ENPRO 356 Final Report

Spring 2010

Design of a Large Scale Structural System for the 21st Century – Team 1

Advisors: Jorge Cobo, Steve Beck, and Mark Snyder

Abstract

The purpose of this ENPRO is to determine the most feasible and viable solution for the Michael Reece site. Also, the purpose of this ENPRO is to learn how to design a building complete with structural drawings, architectural drawings, and 3D modeling.

First, to determine the most feasible and viable solution for the Michael Reece site, we received guidance from experts in the field of community development and business. Using their advice and our own ideas, we decided the best solution for the site was an innovative vertical farm. Since a vertical farm is a very new concept, it is perfect for Chicago.

Background and Objective

Due to Chicago not receiving the bid for the 2016 Summer Olympic, the question of what to use the land designated for the Olympics for arose. The land used to be home to the Michael Reece Hospital. However, the hospital recently shut down due to lack of business. Therefore, as the first Civil Engineering ENPRO, our task was to figure out what was the best solution for this land.

A vertical farm would be innovative as well as good for the community in providing the freshest food for its residents. One of the members in the ENPRO has done a lot of research about vertical farming and shared his expertise. Due to the many benefits to doing a vertical farm, this became our proposed anchor building for the Michael Reece site.

Organization and Approach

This IPRO was faced with the challenge of developing a thirty-seven acre site. Using every group member's opinion and vision of the development would have created chaos. This led us to split up into smaller groups in order to tackle certain portions of the project. Our team consists of seventeen members representing majors including mechanical engineering, civil engineering, and architecture. The three groups that were formed included a business team, civil team and architectural team each with approximately 4 to 6 members. The three subgroups allowed for a more focused approach of each facet of the development. The business team dealt with understanding the site's surrounding economy and putting together a financial plan that supported the development of the site as a whole. The civil team handled the structural analysis and layout of the vertical farm anchor building. Finally, the architectural team developed the master plan for the site and created detailed renderings of the site itself.

Once the sub groups had been formed, a more focused approach was taken within each group. Ultimately, this method allowed for more efficient work throughout each week. When we meet in class a status report was given by each group and this is when all three groups collaborated as a whole and shared individual ideas.

As a whole group, the first things done in the semester were the examination the site and surrounding area, which was done in order to find out what the site needed. This led to the development of the master plan which zoned the entire site and left room for the vertical farm as the anchor building. The main focus then turned to the vertical farm by leaving the rest of the site as just zoned territory. Moving forward with the vertical farm meant

designing the structure inside and out. The civil sub-group conducted structural analysis while the architecture sub-group developed floor plans along interior and exterior renderings. This left the business sub-group to research and write up a plan that would verify the financial feasibility of the vertical farm. Once each sub group had completed their portion of the project, the final project became three individual final projects all supporting one another.

Analysis and Findings

The analysis for this IPRO was two-fold: determine the feasibility for the master plan that was decided on, and design the anchor building that the site would be focused around. In the beginning of the semester, the main focus of the IPRO was to decide on an anchor building, and design a master plan for the site. After deciding on using a vertical farm as the anchor building for the site, the master plan was designed shortly afterward to reflect the anchor building.

Once the anchor building and site plan were decided on, the IPRO team broke up into two analysis groups: the business group and the anchor building group.

The business group had the task of determining the economic feasibility of the plan decided on. This involved looking at both the costs and benefits of developing the site, as well as the costs and benefits for the vertical farm alone. The economic analysis was straight-forward: determine the construction and maintenance costs for the buildings that would fill the site. This was done through use of square foot estimates for the cost of construction, and use of the pro forma for other economic costs and benefits.

The economic analysis for the vertical farm was far more difficult than for any other single building. This is primarily because no vertical farm has been constructed before. Therefore, a lot of work has gone into determining accurate costs and returns for this building.

The anchor building group had the job of designing the anchor building. This involved lots of cooperation between the architects and the civil engineers. The main design of the building was decided on based on the structure's purpose. Since a farm requires sunlight to grow produce, the building was designed to be narrow, while being wide and tall also. The large surfaces of the building would face North/South as to collect the largest amount of sunlight possible. From this original design, details were added slowly. To make sure that the members of the group performing the structural analysis were designing beam and column sizes for the same structure being designed, a final design was decided on for the column and beam grid. From this final grid agreed on, the architects and engineers were both able to work on their respective parts, without fear of any design changing.

Conclusion and Findings

It was found that the Vertical farm is a viable choice in terms of its profitability.

Due to the large amount of land available from this site the whole area would become one independent community with residents being able to get to work, home, and places of entertainment all within walking distance.

The site development is planned to occur in three stages, starting from the southernmost portion and then moving north, in a way such that each "circular ring" represents one stage. We have left a possibility of potentially selling off the northern third portion of the site to the Metropolitan Pier and Exposition Authority, also known as the McCormick Convention Center. If the McCormick Center would be interested in expanding then moving southward (onto our plot of land) would be the easiest and most logical step due to the other directions already being developed or having natural boundaries. Since the northern ring is the last planned development there would still be plenty of time to see which route to take.

The building structure was modeled and fully analyzed using SAP2000, a computerized structural analysis program, for both strength requirements as well as serviceability. The building is designed to use a braced frame load resisting system due to the easier construction and lower initial costs. The building was also designed using steel since it is easier for engineers to analyze and design, which was helpful due to time constraints placed on this IPRO. It was designed using the current Chicago Building Code as a guide. Detailed structural drawings have also been prepared to show the size, layout, and connection types of the members.

Acknowledgements and References

ENPRO 356 would like to thank all the following guest speakers for their time and support with this project:

Gropius in Chicago Coalition

Ray Hodges, CB Richard Ellis

Julia Kirsch, Jones Lang LaSalle

Attachments

We have attached a copy of our business plan as an appendix to this report.

Team Organization

Business Team

Team Leader -

Ross Brazzale
Andrew Cho
Matthew Coad
Zachary Waas

The business team was in charge of the business plan for the ENPRO. They made to business plans, one focusing on the vertical farm and one focusing on the rest of the land.

Structural Team

Team Leader – Karen Nelson

AutoCAD
Dave Belanger
Francesco Fanizza
Lisa Nielsen

The AutoCAD team made Structural drawings for the vertical farm.

Sap Modeling
Xavier Alarcon
Karen Nelson
Patrick Olechno

The Sap Modeling team made a 3D model of the anchor building, which was used to design all of the needed member sizes.

Architectural Team

Melissa Hold
Bryan Fujiwara
Bonnie Wedster
Grant Mosey
Razieh Nilforooshan

The Architectural team designed the layout of the site, prepared Architectural drawings, as well as made a model of the site for the IPRO presentation.

