

## Problem Set 2: Back of the Envelope<sup>1</sup>

**Objective:** The objective of this assignment is to introduce students to how developers and investors initially examine the financial feasibility of a deal<sup>2</sup>. The intuition underlying this static approach is that an investor seeks solvency (breakeven) in the short run and profitability in the long run.<sup>3</sup> It is also a useful method to (stress) test the initial cash flow assumptions that create the yield. This is important because if the initial cash flow in year one is faulty, by simply doing discounted cash flow analysis, an investor is first compounding the errors into the future and then discounting these errors back to the present.

**The deal:** *75 Broad NY, NY* (located in the heart of New York's Financial District). Constructed in 1928 as the world headquarters of the International Telephone & Telegraph Company, 75 Broad Street has long been one of Downtown Manhattan's signature "Industry Buildings." Situated atop one of New York City's only TransAtlantic AC-1 connector sites, the property has benefited from nearly \$45 million of infrastructure and cosmetic upgrades<sup>4</sup> and has become Downtown's premier "multi-use" property. The building's superior infrastructure, central location and flexible floorplates have attracted a broad base of both high-tech and traditional office tenants as well as Downtown Manhattan's newest and most celebrated educational center, Millennium High School.

75 Broad Street is one of the few office buildings in all of New York City that is able to provide the necessary infrastructure<sup>5</sup> to support "mission critical" operations for tenants in the telecommunications and high technology industries. The building has two floors (plus parts of the mezzanine) dedicated to a "generator farm", diesel powered generators both landlord and tenant owned, that can supply power independent of Con Edison. This unique capability was critical in the property's seamless and undisturbed operation following the events of September 11th and the blackout of August 2003.



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<sup>2</sup>This is known in the trade as the "back of the envelope" or the backdoor-frontdoor approach.

<sup>3</sup>This is the philosophy that used to be taught at the University of Wisconsin by the late Professor James A. Graaskamp, my mentor. Graaskamp coined the phrase backdoor-frontdoor.

<sup>4</sup>Investment efforts included extensive upgrades to all common areas, new elevator controls and cabs, and individually controlled A/C systems. JEMB also restored the building's interior by revitalizing the lobby's marble floors, walls and original ceiling murals.

<sup>5</sup>15 Diesel Power generators (with room for at least 7 more), GPS Satellite Farm, Fiber optic service (including Dark Fiber) from all major carriers, Redundant fuel oil distribution systems (40,750 KVA capacity), New Con Ed Vault, and Trans-Atlantic, high speed bandwidth undersea fiber optic cable and AC1 connection.

75 Broad Street's extensive and unique infrastructure amenities are rarely found in other properties in Manhattan. Tenants making their home at 75 Broad Street tend to renew their leases due the high costs associated with duplicating their operations, relocating, and / or reconstructing amenities such as emergency power, cooling and communication.

The opening of Millennium High School at 75 Broad Street in 2003, the property's largest anchor, was one of the most significant events in Downtown Manhattan and has transformed the asset into Downtown's newest educational center. The school enjoys a private entrance and elevator banks, creating a "building within a building" that enables the asset to function as both a place of business and academia. Millennium High School is backed by the New York City Board of Education (rated "A" from S&P) providing a strong and long-term credit anchor for the property.

75 Broad Street's distinctive "wedding cake" structure creates floors that span from 30,000 square feet in the base of the building to 4,500 square feet in the tower. The variety of floorplates has enabled the property to target both larger public and private institutions to small businesses that desire the prestige of a full floor tenancy. Tenants wishing to renew and expand their business can find growth options in 75 Broad Street and its multiple floor sizes. In addition, the separate entrances create optimal flexibility.

