LM04 · REAL ESTATE & INFRASTRUCTURE · LOS A, B, C, D

Real Estate & Infrastructure

CFA Level I · 2025 Curriculum

Why These Two Together?

Real estate and infrastructure are the two largest **real asset** categories within alternatives. Both involve physical assets, produce cash flows from use-rights, serve as **inflation hedges**, and require specialized valuation. Both also have unique structures — REITs, MLPs, and PPPs — that provide diversified investor access.

Two Major Sectors in Real Estate

Residential RE

Owner-occupied single-family and multi-family homes — typically the largest RE segment by value.

Trap: a residential property owned to rent out → classified as commercial RE.

Commercial RE

Any property held to generate income (rent). Includes office, retail, industrial, hospitality — *and* residential held for rental.

The test is intent to generate income, not the structure type.

Commercial RE Sub-Sectors

COMMERCIAL RE TYPES AT A GLANCE

Office
Multi-year leases
CBD vs. Suburbs

Retail
Malls vs. strips
% rent + base

Industrial
Warehouse, logistics
E-commerce driver

Hospitality
Daily lease terms
Highly cyclical

Multifamily
Short residential leases
Stable demand

Specialty RE
Data centers · Self-storage · Healthcare · Cell towers
Typically long-term leases

Unique Features of Real Estate

FEATURE	IMPLICATION
Indivisibility	Requires large capital outlays — hard to invest small amounts directly. Creates need for pooled vehicles (REITs, funds).
Heterogeneity	No two properties identical. Location, condition, and characteristics all differ. Complicates valuation and price comparison.
Illiquidity	Transactions are costly and time-consuming (weeks to months). No centralized exchange.
Opaque Price Discovery	Historical prices may not reflect current conditions. Appraisal-based, infrequent valuations.
Fragmented Markets	Local supply/demand conditions drive value far more than national trends.

□ **Exam Tip:** Classification rule: If the owner's *intent is to generate rental income*, it's commercial RE — regardless of structure type. An investor who owns an apartment building to rent out is in commercial RE, not residential RE.

LOS A · INVESTMENT STRUCTURES

Real Estate Investing — The Four Quadrants

Every real estate investment fits into one of four cells defined by two dimensions: **public vs private** market access, and **debt vs equity** claim structure.

THE FOUR QUADRANTS OF REAL ESTATE INVESTING

	EQUITY	DEBT
PRIVATE	**Private Equity** Direct ownership of properties • Sole ownership · Joint ventures • Real estate limited partnerships • Private REIT funds • Core / Core-Plus / Value-Add / Opportunistic **✓ Maximum control · ✗ Illiquid · High minimum**	**Private Debt** Lending against properties • Mortgages · Construction loans • Mezzanine RE debt • Bridge loans • Direct bank lending **✓ Fixed income · ✗ Credit risk · Illiquid**
PUBLIC	**Public Equity** Exchange-traded RE shares • Public REITs (equity REITs) • RE operating companies • RE ETFs & mutual funds • Real estate GICS sector (2016+) **✓ Liquid · ✓ Small minimums · ✗ Market volatility**	**Public Debt** Traded mortgage securities • MBS · CMBS · CMOs • Covered bonds • Mortgage REITs (mREITs) • Agency debt (Fannie/Freddie) **✓ Liquid · ✓ Credit-rated · ✗ Interest rate risk**

Key Takeaways from Each Quadrant

QUADRANT	WHO INVESTS	TYPICAL RETURN	LIQUIDITY
Private Equity	Institutions, HNWIs, RE funds	Income + appreciation	Very low
Private Debt	Banks, insurance cos., debt funds	Interest (coupon-like)	Very low
Public Equity	Retail + institutional	Income (dividends) + appreciation	High (daily)
Public Debt	Retail + institutional	Interest (coupon)	High (daily)

□ **Exam Tip:** Memorize the 2×2 matrix: **Public/Private × Debt/Equity**. Most CFA questions can be classified this way. Public vehicles give liquidity; private gives control and potential return premium for illiquidity.

LOS B · CORE RE VALUATION

NOI & Cap Rate — The Core RE Metrics

Two formulas dominate commercial real estate valuation at the property level. Master these and you can answer most CFA Level I questions on RE valuation.

NET OPERATING INCOME

`NOI = Rental Income − Operating Expenses`

CAPITALIZATION RATE

`Cap Rate = NOI / Property Value`

What's in NOI?

