

PRIM Board Quarterly Update

THIRD QUARTER 2019

Markets Overview and PRIT Fund Performance Summary

PRIM Executive Director and Chief Investor Officer Michael G. Trotsky, CFA provided the following information to the PRIM Board at its November 14, 2019, meeting:

Markets and PRIT Fund Performance Summary

Worldwide economies continue to slow, some are already in recession, and GDP growth in the U.S. is expected also to continue its decline. Third calendar quarter U.S. GDP growth was 1.9%, down from 2.0% in the second quarter of 2019, and was slightly higher than estimates, mainly due to a solid increase in federal government spending. Business investment declined 3% annualized, which followed a 1% decline in the second quarter. The 1.9% third quarter GDP growth is down from the more than 3% reported in first quarter. Consensus estimates for the fourth calendar quarter and into 2020 continue to anticipate a continued slowdown. The current consensus is for quarterly GDP growth to bottom at approximately 1% in 2020 before rising again in 2021.

Recent economic data has been mixed. For example, the Institute for Supply Management (ISM) manufacturing index of 48.3 in October remains below the 50 threshold that separates expansion from contraction, and the Chicago Purchasing Manager Index dropped to 43.2, hitting a nearly four year low. However, recent jobs reports, by contrast, were more positive. The Labor Department reported that 128,000 jobs were added in October, well above the expectation of 75,000. The unemployment rate fell (0.2%) to 3.5% in September, a 50-year low, yet even with the positive surprise, job growth remains below previous levels and below the average monthly rate of more than 160,000 in 2019.

Consumption growth slowed to 2.6% from 4.6% in the second quarter and with job growth slowing from previous levels, further moderation is expected. Perhaps a harbinger of things to come, US retail sales fell in September for the first time in seven months. Central banks around the world, including the US Federal Reserve Bank, have shifted to an accommodative stance. The Fed lowered the federal funds rate a quarter of a percent last week to a range of 1.50% to 1.75%, the third cut this year, following similar cuts in July and September. At the time of this writing, 71% of the S&P 500 companies have reported quarterly earnings and 76% of them have exceeded analysts' expectations, but corporate earnings have declined for the third consecutive quarter. On average, corporate earnings for the third quarter are 2.7% below last year's level.

Meanwhile, despite the continued slowdown in global growth and a steady stream of mixed economic news, equity market returns strengthened in September and into October as investors continue to climb the proverbial "wall of worry". There is still plenty to worry about: slowing global growth, trade tensions, geopolitical tensions, political gridlock, political infighting globally, and military escalations in the middle east, to name just a few. Yet the S&P 500 index is making regular new all-time highs, while international equities are likewise rebounding. Bond yields are off their lows for the year (the 10-yr hit 1.47% in September), but these ultra-low levels (negative in some geographies) continue to indicate a lack of confidence in the global markets. At the PRIM Investment Committee meetings in July and in October, we identified several reasons to remain cautious, and we recognized a divergence between economic sentiment and expectations versus actual economic performance. Markets eventually react to mismatches of data and expectations, so we will be watching closely in the coming months for confirming data to support the recently rising equity markets. Something to watch closely is the widely held belief

that the consumer (the driving force of economic growth in the U.S.) is healthy, but there are already some worrisome signs: average hourly earnings are down, average weekly hours are down, retail sales were down in September, and monthly employment growth, while still positive, is slowing.

We think of the recent strength of equity markets in terms of three possibilities:

Scenario 1: The recent strength in equities is a counter-trend move. When trades become as one sided as they were by late-summer, markets can try out the opposite scenario. In other words, perhaps the market weakness in the summer months was too extreme, and the recent bounce is merely a reversal.

Scenario 2: The recent strength in equities is an early indication of a stronger global economy. Changes in equity sector performance can be a first sign of regime change. If something really different is developing in the global economy, there will need to be evidence in orders and in spending. So far, global conditions are still deteriorating. This could change with confirming data.

