Analyzing the Private Development Model for University Real Estate Development

by

James F. Gerrity IV
B.A. History, 2003
Williams College

Submitted to the Center for Real Estate in Partial Fulfillment of the Requirements for the Degree of Master of Science in Real Estate Development

at the
Massachusetts Institute of Technology

September, 2009

©2009 James F. Gerrity IV
All rights reserved

The author hereby grants to MIT permission to reproduce and to distribute publicly paper and electronic copies of this thesis document in whole or in part in any medium now known or hereafter created.

Signature of Author __________

Certified by __________

Deennis Frenchman
Professor, Department of Urban Studies & Planning
and Department of Architecture
Thesis Supervisor

Accepted by __________

Brian A. Ciochetti
Chairman, Interdepartmental Degree Program in Real Estate Development
ABSTRACT

Universities within the United States have long been active in the real estate development market surrounding their respective campuses. However, beginning with the baby boom in the late 1950s, colleges have begun expanding their campuses at ever increasing rates to account for the influx of new students. In order to accommodate this increased need for campus expansion, universities have begun to look increasingly to private development firms as a means to facilitate the development of university real estate product. As these development partnerships between the institution and the private sector become more widespread, in what ways can private firms provide a benefit to the university by building facilities that utilize private market efficiencies of design and construction. The question will be answered by studying three cases of university–private sector development: Harvard University, The University of Pennsylvania, and the Massachusetts Institute of Technology. By focusing on two types of real estate product in particular, student housing and laboratory space, the case studies will compare product developed privately for each university to product developed by the university’s internal facilities department. Financial, construction, and design metrics of privately and university developed products will be compared and contrasted to determine where and how private, market influence might provide the university with an advantage in developing real estate.

Thesis Supervisor: Dennis Frenchman
Title: Professor, Department of Urban Studies & Planning and Department of Architecture
# Table of Contents

Chapter 1: Introduction and Overview ................................................................. 4  
  Why do Universities Develop .................................................................. 6  
  How do Universities Build .................................................................. 10  
  How do Universities Finance Development .............................................. 15  

Chapter 2: Methodology ............................................................................... 20  

Chapter 3: Harvard Case Study .................................................................... 24  

Chapter 4: MIT Case Study ......................................................................... 37  

Chapter 5: Penn Case Study ......................................................................... 57  

Chapter 6: Lessons Learned from Case Analysis .......................................... 72  

Chapter 7: Conclusion .................................................................................. 77  
  Risk .................................................................................................. 77  
  Finance ............................................................................................ 78  
  Control .............................................................................................. 79  
  Internal Organization ......................................................................... 80  
  Recommendations .............................................................................. 81  

Bibliography .................................................................................................. 86  

Appendices ................................................................................................. 88
Chapter 1 – Introduction

Universities in the United States have long been active in the real estate development market surrounding their campuses. Beginning in the late 1950s, colleges began expanding their campuses at ever increasing rates to account for the influx of new students due to the baby boom. This has continued to today, and from 2009 through 2012, the college age population is expected to grow 4.2% in total enrollments increasing 8%\(^1\). To accommodate this growth, colleges such as the University of Pennsylvania expect to expand at a rate of 50 acres every 75 years.\(^2\) In addition to providing “additional support for academic operations,” generated by increased enrollment, further motivations for campus expansion also include “strategic land banking.....and improving the surrounding community.”\(^3\) To achieve this increased need for campus expansion in an environment where development is becoming an even more complex undertaking, universities have begun to look increasingly to private development firms as a means to facilitate the development of university real estate product. The involvement of the private sector provides the universities with financial tools, quality, and efficiency in the development process that the university is often not able to produce with its internal resources.

\(^{1}\) Marcus and Millichamp, National Student Housing Report, First Quarter 2009.
\(^{2}\) Robert Campbell, “Universities are the New City Planners”
\(^{3}\) Wim Wiewel, “Working Together or Going it Alone, How Should Universities Develop Real Estate”
To remain competitive, universities have been required to leverage their physical assets to attract the most talented student base. The growth of the student population will no doubt continue to spur university expansion, and development partnerships between the institution and the private sector will become more widespread. As campus expansion continues, in what ways can private firms provide a benefit to the university by building facilities that utilize private market efficiencies of design and construction? Can private developers effectively utilize private market efficiencies of design and construction to provide better campus buildings at a lower cost? Can they streamline the development process? These questions will be answered by studying three cases of university – private sector development: Harvard University, The University of Pennsylvania, and the Massachusetts Institute of Technology. By focusing on two types of real estate product in particular, student housing and laboratory space, the case studies will compare product developed privately for the university to product developed by the university's internal facilities department. Financial, construction, and design metrics of private and university developed products will be compared and contrasted to determine where and how private market influence might provide the university with an advantage in developing real estate.
Why do Universities Develop?

Universities within the United States develop real estate for a number of reasons. First, universities develop to provide students and faculty with improved and upgraded facilities. Competition among schools to attract students is continually increasing. With an expanding population of college age students, schools must, "entice youthful prospects with new amenities, social, sports, and cultural facilities." 4 These amenities are often found in the form of new buildings designed to provide students with better academic facilities as well as increased options for recreation. Without, "an engaged, vital, and vibrant community with entertainment and nightlife, [the school] loses both faculty and students." 5 Thus, if the school is not located in a vibrant area with existing dining and entertainment amenities supported by a strong surrounding community, or if the school possesses aging real estate that cannot support the residential or academic needs of students and faculty, the school is left with no option but to construct new real estate or re-develop existing buildings in order to provide the services the academic market requires.

---

4 Robert Campbell, “Universities are the New City Planners”
5 Robert Campbell, “Universities are the New City Planners”
A driver of university development in the residential housing area is to accommodate more students in university controlled housing. Increasingly, urban universities in particular are being faced with complaints from surrounding communities that student renters drive up housing prices. Indeed, “universities are being pushed, notably in Boston, to house more of their students, in order to relieve pressure on the housing market.” The impact of students residing in non-university controlled housing stock has a second negative impact on the surrounding community in that, “some universities are surrounded by privately owned housing that caters to students, and those landlords often engage in short term management practices to maximize their profits. Substandard property maintenance, coupled with high turnover of rental units, can lead to rapid deterioration in the housing stock.” This process can in turn lead to declining property values and neighborhood deterioration, both of which would have long term negative repercussions on the neighborhood, and also on the university through creating a surrounding community less able to accommodate the retail, dining, and recreational amenities that the university needs to attract students and faculty.

---

6 Wim Wiewel, Kara Kunst, Raymond Dubicki, “University Real Estate Development: Campus Expansion in Urban Settings”
7 Robert Campbell, “Universities are the New City Planners”
8 Allegra Calder and Rosalind Greenstein, “Universities as Developers”
In the laboratory area, universities are being driven to develop new facilities because they, "can't get research grants unless they offer better facilities."\textsuperscript{9} Quality scientists bring in large amounts of money to the university through such programs as National Institutes of Health (NIH) science grants which in turn offset much of the costs the university expends to support its science and technology programs. In addition, NIH grants provide the university with a public benchmark to showcase the quality of its scientists, research, and technology to the greater community of academics and prospective students. This benchmark enables the university to build its reputation, and reputation is a key factor in retaining existing students and faculty in addition to attracting the best and the brightest of prospective students. However, such granting agencies include the quality of laboratory facilities as an important component in their grant making decisions.

Another reason universities develop laboratory real estate is to, "attract private spinoffs that want to locate near them."\textsuperscript{10} Many of these private spinoffs are headed by scientists or technology experts who had previously taught or studied at the university. Through providing quality laboratory and technology facilities, universities can leverage the academic talent these facilities attract to create a private market for university affiliated professors and students to monetize their ideas. This, in turn, has the cyclical effect of attracting talented faculty and students who are drawn to the university both for its academic offerings, but also for the ability to easily transfer knowledge between the academic and private markets.

\textsuperscript{9} Robert Campbell, "Universities are the New City Planners"
\textsuperscript{10} Robert Campbell, "Universities are the New City Planners"
Finally, many universities expand simply to protect the investment they have placed in their campus, both physically and culturally. "Universities typically do not have the option of relocating, so they depend on and contribute to the health and vitality of their surrounding communities to protect their vested interests. The quality of the surrounding environment directly affects the competitive advantage of the university which is crucial to attracting and retaining the best students and faculty." To protect against the negative effects of a deteriorating surrounding community, a university may purchase land or existing property with no immediate thought of re-development. Through land banking, the university has ensured that its future needs for expansion will be secured, but, equally as importantly, it has retained control over the future of that land with respect to ensuring a use compatible with the needs of the institution.

Land banking also allows the university additional time to proceed with any necessary zoning and community approvals, thereby providing for a longer planning period through which the ultimate needs of the university might be better met. As Robert Campbell argues, this process allows for the university to better match its long term plans to the needs of the surrounding community, as in essence placing the university in the role of urban planner to ensure that the neighboring community is able to support the vibrant environment that the students and faculty require. The university is thereby able to mitigate the risk presented by further deterioration of a declining neighborhood, but it is also able to preserve opportunities to enhance the community to reflect the vibrant image the university hopes to portray through its campus.

11 Allegra Calder and Rosalind Greenstein, "Universities as Developers"

12 Robert Campbell, "Universities are the New City Planners"
How Do Universities Build?

Universities are inherently risk averse, and it is extremely important to a university to maintain control over its future. Thus, while universities employ a number of methods to develop their real estate, such development is almost always undertaken on land the university owns. Through holding fee interest in the land, the university retains control over the parcel and thus reduces the risk associated with a third party exercising decisions outside of the university’s sphere of influence.

Figure 3: University acquisition methods for development

Perhaps the most common method for a university to develop campus related real estate is through using its facilities department to control the design and construction of the building. This process can often be convoluted, however, as the facilities department is often simply a functionary in the process with very little real power over decision making about the type or

---

13 Wim Wiewel, Kara Kunst, Raymond Dubicki, “University Real Estate Development: Campus Expansion in Urban Settings”
nature of development. The ultimate decisions are made by the university administrators, donors, students, and select faculty who will be using the new facility.

A typical process would proceed as follows. The facilities department will prepare a program for the project with the administration, faculty, or housing office, and establish a budget. Architectural services are solicited through a competitive process reviewed by a facilities committee comprised of administrators, project donors, students, and faculty. This committee will then approve a final architect to begin the design process over which the committee will also have ultimate discretion.

Upon completion of the design process, the facilities department will request bids from a number of contractors using the architect’s design and specifications. Specifications may include standard provisions provided by the facilities department which are generally applied to all university constructed projects. The construction bids will be reviewed by the facilities department as well as a committee usually comprised of the university president, treasurer, and perhaps an outside consultant. This committee will then award a contractor with the building contract and construction administration will undertaken by the architect and/or a professional project management team from the university’s facilities department or an independent firm.

Universities may also develop real estate by outsourcing the actual development of the product to a third party private developer. In a typical process, the university would maintain ownership of the underlying land and lease the developer the right to build and operate the building through a ground lease. This process typically involves substantially less control over the final product by
the university, although the university does retain the right to purchase the building following the expiration of the ground lease and all renewal options, usually a period of between fifty and ninety-nine years. The ground lease minimizes the capital outlay by the university through ensuring that the university is at financial risk only for the cost of the land, as all developments costs are born by the private developer. The ground lease development structure is generally used by universities to mitigate their financial and operational risk associated with developing specialized real estate product that a university might not understand as well as a private developer.

Student housing and laboratory space are excellent examples of such product as both the simplicity of housing and the complexity of lab space are well understood by the private market, and efficiencies of cost and design can be achieved through using the experience of private developers whose primary business is in these products. Further, the ground lease structure enables a university to maintain control of and to receive a return from land for which it might not have a defined long term use. “By retaining ownership of the land, [the university] is capturing the rising land values, and [it] retains the ability to reprogram the land utilization [at the end of the ground lease term].”  

Generally, development under a ground lease occurs when the university purchases the fee in either vacant land, or land with improvements currently constructed. The university, through a series of committees comprised of faculty, facilities personnel, and administrators, decides what it would like to see built on the purchased land and approaches a select group of developers for proposals to develop the required product. As part of their proposal, the developers will often be

14 Wim Wiewel, “Working Together or Going it Alone, How Should Universities Develop Real Estate”
asked to provide the rent that they would be willing to pay the university for the ground lease as well as a preliminary design and specifications for the finished product. In turn, the university will agree to lease back on a long term basis all or a portion of the building from the developer once the product is complete. In some cases however, such as University Park at MIT, the university is simply a financial partner in the development through the ground lease and/or participating equity, and does not occupy any space. This structure can be formed as an additional means of generating returns to the university’s endowment, but it can also provide a hedge for future university expansion by allowing the school to lease space in the development when and if it needs to. This creates a hybrid structure through a university using space within the same building for both commercial and academic purposes.

The value creation for a university to structure development through a ground lease with a private developer comes in the form of the private market’s use of commercial best practices in designing the building’s layout and systems, negotiating pricing with contractors, and choosing materials. The cost savings associated with negotiating increased savings for materials and schedule derived from these commercial best practices is often substantial, and can be generalized to equal a savings of 25-30% below what a university might spend for virtually the same product. In addition, the infusion of a third party developer into the process can have a significant effect on sheltering the university from any potential downsides associated with community opposition to the school during the entitlement process. Through acting as the public face of the development, the developer bears the brunt of the public exposure. Thus, if a developer has a clean reputation within a community, that developer may be more successful in

---

15 Paul Sehnert, Director of Real Estate, University of Pennsylvania
achieving entitlements for a project than would a university with an acrimonious community relationship.

Finally, many universities use a hybrid of ground lease structure and internal development to facilitate building real estate. These schools create non-profit organizations that are controlled and funded by the university but publicly appear to be independent. This structure is most often used by larger schools that are seeking to purchase and assemble vast tracts of urban land as well as schools that are located in urban areas where community opposition to university expansion is strong and well organized. Through creating these non-profit development firms, the university shelters its involvement in the purchase and development of the real estate to the larger community, but also retains control over decision making in the design and construction process. The non-profit appears publicly as the owner of the land and the developer of record, while in actuality all major decisions are made by university committees. While this structure has the advantage of potentially accelerating the processes involved with purchasing land and buildings as well as receiving zoning approvals, the danger of schedule and construction cost delays remain due to the bureaucratic decision making structure of the university development committees.

