9-210-070
REV: MAY 4, 2010

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Design Creates Fortune: 2000 Tower Oaks Boulevard[a]

Vedic buildings connect individual life with cosmic life.[1]

—Maharishi Mahesh Yogi

Jeffrey Abramson and David Borchardt, key members of the 2000 Tower Oaks development and ownership team, proudly showed a visitor around their LEED® Platinum, largely vacant office building in the summer of 2009. Located on the prestigious Interstate 270 Corridor in Rockville, Maryland, not far from the U.S. Capital District, 2000 Tower Oaks Boulevard was named the greenest office building in the state of Maryland.[2] The building was also created in accordance with The Tower Companies' commitment to Fortune-Creating® Vedic Architecture (Vedic), promoted in its totality worldwide by Maharishi Mahesh Yogi, founder of the Transcendental Meditation Program.

Abramson and Borchardt believed that the many LEED, Vedic, EPA ENERGY STAR®, and other features of their building would enhance its value and help their tenants to succeed in the long run. But the results were not obvious as they stood in the gleaming lobby with their guest. Could they afford to build a building like 2000 Tower Oaks Boulevard again?

Considering the long-term goals of Abramson and The Tower Companies, could they afford not to?

The Tower Companies

The Tower Companies (Tower), a third-generation, family-owned development and management company, encompassed a diverse portfolio of more than four million square feet of office buildings, office parks, regional malls, lifestyle centers, residential communities, and hotels across the Capital Region. Of this total, one million square feet were so-called "green" or "sustainable" projects. Another 2.5 million square feet were in the planning stages. "For 60 years and three generations, the family-owned Tower Companies has maintained a commitment to socially responsible development by creating environmentally conscious buildings and communities that are enduring and aesthetically pleasing and positively impact their inhabitants," declared Tower's website.[3] Tower claimed to be the largest "green developer" in the Washington, DC area, and one of the largest

[a] Title derived from "Fortune-Creating® Vedic Architecture." "Fortune-Creating" is a registered trademark of the Maharishi Vedic Education Development Corporation.

purchasers of "green energy" in the country, buying 100% wind energy for their electrical needs. Of Tower's employees, 25% held LEED professional accreditation, and Tower was proud to have developed the first LEED certified apartments in the country. The EPA listed Tower as a Climate Leaders Partner, one of only two real estate companies to achieve the designation.[4]

Jeffrey Abramson and David Borchardt

Jeffrey S. Abramson, a partner in The Tower Companies, was the driving force behind Tower's commitments to innovation and leadership. He considered his business work to be philanthropic work and strived to be a catalyst for beneficial change. Tall, lean, a little gray, Abramson radiated energy and vision. In addition to a variety of activities and affiliations typical of many real estate executives, Abramson was a member of the Board of Trustees of The David Lynch Foundation, which provides scholarships throughout the United States for learning the stress reduction technique of Transcendental Meditation. He also served as a Board Chair for Maharishi University of Management in Fairfield, Iowa, an award-winning university specializing in Consciousness-Based Education, and was a trustee of the National Building Museum.

David Borchardt was Director of Sustainable Development for Tower. A licensed Professional Engineer and a LEED Accredited Professional, Borchardt's credentials included membership in the National Society of Professional Engineers (NSPE) and the American Society of Mechanical Engineers (ASME). His role at Tower was to "make it all real."

Rockville, Maryland

Rockville, the second largest incorporated city in the state of Maryland, was located 12 miles northwest of the U.S. Capitol and at the center of Montgomery County, one of the wealthiest counties in the U.S., with a 2008 mean household income of $93,895.[5] Rockville was located within the Washington-Baltimore Metropolitan Area, a region comprising approximately 8,295,397 people as of mid-2008 (the Washington-Baltimore-Northern Virginia Combined Statistical Area).[6]

Rockville was home to top genomics research companies including Celera, Biocon, Origene Technologies, and Shire Labs. Biotech businesses in the area included Human Genome Sciences, The Institute for Genomic Research, and MedImmune. Rockville was also home to the offices of several U.S. federal government agencies, including the General Services Administration, the Department of Health and Human Services, and the Nuclear Regulatory Commission. Three major airports served the area, the Baltimore/Washington International Thurgood Marshall Airport (BWI), Washington Dulles International Airport (IAD), and the Ronald Reagan Washington National Airport (DCA). Amtrak, Maryland Area Regional Commuter train service (MARC), and Metro subway and bus networks complemented ample highway access.[7]

2000 Tower Oaks Boulevard

2000 Tower Oaks Boulevard was a 200,000 square foot (SF), Class "A" office building comprising nine floors of approximately 23,000 rentable square feet (RSF) each. Architecture firm Kishimoto, Gordon, Dalaya, of McLean, VA, designed the building under the leadership of Ben Kishimoto, AIA, an alumnus of the Harvard University Graduate School of Design. Jon Lipman, AIA, Director of Fortune-Creating Buildings, consulted on the building's Vedic features. The building housed four elevators, 600 covered parking spaces in structured parking below the building, and two loading docks. Interior column bays were spaced at 20 feet by 40 feet clear. Finished ceiling heights were determined by Vedic principles and generally amounted to 9 feet, 3 inches. Principal amenities included: sun-filled offices with panoramic window vistas; a green roof, lush garden lobby, high-quality finishes, and original art in public spaces; a 2,500 SF fitness facility including locker rooms, showers, and exercise and meditation rooms; and a café serving organic food on main floor. A 12-acre park surrounded the building. (See **Exhibit 1** for the site plan and **Exhibit 2** for a typical floor plan.)

The broker's marketing package called particular attention to several health and economic benefits for tenants: reduced sick time and increased worker retention due to the healthier building; an efficient design reducing energy use by 28% and water consumption by 41%; a three-stage outside air filtration system removing 95% of airborne pollutants, the capability to re-supply the whole building with 100% outside air every 51 minutes if called for; and the ability to maintain a steady, comfortable temperature.

Three nearby buildings were considered the most comparable in the market, according to local brokers. The Tower Building (also a Tower development) was easily identified by a Bank of America corporate sign facing I-270 and included consulting firm Booz Allen Hamilton as a major tenant. Nearby, Boston Properties, a Boston-based Real Estate Investment Trust, had developed two buildings on land purchased from Tower. Data storage company EMC[2] was a major tenant in one of the Boston Properties buildings (reference **Exhibit 3** for photos of the comparable properties).

