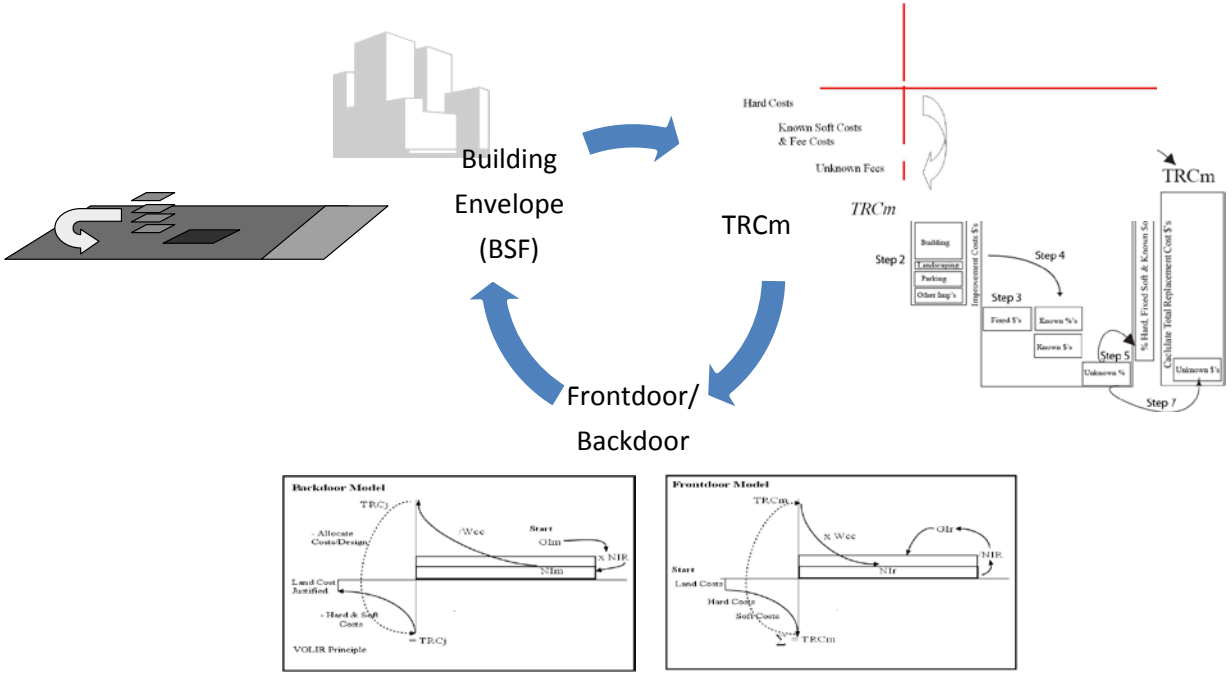
Case 4: Integrated Alternative Use Analysis

Jim DeLisle

Modified October 21, 2007



Component	Re-lease	Renovate	Low Rise	Mid-Rise
Square Footage				
Building Footprint (SF)	23,061	23,061	9,836	4,709
Parking	16,143	16,143	20,656	30,139
Open Space	4,356	4,356	13,068	8,712
Total Site	43,560	43,560	43,560	43,560

Component	Re-lease	Renovate	Low Rise	Mid-Rise
Total Replacement Cost Justified	$1,964,917	$2,650,609	$5,175,691	$5,278,964
Total Replacement Cost Market	$2,332,856	$2,939,140	$5,714,775	$5,832,079
Gap: TRCj vs. TRCm	-$367,939	-$288,531	-$539,084	-$553,115
Gap %	-19%	-11%	-10%	-10%

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This is the 4th in a series of cases. We started with an individual project and calculated the maximum Building Envelope and the Total Replacement Cost in the market (TRCm). We then explored the feasibility of the projected development via the Frontdoor Model for Gross Income Required (GIr) and Backdoor Model for Total Replacement Costs justified (TRCj). While mastering these concepts and tools is critical to determining the Most Fitting Use for a site, the need to crunch through four sets of calculations for each alternative use can be daunting. Indeed, the fear of "analysis paralysis" is fairly common and partially explains why many projects are developed on the basis of some a priori notion, or a sense of Eureka induced by the first idea that passes various filtering steps and has intuitive appeal. While not unacceptable per se, decisions based on such approaches have little prospects for being optimal, for ensuring the full set of options has been adequately considered.

Introduction

Case Objective

The objective of this case is to present an integrated model which eliminates the tedious nature of the analysis and allows the analyst to shift attention from the underlying math to more important issues related to the validity and reliability of market-based inputs that ultimately determine the relative appeal of various alternatives. At the same time, the increased efficiency can allow the decision makers to explore the sensitivity of the outcomes to changes input assumptions. This will allow for the application of risk management, and the "goodness-of-fit" between the ultimate use decision and the users whose real estate needs it is designed to satisfy.

Organization

The decision model presented in this case focuses on an existing, substandard building and whether it should be: re-leased in its current or as is state; renovated and re-leased; or, replaced with a low rise or a mid-rise structure. If there was no existing building, the model could be easily modified to explore four or more optional scenarios. In essence, this decision involves several steps.

- **Building Envelopes**. The first step is the determination of the building envelopes that would be permissible on the site under various land use (e.g., retail, office, apartment, mixed use) and development scenarios (e.g., maxing out the site, blending into surrounding developments).
- **Total Replacement Costs**. Once the alternative building envelopes are specified, the relative costs of development must be calculated. These costs will differ by the type of project along with specified attributes, features, scale, and quality.
- **Frontdoor GIr**. Calculation of the income necessary to deliver the alternative development scenarios in light of the differential costs, return requirements and operating expenses.
- **Backdoor TRCj**. Calculation of the Total Replacement Cost justified or supported by the anticipated net income and the required investment returns.
- **Residual Land Value (RLV)**. Once the justified values have been determined, the costs of producing the asset (e.g., hard costs, soft costs) can be backed out to calculate the gap or surplus between the justified value and the cost to produce the respective assets.

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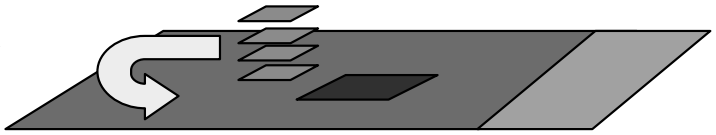
Required Skill Sets and Understanding

In order to follow the discussion and examples presented in this primer, we have made certain assumptions relative to your level of understanding of prior materials.