Executive Summary

Due to Chicago not receiving the bid for the 2016 Summer Olympic, the question of what to use the land for arose. The analysis for this development was two-fold: determine the feasibility for the master plan that was decided on, and design the anchor building that the site would be focused around. In the beginning, the main focus was to decide on an anchor building and it was decided that we would use a vertical farm. The master plan was designed shortly afterward to reflect the anchor building.

Once the anchor building and site plan were decided on, the team broke up into two analysis groups: the business group and the anchor building group. The business group had the task of determining the economic feasibility of the plan decided on. This involved looking at both the costs and benefits of developing the site, as well as the costs and benefits for the vertical farm alone. The economic analysis was straight-forward: determine the construction and maintenance costs for the buildings that would fill the site. This was done through use of square foot estimates for the cost of construction, and use of the pro forma for other economic costs and benefits. The economic analysis for the vertical farm was far more difficult than for any other single building. This is primarily because no vertical farm has been constructed before. Therefore, a lot of work has gone into determining accurate costs and returns for this building. The design of the anchor building involved lots of cooperation between the architects and the civil engineers. The main design of the building was decided on based on the structure's purpose. Since a farm requires sunlight to grow produce, the building was designed to be narrow, while being wide and tall also. The large surfaces of the building would face North/South as to collect the largest amount of sunlight possible. It was found that the Vertical farm is a viable choice in terms of its profitability. It will be capable of growing multiple types of in-season and off-season produce. This produce will then be distributed to local grocers and restaurants. The locally grown produce will ultimately cut the cost of shipping to local markets and restaurants and allow for greatly increased availability of many popular produce items.

Due to the large amount of land available from this site the whole area would become one independent community with residents being able to get to work, home, and places of entertainment all within walking distance. The site development is planned to occur in three stages, starting from the southernmost portion and then moving north, in a way such that each "circular ring" represents one stage. We have left a possibility of potentially selling off the northern third portion of the site to the Metropolitan Pier and Exposition Authority, also known as the McCormick Convention Center. If in fact the McCormick Center would be interested in expanding then moving southward, meaning onto our plot of land, would be the easiest and most logical step due to the other directions already being developed or interference from Lake Michigan. Since the northern ring is the last planned development there would still be plenty of time to see which route to take.

As it is, the financial impact to the developer/investor for entirety of phases 1 and 2: $**91,384,102**
Total NPV of development assuming 30-year hold: **$172,277,034**
Annual Rate of Return to developer assuming 30-year hold: **23.40%**

IPRO 356 Business Plan
Spring 2010

Design of a Large-Scale Structural System for the 21st Century – Team 1

An Entrepreneurial IPRO Project

Advisors: Mark Snyder, Steve Beck, & Jorge Cobo

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Project Plan

The redevelopment of the 37-acre Michael Reese site constitutes a major civil engineering project, considering several civil engineering aspects. Typical concerns include design of pedestrian bridges, residential buildings, hotel buildings, air traffic, transportation facilities, train or bus terminal stations, and other structures. As a minimum, the project requires:

(1) Selection of the type of structure to be used (steel or concrete)
(2) Structural analysis and design including proportioning typical girders, columns and foundations and a check of pertinent serviceability requirements (deflection, cracking, and floor and/or roof vibration)
(3) Study of parking around the structure (if the project involves a building)
(4) Design of the traffic flow capacity and transportation issues;
(5) Pedestrian accessibility as stated in the Americans with Disabilities Act
(6) Preparation of construction scheduling and detail drawings
(7) An estimate of the project cost.

In addition to the integrated design challenge, this Entrepreneurial IPRO (EnPRO) project also involves a business investigation. Member of the team will address the following tasks in a collaborative way across disciplines:

(1) Establish the market needs for the site and expected owner
(2) Develop an integrated approach to the project involving engineering, architecture, and sustainable cost/benefit that meets/exceeds the market needs for the site and expected owner
(3) Determine the benefits versus costs of the approach
(4) Compare benefits versus costs to comparable buildings near the site or elsewhere to show the project is a superior product as a business plan.

Description of Business

The overall goal is to develop a trendy community surrounding and supported by an innovative economic anchor. After deliberating on possible solutions to our problem, the best use for this site would be based on the idea of the Vertical Farm (Dickson Despommier) being the main design element with residential, commercial, and public works spaces tailored to the needs of the communities south of the Loop to form a Vertical Farm centered community.

As can be expected, there are many technologies and sciences that need to be considered when bringing a historically outdoor activity like crop production under the protection of a building. On the upside, all the technology and science required to produce such a building is already there, it only needs to be implemented in efficient and sustainable ways. Concerning the production of food, there is a wide variety of grow systems. Due to the prospect of efficient crop yields, we are only focusing on methods that will give efficient results. This vertical farm will be capable of growing multiple types of in-season and off-season produce. This produce will then be distributed to local grocers and restaurants. The locally grown produce will ultimately cut the cost of shipping to local markets and restaurants and allow for greatly increased availability of many popular produce items. Production of crops also requires the most innovative lighting technologies using LED's and solid state horticultural lighting, automated system controls, extensive passive heating and cooling strategies and technologies, and an extremely sensitive knowledge of material technologies, bioplastics, and non-toxic, naturally derived solutions and chemicals. The building itself will require integrated waste/energy loops to lessen the buildings energy cost, along with passive energy collection from shrouded wind turbines, building integrated photovoltaic's, and rain/wastewater collection. There are an unlimited amount of technologies that can be implemented into the design of a vertical farm, and we have been working to implement the most viable ones.

The community surrounding the vertical farm will be geared towards affordable housing for students and current Bronzeville residents, higher end housing for young professionals and "techies," and in line and big box retails stores, restaurants, and bars to support such residents and the surrounding community.

Business Environmental Analysis

*****See Appendix 1 for the demographic data for the Bronzeville community*****

Based on an increasing amount of development south of the Loop and the proximity to schools such as the Illinois Institute of Technology, University of Chicago, University of Illinois at Chicago, and the schools in the South Loop, the Michael Reese site is ideal for a community that appeals to a younger and environmentally conscious population.

Marketing Plan

CLAIM TO FAME

Food miles, meant to signify the logistical costs associated with the importation of agricultural products, are significantly reduced. Costs for the importation of petroleum based fuels, and the impact of burning those fuels on the environment will be almost negligible when compared to the current methods of produce transportation. With our agricultural venture located in close proximity to our intended market, our furthest accounts will still be within a ten mile radius. Off-season and imported produce will be available year round to local consumers at our onsite grocer and local restaurants. With the vertical farm, out-of-season produce can be grown and packaged with no direct relationship to the outdoor weather.

