



Jim Garzon
Final Proposal
Construction Project Management
Apartment Complex
Anytown, USA

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A Executive Summary

The PACE roundtable discussion, as well as my research on the topics discussed at this meeting have narrowed my options for my proposal. After identifying many problems that my project had, I decided to research four specific topics for my final proposal. Prefabrication, changing the material for the interior framing, changing the exterior wall, and workforce development, are the three topics I plan to research. I narrowed my options to these four topics because I believe that those topics have the most potential to improve the project. I plan to study these four topics in more depth to determine which of them I will peruse on the spring semester as my final thesis proposal.

This document is intended to outline the issues I plan to research during the spring semester. Moreover, this report shows the steps that I plan to follow in order to conduct my research on each topic. Each analysis will contain several elements. A background of the problem, a problem statement, proposed solutions, methods to be used for each solution, task and tools to be used in each solution, and concluding remarks will be done for each of the proposed analysis.

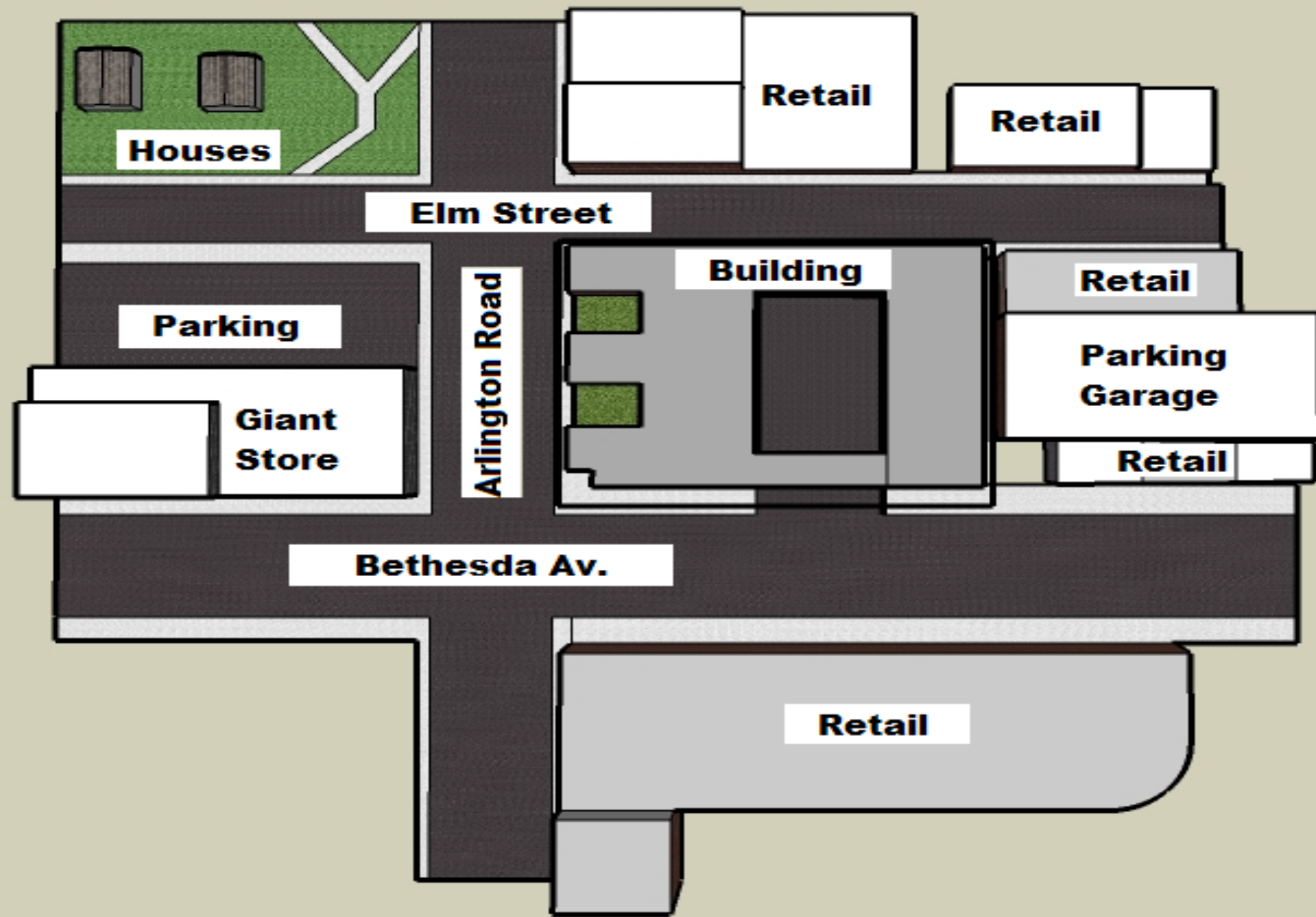
One topic that was really interesting to me at the PACE roundtable was the workforce development. After a while, the discussion on workforce development took many different paths. One of them was the fact that most of the workers are Spanish speakers. On my few years of experience on the construction industry I have notice that the language barrier has become a problem. Therefore In this report contains a plan to research this topic as well.