Building Envelopes (BldgMax)

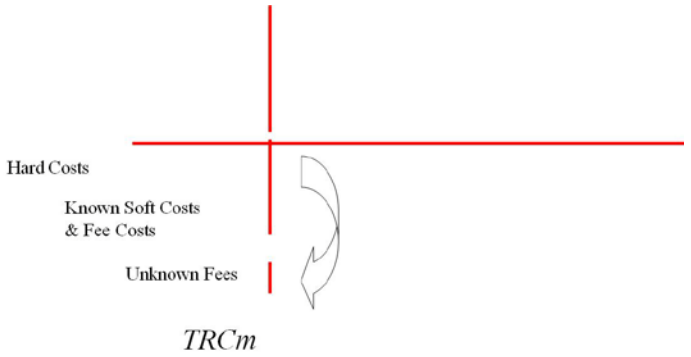
Exhibit 1: Building Envelopes



It is assumed that you understand the basic calculation of maximum building envelopes in light of zoning constraints or other considerations that affect the permissible scale of development for your site. Please note that this case uses very basic assumptions; you can override them or modify them to incorporate your own conclusions, which may be based on other considerations such as neighborhood scale, ingress/egress and market analysis. That is, you do not have to run the template as given. However, you should incorporate the basic analytical framework and independent variables that affect your conclusion (e.g., parking, building height, building efficiency or load). As part of your building design and planning, you should explore your development options defined by zoning and land use controls. Given these constraints, you should allocate your site to various components (e.g., parking, building, and open space) and then step back and look at whether the design and site planning work from a market perspective. Based on market analysis which is likely to be conducted during this preliminary phase, you should be able to identify some potential users of the various development scenarios. This will allow you to extend more detailed, customer-oriented criteria which may transcend regulatory requirements (e.g., higher parking ratios, or incorporate other considerations (e.g., ingress/egress, traffic volumes) that affect the appeal of the site for various potential users. At the same time, these deliberations may point to the need to explore zoning changes or other options which could affect the intensity of use.

Total Replacement Costs (TRCm)

Exhibit 2 (a): Project Cost Timeline



In order to compare alternative development scenarios, you will have to apply basic cost estimation tools. This analysis will help identify the total capital requirements to produce each of the optional projects. Since the emphasis is placed on producing the various developments, these costs cover

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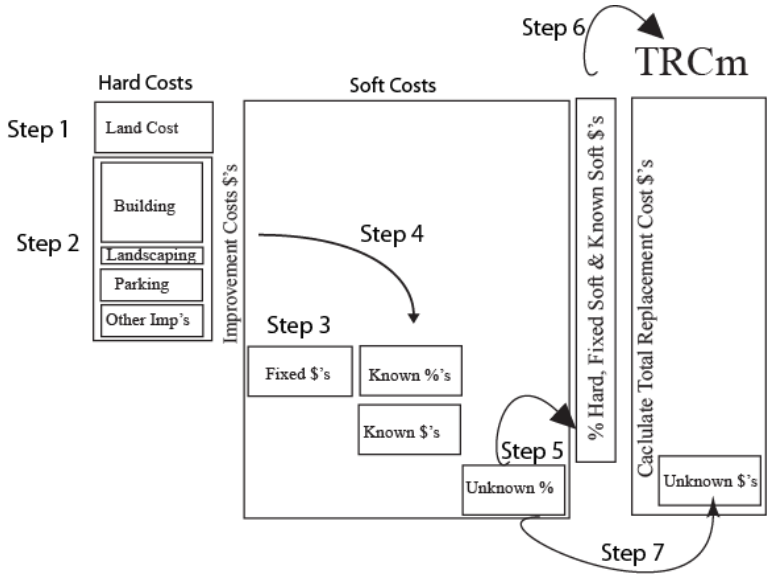
the time period beginning with site acquisition and control, and culminate with the delivery of a completed project that is ready for occupancy and income generation.

Exhibit 2 (b): Hard & Soft Costs



During this phase, the analyst will need to be able to make rough estimates for Hard Costs (e.g., land, building, and other improvements), and Soft Costs. In this context, Soft Costs are comprised of several dimensions: Soft Costs with $ allowances; Soft Costs based on % of Improvements; and, Soft Costs based on % of Total Replacement Costs in the market to produce the assets (TRCm). These preliminary figures can be modified in subsequent phases of analysis as you explore various trade-offs in terms of materials and quality of construction. For example, one of the options could be a "green building" where the emphasis would be on the question of the impact of additional costs on the relative appeal of a final project. Once these inputs have been incorporated in the cost analysis, you can isolate their impacts on income requirements and/or justified value of the various scenarios.

Frontdoor/Backdoor Analysis

Once the TRCm has been established, you can explore the rental implications of the alternative development scenarios using the Frontdoor/Backdoor (FD/BD) models. These models were developed as a filtering mechanism to allow analysts to explore various development scenarios in an efficient, interactive manner. In essence, they are somewhat comparable to cap rate analysis, treating the cash flows as fixed or annuitized payments/receipts, and then discounting them in perpetuity. While lacking the precision of more refined present value or discounted cash flow analysis, the FD/BD models provide benchmarks that can be used as starting points or inputs for such models. Under

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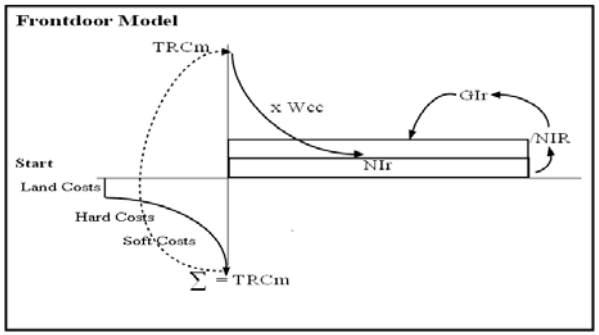
normal conditions, if the FD/BD models indicate a particular development scenario pencils out, with demand supporting the costs of adding new supply, the project will be financially feasible when subjected to more rigorous cash flow modeling.

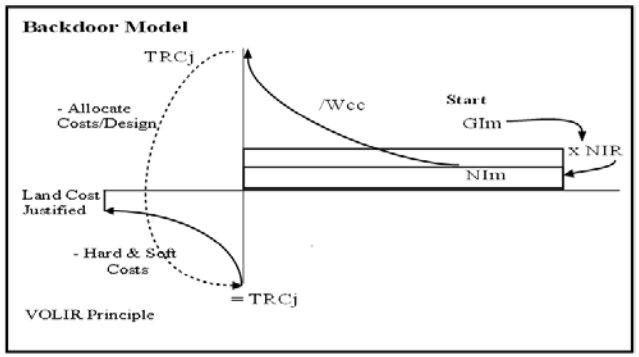
Exhibit 4 (a): Frontdoor Model

The Frontdoor Model is designed to calculate the Net Income required (NIr) to provide an adequate return on the respective capital requirements emanating from the TRCm analysis for the alternative scenarios. This NIr can be converted to Gross Income required (GIr) by netting out the leakage or operating expenses by diving the NIr by the Net Income Ratio (NIR). The model can also be used to establish the rental structure for a project, adding more precision which can help in assessing the demand for a propose project.



The Backdoor Model is used to "back" into the Total Replacement Cost Justified (TRCj) for proposed projects using the estimated market rent as a starting point. This rent is the Gross Income in the market GIm) and can be converted to the Net Income in the market (NIm) by multiplying it by the Net Income Ratio (NIR). In essence, the analysis begins with the most likely tenant or user for the proposed alternative uses, and then backs into the rent they are likely willing to pay for real estate. Using this NIm, the model establishes the Total Replacement Cost that is "justified" (TRCj) by that income in light of return requirements for the various sources of capital.