While the methods described above primarily relate to real estate product developed for university use, many schools invest in real estate as a cash flowing investment with the potential to convert the asset to university use at a later date when a need has been established. This structure is more often used by larger schools with sophisticated investment offices that employ a number of real estate specialists to invest in real estate geared to providing returns to the school’s
endowment. The Massachusetts Institute of Technology (MIT) is an excellent example of this style of development as a portion of the MIT Investment Office is dedicated to purchasing and developing real estate to service the endowment with a future re-development potential to benefit uses associated with the university. In this case, the university will purchase the real estate with funds directly from the endowment, or, more likely, bond financing, and will hire a third party property manager to manage the asset while re-development plans are finalized. The university will receive a return from the cash flow of the property while retaining the flexibility to re-develop the property to a use that will better serve the school’s future real estate needs. In this way, the university retains control of the decision-making surrounding the property while also reducing its risk through the cash flow the property generates.

*How do Universities Finance Development?*

The simplest method for universities to finance real estate acquisition and development is to use endowment funds. In this case, funds are withdrawn directly from the university’s endowment account and used to facilitate the purchase and development of real estate. However, in keeping with a university’s typical desire to minimize risk, the application of endowment funds to real estate development is not the preferred method for many schools and in some cases is not legally allowable. The average endowment return from 1975 through present for a school with endowment assets in excess of one billion dollars is 10.50%. The average unlevered return on student housing product from 2002 - 2008 is roughly 8%, while the return on laboratory space dedicated to university use is generally 0% as scientists are usually not required to pay rent for their research space, or the university essentially pays itself rent in the form of one department

---

16 NACUBO
17 Marcus and Millichamp, National Student Housing Report, First Quarter 2009.
paying the university controlled real estate department rent. Therefore, through withdrawing endowment funds to invest in either a student housing or a laboratory facility, the university is foregoing the opportunity cost of the lost endowment income, representing 2% for student housing, and 10.50% for laboratory. It should be noted here that at all institutions, overhead charged on research grants offsets the cost of facilities, although it is difficult to calculate this as a return on investment.

**Figure 4: Student housing sales trends**

A more popular method for universities to finance real estate development is through bond issuance. Depending on their credit rating as non-profit institutions able to issue tax-free debt, universities can typically borrow at significantly more favorable rates than can private developers. Because most universities are able to issue bonds tax-free, the schools are able to pay lower interest rates to bond investors. Current average interest rates for AAA rated universities are between 4 - 5%\(^{18}\) versus 5 - 7%\(^{19}\) for private firms. Universities are also generally not

\(^{18}\) Paul Sehnert, Director of Real Estate, University of Pennsylvania

\(^{19}\) Peter Calkins, Executive Vice President and Chief Operating Officer, Forest City Enterprises Boston
limited to issuing bonds collateralized by the real estate, and the schools are able to bundle bond offerings into packages cross collateralized by a number of assets as well as a general guarantee tied to the university’s credit\textsuperscript{20}. This allows the university to finance real estate projects even in down real estate markets by leveraging the financial strength of the institution as a whole. Through utilizing bond financing, universities are not required to de-capitalize endowment funds.

However, bonds still require annual interest payments in addition to the principle repayment at the end of the term. Assuming 100\% of development costs have been financed through bonds, and based on the university’s assumed unlevered return of 8\% on student housing and 0\% on laboratory space, we must subtract the bond interest payments of 5\% to reach the net return of 3\% on student housing and a loss of 5\% on laboratory space.

The impact of a bond’s effect on the balance sheet of a university cannot be overlooked. Additional debt applied to the balance sheet will have a negative effect on the credit rating of the university. A negative credit rating would increase the interest rate payable on bonds issued by the university, and it may hamper the university’s ability to issue bonds in the future. The issuance of bonds also increases the risk profile of the university’s involvement in the development, and for an institution that is inherently risk averse and dedicated to preserving the value of its holdings; this increased risk may not be desirable. The figure below illustrates the methods universities use to finance development projects.

\textsuperscript{20}Steven Nason, Director of Residential Real Estate, Harvard University
Universities can also finance real estate development through donor financing. In this situation, a single donor, or larger group of donors provides funding for the university to develop a specific asset. The project budget is funded through these donations, and the university is not required to issue bonds, or to use endowment funds. However, because donors specify a pre-determined amount to be applied to the development, the university must be cognizant of 3 factors which could affect the outcome of the development. First, the hard budget requires strong project management skills to ensure that cost overages do not occur, for without looking to other donors or alternative financing options, there are no further funds available for the project beyond the approved budget. Second, the university must be able to achieve the quality of facility it is seeking with the donor funding provided. If the donor funding will allow only for a project budget that will not adequately fulfill the university’s requirements, then the school is left with either building an inadequate facility, or once again looking to other funding sources to bridge the budget gap. Third, donors often mandate what type of facility their donation will be used to construct. In this situation, a university could be forced to expend time and resources developing a facility that might not serve as functionally efficient in fulfilling the university’s current or future needs.

Wim Wiewel, Kara Kunst, Raymond Dubicki, “University Real Estate Development: Campus Expansion in Urban Settings”
Finally, universities can use private developer financing to facilitate development. Under a ground lease or similarly structured development scenario, the university can purchase land using bond financing. The balance of the development costs would then be offloaded to the developer who would access capital markets to finance the development. While a developer would be paying a higher interest rate than a university, and while the developer would likely pass this cost through in the form of lower rent on the ground lease, the university is effectively mitigating its risk through this structure by not subjecting its balance sheet to liabilities other than the relatively small cost of the land, while also saving the lost opportunity cost involved with tying-up notional bond principal in developing the building.

It is clear that universities employ a variety of factors in their consideration of how to design, build, and finance real estate. Each university is affected differently by these factors, and it is important to implement controls when comparing the development process between institutions. These controls between universities can take the form of financial strength, internal development capabilities, and scope of planned development. In the following chapter, the controls used for this thesis will be discussed in greater detail.
Chapter 2 – Methodology

The three case schools, Harvard, Penn, and MIT, were chosen for a number of reasons. Each school has a dedicated real estate office tasked with planning, developing, and operating real estate associated with the university. At each school, the real estate office has the ability to develop a real estate project internally if so desired. The sophistication of the university decision makers involved with the decision to privatize university development is important because a number of complex financial, design, and operational considerations must be evaluated for a university to fully understand the costs and benefits of using a private development model. The ability to understand and satisfy the interests of both a private developer and the university is a complex process, and a more experienced university real estate office provides increased transparency behind the motivations of the university in pursuing privatization of all, or a portion of their real estate development projects.

A transparent decision making process is integral to providing the most comprehensive understanding of what is a nuanced cost/benefit analysis to the university. A successful analysis of a university/private development model rests on understanding the goals that both the university and the developer hope to achieve through the development project. Without a rational basis for decisions with consideration paid to a number of sophisticated variables, it would be difficult to measure success in a project, especially through a comparison to the original goals the project was set out to fulfill. Therefore, through using schools that possess sophisticated real estate offices, a more complete understanding of the factors that influence development decisions within the university can be understood. In this way, the thesis is able to control for the
experience of the university decision making process that each school relies upon in deciding whether to privatize development projects.

Each school chosen for a case study shared a similar credit rating of AAA by Standard and Poor’s (S&P). The strength of the school’s credit rating translates into the interest rate required to be paid by the school for bonds it issues. As the interest rate on bonds translates effectively into the university’s cost of capital, a control must be placed in ensuring a similar cost of capital among the schools studied for this thesis. Varying costs of capital will impose varying motivations on a school for pursuing private party development for university assets. By controlling for the cost of capital among the schools sampled, the thesis standardizes the base cost of capital and resulting discount rate involved with evaluating the various financial implications of the development projects among the case studies.

The thesis limited the evaluation of real estate product studied to two types of assets: student housing and laboratory buildings with no commercial component. The limitation of study to these two structures imposed a control between the case studies evaluated. Further, each of these types of assets provides a unique motivation for the university and the private developer to pursue a partnership for development.

Student housing is one of the few real estate assets that has the potential to provide a measureable financial return to the university. Student housing facilities are operated in much the same way as apartment housing units, and, “rising construction costs on traditional residence halls have precluded many universities from embarking on housing projects, paving the way for
private developers to increase their presence [in the market]."²² Because of the defined and easily underwritten structure of the student housing cash flow model, with rent paid by students in return for the university providing housing services, a private developer could easily justify its involvement in a student housing development. Further, students are increasingly demanding amenities in student housing product that are normally found in Class A mixed-use apartment complexes and are rarely available in dormitory environments.²³ The complexity of these projects through their mixed-use nature often requires a market knowledge and development experience beyond the capacity of the university’s real estate office. This enables private firms to further expand their influence in the student housing market.

Laboratory space serves as a main driver for universities to attract the most talented scientists, researchers, and professors. The recognition that top scientists provide to a university, coupled with the income realized through grants to scientists engaged in research at the university from a wide variety of sources provide both a reputational and an economic incentive for universities to develop the most technologically advanced laboratory facilities to ensure retention of the best scientists. In many cases, the experience of the private market in controlling costs and ensuring quality through developing laboratory product justifies the university relying on private firms to build laboratory space.

Academic research on the privatization of university real estate development is rare, and therefore published literature on the subject is sparse. While a few academic case studies have been completed on the subject of university real estate development, the vast majority of these

²² Marcus and Millichamp, National Student Housing Report, 1st Quarter 2009
²³ Marcus and Millichamp, National Student Housing Report, 1st Quarter 2009
studies have been focused on understanding the process through physical and social means focused on the impact of the university on the surrounding community. Very little has been studied regarding the motivations and effects of privatizing the university development process, and the costs and benefits that such privatization has on the university and the developer.

The previously published case studies serve as useful guides on the background and main themes governing the decision of a university to privatize development. However, projects that have been studied have been generally large scale urban renewal-type of developments that do not directly translate into an analysis of the effects that privatization has on individual projects built by the university. This thesis seeks to undertake a more micro-level analysis of the manner in which the privatization of university real estate development can be undertaken by schools that do not have the need or the capacity to engage in large scale developments.

Therefore, the vast majority of data and conclusions reached in this thesis will be through a combination of personal interviews and document review associated with the three case studies. Personal interviews were conducted with a number of officials in the development offices of universities, as well as employees of the private developer. These interviews explored the motivations behind both the developer and the university to enter into partnerships for development, the structure of the partnership, as well as the strengths and weaknesses of those partnerships in relation to the finished product. In addition to the interviews, documents were reviewed to understand construction information, constructions costs, and return analyses. These were instrumental in providing much of the quantitative data required to evaluate the relative success of a partnership versus alternative options open to the university.
Chapter 3 – Harvard Case Study

In the late 1990’s Harvard University embarked on a 10 year plan to expand its graduate housing to add a total of 1,500 units capable of accommodating 50% of the graduate student population enrolled at the university. Within 7 years, Harvard achieved this goal by developing graduate student housing both through internally controlled development as well as in conjunction with private development firms. This case study examines a project Harvard undertook in partnership with a private development firm, Samuels and Associates. Trilogy, located in the Longwood Medical area of Boston, is a residential for-rent apartment project.

Figure 6: Trilogy view looking east on Brookline Avenue

Through understanding the development process involved with the Trilogy project, the case study seeks examine the planning and delivery methods involved with the project. This chapter

24 Steven Nason, Director of Residential Real Estate, Harvard University
hopes to answer the question: does a private developer possess the market knowledge, the product knowledge, and the entrepreneurial focus on minimizing schedule delays to produce a development more efficiently than Harvard could achieve using its internal facilities agency?

Because the Trilogy project was an opportunistic investment by Harvard into a long term relationship with a private developer, it is a somewhat unique project to compare with an internally Harvard developed project. However, the benefits of a streamlined decision making process as well as cost savings to schedule are two of the major benefits that Harvard experienced as a result of employing the private market to facilitate institutional real estate development.

As Harvard was expanding its medical school presence in the Longwood Medical area of Boston, the school was facing an increased housing shortage for medical students who wanted to live close to the medical campus. The vast majority of the university’s graduate student housing was centered near its Cambridge, Massachusetts main campus, a distance of approximately three miles from the Longwood Campus. To alleviate the housing shortage in the Longwood area, Harvard embarked on a search for a suitable site through which it could develop graduate student housing. Harvard eventually settled on three potential sites for development. One site consisted of a vacant parcel of land, the other site involved the demolition of an existing building to facilitate new construction, and the third site consisted of a fully permitted but not yet constructed 576 unit condominium complex controlled by a local developer, Samuels & Associates

25 Steven Nason, Director of Residential Real Estate, Harvard University
The Longwood area had historically been comprised of a mix of uses. Brigham and Women’s Hospital, Dana Farber Cancer Institute, and the Harvard Medical School had long anchored a number of medical uses. In addition, undergraduates from Northeastern University and Boston University occupied a large portion of the rental housing available in the area. Finally, Fenway Park in nearby Kenmore Square supported a number of retail and entertainment uses. However, beginning in the late 1990s, the purchase of the Boston Red Sox by new local owners and the proposed re-development of Fenway Park, as well as growth in area hospitals spurred residential development of increasing density in the Longwood area. The increased density and potential for both higher foot traffic associated with the Red Sox and a growing student population occupying the rental housing led area residents to begin to organize in opposition to further development. While the increased vehicular traffic associated with a Fenway Park expansion was of serious concern to the neighborhood, the noise and unruly behavior by students that would result from an increase in the undergraduate student population was perhaps more central to the neighborhood’s opposition to expansion by the various universities in the area. Secondary was the neighborhood’s concern that increased development would spur gentrification of the area resulting in increased housing prices pushing home affordability out of the reach of the areas’ lower income residents. It was in this environment that Harvard found itself as it attempted to construct graduate student housing in the Longwood Medical area.

Harvard controlled two development sites in the Fenway area, however zoning made it impossible to undertake as-of-right construction for the residential product that Harvard required. Thus, to achieve the required product would involve substantial permitting and zoning relief.
Given the typically difficult permitting process experienced by many projects in the City of Boston, coupled with the recent organization of the surrounding community in opposition to further expansion of university housing in the area, Harvard realized that ground-up development of the two land sites which it owned could be a long and expensive process. Further, there was no guarantee that, at the end of the permitting process, Harvard would actually be able to gain a permit for the number of units it was seeking, or to undertake a design that would meet the University’s specifications. Finally, the issue of providing community concessions in return for receiving zoning variances loomed large in Harvard’s mind. The University was concerned that the neighborhood would seek to extort above market concessions from Harvard on the belief that the wealthy school could afford virtually any community request.  