INCLUDED	EXCLUDED
Rental income	Mortgage interest (financing cost)
Minus operating expenses	Depreciation & income taxes

Why NOI excludes financing: NOI measures the *property's* cash generation, independent of how it's financed. Two investors buying the same property with different debt levels have identical NOI, but different equity returns.

The Three Ways Cap Rate Is Used

USE 1

Current Yield

Cap Rate = NOI / Price. A quick measure of income yield at the time of purchase. Comparable to a bond's coupon yield.

USE 2

Valuation Tool

Property Value = NOI / Cap Rate. Given the market's prevailing cap rate for similar properties, solve for value.

USE 3

Risk/Growth Indicator

Lower cap rate = higher price per $1 NOI = market expects growth OR low risk. Higher cap = discount = higher risk OR stagnant.

Cap Rate and Discount Rate — Conceptual Link

Conceptually, the cap rate reflects the relationship between the investor's required return and expected NOI growth: higher required return pushes cap rates up; higher expected growth pulls them down.

So: a lower cap rate can mean either *lower perceived risk* (lower required return) OR *higher expected growth*.

Worked Example: Cap Rate Valuation

□ WORKED EXAMPLE

Scenario: You're analyzing an office building. It generates:

- Gross rental income: $2,400,000/year
- Property management: $80,000
- Property taxes: $180,000
- Insurance: $45,000
- Repairs/maintenance: $95,000

Comparable properties are trading at 6.5% cap rate.

✓ SOLUTION

Step 1: Calculate NOI

```
\text{NOI} = $2,400,000 - ($80,000 + $180,000 + $45,000 +
$95,000) = $2,400,000 - $400,000 = \mathbf{$2,000,000}
```

Step 2: Apply Cap Rate to Value the Property

```
Value = \text{NOI} / Cap Rate = $2,000,000 / 0.065 =
\mathbf{$30,769,231}
```

Step 3: Interpret

If a comparable property trades at a 6.5% cap, similar income should produce similar pricing. If you can buy this one for $28M instead, you'd be getting a 7.14% cap — higher yield, potentially an undervalued opportunity.

□ **Exam Tip:** Cap rate questions test: (1) Knowing what's *in* and *out* of NOI — mortgage interest is always OUT. (2) Rearranging the formula: **V = NOI / Cap**; **NOI = V × Cap**; **Cap = NOI / V**. (3) Understanding that lower cap = higher price = market expects growth or low risk.

LOS A · REIT STRUCTURE

REITs — Access to Real Estate at Retail Scale

What Makes a REIT Special?

A Real Estate Investment Trust (REIT) is a company that owns, operates, or finances income-producing real estate. REITs allow investors to access diversified, professionally-managed RE portfolios through liquid public shares.

REIT TAX ADVANTAGE (US)

`Distribute ≥ 90% of taxable income → Corporate tax exemption`

The 90% Rule — Why It Matters

A REIT that distributes at least 90% of its taxable income as dividends to shareholders **avoids corporate income tax**. Income is taxed only at the shareholder level — escaping the double taxation that regular corporations face. This pass-through treatment is why REITs are the dominant real estate investment vehicle for retail investors.

Three Types of REITs

EQUITY REITS

The Classic REIT

Own and operate income-producing properties. Generate returns from rent plus property appreciation. The dominant REIT category.

MORTGAGE REITS

RE Debt Plays

Invest in mortgages and mortgage-backed securities. Generate returns from interest income. Highly leveraged; sensitive to rate changes.

HYBRID REITS

Combine Both

Hold both physical properties and mortgage assets. Less common than pure equity or mortgage REITs.

REIT Pros & Cons

✓ Advantages

- Liquid (daily exchange trading)
- Low minimums (single share)
- Tax-efficient (90% rule)
- Professional management
- Diversification across properties

✗ Disadvantages

- Higher correlation with stocks than private RE
- Market volatility (not just property volatility)
- Interest rate sensitive
- Less control for investors
- Trading premium/discount to NAV

- Transparent reporting (public disclosures)