According to Borchardt, one broker had advised him that in late summer of 2009, there was about 6.5 million SF of available office inventory with another 150,000 SF under construction in the Rockville area. Vacancy was running in the mid teens, and net absorption was almost flat. Landlord rental rate quotes for Class "A" office space averaged $34.00 per SF on a full service basis, according to the broker.[8]

Productivity

One significant benefit of high-performance buildings is better well-being. Healthier environments boost productivity, attitudes, attendance, and learning as well as increase sales in retail stores. A small shift in well-being and productivity can be huge. For example, a one percent improvement in office-worker productivity as a result of superior lighting and thermal comfort can have a bigger impact on the bottom line than eliminating all of a building's utility costs.

—Rocky Mountain Institute, Building Environment Team[9]

Thinking back on the purpose of his focus on the healthy characteristics of tenant spaces, Abramson commented, "According to the U.S. Department of Labor, the real cost of labor including all of the occupancy costs is 1.7 times the direct cost of labor.[b] In DC (the Baltimore-Washington Metropolitan Area), this is about $400 per square foot per year all-in to both buy office labor and to house it (reference **Exhibit 4** for an illustration of this calculation). The cost of energy averages $3.00-$5.00 per square foot. It seems to me that as developers we should be addressing the entire $400 psf cost so that we can help our client companies to succeed. The business idea should be, 'fewer people, doing more.'"[10]

"Human capital is the largest cost for most companies. That's the cost associated with growing and maintaining your business. It's also the cost with the most variability. I believe this $400 per square foot cost is the area the real estate developer can address: my job is to help create environments where businesses and people can excel. With Vedic and green buildings, we now have the tools to do so," Abramson continued.[11]

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[b] The "fully loaded" direct cost of labor was usually calculated as salary plus employer-funded taxes, plus the cost of benefits, plus the cost of insurances, but before considering the rent and associated costs of the employee's office or factory space.

Abramson felt that tenants would, over the course of time, come to appreciate the very real impact of these design benefits and pay a rental premium to enjoy them. (Reference **Exhibit 5** for an example calculation of the impact of productivity benefits on a tenant's finances.) Employees of tenant companies were going to occupy their office space 8-10 hours per day, 5–6 days per week, representing the bulk of their waking hours and time dedicated to their work. Therefore, Abramson asserted, their building could greatly impact their success.

Tower tried to directly address this aspiration in all of their buildings, and notably at 2000 Tower Oaks Boulevard. Decisions for this building, and for future buildings, ranged from those which were easy to quantify on a pure economic basis (such as energy costs), to those arguably as important and plausible to quantify, like the benefits of fresh air and sunlight, and finally to those that were very hard to quantify, such as the creativity and productivity benefits of the Vedic principles. Abramson and Borchardt set out to analyze them all.

Features, Costs, and Benefits

My mechanical engineering mentor at Boston University taught me, "I don't care how cool or sexy your idea is, there still needs to be an economic payback."

—David Borchardt[12]

Energy-Saving Equipment

The Tower team hoped that 2000 Tower Oaks would become a model for many innovative energy designs and technologies. There were dozens of interrelated systems and hundreds of components. At the moment Borchardt was evaluating three of them for their cost/payback, and their interaction: a low-friction magnetic bearing centrifugal chiller/compressor unit, an enthalpy wheel, and a system of in-room carbon dioxide (CO_2) sensors.

Chiller/compressor unit Commercial buildings with cooling needs generally relied on chiller/compressor units to provide chilled water to air handling units responsible for conditioning building air. Such systems relied on the refrigeration cycle, the core principle behind home refrigerators, for example. The refrigeration cycle reflected basic principles of thermodynamics which dictated that the temperature of a gas would increase as it was compressed and decrease as it was expanded.

The refrigeration cycle followed several stages:

1. A gas in a chiller/compressor unit would start at room temperature and pressure, contained within the piping and apparatus of the unit.[c]
2. The electrically-powered chiller/compressor unit would then compress the gas into a smaller volume, causing an increase in temperature.
3. The compressed, warmer gas would then be pumped from the chiller/compressor and exposed to room or outside air temperature. At this point the gas would cool, but remain compressed within the unit.
4. The compressed and newly room temperature gas would then flow to another area and be allowed to expand. In a home refrigerator, this would occur within the interior cabinet. As the

[c] The gas, or refrigerant, for this chiller/compressor unit was specified as R134a, also known as tetrafluoroethane, a common, ozone-friendly refrigerant used in many types of applications.

gas then expanded, it would cool and draw heat from the cabinet (containing milk, eggs, etc.). The gas would then be at room pressure and at the temperature of the cabinet.

5. The gas would then return to the beginning of the loop to begin the cycle again.

At 2000 Tower Oaks Boulevard, the chiller/compressor unit produced chilled water which was pumped to air handling units on each floor. These units blew warm air over the chilled water (in cooling coils) to make colder air to distribute throughout the building.

There were many chiller/compressor technologies available. Borchardt was interested in the low-friction magnetic bearing centrifugal chiller/compressor chosen for 2000 Tower Oaks (see **Exhibit 6**). For a variety of reasons this design was substantially more efficient to run than standard models, resulting in less energy use and lower maintenance cost for the same cooling output. Borchardt estimated that the more efficient chiller/compressor unit consumed 700,000 fewer kilowatt hours (kW h) per year compared to the baseline model. These savings amounted to approximately $85,000 annually.[d] With a cost premium of $108,675 to purchase the unit, Borchardt calculated a rough payback period of 16 months.[13]

Enthalpy wheel While the chiller/compressor unit was relatively easy to analyze since it was essentially a stand-alone upgrade from a basic energy-intensive standard component to a still energy-intensive premium component, the enthalpy wheel was another matter. It was an added component with all the issues of inserting new activity in a complex system. It required very little energy to run. And it was difficult to project how much it would save since so much depended on the weather, other components of the HVAC system, and the behavior of building occupants.

Office building ventilation systems typically drew in some proportion of fresh outside air to supplement internal air, and exhausted an equivalent volume of old inside air. While it was possible to continually re-circulate 100% of the air within a building, eventually staleness and depleted oxygen levels would become a major problem. Similarly, it was possible to use 100% fresh air all of the time, although if the outside conditions were below freezing (about 40 degrees Fahrenheit (F) below the comfort range for interior space) or above the core temperature of people (about 30 degrees F above the comfort level), then conditioning (heating or cooling) 100% fresh air would be very expensive. Abramson and Borchardt wanted to provide their tenants with plenty of fresh air while not wasting any money unnecessarily conditioning either fresh or building air.

