PREPARED FOR
ARIZONA STATE RETIREMENT SYSTEM
MARCH 23, 2020
UPDATE: COVID-19, OIL PRICE WAR & STOCK MARKET SELLOFF

- For at least two years, RCLCO has been positioning the business cycle as being in a "late stable" stage, with the primary risks to current conditions being a "black swan" event or external shock that negatively impacts either supply or demand fundamentals. The COVID-19 outbreak may have served as this trigger.

- The real estate industry will be impacted by a range of disruptions (e.g., supply chain, travel and event cancellations, spooked investors, etc.) due to the Covid-19 outbreak, but despite the uncertainty and heightened nervousness, we expect real estate fundamentals to fare better than in the 2008 Global Financial Crisis ("GFC") due to:
  - Relatively disciplined and limited excess construction activity.
  - Relatively conservative capital structures (e.g., comparatively lower leverage) employed during the expansion.

- ASRS’ real estate portfolio is well-positioned to manage through the expected disruption and possible downturn because of the investment approach and program that has been implemented since 2012:
  - Investing primarily through vehicles that provide ASRS’ significant control over new investments, sales activities, capital expenditures, and leverage.
  - Retaining significant real time transparency covering portfolio and asset operating performance.
  - Focusing investment activities in property types and strategies best positioned to survive and thrive over the long term as well as during market downturns.

- Nevertheless, we are closely monitoring asset performance within the ASRS Real Estate Portfolio and property and capital market fundamentals. Ultimate impacts will depend on the severity and duration of the outbreak and implications to the broader economy, but near-term impacts potentially include:
  - Implementation of heightened health and safety measures for employees and tenants/occupants of portfolio buildings, particularly seniors housing.
  - Disruption in demand of hospitality given significantly diminished travel (ASRS only owns one hotel).
  - Reduced demand from industrial tenants that rely on global supply chains (impacts properties with vacancy or lease roll, which represents 5% of the ASRS Real Estate Portfolio NAV).
  - Broader slowdown in markets with heavy reliance on tourism and energy, such as Las Vegas and Houston (only three ASRS assets located in these two markets).

- We are advising ASRS’ partners to develop points of view regarding the likely real estate impacts of the coronavirus and the current economic environment, and to include these in their current underwriting of new properties. In particular, we are assuming more conservative rent growth and leasing assumptions, and expecting slight-to-moderate pricing declines from recent peaks.

- The ASRS Real Estate Implementation Plan completed in February 2020 is still largely relevant given its focus on long-term investing, though certain investment and pacing assumptions have been modified due to the current situation and the likely ~5% decline in ASRS Portfolio NAV.
EXECUTIVE SUMMARY

2020 IMPLEMENTATION PLAN

► RCLCO believes—and our track record confirms—that the most effective way to generate superior returns in real estate will be through identifying specific opportunities where space demand exceeds supply, investor activity is moderate, and ASRS’ partners can rely on operational expertise to execute business plans even during a downturn. Our perspective is that current disruptions or a possible downturn will be less severe compared to the GFC, particularly for the real estate sector which, to date, has been relatively disciplined in commencing new construction and in its use of leverage.

► Our 2020 Implementation Plan therefore continues to recommend a focus on “demand-driven” investing, which includes taking market, leasing and construction risks to generate targeted excess returns, through partnerships that align parties’ interests and preserve the Investor’s control and transparency.

► We continue to underwrite new investments to a target net return of 8% through the value creation activities described above, while existing properties, which have already achieved their value targets, may earn lower returns in the 5%-6% range. We also ensure that underwriting efforts adequately factor impacts to real estate from current events in both the real estate market and broader economy.

► This strategy has generated returns to ASRS in excess of the ODCE benchmark: Separate Accounts have outperformed the benchmark by roughly 510 basis points over the past five years while the real estate portfolio has outperformed by approximately 200 basis points.

► We therefore recommend dynamically overweighting the real estate allocation by both continuing the path to 20% and allowing a >20% allocation as long as we find opportunities that underwrite to a target return of greater than 8%.

► The 2020 Implementation Plan achieves this primarily through cultivating ASRS’ existing separate account and platform relationships: growing those that continue to be most successful and productive in strategies that have demand tail winds, while culling those that are stale, underperforming, or facing property-level headwinds.

► We also recommend exploring, and potentially implementing, platform or separate account relationships in a handful of new real estate strategies that we are confident will outperform the broader market, including development of “21st-century” office space, daily-need, service-oriented retail in grocery-anchored and unanchored formats, a sharpshooter in the San Francisco Bay Area and additional allocations in real estate debt.

► The Implementation Plan leaves the door open for investments in other real assets (e.g., agriculture and infrastructure), though we do not find opportunities in these sectors to be sufficiently compelling at this time.

► We believe this strategy will lead to continued outperformance relative to both the 8% target return and the ODCE benchmark; specifically, we project that the separate account portfolio will outperform by ~170 bps over the next five years on average, while the overall portfolio will outperform by ~150 bps.
GOALS AND OBJECTIVES

The objective of the Implementation Plan is to prepare an updated “Pacing Plan” for the Real Estate Portfolio that aligns with the investment opportunities outlined in a recommended “Model Allocation” as well as the ASRS Strategic Asset Allocation Policy Investment Strategy (“SAA”) approved in June 2018.

To accomplish the above objective, RCLCO reviewed the ASRS Portfolio, policies and limitations, previous recommendations and activities, as well as current and forecasted economic, capital market, and property market conditions.

Long-term goals and objectives that the Implementation Plan works to achieve include:

► Target a real estate allocation of 20%;¹
► Target a total return that outperforms ODCE by 150 bps annually over the next five years;
► Target a “Model Allocation” by property type for:
  » “Where People Live” (Apartments, Senior Housing, Student Housing, Self-Storage)
  » “Where People Work” (Office, Health Care, Hospitality)
  » “Where People Shop” (Retail and Industrial)
► Target “Model Allocation” by risk profile to maintain appropriate levels of risk/return:
  » “Stabilized”
  » “Value Enhancement” (Lease-up/Roll, Renovation)
  » “Construction” (Built-to-Suit, Speculative)
► Target an allocation to a range of investment vehicles that provide transparency and control and appropriate levels of fees.

¹The allocation to Real Estate as part of the total ASRS fund was modified since the adoption of the ASRS Strategic Plan in 2003. The revised target increased from 6% of the total ASRS Portfolio to 8% in 2014, 10% in 2015, and subsequently increased further to 20% in 2018.
GUIDING PRINCIPLES

PORTFOLIO CONTROL
ASRS pursues relationships and investment vehicles that maximize alignment, provide transparency, provide liquidity through control of investment periods, financing, and exits, and allow for the opportunity to review compliance with criteria on each investment. In practical terms, this has meant:

► Greater emphasis on strategic manager relationships through both separately managed accounts (“SMAs”) and direct investments in companies;
► Proactively identifying opportunities offering superior investment fundamentals, and identifying “best in class” vehicles for each strategy;
► Monitoring manager relationships to ensure alignment with strategy and investment criteria, and, as necessary, modifying strategies to reflect the external environment.