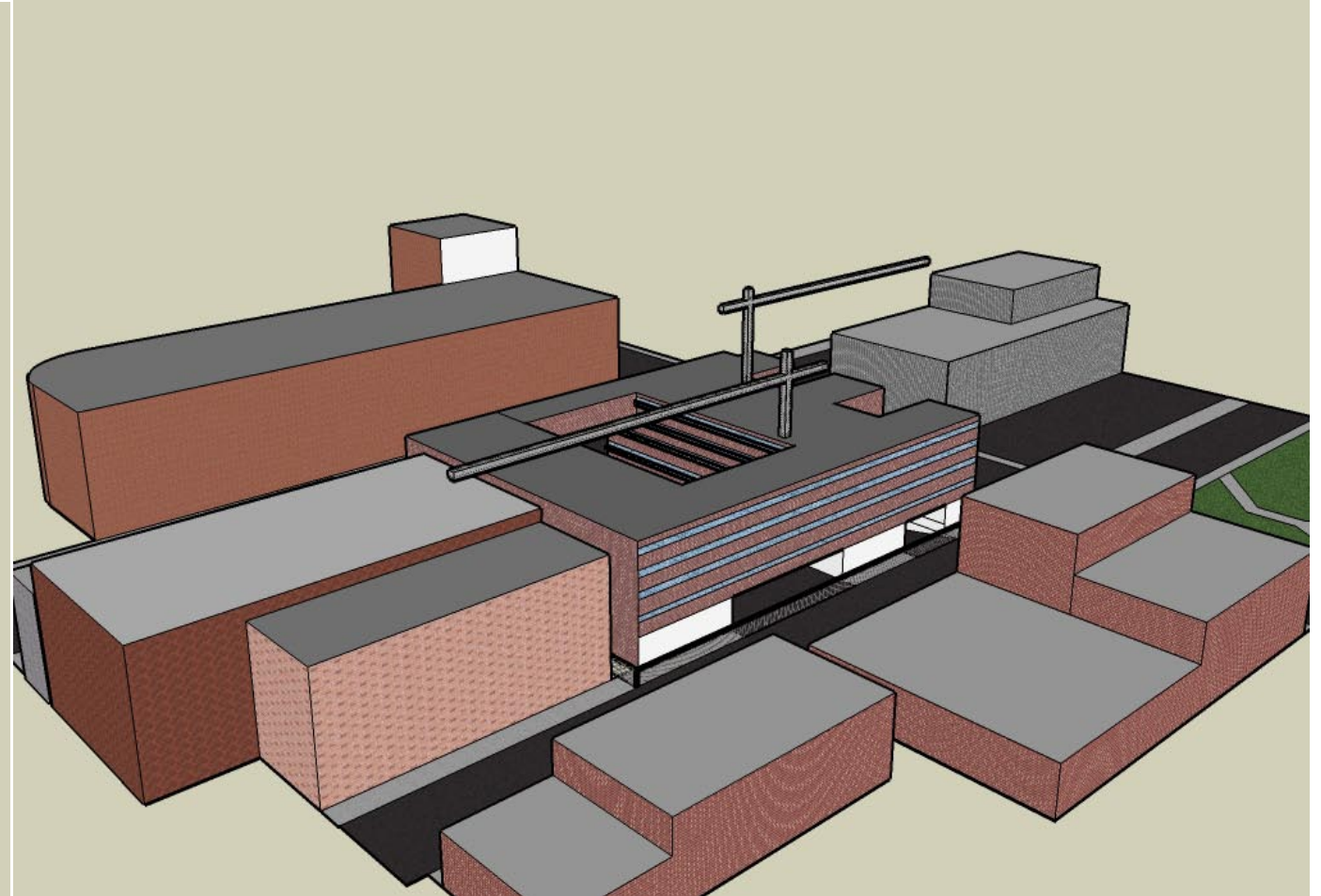
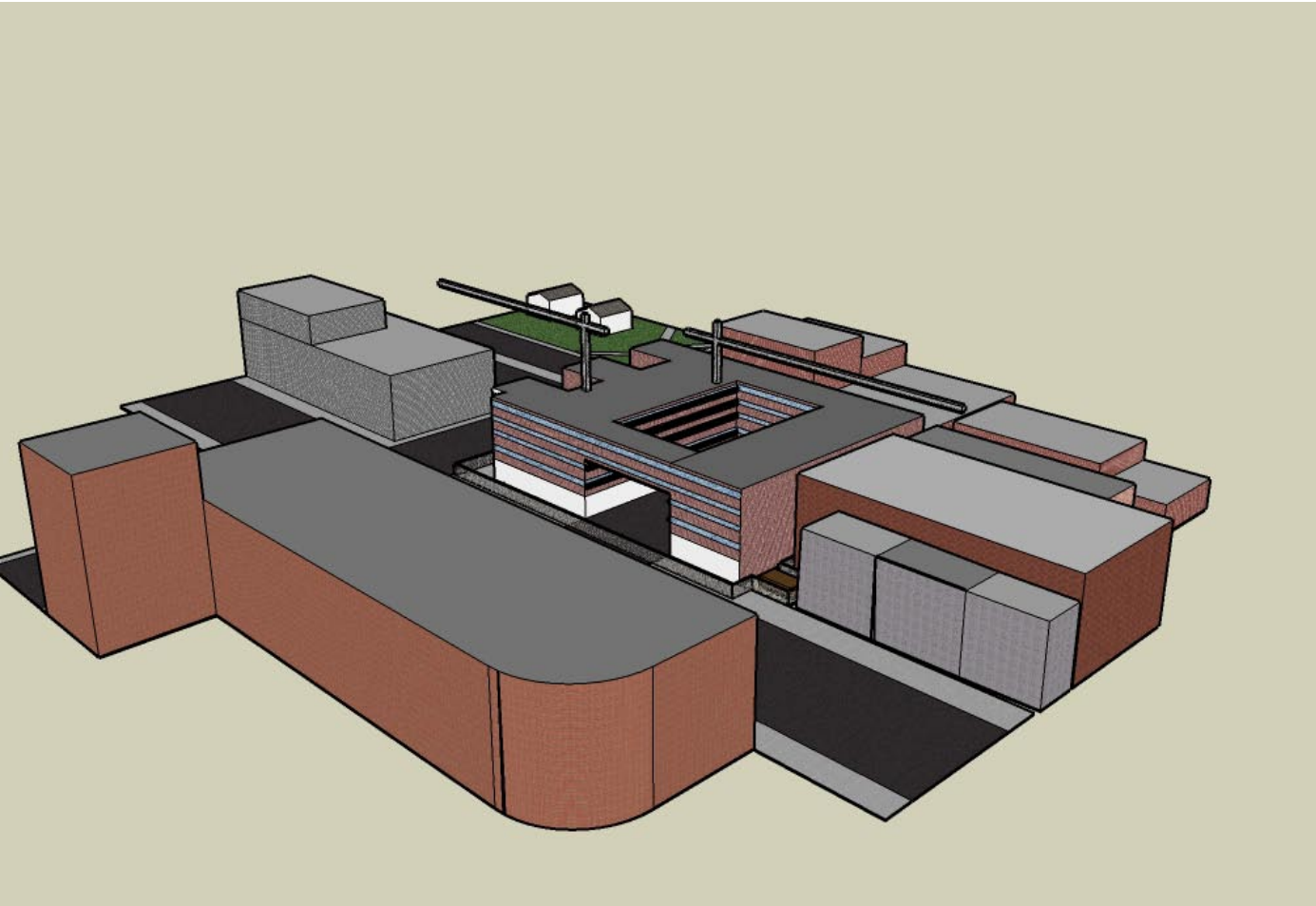
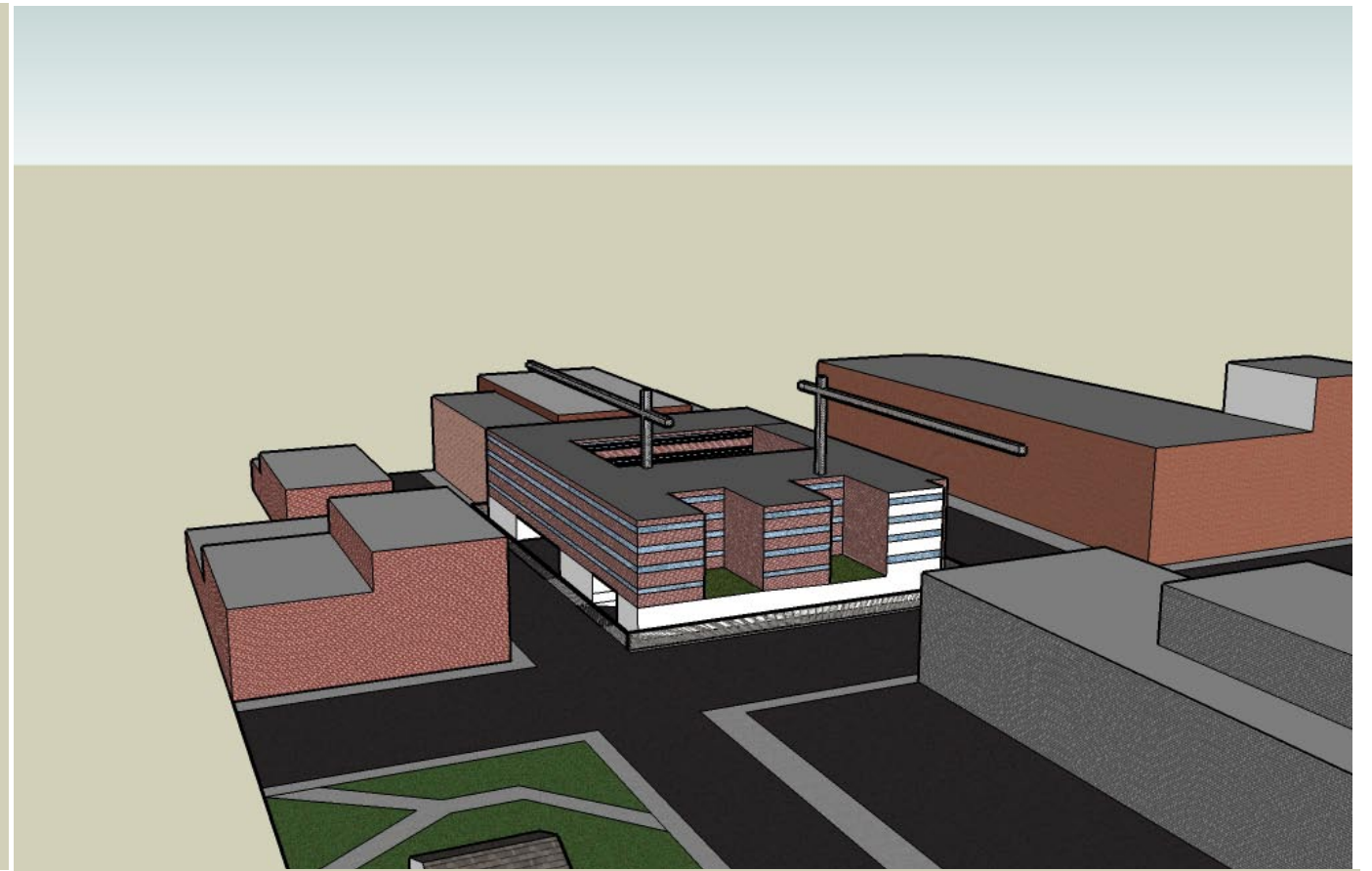
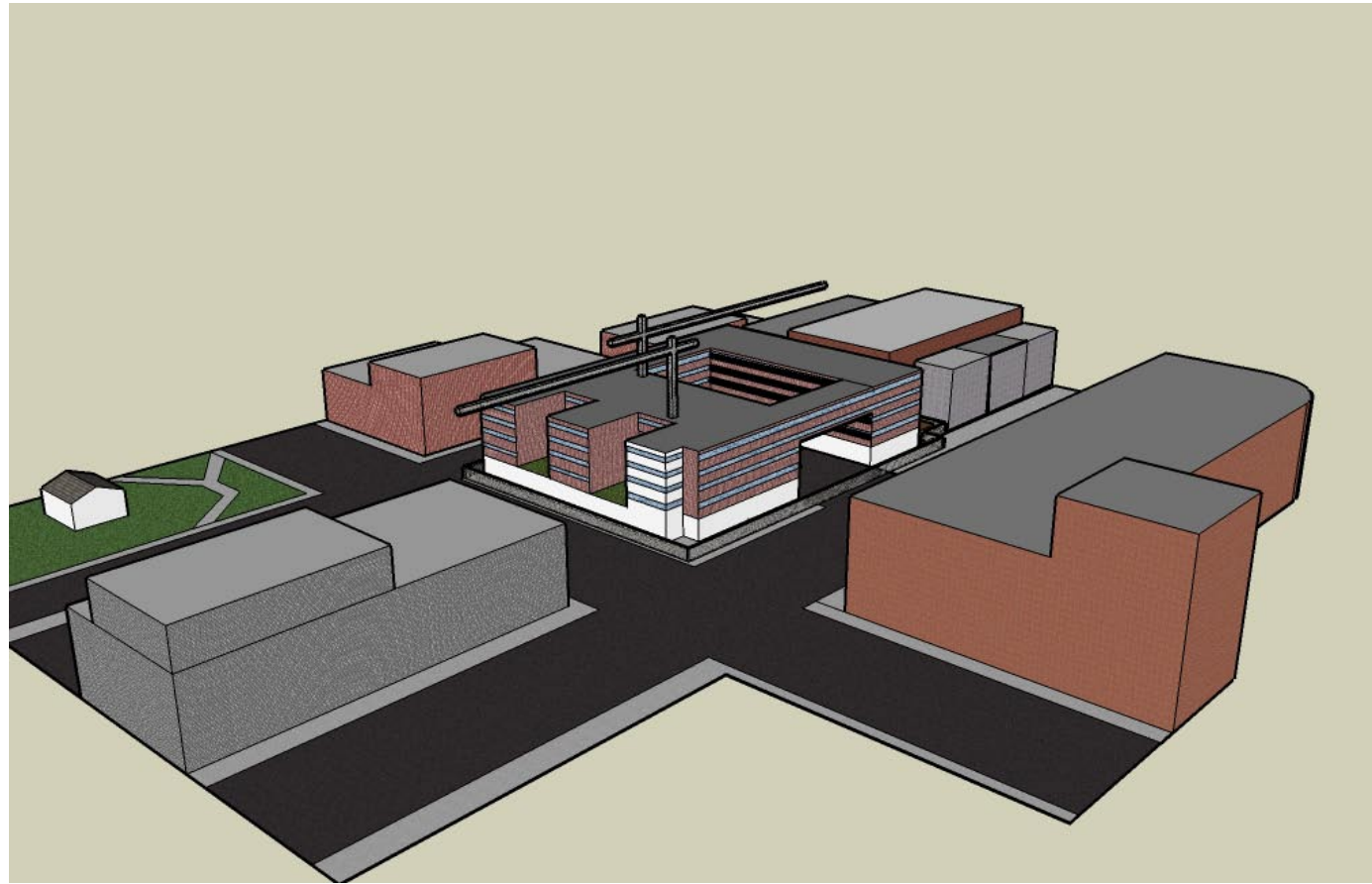
My goal is to organize all the information that I have in order to do the research in the most efficient way. Ultimately, my goal is to determine which analysis could benefit my project the most. Once my research on each analysis is done, I plan to continue researching one topic in order to determine how much money or time could have been saved or how much value could have been added to the project if my proposed ideas would have been selected instead.

