

FUND EVALUATION REPORT

Worcester Retirement System

Quarterly Review
May 12, 2016



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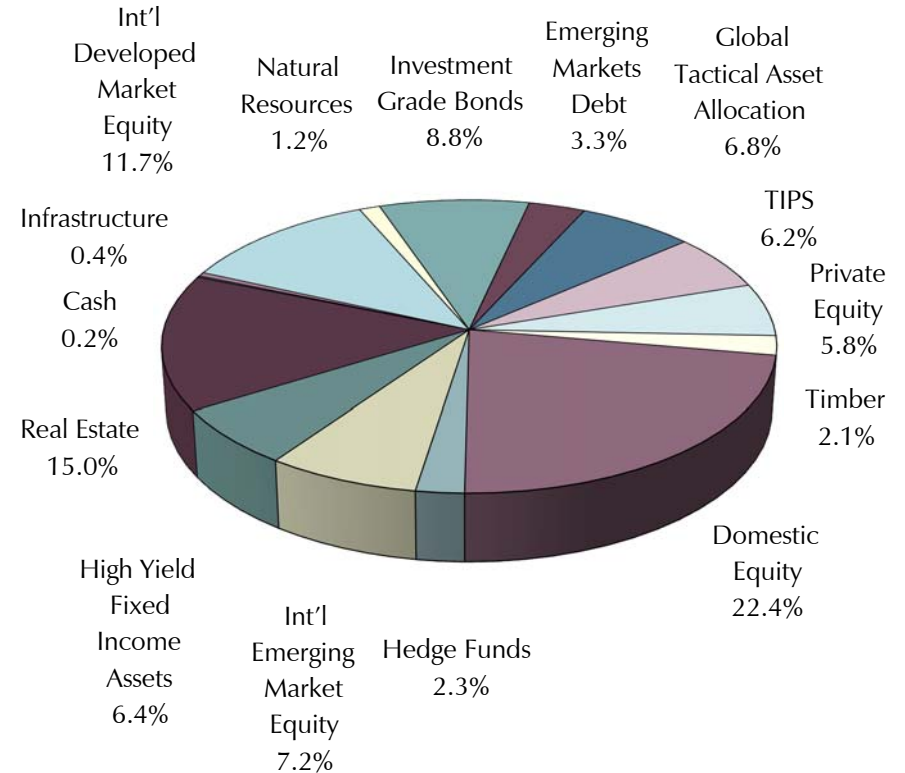
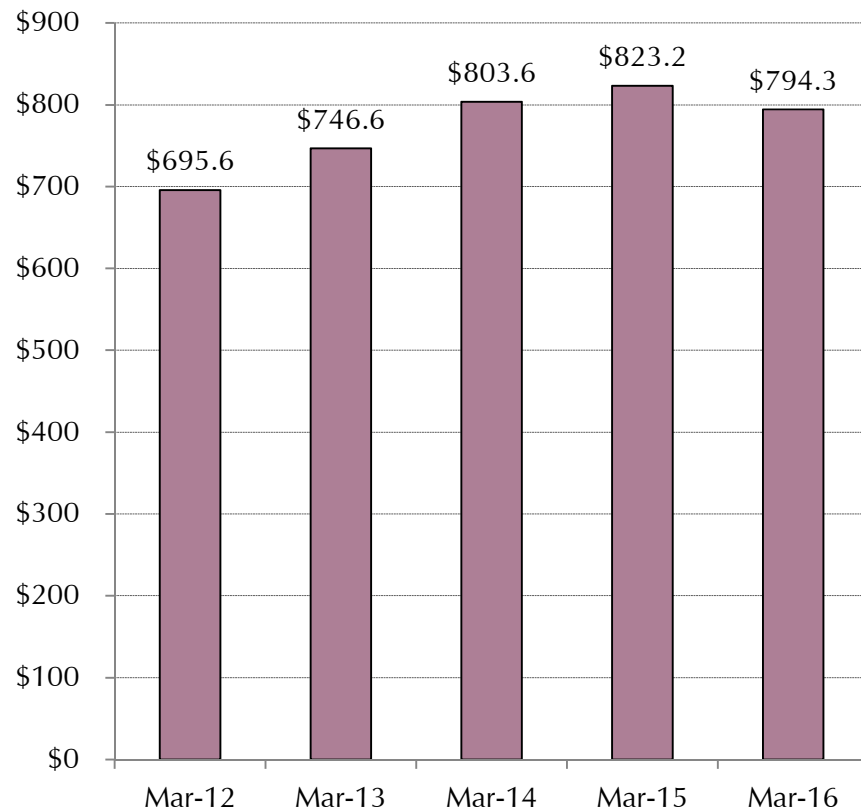
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Retirement System Summary
As of March 31, 2016