Enthalpy wheels posed a potential solution to this issue of balancing fresh and building air in the conditioning process. In the summer, for example, outside air might reach 95 degrees F while the interior air being exhausted might be 75 degrees F. With a chiller/compressor system alone, it would be expensive to make up that difference.

The enthalpy wheel (depicted in **Exhibit 7**) captured some of that cold air. The system involved a large wheel constructed of thousands of small pieces of foil made from a highly conductive alloy. The wheel turned slowly, cooling off as inside air blew over an exposed section, and rotating to move the relatively cold metal into the path of the oncoming outside air. In this manner, instead of exhausting 75 degree air and taking in 95 degree air, the building would effectively exhaust 80 degree air and take in 90 degree air. This would require the chiller/compressor and chilled water system to cool air 10 degrees instead of 20 degrees. This was projected to result in a 25% reduction in energy needed.

[d] When demand for conditioned air was not mitigated by other energy savings measures like an enthalpy wheel or CO_2 sensors.

Borchardt reviewed his consultant's illustration of how the payback might be considered for a system like this (reference **Exhibit 8**). He noted that the cost equation was quite predictable, but the performance was not. Any enthalpy wheel installation would be a part of an interdependent system of controls and components reacting to a wide range of weather and occupancy conditions.

CO_2 monitoring system Borchardt had lobbied for CO_2 sensors to be installed in conference rooms and other high-capacity assembly areas in the building. He had noted that the building systems were normally designed to supply substantial fresh air to these rooms as if they were occupied continuously throughout normal working hours. In practice, however, he realized that occupancy of these areas would be intermittent. (Reference **Exhibit 9** for a photograph of a CO_2 sensor.)

Borchardt reasoned that the goal for his tenants should be for them to have fresh air and low CO_2 levels on an as-needed basis. If his CO_2 sensors throughout the building read at acceptably low levels, then the HVAC system could reduce the quantity of fresh air intake. This would lighten the load on the chiller/compressor given the lower quantity of hot outside air entering the building. If the CO_2 levels were higher than desired, he could program the system to call for more outside air.

The sensors themselves were relatively cheap. The control wiring, variable volume fans, and other parts of the assembly were more expensive.

Borchardt contemplated another factor going forward. If the CO_2 sensors and the enthalpy wheel worked as effectively as promised, then the building would require much less output from the chiller/compressor unit.[e] Borchardt consulted a cost/payback analysis of the CO_2 sensors alone (**Exhibit 10**) and a hybrid analysis of the combined impact of the CO_2 sensors with the enthalpy wheel (**Exhibit 11**). He wondered if it made sense to install both systems on future buildings and what key sensitivities might prove problematic at 2000 Tower Oaks in the years ahead. (Reference **Exhibit 12** for a summary of his analyses.)

Design for Health and Productivity

Some elements of 2000 Tower Oaks Boulevard had no cost justification in the current market with respect to either energy savings or rental rate premiums. An example was the steel electro-magnetic shielding around the basement electrical transformer and switchgear room. (See photo in **Exhibit 13**). "This cost us about $180,000," Abramson said. "Like everything, we had to educate tenants and brokers. Research has shown that EMF radiation is harmful not only to people with pacemakers, but to everyone." Technicians were able to quantify the benefit of the EMF shielding by using a Gaussmeter. It was certainly possible that a prospective tenant may come looking for this attribute in the future. In that case, it would be near impossible to install the shielding after the fact. Abramson argued that this was a prudent gamble in a market full of sophisticated scientific, medical, and government tenants with highly specific needs. He also stated his belief that EMF concerns were likely to become "the next asbestos."[14] But others questioned whether this was spending in excess, during the height of the financial bubble, to make a point.

[e] Counter-intuitively, this benefit would obviate a significant portion of the economic savings from chiller/compressor efficiency (since the chiller operating savings were based on a load absent the effectiveness of the enthalpy wheel and CO_2 sensors).

Overriding the Experts

Among the many design and implementation decisions facing Abramson and Borchardt, one of the most frustrating for them pertained to their contract with their mechanical engineering design firm. Tower's typical contracts were structured with one Owner-Contractor Agreement and a separate Owner-Architect Agreement.[f] The mechanical engineer technically worked for the architect under a type of contract for consultants generally referred to as an Architect-Consultant Agreement.[15] Tower also had engaged its own energy and LEED consultant.

Various elements of responsibility for the performance of the design flowed through the architect and its structural, mechanical, and other consultants. Licensed professionals "stamped" plans and specifications, representing the sufficiency of the designs and accepting certain levels of professional liability with respect to the performance of the building.[g]

Mechanical engineers in particular had been seasoned by decades of disputes to be cautious about capacities and specifications of heating and cooling equipment. In a highly complex and interdependent modern building, in an environment like Rockville where temperatures could range from below freezing to over 100 degrees F and dew points could exceed 70 degrees F, it was difficult to design a building where all occupants would be comfortable and where components would be durable. Engineers had a substantial incentive to design excess capacity and specify very high-quality components in order to contain professional liability exposure. Since engineering firms did not actually pay for the equipment or the energy (the owners or their tenants did), developers were in a constant state of tension over what was needed and what would be stamped by engineers.

In the case of 2000 Tower Oaks Boulevard, the energy and LEED consultant recommended both substantially reduced capacity and a number of innovative equipment designs. If the day-lighting features, CO_2 sensors, air recycling measures, and low-energy glass performed as planned, the building would indeed need much less capacity in ductwork and equipment. But the mechanical engineer of record would not stamp the drawings with the innovative design suggestions unless Abramson and Tower executed an agreement indemnifying the architect and mechanical engineer with respect to possible future capacity problems.

Abramson was incensed when this issue first arose. He wanted to build efficient buildings. He did not want pay for "gold plated" capacity he would not need. He wanted to be at the forefront of the industry. He had to decide whether to pay up and buy the design of the engineer of record or to downscale the capacities, buy the innovative equipment, indemnify the engineer, and bring performance responsibility onto Tower and its investors and lenders. This looked like an intractable long-term dilemma. Would there be a way to better handle this issue on future projects, or was this yet another unavoidable obstacle in the attempt to do the right thing?

An Educated Consumer

The purpose of buildings is to house businesses' aspirations. Therefore, as a developer of the built environment, I have a responsibility to help them make their work force more creative and successful. Buildings

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[f] The American Institute of Architects (AIA), a leading industry group, offered a set of standard forms and contracts prepared and tested over many years and relied upon by owners, contractors, attorneys, architects, engineers, and others. Among the more than 100 choices were, "A101 Standard Form of Agreement between Owner and Contractor," "B101 Standard Form of Agreement between Owner and Architect," and "C101 Standard Form of Agreement between Architect and Consultant."