Scenario 3: Shares that powered the U.S. market to rebounds from sell-offs in 2018 and 2019, and held it at high levels since, have more recently faltered. We highlighted the historic, but temporary reversal into value stocks recently at the PRIM Investment Committee meeting. If new leadership is not sustained, if the strength in the markets continues to be the result mainly of a narrow group of high performers, then equity markets are still vulnerable.

Bottom line: We will be watching closely for confirming data to support the recently rising equity markets and we continue to believe that the carefully constructed PRIT Fund asset allocation will enable strong performance in any of these potential scenarios.

Last quarter, we highlighted that the largest component of the relative underperformance for the trailing 12 months was due to the “Actual v. Target Weight Divergence Effect.” This divergence is caused by being unable to precisely match the actual PRIT Fund assets to the target allocation of illiquid alternative investments. This was still the case in the September quarter. We were overweight poorly performing global equities as a result of being underweight our target private equity allocation, which performed strongly. This was the major source of the underperformance reported relative to our benchmark.

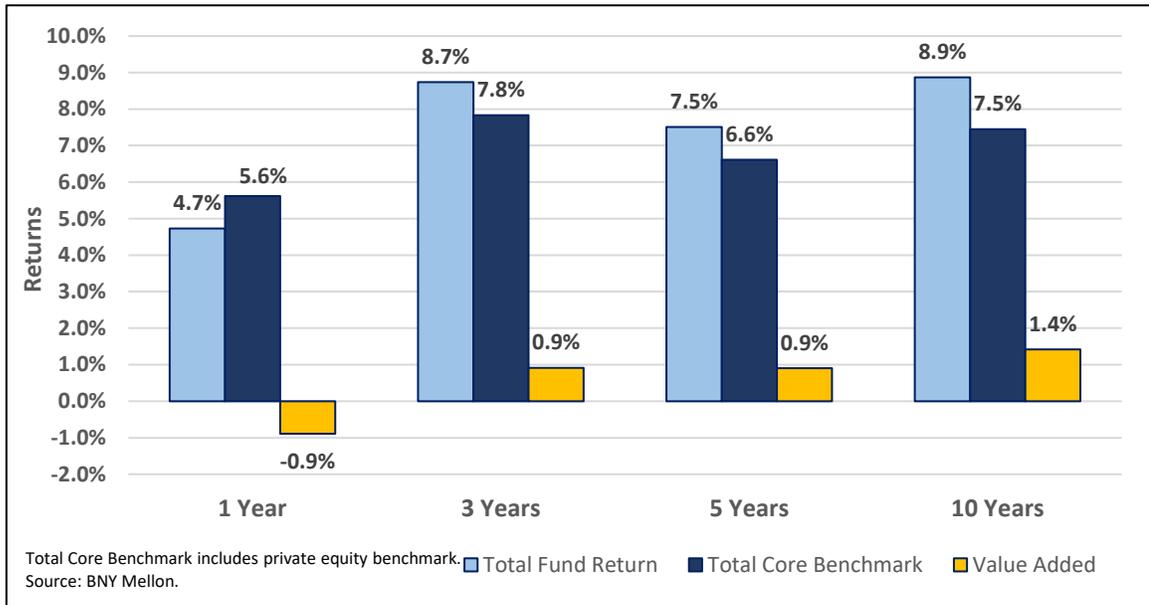
The PRIT Fund benchmark is based on our target asset allocation and not on the actual allocation. It is not always advisable, practical, or even possible, to identify and invest in PRIM’s high performing, illiquid alternative investments such as private equity quickly enough to match the target allocation, particularly in volatile market environments. The current comparison to the target allocations penalized us during the last 12 months for not being able to invest quickly enough in our higher-performing, illiquid alternatives – Private Equity in particular. We will be addressing this divergence effect with a possible solution for consideration during the next Board meeting in February.