Worcester Retirement System

Aggregate Assets as of 3/31/16



Worcester Retirement System

Aggregate Assets Portfolio Roster as of 3/31/16

	Market Value 3/31/16 (\$ mm)	% of System	Target Allocation (%)	Target Range (%)	Market Value 12/31/15 (\$ mm)
Total Retirement System	794.3	100	NA	NA	796.5
Domestic Equity Assets	178.2	22	22	17-27	186.4
International Developed Market Equity Assets	93.3	12	12	7-17	104.2
International Emerging Market Equity Assets	57.5	7	9	6-12	61.4
Investment Grade Bond Assets	69.7	9	9	6-12	55.2
TIPS Assets	48.9	6	5	2-8	47.2
Emerging Markets Debt Assets	26.3	3	3	1-5	24.6
High Yield Fixed Income Assets	50.9	6	4	1-7	49.6
Real Estate Assets ¹	119.3	15	10	5-15	116.6
Private Equity Assets ¹	46.3	6	10	7-13	45.9
Global Tactical Asset Allocation Assets	54.4	7	7	4-10	54.3
Hedge Fund Assets	18.2	2	2	0-4	18.7
Timber Assets ¹	17.0	2	3	2-4	16.4
Natural Resources Assets	9.6	1	2	1-3	9.3
Infrastructure Assets ¹	3.3	< 1	2	0-3	5.2
Cash ²	1.4	< 1	0	< 5	1.5

¹ Market values are based on December 31, 2015 fair market values, adjusted for subsequent period cash flows.

² Includes \$1.0mm held in Euros to be repatriated.



Worcester Retirement System

Aggregate Assets Portfolio Roster as of 3/31/16

	Market Value 3/31/16 (\$ mm)	% of Asset Class	% of System	Target Allocation (%)	Target Range (%)	Market Value 12/31/15 (\$ mm)
Total Retirement System	794.3	NA	100	NA	NA	796.5
Domestic Equity Assets	178.2	100	22	22	17-27	186.4
SSgA S&P 500 Index	83.2	47	10			87.0
SSgA Russell 1000 Growth Index	34.8	20	4			37.4
SSgA Russell 1000 Value Index	33.8	19	4			36.1
LMCG Small Cap Value	9.3	5	1			8.9
SSgA S&P Midcap 400 Index	9.2	5	1			8.9
Nichols Small Cap Growth	7.9	4	1			8.2
International Developed Market Equity Assets	93.3	100	12	12	7-17	104.2
SSgA MSCI EAFE Index ¹	75.0	80	9			85.9
Acadian Non-U.S. Small Cap Equity	18.3	20	2			18.3
International Emerging Market Equity Assets	57.5	100	7	9	6-12	61.4
Lazard Emerging Markets Equity	35.8	62	5			41.2
Dimensional Emerging Markets	21.7	38	3			20.3
Investment Grade Bond Assets	69.7	100	9	9	6-12	55.2
IR&M Aggregate Bond	69.7	100	9			55.2

¹ The SSgA MSCI EAFE Index daily liquidity fund had a market value of \$38.7 million.