[g] Professional liability for design issues is a complex subject that is richer than what is described above.

making people succeed while collectively reducing energy consumption and pollution is 'saving the planet through real estate,' a phrase coined by my niece, Marnie.

—Jeffrey Abramson[16]

2000 Tower Oaks Boulevard faced a major communication issue with real estate brokers. Like most landlords, Tower relied on outside brokers to show space to prospective tenants. The brokers performed substantial other services for tenants as well, notably in explaining and navigating the comparison, negotiation, and leasing process.

The principals at Tower did not want to underestimate the value proposition of educating and empowering the consumer, industry leaders, business organizations and local and state governments, in addition to real estate brokers. Abramson and others embarked on an aggressive public education campaign outside of the broker community through several venues. They spoke before regional business and environmental organizations, testified before local government bodies and conducted numerous media interviews to explain the benefits of green to the general population. The building's numerous public and private sector awards and frequent tours for the public further enhanced awareness.

Net Leases, Energy Expenses, Equipment Upgrades, Sharing Costs, and Capturing Benefits

Major office space in the Rockville area was typically leased on either a "Full Service" or "Triple-Net" basis (often abbreviated "NNN"). Under triple-net leases, the tenant paid a fixed rent to the landlord and was responsible for its own costs including utilities (like electricity), a pro-rated share of operating expenses for the building (like cleaning and security), and a pro-rated share of taxes and fees for the building. (Reference **Exhibit 14** for an example of how a pro forma operating budget for 2000 Tower Oaks Boulevard might look.) From the landlord's point of view, the rent was "net" of these three costs, hence the term "Triple-Net." This system contrasted with full service leases where the tenant wrote one check for all costs including rent, utilities, building expenses, and taxes.

Landlords were skilled at preparing analyses on either a full service or triple-net basis for their own purposes. The issue started coming to a head for Tower, however, when the firm began to commit major incremental upfront capital costs towards designing and building structures that were far more energy efficient than others in the market. In a triple-net scenario, the benefits of an energy-efficient building would flow to the tenant, preventing the landlord from recouping upfront first costs of the savings measures. Many in the industry felt that this situation would lead to continued short-term thinking about first costs of buildings and thus more energy use overall.

Abramson and Borchardt saw three possible ways to proceed. First, they could quote a substantially higher triple-net rate to tenants than what competing, less efficient buildings were asking. This would allow Tower to recoup its first costs and in theory allow tenants to experience lower total costs (because energy costs would be lower). This required a broker able and willing to explain the analysis, a tenant that cared about energy costs (a small figure for many service firms), was able to conduct the analysis, and was confident that the projected energy savings were real.

Tower's second option was to charge full service rents (inclusive of energy costs) for the space, thereby appropriating most of the benefits of energy savings for themselves and paying back the cost of equipment. This was simple but would still involve educating prospective tenants. This approach had the added burden of being difficult to compare to triple-net leases and even other full service leases in buildings with different operating characteristics.

The third way to proceed was to recognize the major downward pricing pressure in the current market and not invest in energy-saving design and equipment that tenants did not value. If the tenants did not value the potential savings, then Tower's rental stream would not be any different than in other competing properties. The eventual value of the building would also not be any different than in competing properties. So maybe, frustratingly, gratingly, counter-intuitively, there was no payback or comparative advantage in making forward-looking energy investments. Some thought Tower should just focus their design efforts and discretionary capital spending on differentiating the physical space.

Design Creates Fortune

Fortune-Creating Vedic Architecture is the world's most ancient system of architecture. It is the knowledge of how to construct and design buildings in accord with Natural Law, in perfect harmony with all the laws of nature. Laws of nature are the universal principles of intelligence with nature that administer, with perfect order, everything from our human physiology to the whole galactic universe.

—2000 Tower Oaks Boulevard website[17]

"This is the part that really excites us, this is the next generation of green building," Abramson said. After incorporating Vedic design in his own home, Abramson realized the potential for office buildings. Of the 100 principles of Vedic design, Abramson often emphasized the first four for brevity:

- Orientation of the building: "East-facing buildings are associated with good fortune, creativity, and alertness. North-facing, with financial success. All other directions create loss, ill health and quarrelling," Abramson noted. East-facing allows a greater amount of sunlight into a building, further reducing demand for artificial light and reducing heat load in the building. "Human beings need to experience the full range of daylight to create biological chemicals that keep us balanced and focused," he continued.[18] In fact, research had shown that receptors in human eyes were able to detect changes in the color of light and were involved in setting the human biological clock.[19]

- Proportion: "Height, width, length all matter. These are the basic tenets of architecture followed by designers from the Parthenon to Palladio and Thomas Jefferson." Abramson liked to point out how many orders had relied on these concepts; "The Freemasons used to say, 'Architecture is the intersection of the human and the divine. '"[20]

- Center point: "The nucleus is the architecture of nature. The sun is the center of the solar system, and the nucleus is the center of a cell. The nucleus of a cell contains the intelligence—it contains the purpose. In this building, the brahmasthan stone in the main elevator lobby is the representation of the center." (Reference **Exhibit 15**.)

- Fencing or surrounds: "The building should be encapsulated or surrounded with a fence, or a wall, or a garden. This is the classic use of the word, "Vastu," a defined fence surrounding the building. The building is placed within the vastu, following defined proportions. The vastu fence creates a sphere of coherence around a system."[21]

"All of these points and others combine to create the uniqueness of this building. People don't notice time in the building. There is a dynamism here; a rightness; a thrust; you feel like you have the wind at your back. People realize here, that they are more innovative, more creative, more willing to let go, more willing to change and collaborate," Abramson concluded.

Research was being performed at both the University of the Faroe Islands, Denmark, and at Maharishi University of Management to explore the hypothesis that the elements of Vedic architecture were highly correlated to the success of companies.

Abramson and Borchardt estimated that the Vedic components of the design added about 3% to the first cost of the building.[22] (Reference **Exhibit 16** for the development budget.) These choices could be compared to other architectural choices made by other developers, for example for complex curtainwall systems or fancy finishes in lobbies. According to the Tower team regarding its architectural choices, "We provide the right environment for people to succeed. People automatically respond to the space."[23] (Reference Exhibit X for

The Shape of the Future

When we mean to build,
We first survey the plot, then draw the model.
And when we see the figure of the house,
Then must we rate the cost of the erection,
Which if we find outweighs ability,
What do we then but draw anew the model
In fewer offices, or at least desist
To build at all?