Exhibit 4 (b): Backdoor Model



As you may have noted, the Frontdoor and Backdoor Models essentially apply the same algorithms and independent variables, setting the stage for interactive, what-if type analysis that can be used to explore alternative uses, or test the stability or elasticity of outcomes. When introduced to the Alternative Use analysis, they provide a flexible, integrated system for comparing, or refining, proposed alternatives. They can also be used to explore the general cost/benefit of alternative systems, components or materials by tracing their impacts back to the rent required or the rent justified.

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Residual Land Values

As noted in Exhibit 4 (b), the Backdoor Model can be used to isolate the residual land value supported by the various alternative scenarios. This application is noted by the reference to the VOLIR principle which stands for Value of Land is a Residual. That is, once the TRCj is calculated by capping the Net Income by the cost of capital, the Hard and Soft Costs necessary to produce the respective asset can be netted against that base, leaving a residual value that can be justified to spend on the underlying site. This "residual" analysis is based in part on the fact that the land can be considered a passive asset, while the design, project management and overall development are active assets that must be adequately compensated to justify their deployment. Once the capital requirements are set in terms of required rates of return, the land becomes the dependent variable. In a traditional sense, the development scenario with the highest residual land value is considered the "Highest and Best Use."

Integrated Alternative Use Model

Stage I: Exploration of Alternative Development Scenarios

Identification of Potential Uses

The first step in alternative use analysis is to explore the permissible scale of potential use scenarios. These scenarios will vary depending on the nature of the site, the existence of existing buildings which may be renovated, and goals and objectives of the developer or investor. Several considerations can be incorporated in this decision including:

- Zoning
  - What are the legally permissible uses under the current zoning? Can a reasonable, defensible and politically palatable argument be made to support a zoning change?
  - Is the current zoning still "appropriate" for the site or have market changes (e.g., increasing importance paid to linkages affecting infill sites, community values (e.g., a commitment to higher density to combat sprawl), incentive programs (e.g., density overlays in return for "affordable housing"), or changes in infrastructure (e.g.., addition of light rail, monorail, streetcar) that have rendered the current zoning suboptimal from a public benefit/good perspective.
  - Are there some incentive programs that can be applied to the site? What are they and are they attractive and cost effective? What implications do they have on development risk and the final product (e.g., expedited approvals for green buildings, density bonuses for retail in residential buildings located in mixed-use zones/overlays).

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- Static, Environmental or Linkages Analysis
  - Is there an existing building on the site? If so, is it physically, functionally and economically obsolescent, or can it be converted to an alternative use? What are the costs of conversion and can they be recaptured? Is there too much or too little parking that can be developed without compromising the marketability of the site? Can the building be expanded by adding floors or punching out walls?
  - What is the topography like? Does it offer unique advantages or disadvantages and if so, what are they? Can the site accommodate a multi-story building with access to below-grade parking?
  - What type of ingress/egress does the site feature? How easy or difficult is it to get on the site and exit the site given traffic patterns, speeds, and directions of travel?
  - What linkages currently serve the site? Have these changed since the current use was designed and if so, how impact the suitability of the use? What transit/transportation changes are anticipated and what is the probability they actually will occur in a timely manner with respect to the likely holding period of the investment?
- Market Analysis
  - Is there some evidence of oversaturation of various land uses, suggesting some alternatives may be less attractive? This can be evidenced by high vacancy rates, high turnover, low rents, or spot shortages of certain subtypes of space (e.g., short on 1 bedrooms, long on two-bedrooms, short on large retail with parking, long on small without parking).
  - Are there some missing land uses which, if added, would exploit agglomeration effects and/or create positive synergies that would enhance the use on the site as well as the complement the neighborhood and/or market area? What are these uses and does your site have some competitive advantage over other sites? What is that advantage and how can you capture it?
  - Has merchandising analysis might have identified a tenant who will commit to anchor and/or take up the entire space if sufficient scale can be achieved? This user may be attractive and a preferred tenant relative to economic development plans (e.g., national technology tenant in or near emerging biotechnology district).
  - Have there been some changes in consumer values or choices in terms of spatial preferences? Is there sufficient evidence that the demand will outstrip supply? Is this site a plausible alternative in terms of likely new competition that the surge in demand will trigger?

Alternative Development Scenarios and Building Envelopes

Once these items are considered, the preliminary list of use scenarios can be evaluated. This stage involves applying the land use restrictions and marketing considerations that affect size, height, parking and other attributes. In this example, we are beginning with the current use as a starting point. As noted in Table I, the scenarios draw off of some common static

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attributes, but have different zoning and intensity of use standards and assumptions. Since the scenarios all focus on office-commercial uses, the Revenue Unit is specified in terms of square feet. If the alternatives focused on --or included-- residential, the analysis would be a hybrid, using square footage for costs and number of units for revenues and expenses. As such, the underlying equations must be adjusted where appropriate. However, for this preliminary stage of alternative use analysis, it may be acceptable to focus on the square footage of each of the options, and then convert it to units and rental structure in more detailed analysis of a "short list" of alternatives.

- The existing building operates at a relatively low load factor (i.e., efficiency or percent leasable to percent actual), which places a cap on the revenue that it can generate.
- The second scenario is based on the assumption that the efficiency of the building can be improved from 80% to 90% by renovating it. This change will result in an increase in revenue units (i.e., rentable square feet) from 18,449 to 20,775 square feet. In addition to increasing the rentable area, the renovation will also increase the rent per square foot ($/sf) the space could command as a result of the upgrades and repositioning of the asset. Thus, this improvement is worth considering over more aggressive alternatives entailed with leveling the building and recycling the space. It should be noted that the annual market rent of $12/sf and $16/sf for the current building are the "net rents."
- The third option (Mid-rise) is a scenario for new construction of a two-story building. This would represent a moderate increase in the intensity of development.
- The fourth option (High Rise) proposes a five-story building which would require a rezone, but is compatible with renewed interest in more dense development. It would also take advantage of changes in transportation associated with the announcement of a new light rail system with a station near the site.

Alternative Use Scenarios and Maximum Building Constraints

Table 1 (a) presents a snapshot of the maximum building constraints for each of the four scenarios and the sources of data. As noted in the table, when it was built, the existing building benefited from the application of a higher Lot Coverage (LC) ratio (90%) than allowed in the current zoning (70%). As such the building is a non-conforming use and cannot be replaced with a building with a similar footprint. On the other hand, the building has lower efficiency (i.e., load = 80%) which could be increased with the renovation or by replacement by a new building. In terms of parking, the current use has a lower parking index than required under the existing code and/or competitive market standards. To save costs which could be some $25,000/stall, the developer is not considering underground parking. On the same note, the developer is not willing to invest in a parking ramp, designating all parking as part of the surface coverage. If such changes were considered, the basic equations would have to be modified.