Separating agricultural production from outdoor weather conditions means (1), no weather related crop failures due to droughts, floods, and pests; (2) by bringing crop production indoors, we can optimize growth rates and quality to yield a consistent, year-round supply of produce, (3) all food grown in the vertical farm is grown to a high standard of quality, using absolutely no herbicides, pesticides, or chemical fertilizers (only composted organic materials and extracts from aquatic plants as fertilizer), (4) indoor production is calculated by volume where outdoor production is calculated by area; one indoor acre is equivalent to 4 or more outdoor acres depending on the crop (strawberries: one indoor acre = ~30 outdoor acres and (5), A dramatic reduction in fossil fuel consumption. No tractors, implements, or semi trailer rigs are needed.

Traditionally, when agricultural crops are transported long distances, 30% of the shipment is deemed unsellable, spoiled, or contaminated by the receiving party. This in turn raised prices to accommodate for the loss of capitol, which in turn raises the prices to the consumer. By locating the crop production within a few miles of the point of consumption, the percentage of spoilage or contamination is significantly reduced to around 5-6%, which enables 3 things: better producer/retailer relationships, more reliable shipments and quality, and negligible price fluctuation due to logistics. As a tertiary benefit, almost all financial transactions between the vertical farm and its accounts are kept in the local economy, further stabilizing our markets.

Regarding residences and commercial spaces, the cost of such spaces has been set to be competitive with that of the South Loop and Bronzeville communities. Under such a competitive price, such spaces will be enticing to residents of many incomes and retailers of varying sizes. Additionally, the all encompassing community setup will ensure that the financial, social, and operational needs of both residents and retailers are met.

ADVERTISING

1. Billboards/signs

    a) Billboards will be located in train stations, airports, and expressways.
    b) Signs will be posted in local markets, local hotels, busses, trains, and taxis.

2. Television/Radio

    a) Commercials will be made and broadcasted on local and national television channels.
    b) Radios will be advertising the commercial and residential condominiums.

3. Internet

    a) The Vertical Farm website will be created with user-friendly options that allow the user to view and purchase produce directly.
    b) The website will provide information regarding tour information and tour rates for customers.
    c) The website will also provide information on parking location and sites. The location of the Vertical Farm will also be provided via Google Maps.

BUYERS AND SALES TEAM

1. Local grocery markets

    a) Local grocery markets will be the only targets of the vertical farm produce distribution. Out of state markets will not benefit from the vertical farm.
    b) Grocery markets such as the Jewel-Osco on Roosevelt, the Dominicks on Halsted and Roosevelt, Whole foods on Roosevelt, and the Chinatown market will be targeted. Through these the individual consumer will be targeted as well.

2. Hotels

    a) There are seventy-five hotels in a five-mile radius from the site.
    b) The Hotels that will be targeted are specifically the Chicago South Loop Hotel, Best Western Grant Park Hotel, Chicago Essex Inn, Hilton Chicago, Renaissance Black Stone Chicago Hotel, Travelodge Hotel Downtown Hotel, Hotel Blake, W Chicago, and the AAE Chicago Parthenon. These hotels are nearest to the site and are highly rated according to consumer review.

3. Restaurants

    a) Popular restaurants that require daily fresh produce will be targeted.
    b) Popular restaurants such as the Capital Grille, Morton's Steakhouse, Everest Restaurant, Les Nomades, and Charlie's Trotters will be targeted.

4. Individual consumers
    a) Individual customers who visit the grocery markets and the vertical farm website will be targeted. Essentially, the individual customers will be the ones consuming the product in the end, thus they are the main targets.

5. Sales (team)

    a) Sales teams will be hired to visit each restaurant, hotel, and market to advertise the vertical farm and its produce. With sales teams like these, the awareness of the vertical farm will be known quicker and each buyer will have a better understanding of the type of produce that is being sold.

Competitive Analysis

Competition for the occupation of our proposed site includes the new development on Roosevelt and residential and retail spaces in the South Loop. Ideally, with improved public transportation via CTA busing and an improved 27th Street Metra Electric stop, the development at this site will be more appealing to local residents that must currently travel to the Loop. Additionally, the pricing of the rental residences and retail spaces are competitive with such locations but in a much closer proximity to a large

population that must currently travel further for the same value. With the growth of this development, the financial appeal to both residents and retailers will only increase.

The vertical farm will be considered as a local Chicago land produce supplier. This implies that the competitors are crop and produce producers all around that globe that supply to the Chicago land area. There are three main benefits to the vertical farm that give it a competitive edge in the Chicago market. First, the food miles, as explained in the claim to fame portion, allows for cheap and effective local shipping of the product. Second, the ability for the vertical farm to produce year round in a controlled climate, which ultimately means there will be no production fluctuation, allowing for steady consistent production of even the typically offseason crops. Finally, the idea that this vertical farm could be the first of its kind will generate loads of interest in the success of our proposed community. This will cause tourism and retail and residential space occupation to rise greatly due the anticipation of this radically new concept.

Operational Procedures

SITE DEVELOPMENT

The large size of the site and subsequent size of the development lends itself well to a phased development. Phase 1 (the southern most region) will be composed of residential units in the form of row houses typical to those already found in Bronzeville, 5-8 story midrise apartment complexes, and 8-12 story condominium/apartment complexes, and a subsequent parking structure for off street residential parking and parking for Phase 2. Our proposed plan results in approximately 100 for purchase units, approximately 373 rental units, and approximately 500 parking spaces upon completion of Phase 1. Phase 2 (the middle region) will be composed of the Vertical Farm and various retail and entertainment spaces. These proposed commercial buildings result in 234,000 square feet of retail and entertainment space.

VERTICAL FARM

Our proposed vertical farm would employ a series of self contained, aeroponic propagation chambers for the acceleration of the growth process. These chambers use 70% less water and 40% less electricity than any variation of the traditional farming methods. Using these chambers for accelerated propagation and germination, we are able to facilitate a two stage growing procedure. The first stage is isolated in these aeroponic chambers, and consists of an accelerated process of germination and propagation of seeds and cloned cuttings, which are easily monitored by both computers and technicians. The second stage begins when the seedlings/cuttings reach their reproductive stage (an average of 15-20 days). The plants are then transplanted (aeroponic systems have a 99% transplant success rate) into our grow beds. Spaced for efficiency and ideal production rates, the plants continue accelerated development with solid state horticulture lights and LED’s, a rich soil/compost growth medium, and frequent monitoring by our staff of horticulturists and engineers.