—William Shakespeare, *King Henry the Fourth,* Part II (Lord Bardolph Act I, iii)[24]

Tower built 2000 Tower Oaks Boulevard at the height of the real estate boom, beginning construction in 2006 and completing in 2008. The purpose of the building and of the developers was to influence practice. Now that the economic boom had slowed, some wondered if influence would be harder to achieve. Abramson and Tower had decided not only to create sculptural shapes to be admired from afar as brand icons, but also to focus on the space between the walls, going beyond "green." Would this approach prove attractive to tenants?

A second aspect of shape was financial. What would be the shape of the economic recovery? Notably, what would be the shape of energy cost charts, capital costs, general office demand, and of awareness of healthier and more productive buildings (if the Vedic concepts were realized by the market)?

The final aspect of shape related to the industry and a way of thinking. Abramson hoped in the example of 2000 Tower Oaks Boulevard and future buildings to promote, to publicize, to overcome barriers, and to illuminate a path toward more effective buildings and better realization of human potential. He hoped to do this in alignment with his investors and colleagues.[25]

Can We Do This Again?

Evolve beyond what you know. Building a better world for future generations depends on innovations we have yet to imagine. The time is now to transcend imagination—to create a place where the benefits of balance, well-being and prosperity are experienced by everyone. The Tower Companies invite you to change your perception with us. Change one thought, and begin the re-evolution.

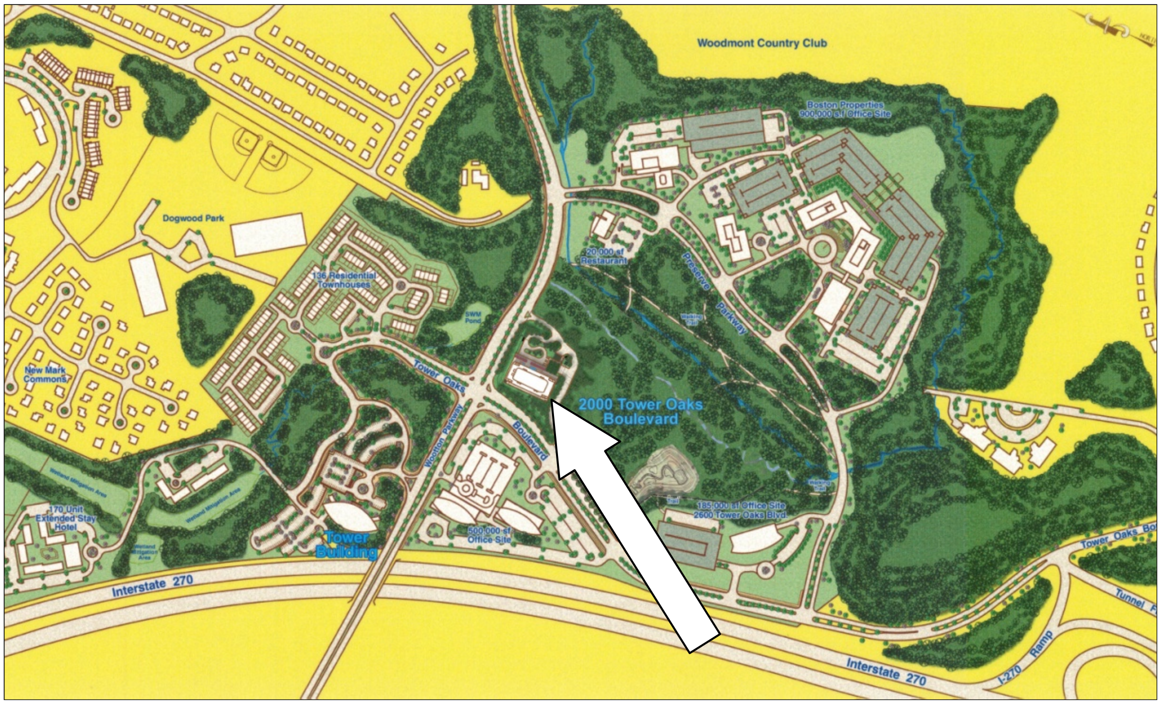
—Tower Companies website[26]

Abramson, Borchardt, and their partners were meeting shortly to discuss plans for future towers. They wanted to be ready when the business cycle turned. Abramson was adamant about repeating all of the green, LEED, and Vedic features of 2000 Tower Oaks Boulevard . . . and going further. He aspired to include power generation features such as wind, solar, and geothermal on future projects. He believed this was the way to associate green and Vedic with saving money for tenants and maximizing their potential, truly making businesses successful. And he believed all of this was the right thing to do.

The finance team was not so sure. They could possibly justify some of the energy-saving features. But if they could not see short-term revenue benefits compared to the competition, they could not see the point of spending the money. The market was much more likely to be cost sensitive on the rebound, and they couldn't waste more key pieces of ground on the I-270 corridor, they thought. Some considered whether it was far-fetched to back this design dream.

Abramson started to recap his list of recommendations and justifications for Tower's next tower.

Exhibit 1 2000 Tower Oaks Boulevard—Site Plan



Source: Company documents.

Exhibit 2 2000 Tower Oaks Boulevard—Typical Floor Plan

Source: Company documents.

Exhibit 3 2000 Tower Oaks Boulevard and Comparables

2000 Tower Oaks Boulevard

1101 Wootton Parkway (The Tower Building)
(Tenants include Bank of America and Booz Allen Hamilton)

Source: Company documents (photography by Ron Blunt Photography).

Exhibit 3 (continued)

2600 Tower Oaks Boulevard (Boston Properties)
(Tenants include EMC^2)

Source: Photo by casewriter.

Exhibit 4 Illustration of Arithmetic: Fully-Loaded "Cost per Employee per SF"

Gross Wages per Employee:	$80,000
Insurance, Taxes, Benefits:	15%
Total Payroll Cost per Employee	**$92,000**
Square Feet per employee:	250
All-In Gross Rent & Expenses per SF	$50.00
Space Cost per Employee	**$12,500**
Payroll & Space Cost per Employee	$104,500
Per SF:	$418.00

This analysis provides the arithmetic background for the assertion of a measure of "Cost per Employee per SF" expressed in the case text.

Source: Casewriter.

