JUNK

DUO CHEN

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28 APRIL, 2008

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ABSTRACT

Architecture can be broken down into three components: materials, structures, and construction methods (wall section). Ordinary building materials that typically come to mind are stone, timber, steel, concrete, and glass. More contemporary architecture may also utilize materials from hay bales to discarded tires to construct “green architecture”. In order to do so architects need to come up with more innovative construction methods and structures to integrate these unconventional materials. These three components (materials, structures, and construction methods) are interdependent. They can not be designed independently, nor can they be designed simultaneously. Inevitably one of these components has to be picked out as the main component in order for the other two components to be designed around it. Materials affect the project’s budget, the look of a building, and it may also be the most important component to consider in the future architecture. “Green Architecture” often refers to the concept of “reuse, reduce, and recycle”. The best sustainable strategy concerning materials is reuse. Reuse of materials has to take place first, and then reduction of material consumption will follow. In the worst case, if materials can not be reused, then they should be recycled. The main thesis here will be to investigate how “Junk” can be reconstructed into “Green Architecture” through innovative construction methods and structures.

There are many different ways to design a building that will not be harmful to the environment. The United States Green Building Council's "Leadership in Energy and Environment Design" program has divided sustainable design into seven categories. Three main sustainable strategies regarding materials are reuse, reduce, and recycle. This thesis will focus on the strategy of reusing materials. "Truly green buildings of the future should be designed for deconstruction to maximize the reuse and recovery of building components and materials"(1). A building cannot consider being sustainable if it does not incorporate some methods of deconstruction. Methods of deconstruction will also be considered in this thesis. "Recycled materials are not just practical and cost effective; they create a unique, dramatic architectural vocabulary"(2). A project that attempts to take advantage of salvaged materials does put some limitations or additional criteria on the design. A traditional design process begins with schematic design, and then looks for manufacturers to fabricate the specific items that fit the project. This process needs to be reversed in order for designers to reuse salvaged material in their projects, because in order to avoid constant revision of the design, they need to find what they have to design with first.

Site is another element that adds some limitations on the project. The ideal site, considering the goal of sustainability, would be a site that was being developed that has some abandoned building materials left behind for reconstruction. A sustainable site should be located near a public transportation place to encourage less fuel consumption due to individual commuting. A proposed program for the thesis project is a mixed-use building including residential and commercial uses. This idea of a mixed-use building ties back to the idea of reducing fuel consumption due to individual travel for shopping. The repetition of the residential unit modulus is also well suited for the reuse of certain “Junk” materials that are able to be retrieved in large quantities. If certain “Junk” materials can only be gathered in small quantities, then they can be reused in commercial units, because most commercial units are designed differently than each other due to the variety of commercial uses.

Materials are the most important component to dictate modern architecture. When we think of construction materials, we would generally think of wood, concrete, steel, brick, and glass, but some architects have utilized junk materials to construct amazing architecture. These junk materials range from industrial waste to agricultural waste. Any thing can become architecture, if the found materials are properly put together. The Rural Studio at Auburn University constructed the Yancey Chapel out of discarded tires used as walls and they also used hay bales as insulated walls in The Hay Bale House. There are tremendous amounts of junk being dumped into the junk yard everyday, and some of this material can be salvaged to construct beautiful architecture.

"The U.S.A economy produces millions of tons of industry materials and, almost as rapidly, it consumes and discards them. A recent study of the country's materials use estimated that nearly 2.5 billion metric tons of non-fuel material moved through the economy in 1990, over 70% of the material was used in construction"(3). According to the Victorian reprocessing plant, in 1997 they reprocessed 3 million tons of secondary material. Over 50 percent of these materials were from construction and demolition. In 2005, they reprocessed about 5 million tones of secondary material. We probably should ask why we are producing more waste. This information supports the idea that architects have the ability to make the world different. According to ZWA, from 1991 to 1999, every American was responsible for about 1 ton of waste every year. Some additional statistics provide information about our daily production of waste: "packaging accounts for 10-15 percent of the cost of a product and 50 percent of all consumer waste. The energy saved by recycling one aluminum can is enough to keep a 100-watt light bulb burning about 3 1/2 hours. For every ton of crushed glass recycled, 1.2 tons of raw materials are saved. Each ton of paper recycled saves 17 trees. A baby may use 10,000 diapers in the first three years of life. Disposable diapers take up as much as 2 percent of our landfills. (4)" These statistics can remind us that a lot of waste is being dumped into landfills everyday, and much of it could be minimized or salvaged.

