.5	40.1	(38.5)	(11,942)
Fixed Income - U.S.	active	10,934	3.0	14.5	(11.5)	(12,562)
Cash	active	1,690	1.7	n/a	--	--
Global TAA	active	577	23.8	125.1	(101.3)	(5,846)
REITs	passive	1,190	0.8	6.8	(6.1)	(721)
Real Estate ex-REITs	active	5,555	30.9	55.1	(24.1)	(13,413)
Natural Resources	co-inv	263	1.5	95.5	(94.0)	(2,469)
Other Private Equity	active	204	8.3	150.0	(141.7)	(2,890)
Total for internal management					(12.7) bp	(95,249)
Total in bps						

Differences in external active usage saved you 7.5 bp relative to your peers.

Calculation of the cost impact of differences in external active usage

Asset class*	Your avg holdings in \$mils	% External active			Premium vs passive & internal ¹	Cost/ (savings)	
		You	Peer average	More/ (less)		\$000s	bps
	(A)			(B)	(C)	(A X B X C)	
Stock - U.S. Large Cap	20,822						
Stock - U.S. Small Cap	2,091						
Stock - EAFE	11,299						
Stock - Emerging	3,307						
Stock - Global	585						
Stock - ACWI x U.S.	4,431						
Fixed Income - U.S.	10,934						
Fixed Income - Emerging	776						
Fixed Income - High Yield	821						
REITs	1,190						
Real Estate ex-REITs	7,035						
Infrastructure	90						
Natural Resources	696						
Global TAA	577						
Diversified Private Equity	249						
Venture Capital	1,608						
Other Private Equity	2,675						
Impact of more/less external active vs. lower cost styles						(56,099)	(7.5) bp

*Asset classes where you are implementation style is the same as your peers (i.e. style impact is zero) are not shown.

1. The cost premium is the additional cost of external active management relative to the average of other lower cost implementation styles - internal passive, internal active and external passive.

Differences in implementation style saved you 6.4 bp relative to your peers.

Calculation of the cost impact of differences in implementation style

Asset class*	Your avg holdings in \$mils	<u>Implementation style</u>			Premiums vs external active ¹	Cost/ (savings)	
		You	Peer average	More/ (less)		\$000s	bps
	(A)	(B)			(C)	(A X B X C)	
		<u>LPs % of external active</u>					
Real Estate ex-REITs	1,481						
Infrastructure	90						
Natural Resources	696						
Impact of more/less partnerships as a percentage of external active						3,486	0.5 bp
		<u>Fund of funds % of LPs</u>			vs. direct LP ¹		
Real Estate ex-REITs	1,481						
Infrastructure	90						
Natural Resources	696						
Hedge Funds	1,821						
Top layer perf. fees (on NAV)	1,821						
Diversified Private Equity	249						
Venture Capital	1,608						
LBO	5,749						
Impact of more/less fund of funds vs. direct LPs						(368)	(0.0) bp
<u>Overlays and other</u>							
Impact of higher use of portfolio level overlays						(1,478)	(0.2) bp
Impact of mix of internal passive, internal active, and external passive ²						6,483	0.9 bp
Total impact of differences in implementation style						(47,975)	(6.4) bp

*Asset classes where you are implementation style is the same as your peers (i.e. style impact is zero) are not shown.

1. The cost premium versus external active is the additional cost of direct limited partnerships relative to the cost of external active implementation within private assets. The premium versus direct limited partnerships is the additional premium of fund of funds relative to the cost of direct limited partnerships.

2. The 'Impact of mix of internal passive, internal active and external passive' quantifies the net cost impact of differences in cost between, and your relative use of, these 'low-cost' styles.

The net impact of paying more/less for external asset management costs saved 4.2 bps.

Cost impact of paying more/(less) for external asset management

Style	Your avg holdings in \$mils	Cost in bps			Cost/ (savings) \$'000s
		Your Fund	Peer median	More/ (less)	
External asset management	(A)			(B)	(A X B)
Stock - U.S. Large Cap	active	1,134			
Stock - U.S. Small Cap	active	1,257			
Stock - EAFE	active	5,672			
Stock - Emerging	active	1,085			
Stock - ACWI x U.S.	active	1,331			
Fixed Income - Emerging	active	776			
Fixed Income - High Yield	active	821			
Real Estate ex-REITs	LP	1,481			
Infrastructure*	FoF	90			
Underlying base fees*	FoF	90)
Natural Resources	LP	696			
Hedge Funds	active	1,821			
Top layer perf. fees (on NAV)	active	1,821			
Global TAA	active	577			
Diversified Private Equity	LP	249			
Venture Capital	FoF	295			
Underlying base fees	FoF	295			
Venture Capital	LP	1,314			
LBO	FoF	1,243			
Underlying base fees	FoF	1,243			
LBO	LP	4,506			
Private Credit	LP	791			
Other Private Equity	LP	2,471			
Total impact of paying more/less for external management					(31,822)
Total in bps					(4.2) bp

Footnotes:

1. You paid performance fees in this asset class.

*Universe median used as peer data was insufficient.

The net impact of paying more/less for internal asset management costs added 0.6 bps.

Cost impact of paying more/(less) for internal asset management

	Style	Your avg holdings in \$mils	Cost in bps			Cost/ (savings) \$000s
			Your Fund	Peer median	More/ (less)	
Internal asset management		(A)			(B)	(A X B)
Stock - U.S. Large Cap	passive	9,206	■	■	■	■
Stock - U.S. Large Cap	active	10,483	■	■	■	■
Stock - U.S. Small Cap	active	834	■	■	■	■
Stock - EAFE	active	5,627	■	■	■	■
Stock - Emerging	active	2,222	■	■	■	■
Stock - Global	active	585	■	■	■	■
Stock - ACWI x U.S.**	active	3,100	■	■	■	■
Fixed Income - U.S.	active	10,934	■	■	■	■
REITs	passive	1,190	■	■	■	■
Real Estate ex-REITs	active	5,555	■	■	■	■
Other Private Equity	active	204	■	■	■	■
Total for internal management						4,665
Total in bps						0.6 bp

'Excluded' indicates that the asset class was excluded from this analysis due to comparability concerns with peers.

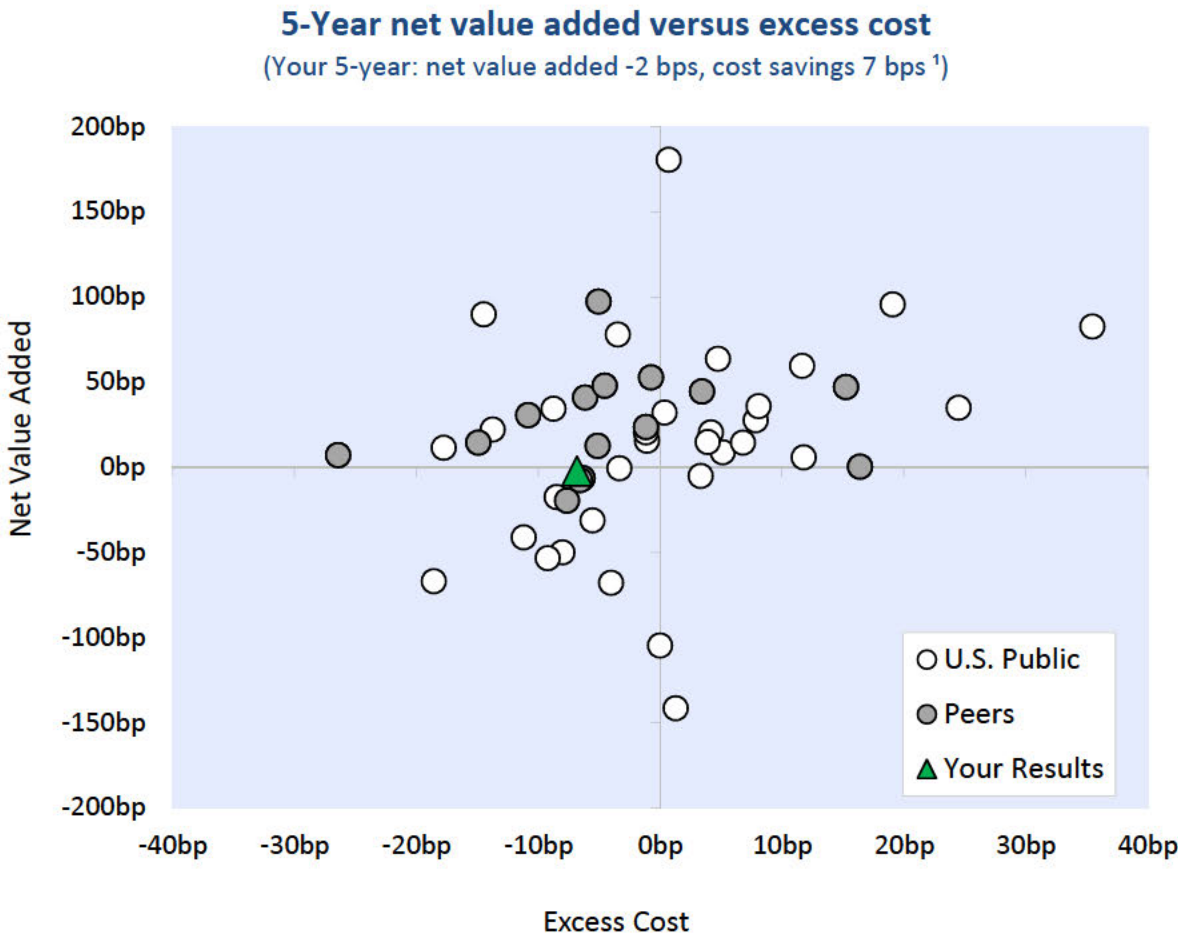
**Database median used as peer and universe data was insufficient.

The net impact of differences in oversight, custodial & other costs added 0.1 bps.

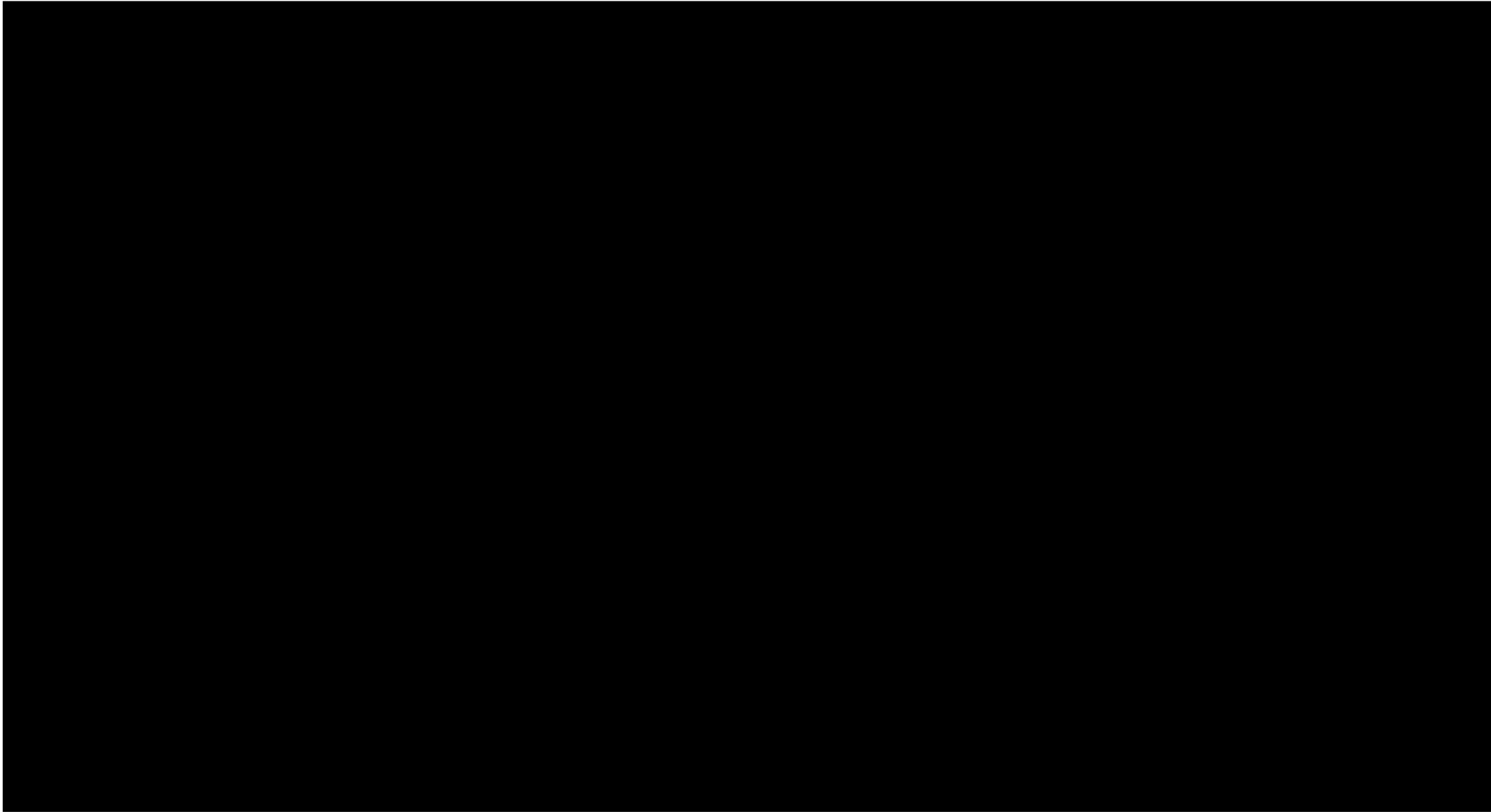
Cost impact of differences in oversight, custodial & other costs

	Your avg holdings in \$mils (A)	Cost in bps			Cost/ (savings) \$000s (A X B)
		Your Fund	Peer median	More/ (less) (B)	
Oversight	74,983	■	■	■	■
Consulting	74,983	■	■	■	■
Custodial	74,983	■	■	■	■
Audit	74,983	■	■	■	■
Other	74,983	■	■	■	■
Total for oversight, custodial, other					640
Total in bps					0.1 bp

Your fund achieved 5-year net value added of -2 bps and cost savings of 7 bps on the cost effectiveness chart.



Comparison of risk levels



Your asset risk of 11.0% was above the U.S. Public median of 10.5%. Asset risk is the standard deviation of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your policy mix.

Summary of key takeaways

Returns

- Your 5-year net total return of 10.1% was in the top decile of the U.S. public universe. This compares to the U.S. Public median of 9.0% and the peer median of 9.0%.
- Your 5-year policy return was 10.1%. This was above the U.S. Public median of 8.8% and above the peer median of 8.8%.

Value added

- Your 5-year net value added was 0.0%. This was slightly below both the U.S. Public median and the peer median of 0.2%.

Cost and cost effectiveness

- Your investment cost of 40.4 bps was below your benchmark cost of 50.3 bps. This suggests that your fund was low cost compared to your peers.
- Your fund was low cost because you had a lower cost implementation style and you paid less than peers for similar services.

Risk

- Your asset risk of 11.0% was above the U.S. Public median of 10.5%.

2

Description of peer group and universe

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Implementation style by asset class	7
Actual mix from 2013 to 2017	8
Policy mix from 2013 to 2017	9

Peer group

Your peer group is comprised of 17 U.S. Public public funds, with assets ranging from \$48.3 billion to \$350.0 billion versus your \$78.3 billion. The median size is \$94.1 billion.

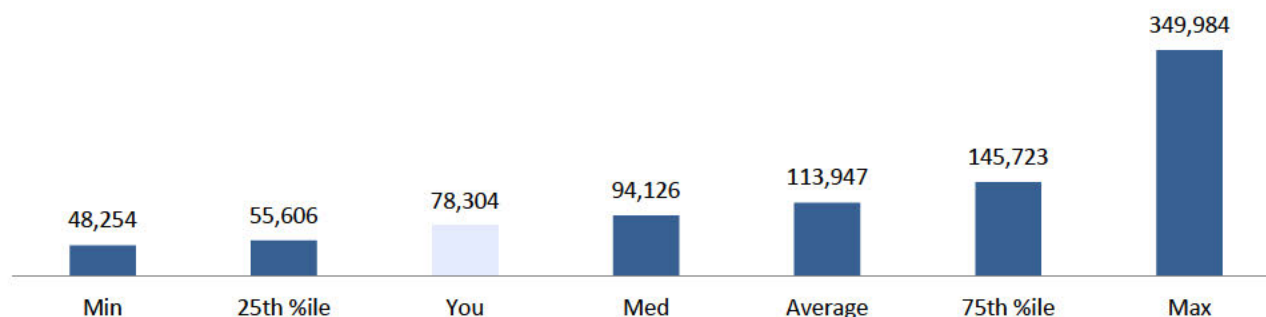
In order to preserve client confidentiality, we do not disclose your peers' names in this document due to the Freedom of Information Act. Your peer group consist of plans with the following characteristics:

Peer Group Characteristics - 2017

	Your Plan	Peers	U.S. Public
<u>Plan Assets (\$ billions)</u>			
Range	78.3	48.3 - 350.0	1.4 - 350.0
Median		94.1	19.9
<u># of Plans</u>			
Corporate		0	0
Public	1	17	58
Other		0	0
Total	1	17	58
<u>Implementation style</u>			
% External active	30.7	57.1	66.6
% External passive	-0.1	9.7	21.0
% Internal active	55.8	20.2	7.7
% Internal passive	13.6	12.9	4.8
<u>Asset mix</u>			
% Stock	56.0	43.5	46.9
% Fixed Income	21.0	25.6	25.9
% Real Assets	10.5	12.7	11.1
% Private Equity	9.6	11.1	8.4
% Hedge Funds & Other	2.9	7.2	7.6

Your peer group is selected such that your fund size is usually close to the median of your peer group. Size is the primary criteria for choosing your peer group, because size greatly impacts how much you pay for services. Generally, the larger your fund, the smaller your unit operating costs (i.e., the economies of scale impact).

Total fund assets (\$ millions) - you versus peers

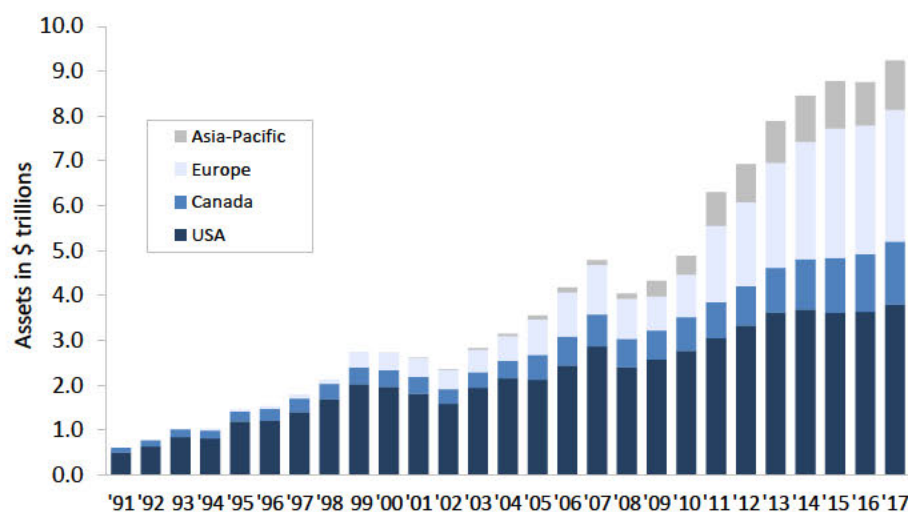


CEM global universe

CEM has been providing investment benchmarking solutions since 1991. The 2017 survey universe is comprised of 293 funds representing \$9.2 trillion in assets. The breakdown by region is as follows:

- 162 U.S. pension funds with aggregate assets of \$3.8 trillion.
- 77 Canadian pension funds with aggregate assets of \$1.4 trillion.
- 43 European pension funds with aggregate assets of \$2.9 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Denmark, UK, and Ireland.
- 8 Asia-Pacific pension funds with aggregate assets of \$1.0 trillion.

CEM global universe



Universe subsets

CEM's global survey universe is comprised of 293 funds with total assets of \$9.2 trillion. Your fund's returns and costs are compared to the following two subsets of the global universe:

- **Peers** - Your peer group is comprised of 17 U.S. Public public funds ranging in size from \$48.3 - \$350.0 billion. The peer median of \$94.1 billion compares to your \$78.3 billion.
- **U.S. Public** - The U.S. Public universe is comprised of 58 funds ranging in size from \$1.4 - \$350.0 billion. The median fund is \$19.9 billion.

Universe subsets by number of funds and assets

Peer group ¹		U.S. Public by type				Global by Country				
		Corp.	Public	Other	Total	U.S.	Canada	Europe	Asia-Pacific	Total
# of funds										
2017	17	0	58	0	58	162	77	43	11	293
2016	17	0	60	0	60	170	80	42	11	303
2015	16	0	64	0	64	176	80	56	12	324
2014	16	0	68	0	68	178	89	104	13	384
2013	16	0	68	0	68	193	90	112	11	406
# of funds with uninterrupted data for:										
1 yr	17	0	58	0	58	162	77	43	11	293
2 yrs	17	0	54	0	54	149	70	36	10	265
3 yrs	16	0	51	0	51	134	58	35	10	237
4 yrs	16	0	51	0	51	130	55	32	10	227
5 yrs	16	0	47	0	47	120	53	31	8	212
Total assets (\$ billions)										
2017	1,937	0	2,612	0	2,612	3,805	1,393	2,943	1,095	9,236
2016	1,732	0	2,485	0	2,485	3,638	1,282	2,874	958	8,752
2015	1,642	0	2,510	0	2,510	3,610	1,228	2,892	1,047	8,777
2014	1,646	0	2,509	0	2,509	3,689	1,121	2,619	1,027	8,456
2013	1,563	0	2,445	0	2,445	3,627	990	2,336	930	7,884
2017 asset distribution (\$ billions)										
Avg	113.9	0.0	45.0	0.0	45.0	23.5	18.1	68.4	99.6	31.5
Max	350.0	0.0	350.0	0.0	350.0	350.0	236.8	1,129.9	578.3	1,129.9
75th %ile	145.7	0.0	52.3	0.0	52.3	25.4	10.3	38.5	70.0	25.6
Median	94.1	0.0	19.9	0.0	19.9	9.6	4.1	23.0	26.3	8.2
25th %ile	55.6	0.0	8.2	0.0	8.2	3.0	1.5	4.1	19.3	2.3
Min	48.3	0.0	1.4	0.0	1.4	0.2	0.1	0.4	2.9	0.1

1. Peer group statistics are for your 2017 peer group only as your peer group may have included different funds in prior years.

Implementation style, actual mix and policy mix by universe subset

Implementation style, actual mix and policy mix - 2017
(as a % of year-end assets)

	Your fund	Peer group	U.S. Public by type				Global by Country				
			Corp.	Public	Other	Total	U.S.	Canada	Europe	Asia-Pacific	Total
<u>Implementation style</u>											
External active	29.2	56.1	n/a	63.5	n/a	63.5	70.0	63.8	39.8	44.4	63.0
Fund of funds	1.5	1.1	n/a	3.1	n/a	3.1	2.9	1.6	2.3	1.8	2.4
External passive	-0.1	9.7	n/a	21.0	n/a	21.0	19.6	11.4	28.0	19.2	18.7
Internal active	55.8	20.2	n/a	7.7	n/a	7.7	4.7	18.3	25.3	22.9	12.0
Internal passive	<u>13.6</u>	<u>12.9</u>	<u>n/a</u>	<u>4.8</u>	<u>n/a</u>	<u>4.8</u>	<u>2.8</u>	<u>4.9</u>	<u>4.5</u>	<u>11.7</u>	<u>3.9</u>
Total	100	100	n/a	100	n/a	100	100	100	100	100	100
<u>Actual asset mix</u>											
Stock	56.0	43.5	n/a	46.9	n/a	46.9	40.7	43.5	32.9	44.7	40.4
Fixed income	20.9	26.3	n/a	26.6	n/a	26.6	39.3	38.0	54.2	30.8	40.8
Global TAA	0.9	0.6	n/a	0.9	n/a	0.9	1.2	0.6	0.0	0.6	0.8
Real assets	10.5	12.7	n/a	11.1	n/a	11.1	7.3	12.2	8.3	14.6	9.0
Hedge funds	2.1	4.7	n/a	4.9	n/a	4.9	4.9	2.0	1.9	3.5	3.7
Balanced Funds	0.0	0.0	n/a	0.0	n/a	0.0	0.0	0.0	0.0	0.0	0.0
Risk Parity	0.0	1.1	n/a	1.1	n/a	1.1	0.6	0.2	0.0	0.7	0.4
Private equity	<u>9.6</u>	<u>11.1</u>	<u>n/a</u>	<u>8.4</u>	<u>n/a</u>	<u>8.4</u>	<u>5.9</u>	<u>3.5</u>	<u>2.7</u>	<u>5.1</u>	<u>4.8</u>
Total	100	100	n/a	100	n/a	100	100	100	100	100	100
<u>Policy asset mix</u>											
Stock	55.0	43.7	n/a	46.4	n/a	46.4	40.4	43.2	32.7	48.3	40.3
Fixed income	21.0	25.1	n/a	25.7	n/a	25.7	38.9	39.0	54.3	27.7	40.8
Global TAA	0.0	0.6	n/a	1.0	n/a	1.0	1.1	0.8	0.1	0.7	0.9
Real assets	10.0	14.0	n/a	12.2	n/a	12.2	7.7	12.6	8.5	14.8	9.4
Hedge funds	0.0	3.8	n/a	4.6	n/a	4.6	4.9	1.4	1.9	2.7	3.4
Balanced Funds	0.0	0.0	n/a	0.0	n/a	0.0	0.0	0.0	0.0	0.0	0.0
Risk Parity	0.0	1.2	n/a	0.9	n/a	0.9	0.6	0.2	0.0	0.8	0.4
Private equity	<u>14.0</u>	<u>11.6</u>	<u>n/a</u>	<u>9.3</u>	<u>n/a</u>	<u>9.3</u>	<u>6.5</u>	<u>2.9</u>	<u>2.5</u>	<u>4.9</u>	<u>4.9</u>
Total	100	100	n/a	100	n/a	100	100	100	100	100	100

Implementation style, actual mix and policy mix trends

Implementation style, actual mix and policy mix - 2013 to 2017
(as a % of year-end assets)

	Your fund					Peer average ¹					U.S. Public average ¹				
	2017	2016	2015	2014	2013	2017	2016	2015	2014	2013	2017	2016	2015	2014	2013
<u>Implementation style</u>															
External active	29.2	29.7	29.2	27.1	24.3	55.1	56.0	55.5	54.9	54.8	61.2	61.6	62.3	62.6	62.6
Fund of funds	1.5	1.5	1.4	1.0	0.9	1.2	1.2	1.1	1.1	1.0	3.1	3.0	2.9	2.6	2.4
External passive	-0.1	0.1	0.0	0.0	0.0	10.3	10.3	11.0	11.3	11.3	22.0	22.1	21.7	21.5	21.4
Internal active	55.8	54.6	55.6	58.5	62.7	20.7	20.5	20.3	20.8	20.9	8.7	8.5	8.4	8.7	8.8
Internal passive	<u>13.6</u>	<u>14.1</u>	<u>13.9</u>	<u>13.4</u>	<u>12.1</u>	<u>12.7</u>	<u>12.1</u>	<u>12.0</u>	<u>12.0</u>	<u>12.0</u>	<u>4.9</u>	<u>4.7</u>	<u>4.7</u>	<u>4.7</u>	<u>4.8</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<u>Actual asset mix</u>															
Stock	56.0	57.6	57.3	56.8	55.7	45.0	44.6	45.9	47.6	49.0	46.4	45.8	46.8	48.4	50.3
Fixed income	20.9	16.8	17.9	21.3	24.2	26.1	25.9	25.9	26.2	26.2	26.4	26.6	27.0	27.0	26.9
Global TAA	0.9	0.6	0.5	0.0	0.0	0.7	0.6	0.7	0.9	0.7	1.0	1.4	1.4	1.6	1.5
Real assets	10.5	12.9	12.4	10.5	9.8	12.2	13.0	12.1	11.0	10.3	11.3	11.4	10.3	9.4	8.5
Hedge funds	2.1	2.8	2.9	2.8	2.2	4.4	4.5	4.5	3.7	3.5	5.1	5.5	5.8	5.5	5.3
Balanced Funds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Risk Parity	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.4	0.3	0.1	1.0	0.5	0.5	0.4	0.2
Private equity	<u>9.6</u>	<u>9.3</u>	<u>9.0</u>	<u>8.6</u>	<u>8.0</u>	<u>10.9</u>	<u>10.9</u>	<u>10.5</u>	<u>10.3</u>	<u>10.1</u>	<u>8.8</u>	<u>8.7</u>	<u>8.2</u>	<u>7.6</u>	<u>7.3</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<u>Policy asset mix</u>															
Stock	55.0	57.0	57.0	57.0	58.0	45.2	45.9	46.7	46.6	47.2	46.1	46.0	47.4	47.5	48.3
Fixed income	21.0	19.0	19.0	19.0	19.0	25.2	25.9	25.1	25.8	26.4	25.4	26.2	25.7	26.4	27.4
Global TAA	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.8	0.9	0.7	1.1	1.2	1.3	1.3	1.6
Real assets	10.0	10.0	10.0	10.0	10.0	13.3	12.8	12.4	12.1	12.0	12.4	12.0	10.9	10.7	9.9
Hedge funds	0.0	0.0	0.0	0.0	0.0	3.4	3.1	3.3	2.9	2.8	4.6	4.8	5.1	4.9	4.2
Balanced Funds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Risk Parity	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.1	0.8	0.6	0.6	0.5	0.2
Private equity	<u>14.0</u>	<u>14.0</u>	<u>14.0</u>	<u>14.0</u>	<u>13.0</u>	<u>11.5</u>	<u>11.0</u>	<u>11.1</u>	<u>11.1</u>	<u>10.9</u>	<u>9.5</u>	<u>9.1</u>	<u>9.0</u>	<u>8.7</u>	<u>8.4</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

1. Trends are based on the 47 U.S. Public and 16 peer funds with 5 or more consecutive years of data ending 2017.

Implementation style by asset class

Implementation style impacts your costs, because external active management tends to be more expensive than internal or passive (or indexed) management and fund-of-funds usage is more expensive than direct fund investment.

Implementation style by asset class - 2017 (as a % of year-end assets)

	Your fund %					Peer average %					U.S. Public average %				
	External			Internal		External			Internal		External			Internal	
	Active	FOFs	Index	Active	Index	Active	FOFs	Index	Active	Index	Active	FOFs	Index	Active	Index
Stock - U.S. Broad/All						17.2		28.3	6.7	47.9	30.4		55.6	1.7	12.2
Stock - U.S. Large Cap	5.7			49.7	44.6	16.1		25.1	22.6	36.3	32.8		43.2	6.8	17.3
Stock - U.S. Mid Cap						38.6		8.8	47.3	5.4	66.9		14.3	12.3	6.4
Stock - U.S. Small Cap	60.0			40.0	0.0	72.0		4.5	21.5	2.0	85.4		8.9	4.1	1.6
Stock - EAFE	50.9			49.1	0.0	50.2		20.3	12.9	16.6	53.7		32.0	6.2	8.1
Stock - Global	0.0			100.0	0.0	70.3		0.0	21.2	8.4	59.3		32.6	3.7	4.3
Employer Stock						0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Stock - Other						10.1		2.7	44.1	43.1	71.0		18.1	5.5	5.4
Stock - Emerging	32.3			67.7	0.0	68.6		13.3	8.4	9.8	77.0		15.8	3.3	3.9
Stock - ACWI x U.S.	30.6			69.4	0.0	76.6		15.9	7.4	0.1	69.5		29.5	1.0	0.0
Stock - Aggregate	24.9			53.3	21.8	41.9		19.0	15.4	23.7	51.7		35.5	4.2	8.6
Fixed Income - U.S.	0.0			100.0	0.0	31.5		6.3	59.0	3.2	58.8		17.9	22.2	1.1
Fixed Income - U.S. Gov't						28.3		0.0	71.7	0.0	35.9		41.0	23.1	0.0
Fixed Income - U.S. Credits						100.0		0.0	0.0	0.0	100.0		0.0	0.0	0.0
Fixed Income - EAFE						52.8		0.0	47.2	0.0	87.6		0.0	12.4	0.0
Fixed Income - Global						1.9		0.0	98.1	0.0	70.9		3.9	25.2	0.0
Fixed Income - Other						92.5		0.1	0.0	7.4	90.9		3.8	2.3	3.0
Fixed Income - Long Bonds						7.0		0.0	22.1	70.9	81.0		2.3	4.0	12.7
Fixed Income - Emerging	100.0			0.0	0.0	97.9		0.0	2.1	0.0	99.2		0.1	0.7	0.0
Fixed Income - Inflation Indexed						24.0		19.1	22.2	34.6	46.2		33.2	8.0	12.5
Fixed Income - High Yield	100.0			0.0	0.0	97.0		0.0	1.9	1.1	98.0		1.1	0.5	0.3
Fixed Income - Mortgages						19.7		1.1	79.2	0.0	22.7		1.0	76.3	0.0
Fixed Income - Private Debt						96.6		0.0	3.4	0.0	97.7		0.0	2.3	0.0
Fixed Income - Absolute Return						0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Fixed Income - Bundled LDI						0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Fixed Income - Convertibles						100.0		0.0	0.0	0.0	100.0		0.0	0.0	0.0
Cash	0.0			100.0		39.0			61.0		44.9			55.1	
Fixed Income - Aggregate	10.1			89.9	0.0	41.7		4.8	46.1	7.4	64.2		13.8	19.8	2.2
Commodities						57.0		0.0	18.4	24.6	77.6		8.4	6.0	8.0
Infrastructure	0.0	100.0		0.0		73.1	4.8		22.1		84.5	11.8		3.7	
Natural Resources	100.0	0.0		0.0		98.5	0.2		1.3		99.7	0.0		0.2	
REITs	0.0			0.0	100.0	57.3		4.0	7.6	31.0	71.4		18.9	1.2	8.6
Real Estate ex-REITs	15.7	0.0		84.3		90.6	0.7		8.7		95.7	0.4		4.0	
Other Real Assets						94.1			5.9		97.4			2.6	
Real Assets	19.2	0.9		66.1	13.9	87.5	0.6	0.2	9.0	2.7	92.3	0.9	2.2	3.3	1.2
Hedge Funds	100.0	0.0				94.6	5.4				73.6	26.4			
Global TAA	100.0			0.0		80.1			19.9		96.0			4.0	
Risk Parity						64.8			35.2		89.3			10.7	
Diversified Private Equity	100.0	0.0		0.0		93.2	6.8		0.0		73.1	26.8		0.0	
Venture Capital	80.1	19.9		0.0		66.6	24.9		8.5		62.4	33.3		4.3	
LBO	76.4	23.6		0.0		95.1	4.9		0.0		96.4	3.6		0.0	
Private Credit	100.0	0.0		0.0		100.0	0.0		0.0		100.0	0.0		0.0	
Other Private Equity	84.4			15.6		94.6			5.4		96.8			3.2	
Private Equity	80.5	16.2		3.3		92.1	7.2		0.8		79.5	20.2		0.3	
Total Fund - Yr.-End Holdings	28.5	1.5	-0.1	56.3	13.7	55.6	1.1	9.8	20.4	13.1	63.4	3.1	21.0	7.7	4.9

Actual mix

Actual asset mix - 2013 to 2017
(as a % of total year-end assets)

	Your fund					Peer average %					U.S. Public average %				
	2017	2016	2015	2014	2013	2017	2016	2015	2014	2013	2017	2016	2015	2014	2013
Stock - U.S. Broad/All						6.8	6.6	6.8	7.1	7.2	7.8	7.2	6.7	6.6	9.1
Stock - U.S. Large Cap	27.3	28.3	28.2	28.7	28.5	11.8	12.1	13.1	13.6	13.2	11.5	13.4	14.5	15.3	13.7
Stock - U.S. Mid Cap						0.6	0.5	0.6	0.5		0.7	0.8	0.9	0.8	0.2
Stock - U.S. Small Cap	2.7	2.9	2.7	2.7	2.8	1.4	1.8	2.2	2.3	3.1	2.2	2.4	2.9	3.2	4.2
Stock - EAFE	14.7	15.4	15.8	15.3	15.7	10.3	9.8	10.7	10.9	11.2	6.3	6.3	6.7	7.2	8.1
Stock - Global	0.8	0.7	1.1	1.1	1.1	4.1	4.1	3.9	4.1	4.3	6.8	5.2	4.2	3.8	3.6
Employer Stock															
Stock - Other						0.4	0.5	0.5	0.7	0.9	0.9	0.7	1.1	1.2	0.9
Stock - Emerging	4.5	4.3	3.9	3.9	3.8	4.9	4.4	4.3	4.4	4.5	3.6	3.0	2.9	3.3	3.3
Stock - ACWI x U.S.	5.9	5.9	5.6	5.1	3.9	3.3	3.3	3.8	4.0	4.7	7.2	7.6	8.0	7.8	8.2
Stock - Aggregate	56.0	57.6	57.3	56.8	55.7	43.5	43.1	45.9	47.6	49.0	46.9	46.6	48.0	49.2	51.2
Fixed Income - U.S.	16.7	12.3	13.7	15.1	17.3	12.7	12.7	13.3	13.6	14.1	12.7	13.6	14.5	14.1	14.8
Fixed Income - U.S. Gov't						0.5	0.5	0.5	0.5		1.3	0.8	0.6	0.3	0.1
Fixed Income - U.S. Credits						0.0	0.0	0.1	0.3		0.3	0.0	0.3	0.1	0.0
Fixed Income - EAFE						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Fixed Income - Global						1.5	1.7	2.0	2.1	3.1	1.7	2.0	1.7	1.9	1.9
Fixed Income - Other						1.2	1.4	1.4	1.3	1.2	0.9	1.0	1.0	1.0	0.8
Fixed Income - Long Bonds						0.8	0.8	0.8	0.8	0.8	1.4	0.9	1.0	1.0	0.8
Fixed Income - Emerging	1.0	1.0	1.0	1.2	1.0	1.3	1.2	1.1	1.0	0.7	1.2	1.0	0.9	0.9	0.8
Fixed Income - Inflation Indexed						2.3	2.3	2.3	2.2	2.0	1.9	1.8	1.9	1.8	2.0
Fixed Income - High Yield	1.1	1.1	1.3	1.7	1.2	1.6	1.6	1.5	1.4	1.3	1.7	1.5	1.5	1.6	1.6
Fixed Income - Mortgages						0.3	0.4	0.5	0.4	0.4	0.1	0.1	0.2	0.2	0.2
Fixed Income - Private Debt						0.9	0.9	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2
Fixed Income - Absolute Return															
Fixed Income - Bundled LDI															
Fixed Income - Convertibles						0.1					0.0				
Cash	2.2	2.3	1.8	3.4	4.8	2.3	1.9	1.4	1.6	1.7	2.3	2.1	2.0	2.0	2.2
Fixed Income - Aggregate	21.0	16.7	17.9	21.3	24.2	25.6	25.6	25.5	26.0	25.7	25.9	25.3	25.9	25.2	25.5
Commodities						0.7	0.7	0.5	0.6	0.6	0.6	0.7	0.5	0.6	0.6
Infrastructure	0.1	0.2	0.1	0.1	0.1	0.4	0.3	0.2	0.2	0.1	0.7	0.4	0.3	0.3	0.3
Natural Resources	0.9	1.4	1.3	0.5	0.4	0.8	0.8	0.6	0.5	0.4	1.2	0.9	0.6	0.5	0.4
REITs	1.4	1.8	1.6	1.5	1.3	0.5	0.7	0.7	0.7	0.7	1.0	0.8	0.8	0.9	0.7
Real Estate ex-REITs	8.1	9.7	9.3	8.4	7.9	9.4	10.1	9.7	8.7	8.3	7.0	7.8	7.3	6.5	6.1
Other Real Assets						0.9	0.7	0.3	0.3	0.2	0.6	0.9	0.7	0.5	0.4
Real Assets	10.5	12.9	12.4	10.5	9.8	12.7	13.4	12.1	11.0	10.3	11.1	11.5	10.2	9.4	8.5
Hedge Funds	2.1	2.8	2.9	2.8	2.2	4.7	4.8	4.5	3.7	3.5	4.9	5.2	5.5	5.4	5.2
Global TAA	0.9	0.6	0.5			0.6	0.6	0.7	0.9	0.7	0.9	1.6	1.3	2.1	1.3
Risk Parity						1.1	1.1	0.4	0.3	0.1	1.1	0.6	0.3	0.3	0.2
Diversified Private Equity	0.1	0.1	0.1	4.7	4.6	7.3	7.5	7.2	7.5	7.9	5.7	6.2	5.5	5.5	5.7
Venture Capital	1.7	1.6	1.6	1.4	1.2	0.7	0.7	0.5	0.4	0.3	0.4	0.4	0.5	0.4	0.4
LBO	4.6	4.5	4.5			2.3	2.2	2.3	2.1	1.5	1.4	1.3	1.6	1.4	1.3
Private Credit	0.5					0.4	0.3	0.2	0.1	0.1	0.8	0.7	0.5	0.5	0.2
Other Private Equity	2.6	3.1	2.7	2.5	2.2	0.4	0.5	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2
Private Equity	9.6	9.3	9.0	8.6	8.0	11.1	11.1	10.5	10.3	10.1	8.4	8.8	8.4	8.1	7.7
Derivatives/Overlays Mkt Value	-0.1	0.1			0.0	0.7	0.4	0.4	0.3	0.5	0.7	0.5	0.4	0.4	0.4
Total Fund	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Count	1	1	1	1	1	17	17	16	16	16	58	60	64	68	68
Median Assets (\$ billions)	78.3	71.7	70.8	73.5	72.4	94.1	85.1	84.1	83.6	77.9	19.9	17.2	16.6	16.4	15.7

Policy mix

Policy asset mix - 2013 to 2017
(as a % of total assets)

	Your fund %					Peer average %					U.S. Public average %				
	2017	2016	2015	2014	2013	2017	2016	2015	2014	2013	2017	2016	2015	2014	2013
Stock - U.S. Broad/All						11.0	11.7	12.3	9.8	9.0	10.0	10.1	10.2	9.5	10.7
Stock - U.S. Large Cap	30.0	31.0	31.0	31.0	33.0	3.3	4.9	4.6	6.7	8.2	8.2	9.6	9.9	11.1	9.6
Stock - U.S. Mid Cap									0.2		0.5	0.4	0.4	0.3	0.2
Stock - U.S. Small Cap						0.2	0.2	0.3	0.5	1.4	1.2	1.5	1.6	1.6	2.1
Stock - EAFE	20.0	20.8	20.8	20.8	20.0	5.3	6.2	6.2	6.2	8.1	4.1	4.9	5.0	5.7	7.2
Stock - Global						16.3	13.7	15.4	15.4	12.4	11.2	9.0	9.0	7.8	8.2
Employer Stock															
Stock - Other						0.1	0.2	0.4	0.4	0.4	0.8	0.6	0.8	0.7	0.7
Stock - Emerging	5.0	5.2	5.2	5.2	5.0	2.8	2.7	2.5	2.3	3.4	2.4	2.2	2.2	2.2	2.3
Stock - ACWI x U.S.						4.6	4.7	4.9	5.2	4.3	7.9	8.3	8.9	9.1	7.5
Stock - Aggregate	55.0	57.0	57.0	57.0	58.0	43.7	44.3	46.7	46.6	47.2	46.4	46.5	48.2	47.9	48.5
Fixed Income - U.S.	20.0	18.0	18.0	18.0	18.0	15.8	15.8	16.9	15.5	15.8	14.9	15.0	15.8	15.7	17.5
Fixed Income - U.S. Gov't						0.1	0.1	0.0			1.1	0.7	0.5	0.4	0.4
Fixed Income - U.S. Credits													0.2		
Fixed Income - EAFE						0.1	0.1			0.1	0.1	0.1	0.1	0.1	0.2
Fixed Income - Global						1.5	1.7	1.9	2.9	2.7	1.7	1.8	1.5	1.9	1.4
Fixed Income - Other						0.6	0.9	0.7	0.8	1.3	0.7	0.7	0.5	0.6	0.7
Fixed Income - Long Bonds						0.8	0.8	0.7	0.7	0.8	2.1	1.7	1.5	1.5	1.2
Fixed Income - Emerging						0.9	0.9	0.9	0.7	0.5	1.1	0.9	0.9	0.9	0.7
Fixed Income - Inflation Indexed						3.1	3.2	2.1	2.5	2.6	2.7	2.7	2.6	2.6	2.7
Fixed Income - High Yield						1.7	1.8	1.3	1.5	1.6	1.9	1.9	1.8	1.8	2.0
Fixed Income - Mortgages						0.1	0.3	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0
Fixed Income - Private Debt						1.0	0.6	0.4	0.4	0.2	0.4	0.4	0.4	0.2	0.1
Fixed Income - Absolute Return F															
Fixed Income - Bundled LDI															
Fixed Income - Convertibles															
Cash	1.0	1.0	1.0	1.0	1.0	-0.6	-0.7	0.2	0.7	0.7	-1.0	-0.9	-0.9	-0.7	-0.1
Fixed Income - Aggregate	21.0	19.0	19.0	19.0	19.0	25.1	25.6	25.1	25.8	26.4	25.7	25.1	24.9	24.9	26.8
Commodities						0.8	1.1	0.6	0.7	0.7	1.0	1.3	1.0	1.1	1.0
Infrastructure						0.5	0.3	0.2	0.2	0.2	0.8	0.6	0.3	0.4	0.4
Natural Resources						0.9	0.7	0.6	0.6	0.6	1.0	1.0	0.7	0.5	0.7
REITs	1.5	1.5	1.5	1.5	1.5	0.5	0.5	0.5	0.9	0.9	0.8	0.6	0.6	0.6	0.6
Real Estate ex-REITs	8.5	8.5	8.5	8.5	8.5	10.4	10.1	9.8	9.4	9.1	7.7	7.7	7.4	7.5	7.0
Other Real Assets						1.0	0.9	0.6	0.4	0.6	0.8	1.1	0.8	0.8	0.4
Real Assets	10.0	10.0	10.0	10.0	10.0	14.0	13.6	12.4	12.1	12.0	12.2	12.2	10.9	10.9	10.1
Hedge Funds						3.8	3.5	3.3	2.9	2.8	4.6	4.6	4.9	5.1	4.4
Global TAA						0.6	0.7	0.8	0.9	0.7	1.0	1.5	1.4	1.7	1.2
Risk Parity						1.2	1.2	0.6	0.6	0.1	0.9	0.6	0.4	0.4	0.2
Diversified Private Equity				14.0	13.0	9.0	8.2	8.6	10.1	9.9	7.0	7.0	7.0	7.4	7.2
Venture Capital						0.4	0.5	0.3	0.2	0.2	0.3	0.3	0.2	0.3	0.2
LBO	14.0	14.0	14.0			1.6	2.1	2.2	0.8	0.8	0.9	1.2	1.5	0.9	1.1
Private Credit						0.5					1.0	0.6	0.4	0.4	0.1
Other Private Equity						0.1	0.4	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.2
Private Equity	14.0	14.0	14.0	14.0	13.0	11.6	11.1	11.1	11.1	10.9	9.3	9.4	9.3	9.2	8.9
Total Fund	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Count	1	1	1	1	1	17	17	16	16	16	58	60	64	68	68

