

QUINCY QUARRIES: DEVELOPMENT FEASIBILITY STUDY

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JONATHAN R. WARNER

Submitted to the Department of Urban Studies and Planning on May 28, 1986 in partial fulfillment of the requirements for the Degree of Master of City Planning.

ABSTRACT

This thesis evaluates the development feasibility for a 120,000 square foot office building on a 4.9 acre site in Quincy Massachusetts. The site is an abandoned rock quarry and its positive attributes as well as its negative inherent qualities are evaluated.

Present and future office market conditions and vacancy rates are estimated for this site using a supply and demand study for the Boston Suburban, South Suburban, and Quincy Office markets. These figures are projected forward based on historic office market information and growth potential for the South Coastal Suburban and Quincy economies.

In addition to evaluating the market environment for the project this thesis examines the cost and revenue generating elements of the project. A parametric cost analysis system is used to estimate the projects total cost at \$11,975,824. The projects revenue generating potential is derived using estimated vacancy and rental rate figures. The rental rate figures are estimated with a linear regression analysis that uses a data base of 36 office buildings to estimate market rental values for separate building and site attribute components. These market component values are then used to estimate the annual per square foot rental value for this project based on the project's specific site and building attributes.

The project's economic feasibility has been determined using the above mentioned revenue and cost inputs. The projects return on total assets for the first stabilized year is 11.96%. In the present lending environment where the cost of debt is lower than this, the project represents an opportunity for a positively leveraged investment. Three financing options are considered and a fixed rate mortgage is chosen as the preferable option for the amount of \$11,975,824 with a 9 1/4% interest rate. The financial feasibility of the project is evaluated using a discounted cash flow analysis in which annual cash flows and residual value are compared with original capital investment to determine the project's net present value, which discounted

at 14% is \$2,671,286. The project is tested for its financial sensitivity to a number of worst case economic scenarios. Because of the Projects ability to maintain a positive net present value in a variety of adverse economic environments, it is recommended for development.

Thesis Supervisor: William Wheaton, PhD

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Urban Studies

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CHAPTER I: INTRODUCTION

SCOPE AND PURPOSE

The purpose of this thesis is to evaluate the development feasibility for a 120,000 square foot three story office building on a 4.9 acre site at the Crown Colony Place Office Park in Quincy Massachusetts. This analysis will determine whether the site's excellent locational characteristics can counteract the fact that the site is an old abandoned quarry. The evaluation will include an office market analysis for Boston's current and projected suburban market as well as pertinent regional sub markets. Office space demand will be evaluated using the Spaulding and Slye Boston Area Report (Cunningham, 1981-1986; p.8-17) for projecting absorption rates and vacancy rates for the suburbs and the Quincy-Braintree markets. Office rent determinants for the Quincy- Braintree office market will be identified and used to estimate the rental rate potential for the Crown Colony Place Site. These market variables will determine the income potential for the proposed office building at this site and the financial feasibility for its development.

The site is located on a unique piece of property that previously functioned as a rock quarry and recently has been planned as The Crown Colony Place Office Park Master Plan. The Master Plan area is triangularly shaped with the buildable portions of the plan 150 feet to 175 feet below

two of the peripheral edges of the site (See site plan exhibit p.12). These areas consist of approximately 173 acres of the sites total 193 acres, and their flat buildable slope was formed when a wedged shape piece of earth was extracted from the property when it was a active quarry. These unique topographic and geological forms will affect and impact future development on the site in several significant ways, as described below.

The flat buildable areas represented on the master plan consist of bedrock with no topsoil or ground cover. This condition will require blasting, or earth fill on each buildable site at a depth of four feet so that utilities can be placed under the proposed office buildings. This condition will result in additional site premium cost for each office parcel that is developed. The sunken elevation of the buildable areas of the master plan will result in view obstruction to and from the future office buildings to the highways that run along the elevated peripheral edges of the site. This condition may negatively affect the marketability of the office park because certain office uses prefer highly visible locations. The existing barren rock surface and unvegetated character of the site create an aesthetically barren environment that may detract from the site's initial marketability. Until a certain amount of development has occurred on the site, it will continue to retain its moonscape quality and it will lack the human scale attributes of a office park environment.

These negative characteristics of the site plan are compensated for by some rather substantial positive qualities which are mostly locational in nature. The master plan has excellent access to public transportation and major highways. It is located at the intersection of 3 highways: Route 128 (leading to Boston's high technology area and points west), Route 3 (leading to Plymouth and Cape Cod), and the Southeast Expressway (leading to Boston and points north) (See project vicinity map p.10). The plan is also adjacent to the "Quincy Adams" MBTA Red Line Station and its 2000 car garage which provides subway transportation to Boston and points north and Braintree. These attributes give the site excellent access to the laborshed areas of Boston's south suburban market. Only one other office building in the Quincy - Braintree market is fortunate enough to share both of these attributes, and this particular office building has a 7.1% vacancy rate, and it has the highest rental rates of any class A office in the market. This indicates that these attributes are valued and regarded highly in this office market.

The remaining portions of this chapter will discuss the general background and history of the site as well as the marketing potential of the "Quincy Adams" public transportation station that is adjacent to it. The impacts of future master plan infrastructure improvements will also be evaluated as they pertain to this specific office site.

PROJECT VICINITY MAP

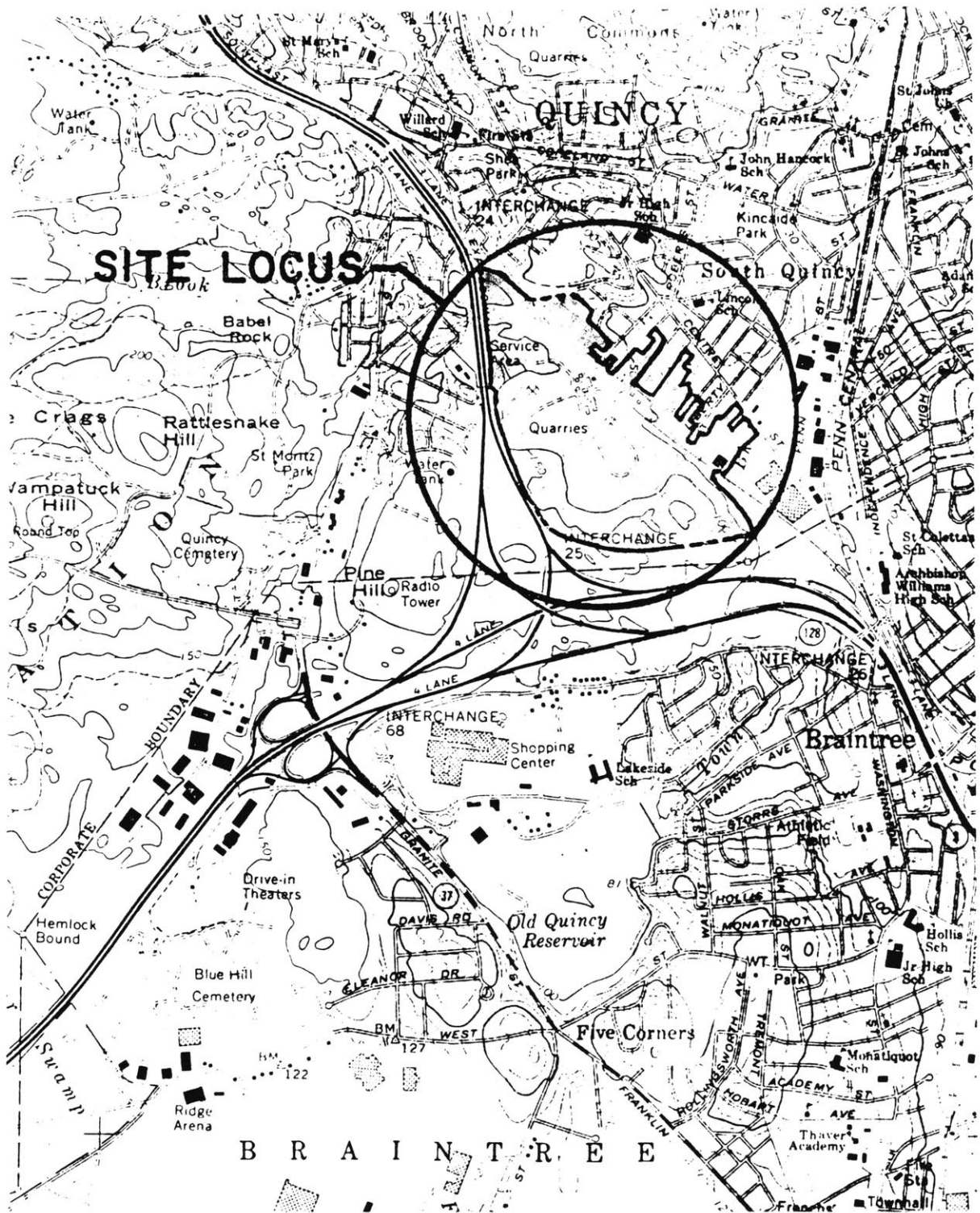


ILLUSTRATION NO. 1

Chapter Two will review the present and the projected economic environment for the site and its linkages and affects upon the site's office market. Chapter Three will assess the present and projected conditions of the pertinent geographic office markets that affect the site. Finally Chapters Four and Five translate this information into its financial implications for development on the site through a cost and financial feasibility study.

GENERAL SITE BACKGROUND AND HISTORY

Crown Colony Place is presently owned by a group of Kuwaiti businessmen with the real estate brokerage firm of Meredith and Grew acting as their representatives. In 1984 the owners of the Crown Colony Place site gained formal planning approval to proceed with the development of a 300 room hotel/convention center and office park master plan with 2 million square feet of office space. The master plan has been subdivided into 18 office sites ranging in size from 4.2 acres to 16.2 acres (See project site plan,p.12). In anticipation of sufficient office space demand the owners have built 2/3 of the roadway and infrastructure improvements for the site. Since the initial planning and infrastructure improvements the site has only recently been able to attract any speculative builders or tenants, and only one of the sites is being developed for a 30,000 SF office building. This lack of demand is not the result of a weak office market but is hypothesized in this thesis as

PROJECT SITE PLAN

SITE PLAN
Quincy, Massachusetts

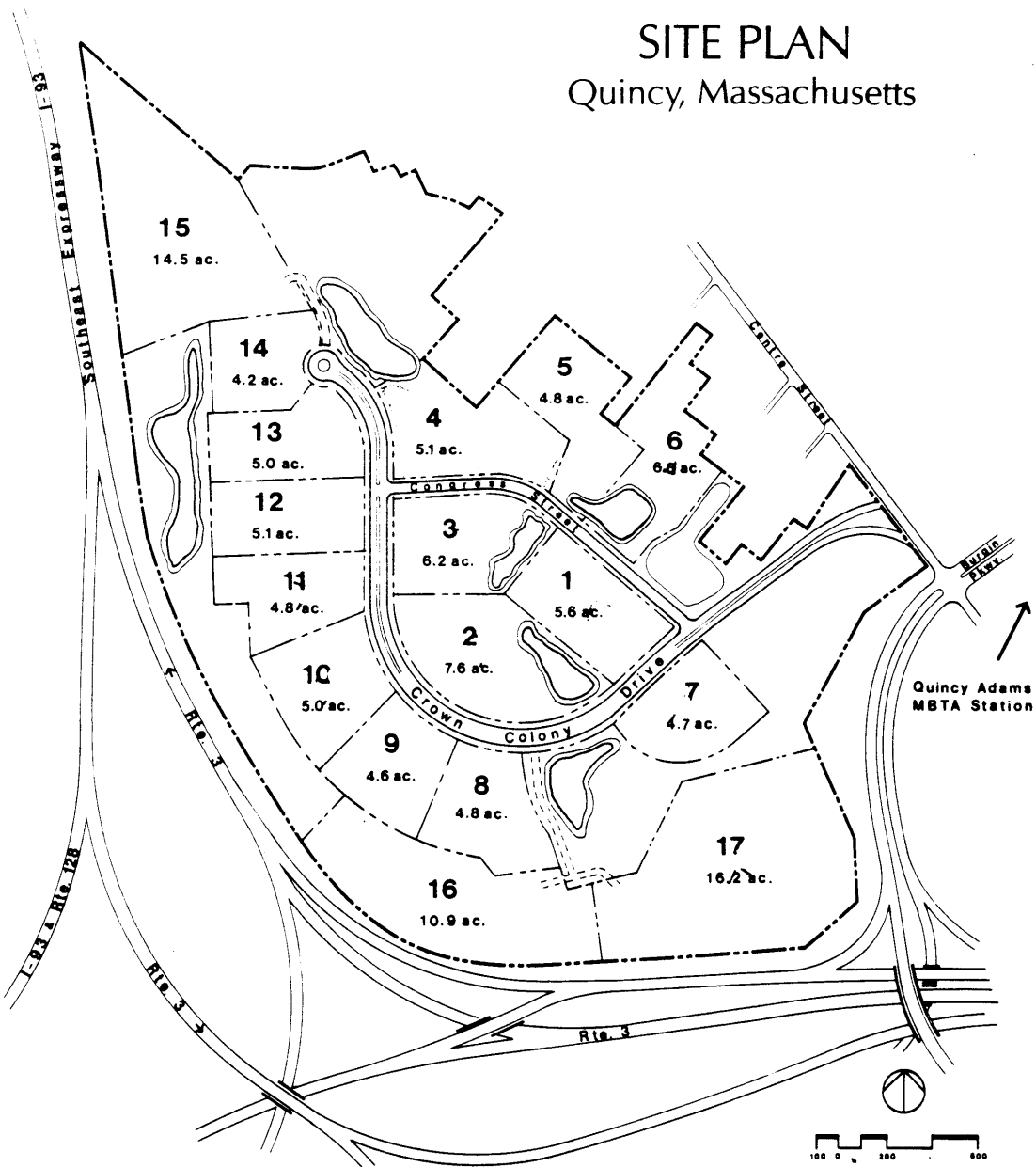


ILLUSTRATION NO. 2

being the result of the site's inherent negative marketability in terms of the perceived risks and premium costs associated with development on this site.