There are many designers starting to utilize salvaged materials to construct their art. Some designers have used industrial scraps to build lighting fixtures for example. There are many different ways to utilize salvaged materials and the methods for how to do it depend on the individual designer's imagination. Scrapile Design makes beautiful pendent lights out of wood scraps left over from other manufacturing processes. The wood scraps were glued together and different wood types show a different grain, but together they form a beautiful texture. Jennifer Siegal designed the Sea Train House in Los Angeles, which was mostly constructed out of found materials. Most found materials were reused directly in their original state, except for a few items that were transformed. The salvaged steel beams, salvaged corrugated steel deck, and reclaimed wood crossbeams are reused in a straightforward way; they are used as roof construction, but grain trailers were reconstructed into a Koi fishpond and lap pool. The Sea Train House was designed to focus on saving materials, and another project done by Rachel Weidinger (Project Director) took this idea a step further. Scrap House was built and open to the public on world environment day 2005. Scrap House was inspired by the use of abandoned materials from everyday uses. This house, built next to San Francisco City Hall, was meant to show the public that even junk or scrap material can be directly reused to form a building shell. All materials used in Scrap House from the foundation to the roof were reclaimed, and the only brand new materials used was hardware and fasteners. Scrap House utilized phonebooks, traffic lights, computer keyboards, etc, as different components of the house. For Example, the traffic light was transformed into a colorful chandelier.

Another way to reuse material is to adaptively reuse an entire abandoned building. A lot of energy, labor and material can be saved if designers do not wipe out an existing building. The advantages of reusing existing buildings are: raw material is being saved from new construction, energy is being saved from recycling junk material, and it is logical to reuse the existing materials rather than sending it to a junk yard or to reprocess.

In early construction methods, stone, brick and timber were commonly used as construction materials. After the industrial era, architecture shifted from ordinary construction materials to modern construction materials, which are: steel, aluminum and glass. This movement allows architecture to evolve from massive to light and from chunky to thin. In modern architecture, we see high rise buildings, glass box buildings, and steel framed buildings all over the world. These buildings look lighter than ordinary buildings which are massive and built out of heavy stones and bricks. Buildings that look lighter are commonly conceived to be efficient. This is how ordinary people think and react when they see these kinds of buildings. However, when we look at the material production process, the lighter building materials generate a huge amount of waste during the production process, even more than the massive buildings' total product. Another advantage of massive buildings is they are more durable and require less maintenance. According to IBI Group for Canada Mortgage and Housing Corporation in may 2000, the average window systems in high rise residential apartments only last about 22.5 years, and average caulking only last 10.5 years. Because these modern materials are more and more broadly used, therefore more and more waste is generated from their production process. This may also explain why the reprocessing plants and landfills are receiving more and more waste. The sustainable remedies to address this issue are: **Reuse**, Reduce, and Recycle.

The U.S. Green Building council, Leadership in Environmental and Energy Design reference book dedicates an entire category to materials and resources. "Reuse of existing building, versus building new structures, is one of the most effective strategies for minimizing environmental impacts"(5). Reuse is a more effective ecological strategy than reduce and recycle. Reusing a material allows one to extend the material life, and then less natural resources are extracted to produce the identical material, and also less energy is devoted to recycling the discarded material. However, when reusing existing materials, designers need to deal with technical difficulties.

It is easy to say that we are going to reuse salvaged materials, but is not easy to do so. When a designer proposes a different function for an existing building, then the design loads will vary. The existing structure of the building will be adequate if the new design load is less than the existing structure's design load. What if the new design load is larger than the existing structures' design load? The designer can approach the solution from two directions. One way is to adjust the new design load, so the existing structure is adequate to handle the new design load and new function. The second way is to reinforce the existing structure. This method may be taken care of by inserting more columns, beams, and joists, or designing reinforcement of the beams and columns. What if the designer proposes a different building form, but the designer also wants to reuse the existing building materials? This proposal will still be possible, and also the end result on reuse of the existing building materials will be similar to leaving the building in its original form. This proposal gives the designer an opportunity to express a different look, but also deconstruct the building materials and reuse them.

Deconstruction is also a very important element to consider in order to be able to salvage the materials which later can be reused. The Welihe Stadium in

ShenYan, China, was demolished to build a larger stadium for the 2008 Olympics. It only took 5 minutes to blow up the previous Welihe Stadium. The only things left behind were waste and dust. The Deutsche Bank was severely damage by the 911 attack on the World Trade Center. The Lower Manhattan Development Corporation has a deconstruction plan to protect the surrounding buildings and occupants. Even though the purpose of the deconstruction process was to protect public safety, this presents the opportunity to reuse these deconstructed materials, such as steel frames which are a big part of the building. Deconstruction is always a better ecological solution than demolition.