In light of this, Harvard began to explore Trilogy, the Samuels site. The site had already received zoning approval from the City of Boston, and community concessions such as the affordable housing component had been negotiated by Samuels prior to Harvard’s involvement. In addition, the exterior building envelope had been approved through a community design review process, eliminating a potentially expensive unknown. However, the building had originally been permitted for condominiums intended for purchase by young professionals and medical personnel in the area, but market conditions had eroded since Samuels had first proposed the site. At the time of Harvard’s entry into the process, the project could no longer justify the market absorption rates for purchase of the condominiums necessary to gain construction project financing. Thus, barring improved external market factors, Trilogy was effectively dead in the water until market demand recovered, or an external factor could be brought in to enhance the

---

26 Steven Nason, Director of Residential Real Estate, Harvard University
feasibility of the project. Harvard proved to be that external factor enabling the development of Trilogy to proceed\(^{27}\).

For Harvard, the Trilogy project appeared to be an excellent way to quickly obtain a critical mass of graduate student housing units with a minimum of time and money spent on the public approval process\(^{28}\). Harvard’s risk profile represented through its involvement in Trilogy had been substantially mitigated by the approvals already negotiated and received by Samuels. Through not having to publicly face either the City or the neighborhood, Harvard was able to avoid potential negative backlash against a proposed Harvard project. Thus, when Harvard saw an opportunity to purchase 171 units at Trilogy, the school reacted quickly to seize the opportunity. To accommodate Harvard’s desire to own the units outright, Samuels divided the building into four condominium entities comprised of the 600 space parking garage, 43,493 square feet of ground floor retail space, 405 for-rent apartment units controlled by Samuels, and 171 units controlled by Harvard\(^{29}\). Upon receipt of a certificate of occupancy, Harvard agreed to purchase the fee interest in the 171 units as well as rights to 175 parking spaces\(^{30}\).

Because Trilogy’s construction schedule had been stalled due to lack of available financing, the interior design and layout had not been finalized and was still in the design-development stage with Elkus Manfredi Architects. The original design for Trilogy incorporated a majority of two bedroom units of roughly 1,100 square feet, too large for Harvard’s program of studio and convertible 1 bedroom units. However, during the design-development process the architect,

---

\(^{27}\) Steven Nason, Director of Residential Real Estate, Harvard University

\(^{28}\) Steven Nason, Director of Residential Real Estate, Harvard University

\(^{29}\) www.samuelsre.com

\(^{30}\) Steven Nason, Director of Residential Real Estate, Harvard University
Elkus-Manfredi, worked with Harvard to re-design the 2 bedroom units into 2 separate apartments, a studio and convertible one bedroom unit$^{31}$.

*Figure 7: Harvard Trilogy studio$^{32}$*

![Diagram of Studio Apartment](image)

*Figure 8: Harvard Trilogy convertible one bedroom$^{33}$*

![Diagram of One Bedroom Apartment](image)

$^{31}$ Steven Nason, Director of Residential Real Estate, Harvard University

$^{32}$ Harvard Trilogy Open House Flyer, Harvard University

$^{33}$ Harvard Trilogy Open House Flyer, Harvard University
Figure 9: Harvard Trilogy kitchen

Figure 10: Harvard Trilogy living room

34 www.samuelsre.com
35 www.samuelsre.com
Further, the interior mechanical and electrical design was not sufficient to suit Harvard’s specifications for its graduate student housing. However, because Harvard was only purchasing 171 units within the 576 unit development, Samuels did not want to re-design the Samuel’s controlled units to Harvard’s specifications. Reasons for this included Harvard’s requirement that HVAC and electrical services be centrally metered, something that Samuels could not support in its for-rent apartment model for the remainder of the building. Here, the efficiency created by Elkus Manfredi’s prior involvement in the buildings design created a schedule savings for Harvard.\(^{36}\)

Elkus Manfredi was able to essentially create a building within a building to facilitate Harvard’s requirements. In addition to the issues posed by HVAC and electrical services, the entrance to Trilogy created a problem for both Samuels and Harvard. Samuels wanted to maintain a sense of exclusivity among the building’s residents, many of whom would be paying upwards of $3,000 per month in rent. Samuels was concerned that allowing student residents to enter into the same lobby as non-student residents would endanger that sense of exclusivity. For its part, Harvard wanted to limit its student residents to a secured lobby that could be controlled by Harvard security personnel.\(^{37}\) Elkus Manfredi’s solution was to create two lobbies with different orientations. The main building lobby was positioned on Boylston Street to gain maximum exposure to pedestrian traffic and to allow residents easy access to the shopping and eating amenities located along Boylston Street. Harvard’s lobby was positioned on the opposite side of the building on Brookline Avenue, a smaller feeder street for Boylston Street.

\(^{36}\) Steven Nason, Director of Residential Real Estate, Harvard University

\(^{37}\) Steven Nason, Director of Residential Real Estate, Harvard University
Table 1: Harvard Trilogy unit description and rental rates

<table>
<thead>
<tr>
<th>Unit Description</th>
<th>Utilities Included w/ Rent</th>
<th>Rental Range/Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio</td>
<td>heat, hot and cold water, sewer, electricity, air</td>
<td>$1,607 - $1,654</td>
</tr>
<tr>
<td>Double Studio</td>
<td>conditioned, air conditioning, Internet</td>
<td>$2,115 - $2,345</td>
</tr>
<tr>
<td>1 Bed Convertible</td>
<td></td>
<td>$1,988 - $2,078</td>
</tr>
</tbody>
</table>

Separate entrances required separate elevators, so elevator banks were designed to exclusively service Harvard controlled areas as well as non-Harvard controlled areas. In addition, as was previously mentioned, Harvard required the ability to control utilities centrally as opposed to the individual unit control common in most apartment developments. A separate mechanical and electrical system was therefore designed to service the 171 Harvard owned units in the development. The Samuels controlled portion of the project operated off of one set of...
mechanical heat pump units and electrical systems, and Harvard’s portion was serviced by independent systems including fan coil units served from a central cooling loop.39

The Trilogy project was constructed under two sets of construction documents with the same general contractor, Suffolk Construction. Samuels held the overall contract to construct the entire project and retained liability for project delivery. However, Samuel’s section of the construction documents was limited to the structure, the façade, and the parking garage as well as the interiors and common areas of the 405 market rate residential rental units. Harvard retained oversight and control over the interior design and construction documents related to the 171 Harvard owned units, lobbies, elevators, as well as the mechanical, electrical, and plumbing required to service the Harvard space. However, Samuels still controlled the entire project budget and schedule, and the Harvard cost structure was based on a bid-out set of construction documents based on Harvard’s specifications and attached to the project GMP.40

Samuels structured a GMP contract with Suffolk Construction based on the two sets of construction documents and specifications. Because Harvard was very sensitive to a mid-summer delivery to enable occupancy of the units for the upcoming academic year, Samuels included a penalty in the Suffolk contract for delivery delays. While Samuels retained risk for cost overages above the GMP contract pricing for the Harvard portion of the project, Harvard absorbed change orders for their portion of the project. By the same token, Samuels was allowed to keep any savings realized from the Harvard portion of the GMP.41

39 Steven Nason, Director of Residential Real Estate, Harvard University
40 Steven Nason, Director of Residential Real Estate, Harvard University
41 Steven Nason, Director of Residential Real Estate, Harvard University
The Trilogy project was entirely privately financed through Samuels. While Harvard’s agreement to purchase 171 units upon receipt of a certificate of occupancy was instrumental to providing Samuels with the ability to achieve funding through a 3rd party lender, Harvard did not contribute any initial equity toward the purchase price, nor did the University provide guarantees other than to purchase the units. However, Harvard did need to issue bonds to finance the acquisition of the units from Samuels. The Trilogy project was entirely funded through the issuance of bonds by Harvard’s central treasury. Harvard issued tax free bonds to the market which were then applied as a liability to Harvard’s balance sheet. Under this scenario, Harvard’s risk profile was increased as additional bond liabilities affect the interest rate that Harvard must pay to its creditors. Increased debt liabilities also affected the credit rating that the University enjoyed and from which the interest rate it must pay on its debt was derived. If that credit rating fell, Harvard would be required to pay higher interest rates on the bonds it issued, and the total amount of the University’s borrowing capacity would be reduced by a downgrade in the institution’s credit rating.

The development of Trilogy has proven to be extremely successful for Harvard as evidenced by the oversubscribed demand for the project from medical students. All 171 units in the project have been fully leased since the project opened in 2002. Harvard’s commitment to the project enabled Samuels to develop a mixed-use project that, at the time, could not have been developed without Harvard’s involvement. However, Samuels’ ability to develop a mixed-use project with retail shopping and dining amenities on-site has provided a draw to both Harvard affiliated and market residents alike. This experience needed to successfully meld the retail and residential

---

42 Steven Nason, Director of Residential Real Estate, Harvard University
43 Steven Nason, Director of Residential Real Estate, Harvard University
uses together into a successful development is something that Harvard did not possess through its internal real estate capabilities, and the project’s occupancy has benefitted from the success of the retail component in providing Trilogy with unique amenities not found elsewhere in Harvard’s student housing options.

The real lesson in this case study is understood through efficiencies gained in the design and construction process by the private market’s influence on the Trilogy project. The team of design, development, and construction professionals was essential to the success of the Trilogy project. Elkus Manfredi’s ability to utilize the design development process effectively was central to cost control through design efficiency and allowed for costs associated with essentially creating “a building within a building” to be mitigated through careful design.

In addition, “the personal integrity of the developer was essential to providing Harvard with a sense of comfort during the project.” The involvement of a private developer in the process increased a number of risks for Harvard that would not have been issues in a Harvard funded and controlled project. Most namely, the risks associated with bankruptcy by the developer or the lending bank were risks that Harvard could not effectively underwrite with certainty. While Harvard mitigated its risk somewhat by deferring ownership of the construction contract, it also gave up a measure of control to Samuels over the contractor and the architect. This was further demonstrated by the fact that Harvard did not control ownership of its portion of the project until the development reached effective completion through receipt of the certificate of occupancy.

---

44 Steven Nason, Director of Residential Real Estate, Harvard University
45 Steven Nason, Director of Residential Real Estate, Harvard University
Therefore, honesty and communication between Harvard and Samuels was essential to providing Harvard with the piece of mind it required to manage its risk profile in the project.

Finally, the involvement of a private developer having overall control of the project streamlined a decision making process for Harvard that was often slowed by beaurocracy, and enabled, “an efficiency of decision making with Harvard often being presented with no other choice” 46 in how certain aspects of the development process would be handled. In addition, the existence of the private developer as the public face of the project shielded Harvard from the permitting process and allowed for the permitting of a structure that the community might not have approved had they known Harvard was involved in the project. Further the ability of the private developer to utilize market knowledge and experience to construct a mixed-use project of retail as well as residential provided a draw for Harvard graduate students and ensured strong occupancy for Harvard’s portion of the project.

---

46 Steven Nason, Director of Residential Real Estate, Harvard University
Chapter 4 – MIT Case Study

This chapter examines and compares two developments at the Massachusetts Institute of Technology, Sidney-Pacific and New Ashdown. Both developments are student housing facilities, although New Ashdown was constructed under the purview of the MIT facilities department, and Sidney-Pacific was built by the MIT Investment Office’s Real Estate Group. The key findings of this chapter relate to inefficiencies of design and schedule costs between the 2 projects. The chapter will review the approval process for design and construction between the 2 projects, and it will explain how the complexities involved with MIT’s internal development process in the New Ashdown project negatively affected the project cost structure as compared to the Sidney-Pacific project which was developed independently of MIT’s typical development controls.

In the late 1990’s one-third of undergraduate students at MIT lived off-campus, either in non-MIT controlled rental units, or in fraternities and sororities. When a freshman student died from an alcohol overdose in 1997, the MIT administration made a commitment to bring all freshman students into on-campus housing by the Fall of 2001. This policy change required the construction of new dormitory facilities to house the additional freshman load on campus housing. While the feasibility of building these new dorms was being explored, a study of graduate housing was also initiated to address the housing demand by the 8,000 MIT affiliated graduate students for MIT supplied housing.

47 Pamela Delphenich, Director of Campus Planning and Design, MIT
48 http://simmons.mit.edu/prehistory/sh_prehistory_2challenges.html
The MIT planning department had developed a master plan to accommodate undergraduate housing in a defined zone located in a residential campus near the MIT playing fields and across Massachusetts Avenue and the railroad tracks from the main campus. While the idea of this residential campus was to foster a connection between the undergraduate students living there, the reality of the situation was that the campus was located quite far away from the main campus where the students spent most of their time. This planned residential campus was designed without a great degree of student influence, and was sited primarily as a function of the availability of land to support the development. Through ignoring the opinion of its student base, MIT failed to thoroughly evaluate the market for which it was constructing the housing product, namely undergraduates, and embarked on developing a plan that was locationally unattractive to students who would be living there. In this way, MIT misjudged the market presented by the undergraduate population, and sited a project that was not in close proximately to either classrooms or shopping and food amenities located along Massachusetts Avenue. In fact, the net result of MIT’s misjudging the undergraduate response to locating housing in the planned residential campus was the elimination of the campus notion in favor of massing undergraduates into housing located closer to the main campus along Memorial Drive. This move precipitated the construction of New Ashdown as a replacement for housing the graduate student residents of the original Ashdown, a building that would now be converted to undergraduate use.

The residential campus plan was eventually scrapped, but not before the construction of Simmons Hall. The initial phase of the residential campus development involved MIT’s facilities department designing and constructing Simmons Hall, a 350 bed undergraduate dorm. However, no sooner had construction begun, than an abutter to the Simmons site sued MIT citing

\[ 49 \text{ MIT Tech} \]
shadow infractions by the proposed development. While the merits of the lawsuit were questionable, MIT was nonetheless concerned about the lawsuit causing delays to effect the mid-summer delivery of the dormitory as the timing of delivery was imperative in order to allow for students to move in prior to the upcoming academic year. With the construction delivery of the Simmons project uncertain, MIT was forced to evaluate alternative options for undergraduate housing.