Worcester Retirement System

Aggregate Assets Portfolio Roster as of 3/31/16

	Market Value 3/31/16 (\$ mm)	% of Asset Class	% of System	Target Allocation (%)	Target Range (%)	Market Value 12/31/15 (\$ mm)
TIPS Assets	48.9	100	6	5	2-8	47.2
IR&M Intermediate TIPS	48.9	100	6			47.2
Emerging Markets Debt Assets	26.3	100	3	3	1-5	24.6
Lazard Emerging Market Debt Blend	26.3	100	3			24.6
High Yield Fixed Income Assets	50.9	6	6	4	1-7	49.6
Loomis Sayles ¹	41.7	100	5			41.0
Private Debt²	9.2	1	1			8.5
Northstar Mezzanine Partners VI	3.1	< 1	< 1			3.0
Newstone Capital Partners II	2.2	< 1	< 1			1.9
Northstar Mezzanine Partners V	2.0	< 1	< 1			2.1
Northstar Mezzanine Partners IV	1.0	< 1	< 1			0.7
Newstone Capital Partners	0.4	< 1	< 1			0.4
Northstar Mezzanine Partners III	0.3	< 1	< 1			0.3

¹ The high yield bond component was valued at approximately \$20.8 million, while the bank loan component was valued at approximately \$21.0 million.

² Market values are based on December 31, 2015 fair market values, adjusted for subsequent period cash flows.



Worcester Retirement System

Aggregate Assets Portfolio Roster as of 3/31/16

	Market Value 3/31/16 (\$ mm)	% of Asset Class	% of System	Target Allocation (%)	Target Range (%)	Market Value 12/31/15 (\$ mm)
Real Estate Assets¹	119.3	100	15	10	5-15	116.6
PRIT Real Estate	62.9	53	8			61.3
INVESCO Core Real Estate USA	48.8	41	6			48.2
AEW Partners VII	4.6	4	1			4.3
AEW Partners VI	3.0	3	< 1			2.7
Intercontinental Real Estate Investment Fund IV	0.1	< 1	< 1			0.1
AREA Property Partners Fund II	< 0.1	< 1	< 1			< 0.1
Private Equity Assets¹	46.3	100	6	10	7-13	45.9
Buyouts	34.7	75	4			34.3
American Securities Partners VI	7.5	16	1			7.4
Vitruvian Investment Partnership I	6.8	14	1			6.5
Riverside Capital Appreciation Fund VI	4.4	9	1			4.2
Riverside Micro Cap Fund III	4.3	9	1			4.2
Capital International Private Equity Fund VI	3.4	7	< 1			3.4

¹ Market values are based on December 31, 2015 fair market values, adjusted for subsequent period cash flows.



Worcester Retirement System

Aggregate Assets Portfolio Roster as of 3/31/16

	Market Value 3/31/16 (\$ mm)	% of Asset Class	% of System	Target Allocation (%)	Target Range (%)	Market Value 12/31/15 (\$ mm)
Private Equity Assets¹ (continued)	46.3	100	6	10	7-13	45.9
Harvest Partners V	2.1	5	< 1			2.2
Riverside Europe Fund III	1.9	4	< 1			2.2
Charlesbank Equity Fund VI	1.9	4	< 1			1.7
Riverside Capital Appreciation Fund V	1.5	3	< 1			1.6
TA XII	0.4	1	< 1			0.0
Ridgemont II	0.3	1	< 1			0.3
2000 Riverside Capital Appreciation	0.2	< 1	< 1			0.2
2003 Riverside Capital Appreciation	0.2	< 1	< 1			0.2
Charlesbank Equity Fund V	< 0.1	< 1	< 1			0.2
Venture Capital Funds	11.1	24	1			10.8
Ascent Venture Partners V	5.5	12	1			5.4
Boston Millennia Partners III	2.0	5	< 1			2.0
Boston Millennia Partners II	1.2	3	< 1			1.2
Ascent Venture Partners IV	0.9	2	< 1			1.2
Ascent Venture Partners VI	0.8	2	< 1			0.4
Ascent Venture Partners III	0.3	1	< 1			0.4
Ascent Venture Partners II	0.2	1	< 1			0.2
Boston Capital Venture Fund III	< 0.1	< 1	< 1			< 0.1

¹ Market values are based on December 31, 2015 fair market values, adjusted for subsequent period cash flows.