Organic waste, as a byproduct of our agricultural venture, will be recycled into compost and redistributed into the grow beds as nutrient rich soil. Using IIT's campus as a model for organic waste production, it has been determined that an A700 Rocket Composter, macerator, and de-waterer (3 cubic yards a week capacity) is appropriate for the needs of our vertical farm and meets all composting standards set forth by the City of Chicago. The initial cost, including delivery and installation, was estimated at around $52,000 with a running cost of about $2/week. By recycling our organic waste rather than utilizing a waste delivery service, we can expect to save an average of $10,000 a year, recouping the cost of the in-vessel unit in just over five years.

The vertical farm, with City cooperation, will rely heavily on a liquid waste remediation system as an essential component of the building's infrastructure. Central to our planned development, the vertical farm will act as a buffer between the community and the City of Chicago's liquid waste disposal system. To accommodate the amount of black water, grey water, and solid organic waste produced by the vertical farm and the surrounding retail and residential community, several remediation strategies will be employed. Black water, defined as any raw, untreated sewage or water that has been contaminated with

animal, human, or food waste, requires an extensive treatment. Grey water, less volatile than black water, is generated from domestic activities such as laundry and bathing. By recycling the black water, grey water, and other organic wastes within our development for use in the vertical farm, we can effectively reduce both our water costs and our energy costs. To ensure optimal growing conditions and prevent the possibility of introducing water borne pathogens, black water and biodegradable organic solids are processed in a three-stage anaerobic reactor. As the mix is filtered and decomposed through the series of anaerobic digesters, it is separated into nutrient rich solids, that can then be incorporated with the materials run through the A700 Rocket composting system, a liquid component that continues through an aeration tank, reverse osmosis unit, and final water treatment to produce clean reusable water that will then be reintroduced into the buildings agricultural water supply, and as a third product of the remediation process, methane gas is converted into energy and heat by a turbine generator. The heat given off by converting methane gas to energy is directed back to the anaerobic digesters to facilitate the decomposition process, leaving the energy generated by the turbine to finish the process by then going through AC power converters and fed back into the buildings power supply. Grey water, not needing such a complex system for remediation, can be handled by an anaerobic-aerobic system. This system uses a three-stage septic tank for the removal of sludge and grease, followed by a sand-bed system to further filter the liquid waste. The nearly scrubbed grey water is then fed into the reverses osmosis unit, after which the product can be reused in the growth process. Water from evapotranspiration on the grow floor can be recaptured employing a brine cooled condensation/precipitation system, generating even more usable water.

Financial Plan

BUILDING COSTS ~ $261,098,000

The overall cost of construction will be dictated by the costs of the raw materials which include actual the actual buildings and the necessary site work, and the labor costs which include paying for the company that is contracted to build the vertical farm. The companies can include but are not limited to construction, electrical installation, pluming, inspection, etc. The amount of time it takes to complete the construction will play a major role in the cost/income of the vertical farm and auxiliary residential and commercial units.

OPERATING COST ~ $11,680,800 / Year 1

1. Vertical Farm Workers
    a) Our Marketing Team will employ one receptionist at around $29,000/year, and 2 marketing associates at $27,000/year.
    b) Our Business/Accounting team will employ one receptionist at $29,000/year, one bookkeeper accountant at $42,000/year, and one assistant accountant at $28,000/year.
    c) The main vertical farm grow team will consist of 4-5 agricultural/biological/chemical engineers at $50-55,000/year each, three teams of two horticulturists at $21,000/year and three agricultural laborers at 20,000/year to monitor, harvest, and control crop production. This work force will be supplemented by a health supply of local volunteers through vertical farm community outreach programs and a partnered initiative with local schools to reeducate urban youths on best growing practices (Milwaukee's Will Allen of Growing Power is a solid model for these programs).
    d) The Shipping/Receiving team needs to employ at least one shipping supervisor at 40,000/year, one forklift/warehouse worker at 30,000/year, and three or four packaging/warehouse workers at around 24,000/year. It is our intension to outsource delivery/vehicle drivers to one of the many local companies.
    e) The Security force will need at least two revolving armed security officers at $32,000/year, two revolving unarmed security officers at $25,000/year, and one warehouse security guard at $40,000/year.
    f) The Human Resources office will employ one tour guide/HR associate at $38,000/year, one HR coordinator at $39,000/year, one HR assistant/Shift manager at $36,000/year, and one HR Manager at $60,000/year.

g) Management consists of at least one receptionist at $24-26,000/year, one general manager at $50,000/year, one system administrator at $55,000/year, and one operations supervisor at $38,000/year.
h) Our on-site restaurant employs two restaurant chefs at $40,000/year, four kitchen assistants at $22,000/year, four revolving waiters at $18,000/year, and two busboys at $17,000/year.
i) The Grocery located on site will be maintained by a team of one retail store manager at $40,000/year, six revolving cashiers at $19,000/year, and six revolving product stockers at $20,000/year.
j) The maintenance of the buildings landscape and building exterior is handled by one crew leader at $27,000/year, and two grounds man at $22,000/year.
k) The maintenance of the building itself is handled by one grounds maintenance supervisor/ building engineer at $48,000/year, one carpenter/maintenance handyman at $40,000/year, four daytime janitorial/general maintenance workers at $22,000/year, and two night shift janitor/system monitors at $22,000/year.

2. Stabilized Operating Expenses

a) The stabilized operating expenses of the retail spaces are estimated at 50% of the income, or $12.50 per square foot of rentable space. This covers utilities, maintenance, etc.
b) The stabilized operating expenses of the residential units are estimated at 33% of the income, or $4,000 per unit. This covers utilities, maintenance, etc.
c) The stabilized operating expenses of the parking garage is estimated at 40% of the income, or $1,200 per space. This covers utilities, maintenance, etc.

3. Real Estate Taxes

a) The real estate taxes for the entertainment, retail, and apartment components of the proposed development were estimated to be 33% of revenues.
b) The real estate taxes for the vertical farm component of the proposed development were estimated to be 0% because of the availability of government subsidies and other tax breaks.

INSURANCES

1. Fleet Insurance

a) This covers any trucks or vehicles used to move the product to local grocers/restaurants or for any other business purposes. It also includes accident and maintenance coverage for any vehicles.

2. 2. Health/Dental

a) This will cover all employees of the vertical farm business, including the immediate family members of employees. Costs will depend on the individual's criterion which includes things like age, smoker/non-smoker, pre existing conditions, etc.

3. Liability/ Product Liability

a) This will cover our product as it is grown, shipped and consumed, and any problems that may occur in any one of the previous mentioned phases. This will also include any product equipment.
b) Also protects workers from injury on the job and any tourists or public that could have potential accidents on site. This will also include the community surrounding the vertical farm if something were to go wrong that affected it.