The graduate housing study performed by MIT identified an MIT controlled site located on Pacific Street in Cambridge, Massachusetts as a focus for future graduate housing development. To account for the delay of the Simmons project, the MIT administration decided to commence construction on the Sidney Pacific site with the intention of designing the new building to flexibly accommodate either graduate housing, or to house undergraduates if Simmons was delayed indefinitely50.

Figure 12: Map of New Ashdown and Sidney-Pacific in relation to MIT campus

50 [http://tech.mit.edu/V121/N40/40const.40n.html](http://tech.mit.edu/V121/N40/40const.40n.html)
Timing was crucial for the delivery of the Sidney-Pacific development. The delays to the Simmons project had left only 2.5 years to permit and deliver a dormitory in order to maintain the original development schedule for accommodating undergraduates in on-campus housing. Faced with this constricted schedule to permit and construct the Sidney-Pacific project, MIT turned to the real estate arm of the MIT Investment Office. The facilities department was already developing the Stata Center and various renovations within the MIT campus, and it did not have the capacity to take on an additional project. The Investment Office, however, differed significantly from the facilities department in its approach to development. The Investment Office typically invested in cash flowing and for-profit development real estate managed to generate returns to MIT's endowment. In this capacity, the Investment Office operated similarly to a for-profit developer.

Due to the constricted timeline for delivery of the Sidney-Pacific product slated for August 2002, the Investment Office required almost complete autonomy in the development process. The Investment Office agreed to deliver the 750 bed Sidney-Pacific project by August of 2002 at a designated budget approved by the MIT administration. In return, the Investment Office was granted autonomy in fast-tracking the design-development process pursuant to general guidelines regarding the number of beds, as well as common area and study space ratios. However, within the confines of these general guidelines, the MIT Investment Office retained full discretion to select architects and contractors, to negotiate contracts and pricing, and finally to organize and control the development process without interference from other MIT affiliates in the form of the facilities department or oversight committees.

---

51 Pamela Delphenich, Director of Campus Planning and Design, MIT
52 Michael Owu, Director of Real Estate, MIT Investment Management Company
This notion of discretion was central to the Investment Office’s success in the delivery of the Sidney-Pacific project. The Investment Office’s approach to real estate was generally in the capacity of a for-profit owner and developer, although the case of Sidney-Pacific was somewhat unique insofar as the tenant, MIT, was assured and the process was essentially a build-to-suit for the institution as opposed to a spec development with market occupancy risk. However, given its experience in the private commercial real estate markets as an owner and developer in other projects, the Investment Office was able to utilize its contacts and experience in the market to leverage efficiencies in design and construction generated by the current commercial best practices within the industry. In this capacity, the Investment Office was able to use its relationship with various City of Cambridge permitting agencies to negotiate an increase in massing above the as-of-right zoning translating into a 103,000 additional square feet gain from transferring development rights from an abutting MIT owned parcel donated to the City for a public park.\textsuperscript{53}

However, the single greatest advantage that the Investment Office provided to the Sidney-Pacific development process was its ability to side-step the internal approval processes for buildings constructed by the MIT facilities department. The MIT approval process is cumbersome, with input required from a number of committees on virtually every aspect of the design and construction process. These committees consist of faculty, administration, and students, and very few, if any of the members of these committees have real estate development experience. In past developments controlled by the facilities department, facilities personnel were required to present the various committees with a number of options for design and construction before the

\textsuperscript{53} Michael Owu, Director of Real Estate, MIT Investment Management Company
impact of those options on budgets and schedule had been accurately determined. Once a committee chose a certain scheme, pricing would then be generated.

**Figure 13: Organizational structure of Sidney-Pacific development**

![Organizational structure of Sidney-Pacific development](image)

This process was inefficient in a few important ways. First, schedule delays were created through having to generate an initial set of design schemes for committee approval, wait for the approval process to run its course, and then re-design the schemes to accommodate committee feedback. Secondly, the committee approval process created bloated project budgets. Because architects and contractors understood the time consuming process involved with development at MIT, the resulting pricing anticipated heavy allocations to items such as preconstruction services and

---

54 Michael Owu, Director of Real Estate, MIT Investment Management Company
55 Pamela Delphenich, Director of Campus Planning and Design, MIT
general conditions. The fact that numerous stakeholders involved with the approval process all had different motivations for what they wanted to see in a proposed development had the danger of causing the final design to be a compromise, thereby building a project that did not effectively serve the needs of any group. For example, students might be focused on the room configuration and amenities of a proposed housing project while administrators might be more concerned with economizing design and construction costs. Finally, the facilities and planning departments might be most concerned with siting the project in a location with available land without thought of how the proposed project use might be affected by the location. This idea can be seen with the planning process for the MIT residential campus for undergraduates.

The notion of design cost must also be considered from the perspective of the motivations behind the design. Simmons Hall was designed by renowned architect Steven Holl, and the intent through the design was to create a landmark building that would reflect a certain image of MIT to the academic community as an institution continually innovating through technology. Thus, a complex and visually striking design was chosen for Simmons Hall. Because the design of Simmons Hall was so important to MIT’s image, strong debate within the Institution was held before the design was finalized. This caused comparatively high architectural and engineering costs to be incurred on the project. However, the architectural and engineering costs cannot be effectively compared to other student housing facilities through a simple cost comparison. MIT placed an unquantifiable value on the benefits that the Simmons design would have in attracting prospective students and faculty, and fostering an image of MIT to the world as a leader in technological innovation. Thus, the costs involved with the Simmons design, while higher than

---

56 Michael Owu, Director of Real Estate, MIT Investment Management Company
57 Dennis Frenchman, Professor of Urban Studies and Architecture, MIT
other institutionally developed student housing facilities, were financially justifiable due to the advertising benefits that the image of the Simmons building reflected upon MIT to the world. Therefore, in some cases involving the development of a landmark building, design and construction costs cannot be effectively evaluated using a comparison limited strictly to budgets. Landmark buildings enable a university such as MIT to use its real estate to enhance its image and reputation to attract students and faculty. In this way, a number of abstract benefits can be applied to a landmark building development that might have the ability to justify increased costs of design and construction.

In discussions with the Investment Office for this chapter, it was stated that various MIT committees were provided with options during the Sidney-Pacific development process, but “whatever options that were presented were pre-screened [to ensure] that they fit with the defined budget and schedule.” In this way, the committees could retain their input into the project, although that input was limited to, “certain areas within a defined framework of options pre-designed to fit the schedule and budget.” These options most often took the form of interior finishes such as counter-top material, lighting, paint color, and appliances. Through its ability to mitigate the effect that committees had on the schedule and the budget, the Investment Office was able to ensure that the Sidney Pacific project would achieve the required delivery timing. Further, the cost control through the use of the GMP construction contract enabled the Investment Office to retain a certainty of costs while still allowing MIT some leeway in choosing finishes within the constraints of the GMP. In the end, this delivery method allowed MIT to mitigate its risk profile through defining a budget and a schedule, and the project successfully

---

58 Michael Owu, Director of Real Estate, MIT Investment Management Company
59 Michael Owu, Director of Real Estate, MIT Investment Management Company
achieved MIT's main objective in beginning the development, namely to hedge the risk of a delay to the Simmons project through providing the necessary number of beds to house students displaced by a Simmons delay while also providing long term graduate housing for the Institution.

*Figure 13: Sidney-Pacific efficiency unit with shared kitchen and bathroom*

*Figure 14: Sidney-Pacific 5th floor showing mix of single and shared efficiency units*
While the Sidney-Pacific project was a success insofar as it was delivered on time and on budget, some aspects of the project were less successful. Much like Simmons, the project was located relatively far from MIT’s main campus as well as the shopping and dining amenities offered by Massachusetts Avenue. Further, the interior design feature of windowless common areas was not well received by the student population. This design was used to control costs, but it had the effect of making the project less desirable among prospective student residents. While the MIT Investment Office essentially completed the project as a build-to-suit for MIT, it failed in much the same way as MIT’s planning department had done with the residential campus to understand the student market for which Sidney-Pacific was being completed. The issue of location was pre-defined by MIT and out of the Investment Office’s control; however, the interior design issues were controlled by the Investment Office. By not fully understanding the desires of the market by using input from current students, the Investment Office delivered a product in Sidney-Pacific that failed in some major respects in synchronizing the product to the demand.

In contrast to Sidney-Pacific, the development of the New Ashdown graduate dormitory was controlled by the MIT facilities department. The New Ashdown project was conceived to house graduate students who would be displaced when the original Ashdown dormitory was converted to undergraduate use. Much like Sidney-Pacific, the facilities department retained discretion over choosing a contactor, but the choice of the architect was left open to committees comprised of faculty and students. While the inherent inefficiencies involved with the committee approval process at MIT have been previously explained, a degree of sentimentality surrounded the New

---

60 Dennis Frenchman, Professor of Urban Studies and Architecture, MIT
Ashdown project which enabled the committees to exert even more power over the project than was typical\textsuperscript{61}.

\textbf{Figure 15: New Ashdown exterior view}\textsuperscript{62}

Sidney-Pacific had been constructed as a new facility to house students who had previously lived off-campus. The fact that the potential residents of the project had no prior experience with MIT housing, coupled with MIT's ceding major decision control to the Investment Office and away from internal MIT committees led to a certain "lack of engagement from major stakeholders in the project."\textsuperscript{63} This lack of engagement allowed the Investment Office to develop Sidney-Pacific through the lens of a private developer with a focus on maximizing savings to cost and schedule.

\textsuperscript{61} Pamela Delphenich, Director of Campus Planning and Design, MIT
\textsuperscript{62} www.mit.edu
\textsuperscript{63} Pamela Delphenich, Director of Campus Planning and Design, MIT
In contrast, New Ashdown was designed to house a group of students who had already been living on campus at MIT. These students’ attachment to the existing Ashdown dormitory, a former hotel with a prime location, individual rooms with private baths, and views of the river, drove considerable student involvement in the New Ashdown design process in the form of student led committees, and it was this involvement that presented the starkest difference between the New Ashdown and Sidney-Pacific projects.

*Figure 16: New Ashdown interior view*\(^{64}\)

---

The student influence to replicate the room configuration of the existing Ashdown building led to a decision by the administration to design New Ashdown primarily as a dormitory style building, with individual rooms with baths opening off of a long common hallway. Most of the new housing buildings at MIT, including Sidney-Pacific, had been designed with a suite configuration.

\(^{64}\) www.mit.edu
of rooms opening off of a common living and kitchen area. While the Sidney-Pacific design allowed for shared services in kitchens and bathrooms within the common areas, the dormitory configuration of New Ashdown increased the development cost due to the additional mechanical, electrical, and plumbing services required to serve each individual room\textsuperscript{65}.

\textit{Figure 17: New Ashdown 2nd floor plan showing dormitory style configuration}

While housing rents are somewhat elastic and could have been increased to account for the additional development cost, the real issue in New Ashdown’s design was the survivability of the dormitory style model over time. While the current students living in the original Ashdown wanted dormitory style rooms because they had been used to living in that style, not enough market research was completed to understand whether the desire for this design was shared among a larger sampling of students, not just the original Ashdown residents. If the demand was justifiable for dormitory product, than the additional development cost could potentially be justified in the form of higher rents. However, if the demand for dormitory space was simply a

\textsuperscript{65} Pamela Delphenich, Director of Campus Planning and Design, MIT
product of the current residents' affinity for nostalgia, than the development of dormitory product would not generate a sustainable demand over the long term.

In the case of New Ashdown, the building was designed to house primarily older graduate students who preferred the privacy offered by individual rooms and baths or small studios. Suites with multiple bedrooms were generally less attractive to the students. However, the rents at the original Ashdown were comparatively low for the product offered by the private rooms and baths. The students expressed a strong desire to maintain the original Ashdown rents at New Ashdown, a request that was difficult for the facilities department to accommodate and still provide the privacy that students required from the dormitory style configuration. “As the result of last minute compromises, student concerns about common space and affordability of rooms were incorporated in a final design that allowed the project to move forward.” Therefore, an imbalance between MIT’s revenue model for New Ashdown and its cost model became apparent, for increased privacy is certainly preferred in any living situation, but the cost of providing that privacy through increased development costs must be able to be recouped through higher rents.

Herein lies the danger of enjoining decision making powers over the development process to a group of students who have limited long term vision for the product’s design. Tastes change over time, and the average graduate student typically is enrolled at a university for 2-4 years. Thus, the students’ motivations for design are based upon what is currently attractive, not necessarily what is a sustainable design over the longer term life of the building, fifty or even one-hundred years. However, some student needs are relatively consistent. As seen in the New Ashdown

---

66 Dennis Frenchman, Professor of Urban Studies and Design, MIT
67 MIT Tech Volume 12, Issue 2, February 2007
development, students wanted to maintain privacy in their living configurations, a desire shared by most students, undergraduate and graduate. In this case, the market must be carefully evaluated to determine if the cost of providing increased privacy through individual room and bath design can be justified by the rents students would be willing to pay. The university therefore needs to balance the wishes of the students with the reality of the market in designing a successful product that will succeed over the long term.

Figure 18: New Ashdown common area view

In addition, the fact that the New Ashdown project was controlled by the MIT facilities department mandated that the project adhere to the MIT specifications for construction to the ‘100 year’ building standard employed by the Institution. This standard is the accepted construction specification required of any internally produced MIT related development project.

68 www.mit.edu
Among other things, the MIT ‘100 year’ standard required that New Ashdown be constructed to LEED Gold standards\textsuperscript{69}. The increased efficiency standard which is required of LEED Gold buildings significantly increased the construction cost for the project above that of a non-LEED certified building. It is worth noting here that the Sidney-Pacific project was not required to adhere to this same ‘100 year’ standard due to the potential for elements of the specification endangering both the accelerated development timeline as well as the pre-approved budget. Thus, the project did not garner a LEED rating, and enjoyed significant cost savings as a result\textsuperscript{70}.

However, it must also be noted that, while deciding to build to a non-LEED standard might save costs in the short term development budget, the less efficient systems will cost the institution more in utility bills and replacement costs over the long term. Further, the potential negative implications involved with the market associating a non-LEED building with a technologically progressive institution such as MIT could have repercussions that might cost the university more in tarnished image than the initial construction cost savings.