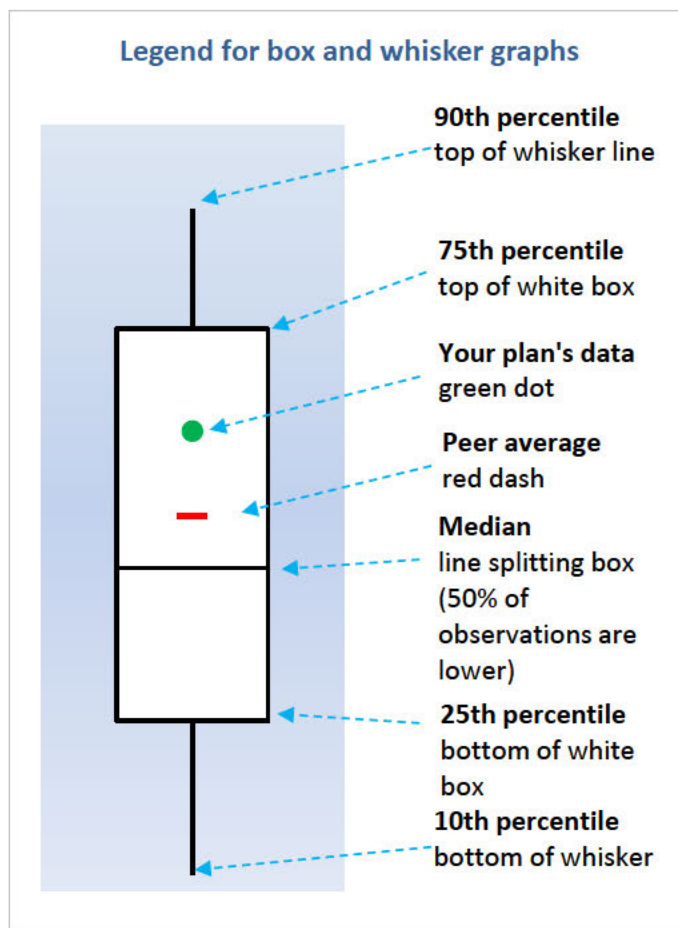
3

Returns, Benchmarks and Value Added

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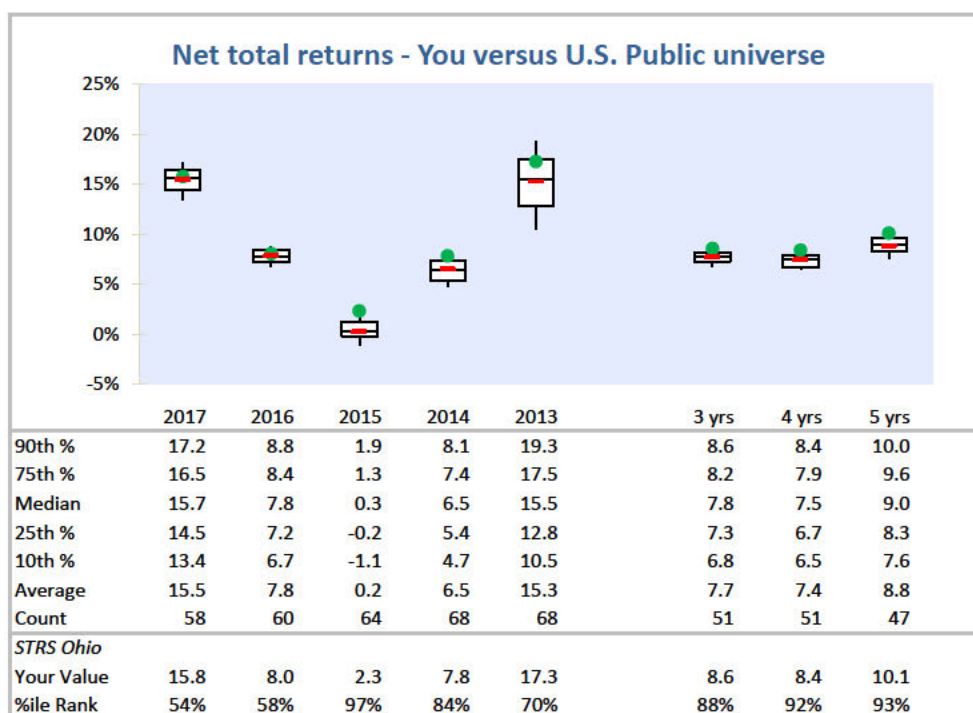
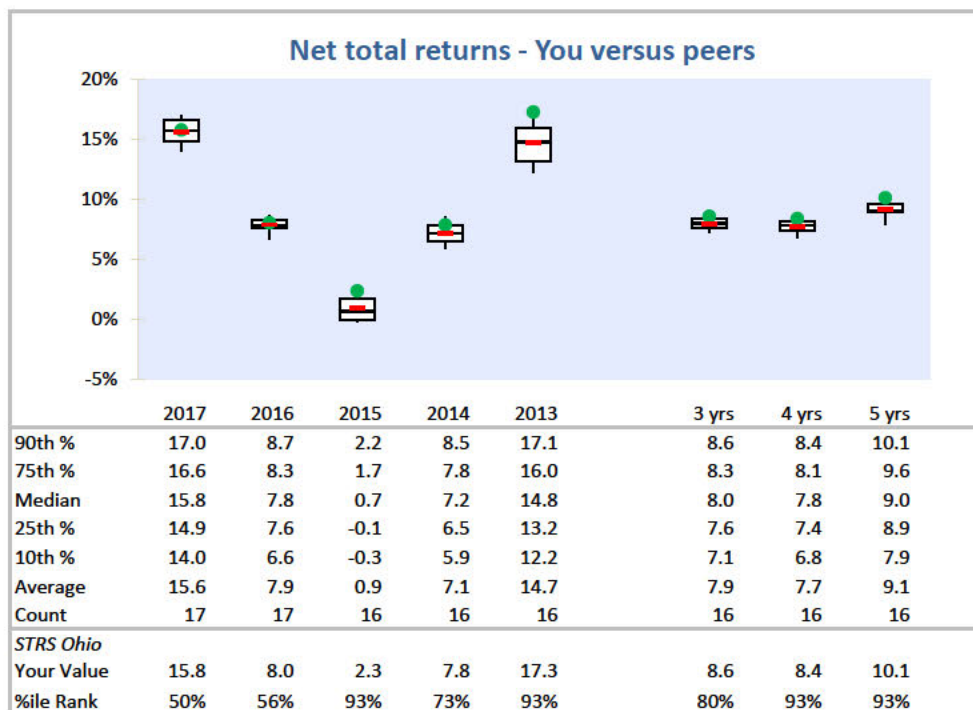
Interpreting box and whisker graphs

Box and whisker graphs are used extensively in this report because they show visually where you rank relative to all observations. At a glance you can see which quartile your data falls in.



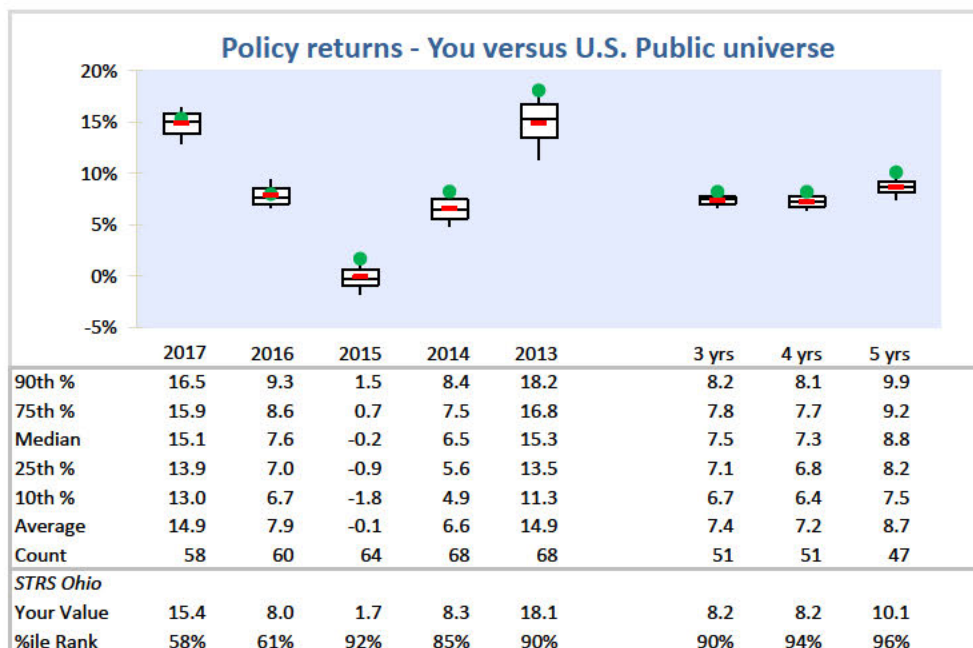
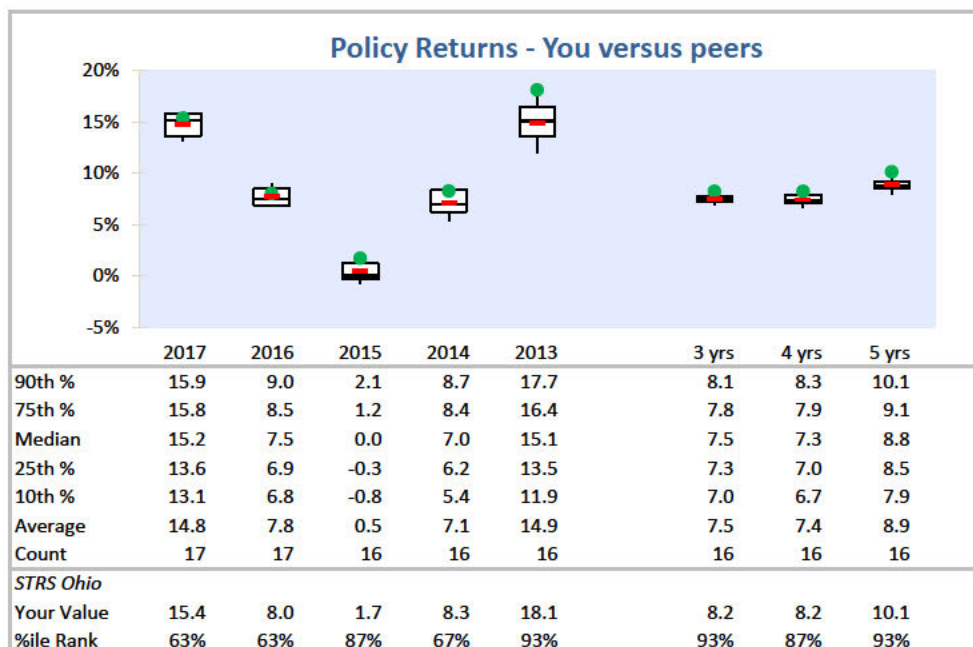
Net total returns

Your 5-year net total return of 10.1% was among the highest in your peer group and among the highest in the U.S. Public universe. Comparisons of total return do not help you understand the reasons behind relative performance. To understand the relative contributions from policy asset mix decisions and implementation decisions we separate total return into its more meaningful components - policy return and implementation value added.



Policy returns

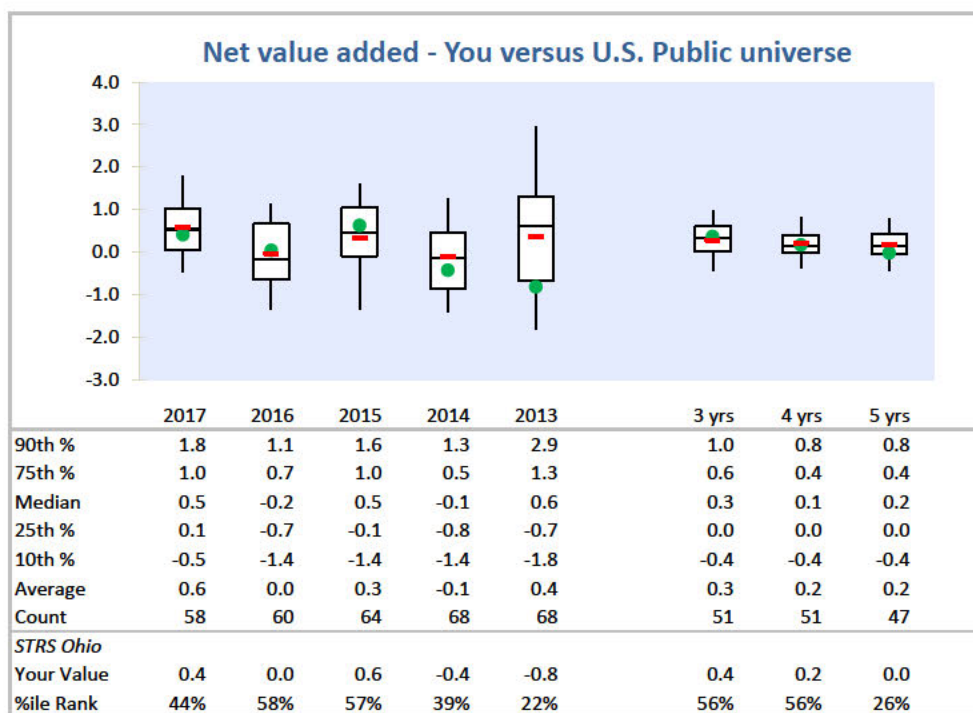
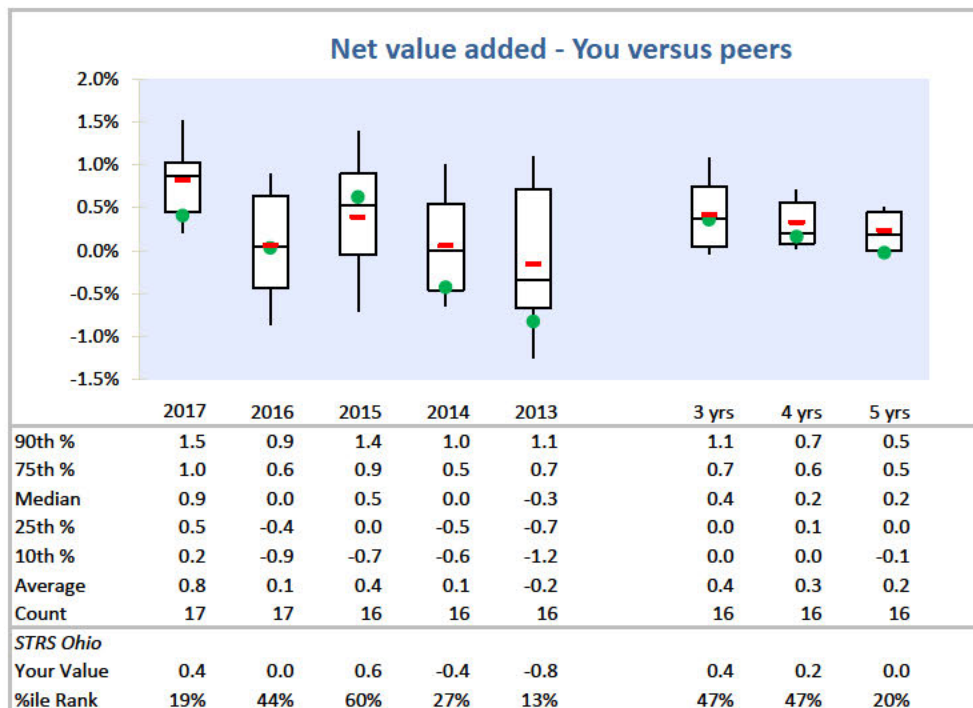
Your 5-year policy return of 10.1% was among the highest in your peer group and among the highest in the U.S. Public universe. Policy return is the return you would have earned had you passively implemented your policy asset mix decision through your benchmark portfolios.



To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 10.7%, 0.6% higher than your actual 5-year policy return of 10.1%. Mirroring this, your 5-year total fund net value added would be 0.6% lower. Refer to the appendix of this section for details.

Net value added

Your 5-year net value added of 0.0% was below the peer median and below the median of the U.S. Public universe. Net value added is the difference between your net total return and your policy return.



Net returns by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2017	2016	2015	2014	2013	5-yr ¹	2017	2016	2015	2014	2013	5-yr ¹	2017	2016	2015	2014	2013	5-yr ¹
Stock - U.S. Broad/All							21.6	11.0	-0.1	10.6	34.0	15.1	20.2	11.1	-0.4	11.0	33.3	14.6
Stock - U.S. Large Cap	22.1	10.6	1.0	12.4	31.1	15.0	21.7	11.8	1.1	12.8	33.2	15.6	22.2	11.2	0.9	12.7	33.6	15.6
Stock - U.S. Mid Cap							17.9	12.6	-1.9	9.0			18.7	13.0	-2.7	8.7	38.0	14.0
Stock - U.S. Small Cap	19.6	17.2	-2.2	4.3	42.2	15.2	15.7	18.1	-3.2	5.4	40.3	14.4	15.6	18.4	-3.7	5.0	39.0	14.2
Stock - EAFE	21.9	4.8	3.5	1.1	25.3	10.9	26.6	3.3	-0.2	-2.3	23.7	9.3	25.7	2.9	0.1	-3.5	23.2	9.1
Stock - Global	24.0	8.8	-1.3	3.7	24.5	11.4	35.7	7.3	-0.7	5.0	25.7	14.0	29.6	7.3	-0.9	3.7	24.2	12.5
Employer Stock																		
Stock - Other							16.1	12.7	-4.0	3.8	12.8	8.7	15.3	11.5	-6.0	3.1	18.7	7.5
Stock - Emerging	31.6	13.6	-12.0	-1.7	-1.3	5.0	35.9	10.7	-14.2	-1.0	-2.5	4.7	36.6	10.6	-13.6	-1.3	-1.5	5.0
Stock - ACWI x U.S.	23.8	7.5	-0.9	0.5			28.4	3.7	-2.2	-2.8	18.2	8.2	28.6	3.5	-2.7	-3.7	19.1	8.0
Stock - Total	22.9	9.2	0.4	6.9	27.3	12.9	25.3	9.0	-1.5	5.0	26.7	12.3	24.7	9.0	-1.7	5.0	26.7	12.1
Fixed Income - U.S.	3.4	2.7	1.0	5.5	-1.6	2.2	5.0	3.7	0.3	7.2	-2.3	2.7	4.3	3.8	0.2	5.8	-1.5	2.4
Fixed Income - U.S. Gov't							1.8	-0.3	0.7	1.0			2.8	0.7	1.0	4.5	-5.0	
Fixed Income - U.S. Credits							5.1	6.0	-1.8	4.4			6.5	6.0	-2.2	6.5	-1.2	
Fixed Income - EAFE							12.3	2.5	-8.6	-3.0	-5.2	-0.7	9.6	3.8	-8.1	-1.3	-3.1	-0.7
Fixed Income - Global							30.5	4.7	-0.9	3.9	0.7	7.1	13.0	5.8	-2.0	3.7	-0.6	4.2
Fixed Income - Other							45.9	19.2	0.1	4.5	7.2	22.0	26.4	14.2	0.3	5.6	9.5	17.4
Fixed Income - Long Bonds							8.7	2.7	-3.4	16.5	-3.9	4.1	9.8	3.4	-3.8	22.3	-7.5	4.1
Fixed Income - Emerging	10.4	15.4	0.6	1.5	-4.8	4.4	12.3	10.0	-4.3	-0.3	-6.4	3.0	12.6	10.7	-5.3	-0.8	-7.7	2.1
Fixed Income - Inflation Indexed							4.0	4.5	-2.2	4.2	-7.3	0.5	3.6	5.7	-1.7	4.6	-7.8	0.9
Fixed Income - High Yield	7.3	16.9	-4.5	2.1	8.2	5.8	7.3	12.7	-2.6	4.7	7.3	5.8	7.2	12.5	-3.2	3.3	7.1	5.5
Fixed Income - Mortgages							6.4	2.0	3.8	8.4	5.4	5.7	5.6	2.9	3.8	7.2	5.6	5.6
Fixed Income - Private Debt							7.4	6.5	1.0	4.9	6.2	4.5	7.4	6.3	2.4	7.1	8.1	4.5
Fixed Income - Absolute Return Bonds																		
Fixed Income - Bundled LDI																		
Fixed Income - Convertibles							12.6						10.2					
Cash	0.7	0.5	0.1	0.1	0.1	0.3	0.1	2.8	-0.7	0.8	0.4	0.5	0.9	1.3	0.0	0.4	0.2	0.5
Fixed Income - Total	4.0	4.8	0.6	5.0	-1.0	2.6	5.4	4.7	-0.5	6.3	-1.7	2.7	5.1	4.7	-0.6	5.4	-1.4	2.4
Commodities							10.4	13.6	-31.8	-17.1	-10.7	-10.3	6.7	12.4	-26.5	-16.6	-7.9	-8.9
Infrastructure	1.9	3.6	3.2	15.8	2.3	5.2	13.8	8.8	6.3	24.3	7.2	12.2	11.9	9.0	4.3	15.8	10.0	9.9
Natural Resources	-34.5	-4.1	2.0	7.7	7.5	-5.8	1.4	2.0	-6.6	9.2	9.2	2.5	6.9	6.4	-5.4	11.7	7.4	5.3
REITs	5.2	8.8	3.2	30.5	1.8	9.4	9.0	5.2	3.1	19.4	5.0	8.1	8.6	4.8	2.2	20.2	4.4	8.0
Real Estate ex-REITs	6.1	9.3	12.2	14.8	11.2	10.7	9.5	9.6	13.9	13.8	12.7	11.8	8.3	8.2	12.8	12.6	12.6	10.7
Other Real Assets							4.0	12.1	-8.6	2.5	1.4	-0.4	2.9	12.5	-13.1	4.6	10.8	1.9
Real Assets - Total	2.8	7.7	9.8	15.7	9.6	9.1	8.8	9.1	9.3	12.3	9.4	9.9	7.7	8.1	7.2	11.3	9.9	8.9
Hedge Funds	5.6	3.4	-0.6	3.3	11.4	4.6	5.1	0.2	-1.0	3.0	10.7	3.1	5.9	1.5	-0.6	4.1	10.1	3.6
Global TAA	10.5	8.1	-2.6				14.2	6.5	-2.2	6.4	2.6	5.3	12.6	7.5	-3.6	5.3	1.9	4.7
Risk Parity							15.5	13.3	-10.8	8.5	-2.6	5.3	13.7	12.5	-9.5	7.9	-2.6	4.5
Diversified Private Equity	19.3	6.7	9.9	18.9	20.0	14.8	17.9	8.7	8.2	15.9	16.7	13.3	17.0	9.0	8.3	15.6	16.5	13.3
Venture Capital	13.2	3.1	11.8	17.9	10.4	11.2	10.5	5.1	12.5	23.5	12.8	12.5	11.2	4.4	14.3	18.7	14.6	12.8
LBO	19.3	6.7	9.9				17.8	9.3	6.6	14.7	16.4	13.1	19.5	14.2	10.2	14.7	16.5	14.0
Private Credit	5.9						8.6	8.0	6.1	14.4	18.3	11.5	10.3	7.9	5.0	10.6	14.5	9.8
Other Private Equity	7.3	4.2	5.0	13.5	16.5	9.2	10.2	8.7	9.2	11.5	14.8	10.9	9.4	8.4	8.3	16.4	16.0	12.3
Private Equity - Total	14.2	5.3	8.7	17.2	17.5	12.5	17.5	9.0	8.6	16.5	17.1	13.6	16.9	9.2	9.0	15.5	16.3	13.5
Total Fund Return	15.8	8.0	2.3	7.8	17.3	10.1	15.6	7.9	0.9	7.1	14.7	9.1	15.5	7.8	0.2	6.5	15.3	8.8

You were not able to provide full year returns for all of the components of returns of asset classes with values shown in italics. The composite calculation only uses those components with a full year return.

1. The 5-year return number only includes funds with continuous data over the last 5 years.

Benchmark returns by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2017	2016	2015	2014	2013	5-yr ¹	2017	2016	2015	2014	2013	5-yr ¹	2017	2016	2015	2014	2013	5-yr ¹
Stock - U.S. Broad/All							22.0	12.3	0.5	12.7	33.3	15.6	21.8	12.4	0.7	12.7	33.2	15.7
Stock - U.S. Large Cap	21.1	12.7	0.5	12.6	33.6	15.6	20.9	12.7	0.9	13.2	33.1	15.7	21.5	12.4	1.0	13.2	32.9	15.7
Stock - U.S. Mid Cap							18.6	13.1	-2.4	12.1			19.0	12.5	-2.0	10.8	34.4	15.3
Stock - U.S. Small Cap	14.7	21.3	-4.4	4.9	38.8	14.1	15.7	19.8	-3.9	5.4	38.8	14.3	15.2	20.1	-3.4	6.0	37.9	14.4
Stock - EAFE	20.1	5.0	0.4	0.8	23.1	9.5	24.7	2.6	-1.0	-3.8	22.3	8.3	25.0	2.3	-1.0	-4.2	22.1	8.1
Stock - Global	24.6	7.9	-2.4	4.2	22.8	10.9	24.0	8.0	-1.6	3.8	22.1	11.1	24.2	7.9	-1.7	3.4	22.2	10.8
Employer Stock																		
Stock - Other							20.2	9.6	-4.0	2.9	15.7	9.1	15.8	8.7	-6.7	1.1	19.1	7.0
Stock - Emerging	37.3	11.2	-14.9	-2.2	-2.3	4.4	36.8	11.2	-14.9	-1.7	-2.6	4.4	37.1	10.9	-14.5	-1.9	-1.7	4.5
Stock - ACWI x U.S.	23.4	6.4	-2.8	0.2	17.6	8.5	26.4	4.9	-4.4	-3.3	17.1	7.5	27.7	4.5	-4.8	-3.7	16.4	7.3
Stock - Total	22.2	9.8	-1.0	6.9	26.9	12.5	24.0	9.2	-2.0	4.5	24.8	11.6	23.8	9.4	-2.0	5.1	25.5	11.8
Fixed Income - U.S.	3.9	3.9	0.4	5.6	-1.3	2.5	4.5	2.8	0.3	6.8	-2.7	2.3	3.8	2.8	0.4	6.1	-2.1	2.2
Fixed Income - U.S. Gov't							2.3	-0.2	0.7	0.8			2.5	0.8	0.8	4.5	-3.9	
Fixed Income - U.S. Credits							3.7	3.7	0.2	5.8			3.7	3.7	-0.7	6.3	-2.0	
Fixed Income - EAFE							11.6	2.6	-6.5	-5.4	-4.8	-0.7	8.4	6.1	-6.0	-3.0	-3.8	-0.5
Fixed Income - Global							6.2	5.3	-0.7	3.2	0.0	2.8	5.0	4.8	-0.9	3.6	-1.7	2.1
Fixed Income - Other							5.1	6.2	0.1	5.6	3.2	4.6	4.6	6.6	0.4	5.8	5.1	3.9
Fixed Income - Long Bonds							8.0	2.1	-1.0	18.2	-6.4	3.8	8.9	3.2	-1.9	20.1	-9.9	3.7
Fixed Income - Emerging	8.2	9.9	1.3	4.8	-4.1	3.9	12.2	9.4	-2.0	1.5	-6.5	3.0	11.8	9.8	-4.9	0.2	-6.4	2.3
Fixed Income - Inflation Indexed							3.4	4.6	-2.1	3.9	-5.5	0.8	3.2	5.6	-1.7	4.7	-6.7	1.0
Fixed Income - High Yield	7.5	17.1	-4.5	2.5	7.4	5.8	6.9	15.3	-3.5	2.5	6.7	5.3	7.0	15.4	-3.9	2.3	6.6	5.4
Fixed Income - Mortgages							3.6	3.0	1.6	4.7	-0.3	2.4	2.9	2.9	2.0	4.4	0.2	2.3
Fixed Income - Private Debt							7.2	8.5	0.3	4.7	6.2	5.4	7.7	10.1	-0.1	4.6	6.5	5.4
Fixed Income - Absolute Return Bonds																		
Fixed Income - Bundled LDI																		
Fixed Income - Convertibles							15.7						18.8					
Cash	0.9	0.3	0.1	0.0	0.1	0.3	0.9	0.3	0.1	0.0	0.2	0.3	1.0	0.4	0.1	0.2	0.1	0.4
Fixed Income - Total	3.9	3.9	0.4	5.6	-1.3	2.5	5.1	4.7	-0.3	6.6	-2.4	2.5	5.3	4.9	-0.3	7.2	-2.5	2.8
Commodities							4.0	10.9	-24.1	-19.4	-3.7	-8.0	3.0	10.9	-22.8	-16.6	-4.7	-8.4
Infrastructure	12.2	5.3	6.1	13.5	16.5	10.6	8.1	6.7	4.8	7.6	7.8	6.6	8.8	6.9	5.0	6.4	6.6	6.5
Natural Resources	12.2	5.3	6.1	13.5	16.5	10.6	8.2	5.0	-0.7	8.8	8.4	5.8	6.6	6.8	-0.5	7.0	7.5	5.2
REITs	5.2	8.5	3.2	30.1	2.5	9.5	8.5	6.1	3.1	21.4	3.1	7.8	8.1	6.7	2.9	21.1	3.2	8.2
Real Estate ex-REITs	7.0	8.0	13.3	11.8	11.0	10.2	7.1	8.7	13.8	11.6	12.0	10.7	6.6	8.5	13.7	11.8	11.6	10.7
Other Real Assets							3.5	10.2	4.6	6.3	7.5	5.8	1.8	12.4	-10.0	4.7	10.1	2.5
Real Assets - Total	6.7	8.1	11.8	14.6	9.7	10.1	7.3	8.6	9.8	10.3	9.8	9.2	6.2	8.8	7.4	9.0	9.2	8.1
Hedge Funds	12.2	5.3	6.1	13.5	16.5	10.6	5.4	2.7	1.1	4.3	9.2	4.4	7.1	3.2	1.3	4.0	9.3	4.7
Global TAA	12.2	5.3	6.1				12.7	6.3	2.1	4.7	10.4	7.1	12.9	5.9	1.3	5.0	10.4	6.9
Risk Parity							13.7	10.5	-2.2	7.6	10.2	7.9	14.4	9.8	-3.7	6.3	3.7	5.8
Diversified Private Equity ¹	12.2	5.3	6.1	13.5	16.5	10.6	16.3	10.3	3.1	16.0	29.0	14.5	17.4	10.2	2.7	16.6	29.8	15.0
Venture Capital ¹	12.2	5.3	6.1	13.5	16.5	10.6	15.8	10.7	2.9	14.9	27.8	14.0	17.5	10.0	3.5	15.3	30.3	14.7
LBO ¹	12.2	5.3	6.1				15.5	10.4	2.9	15.2	29.8	14.6	17.6	9.5	3.5	16.0	30.8	15.0
Private Credit ¹	12.2						15.2	11.7	1.3	18.3	29.4	14.6	17.2	11.2	5.4	12.8	31.7	15.0
Other Private Equity ¹	12.2	5.3	6.1	13.5	16.5	10.6	15.4	9.5	4.4	13.9	27.0	13.7	18.7	8.6	4.0	12.6	31.4	14.4
Private Equity - Total	12.2	5.3	6.1	13.5	16.5	10.6	16.3	10.3	3.1	16.0	29.0	14.5	17.6	10.1	2.8	16.6	29.9	15.0
Total Policy Return	15.4	8.0	1.7	8.3	18.1	10.1	14.8	7.8	0.5	7.1	14.9	8.9	14.9	7.9	-0.1	6.6	14.9	8.7

1. The 5-year return number only includes funds with continuous data over the last 5 years.

2. To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 10.7%, 0.6% higher than your actual 5-year policy return of 10.1%. Mirroring this, your 5-year total fund net value added would be 0.6% lower. Refer to the appendix of this section for details.

Net value added by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2017	2016	2015	2014	2013	5-yr ¹	2017	2016	2015	2014	2013	5-yr ¹	2017	2016	2015	2014	2013	5-yr ¹
Stock - U.S. Broad/All							-0.4	-1.3	-0.5	-2.0	0.6	-0.5	-1.6	-1.2	-1.2	-1.7	0.1	-1.1
Stock - U.S. Large Cap	1.0	-2.1	0.5	-0.2	-2.5	-0.6	0.8	-0.9	0.2	-0.3	0.1	0.0	0.7	-1.2	-0.1	-0.5	0.6	-0.1
Stock - U.S. Mid Cap							-0.7	-0.5	0.5	-3.1			-0.4	0.5	-0.7	-2.2	3.6	-1.3
Stock - U.S. Small Cap	5.0	-4.1	2.2	-0.6	3.3	1.1	0.0	-1.8	0.7	0.0	1.5	0.1	0.4	-1.6	-0.3	-1.0	1.1	-0.2
Stock - EAFE	1.8	-0.2	3.2	0.3	2.2	1.4	2.0	0.7	0.8	0.4	1.5	1.0	0.7	0.6	1.3	0.3	1.2	1.0
Stock - Global	-0.6	0.9	1.1	-0.5	1.7	0.5	11.8	-0.7	0.9	1.2	3.6	2.9	5.2	-0.4	0.6	0.5	2.2	1.8
Employer Stock																		
Stock - Other							-4.1	3.1	0.0	0.9	0.0	0.6	-2.0	2.0	0.7	2.3	-0.8	1.3
Stock - Emerging	-5.7	2.4	3.0	0.5	0.9	0.6	-0.9	-0.5	0.7	0.7	0.0	0.3	-0.6	-0.6	0.8	0.6	0.2	0.4
Stock - ACWI x U.S.	0.4	1.1	1.9	0.2			1.7	-1.0	2.6	0.3	2.5	1.2	0.8	-0.9	2.2	0.0	2.9	0.8
Stock - Total	0.6	-0.5	1.4	0.0	0.5	0.4	1.3	-0.3	0.5	0.5	1.9	0.7	0.8	-0.4	0.3	-0.1	1.2	0.3
Fixed Income - U.S.	-0.4	-1.2	0.6	0.0	-0.2	-0.3	0.4	0.9	0.0	0.4	0.3	0.4	0.5	1.0	-0.2	-0.3	0.5	0.2
Fixed Income - U.S. Gov't							-0.5	-0.2	-0.1	0.2			0.3	-0.1	0.2	0.0	0.1	
Fixed Income - U.S. Credits							1.4	2.3	-2.0	-1.4			1.4	2.3	-1.4	0.2	0.8	
Fixed Income - EAFE							0.7	-0.1	-2.1	2.4	-0.4	0.1	1.2	-2.3	-2.1	1.7	0.9	0.1
Fixed Income - Global							24.3	-0.6	-0.2	0.7	0.8	4.3	8.1	1.0	-1.2	0.0	0.9	1.8
Fixed Income - Other							40.9	13.0	0.0	-1.0	4.9	18.5	21.9	7.7	-0.2	0.2	2.9	13.7
Fixed Income - Long Bonds							0.7	0.4	-2.4	-1.7	2.5	0.3	0.9	-0.6	-1.8	3.3	1.5	0.3
Fixed Income - Emerging	2.2	5.5	-0.6	-3.2	-0.7	0.5	0.1	0.5	-1.1	-1.8	0.0	-0.2	0.8	0.9	-0.1	-1.0	-1.3	-0.2
Fixed Income - Inflation Indexed							0.6	0.0	0.1	-0.3	-1.8	-0.3	0.4	0.1	0.0	-0.3	-0.9	0.0
Fixed Income - High Yield	-0.2	-0.3	0.0	-0.4	0.7	0.0	0.4	-2.5	0.7	2.2	0.2	0.2	0.1	-3.1	0.9	0.7	0.4	-0.1
Fixed Income - Mortgages							1.2	-1.0	2.1	3.7	5.9	2.8	1.5	0.0	1.8	2.8	5.5	2.9
Fixed Income - Private Debt							0.1	-2.0	1.8	0.2	0.0	0.3	-0.6	-3.0	2.9	1.9	1.8	0.3
Fixed Income - Absolute Return Bonds																		
Fixed Income - Bundled LDI																		
Fixed Income - Convertibles							-3.1						-8.6					
Cash	-0.1	0.1	0.0	0.0	0.0	0.0	-0.8	2.4	-0.9	0.7	0.3	0.2	-0.2	0.9	0.0	0.1	0.1	0.2
Fixed Income - Total	0.1	0.9	0.2	-0.5	0.3	0.2	0.2	0.0	-0.2	-0.3	0.6	0.2	-0.2	-0.2	-0.3	-1.8	1.1	-0.4
Commodities							6.0	3.0	-7.9	3.4	-6.9	-2.3	3.4	1.1	-3.5	1.5	-3.1	-0.9
Infrastructure	-10.3	-1.7	-2.9	2.3	-14.2	-5.4	5.7	2.1	1.5	16.7	-0.5	5.6	3.0	2.1	-0.7	8.7	3.4	3.6
Natural Resources	-46.7	-9.4	-4.1	-5.8	-9.0	-16.4	-7.3	-3.0	-5.9	0.4	-0.4	-4.4	0.4	-0.5	-4.5	4.7	-1.2	-0.3
REITs	0.0	0.3	0.0	0.3	-0.6	0.0	0.5	-0.7	0.1	-2.0	1.9	0.2	0.5	-1.8	-0.8	-1.0	1.1	-0.4
Real Estate ex-REITs	-0.9	1.3	-1.2	3.0	0.2	0.5	2.7	1.0	0.1	2.2	0.7	1.2	1.8	-0.2	-0.8	0.8	1.0	0.2
Other Real Assets							0.4	2.0	-13.2	-3.8	-6.1	-6.1	1.0	-0.4	-3.1	0.5	-0.5	-0.6
Real Assets - Total	-3.9	-0.3	-2.0	1.1	-0.1	-1.1	1.8	0.6	-0.7	2.0	-0.4	0.8	1.6	-0.6	-0.2	2.3	0.7	0.9
Hedge Funds	-6.7	-1.9	-6.7	-10.3	-5.0	-6.1	-0.7	-2.4	-2.0	-1.3	1.2	-1.5	-1.3	-1.7	-1.9	0.0	0.6	-1.0
Global TAA	-1.7	2.8	-8.7				1.6	0.2	-4.3	1.8	-7.8	-1.8	-0.3	1.5	-4.9	0.3	-8.4	-2.2
Risk Parity							1.8	2.8	-14.1	0.9	-12.7	-2.5	-0.6	2.7	-7.0	0.6	-6.4	-1.3
Diversified Private Equity ¹	7.1	1.4	3.8	5.4	3.5	4.2	1.7	-1.6	5.2	-0.1	-12.3	-1.2	-0.4	-1.1	5.4	-0.9	-13.3	-1.7
Venture Capital ¹	1.0	-2.2	5.7	4.4	-6.0	0.5	-5.4	-5.6	9.6	8.6	-15.0	-1.5	-6.4	-5.4	10.2	4.1	-15.8	-1.9
LBO ¹	7.1	1.4	3.8				2.4	-1.1	3.7	-0.6	-13.5	-1.5	1.7	5.3	6.3	-0.6	-14.5	-1.1
Private Credit ¹	-6.3						-6.6	-6.8	9.7	-4.0	-11.1	-3.0	-7.0	-4.2	4.0	-4.9	-17.8	-4.4
Other Private Equity ¹	-4.9	-1.1	-1.1	0.0	0.0	-1.4	-5.2	-1.0	4.6	-2.4	-11.6	-2.8	-9.2	1.1	3.8	4.0	-15.0	-2.1
Private Equity - Total	2.0	0.0	2.6	3.7	1.1	1.8	1.2	-1.3	5.5	0.5	-11.9	-1.0	-0.7	-0.8	6.1	-1.0	-13.5	-1.5
Total fund	0.4	0.0	0.6	-0.4	-0.8	0.0	0.8	0.1	0.4	0.1	-0.2	0.2	0.6	0.0	0.3	-0.1	0.4	0.2

Total net value add is determined by both actual and policy allocation. It is the outcome of total net return (page 6) minus total benchmark return (page 7). Aggregate net returns are an asset weighted average of all categories that the fund has an actual allocation to. Aggregate benchmark returns are a policy weighted average and includes only those categories that are part of your policy fund's mix.

You were not able to provide full year returns for all of the components of returns of asset classes with values shown in italics. The composite calculation only uses those components with a full year return.

1. The 5-year return number only includes funds with continuous data over the last 5 years.

2. To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 10.7%, 0.6% higher than your actual 5-year policy return of 10.1%. Mirroring this, your 5-year total fund net value added would be 0.6% lower. Refer to the appendix of this section for details.