RISK MANAGEMENT
ASRS aims to exceed performance of real estate benchmarks over the long-term by taking, and managing, three primary types of risks:

► Economic cycle risk:
  » Real estate, like the broad economy, is inherently cyclical due to elasticity of demand and inelasticity of supply.
  » Achieving consistent positive performance requires monitoring and proactively preparing for each stage of the cycle.
  » Cycle-driven distress resulting from failure to achieve business plans and/or market illiquidity creates opportunities for long-term oriented investors.

► Business risk:
  » Business risk in real estate is primarily derived from the ability of operators to control costs and attract tenants/buyers.
  » Managers and investors manage these risks through maintaining market and product knowledge, performing effective due diligence, and profiting from imbalances of information in this inherently inefficient asset class.

► Property life cycle risk:
  » The three primary life cycle classifications include Stabilized, Value Enhancement (Renovation & Lease-up/Roll), and Construction (Build-to-Suit & Speculative).
  » Appropriate levels of risk must be reintroduced to the portfolio to maintain target returns as Value Enhancement and Construction assets convert to Stabilized.
## RECAP: 2019 RECOMMENDATIONS & ACTIONS

<table>
<thead>
<tr>
<th>RECOMMENDATIONS</th>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Portfolio</strong></td>
<td>• We continue to evaluate opportunities to dispose of the Legacy commingled funds, though pricing continues to be unattractive relative to continued holds</td>
</tr>
<tr>
<td>• Consider Disposition of Commingled Funds excluding Strategic Relationships</td>
<td>• Industrial: Acquisition of 49% of an industrial operating company and a $400M SMA</td>
</tr>
<tr>
<td><strong>New SMAs &amp; Other Investments</strong></td>
<td>• NYC Sharpshooter: Implemented $500M NYC and Boston “sharpshooter” SMA</td>
</tr>
<tr>
<td>• Assess Implementation of Large Manager – Industrial</td>
<td>• Hospitality: Implemented $200M SMA with a global hotel investor and operator</td>
</tr>
<tr>
<td>• Implement NYC Sharpshooter and Hospitality SMAs</td>
<td>• BTR &amp; For-Sale Housing: Implemented a $400M SMA</td>
</tr>
<tr>
<td>• Implement Build to Rent (“BTR”) &amp; For-Sale Housing SMA</td>
<td>• Multi-Asset Strategy: Acquisition of a minority interest in fund management platform, which will provide access to a wide range of equity and debt investments nationally and across the risk spectrum</td>
</tr>
<tr>
<td>• Assess Implementation of Large Manager – Opportunistic Multi-Asset Strategy</td>
<td>• Office: We continue to research office and advocate for identifying a “21st-Century” office partner in 2020.</td>
</tr>
<tr>
<td>• Re-tool Office Strategy by Identifying Future Needs and Trends and Assess Implementation of Large Manager – Office</td>
<td></td>
</tr>
<tr>
<td><strong>Existing SMAs &amp; Other Real Estate Investments</strong></td>
<td>• ASRS committed $1.1B to 42 new SMA investments in FY 2019:</td>
</tr>
<tr>
<td>• Opportunistically continue Multifamily, Seniors Housing, and Self-Storage Investment</td>
<td>• Multifamily: $375M committed to 9 projects</td>
</tr>
<tr>
<td>• Continue Office Investments through Existing Sharpshooter, Medical Office SMA, and Suburban Office SMA</td>
<td>• Industrial: $172M committed to 26 assets</td>
</tr>
<tr>
<td>• Sell Peak Value/Underperforming Assets</td>
<td>• Office: $538M committed to 7 assets</td>
</tr>
<tr>
<td></td>
<td>• ASRS disposed of 5 projects in FY 2019 totaling $310M:</td>
</tr>
<tr>
<td></td>
<td>• Self-storage: Minnesota Portfolio ($50M)</td>
</tr>
<tr>
<td></td>
<td>• Industrial: Orlando Super Bulk Warehouse ($108M)</td>
</tr>
<tr>
<td></td>
<td>• Medical Office: VA Portfolio ($46M)</td>
</tr>
<tr>
<td></td>
<td>• Land Banking: Residential Land Portfolio ($101M)</td>
</tr>
<tr>
<td></td>
<td>• Retail: Colorado Multifamily Land Parcel ($5M)</td>
</tr>
</tbody>
</table>
INTERNAL PACING CONSIDERATIONS
In 2019, RCLCO re-evaluated the model allocation and recommended a target allocation of 50% "Where People Live," 25% "Where/How People Shop," and 25% "Where People Work." The Model Allocation will also allow for a maximum of 15% for Other investments including non-classifiable investments within commingled funds and other real assets (Agriculture, Infrastructure, Timberland, etc.). We continue to recommend this target allocation by property type.

The portfolio is within the target allocation ranges, though we recommend charting a path to bring “Where/How People Shop” closer to the 25% target, primarily through additional investments in industrial. “Where People Work” exceeds the target primarily due to the acquisition of high value, large office investment, although we expect the margin to narrow as “Shop” grows. “Where People Live” is expected continue to predominate, though, given ongoing threats to office and retail, it will be necessary to identify creative and niche opportunities to grow the other property types in order to maintain compliance.
MODEL ALLOCATION
TARGET ALLOCATION BY RISK PROFILE

The Real Estate Portfolio is primarily comprised of assets generating strong income returns, but must continually rely on new investments that benefit from appreciation in order to maintain long-term return targets. We therefore continue to recommend that the Real Estate Portfolio be managed to a target allocation of 65.0% +10%/-15% Stabilized assets, 17.5% ± 10.0% Value Enhancement assets (Renovation and Lease-up/Roll), and 17.5% ± 10.0% Construction assets.

The portfolio is currently in compliance with the target allocation by risk profile and takes a “neutral” stance relative to the ranges. We believe this positioning is appropriate for 2020:

- We do not recommend taking on excessive (e.g., higher ends of the allocation ranges) Construction and Value Enhancement risks at this time. These types of strategies typically require significant time (1-4+ years) to execute and could be negatively impacted by a broad downturn in the economy.
- At the same time, taking an overly conservative stance (e.g., higher end of the range for Stabilized) is likely to forego earning attractive returns. ASRS’ investment approach—demand-driven investing, with prudent debt, through aligned partnerships over which it retains control—mitigates a downturn’s worst implications on real estate, and the highly uncertain timing and magnitude of the next downturn suggests that ASRS should continue to pursue these higher-returning Value-Enhancing and Construction investments as long as their potential risks are appropriately priced.

\[\text{Target Allocation Risk Profile}\]

- Stabilized 64.0%
- Value-Enhancement 21.0%
- Construction 15.0%
- Construction 17.5% ± 10.0%
- Current Allocation Risk Profile (Q2 2019)
- Stabilized 65.0% +10%/-15%

\[1\text{Based upon the most recent underwriting of each asset within the portfolio, including assets within initial and final certification.}\]
REAL ESTATE DEBT
RCLCO TO EVALUATE RE DEBT INVESTMENTS

- The Real Estate Portfolio is currently comprised of real estate equity investments, other real assets (infrastructure & farming), and debt and / or preferred equity investments. RCLCO will further explore investing in real estate debt within the portfolio to diversify as well as maximize the potential of generating returns from real estate investing.