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It should be noted that the model used to illustrate this case is fairly flexible and can be applied in a number of cases. However, its goal is to present the alternative use analysis in a manner that it can be understood by an intermediate user who understands the basic components. At the same time, it is fairly robust and can be modified by users to handle much more complicated scenarios. Alternatively, inputs can be calculated externally and fed into any cell, thus overriding the calculations.

Table 1 (a): Existing Development and Capitalized Value

Component	Input	Code	Sources/Equation
Site Size	43,560	GSSF	Given
Raw Land Value/SF	$10.00	$RLVSF	Market research
As is Building SF	23061	AI_BSF	Given
As is Load	80%	AI_Ld	Given
As is Revenue Units	18,449	AI_RU	AI_BSF * AI_Ld
As is NOI/SF	$ 12.00	AI_$NOI	Market research
As is Cap Rate	10%	AI_Cap	Market research
As is Capitalized Value	$ 2,213,856	AI_$CV	(AI_RU*AI_$NOI)/AI_Cap
As is Raw Land Value	$ 435,600	AI_$RLV	(GSSF*$RLVSF)
As is Net Cap Building Value	$ 1,778,256	AI_$NCBV	AI_$CV-$RLV)
Property Tax Mill Rate	8	PtxR	Research' $/1,000 of value

As noted, this adjustment applies the following calculation for the Net Capitalized Building Value:

((AI_RU*AI_NOI)/AI_____Cap) - $LC

Where,

- AI_RU is the number of Revenue Units in the current or “as-is” building.
- AI_NOI is the Net Operating Income per Square Foot of rentable area.
- AI_Cap is the cap rate the market would assign to such a project.

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In order to apply the Integrated Alternative Use Model, it is necessary to specify the core alternative development scenarios you will be considering. Table 1 (b) presents a snapshot of the alternatives used in this Case study. As noted there are four scenarios; two which retain the existing building, and two which demolish it and replace it with a new building. The alternatives are labeled:

- As Is: Re-lease. In this option, the current building is taken over with minimal cost and the developer is "creating value" by finding a tenant who will take it in largely "as-is" condition with limited or no improvements or enhancements. This may be a short-term strategy to generate income until the market matures and demand will justify new construction, or a minimalist approach where the buyer has little expertise and lacks the ability or inclination to create value and assume the commensurate risk.
- Renovate. In this option, the owner takes over the land and building at its current value and intends to add a nominal amount of capital to upgrade the building and improve parking and landscaping. As with the first scenario, this can be a short-term strategy or a long-term approach.
- Low-Rise. In this option, the developer is looking at replacing the functionally obsolescent existing building with a new, two story project. This represents a moderate upgrade in site use and is undertaken to create value by replacing an inefficient building with a more efficient and marketable substitute.
- Mid-Rise. In this scenario, the site would be deployed to a more intense use, replacing the existing one story building with a more efficient, higher density four story option.

Table 1 (b): Alternative Use Labels and Unit Costs

	Alternative Use: Labels					
Cost Components/Types	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources
Construction Costs						
Demolition Cost			$8.00	$8.00	D_{SF}	Market research, cost estimator
Renovation Cost	$0.00	$15.00			R_{SF}	Market research, cost estimator
New Building Cost			$100.00	$120.00	NC_{SF}	Market research, cost estimator
Parking		$0.60	$1.70	$1.70	P_{SF}	Market research, cost estimator
Landscaping		$0.75	$2.50	$2.50	LSC_{SF}	Market research, cost estimator

Now that the alternative scenarios have been specified, the analysis can shift attention to the Building Envelope calculations. Since there is an existing building on the site, the constraints do not have to be processed through the model, but can be entered directly. In this case, the current building is rather inefficient, with an 80% Load factor. The Renovate option would recapture some of the lost space, in addition to upgrading the remainder. The building constraints for each of the four

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development scenarios are presented in Table 2 (a). As noted, the current building indicates a higher Lot Coverage ratio than allowed under the current zoning, suggesting the building is something of a non-conforming use.

Table 2 (a): Building Constraint Inputs

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Gross Site Area	43,560	43,560	43,560	43,560	GS_{SF}	Site Given: site in search of use
Lot Coverage Ratio	90%	90%	70%	80%	LC	Zoning Code or design concept (i.e., open space)
FAR Maximum	3	3	2	3	FAR	Zoning Code
Building Design						
Number of Floors	1	1	2	4	BN	Zoning Code
Revenue Unit Size (SF)	1	1	1	1	Rusf	Market research; avergage unit size
Load (Efficiency) Factor	80%	85%	92%	85%	Load	Design standards; function of building type
Parking						
Index (#/1,000)	2	2	3	4	PI	Zoning or Market, whichever greater
SF/Stall	350	350	350	400	PS_{SF}	Design standards; differ by open/ramp
Number of Stories	1	1	1	1	PN	Design decision

Once the existing use and the land use constraints for the potential use candidates are identified, the maximum building area and site allocation for alternative development scenarios can be calculated. To explore the utilization of the site, the outputs also indicate the effective building, parking, and open space coverage, as well as the Floor Area Ratios. As noted in Table 1 (b), the Low-Rise proposal allows less square footage than the existing use due in large part to the lower Lot Coverage ratio. The Mid-Rise building has the largest building maximum, along with the greatest number of required parking stalls. The Building Envelope calculations presented in the table are driven off a core equation:

$$(GS_{SF} * LC) / [(1 / BN) + (1 / (1000 / PI)) * (PS / PN)]$$

Where:

- GS_{SF} = Gross Square footage of site area
- LC = Lot Coverage Ratio
- BN = Number of Floors of Building
- PI = Parking Index (i.e., stalls/1,000sf of building)
- PS = Parking size/stall
- PN = Number of levels of parking on surface or in deck

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Table 2 (b): Alternative Building Envelopes

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Improvement Size						
Building	23,061	23,061	19,672	18,837	BLD_{SF}	If existing, BLD_{SF}, else: $(GS_{SF} * LC) / [(1 / BN) + (1 / (1000 / PI)) * (PS / PN)]$
Parking	16,143	16,143	20,656	30,139	PKG_{SF}	$(BLD_{SF} / (1000/PI)) * PS_{SF}$
Revenue Units						
Building	18,449	19,602	18,098	16,011	BRU	BLD_{SF} * Load
No. of Parking Stalls	46	46	59	75	PRU	PKG_{SF} / PS_{SF}

The Revenue Units refer to the rentable area of the building after deducting for common areas, elevators, corridors, utility rooms and other non-revenue generating space. The net building area after these items is calculated by: BLD_{SF} * Load, where Load is the Efficiency Ratio of the building. As noted, the higher efficiency of the new buildings helps close the gap between the RUs in the new vs. older building.

