

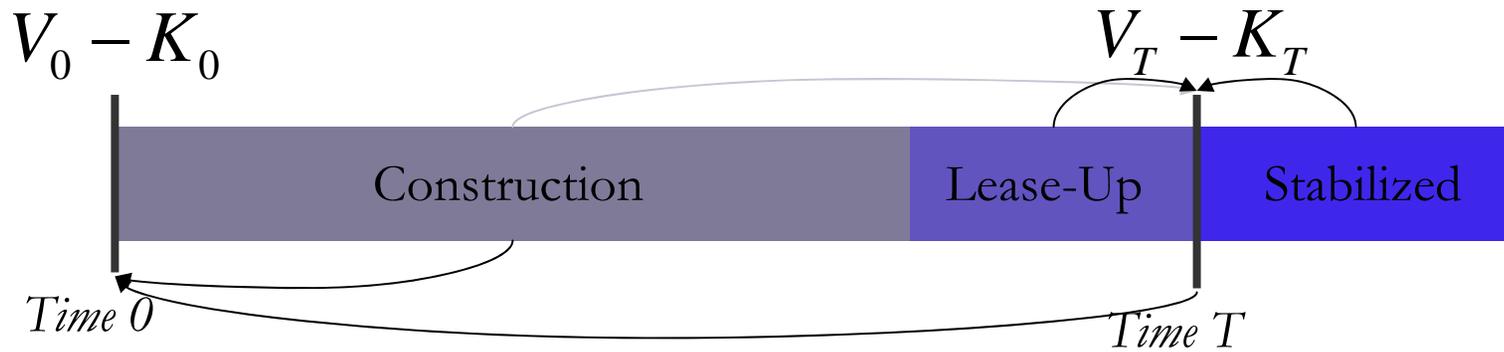
The construction loan collapses a series of costs (cash outflows) incurred during the construction process into a *single value* as of a single (future) *point in time* (the projected completion date of the construction phase).

Actual construction expenditures (“*draws*” on the construction loan) are added to the accumulating *balance* due on the loan, and interest is charged and compounded (adding to the balance) on all funds drawn out from the loan commitment, from the time each draw is made.

Thus, interest *compounds forward*, and the borrower owes no payments until the loan is due at the end of construction, when all principle and interest is due.

Bottom line: Borrower (developer) faces no cash outflows for construction until the end of the process, when the entire cost is paid (including the “cost of capital”).

The “Canonical” Formula - Graphical Representation



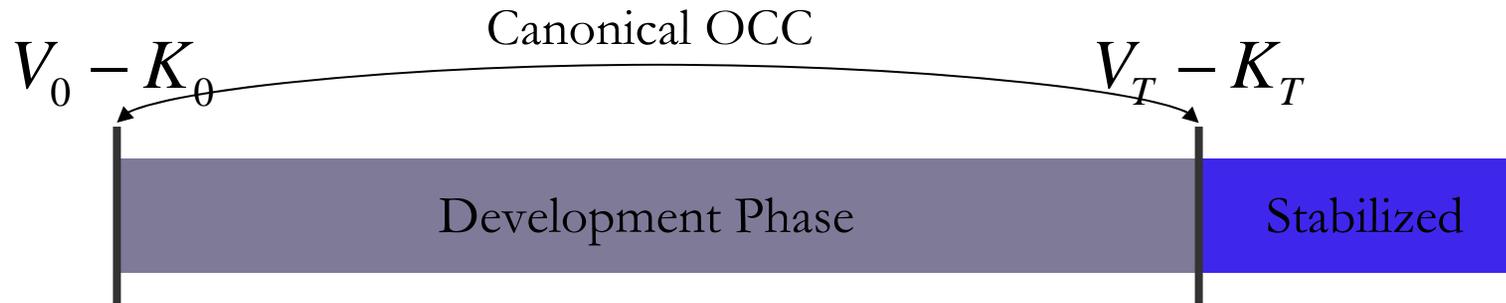
To *Time T*

- Cash flows from the stabilized building (s) are discounted at Stabilized OCC to value main part of V_T (or use direct capitalization with projected cap rate).
- Cash flows from the lease-up period are compounded at Speculative OCC (Stabilized OCC + 50 to 200bps for lease-up risk) to value rest of V_T
- Cash flows from the construction period are compounded at Construction OCC to form K_T

To *Time 0*

- V_T is discounted at Speculative OCC to arrive at V_0
- K_T is discounted at Construction OCC to arrive at K_0

The “Canonical” Formula - Graphical Representation



$$\frac{V_T - K_T}{(1 + E[r_C])^T} = V_0 - K_0 = PV[V_t] - PV[K_t]$$

$$1 + E[r_C] = \left(\frac{V_T - K_T}{V_0 - K_0} \right)^{1/T}$$

The “Canonical” Formula - NPV Rule

For the development project:

NPV exclusive of land cost =

$$PV[V_T - K_T] = PV[V_T] - PV[K_T] = V_0 - K_0$$

- $V_0 - K_0 < \text{Land Cost}$
 - Don't undertake the project
- $V_0 - K_0 > \text{Land Cost}$
 - Undertake the project

Three considerations are important and unique about applying the NPV rule to evaluating investment in development projects as compared to investments in stabilized operating properties:

- 1. “*Time-to-Build*”:** Investment cash outflow occurs *over time*, not all at once up front, due to the *construction phase*.
- 2. *Construction loans*:** Debt financing for the construction phase is *almost universal* (even when the project will ultimately be financed entirely by equity).
- 3. *Phased risk regimes*:** Investment risk is very different (greater) between the construction phase (the *development investment per se*) and the stabilized operational phase. (Sometimes an intermediate phase, “*lease-up*”, is also distinguishable.)