Your policy return and value added calculation - 2017

2017 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
Stock - U.S. Large Cap	30.0%	Russell 1000 (Russell 3000 for total Dom Equity)	21.1%	22.1%	1.0%
Stock - U.S. Small Cap		Russell 2000	14.7%	19.6%	5.0%
Stock - EAFE	20.0%	MSCI World xUS 50% Hedged Net	20.1%	21.9%	1.8%
Stock - Global		MSCI ACWI net	24.6%	24.0%	-0.6%
Stock - Emerging	5.0%	MSCI Emerging Market Net	37.3%	31.6%	-5.7%
Stock - ACWI x U.S.		International Blended Benchmark	23.4%	23.8%	0.4%
Fixed Income - U.S.	20.0%	Fixed Income Blended (Jul 1 2017)	4.0%	3.4%	-0.4%
Fixed Income - Emerging		Barclays Emerging Market	8.2%	10.4%	2.2%
Fixed Income - High Yield		Barclays US Corp High Yield	7.5%	7.3%	-0.2%
Cash	1.0%	US 90 day T bill	0.9%	0.7%	-0.1%
Infrastructure		Custom (Alternative Investment Actual Return)	12.2%	1.9%	-10.3%
Natural Resources		Custom (Alternative Investment Actual Return)	12.2%	-34.5%	-46.7%
REITs	1.5%	Your REIT benchmark	5.2%	5.2%	0.0%
Real Estate ex-REITs	8.5%	NCREIF NPI	7.0%	6.1%	-0.9%
Hedge Funds		Custom (Alternative Investment Actual Return)	12.2%	5.6%	-6.7%
Global TAA		Custom (Alternative Investment Actual Return)	12.2%	10.5%	-1.7%
Diversified Private Equity		Custom (Alternative Investment Actual Return)	12.2%	19.3%	7.1%
Venture Capital		Custom (Alternative Investment Actual Return)	12.2%	13.2%	1.0%
LBO	14.0%	Custom (Alternative Investment Actual Return)	12.2%	19.3%	7.1%
Private Credit		Custom (Alternative Investment Actual Return)	12.2%	5.9%	-6.3%
Other Private Equity		Custom (Alternative Investment Actual Return)	12.2%	7.3%	-4.9%
Total	100.0%				
Net Actual Return (reported by you)					15.8%
Calculated Policy Return = sum of (policy weights X benchmark returns)				15.4%	
Adjustment to reflect rebalancing and overlay impacts				-0.1%	
Policy Return (reported by you)					<u>15.4%</u>
Net Value Added (Net Return - Policy Return)					0.4%

Your policy return and value added calculations - 2013 to 2016

2016 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
Stock - U.S. Large Cap	31.0%	Russell 1000 (Ru	12.7%	10.6%	-2.1%
Stock - U.S. Small Cap		Russell 2000	21.3%	17.2%	-4.1%
Stock - EAFE	20.8%	MSCI World xUS	5.0%	4.8%	-0.2%
Stock - Global		MSCI ACWI net	7.9%	8.8%	0.9%
Stock - Emerging	5.2%	MSCI Emerging	11.2%	13.6%	2.4%
Stock - ACWI x U.S.		International Bl	6.4%	7.5%	1.1%
Fixed Income - U.S.	18.0%	Barclays Univers	3.9%	2.7%	-1.2%
Fixed Income - Emerging		Barclays Emergi	9.9%	15.4%	5.5%
Fixed Income - High Yield		Barclays US Cor	17.1%	16.9%	-0.3%
Cash	1.0%	US 90 day T bill	0.3%	0.5%	0.1%
Infrastructure		Custom (Altern	5.3%	3.6%	-1.7%
Natural Resources		Custom (Altern	5.3%	-4.1%	-9.4%
REITs	1.5%	Your REIT bench	8.5%	8.8%	0.3%
Real Estate ex-REITs	8.5%	NCREIF NPI	8.0%	9.3%	1.3%
Hedge Funds		Custom (Altern	5.3%	2.3%	-3.0%
Global TAA		Custom (Altern	5.3%	8.1%	2.8%
Diversified Private Equity		Custom (Altern	5.3%	6.7%	1.4%
Venture Capital		Custom (Altern	5.3%	3.1%	-2.2%
LBO	14.0%	Custom (Altern	5.3%	6.7%	1.4%
Other Private Equity		Custom (Altern	5.3%	4.2%	-1.1%
Total	100.0%				
Net Return (reported by you)					8.0%
Calculated policy return (sum: Policy weights x benchmarks)				7.8%	
Adjustment to reflect rebalancing and overlay impacts				<u>0.2%</u>	
Policy return (reported by you)					<u>8.0%</u>
Net Value Added (Net Return - Policy Return)					0.0%

2014 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
Stock - U.S. Large Cap	31.0%	Russell 1000 (Ru	12.6%	12.4%	-0.2%
Stock - U.S. Small Cap		Russell 2000	4.9%	4.3%	-0.6%
Stock - EAFE	20.8%	MSCI World xUS	0.8%	1.1%	0.3%
Stock - Global		MSCI ACWI Net	4.2%	3.7%	-0.5%
Stock - Emerging	5.2%	MSCI Emerging	-2.2%	-1.7%	0.5%
Stock - ACWI x U.S.		International Bl	0.2%	0.5%	0.2%
Fixed Income - U.S.	18.0%	Barclays Univers	5.6%	5.5%	0.0%
Fixed Income - Emerging		Barclays Emergi	4.8%	1.5%	-3.2%
Fixed Income - High Yield		Barclays US Cor	2.5%	2.1%	-0.4%
Cash	1.0%	US 90 day T bill	0.0%	0.1%	0.0%
Infrastructure		Custom (Altern	13.5%	15.8%	2.3%
Natural Resources		Custom (Altern	13.5%	7.7%	-5.8%
REITs	1.5%	Your REIT bench	30.1%	30.5%	0.3%
Real Estate ex-REITs	8.5%	NCREIF NPI	11.8%	14.8%	3.0%
Hedge Funds		Custom (Altern	13.5%	2.0%	-11.5%
Diversified Private Equity	14.0%	Custom (Altern	13.5%	18.9%	5.4%
Venture Capital		Custom (Altern	13.5%	17.9%	4.4%
Other Private Equity		Custom (Altern	13.5%	13.5%	0.0%
Total	100.0%				
Net Return (reported by you)					7.8%
Calculated policy return (sum: Policy weights x benchmarks)				8.3%	
Adjustment to reflect rebalancing and overlay impacts				<u>0.0%</u>	
Policy return (reported by you)					<u>8.3%</u>
Net Value Added (Net Return - Policy Return)					-0.4%

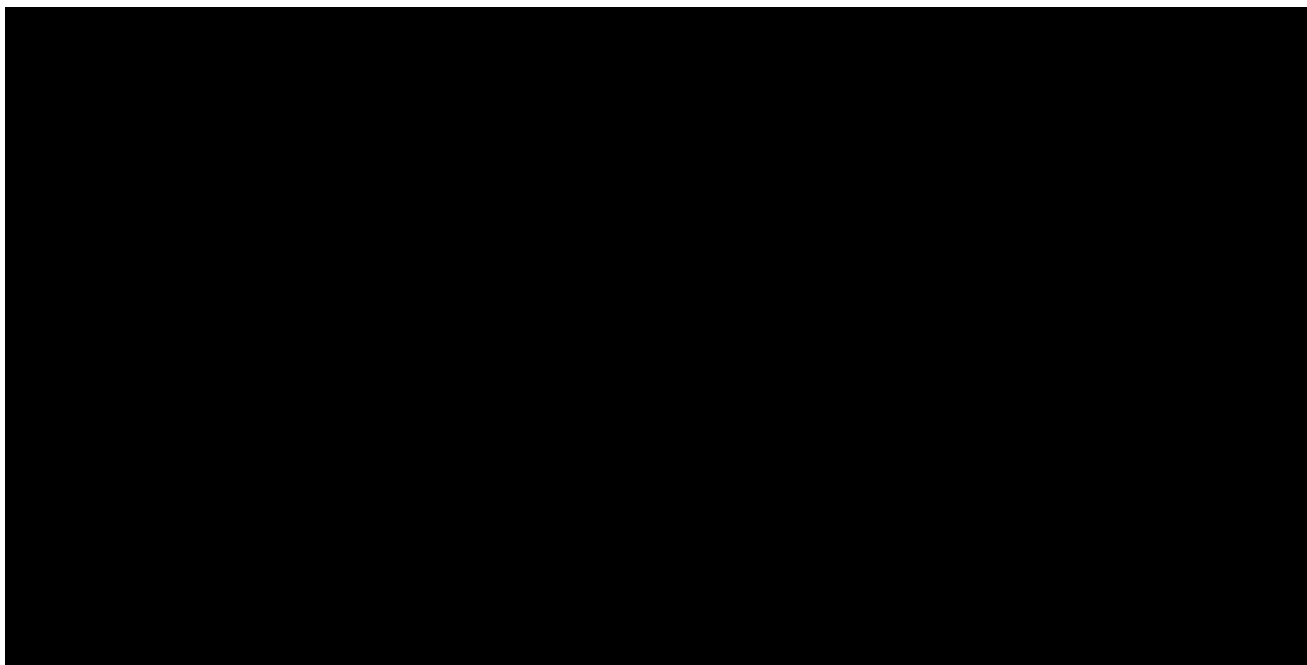
2015 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
Stock - U.S. Large Cap	31.0%	Russell 1000 (Ru	0.5%	1.0%	0.5%
Stock - U.S. Small Cap		Russell 2000	-4.4%	-2.2%	2.2%
Stock - EAFE	20.8%	MSCI World xUS	0.4%	3.5%	3.2%
Stock - Global		MSCI ACWI net	-2.4%	-1.3%	1.1%
Stock - Emerging	5.2%	MSCI Emerging	-14.9%	-12.0%	3.0%
Stock - ACWI x U.S.		International Bl	-2.8%	-0.9%	1.9%
Fixed Income - U.S.	18.0%	Barclays Univers	0.4%	1.0%	0.6%
Fixed Income - Emerging		Barclays Emergi	1.3%	0.6%	-0.6%
Fixed Income - High Yield		Barclays US Cor	-4.5%	-4.5%	0.0%
Cash	1.0%	US 90 day T bill	0.1%	0.1%	0.0%
Infrastructure		Custom (Altern	6.1%	3.2%	-2.9%
Natural Resources		Custom (Altern	6.1%	2.0%	-4.1%
REITs	1.5%	Your REIT bench	3.2%	3.2%	0.0%
Real Estate ex-REITs	8.5%	NCREIF NPI	13.3%	12.2%	-1.2%
Hedge Funds		Custom (Altern	6.1%	-1.1%	-7.2%
Global TAA		Custom (Altern	6.1%	-2.6%	-8.7%
Diversified Private Equity		Custom (Altern	6.1%	9.9%	3.8%
Venture Capital		Custom (Altern	6.1%	11.8%	5.7%
LBO	14.0%	Custom (Altern	6.1%	9.9%	3.8%
Other Private Equity		Custom (Altern	6.1%	5.0%	-1.1%
Total	100.0%				
Net Return (reported by you)					2.3%
Calculated policy return (sum: Policy weights x benchmarks)				1.6%	
Adjustment to reflect rebalancing and overlay impacts				<u>0.1%</u>	
Policy return (reported by you)					<u>1.7%</u>
Net Value Added (Net Return - Policy Return)					0.6%

2013 Policy Return and Value Added

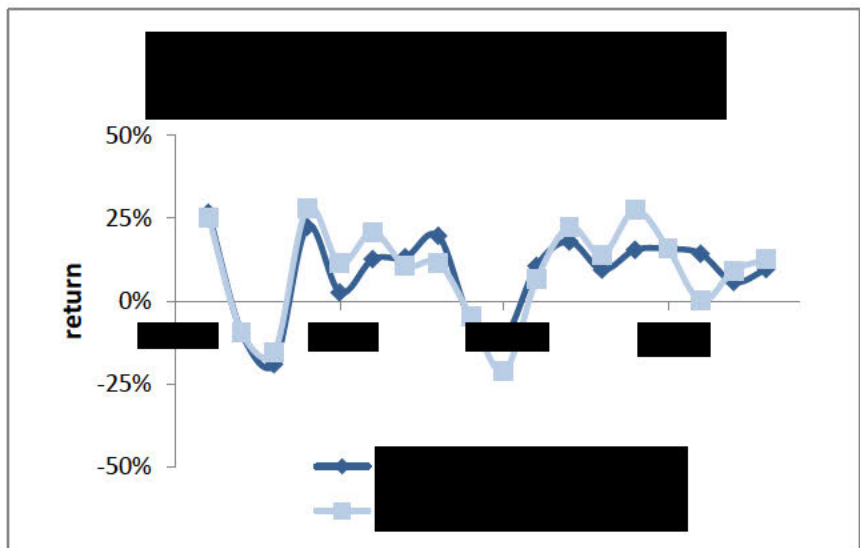
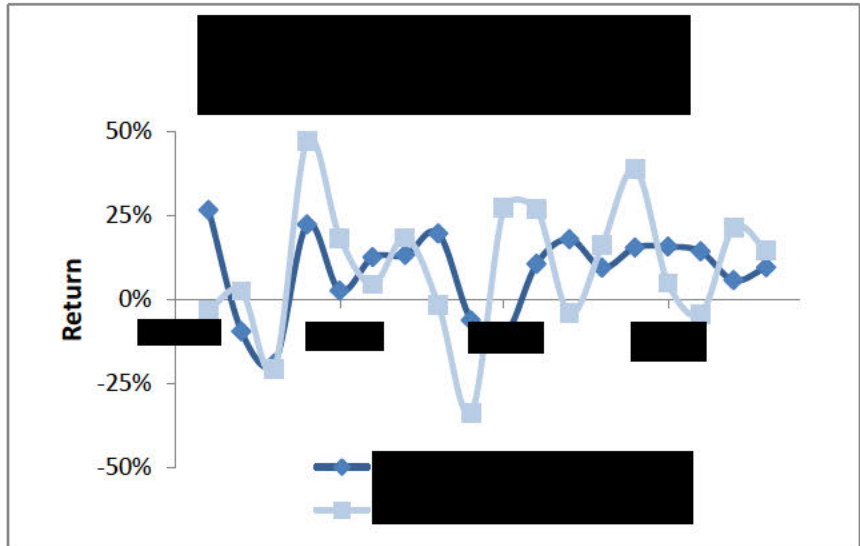
Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
Stock - U.S. Large Cap	33.0%	Russell 1000 (Ru	33.6%	31.1%	-2.5%
Stock - U.S. Small Cap		Russell 2000	38.8%	42.2%	3.3%
Stock - EAFE	20.0%	MSCI World xUS	23.1%	25.3%	2.2%
Stock - Global		MSCI ACWI	22.8%	24.5%	1.7%
Stock - Emerging	5.0%	MSCI Emerging	-2.3%	-1.3%	0.9%
Stock - ACWI x U.S.		International Bl	17.6%		
Fixed Income - U.S.	18.0%	Barclays Univers	-1.3%	-1.6%	-0.2%
Fixed Income - Emerging		Barclays Emergi	-4.1%	-4.8%	-0.7%
Fixed Income - High Yield		Barclays US Cor	7.4%	8.2%	0.7%
Cash	1.0%	US 90 day T bill	0.1%	0.1%	0.0%
Infrastructure		Custom (Altern	16.5%	2.3%	-14.2%
Natural Resources		Custom (Altern	16.5%	7.5%	-9.0%
REITs	1.5%	Your REIT bench	2.5%	1.8%	-0.6%
Real Estate ex-REITs	8.5%	NCREIF NPI	11.0%	11.2%	0.2%
Hedge Funds		Custom (Altern	16.5%	11.4%	-5.0%
Diversified Private Equity	13.0%	Custom (Altern	16.5%	20.0%	3.5%
Venture Capital		Custom (Altern	16.5%	10.4%	-6.0%
Other Private Equity		Custom (Altern	16.5%	16.5%	0.0%
Total	100.0%				
Net Return (reported by you)					17.3%
Calculated policy return (sum: Policy weights x benchmarks)				18.5%	
Adjustment to reflect rebalancing and overlay impacts				<u>-0.4%</u>	
Policy return (reported by you)					<u>18.1%</u>
Net Value Added (Net Return - Policy Return)					-0.8%

Profit/Loss on overlay programs



Profit/loss in basis points was calculated using total fund average holdings. This was done to measure the impact of the program at the total fund level.

[REDACTED]



[REDACTED]

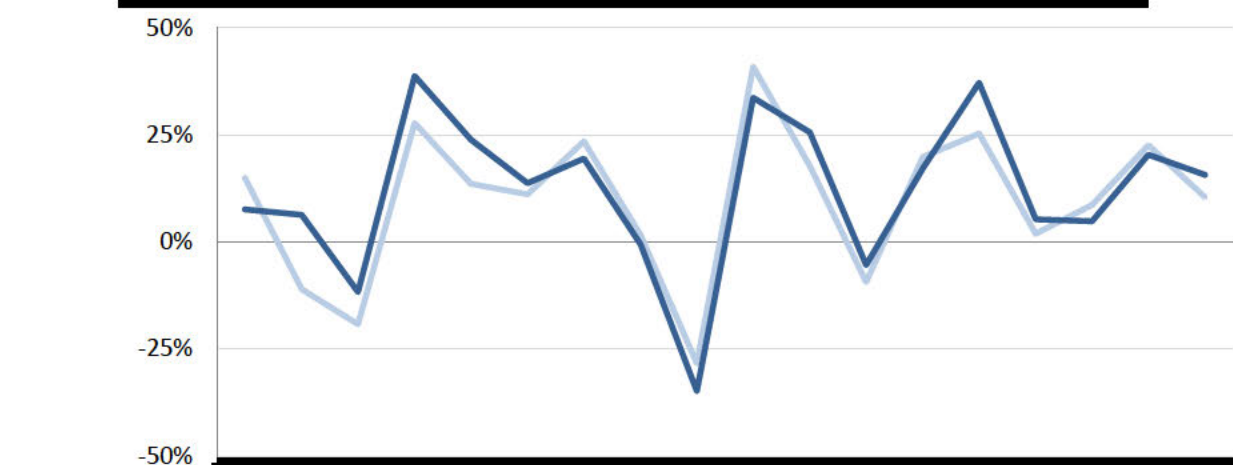
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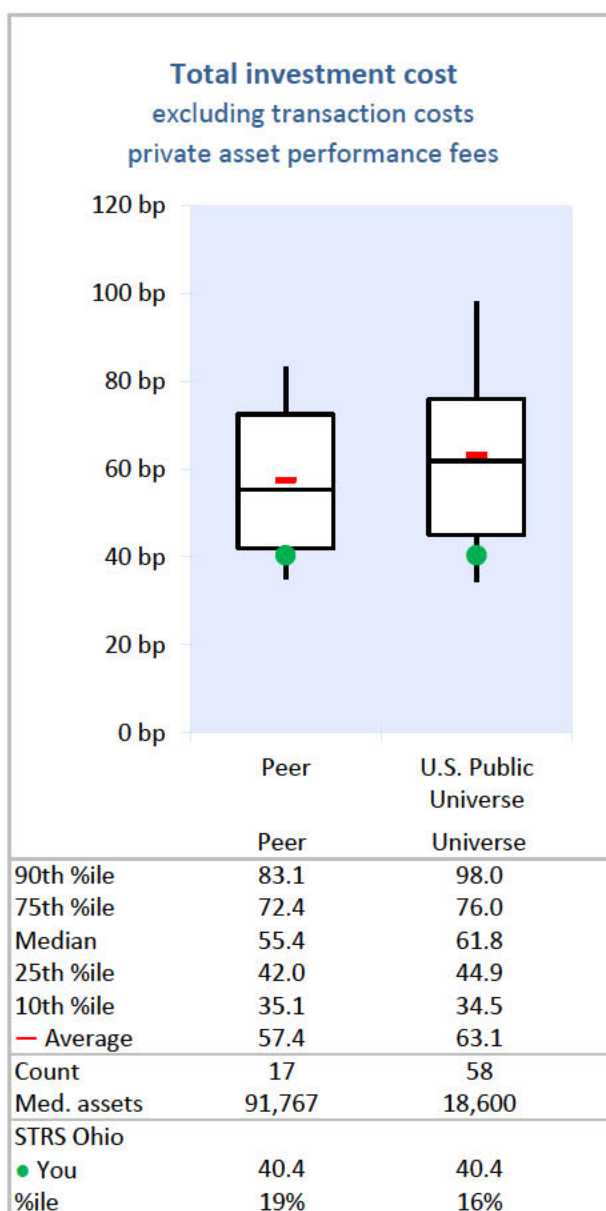
Total cost and benchmark cost

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Comparisons of total investment cost

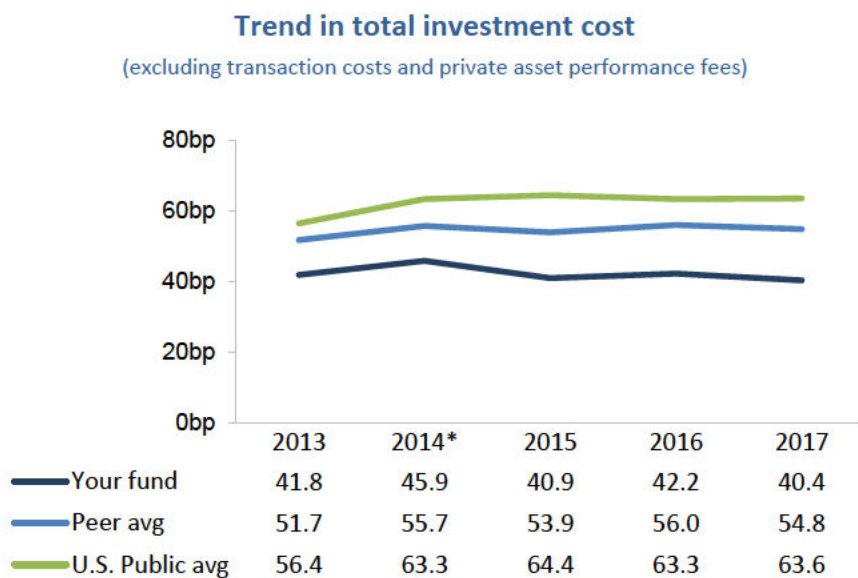
Your total investment cost, excluding transaction costs and private asset performance fees, of 40.4 bps was below the peer median of 55.4 bps.

Differences in total investment cost are often caused by two factors that are usually outside of management's control: asset mix and fund size. Therefore, to assess whether your fund's total investment cost is high or low given your unique asset mix and size, CEM calculates a benchmark cost for your fund. Benchmark cost analysis begins on page 7 of this section.



Trend in total investment cost

Your total investment cost, excluding transaction costs and private asset performance fees, decreased from 41.8 bps in 2013 to 40.4 bps in 2017.



Trend analysis is based on 47 U.S. Public funds and 16 peer funds with 5 or more consecutive years of data.

* Since 2014, hedge fund performance fees have been included for all participants.

Types of costs included in your total investment cost

The table below outlines the types of costs included in your total investment cost.

Asset class	Internal		External			
	In-house total cost	Transaction costs	Manager base fees	Monitoring & other costs	Perform. fees (active only)	Transaction costs
<u>Public</u>						
(Stock, Fixed income, commodities, REITs)	✓	✗	✓	✓	✓	✗
Derivatives/Overlays	✓	✗	✓	✓	✓	✗
<u>Hedge funds & Global TAA</u>						
Hedge Funds	n/a	n/a	✓	✓	✓	✗
Global TAA	✓	✗	✓	✓	✓	✗
<u>Private real assets</u>						
(Infrastructure, natural resources, real estate ex-REITs, other real assets)	✓	✗	✓	✓	✗	✗
<u>Private equity</u>						
(Diversified private equity, venture capital, LBO, other private equity)	✓	✗	✓*	✓	✗	✗

*External manager base fees represent gross contractual management fees.

- ✓ indicates cost is included.
- ✗ indicates cost is excluded.
- Green shading indicates that the cost type has been newly added for the 2014 data year.
- CEM currently excludes external private asset performance fees and all transaction costs from your total cost because only a limited number of participants are currently able to provide complete data.

Detailed breakdown of your total investment cost

Your 2017 total investment cost, excluding transaction costs and private asset performance fees, was 40.4 bp or \$302.6 million.

Your investment costs

	Internal		External Passive		External Active			Total ¹		
	Passive	Active	Fees	Monitoring & Other	Base Fees	Perform. Fees	Monitor. & Other	\$000s	bps	% of Total
Asset management										
Stock - U.S. Large Cap	72	12,590			2,466		227	15,356		5%
Stock - U.S. Small Cap		346			9,643		75	10,064		3%
Stock - EAFE		3,597			19,870		242	23,709		8%
Stock - Emerging		2,697			6,402		263	9,362		3%
Stock - Global		495						495		0%
Stock - ACWI x U.S.		475			6,122		20	6,617		2%
Fixed Income - U.S.		3,305						3,305		1%
Fixed Income - Emerging					3,436		156	3,592		1%
Fixed Income - High Yield					3,146		165	3,312		1%
Cash		286						286		0%
REITs	94							94		0%
Real Estate ex-REITs ¹²		17,182						17,182		6%
Real Estate - LPs ¹²					17,650	5,941	464	18,114		6%
Infrastructure - FoFs ¹²					460	352	13	473		0%
Underlying FoF Fees ¹²					767	1,627		767		0%
Natural Resources ¹²										
Natural Resources - LPs ¹²					6,832	2,885	69	6,901		2%
Natural Resources - Co-Invest. ¹							40	40		0%
Hedge Funds					26,981	22,775	291	50,047		17%
Global TAA					1,335		37	1,372		0%
Diversified Private Equity - LPs ¹²					3,104	1,808	40	3,144		1%
Diversified Private Equity - FoFs ¹										
Underlying FoF Fees ¹										
LBO - LPs ¹²					44,818	55,268	791	45,609		15%
LBO - FoFs ¹²					6,707	3,151	794	7,500		2%
Underlying FoF Fees ¹²					10,952	16,464		10,952		4%
Venture Capital - LPs ¹²					16,965	11,703	252	17,217		6%
Venture Capital - FoFs ¹²					1,207	740	75	1,282		0%
Underlying FoF Fees ¹²					4,794	2,935		4,794		2%
Private Credit - LPs ¹²					8,251	4,712	114	8,365		3%
Other Private Equity - LPs ¹²		168			23,549	12,342	348	24,065		8%
Other Private Equity - Co-Invest. ¹							193	193		0%
Derivatives/Overlays	330			165				495		0%
Total asset management costs excluding private asset performance fees								294,704	39.3bp	97%
Oversight, custodial & other asset related costs										
Oversight of the Fund								4,812		2%
Trustee & Custodial								2,412		1%
Audit								168		0%
Other								477		0%
Total oversight, custodial & other costs								7,870	1.0bp	3%
Total investment costs excluding transaction costs and private asset performance fees								302,574	40.4bp	100%

1. Total cost excludes carry/performance fees for real estate, infrastructure, natural resources and private equity. Performance fees are included for the public market asset classes and hedge funds.

2. Default costs added. Refer to Appendix A.

Changes in your investment costs

The table below shows how your investment costs have changed from year to year by asset class.

Change in your investment costs (2017 - 2013)

	Investment costs (\$000s)					Change (\$000s)				Change (%)			
	2017	2016	2015	2014	2013	2017	2016	2015	2014	2017	2016	2015	2014
Asset management													
Stock - U.S. Large Cap	15,356	13,728	14,183	12,886	12,822	1,628	-455	1,297	64	12%	-3%	10%	0%
Stock - U.S. Small Cap	10,064	9,173	9,392	9,742	9,943	891	-219	-350	-201	10%	-2%	-4%	-2%
Stock - EAFE	23,709	22,089	23,022	22,179	20,301	1,620	-933	843	1,879	7%	-4%	4%	9%
Stock - Emerging	9,362	8,662	8,177	8,780	9,689	699	486	-604	-908	8%	6%	-7%	-9%
Stock - Global	495	452	457	423	409	43	-5	34	14	9%	-1%	8%	3%
Stock - ACWI x U.S.	6,617	5,898	5,480	2,416	409	719	418	3,064	2,007	12%	8%	127%	491%
Fixed Income - U.S.	3,305	2,466	2,552	2,539	2,573	839	-86	13	-34	34%	-3%	1%	-1%
Fixed Income - Emerging	3,592	3,311	3,717	3,856	2,974	281	-406	-139	882	8%	-11%	-4%	30%
Fixed Income - High Yield	3,312	3,821	4,606	4,336	3,476	-510	-785	270	860	-13%	-17%	6%	25%
Cash	286	266	269	266	256	20	-3	3	9	7%	-1%	1%	4%
REITs	94	89	226	16	328	5	-137	210	-312	6%	-61%	1273%	-95%
Real Estate ex-REITs ¹²	17,182	16,632	16,561	14,192	12,476	550	71	2,370	1,715	3%	0%	17%	14%
Real Estate - LPs ¹²	18,114	17,879	18,382	25,031	26,811	235	-502	-6,649	-1,780	1%	-3%	-27%	-7%
Infrastructure - FoFs ¹²	473	508	514	518	610	-36	-6	-3	-92	-7%	-1%	-1%	-15%
Underlying FoF Fees ¹²	767	1,321	1,946	1,249	1,069	-554	-625	697	180	-42%	-32%	56%	17%
Natural Resources ¹²	0	298	169	0	0	-298	129	169		-100%	77%		
Natural Resources - LPs ¹²	6,901	6,505	7,716	5,055	4,682	396	-1,211	2,661	372	6%	-16%	53%	8%
Natural Resources - Co-Invest. ¹	40												
Hedge Funds	50,047	54,886	45,603	55,312	23,475	-4,839	9,283	-9,709	31,837	-9%	20%	-18%	136%
Global TAA	1,372	1,218	690			154	528			13%	76%		
Diversified Private Equity - LPs ¹²	3,144	2,743	1,442	95,549	88,555	401	1,301	-94,107	6,994	15%	90%	-98%	8%
Diversified Private Equity - FoFs ¹				5,522	5,360				162				3%
Underlying FoF Fees ¹				7,965	7,841				124				2%
LBO - LPs ¹²	45,609	53,243	51,636			-7,634	1,607			-14%	3%		
LBO - FoFs ¹²	7,500	7,355	6,569			146	785			2%	12%		
Underlying FoF Fees ¹²	10,952	8,311	11,206			2,641	-2,896			32%	-26%		
Venture Capital - LPs ¹²	17,217	20,414	28,163	35,444	35,704	-3,198	-7,749	-7,281	-260	-16%	-28%	-21%	-1%
Venture Capital - FoFs ¹²	1,282	1,750	1,617	1,161	1,085	-468	133	456	77	-27%	8%	39%	7%
Underlying FoF Fees ¹²	4,794	4,392	3,665	2,824	2,372	402	727	841	452	9%	20%	30%	19%
Private Credit - LPs ¹²	8,365												
Other Private Equity - LPs ¹²	24,065	25,635	19,766	10,947	9,726	-1,570	5,869	8,819	1,221	-6%	30%	81%	13%
Other Private Equity - Co-Invest. ¹	193	34	9			160	25			473%	289%		
Derivatives/Overlays	495	452	457	367		43	-5	90		9%	-1%	25%	
Total excl. private asset perf. fees	294,704	293,532	288,193	328,574	282,946	1,171	5,340	-40,381	45,628	0%	2%	-12%	16%
Oversight, custodial & other asset related costs													
Oversight of the Fund	4,812	4,578	4,539	3,804	4,073	234	39	735	-269	5%	1%	19%	-7%
Trustee & Custodial	2,412	2,090	2,150	1,673	1,438	322	-60	477	235	15%	-3%	29%	16%
Audit	168	166	158	136	119	2	8	22	17	1%	5%	16%	14%
Other	477	418	375	339	327	59	43	36	12	14%	12%	11%	4%
Total oversight, custodial & other	7,870	7,252	7,222	5,952	5,957	618	30	1,270	-5	9%	0%	21%	0%
Total investment costs ¹	302,574	300,785	295,415	334,526	288,902	1,789	5,370	-39,111	45,624	1%	2%	-12%	16%
Total in basis points	40.4bp	42.2bp	40.9bp	45.9bp	41.8bp								

1. Total cost excludes carry/performance fees for real estate, infrastructure, natural resources and private equity. Performance fees are included for the public market asset classes and hedge funds.

2. Default costs added. Refer to Appendix A.

Total cost versus benchmark cost

Your fund's total investment cost, excluding transaction costs and private asset performance fees, was 9.9 bps below your benchmark cost of 50.3 bps. This implies that your fund was low cost by 9.9 bps compared to the peer median, after adjusting for your fund's asset mix.

Your cost versus benchmark

	\$000s	bps
Your fund's total investment cost excluding transaction costs and illiquid asset performance fees	302,574	40.4 bp
- Your fund's benchmark	377,066	50.3 bp
= Your fund's cost savings	-74,493	-9.9 bp

Your benchmark cost is an estimate of your total costs assuming that you paid the peer median cost for each of your investment mandates and fund oversight. The calculation of your benchmark cost is shown on the following page.

The reasons why your fund's total cost was below your benchmark are summarized in the table below. Details of each of the impacts below are provided on pages 9 to 12.

Reasons why your fund was low cost

	Cost/-Savings impact	
	\$000s	bps
<u>Differences in implementation style:</u>		
External active vs. low cost styles	-56,099	-7.5 bp
Partnerships vs. external active	3,486	0.5 bp
Fund of funds vs. external direct	-368	0.0 bp
Mix of internal and passive styles	6,483	0.9 bp
Style impact of overlays	-1,478	-0.2 bp
Total style impact	-47,975	-6.4 bp
<u>Paying more/-less for similar services:</u>		
External investment management	-31,822	-4.2 bp
Internal investment management	4,665	0.6 bp
Oversight, custodial and other	640	0.1 bp
Total impact of paying more /-less	-26,518	-3.5 bp
Total savings	-74,493	-9.9 bp

Benchmark cost calculation

Your 2017 benchmark cost was 50.3 basis points or 377.1 million. It equals your holdings for each asset class multiplied by the peer median cost for the asset class. The peer median cost is the style weighted average for all implementation styles (i.e., internal passive, internal active, external passive, external active).

Calculation of your 2017 benchmark cost

Asset class	Your average assets	Weighted peer median cost ¹	Benchmark \$000s
	(A)	(B)	(A X B)
Asset management costs			
Stock - U.S. Large Cap	20,822	5.0 bp	10,482
Stock - U.S. Small Cap	2,091	48.4 bp	10,124
Stock - EAFE	11,299	19.6 bp	22,176
Stock - Emerging	3,307	41.4 bp	13,674
Stock - Global	585	33.0 bp	1,929
Stock - ACWI x U.S.	4,431	32.1 bp	14,226
Fixed Income - U.S.	10,934	6.6 bp	7,179
Fixed Income - Emerging	776	34.3 bp	2,658
Fixed Income - High Yield	821	36.7 bp	3,010
Cash	1,690	1.7 bp	286
REITs	1,190	21.8 bp	2,593
Real Estate ex-REITs	7,035	79.9 bp	56,246
Infrastructure	90	93.6 bp	842
Natural Resources	696	92.6 bp	6,445
Hedge Funds	1,821	129.6 bp	23,602
Perf. fees (on NAV)	1,821	73.0 bp	13,301
Global TAA	577	101.8 bp	5,871
Diversified Private Equity	249	154.6 bp	3,844
Venture Capital	1,608	194.1 bp	31,216
LBO	5,749	154.8 bp	88,987
Private Credit	791	114.6 bp	9,061
Other Private Equity	2,675	150.0 bp	40,111
Overlay Programs ²	74,983	0.3 bp	1,974
Benchmark for asset management	74,983	49.3 bp	369,837
Oversight, custody and other costs			
Oversight of the Fund	74,983	0.5 bp	3,586
Trustee & Custodial	74,983	0.3 bp	2,412
Consulting and Performance Measurement	74,983	0.0 bp	0
Audit	74,983	0.0 bp	197
Other	74,983	0.1 bp	1,034
Benchmark for oversight, custody & other		1.0 bp	7,230
Total benchmark cost		50.3 bp	377,066

1. The weighted peer median cost for asset management is the style-weighted average of the peer median costs for all implementation styles (i.e., internal passive, internal active, external passive, external active, fund of fund). The style weights by asset class for your fund and the peers are shown on page 17 of this section.

2. Total fund average holdings is used as the base when calculating the relative cost impact of the overlay programs.

Gender	Age Group	Number of Respondents
Male	18-24	10
	25-34	20
	35-44	30
	45-54	40
	55-64	50
	65+	60
Female	18-24	15
	25-34	25
	35-44	35
	45-54	45
	55-64	55
	65+	65



-47,975 -6.4 bp

Cost impact of overlays

As summarized on the previous page, the style impact of overlays saved you 0.2 bps. If you use more overlays than your peers, or more expensive types of overlays, then it increases your relative cost.

	Your average total holdings (mils)	Cost as % of total holdings		Cost/-Savings Impact (000s)
		You	Peer avg.	
	(A)	(B)	(C)	A X (B - C)
External Overlays				
Total impact in 000s				
Total impact in basis points				

Cost impact of lower cost styles

As summarized on page 9, your mix of 'lower-cost' internal and passive styles cost you 0.9 bps. Details are shown below.

[illegible]

Cost impact of paying more/-less for similar services

Differences in what you paid relative to your peers for similar asset management and related oversight and support services saved you 3.5 bps.

Calculation of the cost impact of paying more/-less

	Style	Your avg holdings (mils) (A)	<u>Cost in bps</u>			Cost/ -Savings \$000s (A X B) bps
			Your	Peer median	More/ -less (B)	
External asset management						
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total for external management						
Internal asset management		(A)			(B)	(A X B)
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total for internal management						
Oversight, custodial, other						
[REDACTED]		[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total for oversight, custodial, other						
Total						

1. Universe median used because peer data was insufficient.
2. Database median used because peer and universe data were insufficient.
3. The impact of this line is neutralized by setting the benchmark cost to You.

Summary of why you are high or low cost by asset class

The table below summarizes where you are high and low cost by asset class. It also quantifies how much is due to differences in implementation style (i.e., differences in the mix of external active, external passive, internal active, internal passive and fund of fund usage) and how much is due to paying more or less for similar services (i.e., same asset class and style).

Summary of why you are high or low cost by asset class

	Your cost ¹	Benchmark = peer weighted median cost ¹	More/-less	Your average assets (or fee basis)	'More/-less in \$000s		
					Total More/-less	Due to Impl. style	Due to paying more/less
Asset management costs	(A)	(B)	(C = A - B)	(D)	(C X D)		
Stock - U.S. Large Cap	7.4 bp	5.0 bp	2.3 bp	20,822	4,874	-3,451	8,325
Stock - U.S. Small Cap	48.1 bp	48.4 bp	-0.3 bp	2,091	-60	-1,199	1,139
Stock - EAFE	21.0 bp	19.6 bp	1.4 bp	11,299	1,533	2,650	-1,117
Stock - Emerging	28.3 bp	41.4 bp	-13.0 bp	3,307	-4,313	-4,869	556
Stock - Global	8.5 bp	33.0 bp	-24.5 bp	585	-1,434	-1,485	52
Stock - ACWI x U.S.	14.9 bp	32.1 bp	-17.2 bp	4,431	-7,609	-5,794	-1,814
Fixed Income - U.S.	3.0 bp	6.6 bp	-3.5 bp	10,934	-3,875	-3,890	16
Fixed Income - Emerging	46.3 bp	34.3 bp	12.0 bp	776	934	44	890
Fixed Income - High Yield	40.4 bp	36.7 bp	3.7 bp	821	301	78	223
Cash	1.7 bp	1.7 bp	0.0 bp	1,690	0	0	0
REITs	0.8 bp	21.8 bp	-21.0 bp	1,190	-2,499	-2,252	-247
Real Estate ex-REITs	50.2 bp	79.2 bp	-29.0 bp	7,035	-20,409	-25,135	4,726
Underlying base fees	0.0 bp	0.8 bp	-0.8 bp	7,035	-541	-541	0
Infrastructure	52.6 bp	88.7 bp	-36.2 bp	90	-326	-268	-57
Underlying base fees	85.3 bp	4.9 bp	80.4 bp	90	723	1,008	-285
Natural Resources	99.8 bp	92.5 bp	7.2 bp	696	504	210	295
Underlying base fees	0.0 bp	0.1 bp	-0.1 bp	696	-8	-8	0
Hedge Funds	149.7 bp	121.5 bp	28.2 bp	1,821	5,134	651	4,483
Perf. fees (on NAV)	125.0 bp	68.9 bp	56.1 bp	1,821	10,222	561	9,661
Underlying base fees	0.0 bp	8.0 bp	-8.0 bp	1,821	-1,464	-1,464	0
Underlying perf. fees (on NAV)	0.0 bp	4.1 bp	-4.1 bp	1,821	-748	-748	0
Global TAA	23.8 bp	101.8 bp	-78.0 bp	577	-4,499	1,347	-5,846
Diversified Private Equity	126.4 bp	145.1 bp	-18.7 bp	249	-465	120	-585
Underlying base fees	0.0 bp	9.5 bp	-9.5 bp	249	-236	-236	0
Venture Capital	115.0 bp	182.5 bp	-67.5 bp	1,608	-10,859	-2,792	-8,068
Underlying base fees	29.8 bp	11.5 bp	18.3 bp	1,608	2,937	3,799	-862
LBO	92.4 bp	149.5 bp	-57.1 bp	5,749	-32,818	-8,495	-24,323
Underlying base fees	19.1 bp	5.3 bp	13.7 bp	5,749	7,892	7,892	0
Private Credit	105.7 bp	114.6 bp	-8.8 bp	791	-696	0	-696
Underlying base fees	0.0 bp	0.0 bp	0.0 bp	791	0	0	0
Other Private Equity	90.7 bp	150.0 bp	-59.3 bp	2,675	-15,853	-2,230	-13,623
Overlay Programs ²	0.1 bp	0.3 bp	-0.2 bp	74,983	-1,478	-1,478	0
Total asset management	39.3 bp	49.3 bp	-10.0 bp	74,983	-75,133	-47,975	-27,158
Oversight, custody and other costs							
Oversight of the Fund			0.2 bp	74,983	1,226	n/a	1,226
Trustee & Custodial			0.0 bp	74,983	0	n/a	0
Consulting			0.0 bp	74,983	0	n/a	0
Audit			0.0 bp	74,983	-29	n/a	-29
Other			-0.1 bp	74,983	-557	n/a	-557
Total oversight, custody & other			0.1 bp	74,983	640	n/a	640
Total	40.4 bp	50.3 bp	-9.9 bp	74,983	-74,493	-47,975	-26,518

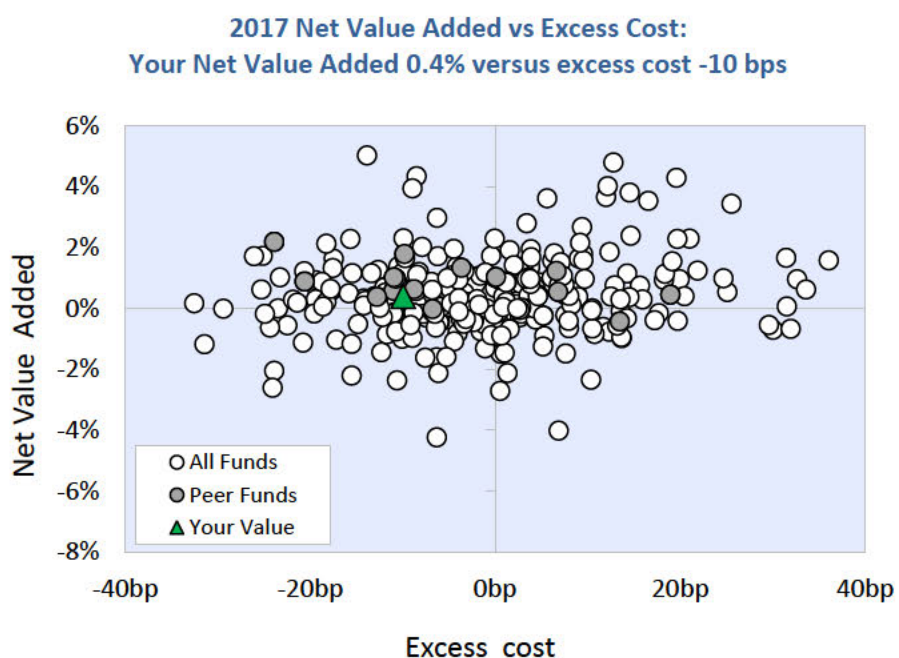
1. The weighted peer median cost for asset management is the style-weighted average of the peer median costs for all implementation styles (i.e., internal passive, internal active, external passive, external active, fund of fund). It excludes performance fees on private assets. The style weights by asset class for your fund and the peers are shown on page 17 of this section.

2. Total fund average holdings is used as the base when calculating the relative cost impact of the overlay programs.

Your cost effectiveness ranking

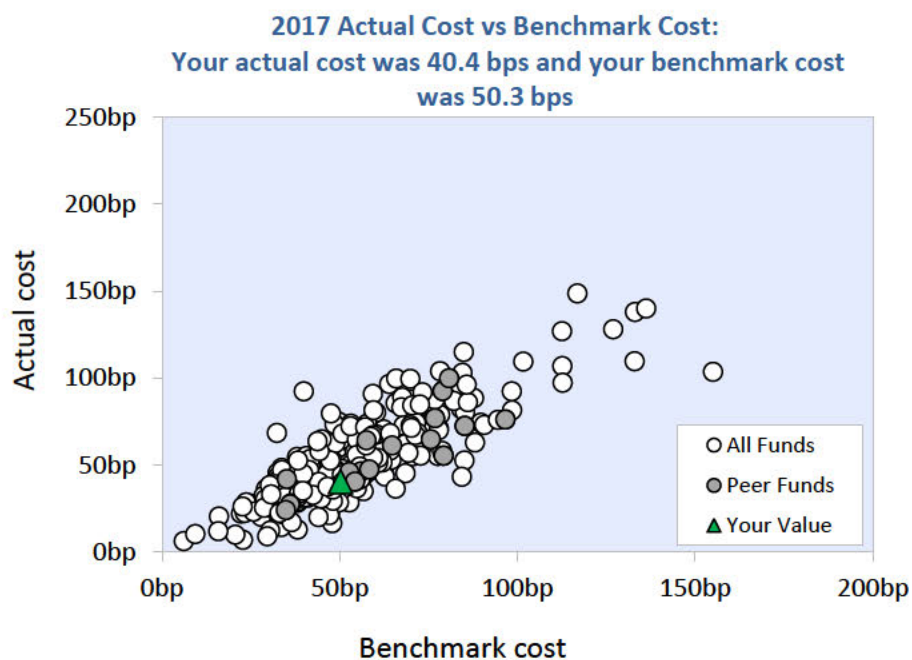
Being high or low cost is neither good nor bad. The more important question is, are you receiving sufficient value for your excess cost? At the total fund level, we provide insight into this question by combining your value added and your excess cost to create a snapshot your cost effectiveness performance relative to that of the survey universe.

For the 2017 year, your fund ranked in the positive value added, low cost quadrant.



1 Benchmark cost and excess cost calculations are based on regression analysis (see Appendix B in this section) for all funds except your fund. Your fund's benchmark cost is based on peer-median costs (per page 7 of this section).

Actual cost versus benchmark cost



1 Benchmark cost calculations are based on regression analysis (see Appendix B in this section) for all funds except your fund. Your fund's benchmark cost is based on peer-median costs (per page 7 of this section).

Appendix A: Benchmarking methodology formulas and data

Appendix A: Benchmarking methodology formulas and data (page 2 of 2)

b) 2017 cost data used to calculate weighted peer median costs and impact of mix differences.

[illegible]

c) 2017 Style weights used to calculate the weighted peer median costs and impact of mix differences.

Style Weights	You (%)						Peer average (%)					
	Internal Passive	Internal Active	External Passive	External Active	Limited Partner.	Fund of Funds	Internal Passive	Internal Active	External Passive	External Active	Limited Partner.	Fund of Funds
Stock - U.S. Large Cap	44.2%	50.3%	0.0%	5.4%			36.5%	22.5%	25.1%	15.9%		
Stock - U.S. Small Cap	0.0%	39.9%	0.0%	60.1%			1.9%	21.2%	5.8%	71.1%		
Stock - EAFE	0.0%	49.8%	0.0%	50.2%			16.5%	12.9%	20.5%	50.1%		
Stock - Emerging	0.0%	67.2%	0.0%	32.8%			9.3%	8.8%	12.9%	69.1%		
Stock - Global	0.0%	100.0%		0.0%			8.4%	20.9%		70.7%		
Stock - ACWI x U.S.	0.0%	70.0%	0.0%	30.0%			0.1%	7.4%	15.9%	76.6%		
Fixed Income - U.S.	0.0%	100.0%	0.0%	0.0%			3.3%	58.5%	6.0%	32.3%		
Fixed Income - Emerging		0.0%		100.0%				2.1%		97.9%		
Fixed Income - High Yield	0.0%	0.0%		100.0%			1.1%	1.9%		96.9%		
Cash		100.0%		0.0%				100.0%		0.0%		
REITs	100.0%	0.0%	0.0%	0.0%			31.1%	7.2%	3.8%	57.8%		
Real Estate ex-REITs		79.0%		0.0%	21.0%	0.0%		8.0%		39.3%	52.0%	0.7%
Underlying base fees		79.0%		0.0%	21.0%	0.0%		8.0%		39.3%	52.0%	0.7%
Infrastructure		0.0%		0.0%	0.0%	100.0%		17.5%	16.4%	61.9%	4.2%	
Underlying base fees		0.0%		0.0%	0.0%	100.0%		17.5%	16.4%	61.9%	4.2%	
Natural Resources		0.0%		0.0%	100.0%	0.0%		0.8%	20.4%	78.7%	0.1%	
Underlying base fees		0.0%		0.0%	100.0%	0.0%		0.8%	20.4%	78.7%	0.1%	
Hedge Funds				100.0%		0.0%				94.3%		5.7%
Perf. fees (on NAV)				100.0%		0.0%				94.3%		5.7%
Underlying base fees				100.0%		0.0%				94.3%		5.7%
Underlying perf. fees (on NAV)				100.0%		0.0%				94.3%		5.7%
Global TAA		0.0%		100.0%				20.3%		79.7%		
Diversified Private Equity		0.0%			100.0%	0.0%		0.0%			93.9%	6.0%
Underlying base fees		0.0%			100.0%	0.0%		0.0%			93.9%	6.0%
Venture Capital		0.0%			81.7%	18.3%		0.4%			93.6%	6.0%
Underlying base fees		0.0%			81.7%	18.3%		0.4%			93.6%	6.0%
LBO					78.4%	21.6%					94.0%	6.0%
Underlying base fees					78.4%	21.6%					94.0%	6.0%
Private Credit					100.0%						100.0%	
Underlying base fees					100.0%						100.0%	
Other Private Equity		7.6%			92.4%			0.0%			100.0%	

The above data was adjusted as noted when there were insufficient peers, or for other reasons where direct comparisons were inappropriate.