Once the maximum Building Envelopes are calculated, it useful to look at how site is allocated under the various scenarios to compare the intensity of development they will project in terms of site coverage. In the example, the Mid-Rise building requires the greatest dedication of site area for parking with a smaller building footprint. Thus, even though the option is larger in terms of total building size, at the site level, it could have a more open feel since the building is spread over five floors, vs. the one story for the existing building and two for the Low Rise option. Indeed, the building footprint for the Mid-Rise is 4,879 which is slightly more than 10% of the site, while the parking covers almost 60% of the site (see: Table 2). It should be noted that in some jurisdictions, the Open Space requirement can be accommodated on the roof or other non-surface areas. Such treatment can be accommodated by adjusting the equations as in the case of below-grade parking, or in calculating the Building Envelopes off-line and feeding the results into the model for TRCm and other dependent analysis.

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Table 2 (c): Site Allocation

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Square Footage						
Building Footprint (SF)	23,061	23,061	9,836	4,709	SA_{SF}	BLD_{SF} / BN
Parking	16,143	16,143	20,656	30,139	SAP_{SF}	PKG_{SF} / PN
Open Space	4,356	4,356	13,068	8,712	$SAOS_{SF}$	GS_{SF} - (SAB_{SF} + SAP_{SF})
Total Site	43,560	43,560	43,560	43,560	TS	SAB_{SF} + SAP_{SF} + SAO_{SF}
Site Allocation Check	0%	0%	0%	0%	GStest	GS_{SF} - (SAB_{SF} + SAP_{SF} + $SAOS_{SF}$)
Site Allocation						
Building Coverage	53%	53%	23%	11%	BCR	SAB_{SF} / GS_{SF}
Parking Coverage	37%	37%	47%	69%	PCR	SAP_{SF} / GS_{SF}
Open Space	10%	10%	30%	20%	OSR	$SAOS_{SF}$ / GS_{SF}
FAR Actual	0.90	0.90	0.93	1.12	FARact	(BLD_{SF} + PKG_{SF}) / GS_{SF}

The extent to which the site is fully utilized under the various constraints can be calculated by the Site Allocation check which calculates the building footprint, surface parking and open space:

$$GS_{SF} - (SAB_{SF} + SAP_{SF} + SAOS_{SF})$$

In some cases, the developer may opt to build at a lower than the maximum density. Such a strategy could be driven by several concerns ranging from uncertainty with respect to demand in a transitional area that is being upgraded, to situations where the calculated building footprint is too small in terms of tenant needs. Thus, while the equations presented in the model are helpful in maximizing development intensity, other considerations may argue for a less intense project. In such cases, it may be helpful to still calculate the maximum allowable size and then compare it to the planned development to quantify the excess capacity that is not being utilized. Such analysis may be helpful in negotiating with zoning bodies or other stakeholders who object to the intensity of development.

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Stage II: Derivation of Total Replacement Costs (TRCm)

Cost Inputs

As noted earlier, the first two scenarios explore the reuse of the current building. As such, there is no "new" building cost for the current use scenarios, although there is a renovation cost for the second option of $15/sf. Table 3 (a) presents a snapshot of the unit costs for the various components and scenarios. These costs can be derived through a variety of means ranging from cost estimation services (e.g., RS Means, Marshal Swift) to preliminary estimates from contractors who have built similar buildings. In this application, the unit costs in Table 3 (a) were drawn from the initial input assumptions where the development scenarios were identified. The rationale for including them at that point is that they reflect the quality levels that have been suggested by preliminary market research, rather than the generic or average unit costs. In some cases, it may be appropriate to override these costs and feed them into the appropriate cells. In addition to the unit costs, another key input assumption at this phase is the estimation of the time it will take to renovate the existing building or to develop the new projects. This construction period will affect property taxes and other carrying charges, as well as construction interest and other soft costs.

Table 3 (a): Hard Cost Unit Inputs

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Construction Period	0	6	12	18		Market
Cost/SF						
Demolition Cost	$0.00	$0.00	$8.00	$8.00	$\$D_{SF}$	Market
Renovation Cost	$0.00	$15.00	$0.00	$0.00	$\$R_{SF}$	Market
New Construction Cost	$0.00	$0.00	$100.00	$100.00	$\$NC_{SF}$	RS Means, Marshall-Swift by size, quality
Parking	$0.00	$2.00	$8.00	$8.00	$\$P_{SF}$	RS Means, Marshall-Swift by size, quality
Landscaping	$0.00	$0.75	$1.80	$1.80	$\$LSC_{SF}$	RS Means, Marshall-Swift by size, quality
Other Improvement Lump					$OI	Market
Land	$10.00	$10.00	$10.00	$10.00	$\$L_{SF}$	Market research, or cost basis/acquisition

Drawing on the unit calculations developed in the Building Envelope analysis, or fed into the model from the existing improvement profiles, the Hard Cost/Unit can be used to drive the Total Hard Costs for the alternative scenarios. As noted in Table 3 (b), the Hard Costs refers to the Land and Capitalized Building Values, as well as costs of demolition, renovation and new construction costs. The costs for the respective scenarios depend on the nature of the development activity, as well as on the type of construction. The Land Costs and Capitalized Building Values are fixed for each of the scenarios. That is,

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they do not vary as a function of new development activity, but are sunk costs associated with gaining control of the site. The fact that the existing building carries an implicit capitalized value of some $1.79 million indicates the present value of the income that could have been generated for the building in a passive acquire and lease scenario. Thus, although the raw land cost is estimated at $10/SF, when the discounted value of the foregone income is added to the raw land value, the effective per square foot cost of land is $51.82/SF.

Table 3 (b): Hard Cost Calculated Values

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Building Costs						
Demolition Cost	$0	$0	$184,489	$184,489	$D	$D_{SF} * BLD_{SF}$
Renovation Cost	$0	$242,142	$0	$0	$R	$R_{SF} * BLD_{SF}$
New Construction Cost	$0	$0	$1,967,226	$1,883,676	$NC	$B_{SF} * BLD_{SF}$
Parking	$0	$39,204	$165,247	$241,110	$P	$P_{SF} * PKG_{SF}$
Landscaping	$0	$3,267	$23,522	$15,682	$LSC	$LSC_{SF} * SAOS_{SF}$
Other Improvement Lump				$300,000	$OI	$OI
Total New Hard Costs	$0	$42,471	$2,155,995	$2,440,468	$THNC	SUM($DC+$RC+$NC+$P+$LSC+$OI)
Land	$435,600	$435,600	$435,600	$435,600	$LC	$TS_{SF} * L_{SF}
Capitalized Buildng Value	$1,778,273	$1,778,273	$1,778,273	$1,778,273	$CBV	((AI_RU*AI_NOI)/AIcap) - $LC
Total Hard Costs	$2,213,873	$2,256,344	$4,369,868	$4,654,341	$THC	Sum ($THNC + $LC+$CBV)

In addition to the Hard Costs that can be calculated by multiplying the number of units by the respective cost/unit, real estate projects usually include Soft Costs incurred during the construction period which cover such items as consulting services, insurance, legal fees and other charges. These costs will vary by size of project, complexity, life cycle stage and other factors as determined by the local market. It should be pointed out that these costs are incurred as part of the acquisition or development and are considered part of the initial costs. For example, while property taxes are an on-going operating expense, they are also incurred during the construction period and should be treated as carrying costs which are added to the Known Construction Soft Costs. These costs may be extracted from the market, drawing on similar projects. Alternatively, they may be provided by cost estimators or third party cost services.