- RCLCO proposes a strategic allocation of 0% - 20% for debt within the ASRS real estate portfolio (current allocation is 6.1%).

- In addition to existing debt investments within the portfolio, RCLCO has assumed that ASRS will invest in the proposed $400.0M investment in a new debt fund.

- As with real estate equity, investment in real estate debt will be determined based on the following “demand-driven” framework:
OTHER REAL ASSETS
RCLCO TO EVALUATE AGRICULTURE AND INFRASTRUCTURE

- RCLCO proposes a strategic allocation of 0% - 10% for other real assets within the ASRS real estate portfolio. The current allocation is 9.2% and is dominated by two fund investments:
  - Agriculture Fund, NAV of $190.7M, projected to liquidate by FY 2023;
  - Infrastructure Fund, NAV of $352.0M, projected to be disposed of by FY 2021 given subpar market fundamentals and unhedged currency risk.

- We continue to evaluate other real asset investment strategies, but we don’t perceive the immediate need to invest over the next 12-18 months due to comparably more attractive investment opportunities in real estate.
  - RCLCO recommends that ASRS does not invest in farmland at present as a result of high global agricultural commodity supply, the low current and projected inflationary environment, and a historically low farmland cap rate to risk-free rate spread (see below).
  - RCLCO recommends continuing to evaluate infrastructure given significant demand drivers. Additional research is necessary, however, to determine the best investment approach given the predominance of commingled funds, international (and therefore currency) exposure, and rapidly diminishing investor returns.
# Real Estate Portfolio Compliance
## Summary of Targets and Constraints

<table>
<thead>
<tr>
<th>Category</th>
<th>Parameter</th>
<th>Requirement</th>
<th>Compliant?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Type Model Allocation</td>
<td>&quot;Where People Live&quot;</td>
<td>50% ± 10%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>&quot;Where People Shop&quot;</td>
<td>25% ± 10%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>&quot;Where People Work&quot;</td>
<td>25% ± 10%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Other (non-classifiable)</td>
<td>15% Maximum</td>
<td>✓</td>
</tr>
<tr>
<td>Property Life Cycle/Risk Profile Allocation</td>
<td>Stabilized</td>
<td>65% +10%/-15%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Value Enhancement</td>
<td>17.5% ± 10%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
<td>17.5% ± 10%</td>
<td>✓</td>
</tr>
<tr>
<td>Asset Class Allocation</td>
<td>Real Estate Equity</td>
<td>80% +20%/-0%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Real Estate Debt</td>
<td>0% - 20%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Real Assets</td>
<td>0% - 10%</td>
<td>✓</td>
</tr>
<tr>
<td>Portfolio Geographic Allocation</td>
<td>% of portfolio in any single MSA</td>
<td>40% Maximum</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>% of portfolio with non-U.S. exposure</td>
<td>30% Maximum</td>
<td>✓</td>
</tr>
<tr>
<td>Leverage</td>
<td>Total portfolio leverage (LTV)</td>
<td>60% Maximum</td>
<td>✓</td>
</tr>
<tr>
<td>Manager Relationships</td>
<td>Target Number of Managers</td>
<td>20 Maximum</td>
<td>✓</td>
</tr>
<tr>
<td>Total Portfolio</td>
<td>% of ASRS portfolio in Real Estate</td>
<td>20% ± 10%</td>
<td>✓</td>
</tr>
</tbody>
</table>

1 The Portfolio will be managed to ensure classifiable Real Estate investments comply with the “Live, Work, Shop” allocation targets despite an allocation to Other.
OPPORTUNITIES AND CHALLENGES

REAL ESTATE CYCLE

- We expect recent events including the COVID-19 outbreak, losses in the stock market, and turmoil in oil markets to negatively impact the long running growth in the US economy and real estate markets, though severity and duration remains uncertain.

- The primary risks to real estate performance have been “macro” and therefore affect all asset classes, including concerns about the long-term global growth rate and ongoing worries that assets may be generally overvalued.

- Our view is that, over the short- to near-term, real estate assets will experience very mixed performance based on a range of property-type and geographic drivers amid an expected more favorable capital markets environment compared to the 2008 GFC that maintains abundant debt and equity capital—especially for favored property types and geographies that might be relatively less impacted by current events.

- Activities in this environment include prudently investing in real estate most likely to benefit from sustained demand drivers but look to prune portfolios of assets that are likely at peak values medium-term. In general, a focus on income and operational excellence, which is driven by demand, should drive superior total returns.

1 Includes pension plans, insurance companies, sovereign wealth funds, and endowments and foundations
Source: FRED; Bureau of Labor Statistics; Cornell University and Hodes Weill & Associates
## OPPORTUNITIES AND CHALLENGES
### LONG-TERM STRUCTURAL AND SECULAR TRENDS