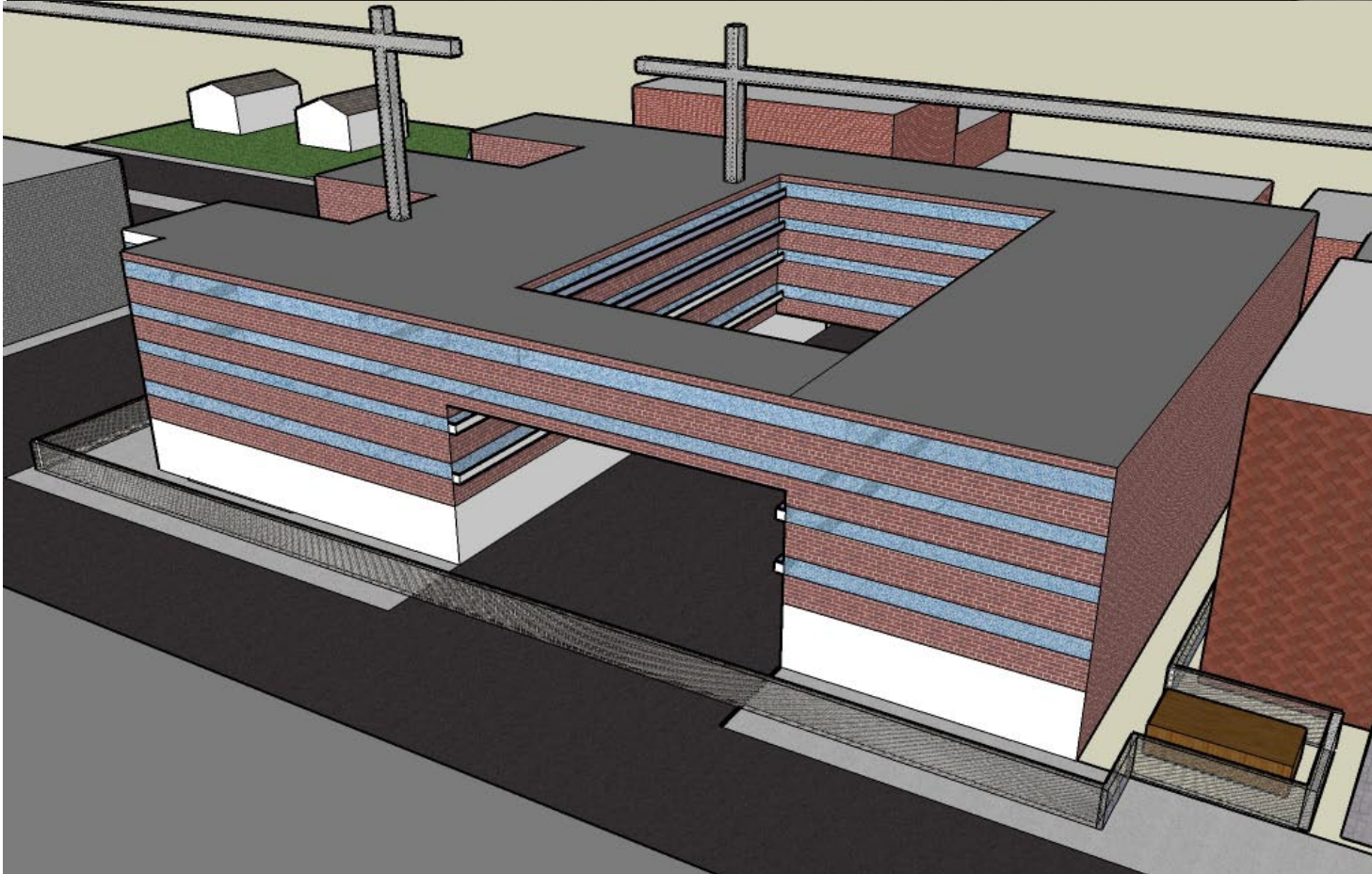
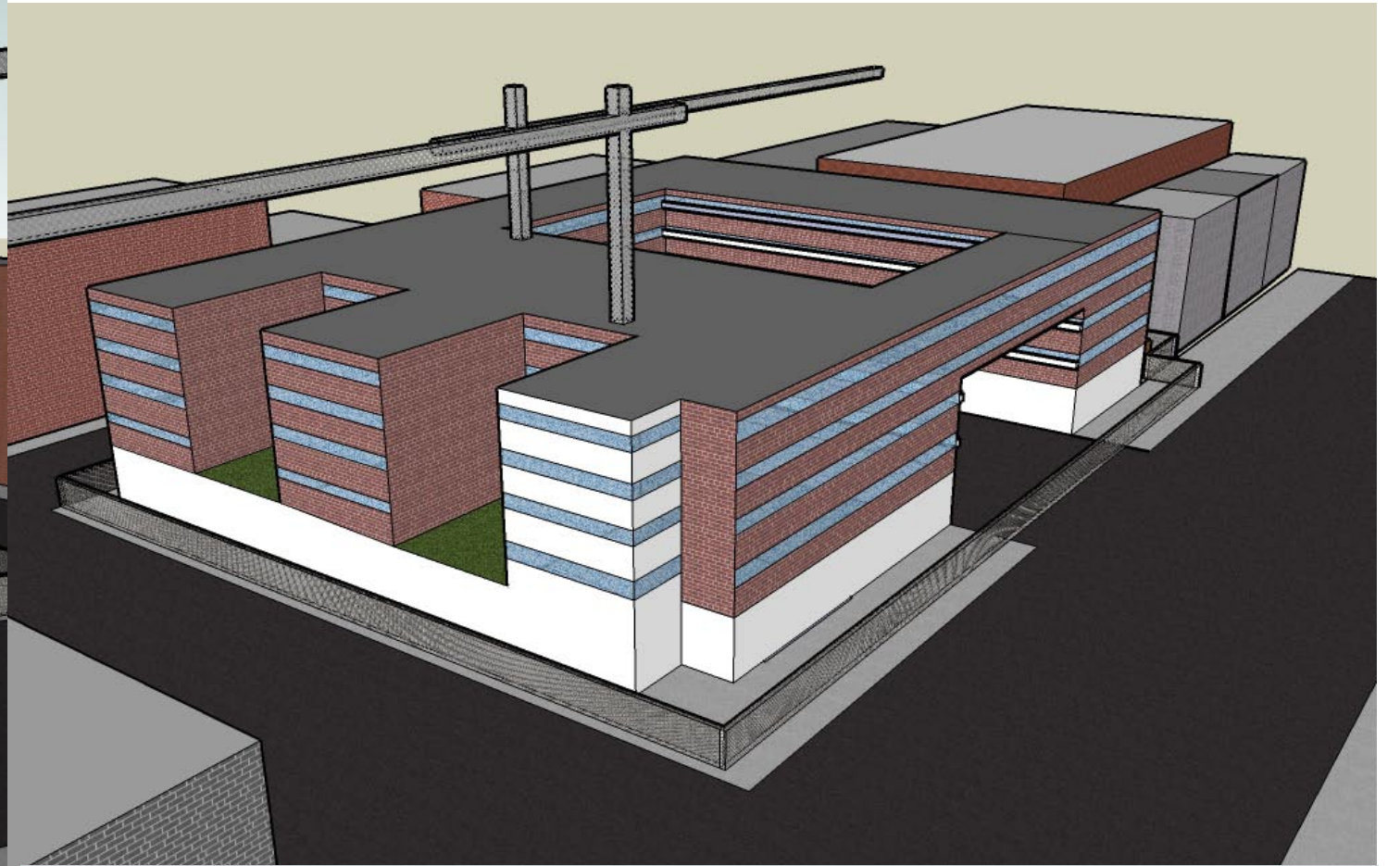