Appendix B: Regression based benchmarks

[illegible]

Age Group	Percentage Vaccinated
18-24	~45%
25-34	~35%
35-44	~65%
45-54	~80%
55-64	~100%
65-74	~100%
75-84	~15%
85+	~70%

5

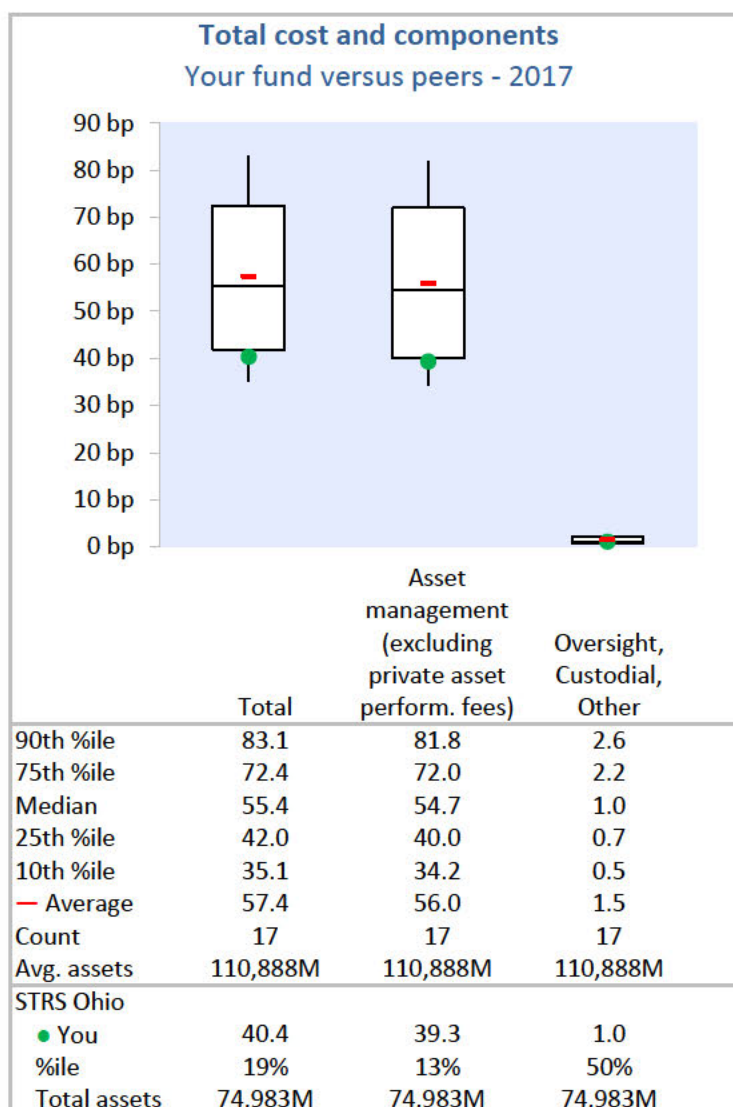
Cost comparisons

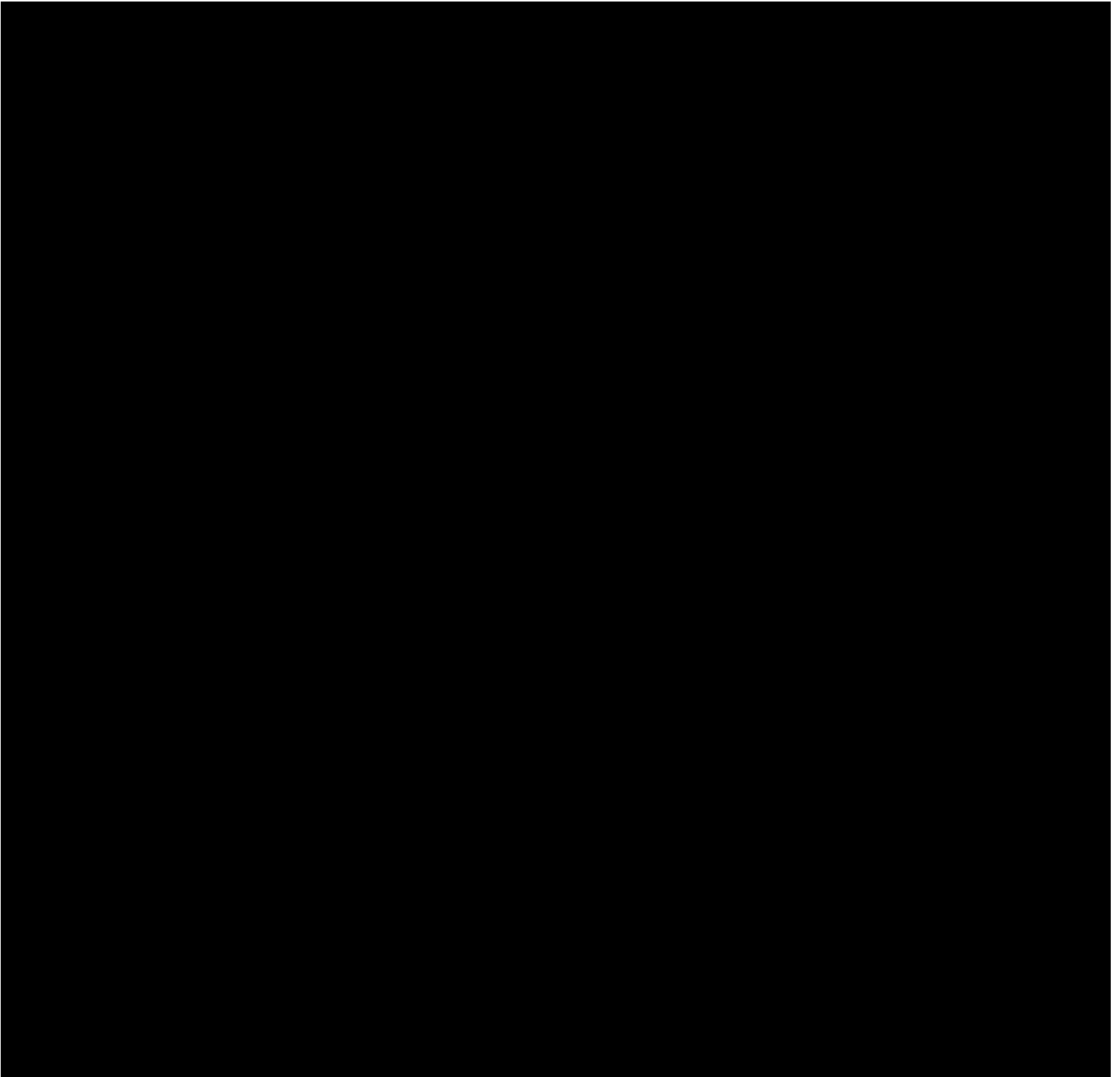
Total fund cost	2
Governance, operations & support	3
Public asset classes	
- Stock	4
- Fixed Income	14
- Commodities	30
- REITs	31
Real asset classes	
- Real estate ex-REITs	32
- Infrastructure	33
- Natural resources	34
- Other real assets	35
Private equity	
- Diversified private equity	36
- LBO	37
- Venture capital	38
- Private credit	39
- Other private equity	40
Global TAA	41
RiskParity	42
Hedge Funds	43
Overlays	44

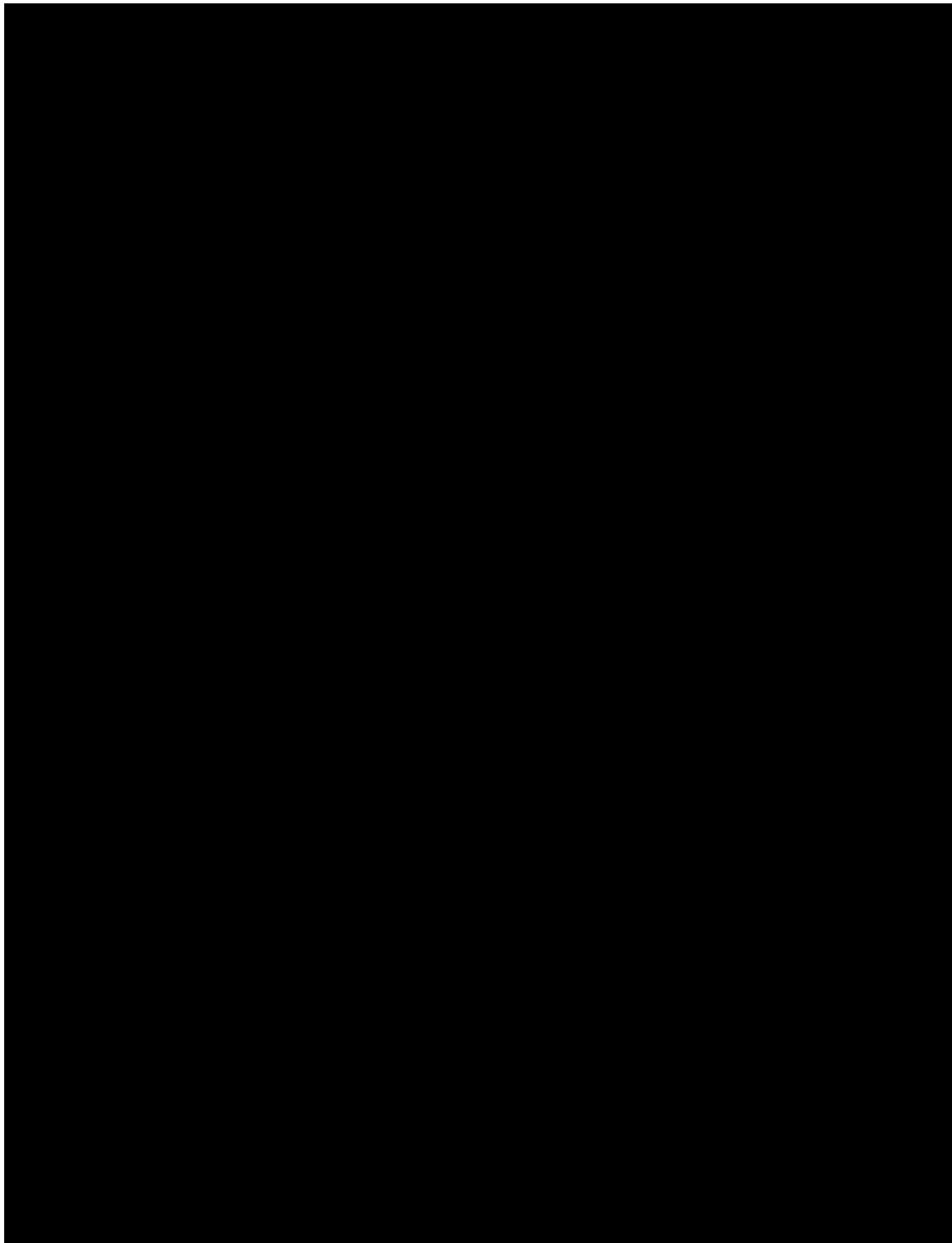
Total fund cost

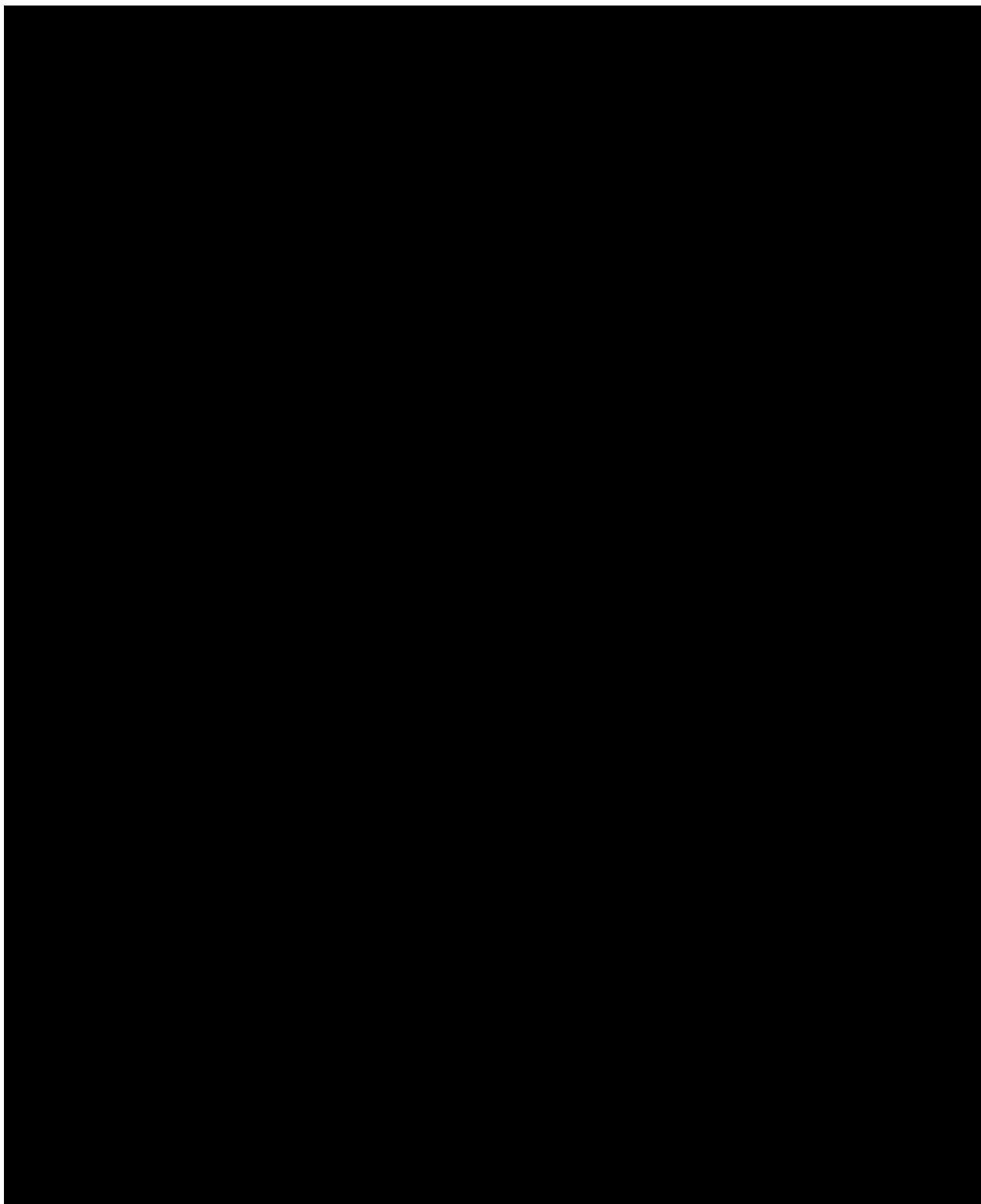
Total costs are benchmarked in the previous section. In this section, your fund's costs are compared on a line-item basis to your peers. This enables you to understand better why you may be a high or low cost fund and it also identifies and quantifies major cost differences that may warrant further investigation.

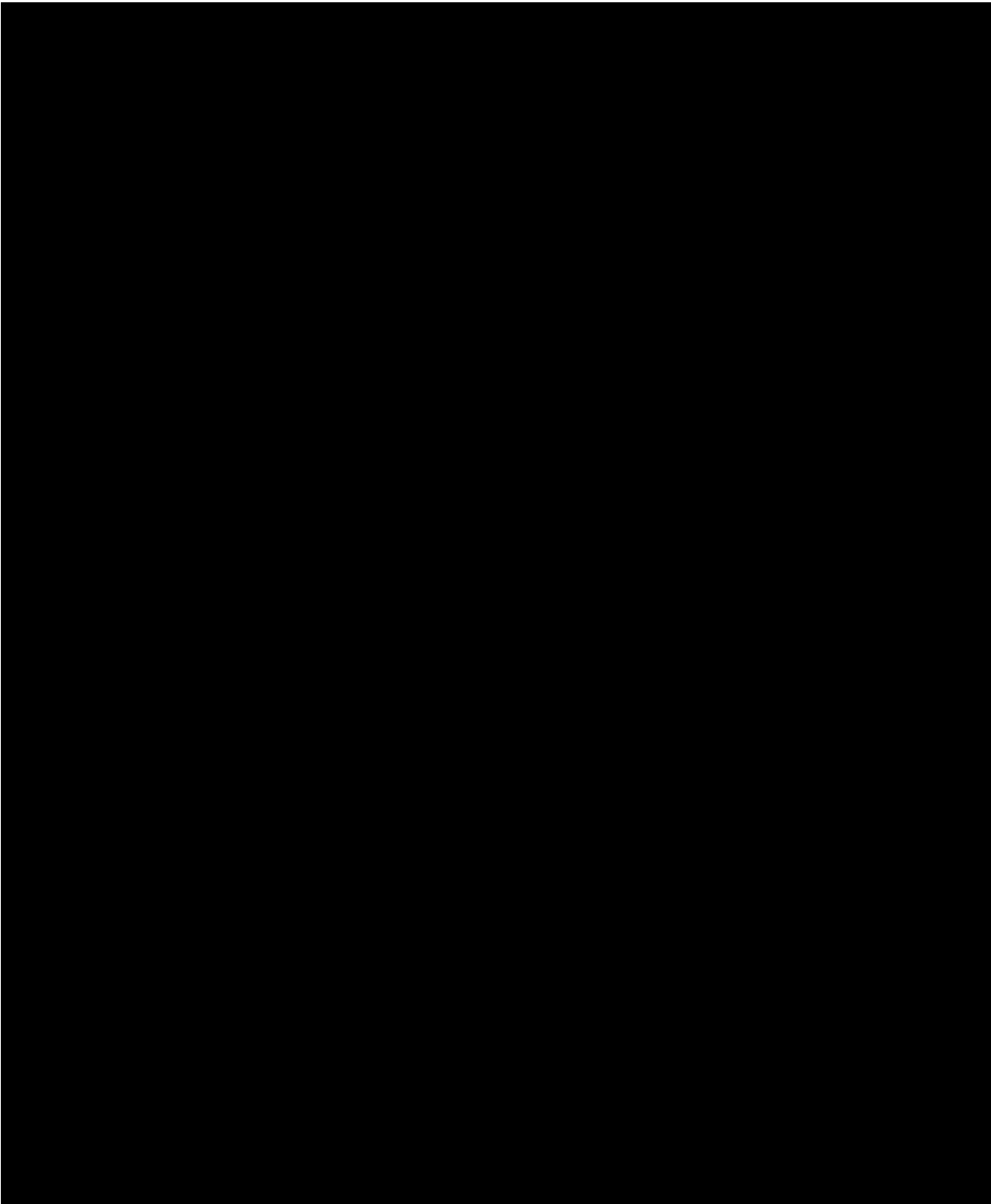
The 25th to 75th percentile range is the most relevant since higher and lower values may include outliers caused by unusual circumstances, such as performance-based fees. Count refers to the number of funds in your peer group that have costs in this category. It enables you to gauge the statistical significance.