We can see from the data that the New Ashdown and Sidney-Pacific projects experienced vast dispersions in constructions costs for what, on the surface would be considered comparable product given that both facilities were constructed at similar times for the same use. We can control for some variables so as to better understand where the cost differences occurred. Both projects were constructed using GMP contracts with locally reputable contractors. Thus, it would appear that pricing inefficiencies due to divergent construction methods is not a factor in this analysis.

\textsuperscript{69} Pamela Delphenich, Director of Campus Planning & Design, MIT
\textsuperscript{70} Michael Owu, Director of Real Estate, MIT Investment Management Company
We can therefore attribute the cost differences to 4 factors: market demands or desires, design, systems and finishes, and schedule. Each of these variables was handled very differently between the 2 projects. With respect to design, the impact of the committee style of decision making in the New Ashdown project caused significant increases to the project budget. However, much of the dissatisfaction felt by the students over the New Ashdown process was caused by MIT failing to include students in the initial phase of the planning process. Plans for New Ashdown were already well underway when students learned that the original Ashdown would be converted to undergraduate use. Original Ashdown had been a graduate dormitory for 75 years, and the students had gained a great affinity for the architecture, the private rooms with amenities such as fireplaces, and the views of the river. The graduate student residents of Ashdown were therefore quite upset when they learned that they would be forced to move into a new facility in which location, views, and design were all perceived as being sub-par to what was existing in Ashdown. This caused the graduate student committees involved with the New Ashdown project to become especially obstinate in their demands to attempt to replicate the original Ashdown design, and this all translated into increased design costs.

These increased costs can be seen when the New Ashdown project budget ballooned from $104 million to an estimated $115 million. The resulting budget increase led to an initial decision by MIT to eliminate the fourth floor of the initially proposed five floor project. However, this decision was made without consulting the student committees that had heretofore been involved in the New Ashdown development process. Student outraged led to the facilities department re-evaluating the project and ultimately re-instating the fourth floor into the development plan.

---

71 Dennis Frenchman, Professor of Urban Studies and Architecture, MIT
72 MIT Tech Volume 12, Issue 2, February 2007
Through failing to initially include a major portion of the stakeholders in the New Ashdown process at the beginning of the process, MIT created an environment of mistrust between students and the administration which had a correlational effect in increasing costs associated with New Ashdown.

The concept of systems costs can also be seen through MIT’s ‘100 year’ specifications. An excellent example of this can be seen through HVAC. While the Investment Office may have specified a 2 pipe HVAC system with heat pump units for Sidney-Pacific, the MIT ‘100 year’ specification would have required a 4 pipe HVAC system with fan coil units for New Ashdown. The 2 pipe system exhibits a cost savings on average of $3.00 per square foot over the 4 pipe system, and the performance of each is quite comparable in a residential application. While a 2 pipe system may experience inefficiencies in heating and cooling during ‘change-over’ months in the spring and fall when heating or cooling is unavailable, these cases are generally limited to climates such as the Northeast where temperatures fluctuate. In addition, a 2 pipe system is more efficient to operate as it does not require the energy needed to simultaneously heat and chill the water loop in a 4 pipe system. The major difference between the systems is in longevity, with a 4 pipe system having a longer useful life than its 2 pipe counterpart. However, given the initial cost savings in installation as well as the utility savings, a 2 pipe system would be the more cost effective choice for a university to install.

Finally, the construction schedule varied between the 2 projects. Again, this variance can be ascribed to the delays caused during the design process for New Ashdown. In the case of New Ashdown, the lack of centralized decision making by the facilities department whose goals are

---

73 Suffolk Construction

54
long term in nature and whose leadership is relative stable caused delays in the construction process. Further, the absence of limitations on cost and schedule imposed by a department ceded by the Institution with centralized control ability engendered a degree of confusion in the process between the stakeholders responsible for the development process. For example, the amount of control student committees were allowed to have on the project was unclear. According to Kirk D. Kolenbrander, vice president for Institute affairs and secretary of the Corporation, “While students should expect to have some input, how that will actually be made real is not simple. He further acknowledged that “finding the right balance is something we need to work on, and that balance has not been achieved.” With no one entity responsible for providing a baseline of allowances for cost and schedule, it is impossible for the decision makers on the various committees to benchmark their decisions to a set baseline for design, construction, and schedule. When the ability to enforce cost and schedule controls can be consolidated into a single entity as was the case with the Investment Office in the Sidney-Pacific project, the development process is significantly streamlined and delays due to internal confusion and dissent can be minimized.

---

74 Pamela Delphenich, Director of Campus Planning and Design, MIT
75 MIT Tech Volume 12, Issue 2, February 2007
MIT’s facilities office was unable to provide hard or soft construction costs for the New Ashdown project, citing confidentiality concerns. Therefore, the construction numbers of the New Ashdown project shown in Table 2 reflect estimates provided by the MIT Tech through interviews with MIT personnel involved with the New Ashdown project. In addition, the architectural and engineering line item, perhaps the most divergent cost between the Sidney-Pacific and New Ashdown projects, was excluded from the analysis due to unavailability of data. Nonetheless, we can gain a basic understanding of the overall cost differential between the institutionally developed New Ashdown and the quasi-privately developed Sidney-Pacific. We see here that the institutional project exhibited a 288% increase in per square foot costs over Sidney-Pacific. Based on the information provided by interviews with MIT’s facilities department and the MIT Investment Office, it is reasonable to assume, in the absence of line item schedule of value cost data, that this vast cost differential between the two projects can be attributed to design considerations and delays imposed by the committee style of decision making in the New Ashdown project as well as costs imposed by the MIT ‘100 year’ institutional standard for materials and systems.

---

MIT’s facilities office was unable to provide hard or soft construction costs for the New Ashdown project, citing confidentiality concerns. Therefore, the construction numbers of the New Ashdown project shown in Table 2 reflect estimates provided by the MIT Tech through interviews with MIT personnel involved with the New Ashdown project. In addition, the architectural and engineering line item, perhaps the most divergent cost between the Sidney-Pacific and New Ashdown projects, was excluded from the analysis due to unavailability of data. Nonetheless, we can gain a basic understanding of the overall cost differential between the institutionally developed New Ashdown and the quasi-privately developed Sidney-Pacific. We see here that the institutional project exhibited a 288% increase in per square foot costs over Sidney-Pacific. Based on the information provided by interviews with MIT’s facilities department and the MIT Investment Office, it is reasonable to assume, in the absence of line item schedule of value cost data, that this vast cost differential between the two projects can be attributed to design considerations and delays imposed by the committee style of decision making in the New Ashdown project as well as costs imposed by the MIT ‘100 year’ institutional standard for materials and systems.

---

MIT Investment Office and Kieran Timberlake LLP report
Chapter 5 – Penn Case Study

This chapter examines the development of 2 laboratory buildings for the University of Pennsylvania. The Transitional Research Laboratories (TRL) was constructed privately by Forest City Enterprises Science and Technology Group and leased back on a long term basis by Penn. The other building, the Carolyn Lynch Laboratory, was constructed by Penn’s internal facilities department and financed through a mixture of private donations and bond issuances. This chapter will explore the differences between the 2 developments from the perspectives of construction costs, financial returns, and design efficiencies. The chapter concludes with findings supporting the private development process undertaken with TRL as being significantly more efficient from a construction cost and return perspective than the internally controlled Lunch development controlled by Penn.

Figure 19: Map of Penn campus with project locations

77 www.pennconnects.org
The TRL building was purchased by Penn in 1999 essentially to serve as a land bank space until a more defined use could be conceived. An existing 75,000 square foot building on the site had historically been used for industrial purposes by Westinghouse and Eastern Electric Apparatus Company. In 2002, Penn’s School of Medicine identified an immediate need for 40,000 square feet, but lacked the funding and the physical space within its own campus to facilitate the construction of space to fit this need. The TRL building, located in an underutilized section of campus near the railroad tracks, was viewed as a potential option to house the School of Medicine’s needs. However, Penn still faced financial constraints in developing the project.

Figure 20: Architect’s rendering of TRL

---

78 "Private Developer and the Urban University", Urban Land Institute
79 www.pennconnects.org
To enable development of the TRL site, Penn turned to the private development sector, structuring a ground lease and development program with Forest City. “The challenge for Penn was one of capital; a biomedical research facility can cost up to $500 per square foot. This platform, along with Penn’s long term goal to increase the amount of high quality research space available on campus and [Penn’s] desire to, as much as practical, not tie up precious capital in real estate, led us to structure a long-term ground lease and lease back deal with Forest City.”

Penn focused on Forest City as a developer due to their previous experience with engaging in partnerships and building structures for institutions such as the University Park project at MIT, a $900 million mixed use development near the Massachusetts Institute of Technology’s main campus in Cambridge, Massachusetts.

Rather than tear the existing TRL structure down, the development team of Penn and Forest City decided to gut and expand the building to eventually house 130,000 square feet of laboratory and research space on 2 levels. Because, “part of the TRL’s goal [was] to facilitate the transfer of basic academic research into what would eventually lead to collaboration with the private sector,” special care was taken to design the building to allow for a flexibility of science uses in the future. Due to Forest City’s previous experience with building laboratory facilities for institutions, Penn deferred to Forest City in choosing Tsoi Kobus architects for the project. Kobus was charged with designing the exterior of the building as well as the interior shell and finishes for common areas. Penn hired their own architect, Nalls Architecture, to design the tenant spaces for use by Penn. “The overall lab design was based on an open lab planning concept, maximizing flexibility for the future and facilitating collaboration among the teams of

---

80 Private developer and the Urban University, Urban Land Institute Article
81 Paul Sehnert, Director of Real Estate Development, University of Pennsylvania
82 Private developer and the Urban University, Urban Land Institute Article
researchers. The series of entry points established by the base building generated logical breaks in the open labs, providing access to public circulation as well as clustering of shared equipment and support functions, including cold rooms. These also became the fixed locations where power panels and other service distributions could be located, even while design of the laboratories was still proceeding.”

Figure 20: TRL first floor plan showing central atrium with flexible tenant space configurations

The idea of using an accelerated design development process was apparent in Forest City’s work with Kobus in using a design build structure to build the HVAC system serving the building. In addition, Forest City awarded the GMP construction contract to Turner Construction, but insisted on a fast track construction schedule where distinct project milestones, scheduled overtime work

83 Private developer and the Urban University, Urban Land Institute Article
84 www.pennconnects.org
85 Paul Sehnert, Director of Real Estate Development, University of Pennsylvania
and rates, as well as weekly coordination meetings with the entire project team were pre-defined to minimize confusion or delays to the construction process\textsuperscript{86}. Not only did this process speed up the project delivery, but it also minimized costs associated with general conditions and design contingencies appropriated to compensate the designers and contractors for delays to the schedule.

\textbf{Figure 21: Use of natural light to illuminate tenant areas}

![Image of natural light in tenant areas]

The flexible design of the project was driven by Penn’s desire to retain the ability to eventually use the building to house commercial life sciences tenants in the early growth stage that had grown from connections to the Penn School of Medicine. However, market conditions at the time TRL was constructed could not support this model, and thus Penn was forced to fill the building with a number of internally sourced Penn affiliated tenants. While the School of Medicine requirement for 40,000 square feet was known at the time of construction, Penn did not have defined uses for the balance of the space. Therefore, Penn and Forest City agreed to an allowance

\textsuperscript{86} Peter Calkins, Executive Vice President and Chief Operating Officer, Forest City Enterprises Boston
payment from Forest City to Penn to be used for tenant improvement costs when Penn found uses for the balance of the vacant space. Penn would then hire its own architects for the tenant improvement work while using Turner for the construction. This effectively mitigated Forest City’s exposure to tenant improvement costs by capping the required payment while also enabling Penn to retain an additional degree of control over the design of its tenant spaces. Finally, quality could be controlled through ensuring that Turner completed both the base building and the tenant improvement work on the project.

Further, the influence of Forest City in the project allowed for the implementation of commercial best practices into the design and construction specifications. This provided substantial time and material savings by not having to adhere to Penn’s ‘100 year’ design specifications for its internally developed buildings. Examples of this included the design build applications for systems, but also more pedestrian areas such as the installation of drywall. Whereas the internal Penn standards would not permit the installation of drywall until the roof was fully installed and successfully water tested, Forest City and Turner began to install drywall as the roof was also being installed, using temporary weather protection to cover the drywall as the roof was made weather tight. The installation of drywall in this manner maximized the progression of the project schedule through enabling different trades to work simultaneously on the project. The net effect was a substantial savings to general conditions costs due to the contraction of the construction schedule.

The development partnership was structured as a 65 year ground lease with rent payable by Forest City to Penn. In return, Penn would master lease back the entire TRL facility for a 20 year
initial term with two 20 year options and one 5 year option. “With a financially strong institution such as Penn willing to enter into a long term bondable lease, a developer can borrow at rates well below what may be considered market for a private development” 87. This enabled Forest City to pass on a favorable lease rate to Penn for its master lease. Penn’s annual rent was pegged to 400 basis points over the 10 year Treasury bill at the time, roughly equating to an 8% annual return of Forest City’s development costs and ground rent payments 88. In addition, the lease with Penn was structured as a, “triple net bondable lease carefully crafted as an operating lease rather than a capital lease, thus avoiding the effect of a capital lease on Penn’s balance sheet and credit rating.” 89 While helping Penn to retain its credit worthiness for future bond offerings, the bondable operating lease also enabled Forest City to finance the balance of the development costs associated with the project, leaving Forest City with a de-minimus amount of equity in the project 90.

One of the benefits of this structure was enabling Forest City to effectively re-deploy its equity in other projects to expand its operations rather than having equity tied up for the long term in a project it expected to own for upwards of 20 years. In addition, while the size of the loan consumed the balance of the available clash flow from Penn’s lease payments, the extremely small amount of Forest City’s equity assured that the remaining cash flow not paid to debt service enjoyed an almost infinite return on the in-place equity. In essence, Penn’s long term commitment to master lease the building reduced Forest City’s risk substantially due to Penn’s credit while also ensuring that Forest City could develop the project for very little equity

87 Private developer and the Urban University, Urban Land Institute Article
88 Paul Sehnert, Director of Real Estate Development, University of Pennsylvania
89 Private developer and the Urban University, Urban Land Institute Article
90 Peter Calkins, Executive Vice President and Chief Operating Officer, Forest City Enterprises Boston
invested and experience an extremely lucrative return on that investment given the relative risk involved.