Worcester Retirement System

Aggregate Assets Portfolio Roster as of 3/31/16

	Market Value 3/31/16 (\$ mm)	% of Asset Class	% of System	Target Allocation (%)	Target Range (%)	Market Value 12/31/15 (\$ mm)
Private Equity Assets¹ (continued)	46.7	100	6	10	7-13	45.9
Fund of Funds	0.5	1	< 1			0.8
European Strategic Partners	0.3	1	< 1			0.4
INVESCO Private Capital Fund II ²	0.2	< 1	< 1			0.4
Global Tactical Asset Allocation Assets	54.4	100	7	7	4-10	54.3
William Blair Macro Allocation Strategy	54.4	100	7			54.3
Hedge Fund Assets	18.3	100	2	2	0-4	18.7
PRIT Hedge Fund	18.3	100	2			18.7
Timber Assets¹	29.9	100	4	3	2-4	30.9
RMK Select Timberland Investment Fund I	5.7	34	1			5.8
Hancock Timberland VII	5.7	33	1			5.1
RMK Select Timberland Investment Fund II	3.6	21	< 1			3.7
RMK Balanced Timberland B	2.0	12	< 1			1.9

¹ Market values are based on December 31, 2015 fair market values, adjusted for subsequent period cash flows.

² Market values are based on September 30, 2015 fair market values, adjusted for subsequent period cash flows.



Worcester Retirement System

Aggregate Assets Portfolio Roster as of 3/31/16

	Market Value 3/31/16 (\$ mm)	% of Asset Class	% of System	Target Allocation (%)	Target Range (%)	Market Value 12/31/15 (\$ mm)
Natural Resources Assets	9.6	100	1	2	1-3	9.3
SSGA S&P Large MidCap Natural Resource Index	5.9	61	1			5.4
White Deer Energy II ¹	2.2	22	< 1			2.1
White Deer Energy ¹	1.6	16	< 1			1.7
Infrastructure Assets¹	3.3	100	< 1	2	0-3	5.2
Global Infrastructure Partners	3.3	100	< 1			5.2
Cash²	1.4	100	< 1	0	< 5	1.5
State Street Bank STIF	0.4	25	< 1			0.5

¹ Market values are based on December 31, 2015 fair market values, adjusted for subsequent period cash flows.

² Includes \$1.0mm held in Euros to be repatriated.



Worcester Retirement System

Aggregate Assets Performance as of 3/31/16

	1Q16 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	20 YR (%)	Inception Date	Since Inception (%)
Total Retirement System	1.8	-1.0	4.5	5.3	4.7	7.1	10/1/95	7.3
Net of Fees	1.7	-1.2	4.3	5.1	4.5	6.9		7.0
<i>CPI (inflation)</i>	0.7	0.9	0.8	1.3	1.8	2.1		2.2
<i>Custom Benchmark - Target Allocation¹</i>	1.8	-3.6	4.2	5.3	5.0	NA		NA
<i>60% MSCI ACWI / 40% Barclays Global Aggregate</i>	2.6	-0.6	3.8	4.0	4.5	5.7		5.9
Domestic Equity	1.3	0.4	11.4	10.8	6.7	NA	8/1/00	5.1
<i>Russell 3000</i>	1.0	-0.3	11.1	11.0	6.9	8.0		4.8
International Developed Market Equity	-2.4	-5.4	3.6	3.5	2.4	NA	8/1/00	4.4
<i>MSCI ACWI (ex. U.S.)</i>	-0.4	-9.2	0.3	0.3	1.9	4.5		3.2
International Emerging Market Equity	8.3	-10.5	-4.8	-2.3	NA	NA	8/1/06	5.2
<i>MSCI Emerging Markets</i>	5.7	-12.0	-4.5	-4.1	3.0	5.2		3.4
Fixed Income	3.3	1.1	1.1	3.5	5.4	NA	1/1/98	5.8
<i>Barclays Universal</i>	3.1	1.8	2.5	3.9	5.0	5.7		5.4
Real Estate	2.2	11.6	12.1	11.9	5.8	NA	10/1/00	7.7
<i>NCREIF ODCE</i>	2.4	14.2	13.6	13.2	6.1	9.0		13.7
Private Equity ²	0.3	1.6	5.8	6.9	11.6	NA	10/1/00	8.9
<i>MSCI ACWI+3% 1q Lag</i>	5.7	0.8	11.1	10.7	8.2	9.2		10.4
Global Tactical Asset Allocation	0.1	-9.1	-2.9	1.2	NA	NA	8/1/07	1.6
<i>Spliced Benchmark³</i>	2.6	-1.6	-1.8	0.3	2.7	4.8		1.8
Hedge Funds	-2.6	-7.2	2.0	2.6	2.9	NA	7/1/05	3.8
<i>HFRI Fund of Funds Composite</i>	-2.5	-5.1	2.0	1.4	1.5	4.9		2.5
Real Assets	5.9	-0.4	2.6	3.2	NA	NA	10/1/06	2.5
<i>CPI (Inflation) + 3%</i>	1.4	3.9	3.8	4.3	4.8	5.2		4.7