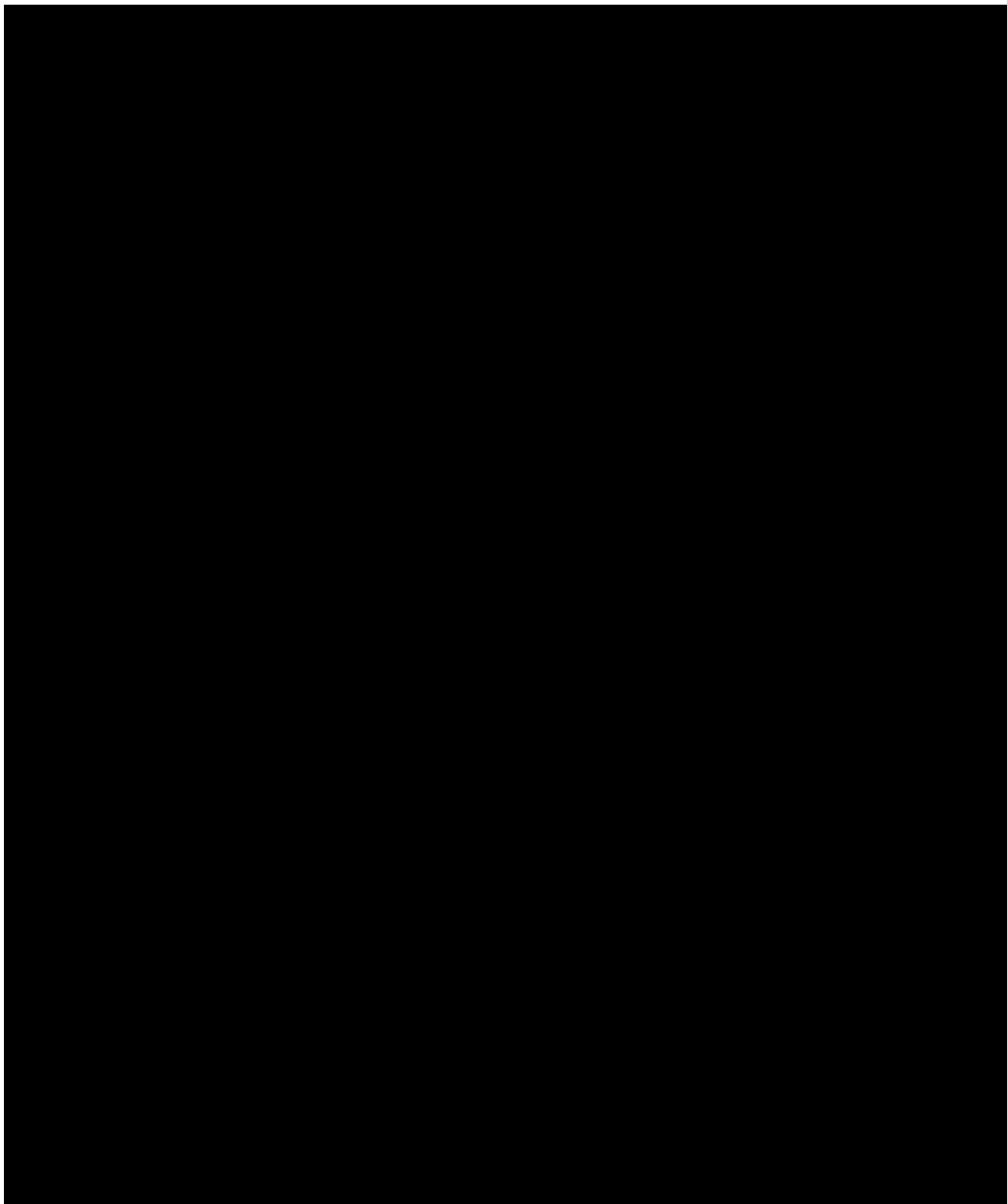


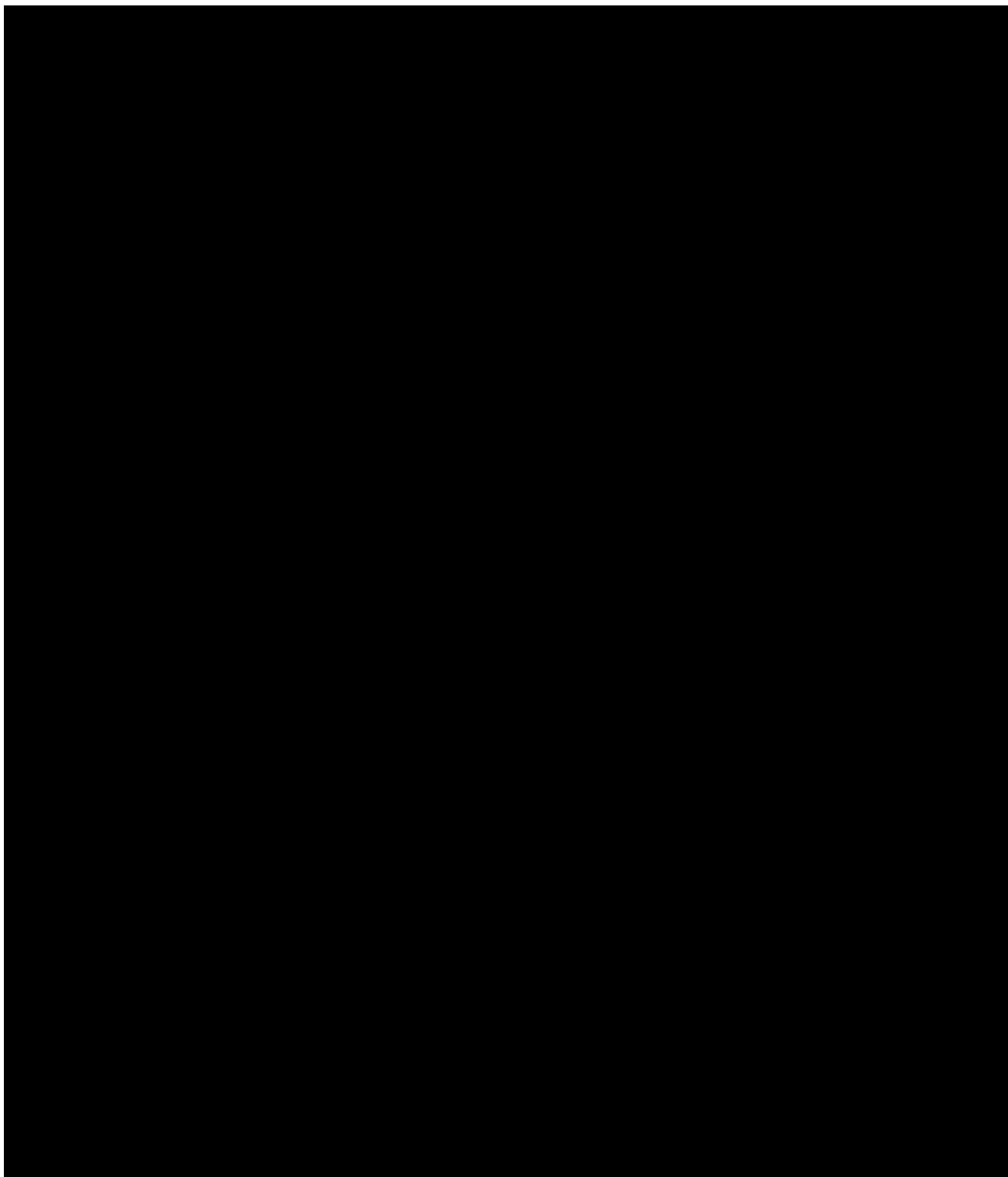


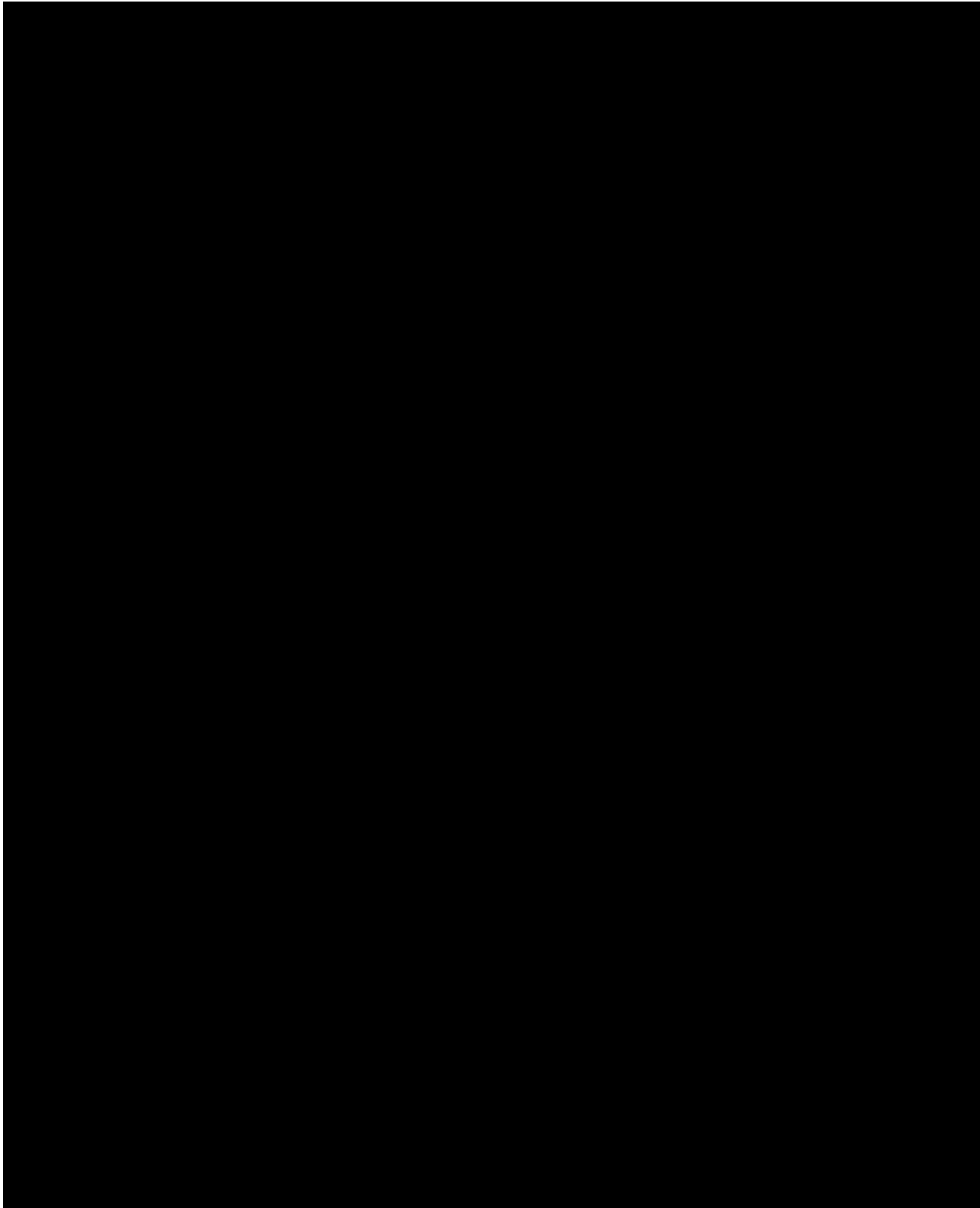


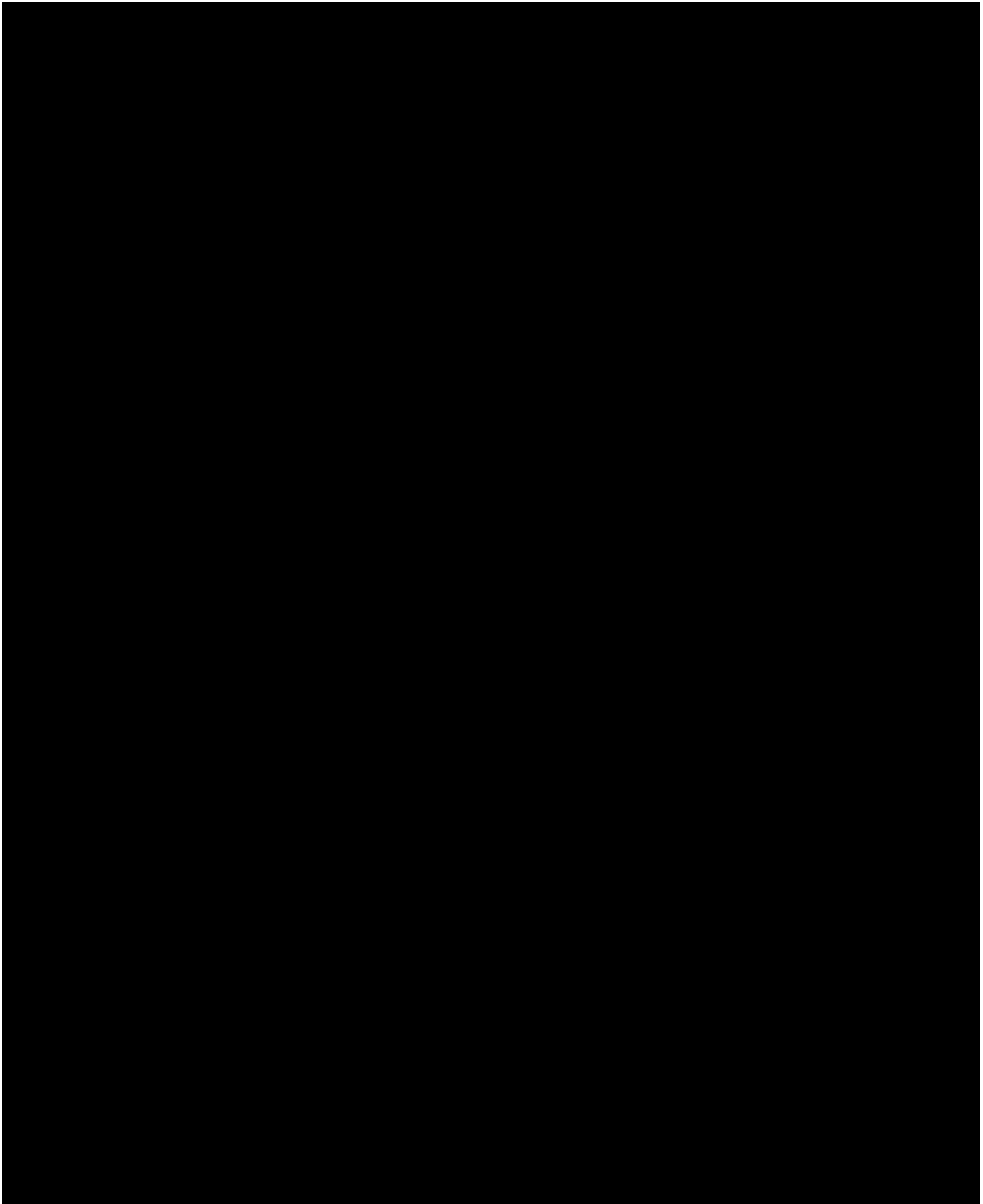


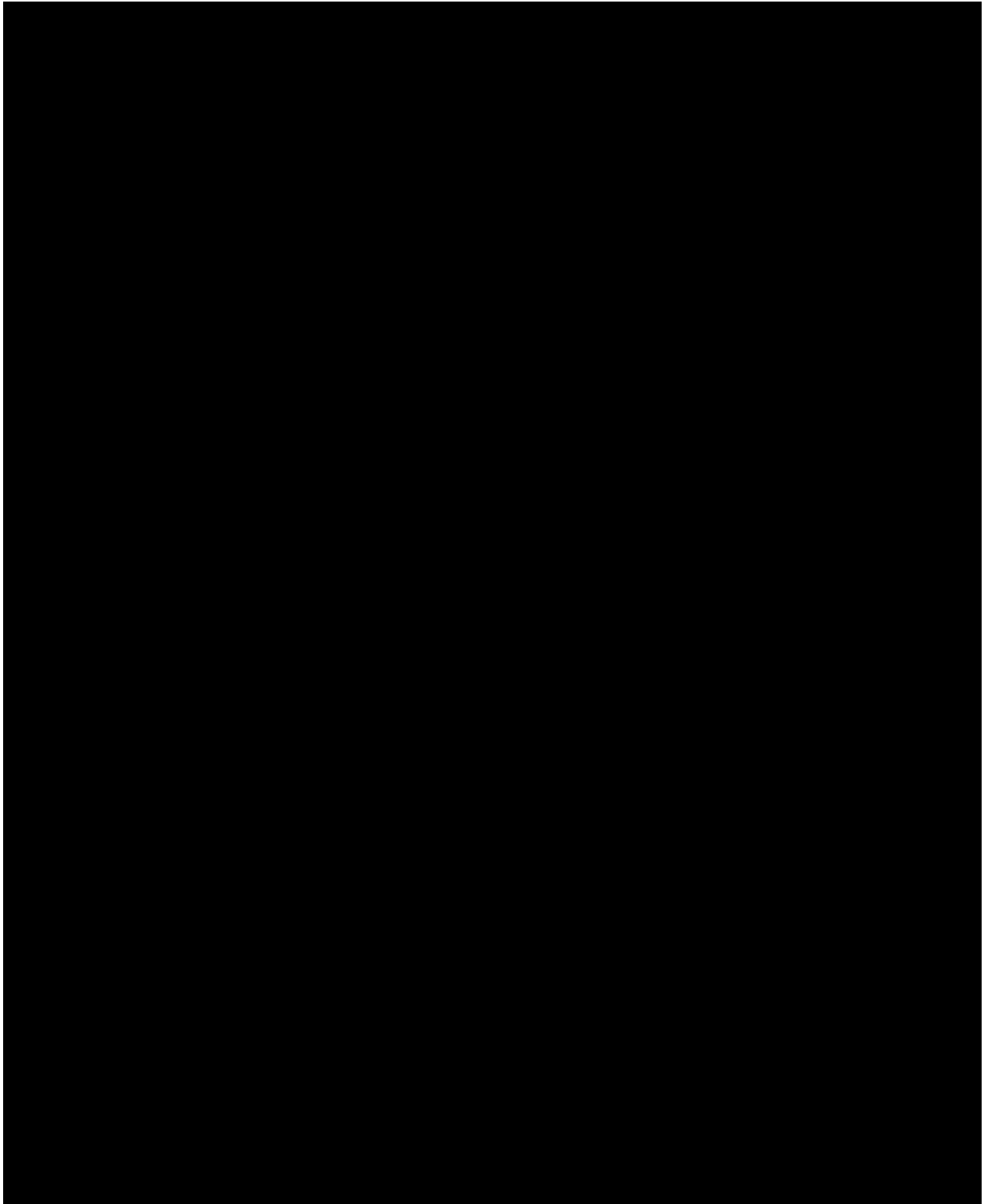


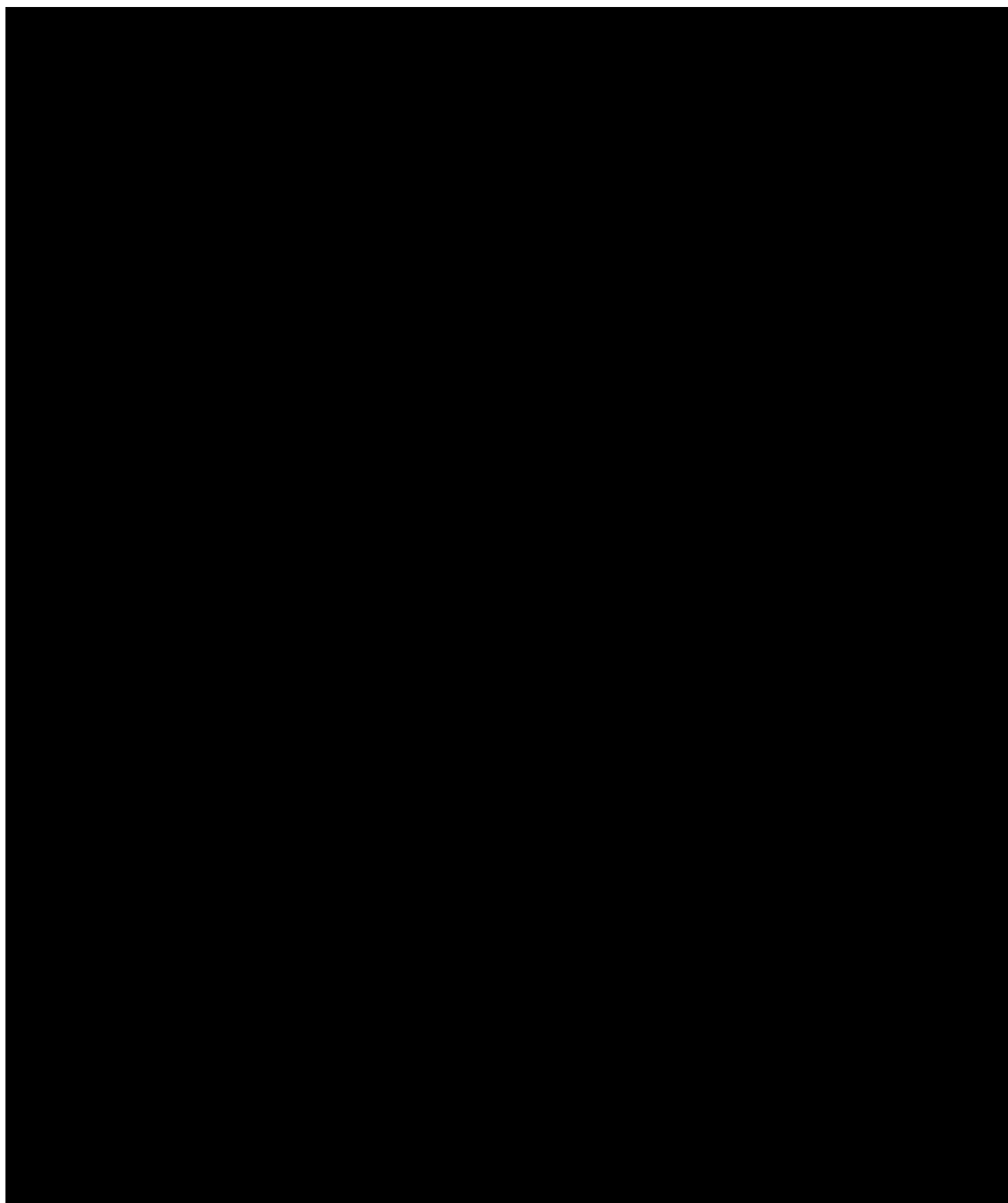


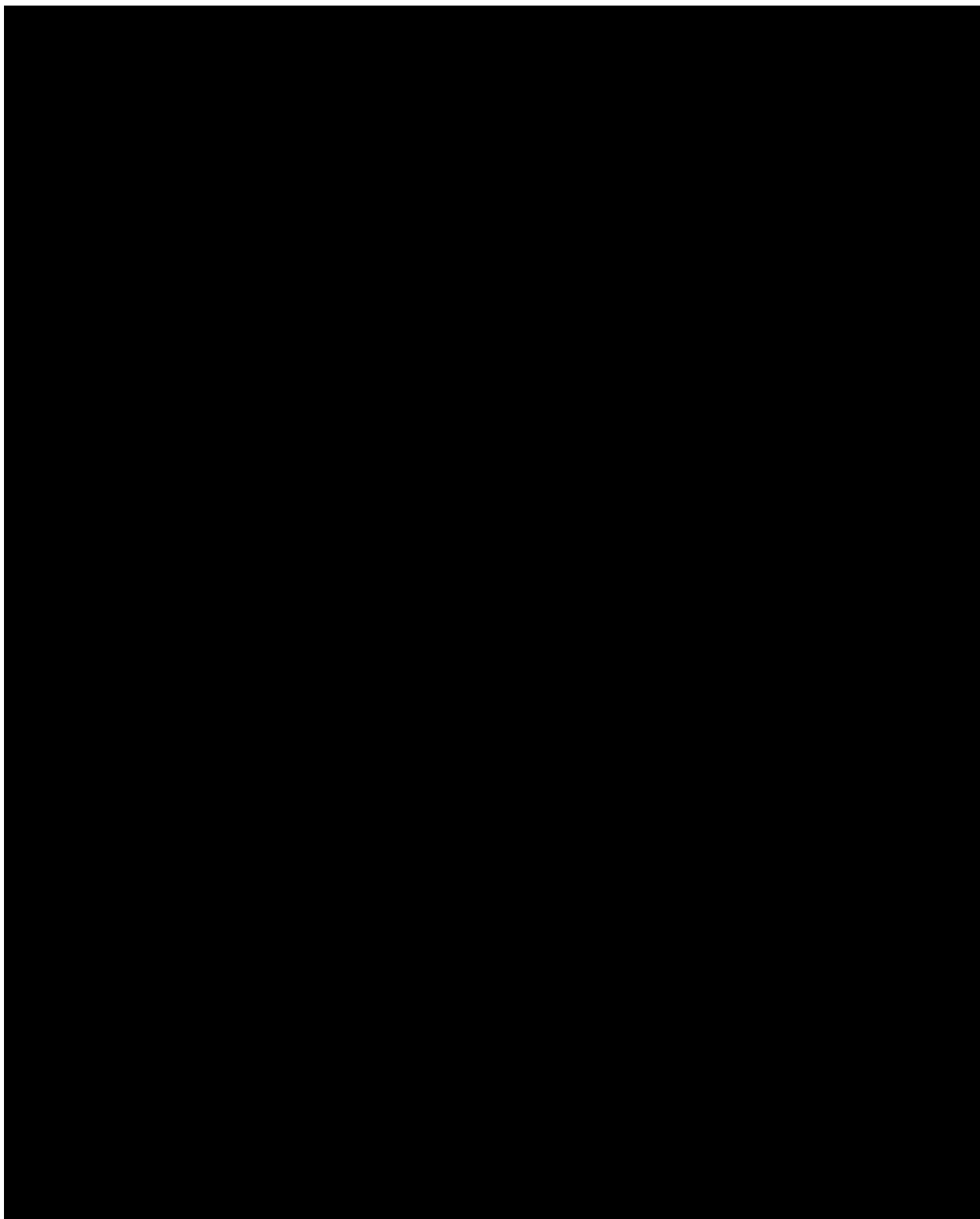


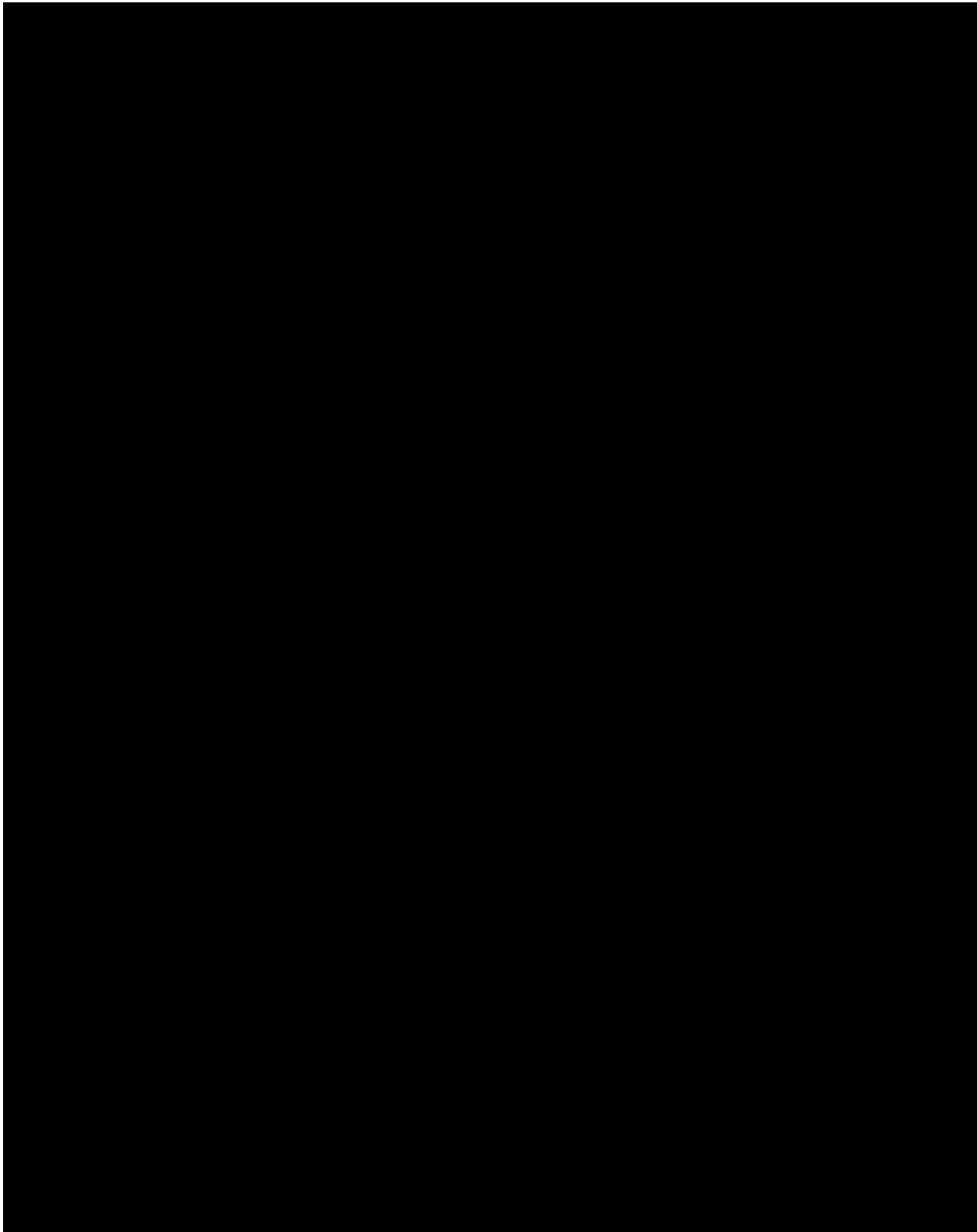


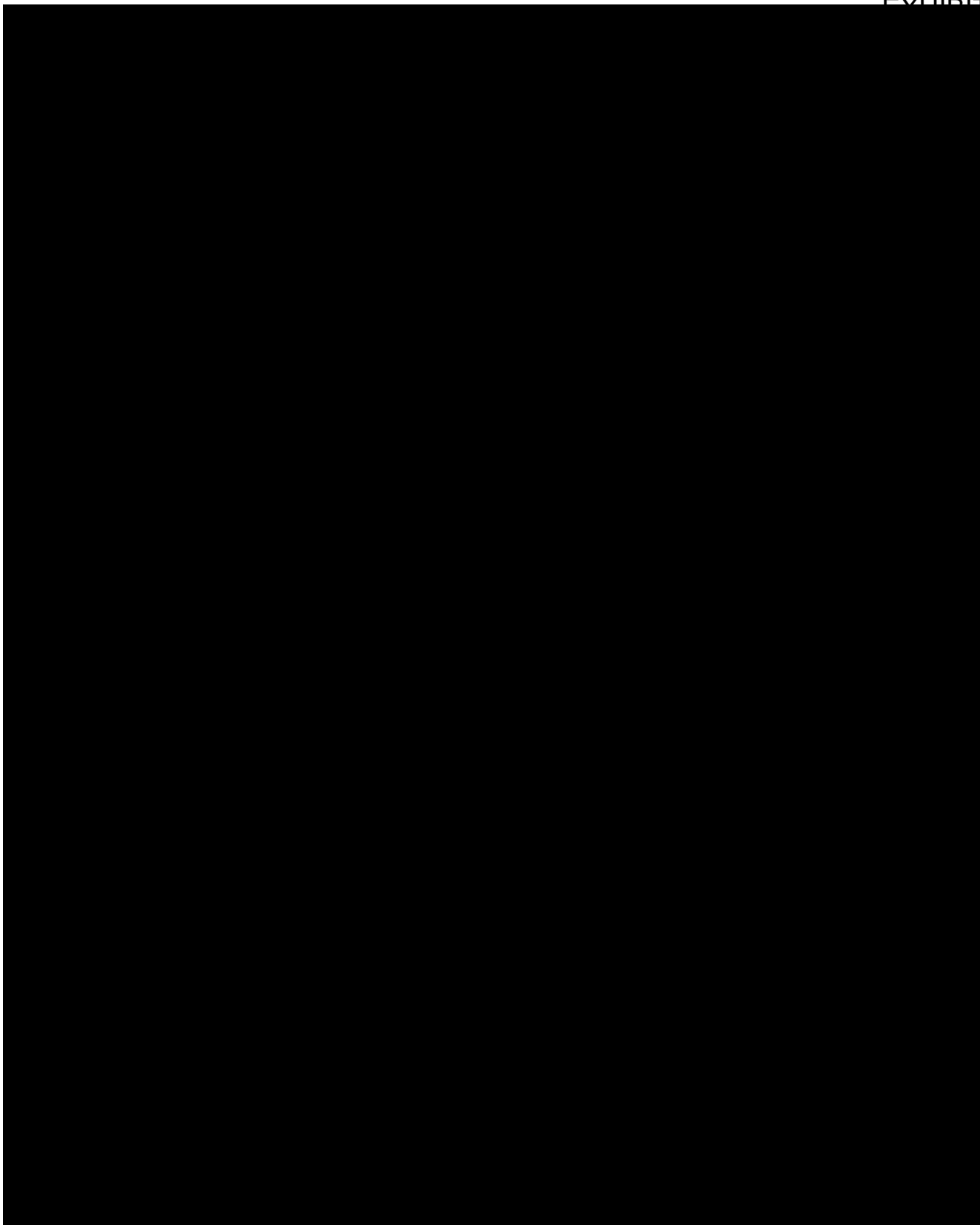


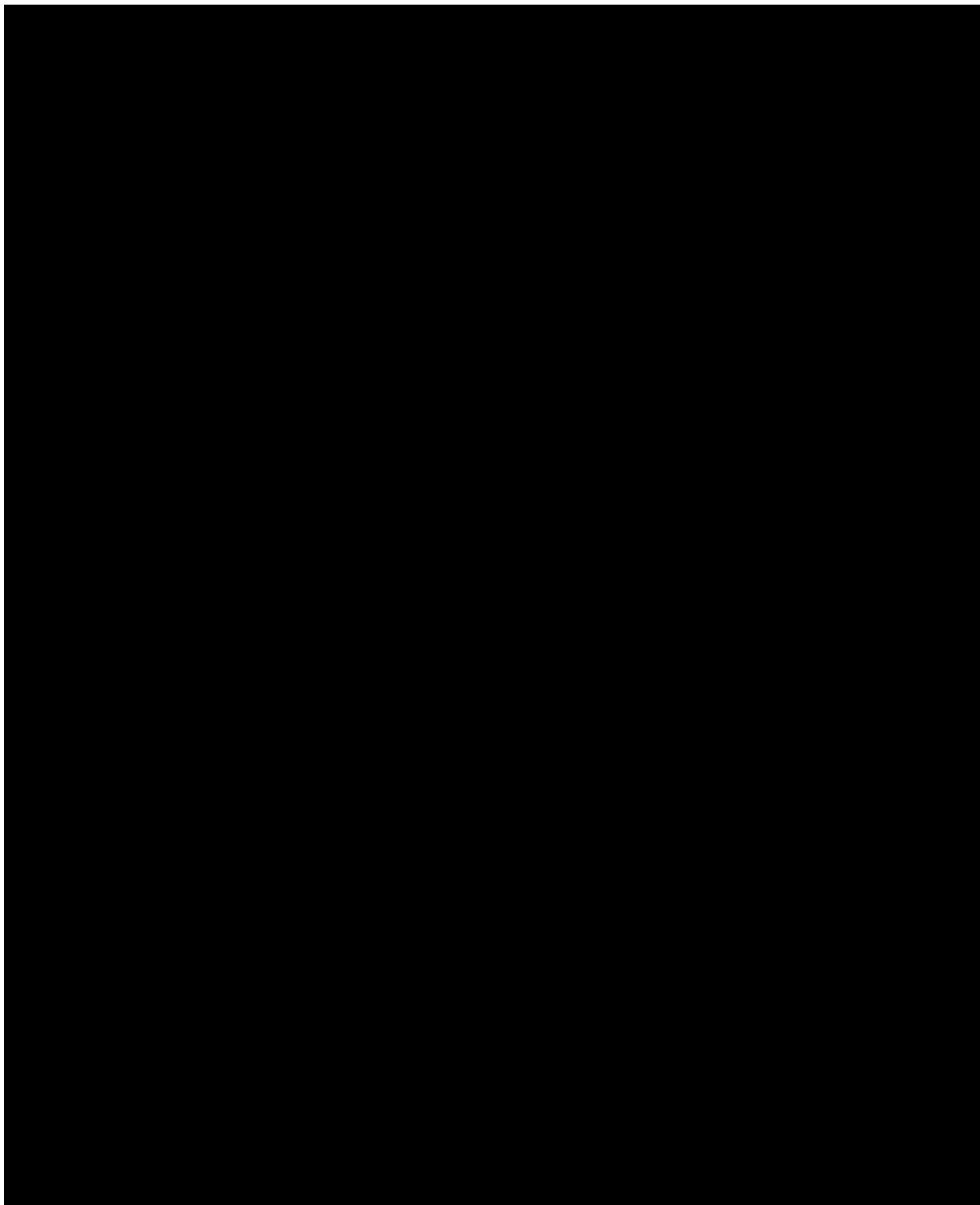


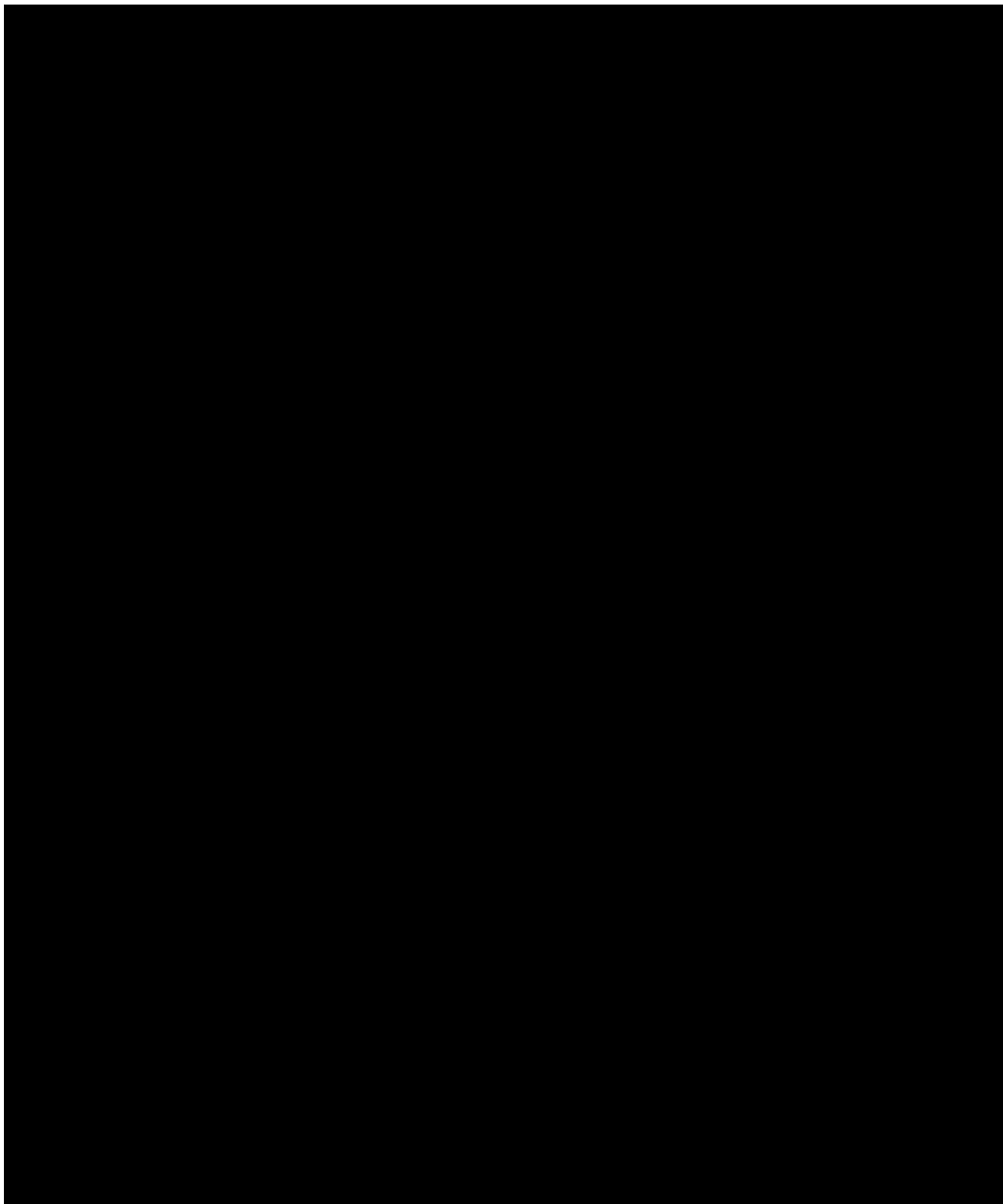


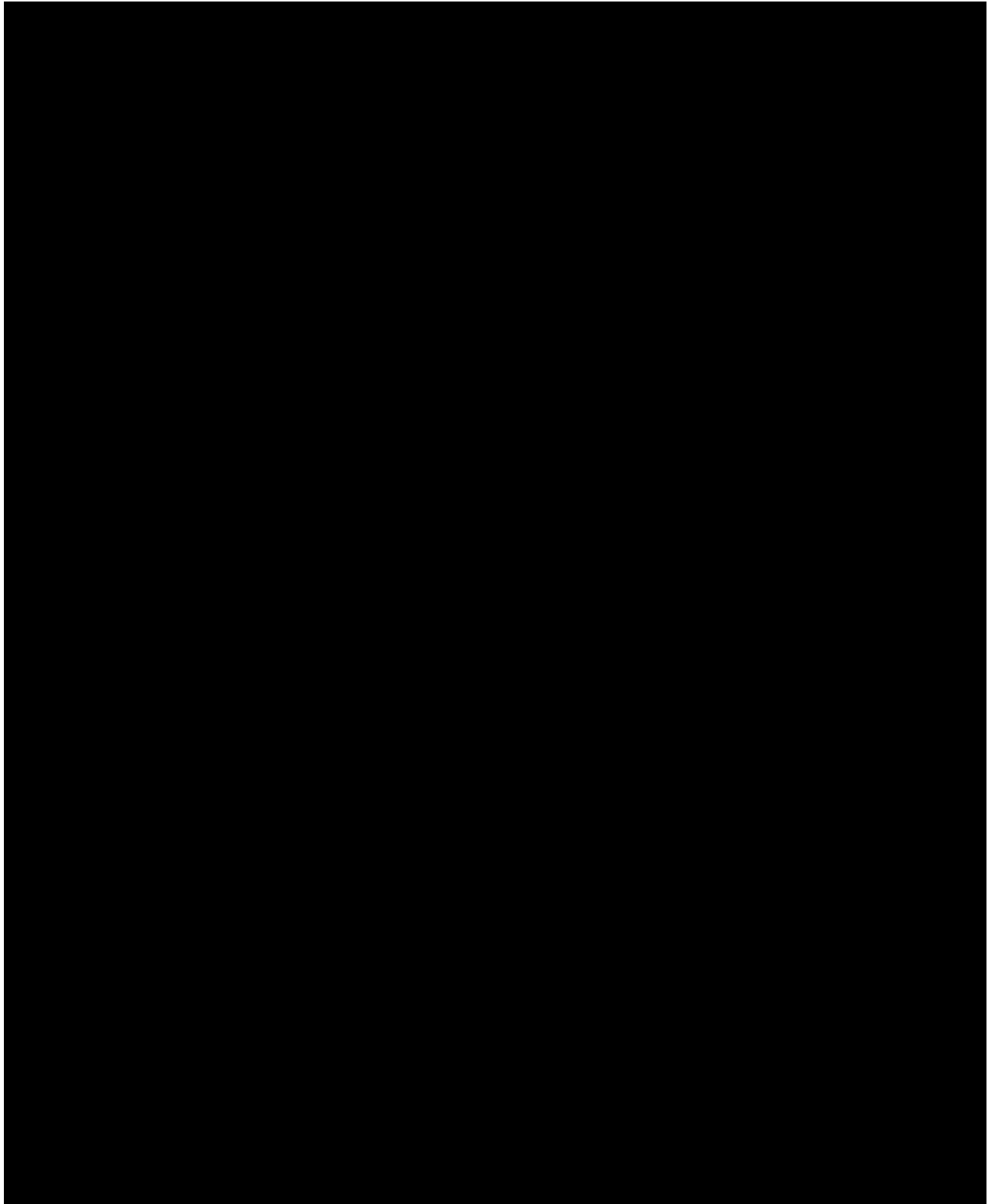


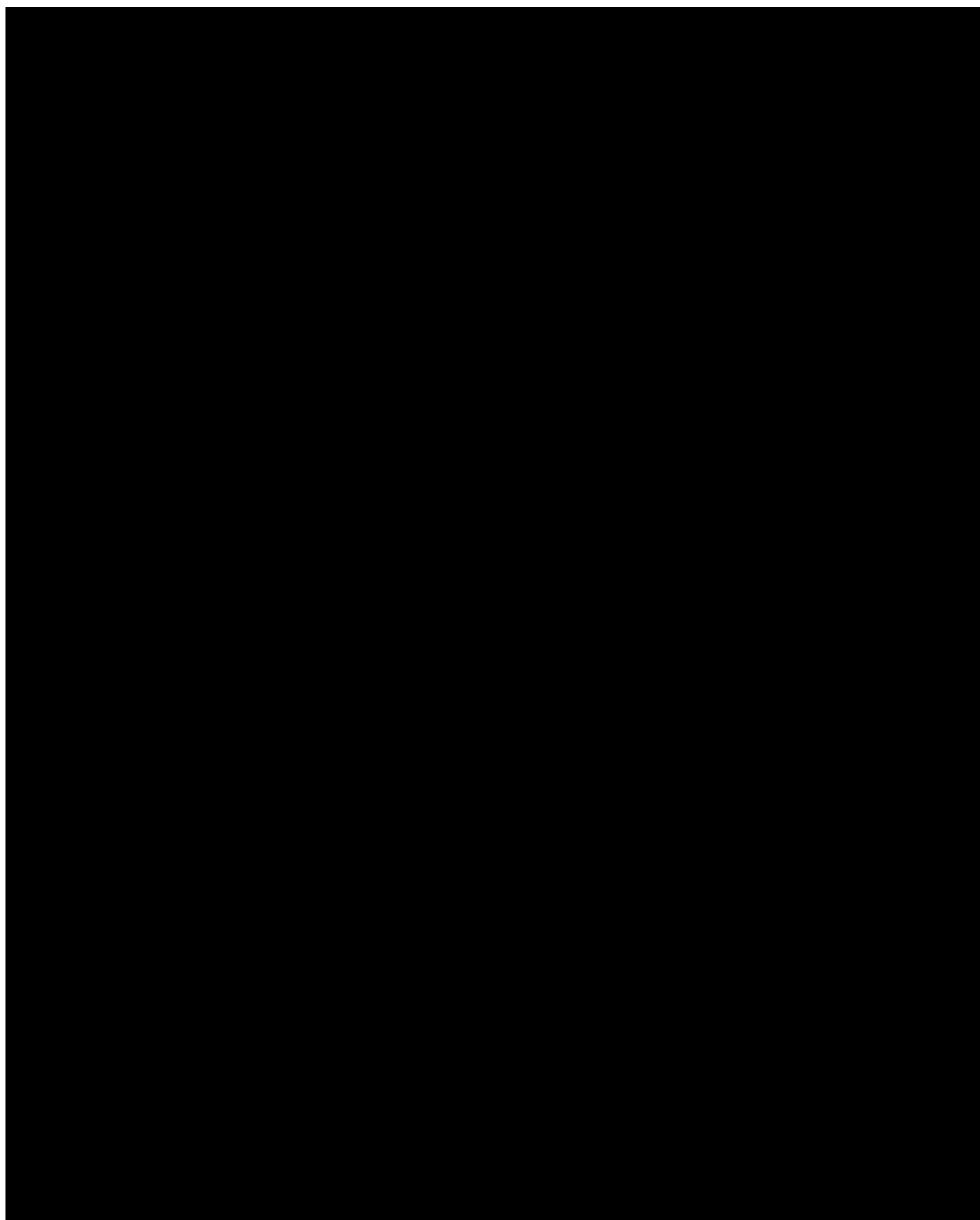


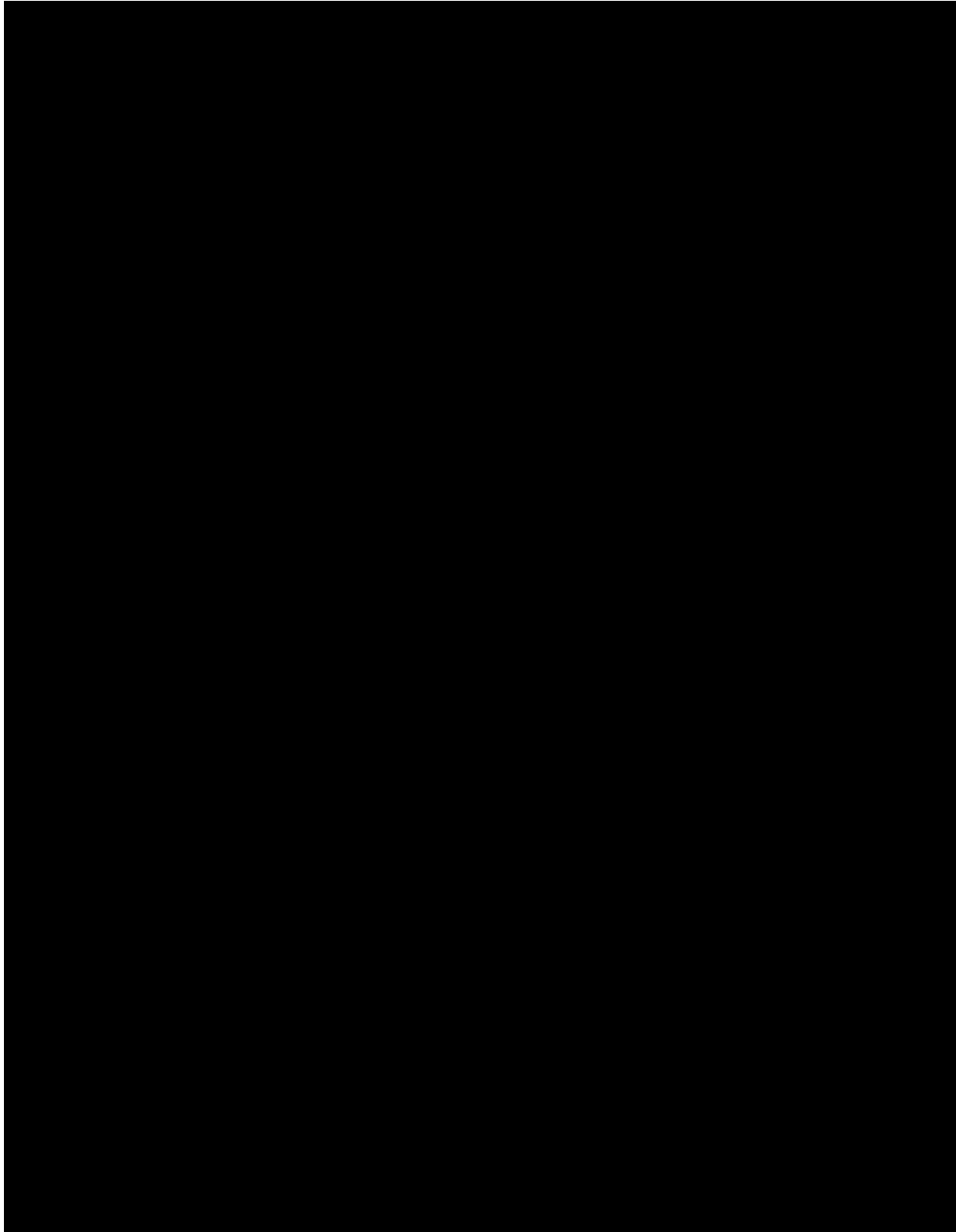


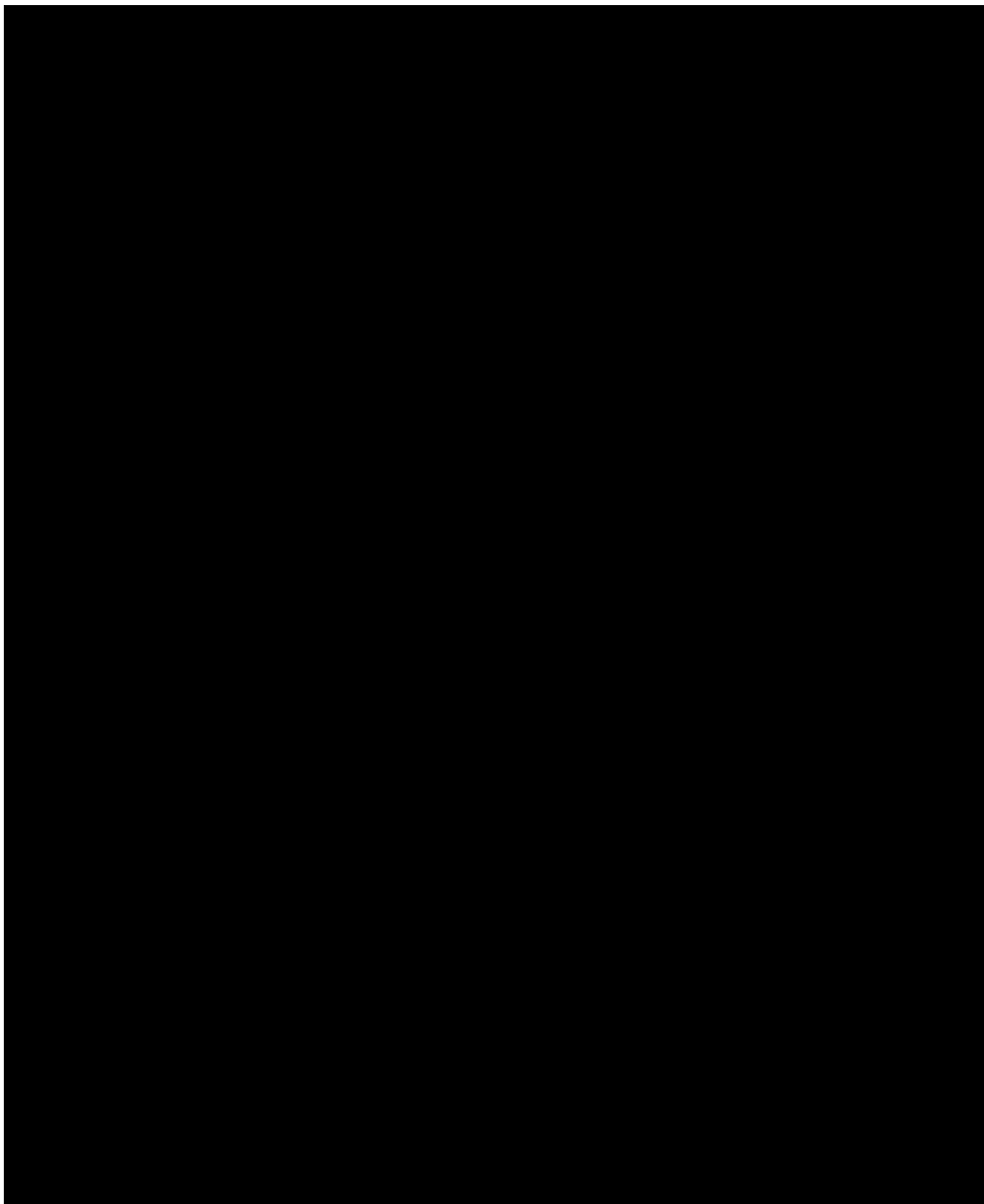


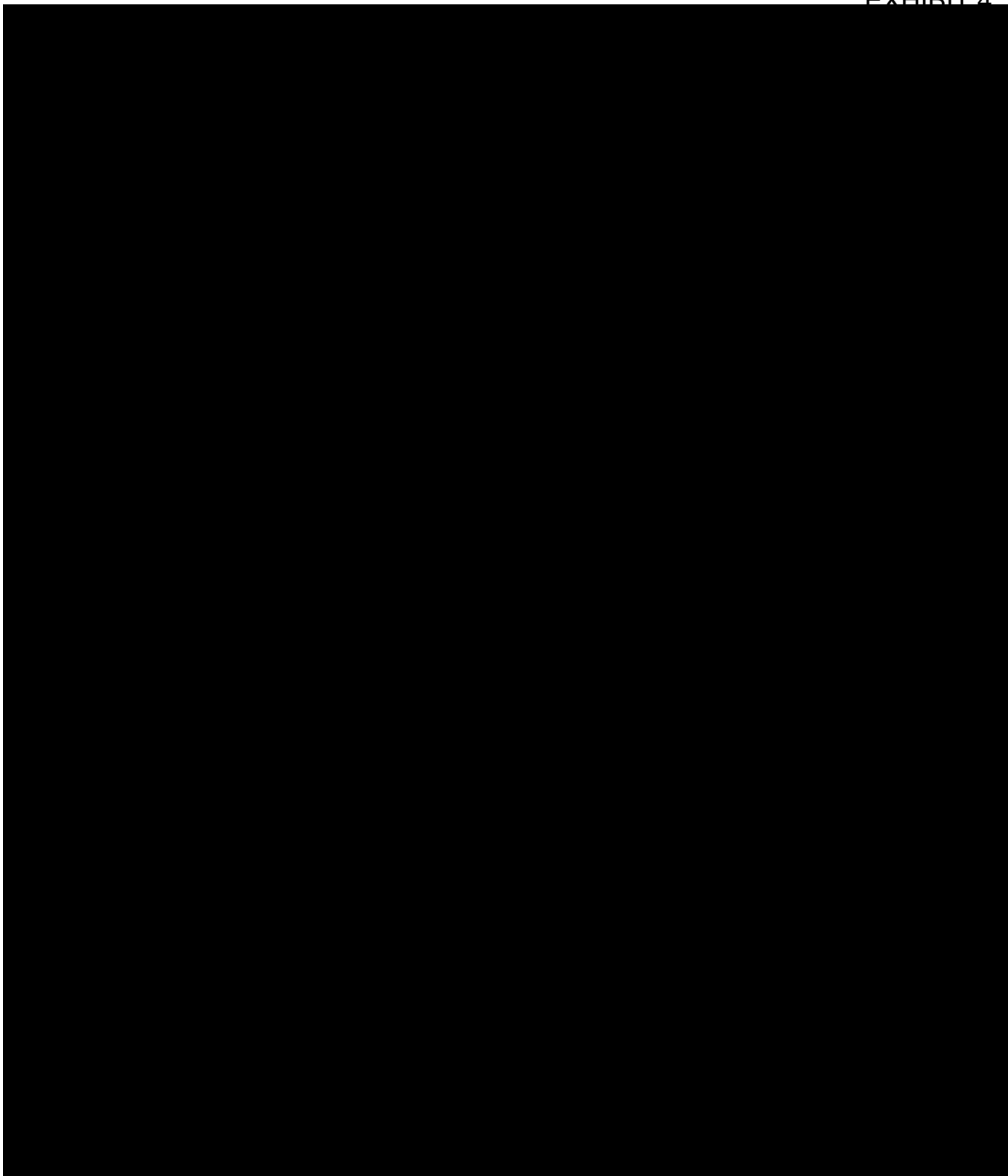


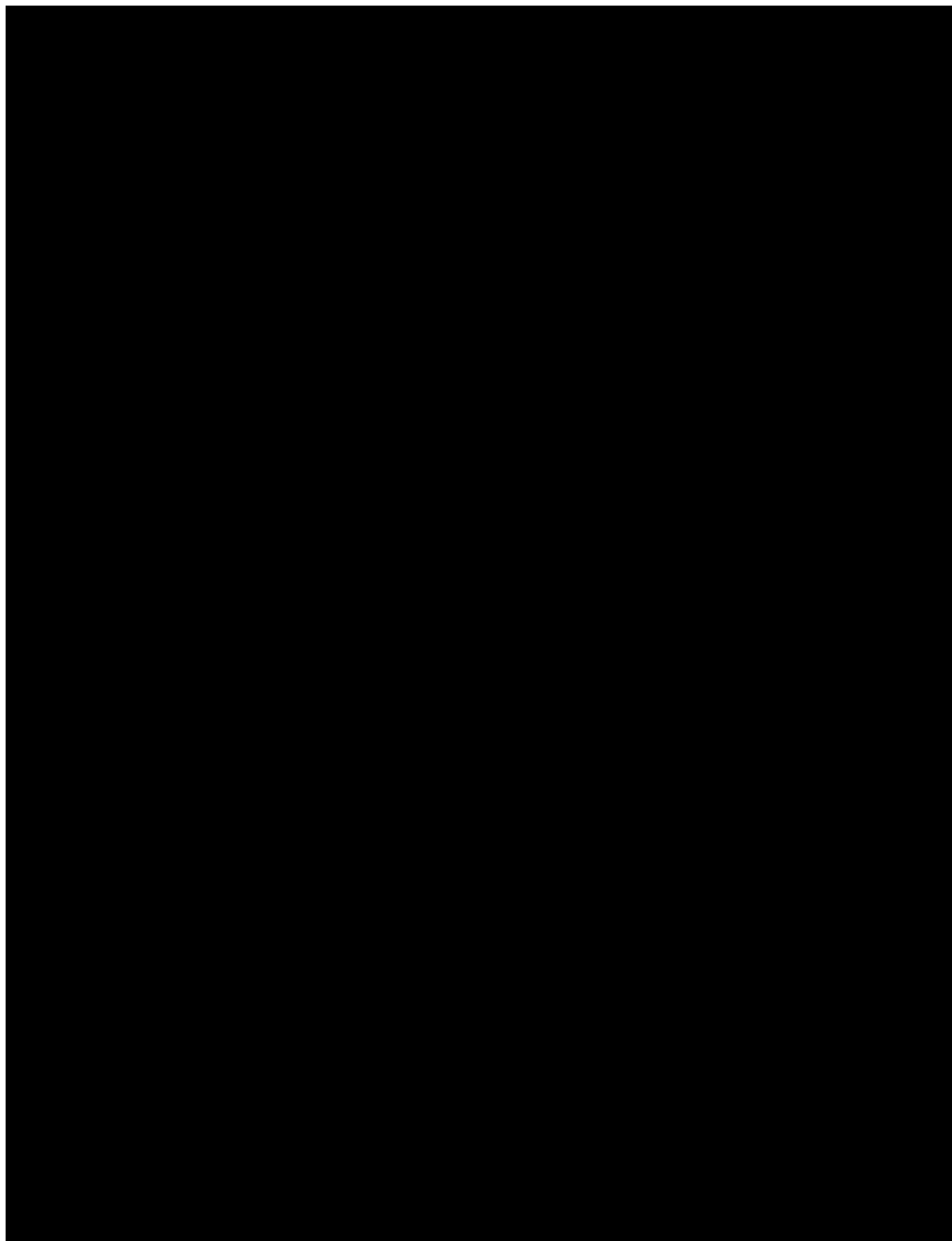


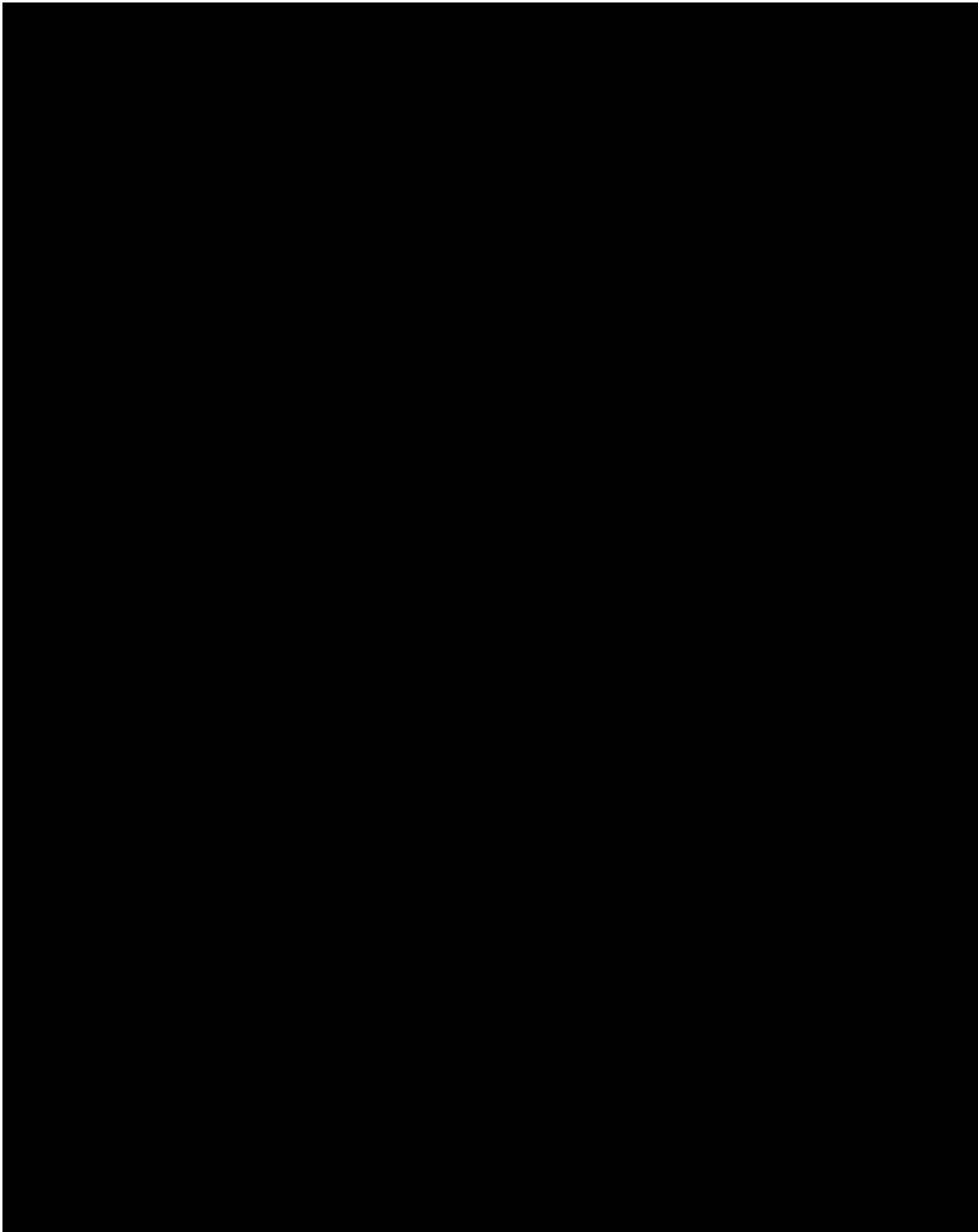


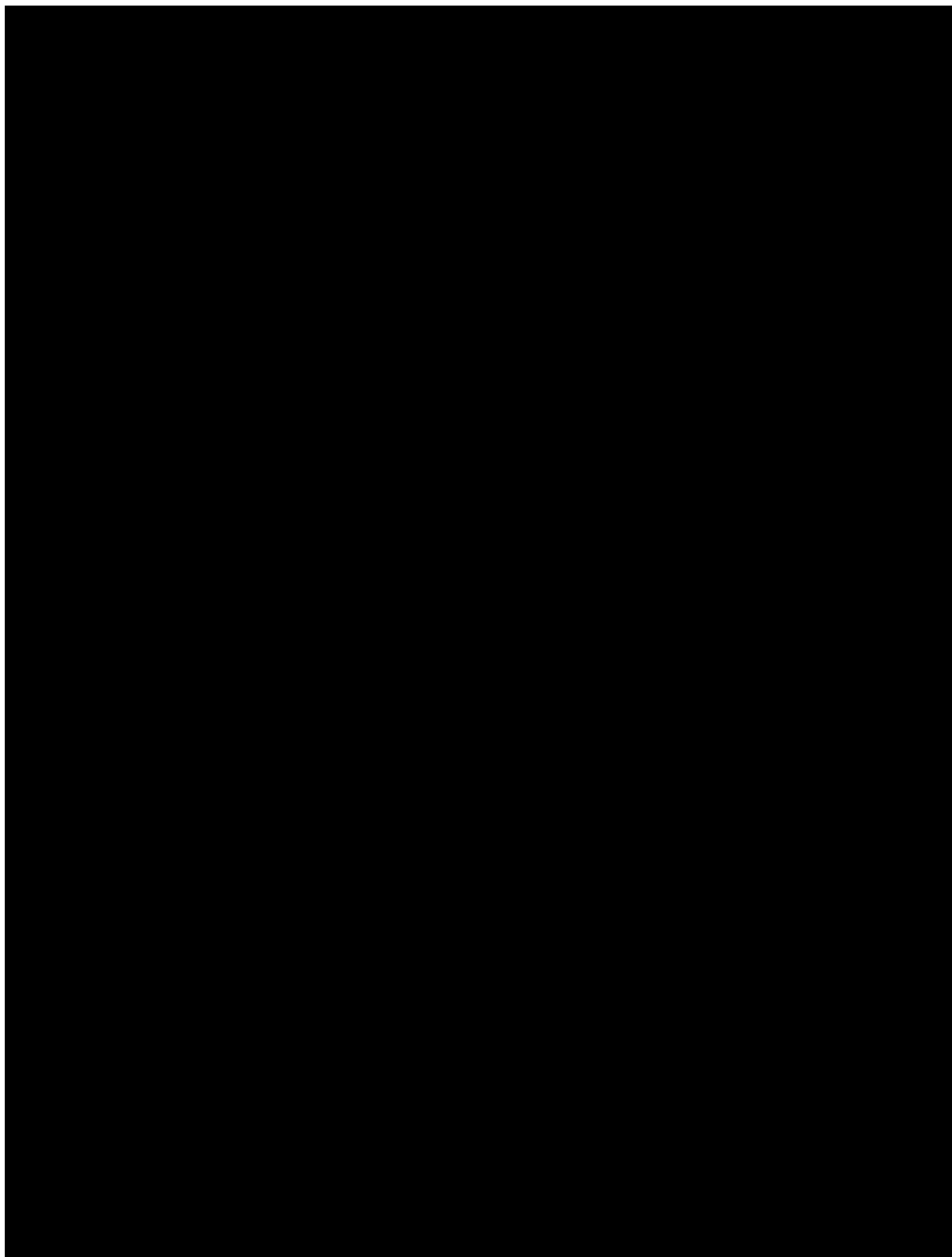


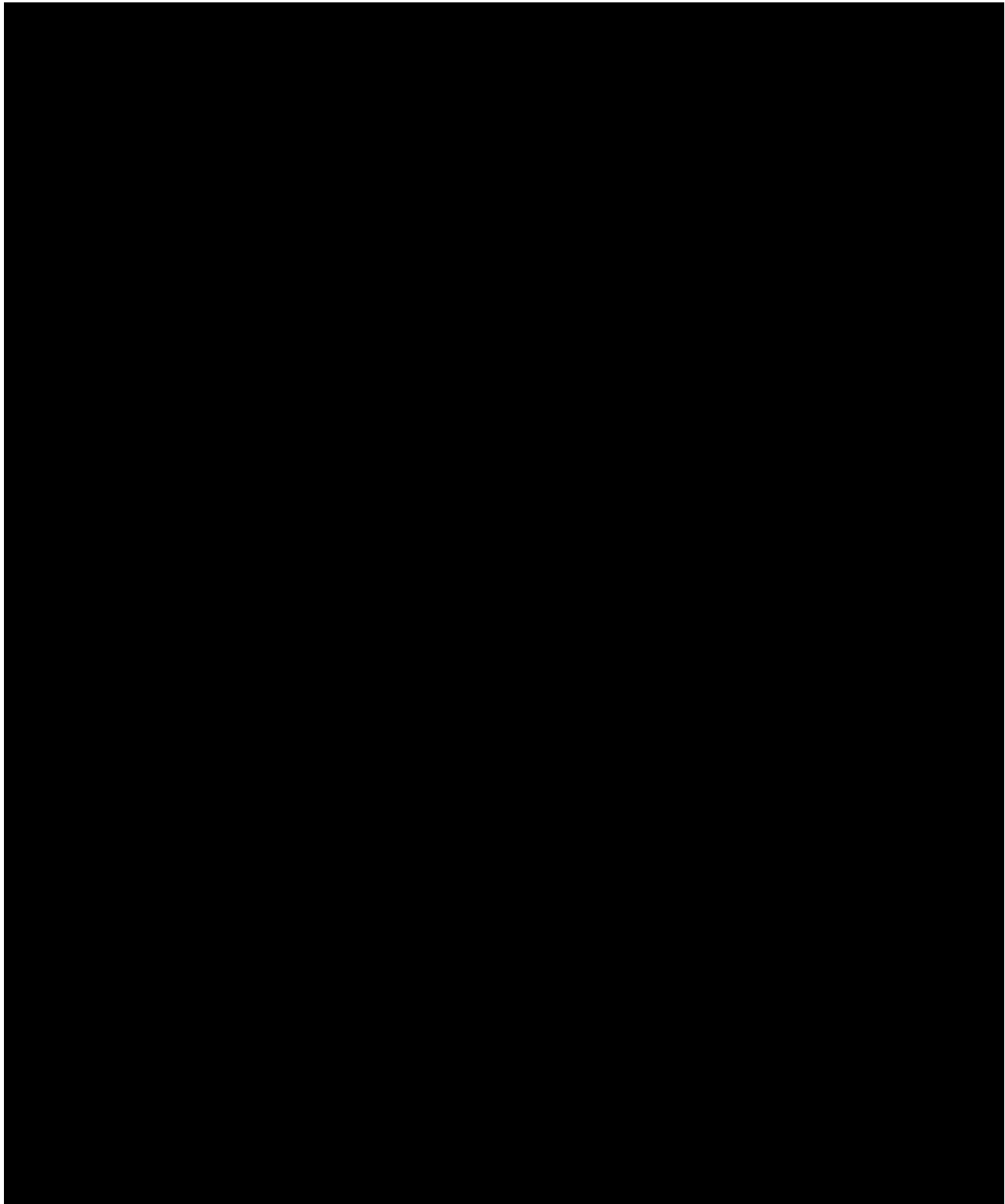


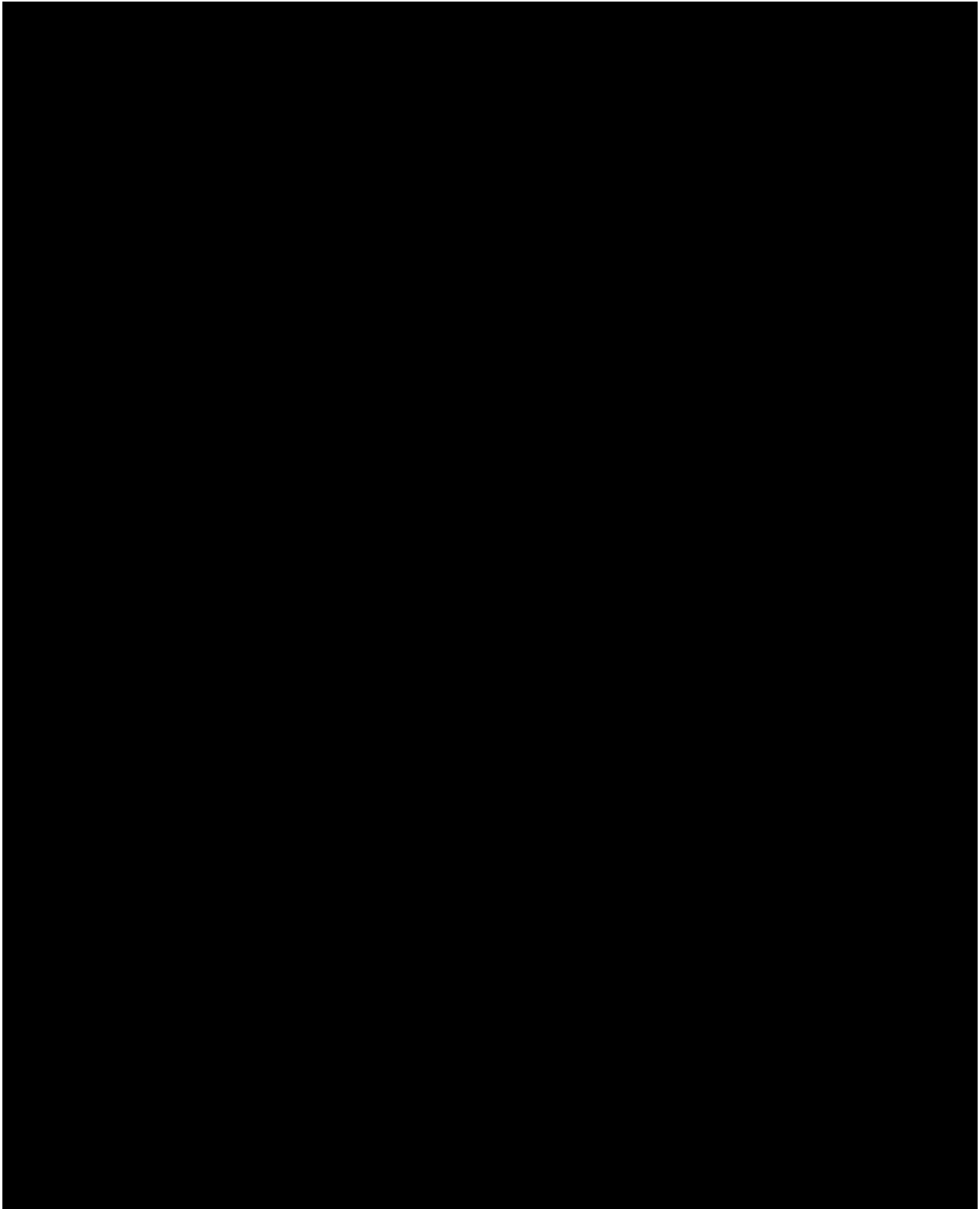


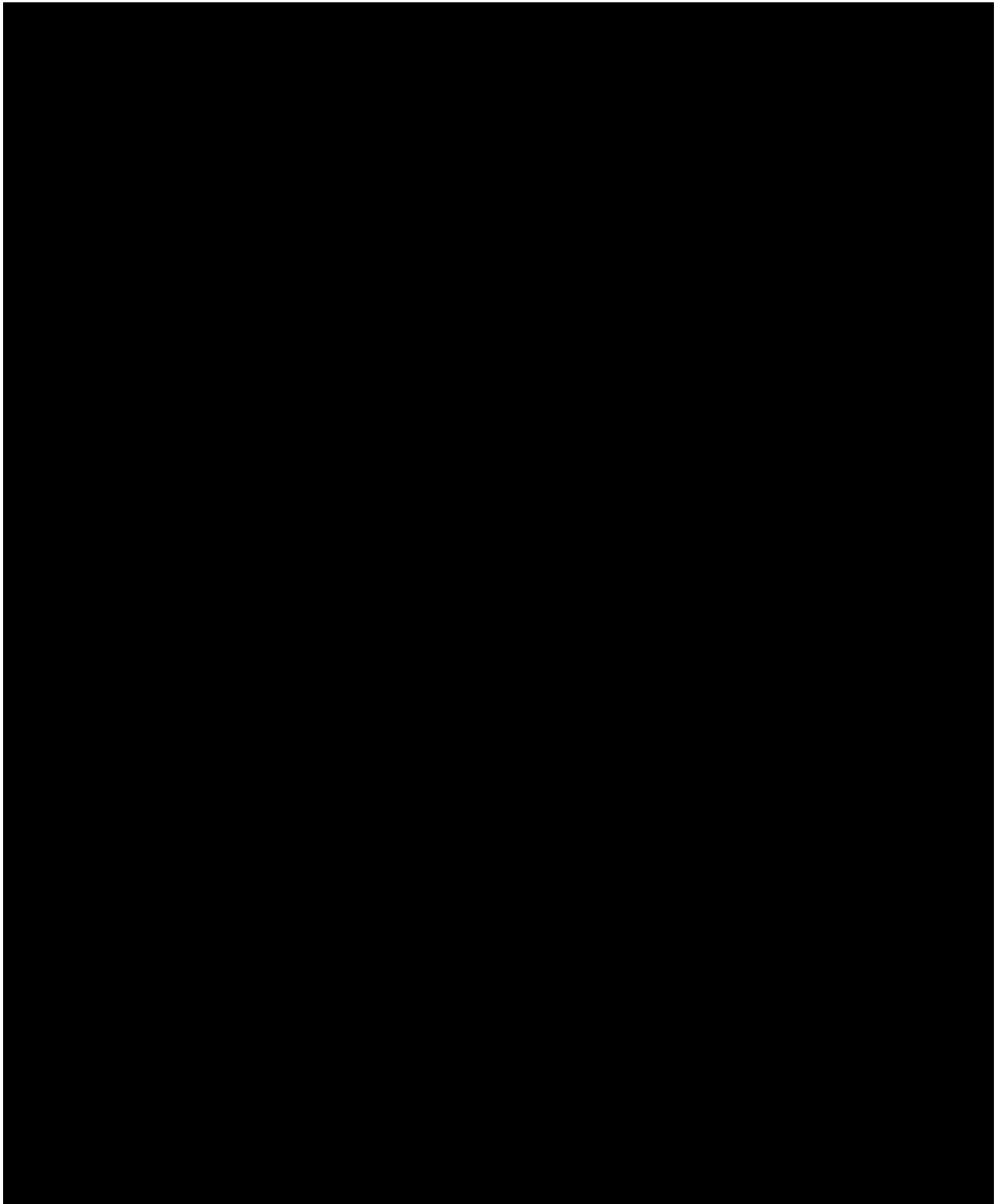


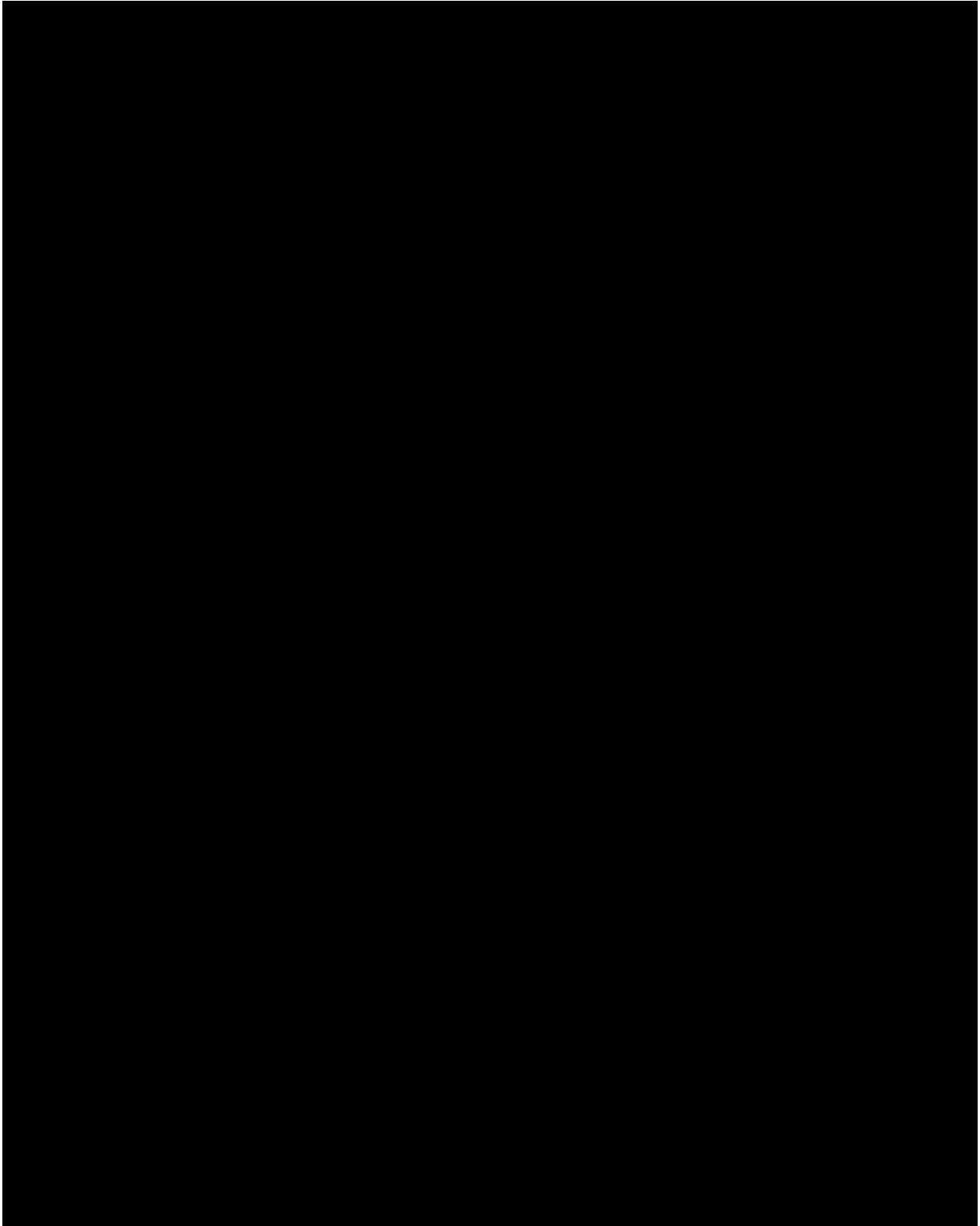


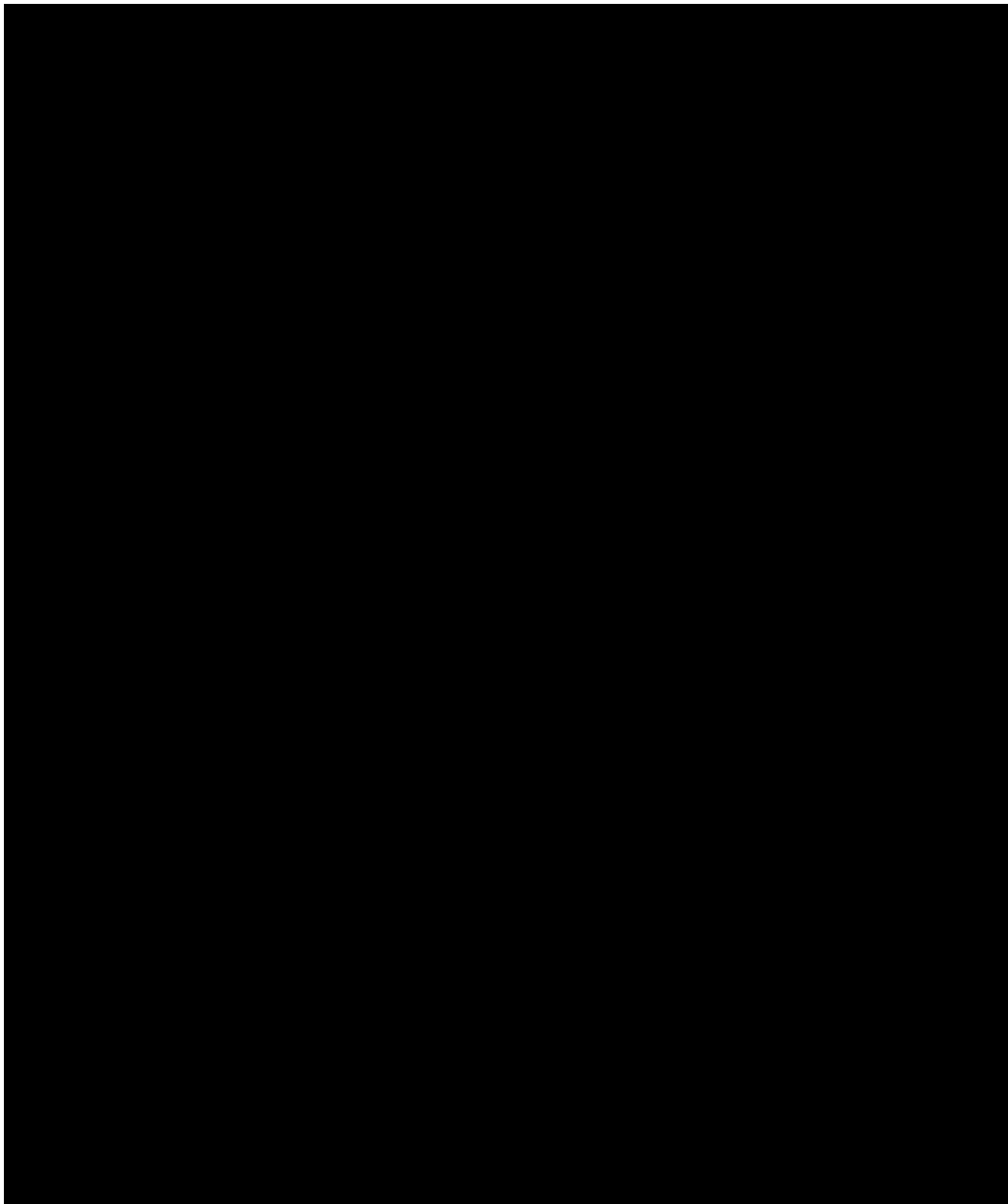


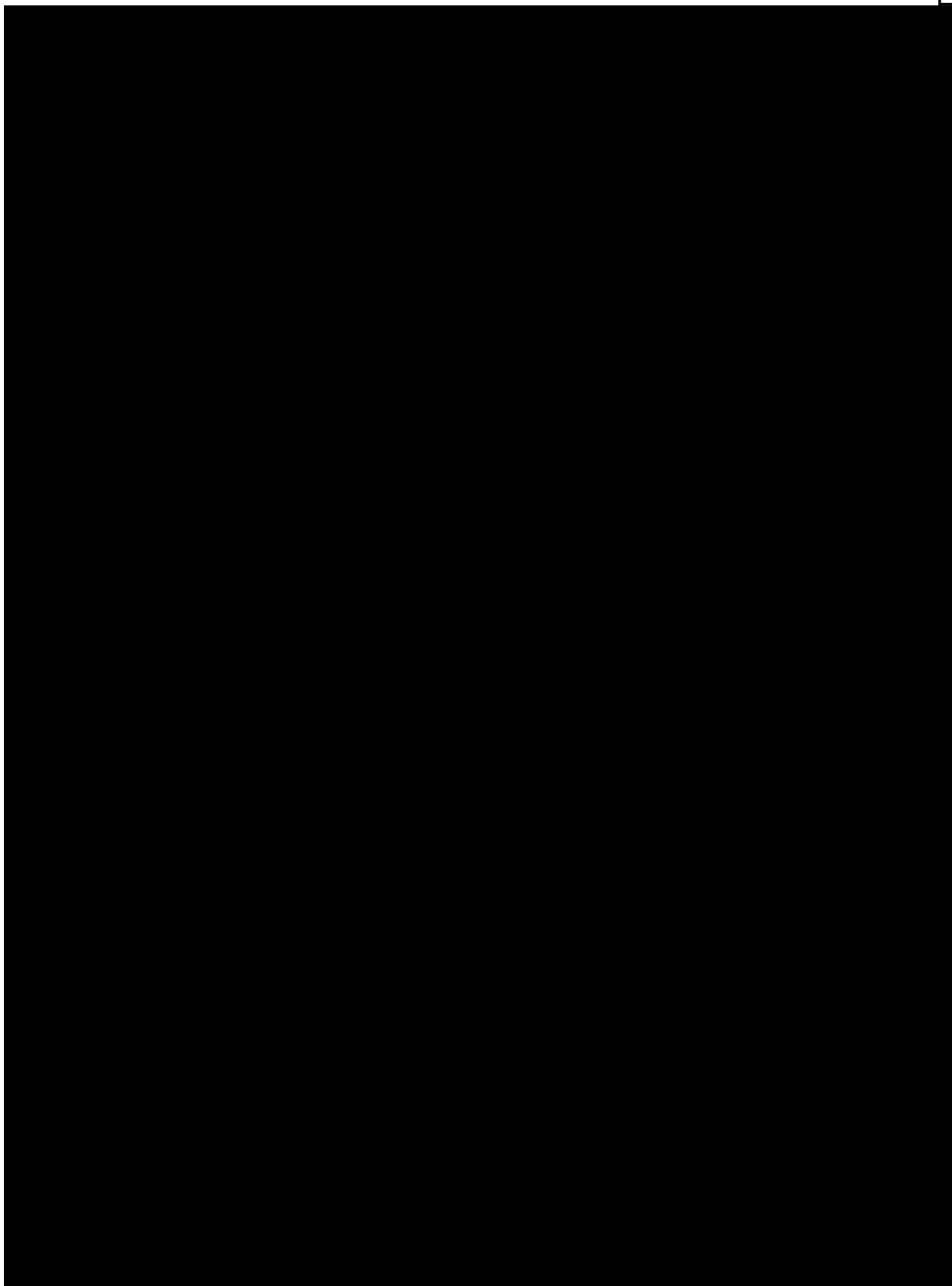


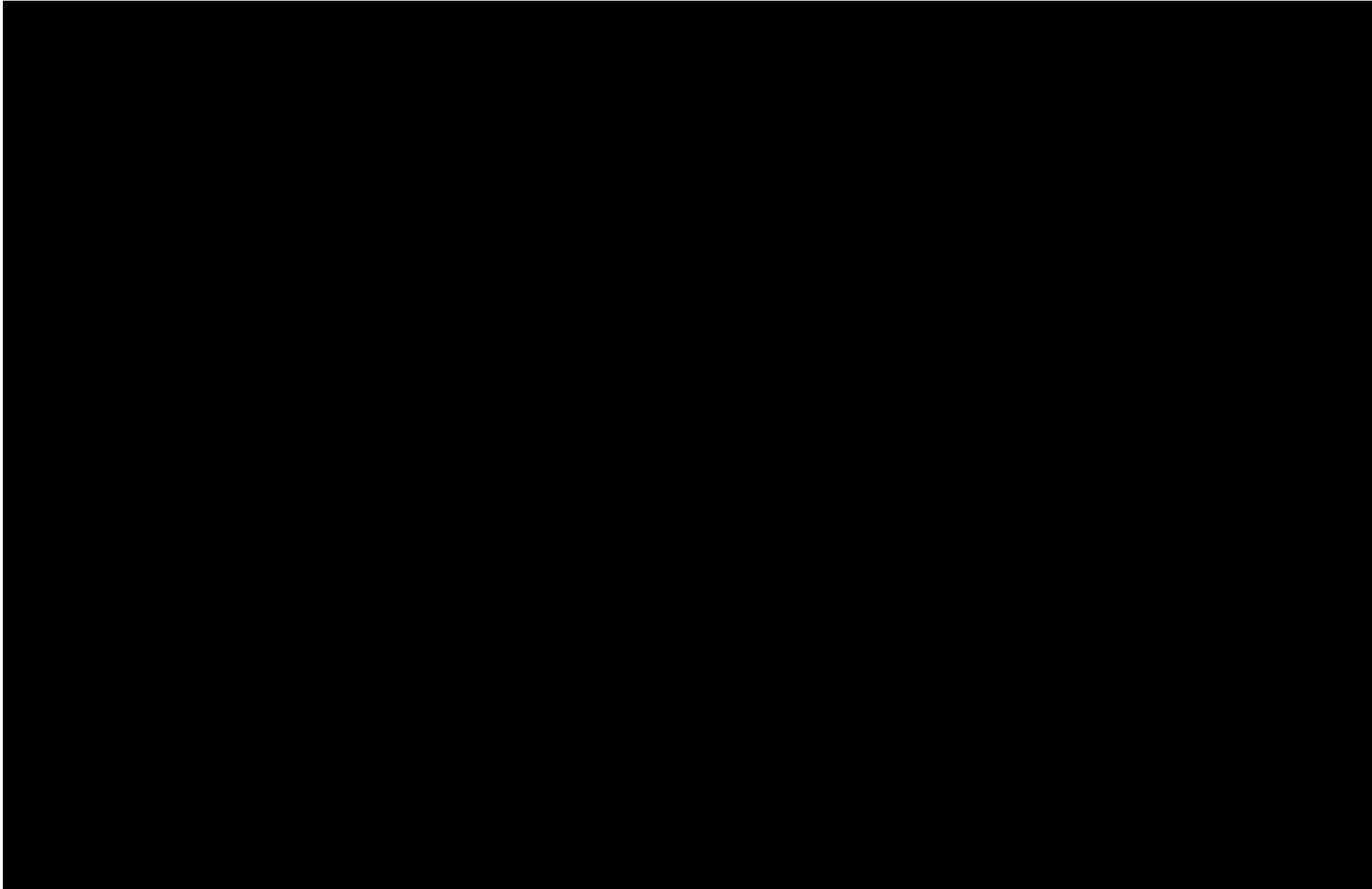


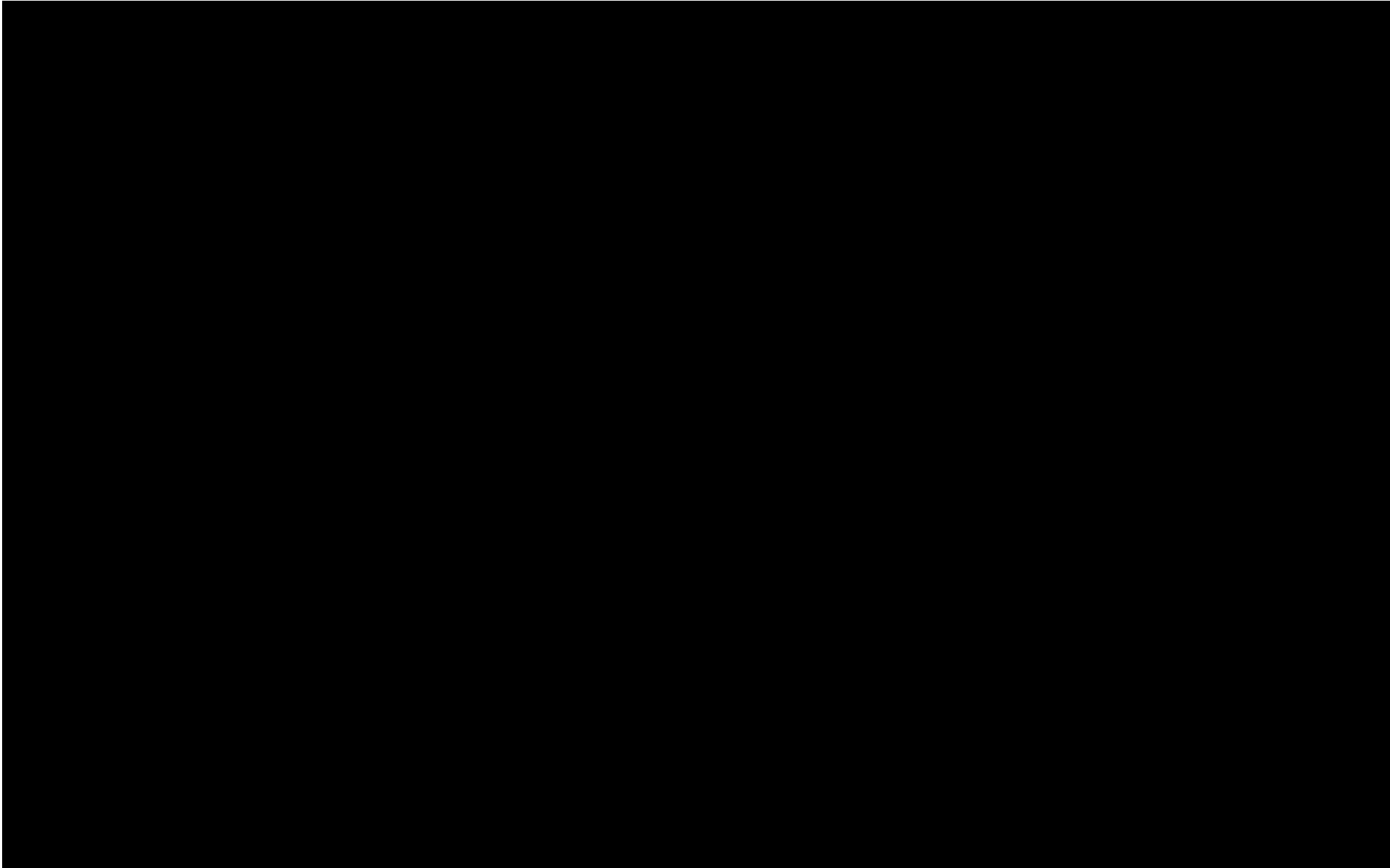


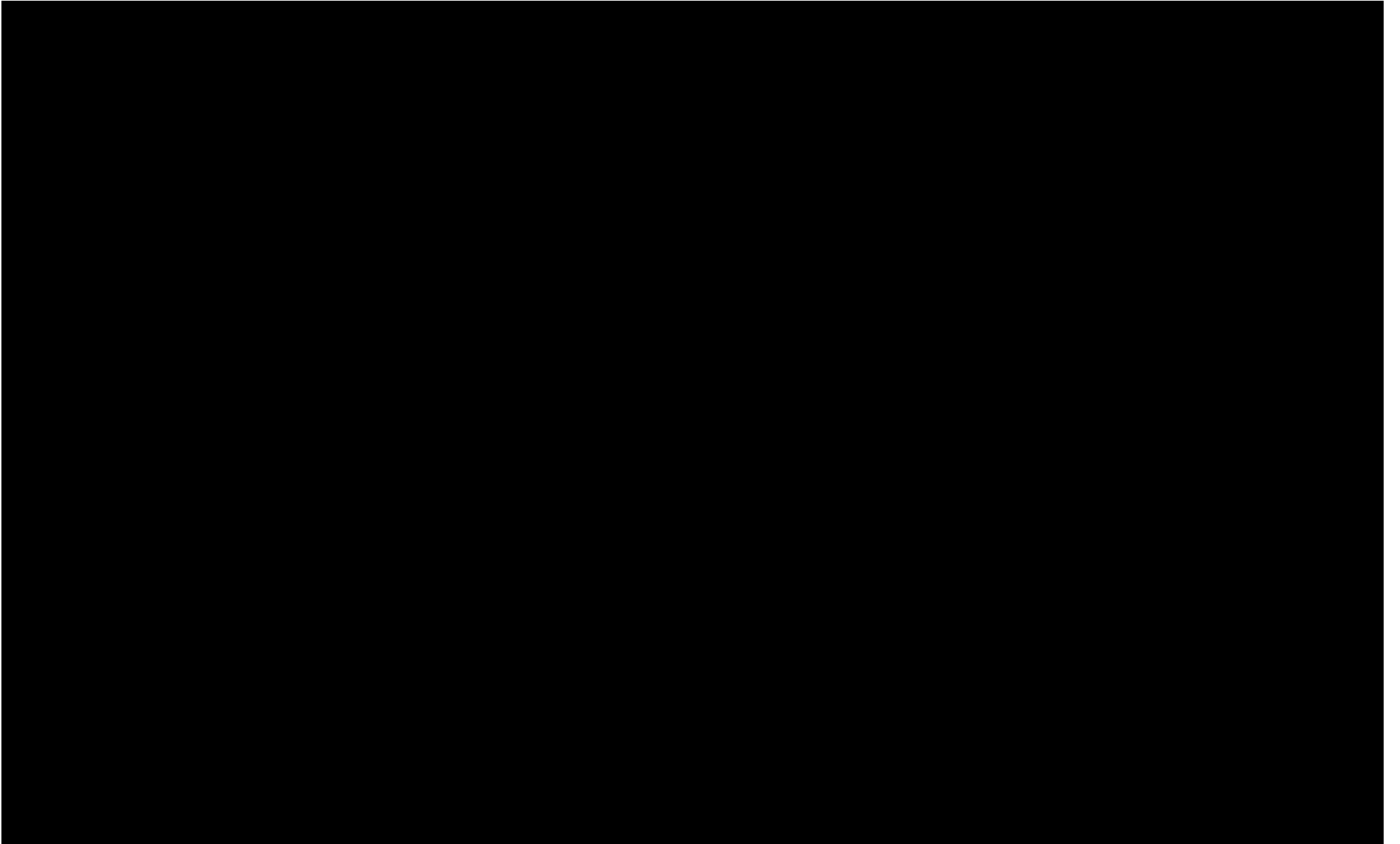




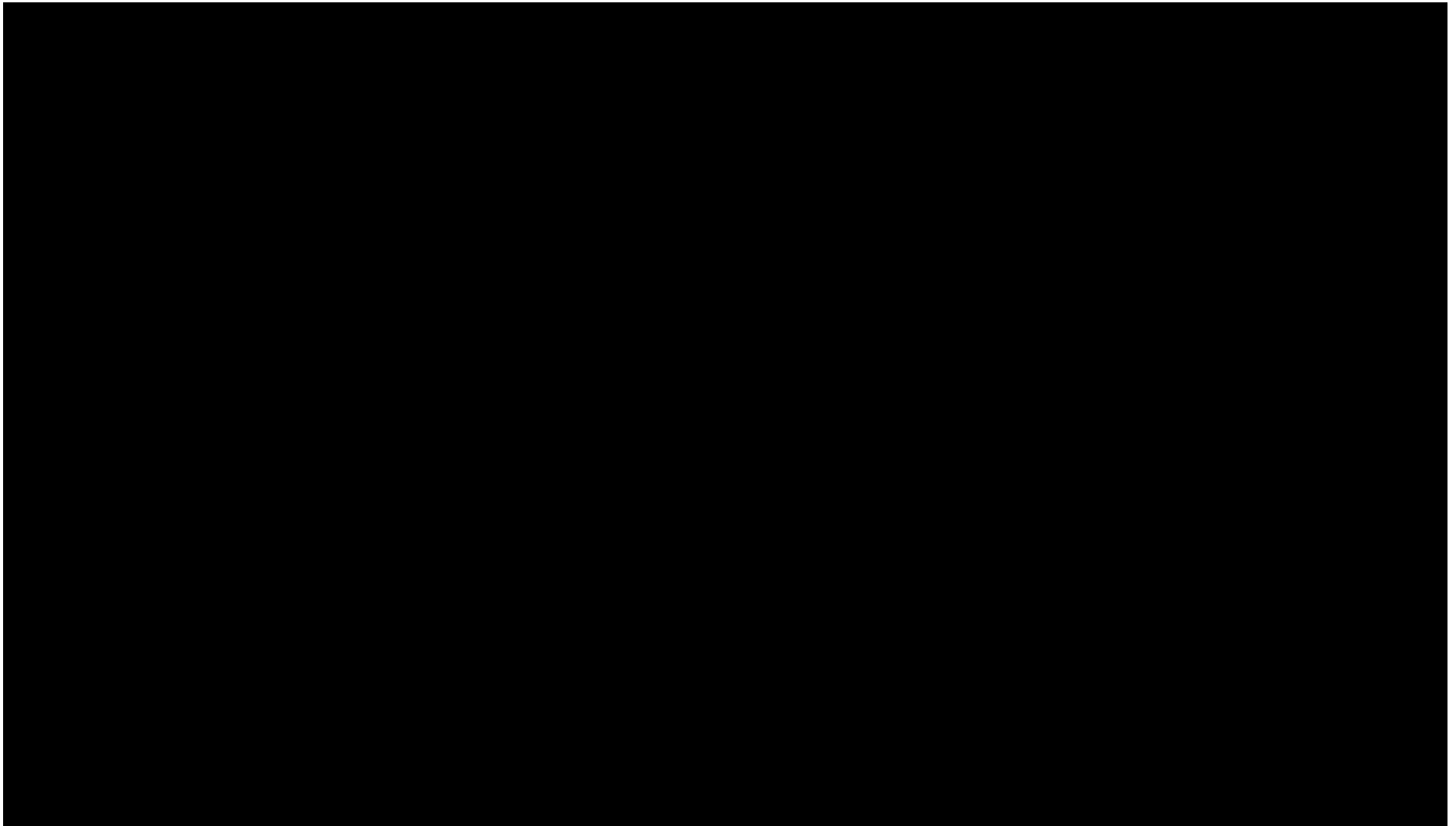


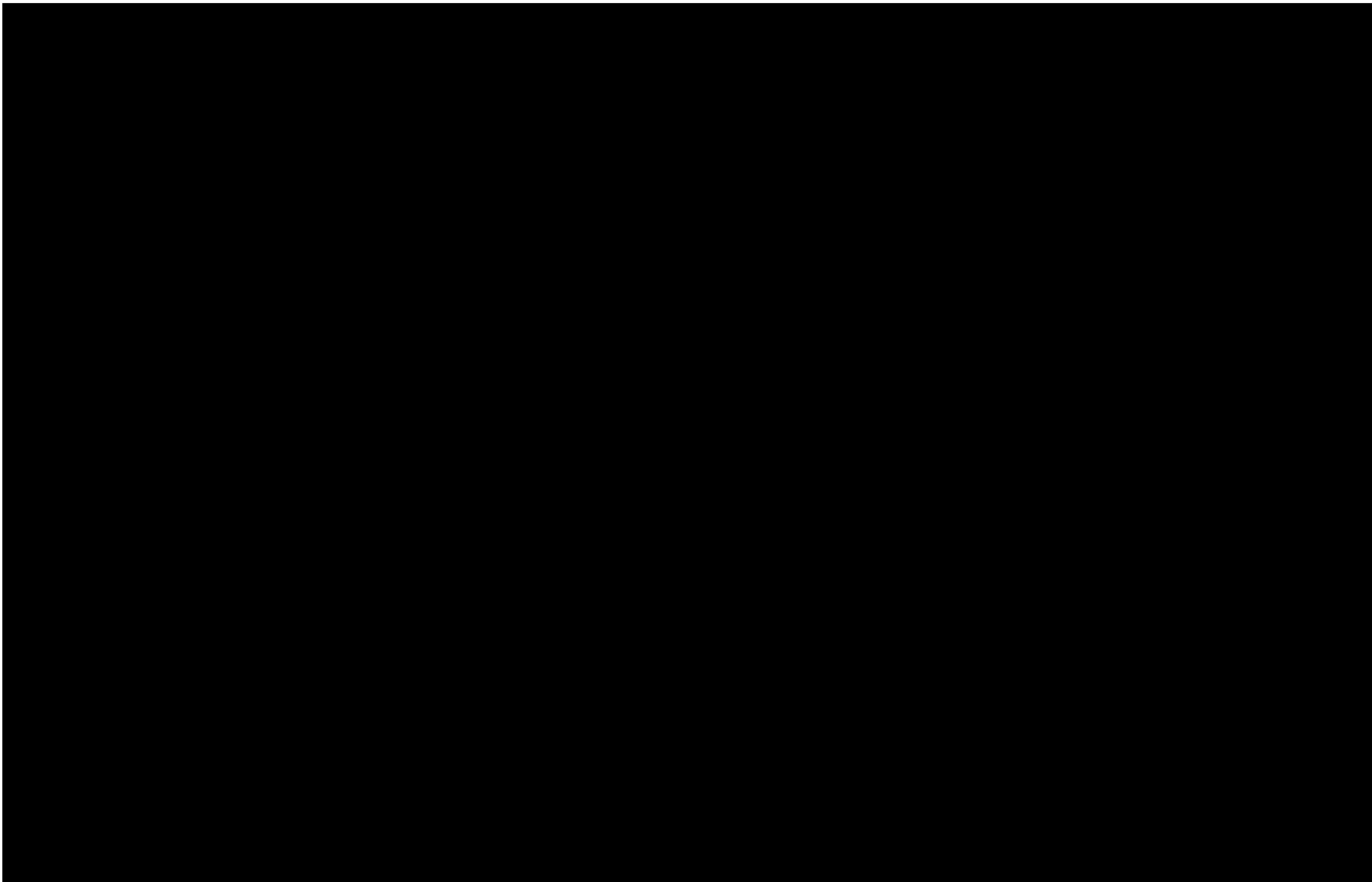


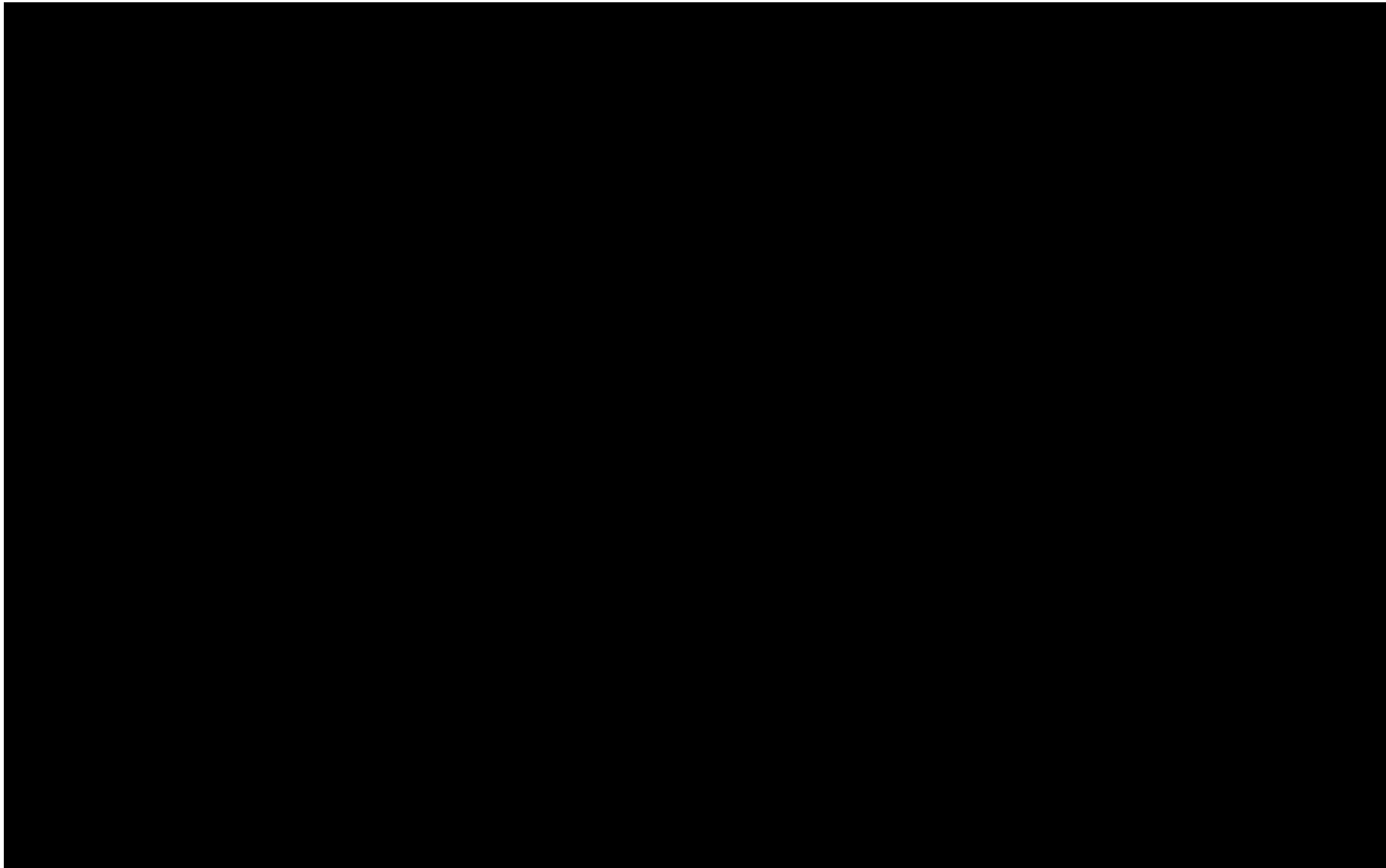


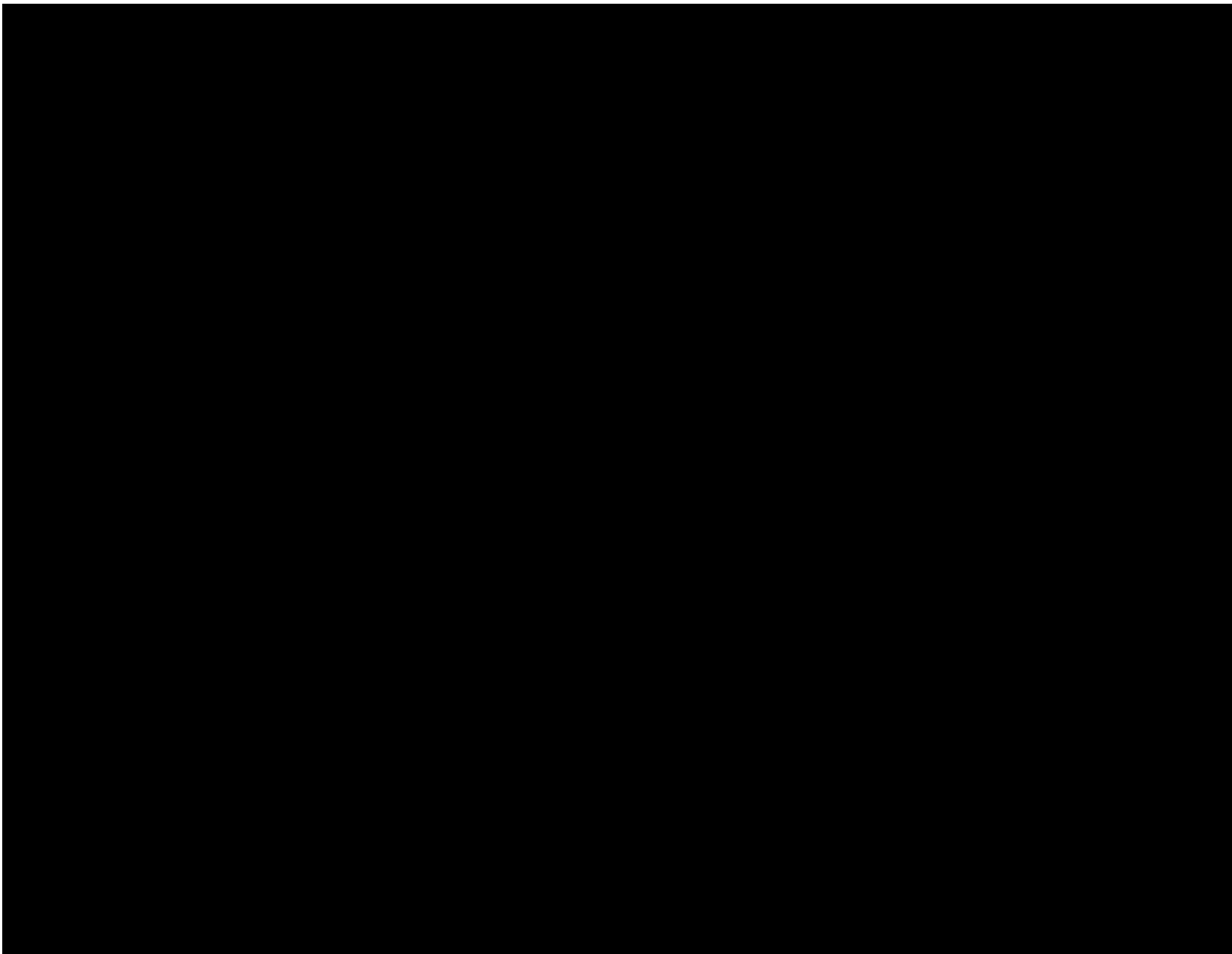


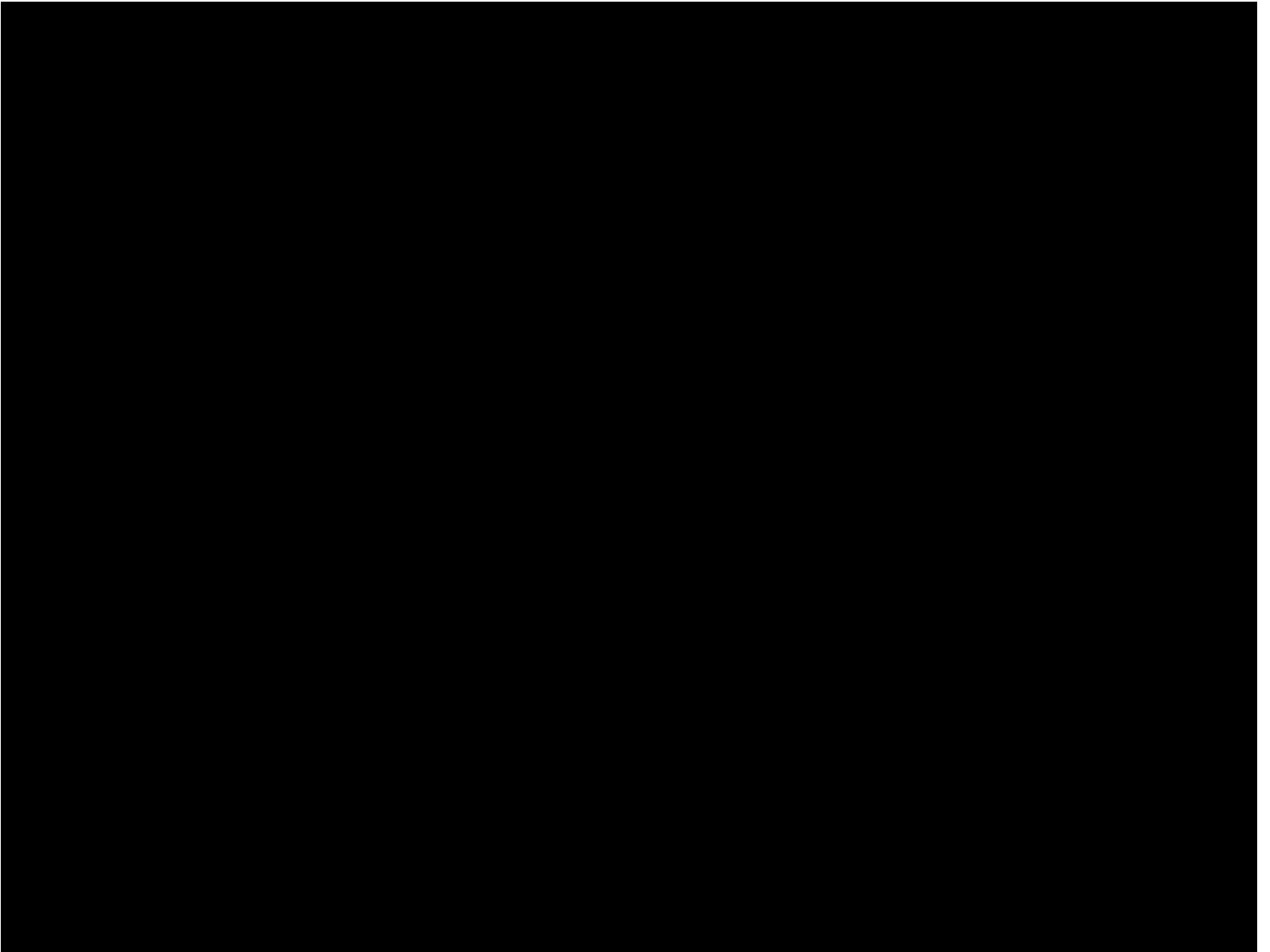


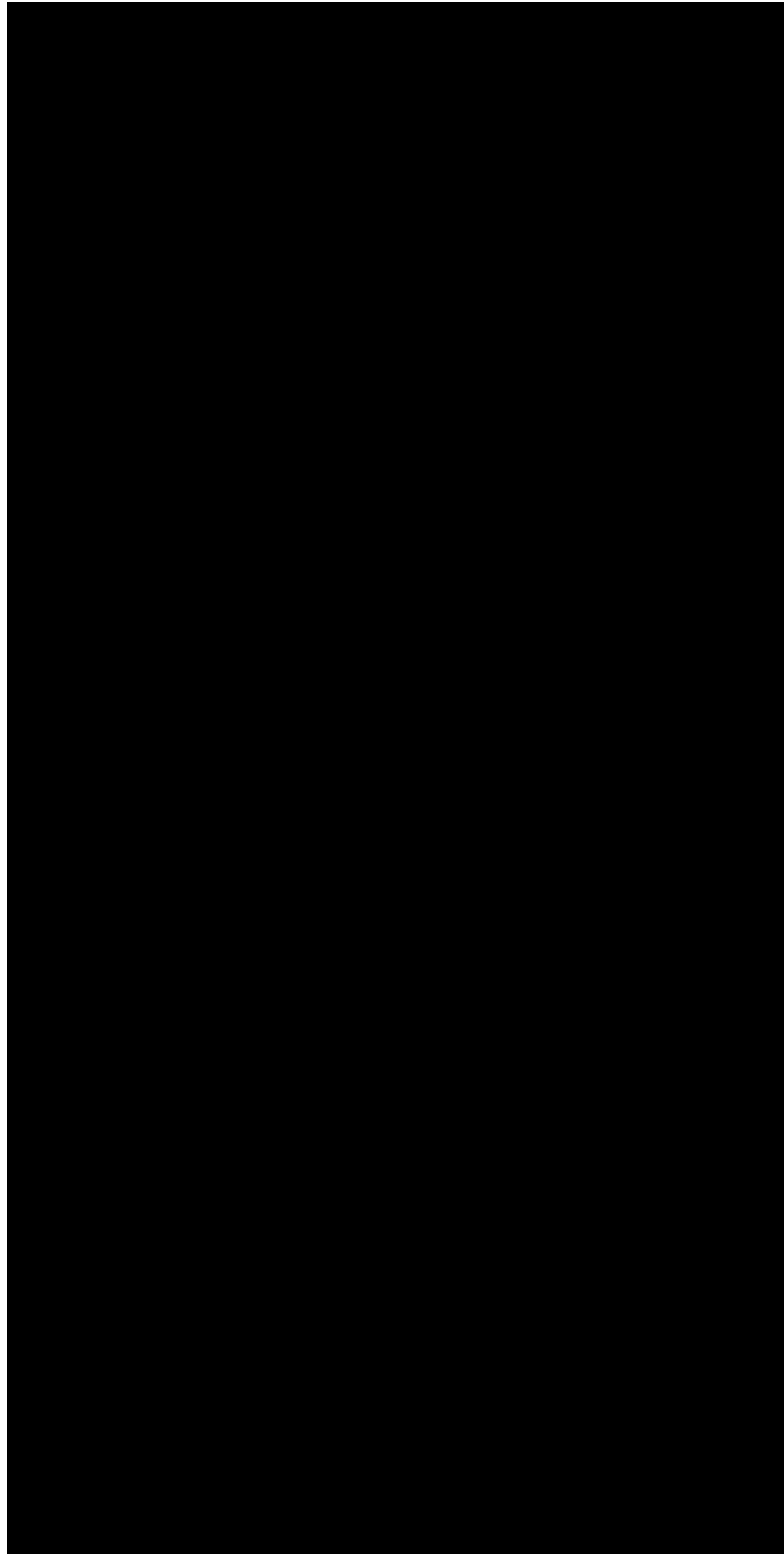


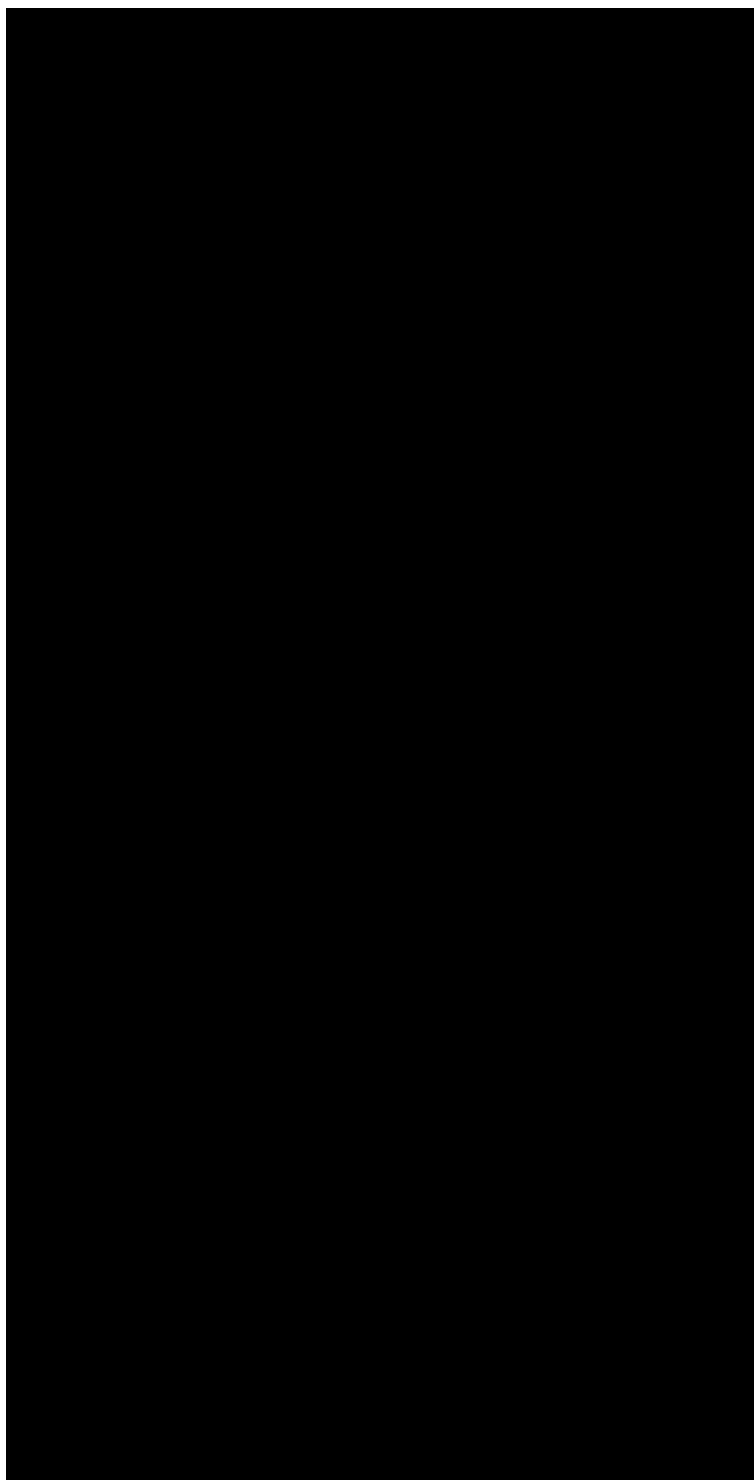




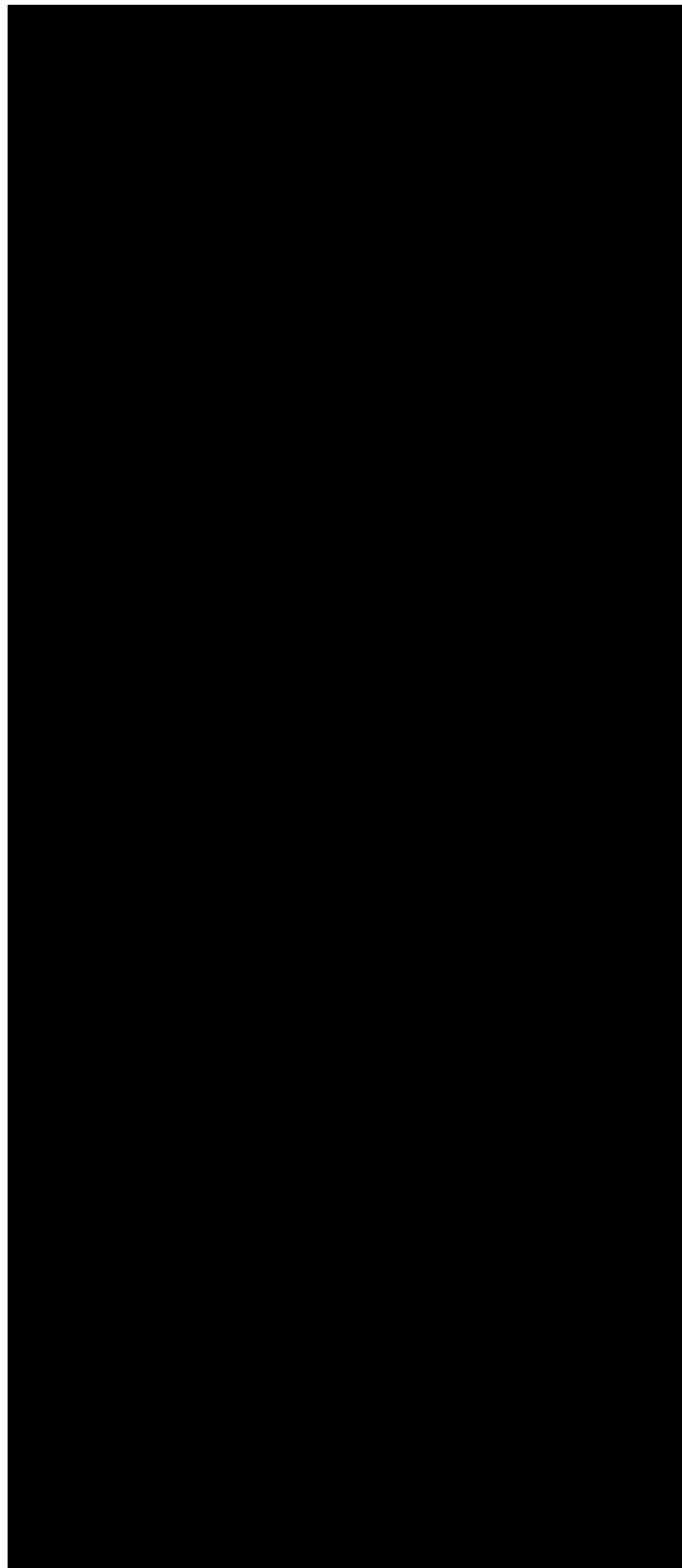


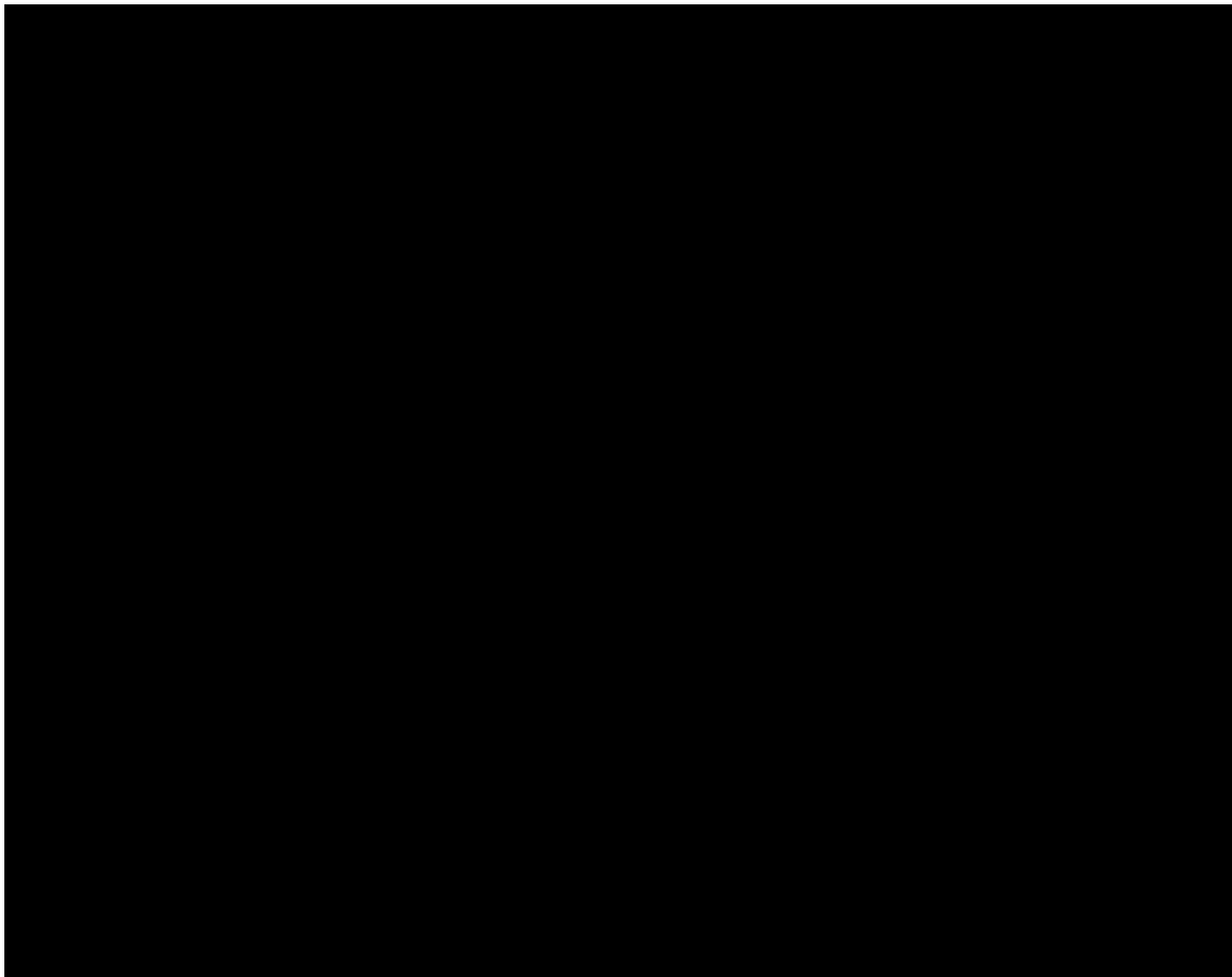


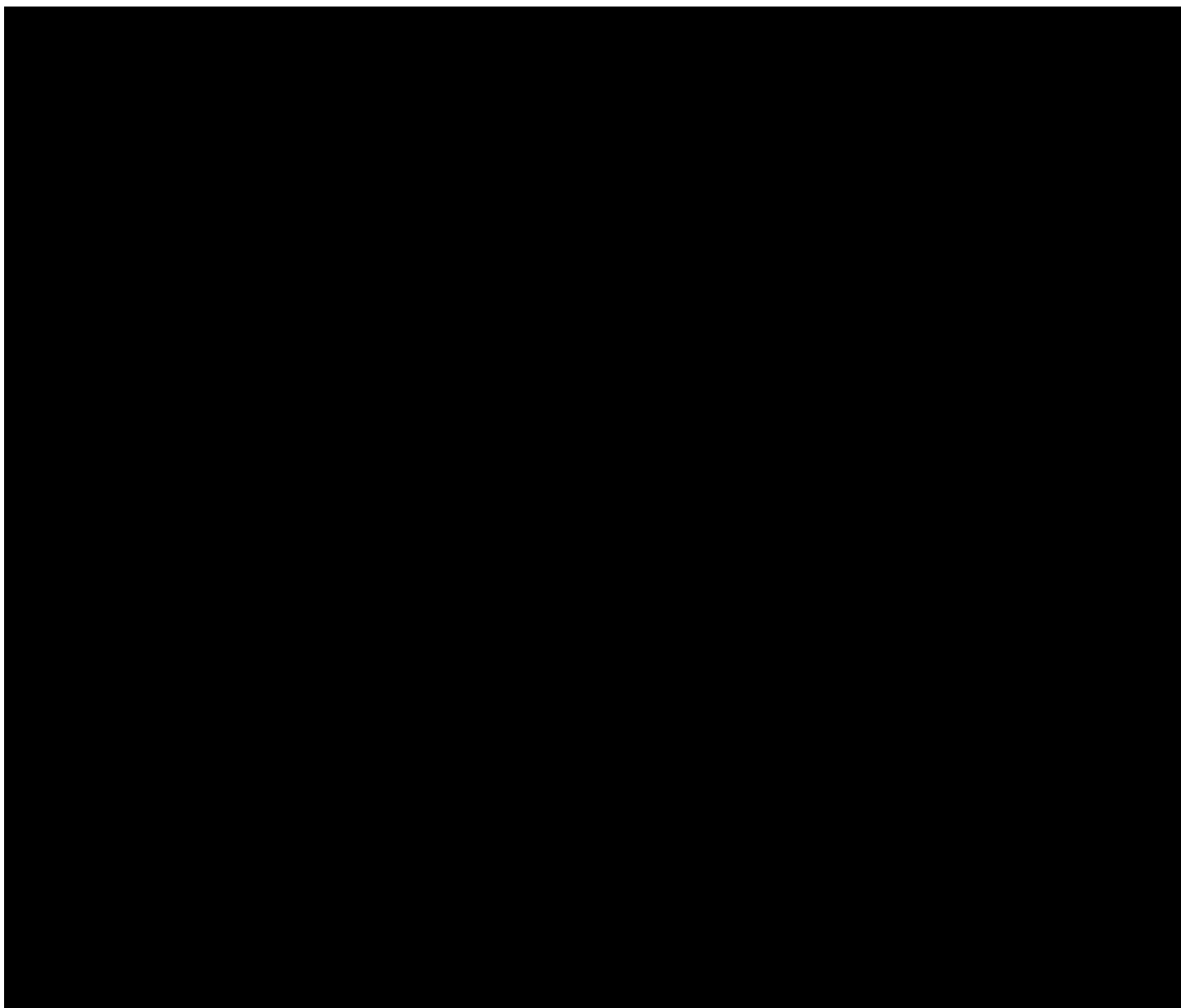


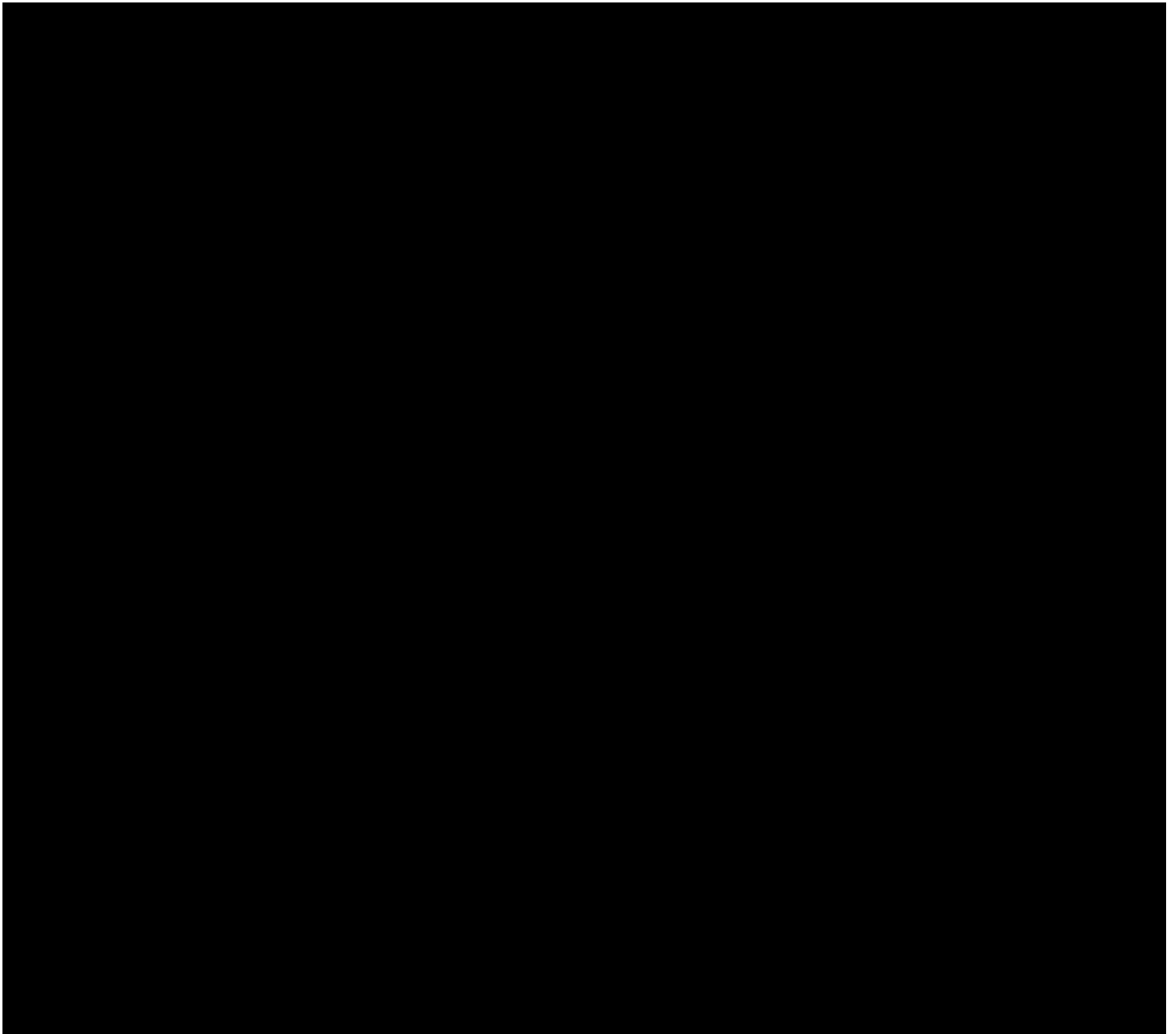


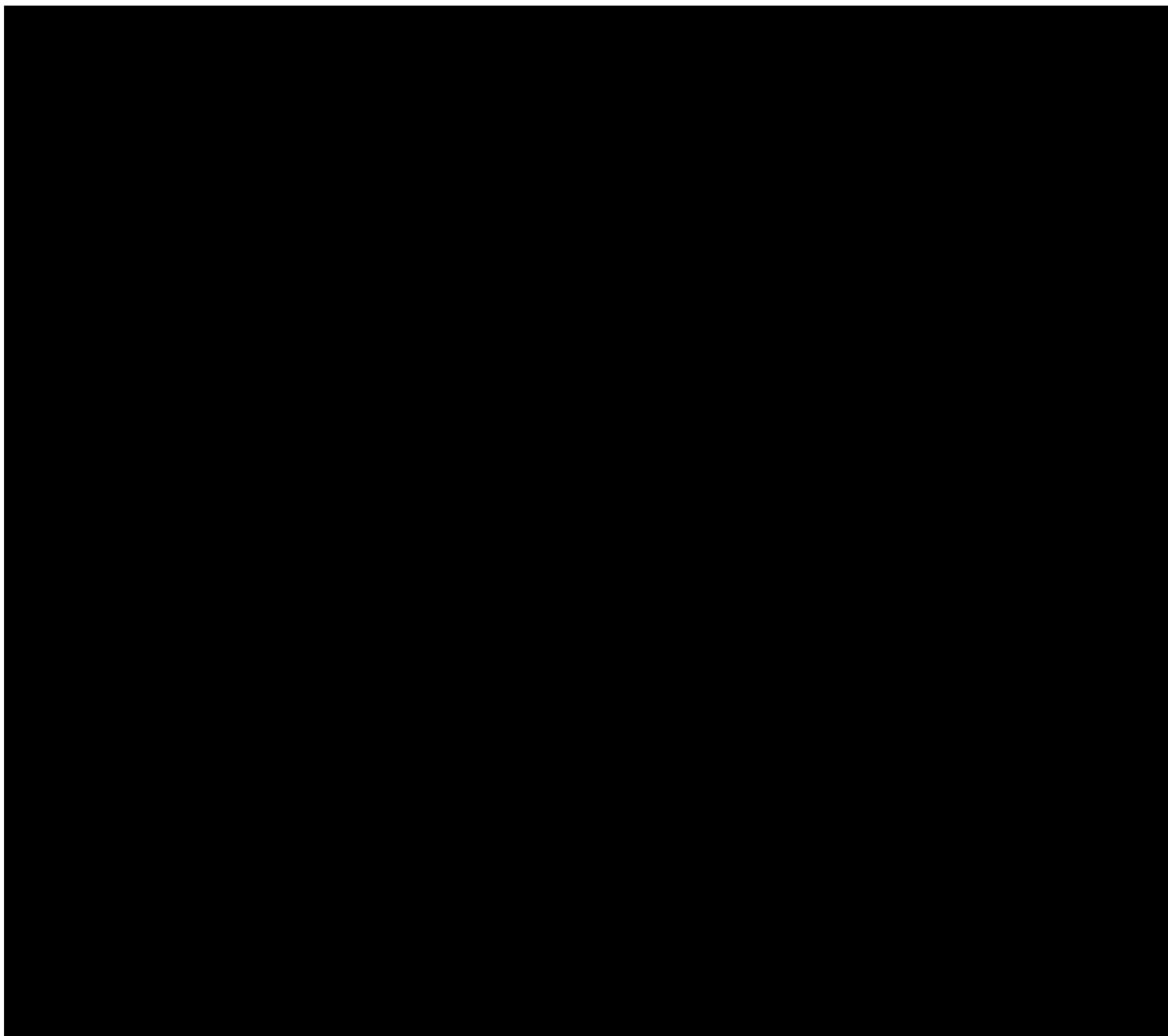
No funds reported a performance fee.









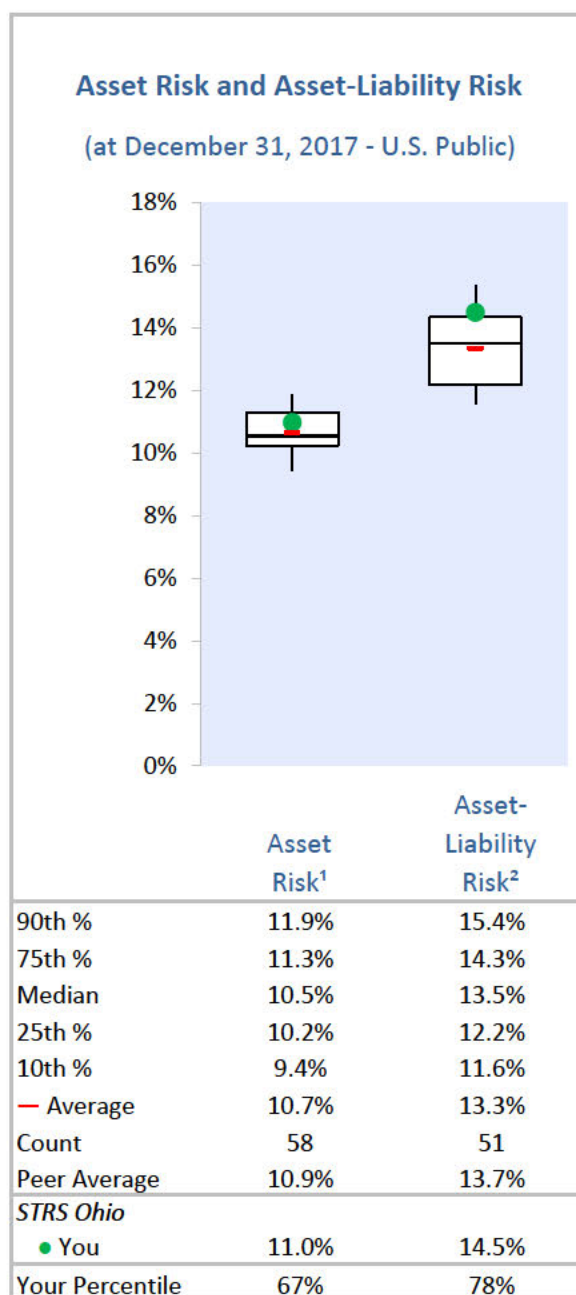


6

Risk

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Comparison of your risk levels to the U.S. Public universe



1. Asset risk is the expected volatility of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your asset mix policy. It is expressed as an annual standard deviation.

2. Asset-liability risk is the expected volatility of surplus returns. Surplus returns are the changes in a plan's marked-to-market funded status caused by market factors. Asset liability risk is a function of the volatility of policy returns (asset risk), the volatility of surplus returns (surplus risk) and the correlation between policy returns and surplus returns.

Calculation of asset risk

Before considering the benefit of diversification, the weighted average risk of the asset classes in your asset mix policy was 14.3%.

Calculation of your weighted asset class risk

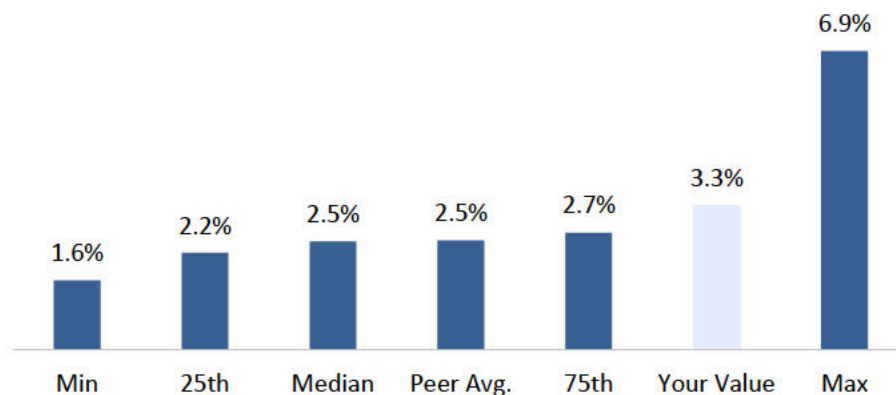
Asset Class	Policy weight	Risk ¹	Weighted risk
	(A)	(B)	(A X B)
Stock: U.S. Large Cap	30.0%	14%	4.2%
Stock: EAFE (Currency Hedged)	10.0%	15%	1.5%
Stock: EAFE	10.0%	17%	1.7%
Stock: Emerging	5.0%	23%	1.1%
Bonds: U.S.	20.0%	5%	1.1%
Bonds: Cash	1.0%	1%	0.0%
REITs	1.5%	20%	0.3%
Real Estate ex-REITs	8.5%	12%	1.0%
LBO	14.0%	24%	3.4%
Weighted Total			14.3%

1. Risk is the standard deviation of returns for the asset class based on standard benchmarks used by CEM.

Reduction in asset risk due to diversification

Your asset risk is less than your weighted asset risk because of the benefit of diversification. Diversification reduces risk because when one asset class has a negative return, it might be offset by another asset class with a positive return. The lower the correlation between your policy asset classes, the greater the diversification benefit. The correlation between your policy asset classes is shown on page 15 of this section.