A key feature of the property is that the traditionally hardest spaces to lease in any office property, the base floors (ground floor to 15<sup>th</sup> floor), not only account for the



bulk of the in-place income but also feature the longest expirations. The property is also the beneficiary of a number of right incentive programs that result in reduced operating costs including the Industrial Commercial Incentive Program (ICIP) which exempts the property from real estate tax increases resulting from the extensive renovation. The asset pays lower real estate taxes as a result, with future potential increases subject to reimbursement by the tenants during the course of their long-term leases. Besides this, the

property enjoys reduced electricity costs by virtue of its participation in the Con Edison Business Incentive Rate and Lower Manhattan Energy Program(s). The savings achieved by the landlord are more pronounced because of the large power requirements of the existing tenants. Lastly, many of the existing tenants (including Millennium School) do not utilize many of the services required by typical office tenants, including the cleaning of their space. The result is an overall reduction in operating expenses including those related to maintenance, the savings from which accrue directly to the bottom line.

CB Richard Ellis (CBRE) is currently marketing 75 Broad. According to IGDNYC<sup>6</sup> the building is expected to sell for approximately \$300 per square foot, or \$198 million. On February 23, 2005, JEMB Realty, the seller completed a \$156.7 million in five-year fixed rate financing from CWCcapital. JEMB purchased the office building in 1999.

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<sup>6</sup>[http://www.igdnyc.com/monthly\\_january2005.shtml](http://www.igdnyc.com/monthly_january2005.shtml)

**Property Assumptions:** (Please refer to the worksheet "Building Stats" for further details about the building)

<b>Category</b>	<b>Description</b>												
Discount rate on new leases	<p>A lease is a type of debt financing (pre-tax). Assume that the average tenant (office and retail) for 75 Broad has a B rating.</p> <p>Pre-tax cost of debt = risk free rate + default premium</p> <p>where risk free rate is located in "Treasury Rates" worksheet and the default premium is located in the "BondMkt Rates" worksheet. The default premium is the premium over the applicable treasury rate. Example: Suppose that the tenant is a AA tenant who signs a 5 year lease. Then the discount rate used to discount lease payments (pre-tax cost of debt) using the numbers in our spreadsheet is</p> <p>Risk free rate: 4.22% (bcs its a 5-year lease)  <u>+ Default premium: .55% (bcs we use a 5-year Treasury)</u>            Pre-tax Cost of Debt 4.77%</p>												
Total Rentable Square Feet	Square feet on Ground floor + Mezzanine through 34 <sup>th</sup> floor + Space below grade (basement)												
psf	per square foot of net rentable area												
Expected Selling Price	\$198 million (\$198,000,000)												
Market Going-In Cap Rate	Use the "Average" going-in cap rate from the "RealtyRates" worksheet.												
Annual Asking Market Rents psf in Year <b>2004</b> .  psf = (per square foot of net rentable area)	Office: Floors 2 – 14 \$25 psf Office: Floors 15 – 22 \$27 psf Office: Floors 23 – 33 \$29 psf Office: Floor 34 \$25 psf Ground Floor: Retail \$50 psf Basement \$26.34 psf												
Growth rate in market rents	<table border="1"> <thead> <tr> <th></th> <th>Office</th> <th>Retail</th> <th>Basement</th> </tr> </thead> <tbody> <tr> <td>Year 2005</td> <td>5%</td> <td>5%</td> <td>5%</td> </tr> <tr> <td>Year 2006+</td> <td>2%</td> <td>3%</td> <td>2%</td> </tr> </tbody> </table>		Office	Retail	Basement	Year 2005	5%	5%	5%	Year 2006+	2%	3%	2%
	Office	Retail	Basement										
Year 2005	5%	5%	5%										
Year 2006+	2%	3%	2%										
Additional rent psf	<table border="1"> <thead> <tr> <th></th> <th>Office</th> <th>Retail</th> <th>Basement</th> </tr> </thead> <tbody> <tr> <td></td> <td>\$4 psf</td> <td>\$0 psf</td> <td>\$4 psf</td> </tr> </tbody> </table> <p>The additional rent per square foot begins 5 years after the start of the lease. For example, if the lease started in 2005, then this additional rent starts in 2009.</p>		Office	Retail	Basement		\$4 psf	\$0 psf	\$4 psf				
	Office	Retail	Basement										
	\$4 psf	\$0 psf	\$4 psf										