4. Workers Compensation

    a) Covers injured, chronically ill, or pregnant employees as they are on extended leave from work. This allows for paid absences due to the conditions previous mentioned.

5. Risk Managements/Disaster Plans

    a) The vertical farm and surrounding buildings in the development must be on par with all city codes. This is so that in the case of natural disasters such as fires or flooding no law suits will come about. Other risk managements include prevention of potential robbery and promoting and maintaining a clean and healthy work environment.

The ultimate annual cost of upkeep and operation for the vertical farm and any other expenses is estimated at 22% (~$3.3M) of the venture's annual revenue. This figure is based on general upkeep and operations practices of other indoor agricultural ventures and our inclusion of certain sustainable technologies.

REVENUES

Vertical Farm Crop Production ~ $9,500,000 / year 1

The vertical farm will produce a variety of crops which in clued but are not limited to tomatoes, strawberries, bell peppers, spinach, grapes, broccoli, romaine lettuce, carrots, celery, basil, and oregano. This could change over time as new crops may be experimented with. However, the basis of our revenue research contains analysis on only the previously mentioned crops. The overall revenue is based on 5000 square feet of grow space.

Tourism/Rental Space for Grocery Store and Restaurant ~ $ 5,500,000 / year 1

The vertical farm will generate a buzz around Chicago, the country and hopefully the world. This attention will draw in tourism that will eventually become a large part of the annual revenue. Along with tourism the vertical farm will contain space for the rental of a grocery store and a top floor restaurant. These spaces will be rented one a yearly basis providing the final portion of the annual revenue for the vertical farm.

In Line Retail, Big Box Retail, and Entertainment ~ $ 8,116,086 / year 1

The revenues of these three components are based on the square footage of product proposed, the rental of $25.00/S.F/Year, and the stabilized occupancy rate of 80%.

Parking ~ $ 1,669,248 / year 1

The revenue of the parking component is based on the number of off street parking spaces available mandated by city zoning laws and the estimated price of $3000/year/space, which is slightly higher than $8.00/space/day.

Apartments ~ $ 5,448,784 / year 1

The total revenue of all of the rentable space available is based on the number of units, assuming an average square footage of 1000 square feet and an average rental rate of $12,000/unit/year.

Conclusion

Our business plan will create a focal point for the Southside community. As the city has demonstrated in years past, they are pushing the development of high income commercial spaces to Southside locations. For example, the newly added commercial space on Roosevelt by UIC. It is only

logical that the next large development will be 31st St. given the combined attraction of the Chicago White Sox stadium and IIT along with available space and access to a beach and Lake Shore Drive.

With the Green movement and push for LEED efficient buildings, our Vertical Farm will serve as a constant reminder that we need to conserve. Renewable technology results in minimal costs, generating profits in an efficient manner. There is funding available through several markets from entities that have proven financial commitments to similar projects such as food production companies, venture capital and philanthropists, as well as government and university agencies making vertical farming a profitable and economically viable venture.

The proposed Michael Reese site development described above, including the Vertical Farm, residential, retail, entertainment, and parking components is an extremely lucrative venture, with an estimated annual return to the investor of 23.4% after debt service for a 30 year hold. Though this proposed development requires large initial capital, this venture is anticipated to develop much excitement as a sustainable, groundbreaking, and lucrative location for Chicago.

Finally, the Vertical Farm will be a statement for the City of Chicago. It demonstrates that Chicago recognizes the environmental problems that we as a nation have been dealing with, Chicago recognizes the need for improvement today, Chicago recognizes what we are facing in the future, and Chicago is doing something about it.

Appendices

APPENDIX 1: 2000 Census Data

US Census 2000 Employment Summary

FreeDemographics™ A Product of SRC

Geography: 60616 Chicago

2000 Occupation & Employment		
Not in Labor Force	14,858	39.3%
In Labor Force	22,957	60.7%
Employed	19,377	84.4%
Unemployed	3,565	15.5%
In Armed Forces	15	0.1%

Means of Transportation to Work	
Workers Age 16+	19,392
Bicycle	0.4%
Bus or trolley bus	19.1%
Carpooled	19.7%
Drove alone	43.0%
Ferryboat	0.0%
Motorcycle	0.1%
Other means	0.6%
Railroad	0.5%
Streetcar or trolley car	0.3%
Subway or elevated	4.3%
Taxicab	0.2%
Walked	9.9%
Worked at home	1.9%

Travel Time to Work	
Median Travel Time To Work in Minutes	27
Less than 5	2.7%
5 to 9	6.6%
10 to 14	11.1%
15 to 19	12.3%
20 to 24	14.2%
25 to 29	5.1%
30 to 34	18.8%
35 to 39	2.9%
40 to 44	3.5%
45 to 59	9.7%
60 to 89	7.3%
90 or more	4.0%
Worked at home	1.9%

Employment by Occupation: Sorted Descending By Percent	
Aircraft and traffic control occupations	0.0%
Architects surveyors cartographers and engineers	1.3%
Accommodation and food services	13.7%
Administrative and support and waste management services	3.4%
Agriculture forestry fishing and hunting	0.1%
Arts entertainment and recreation	1.7%
Arts design entertainment sports and media occupations	2.4%
Building and grounds cleaning and maintenance occs	2.5%
Business operations specialists	2.7%
Community and social services occupations	1.8%
Computer and mathematical occupations	3.5%
Construction trades workers	2.6%
Drafters engineering and mapping technicians	0.5%
Education training and library occupations	5.1%

Employment by Industry: Sorted Descending By Percent	
Construction	3.2%
Educational services	9.3%
Finance and insurance	6.5%
Health care and social assistance	9.5%
Information	3.2%
Management of companies and enterprises	0.1%
Manufacturing	10.9%
Mining	0.1%
Other services (except public admin)	5.0%
Professional scientific and technical services	7.8%
Public administration	6.1%
Real estate and rental and leasing	2.1%
Retail trade	8.2%
Transportation and warehousing	5.8%

Extraction workers	0.0%	Utilities	1.0%
Farmers and farm managers	0.1%	Wholesale trade	2.3%
Farming fishing and forestry occupations	0.1%		
Financial specialists	2.7%		
Fire fighting and law enforcement incl supervisors	1.8%		
Food preparation and serving related occupations	10.2%		
Health diag and treating practitioners and technical occs	3.5%		
Health technologists and technicians	0.9%		
Healthcare support occupations	1.6%		
Installation maintenance and repair occupations	2.1%		
Legal occupations	1.4%		
Life physical and social science occupations	1.5%		
Management occupations except farmers and farm managers	8.4%		
Material moving workers	2.3%		
Motor vehicle operators	2.7%		
Office and administrative support occupations	17.0%		
Other protective service workers including supervisors	1.4%		
Personal care and service occupations	2.3%		
Production occupations	6.9%		
Rail water and other transportation occupations	0.4%		
Sales and related occupations	9.9%		
Supervisors construction and extraction workers	0.4%		
Supervisors transportation and material moving workers	0.1%		

If you are looking for more current demographic data, DemographicsNow provides quarterly population estimates, current year estimates and 5 year population projections. Go to www.demographicsnow.com.