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Table 4 (a): Known Construction Soft Costs.

	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Property Taxes		$7,113	$14,226	$21,339	PTx$	Market standards
Insurance		$12,500	$40,000	$40,000	I$	Market standards
Title & Recording	$20,000	$20,000	$20,000	$20,000	Tt$	Market standards
Legal & Organizational	$10,000	$20,000	$30,000	$50,000	L$	Market standards
Appraisal	$5,000	$10,000	$15,000	$15,000	App$	Market standards
Other Fees		$5,000	$7,500	$10,000	Oth$	Market standards
Total Known Costs	$35,000	$74,613	$126,726	$156,339	$TKC	Calculated

Another element of Soft Costs that contribute to the Total Replacement Cost of a project, are those costs that are based on percentages of improvement costs (e.g., Builder's Overhead, Architect's Design). Since these fees are paid in return for "value add" or value creation, the do not apply to land or other soft costs to avoid further markups and added compensation. Table 4 (b) presents a schedule of such costs for each scenario. As noted, in the minimalist "re-lease" option, there are not such costs. On the other hand, the Renovation option as well as the Low-Rise and Mid-Rise options, the magnitude of these costs follow local market conventions.

Table 4 (b): Known % Soft Costs

	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
General Requirements	0.00%	5.20%	5.20%	5.20%	GR%	RS Means or local market
Builders Overhead	0.00%	2.50%	2.50%	2.50%	BOH%	RS Means or local market
Builders Profit	0.0%	6.0%	6.0%	6.0%	BP%	RS Means or local market
Bond Fee	0.0%	1.0%	1.0%	1.0%	Bnd%	RS Means or local market
Architect's Design	0.0%	7.00%	5.80%	5.80%	AD%	RS Means or local market
Architect's Inspection	0.0%		1.80%	1.80%	AI%	RS Means or local market

Once these fees are specified, they can be converted to their dollar equivalents (see: Table 4 (c)) by multiplying them by the $Total Known Hard Costs. In some cases, as in the Re-leasing and Renovation options, a developer may be able to negotiate a fixed fee that is not tied to a percentage of construction costs. In such cases, the data can be fed directly into Table 4 (c).

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Table 4 (c): Known % Soft Costs in $'s

	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
General Requirements	$0	$2,208	$112,112	$126,904	GR$	$TNHC * GR%
Builders Overhead	$0	$1,062	$53,900	$61,012	BOH$	$TNHC * BOH%
Builders Profit	$0	$2,548	$129,360	$146,428	BP$	$TNHC * BP%
Bond Fee	$0	$425	$21,560	$24,405	Bnd$	$TNHC * Bnd%
Architect's Design	$0	$2,973	$125,048	$141,547	AD$	$TNHC * AD%
Architect's Inspection	$0	$0	$38,808	$43,928	AI	$TNHC * AI%
Total % Soft Costs	$0	$9,216	$480,787	$544,224	$TSC	SUM (GR$+BOH$+BP$+Bnd$+AD$+AI$)

Cost of Capital Inputs

Once the cost schedule for hard costs and soft costs (e.g., fees) is established, the TRCm to prepare for leasing can be calculated. As noted, the cheapest option is to reuse the existing facility as is and renew the leases. However, it is not clear from an investment perspective which of the alternatives is the most attractive. It should be noted that the costs of capital may vary by development scenario since they will entail different risks and will be funded by different sources of capital. As noted earlier, these costs are born during construction and become part of the cost of producing or acquiring the asset.

Table 4 (d): Costs of Capital-Construction Period

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Construction Interest						
Interest Rate	0.00%	8.00%	7.50%	5.50%	CIR%	Market research
Average Draw		65.00%	65.00%	65.00%	Cd	Market research
Months to Build	0	6	12	18	Cm	Market research
Construction Commitment Fee	0.00%	1.20%	1.20%	1.20%	CCF%	Market research
Total Construction Fees	0.00%	3.80%	6.08%	6.56%	TCF%	((CIR%*(Cm/12)*Cd))+CCF%
Permanent Loan						
Commitment Fee	1.00%	1.00%	1.00%	1.00%	PCf	Market research
Financing Fee	2.00%	2.00%	2.00%	2.00%	PFf	Market research
Inspection Fee	0.60%	0.60%	0.60%	0.60%	Pif	Market research
Total Permanent Loan Fees	3.60%	3.60%	3.60%	3.60%	TPF%	Sum(PCf + PFf + Pif)
Calculated Total Financial Fees	3.60%	7.40%	9.68%	10.16%	TFF%	TCF% + TPF%

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Total Replacement Costs

Since the first two uses assume the site "as is," the total building and land costs can be calculated by capping the current net income by the equity cost of capital. In this case, the current Net Income/sf was $12.00/sf for the 18,449 rentable square feet. Assuming the buyer is looking at the project on an Unleveraged basis, the current value can be calculated by capitalizing the total net income by the Equity Discount rate of 10% which the building costs for the new uses are based on the various components and fees, while the renovation costs and demolition costs are assumptions. As noted in the table, the most expensive option is the Mid-Rise, and the cheapest is to continue as is and merely release the premises to create value.

Table 5: Total Replacement Cost in Market (TRCm)

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Capitalized Building Value	$1,778,273	$1,778,273	$1,778,273	$1,778,273	$CBV	($NI / SF * BRU) / Ec
Renovation Costs	$0	$345,918	$0	$0	$RC	BLDSF * $RSF
Demolition Costs	$0	$0	$184,489	$184,489	$DEM	(D_{SF}$ * BLD$_{SF}$)
New Building Cost	$0	$42,471	$1,967,226	$1,883,676	$NBC	BLDSF * $BSF
Parking Cost	$0	$32,286	$165,247	$241,110	$PC	P_{SF}$ * PKG$_{SF}$
Landscaping Costs	$0	$3,267	$23,522	$15,682	$LsC	OSR * $LSCSF
Land Costs	$435,600	$435,600	$435,600	$435,600	$LC	GS$_{SF}$ * L_{SF}$
Total Hard Costs	$2,213,873	$2,637,814	$4,554,358	$4,538,830	$THC	SUM($CBV+$RC+$DEM+$NBC+$PC+$LsC+$LC)
Soft Costs	$35,000	$74,613	$126,726	$156,339	$FC	$ALC+$DEM+$BC+$RC +$PC+LsC
Known Fees (e.g. Arch, Eng)	$0	$9,216	$480,787	$544,224	$ACFee	((GR% + AE% + BOH% + BP%) * ($FC-$ALC))+($OC+$L&O)
Unknown Financial Fees	$83,983	$217,496	$552,904	$592,685	$FinFee	$BTRCm - ($FC + $ACFee)
Total Replacement Cost Market	$2,332,856	$2,939,140	$5,714,775	$5,832,079	TRC_{m}$	($FC+ $ACFee)/(1-(LV) * ((CIR% * (Cmo/12) * (0.5))+FinF%))
Fully loaded Cost/Building SF	$ 101.16	$ 127.45	$ 290.50	$ 309.61	FLC/BSF	$TRC/BLDSF

In addition to calculating the TRCm, at this stage it is useful to compare some of the implicit costs against market benchmarks. As noted in the table, one measure is the "Fully loaded" costs/building square footage. In this case, the Re-lease option is the least expensive and could thus be leased at the lowest rates, while the Mid-Rise would have the highest costs, both absolutely and per square foot.