MASTER PLAN PHASING AND INFRASTRUCTURE IMPROVEMENTS

Future infrastructure improvements have been imposed on the site as a requirement of the Environmental Impact Report (EIR) which was filed and approved on June 8, 1984 (EIR, EDEA # 4879, Boston, Ma. June 1984). The impacts for development are based on a master development plan that proposes 2,000,000 square feet of office space and a 300 room hotel. The development impacts created by this development fall into two categories; air quality and traffic. The EIR recommends certain mitigation measures for these impacts which require improvements at different stages of development. These improvements are significant in that they occur in three distinct phases based on estimates of traffic generated by the master plan. At 33% buildout and 72% buildout of the master plan, major infrastructure improvements will have to be made. A proposed phase III infrastructure improvement for a major access revision, may not be implemented because of conditions placed on the development by the EIR. Air pollution impacts may restrict development after phase II. These conditions could seriously delay development for the proposed 4.9 acre office site. I would recommend that it be a condition of the purchase and sale agreement for the property that the

traffic generated from it be included as traffic flows for phase I of the project. This will insure timely development of the site and it will clear the title for the property so that it can be used as collateral for financing.

For acceptable air quality the impact statement recommends the use of all possible mitigation measures (EIR, EOAE #4879, 1984, p 2-1). In spite of this, the EIR predicts a 1990 Carbon Monoxide violation of air quality standards. An estimated 15% drop in 1990 traffic projections would be required to eliminate this condition. In fact this condition could occur late in phase II of the development.

For traffic impact mitigation the EIR recommended that key roadway improvements be made at three different stages of development (EIR, EOAE #4879, 1984, p 5-1). The existing roadway system will support development through phase I (640,000 SF of office & Hotel Development). This roadway system has been constructed at a cost of \$1,020,000 (1985 dollars) (See table 1). To accommodate impacts through phase II (building out office space to, 1,440,000 SF) a major realignment of the access drive into the site from Centre street would be required. This would require that rather than terminating the access drive at Centre street that it curve in a northeast to southeast direction to meet Bergin Parkway. Two lanes of travel would be provided in each direction on the access road with exclusive right and left turns at several locations. Improvement costs for this

phase are estimated to be \$862,200 (1986 Dollars). To mitigate impacts of development through phase III (building out office space to 2,000,000 SF) a secondary point of access would be required for the site. One alternative would consist of the construction of ramps accessible to South Shore commuters only, bypassing the Burgin Parkway intersection. Motorists would then travel directly into the site via the old railroad bed. It should be noted however that this private access off a state ramp violates state policy and would accomodate incoming traffic only. This access would only be required if phase II traffic volumes were exceeded by development on the site. This improvement is estimated to cost \$1,267,700 (1986 Dollars).

TABLE 1
MASTER PLAN ROADWAY IMPROVEMENTS

	PHASE I		PHASE II		PHASE III	
MAXIMUM SF	670,000 SF		1,440,000 SF		2,000,000 SF	
COST	\$1,020,000		\$862,200		\$1,267,700	
TOTAL GENERATED TRAFFIC VOLUME	AM	PM	AM	PM	AM	PM
	602	545	1361	1179	1801	1638

(Source: EIR, EDAE #4879, 1984, p. 5-1)

PUBLIC TRANSPORTATION MARKET POTENTIAL

The "Quincy Adams" Red Line T Station is within walking distance and adjacent to the site. It is one of five stations on the South Shore Redline extension which extends as far south as Braintree. The "Quincy Adams" Station opened on September 10th 1984 with a average weekday peak hour

(6:30am - 9:30am) ridership of 1,328 passengers and with 850 cars parked in its 2000 car garage. From the stations opening date through March 1986 weekday (6am - 1pm) ridership has an average of 5,434 passengers and as of April 1986 1,800 of the 2,000 spaces in the garage have been leased (Wilson, Alicia, 1984; p.34).

The station will be a benefit as a commuter service for employees that work at the site and live north or south of the site. With a maximum am peak hour capacity of 10,890 passengers the Redline could transport enough workers in the am peak hour time period to occupy 2,178,000 SF of office space assuming that each worker occupied 200 SF. This represents a economic advantage for firms that locate on the site because it would lower employee commuting costs and in effect it could lower labor overhead costs. The Quincy Adams station is a convenient and economic ammenity for future firms that may choose to locate in this office building.

CHAPTER II: ECONOMIC OVERVIEW

INDUSTRY ANALYSIS

The growth potential of the Quincy and Braintree economic environment as well as the South Coastal Suburban economy have been evaluated. The purpose of this is to determine the impact of these economies on the Quincy and suburban class A office market.

Quincy and Braintree are located in the northern section of the Southern Coastal Service Delivery Area (SCSDA) and they have a combined population of 120,720 residents. The (SCSDA) consists of 22 cities and towns which represents the suburban settlement areas south and directly adjacent to Boston.

The economy of the SCSDA is relatively strong and it has grown significantly, with the southern portion of the region experiencing more growth than the rest. Between 1970 and 1980 population in the SCSDA grew by 10.7% with unemployment in the area remaining consistently below the state rate. With a fairly robust economy, the industrial composition of the SCSDA has been shifting from a manufacturing base to a wholesale trade, retail trade and service sector based economy. Less than 20% of the employment in the SCSDA is concentrated in the manufacturing sector as compared with 27% for the state.

TABLE 2
SOUTH COASTAL SDA/ EMPLOYMENT CHANGE 1982-1984

INDUSTRY	1982 1ST /	1984 1ST/	ABSOLUTE CHANGE /	% SCSDA	%STATE
Total Emp.	135,429	149,027	13,598	10%	6%
Private Emp.	116,130	129,930	13,800	11.9%	7%
Retail					
Trade	37231	41391	4160	11.2%	11.2%
Services	25,922	29976	4054	15.6%	9%
Wholesale					
TRade	5781	7577	1796	31.1%	12.6%
Construction	5040	6682	1642	32.6%	14.6%
F.I.R.E.	10139	11764	1625	16%	6%
Manufacturing					
Durable Goods	16766	17035	276	1.6%	2.1%
Non Durable					
Goods	8944	9101	157	1.8%	.1%
Forestry	735	892	157	21.4%	12.3%
Mining	106	112	6	5.7%	10.7%
Transportation					
Communication					
Utilities	5472	5399	-73	-1.3%	1.5%
Government	19296	19096	-200	-1%	.3%

(Source: Division of Employment Security, Commonwealth of Massachusetts: SCSDA, An Analysis of Employment and Unemployment Conditions. March 1983, p. 6)

Between the first quarter of 1982 and the first quarter of 1984 private employment in the South Coastal SDA expanded by 11.9% to a total employment of 129,930 (See table 2). An analysis of the employment change for this period reveals that the strongest growth industries in the SCSDA economy are; 1) Retail Trade - 4160 jobs, 2) Services - 4054 jobs and, 3) Wholesale Trade - 1796 jobs. In addition to this the Massachusetts Division of Employment Security revealed six non manufacturing industries, with a favorable longterm outlook. These industries are projected to grow at a faster rate than the average rate for the state. The nonmanufacturing industries are; 1) eating and drinking

places, 2) grocery stores, 3) commercial and stock savings banks, 4) security and commodity services, 5) hospitals and, 6) general trade construction (Division of Employment Security, South Coastal Service Delivery Area, 1984; p.1-6).

RETAIL (4160 JOBS)

In Retail trade sector employment increased at 11.2% for 4160 new jobs. Eating and drinking places experienced employment growth of 1074 jobs. General merchandise grew by 609 jobs with department stores up by 473 jobs and variety stores up by 202 jobs. Food stores grew by an additional 1074 jobs (Division of Employment Security, South Coastal Service Delivery Area. 1984; p.1-6).

SERVICES (4054 JOBS)

The services sector grew by 4054 jobs a increase of 15.6%. One of the fastest growing services was business services which increased by 1368 or 30.7%. The health services accounted for a significant portion of the growth with an increase of 1045 jobs, the fastest growing subsector being medical and dental laboratories which grew by 72.2% for an increase of 239 jobs. Nurseing care facilities grew by 128 jobs for a growth rate of 2% with increases in dentist and physician offices at 16.6%. As a whole the health services industry was a growth industry with projected growth rate of 5.3% until 1990. Personnel services as a whole grew by an additional 34 jobs at a rate of 27%.

WHOLESALE TRADE (1796 JOBS)

The wholesale trade industry experienced strong growth at 31% for an additional 1796 jobs. Areas of significant growth were motor vehicles, furniture, electrical goods, hardware, plumbing and heating supplies and machinery. In nondurable goods growth industries were paper goods, chemicals and beer and wine.

FINANCE INSURANCE AND REAL ESTATE (FIRE) (1625 JOBS)

The industry of finance insurance and real estate had an overall growth rate of 10.0% for an additional 1625 jobs. Banking grew by 631 jobs, While the insurance industry grew by 15% for an additional 227 jobs.

MANUFACTURING (433 JOBS)

In the South Coastal SDA manufacturing growth tended to be increasing at a rate of 1.7% for an additional 433 jobs between 1982-1984. Within durable goods the largest gainer was transportation equipment with a increase of 44.3% . Nondurable goods employment increased by 157 jobs with an expansion rate of 1.8%. Printing and publishing increased by 2.1% with commercial printing recording the largest gain.

TRANSPORTATION & COMMUNICATIONS (-73 JOBS)

Within the transportation communication and public utilities sector, transportation employment and public utilities employment was up by 5.5% and 9.4% respectively. However these gains were offset by a decline of 14.5% in communications.

In summary between 1982 and 1984 the SCSDA economy has experienced employment growth at a rate of 11.9% compared to a rate of 7% for the state. For the SCSDA this growth has been most noticeable for the Retail Trade, Services and Wholesale Trade sectors of the economy. This is significant for the office market because office space demand has historically been driven by employment growth in the Finance Insurance and Real Estate (FIRE) sectors and the Service sector of the economy. The robust present and projected future condition of the SCSDA economy especially in the Service and FIRE sectors is a strong indicator that the South Suburban office market will continue to sustain a healthy demand for office space with increased office space absorption lagging a year or two behind the employment demand.

the outlook for the Quincy Braintree office market is even more optimistic based on outstanding economic performance. Between 1980 and 1983 the FIRE sector has grown by 38.1% and 22.9% for Quincy and Braintree respectively. In 1982 and 1984 however the FIRE sector for the SCSDA has experienced only a 6% growth rate. The Service sector for Quincy and Braintree for the same period of time has experienced a growth rate of 21% and 34% respectively as compared to the SCSDA which experienced a growth rate between 1982 and 1984 of only 9% (See table 3). In conclusion and based on historic performance it would appear that the future for the Quincy - Braintree office market is

bright and that it should continue to outperform the larger suburban market as long as its microeconomy continues to do so.

TABLE 3
COMPARATIVE EMPLOYMENT CHANGE FOR
QUINCY, BRAINTREE AND THE SCSDA

SECTOR;	QUINCY 80-83/	BRAINTREE 80-83/	SCSDA 82-84/	%EMPO	/%EMPB
Wholesale Retail Trade	11%	14.6%	11.6%	2.5%	42%
FIRE	38.1%	22.9%	6%	13.4%	6.3%
Constr.	19.7%	-13.1%	32.6%	5.1%	3.1%
Mfg.	-20.3%	-5.6%	1.7%	20.6%	15.2%
Transport. Utilities Comm.	-8.6%	53%	1.5%	2.9%	6%
Government				11.4%	7.5%

(Source: Division of Employment Security, Commonwealth of Massachusetts: Cities and Towns 1980 - 1983, p.130 & 131)

CHAPTER III OFFICE MARKET ANALYSIS

THE SUBURBAN OFFICE MARKET

Because development on the Crown Colony Place site involves a substantial amount of risk and due to the fact that there are no comparable office buildings in the immediate vicinity it is necessary to evaluate the present and future office market conditions affecting this site. This analysis evaluates three different scales of geographic markets affecting the site, starting with the Boston Suburban Market, and then the South Suburban Market and concluding with the Quincy Office Market.

The Boston Suburban Market Area consists of 36 towns located adjacent to the city of Boston and within the route 495 Beltway that encompasses the metropolitan area. As of the 1st quarter in 1986 23,436,713 SF of class A office space existed in the Boston Suburban Office Market, 4,620,928 of this space was unoccupied representing a vacancy rate of 19.7%. This represents an extreme change from the previous years of 1983 and 1984 which had vacancy rates of 12% and 13% respectively. This can be explained by developers willingness to build office space in 1983 in unprecedented amounts at a time when the market had strong demand (annual absorption = 1,964,907 SF) and moderate vacancy rates (annual vacancy = 12%) (See table 4). This unprecedented surge of office space construction came on

line only recently as new available building space in the 1985 market. This is evidenced by the fact that in 1983 and 1984 2,242,913 SF and 2,501,240 SF of new buildings opened, however in 1985 4,534,016 SF of new bulidings opened. Unfortunately for this same period of time the absorption of office space per year only increased from 1,972,2750 SF in 1984 to 2,883,613 SF in 1985. This resulted in a increase of 1,650,403 SF of additional vacant space in the market raising the vacancy rate from 13.4% in 1984 to 18.2% in 1985 and 19.7% in 1986 (Q1) (See table 4).