<table>
<thead>
<tr>
<th>TRENDS AND THEMES</th>
<th>LIVE</th>
<th>WORK</th>
<th>SHOP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MACROECONOMICS</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Slower near-term growth due to current events and possible recession.</td>
<td>Steady growth in all types of housing needs</td>
<td>Office-using employment growing, but at slowing pace</td>
<td>Consumer spending and disposable income growing above historical averages</td>
</tr>
<tr>
<td>Most growth coming from creative, tech-centric industries</td>
<td>Affordability challenges impacts both renters and owners nationwide, but renting is comparably more affordable</td>
<td>Intense competition for talent leads to &quot;workspace as human habitat&quot; and obsolescence of older offices</td>
<td>Great bifurcation in demand for retail by income, with high-income households focused on experiences (dining out, lifestyle brands) and convenience (e-commerce) and low-income households focused on savings and convenience (&quot;dollar stores&quot; in addition to Walmart)</td>
</tr>
<tr>
<td>Income inequality and heightened personal debt</td>
<td>Higher personal debt, job insecurity, personal preferences for infill locations and flexibility balance against need/desire for larger homes and yards—and support single-family rentals</td>
<td>Clearer winners and losers by location (market, submarket, building)</td>
<td>Trade uncertainty only modestly impacts demand for industrial</td>
</tr>
<tr>
<td>Risks from trade tensions, populism, increased risk aversion</td>
<td>Oversupply of senior housing units in various major markets</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DEMOGRAPHICS</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Aging Millennials entering family formation, though still marrying later and having fewer kids</td>
<td>Significant near-term demand for single-family and lower density housing</td>
<td>Growing need/demand for health care and medical office</td>
<td>Young-tech-savvy consumers demand both experience and convenience in their shopping, suggesting there is too much obsolete retail and not enough logistics space</td>
</tr>
<tr>
<td>Baby Boomers with longer lifespans</td>
<td>Long-term demand for seniors housing</td>
<td>Office product needs to be geared toward &quot;21st century employee,&quot; requiring new development or large capex</td>
<td>New experiential retail likely a necessary amenity in the &quot;new suburbs&quot;</td>
</tr>
<tr>
<td>Gen Z approaching early adulthood</td>
<td>Gen Z to backfill Millennial multifamily demand</td>
<td>Significant demand for areas offering the benefits of both the suburbs (good schools, larger homes) and cities (good restaurants, cultural amenities)</td>
<td></td>
</tr>
<tr>
<td>Urbanization (&quot;city-fication&quot; of suburbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TECHNOLOGY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology-enabled flexibility</td>
<td>Ride-sharing, micro-mobility, and self-driving cars change location characteristics</td>
<td>Freelancing, flexibility, co-working lead to consistently declining office space usage per employee and shorter, more flexible lease terms</td>
<td>Online shopping and delivery of ever more products and services becomes more feasible</td>
</tr>
<tr>
<td>Mobility revolution</td>
<td>Construction innovations and modular living change product types and land values</td>
<td>New technology and infrastructure demands within buildings</td>
<td>Self-driving trucks change location considerations</td>
</tr>
<tr>
<td>Virtual and augmented reality</td>
<td>Increased segmentation by demographics and preferences</td>
<td>Buildings designed for rideshare, delivery, and micro-mobility</td>
<td></td>
</tr>
</tbody>
</table>
PROPERTY TYPE TRENDS
INVESTOR ACTIVITY VS. MARKET FUNDAMENTALS

Investor Activity (Deal Supply vs. Deal Demand)

Market Fundamentals (Space Supply vs. Space Demand)

Lots of Demand Relative to Supply
- Warehouse/Dist.
- Manufactured Housing
- Class-B MF
- Single-Family Rental
- Flex/R&D
- Medical Office
- Data Centers
- Life Sciences
- Self-Storage

Lots of Supply Relative to Demand
- Grocery-Anchored
- Strip Centers
- “Oslo’s” Office
- High-Street Retail
- Hotel – Limited Service
- Hotel – Full Service
- Single-Family Development
- Next Generation Office
- Affordable Housing
- Class-A Retail
- Super/Regional Malls
- Power Centers
- Class-A Offices

Note: The arrows indicate the potential directions in which each respective product type may shift towards in the future.

RCLCO
REAL ESTATE ADVISORS

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PACING SUMMARY
RCLCO OUTLOOK & DYNAMIC ALLOCATION

► Despite short- to near-term risk of a downturn, RCLCO still expects real estate to outperform over the long-term:
  » Globally, population growth, expansion of the middle class, and vast urbanization requires millions of square feet of new real estate annually.
  » Domestically, population and income growth and shifting location and product preferences lead to vast demand for real estate in certain regions and metropolitan areas.
  » Delivery of new buildings virtually everywhere is becoming more difficult due to land constraints, new regulations, public pushback, and labor shortages leading to construction cost increases. Supply pressures lead to rent and pricing increases.
  » Long-term shift of global capital from public equities and bonds to privately held assets, including real estate.

► ASRS’s approach to investing in real estate is well-positioned to respond to these pressures and to meet or exceed policy return targets and outperform the benchmark:
  » The “demand-driven” investing approach builds on RCLCO’s core competencies and leads us to invest in properties where demand exceeds supply and user needs are addressed.
  » We partner with “best in class” operators that develop property-level business plans to beat potential competitors in the inherently inefficient real estate market.
  » ASRS has the ability to invest in vehicles that provide it with control over key investment decisions (buy, sell, finance, re-invest), mitigating the misalignment that inevitably exists in GP-LP relationships.

► We therefore recommend ASRS’ to continue pacing toward the 20% real estate allocation target and permitting it to exceed 20% for as long as other, more desirable alternative investments do not exist.

► The recommended pacing and an increased allocation to real estate can be accomplished through:
  » Upsizing successful ventures where demand-drivers continue to be favorable.
  » Replacing or supplementing managers of strategies that we continue to find attractive, but where capital deployment has been too slow.
  » Identifying new real asset investment strategies, such as infrastructure and/or international investments.
The path to a 20% real estate allocation portfolio projected to meet 20.0% by FY 2022

- The real estate portfolio is projected to meet the 20.0% allocation by FY 2022 primarily through investing with its existing strategic partner relationships, despite expected dispositions and strategy exits.
- We continue to evaluate other real asset investment strategies (e.g., increasing exposure to infrastructure), but we don’t perceive the immediate need to invest over the next 12-18 months due to comparably more attractive investment opportunities in the real estate equity and debt markets.
- Given the RE portfolio’s historic outperformance to the ODCE benchmark and overall portfolio, as well as comparatively attractive fundamentals going forward for certain property types, RCLCO believes a dynamic overweight to the real estate asset class is merited.
THE PATH TO A 20% REAL ESTATE ALLOCATION CONTINUED

- Even in the event of a severe recession, a dynamically overweight portfolio would likely be within the 20% ± 10% allocation to real estate. Due to the long-term outperformance of real estate, however, ASRS may want to consider increasing the real estate portfolio’s allocation to 25% ± 10%.

- In order to maintain appropriate levels of risk over the long-term (FY 2026-FY 2029), the portfolio would require significant dispositions and/or refinancing of stabilized assets.
MODEL ALLOCATION FORECAST
FORECASTED TO REMAIN COMPLIANT OVER LONG-TERM

Allocation by Investment Vehicle

% of Net Asset Value

FY 2019: 14% SMA, 15% Open, 73% Closed
FY 2020: 14% SMA, 15% Open, 76% Closed
FY 2021: 14% SMA, 15% Open, 83% Closed
FY 2022: 14% SMA, 15% Open, 84% Closed
FY 2023: 14% SMA, 15% Open, 85% Closed
FY 2024: 14% SMA, 15% Open, 87% Closed
FY 2025: 14% SMA, 15% Open, 89% Closed
FY 2026: 14% SMA, 15% Open, 90% Closed
FY 2027: 14% SMA, 15% Open, 90% Closed
FY 2028: 14% SMA, 15% Open, 90% Closed
FY 2029: 14% SMA, 15% Open, 90% Closed