- Management fee drag

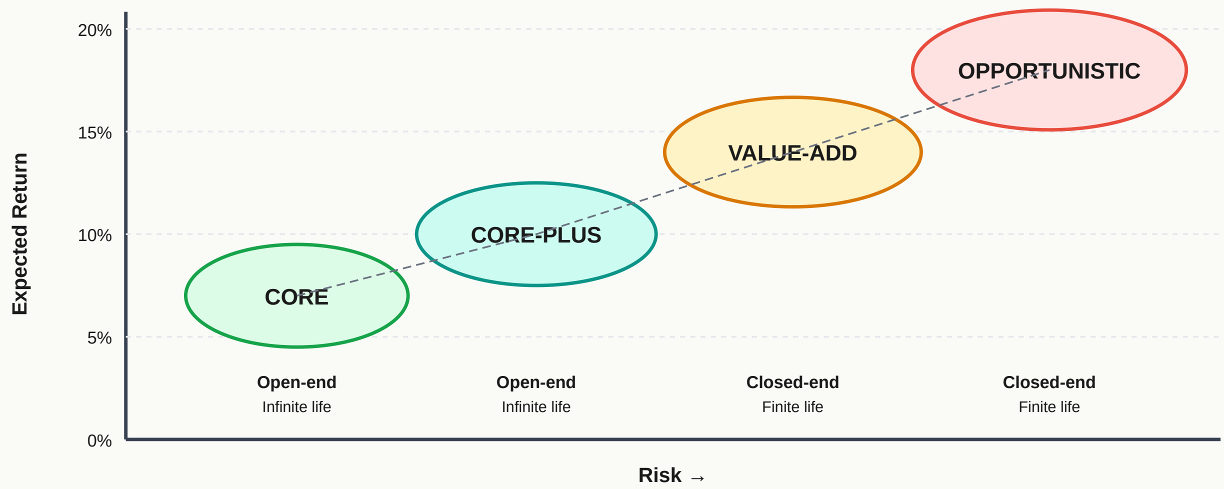
 Exam Tip: The REIT **90% distribution requirement** is the most commonly tested REIT fact on the exam. Also know: REITs trading above NAV = *premium*; below NAV = *discount*. Premium typically signals market optimism; discount signals skepticism or distressed valuations.

LOS A · PRIVATE RE FUND STYLES

Private RE Fund Investing Styles — The Risk Spectrum

Private RE funds are classified into four styles by their target risk/return profile. The styles progress from low-risk stabilized income (Core) to high-risk ground-up development (Opportunistic).

PRIVATE RE FUND STYLES — RISK/RETURN SPECTRUM



The Four Styles Explained

STYLE	FUND STRUCTURE	TARGET PROPERTIES	RETURN DRIVER
Core	Open-end (infinite life)	Well-leased, high-quality properties	Stable income
Core-Plus	Open-end	Secondary/tertiary cities; hotels, nursing homes and similar	Income + modest growth
Value-Add	Closed-end (finite life)	Modest redevelopment or repositioning	Growth through improvement
Opportunistic	Closed-end	Development or major redevelopment	Speculation + development

Style Mnemonic

As you move from **Core → Opportunistic**: risk *increases*, leverage *increases*, fund life *becomes finite*, income contribution *decreases*, appreciation contribution *increases*.

 Exam Tip: Key exam distinction: **Open-end (Core / Core-Plus)** vs **Closed-end (Value-Add / Opportunistic)**. Open-end funds are like mutual funds — you can redeem over time. Closed-end funds have a fixed life with no redemptions until liquidation.

LOS B · RETURN CHARACTERISTICS

RE Returns, Risks & Portfolio Diversification

Two Sources of RE Returns

□ Bond-like (Income)

Stable, predictable **lease income** — comparable to bond coupons. Long leases with inflation escalators provide contractual cash flows.

Approximately **half of returns** in private core and listed real estate are derived from income.

□ Equity-like (Appreciation)

Speculative returns from **price appreciation**. Driven by rent growth, cap rate compression, or property improvement.