TABLE 4

BOSTON SUBURBS OFFICE MARKET DEMAND AND SUPPLY PROJECTIONS

TIME PERIOD	TOTAL RENTABLE END YEAR	% VACANT SPACE	TOTAL VACANT SPACE	OCCUPIED SPACE END YEAR	ABSORPTION PER YEAR	NEW SPACE PER YEAR	VACANT SPACE PER YEAR	ABSORPTION % CHANGE
1981 4TH	10,100,125	7.2%	730,322	9,369,803				
1982 4TH	12,349,872	12.0%	1,484,078	10,865,794	1,495,991	2,249,747	753,756	
1983 4TH	14,592,785	12.1%	1,762,084	12,830,701	1,964,907	2,242,913	278,006	31.3%
1984 4TH	17,094,025	13.4%	2,290,754	14,803,271	1,972,570	2,501,240	528,670	0.4%
1985 4th	21,628,041	18.2%	3,941,157	17,686,884	2,883,613	4,534,016	1,650,403	46.2%
PROJECTED 1986 4th	25,199,166	20.2%	5,084,191	20,114,975	2,428,091	3,571,125	1,143,034	-15.8%
1987 3rd	27,877,509	21.3%	5,941,466	21,936,043	1,821,068	2,678,343	857,275	-25.0%

(Source: Spaulding & Slye Boston Area Report, 1981 - 1986)

The suburban office markets tendency to overbuild during this period of time can be attributed to the fact that developers have been encouraged by a growing high technology market which has been easy to enter because of the percieved strong market and sufficient supply of investment funds from insurance agencies and pension funds. The continued building may also be explained by the fact

that developers have large operations with large workforces and to maintain the staff they have to keep building.

Vacancy rates have been projected to 1987 quarter 3 (Q3) to estimate what the vacancy rates will be when the Crown Colony Place office building is being leased in 1988 (Q1). This estimate has been derived by projecting the total rentable area for the market to 1987 (Q3) 27,877,509 SF and subtracting from it the total projected occupied space for 1987 (Q3) 21,936,043 SF to derive the projected vacant space for 1987 (Q3) 5,941,465 SF which results in a projected vacancy rate for the suburban market of 21.3% (see table 4).

The estimated 21% vacancy rate for this period represents a increase in vacancy for the entire market of 1.8% when it is compared to the 1985 (Q4) vacancy rate of 19.7%. This projection is therefore made with the key assumption that the disequilibrium of office space will continue to be the prevalent pattern of the future as it has in the past. These projections have been calculated with the following additional assumptions 1) the average time period for office building construction is 18 months, 2) the projected annual absorption rate (2,428,091 SF) is equivalent to the average of the annual absorption rates for years of 1984 and 1985 and, 3) the the total rentable area for 1987 (Q3) is derived by adding the space under construction in 1986 (Q1) to the total rentable area for that period giving you a total rentable area of 27,877,509

SF for 1987 (Q3) (See table 4).

THE SOUTH SUBURBAN OFFICE MARKET

The South Suburban Office Market Area represents the southern portion of the entire suburban market. This area is defined by the Spaulding and Slye Office Area Report (Cunningham, 1981-1986; p.8-16) as including the towns of Braintree, Brockton, Canton, Dedham, Hingham, Milton, Norwell, Norwood, Quincy, Randolph and Westwood. As of the 1st quarter of 1986 the South Suburban market had 4,865,600 SF of class A office space with a vacancy rate of 16.1% as compared to 19.7% for the entire Suburban Market. This represents a significant increase for this geographic market when it is compared to the annual vacancy rates from 1982 thru 1985 when they varied between 3.7% and 11.8% (See table 5).

For the 1st quarter of 1986 784,323 SF of space was vacant and 864,500 SF of space was under construction. To derive the projected vacancy rates for this market the space under construction for 1986 (Q1) was added to the existing office space for this period to determine the estimated total office space in the market for 1987(Q3). The projected annual absorption rate for 1986 and 1987 was estimated as being equivalent to the average annual absorption rate for the years 1982 thru 1985. The difference in 1987 (Q3) between the total occupied space which was

The Quincy office market consists of all the offices in the town of Quincy and it presently represents one of the strongest office markets in the state with one of the lowest vacancy rates. As of 1986 (Q1) 2,518,000 SF of space existed in the market, 199,416 SF of this space was unoccupied representing a vacancy rate of 7.9%. However this rate has historically fluctuated from a low of 3% to a high of 15%. The absorption for 1986 (Q1) was 285,900 SF which on an annual basis is stronger than it has been in the past.

The cycle of vacancy rate changes in the Quincy market

THE QUINCY OFFICE MARKET

(Source: Spaulding & Slye Boston Area Report, 1981 - 1986)

PERIOD	TOTAL RENTABLE SPACE	TOTAL VACANT SPACE	TOTAL OCCUPIED SPACE	ABSORPTION PER YEAR	NEW SPACE PER YEAR	VACANT ABSORPTION PER YEAR	% CHANGE
1981 4TH	1,903,000	15.0%	286,000	1,617,000			
1982 4TH	2,503,000	3.7%	92,400	2,410,600	793,600	600,000	(193,600)
1983 4TH	3,050,000	11.5%	352,000	2,698,000	287,400	547,000	259,600
1984 4TH	3,485,000	11.8%	412,600	3,072,400	374,400	435,000	60,600
1985 4TH	4,197,600	10.3%	431,077	3,766,523	694,123	712,600	18,477
1986 4TH	5,073,314	15.2%	769,411	4,303,903	537,380	875,714	338,334
1987 3RD	5,730,099	17.9%	1,023,161	4,706,938	403,035	656,785	253,750
PROJECTED							-22.6%
							-25.0%

 PERIOD RENTABLE VACANT TOTAL OCCUPIED ABSORPTION NEW VACANT ABSORPTION
 END YEAR SPACE SPACE SPACE PER YEAR SPACE PER YEAR SPACE PER YEAR

SOUTH SUBURBAN OFFICE MARKET DEMAND AND SUPPLY PROJECTION

TABLE 5

(see table 5).

vacancy rate of 17.9% for the entire South Suburban market

5,730,099 SF was 1,023,162 SF which is equivalent to a

4,706,938 SF and the total rentable space for 1987 (Q3)

are countercyclical to the total suburban office market vacancy cycle, experiencing low vacancy rates when the suburban market experiences relatively high vacancy rates and high rates when the suburban market experiences low rates. For example in 1981 and 1983 vacancy rates in Quincy were 9.2% and 15.2% (See table 6) while the overall suburban market experienced relatively low vacancy rates for the suburban market of 7% and 12% comparatively (see table 4). This phenomenon would seem to imply that the Quincy market vacancy cycle, and subsequently the Quincy office market, is driven by different economic forces than the overall suburban market. In this regard I would contend that the suburban office market is more directly linked to Boston's high technology economy, while the Quincy office market is linked to Boston's service sector economy and its demand for back office space.

TABLE 6
QUINCY OFFICE MARKET DEMAND AND SUPPLY PROJECTIONS

TIME PERIOD	TOTAL RENTABLE END YEAR	% VACANT SPACE	TOTAL VACANT SPACE	OCCUPIED SPACE END YEAR	ABSORPTION PER YEAR	NEW SPACE PER YEAR	VACANT SPACE PER YEAR	ABSORPTION % CHANGE
1981 4TH	1,241,000	9.2%	114,000	1,127,000				
1982 4TH	1,617,000	3.2%	51,200	1,565,800	438,800	376,000	(62,800)	
1983 4TH	2,164,000	15.2%	328,000	1,836,000	270,200	547,000	276,800	-38.4%
1984 4TH	2,194,000	12.3%	269,600	1,924,400	88,400	30,000	(58,400)	-67.3%
1985 4th	2,421,000	7.8%	188,900	2,232,100	307,700	227,000	(80,700)	248.1%
PROJECTED								
1986 4th	2,607,857	5.9%	153,657	2,454,200	222,100	186,857	(35,243)	-27.8%
1987 3rd	2,747,999	4.6%	127,224	2,620,775	166,575	140,142	(26,433)	-25.0%

(Source: Spaulding & Slye Boston Area Report, 1981 - 1986)

A brief review of Quincy's economic history will help

to substantiate this. During the 1960s and 1970s Quincy lost a fair amount of its income as retail stores moved from downtown Quincy to the regional malls. However throughout the 1980s the Quincy downtown economy has been revived by an extension of the MBTA Redline and an influx of service sector businesses moving from Boston to Quincy and building approximately 1.2 million SF of office space since 1981. The increased demand has effected the office space characteristics of the Quincy office market, In 1982 the absorption rate for office space in the Quincy office market increased noticeably to a level of 438,800 SF annually (see table 6). This change was a direct result of the 1.2 million SF of Boston service sector office space that entered the market in 1981. Today as much as 60% of the office space in Quincy can be described as back office space which is directly linked to the service sector growth of Boston's downtown economy and is usually built to accomodate insurance companies, banks or service sector related companies. A list of companies that have recently located offices in Quincy include: Kemper Insurance 130,000 SF, Stop & Shop 250,000 SF, Blue Cross Blue Shield 85,000 SF, Commercial Union 120,000 SF and CNA 150,000 SF.

The Quincy office market is unique to most markets in the suburban area because it is driven by two economic sectors, the high technology sector and Boston's service sector. While the high technology sector has been the dominant economic force for the suburban office market it

affects less than 40% of the Quincy market. On the other hand Boston service sector economy has recently fueled demand for more than 60% of the office space in Quincy. This is substantiated by the fact that the strength of these economic sectors has correlated positively with the strength of the geographic office markets they drive. In the past few years the high technology sector has experienced a reduced growth rate, and in response to the growth reduction in Boston's suburban office market has decreased. This is evidenced by the fact that the absorption growth rate for office space in the suburban market has leveled off between 1983 and 1985 with the percentage change in absorption being 0.4% in 1984 (see table 4). On the other hand the the financial services sector in Boston has recently been strong and in response to this the recent rate of the change for absorption of office space in the Quincy market has been strong at 248% in 1985 (see table 6). This compares to a rate of change for absorption of 85% and 46% for the south suburbs and suburban market.

Vacancy rates for the Quincy office market have been projected to be 4.6% in 1987 (Q3). This estimate has been performed so that a more accurate vacancy rate can be used in the financial analysis for the Crown Colony Place office. This estimate assumes that vacant office space in the Quincy market for this period is equivalent to the difference between the projected total rentable area for this period and the total projected occupied space for this period. The

net difference has been estimated as 71,000 SF (see table 6). The 1987 (Q3) annual office space absorption rate 166,575 SF has been estimated as being equivalent to the average annual absorption rate for the years of 1983 and 1984. The projected total rentable area for 1987 (Q3) has been estimated by adding the space under construction in 1986 (Q1) to the total rentable area for that same period.

This optimistic projection of a 4.6% vacancy rate assumes that Quincy's service economy will be as strong in the future as it has been in the past (See table 6). Economic projections for the Quincy economy support this scenario. In 1982 and 1983 the Quincy economy experienced employment growth of 21% in the service sector and 38% in the FIRE Sector. Data Resources is projecting that FIRE sector of the economy for the state will hire 32,550 employees between 1985 and 1990.

Because the Crown Colony Place site is further south than most offices in Quincy it is expected that it will be influenced by the Route 128 high technology market more than most offices in Quincy. As a result of this the 1987 (Q3) vacancy rate for the Crown Colony site has been conservatively estimated to be equivalent to the average historic rate of 7.25% for Quincy, which is considerably greater than the 4.6% projected rate for Quincy.

FORCASTED OFFICE RENTAL GROWTH RATE

In most office markets office rents and their relative rate of growth are directly linked to the vacancy rates in that market. As vacancies increase the supply of office space increases at a greater rate than the rate of increase for demand in the market. The net effect of this is a reduction or reversal of the rental growth rate in the market due to the fact that space is more abundant and the owners are willing to lease it at lower rates. Historically in Quincy, when vacancy rates have increased to an above average level as they did in 1983 and 1984 at 15.2% and 12.3% respectively, rental rate growth has stopped and rents were frozen at \$18.25 per square foot for those two years. However the Quincy market vacancy rate has been projected at 4.6% in 1987 (Q3) (see table 6). This is lower than the historic average for Quincy which is 7.25%. Consequently I would estimate the office market rental growth rate for 1987 (Q3) to be greater than the historic rate due to the fact that vacancies are estimated to be less. However to be conservative I have estimated it to be equal to the historic rental growth rate for Quincy which in the past has been 3%. Due to the cyclical nature of vacancy rates. I would recommend that during the operating and management phases of the project that market vacancy and absorption rates be monitored so that the rental growth rate can be adjusted if vacancy rates increase to above historic averages. This

would obviously be most important for the years that space is being re-released.