TRL was fully occupied upon its completion by a number of uses affiliated with Penn. Tenants include a sleep study laboratory as well as a vivarium. The building has been received very well by its tenants, with design features such as a central atrium with clerestory ceiling serving as key drivers of tenant satisfaction. Further, Forest City’s management team at the building utilizes the company’s vast experience in the life sciences industry to not only gain efficiencies of operations which drive down costs to Penn in the triple net lease structure, but also to ensure a quality of institutional management for responsiveness to building maintenance and repair issues. In addition, the flexible floor plan design of the building has enabled Penn to utilize its real estate more efficiently by bringing other uses into the project, such as the sleep laboratory, that might not have originally been programmed for TRL, but whose relocation has enabled better utilization of other Penn buildings.

---

91 Paul Sehnert, Director of Real Estate Development, University of Pennsylvania
92 Paul Sehnert, Director of Real Estate Development, University of Pennsylvania
The Carolyn Lynch Laboratory is an 116,000 square foot laboratory facility constructed to house Penn’s Department of Biology as well as to serve as the headquarters of Penn’s Genomics Institute. The laboratory was designed by Ellenzweig Associates and was completed in June, 2006. The building was built by Henderson Corporation, a New Jersey based general contractor.\(^93\)

Much like TRL, the Lynch Laboratory was designed to be flexible in accommodating a number of uses. “A key feature of the new building is its flexible research modules, which can be reconfigured to accommodate emerging research priorities and cross-disciplinary collaboration. Special facilities in the building include wet laboratories for biology and genomics research, plant growth chambers and greenhouses, conference rooms, faculty offices, and animal, plant, and fish facilities”.\(^94\)

---

\(^93\) [www.pennconnects.org](http://www.pennconnects.org)

\(^94\) [http://www.sas.upenn.edu/home/news/lynch_lab.html](http://www.sas.upenn.edu/home/news/lynch_lab.html)
The Lynch Laboratory’s total project costs were in excess of $61 million, and took 10 years to design. The extremely long design process was a product of the numerous stakeholders at Penn who were required to be involved in the decision making process for a Penn controlled development. Among others, the major groups involved with the Lynch decision making were, Facilities and Real Estate Services, School of Medicine, Public Safety, Information Systems and Computing, Environmental Health and Radiation Safety, and Risk Management\(^{95}\). These stakeholders all had divergent interests in what each wanted to accomplish through the development and no stakeholder was provided with the centralized power to curtail discussion and exert a final decision on any one issue. Further, the overall project budget and schedule was overseen by Penn administrators who had little or no prior development experience. This decentralized decision making, coupled with a lack of ownership for responsibility in budgeting considerations led to an inability to control costs in the design and construction process\(^{96}\). Further, inexperience with the real estate development process led to an inability to effectively negotiate on pricing, leading to further cost excesses\(^{97}\). The result of this process was an unnecessarily protracted and costly development process.

\(^{95}\) Paul Sehnert, Director of Real Estate Development, University of Pennsylvania

\(^{96}\) Paul Sehnert, Director of Real Estate Development, University of Pennsylvania

\(^{97}\) Paul Sehnert, Director of Real Estate Development, University of Pennsylvania
Table 3: Lynch Laboratory and TRL construction cost comparison

<table>
<thead>
<tr>
<th></th>
<th>Lynch</th>
<th>TRL</th>
<th>Cost Variance from Lynch to TRL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hard Costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Building</td>
<td>44,200,000</td>
<td>29,966,150</td>
<td>147%</td>
</tr>
<tr>
<td>Site/Landscaping/Demo</td>
<td>600,000</td>
<td>413,640</td>
<td>145%</td>
</tr>
<tr>
<td>Permits/Bonding</td>
<td>450,000</td>
<td>258,525</td>
<td>174%</td>
</tr>
<tr>
<td>Tenant Allowance</td>
<td>1,750,000</td>
<td>16,157,813</td>
<td>-923%</td>
</tr>
<tr>
<td>Other Hard Costs</td>
<td>2,520,000</td>
<td>1,048,577</td>
<td>240%</td>
</tr>
<tr>
<td>Hard Cost Contingency</td>
<td>2,648,756</td>
<td>1,998,915</td>
<td>133%</td>
</tr>
<tr>
<td><strong>Total Hard Costs</strong></td>
<td>52,168,756</td>
<td>49,843,620</td>
<td>105%</td>
</tr>
<tr>
<td><strong>Soft Costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A&amp;E</td>
<td>7,441,000</td>
<td>1,344,330</td>
<td>554%</td>
</tr>
<tr>
<td>Misc Soft Costs</td>
<td>0</td>
<td>925,520</td>
<td>0%</td>
</tr>
<tr>
<td>Soft Cost Contingency</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>OH&amp;P</td>
<td>1,390,244</td>
<td>1,240,920</td>
<td>112%</td>
</tr>
<tr>
<td><strong>Total Soft Costs</strong></td>
<td>8,831,244</td>
<td>3,510,770</td>
<td>252%</td>
</tr>
<tr>
<td><strong>Total Project Costs</strong></td>
<td>61,000,000</td>
<td>53,354,390</td>
<td>114%</td>
</tr>
</tbody>
</table>

* TRL costs inflated at average Philadelphia CPI inflation of 3.41% from January, 2005 - July, 2006

** Balance of Tenant Allowance costs for Lynch included in Base Building

*** A&E Costs reflect 10 year design and development planning process for Lynch

---

Figure 22: Exterior view of Lynch Laboratory

---

www.penn.edu

67
The above cost table provides a comparison between the development costs of the Lynch Laboratory and the TRL facility. While the Lynch building exhibits an 14% cost variance to TRL on a total cost basis, the more telling comparison is the 35% overage using a cost per square foot analysis. When evaluating the cost variances on a line item basis, it becomes evident that, while the Lynch per square foot costs are higher than TRL in virtually every category, the highest variance can be seen in the Architectural & Engineering line item. This variance is striking because it seems to be caused simply by delays and redesigns resulting from the de-centralized decision making process involved with Penn controlled developments. The poor decision making that Penn employed through enabling a number of committees and groups to comment on design an construction questions without centralizing decision making power in a single defined entity caused extreme delays in the design process for the Lynch Laboratory which in turn resulted in excessive cost overages for the Lynch facility when compared to a comparable laboratory facility in the TRL project. The pressure placed on Penn by privatizing the TRL development process through Forest City’s involvement, “required Penn to adopt a new process of capital project planning and execution to ensure accountability”.  

Penn is highly consultive in its approach to development, with the intent of offloading risk onto the consultants to account for Penn’s inexperience in the real estate development industry. For TRL, however, “Penn developed a stream-lined planning and approval process that leveraged the discipline of a market oriented partner in Forest City, and the certainty of rent commencement as

99 University of Pennsylvania Real Estate Office
100 Private developer and the Urban University, Urban Land Institute Article
integral in keeping this project on the fast track”.\textsuperscript{101} To this end, the Penn Real Estate office was charged as the point-entity for communication with Forest City and Turner. Further, a formal process for internal decisions and communications within the Real Estate Office was organized to ensure fluidity of information transfer and effectiveness of using input from a variety of groups effectively\textsuperscript{102}.

Penn’s failure to implement this organizational strategy into its internal process for the Lynch Laboratory can also be seen in the cost overages within the hard cost line items. Because institutions such as Penn are not generally in the business of for profit real estate development, the art of pricing negotiation in construction contract bids is largely foreign to the university. Thus, the designer and the contractor are able to pad their bids with costs and fees that would not be accepted by a developer in a market for-profit development. Examples of this can be seen in the cost discrepancies in the unit pricing comparison above. These negotiations would take the form of developer push back on materials and pricing as well as general conditions and overhead and profit costs that the contractor and designer increase to account for the potential delays caused by the institutional decision making process.

Finally, the impact of the institutional construction ‘100 year’ construction specification must be understood. “Academic and institutional design standards serve a valuable purpose when it comes to quality control, operational consistency and safety”.\textsuperscript{103} However, a review of the specifications in place within peer group facilities must also be understood to effectively balance

\textsuperscript{101} Private developer and the Urban University, Urban Land Institute Article
\textsuperscript{102} Paul Sehnert, Director of Real Estate Development, University of Pennsylvania
\textsuperscript{103} Private developer and the Urban University, Urban Land Institute Article
design specifications between quality and cost. These peer group buildings should not be limited to institutionally built product, but rather expanded to include commercial product built by quality minded developers. Perhaps even greater than profit, a quality developer’s primary motivation is to ensure its reputation is highly considered by the market, and quality of construction is probably the most evident indicator of that reputation. Thus, institutions such as Penn would do well to benchmark their standards to that of quality commercial developers.

The ‘100 year’ standard is often used by universities to justify the long term nature of their ownership horizon for the building. Thus, a premium is often placed on using the most technologically advanced construction materials and systems to mitigate the ongoing repair and maintenance costs required on the project. While there is some merit in this approach, many private developers and real estate operators, such as Forest City and many REITs, also have long term ownership horizons\textsuperscript{104}. Thus, it makes sense both from a cost and a maintenance perspective for the institution to benchmark its construction and design standards to comparable private market developments developed under similar expectations of long term ownership. In addition, the intended use for many buildings will change with time as technology evolves and academic focuses vary. Therefore, to design a building for today’s use for the next ‘100 years’ with no anticipation of flexibility in the future may actually cost the institution more money over the long term both in initial design and construction costs, but also in rehabilitation costs for future adaptation to changing technology.

The comparison between TRL and the Lynch laboratory has shown some of the savings to both time and construction costs that employing the private sector to facilitate institutional real estate

\textsuperscript{104} Peter Calkins, Executive Vice President and Chief Operating Officer, Forest City Enterprises Boston
development for a university can achieve. In the case of Penn, including Forest City in the
development process streamlined the decision making process for the institution and imposed
order into the process which resulted in substantial savings in design costs as well as savings to
construction costs associated with schedule such as general conditions. In addition, the ability of
Forest City to leverage its experience in building a product, such as laboratory space, over and
over again as its primary business translated into a savings on materials beyond what Penn, as a
relatively inexperienced developer in laboratory product when compared to Forest City, would
likely not be able to achieve on its own. Penn’s ability to use the private market to provide a
control over the institutional beaurocracy involved in typical university development projects, as
well as to leverage the efficiencies of construction that private market experience provides to the
development process, enabled the University of Pennsylvania to construct a building that
adequately performed its intended function at a cheaper price and more quickly that Penn could
have achieved using its own internal resources for development.
Chapter 6 – Lessons From Case Analysis

There are a number of lessons to be learned from the case studies examined. First, and perhaps most evident, is the streamlining effect that is brought to bear on the development process by the introduction of private market forces. In all 3 case studies, we have seen that the private market’s influence on the development process has instituted controls on the university’s internal review and approval processes which enabled decisions to be reached more quickly on a variety of development issues. In Harvard’s case, these controls took the form of schedule benchmarks imposed by the developer, Samuels. These benchmarks demanded responsiveness from the various Harvard stakeholders involved in decision making for the project on a variety of levels. The benchmarks provided the Harvard project management team with the authority necessary to filter the input from the variety of Harvard offices involved with the development process into a concise and effective development plan.

MIT and Penn, however, took a more hands-off approach to participating in the development process in the Sidney-Pacific and TRL projects. Through empowering the developer of each project to develop the project with minimal oversight from the institution, MIT and Penn effectively conceded that the private market would be able to develop the project to fit the specific needs of the school more quickly and more efficiently than would be possible if internal institutional discussion were allowed to enter into the development process. While each project
could be qualified as a success in that the institution achieved the required elements of each project, speed of delivery in MIT’s case, and efficiency of cost in Penn’s case, it must be noted that eliminating the institutional review and comment process in favor of a process driven by the private market is not necessarily beneficial to each project. We can see this in the Simmons Hall project at MIT, where the institutional process created a building that was extremely expensive by any comparable benchmark, yet also achieved success in the areas it was designed for, namely student approval and the reflection on MIT’s worldwide reputation as a leader in technology and design.

The impact of the private market acting as a buffer between the university and the surrounding community is also an important lesson learned through these case studies. In the Trilogy development, Harvard was able to utilize the permits and community approvals already obtained by Samuels to achieve the delivery of 171 graduate student housing units on a schedule that would have been impossible had Harvard chosen to move forward with developing one of the 2 properties it controlled. MIT also benefitted somewhat from the MIT Investment Office’s role in the Sidney-Pacific development. Through softening the public perception of MIT’s control over the project, the Investment Office was able to obtain variances to the zoning code to allow for additional height and massing. This ability to use the private market to obfuscate the true entity behind a project’s development will become increasingly important as urban universities continue to expand into increasingly dense and politically organized neighborhoods.

However, the school must be careful not to use the private developer as a hammer to undertake the university’s wishes without adequate attention paid to community concerns. The school must
be careful to act in good faith as a neighbor to the community, for a vibrant and healthy community is extremely important element of the university’s ability to attract talented students and faculty. In contrast, the community also stands to realize significant benefits from the proximity of the university in the form of economic and cultural contributions. Thus, the private developer can be utilized as a liaison between the school and the community to work between the parties for compromise on issues that often will benefit both parties. Because of the relatively neutral status of the developer insofar as a lack of past involvement in town-gown issues, the developer can serve as a sounding board and intermediary between the community and the university to achieve compromise on a proposed project.

An additional lesson that can be learned through these case studies concerns cost control. In all 3 cases, construction costs for the privately controlled developments were significantly lower than their counterparts developed internally by the university. While the architectural and engineering costs are usually the most significant difference between the development processes, the hard costs are also generally significantly lower. In Penn’s case, hard costs per square foot were 24% higher for the Penn developed Lynch Laboratory when compared to the Forest City developed TRL facility. The private market, through its daily experience building real estate product, possesses the knowledge and motivation required to successfully understand and negotiate costs with designers, contractors, and tenants.