<b>Category</b>	<b>Description</b>								
Term of New Lease	10 years								
Free Rent (Months)	<table border="1"> <thead> <tr> <th></th> <th>Office</th> <th>Retail</th> <th>Basement</th> </tr> </thead> <tbody> <tr> <td>Months</td> <td>6</td> <td>0</td> <td>0</td> </tr> </tbody> </table> <p>Assume that the tenant takes one month of free rent each year from year 5 (2009) onwards to offset the additional rent psf starting in year 5. In practice, this assumption varies from market to market.</p>		Office	Retail	Basement	Months	6	0	0
	Office	Retail	Basement						
Months	6	0	0						
Tenant Improvements on <b>New</b> Space psf (Lease concession). Also known as TI or Finish Out Allowance	<table border="1"> <thead> <tr> <th></th> <th>Office</th> <th>Retail</th> <th>Basement</th> </tr> </thead> <tbody> <tr> <td>\$/psf</td> <td>\$30</td> <td>\$0</td> <td>\$0</td> </tr> </tbody> </table> <p>This is the tenant improvement allowance per square foot for new office leases (new tenant). The landlord a.k.a. lessor pays for this cost (TI) and represents a concession that effectively lowers the rental rate. We assume that TI is amortized (depreciated) over the life of the lease e.g. assumes that the life of Tenant Improvements is equal to the length of the lease. Note: any cost in excess of the agreed amount is to be paid by the tenant. <b>No excessive</b> TI allowance is assumed for our property e.g., additional amount above standard TI.</p>		Office	Retail	Basement	\$/psf	\$30	\$0	\$0
	Office	Retail	Basement						
\$/psf	\$30	\$0	\$0						
Tenant Improvements on <b>Existing</b> Leases	This is the equivalent annual annuity of TI on existing leases. See the "Rents & Expenses" worksheet.								
Immediate Capital Improvements	\$0; Seller has already upgraded the building <sup>7</sup> .								
Total Potential Gross Revenue ( <b>PGI</b> )	<p>Base Rental Revenue  - Base Rent Abatements  <u>+ Recoveries &amp; Other Income</u>  = Total Potential Gross Revenue (<b>PGI</b>)</p> <p>Please refer to the "Terminology" worksheet.</p>								

<sup>7</sup>On January 29, 2003, the owners of 75 Broad St. (75 Broad Street LLC) in Manhattan announced that they had completed an \$85 million of interim financing by CDP Capital Mortgages. The financing allowed JEMB to further upgrade the already technologically advanced 75 Broad Street. The property underwent cosmetic upgrades of pre-built units utilizing the existing infrastructure. Following JEMB's purchase of the property in 1999, more than \$35 million was initially invested to redevelop the property with infrastructure improvements including new routing of the power feeders, telecommunications risers and emergency generators. Cosmetic improvements included new marble floors, walls and ceiling murals in the entrance lobby.

<b>Category</b>	<b>Description</b>
Effective Gross Income (EGI)	Base Rental Revenue - Base Rent Abatements <u>+ Recoveries &amp; Other Income</u> Total Potential Gross Income (PGI) <u>- Absorption &amp; Turnover Vacancy</u> Total Effective Gross Income (EGI)
Total Rent (Vacant Space)	In calculating rent on space that is currently vacant, use the equivalent annuity for <b>effective</b> rent. See "3. Calc EfcRent (New Space)" worksheet. Note: This effective rent includes any additional rent, free rent, and tenant improvements on new space.
Market Vacancy: Class A Office (Downtown)	Use the vacancy rate associated with the category entitled "Available now and in the next two years" in the "NYC OfcMkt Stats" worksheet for Class A Office, Downtown
Market Vacancy: Retail (Downtown)	Use the vacancy rate associated with the category entitled "Available now and in the next two years" in the "NYC OfcMkt Stats" worksheet for Retail, Downtown
Market Vacancy Rate for 75 Broad (used in Frontdoor and Backdoor)	To obtain the market vacancy rate for 75 Broad, use the "4. Calc ProForma (All Space)" worksheet, and divide the Dollar Vacancy Amount in cell C38 by the Total Rent (All Space) in cell C12. Rationale: There is the vacancy rate for office space (above ground vs. below grade) and retail space and as such you need to take a weighted average.
Property Expenses	Please refer to the "Rents & Expenses" worksheet. Operating Expenses include both fixed and variable expenses. Fixed expenses include property taxes and BID assessment <sup>8</sup> . Expenses that vary with EGI (effective gross income) include electricity expense after rebates, salaries & benefits, cleaning, security, repairs & maintenance, insurance, steam, water & sewer, management fee, general & administrative, and professional fees. Expenses that vary with PGI (potential gross income) include leasing commissions. Other operating expenses include TI on existing leases.