Allocation by Risk Profile

% of Net Asset Value

FY 2019: 15% Stable, 14% Value Enhancement (Renovation & Lease-up/Roll), 81% Construction
FY 2020: 15% Stable, 14% Value Enhancement (Renovation & Lease-up/Roll), 81% Construction
FY 2021: 21% Stable, 21% Value Enhancement (Renovation & Lease-up/Roll), 63% Construction
FY 2022: 21% Stable, 21% Value Enhancement (Renovation & Lease-up/Roll), 63% Construction
FY 2023: 20% Stable, 20% Value Enhancement (Renovation & Lease-up/Roll), 71% Construction
FY 2024: 12% Stable, 14% Value Enhancement (Renovation & Lease-up/Roll), 75% Construction
FY 2025: 16% Stable, 15% Value Enhancement (Renovation & Lease-up/Roll), 69% Construction
FY 2026: 12% Stable, 15% Value Enhancement (Renovation & Lease-up/Roll), 70% Construction
FY 2027: 15% Stable, 15% Value Enhancement (Renovation & Lease-up/Roll), 72% Construction
FY 2028: 15% Stable, 15% Value Enhancement (Renovation & Lease-up/Roll), 71% Construction
FY 2029: 14% Stable, 14% Value Enhancement (Renovation & Lease-up/Roll), 73% Construction

Allocation by Property Type Category

% of Net Asset Value

FY 2019: 16% Where People Live, 18% Where People Work, 80% Where/How People Shop
FY 2020: 16% Where People Live, 18% Where People Work, 80% Where/How People Shop
FY 2021: 19% Where People Live, 19% Where People Work, 80% Where/How People Shop
FY 2022: 21% Where People Live, 21% Where People Work, 78% Where/How People Shop
FY 2023: 23% Where People Live, 23% Where People Work, 77% Where/How People Shop
FY 2024: 23% Where People Live, 23% Where People Work, 77% Where/How People Shop
FY 2025: 24% Where People Live, 23% Where People Work, 76% Where/How People Shop
FY 2026: 24% Where People Live, 23% Where People Work, 76% Where/How People Shop
FY 2027: 24% Where People Live, 23% Where People Work, 76% Where/How People Shop
FY 2028: 24% Where People Live, 23% Where People Work, 76% Where/How People Shop
FY 2029: 24% Where People Live, 23% Where People Work, 76% Where/How People Shop

Allocation by Asset Class

% of Net Asset Value

FY 2019: 9% Real Estate Equity, 6% Real Estate Debt, 85% Other Real Assets
FY 2020: 9% Real Estate Equity, 6% Real Estate Debt, 85% Other Real Assets
FY 2021: 8% Real Estate Equity, 5% Real Estate Debt, 90% Other Real Assets
FY 2022: 8% Real Estate Equity, 5% Real Estate Debt, 90% Other Real Assets
FY 2023: 8% Real Estate Equity, 5% Real Estate Debt, 90% Other Real Assets
FY 2024: 9% Real Estate Equity, 6% Real Estate Debt, 93% Other Real Assets
FY 2025: 9% Real Estate Equity, 6% Real Estate Debt, 93% Other Real Assets
FY 2026: 9% Real Estate Equity, 6% Real Estate Debt, 93% Other Real Assets
FY 2027: 9% Real Estate Equity, 6% Real Estate Debt, 93% Other Real Assets
FY 2028: 9% Real Estate Equity, 6% Real Estate Debt, 93% Other Real Assets
FY 2029: 9% Real Estate Equity, 6% Real Estate Debt, 93% Other Real Assets
### SMA/OPCO STRATEGIES

<table>
<thead>
<tr>
<th>STRATEGY/PROPERTY TYPE</th>
<th>TOTAL COMMITMENT</th>
<th>AVAILABLE CAPITAL</th>
<th>NET ASSET VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A Apartments</td>
<td>$750.0</td>
<td>$0.00</td>
<td>$735.7</td>
</tr>
<tr>
<td>MF Operating Company</td>
<td>$544.0</td>
<td>N/A</td>
<td>$456.8</td>
</tr>
<tr>
<td>Class B Apartments</td>
<td>$300.0</td>
<td>$112.30</td>
<td>$187.7</td>
</tr>
<tr>
<td>Preferred Equity Fund</td>
<td>$300.0</td>
<td>$153.00</td>
<td>$147.0</td>
</tr>
<tr>
<td>For-Sale Single Family / SFR</td>
<td>$400.0</td>
<td>$350.20</td>
<td>$49.8</td>
</tr>
<tr>
<td>Seniors Housing &amp; MOB</td>
<td>$300.0</td>
<td>$0.00</td>
<td>$166.2</td>
</tr>
<tr>
<td>Self-Storage</td>
<td>$100.0</td>
<td>$0.00</td>
<td>$68.3</td>
</tr>
<tr>
<td>Student Housing</td>
<td>$300.0</td>
<td>$0.00</td>
<td>$262.8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$2,994.0</strong></td>
<td><strong>$615.50</strong></td>
<td><strong>$2,074.3</strong></td>
</tr>
<tr>
<td>Hotel Value-Add</td>
<td>$200.0</td>
<td>$181.10</td>
<td>$18.9</td>
</tr>
<tr>
<td>Medical Office</td>
<td>$500.0</td>
<td>$43.90</td>
<td>$183.1</td>
</tr>
<tr>
<td>Suburban Office</td>
<td>$100.0</td>
<td>$0.00</td>
<td>$63.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$800.0</strong></td>
<td><strong>$225.00</strong></td>
<td><strong>$265.6</strong></td>
</tr>
<tr>
<td>Industrial</td>
<td>$400.0</td>
<td>$244.00</td>
<td>$156.0</td>
</tr>
<tr>
<td>Industrial Operating Company</td>
<td>$75.0</td>
<td>$66.00</td>
<td>$9.0</td>
</tr>
<tr>
<td>Small Scale/Bay Industrial</td>
<td>$350.0</td>
<td>$177.50</td>
<td>$169.2</td>
</tr>
<tr>
<td>Warehouse and Distributions</td>
<td>$115.0</td>
<td>$0.00</td>
<td>$91.3</td>
</tr>
<tr>
<td>Grocery-Anchored Shopping</td>
<td>$300.0</td>
<td>$180.30</td>
<td>$144.6</td>
</tr>
<tr>
<td>Mid-Scale Industrial</td>
<td>$150.0</td>
<td>$108.80</td>
<td>$41.2</td>
</tr>
<tr>
<td>High-Street Retail</td>
<td>$200.0</td>
<td>$80.00</td>
<td>$103.1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$1,590.0</strong></td>
<td><strong>$856.60</strong></td>
<td><strong>$714.4</strong></td>
</tr>
<tr>
<td>Multi-Asset Value-Add</td>
<td>$1,000.0</td>
<td>$419.4</td>
<td>$815.9</td>
</tr>
<tr>
<td>Southern California Value-Add</td>
<td>$500.0</td>
<td>$293.9</td>
<td>$133.8</td>
</tr>
<tr>
<td>NYC/BOS Sharpshooter</td>
<td>$500.0</td>
<td>$116.8</td>
<td>$383.2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$2,000.0</strong></td>
<td><strong>$830.0</strong></td>
<td><strong>$1,332.9</strong></td>
</tr>
</tbody>
</table>