The other much smaller contributor to underperformance for the 1-year period was due to weakness in a few specific strategies that we have discussed for several quarters, such as Real Assets, the Put Spread Collar strategy (Equity Hedged program), Real Estate, and Private Debt. We understand the reasons for the underperformance, we believe that they are temporary in nature, and in all cases, we have taken necessary steps to address these underperforming areas. In fact, each of the underperforming areas had a much stronger September quarter, and our longer term 3-, 5-, and 10-year performance remains strong.

PRIT Fund Performance Summary

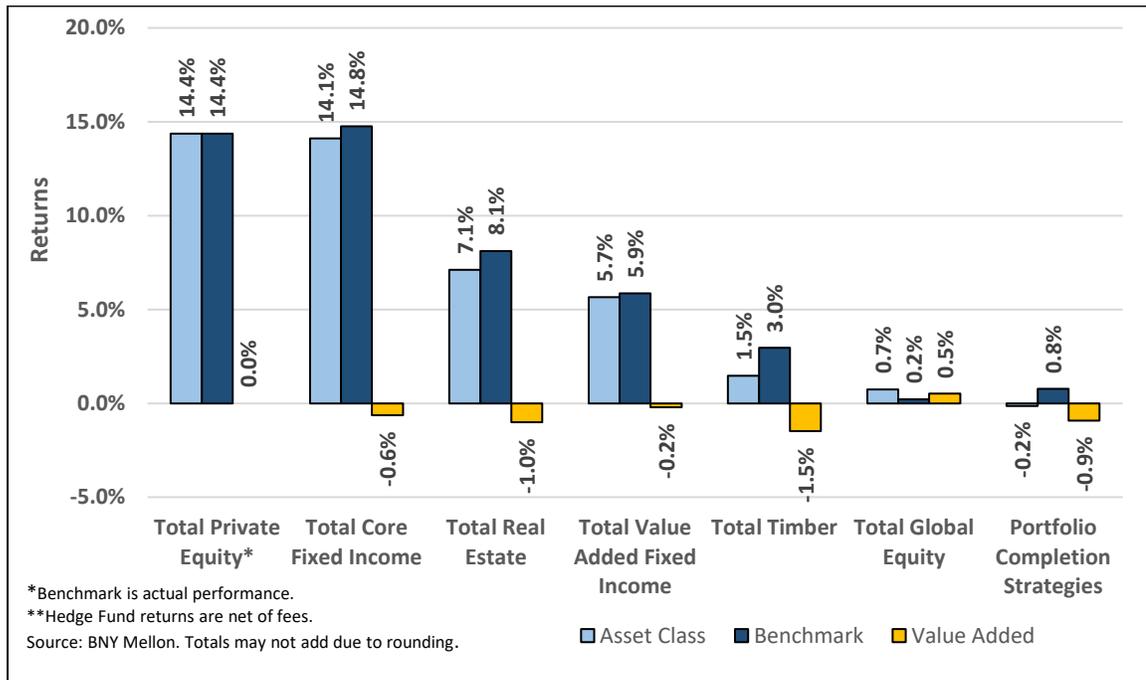
- For the one-year as of September 30, 2019, the PRIT Fund was up 4.7% (4.3% net), underperforming the total core benchmark of 5.6% by 89 basis points (133 bps, net).
- This performance equates to an investment gain of \$3.5 billion (\$3.2B, net of fees).
- Net total outflows to pay benefits for the one-year ended September 30, 2019 were approximately \$960 million.

Total PRIT Fund Returns (Gross of Fees)
Annualized Returns as of September 30, 2019



PRIT Asset Class Performance (Gross of Fees)