We need to account for these differences in the methodology of how we *apply* the NPV Rule to development investments. . .

The Operating Budget (*Recall the items from Chapter 11*):

- **Forecast Potential Gross Income (PGI, based on rent analysis)**
- **Less Vacancy Allowance**
- **= Effective Gross Income (EGI)**
- **Less forecast operating expenses (& capital reserve)**
- **= Net Operating Income (NOI)**

The most important aspect is normally the rent analysis, which is based (more or less formally) on a *market analysis* of the space market which the building will serve. (See Chapter 6, or Wheaton's 11.433 course.)

The bottom line:

NOI forecast, combined with *cap rate* analysis (of the asset market):

→ $\text{NOI} / \text{cap rate} = \text{Projected Completed Building Value} = \text{“Benefit”}$ of the development project.

SFFA “Back Door” Procedure:

Start with rents & building, and end with supportable development costs...

Total Leaseable Square Feet (based on the building efficiency ratio times the gross area)

X Expected Average Rent Per Square Foot

= Projected Potential Gross Income (PGI)

- Vacancy Allowance

= Expected Effective Gross Income

- Projected Operating Expenses

= Expected Net Operating Income

÷ Debt Service Coverage Ratio

÷ Annualized Mortgage Constant

÷ Maximum Loan to Value Ratio

= Maximum Supportable Total Project Costs

(Question: Can it be built for this including all costs?)

- Expected Construction Costs (Other than Site)

= Maximum Supportable Site Acquisition Cost

Question: Can the site be acquired for this or less?

Typical approach for “Use looking for a Site”.

Example:

- Office building 35,000 SF (GLA), 29,750 SF (NRA) (85% “Efficiency Ratio”).
- \$12/SF (/yr) realistic rent (based on market analysis, pre-existing tenant wants space).
- Assume 8% vacancy (typical in market, due to extra space not pre-leased).
- Preliminary design construction cost budget (hard + soft) = \$2,140,000.
- Projected operating expenses (not passed through) = \$63,000.
- Permanent mortgage on completion available at 9% (20-yr amort), 120% DCR.
- Site has been found for \$500,000: *Is it feasible?*

Potential Gross Revenue = 29,750 x \$12 = \$ 357,000

Less Vacancy at 8% = - 28,560

= Effective Gross Income \$ 328,440

Less Operating Expenses - 63,000

= Net Operating Income \$ 265,000

÷ 1.20 = Required Debt Svc: \$ 221,200

÷ 12 = Monthly debt svc: \$ 18,433

→ Supportable mortgage amount = \$ 2,048,735

÷ 0.75 LTV = Min. Reqd. Value: \$ 2,731,647

Less Construction Cost - 2,140,000

→ Supportable site acquisition cost: \$ 591,647.

$$= \frac{18433}{.09/12} \left[1 - \left(\frac{1}{1 + .09/12} \right)^{240} \right]$$

So, the project seems feasible.

But again, something seems left out... Project may be feasible, but...

SFFA “Front Door” Procedure:

Start with costs & end with rent required for feasibility...

Site Acquisition Costs + Construction Costs
= Total Expected Development Cost
X Loan to Value Ratio
= Permanent Mortgage
X Annualized Mortgage Constant
= Cash Required for Debt Service
X Lender Required Debt Service Coverage Ratio
= Required Net Operating Income or NOI
+ Estimated Operating Expenses (Not passed through to tenants)
= Required Effective Gross Income
÷ Expected Occupancy Rate
= Required Gross Revenue
÷ Leasable Square Feet
= Rent Required Per Square Foot

Question: Is this average required rent per square foot achievable?

Typical approach for “Site looking for a Use”.

Example:

- **Class B office building rehab project: 30,000 SF (of which 27,200 NRSF).**
- **Acquisition cost = \$660,000;**
- **Rehab construction budget: \$400,000 hard costs + \$180,000 soft costs.**
- **Estimated operating costs (to landlord) = \$113,000/yr.**
- **Projected stabilized occupancy = 95%.**
- **Permanent loan available on completion @ 11.5% (20-yr amort) with 120% DSCR.**
- **Estimated feasible rents on completion = \$10/SF.**

What major issue is left out here?

Site and shell costs:	\$ 660,000
+ Rehab costs:	580,000
= Total costs:	\$1,240,000
X Lender required LTV	x 80%
= Permanent mortgage amount:	\$ 992,000
X Annualized mortgage constant:	x 0.127972
= Cash required for debt svc:	\$ 126,948
X Lender required DCR:	x 1.20
= Required NOI:	\$ 152,338
+ Estd. Oper. Exp. (Landlord):	113,000
= Required EGI:	\$ 265,338
÷ Projected occupancy (1-vac):	÷ 0.95
= Required PGI:	\$ 279,303
÷ Rentable area:	÷ 27200 SF
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= Required rent/SF:	\$10.27 /SF

Lender will base mortg on Mkt Val, not constr cost.

Use mkt cap rate info to est. bldg val.