TABLE 7
HISTORIC AND PROJECTED RENTAL AND VACANCY RATES
QUINCY MARKET 1981-1990

	RENTS	VACANCY RATES
1981	\$16.33	8%
1982	\$17.37	3.5%
1983	\$18.25	17%
1984	\$18.25	13.1%
1985	\$18.75	8.9%
PROJECTED-----		
1986	\$19.70	8.1% (Q1)
1987	\$20.34	
1988	\$20.98	
1989	\$21.62	
1990	\$22.26	

Source: (Spaulding and Slye Area Report, 1981 - 1986)

To determine historic rental growth rates I tracked rents for four specific buildings in the Quincy market from 1981 to 1985 and projected the average rental rates for these buildings forward through 1990 using a linear regression as illustrated in table 2. The historic average market rent annual growth rate was determined to be 3%. The regression was statistically significant with a positive correlation between rents and dates equal to .964 .

CROWN COLONY PLACE RENTAL RATE DETERMINATION

It was difficult to estimate the rental rates for class A office space on the Crown Colony site for several reasons. Office rents are usually determined by checking rents for

comparable office buildings in the immediate vicinity of the site in question, The Crown Colony site has no comparable office buildings within a half mile of the site making this method nonfeasible. Rental rate determination for the site has been further complicated by the fact that the Quincy Braintree micro economy has a very wide range of rental rates for class A office space, ranging from \$13.25 per square foot to \$21.00 per square foot.

Because of these conditions a methodology has been applied that disaggregates and abstracts key variables that affect office rents and identifies the market value for these attributes in the Quincy Braintree market. The analysis will statistically determine the variables effect on the offices value for this particular market. An example of a rent affecting variable would be the site's relative proximity to major highways. Linear regression analysis has been used to identify and quantify significant office attribute variables and their affects on office rents in the Quincy Braintree market (Addanki, 1985; p.2-34). This analysis has been performed on a sample of 36 office buildings in the Quincy Braintree market as described in appendix III. The key variables that were choosen as rent determinants were chosen because they were supported by literature on current office market determinants or they were in support of a causal relationship regarding rent being hypothesized as part of this thesis. The rental value associated with each of the ten variables was added to a

base market rent that every building shared, so that for any particular building incremental rent values were determined for specific attribute characteristics of the building, and these values were added to the buildings base rent to determine its per square foot market rent. The per square foot rent for the Crown Colony office building has been estimated at \$20.53.

The ten variables for this analysis are described in detail below. For each variable a market rental premium or penalty is identified which is indicative of the variables affect throughout the entire market, a site value is shown also which is the variables specific effect on the Crown Colony Place site, and finally a site cumulative rent is shown which represents the cumulitive rent for the Crown Colony Place site up to that point (See table 8).

BASE RENT = \$20.26

BUILDING AGE: Rent Premium = $-\$.33$ Per Year
Site Value (-2) = $\$.66$ Site Cumulative Rent = \$20.92

The age variable was the most statistically significant of the ten variables in terms of the strength of its causal relationship to rental value. For each year of increased age in a building a $-\$.33$ penalty fee would be subtracted on a per foot basis from the base rent. The Crown Colony Office Site will recieve a premium for this variable because it will be constructed two years in the future. However the average age for office buidings in the survey was 6.86 years with a rental penalty of $-\$.26$. This relationship can be

explained by the fact that older office buildings have been leased for a historic rental rate and that the older rents have not kept up with the rental rate growth in the actual market.

ACCESSIBILITY TO LABOR POOL:

Distance to Public Transportation: Base Rent = \$1.68
Distance to Highway: Base Rent = \$2.61
Distance to Public transportation: Site Value = \$1.68
Distance to Highway: Site Value = \$2.61
Cumulative Site Rent = \$25.21

Distance from the site to public transportation stations and major highways is important because these distances affect the commuting costs for workers to the site and the sites accessibility to laborshed areas. As the distance between these transportation elements and the site decreases the accessibilty to labor shed areas for the site increases and the cost of commuting to the site decreases. Consequently the operational efficiency of a office increases when it is closer to these transportation elements. This is because labor is less expensive because there is a greater supply of it at reduced commuting costs. This results in increased demand for sites at good locations and increased land costs resulting in higher office rents at these locations. The results of the regression analysis support this theory. Offices in the sample that were within one half mile of public transportation or a major highway recieved a per square foot rent premium of a \$1.69 and \$2.61 respectively. The Crown Colony site accomodated both of these conditions and it recieved a total rent premium of

\$4.29 per SF for these attributes.

DISTANCE TO BOSTON: Rent Penalty = $-\$0.62$ per mile
Site Value (8.5 miles) = $-\$5.27$
Cumulative Site Rent = $\$19.94$

It was hypothesized that as distance from Boston to the site increased the office rental rate would decrease. This is based on the theory that Boston is a center of regional activity and offices that are closer to it have greater access to a wide number of services that they depend on. This increases efficiency for these offices because the travel and time expenses involved in acquiring these services is decreased. The results of the regression analysis supported this hypothesis. For every mile of increased distance between office buildings and downtown Boston a penalty of $-\$0.62$ was applied. For the 36 offices in the sample the average distance of separation was 7.73 miles with a rent penalty of $-\$4.79$. The Crown Colony site is 8.5 miles from downtown Boston with a higher rent penalty of $\$5.27$.

DISTANCE TO COMMERCIAL: Rent Premium = \$2.17
Site Value (over .5 miles) = \$0
Cumulative Site Rent = \$19.94

Close proximatey to commercial areas for office uses is thought to be an asset (Hough; Krate. 1983; p. 40-54). One explanation for this is that employees of an office use the office for personal business as well as formal work. The results of the regression analysis supported this theory. Offices that were located within one half mile of the commercial area recieved a rental premium of \$1.68 per square foot. the Crown Colony site is further than half a mile from any commercial use. It therefore recieved no rent premium.

OFFICE PARK CLASSIFICATION: Rent Premium = \$.63
Site Value (affirmative) = \$.63
Cumulative Rent = \$20.57

The regression analysis supported the theory that offices located in office parks or in clusters benefit from this association. The Crown Colony Place site and fifty five percent of the offices in the office survey were located in office parks and as a result of this they recieved a rental premium benefit of \$.63 per SF.

NUMBER OF FLOORS: Rent Penalty = -\$.12
Site value (3 floors) = -\$.36
Cumulative Site Rent = \$20.21

The average height of the office buildings in the office survey was 4.5 stories. The hypothesis put forward was that rent would increase as number of stories increased

due to improved view. The regression analysis did not support this theory and for every additional floor added to a building in the sample a rental penalty of \$-.12 occurred. The Crown Colony office building is three stories and it receives a \$-.36 per square foot rental penalty for this attribute.

TOTAL SQUARE FEET: Rental Premium = \$.37 per 100,000 SF
Site Value (120,000 SF) = \$.45
Cumulative Site Rent = \$20.66

The average size for a office building in the sample was 113,000 SF. It was statistically determined that for every 100,000 SF of office space in a building a per square foot rental premium of \$.37 would occur. The Crown Colony Place office building is 120,000 SF and it will receive a rent premium of \$.45 per square foot.

CONSTRUCTION STATUS: Rent Premium = \$.20
Site Value (affirmative) = \$.20
Cumulative Site Rent = \$20.86

Buildings in the survey group that were under construction or being rehabilitated received a \$.20 per SF rent premium. The Crown Colony Place Office building falls into this category and it will be eligible for this rent premium.

TOWN CLASSIFICATION: Rent Penalty = \$-.33
Site Value (Quincy) = \$-.33
Final Cumulative Site Rent = \$20.53

The Crown Colony Place site and half of the buildings in the office building sample are located in Quincy. These buildings recieved a rental penalty for this condition in the amount of $-\$.33$ per square foot while Braintree recieved no penalty. This penalty would support the the theory that the difference in commercial property taxes between these municipalities is being passed forward to the tenants because the office tenants in Braintree are paying higher rents than the tenants in Quincy while the commercial property tax in Braintree exceeds the tax rate in Quincy by 28%. This fact would also imply that the demand for property in the market is price inelastic as supported by William Wheaton's theory that differences in property taxes between towns will be borne by the property users when the demand for property is price inelastic in that market (Wheaton, 1984; Nat Tax J.)

TABLE 8
DISAGGREGATED SITE RENT FOR CROWN COLONY PLACE VS. AVERAGE
RENT FOR QUINCY AND BRAINTREE

		CROWN COLONY PLACE =====		MARKET AVERAGE =====	
Attribute	Attribute	Value	Value	Avg.	Value
Description	Value	Change	Change	Attribute	Change For
		For Rent	For Rent	Value	Avg. Rent
		Attribute	Attribute		Attribute
=====					
Base Value		\$20.26			\$20.26
Age	-2 yrs.	\$.66		6.86 yrs.	-\$2.26
Distance to Highway	< 1/2 mile	\$2.61		59% < 1/2	\$1.53
Distance to Public T	< 1/2 mile	\$1.68		27% < 1/2	\$1.68
Distance to Commercial Office Park	> 1/2 mile	\$0		3% > 1/2	\$2.10
Classification	< 1/2 mile	\$.63		55% < 1/2	\$.34
Distance to Boston	8.5 miles	-\$5.27		7.73 miles	-\$4.79
No. Floors	3 Floors	-\$.36		4.5 Floors	-\$.54
Square Feet	120,000 SF	-\$.45		113,544	-\$.65
Construction	Yes	\$.20		33% yes	\$.06
Town	Quincy	-\$.33		50% Quincy	-\$.15

TOTAL RENT		\$20.53			\$17.65

(Source: Appendix II & III)

The per square foot rental value for office space in the Crown Colony Place office building has been estimated to be \$20.53. The accuracy of this estimate is supported by the fact that the rent for an average office building with average attribute values has been calculated by this method to be equal to \$17.65 per SF which deviates from the real average of \$17.54 by only \$.12. The Crown Colony Place rent exceeds the average per square foot rental rate for office space in the Quincy Braintree market by \$2.88 per square foot. This difference in rental rate is attributable to the fact that the Crown Colony Place site has

significantly better characteristics than the average site in the Quincy Braintree market in terms of age, and closer proximity to highway and public transportation as illustrated in table 8. The \$20.53 per square foot rental estimate has been used in the financial analysis of this thesis as a key component for determining the financial feasibility of this project.

CHAPTER IV: COST ANALYSIS

To evaluate the costs for this project I used a parametric cost analysis system (See table 9). This system measures cost by items such as tons of steel in the structure and then multiplies the unit quantity by the unit cost to get the total cost of the item. Unit quantities are based on the building design parameters and unit costs have been taken from the Means Systems cost catalog (Robert Snow Means Co. 1985; p. 9, 98, 124, 195, 376). The cost categories include soft costs (land, fees for professional services, construction loan interest) at \$5,136,739 and hard costs (Building, Parking and Landscaping) at \$10,261,260 for a total project cost of \$11,975,824 which includes a 5% contingency. Mitigation requirements for building on the site's unique bedrock surface have a estimated premium cost of \$203,000. The mitigation technique proposed is to elevate the site with fill to a level of four feet above the bedrock so that utilities for the building can be placed on the site. Areas of the site not requiring utility placement will be elevated two feet.

The number of stories for the building is determined by the fact that office buildings have the maximum cost efficiency between three and four stories where the average per square foot cost is \$48.05. The square foot costs decrease as height increases between one and four stories because the premium costs of foundation are distributed

between more square feet. Above four stories, however, a cladding system is required and structural penalties for foundation and frame occur so that SF costs do not become cheaper until you reach about twelve stories. Using the Means Square Foot Cost Catalog for 1986 (Robert Snow Means Co. 1985; p.162-165). I found that a 5 to 10 story office building has a square foot cost of \$55.60 and that a 2 to 4 story office building has a square foot cost of \$48.05. Averaging this difference over the five to ten story height level gives you a per square foot cost increase of \$1.88 for every floor of building that you add between five and ten stories.

The proposed office building will consist of a three story 280 foot by 80 foot rectangular portion and a three story 230 foot by 80 foot rectangular portion. The story to story height will be 12.5 feet with a steel frame structural system composed of 25 foot by 25 foot bays with a floor constructed of light gauge deck and concrete fill. The exterior will have six foot high ribbon windows and a solid portion of facade of granite spandrels. A summary of total costs is provided in table 9 with supporting exhibits.