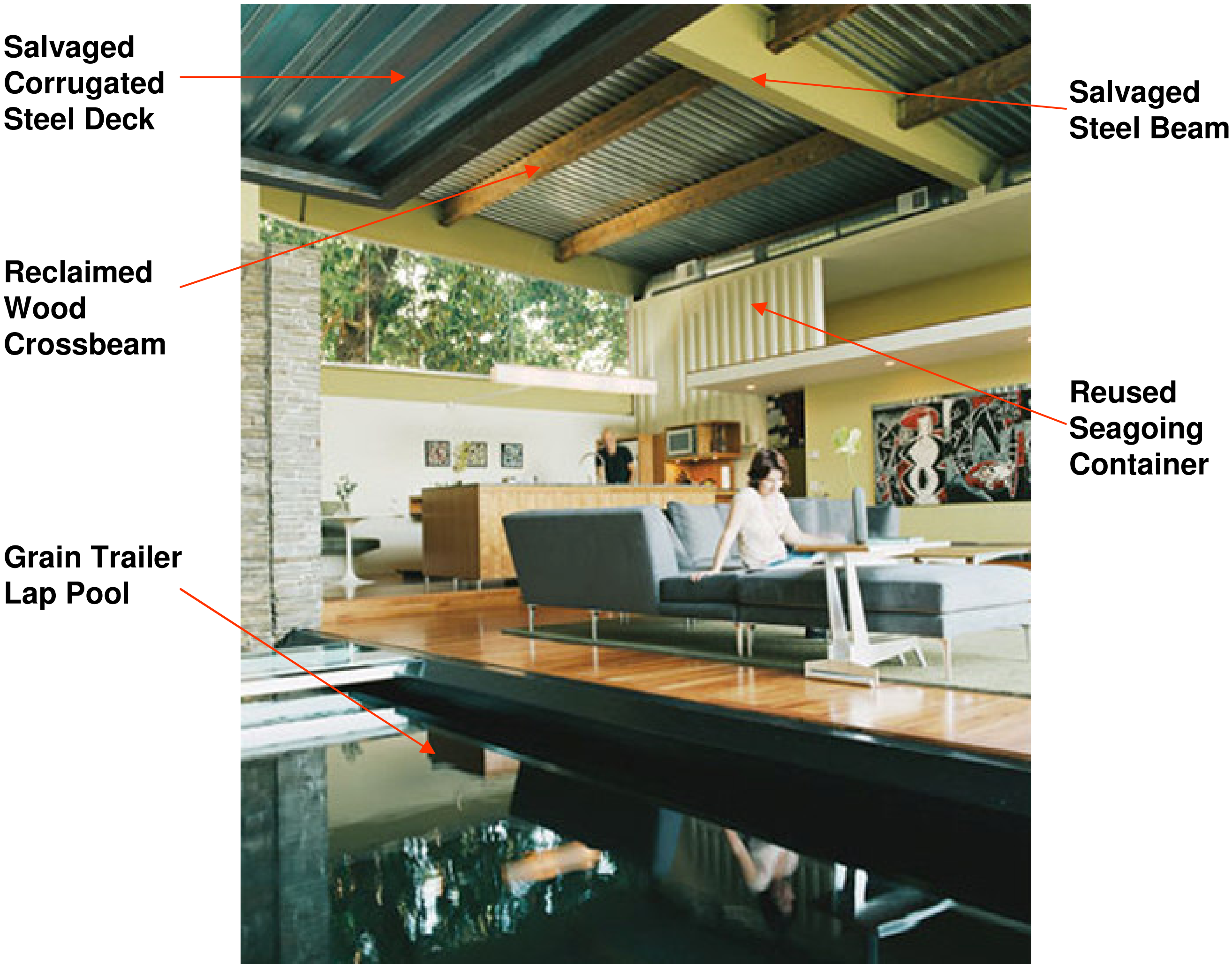
Junk is something everyone wants to toss away into the garbage basket, and then transport to a landfill. So why should we want to reuse junk and try to get more use out of it? When designers incorporate the ecological design strategies: “Reuse, Reduce, and Recycle” into their architecture, they are trying to conserve natural resources. If we are consuming natural resources at the same rate as we are today, then we will run out of natural resources sooner or later. “We don’t inherit our resources from our ancestors; we borrow it from our children. “(Anonymous)

Design by Office of Mobile Design, Jennifer Siegal

Built in 2003

Located in Los Angeles, California

Sea Train House is situated between an industrial building and a junk yard that is owned by Richard Carlson's (owner of the House) family. "I wasn't thinking about sustainable architecture at all, it just made sense to build with what's here". Most of the structure was built out of the scrap metal, reclaimed wood crossbeams, and discarded metal seagoing containers found on site, and also grain trailers were reconstructed into a "Koi Fishpond and Lap Pool".