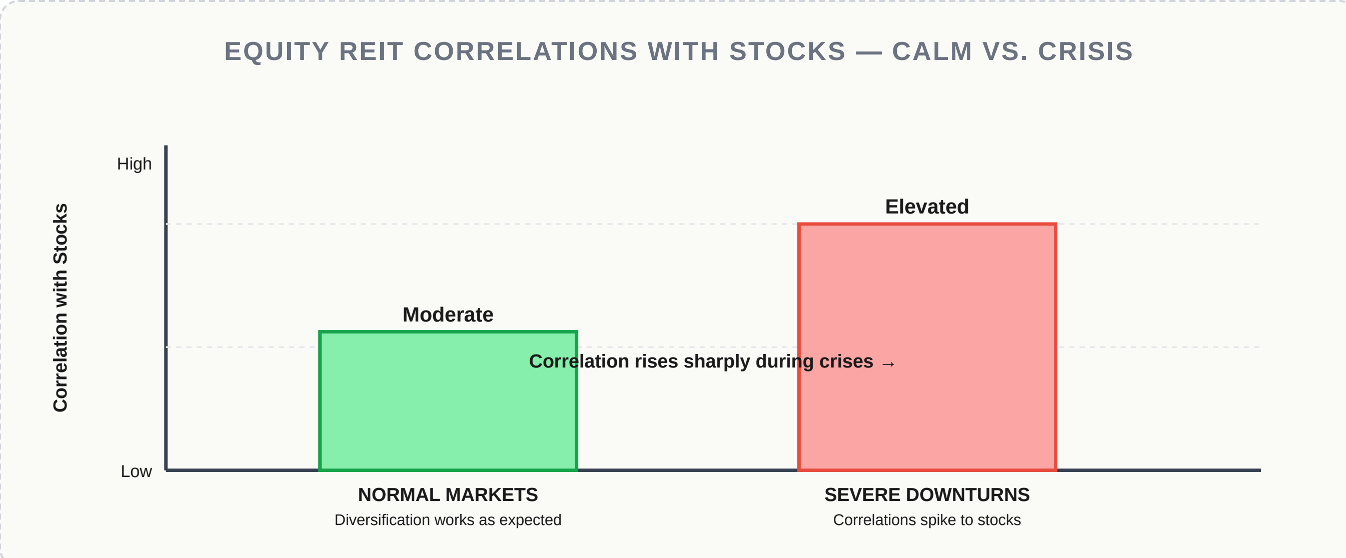
More volatile than income. Subject to market cycles, interest rate moves, and local supply/demand.

Key Risks to RE Investment

RISK TYPE	DESCRIPTION	MITIGATION
Interest Rate Risk	Rising rates increase borrowing costs, depress property values (cap rate expansion)	Long-term fixed-rate debt; interest rate swaps
Economic/Market Risk	Recessions hurt tenant finances, raise vacancies, depress rents	Diversify across property types and geographies
Operating Risk	Unexpected maintenance, tenant turnover, property management issues	Experienced managers; reserves; triple-net leases
Financial Risk	Leverage amplifies gains AND losses; covenants can force sales at bad times	Conservative LTV (<75%); staggered debt maturities
Liquidity Risk	Can't sell quickly without discount	REITs for liquidity; staggered fund commitments
Regulatory Risk	Zoning, rent control, tax law changes	Geographic diversification; legal due diligence

Diversification — The Correlation Trap

RE has historically shown **low-to-moderate correlation** with public stocks and bonds, which makes it attractive for diversification. BUT this correlation is not stable.



Conceptual illustration; observed correlations vary by period and REIT sector.

⚠ Correlation Trap Warning

Equity REIT correlations with stocks **rise sharply during severe market downturns** — exactly when diversification is most needed. This is a well-documented feature of all "alternative" assets during crises. Private RE is less affected in reported data *only because of valuation smoothing* — the actual economic correlation is likely similar.

□ **Exam Tip:** Expect an exam question on this: "REIT correlations with stocks during crises: ↑ or ↓?" Answer: **increase**. The "diversification benefit" of public REITs evaporates when it's most needed.

INTERACTIVE TOOL

Cap Rate & Property Valuation Calculator

Drag the sliders to see how each variable affects property value. Watch the live chart show how cap rate compression or expansion drives valuation swings.