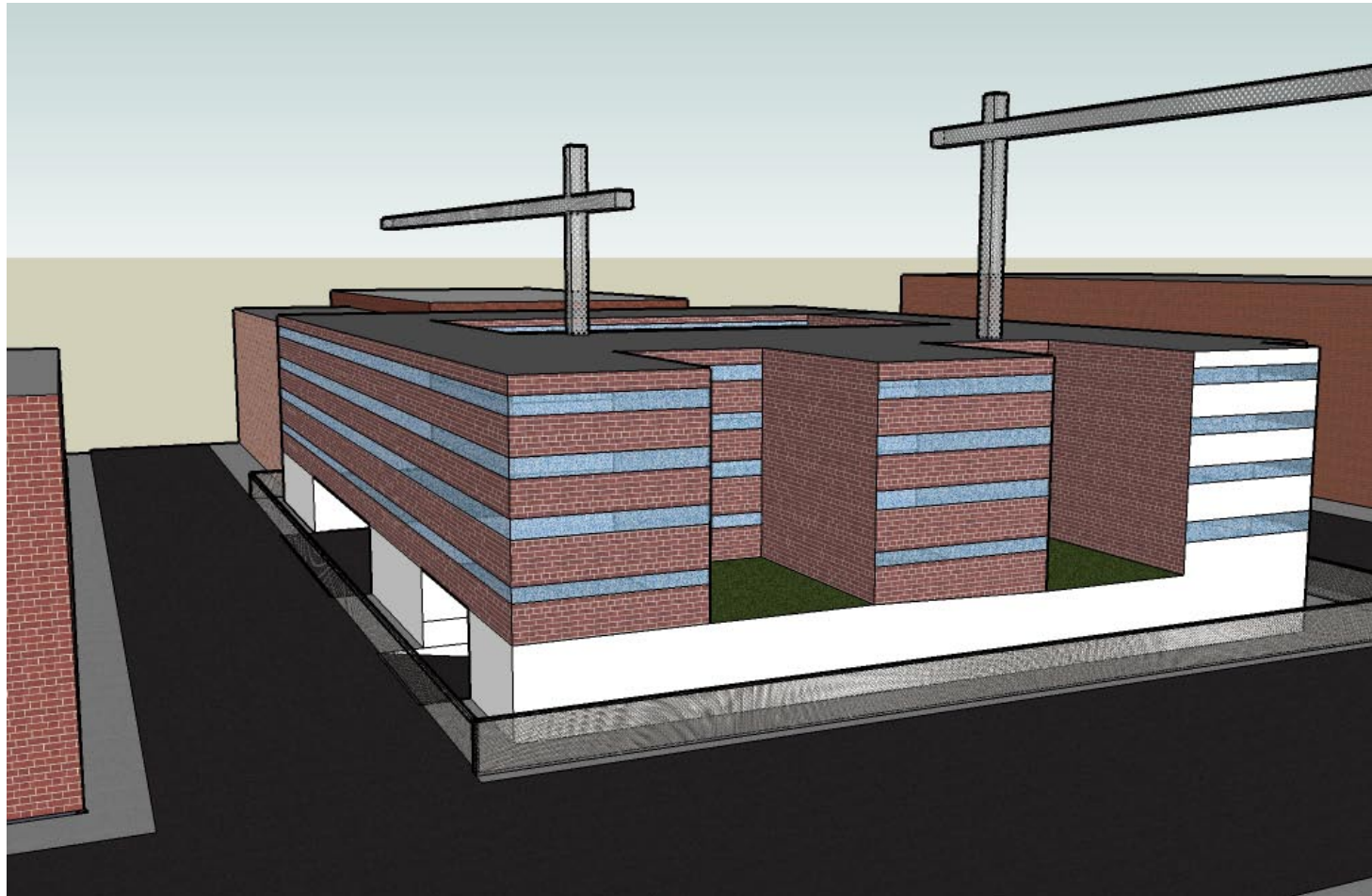
B. Introduction / Project Background