TABLE 9
TOTAL PROJECT CONSTRUCTION COSTS (HARD COSTS)

```
=====
=====
Gross Area: 120,000 SF
No. Stories: 4
Floor to Floor Height: 12.5 FT
Perimeter: 1160 LF
Facade Area: 43,500 SF
Facade Floor Area Ratio: .362
=====
```

BUILDING:	Building= \$6,482,080
PARKING: (240 spaces @ \$405 each)	Parking= \$97,200
LANDSCAPING: (2.38 acres @ \$12,600 per acre)	Landscaping= \$30,064
SIDEWALK:	Sidewalk= \$3,543
FILL: (20,972 CY @ \$9.68 per CY) (@ \$8.25 per yd, \$.63 compaction) (@ \$.80 per yd, to spread)	Fill= \$203,008
LIGHTING: (10 lights @ \$1500 each)	Lighting= \$15,000
TREES: (45 Trees @ \$150 each)	Trees= \$6750
UTILITIES: (160 LF @ \$9.00 per LF) (8" Water @ \$2.00 per LF) (U G Electric @ \$5.00 per LF) (8" Sewer @ \$2.00 per LF)	Utilities= \$1440
TOTAL COSTS	\$6,839,085

=====

DETAILED BUILDING COSTS

=====

1) FOUNDATION:	Sub Total=\$450,800
Footings: (93 @ \$1600 each)=	\$148,800
Perimeter Beam: (1,160 LF @ \$75 per LF)=	\$87,000
Miscellaneous: (Elevator & Stairs)=	\$95,000
Slab on Grade: (40,000 SF @ \$3.00 per SF)=	\$120,000
2) STRUCTURE:	Sub Total= \$1,348,000

Structural Steel: =	\$663,000
(8.5 lbs per SF @ \$1,300 per ton)	
Deck and Concrete Fill: =	\$540,000
(120,000 SF @ \$4.50 per SF)	
Fireproofing: (@ \$10.00 per SF) =	\$120,000
Stairs and Rails: =	\$25,000
 3) EXTERIOR WALLS:	 Sub Total=\$1,329,080
6ft/12.5ft= 48% window area	
6.5ft/12.5= 52% granite area	
Glazing \$26 * 48%= \$12.48	
Granite \$28 * 52%= \$14.56	
SF cost Facade= \$27.04	
Exterior Wall (43,500sf @ \$27.04)=	\$1,176,240
Fire Shaft (Levels * Perim * \$2.00)=	\$6,960
Head & Sill Trim=	\$20,800
(6 * \$1,160 LF * \$3.00)	
Penthouse=	\$50,000
Exterior Doors=	\$75,000
 4) Roof/ Moisture Proofing:	 Sub Total=\$320,000
(@ \$8.00 per SF)	
 5) Interior Construction:	 Sub Total=\$535,200
(@ 4.46 per SF)	
 6) Elavators: (@ \$100,000 each)	 Sub Total=\$200,000
 7) HVAC: (@ \$8.90 per SF)	 Sub Total=\$1,068,000
 8) PLumbing: (@ \$1.78 per SF)	 Sub Total=\$213,600
 9) Sprinklers: (@ \$1.34 per SF)	 Sub Total=\$160,800
 10) Electrical: (@ \$7.14 per SF)	 Sub Total=\$856,800
 Total Direct Cost Bldg.	 Sub Total=\$6,482,080
 TOTAL COST BUILDING: (@ \$54.01 per SF)=	 \$6,482,080

CHAPTER V: FINANCIAL ANALYSIS

The objective of this financial analysis is to identify and evaluate a range of financing options that are presently available in Boston's institutional lending market for financing a speculative office building of this type. Several key hypothetical assumptions have been made about a developer as well as the specific economic and market environment of the office site. These assumptions have been formulated so that different ownership and financing options for the project can be evaluated to determine if and under what conditions development will be feasible.

Variables which have significant affect on the project income stream and project economics are vacancy, market rent and operating costs. These variables have been determined through careful site specific market research. The bid market rent for class A office space on the site has been estimated at \$20.53 per square foot. This estimate is based on a regression analysis that used a data base of 36 office buildings in the Quincy - Braintree market and derived this value on the basis of the building and the sites specific attribute characteristics. The rental market growth rate was estimated to be 3% which is consistent with historic rental growth rates for Quincy. It is assumed that this market growth rate is a function of the markets absorption rate which is driven by employment growth for the area. As described on page 18 of this report the prospects for

employment growth for the SCSDA are strong especially in the Finance Insurance and Real Estate sector. The per square foot operating expenses for the office building have been taken from the 1985 BOMA Experience Exchange Report (Building Owners and Managers Association International, 1985; p.9, 31, 205, 363) and projected forward at a annual growth rate based on historic rates for suburban Boston.

It has been assumed that the developer for this project has minimal capital and his goal in financing this project is to explore and choose the best option. If necessary the developer will use his limited capital and sweat equity to assemble the capital needed to purchase the land, build any improvements and prepare the project to generate revenue. Several financing options have been explored, in particular a short term bullet loan, a participating mortgages, and a long term fixed rate mortgage.

The first step of this analysis has been to evaluate the economics of this project in a stabilized year to determine if the basic economic returns for the project merit proceeding with it. The project's cash flow is stabilized in year three and the gross revenues are equal to \$2,217,240, after subtracting vacancies from this figure the project's net revenues are equal to \$2,057,492 and after deducting expenses the project has a net operating income of \$1,432,117 (see Appendix I, exhibit 4). This gives the project a return on total assets of 11.96% (See table 12) implying that the project will be beneficial and create

positive leverage for any equity investor who can acquire financing at a rate under 11.96%.

TABLE 10
PROJECT STABILIZED CASH FLOW YEAR THREE

Gross Income	\$2,217,240	(rent @ \$20.53 a SF)
- Vacancy	\$159,748	(vacancy @ 7.25%)

Net Income	\$2,057,492	
- Operating Expense	\$625,375	(\$5.60 a SF)

Net Operating Income	\$1,432,117	

(Source: Appendix I, Exhibit 4)

TABLE 11
TOTAL PROJECT COST

Land	\$1,725,516	(\$352,146 per AC)
Building	\$6,482,080	(\$54.06 per SF)
Parking	\$97,200	(\$405 per space)
Landscaping	\$259,805	
\$ Site		
Architecture & Engineering	\$271,523	
Development Fee	\$279,668	
Sub Total Improvements	\$9,115,792	
Total Indirect	\$948,468	
Leasing	\$197,000	
Construction Interest	\$1,714,564	(@ 11.5%)

Total Estimated Cost	\$11,975,824	(\$99.79 per SF)

(Source Appendix I, Exhibits 1 & 2; p.32-33; table 9)

TABLE 12
PROJECT RETURN ON TOTAL ASSETS

$$\text{ROR} = \text{NOI/TOTAL PROJECT COST} = 11.96\%$$

The financing options that have been considered for this project are options that are presently available in Boston's institutional lending environment for this type of speculative office building. The options that have been considered are: 1) a three to four year interest-only bullet loan with a floating interest rate that is 200 to 300 points above the five year government bond rate, 2) a participating mortgage with a fixed below market interest rate of 9% with the lender participating in the cash flow and the residual returns of the project so that the overall yield to the lender has an IRR of 12.5%, (Dana Brit, Boston Financial Technology Group, 1986), and 3) financing of the project through a insurance company mortgage at a 9.25% fixed interest rate with a 1 point origination fee, ten year term and a thirty year amortization period (Prudential Insurance Company, Real Estate Division, 1986) (See Table 13). Each of these options was evaluated for their equity requirements and their risks (See table 14).

TABLE 13
PROJECT FINANCE OPTIONS

1) BULLET LOAN: Rate = 9.8% (floating Rate)
 Points = 0
 Term = 3 - 4 Years
 Amortization = 30 Years
 Payment = \$1,173,630
 Mortg constant = 9.8

NOI = \$1,432,117
 Debt Coverage Ratio = NOI / Debt Payment = 1.22
 Maximum Loan = NOI / DCR / Mk = \$11,978,228
 Equity:

Max Loan	\$11,978,228
Total Cost	\$11,975,824

 \$2,404 (surplus from mortgage)

- Issues: + No equity required
 - Principle is not paid off
 - Risk of refinancing at a higher rate
 - Risk of floating rate debt service

2) PARTICIPATING MORTGAGE Rate = 9% (fixed, participation so
 IRR = 12.5%)
 Points = 0
 Term = 10 years
 Amort = 30 years
 Payment = \$1,165,247
 Mortg.k = 9.73%

Debt Coverage Ratio = 1.229
 Maximum Loan = \$11,976,054
 Equity: Max Loan \$11,976,054
 Total Cost \$11,975,825

 \$229 (surplus from mortgage)

- Issues: + Lender cash flow participation junior to debt
 servic
 - Developers share of cash flow and residual value are
 decreased

3) INSURANCE COMPANY MORTGAGE

Rate = 9.25%
Points = 1
Term = 10
Amortization = 30
Payment = \$1,191,594
Mortg Constant = 9.95%

Debt Coverage Ratio = 1.201
Maximum Loan = \$11,984,292
Equity: Maximum Loan \$11,984,292
Total Cost \$12,078,467

\$94,175 (equity required)

Issues: + Lowest effective fixed financing cost at acceptable risk.
- Equity requirement of \$94,125

The insurance company mortgage has been chosen as the most suitable form of financing for this project for several reasons. It is the most effective loan in terms of repaying the principle at the lowest effective rate for the mortgagor. The cost of borrowing for the mortgagor is 9.86%; however for the bullet loan it is 9.8% with no principle being paid. The bullet loan is subject to fluctuation when the interest rate floats and debt service payments change. For the participating loan the cost of debt is 9.73% excluding mortgagor participation, which could raise the effective cost of debt as high as 13.7%. The insurance company mortgage has the highest break even ratio at 81.02% compared to 79.8% for the participating mortgage and 80.2% for the bullet loan (See table 14). I would contend however that these risk levels are so close and that the chance of vacancies reaching these levels in Quincy is very remote, so that these risk levels can be regarded as equal. However the bullet loan has a additional risk factor

because it has to be refinanced in three to four years leaving the mortgagor exposed to the possibility that he may have to refinance the project at a higher rate. The bullet loan also has the additional risk consideration that the debt service payments are subject to fluctuation as economic conditions change. All of the loans except the insurance company mortgage provide a surplus of cash from the mortgage and require no equity. Because of the one point origination fee for the insurance company mortgage it will require \$94,175 in equity. However this loan lacks the refinancing and floating interest rate risk of the bullet loan and it has a much lower effective borrowing cost to the developer than the participating loan, so it is well worth the extra \$94,175 in equity.

TABLE 14
RISK ANALYSIS

Loan Type	Payment	Break Even Ratio:	Operating Expenses & Debt / Gross
Bullet Loan	\$1,173,630	80.2%	
Participating Loan	\$1,165,247	79.8%	
Insurance Mortgage	\$1,191,594	81.02%	

The financing options being considered for the project all have a cost of debt between 9.86% and 9.73%. creating a range of positive leverage for the project between 2.29% and 2.42%, depending on the financing option chosen (see table 15). This would imply that the project is economically viable if the market and financing assumptions are valid.

TABLE 15
FINANCIAL LEVERAGE ANALYSIS

Finance Type	Mortgage Constant; Mk/Principle
1) Bullet Loan (Floating Rate)	\$1,173,630/\$11,975,824 = 9.8%
2) Participating Mortgage (Excluding Participation)	\$1,165,249/\$11,975,824 = 9.73%
3) Insurance Co Mortgage	\$1,191,594/\$12,078,467 = 9.86%

PREFERRED OPTION ANALYSIS

A computer pro-forma model developed by John McMahan of Stanford University has been used as a analytical tool to financially evaluate the insurance company mortgage scenario. The model creates a discounted cash flow analysis in which annual cash flows and residual are compared with original capital investment. The flows have been combined and discounted at 14% to come up with a after tax net present value of \$2,671,286 for the project.

The input variables for the model are displayed in appendix I as exhibit 1. A more condensed summary of these variables is also included in the text (see table 16).

TABLE 16
INSURANCE MORTGAGAE PRO - FORMA
FINANCIAL VARIABLES

LOAN: Loan Amount: \$11,975,824

Interest Rate: At 9.25% represents the current note on a mortgage property in Boston with Prudential Insurance Co. as the mortgagee.

Ammortization: 30-year

Term: 10-year

Debt Coverage Ratio: 1.201

CONSTRUCTION LOAN:

Interest Rate: 225 points above the permanent loan rate at 11.5%.

Term: 24 months based on construction duration.

Amortization: 30-Year

DISCOUNT RATES: Developer @ 14%

UNIT COST/ Development Phase: Building: \$6,482,080

UNIT COST/ Operating Phase: Operating Expenses
\$5.60 per SF
(BOMA Experience
Exchange Report)

SALE: Stabilized Cap Rate = 10%
Disposition Cap Rate = 10%

TAXATION: Ordinary Income = 50% ; Capital Gains = 20%

LEASING: Vacancy: 7.25% mean historic vacancy rate for the Quincy office market in the last 5 years.

Turning Year: 50 % of year turning space will be vacant.

Tenant Mix: 20% three-year tenants.
80% five-year tenants.
(based on local Mkt information)

Revenues: Market Building Rent; \$20.56
(based on specific site attributes and their market values, see page 21)

GROWTH FACTORS: Market Rents = 3%
(based on historic increases)

Operating Expenses; 4% (based on historic change for expenses 1981 to 1985 BOMA Office Exchange Report)

Financing for the base case scenario is secured with a \$11,975,824 mortgage with an interest rate of 9.25%, a 10 year term, and a 30 year amortization period. The maximum loan amount of \$11,975,824 has been determined by dividing the stabilized NOI for year 3, \$1,432,117 by a 1.20 debt coverage ratio and a mortgage constant of 9.95% (see table 14, #3). The total project cost of \$12,078,467 includes a 1 point origination fee and it exceeds the maximum loan amount by \$94,175 which has to be contributed to the project as equity. In addition to this the developer has to have a capital reserve or financing available in years 5 and 7 to cover low and negative cash flows, however this occurs in all of the scenarios because they all have nearly equivalent annual debt service payments.

The cash flow characteristics of the base case (see table 17) indicate that the project's tax shelter benefits have a NPV value which discounted at 14% is equal to \$1,311,689, and that the after tax cash flow of the project has a NPV of \$2,671,286.