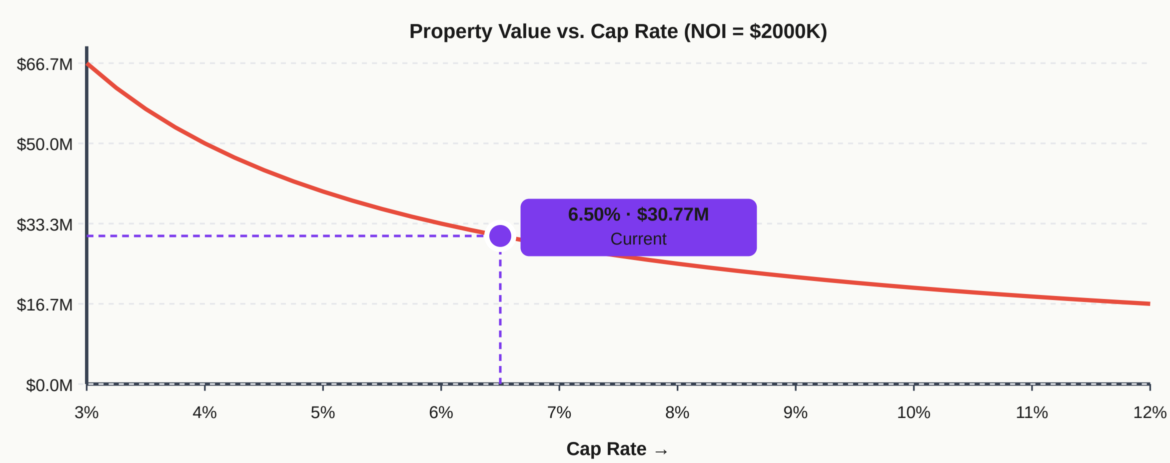
PROPERTY INPUTS

Gross Rental Income	$2,400K
Operating Expenses	$400K
Market Cap Rate	6.50%
Asking Price	$30.0M

NOI	MARKET VALUE	IMPLIED CAP AT ASK
$2000K	$30.77M	6.67%
Annual net income	NOI / Cap Rate	NOI / Asking Price

Cap Rate Sensitivity — Live Chart

See how the implied value would change across a range of cap rates, with your current market rate highlighted.



Deal Analysis

✓ **Fair value with discount:** Slightly above market cap — modest discount to market value. Worth pursuing if fundamentals check out.

Step-by-Step Breakdown

STEP	CALCULATION	VALUE
NOI	$2400K -$400K	$2000K
Market Value (at market cap)	$2000K / 6.50%	$30.77M
Implied Cap at Asking	$2000K /$30000K	6.67%
Discount/Premium to Market	($30000K -$30769K) / $30769K	-2.5%

Exam Tip: Try setting the cap rate at 5% and then sliding it up to 7%. See how a 200 bps expansion crushes value by roughly 30%. This is why rising interest rates (which push cap rates up) cause RE valuations to fall so dramatically.

QUIZ 1 · CHECKPOINT

Test Your Understanding: Real Estate

Q1. A residential apartment building owned by an investor who rents it out is classified as:

Q2. The main advantage of the REIT structure for investors is that it:

Q3. A property generates $400,000 of annual NOI and comparable properties trade at a 5% cap rate. The property's estimated market value is closest to:

Q4. Which RE private fund style is *most* likely to use a closed-end structure with major redevelopment projects?

LOS C · INFRASTRUCTURE FEATURES

Infrastructure Investment — Long-Life, Essential Assets

What Makes Infrastructure Unique?

Infrastructure assets are **long-lived physical assets essential for economic and social function** — roads, airports, utilities, telecom towers, schools, hospitals. They share a characteristic profile: large upfront capital investment, long operational lives, and cash flows tied to *use-rights* rather than sales.

Defining Characteristics

1. **Stable long-term cash flows** — inelastic demand (people need roads, electricity, water regardless of GDP)
2. **Inflation adjustment** — contracts commonly include inflation-linked escalation
3. **Significant capital investment** and **high barriers to entry**
4. **Monopolistic / regulated** — often the only provider in a region; prices set or approved by regulators
5. **Long operational lives**
6. **Strategically important** — essential to economic and social function
7. **Highly leveraged** — stable cash flows support substantial debt financing

Three Cash Flow Sources

HOW INFRASTRUCTURE GENERATES REVENUE

AVAILABILITY PAYMENTS

Paid for being available

Not tied to usage volume

Examples:
- Hospitals · Schools
- Correctional facilities
- Social housing

USAGE-BASED PAYMENTS

Paid per use

Demand risk is present

Examples:
- Toll roads · Bridges
- Airport passenger fees
- Water meters · Telecom

TAKE-OR-PAY

⚡

Minimum purchase obligation

Buyer pays whether or not they take delivery

Examples:
- Power purchase agreements
- Gas/oil pipelines

Economic vs. Social Infrastructure

ECONOMIC INFRASTRUCTURE

Revenue-Generating Assets

Facilitate commerce and economic activity. Generate revenue from **usage fees** — creates demand/market risk.