1 Includes assets closed on as well as those in initial and final certification.

### NEW STRATEGIES TO CONSIDER

- Affordable Housing
- Alternative/Additional Manager for Self Storage
- Next Generation Office (e.g., flex floor plans & lease terms, health/wellness, master leases, cyber infrastructure, etc.)
- Strip/Small-Scale Retail SMA
- Southeast, growth market oriented grocery anchored (potentially through sharpshooters)
- SF/Bay Area Sharpshooter
PROGRESS SINCE INCEPTION

PORTFOLIO SUMMARY

► The primary drivers of success remain:
  » Evaluating underlying demand fundamentals and forecasting a demand/supply outlook for real estate markets and submarkets.
    o Demand is driven by both “macro” and “micro” factors; we therefore need to understand both national and local market drivers and fundamentals.
    o Investments should be allocated to asset classes where investment supply exceeds investor demand.
  » High quality, effective leadership, with high levels of involvement sets high-performing SMAs apart and provides optimal investment returns.

► The ASRS Real Estate Portfolio has grown from $1.2 billion in FY 2011 to $6.1 billion in FY 2019.

► Since prior fiscal year end of June 30, 2018, the Portfolio has grown by roughly $1.3 billion due to a $1.1 billion increase in SMA investments and $180 million increase in fund investments.

► Portfolio composition continues to shift in favor of direct investments, which, as of FY 2019, represent 67% of Portfolio NAV.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total ASRS Fund NAV (Millions)</td>
<td>$28,000</td>
<td>$27,210</td>
<td>$30,500</td>
<td>$34,863</td>
<td>$34,862</td>
<td>$33,956</td>
<td>$37,211</td>
<td>$39,625</td>
<td>$41,253</td>
</tr>
<tr>
<td>Target Allocation - Real Estate</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>8.0%</td>
<td>8.0%</td>
<td>10.0%</td>
<td>10.0%</td>
<td>20.0%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Target Portfolio NAV (Millions)</td>
<td>$1,680</td>
<td>$1,633</td>
<td>$1,830</td>
<td>$2,789</td>
<td>$2,789</td>
<td>$3,396</td>
<td>$3,721</td>
<td>$7,925</td>
<td>$8,251</td>
</tr>
<tr>
<td>RE Portfolio (millions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMAs</td>
<td>$9</td>
<td>$14</td>
<td>$61</td>
<td>$417</td>
<td>$1,024</td>
<td>$1,844</td>
<td>$2,079</td>
<td>$2,439</td>
<td>$3,608</td>
</tr>
<tr>
<td>OpCos</td>
<td>-</td>
<td>$55</td>
<td>$110</td>
<td>$181</td>
<td>$194</td>
<td>-</td>
<td>-</td>
<td>$554</td>
<td>$468</td>
</tr>
<tr>
<td>Current Commingled</td>
<td>$49</td>
<td>$106</td>
<td>$235</td>
<td>$337</td>
<td>$350</td>
<td>$527</td>
<td>$615</td>
<td>$698</td>
<td>$729</td>
</tr>
<tr>
<td>Legacy Funds</td>
<td>$1,309</td>
<td>$1,290</td>
<td>$1,361</td>
<td>$1,280</td>
<td>$1,011</td>
<td>$898</td>
<td>$397</td>
<td>$313</td>
<td>$289</td>
</tr>
<tr>
<td>Debt</td>
<td>$24</td>
<td>$37</td>
<td>$89</td>
<td>$140</td>
<td>$152</td>
<td>$242</td>
<td>$357</td>
<td>$330</td>
<td>$475</td>
</tr>
<tr>
<td>Agriculture &amp; Infrastructure¹</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$563</td>
<td>$543</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$1,391</td>
<td>$1,502</td>
<td>$1,856</td>
<td>$2,355</td>
<td>$2,731</td>
<td>$3,511</td>
<td>$3,448</td>
<td>$4,897</td>
<td>$6,112</td>
</tr>
<tr>
<td>Allocation to Real Estate</td>
<td>5.0%</td>
<td>5.5%</td>
<td>6.1%</td>
<td>6.8%</td>
<td>7.8%</td>
<td>10.3%</td>
<td>9.3%</td>
<td>12.4%</td>
<td>14.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Funds</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>SMAs</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
</tr>
<tr>
<td>Target Portfolio NAV (Millions)</td>
<td>$9,000</td>
<td>$8,000</td>
<td>$7,000</td>
<td>$6,000</td>
<td>$5,000</td>
<td>$4,000</td>
<td>$3,000</td>
<td>$2,000</td>
<td>$1,000</td>
</tr>
</tbody>
</table>
RETURN ATTRIBUTION
LEVERS AND MEASUREMENT

► The ASRS Real Estate Portfolio is benchmarked against the NCREIF NFI-ODCE (“ODCE”), but portfolio performance will differ due to structural differences (or “levers”). RCLCO measures the impact of these levers on portfolio performance to ensure we are maximizing value and returns.

► RCLCO has identified three levers that will primarily drive outperformance versus ODCE:
  » **Investment Vehicle**: the ASRS portfolio is comprised of separate accounts, operating companies, joint venture, commingled funds, and real assets, while ODCE is comprised entirely of open-end commingled funds.
  » **Sector Weighting (calculated for SMAs)**: the SMA portfolio is constructed based on the Model Allocation to “Live”, “Work”, and “Shop” assets, while ODCE’s allocation by product type is dictated by the investment decisions of fund managers that contribute to the index. ASRS is overweight “Live” assets and underweight “Work” and “Shop” assets compared to the benchmark allocation.
  » **Risk Profile or Life Cycle (calculated for SMAs)**: the SMA portfolio has a target allocation of 25%-50% of Lease-up/Roll and Construction assets, compared to ODCE which has a limit of 20% to non-stabilized assets.

► The ASRS Real Estate Portfolio continues to outperform ODCE; as of the June 2019 fiscal year-end, the portfolio generated a 370 bps one-year net excess return.

---

1 NCREIF NFI-ODCE is the leading benchmark for institutional real estate investors consisting of the market cap weighted net returns of ~20 institutional grade open end funds.