Because profit in the private market directly translates into income for the developer, the developer is highly motivated to achieve quality development specifications at the lowest cost possible. The university, on the other hand, is an entity whose mission is education, not profit.
Therefore, many of a university’s actions are not motivated by profit, but by a more complicated structure including social, environmental, and educational considerations. In addition, the university is a relatively diffuse organization where control is shared between a number of parties. This leadership structure differs significantly from a private firm where control is firmly placed with a few individuals who, in turn, share the majority of the profits. Because profits from a university are placed into the school’s endowment or used for other capital outlays rather than being paid as a form of bonus to key decision makers, there is relatively little motivation for decision makers to focus as closely on maximizing profits as a private firm would. The net effect of this disparate focus on profit can translate into inefficiency in the negotiated cost structure between university and privately controlled developments.

Finally, the design specifications employed by a university versus those employed by a private developer vary widely. As the MIT and the Penn case study suggests, the ‘100 year’ standard employed by universities to benchmark their construction is often inefficient and wasteful. While the intentions of the university in using the ‘100 year’ standard are consistent with a desire to produce the highest quality building, many of the elements comprising the institutional standard can be supplemented by cheaper materials or systems with a minimal loss in performance. The private markets focus on efficiency driven by profits has ensured that quality developers have refined their building specifications into a science to ensure the most efficient balance between quality and cost. To be sure, the university must be careful in comparing its specifications to the private market, and must ensure that it benchmarks comparisons only to private developers who share similar ownership horizons and expectations of quality.
Further, the university must also be aware that flexibility is required when designing buildings to the ‘100 year’ standard. Technology and the focus and importance of uses change considerably over time, and many buildings built in the 1960s and 1970s are considered functionally obsolete today. Thus, the university needs to ask itself whether the intended use of the building truly justifies the costs associated with implementing the ‘100 year’ standard. While a laboratory or a specialized academic building might house uses whose focus and technology is subject to rapid change, classroom, administrative, and select housing facilities may serve uses whose future needs are more easily underwritten by a university and its design team. In these cases of a more stable use, the ‘100 year’ standard might make sense for a university to build with the knowledge the school will be operating the product for many years to come.

It should be noted that some uses are not constructed broadly within the private marketplace and as a result are not widely understood by the market. Examples of this might be athletic facilities, hockey rinks, or specialized classroom buildings. In these instances, because there is no ‘market standard’ that the university can use as a benchmark, nor is there a private developer particularly skilled in building the product, the university might be better served to develop the product internally. However, regardless of the use being evaluated for a development, the university that chooses to develop real estate through internal means will benefit from using the private market as a benchmark to ensure that it is developing a product as efficiently as possible.
Chapter 7 - Conclusion

As the case studies suggest, the question for a university of whether to engage the private market to develop real estate product is a complicated one and does not easily present a defined answer. What may work for one university will not work for another, and the process of privatizing the development process might not even make sense between 2 proposed developments at the same university. However, there are a number of clear factors that must be evaluated by the university in order to make the decision of whether to privatize its development process. These include:

Risk

Universities are risk averse by nature. Therefore, the risks associated with a real estate development might not suit the university’s appetite for risk. While tenanting risk is very seldom a concern for universities developing real estate product for internal use, the risks associated with costs relating to permitting, design, and construction are all significant. In addition, the schedule and quality implications involved with construction management are relevant as well. Through using a private firm to develop the real estate product, the university is mitigating much of the risk associated with the development. Risks associated with developer, lender, or contractor bankruptcy can be further nullified through letters of credit and construction bonds. The university still exposes itself to some risk associated with quality control by the developer, background research on the developer, its past projects, and interviews with past clients as well
as contractors and designers can provide a relatively accurate understanding of the developer’s methods and product quality.

However, if the university is sophisticated and develops real estate on a scale such as Harvard, MIT, or Penn, it may be more cost effective for the university to mitigate development risk by bringing the entire process in-house and hiring its own development team. This process must be carefully understood by the university with regard to the financial implications involved in subsidizing the development team. In order to attract top talent, the university must pay premium salaries to lure developers out of the lucrative private market. Thus, does the scope of development being considered by the university, and the relative schedule, rent, and construction cost savings that internally ‘privatizing’ the process would generate exceed that provided by the private development market?

**Control**

The notion of control is central to process universities use to make decisions on real estate. The idea of ceding permanent or long term control over a parcel of land or a building concerns many universities with the belief that their expansion will be hindered by an inability to use the land or building when the need arises. However, there are a number of ways in which a university can privatize a development while maintaining ultimate control of the site. The ground lease is perhaps the most common manner in which a university can structure a development to allow for privatization while retaining control of the site. These ground leases generally require extended lease terms of 50 years or more in order to allow the developer to justify its cost outlay on the product.
Therefore, a university must understand its long term requirements when considering this ground lease structure. If the university anticipates a change of use for the site requiring building demolition prior to the expiration of the ground lease, the university cannot justify the ground lease structure. However, a university with unclear growth requirements can still utilize the benefits of development privatization without ceding control of the site through a ground lease. A ground lease with a purchase option by the university could be structured in which the university can take-out the developer’s ownership in the property at any time at a pre-defined pricing metric to determine the project value. However, without assurances of the purchase price, the university is open to market risk that could cause the purchase price to be significantly higher than the replacement cost for the building. To mitigate this market risk, a private developer could be approached to develop the site for a fee. In this way, the developer would retain no long term control over the product, but the operational and cost benefits of private involvement in the process could still be enjoyed by the university without concern of inflated project value erasing the construction cost savings generated through the privatization process.

**Finance**

The financial implications of development must also be considered. The benefits to the university's balance sheet of deferring the debt burden for the development cost to the developer ensure that the university can continue to pay the most favorable interest rate possible on its bonds. Through offloading the debt obligations for the development on the developer, the university can finance a greater amount of real estate development than could be supportable if
the university undertook the development with on-balance-sheet debt. While many of the wealthier universities, including those studied in this thesis, might not be as sensitive to the effects additional debt would have on the school’s bond rating, schools with smaller endowments can use this model as a viable means of expansion that could not be supported by the endowment of the current borrowing capacity of the institution. In this manner, the school could improve its facilities through leveraging the private markets expertise and financial capabilities, thereby allowing the institution to remain competitive.

In addition, and as evidenced by the case studies, the private developer can bring substantial savings to both hard and soft costs of development. Can the savings generated through privatizing the development process be put to work more effectively by supporting the university’s core academic mission rather than being tied up indefinitely in an illiquid real estate asset? A net present value analysis must be conducted by the university to determine if the imputed return it attributes to its real estate exceeds the opportunity cost of failing to deploy the cost savings into other areas of the university’s operations. Most universities do not have defined return expectations from their investment in real estate directly serving university uses, and even for schools such as Penn who use a 10% hurdle to measure their investment into campus real estate, the parameters by which that return is measured are unclear at best. However, the significant cost savings that can be generated through private involvement in developing university real estate should provide a strong motivation for universities to better quantify their financial assessment of campus real estate.

Internal Organizational Structure

105 Paul Schnert, Director of Real Estate Development, University of Pennsylvania
The structure of the university’s internal process for making and approving real estate decisions must also be examined. In virtually every case study, the de-centralized nature of the university’s decision making process created substantial cost inefficiencies through design revisions and schedule delays. If a university does not have a centralized planning or facilities office empowered with the autonomy necessary to collate input from the variety of stakeholders affiliated with the project and then to make decisions concerning that project, privatizing the development process ought to be considered for the structure that the private market brings to the decision making process. The private process can better manage the impact of a multitude of stakeholders in a project that could otherwise delay the development schedule and increase the project budget. However, many larger universities have sophisticated real estate offices that do hold the decision making power necessary to effectively control the development process against institutional politics. In these cases, the institution may not require the structure provided by the private markets in the design and schedule process.

An additional factor that must be considered within the organizational structure is the use of independent consultants for development advice. Many universities often rely on a bevy of consultants to counteract the school’s development inexperience. While this approach is not necessarily ineffective, rarely is a consultant tasked with managing the entire development process start to finish. For example, an architect may be hired and reviewed by a design consultant. Then traffic, engineering, and landscaping studies will be performed by another set of consultants. Finally, the construction process will be managed by yet another set of consultants. This process diffuses responsibility among the consultants such that no one entity holds ultimate responsibility for the project. Thus, the consultants’ vision is somewhat limited as they have not
necessarily been exposed to the entire development concept that the project is hoping to attain, and their motivations to control costs are not consistent with the entire project budget as they are only focused on their single relatively small piece of the overall development budget. The inexperience of the university stakeholders in the development process causes them to be unable to effectively oversee the consultant’s work, thereby placing the university in danger of blindly following consultants’ recommendations that may not have been formulated with the required understanding of how those recommendations affect other portions of the development schedule, budget, and vision.

In conclusion, a variety of factors must be considered before a university can decide whether to privatize its development process. The real estate development process is one of the largest costs that a university must consider in its budget, and errors in judgment by the institution can result in budget overruns that can be crippling to a school. As budgets increase and reliance on the endowment becomes ever more important to the university’s survival, the ability to defer cost and risk onto the private real estate market will become increasingly appealing to the university. Further, the university must remain competitive in the increasingly crowded market of higher education institutions vying for the best and brightest students and faculty. The institution must retain its financial ability to continue improving and expanding its resources while also ensuring that it is providing its clients in the form of students and faculty with the highest quality facilities to complement the academic offerings. Finally, a university must be aware of its limitations, and act accordingly to positively reinforce those limitations. Universities are in the business of education and not real estate development. The focus of the university business model on education creates an internal organizational structure that, while perhaps extremely effective in
the academic realm, does not possess the experience or motivation required to efficiently manage the real estate development process.

Universities must understand the costs and benefits associated with involving the private sector in real estate development projects. Quality of design and construction, as well as efficiency in the development process should be central to a university’s expectations when it considers involving the private sector. Thus, reputation and the personalities involved with the private development team are of paramount importance to the university. Real estate development is an extremely complex undertaking, and a number of unforeseen circumstances will undoubtedly arise during the process. The university must be comfortable that it can effectively work with the developer to resolve these issues without creating mistrust or dissent among the development team of institutional and private actors involved in the process. If the development team is not compatible, the process will suffer delays and the quality of the final product will suffer.

In addition, the university must clearly define its expectations for the project with the developer, and ensure that open lines of communication are maintained throughout the development schedule. If the development team does not share mutual goals for the project, the organization that private involvement brings to the institutional development process will suffer. Further, a lack of communication between the university and the developer can result in a finished product that fails to achieve the goals that the university intended for the building, potentially eliminating the value creation that the private sector’s involvement was projected to achieve.
It is imperative for universities to understand the development process in the context of the building being developed. In all likelihood, a private developer will not be able to justify the costs involved with developing a ‘landmark’ building for the university without large monetary concessions from the school in the form of rent. In these cases where the university intends to develop a building that it hopes will become an iconic representation of the school’s essence, using an internal process to develop the building may be the best course of action. In these instances, the experience of private market sectors such as construction managers and consultants can be utilized to achieve efficiencies in aspects of the development process, but the level of control that the university requires in design and construction for a ‘landmark’ building would make it difficult for the school to work effectively with a private developer. Further, universities may want to retain control over the design, construction, and operation of buildings the institution views as being central to the identity of the campus. These buildings could take the form of academic or cultural facilities. The long term ownership and use horizon, as well as the university’s long experience in operating and programming these buildings may make it more efficient for the university to develop this product internally.

Finally, if used correctly, the private market can provide the university with real estate product that will effectively support the university’s requirements without exposing the institution to costs in time and money that the institutional development process would have incurred. Privatizing the university real estate development process may allow for a cash-strapped school to expand or improve its facilities more quickly than it would have been able to with internal resources. It may enable institutions to redevelop deteriorating neighborhoods surrounding the school to provide a vibrant and amenity laden extension of the existing campus. It may also
provide schools with the technical expertise required to build a complex or specialized facility that the internal expertise of the school would have been unable to produce. However, regardless of the impact that privatization has on the school, the privatization process is perhaps most effective when used on products that the private market has experience in. These products allow the university to gain an understanding through market comparisons of the type of facility in quality and design that the school will be receiving. Privatizing the university development process is not free of risks, and the university must be careful to educate itself in how to best utilize the advantages provided by the private market for each development opportunity.
Bibliography


Urban Land Institute, “Private developer and the Urban University.” Urban Land Institute Magazine, 2002
Marcus and Millichamp, “National Student Housing Report”, 1st Quarter 2009


MIT Tech Volume 12, Issue 2, February 2007

*Interviews:*

Steven Nason, Director of Residential Real Estate, Harvard University

Michael Owu, Director of Real Estate, MIT Investment Management Company

Pamela Delphenich, Director of Campus Planning & Design, MIT

Patrick Rowe, MIT Investment Management Company

Christopher Gordon, Chief Operating Officer, Allston Development Corporation, Harvard University

Paul Sehnert, Director of Real Estate Development, University of Pennsylvania

Peter Calkins, Executive Vice President and Chief Operating Officer, Forest City Enterprises Science and Technology Group

Bruce Alexander, Vice President and Director for New Haven and State Affairs, Yale University.