US Census 2000 Housing Detail Summary

FreeDemographics™
A Product of SRC

Geography: 60616 Chicago

Population & Household Summary	
Family Population	33,329
Group Quarters Population	2,830
Households	19,162
Non Family Households	9,081
Non-Family Population	4,019
Population	46,858

Household Population Summary	
Household Population	44,028
Family Population	33,329
Householders in Family Population	10,081
% Male Householders	58.8%
% Female Householders	41.4%
Spouses of Hhldr	6,076
Children of Hhldr	12,528
% Natural-born or Adopted	98.3%
% Stepchildren	1.7%
Grandchildren of Hhldr	984
Siblings of Hhldr	897
Parent of Hhldr	830
Other Relatives of Hhldr	1,173
Non-Relatives of Hhldr	741
Non-Family Population	10,699
Male Hhldrs in Non-Family Population	4,019
% Living Alone	83.2%
% Not Living Alone	16.8%
Female Hhldrs in Non-Family Population	5,124
% Living Alone	90.1%
% Not Living Alone	9.9%
Non-Relatives in Non-Family Population	1,556

Household Summary	
Family Households	10,081
Married Couple	6,067
% With Own Children < 18	44.6%
% Without Own Children < 18	55.4%
Female Hhldr, No Husband Present	3,197
% With Own Children < 18	54.1%
% Without Own Children < 18	45.9%
Male Hhldr, no wife present	816
% With Own Children < 18	34.9%
% Without Own Children < 18	65.1%
Nonfamily Households	9,081

Household Income	
Average Household Income	$43,287
Median Household Income	$31,316
Per Capita Income	$17,701

Household Income	
$ 0 - $9,999	22.9%
$ 10,000 - $14,999	7.5%
$ 15,000 - $19,999	6.3%
$ 20,000 - $24,999	6.3%
$ 25,000 - $29,999	5.5%
$ 30,000 - $34,999	6.1%
$ 35,000 - $39,999	5.4%
$ 40,000 - $44,999	5.4%
$ 45,000 - $49,999	3.4%
$ 50,000 - $59,999	7.6%
$ 60,000 - $74,999	8.6%
$ 75,000 - $99,999	6.9%
$100,000 - $124,999	3.5%
$125,000 - $149,999	2.0%
$150,000 - $199,999	1.2%
$200,000 +	1.5%

Household Size	
1 Person Households	41.2%
Person Female Householder	58.0%
Person Male Householder	42.0%
2 Person Households	25.2%
3 Person Households	14.0%
4 person Households	10.6%
5 Person Households	5.1%
6 Person Households	2.7%
7+ Person Households	1.6%

If you are looking for more current demographic data, DemographicsNow provides quarterly population estimates, current year estimates and 5 year population projections. Go to www.demographicsnow.com.

US Census 2000 Housing Value Summary

FreeDemographics™
A Product of SRDC

Geography: 60616 Chicago

Housing Units 2000	
Housing Units	21,971
Owner-Occupied	23.6%
Renter-Occupied	63.6%
Vacant	12.8%
Vacant Housing Units	
For Migrant Workers	0.0%
For Rent	45.9%
For Sale Only	6.4%
For Seasonal, Recreation or Occasional	2.4%
Other	33.3%
Rented or Sold, Not Occupied	12.0%
Year Moved In	
1969 or earlier	9.0%
1970 to 1979	7.2%
1980 to 1989	14.7%
1990 to 1994	15.3%
1995 to 1998	32.8%
1999 to March 2000	21.0%
Housing Value: Owner Occupied	
$ 0 to $10,000	0.9%
$ 10,000 to $14,999	1.5%
$ 15,000 to $19,999	1.6%
$ 20,000 to $24,999	0.4%
$ 25,000 to $29,999	0.0%
$ 30,000 to $34,999	0.0%
$ 35,000 to $39,999	0.0%
$ 40,000 to $49,999	1.5%
$ 50,000 to $59,999	0.8%
$ 60,000 to $69,999	1.4%
$ 70,000 to $79,999	2.5%
$ 80,000 to $89,999	3.6%
$ 90,000 to $99,999	3.2%
$ 100,000 to $114,999	12.5%
$ 115,000 to $149,999	12.3%
$ 150,000 to $174,999	14.4%
$ 175,000 to $199,999	10.3%
$ 200,000 to $249,999	14.6%
$ 250,000 to $299,999	10.1%
$ 300,000 to $399,999	5.7%
$ 400,000 to $499,999	1.2%
$ 500,000 to $749,999	1.2%
$ 750,000 to $999,999	0.1%

Year Structure Built	
Built 1939 or earlier	31.2%
Built 1940 to 1949	8.5%
Built 1950 to 1959	17.2%
Built 1960 to 1969	17.4%
Built 1970 to 1979	10.9%
Built 1980 to 1989	4.7%
Built 1990 to 1994	3.0%
Built 1995 to 1998	4.8%
Built 1999 to March 2000	2.3%
Units in Structure	
1 - Attached Unit	6.0%
1 - Detached Unit	8.1%
2 Units	14.2%
3 - 4 Units	13.0%
5 - 9 Units	7.4%
10 - 19 Units	3.5%
20 - 49 Units	7.2%
50 or more Units	40.4%
Boat, RV, Van, etc	0.0%
Mobile Home/Trailer	0.0%
Rent: Cash Rent	
$ 0 to $100	5.6%
$ 100 to $149	9.8%
$ 150 to $199	4.3%
$ 200 to $249	3.0%
$ 250 to $299	4.4%
$ 300 to $349	3.4%
$ 350 to $399	5.3%
$ 400 to $449	8.2%
$ 450 to $499	3.4%
$ 500 to $549	9.1%
$ 550 to $599	6.0%
$ 600 to $649	4.9%
$ 650 to $699	5.9%
$ 700 to $749	7.7%
$ 750 to $799	2.7%
$ 800 to $899	5.4%
$ 900 to $999	3.9%
$1,000 to $1,249	3.6%
$1,250 to $1,499	0.7%
$1,500 to $1,999	0.3%
$2,000 or more	0.0%
No Cash Rent	2.3%
Total Rental Units	13,969