Source: ASRS

FY 2019 ATTRIBUTION ANALYSIS
SMA’S OUTPERFORM ODCE BY 6.5%; OVERALL PORTFOLIO OUTPERFORMS BY 3.7%

- Separate Accounts and Operating Companies have achieved the strongest returns among any investment vehicle within the real estate portfolio over the long-term, which validates RCLCO’s position to continue to increase the portfolio’s allocation to direct real estate investments.

- While Operating Companies did not perform as well over the one-year term due to the temporary valuation decline of a Multifamily Operating Company investment, Separate Accounts again achieved the highest returns, outperforming ODCE by 650 bps.

- To evaluate the drivers behind the Separate Account performance over the past year, RCLCO has conducted an SMA attribution analysis, detailed on the following slide.

<table>
<thead>
<tr>
<th>Investment Vehicle</th>
<th>1-YEAR</th>
<th>5-YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Net IRR Excess to ODCE</td>
<td>Net IRR Excess to ODCE</td>
</tr>
<tr>
<td>Separate Accounts</td>
<td>10.9%  6.5%</td>
<td>12.9%  5.1%</td>
</tr>
<tr>
<td>Current Commingled</td>
<td>6.6%   2.2%</td>
<td>9.9%   1.4%</td>
</tr>
<tr>
<td>Legacy Funds</td>
<td>3.6%   -0.8%</td>
<td>7.5%   -3.3%</td>
</tr>
<tr>
<td>Debt</td>
<td>3.2%   -1.3%</td>
<td>8.6%   0.4%</td>
</tr>
<tr>
<td>Operating Companies</td>
<td>1.8%   -2.6%</td>
<td>13.2%  6.9%</td>
</tr>
<tr>
<td>Farming / Infrastructure</td>
<td>9.9%   5.5%</td>
<td>8.1%   2.6%</td>
</tr>
<tr>
<td><strong>Sum / Weighted Avg.</strong></td>
<td><strong>8.1%</strong>  <strong>3.7%</strong></td>
<td><strong>10.2%</strong>  <strong>2.0%</strong></td>
</tr>
</tbody>
</table>
FY 2019 SMA ATTRIBUTION
LIFE CYCLE CONTINUES TO DRIVE OUTPERFORMANCE

- **Sector Weighting** attribution calculates excess return generated by RCLCO’s model allocation weightings by property type versus ODCE.
- Over the past year there has been a slightly negative sector weighting performance due to slight underperformance of Apartments within the ODCE Index compared to Office and Industrial.
- RCLCO believes that the 50.0% allocation to Live assets going forward is appropriate given the following:
  - Long-term household growth, especially among older and younger households;
  - The ability to reprice multifamily assets more frequently (i.e., on annual or, in some cases, monthly bases) compared to office, retail, or industrial assets, which have considerably longer lease terms;
  - The ability to source attractive leverage on multifamily assets;
  - Deep market liquidity arising from diversity within the property type and very healthy transaction volume.

<table>
<thead>
<tr>
<th>SEPARATE ACCOUNT ATTRIBUTION (SECTOR WEIGHTING)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sector Weighting</strong></td>
</tr>
<tr>
<td>Live</td>
</tr>
<tr>
<td>Work</td>
</tr>
<tr>
<td>Shop</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

- **Life Cycle** attribution calculates excess return generated by the performance of value creation activities (i.e., Value Enhancement and Construction) compared to ODCE.
- There has been strongly positive Life Cycle attribution through investing in both Value Enhancement & Construction assets.
- Stabilized assets also meaningfully contributed to SMA outperformance relative to the benchmark. This may be due to higher leverage within the SMA portfolio (50%) relative to the relative ODCE Index (22%), different market selection, or other factors. We will research this in early 2020 to be able to identify the relevant factors, though do not expect such a large outperformance by the Stabilized portfolio to consistently occur over the long-term.

<table>
<thead>
<tr>
<th>SEPARATE ACCOUNT ATTRIBUTION (LIFE CYCLE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Life Cycle</strong></td>
</tr>
<tr>
<td>Stabilized</td>
</tr>
<tr>
<td>Value Enhancement</td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

1*Measures the performance of ODCE by L/W/S sector to overall ODCE performance.
2*Measures the excess return of the SMA portfolio to ODCE.
FORECASTED SMA ATTRIBUTION
SECTOR WEIGHTING & LIFE CYCLE

SECTOR WEIGHTING
- For the forecasted Sector Weighting attribution moving forward, RCLCO utilized the PREA NPI forecast to estimate excess returns by sector within ODCE over the next five years. RCLCO also utilized the 30-year Core Real Estate forecast conducted by NEPC (7.0%) to forecast the performance of ODCE over the next five years.
- Sector Weighting is expected to attribute only 1 basis point of outperformance annually over the next five years, therefore having minimal impact compared to Life Cycle attribution.

LIFE CYCLE
- For the forecasted Life Cycle attribution, RCLCO derived excess returns by Life Cycle through a combination of historical portfolio returns and an aggregation of target returns by Life Cycle per the Investment Guidelines for each manager.
- RCLCO forecasts excess annual returns of 0.5%, 2.5%, and 5.5% for Stabilized, Value Enhancement, and Construction assets, respectively, which represent slightly humbled returns compared to historicals and underwriting hurdles. The Life Cycle “lever” is expected to contribute 173 basis points of outperformance annually relative to the benchmark over the next 5 years.
- Overall, through the combination of Sector Weighting and Life Cycle attribution, the SMA portfolio is expected to outperform ODCE by ~170 basis points annually, on average, over the next five years.

<table>
<thead>
<tr>
<th>SEPARATE ACCOUNT ATTRIBUTION FORECAST (5-YEAR)</th>
<th>Forecasted Benchmark Excess</th>
<th>SMA Weight</th>
<th>ODCE Weight (FY 2019)</th>
<th>Active Weight</th>
<th>Sector Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live</td>
<td>0.0%</td>
<td>50.0%</td>
<td>29.8%</td>
<td>20.2%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Work</td>
<td>-0.4%</td>
<td>25.0%</td>
<td>36.3%</td>
<td>-11.3%</td>
<td>0.05%</td>
</tr>
<tr>
<td>Shop</td>
<td>0.4%</td>
<td>25.0%</td>
<td>33.9%</td>
<td>-8.9%</td>
<td>-0.04%</td>
</tr>
<tr>
<td>Subtotal</td>
<td>100.0%</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.01%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Life Cycle</th>
<th>Forecasted Active Excess</th>
<th>SMA Weight</th>
<th>Life Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stabilized</td>
<td>0.5%</td>
<td>65.0%</td>
<td>0.33%</td>
</tr>
<tr>
<td>Value-Enhancement</td>
<td>2.5%</td>
<td>17.5%</td>
<td>0.44%</td>
</tr>
<tr>
<td>Construction</td>
<td>5.5%</td>
<td>17.5%</td>
<td>0.96%</td>
</tr>
<tr>
<td>Subtotal</td>
<td>100.0%</td>
<td></td>
<td>1.73%</td>
</tr>
<tr>
<td><strong>Total SMA Excess Return</strong></td>
<td></td>
<td></td>
<td><strong>1.73%</strong></td>
</tr>
</tbody>
</table>

Note: RCLCO utilized the 30-year Core Real Estate forecast conducted by NEPC (7.0%) to forecast the performance of ODCE over the next five years.
1Forecasted NPI returns from 2019 to 2023 provided by the Q4 2019 PREA Consensus Forecast Survey. Source: NCREIF; NEPC; ASRS; RCLCO
In the 2019 Implementation Plan, RCLCO forecasted that the overall real estate portfolio would exceed ODCE by ~150 bps over the next five years with a tracking error\(^1\) of ~270 bps.