<sup>8</sup>The Business Improvement District (BID) Assessment via the Downtown Alliance has been incorporated into the analysis.

**Property Assumptions (continued):**

<b>Category</b>	<b>Description</b>
Variable Operating Expense Ratio (used in Frontdoor and Backdoor)	Please refer to "5. Calc Total Rent (All Space)" worksheet; The variable operating expense ratio is equal to variable operating expenses divided by Total Rent (All Spaces).
Fixed Operating Expenses per square foot (psf)	Total Fixed Expenses/Total Rentable Square Feet.  Please refer to the "4. Calc ProForma (All Space)" worksheet. Total Fixed Expenses is in cell C43 and Total Rentable Square Feet is in cell C7.
Building Class	Class A <sup>9</sup> .
Debt Coverage Ratio	Use the "Average" column of the DSCR reported in the "RealtyRates" worksheet
Before-tax Cash on Cash (also known as Return on Equity)	Use the "Average" column of the before tax cash on cash rate that is reported in the "RealtyRates" worksheet
Amortization Period	Use the "Average" column of the Amortization reported in the "RealtyRates" worksheet
Period of Loan (in years)	10 years
Payments per Year	12; This is because the mortgage is paid monthly.
Interest Rate	Use the "Average" column of the Interest Rates reported in the "RealtyRates" worksheet
Annual Mortgage Constant	This is the annual mortgage constant assuming monthly payments e.g., monthly mortgage constant * 12 months.

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<sup>9</sup>Building classifications in most markets refer to Class "A", "B", "C" and sometimes "D" properties. While the rating assigned to a particular building is very subjective, Class "A" properties are typically newer buildings with superior construction and finish in excellent locations with easy access, attractive to credit tenants, and which offer a multitude of amenities such as on-site management or covered parking. These buildings, of course, command the highest rental rates in their sub-market. As the "Class" of the building decreases (i.e. Class "B", "C" or "D") one component or another such as age, location or construction of the building becomes less desirable. Note that a Class "A" building in one sub-market might rank lower if it were located in a distinctly different sub-market just a few miles away containing a higher end product.

**Assignment:** Please prepare a spreadsheet to answer the following questions and highlight your answers in **yellow**. *This is an individual assignment.*