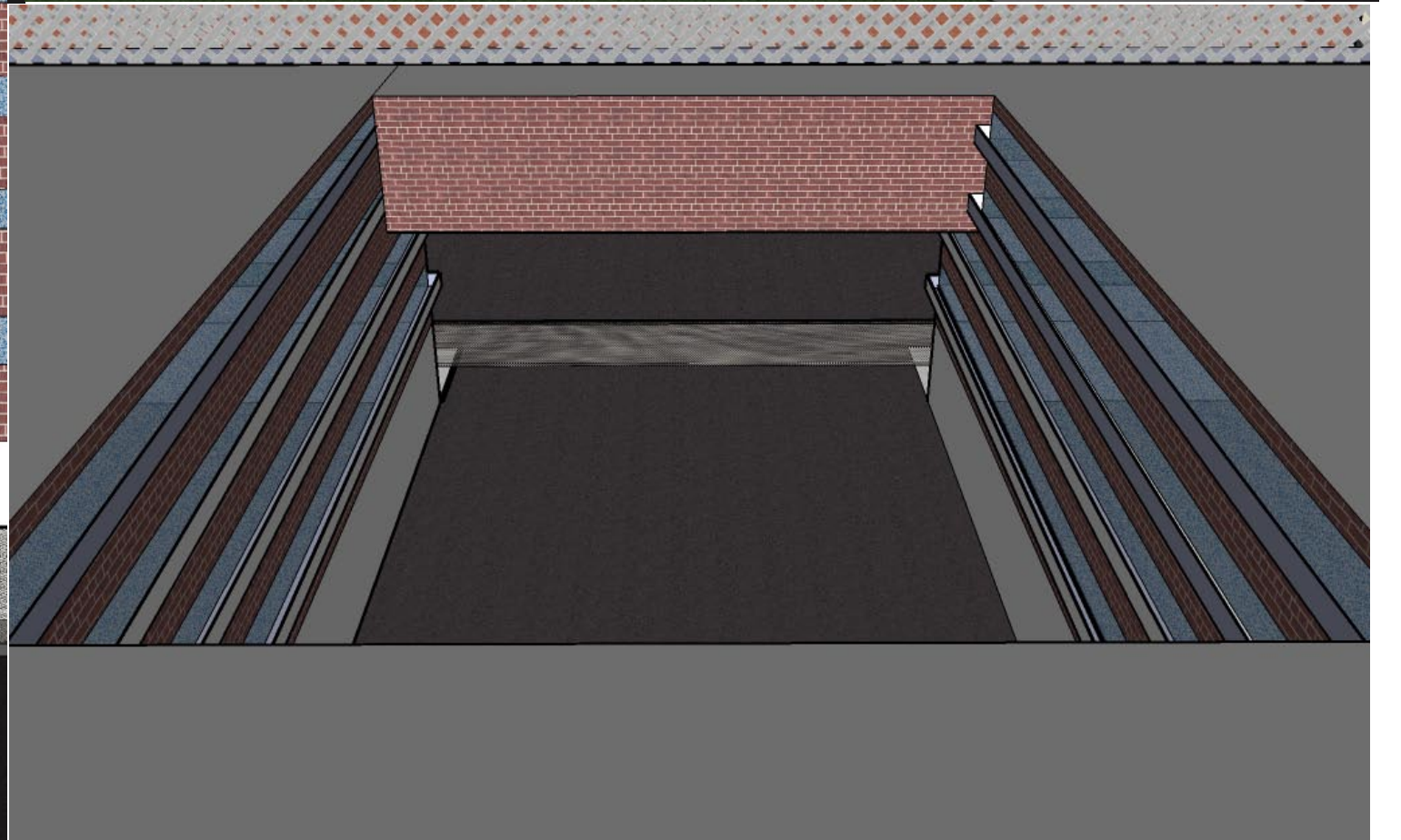
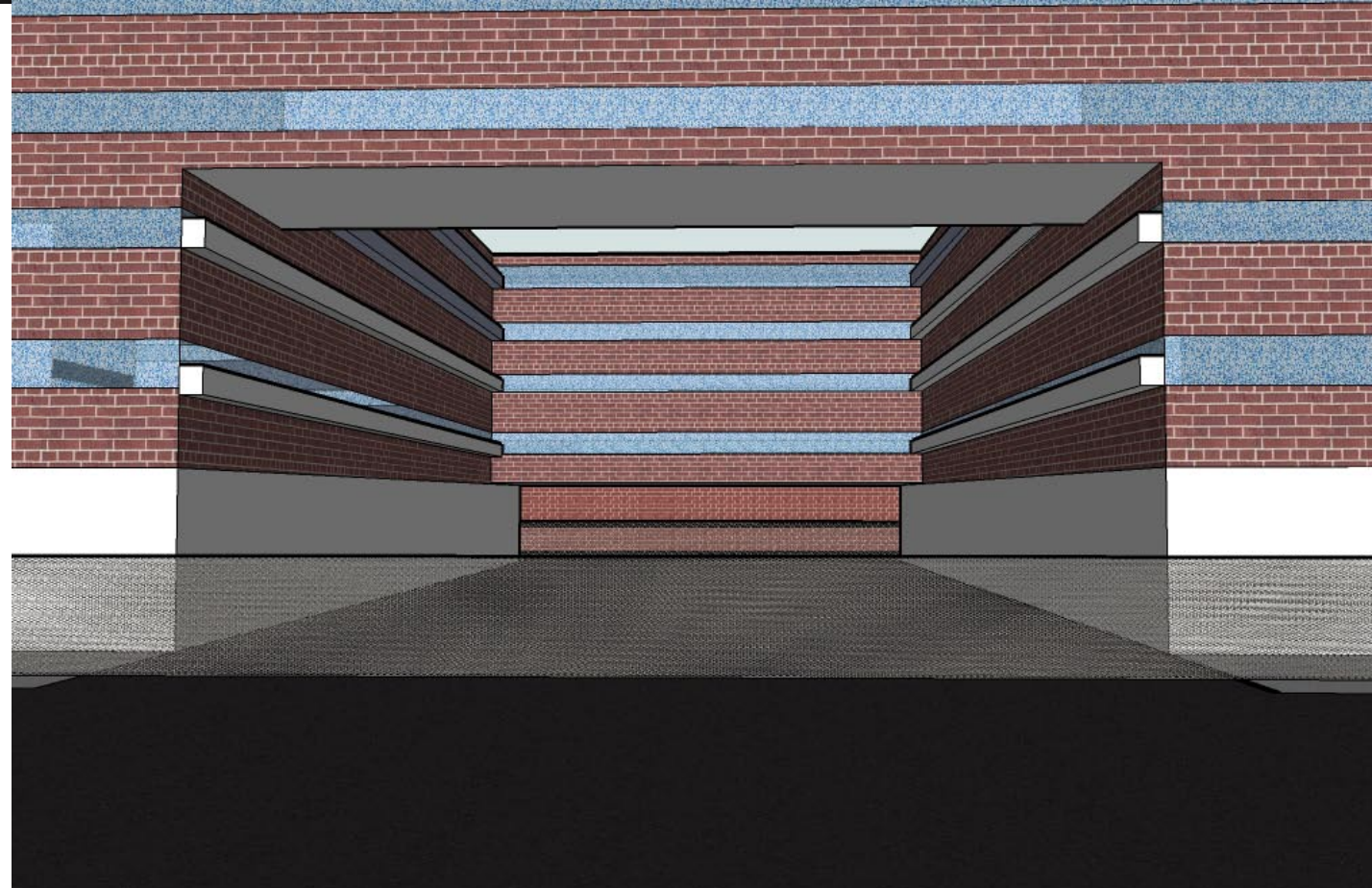
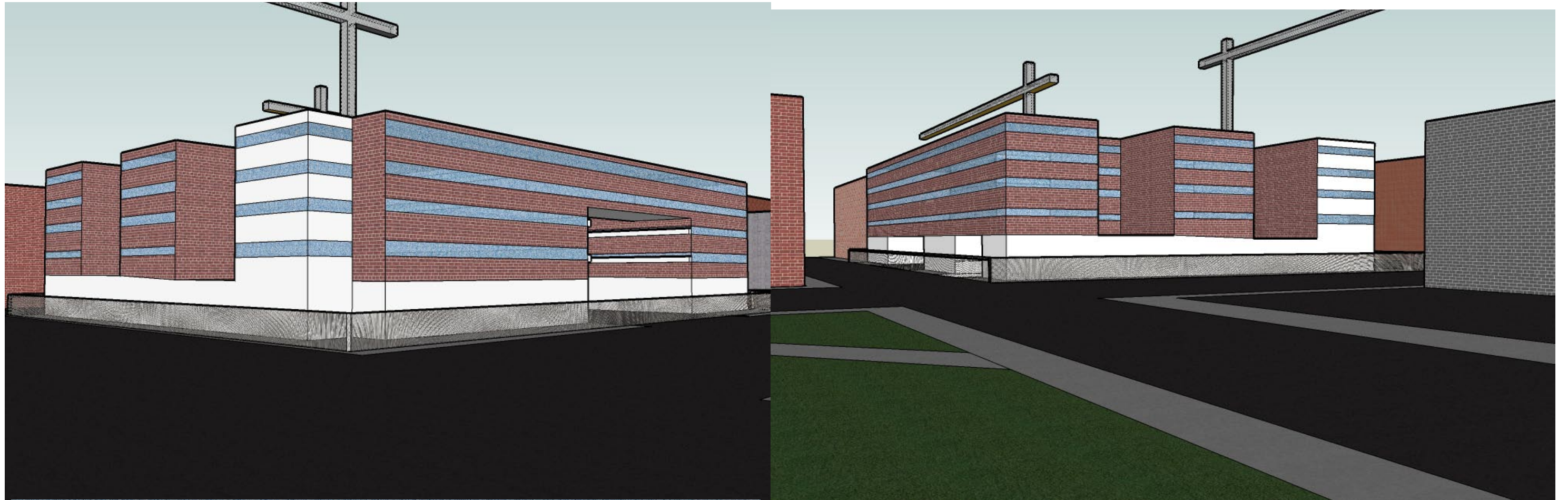
The Apartment Complex project is owned by Federal Realty Investment Trust. This firm is an equity real estate investment trust specializing in the ownership, management, development, and redevelopment of high quality retail assets. Federal Realty's portfolio contains approximately 19.5 million square feet located primarily in strategic metropolitan markets in the Northeast, Mid-Atlantic, and California. Federal Realty is building the Apartment Complex project in Bethesda because is one of the growing areas in the DC area. Bethesda is actually one of the most expensive places to live in DC. Build in Bethesda is very profitable. The market is very large and the demand in increasing every day. Federal Realty is a very experienced company, and they know that a well done project in Bethesda will certainly be a very profitable project.