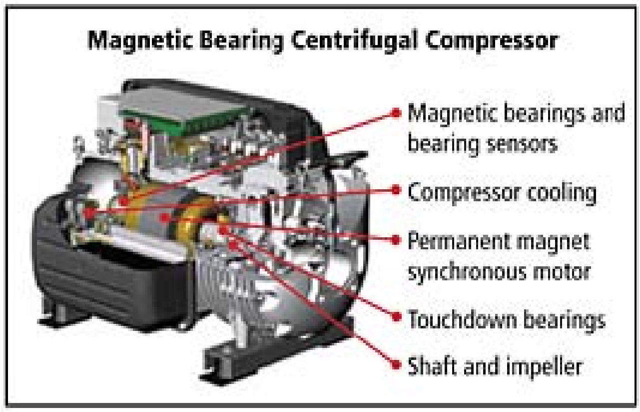
Exhibit 5 Tenant Illustration: The Value of Green and Vedic Design

	Percent of Revenue	Tenant/IC Baseline Example ($'000)	Sample Green & Vedic Delta	Tenant New I/S Illustrative Benefits ($'000)
Revenue from Tenant's Business	100.0%	10,000	2%	10,200
Cost of Labor	40.0%	(4,000)	-5%	(3,800)
Cost of Energy	5.0%	(500)		
Price			n/c	
Consumption			-30%	(350)
Other Costs	30.0%	(3,000)	0%	(3,000)
Subtotal Income Before Rent		2,500		3,050
Rent (Paid by Tenant)	20.0%	(2,000)	10%	(2,200)
Net Income		500		850
Margin in Tenant's Business		5.0%		8.3%

This analysis is intended to articulate in financial terms the effect of productivity, creativity, and performance benefits to tenant companies. The sample green and Vedic design deltas are hypothetical and readers should test the sensitivity of these coefficients. The basic premise in this worksheet is to provide a baseline income statement for a typical tenant in a typical building (baseline column). In the "New Income Statement" column, this sample tenant has monetized both an increase in revenue and a decrease in costs due to employee effectiveness thanks to the better space. Part of this benefit is returned to the landlord in the form of added rent and part is retained by the tenant in the form of higher margins.

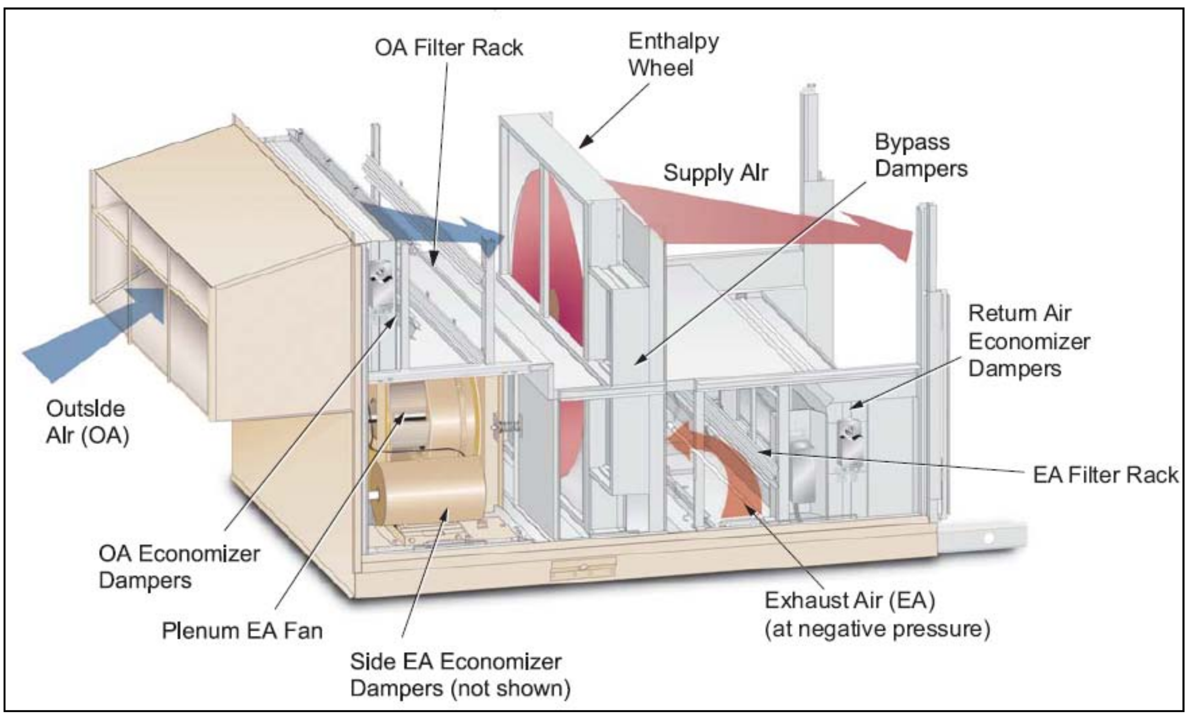
Source: Casewriter.

Exhibit 6 McQuay Low-Friction Magnetic Bearing Centrifugal Chiller/Compressor Unit



Source: www.mcquay.com, accessed on March 16, 2009.

Exhibit 7 McQuay Enthalpy Wheel



Source: www.mcquay.com, accessed on March 16, 2009.

Exhibit 8 Low-Power Enthalpy Wheel Savings Analysis—Without CO_2 Monitoring System

Assumptions:		
Rental Rate	$35.00	per SF - NNN
Rental Rate Annual Escalation	3.0%	
Energy Demand - HVAC System	6,000	MMBtu
1.0 kilowatt hour (kW h) =	3,413	Btu
Average Electrical Utility Cost	$0.1354	per kilowatt hour (kW h)
Energy Cost Escalation + Inflation	5%	annually