TABLE 17

PROJECTED CASH FLOW EXHIBIT
INSURANCE COMPANY MORTGAGE

Financials:		Market Variables:	
Amort =	30	Market Rnts=	\$20.54
Interest =	9.25%	Market Rnts	
Mortgage =	\$11,975,824	Growth Fac =	3.00%
Equity =	(\$94,194)	Occupancy =	92.75%
Costs:		Operating Variables:	
Total Cost =	\$10,261,260	Operating	
Const.Loan =	\$1,714,564	Growth =	4.00%
Total Cost =	\$11,975,824	Oper Exp =	\$5.60

YEAR	TOTAL REVENUE	- EXPENSES & VACANCY	= NOI	- TURNING COSTS	- DEBT SERVICE	= CASH FLOW AFTER DEBT	+ TAX SHELTER	= AFTER TAX CASH FLOW
1987	\$0	\$0	\$0	\$0	(\$619,749)	\$1,291,815	\$239,643	\$1,531,458
1988	\$514,373	(\$519,224)	(\$4,851)	\$0	(\$1,377,220)	(\$1,582,071)	\$343,658	(\$1,238,412)
1989	\$2,057,492	(\$625,375)	\$1,432,117	\$0	(\$1,191,611)	\$240,505	\$221,419	\$461,924
1990	\$2,057,492	(\$625,375)	\$1,432,117	\$0	(\$1,191,611)	\$240,505	\$170,304	\$410,809
1991	\$2,015,452	(\$629,890)	\$1,385,562	(\$126,192)	(\$1,191,611)	\$67,759	\$204,010	\$271,769
1992	\$2,082,552	(\$635,496)	\$1,447,056	\$0	(\$1,191,611)	\$255,445	\$168,381	\$423,825
1993	\$2,070,059	(\$676,463)	\$1,393,596	(\$419,014)	(\$1,191,611)	(\$217,029)	\$216,089	(\$940)
1994	\$2,249,749	(\$727,520)	\$1,522,229	(\$140,897)	(\$1,191,611)	\$189,721	\$147,857	\$337,578
1995	\$2,329,619	(\$736,487)	\$1,593,133	\$0	(\$1,191,611)	\$401,521	\$106,011	\$507,532
1996	\$2,329,619	(\$736,487)	\$1,593,133	\$0	(\$1,191,611)	\$401,521	\$99,438	\$500,959
1997	\$2,286,577	(\$745,244)	\$1,541,333	(\$157,340)	(\$1,191,611)	\$192,382	\$89,987	\$282,369
1998	\$2,387,160	(\$816,753)	\$1,570,406	(\$503,150)	(\$12,033,903)	\$4,823,984	\$116,108	\$2,830,673

TAX SHIELDS
AFTER TAX CASH FLOW
NPV @ 14% >>>> \$1,311,689 \$2,671,286

(Source Appendix I, Exhibits 4,5,6,& 9)

The project's gross revenues including vacancies from year one to year thirteen has a yearly stabilized value within the range of \$2,057,492 for 1990 and \$2,329,619 for 1996 (see table 17 Total Revenue Column). When operating expenses are subtracted from the gross revenues they are reduced by 30% approximately to derive a net operating income of \$1,432,117 (see table 17 Net Operating Income Column). This emphasizes the project's sensitivity to

operating expenses which is further elaborated in the financial sensitivity analysis portion of this chapter. The project's NDI is further reduced when the refurbishment costs for the turning leases are due in years 5, 7, 8 and 11 (see table 17 Turning Costs Column). These costs result in a negative cash flow for year seven and minimal cash coverage of debt service for years 7, 8, and 11. Under extreme economic conditions the reduced cash flow may require that a capital reserve or financing may have to be arranged and paid by the developer for the years that the cash flow is marginal.

The project's after tax cash flow (see Table 17) has a net present value discounted at 14% of \$2,671,286 which includes tax shelter benefits with a net present value of \$1,311,689. The developer's inability to use these excess tax shelter benefits and his limited capital provide him with a strong incentive to copartner this project with an equity partner who would pay the \$94,194 in project equity in exchange for a percentage ownership and tax shelter benefits from the project. The equity partner's percentage ownership would be defined by the rate of return he expects from his equity investment which would be a function of the projects risk. Hypothetically if he wanted a 150% return on investment he would need to receive cash flow and residual tax benefits with a present value of \$141,291. His percentage ownership could be computed backwards from this figure with the understanding that his share of tax shelter

is proportionate to his equity and financed debt (basis) in the project.

FINANCIAL SENSITIVITY ANALYSIS

Five of the project's financial variables have been tested to evaluate the affect of their independent and simultaneous change upon the project's financial performance. For each variable a range of different values have been substituted to simulate different market and economic conditions. From this evaluation information the variables with the greatest potential for financially impacting the project have been identified.

This analysis has been performed on the following variables: 1) Revenue Variables—market building rent, market building rent growth factor, operating expense growth factor; 2) Leasing Variable - occupancy rate, and 3) Operating Variable - operating expense. Market rent and occupancy rate have been identified as the most significant variables in terms of the project's financial sensitivity to their change. It has been determined that market rent will only have to decrease by 28% from its base case value of \$20.54 per SF to \$14.78 per SF to reduce the projects net present value (NPV) of \$2,671,286 to \$0 making the project financially nonfeasible. The occupancy variable would also only need to decrease by 28% from its base value to reduce the projects NPV to \$0 making the project nonfeasible. The

other variables would have to independently deviate from their expected base values by 81%, -192% and 392% to result in a \$0 NPV for the project (see table 18). These levels of change are of a greater magnitude and have a much lower probability of occurring, therefore there assessed financial risk upon the project is less significant.

TABLE 18
 FIANANCIAL VARIABLES PERCENTAGE CHANGE FOR A \$0 PROJECT NPV

Financial Variable	Financial Variable Base Value	Financial Variable \$0 NPV Value	Financial Variable % Change From Base Value
Rents	\$20.54	\$14.78	-28%
Occupancy	92.75%	72%	-28%
Operating Expenses	\$5.60	\$10.50	81%
Market Rent Growth Factor	3%	-2.77%	-192%
Operating Expense Growth Factor	4%	19.71%	392%

(Source:Appendix IV)

For the variable with the highest level of financial risk for the project market rents, and occupancy rates, simultaneous sensitivity analysis has been performed. This analysis evaluates the affects of simultaneous change for these variables upon the projects NPV and the different combinations of these variable values that result in a \$0 NPV for the project (see table 19).

TABLE 19
 RANGE OF SIMULTANEOUS VALUES FOR MARKET RENT AND OCCUPANCY
 RESULTING IN A \$0 NET PRESENT VALUE

RENT Base = \$20.54	% DIFFERENCE FROM BASE	OCCUPANCY Base = 92.75%	% DIFFERENCE FROM BASE
\$13.71	-33%	100%	8%
\$14.43	-29%	95%	2%
\$15.23	-25%	90%	-2%
\$16.12	-21%	85%	-8%
\$17.13	-16%	80%	-13%
\$18.27	-11%	75%	-19%
\$19.58	-4%	70%	-24%

(Source: Appendix IV)

The significance of the simultaneous sensitivity analysis is that variables are more likely to change simultaneously and that when they do a \$0 NPV can occur with less change occurring per variable. The simultaneous change table can also be used to assist an owner in determining what rental reduction increments he can make to increase demand for office space in his building when demand in the overall market is decreasing. The market rents ability to increase the buildings occupancy is dependent upon the office markets demand elasticity for office rent. This table can also be used to evaluate several worst case scenarios. For example if the occupancy rate of the building was reduced to 84.8% (the markets historic lowest recorded rate) the owner could counteract this by lowering the office building rents by 21% to increase occupancy in the building (see table 19).

In conclusion the most significant financial risk

placed on the project is the risk associated with the variability of future office occupancy rates and its potential affect on the project's revenue generation. In order for the project to have a \$0 NPV the buildings occupancy rate would have to be independently reduced by 28%, to a value of 72%, with all of the other variables remaining constant. This is 13% lower than the lowest historic rate for Quincy which would imply that in a worst case scenario the probability of the project having a negative NPV and being financially nonfeasible is very low.

OWNERSHIP ENTITY

The ownership entity that will be used in this partnership is a joint venture general partnership. In a joint venture general partnership all the partners have a voice in the management of the property and a partnership agreement is usually drawn up that defines the laws that will apply to the partners. Profits and losses flow through to the partners who are assessed and pay taxes as separate individuals. The apportionment of profits and losses cannot be designed solely for the purpose of tax avoidance. Each partners ability to deduct losses is subject to a maximum equal to his tax basis which includes the equity and debt issued by him. This form of partnership can have one or more general partners and pay them fixed compensation for professional work they do in service of the partnership which is tax deductible. This feature can be

used for this project by making the developer a general partner who can be paid fees for his development services, increasing the tax shelter to all the partners and increasing the developers cash flow. In a joint venture general partnership the partners are associated solely for the purpose of a limited business enterprise and share liability that is limited strictly to debts incurred for the joint venture purpose.

A joint venture general partnership is the most appropriate form of ownership for this project because the developer can play the role of a general partner charging a fee for his services and investing zero or a limited amount of the equity for the project while the other partner assumes the responsibility of the major equity investor with both partners sharing minimal liability. (Harvard Business School, 1979, p.3-5,p.12).

CONCLUSION

This thesis illustrates that the development of a 120,000 SF office building at the Crown Colony Place Office Park in Quincy Massachusetts is financially feasible in today's office market environment. In spite of the fact that the site was previously used as a rock quarry and that it has negative characteristics which increase construction costs and decrease its marketability it has positive locational and strong geographic submarket characteristics that counteract these negative qualities to make the site

developable.

This study has determined that the sites bedrock surface will only require an additional site premium cost of \$203,000 to mitigate this condition for development. This cost is acceptable given the sites strong revenue generating potential which is evidenced by the fact that the site has a NPV discounted at 14% of \$2,671,286.

The site's sunken elevation and barren geological condition represent negative marketable qualities for the site, however these conditions are compensated for by the site's excellent locational characteristics. When it is developed Crown Colony Place will be one of two office parks in the Quincy-Braintree office market that is within one half mile of both a public transportation station and a major highway. These locational characteristics are highly valued in this market and this study has statistically proven that the office market pays a per square foot annual rent premium of \$4.29 for these features. This fact more than compensates for the projects negative marketable features.

In todays market environment, this project is economical on a cost revenue basis. More importantly however in a regional economy where the vacancy rate for the suburban office market are projected to be 21.3% in 1987 the Crown Colony Place Office Park is fortunate because it is located in a geographic submarket that is projected to have

a 4.6% vacancy rate. This projection is supported by the fact that Crown Colony Place is in a office market that is directly linked to Boston's service sector economy which is expected to sustain strong growth through 1990.

Because of the site's excellent location and office market characteristics it has a annual cash flow and residual value which compare to its original capital investment to yield a net present value which discounted at 14% is equal to \$2,671,286. This NPV is large enough so that in a worst case scenario, the project's occupancy rate and rental rate, key variables for revenue generation, could both decrease to below historic levels of 13% and 16% respectively before the project's NPV would reach \$0.

I would highly recommend this development on the basis of its proximatey to an area with excellent potential for economic growth as well as the projects excellent revenue generating potential.

WORKSHEET FOR PRO-FORMA DEVELOPMENT COSTS

EXHIBIT 1: GENERAL INFORMATION

PROJECT NAME thesis

DATE OF PROJECTION May 1986
 ESTIMATED START DATE July 1986
 CONSTRUCTION PERIOD 24 Months
 LOCATION Quincy, Ma
 TITLE Insurance Mortgage Investment Analysis

SPACE:

Land (LA) sf 214,750
 Building: gross (GBA) sf 120,000
 net (NRA) sf 108,000
 Parking stalls (PA) 240

FINANCING:

Construction:	Amount (CL)	11,975,824	Permanent:	Amount (PL)	11,975,824
	Rate (ci)	11.50%		Rate (I)	9.25%
	Points(cpt)	0.00%		Points (PT)	0.00%
	Term (ct)	24		Term (T)	10
	Average Ostd:con (AVC)	45.00%		amort(N)	30
	leasing (AWL)	100.00%		Fixed Payment (FDS)	1191611
				Participation (PR)	
				Sbl NOI YR 3	1432117
				DCR	1.201
				MORTGAGE K	9.95%
				Perm Loan	\$11,975,824

UNIT COSTS:

DEVELOPMENT PHASE

Land (LC) \$8.035 per sf
 Site Improvements (SI) \$259,805
 Building:shell (BC) \$34.22 per sf
 finish (TI) \$23.85 per sf
 Parking (PC) \$405 per stall
 Arch. & Engineering (REF) 3.0% hard cost
 Development Fee (DOF) 3.0% REF,LD,HC
 Legal & Accounting (LAA) \$30,000
 Permits (PMIT) \$45,000
 Marketing/Leasing (MKTL) \$200,000
 Insurance (INS) \$25,000
 Real Estate Taxes (RET) \$50,000
 Contingency (CTG) \$25,000

LEASING:

Lease-Up Year (RUP) 25.00%
 Stabilized (SL) 92.75%
 Turning Year (V) 50.00% % yr. vacant
 Timing (TF) 0.5 mid year
 Commission (LCOM) 5.0%
 Vac(Sales Calc)(VS) 6.00%
 Tenant Mix:
 Three Year (TM) 20.0%
 Five Year (FM) 80.0%
 Turnover:
 Stay: Three Year (STY) 50.0%
 Five Year (SFY) 75.0%
 Leave: Three Year (LTY) 50.0%
 Five Year (LFY) 25.0%

OPERATIONS PHASE

Refurbish:
 Stay (MFS) \$2.00 per sf
 Leave (MFL) \$6.00 per sf
 Operating Expense (MOE) \$5.60 per sf
 Lease-Up Year (LOEF) 85%
 Replacement Reserve (RR) 1% gr. rev.