Sub-categories:

- **Transportation:** roads, airports, ports, rail, bridges
- **ICT assets:** fiber, cell towers, data centers
- **Utility/Energy:** solar, wind, waste-to-energy, water, gas pipelines

Higher risk (demand-sensitive) → higher returns

SOCIAL INFRASTRUCTURE

Service-Delivery Assets

Support public services. Revenue typically from **availability payments** — minimal demand risk.

Sub-categories:

- **Education:** schools, universities
- **Healthcare:** hospitals, clinics
- **Social housing:** subsidized multi-family
- **Correctional:** prisons, detention facilities

Lower risk (gov't counterparty) → lower returns

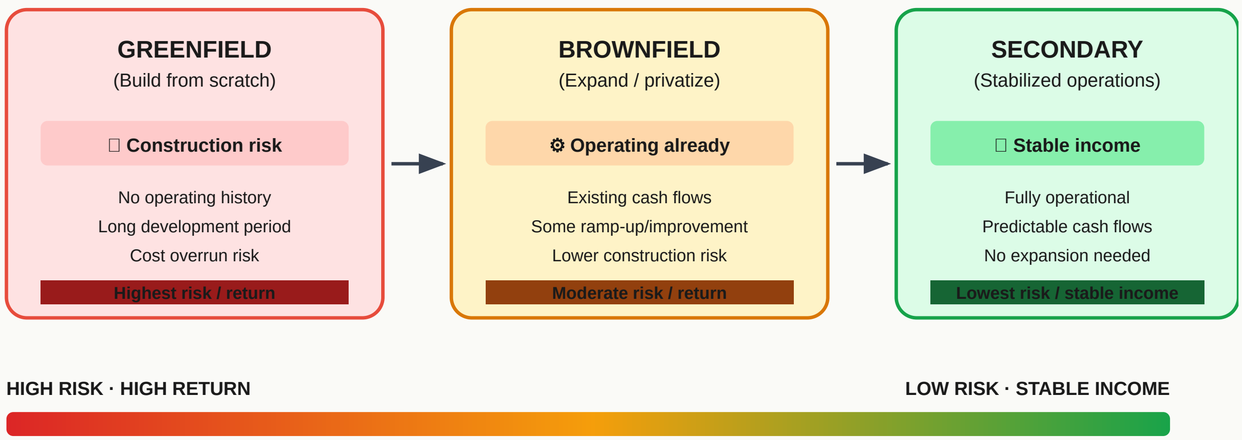
□ **Exam Tip:** Memorize the pattern: **Economic infrastructure = usage-based = demand risk = higher return**. **Social infrastructure = availability payments = lower risk = lower return**. Take-or-pay sits in between — contractual minimum but limited upside.

LOS C · DEVELOPMENT STAGES

Infrastructure Development Stages — Greenfield, Brownfield, Secondary

Infrastructure investments can be classified by the asset's stage of completion. Earlier stages carry **construction and ramp-up risk**; later stages have **operating track records**. Risk and return decline as the asset matures.

INFRASTRUCTURE LIFECYCLE — RISK/RETURN BY STAGE



Pension funds & insurance companies favor secondary-stage for long-duration liability matching.

Why Each Stage Suits Different Investors

INVESTOR TYPE	PREFERRED STAGE	RATIONALE
Pension funds, insurance	Secondary	Match long-duration liabilities with stable inflation-linked cash flows
Infrastructure funds (core)	Brownfield + Secondary	Steady income-focused mandate
Infrastructure funds (value-add/opportunistic)	Greenfield + Brownfield	Higher return targets; accept construction/ramp-up risk
Private equity	Greenfield	Willing to take development risk for upside

Infrastructure Investment Forms

Direct Investment

Own the physical asset or a direct equity stake.

✗ Concentration risk, illiquid, large capital

Indirect (Funds)

Infrastructure funds, PE funds with infra allocation, infrastructure debt funds.

✓ Diversified, managed, accessible

Public Securities

Publicly traded infrastructure company shares, MLPs (Master Limited Partnerships), infrastructure ETFs.

✓ Liquid, small minimums

MLPs — Infrastructure's REIT Equivalent

Master Limited Partnerships are publicly traded partnerships common in US energy infrastructure (pipelines, storage). Like REITs, they avoid corporate taxation by passing income through to unitholders. Typically have a **high-yield, tax-efficient profile**. Common for midstream energy infrastructure.

Infrastructure Debt vs. Comparable Fixed Income

Infrastructure debt is widely considered among the **most secure** categories of credit:

Lower default rates

Stable, regulated cash flows; strategic importance limits default risk.