Operating Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Baseline Energy Demand (MMBtu) - Heating and Cooling		6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Efficiency Factor	85%										
Electrical Demand (kW h) - Heating and Cooling		2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217
Cost - Energy for Heating and Cooling		($294,038)	($308,740)	($324,177)	($340,386)	($357,405)	($375,276)	($394,040)	($413,742)	($434,429)	($456,150)
% Energy Savings claimed from Enthalpy Wheel while in operation[a]	20%										
% of days (annual) where enthalpy wheel can effect savings[b]	70%										
Energy Saved - Heating and Cooling of Make-up Air (MMBtu)		840	840	840	840	840	840	840	840	840	840
Energy Demand Reduction (kW h) - Heating and Cooling		289,550	289,550	289,550	289,550	289,550	289,550	289,550	289,550	289,550	289,550
Cost Savings from Enthalpy Wheel		$41,165	$43,224	$45,385	$47,654	$50,037	$52,539	$55,166	$57,924	$60,820	$63,861
First Costs:											
Enthalpy Wheel	($50,000)										
Ductwork and Misc. Sheet Metal	($20,000)										
Controls, Wiring, and Programming	($5,000)										
Electrical Hook-up and Breaker	($5,000)										
Roof and Penthouse Modifications	($10,000)										
Other Trades	($5,000)										
Commissioning and Validation	($5,000)										
Subtotal	($100,000)										
Maintenance Premium		($500)	($500)	($500)	($500)	($500)	($500)	($500)	($500)	($500)	($500)
Impact on Rentable SF[c] 250 SF		($8,750)	($9,013)	($9,283)	($9,561)	($9,848)	($10,144)	($10,448)	($10,761)	($11,084)	($11,417)
Cash Flow Impact - Enthalpy Wheel	($100,000)	$31,915	$33,711	$35,602	$37,593	$39,689	$41,895	$44,218	$46,662	$49,236	$51,944
% Cost Savings on Energy for Heating and Cooling		10.9%	10.9%	11.0%	11.0%	11.1%	11.2%	11.2%	11.3%	11.3%	11.4%
Discount Rate (Tower's Cost of Capital)	10.0%										
Weather and Technology Risk	2.0%										
Effective Discount rate	12.0%										
Net Present Value (NPV) - Enthalpy Wheel[d]	$121,675										
Pay-Back Period (Year 1 dollars)	3.1 years										

Source: Derived by casewriter.

[a] Net of energy used to power the wheel and to power extra fans to force air across the wheel.

[b] Enthalpy wheel does not operate when outside air temperature is close enough to discharge air temperature so as to render enthalpy wheel ineffective.

[c] While the enthalpy wheel is installed in the rooftop mechanical penthouse, re-routing of ductwork and other considerations impact rentable square feet.

[d] Analysis intentionally excludes a terminal value.

Exhibit 9 Photograph of an Example CO_2 Sensor

Source: Photo by casewriter.

Exhibit 10 Low-Power CO_2 Monitoring Savings Analysis—Without Enthalpy Wheel

Assumptions:		
Rental Rate	$35.00	per SF NNN
Rental Rate Ann. Escalation	3.00%	
Energy Demand - HVAC System	6,000	MMBtu
1.0 kilowatt-hour (kW h) =	3,413	Btu
Average Electrical Utility Cost	$0.1354	per kilowatt-hour (kW h)
Energy Cost Escalation + Inflation	5%	annually

Operating Year	0	1	2	3	4	5	6	7	8	9	10
Baseline Energy Demand (MMBtu) - Heating and Cooling		6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Efficiency Factor	85%										
Electrical Demand (kW h) - Heating and Cooling		2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217	2,068,217
Cost - Energy for Heating and Cooling		$ (294,038)	$ (308,740)	$ (324,177)	$ (340,386)	$ (357,405)	$ (375,276)	$ (394,040)	$ (413,742)	$ (434,429)	$ (456,150)
Energy Savings Claimed from CO_2 Monitoring	8.5%										
% of days (annual) where CO² Sensors save energy[a]	75.0%										
Energy Saved - Heating and Cooling (MMBtu)		383	383	383	383	383	383	383	383	383	383
Energy Demand Reduction (kW h)		131,849	131,849	131,849	131,849	131,849	131,849	131,849	131,849	131,849	131,849
Cost Savings from CO_2 Monitoring		$18,745	$19,682	$20,666	$21,700	$22,785	$23,924	$25,120	$26,376	$27,695	$29,080
First Costs:											
Controls, Wiring, and Programming	($30,000)										
Commissioning and Validation	($5,000)										
Other Trades	($5,000)										
Subtotal	($40,000)										
Maintenance Premium		($150)	($150)	($150)	($150)	($150)	($150)	($150)	($150)	($150)	($150)
Cash Flow Impact - CO_2 Monitoring	($40,000)	$18,595	$19,532	$20,516	$21,550	$22,635	$23,774	$24,970	$26,226	$27,545	$28,930
% Cost Savings for Heating and Cooling		6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%
Discount Rate (Tower's Cost of Capital)	10.0%										
Weather and Technology Risk	2.0%										
Effective Discount rate	12.0%										
Net Present Value (NPV) - CO_2 Monitoring[b]	$86,495										
Pay back period (Year 1 dollars)	2.15	years									

Source: Derived by casewriter.

[a]Sensors will not produce savings on all days given variability in weather, system considerations, and building use.

[b]Analysis intentionally excludes a terminal value.

Exhibit 11 Combined Analysis for Enthalpy Wheel and CO_2 Monitoring System

Operating Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Baseline Total Energy Cost - Heating and Cooling		(294,038)	(308,740)	(324,177)	(340,386)	(357,405)	(375,276)	(394,040)	(413,742)	(434,429)	(456,150)
Savings from CO_2 Monitoring System		18,745	19,682	20,666	21,700	22,785	23,924	25,120	26,376	27,695	29,080
Total Cost with CO_2 Montioring		($275,293)	($289,058)	($303,511)	($318,687)	($334,621)	($351,352)	($368,920)	($387,365)	($406,734)	($427,070)
Energy Demand with CO_2 Monitoring (MMBtu)		5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618
Additional Savings with Enthalpy Wheel Installed (MMBtu)		786	786	786	786	786	786	786	786	786	786
Total Energy Demand with Enthalpy Wheel and CO_2 Monitoring (MMBtu)		4,831	4,831	4,831	4,831	4,831	4,831	4,831	4,831	4,831	4,831
Savings from Enthalpy Wheel with CO_2 Monitoring ($)		$32,760	$34,398	$36,118	$37,924	$39,820	$41,811	$43,901	$46,096	$48,401	$50,821
Total Cost with Enthalpy Wheel and CO_2 Monitoring ($)		(242,534)	(254,660)	(267,393)	(280,763)	(294,801)	(309,541)	(325,018)	(341,269)	(358,332)	(376,249)
First Costs: Enthalpy Wheel	($100,000)										
First Costs: CO_2 Monitoring	($40,000)										
Maintenance		($650)	($650)	($650)	($650)	($650)	($650)	($650)	($650)	($650)	($650)
Rental Impact		($8,750)	($9,013)	($9,283)	($9,561)	($9,848)	($10,144)	($10,448)	($10,761)	($11,084)	($11,417)
Cash Flow Impact of EW and CO_2 Monitoring	($140,000)	$42,105	$44,418	$46,851	$49,412	$52,106	$54,941	$57,923	$61,061	$64,362	$67,834
% Cost Savings for Heating and Cooling		15.3%	15.4%	15.4%	15.5%	15.6%	15.6%	15.7%	15.8%	15.8%	15.9%
Discount Rate (Tower's Cost of Capital)	10.0%										
Weather and Technology Risk	2.0%										
Effective Discount rate	12.0%										
Net Present Value (NPV) - CO_2 Monitoring + Enthalpy Wheel[1]	$151,068										
Pay-Back Period (Year 1 dollars)	3.33	years									

Source: Derived by casewriter.