Trailing 1-year Performance as of September 30, 2019



PRIT Core Fund Performance Summary

Gross of Fees Performance

Trailing 1-Year Performance as of September 30, 2019

Trailing 1-Year Performance: September 30, 2019	Return	Benchmark Return	Over/(Under) Benchmark (bps)	\$Value (millions)	% of PRIT Fund
Total PRIT Fund	4.7%	5.6%	(89)	76,001	100%
Total Global Equity	0.7%	0.2%	51	32,007	42.2%
<i>Domestic Equity</i>	<i>2.6%</i>	<i>1.9%</i>	<i>77</i>	<i>16,622</i>	<i>21.9%</i>
<i>International Developed</i>	<i>-1.7%</i>	<i>-1.7%</i>	<i>(4)</i>	<i>10,893</i>	<i>14.3%</i>
<i>Emerging Markets</i>	<i>0.0%</i>	<i>-2.0%</i>	<i>193</i>	<i>4,492</i>	<i>5.9%</i>
Private Equity	14.4%	14.4%	0	8,553	11.3%
Real Estate	7.1%	8.1%	(101)	7,146	9.4%
Total Timberland	1.5%	3.0%	(148)	2,872	3.8%
PCS	-0.2%	0.8%	(92)	7,370	9.7%
Value Added Fixed Income	5.7%	5.9%	(21)	5,759	7.6%
Core Fixed Income	14.1%	14.8%	(63)	11,017	14.5%

PRIT Asset Class Performance (Gross of Fees)

Annualized Returns as of September 30, 2019

1 Year	3 Year	5 Year	10 Year
PRIVATE EQUITY 14.4%	PRIVATE EQUITY 20.6%	PRIVATE EQUITY 18.0%	PRIVATE EQUITY 18.5%
CORE FIXED INCOME 14.1%	GLOBAL EQUITY 9.8%	REAL ESTATE 9.7%	REAL ESTATE 10.5%
REAL ESTATE 7.1%	REAL ESTATE 7.4%	GLOBAL EQUITY 7.1%	GLOBAL EQUITY 9.0%
VALUE-ADDED FIXED INCOME 5.7%	VALUE-ADDED FIXED INCOME 6.0%	CORE FIXED INCOME 5.3%	VALUE-ADDED FIXED INCOME 7.4%
TIMBER 1.5%	TIMBER 5.7%	TIMBER 5.2%	CORE FIXED INCOME 5.3%
GLOBAL EQUITY 0.7%	TOTAL PCS 4.7%	VALUE-ADDED FIXED INCOME 4.2%	TOTAL PCS 4.6%
TOTAL PCS (0.2%)	CORE FIXED INCOME 2.8%	TOTAL PCS 3.1%	TIMBER 3.3%

Organizational Update

New Hires

With the increase in assets under management and the increase in the number of clients, PRIM is continuing to add to our staff. PRIM currently has eight job openings for which we have received more than 2500 applications. We recently welcomed two new employees.

Emily Green joined the PRIM Client Services team in November as a Client Service Analyst. Most recently, Emily was with financial services firm Stephens Inc., as Vice President, Institutional Equity Sales. She joined Stephens after graduating from Fairfield University with a degree in Marketing and minor in Art History.

Minching Kao joined the Real Estate and Timberland team in October as an Investment Analyst. Most recently, Minching was with Beacon Capital Partners in Boston as a Senior Acquisitions Analyst. Prior to Beacon, Minching held positions at the Boston real estate advisor, GFI Partners, and at National Valuation Consultants, in Denver, CO. Minching holds a bachelor's degree in Finance and English from Tung Hai University and an MBA and Master of Science in Real Estate and Construction Management from the University of Denver.

Awards

PRIM's Executive Director and Chief Investment Officer, Michael G. Trotsky, CFA, has been awarded the *Lifetime Achievement Award* from Institutional Investor. He will receive this honor at the annual Allocators' Choice Awards on December 3, 2019 in New York City.

Qingmei Li, PRIM's Finance Reporting Manager, was awarded the Treasurer's 2019 Citation for Outstanding Performance. Those selected for this honor have made notable contributions to the office of the Treasurer, its agencies, and the citizens of MA. In early June and for the 14th consecutive year, PRIM was awarded the GFOA's (Government Finance Officer Association's) *Certificate of Achievement for Excellence in Financial Reporting*. This award recognizes the completeness and timeliness of our Comprehensive Annual Financial Report, the CAFR. Qingmei manages the production of the CAFR and an increasing number of audits that have dramatically increased in complexity in lock-step with PRIM's innovative investment program. She is the driving force behind PRIM's financial statements consistently having clean audit opinions.