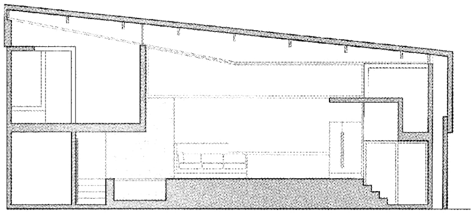

Salvaged Corrugated Steel Deck
Salvaged Steel Beam
Reclaimed Wood Crossbeam
Reused Seagoing Container
Grain Trailer Lap Pool

The interior koi pond, made from an old trailer, is aligned with the exterior pool, creating the illusion of one continuous body of water.

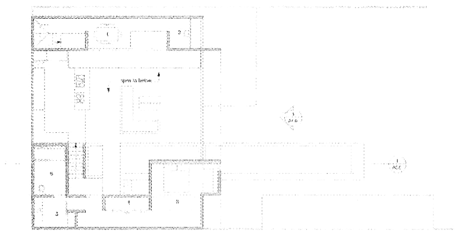
The front end of the master bedroom container was replaced with an arrangement of glass and steel that allows for ventilation and views of the garden.

In the living room, a 15-foot-high flagstone waterfall that runs on recirculated water masks the stairwell leading to the master bedroom.

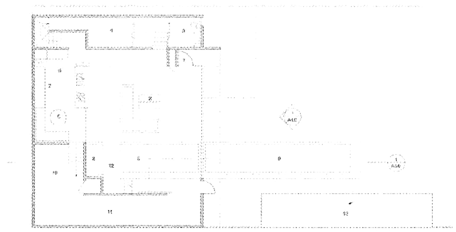
Elevated windows, pale gray slate, and banana-colored walls enhance the natural light in the minimalist bathroom.



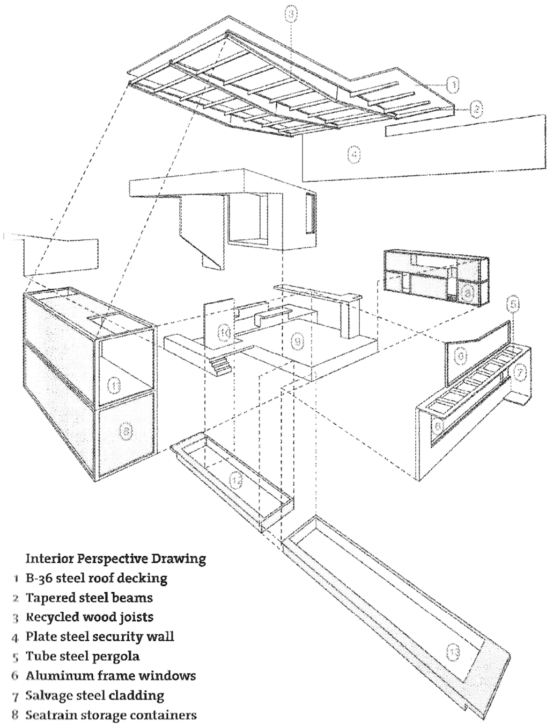
Front Section



Second Floor Plan



Main Floor Plan



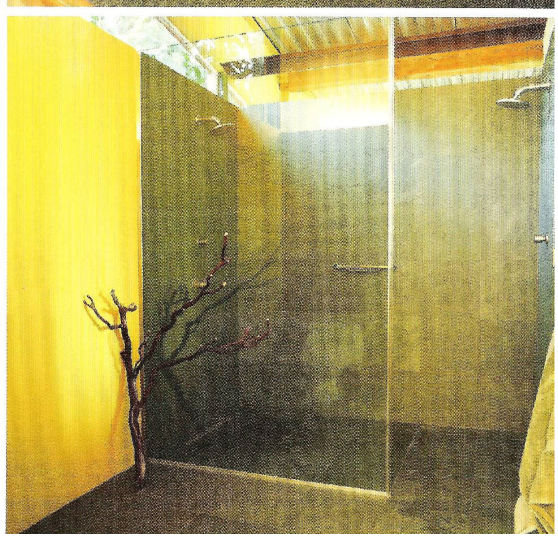
Interior Perspective Drawing

1 B-36 steel roof decking
2 Tapered steel beams
3 Recycled wood joists
4 Plate steel security wall
5 Tube steel pergola
6 Aluminum frame windows
7 Salvage steel cladding
8 Seatrain storage containers
9 Cherrywood flooring
10 Flagstone water wall
11 Recycled carpet
12 Aluminum grain trailer koi pond, interior
13 Aluminum grain trailer koi pond, exterior