Diversification benefit: U.S. Public universe



The benefit of diversification equals weighted asset risk minus asset risk.

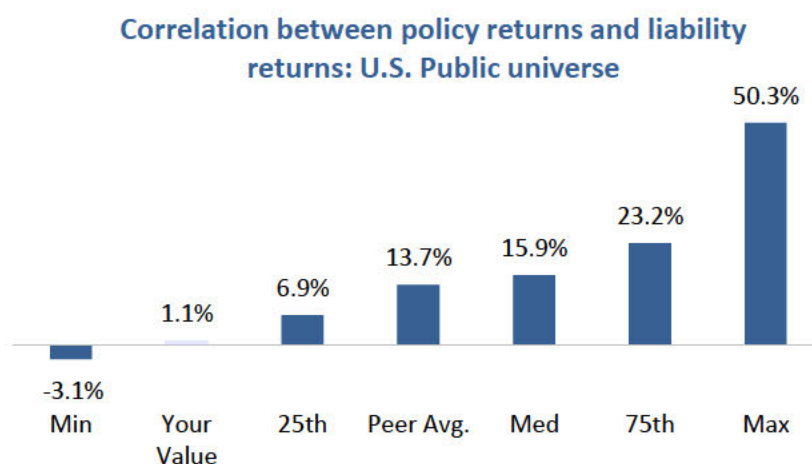
Components of asset risk

	You	Peer median*	Peer average	U.S. Public median*	U.S. Public average
Weighted asset risk	14.3%	13.4%	13.4%	13.1%	13.2%
Benefit of diversification	3.3%	2.7%	2.5%	2.5%	2.6%
Asset risk	11.0%	10.7%	10.9%	10.5%	10.7%

* Comparisons of components of asset risk should be interpreted with caution because it is not always possible to separate the diversification benefit from the weighted asset risk. For example, global stock as an asset class includes the diversification benefit of its geographic components within its asset risk.

Asset-liability risk

Your plan would not have any asset-liability risk if your assets perfectly matched your liabilities. If they matched, then the correlation between asset returns and liability returns would be 100%. If liabilities increased, assets would increase by a like amount (and vice versa). Thus higher correlation between your asset returns and liability returns reduces your asset-liability risk.



In addition to the correlation between asset returns and liability returns, asset-liability risk is also a function of the volatility of asset returns (asset risk) and the volatility of liability returns¹ (liability risk = $\sqrt{R_A^2 + R_L^2 - 2\rho_{AL}R_AR_L}$).

Components of asset-liability risk

	You	Peer median	Peer average	U.S. Public median	U.S. Public average
Asset risk (R_A)	11.0%	10.7%	10.9%	10.5%	10.7%
Liability risk (R_L)	9.6%	9.7%	9.7%	9.7%	9.7%
Correlation between policy returns and liability returns (ρ_{AL})	1.1%	12.9%	13.7%	15.9%	15.6%
Asset-liability risk	14.5%	13.9%	13.7%	13.5%	13.3%

1. Liability returns equal the changes in your marked-to-market liabilities caused by market factors. These are assumed to equal the return on your liability proxy portfolio (see next page).

Liability proxy portfolio

Your liability proxy portfolio is the portfolio of nominal and inflation-indexed bonds that best matches the sensitivity of your liabilities to changes in real and nominal interest rates.

Comparisons of liability proxy portfolio

	Your fund		Peer average		U.S. Public	
	Duration	% of	Duration	% of	Duration	% of
		Assets		Assets		Assets
Inflation Indexed Bonds	10.0	23%	11.9	56%	12.2	57%
Nominal Bonds	11.1	77%	13.9	44%	13.6	43%
Total		100%		100%		100%

Your liability proxy portfolio is a tool that:

- Helps you understand how the unsmoothed market value of your liabilities responds to changes in real and nominal interest rates.
- Helps you make better asset mix policy decisions by providing an understanding of which assets will decrease your asset-liability risk (i.e., assets that behave similarly to the neutral asset mix) and which assets will increase your risk.
- Helps you understand how your liabilities are different from your peers. Differences in liabilities mean that the same asset will have different risk / reward characteristics for different funds. For example, the risk of a nominal bond for a fund with 100% inflation sensitivity is much higher than it is for a fund with less than 100% inflation sensitivity.

Asset-liability risk could theoretically be eliminated if your actual asset mix matched the liability proxy portfolio. However, we recognize that this is neither an option nor a goal for most funds because:

- The supply of inflation-indexed assets is limited. These assets are required to match the obligations of pension liabilities.
- This low-risk strategy also has a lower expected return, implying either higher future funding costs or lower future benefits.

The methodology and formula used to determine your liability proxy portfolio are provided on pages 11-13 of this section.

Liability risk

Differences in liability risk are due to differences in inflation sensitivity and member demographics.

A plan's inflation sensitivity depends on:

a) The type of plan

Final and highest average plans have more inflation sensitivity than career average plans.

Conversely, career average plans have more inflation sensitivity than flat benefit plans. Your plan type is final average.

Plan type	# of plans	% of Total
Flat Benefit	0	0%
Career Average	0	0%
Final/Highest/Best Avg	52	88%
Other	7	12%
Total	59	100%

b) Contractual inflation protection for retired members

Your retired members get 0% contractual inflation protection. Your retiree inflation protection is subject to a cap of 0%.

Retiree inflation protection	# of plans		
	Corporate	Public	Other
0%	0	27	0
>0% and <50%	0	0	0
50%	0	1	0
>50% and <100%	0	6	0
100%	0	20	0
Total	0	54	0

c) Member demographics

Member demographics impacts both inflation sensitivity and the duration of plan liabilities. The survey asks for your plan's percentage of liabilities that relate to retired members from your actuarial reports. If you did not provide this number, then it is estimated (see page 12 of this section). Your percentage of liabilities that relate to retired members was 73%.

	Your fund	Peer Average	U.S. Public Average
Active Members	55%	59%	56%
Retired Members	45%	41%	44%
Total	100%	100%	100%

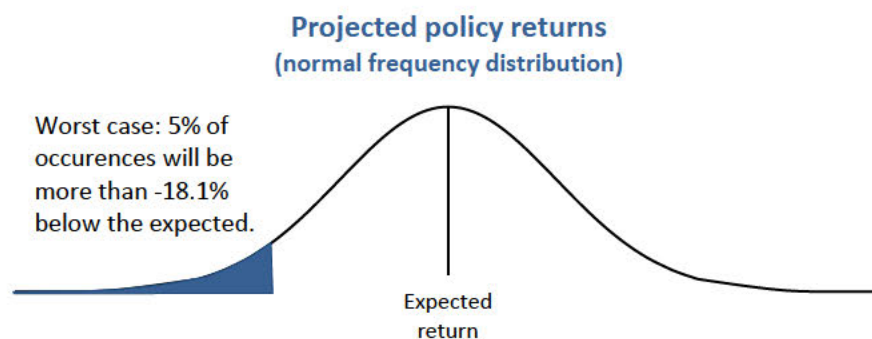
Projected worst case scenarios

We can convert your asset risk and asset-liability risk into worst case outcomes for policy returns and funded status if we make the following simplifying assumptions:

- a) Returns are normally distributed.
- b) Historic return volatility and correlations will continue in the future.
- c) No change in your policy asset mix or liabilities.

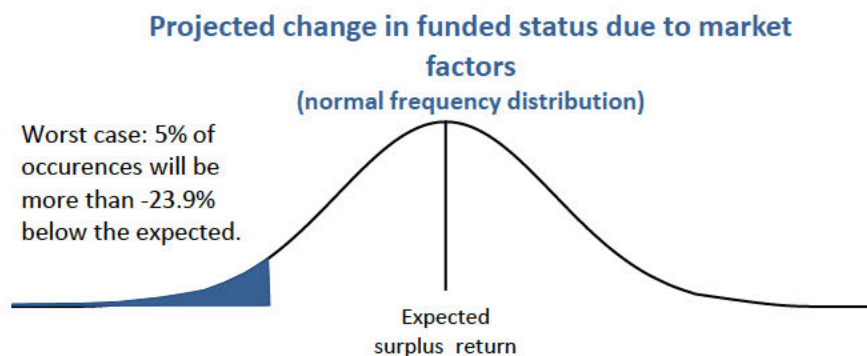
a) Worst case policy returns

Every year there is a 5% probability that your policy return will be worse than your expected policy return by more than -18.1% (-18.1% equals $-1.65 \times$ your asset risk of 11.0%). -18.1% is the starting point of worst case outcomes. They could be much worse.



b) Worst case impact on funded status

Every year, there is a 5% probability that changes in your mark-to-market funded status caused by market factors ("Surplus Returns") will be worse than expected by more than -23.9%. (-23.9% equals $-1.65 \times$ your asset-liability risk of 14.5%). -23.9% is the starting point of worst case outcomes. They could be much worse.



Historic worst case scenarios during the past 5 years

a) Historic worst case policy returns

During the past 5 years, your lowest policy return was 1.7% in 2015.

Historic policy returns - U.S. Public universe

	2017	2016	2015	2014	2013
90th %	16.5%	9.3%	1.5%	8.4%	18.2%
75th %	15.9%	8.6%	0.7%	7.5%	16.8%
Median	15.1%	7.6%	-0.2%	6.5%	15.3%
25th %	13.9%	7.0%	-0.9%	5.6%	13.5%
10th %	13.0%	6.7%	-1.8%	4.9%	11.3%
Average	14.9%	7.9%	-0.1%	6.6%	14.9%
Count	58	60	64	68	68
Peer Avg	14.8%	7.8%	0.5%	7.1%	14.9%
Your Value	15.4%	8.0%	1.7%	8.3%	18.1%

b) Historic worst case changes in funded status

During the past 5 years, your worst change in marked-to-market funded status caused by market factors ("Surplus Returns") was -6.1% in 2014.