¹ Custom Benchmark is composed of 23% Russell 3000, 22% MSCI ACWI ex US, 6% Cambridge Associates Fund of Funds Composites 1q lagged, 7% Barclays Aggregate, 6% Barclays High Yield, 3% blended benchmark comprised of 50% JPM EMBI GD 50% JPM GBI-EM, 6% Barclays US TIPS, 3% NCREIF Timberland, 10% NCREIF ODCE, 2% DJ Brookfield Global Infrastructure, 7% of a blended benchmark comprising 60% MSCI ACWI and 40% Barclays Global Aggregate Bond indices, 2% S&P North American Natural Resources Sector and 2% HFRI Fund of Funds Composite.

² Private market returns lagged one quarter

³ 60% MSCI ACWI and 40% Barclays Global Aggregate Bond indexes since June 2015, Barclay's US Tips 1-10 Year prior.



Worcester Retirement System

Aggregate Assets Performance as of 3/31/16

	1Q16 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	20 YR (%)	Inception Date	Since Inception (%)
Total Retirement System	1.8	-1.0	4.5	5.3	4.7	7.1	10/1/95	7.3
Net of Fees	1.7	-1.2	4.3	5.1	4.5	6.9		7.0
<i>CPI (inflation)</i>	<i>0.7</i>	<i>0.9</i>	<i>0.8</i>	<i>1.3</i>	<i>1.8</i>	<i>2.1</i>		<i>2.2</i>
<i>Custom Benchmark - Target Allocation¹</i>	<i>1.8</i>	<i>-3.6</i>	<i>4.2</i>	<i>5.3</i>	<i>5.0</i>	<i>NA</i>		<i>NA</i>
<i>60% MSCI ACWI / 40% Barclays Global Aggregate</i>	<i>2.6</i>	<i>-0.6</i>	<i>3.8</i>	<i>4.0</i>	<i>4.5</i>	<i>5.7</i>		<i>5.9</i>
Domestic Equity	1.3	0.4	11.4	10.8	6.7	NA	8/1/00	5.1
SSgA S&P 500 Index	1.4	1.9	11.9	11.6	7.1	NA	8/1/98	5.5
<i>S&P 500</i>	<i>1.3</i>	<i>1.8</i>	<i>11.8</i>	<i>11.6</i>	<i>7.0</i>	<i>8.0</i>		<i>5.5</i>
SSgA Russell 1000 Growth Index	0.8	2.5	13.6	12.4	NA	NA	11/1/09	14.8
<i>Russell 1000 Growth</i>	<i>0.7</i>	<i>2.5</i>	<i>13.6</i>	<i>12.4</i>	<i>8.3</i>	<i>7.4</i>		<i>14.8</i>
SSgA Russell 1000 Value Index	1.7	-1.4	9.5	10.3	5.8	NA	7/1/05	6.4
<i>Russell 1000 Value</i>	<i>1.6</i>	<i>-1.5</i>	<i>9.4</i>	<i>10.2</i>	<i>5.7</i>	<i>8.3</i>		<i>6.4</i>
LMCG Small Cap Value	4.6	0.7	9.2	8.4	NA	NA	11/1/09	12.9
<i>Russell 2000 Value</i>	<i>1.7</i>	<i>-7.7</i>	<i>5.7</i>	<i>6.7</i>	<i>4.4</i>	<i>9.1</i>		<i>11.7</i>
SSgA S&P Midcap 400 Index	3.8	-3.6	9.5	9.6	NA	NA	9/1/06	8.7
<i>S&P MidCap</i>	<i>3.8</i>	<i>-3.6</i>	<i>9.5</i>	<i>9.5</i>	<i>7.8</i>	<i>11.1</i>		<i>8.7</i>
Nichols Small Cap Growth	-3.1	-14.6	NA	NA	NA	NA	2/1/15	-5.0
<i>Russell 2000 Growth</i>	<i>-4.7</i>	<i>-11.8</i>	<i>7.9</i>	<i>7.7</i>	<i>6.0</i>	<i>5.8</i>		<i>-3.3</i>