Apartment Complex is a Mixed-use residential building that has retail, on the ground level and residential apartments on the above levels. The size of the project is approximately 420,000 square feet. The building has two levels of parking below ground, and five floors above ground. The project started construction on August 21, 2006 and is intended to be finished on February 08, 2008. The total cost of the project was about \$50,000,000, where almost \$3,000,000 went to general conditions. The project delivery method being used is Design-Bid-Built. The building consists on three rectangles that form a C leaving an open space in the middle of the building where a street with restaurant and stores will be built. The east side has loft apartments while the west side has single apartments. The reason why the apartments are placed that way is so that every apartment can enjoy either a terrace or a balcony. The building façade will be brick almost all the way around, while the interior will be mostly wood. Pictures of a 3D model of the project are shown below.









C Analysis Description

Analysis 1: Prefabricated Brick Façade

A. Problem statement - hand laid brick is the most common method when building the façade of a building. However, this method is slow and takes a lot of time of the schedule.

B. Goal - On a project that has a big façade; it is worth studying how a prefabricated façade would affect the project. The use of pre-cast brick façade panels rather than hand laid brick could reduce the schedule significantly. This analysis will explore how a prefabricated façade would affect the project in terms of cost, schedule, and methods of construction.

C. Research Steps

Step 1 - Review literature and periodicals on prefabrication panels. Moreover, I plan to review previous year's thesis proposals on prefabricated facades since they should have good ideas that could help me on my proposal.

Step 2 – I plan to contact the Project Engineer of this project to get general feedback on my ideas.

Step 3 – Once my ideas are clear, I plan to do a takeoff of the entire façade by using RS-Means.

Step 4 – Investigate costs on prefabricated panels, and the number of prefabricated panels necessary to complete the entire façade.

Step 5 – Investigate the bracing and connections necessary to connect the prefabricated panels to the structure.

Step 6 – Once I find out the cost of the hand laid brick façade and the prefabricated façade, I will compare both prices.

Step 7 – After the cost analysis is done, I plan to look into the schedule impacts by investigating the amount of time that would take to build the prefabricated façade (construction, transportation, staging, erection, connections).

Step 8 – In order to investigate the schedule impacts, I will have to coordinate the erection of the prefabricated panels with the crane usage time.

Step 9 – Summarize results

D. Expected outcome - This research should identify if the prefabrication of the façade will reduce the schedule and the cost of the project. With this analysis, I also plan to identify any potential problem or concern that may appear. With a prefabricated façade there are many issues that could appear such as, crane usage conflicts, or site congestion. I plan to analyze this issue in more depth in order to eliminate any possible conflicts, and maximize the advantages of a prefabricated façade.

E. Summary – With this analysis there are many things that I plan to learn. I will learn about prefabrication, transportation, planning of the staging area, bracing, and erection of prefabricated panels. I will also learn to manage the usage time of a crane in order to meet a schedule. Moreover, I am completely sure that with this analysis I will learn even more things than what I expect. I know that there will be many unexpected steps that will come up as I start to develop my research.

Analysis 2: Wood Framing Vs Metal Framing and Insulation

A. Problem statement – Wood is a cheap and workable material. However, it is a material that is not durable. Metal is a more durable and resistant material that would benefit the building in the long run. Moreover, metal studs come with holes for plumbing and electrical to run through. With wood, you need to drill those holes, which cost money and time. Also, during some seasons of the year, cooling and heating become an issue due to the poor insulation of the exterior walls. Insulation could avoid big changes on temperature on the inside of the building, saving energy and therefore money on the HVAC system.

B. Goal - In this project, all the interior framing was done with wood studs. I believe that wood was used in this project due to its low cost. However, I think that it is worth studying how the project would be affected if metal studs had been used instead. Metal studs would certainly increase the cost of the project, but they would also increase the value of the building. Metal studs are more resistant, more durable, and they have holes for the plumbing and electrical conduits already. Therefore, replacing wood framing for metal framing would increase the value of the building and reduce the schedule as well. This analysis will explore how the project would benefit from switching to metal framing in terms of cost, schedule and method of construction. Moreover, this analysis will investigate the effects of the additional insulation on energy savings and the effects on the HVAC system in terms of cost savings.

C. Research Steps

Step 1 - Review literature and periodicals on wood and metal framing. I plan to get familiarize with the method of construction and durability of both materials.

Step 2 – Contact the Project Engineer of this project to get general feedback on my ideas.

Step 3 – Once my ideas are clear, I plan to do a takeoff of the wood framing by using RS-Means.

Step 4 – Contact metal frame manufacturers to investigate costs of metal framing.

Step 5 – Compare the price of both materials.

Step 6 – After the cost analysis is done, I plan to look into how much value would metal framing add to the project. I will compare the durability of both materials.

Step 7 – Investigate how much could the schedule be reduced with metal framing.

Step 7 – Investigate cost of additional insulation.

Step 8 – Calculate the effect on the room temperature with the additional insulation.

Step 9 – Calculate energy savings.