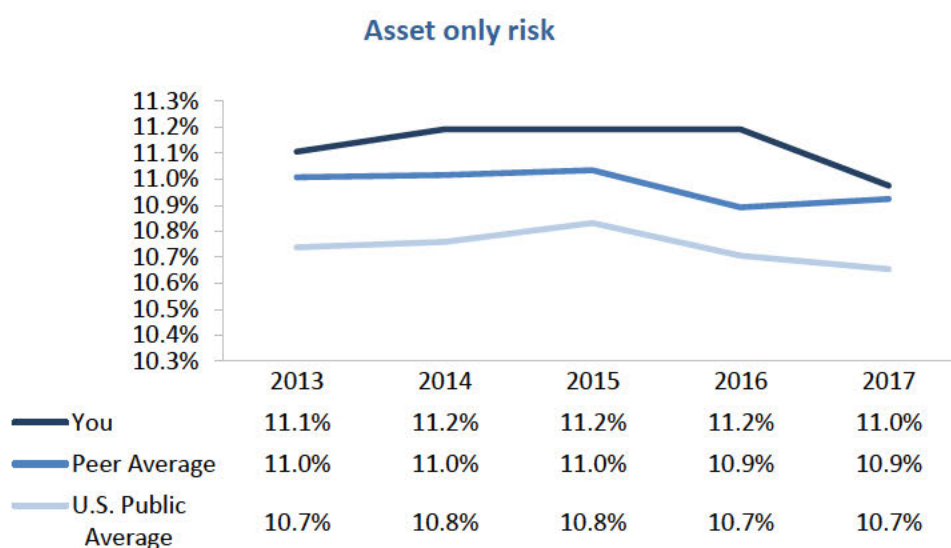
Historic changes in funded status caused by market factors - U.S. Public universe

	2017	2016	2015	2014	2013
90th %	8.6%	4.9%	4.6%	-5.0%	36.9%
75th %	7.8%	4.4%	3.5%	-6.2%	32.9%
Median	6.6%	2.8%	2.1%	-8.0%	29.9%
25th %	5.0%	1.4%	0.8%	-9.8%	26.9%
10th %	3.1%	0.1%	-0.5%	-11.3%	25.1%
Average	6.4%	2.8%	2.1%	-8.1%	30.2%
Count	52	55	59	63	60
Peer Avg	6.3%	3.1%	2.6%	-7.2%	28.9%
Your Value	6.7%	5.1%	1.8%	-6.1%	25.9%

Risk Trends - 2013 to 2017

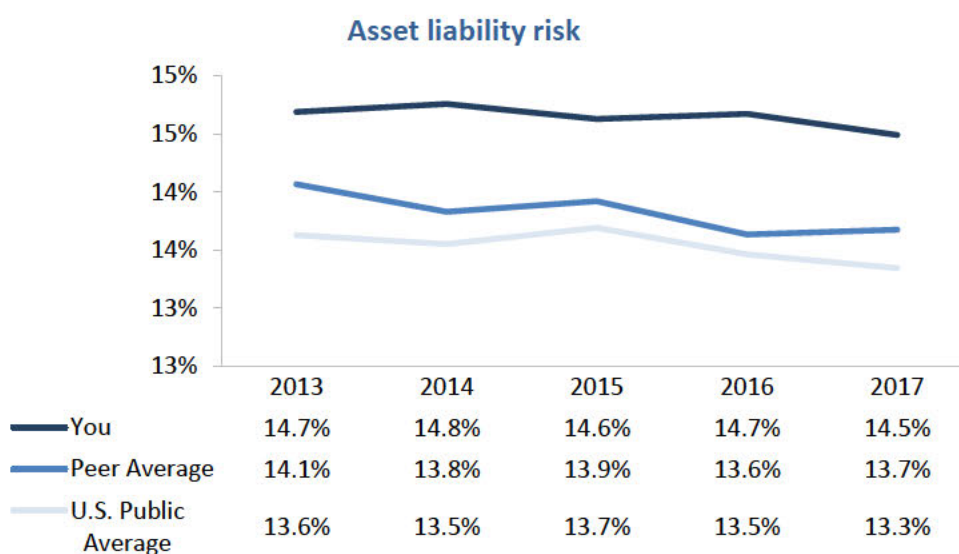
a) Asset risk trends

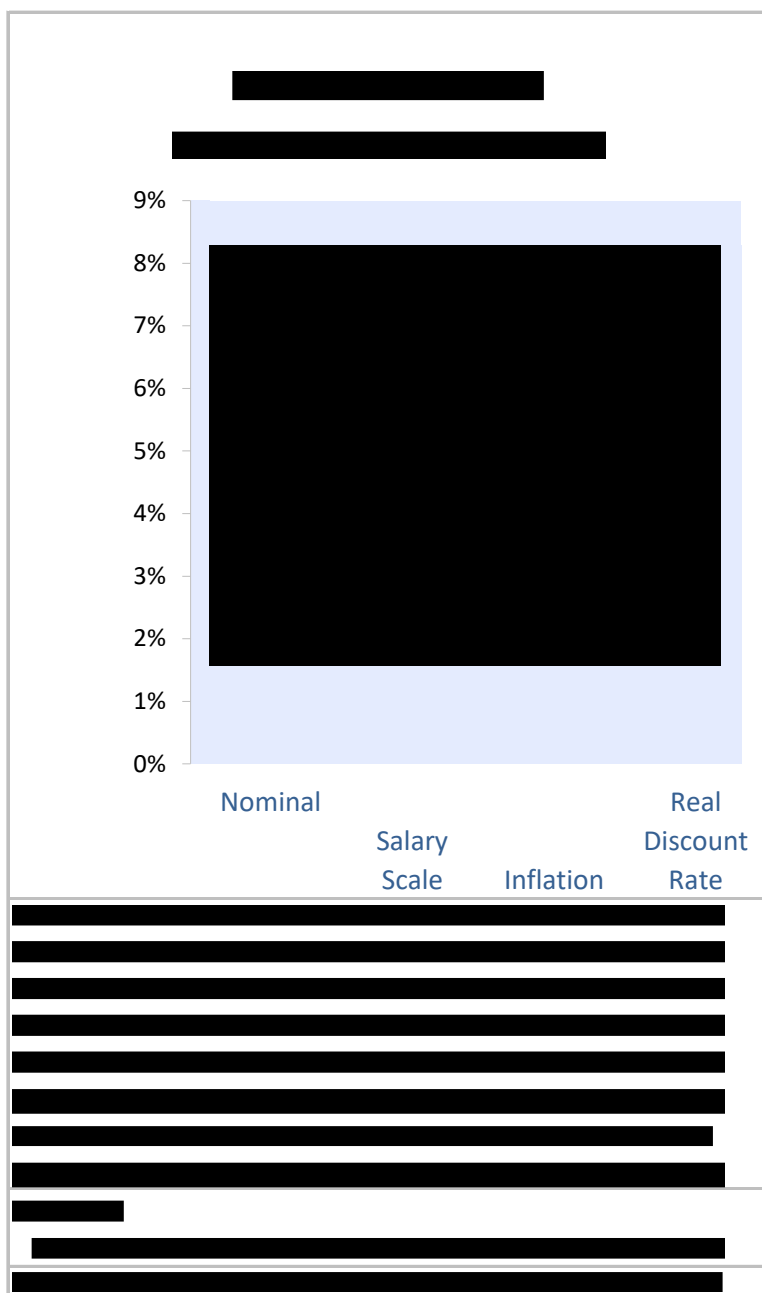
Asset risk will only change if policy asset mix changes. Between 2013 and 2017 the asset risk for your fund decreased from 11.1% to 11.0%.

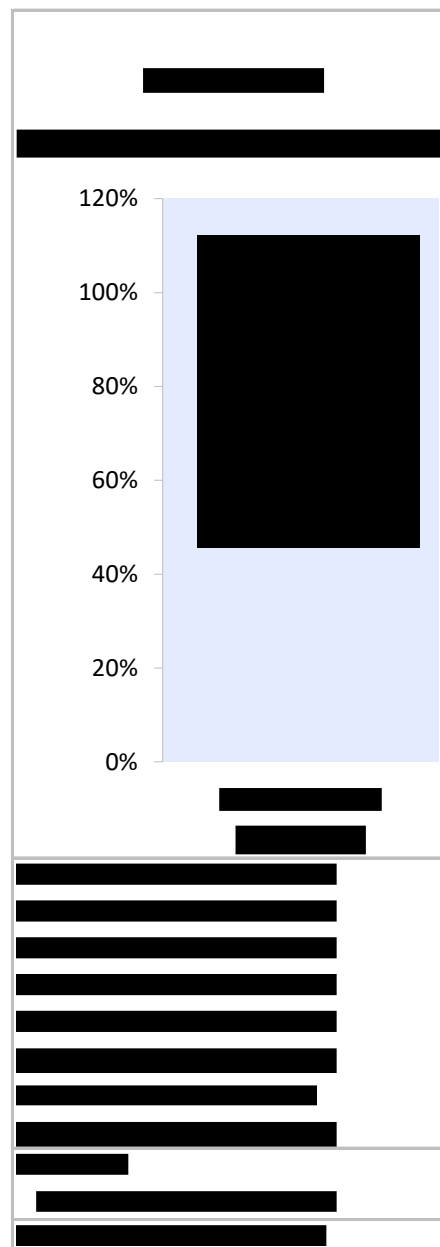
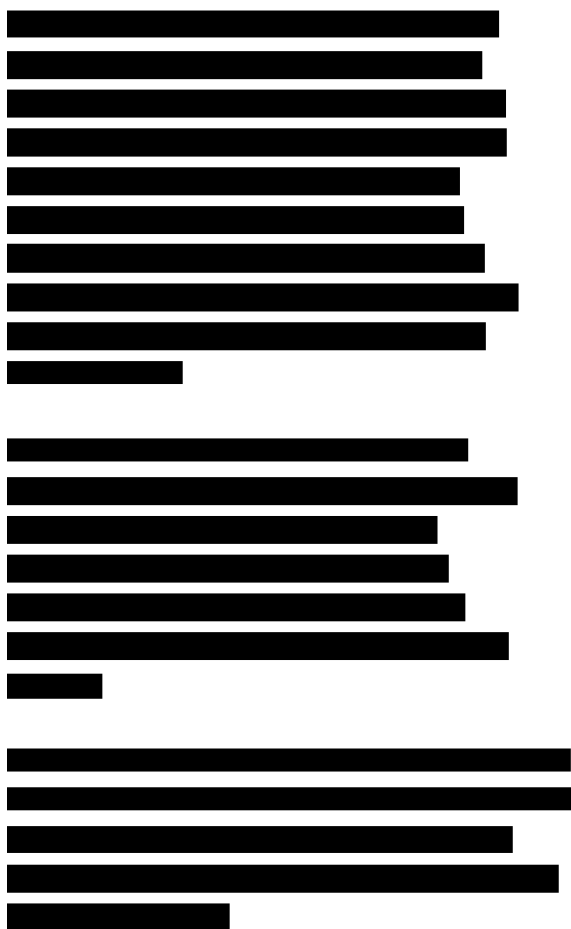


b) Asset-liability risk trends

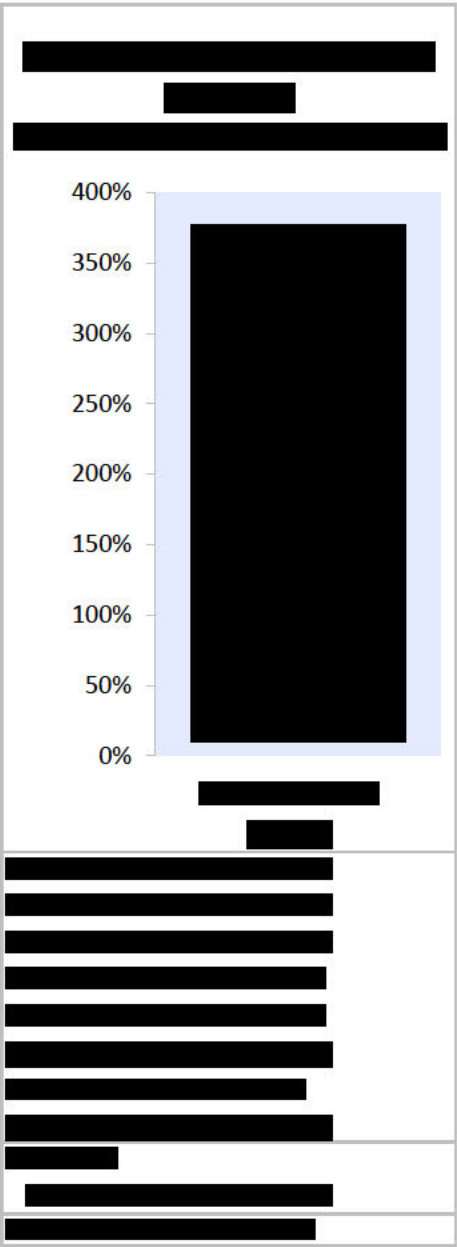
Asset-liability risk will change if policy asset mix changes, or if the nature of your liabilities changes. Between 2013 and 2017 the asset-liability risk for your fund decreased from 14.7% to 14.5%.







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Appendix B - Methodology used to calculate asset and asset-liability risk

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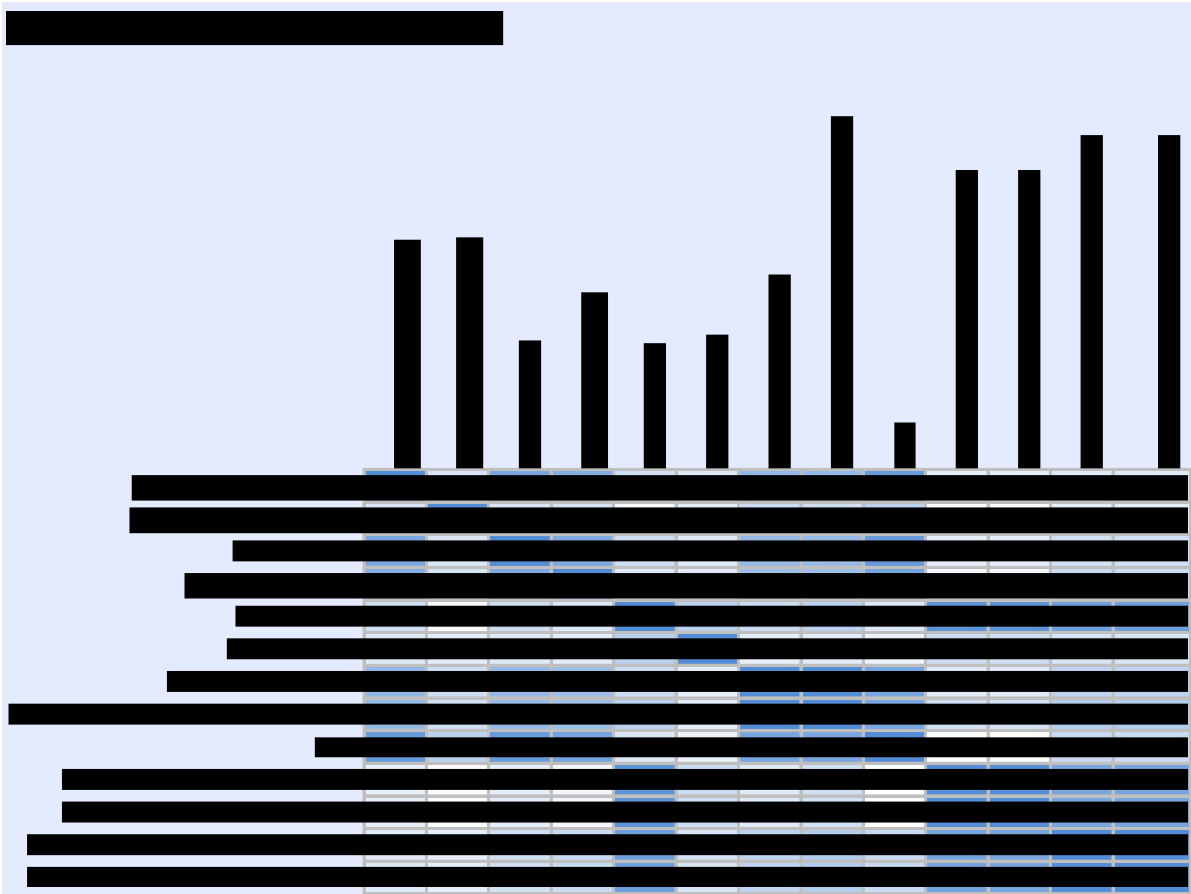
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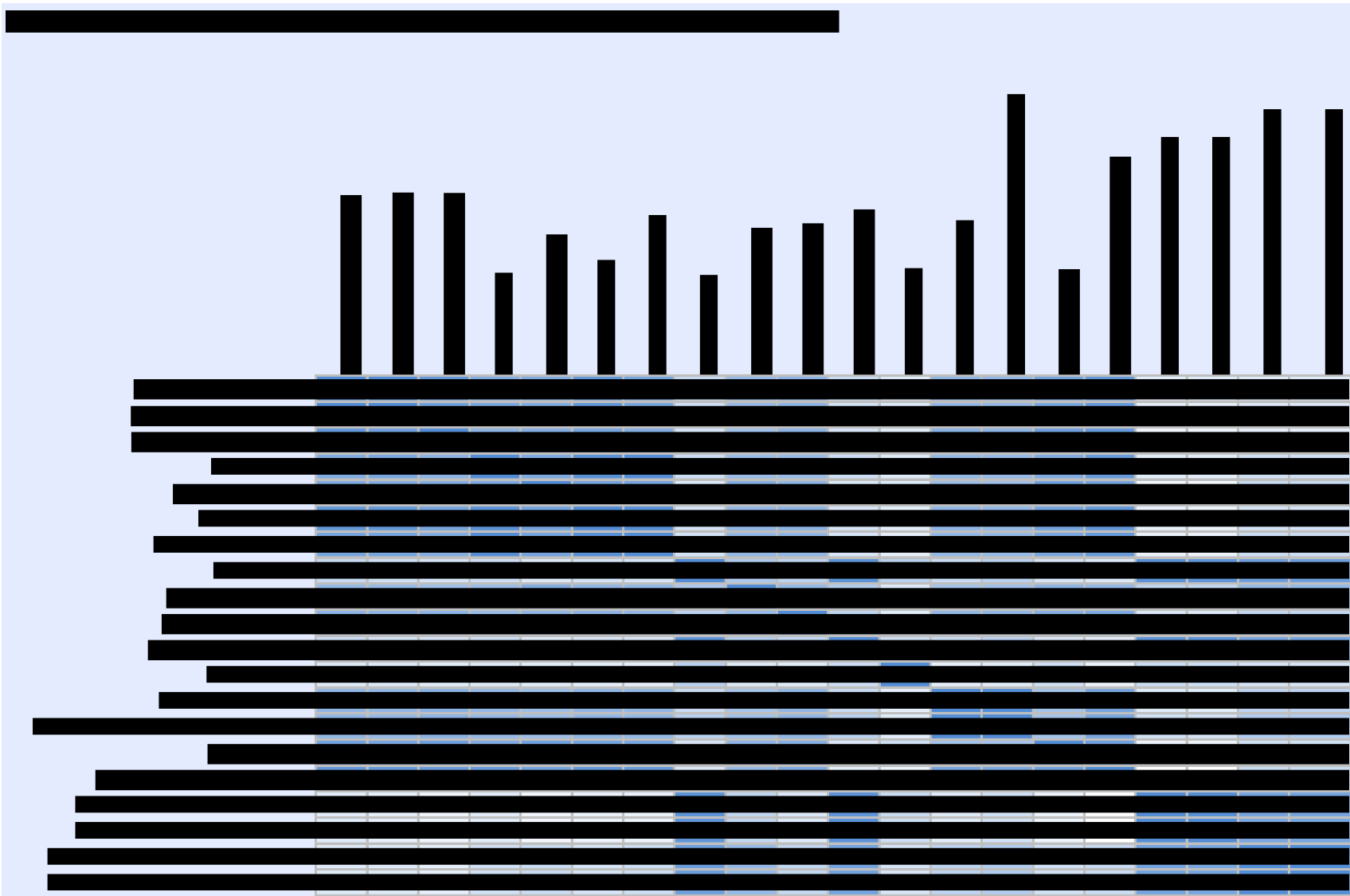
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Appendices

Appendix A - Data Summary

Appendix A2 - Enhanced survey data & mapping to regular survey

Appendix B - Data quality

Appendix C - Glossary of terms

Appendix A - Data Summary

STRS Ohio

Plan Info	2017	2016	2015
Contact	Lynn Hoover	Lynn Hoover	Lynn Hoover
Type of fund (corporate, public, other)	Public	Public	Public
Total fund size (mils) as at December 31	78,304.0	71,661.0	70,756.0
Asset-class level holdings provided on survey are: year end or average?	Year End	Year End	Year End
Total return for year ended	15.76%	8.03%	2.33%
Is the return net or gross?	Net of all investment costs	Net of all investment costs	Net of all investment costs
Total fund policy or benchmark return	15.35%	8.00%	1.71%

Ancillary Data	2017	2016	2015
What is your hedging policy for:			
Foreign Holdings	50%	50%	50%
What were your actuarial fees in 000s?	513	266	247
How many plan members/beneficiaries do you have:			
Active?	193,141	195,440	189,731
Active (no-accrual)?	139,533	135,738	135,215
Retired?	158,039	157,938	158,116
Other?	18,403	17,627	17,453
What type of plan(s) do you have?	Final Average	Final Average	Final Average
To what extent are your retired members' benefits indexed to inflation?			
Contractual %	0%	0%	0%
If the indexation is subject to a cap, describe the cap	0%	2% per year,	2% per year,
What % of the plan's liabilities pertain to retired members?	73%	74%	75%
Actuarial valuation assumptions for funding purposes:			
Liability discount rate	7.5%	7.8%	7.8%
Salary progression rate	3.0%	3.5%	3.5%
What was your actuarial assumption for expected rate of return?	7.5%	7.8%	7.8%

Appendix A - Data Summary: Policy Weights and Benchmarks

STRS Ohio

Asset Class		Policy Weight	Benchmark	
			Description	Return
Stock - U.S. Large Cap	2017	30.0	Russell 1000 (Russell 3000 for total Dom Equity)	21.1
	2016	31.0	Russell 1000 (Russell 3000 for total Dom Equity)	12.7
	2015	31.0	Russell 1000 (Russell 3000 for total Dom Equity)	0.5
Stock - U.S. Small Cap	2017		Russell 2000	14.7
	2016		Russell 2000	21.3
	2015		Russell 2000	-4.4
Stock - EAFE	2017	20.0	MSCI World xUS 50% Hedged Net	20.1
	2016	20.8	MSCI World xUS 50% Hedged Net	5.0
	2015	20.8	MSCI World xUS 50% Hedged Net	0.4
Stock - Emerging	2017	5.0	MSCI Emerging Market Net	37.3
	2016	5.2	MSCI Emerging Market net	11.2
	2015	5.2	MSCI Emerging Market net	-14.9
Stock - ACWI x U.S.	2017		International Blended Benchmark	23.4
	2016		International Blended Benchmark	6.4
	2015		International Blended Benchmark	-2.8
Stock - Global	2017		MSCI ACWI net	24.6
	2016		MSCI ACWI net	7.9
	2015		MSCI ACWI net	-2.4
Fixed Income - U.S.	2017	20.0	Fixed Income Blended (Jul 1 2017)	3.9
	2016	18.0	Barclays Universal for total FI (Barclays Aggregate Index not appropriate for US FI segment)	3.9
	2015	18.0	Barclays Universal for total FI (Barclays Aggregate Index not appropriate for US FI segment)	0.4
Fixed Income - Emerging	2017		Barclays Emerging Market	8.2
	2016		Barclays Emerging Market	9.9
	2015		Barclays Emerging Market	1.3
Fixed Income - High Yield	2017		Barclays US Corp High Yield	7.5
	2016		Barclays US Corp High Yield	17.1
	2015		Barclays US Corp High Yield	-4.5
Cash	2017	1.0	US 90 day T bill	0.9
	2016	1.0	US 90 day T bill	0.3
	2015	1.0	US 90 day T bill	0.1
Global TAA	2017		Custom (Alternative Investment Actual Return)	12.2
	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
Hedge Funds	2017		Custom (Alternative Investment Actual Return)	12.2
	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
REITs	2017	1.5	Your REIT benchmark	5.2
	2016	1.5	Your REIT benchmark	8.5
	2015	1.5	Your REIT benchmark	3.2
Infrastructure	2017		Custom (Alternative Investment Actual Return)	12.2
	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
Real Estate ex-REITs	2017	8.5	NCREIF NPI	7.0
	2016	8.5	NCREIF NPI	8.0
	2015	8.5	NCREIF NPI	13.3
Natural Resources	2017		Custom (Alternative Investment Actual Return)	12.2
	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
Diversified Private Equity	2017		Custom (Alternative Investment Actual Return)	12.2
	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
LBO	2017	14.0	Custom (Alternative Investment Actual Return)	12.2
	2016	14.0	Custom (Alternative Investment Actual Return)	5.3
	2015	14.0	Custom (Alternative Investment Actual Return)	6.1
Venture Capital	2017		Custom (Alternative Investment Actual Return)	12.2
	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1
Private Credit	2017		Custom (Alternative Investment Actual Return)	12.2
	2016			
	2015			
Other Private Equity	2017		Custom (Alternative Investment Actual Return)	12.2
	2016		Custom (Alternative Investment Actual Return)	5.3
	2015		Custom (Alternative Investment Actual Return)	6.1

Appendix A - Data Summary: Assets, Returns and Costs

STRS Ohio

Asset Class		Assets (millions)								Fees/Costs in 000s											
		Internally Managed						Externally Managed		Internally Managed				Externally Managed							
		Indexed		Active		Active		# of mgrs	Indexed		Active		Indexed				Active				
		Assets	Return	Assets	Return	Assets	Return		000s	bps¹	000s	bps¹	Fees	Over-sight	Total 000s	bps¹	Base Fees	Perform Fees	Internal & Other	Total 000s	bps¹
Stock - U S. Large Cap	2017	9,544.3	23.0	10,622.7	21.4	1,220.9	23.3	1	72.1	0.1	12,590.5	12.0					2,466.3		226.9	2,693.2	23.8
	2016	8,868.0	11.3	10,342.4	10.2	1,046.3	9.8	1	64.0	0.1	11,243.9	10.9					2,233.7		186.0	2,419.7	23.6
	2015	8,672.3	2.4	10,308.3	-0.1	1,003.0	2.5	1	40.6	0.0	11,794.0	10.9					2,168.3		179.9	2,348.3	23.7
Stock - U S. Small Cap	2017			842.2	13.7	1,262.6	24.3	5			346.3	4.2					9,642.9		74.6	9,717.5	77.3
	2016			824.9	22.0	1,252.0	14.8	6			257.6	3.2					8,861.7		54.0	8,915.7	75.8
	2015			778.8	-2.4	1,101.3	-1.2	6			293.3	3.6					8,895.4		203.3	9,098.7	81.2
Stock - EAFE	2017			5,663.8	20.1	5,881.0	24.1	3			3,597.2	6.4					19,869.7		241.7	20,111.5	35.5
	2016			5,589.9	4.5	5,463.5	5.6	3			3,292.2	5.9					18,582.3		214.5	18,796.8	34.2
	2015			5,658.2	1.8	5,529.7	5.6	3			2,892.7	5.2					19,934.8		194.7	20,129.5	35.7
Stock - Emerging	2017			2,382.3	32.2	1,139.1	31.4	3			2,696.7	12.1					6,401.6		263.3	6,664.9	61.4
	2016			2,061.8	14.6	1,030.7	12.6	3			2,571.8	13.1					5,834.4		256.1	6,090.6	62.4
	2015			1,856.3	-10.5	920.4	-13.7	3			2,578.4	14.1					5,317.9		280.4	5,598.3	56.2
Stock - ACWI x U S.	2017			3,211.2	24.2	1,418.8	23.4	2			475.0	1.5					6,121.7		20.4	6,142.1	46.1
	2016			2,988.9	9.1	1,243.3	4.1	2			433.9	1.5					5,445.3		18.6	5,463.8	44.6
	2015			2,730.5	-1.8	1,206.1	2.0	2			439.9	1.6					5,022.1		17.5	5,039.7	45.9
Stock - Global	2017			634.2	24.1						495.3	8.5									
	2016			536.0	8.8						452.5	6.9									
	2015			778.8	-1.2						457.4	5.8									
Fixed Income - U.S.	2017			13,081.7	3.5						3,304.9	3.0									
	2016			8,787.2	2.7						2,465.8	2.7									
	2015			9,726.0	1.0						2,552.2	2.5									
Fixed Income - Emerging	2017					813.7	10.8	2									3,435.7		156.3	3,592.0	46.3
	2016					737.3	15.8	2									3,180.6		130.4	3,311.0	45.1
	2015					731.4	1.1	2									3,586.6		130.5	3,717.1	46.6
Fixed Income - High Yield	2017					849.1	7.7	2									3,146.4		165.3	3,311.7	40.4
	2016					792.0	17.3	2									3,666.2		155.0	3,821.3	43.8
	2015					953.9	-4.0	2									4,427.6		178.5	4,606.1	42.2
Cash	2017			1,699.9	0.8						285.8	1.7									
	2016			1,679.5	0.5						266.0	1.8									
	2015			1,274.8	0.1						268.6	1.4									
Global TAA	2017					741.8	10.5	4									1,334.7		36.8	1,371.5	23.8
	2016					412.0	8.4	1									1,191.4	0.0	26.5	1,217.9	30.6
	2015					383.8	-2.2	1									678.1	0.0	12.0	690.1	36.0
REITs	2017	1,117.2	5.2						94.3	0.8											
	2016	1,262.4	8.8						89.1	0.7											
	2015	1,166.2	3.2						226.4	2.0											
Hedge Funds	2017					1,638.9	5.6	11									26,980.9	22,775.2	290.8	50,046.9	274.8
	2016					2,003.9	5.0	11									32,054.3	22,495.0	336.8	54,886.1	271.5
	2015					2,039.1	1.2	11									35,310.0	9,973.0	319.6	45,602.6	223.0

1. Cost in basis points = total cost / average of beginning and end of year holdings

Appendix A - Data Summary: Private Market Assets, Returns and Costs

STRS Ohio

Asset Class		Assets (millions) and Annual Returns						# Ext Mgrs	Investment Fees / Costs in 000s¹																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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				Amt fees based on	Assets Return	Amt fees based on	Assets Return		Total 000s	bps¹	Base Fees	Perform Fees	Internal & Other	Total¹ 000s	bps (% of fee basis)	Underlying² Fees	Base Fees	Perform Fees	Internal & Other	Total¹ 000s	bps (% of fee basis)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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1. Cost in basis points = total cost / average of beginning and end of year holdings. Total cost excludes private asset performance fees because of comparability issues.

2. Default for fees paid to underlying partnerships have been applied.

Appendix A - Data Summary: Oversight, Custodial and Other Costs

STRS Ohio

Oversight, Custodial and Other Costs			
		000s	bps
Oversight of the fund assets ¹	2017	4,812.2	0.6bp
	2016	4,578.3	0.6bp
	2015	4,539.4	0.6bp
Custodial total	2017	2,412.3	0.3bp
	2016	2,090.0	0.3bp
	2015	2,149.9	0.3bp
Audit	2017	168.3	0.0bp
	2016	165.9	0.0bp
	2015	158.3	0.0bp
Other (legal etc)	2017	477.4	0.1bp
	2016	418.1	0.1bp
	2015	374.8	0.1bp
Total	2017	7,870.1	1.0bp
	2016	7,252.3	1.0bp
	2015	7,222.4	1.0bp

Summary of All Asset Management Costs			
		000s	bps
Investment Management Costs	2017	294,703.6	39.3bp
	2016	293,532.4	41.2bp
	2015	288,192.6	39.9bp
Oversight, Custodial & Other Costs	2017	7,870.1	1.0bp
	2016	7,252.3	1.0bp
	2015	7,222.4	1.0bp
Total	2017	302,573.7	40.4bp
	2016	300,784.7	42.2bp
	2015	295,415.0	40.9bp

1. Oversight includes the salaries and benefits of executives and their staff responsible for overseeing the entire fund or multiple asset classes and the fees / salaries of the board or investment committee. All costs associated with the above including fees / salaries, travel, director's insurance and attributed overhead should be included.

Appendix A - Data Summary: Overlays

STRS Ohio

Overlays														
		Notional amount (mils)	Market value (mils)	Profit/ Loss (000s)	% of Cost (000s)	Duration Notion (bps) (years)	Notional amount (mils)	Market value (mils)	Profit/ Loss (000s)	Base fees (000s)	Perf. fees (000s)	Over- sight (000s)	Total (000s)	% of Notion. Duration (bps) (years)
	2017	5,243.5	-39.1	330.2	0.6		4,726.6	-39.8				165.1	165.1	0.4
	2016	6,069.4	6.4	301.6	0.6		4,147.6	43.4				150.8	150.8	0.4

Appendix A - Data Summary: Comments and defaults

[illegible]

Appendix A - Data Summary - Enhanced Survey Data and Mapping to Regular Survey - Mapped Data

Data after the mapping process from enhanced survey to regular is shown below. The below data is used through the rest of this report.

Investment Costs by Asset Class and Style (\$000s)										
	Internal		External Passive		External Active			Total		
	Passive	Active	Fees	Monitoring & Other	Base Fees	Perform. Fees	Monitoring & Other	000s	% of Total	
Stock - U.S. Large Cap	72	12,590			2,466		227	15,356	5%	
Stock - U.S. Small Cap		346			9,643		75	10,064	3%	
Stock - EAFE		3,597			19,870		242	23,709	8%	
Stock - Emerging		2,697			6,402		263	9,362	3%	
Stock - ACWI x U.S.		475			6,122		20	6,617	2%	
Stock - Global		495						495	0%	
Fixed Income - U.S.		3,305						3,305	1%	
Fixed Income - Emerging					3,436		156	3,592	1%	
Fixed Income - High Yield					3,146		165	3,312	1%	
Cash		286						286	0%	
Infrastructure - FoFs					460	352	13	473	0%	
REITs	94							94	0%	
Real Estate ex-REITs		17,182						17,182	6%	
Real Estate - LPs					17,650	5,941	464	18,114	6%	
Natural Resources - LPs					6,832	2,885	69	6,901	2%	
Hedge Funds					26,981	22,775	291	27,272	9%	
Global TAA					1,335		37	1,372	0%	
Diversified Private Equity					3,104	1,808		3,104	1%	
LBO					44,818			44,818	15%	
LBO - FoFs					6,707	3,151	794	7,500	2%	
LBO - FoFs					10,952	16,464		10,952	4%	
Venture Capital - LPs					16,965	11,703	252	17,217	6%	
Venture Capital - FoFs					1,207	740	75	1,282	0%	
Venture Capital - FoFs					4,794	2,935		4,794	2%	
Private Credit					8,251	4,712	114	8,365	3%	
Other Private Equity		168			23,549	12,342	348	24,065	8%	
Overlay Programs	330			165				495	0%	
Total investment management costs - Internal & Monitoring								45,409	15%	
Total investment management fees (excluding performance in private assets)								224,688	74%	
Total investment management costs					39.3bp			294,704	97%	
Oversight, Custodial & Other Asset Related Costs (\$000s)										
Oversight of the Fund								4,812	2%	
Trustee & Custodial								2,412	1%	
Audit								168	0%	
Other								477	0%	
Total oversight, custodial & other costs								1.0bp	7,870	3%
Total cost for STRS Ohio								40.4bp	302,574	100%

* Default cost used. Refer to Appendix A.

Costs in blue come from the following page.

Costs in purple are from a two-step process shown over the next two pages.

Appendix A - Data Summary - Enhanced Survey Mapping to Regular Survey

Activity	Cost per Enhanced Survey	# of FTE	Step 1: Attribution of Oper. & Support	Cost with Attribution
Front Office				
external alternative investments	2,281	4.0	542	2,823
internal fixed income	2,678	7.0	949	3,626
internal alternative investments	90	2.3	312	401
internal active large & mid cap	9,293	26.0	3,524	12,817
internal developed	2,789	7.8	1,050	3,839
internal emerging	2,249	5.3	712	2,960
internal Global ex US (ACWI ex US)	360	1.0	136	495
Currency hedge (from internal developed)	360	1.0	136	495
internal active small cap	150	2.0	271	421
internal real estate (directly held)	11,761	40.0	5,422	17,182
internal global quant	360	1.0	136	495
internal real estate indirect	329	1.0	136	464
Internal liquidity reserves	150	1.0	136	286
internal reit	67	0.2	27	94
internal passive domestic equity	45	0.2	27	72
Total front office	32,960	99.7	13,513	46,473
Governance, Operations and Support				
Board, CEO & assistants re: investments (A)	1,119	2.0	271	1,390
CIO, Investment strategy, asset allocation (B)	2,474	7.0	949	3,422
Oversight of the fund per regular CEM survey (A + B)				4,812
Risk management	270	0.4	n/a	2,412
Internal audit	168	1.0	n/a	168
Responsible investing, corporate governance			n/a	477
Custodial fees	2,412	n/a	-2,412	0
Valuation & performance analytics	2,209	3.0	-2,209	0
Investment operations - excluding private mark	592	4.0	-592	0
Investment operations - private markets	148	1.0	-148	0
Compliance	163	1.0	-163	0
Information Technology	7,298	40.0	-7,298	0
Public relations & internal communication	280	2.0	-280	0
Finance, external reporting & tax	858	3.0	-858	0
Legal services	477	1.0	-477	0
Human resources	491	3.0	-491	0
Building, utilities & office services	2,317	16.0	-2,317	0
Non-specific allocated overhead	107	8.0	-107	0
Total cost excluding external manager fees	54,343	192.1	-2,620	54,343

How CEM mapped the above costs to the regular survey

CEM attributed both front office and back office costs to the CEM asset classes by style using the following methodology:

Step 1 - CEM attributed operations and support costs to front office & oversight pro rata based on FTE.

Step 2 - CEM attributes the fully loaded cost (shown in green) to all of the CEM asset classes that the team manages (see next page). The attribution preserves the relative cost ratios versus the CEM universe for each of the asset classes that the team manages.

Appendix A - Data Summary - Enhanced Survey Mapping of Internal Teams

Front Office	Cost with Attribution from Step 1	Responsibilities by CEM asset class	Step 2 Attribution to Asset Classes
external alternative investments	2,823	Infrastructure	13
		Monitoring LP Natural Resources	69
		Monitoring Hedge Funds	291
		Monitoring Global TAA	37
		Monitoring LP Diversified Private Equity	40
		Monitoring LP Venture Capital	252
		Venture Capital	75
		Monitoring LP LBO	791
		LBO	794
		Monitoring LP Private Credit	114
		Monitoring LP Other Private Equity	348
internal fixed income	3,626	Fixed Income - U.S.	3,305
		Monitoring Fixed Income - Emerging	156
		Monitoring Fixed Income - High Yield	165
internal alternative investments	401	Natural Resources	40
		Other Private Equity	168
		Other Private Equity	193
internal active large & mid cap	12,817	Stock - U.S. Large Cap	12,590
		Monitoring Stock - U.S. Large Cap	227
internal developed	3,839	Stock - EAFE	3,597
		Monitoring Stock - EAFE	242
internal emerging	2,960	Stock - Emerging	2,697
		Monitoring Stock - Emerging	263
internal Global ex US (ACWI ex US)	495	Stock - ACWI x U.S.	475
		Monitoring Stock - ACWI x U.S.	20
Currency hedge (from internal developme	495	Passive Derivatives/Overlays - Currency	330
		Monitoring Passive Derivatives/Overlays - Currency	165
internal active small cap	421	Stock - U.S. Small Cap	346
		Monitoring Stock - U.S. Small Cap	75
internal real estate (directly held)	17,182	Real Estate ex-REITs	17,182
internal global quant	495	Stock - Global	495
internal real estate indirect	464	Monitoring LP Real Estate ex-REITs	464
Internal liquidity reserves	286	Cash	286
internal reit	94	Passive REITs	94
internal passive domestic equity	72	Passive Stock - U.S. Large Cap	72
Total Front Office	46,473		46,473

Front Office team costs, including allocated operations and support costs (see prior page), are attributed to the asset classes managed or overseen by the team. These attributions, shown in purple, are then inserted back into the regular survey.

Appendix A - Data Summary - Enhanced Survey Definitions

Costs - Attribute 100% of costs excluding manager fees and transaction costs including:

- (i) **Salaries and benefits** of FTE
- (ii) **General & administrative:** travel, supplies, staff education, publications and reference materials, etc.
- (iii) **Consulting** and other third party fees

FTE - Includes full time permanent salaried employees, include the FTE of long and short term contract individuals dedicated to your organization that are working onsite or working full-time for your fund on a project or in a role supervised by your staff. Do not include FTE at external consultants or service providers if they are not being supervised by your staff, even if they are dedicated to serving your organization.

Activity Definitions

1. Front Office consists of investment-decision making staff, including traders, analysts, portfolio managers and staff selecting and monitoring external managers, their immediate assistants and their management below the CIO level. Include third party fees for advice at the asset-class or security level such as manager search consultants, private equity consultants, and investment specific legal and due diligence fees that are not treated as transaction costs.

Does NOT include:

- (i) External manager fees. These are collected separately on the holdings tabs.
- (ii) Costs that relate to activities defined as Governance, Operations and Support in the table such as: board consultants, CIO, asset allocation and risk policy consultants, or other services (such as building, utilities and office services, information technology and human resources).

a. Board, CEO & assistants re: investments: Include only the proportion of the costs (fees paid to Board directors, travel, director insurance, CEO and CEO's direct assistants) equal to their proportion of time spent on investments and investment governance support. Exclude time spent on non-investment activities such as benefit administration, sales, marketing, new product development.

b. CIO, Investment strategy, asset allocation: Include 100% of CIO FTE and costs including his/her direct assistants, total fund asset allocation strategy, tactical deviations from the mix, economic political or other research, etc.

c. Risk management: Developing and implementing risk controls for operational and investment risk including surplus risk, factor exposures, credit, counterparty, etc. Excludes the cost of IT/IS risk systems. These belong in IT/IS.

d. Internal Audit: Independent review of business processes. Excludes external auditor fees. These belong in Finance, external reporting & tax.

e. Responsible investing, corporate governance: Policy setting and coordination across asset classes for sustainable, socially and/or environmentally responsible investing, and for corporate governance.

f. Client account management: Client service & reporting related to investing client assets, including client Board meetings, strategic client advice (ALM, risk, client portfolio construction).

g. Custodial fees: should be reported gross before any reductions relating to securities lending or other revenues credited against fees.

h. Data, valuation & performance analytics: Valuation and performance measurement of securities, funds, portfolios, risk, compliance, client reporting and other analysis and reporting. Include costs of data, dealing with data vendors and cleaning data.

Appendix A - Data Summary - Enhanced Survey Definitions (page 2)

i. Investment operations: Listed security operations including trade settlement, custodial bank monitoring and reconciliation, cash management and corporate actions, private asset class, derivatives and swap administration, COO. If the COO or CFO is responsible for multiple activities (i.e., Valuations and performance analytics, investment operation and finance) then split their FTE between the activities based on time spent.

j. Compliance: Monitoring, training on and dealing with regulatory infractions. Includes securities and pension regulation. Excludes compliance related to benefit administration.

k. IT/IS systems: IT management and strategy, architecture, data center, database and application management and maintenance, development, user services, network, telecommunications, etc. Also include the costs of purchasing and maintaining the following systems/software applications: portfolio management, risk management, trade processing/order execution management, compliance monitoring, performance analytics, fund accounting system. Exclude the pro rata portion that relates to non-investment activities such as benefit administration, sales, marketing, new product development.

l. Public relations and internal communication: External communication with entities such as regulators and media. Internal communication to staff. Excludes member and employer communication, marketing and sales.

m. Finance, external reporting & tax: Financial statements, external auditor fees, general accounting, budgeting, tax reporting, procurement and accounts payable. CFO. If the CFO or COO is responsible for multiple activities (i.e., finance and IT) then split their FTE between the activities based on time spent.

n. Legal services: General counsel, corporate secretary, legal counsel of any kind, even those specializing in real estate or private equity, paralegals, legal assistants and all FTE involved in legal analysis and advice. Investment related legal fees and costs, such as the legal fees to close private equity transactions, should be included under 'Front Office' if not treated as a transaction cost. Exclude amounts that pertain to non-investment activities such as benefit administration.

o. Human resources: Human resources staff and consulting, including recruitment, training, career development, induction, disciplinary action, developing HR policies and procedures, etc.
Exclude: Amounts that relate to non investment activities such as benefit administration and both severance and recruitment fees and activity specific training (these should be included in the Front Office Cost Centers table).

p. Building, utilities and office services: Building occupancy costs including rent, lease, amortization of leaseholds and depreciation of buildings, office services such as reception, mailroom, cleaning and maintenance, building insurance, utilities. Include satellite offices. Exclude the pro rata portion that relates to non-investment activities such as benefit administration, sales, marketing, new product development.

Appendix B - Data quality

The value of the information contained in these reports is only as good as the quality of the data received. CEM's procedures for checking and improving the data include the following.

Improved survey clarity

Twenty years of feedback from survey participants has led to improved definitions and survey clarity. In addition to immediate feedback from participants, CEM has hosted user workshops to solicit additional feedback and to resolve issues, such as trade-offs between more information and effort on the part of participants.

Computer and desktop verification

Survey responses are compared to norms for the survey universe and to each sponsor's prior year data when available. This typically results in questions generated by our online survey engine as well as additional follow-up to clarify responses or with additional questions.

In addition to these procedures, data quality continues to improve for the following reasons:

Learning curve

This is CEM's 27th year of gathering this data and experience is teaching the firm and the participants how to do a better job.

Growing universe

As our universe of respondents continues to increase in size, so does our confidence in the results as unbiased errors tend to average themselves out.

Any suggestions on how to further improve data quality are welcome.

Currency Conversions

For reports where either the peer group or report universe includes funds from multiple countries, we have converted the returns back to the base currency of the fund we prepared the report for. For example, for a Euro zone fund with peers from the U.S. we converted U.S. returns to Euro based on the currency return for the year using December 31 spot rates.

Appendix C - Glossary of terms

Average cost

- Calculated by dividing actual annual costs by the average of beginning and end-of-year holdings. If beginning-of-year holdings are not available, they are estimated using end-of-year holdings before the effect of this year's return on investment.

Benchmark return

- Rate of return on a portfolio of investable assets (such as the S&P500) designated as the benchmark portfolio against which the fund measures its own performance for that asset class.

F statistics

- Measure of the statistical significance of the regression coefficients taken as a group. Generally, regression equations with 5 coefficients and sample sizes greater than 20 are statistically significant if its F statistic is greater than 3.

Global TAA

- Fully funded segregated asset pool dedicated to active asset allocation.

Impact coefficient

- Estimate of the impact on the dependent variable in a regression of a change in the value of a given explanatory variable

Level of significance

- Degree to which sample data explains the universe from which they are extracted.

N-year peers

- Subset of peer group that have participated in our study for at least the consecutive n years.

Oversight of the fund

- Resources devoted to the oversight of the fund.

Overlay

- Derivative based program (unfunded other than margin requirements), designed to enhance total portfolio return (such as a tactical asset allocation program) or to achieve some specific mandate such as currency hedging.

Passive proportion

- Proportion of assets managed passively, i.e., indexed to broad capital market benchmarks or dedicated to replicate market benchmarks.

Policy mix

- Reflects long-term policy or target asset weights. Policy asset mix is often established by a fund's investment committee or board and is determined by such long term considerations as liability structure, risk tolerance and long term capital markets prospects.

Policy return

- The return you would have earned if you had passively implemented your policy mix decision through your benchmark portfolios. Your policy return equals the sum of your policy weights multiplied by your asset class benchmarks for each asset class.

R squared (coefficient of determination)

- The percentage of the differences in the dependent variable explained by the regression equation. For example, an R squared of 1 means 100% of the differences are explained and an R squared of 0 means that none of the differences are explained.

Value added

- the difference between your total actual return and your policy return. It is a measure of actual value produced over what could have been earned passively.