¹ Custom Benchmark is comprised of 23% Russell 3000, 22% MSCI ACWI ex US, 6% Cambridge Associates Fund of Funds Composites 1q lagged, 7% Barclays Aggregate, 6% Barclays High Yield, 3% blended benchmark comprised of 50% JPM EMBI GD 50% JPM GBI-EM, 6% Barclays US TIPS, 3% NCREIF Timberland, 10% NCREIF ODCE, 2% DJ Brookfield Global Infrastructure, 7% of a blended benchmark comprising of 60% MSCI ACWI and 40% Barclays Global Aggregate Bond indices, 2% S&P North American Natural Resources Sector and 2% HFRI Fund of Funds Composite.



Worcester Retirement System

Aggregate Assets Performance as of 3/31/16

	1Q16 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	20 YR (%)	Inception Date	Since Inception (%)
International Developed Market Equity	-2.4	-5.4	3.6	3.5	2.4	NA	8/1/00	4.4
SSgA MSCI EAFE Index ¹	-2.9	-8.0	2.5	2.6	2.1	NA	9/1/04	5.3
MSCI EAFE	-3.0	-8.3	2.2	2.3	1.8	4.1		5.0
Acadian Non-U.S. Small Cap Equity	-0.1	7.2	8.5	7.5	4.3	NA	2/1/05	7.7
MSCI EAFE Small Cap	-0.6	3.2	7.3	5.6	3.4	NA		6.0
International Emerging Market Equity	8.3	-10.5	-4.8	-2.3	NA	NA	8/1/06	5.2
Lazard Emerging Markets Equity	8.9	-10.0	-4.9	-2.4	NA	NA	8/1/06	5.1
MSCI Emerging Markets	5.7	-12.0	-4.5	-4.1	3.0	5.2		3.4
Dimensional Emerging Markets	7.3	-10.4	-3.9	NA	NA	NA	3/1/13	-3.7
MSCI Emerging Markets	5.7	-12.0	-4.5	-4.1	3.0	5.2		-4.9
Fixed Income	3.3	1.1	1.1	3.5	5.4	NA	1/1/98	5.8
IR&M Aggregate Bond	3.2	2.0	NA	NA	NA	NA	2/1/14	4.1
Barclays Aggregate	3.0	2.0	2.5	3.8	4.9	5.6		3.7
IR&M Intermediate TIPS	3.6	1.9	NA	NA	NA	NA	2/1/14	1.3
Barclays U.S. TIPS 1-10 Year	3.6	1.8	-0.7	1.9	4.0	NA		1.2
Lazard Emerging Market Debt Blend	6.9	-1.3	NA	NA	NA	NA	8/1/13	-1.7
50% JPM EMBI GD 50% JPM GBI-EM	8.0	1.3	-1.7	2.1	NA	NA		0.4

¹ SSgA MSCI EAFE index fund performance is based on the aggregate of the daily liquidity fund and the semi-monthly liquidity fund.