US Census 2000 Overview Summary

FreeDemographics™
A Product of SRC

Geography: 60616 Chicago

Population Summary	
Total Population	46,858
Female Population	52.2%
Male Population	47.8%
Race & Ethnicity	
American Indian, Eskimo, Aleut	0.4%
Asian	29.5%
Black	37.2%
Native Hawaiian/Other Pacific Islander	0.1%
White	26.7%
Other	4.4%
Two or More Races	1.7%
Hispanic Ethnicity	9.7%
Not Hispanic or Latino	90.4%
Educational Attainment	
Nursery School - 8	11.7%
9th to 12th grade, no diploma	16.8%
High School Graduate	21.4%
Associates Degree	4.2%
Some College, No Degree	17.8%
Bachelor's Degree	14.0%
Graduate Degree	10.7%
No Schooling	3.4%
Age: Total	
Age 0 - 4	6.3%
Age 5 - 9	6.5%
Age 10 - 13	4.5%
Age 14 - 17	3.9%
Age 18 - 20	5.5%
Age 21 - 24	6.9%
Age 25 - 29	9.3%
Age 30 - 34	8.5%
Age 35 - 39	7.8%
Age 40 - 44	7.1%
Age 45 - 49	6.4%
Age 50 - 54	5.4%
Age 55 - 59	4.0%
Age 60 - 64	3.8%
Age 65 - 69	3.8%
Age 70 - 74	3.8%
Age 75 - 79	2.8%
Age 80 - 84	1.9%
Age 85+	1.8%

Household Summary	
Total Households	19,162
Median Household Income	$31,316
Average Household Income	$43,287
Per Capita Income	$17,701
Median Housing Value	$172,852
Avg Monthly Contract Rent	$491
Income by Type: Household Income	
$ 0 - $9,999	22.9%
$ 10,000 - $14,999	7.5%
$ 15,000 - $19,999	6.3%
$ 20,000 - $24,999	6.3%
$ 25,000 - $29,999	5.5%
$ 30,000 - $34,999	6.1%
$ 35,000 to $39,999	5.4%
$ 40,000 to $44,999	5.4%
$ 45,000 to $49,999	3.4%
$ 50,000 - $59,999	7.6%
$ 60,000 - $74,999	8.6%
$ 75,000 - $99,999	6.9%
$100,000 - $124,999	3.5%
$125,000 - $149,999	2.0%
$150,000 - $199,999	1.2%
$200,000 +	1.5%
Size of Household	
1 Person Households	41.1%
2 Person Households	25.2%
3 Person Households	14.0%
4 Person Households	10.6%
5 Person Households	5.1%
6 Person Households	2.7%
7+ Persons	1.6%
Year Moved In	
1969 or earlier	9.0%
1970 to 1979	7.2%
1980 to 1989	14.7%
1990 to 1994	15.3%
1995 to 1998	32.8%
1999 to March 2000	21.0%
Housing Stability (5 Year)	48.5%

APPENDIX 2: Vertical Farm Produce Revenues

sf	**Production net profits first year**	*	ROI (days)	equivalence (5000 sf)
8000	Tomatoes	$ 699,896	45	$437,435
4000	Strawberries	$ 476,408	132	$595,510
3200	Bellpeppers	$ 492,536	83	$769,588
1600	Spinach	$ 557,496	75	$1,742,175
3000	Grapes	$ 9,280	795	$15,467
8000	Brocoli	$ 142,776	190	$89,235
1200	Romaine lettuce	$ 123,896	212	$516,233
800	Carrots	$ 21,496	212	$134,350
2800	Celery	$ 36,856	326	$65,814
800	Basil	$ 487,416	109	$3,046,350
800	Oregano	$ 306,936	167	$1,918,350
	Total Net Profits	**$ 3,354,992**		**$9,330,507**

*figures are based on one set of ten growing chambers for each product.

APPENDIX 3: Development Portfolio Summary

Portfolio-Level Projections

Total Development Financial Impact	Total SF or Units Developed	Total Project Costs	Construction Year Developer Capital Contribution 2011	Operational Year 1 Yr 1 2012	Yr 2 2013	Yr 3 2014	Yr 4 2015	Yr 5 2016
Entertainment Capital Costs	24,639	$7,335,220	($2,567,327)					
Entertainment Cash Flow				($6,019)	$23,363	$54,529	$87,576	$122,608
Entertainment Property Sale Yr 31								
In-Line Retail Capital Costs	153,747	$23,805,905	($8,332,067)					
In-Line Retail Cash Flow				$1,113,035	$1,296,379	$1,490,850	$1,697,063	$1,915,667
In-Line Retail Property Sale Yr 31								
Big-Box Capital Costs	43,365	$6,714,557	($2,350,095)					
Big-Box Cash Flow				$313,936	$365,649	$420,500	$478,664	$540,322
Big-Box Property Sale Yr 31								
Vertical Farm Capital Costs	188,373	$39,669,475	($13,884,316)					
Vertical Farm Flow				$8,181,734	$8,761,590	$9,372,445	$10,015,909	$10,693,674
Vertical Farm Property Sale Yr 31								
Parking Capital Costs	504	$27,599,977	($9,659,992)					
Parking Cash Flow				($381,271)	($315,952)	($247,005)	($174,237)	($97,445)
Parking Property Sale Yr 31								
Apartment Capital Costs	373	$73,972,301	($25,890,305)					
Apartment Cash Flow				($850,471)	($650,767)	($439,623)	($216,423)	$19,480
Apartment Property Sale Yr 31								
Total Development Costs		$261,097,435						
Cumulative Financial Impact			($91,384,102)	**$8,370,946**	**$9,480,262**	**$10,651,696**	**$11,888,551**	**$13,194,306**
Total Annual Cash Flow			($62,684,102)	$8,370,946	$9,480,262	$10,651,696	$11,888,551	$13,194,306
Terminal Value (Yr 31)								
Total NPV of Development (Assuming 30 year hold)			**$172,277,034**					

30-year hold: Portfolio							
Sale in year 31:		$15,623,517,914					
Loan Payoff:		$0					
Cash Flows:	($91,384,102)	$8,370,946	$9,480,262	$10,651,696	$11,888,551	$13,194,306	
Developer Annual Return on Investment:		23.40%					
10-year hold: Portfolio							
Sale in year 11:		$416,610,153					
Loan Payoff		($144,889,959)					
Cash Flows:	($91,384,102)	$8,370,946	$9,480,262	$10,651,696	$11,888,551	$13,194,306	
Developer Annual Return on Investment:		20.89%					
5-year hold: Portfolio							
Sale in year 6:		$312,937,133					
Loan Payoff		($159,381,245)					
Cash Flows:	($91,384,102)	$8,370,946	$9,480,262	$10,651,696	$11,888,551	$166,750,194	
Developer Annual Return on Investment:		20.33%					