Staff Recognition

Michael M. McGirr, CFA, Senior Investment Officer, Private Equity, has accepted an invitation from the Institutional Limited Partners Association, ILPA, to join its newly created Content Committee. This committee is responsible for creating and curating content that will be beneficial for the ILPA's membership, which includes more than 500 international institutional private equity investors from peer public pensions, corporate pensions, endowments and foundations.

PRIM BOARD ACTIONS –November 14, 2019

Public Markets

At its November 14, 2019 meeting, the PRIM Board approved the following recommendation of the Investment Committee and PRIM Staff:

Short-Term Term Fixed Income, a new sub asset class within the PRIT Core Fixed Income allocation, was added to the PRIT portfolio when the PRIM Board approved the 2019 Asset Allocation Plan at its February

26, 2019 Board meeting. The current mid-point target allocation of the Short-Term Fixed Income portfolio is 2% of total PRIT Fund assets, or approximately \$1.5 billion. PRIM staff and the Investment Committee recommended (unanimously) to the PRIM Board that the Board approve the selection of BlackRock, Inc. as the Passive Short-Term Fixed Income Investment Manager.

Other Credit Opportunities

At its November 14, 2019 meeting, the PRIM Board approved the following recommendation of the Investment Committee and PRIM Staff:

PRIM staff and the Investment Committee recommend (unanimously) to the PRIM Board that the Board approve an initial allocation of up to \$200 million to the LibreMax Structured Credit Separately Managed Account (SMA), subject to satisfactory ongoing contract negotiations. LibreMax is a New York based, SEC-registered investment adviser that was founded in April 2010 by Greg Lippmann and Fred Brettschneider. Today LibreMax has over \$7.5 billion in assets under management. The LibreMax Structured Credit SMA seeks to earn attractive risk-adjusted returns by opportunistically investing across a broad range of higher yielding tradeable CUSIP and less liquid privately negotiated structured products in the United States and Europe. The Account may invest across a diversified range of sectors and collateral types including consumer, residential, commercial, regulatory capital, and CLOs.

Portfolio Completion Strategies

At its November 14, 2019 meeting, the PRIM Board approved the following recommendation of the Investment Committee and PRIM Staff:

PRIM staff and the Investment Committee (unanimously) recommended to the PRIM Board that the Board approve an initial allocation of up to \$150 million to the Advent Vega Strategy Separately Managed Account, subject to satisfactory ongoing contract negotiations. Advent Vega Strategy (AVS or the Strategy) is a convertible arbitrage strategy. AVS trades idiosyncratic opportunities in convertible bonds and targets to produce uncorrelated absolute returns. The Strategy marries quantitative analysis with fundamental credit research to identify mispriced volatility or corporate events that could trigger higher volatility.

A convertible bond is priced as one straight bond plus a call option, and valuation of the embedded call option depends on volatility of the same issuer's stock. A convertible bond is considered cheap when the option's implied volatility is lower than actual volatility. By combining a convertible bond with equity hedge, AVS attempts to capture the "cheapness" of the embedded call option and profit from implied volatility converging towards realized volatility.

Further, a convertible bond's equity sensitivity varies as the stock price moves, and the long-short position creates convexity, or "gamma", in Profit and Loss (P&L). If the stock price abruptly declines, the Strategy will benefit from the equity hedge, while the bond component still pays coupon and has less downside risk; however, if the stock price rises, the gain on the embedded call option will offset the loss from the short stock position.

Private Equity

At its November 14, 2019 meeting, the PRIM Board approved the following recommendations of the Investment Committee and PRIM Staff:

PRIM staff and the Investment Committee recommended (unanimously) to the PRIM Board that the Board approve the issuance of an RFP for private equity consulting services. PRIM's contract with Hamilton Lane, the incumbent private equity consultant, expires on September 30, 2020.