REVENUES:

Market Building Rent (MBR) \$20.54 per sf
 Parking Rent (MPR) \$0.00 per stall /per month
 Growth Factors:
 Market Rents (IMR) 3%
 Operating (IOE) 4%
 Construction (ICO) 5%

SALE:

Stabilized Cap Rate (SCAP) 10.0%
 Disposition Cap Rate (DCAP) 10.0%
 Sales Expense (SE) 3.0%

STABILIZED YEAR

HOLDING PERIOD (years) 10
 HURDLE RATE (HU) 14%
 CONVENTION End of Year

APPENDIX I
 FINANCIAL PRO-FORMA MODEL, EXHIBIT 1,

EXHIBIT 2: PROJECT COST ESTIMATE

YEAR	PROJECT CONSTRUCTION START SPACE		Office Building		Total Cost	Cost Per Square Foot(NRA)
	1	2	Construction	Leasing		
ACTIVITY						
ITEM COST ESTIMATE						
Land(L)	\$1,725,516				\$1,725,516	\$8 L/LA
					\$0	\$0 X/NRA
Improvements					\$0	\$0
Building	\$6,482,080				\$6,968,236	\$65
Parking	\$97,200				\$97,200	\$1
Site & Landscaping	\$259,805				\$259,805	\$2
Arch. & Engineering	\$271,523				\$271,523	\$3
Development Fee/OH	\$279,668				\$279,668	\$3
Total Improvements	\$9,115,792				\$9,601,948	\$73 X/NRA
Indirect						
Legal & Accounting	\$40,000				\$40,000	\$0 X/GBA
Permits	\$45,000				\$45,000	\$0
Marketing & Leasing		\$197,000			\$200,000	\$2
Insurance	\$25,000				\$25,000	\$0
Real Estate Taxes	\$50,000				\$50,000	\$0
Contingency	\$788,468				\$302,312	\$3
Total Indirect	\$948,468	\$197,000			\$662,312	\$6 TOTAL/NRA
TOTAL ESTIMATED COST	\$10,064,260	\$197,000			\$10,261,260	\$95 TOTAL/NRA

APPENDIX I
FINANCIAL PRO-FORMA MODEL, EXHIBIT 2

APPENDIX I
FINANCIAL PRO-FORMA MODEL, EXHIBIT 4

EXHIBIT 4: NET OPERATING INCOME

YEAR	1 1987	2 1988	3 1989	4 1990	5 1991	6 1992	7 1993	8 1994	9 1995	10 1996	11 1997	12 1998	13 1999
ACTIVITY	Construction	Leasing	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Sale
MARKET RENT/Building (MR)	\$20.54	\$20.54	\$20.54	\$21.16	\$21.79	\$22.44	\$23.12	\$23.81	\$24.53	\$25.26	\$26.02	\$26.80	\$27.60
# 12 wly Parking (MPR)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
GROSS REVENUE (GR)													
Building		\$102,875	\$411,498	\$411,498	\$212,014	\$486,559	\$436,539	Nil	\$477,039	\$477,039	Nil	\$521,274	\$521,274
Three Year Stay Leave					\$157,444			\$228,999			\$249,378		
Five Year Stay Leave		\$411,498	\$1,645,993	\$1,645,993	\$1,645,993	\$1,645,993	\$1,311,965	\$1,852,580	\$1,852,580	\$1,852,580	\$1,852,580	\$1,500,086	\$2,147,648
Parking		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Revenue	\$514,573	\$2,057,492	\$2,057,492	\$2,015,452	\$2,082,552	\$2,070,059	\$2,249,749	\$2,329,619	\$2,329,619	\$2,329,619	\$2,286,577	\$2,387,160	\$2,668,922
OPERATING EXPENSE													
Market Operating Expense (MOE) (MOE Infl @ 5% (1990))	\$5.60	\$5.60	\$5.62	\$6.06	\$6.30	\$6.55	\$6.81	\$7.09	\$7.37	\$7.66	\$7.97	\$8.29	\$8.62
Less: Total Operating Expense (TOE)		\$102,816	\$120,960	\$125,798	\$130,830	\$136,064	\$141,505	\$147,166	\$153,053	\$159,173	\$165,542	\$172,164	\$179,050
Three Year		\$411,264	\$483,840	\$509,194	\$529,321	\$544,254	\$564,024	\$589,465	\$612,212	\$636,700	\$662,168	\$688,635	\$716,201
Five Year		\$514,080	\$604,800	\$628,992	\$654,152	\$680,318	\$707,530	\$735,832	\$765,265	\$795,876	\$827,711	\$860,819	\$895,252
Total		\$514,080	\$604,800	\$628,992	\$654,152	\$680,318	\$707,530	\$735,832	\$765,265	\$795,876	\$827,711	\$860,819	\$895,252
Plus: Tenant Reimbursement (TR)	\$0	\$0	\$0	\$4,888	\$4,995	\$5,238	\$10,676	\$8,168	\$5,887	\$12,009	\$9,188	\$6,422	\$19,508
Three Year	\$0	\$0	\$0	\$19,354	\$39,481	\$50,414	\$41,052	\$22,641	\$46,188	\$70,676	\$96,144	\$61,315	\$27,546
Five Year	\$0	\$0	\$0	\$24,192	\$44,417	\$65,647	\$91,768	\$30,809	\$52,074	\$82,685	\$109,332	\$67,937	\$41,054
Net Operating Expense (NOE)		\$102,816	\$120,960	\$120,960	\$125,895	\$130,830	\$130,830	\$138,998	\$147,166	\$147,166	\$156,354	\$165,542	\$165,542
Three Year		\$411,264	\$483,840	\$483,840	\$483,840	\$483,840	\$524,932	\$564,024	\$564,024	\$564,024	\$564,024	\$627,340	\$688,635
Five Year		\$514,080	\$604,800	\$604,800	\$609,735	\$614,670	\$635,763	\$705,023	\$713,191	\$713,191	\$722,379	\$752,882	\$854,197
REPLACEMENT RESERVE (RR)	\$0	\$5,144	\$20,575	\$20,575	\$20,155	\$20,626	\$20,701	\$22,497	\$23,296	\$23,296	\$22,866	\$23,872	\$26,689
NET OPERATING INCOME (NOI)	\$0	(\$4,851)	\$1,432,117	\$1,432,117	\$1,385,562	\$1,447,056	\$1,399,596	\$1,522,229	\$1,599,133	\$1,599,133	\$1,541,333	\$1,570,406	\$1,788,025

APPENDIX I
FINANCIAL PRO-FORMA MODEL, EXHIBIT 5

EXHIBIT 5: CASH FLOW PROJECTION

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13
ACTIVITY	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	Construction	Leasing	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Sale
TOTAL PROJECT COST													
NET OPERATING INCOME (NOI)	\$0	(\$4,851)	\$1,432,117	\$1,432,117	\$1,385,562	\$1,447,056	\$1,393,596	\$1,522,229	\$1,593,133	\$1,593,133	\$1,541,333	\$1,570,406	\$1,788,035
TURNING COSTS													
Market Refurbishment Costs													
Stay (MFS)	\$2.00	\$2.00	\$2.00	\$2.00	\$2.16	\$2.25	\$2.34	\$2.43	\$2.53	\$2.63	\$2.74	\$2.85	\$2.96
Leave (NFL)	\$6.00	\$6.00	\$6.00	\$6.24	\$6.49	\$6.75	\$7.02	\$7.30	\$7.59	\$7.90	\$8.21	\$8.54	\$8.88
Tenant Refurbishment Costs													
Stay (TFS)	\$0	\$0	\$0	\$0	\$23,363	\$0	\$151,614	\$26,200	\$0	\$0	\$29,561	\$184,461	\$0
Leave (TFL)	\$0	\$0	\$0	\$0	\$70,088	\$0	\$151,614	\$78,839	\$0	\$0	\$88,683	\$184,461	\$0
Total	\$0	\$0	\$0	\$0	\$93,450	\$0	\$303,227	\$105,119	\$0	\$0	\$118,244	\$368,922	\$0
Leasing Commissions (LCOM)	\$0	\$200,000	\$0	\$0	\$32,742	\$0	\$115,786	\$35,778	\$0	\$0	\$39,096	\$134,228	\$0
TOTAL COSTS OF TURNING	\$0	\$0			\$126,192	\$0	\$419,014	\$140,897	\$0	\$0	\$157,340	\$503,150	\$0
SALES PROCEEDS (SP)	\$0	\$0										\$15,790,631	
CASH FLOW	-10064260.2	(\$204,851)	\$1,432,117	\$1,432,117	\$1,259,370	\$1,447,056	\$974,582	\$1,381,332	\$1,593,133	\$1,593,133	\$1,383,993	\$16,857,887	

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APPENDIX I
FINANCIAL PRO-FORMA MODEL, EXHIBIT 6

EXHIBIT 6: LEVERAGED ANALYSIS														
YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13
ACTIVITY	Pre Construction	Construction	Leasing	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Sale
MIN-LEVERAGED CASH FLOW	(10,064,260)		(204,051)	1,432,117	1,432,117	1,259,370	1,447,056	974,582	1,381,332	1,593,133	1,593,133	1,383,993	16,857,887	
MORTGAGE (MTG)	11,975,824													
PURCHASE MTG (PCMS)														
CONSTRUCTION MORTGAGE														
Points (pt)		0												
Interest (ic)		(619,749)	(1,377,220)											
PERMANENT MORTGAGE														
Points (PT)														
Fixed Debt Service (FDS)				(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)
Cash Flow Before Participation [#]	1,291,015	(1,582,071)	240,505	240,505	67,759	255,445	(217,029)	189,721	401,521	401,521	192,382	15,666,275		
Participation (PDS)													(10,842,292)	
Debt Payback														
Total Participation														
partic [#] PDS Total Debt Service	(619,749)	(1,377,220)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(1,191,611)	(12,033,903)	
CASH FLOW (CFAD) DEV	1,291,015	(1,582,071)	240,505	240,505	67,759	255,445	(217,029)	189,721	401,521	401,521	192,382	4,823,984		
CASH FLOW AFTER DEBT (LENDER)	(12,647,890)	1,377,220	1,191,611	1,191,611	1,191,611	1,191,611	1,191,611	1,191,611	1,191,611	1,191,611	1,191,611	1,191,611	12,033,903	

APPENDIX I
FINANCIAL PRO-FORMA MODEL, EXHIBIT 9

EXHIBIT 9: AFTER-TAX ANALYSIS

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13
ACTIVITY	Construction	Leasing	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	Operations	
NET OPERATING INCOME	\$0	(\$4,051)	\$1,432,117	\$1,432,117	\$1,385,562	\$1,447,056	\$1,393,596	\$1,522,229	\$1,593,133	\$1,593,133	\$1,541,333	\$1,570,406	
DEDUCTIBLE EXPENSE													
Lease Debt Service Interest	\$0	\$0	\$1,207,919	\$1,105,690	\$1,097,397	\$1,088,303	\$1,078,331	\$1,067,396	\$1,055,407	\$1,042,260	\$1,027,844	\$1,012,036	\$0
IF PRODN Includes Participation													
Lease Depreciation		\$437,580	\$437,580	\$437,580	\$437,580	\$437,580	\$437,580	\$437,580	\$437,580	\$437,580	\$437,580	\$437,580	\$3,063,057
Construction Period Taxes	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	
Interest	\$51,975	\$199,637	\$199,637	\$199,637	\$199,637	\$199,637	\$199,637	\$199,637	\$199,637	\$199,637	\$199,637	\$142,500	
Leasing Commissions													
Three-Year	\$0	\$13,333	\$13,333	\$13,333									
Five-Year	\$0	\$32,000	\$32,000	\$32,000	\$32,000	\$32,000							
Expenses													
Legal & Acc't	\$40,000	\$0											
Insurance	\$25,000	\$0											
Permits	\$45,000	\$0											
Misc.	\$302,312	\$0											
Financing Fees													
Construction Loan	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Permanent Loan	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Turning Expense													
Tenant Refurbishment					\$31,150	\$31,150	\$31,150	\$36,040	\$36,040	\$36,040	\$39,415	\$39,415	\$39,415
Three-Year					\$0	\$0	\$0	\$60,645	\$60,645	\$60,645	\$60,645	\$60,645	\$73,784
Five-Year													\$296,130
Leasing Commissions					\$10,914	\$10,914	\$10,914	\$11,926	\$11,926	\$11,926	\$13,032	\$13,032	\$13,032
Three-Year					\$0	\$0	\$23,157	\$23,157	\$23,157	\$23,157	\$23,157	\$23,157	\$24,846
Five-Year													\$107,382
Total Deductible	\$479,287	\$687,610	\$1,896,529	\$1,795,300	\$1,813,737	\$1,804,643	\$1,846,474	\$1,840,441	\$1,828,461	\$1,818,304	\$1,744,173	\$1,602,692	\$1,602,692
Plus: REPLACEMENT RESERVE	\$0	\$5,144	\$20,575	\$20,575	\$20,155	\$20,826	\$20,701	\$22,497	\$23,296	\$23,296	\$22,866	\$23,872	\$23,872
TAXABLE INCOME (LOSS)	(\$479,287)	(\$687,317)	(\$442,837)	(\$340,608)	(\$408,020)	(\$336,761)	(\$432,177)	(\$295,718)	(\$212,023)	(\$198,076)	(\$179,974)	(\$232,216)	
TAX LIABILITY (50%)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TAX SHELTER (50%)	\$239,643	\$343,658	\$221,419	\$170,304	\$204,010	\$168,381	\$216,089	\$147,857	\$106,011	\$99,438	\$89,987	\$116,108	
CAPITAL GAINS TAX													
Sales Proceeds	\$15,790,631												
Basis													
Land	\$1,725,516												
Building	\$3,063,057												
Unamortized Expense	\$0												
Points	\$334,553												
Refurbishment	\$120,414												
Leasing Commissions													
Net Gain	\$10,547,091												
Tax Liability (20%)	\$2,109,418												
AFTER-TAX CASH FLOW (Leveraged)	\$1,291,815	(\$1,582,071)	\$240,505	\$240,505	\$67,759	\$255,445	(\$217,029)	\$189,721	\$401,521	\$401,521	\$192,382	\$2,714,565	
Without Shelter, With Liability	\$1,291,815	(\$1,582,071)	\$240,505	\$240,505	\$67,759	\$255,445	(\$217,029)	\$189,721	\$401,521	\$401,521	\$192,382	\$2,714,565	
With Shelter	\$1,531,458	(\$1,238,412)	\$461,924	\$410,809	\$271,769	\$423,825	(\$940)	\$337,578	\$807,532	\$500,959	\$282,369	\$2,830,673	
NET PRESENT VALUE													
Disc. @ 14.00%													
Without Shelter	\$1,359,597												
With Shelter	\$2,671,286												