Portfolio-Level Projections

l Analysis		Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15	Yr 16	Yr 17	TOTAL
		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Total Development Financial Impact														
	Entertainment Capital Costs Entertainment Cash Flow Entertainment Property Sale Yr 31	$135,097	$173,695	$214,603	$257,946	$303,858	$352,480	$403,959	$458,452	$516,122	$577,142	$641,692	$709,965	
	In-Line Retail Capital Costs In-Line Retail Cash Flow In-Line Retail Property Sale Yr 31	$2,047,407	$2,289,875	$2,546,799	$2,818,971	$3,107,227	$3,412,444	$3,735,547	$4,077,509	$4,439,354	$4,822,161	$5,227,062	$5,655,252	
	Big-Box Capital Costs Big-Box Cash Flow Big-Box Property Sale Yr 31	$577,480	$645,869	$718,335	$795,103	$876,407	$962,494	$1,053,627	$1,150,079	$1,252,139	$1,360,111	$1,474,315	$1,595,088	
	Vertical Farm Capital Costs Vertical Farm Flow Vertical Farm Property Sale Yr 31	$11,407,520	$12,159,316	$12,951,028	$13,784,721	$14,662,565	$15,586,843	$16,559,953	$17,584,415	$18,662,876	$19,798,121	$20,993,074	$22,250,810	
	Parking Capital Costs Parking Cash Flow Parking Property Sale Yr 31	($16,417)	$69,070	$159,253	$254,378	$354,706	$460,510	$572,077	$689,711	$813,728	$944,464	$1,082,269	$1,227,514	
	Apartment Capital Costs Apartment Cash Flow Apartment Property Sale Yr 31	$1,349,791	$1,645,611	$1,957,259	$2,285,560	$2,631,376	$2,995,617	$3,379,238	$3,783,243	$4,208,687	$4,656,681	$5,128,388	$5,625,035	
	Total Development Costs													
	Cumulative Financial Impact	**$15,500,877**	**$16,983,436**	**$18,547,277**	**$20,196,678**	**$21,936,138**	**$23,770,388**	**$25,704,401**	**$27,743,408**	**$29,892,907**	**$32,158,679**	**$34,546,801**	**$37,063,663**	
	Total Annual Cash Flow	$15,500,877	$16,983,436	$18,547,277	$20,196,678	$21,936,138	$23,770,388	$25,704,401	$27,743,408	$29,892,907	$32,158,679	$34,546,801	$37,063,663	
	Terminal Value (Yr 31)													
	Total NPV of Development (Assumir													

30-year hold: Portfolio

$15,500,877	**$16,983,436**	**$18,547,277**	**$20,196,678**	**$21,936,138**	**$23,770,388**	**$25,704,401**	**$27,743,408**	**$29,892,907**	**$32,158,679**	**$34,546,801**	**$37,063,663**	

10-year hold: Portfolio

$15,500,877	**$16,983,436**	**$18,547,277**	**$20,196,678**	**$293,656,332**								

Portfolio-Level Projections

JLL CUICAR Financial Analysis	Yr 18	Yr 19	Yr 20	Yr 21	Yr 22	Yr 23	Yr 24	Yr 25	Yr 26	Yr 27	Yr 28	Yr 29	TOTAL Proforma2 Yr 30	With VF-2-1 Yr 31
	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2041
Total Development Financial Impact														
Entertainment Capital Costs														
Entertainment Cash Flow	$782,161	$858,491	$939,177	$1,024,455	$1,114,570	$1,209,780	$1,310,360	$1,416,595	$1,528,786	$1,647,252	$1,772,326	$1,904,358	$2,043,718	
Entertainment Property Sale Yr 31														$32,832,627
In-Line Retail Capital Costs														
In-Line Retail Cash Flow	$6,107,986	$6,586,585	$7,092,439	$7,627,012	$8,191,841	$8,788,546	$9,418,829	$10,084,481	$10,787,387	$11,529,528	$12,312,988	$13,139,961	$14,012,752	
In-Line Retail Property Sale Yr 31														$204,875,110
Big-Box Capital Costs														
Big-Box Cash Flow	$1,722,783	$1,857,774	$2,000,453	$2,151,231	$2,310,544	$2,478,847	$2,656,621	$2,844,371	$3,042,629	$3,251,953	$3,472,931	$3,706,182	$3,952,357	
Big-Box Property Sale Yr 31														$57,785,903
Vertical Farm Capital Costs														
Vertical Farm Flow	$23,574,557	$24,967,712	$26,433,840	$27,976,690	$29,600,200	$31,308,509	$33,105,965	$34,997,139	$36,986,830	$39,080,084	$41,282,202	$43,596,752	$46,035,585	
Vertical Farm Property Sale Yr 31														$633,459,792
Parking Capital Costs														
Parking Cash Flow	$1,380,586	$1,541,894	$1,711,867	$1,890,957	$2,079,637	$2,278,407	$2,487,791	$2,708,339	$2,940,630	$3,185,274	$3,442,910	$3,714,210	$3,999,881	
Parking Property Sale Yr 31														$71,829,817
Apartment Capital Costs														
Apartment Cash Flow	$6,147,909	$6,698,363	$7,277,820	$7,887,773	$8,529,794	$9,205,532	$9,916,723	$10,665,189	$11,452,845	$12,281,703	$13,153,879	$14,071,594	$15,037,183	
Apartment Property Sale Yr 31														$249,098,186
Total Development Costs														
Cumulative Financial Impact	**$39,715,982**	**$42,510,819**	**$45,455,596**	**$48,558,118**	**$51,826,586**	**$55,269,622**	**$58,896,289**	**$62,716,114**	**$66,739,107**	**$70,975,795**	**$75,437,236**	**$80,135,057**	**$85,081,476**	
Total Annual Cash Flow	$39,715,982	$42,510,819	$45,455,596	$48,558,118	$51,826,586	$55,269,622	$58,896,289	$62,716,114	$66,739,107	$70,975,795	$75,437,236	$80,135,057	$85,081,476	
Terminal Value (Yr 31)													Terminal Value	$1,249,881,433
Total NPV of Development (Assumin														

30-year hold: Portfolio														
	$39,715,982	$42,510,819	$45,455,596	$48,558,118	$51,826,586	$55,269,622	$58,896,289	$62,716,114	$66,739,107	$70,975,795	$75,437,236	$80,135,057	$15,706,599,390	