PRIM staff and the Investment Committee recommended (unanimously) to the PRIM Board that the Board approve a commitment of up to \$75 million to Georgian Partners Growth Fund V, L.P. (Fund V or Georgian V). Georgian V is managed by Georgian Partners (Georgian), a Toronto, Canada based growth equity firm. Georgian V will target growth equity stage investments in high growth software companies demonstrating efficient and predictable recurring revenue models. Georgian Partners' team and strategy will continue to be led by its founders Justin LaFayette, Simon Chong, and John Berton. PRIM has not invested in prior Georgian Partners' funds. Georgian Partners Growth Fund V L.P. is a growth equity fund being established to invest in growth-oriented, lower middle market software companies located primarily in North America. Fund V will be \$850 million in aggregate commitments.

PRIM staff and the Investment Committee recommend (unanimously) to the PRIM Board that the Board approve Georgian Partners for co-investment because Georgian Partners meets PRIM's co-investment criteria. Those criteria include: a superior track record; a strong co-investment history; and a willingness to partner with PRIM.

PRIM staff and the Investment Committee recommend (unanimously) to the PRIM Board that the Board approve a commitment of up to \$100 million to TA Select Opportunities Fund, L.P. (Select Opps). PRIM has invested in six prior TA Associates (TA) funds since 1997. TA's senior team has worked together for over 17 years. With the exception of TA X, all of TA's funds are in Cambridge Associates' first or second quartiles for fund performance. TA targets middle-market growth companies in North America, Europe and Asia in the technology, healthcare, financial services, consumer and business services sectors. TA's flagship fund will continue its successful approach of investing in middle-market growth companies located in North America, Europe and Asia. TA Select Opportunities Fund will target \$1 billion in aggregate commitments.

Private Equity Commitment Summary for Vintage Year 2019 (excluding newly approved opportunities)

PRIM	
Private Equity	
2019 Investment Summary	
(in Millions)	
*Denotes existing PRIM relationship	
<u>Partnership</u>	<u>Commitment</u>
<u>Approved on January 15th as Interim</u>	
<i>Trident VIII, L.P.*</i>	\$90
<u>Approved at the February 26th Board Meeting</u>	
<i>American Industrial Partners VII, L.P.</i>	75
<i>Blackstone Capital Partners VIII, L.P.*</i>	250
<i>Providence Strategic Growth Fund IV, L.P.*</i>	100
<i>Spark Capital Growth Fund III, L.P.*</i>	20
<i>Spark Capital VI, L.P.*</i>	10
<u>Approved at the May 14th Board Meeting</u>	
<i>Advent International GPE IX, L.P.*</i>	260
<i>TA XIII, L.P.*</i>	250
<i>Medicxi III, L.P.*</i>	34
<u>Approved on September 30th as Interim</u>	
<i>KPS Special Situations Fund V, L.P.*</i>	75
<i>KPS Special Situations Mid-Cap Fund, L.P.*</i>	40
<i>Total</i>	\$1,204
<i>2019 Investment Plan</i>	\$1,400 - \$2,000

Real Estate and Timberland

At its November 14, 2019 meeting, the PRIM Board approved the following recommendation of the Real Estate and Timberland Committee and PRIM Staff:

PRIM staff and the Real Estate and Timberland Committee recommended (unanimously) to the PRIM Board that the Board approve a commitment of up to \$200 million to DivcoWest Fund VI, L.P. (Fund VI). Fund VI is being offered by DivcoWest Real Estate Services, LLC (Divco) to invest in real estate and real estate-related assets located primarily in growth-oriented markets throughout the U.S. Divco is a vertically-integrated real estate investment firm with 125 employees and office locations in San Francisco, Boston, Los Angeles, Washington D.C and New York, NY. Fund VI will continue Divco's history of investing primarily in properties that serve the high growth markets of the economy, seeking to capitalize on Divco's extensive relationships within the markets it has served over the last 25 years. Divco is expected to raise approximately \$2.0 billion for Fund VI.