Higher recovery rates

Physical assets provide meaningful collateral in workout scenarios.

Implication: An attractive risk-adjusted profile for long-horizon investors such as pension funds and insurance companies.

□ **Exam Tip:** Memorize the risk ordering: **Greenfield (highest risk)** → **Brownfield** → **Secondary (lowest risk)**. Greenfield = build new (construction risk). Brownfield = expand existing (moderate). Secondary = buy already-operating (stable).

QUIZ 2 · CHECKPOINT

Test Your Understanding: Infrastructure

Q5. Which type of infrastructure investment has the *lowest* expected risk and return?

Q6. A hospital built under a public-private partnership receives payments based on the facility being available for use. These are:

Q7. Infrastructure debt compared to comparable-rated fixed-income instruments *typically* has:

Q8. A natural gas pipeline operator signs a 20-year contract where the buyer must pay for a minimum volume each year *regardless of whether they actually take delivery*. This is *best* described as:

INTERACTIVE TOOL

RE & Infrastructure Scenario Explorer

Click different scenarios to see how each investment type performs under various market conditions. Build intuition for **when** each asset class shines and where each fails.

Select a Scenario

Click a scenario above to see how different asset types respond.

FINAL COMPREHENSIVE QUIZ

Final Assessment — Integrating RE & Infrastructure

Q9. A pension fund with long-duration liabilities seeks stable income and inflation protection. The *most* suitable infrastructure stage would be:

Q10. Which statement about RE and infrastructure is *least* accurate?

Q11. Which statement about equity REIT correlations is *most* accurate?

Q12. If market cap rates compress (fall), holding NOI constant, the implied property value will:

MODULE COMPLETE

Your Scorecard

0 / 12

LM04 Key Takeaways — Exam-Ready Cheat Sheet

Real Estate Essentials

1. **Two sectors:** Residential and Commercial. **Classification follows intent** — residential property owned to rent = commercial RE.
2. **Four Quadrants:** Public/Private × Debt/Equity. Private = control but illiquid. Public = liquid but market-priced.
3. **NOI = Rent − OpEx**. Excludes: mortgage interest, depreciation, income taxes, CapEx. Includes: property taxes, insurance, management, maintenance.
4. **Value = NOI / Cap Rate**. Cap rate reflects both required return and expected NOI growth — lower cap = higher value (growth or low risk priced in).

REITs

5. The **90% distribution rule** is the main REIT feature — pass-through taxation, no double tax at corporate level.
6. Three types: **Equity REITs** (own properties, dominant category), **Mortgage REITs** (RE debt), **Hybrid** (both).
7. REITs trade at **premium or discount to NAV**. Correlations with stocks *rise* during severe downturns.

Private RE Fund Styles

8 **Core / Core-Plus:** open-end, stabilized income, low-moderate leverage. **Value-Add / Opportunistic:** closed-end, development/redevelopment, high leverage.

9 Risk ordering: Core < Core-Plus < Value-Add < Opportunistic. Return contribution shifts from income to appreciation.

Infrastructure

10 **3 cash flow sources:** Availability (social), Usage-based (economic), Take-or-pay (contract minimum).

11 **Economic infra** (transport, utilities, telecom) = usage-based = demand risk = higher return. **Social infra** (schools, hospitals) = availability = lower risk = lower return.

12 **3 development stages:** Greenfield (build new, highest risk/return) > Brownfield (expand existing) > Secondary (stabilized, lowest risk/return).

13 **MLPs** = publicly traded partnerships in energy infra; pass-through like REITs. Common for midstream (pipelines).

14 **Infrastructure debt** typically has *lower default rates AND higher recovery rates* than comparable-rated corporate bonds.

⚡ Quick-Recall Formulas

NOI = Rental Income − Operating Expenses

Cap Rate = NOI / Property Value

Property Value = NOI / Cap Rate

% Value Change ≈ −% Change in Cap Rate (approximately)

⚡ Exam-Trap Reminders

- **Classification follows intent**: rental residential = commercial
- **Mortgage interest NOT in NOI** (financing is a capital structure choice)
- **REIT correlations RISE in crises**
- **Social = Availability · Economic = Usage**
- **Greenfield > Brownfield > Secondary** (risk/return)

- **Infrastructure debt: lower default AND higher recovery**
- **Open-end = Core/Core-Plus; Closed-end = Value-Add/Opportunistic**

Step 1 of 14