1. Rollover of Key Tenants (5 points): Using the information on tenants in the “Tenant Stack” worksheet, complete the “1. Major Tenant Expirations” worksheet by filling in the area highlighted in **yellow**. Discuss whether the new owner has to worry about any of the major tenants leases expiring in the short term e.g., the next 3 years?
2. Lease Rollover Analysis (10 points): Using the information on tenants in the “Tenant Stack” worksheet, complete the “2. Expiration Summary” worksheet by filling in the area highlighted in **yellow**. In what year does at least 10% of the total net rentable square feet come up for renewal? What are the critical years with respect to leases potentially rolling over? Discuss why it is important to do a lease rollover analysis?
3. Effective Gross Rent on New Space (20 points): Calculate the equivalent annuity for effective gross rent on new office, retail, and basement space using the “3. Calc EfcRent (New Space)” worksheet. Your textbook discusses the procedure used in the spreadsheet template which essentially involves converting the flows into an equivalent annual annuity (EAA) that you should have learned about in your Financial Management class. In doing your calculations, please refer to the Assumptions page(s) of this case.
4. Pro-Forma Rents and Expenses (20 points): Calculate the pro-forma rents and expenses for Year **2006** using the “4. Calc ProForma (All Space)” worksheet in conjunction with the “Tenant Stack”, “Rents & Expenses”, and “NYC OfcMkt Stats” worksheets.
5. Cap Rate Frontdoor Approach (25 points):
  - a. Required Rent: What is the required asking rent per square foot of **net rentable area** using the cap rate version of the front door approach given the expected selling price? Is the deal financially feasible? Please explain. Using sensitivity analysis e.g. Data Table (Going-In Cap Rate vs. Vacancy Rate), what does the going-in cap rate and vacancy rates have to be for solvency to obtain? If the sensitivity analysis is done using the variable operating expense ratio instead of vacancy rates, what does the going-in cap rate and operating expenses psf have to be for solvency to obtain? To access the Data Table command in Excel click on **Data** submenu on the Excel toolbar → **Table ...** .
  - b. Sensitivity Analysis: This is where we try to structure the deal to make it financially feasible by varying the terms of the deal.
    - What is the highest purchase price that an institutional investor should pay and still have the deal be financially feasible all other variables remaining constant? Is this a feasible alternative? Please explain.
    - What is the highest vacancy rate that the building can have and still have the investor remain solvent all other variables remaining constant including the

purchase price? Is this vacancy rate lower than the direct market vacancy rate? Is this a feasible alternative? Please discuss.

- What would the going-in cap rate have to be for the deal to breakeven all other variables remaining constant? Note: Some developers such as the Reichmans use the interest rate in lieu of the going-in cap rate. This implicitly assumes that no equity is put into the deal e.g., 100% debt financing so the investor “mortgages-out”. (Please see Appendix A of this case study). Is this deal feasible from the standpoint of a German investor e.g., Paramount invested funds for its German clients at 1177 Sixth Avenue at a going-in cap rate of 5.7%?

**A Note on German Investors:** According to a research paper by the Institute for Fiduciary Education, <http://www.ifecorp.com/Papers2005/Ingall0305.pdf>, “At present, spread differentials reward Central European investors for bearing the perceived incremental risk of real estate investments in the region...Office investments in Bratislava and the Baltics offer yields 375 to 450 basis points greater than in the major Western European markets. For comparison, London and Paris offered prime office yields of 5.75% and 6.0%, respectively, while German yields were in the 5.38%–5.62% range....Some investors, including many German funds prefer to purchase only Class-A properties in the best locations with investment-grade leases.”

In the NAIOP's development magazine's Inside Finance, section: Fearless Forecast for '05: Healthy Economy, Good Time for Selling Assets or Financing <http://www.naiop.org/developmentmag/insidefinance/index.cfm>, the following insert reads: **Darn Clever, These Europeans.** Low yields are de rigueur for Europeans investing in U.S. real estate, and we should probably do a better job of figuring out why, according to Dr. Norman Miller, director of the Real Estate Center at the University of Cincinnati and a NAIOP Distinguished Fellow. Recently, for example, a German buyer had paid perhaps three to four percent more for a Chicago property than the next highest American bidder would have paid. "Was this rational?" Dr. Miller asked. "The brokers should have developed a spreadsheet with a currency expectation built in. If they did this and considered the likely dollar strengthening by 10 to 20 percent relative to the Euro over the next few years, they would observe much better returns for the Germans than for the Americans who may have paid a lower price. "This is the situation for many European buyers," he noted. "Yields are quite low in countries like Germany, and so the alternative yield opportunities may not be as good as in the U.S. The world knows the dollar is weak, and while it may remain weak for a quarter or two, it will very likely strengthen over the next few years. This expectation is having an effect on some of the observed real estate transactions." "The smart European buyer is making a currency play as well as core investment. If the dollar does strengthen over the next few years, they can easily see IRR's in the double-digit region with only modest current yields on the real estate and modest dollar appreciation. Maybe instead of looking at the



Europeans oddly, we should be running some spreadsheets showing just how well they will do if the dollar strengthens."