Staff believes that Fund VI is an attractive opportunity for the non-core real estate program. The focus of Fund VI will be to invest in high quality assets, with value-add characteristics, located in markets with strong economies, skilled workforces and substantial tenant bases that will benefit from continued economic expansion and job growth. Divco employs a disciplined approach to investing on behalf of a broad base of U.S. and non-U.S. public and corporate pension funds, institutional investors and high net worth individuals, with a focus on creating value through prudent acquisitions, active management and well-timed sales.

The DivcoWest investment team for Fund VI is experienced with this strategy and has generated exceptional investment performance through multiple market cycles. Divco's previous offerings have consistently delivered top quartile performance relative to its peers. The firm's strong performance is partially the result of the investment team's objective to limit downside risk and preserve capital by acquiring assets at relatively attractive valuations.

Operational Due Diligence Recommendation

At its November 14, 2019 meeting, the PRIM Board approved the following recommendation of the Investment Committee and PRIM Staff:

PRIM staff and the Investment Committee recommended (unanimously) to the PRIM Board that the Board approve the selection of Albourne Partners to provide operational due diligence services for PRIM's portfolio. Albourne Partners will be conducting on-site operational due diligence on all new investments, as well as providing daily news monitoring and risk-based annual reviews for PRIM's current investment manager portfolio

Finance and Administration

At its November 14, 2019 meeting, the PRIM Board approved the following recommendations of the Administration and Committee and PRIM Staff:

PRIM staff and the Administration and Audit Committee recommended (unanimously) that the PRIM Board accept 1) the Fiscal Year 2019 PRIM and PRIT audited financial statements, 2) the Agreed-Upon Procedures report on PRIM's Procurement Process for Investment Management and Other Professional Services, and 3) Agreed-Upon Procedures report on the PRIT Fund's Benchmark Calculations.

The annual audits of PRIM and PRIT have concluded with clean opinions and no audit exceptions. The Agreed-Upon Procedures review of PRIM's Procurement Process for Investment Management and Other

Professional Services and the Agreed-Upon Procedures review of the PRIT Fund's Benchmark Calculations (the AUP reviews) have concluded with no findings or exceptions.

PRIM staff and the Administration and Audit Committee recommended (unanimously) to the PRIM Board that the Board approve the draft Fiscal Year 2019 PRIT Fund Comprehensive Annual Financial Report. (CAFR). PRIM staff has completed its 15th PRIT Fund CAFR. The primary purpose of this document is to provide a thorough, detailed and transparent presentation of PRIT's financial position and results of operations. The report has four sections – Introductory, Financial, Investment and Statistical. PRIM submits its CAFR for a comprehensive review by the Government Finance Officers Association (GFOA) each year, and the GFOA determines if the report continues to qualify for the organization's prestigious Certificate of Achievement for Excellence in Financial Reporting, which recognizes and encourages excellence in financial reporting by state and local governments. PRIM staff, with KPMG's assistance, prepared the CAFR based upon the GFOA's checklist, and is optimistic that its submission will result in a 15th certificate.

At its May 14, 2019 meeting, the Board approved the issuance of an RFP for Audit and Tax Services. The Evaluation Committee and the Administration and Audit Committee recommended (unanimously) to the PRIM Board that the Board approve the selection of the incumbent, KPMG, for PRIM and PRIT audit services, and also for Real Estate, Timber and Agriculture audit services, for a five-year period, plus two optional one-year extensions. Additionally, the Evaluation Committee and Administration and Audit Committee recommend (unanimously) to the PRIM Board that the Board approve the selection of the incumbent, Deloitte, for tax services, for a five-year period, plus two optional one-year extensions.

The Client Services team -- Paul Todisco, Francesco Daniele, and Emily Green – will continue to meet with the retirement boards of PRIM's member retirement systems throughout the year. To schedule a visit, please contact Paul at ptodisco@mapension.com, Francesco at fdaniele@mapension.com, Emily at egreen@mapension.com, or call 617-946-8401. We look forward to seeing you soon.