[a]Analysis intentionally excludes a terminal value.

Exhibit 12 Summary of Energy Initiative Analysis

Measure	% Savings on HVAC Energy	NPV	Payback Period (yrs.)
CO_2 Monitoring	6.32%	$ 86,495	2.2
Enthalpy Wheel	10.85%	$121,675	3.1
CO_2 Monitoring + Enthalpy Wheel	15.29%	$151,068	3.3

Source: Derived by casewriter.

Exhibit 13 EMF Shielding in Switchgear Room

Source: Photo by casewriter.

Exhibit 14 Pro Forma Operating Budget: Stabilized Year 2010

Floor	Rentable SF	Rate($) /SF/yr (NNN)	Extension ($)	PSF
1	13,136	40.00	525,440	
2	23,628	40.00	945,120	
3	23,628	40.00	945,120	
4	23,628	40.00	945,120	
5	23,628	40.00	945,120	
6	23,628	40.00	945,120	
7	23,399	42.00	982,758	
8	22,865	44.00	1,006,060	
9	22,865	46.00	1,051,790	
	200,405		8,291,648	41.37
Parking ($/space/mo)	606	70.00	509,040	
Rental Revenue			8,800,688	
Vacancy Allowance		5.0%	(440,034)	
Pro Forma Revenue			8,360,654	
Operating Costs:				
Utilities (LL and common)		3.00	(601,215)	
Payroll		2.00	(400,810)	
Maintenance & Repairs		0.50	(100,203)	
Other Direct Costs		0.90	(180,365)	
G & A		2.00	(400,810)	
Taxes		2.50	(501,013)	
Insurance		0.25	(50,101)	
Assessment Water/ Paving		(fixed)	(16,634)	
Capital Reserve Accrual			--	
			(2,251,150)	
Cash Flow from Operations			6,109,504	

Source: Company documents (figures disguised by casewriter).

Exhibit 15 Brahmasthan in Elevator Lobby

Brahmasthan, or nucleus of the building

Source: Company documents (photography by Ron Blunt Photography).

Exhibit 16 Project Budget for Core and Shell (prior to tenant improvements)

	Budget	Per FAR SF
Uses of Funds ($)		**195,925**
Building Construction	42,500,000	216.92
Building Soft Costs	4,400,000	22.46
Owner Soft Costs	200,000	1.02
Overhead Reimbursement	1,200,000	6.12
Loan Fees and Interest Carry	5,500,000	28.07
Contingency	3,500,000	17.86
Developer's Fee	--	--
Taxes and Other Charges	500,000	2.55
Subtotal	57,800,000	295.01
Parking Deck Construction (3 levels below)	9,600,000	n/a
Land Value	9,000,000	45.94
Total (prior to tenant improvements)	76,400,000	389.95
Sources of Funds ($)		
Bank Debt	33,000,000	168.43
Equity	43,400,000	
Total Sources	76,400,000	

Source: Company documents (figures disguised by casewriter).

Endnotes

[1] Attributed to Maharishi Mahesh Yogi, press conference with The World Press, February 16, 2004. Source: http://www.fortunecreatingbuildings.com/popups/about_maharishi.html, accessed March 16, 2010. ("Sthapatya Veda provides the knowledge to connect the individual with his cosmic potential" is the quote attributed to Maharishi Mahesh Yogi from the 2004 press conference. It was paraphrased here by Jeffrey Abramson in an interview with the casewriter, March 16, 2010.)

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[3] The Tower Companies, The Tower Companies company website, http://www.towercompanies.com, accessed August 12, 2009.

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[5] U.S. Census Bureau, "State and County Quickfacts: Montgomery County," http://quickfacts.census.gov/qfd/states/24/24031.html, accessed March 13, 2010.

[6] "Annual Estimates of the Population of Combined Statistical Areas: April 1, 2000 to July 1, 2008" (CSV). 2008 Population Estimates. United States Census Bureau, Population Division. March 19, 2009. http://www.census.gov/popest/metro/tables/2008/CBSA-EST2008-02.csv, accessed March 13, 2010.

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[8] David Borchardt, interview by author, Rockville, MD, July 29, 2009.

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[10] Jeffrey Abramson, interview by author, Rockville, MD, July 29, 2009.

[11] Jeffrey Abramson, interview by author, Boston, MA, March 16, 2010.

[12] David Borchardt, interview by author, Rockville, MD, July 29, 2009. The reference is to Professor Theo de Winter, Associate Professor at Boston University

[13] David Borchardt, "More stuff," email message to John Macomber, August 20, 2009.

[14] Jeffrey Abramson, interview by author, Boston, MA, March 16, 2010.

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[17] The Tower Companies, 200 Tower Oaks Boulevard property website, http://www.toweroaks.com/files/Vedic_Architecture.pdf, accessed August 10, 2009.

[18] Jeffrey Abramson, interview by author, Boston, MA, March 17, 2010.

[19] Peter Boyce, Claudia Hunter, Owen Howlett, "The Benefits of Daylight through Windows," Lighting Research Center, Rensselaer Polytechnic Institute, September 12, 2003.

[20] Jeffrey Abramson, interview by author, Rockville, MD, July 29, 2009.

[21] Jeffrey Abramson, interview by author, Boston, MA, March 16, 2010.

[22] David Borchardt, "Vedic cost," email message to John Macomber, August 18, 2009.

[23] Jeffrey Abramson, interview by author, Rockville, MD, July 29, 2009.

[24] Giga Quotes website, http://www.giga-usa.com/quotes/topics/architecture_t003.htm, accessed August 11, 2009.

[25] Jeffrey Abramson, interview by author, Rockville, MD, July 29, 2009.

[26] The Tower Companies, The Tower Companies company website, http://www.towercompanies.com accessed August 12, 2009.