The chart below shows the performance of the portfolio over the past five years (measured as cumulative IRR) compared to the excess return and volatility expectations established in the 2019 Plan.

While the portfolio has consistently outperformed the excess return target since 2017, outperformance has remained within a reasonable range—generally less than one standard deviation from the return expectation. Thus, RCLCO believes that last year’s projections of ~150 bps excess return with 270 bps tracking error continues to be an appropriate target for the next five years.

\(^1\)Tracking Error = \(\sigma (R_{\text{portfolio}} - R_{\text{benchmark}})\)

Source: ASRS
The ASRS Real Estate Portfolio’s outperformance is also driven by favorable fee structures negotiated for the majority of the portfolio. The portfolio has intentionally been constructed with vehicles that offer increased control and negotiation capabilities vis-à-vis structures and fees:

- Direct Investments (including those in Operating Companies) often have no fees.
- Separate Account structures are highly negotiated to minimize or completely eliminate fees on committed capital and catchups. These accounts also help align interests through NOI-based fees and offer opportunities to further reduce capital-based fees as investment relationships grow.
- Co-Investments offer fees that are materially lower than traditional fund structures or, in certain instances, have no fees altogether.

The table below estimates annual fee savings by investment vehicle/fee category relative to market terms offered by conventional funds.

- Approximately $142M in fee are realized annually based on the ~$6.7B current invested capital, which increases further to ~$210M upon full deployment of ~$9.8B in committed capital.
- Incremental fee savings are estimated to be at $21M per $1B of capital invested.

---

### FEE STRUCTURES - CURRENT VS. RACK RATE "MARKET" FUNDS

<table>
<thead>
<tr>
<th>Investment Vehicle</th>
<th>Management Fees</th>
<th>Actual</th>
<th>Market</th>
<th>Actual</th>
<th>Market</th>
<th>Actual</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate Accounts</td>
<td>0.5% - 1.25% &amp;</td>
<td>1.5%</td>
<td>8.0%</td>
<td>7.0% - 9.0%</td>
<td>10.0% - 20.0%</td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.5% - 5.0% (NOI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-Investments</td>
<td>0.0% - 1.0%</td>
<td>1.5%</td>
<td>0.0% - 10.0%</td>
<td>7.0% - 9.0%</td>
<td>0.0% - 10.0%</td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>0.5% - 1.5%</td>
<td>1.5%</td>
<td>7.0% - 9.0%</td>
<td>7.0% - 9.0%</td>
<td>10.0% - 20.0%</td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>Direct</td>
<td>0.0%</td>
<td>1.5%</td>
<td>0.0% - 8.0%</td>
<td>7.0% - 9.0%</td>
<td>0.0% - 20.0%</td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>Other (^2)</td>
<td>1.2% - 1.3%</td>
<td>1.5%</td>
<td>8.0%</td>
<td>7.0% - 9.0%</td>
<td>20.0%</td>
<td>20.0%</td>
<td></td>
</tr>
</tbody>
</table>

---

### ESTIMATED FEE SAVINGS PER YEAR

<table>
<thead>
<tr>
<th>Vehicle / Fee Category</th>
<th>Savings On Invested ($M) (^1)</th>
<th>Savings On Committed ($M) (^1)</th>
<th>Fee Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>$16.0</td>
<td>$23.6</td>
<td>-3.5% on committed capital</td>
</tr>
<tr>
<td>Co-Investments</td>
<td>$2.6</td>
<td>$3.9</td>
<td>-1.5% on committed capital</td>
</tr>
<tr>
<td>On Invested</td>
<td>$15.4</td>
<td>$22.7</td>
<td>-0.3% on committed capital</td>
</tr>
<tr>
<td>European waterfall</td>
<td>$5.1</td>
<td>$7.6</td>
<td>-0.1% on committed capital</td>
</tr>
<tr>
<td>No Catchup</td>
<td>$76.9</td>
<td>$113.5</td>
<td>-1.5% on committed capital</td>
</tr>
<tr>
<td>Fee Negotiations</td>
<td>$26.3</td>
<td>$38.9</td>
<td>Management fee reduced by half</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$142.2</strong></td>
<td><strong>$210.1</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: ASRS

\(^1\) Negotiated fees (i.e., Actual) are nearly always calculated on invested capital, while market fees are based on total capital committed

\(^2\) Comprised of farmland & infrastructure fund investments
SMA FEE EFFECTIVENESS MONITORING

Given SMAs represent the predominant investment vehicle of the portfolio (~60% as of 2019 fiscal year-end) with varying life-cycle profiles, we monitor fee effectiveness on a quarterly basis as well as confirm the complete accuracy of fees charged to ASRS each year.

SMA FEE EFFECTIVENESS ANALYSIS

► ASRS should retain at minimum half of the upside (a 1:1 ratio) above an 8.0% levered return, with a target of two-thirds of the upside (a 2:1 ratio).

► Effectiveness Ratio = \[ \frac{\text{ASRS' total excess return (i.e., gross cash flow less required cash flow to reach 8.0% minimum hurdle less total fees and promote)}}{\text{Total fees and promote}} \]

► As of Q3 2019, total portfolio fee effectiveness is 1.4, which exceeds the minimum target of 1.0. Fee effectiveness is expected to increase further as more value is created given 37% of the total portfolio have recent vintages and 36% of the portfolio still in the midst of value creation (i.e., construction, etc.).

COMPLIANCE REVIEWS

► All SMA Manager fee calculations are reviewed on an ongoing basis as well as during a formal review process conducted annually. These efforts ensure fee accuracy and compliance with ASRS policies and Operating Agreements.

► The annual compliance review assess the accuracy of all fee categories—including Manager affiliates for property-level work—as part of the operating expenses at each property (i.e., property management and construction/developer fees, and so forth).

► The accuracy of all calculations/fees is paramount as errors in the se metrics often have ripple effects throughout real estate portfolios.

► Compliance reviews have identified approximately $0.4M in fee variances, the majority of which are overcharges that have since been corrected.
The information contained in this report is confidential, may be legally privileged, and is intended only for the use of the Arizona State Retirement System.