APPENDIX II
RENTAL RATE DETERMINATION METHODOLOGY

To determine bid rents for the site I created a database that contained information on 36 office buildings in Quincy and Braintree. Information for 12 independent variables was collected to test the hypothesis that these variables were significant in effecting rent as a dependent variable and that through regression analysis coefficients could be identified for each independent variable and used to determine the market rent for the site based on the sites attributes as they relate to the specific independent variable. The variables used were, rent, age, vacancy, gross square feet, number of stories, office park status, distance to highway, distance to public transportation, distance to commercial centers, distance to Boston, and town and construction status. All of the variables except for town designation, office park status and construction status were interval level variables so that distances between any two values could be measured relatively, town designation, office park status, construction status and duplicate variables for distance to commercial, public transportation and highway were nominal level variables using dummy values of one for affirmative and zero for nonaffirmative conditions.

The distance variables were duplicated in nominal and interval level values to see what variable types were more effective in creating regression equations with high R

squared values and high T statistic values. The hypothesis being tested was that for pedestrian traveled distances to public transportation and commercial areas the nominal level variables would be more effective because they measured distances in terms of being within walking distance (under one half mile) or out of range for walking over one half mile. When I ran identical regression equations and substituted transportation nominal variables for interval variables I found that the equation with all nominal level variables had the highest R squared value and that the t values for public transportation distance and commercial distance variables were statistically more significant in this equation with values of 2.1 and 2.05 compared to values of 1.5 and .93 when the interval level variables were used. This supported the hypothesis that nominal level variables would be more effective in measuring distances causal relationship to rent because of their distinct ability to classify distances as pedestrian or nonpedestrian distances. As a result of this the final regression equation used to determine the site bid rent, exclusively used the nominal level distance variables.

To determine the regression equation that fit the data best a number of different multivariable linear regressions were run and evaluated to determine what equation and combination of variables most accurately explained the variation of the dependent variable, rent as a linear function of these variables. The most significant equation

had a R squared value of .813 indicating that 81.3% of the variation in rent could be explained by the variation of the variables in that equation. Two of the ten independent variables age (T = -5.97) and distance to highway (T = 2.13) had values greater than two implying a 95% probability that causality between rent and each variable was not due to random chance. Two of the ten variables, Distance to T (T = 1.52) and distance to Boston (T = -1.61) had T values greater than 1.51 implying a greater than 80% probability that causality between these variables and rent was not due to random chance. The other six variables number of floors, square feet, construction status, town designation , office park classification and distance to commercial area had T values that implied causality between these variables and rent as having a 20% or greater probability of occurring due to random chance. The final regression equation used to determine the market rent for the site included all of these variables and had the following characteristics.

TABLE 20
CROWN COLONY PLACE COMPONENT RENT VALUES AND RENTAL RATE
DETERMINATION

DEPENDENT VARIABLE = RENT
 MEAN OF DEPENDENT VARIABLE = \$17.25
 STANDARD DEVIATION = \$3.15
 R SQUARED = 82.9%

VARIABLE	ESTIMATE	T STATISTIC	UNITS	SITE QUALITY	SITE RENT
Intercept	20.26	4.32			\$20.26
Age	-.33	-5.97	Years	-2	\$.66
Dist to Highway	-2.61	-2.13	Miles	1	\$-2.61
Dist to Publi T	1.68	1.52	Miles	1	\$1.68
Distance to Comm	2.17	.93	Miles	0	\$0
Office Park	.63	.47	1 or 0	1	\$.63
Distance to Boston	-.62	-1.61	Miles	8.5	\$-5.27
No. Floors	-.12	.57	1 to 10	3	-\$.36
Square Feet	.0000037	.78	Sq. Ft.	120,000	\$.45
Construction	-.20	.29	1 or 0	1	\$.20
Town	-.33	1.31	1 or 0	1	-\$.33
RENT PER SF					\$20.53

The bid rent for this office building using the regression equation was estimated to be \$20.53 per square foot.

APPENDIX III
RENTAL RATE DETERMINATION DATA

DATA TABLE : RENTAL RATE DETERMINATION / QUINCY BRAINTREE OFFICE MARKET, 36 BUILDINGS

	DIST TO BOSTON	RENT	VACANCY	AGE	S.F.	STORIES	DIST TO HMY	DIST TO T	DIST TO COMM	OFFICE PARK	TOWN	1=CONST & REHAB
Braintree: 18 Buildings												
13 Braintree Hill Park	8.5	18.00	0.0	11	63000	4	1	0	1	1	0	0
29 Braintree Hill Park	8.5	18.50	1.6	4	161000	4	1	0	1	1	0	0
33 Braintree Hill Park	8.5	20.00	0.0	1	102000	4	1	0	1	1	0	0
45 Braintree Hill Park	8.5	21.50	100.0	-1	70000	4	1	0	1	1	0	1
58 Braintree Hill Park	8.5	20.00	59.4	0	160000	5	1	0	1	1	0	1
18 Forbes Rd East	9.0	16.00	0.0	19	40000	2	1	0	1	1	0	0
18 Forbes Rd West	9.0	19.00	59.1	2	44000	4	1	0	1	1	0	0
161 Forbes Rd	9.0	13.25	0.0	22	34000	4	1	0	1	1	0	1
220 Forbes Rd	9.0	13.25	13.9	18	57600	4	1	0	1	1	0	1
220R Forbes Rd	9.0	13.25	0.0	17	22000	1	1	0	1	1	0	0
222 Forbes Rd	9.0	13.25	0.0	17	43200	4	1	0	1	1	0	1
166-196 Forbes Rd	9.0	13.25	0.0	20	60000	2	1	0	1	1	0	1
340 Granite Street	9.5	21.00	100.00	-1	92500	4	1	0	1	0	0	1
636 Granite Street	9.5	16.00	9.7	2	77000	5	0	0	1	0	0	0
480 Washington St.	9.0	13.75	4.4	12	50000	4	0	0	1	0	0	0
420 Washington St.	9.0	13.75	11.7	14	30000	4	0	0	1	0	0	0
140 Wood Street	8.5	12.25	0.0	16	43000	4	1	0	1	1	0	0
130 Wood Street	8.5	13.25	0.0	14	38000	4	1	0	1	1	0	0
Quincy: 18 buildings												
1 Adams Place	8.0	21.00	89.2	0	125000	4	1	0	1	1	1	1
2 Adams Place	8.0	22.00	100.0	-2	125000	4	1	0	1	1	1	1
1 Batterymarch Park	8.0	20.00	8.0	5	150000	5	1	0	1	1	1	0
2 Batterymarch Park	8.0	23.00	42.9	0	105000	5	1	0	1	1	1	1
180 Crown Colony	8.5	20.00	50.0	-1	30000	2	1	1	0	1	1	1
Eastern Harbor Of Park	5.0	17.50	46.5	3	43000	3	0	0	1	0	1	0
1220 Hancock Street	7.0	14.50	15.6	1	32000	3	0	0	1	0	1	1
Harbor South Tower	5.5	21.50	7.1	3	203000	10	1	1	1	0	1	0
1 Heritage Drive	5.0	18.50	0.0	6	173000	5	0	1	1	0	1	0
2 Heritage Drive	5.0	18.50	0.0	5	186000	9	0	1	1	0	1	0
1776 Heritage Drive	5.0	18.50	0.0	13	740000	5	0	1	1	0	1	0
Menarch III	5.5	19.50	0.0	4	332000	7	0	0	1	1	1	0
29 Newport Ave	6.0	19.50	20.6	1	97000	4	0	1	1	0	1	0
180 Newport Ave	6.0	19.00	0.0	6	124000	4	0	1	1	0	1	0
240 Newport Ave	6.0	20.50	76.3	1	150000	8	0	1	1	0	1	0
Quincy Center Plaza	7.5	15.00	0.0	5	190000	10	0	1	1	0	1	0
Quincy Savings Bank	7.5	15.00	0.0	9	54000	3	0	1	1	0	1	0
Hillard School Bldg.	7.5	18.00	30.9	1	44000	4	1	0	1	0	1	0
QUINCY & BRAINTREE MEAN VALUE =	7.73	17.52	23.52	6.86	87544	4.5	0.59	0.27	0.97	0.55	0.5	0.33

APPENDIX IV
FINANCIAL SENSITIVITY ANALYSIS

FINANCIAL SENSITIVITY ANALYSIS EXHIBIT
INDEPENDENT VARIABLE AND SIMULTANEOUS VARIABLE ANALYSIS
INSURANCE COMPANY MORTGAGE

Financials:		Market Variables:	
Amort =	30	Market Rnts=	\$20.54
Interest =	9.25%	Market Rnts	
		Growth Fac =	3.00%
Costs:		Occupancy =	92.75%
Total Cost =	\$10,261,260		
Const. Loan	\$1,714,564	Operating Variables:	
Total Cost =	\$11,975,584	Operating	
		Growth =	4.00%
		Oper Exp =	\$5.60

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INDEPENDENT VARIABLE ANALYSIS

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Rents	NPV@14%	Occupancy	NPV@14%	Market Rent	NPV@14%
	\$2,671,286		\$2,671,286	Growth	
\$16	\$565,331	\$1	\$3,416,048	Factor	\$2,671,286
\$17	\$1,029,198	\$1	\$3,107,871	\$0	\$1,379,856
\$18	\$1,493,065	\$1	\$2,671,286	\$0	\$1,576,886
\$19	\$1,956,931	\$1	\$1,875,161	\$0	\$1,780,888
\$20	\$2,420,798	\$1	\$1,669,709	\$0	\$1,992,091
\$21	\$2,884,665			\$0	\$2,210,729
				\$0	\$2,671,286
Operating	NPV@14%	Operating Expense		\$0	\$3,164,575
Expense	\$2,671,286	Growth	NPV@14%	\$0	\$3,692,731
\$1	\$5,371,310	Factor	\$2,671,286		
\$3	\$4,197,386	\$0	\$3,281,984		
\$5	\$3,023,463	\$0	\$3,144,575		
\$7	\$1,849,540	\$0	\$2,839,886		
\$10	\$88,654	\$0	\$2,490,907		
		\$0	\$2,091,736		

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SIMULTANEOUS VARIABLE ANALYSIS: (Rent & Occupancy)

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Rents	Occupancy							
2671285.890	100.00%	95.00%	90.00%	85.00%	80.00%	75.00%	70.00%	
\$14	\$145,226	(\$204,862)	(\$554,950)	(\$905,038)	(\$1,255,126)	(\$1,605,214)	(\$1,955,303)	
\$15	\$645,351	\$270,257	(\$104,837)	(\$479,932)	(\$855,026)	(\$1,230,120)	(\$1,605,214)	
\$16	\$1,145,477	\$745,377	\$345,276	(\$54,825)	(\$454,925)	(\$855,026)	(\$1,255,126)	
\$17	\$1,645,603	\$1,220,496	\$795,389	\$370,282	(\$54,825)	(\$479,932)	(\$905,038)	
\$18	\$2,145,729	\$1,695,616	\$1,245,502	\$795,389	\$345,276	(\$104,837)	(\$554,950)	
\$19	\$2,645,854	\$2,170,735	\$1,695,616	\$1,220,496	\$745,377	\$270,257	(\$204,862)	
\$20	\$3,145,980	\$2,645,854	\$2,145,729	\$1,645,603	\$1,145,477	\$645,351	\$145,226	
\$21	\$3,646,106	\$3,120,974	\$2,595,842	\$2,070,710	\$1,545,578	\$1,020,446	\$495,314	

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