- What is the highest variable operating expense ratio that the building can have and still have the investor remain solvent all other variables remaining constant including the purchase price? Is this a feasible alternative? Please explain.

Hint: Make a copy of your Frontdoor worksheet by right clicking on the mouse, selecting the **Move or Copy....** option, highlighting the Frontdoor worksheet, click on the box at the lower left hand corner **Create a copy** and then click the **OK** button. Next, use the **Solver...** subroutine located under the **Tools** submenu in Excel and set the justified rent equal to the asking rent. Please discuss whether these terms make financial sense or not. You might have to retype the operating expense ratio and vacancy rate ratios as numbers instead of formulas in the Assumptions box in your copied worksheet prior to using Solver.

6. Backdoor using Debt Coverage Ratio Approach (20 points):

- a. Justified Price: What is the justified price for 75 Broad? Is the deal financially feasible from a backdoor perspective for an American investor? What about from the perspective of a German investor? Please explain. Please use the proposed selling price of the property on the Assumption page of this case to see if the deal is solvent.
- b. Two Way Sensitivity Analysis (Stress Testing the Deal): Please use the Data Table command in Excel to set up a two-way table showing the justified price per square foot at various combinations of cash-on-cash and interest rates. What would the before tax cash on cash have to be for the deal to be solvent from a DCR Backdoor perspective relative to interest rates? What if the DCR was used in lieu of interest rates?

***Restatement of assignment.*** Please highlight your answers in **yellow**, turn in a hard copy of your results and turn in your spreadsheet on a disk with your name on the disk so that we can check your work and also to make sure that you didn't copy someone else's assignment. ***This is an individual assignment.***

## Appendix A: The Brothers Reichmann

The Brothers Reichman and the Strategy of “More is More”<sup>10</sup>: In an interview with Olympia and York’s executive vice president Edward Minskoff,

“Just how well the market adapts to rent increases is the determining factor in Olympia & York’s planning for new developments. The go-ahead is very much a function of projected income exceeding projected costs. ‘Before flashing the green light for a new project, the developer has to tally both hard and soft costs,’ Minskoff explains. ‘The former refers to expenses incurred on the actual construction work; the latter includes design, legal and accounting fees, marketing, expenses and so forth.

In New York today (1983), hard and soft costs to develop new properties range from \$150 to \$250 per square foot depending on the cost of the land. For argument’s sake, let’s figure \$150 as the average cost. With financing at 15 percent, interest would be \$22.50 per square foot, add another \$7 per square foot for taxes and \$7 for maintenance and you have a breakeven figure of \$36.50 per square foot. Projected market rent levels will have to be at a minimum \$38 to \$40 per square foot



Paul Reichmann

level to make the development economically feasible. We also figure our rent adjustments this way. They should reflect replacement costs to develop similar buildings in the current market.

The same kind of thinking applies to property purchases, as well. One of the reasons we bought the Uris buildings was that calculations showed the asking price to be about a third of replacement costs. We’d have had to spend three times as much to build comparable properties.’ ”

In 1964, the Reichmann brothers: Albert, Paul and Ralph, established Olympia and York



Canary Wharf, UK

Industrial Development Company, which, at its peak, constituted the greatest real estate empire the world had ever seen. Two sentences could express the Reichmann’s way of doing business: “Their edge was their integrity” and “Their word was their bond”. The Reichmanns were one of the ten wealthiest families in the world, ranking just below the British Royal family in the 1980s. Paul Reichmann has been at the same time one of the most resourceful and resilient entrepreneurs of the 20th century. Notable buildings that the Reichmanns have developed include the World Financial Center and Canary Wharf.

([www.shemayisrael.co.il/orgs/ozar/reichman.htm](http://www.shemayisrael.co.il/orgs/ozar/reichman.htm))

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<sup>10</sup>from Mark Stevens, *Land Rush: The Secret World of Real Estate’s Super Brokers & Developers*, 1984, McGraw-Hill