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Stage III: Frontdoor Analysis

Overview

In moving from the Total Replacement Cost to the Net Income Required to compensate capital for that cost, it is important to quantify the required rate of return. Since the exampled contemplates some combination of debt and equity, this cost of capital can be referred to as the Weighted Cost of Capital (Wcc). As noted in Table 6, the calculation of the Weighted Cost of Capital (Wcc) is dependent on the return requirements of the two sources of capital (i.e., debt and equity) with the weighting between the two sources established by the Loan-to-Value (LV) ratio. It should be noted that the following equations are applied:

- Mc: = ((IR%/(P/yr))/((1-(1 /((1+(IR%/(P/yr))^(Pt*(P/yr)))
- Wcc = [(LV * Mc) + (1 - LV * (Ec / 12))]
  Where:
  - IR%/(P/yr) = Permanent Loan interest rate/periodicity or payments per year (P/yr)
  - Pt = Term
  - P/yr = Payments/year that may override records and create new state champs.
  - LV = Loan to Value ratio
  - MC = Mortgage Coefficient
  - Ec = Equity hurdle from market.

Table 6: Weighted Cost of Capital

Permanent Financing	Re-lease	Renovate	Low Rise	Mid-Rise		
Loan-to-value Ratio	70%	80%	80%	80%	LV	Market conditions
Interest Rate	6.0%	7.0%	6.5%	7.5%	IR%	Market conditions
Term in Years	30	30	30	30	Pt	Market conditions
Payments/Year	12	12	12	12	P/Yr	Market conditions
Weigthed Cost of Capital						
Equity Cap Rate	8.0%	8.0%	9.0%	10.0%	Ec	Market research; local and national
Mcc	0.00599551	0.00665302	0.00632068	0.00699215	Mcc	1*((IR%/(P/yr))/((1-(1 /((1+(IR%/(P/yr))^(Pt*(P/yr)))
Calculated Wcc	0.00619685	0.00665575	0.00655654	0.00726038	Wcc	[(LV * Mc) + (1 - LV * (Ec / 12))]

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Before the TRCm can be converted to income, the "leakage" or claims that differentiate Gross Income from Net Income must be deducted. To that end, the requirements must be stated for each use category. Table 7 provides the operating expense ratios for the respective scenarios. Not that the existing building is relatively inefficient (i.e., not green), resulting in higher operating expenses. The Renovation will provide some modest improvement still lag the Low-Rise and the Mid-Rise, the latter of which is a "green" building.

Table 7: Expense Ratios

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Vacancy Ratio	10%	6%	5%	6%	VR	Market research
Expense Ratio	14%	12%	10%	8%	ER	Market research or published benchmarks
Property Tax Ratio	10%	10%	10%	10%	PTxR	Assessor: Assessed Value * Mill Rate ($/1000)
Reserve Ratio	4%	2%	2%	2%	RR	Optional; risk management
Building Net Income Ratio	62%	70%	73%	74%	NIR	1- (VR + ER + PTxR + RR)

Frontdoor Model: Net Income Required

In order to explore the financial feasibility of the use alternatives, the analyst should calculate the Gross Income Required (GIr) from the market to provide the required return for each of the uses. As noted, we assumed an average annual market rent of $12/sf net rent in determining the value of the current use for acquisition. This figure is close to the required "Net Income" indicating the current use pencils out for the investor. That is, the NOI/Unit is actually below the estimated $12/SF that was used in determining the capitalized building value in the acquisition cost analysis (see: Table 5). This is due to the lower operating efficiency in the building which lagged the market. At this point, the analysis can turn to the question of whether the market can support the required rents. That is, if the market can pay at or above the required rents for the respective scenarios, they will be economically feasible. Thus, the selection can focus on other variables or relative profit.

Table 8: Frontdoor Net and Gross Income Required

	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Net Income Building Required	$14,456	$19,562	$37,469	$42,343	NIr	$BTRCm * Wcc
Gross Building Income Required	$21,259	$26,435	$51,328	$58,810	GIr	NI_r / NIR
GIr/Unit/Month	$1.15	$1.35	$2.84	$3.67	$GIrU_m$	GI_r / BRUs
GIr/Unit/Yr	$13.83	$16.18	$34.03	$44.08	GIrUYr	GI_rUm * 12
NOI/Unit/Yr	$9.40	$11.98	$24.84	$31.74	NIrUYr	GIrUYr*NIR

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Stage IV: Backdoor Analysis

Overview

Now that the required income levels have been generated, the analysis can reverse the process. That is, rather than solving for the GIr as a dependent variable, the analysis can start with the Gross Income in the market (GIm) and then back into the Total Replacement Cost justified (TRCj) by that income. The extent to which the GIm exceeds the GIr for a project provides a measure of the its potential to outperform expectations or investment hurdles. On the other hand, if the GIm is less than the GIr, it will reveal the gap between the justified investment (TRCj) and the required investment to build or acquire the project (TRCj). The starting point for the Backdoor analysis is an analysis of the effective demand (i.e., will and ability to pay) for the respective projects expressed as Gross Income (GIm). Table 9 presents the GIm for the respective development scenarios.

Table 9: Market-Based Gross Income/SF

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Gross Income Market/SF	$12.00	$15.00	$30.00	$35.00	BR_{SF}$	Market research
Parking/Unit/Year	$0	$0	$0	$0	$PUnitYr	Market research
Other Income					$OI	Fill

In order to convert the GIm to a value, certain assumptions must be made relative to the cost of capital. Table 10 presents the costs of capital for each of the proposed scenarios. At this point, these numbers are likely to echo those used in the Frontdoor analysis, since the respective projects have the same risk profiles. However, in fine tuning the analysis, the requirements may be adjusted. The extent to which they have to be changed provides insight into the relative risks of the various scenarios, as well as whether the potential gap between TRCm and TRCj can be closed.