*Websites:*

www.pennconnects.upenn.edu
www.allston.harvard.edu/
www.yale.edu
www.mit.edu
www.samuelsrc.com
Appendices:

Appendix A: National Association of College and University Business Officers Endowment Study

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Equal-weighted Average Rate of Return</th>
<th>Dollar-weighted Average Rate of Return</th>
<th>Median</th>
<th>Total # of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>-11.4%</td>
<td></td>
<td></td>
<td>136</td>
</tr>
<tr>
<td>1975</td>
<td>12.0%</td>
<td></td>
<td></td>
<td>144</td>
</tr>
<tr>
<td>1976</td>
<td>9.9%</td>
<td></td>
<td></td>
<td>142</td>
</tr>
<tr>
<td>1977</td>
<td>5.1%</td>
<td></td>
<td></td>
<td>148</td>
</tr>
<tr>
<td>1978</td>
<td>2.5%</td>
<td></td>
<td></td>
<td>144</td>
</tr>
<tr>
<td>1979</td>
<td>10.8%</td>
<td></td>
<td></td>
<td>147</td>
</tr>
<tr>
<td>1980</td>
<td>11.9%</td>
<td></td>
<td></td>
<td>198</td>
</tr>
<tr>
<td>1981</td>
<td>14.6%</td>
<td></td>
<td></td>
<td>209</td>
</tr>
<tr>
<td>1982</td>
<td>-0.9%</td>
<td></td>
<td></td>
<td>218</td>
</tr>
<tr>
<td>1983</td>
<td>41.3%</td>
<td></td>
<td></td>
<td>220</td>
</tr>
<tr>
<td>1984</td>
<td>-2.2%</td>
<td></td>
<td></td>
<td>206</td>
</tr>
<tr>
<td>1985</td>
<td>25.5%</td>
<td></td>
<td></td>
<td>277</td>
</tr>
<tr>
<td>1986</td>
<td>26.9%</td>
<td></td>
<td></td>
<td>260</td>
</tr>
<tr>
<td>1987</td>
<td>13.9%</td>
<td></td>
<td></td>
<td>270</td>
</tr>
<tr>
<td>1988</td>
<td>1.3%</td>
<td>1.2%</td>
<td>0.7%</td>
<td>315</td>
</tr>
<tr>
<td>1989</td>
<td>14.1%</td>
<td>14.6%</td>
<td>13.9%</td>
<td>330</td>
</tr>
<tr>
<td>1990</td>
<td>9.6%</td>
<td>10.4%</td>
<td>9.3%</td>
<td>369</td>
</tr>
<tr>
<td>1991</td>
<td>7.2%</td>
<td>6.1%</td>
<td>7.2%</td>
<td>396</td>
</tr>
<tr>
<td>1992</td>
<td>13.1%</td>
<td>14.0%</td>
<td>13.3%</td>
<td>420</td>
</tr>
<tr>
<td>1993</td>
<td>13.3%</td>
<td>14.5%</td>
<td>13.4%</td>
<td>440</td>
</tr>
<tr>
<td>1994</td>
<td>2.9%</td>
<td>4.4%</td>
<td>2.9%</td>
<td>447</td>
</tr>
<tr>
<td>1995</td>
<td>15.5%</td>
<td>16.9%</td>
<td>15.5%</td>
<td>463</td>
</tr>
<tr>
<td>1996</td>
<td>17.2%</td>
<td>20.6%</td>
<td>17.1%</td>
<td>472</td>
</tr>
<tr>
<td>1997</td>
<td>20.4%</td>
<td>21.8%</td>
<td>20.3%</td>
<td>486</td>
</tr>
<tr>
<td>1998</td>
<td>18.0%</td>
<td>18.6%</td>
<td>17.9%</td>
<td>509</td>
</tr>
<tr>
<td>1999</td>
<td>11.0%</td>
<td>11.9%</td>
<td>10.9%</td>
<td>509</td>
</tr>
<tr>
<td>2000</td>
<td>13.0%</td>
<td>23.8%</td>
<td>10.8%</td>
<td>574</td>
</tr>
<tr>
<td>2001</td>
<td>-3.6%</td>
<td>-2.7%</td>
<td>-3.7%</td>
<td>617</td>
</tr>
<tr>
<td>2002</td>
<td>-6.0%</td>
<td>-4.2%</td>
<td>-6.4%</td>
<td>654</td>
</tr>
<tr>
<td>2003</td>
<td>3.0%</td>
<td>4.7%</td>
<td>2.9%</td>
<td>723</td>
</tr>
<tr>
<td>2004</td>
<td>15.1%</td>
<td>17.4%</td>
<td>16.0%</td>
<td>747</td>
</tr>
<tr>
<td>2005</td>
<td>9.3%</td>
<td>13.9%</td>
<td>9.1%</td>
<td>753</td>
</tr>
<tr>
<td>2006</td>
<td>10.7%</td>
<td>15.3%</td>
<td>10.8%</td>
<td>772</td>
</tr>
</tbody>
</table>

Data source: NACUBO Endowment Study for each year listed.
Averages include all participants in the study in the given year.

---

NACUBO
Appendix B: Sidney-Pacific Construction Cost Summary

MIT Graduate Dormitory
70 Pacific Street
Final Construction Budget

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>TOTAL IND COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE IMPROVEMENTS</td>
<td>$1,167,859</td>
</tr>
<tr>
<td>CAST IN PLACE CONCRETE</td>
<td>$3,870,594</td>
</tr>
<tr>
<td>MASONRY</td>
<td>$3,398,428</td>
</tr>
<tr>
<td>STRUCTURAL STEEL</td>
<td>$6,032,927</td>
</tr>
<tr>
<td>METAL FABRICATIONS</td>
<td>$1,021,670</td>
</tr>
<tr>
<td>FINISH CARPENTRY</td>
<td>$1,509,558</td>
</tr>
<tr>
<td>ROOFING</td>
<td>$377,041</td>
</tr>
<tr>
<td>THERMAL AND MOISTURE PROTECTION</td>
<td>$381,971</td>
</tr>
<tr>
<td>DOORS, FRAMES AND HARDWARE</td>
<td>$983,134</td>
</tr>
<tr>
<td>GLASS AND GLAZING</td>
<td>$4,615,786</td>
</tr>
<tr>
<td>DRYWALL AND CARPENTRY</td>
<td>$6,304,724</td>
</tr>
<tr>
<td>ACOUSTICAL CEILINGS</td>
<td>$317,911</td>
</tr>
<tr>
<td>FLOORING</td>
<td>$1,987,762</td>
</tr>
<tr>
<td>PAINT</td>
<td>$633,872</td>
</tr>
<tr>
<td>SPECIALTIES AND TOILET ACCESSORIES</td>
<td>$97,638</td>
</tr>
<tr>
<td>EQUIPMENT</td>
<td>$461,161</td>
</tr>
<tr>
<td>FURNISHINGS</td>
<td>$118,365</td>
</tr>
<tr>
<td>ELEVATORS</td>
<td>$842,260</td>
</tr>
<tr>
<td>FIRE SPRINKLERS, PLUMBING, HVAC</td>
<td>$10,727,523</td>
</tr>
<tr>
<td>ELECTRICAL</td>
<td>$6,676,755</td>
</tr>
<tr>
<td>GENERAL CONDITIONS</td>
<td>$1,896,133</td>
</tr>
<tr>
<td>JOB EXPENSE</td>
<td>$2,040,839</td>
</tr>
<tr>
<td>BUILDING PERMIT</td>
<td>$42,124</td>
</tr>
<tr>
<td>BUILDERS RISK PREMIUM</td>
<td>$19,800</td>
</tr>
<tr>
<td>OCIP SUBCONTRACTOR CREDITS</td>
<td>-$1,158,420</td>
</tr>
<tr>
<td>WINTER WEATHER</td>
<td>$302,116</td>
</tr>
<tr>
<td>FEE</td>
<td>$1,792,242</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td><strong>$61,344,689</strong></td>
</tr>
</tbody>
</table>

---

107 Michael Owu, Director of Real Estate, MIT Investment Management Company
# Appendix C: Lynch Laboratory Budget\(^{108}\)

<table>
<thead>
<tr>
<th>Planned Budget Items</th>
<th>Baseline Budget Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASIL REQU MNT NEWCONS</td>
<td></td>
</tr>
<tr>
<td>1925-1 LAND DEVELOP</td>
<td>500,000.00</td>
</tr>
<tr>
<td>1925-2-LOYS</td>
<td></td>
</tr>
<tr>
<td>1920-1 CONSTRUCTION</td>
<td>44,200,000.00</td>
</tr>
<tr>
<td>1916-2-INDUSTRICT</td>
<td>100,000.00</td>
</tr>
<tr>
<td>1916-2 DEMOLITION</td>
<td>100,000.00</td>
</tr>
<tr>
<td>1914-1 BLDG MAINT EQUIP</td>
<td>20,000.00</td>
</tr>
<tr>
<td>1912-1 TECH DEP EQUIP</td>
<td>300,000.00</td>
</tr>
<tr>
<td>1910-1 FURNITURE</td>
<td>500,000.00</td>
</tr>
<tr>
<td>1914-1 UTILITIES/DEPOMS</td>
<td>20,000.00</td>
</tr>
<tr>
<td>1914-1 UTILITIES DURING CONSTRUCTION</td>
<td>60,000.00</td>
</tr>
<tr>
<td>1911-1 OTHER</td>
<td>600,000.00</td>
</tr>
<tr>
<td>1911-2 Other</td>
<td></td>
</tr>
<tr>
<td>1901-1</td>
<td></td>
</tr>
<tr>
<td>1901-2 MOVING ALLOW</td>
<td>150,000.00</td>
</tr>
<tr>
<td>1901-1 CONSTRUCTION</td>
<td>400,000.00</td>
</tr>
<tr>
<td>1900-1 ASBESTOS REMOV</td>
<td>100,000.00</td>
</tr>
<tr>
<td>1900-1 SIGNAGE</td>
<td>100,000.00</td>
</tr>
<tr>
<td>1900-1 TELEPHONE COMM</td>
<td>300,000.00</td>
</tr>
<tr>
<td>1900-1 FEE PLC Equip</td>
<td>100,000.00</td>
</tr>
<tr>
<td>1900-1 SECURITY SYSTEMS</td>
<td>300,000.00</td>
</tr>
<tr>
<td>1900-1 UTILITIES REL</td>
<td>1,600,000.00</td>
</tr>
<tr>
<td>1900-1 PROPERTY ACQ</td>
<td></td>
</tr>
<tr>
<td>1900-1 INTERIOR DEMO</td>
<td></td>
</tr>
<tr>
<td>1930-1 MECH CIRCUITRY</td>
<td>20,000.00</td>
</tr>
<tr>
<td>1930-1 PERMITS</td>
<td>50,000.00</td>
</tr>
<tr>
<td>1930-1 OTHER CONSULTANT</td>
<td>30,000.00</td>
</tr>
<tr>
<td>1930-1 LAND UTIL MGT</td>
<td>30,000.00</td>
</tr>
<tr>
<td>1930-1 CONSULTANTS</td>
<td>590,000.00</td>
</tr>
<tr>
<td>1930-1 ARTIFICIAL FEE</td>
<td>485,000.00</td>
</tr>
<tr>
<td>1930-1 ARTIFICIAL FEE</td>
<td>5,800,000.00</td>
</tr>
<tr>
<td>1931-1 STRUCTURAL CONSTRUCTION</td>
<td>390,000.00</td>
</tr>
<tr>
<td>1931-1 ARCH CONSTRUCTION CONSULTANT</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1931-1 TEST REPORTS</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 TESTING/REPORT</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 SURVEYS</td>
<td>40,000.00</td>
</tr>
<tr>
<td>1932-1 APPRAISAL FEE</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 ARCH CONSTRUCTION</td>
<td>2,649,756.00</td>
</tr>
<tr>
<td>1932-1 COST CONTINGENCY</td>
<td>390,000.00</td>
</tr>
<tr>
<td>1932-1 COST CONTINGENCY</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 DEFENSE CONSTRUCTION</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 TEST REPORTS</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 SURVEYS</td>
<td>40,000.00</td>
</tr>
<tr>
<td>1932-1 APPRAISAL FEE</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 ARCH CONSTRUCTION</td>
<td>2,649,756.00</td>
</tr>
<tr>
<td>1932-1 COST CONTINGENCY</td>
<td>390,000.00</td>
</tr>
<tr>
<td>1932-1 DEFENSE CONSTRUCTION</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 TEST REPORTS</td>
<td>140,000.00</td>
</tr>
<tr>
<td>1932-1 SURVEYS</td>
<td>40,000.00</td>
</tr>
</tbody>
</table>

\(^{108}\) Paul Sehnert, Director of Real Estate Development, University of Pennsylvania
### Appendix D: TRL Budget Summary

<table>
<thead>
<tr>
<th>Description</th>
<th>Project Cost</th>
<th>$/sf @ 225 $/sf @ 125</th>
<th>% of Total Project Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hard Costs:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Building</td>
<td>128,790 sf</td>
<td>28,978 231.82</td>
<td>52.3%</td>
</tr>
<tr>
<td>Site Improvements/Landscaping/Site Work</td>
<td>400</td>
<td>3.20</td>
<td>0.7%</td>
</tr>
<tr>
<td>Permits &amp; Bonding</td>
<td>250</td>
<td>2.00</td>
<td>0.5%</td>
</tr>
<tr>
<td>Tenant Allowance</td>
<td>125,000 sf</td>
<td>15,625 125.00</td>
<td>28.2%</td>
</tr>
<tr>
<td>Other Hard Costs</td>
<td>1,014</td>
<td>8.12</td>
<td>1.8%</td>
</tr>
<tr>
<td>Hard Cost Contingency</td>
<td>1,933</td>
<td>15.46</td>
<td>3.5%</td>
</tr>
<tr>
<td><strong>Total Hard Costs</strong></td>
<td>48,200</td>
<td>385.60</td>
<td>87.0%</td>
</tr>
<tr>
<td><strong>Soft Costs:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Architecture &amp; Engineering</td>
<td>1,300</td>
<td>19.20</td>
<td>4.3%</td>
</tr>
<tr>
<td>Construction Interest</td>
<td>2,400</td>
<td>3.47</td>
<td>0.8%</td>
</tr>
<tr>
<td>Construction Financing Fees</td>
<td>370</td>
<td>2.96</td>
<td>0.7%</td>
</tr>
<tr>
<td>Total Financing Fees</td>
<td>3,204</td>
<td>25.63</td>
<td>5.8%</td>
</tr>
<tr>
<td>Preopening / Publicity / Community Relations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal / Organize / Accounting</td>
<td>100</td>
<td>0.80</td>
<td>0.2%</td>
</tr>
<tr>
<td>Insurance / Interim Taxes</td>
<td>150</td>
<td>1.20</td>
<td>0.3%</td>
</tr>
<tr>
<td>Travel &amp; Lodging / Office Expense</td>
<td>170</td>
<td>1.36</td>
<td>0.3%</td>
</tr>
<tr>
<td>FF&amp;E / Operations Prior to Opening</td>
<td>5,399</td>
<td>43.19</td>
<td>9.7%</td>
</tr>
<tr>
<td>Soft Cost Contingency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest City Overhead</td>
<td>600</td>
<td>4.80</td>
<td>1.1%</td>
</tr>
<tr>
<td><strong>Total Project Costs</strong></td>
<td>55,399</td>
<td>443.19</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

---

109 Paul Sehnert, Director of Real Estate Development, University of Pennsylvania