Worcester Retirement System

Aggregate Assets Performance as of 3/31/16

	1Q16 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	20 YR (%)	Inception Date	Since Inception (%)
Fixed Income (continued)	3.3	1.1	1.1	3.5	5.4	NA	1/1/98	5.8
Loomis Sayles Bank Loan	1.5	1.4	2.7	3.9	4.0	NA	10/1/05	4.1
S&P LSTA Leveraged Loan Index "BB"	1.8	1.6	2.7	3.6	3.7	NA		3.8
Loomis Sayles High Yield Full Discretion	2.0	-5.2	2.0	4.3	7.2	7.9	1/1/96	7.8
Barclays High Yield	3.4	-3.7	1.8	4.9	7.0	6.8		6.8
Private Debt (lagged one qtr.)	1.7	18.1	10.6	9.2	8.0	8.7	10/1/05	8.4
Real Estate	2.2	11.6	12.1	11.9	5.8	NA	10/1/00	7.7
Open-End Real Estate	2.0	11.3	11.9	11.3	4.8	NA	1/1/99	7.2
PRIT Real Estate ¹	2.6	11.1	12.6	12.2	NA	NA	4/1/10	13.0
NCREIF ODCE	2.2	13.7	13.6	13.3	6.4	9.4		14.4
NCREIF ODCE Equal Weighted	2.5	14.2	13.6	13.2	6.1	9.0		14.3
Custom Benchmark ²	3.2	11.9	12.6	12.5	NA	NA		13.9
INVESCO Core Real Estate USA	1.5	12.7	13.1	12.8	6.3	NA	4/1/06	6.3
NCREIF ODCE	2.2	13.7	13.6	13.3	6.4	9.4		6.4
NCREIF ODCE Equal Weighted	2.5	14.2	13.6	13.2	6.1	9.0		6.1
NCREIF Property	2.2	11.8	11.9	12.0	7.6	9.9		7.6
Non-Core Real Estate (lagged one qtr)	5.8	16.0	17.3	19.5	17.8	NA	10/1/05	12.7

¹ PRIT Real Estate inception date shown is based on the first full quarter invested.

² Custom Benchmark is composed of 80% NCREIF ODCE, 10% NAREIT Equity and 10% FTSE EPRA NAREIT Developed ex. U.S. REIT.



Worcester Retirement System

Aggregate Assets Performance as of 3/31/16

	1Q16 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	20 YR (%)	Inception Date	Since Inception (%)
Private Equity (lagged one qtr.)	0.3	1.6	5.8	6.9	11.6	NA	10/1/00	8.9
Buyouts	0.8	5.8	5.9	8.0	11.5	NA	10/1/05	11.5
Venture Capital Funds	0.4	-8.0	5.9	4.5	7.7	NA	10/1/05	7.6
Fund of Funds	0.4	-1.8	2.3	2.3	8.7	NA	10/1/05	11.0
<i>MSCI ACWI +3% 1q Lag</i>	5.7	0.8	11.1	10.7	8.2	9.2	10/1/05	10.4
Global Tactical Asset Allocation	0.1	-9.2	-2.9	1.1	NA	NA	8/1/07	1.5
William Blair Macro Allocation Strategy	0.1	NA	NA	NA	NA	NA	6/1/15	-11.4
<i>60% MSCI ACWI / 40% Barclays Global Aggregate</i>	2.6	-0.6	3.8	4.0	4.5	5.7		-1.9
<i>90-Day T-Bills</i>	0.1	0.1	0.0	0.1	1.1	2.4		0.1
Hedge Funds	-2.5	-7.2	2.0	2.6	2.9	NA	7/1/05	3.8
PRIT Hedge Fund	-2.5	-7.2	NA	NA	NA	NA	7/1/13	2.5
<i>HFRI Fund of Funds Composite</i>	-2.5	-5.1	2.0	1.4	1.5	4.9		2.1
Real Assets	5.9	-0.4	2.6	3.2	NA	NA	10/1/06	2.5
Timber (lagged one qtr.)	4.0	1.2	2.6	2.3	2.0	NA	10/1/05	2.4
Natural Resources (Public)	9.1	-17.4	-10.4	NA	NA	NA	5/1/11	-10.3
SSGA S&P Large MidCap Natural Resource Index	9.1	-17.4	-10.4	NA	NA	NA	5/1/11	-10.3
<i>S&P Global Large MidCap Commodity and Resources</i>	9.2	-17.1	-10.4	-9.8	2.1	NA		-10.4
Natural Resources (Private; lagged one qtr.)	-4.5	-27.0	-10.0	9.7	NA	NA	7/1/10	7.9
Infrastructure Aggregate	22.7	63.3	36.6	24.8	NA	NA	6/1/08	15.2