Step 10 – Summarize results

D. Expected outcome - This research should identify if the metal studs will add enough value to the building to justify the extra cost. This analysis should also determine if the extra insulation would reduce costs by saving energy that would have been used by the HVAC system.

E. Summary – With this analysis there are many things that I plan to learn. I will learn about durability of materials, different methods of construction, installation of wood and metal framing. I will also become more familiar with change in temperature calculations (R and U values), and air distribution calculations (air flow rate, etc). I know that there will be many unexpected steps that will come up as I start to develop this research as well. Therefore, I expect to learn many other things from this analysis.

Analysis 3: Brick exterior wall Vs CMU Exterior wall and insulation

A. Problem statement - hand laid brick is the most common method when building the façade of a building. However, this method is slow and takes a lot of time of the schedule, especially when the brick used is small in size. Smaller bricks mean that more pieces are needed, and therefore more hand laid brick work is needed. Also, during some seasons of the year, cooling and heating become an issue due to the poor insulation on the exterior walls. Insulation could avoid big changes on temperature on the inside of the building saving money on the HVAC system.

B. Goal - On a project that has a big façade; it is worth studying how much time it takes for a worker to cover an area of the façade with different brick sizes. This analysis will explore if building a façade with CMU blocks will be faster than doing it with regular 4" brick. In a large façade, little saving could add up to a significant amount of time saved that could end up reducing the entire duration of the schedule. Moreover, this analysis will investigate the effects of the additional insulation on energy savings and the effects on the HVAC system in terms of cost savings.

C. Research Steps

Step 1 - Review literature and periodicals on hand laid brick, and its productivity rates. My first goal is to determine if the size of the brick could determine the time it takes to build a façade.

Step 2 – Contact the Project Engineer of this project to get general feedback on my ideas.

Step 3 – I will compare similar project's schedules with different sizes of bricks to determine if there are any differences in time when working with regular brick Vs CMU.

Step 3 – I will try to find out, by comparing many different projects, if there is a ratio that I can come up with. That way I could just apply that ratio to my schedule and then determine approximately how much time could the schedule be reduced using CMU blocks.

Step 7 – Investigate cost of additional insulation

Step 8 – Calculate the effect on the room temperature with the additional insulation.

Step 9 – Calculate energy savings.

Step 10 – Summarize results

D. Expected outcome - This research should identify if the size of the brick does affect the time it takes to build a façade with it. Moreover, this analysis should identify if there is a consistency on the time it takes to build a façade with each material. That way a factor or a ratio could be created and used when a schedule needs to be reduced. This analysis should also determine if the extra insulation would reduce costs by saving energy that would have been used by the HVAC system.

E. Summary – With this analysis there are many things that I plan to learn. I will learn about production rates, different methods of construction, and material differences. I will also become more familiar with change in temperature calculations (R and U values), and air distribution calculations (air flow rate, etc). I know that there will be many unexpected steps that will come up as I start to develop this research as well. Therefore, I expect to learn many other things from this analysis

Analysis 4: Workforce development (Language barrier)

A. Problem statement – The language barriers that the industry is facing has become a problem. However, there is little information about how is this problem affecting the industry in terms of costs and productivity.

B. Goal - This analysis will explore the consequences in terms of; costs, safety, and production, associated with the language barrier on construction projects in Washington DC. This analysis will also explore possible solutions to this problem.

C. Research Steps

Step 1 - Review literature on workforce development, immigrant construction workers, and anything related to the language barrier problem that the industry is facing.

Step 2 – Get some feedback from people in the industry and professors in the AE department.

Step 3 – Create a survey, and interview Project managers, superintendents, and foreman, which are the people that have direct contact with the construction workers. The goal is to determine if there is a pattern, regarding costs, safety, or production, that can be seen in projects where the language barrier is present.

Step 5 - Examine data for patterns

Step 6 - Suggest solutions or strategies to address this problem and present them to my thesis advisor or any AE faculty.

Step 7 - Summarize results

D. Expected outcome - This research should identify if there is a pattern, regarding costs, safety, or production, that can be seen in projects where the language barrier is present. If a pattern is found, then solutions or strategies can be proposed. One solution, that I already thought, could be to implement intensive Spanish classes to the management staff on site. Hopefully, other solutions will emerge as I do my research.

E. Summary – Mainly, what I want to learn is if the language barrier is affecting the industry. With my study, I feel like I can help the industry. I think that everyone should contribute somehow to the industry, because in the end we are already part of this business, and what is best for the industry is best for us.

D. Weight Matrix

Description	Research	Value Eng.	Construction Rev.	Schedule Red.	Total
Prefabrication of the brick façade	15		5	20	40
Exterior Wall Changes / Insulation		10	15		25
Wood studs Vs Metal studs / Insulation		15	10		25
Workforce Development	10				10
Total	25	25	30	20	100%

E. Appendix 1 – Breadth Studies

The four analyses that I plan to study for my final proposal are related to each other. Moreover, each analysis covers more than two breadth areas. Below, there is a description of the breadth areas that each analysis covers.

Analysis 1: Prefabrication of the Façade

Breadths covered by this analysis are: Construction, Structural, and Architectural.

This analysis covers the construction breadth since the whole purpose of doing the prefabrication façade is to reduce the schedule duration and therefore save time and money. Moreover, planning will be an issue since the crane and the staging area will have to be coordinated in order to meet the needs of the project. The analysis covers the structural breadth as well since the prefabricated panels will need bracing in order to be attached to the structural system. Therefore, the structural system will have to be redesigned. Lastly, the appearance of the façade may change if the façade is prefabricated. Therefore, the architectural breadth will be covered as well.

Analysis 2: Wood studs Vs Metal Studs and insulation

Breadths covered by these analyses are: Construction, Structural, and Mechanical.

The construction breadth will be covered by this analysis since this change will affect the schedule, the cost, and the methods of construction of the project. This analysis will also affect the structure since the framing forms part of the structure, and if the framing is changed, then the structure will change as well. With the changing of the exterior framing, I was planning to implement some changes to the insulation as well, which will affect the room temperatures, and therefore the mechanical system.

Analysis 3: 4” brick exterior wall Vs CMU exterior wall and insulation

Breadths covered by these analyses are: Construction, Structural, Mechanical, and Architectural.

The construction breadth will be covered by this analysis since this change will affect the schedule, the cost, and the methods of construction of the project. This analysis will also cover the structural breadth since the proposed CMU exterior wall will need a different type of bracing that will affect the structure. With the changing of the exterior wall, I was planning to implement some changes to the insulation as well, which will affect the room temperatures, and therefore the mechanical system. Lastly, if the exterior wall is made with CMU, this would change the appearance of the façade since it will need to be painted afterwards. The brick façade appearance will be eliminated. Therefore, the architectural breadth will be covered as well.

Analysis 4: Workforce development (language barrier in the Industry)

Even though this analysis is very interesting to me, and it could really help the industry; it seems to me that this analysis does not cover many breadths. I will not start my research on this topic until comments are made, and the idea is approved.