Table 10: Backdoor Costs of Capital

Permanent Financing	Re-lease	Renovate	Low Rise	Mid-Rise		
Loan-to-value Ratio	70%	80%	80%	80%	LV	Market conditions
Interest Rate	6.0%	7.0%	6.5%	6.5%	IR%	Market conditions
Term in Years	30	30	30	30	Pt	Market conditions
Payments/Year	12	12	12	12	P/Yr	Market conditions
Weigthed Cost of Capital						
Equity Cap Rate	8.0%	8.0%	9.0%	10.0%	Ec	Market research; local and national
Mcc	0.00599551	0.00665302	0.00632068	0.00632068	Mcc	1*((IR%/(P/yr))/((1-(1 /((1+(IR%/(P/yr))^(Pt*(P/yr)))
Calculated Wcc	0.00619685	0.00665575	0.00655654	0.00672321	Wcc	[(LV * Mc) + (1 - LV * (Ec / 12))]

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As in the case of the Costs of Capital, the Backdoor model could draw on the same expense assumptions as in the Frontdoor. Indeed, at this point, the inputs are the same. However, in the model they are provided as a separate set of inputs to allow the analyst to explore various assumptions in an effort to close a potential gap between the TRCm to produce one of the scenarios, and the TRCj by the likely income supported by the market. Such analysis can also be used to assess the relative risks of various options by exploring the sensitivity or elasticity of the conclusion to alternative assumptions. Table 11 presents the Backdoor Expense Ratios.

Table 11: Backdoor Expense Ratios

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Vacancy Ratio	10%	6%	5%	6%	VR	Market research
Expense Ratio	14%	12%	10%	8%	ER	Market research or published benchmarks
Property Tax Ratio	10%	10%	10%	10%	PTxR	Assessor: Assessed Value * Mill Rate ($/1000)
Reserve Ratio	4%	2%	2%	2%	RR	Optional; risk management
Building Net Income Ratio	62%	70%	73%	74%	NIR	1- (VR + ER + PTxR + RR)

Backdoor Model: TRCj

One the inputs have been specified, the Backdoor Model will generate the TRC justified by the assumed income, expenses, and costs of capital. As noted in Table 12, the costs vary dramatically between the first two scenarios which retain the existing building, and the latter two which replace the building with a more efficient and dense project.

Table 12: Backdoor TRCj

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Gross Income						
Building Income	$221,387	$294,030	$542,954	$560,394	$BI	BRU * $BRSF or, (BRU * $BRunit)
Parking Income	$0	$0	$0	$0	$PI	PIUYr * PRU
Other Income	$0	$0	$0	$0	$OI	Market research
Gross Income Market	$221,387	$294,030	$542,954	$560,394	GI_m$	$BI + $PI + $OI
Building Vacancy	$22,139	$17,642	$27,148	$33,624	$Vac	$GIm * VR
Building Operating Expenses	$30,994	$35,284	$54,295	$44,831	$OExp	$GIm * ER
Building Property Taxes	$22,139	$29,403	$54,295	$56,039	$PTx	$GIm * PTx
Building Reserve Ratio	$8,855	$5,881	$10,859	$11,208	$Res	$GIm * RR
Net Income Market	$146,116	$211,702	$407,216	$425,899	NI_m$	$GIm - Total Vac/Exp
Total Replacement Cost Justified	$1,964,917	$2,650,609	$5,175,691	$5,278,964	TRCj	(NI / Wcc) or, (GIm * NIR) / Wcc
Fully loaded TRCj/Building SF	$ 85.20	$ 114.94	$ 263.10	$ 280.25	FLC/BSF	$TRC/BLDSF

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As note in the table, the fully loaded costs/square foot vary widely, with the lower cost options of re-using the existing building coming in from $85-$115/SF, and the upper end at $260-$280. Despite these differences, it should be noted that the returns provided by the project as built into the Weighted Cost of Capital (Wcc) are the same. However, the equity requirements, and total capital, are significantly different.

Conclusion

Gap Analysis

Once the Frontdoor and Backdoor models have been run, the analyst can start evaluating which of the scenarios is the most attractive based on the economics of the proposal. At the same time, the analysis can be used to eliminate options which are not likely to pencil out. Table 13 presents the Gap Analysis which highlights the differences between the cost to acquire and/or build (TRCm) and the cost justified (TRCj). In this case, the lower cost re-cycle options have the smallest gap in terms of dollars, but the higher gaps in terms of % deviation from TRCm. At this point, the analyst can start changing assumptions to figure out if the gap can be closed. From a Frontdoor perspective, this may involve lowering the quality of construction, cutting costs, accelerating construction, or lowering the cost of capital. From the Backdoor perspective, this analysis may look at whether rents can be pushed, operating expenses can be reduced, vacancy allowances can be cut back, or costs of capital can be engineered to lower the hurdle rates.

Table 13: Gap Analysis - TRCj vs TRCm

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Total Replacement Cost Justified	$1,964,917	$2,650,609	$5,175,691	$5,278,964	TRCj	(NI / Wcc) or, (GIm * NIR) / Wcc
Total Replacement Cost Market	$2,332,856	$2,939,140	$5,714,775	$5,832,079	TRCm	($FC+ $ACFee)/(1-(LV) * ((CIR% * (Cmo/12) * (0.5))+FinF%))
Gap: TRCj vs. TRCm	-$367,939	-$288,531	-$539,084	-$553,115	TRC_$Gap	$TRC_j - TRC_m$
Gap %	-19%	-11%	-10%	-10%	TRC_%Gap	TRC_$Gap/TRCj

In running through the various combinations and permutations, the analyst should set up a table or matrix which indicates the initial assumptions, the aggressive assumptions, and the conservative assumptions that may be used in the Gap Analysis. This can be done independently, as well as simultaneously across variables. This tracking log or audit trail will be helpful in documenting the decision-making process and/or indicating the deal-breaking assumptions which render one or more of the scenarios unacceptable.

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Residual Land/Acquisition Value

One of the final applications of the Integrated Alternative Use model is to quantify the justified value that can be paid to acquire the asset and/or land. In essence, land is an idle asset in the sense that it does not require the deployment of labor and materials to "create." Thus, its inherent value can be considered a residual and can be backed in. As noted in Table 14, each of the scenarios would pencil out if the land/acquisition value was reduced. It should be noted that the "Land" value for the new building options included the capitalized value of the income potential for the existing building that must be foregone. Assuming the site could be acquired for the justified acquisition values, each of the projects would pencil out. Thus, the decision as to the optimal use could hinge on other considerations, both quantitative and qualitative.

Table 14: Residual Land Values

Component	Re-lease	Renovate	Low Rise	Mid-Rise	Code	Sources/Equations
Land/Acquisition Value Justified	$1,845,934	$1,925,342	$1,674,789	$1,660,758	LAVj	$LC + $BCV + TRC_$Gap
Implicit Land Value/SF	$ 42.38	$ 44.20	$ 38.45	$ 38.13	ILV/SF	LAVj/GSSF
Gap Land/Acq Mkt vs. Justified	-$367,939	-$288,531	-$539,084	-$553,115	AL_$Gap	L_{SF}$ + $Lndex
Acquisition Value Justified	-17%	-13%	-24%	-25%	AL_%Gap	$VOLIR / GS_{SF}

The templates that were presented in this case can be easily modified to support Alternative Use decisions on a range of potential development or acquisition projects. It can also be modified to explore the benefits of "green" building or other options a developer may be considering. Once the final use determination has been made, the inputs should be fed into a Discounted Cash Flow model for further investment analysis and to determine if the selected use is likely to be a good investment.

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