PRECEDENT ANALYSIS – SEA TRAIN HOUSE





Rachel Weidinger, Project Director

John Peterson, Architect

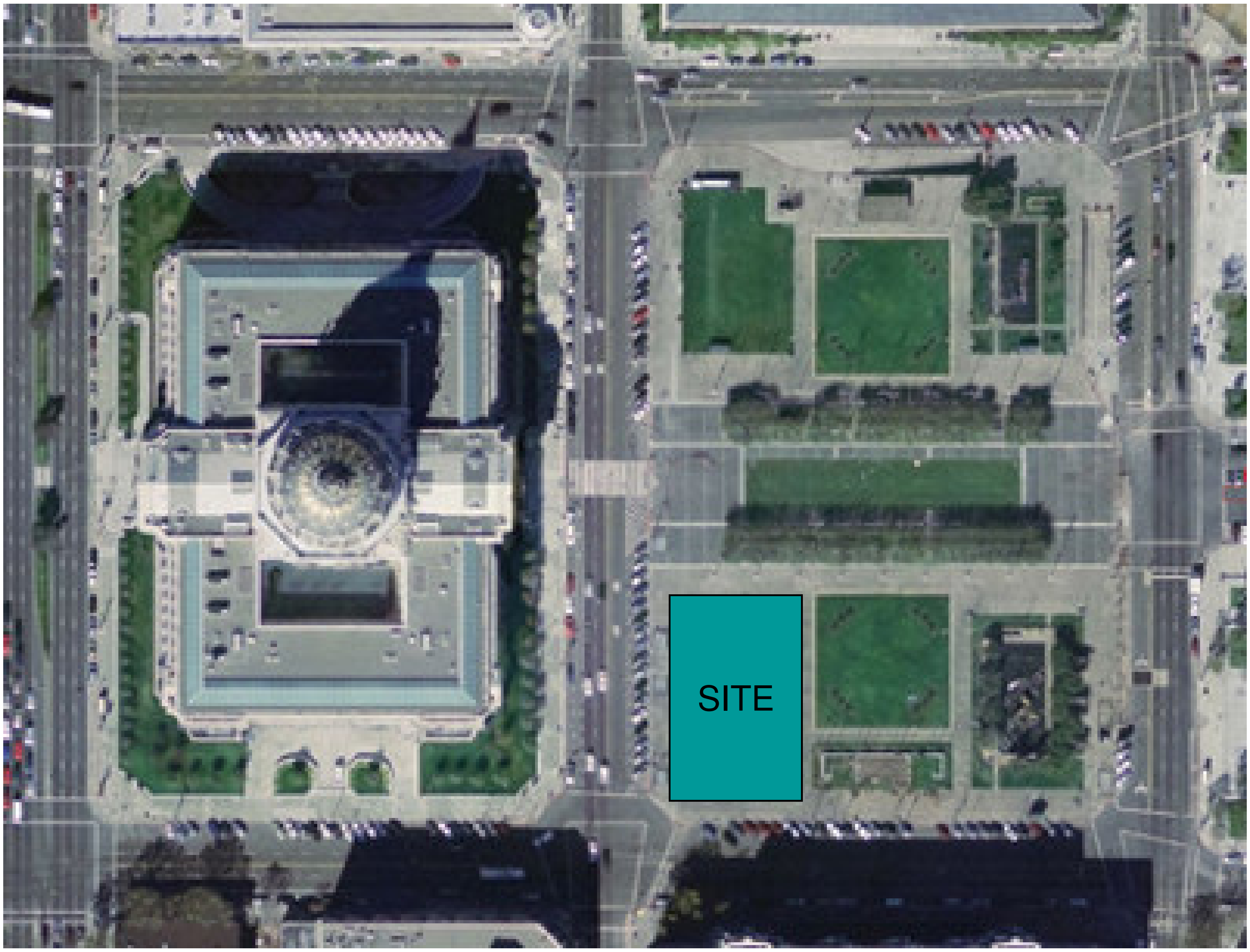
Patrick Buscovich, Structural Engineer

John Lieb, Materials Wragler

Laurence Kornfield, Construction Manager

Built In 2005

Located in San Francisco, California



In celebration of World Environment Day in 2005, a new green demonstration house was built and open to the public. The Scrap House is built on the civic center next to San Francisco City Hall. The Scrap House design team was inspired by the use of abandoned scrap materials. All materials used from the foundation to the roof were reclaimed and reused materials. To rethink a standard single family floor plan was the first challenge. The second challenge of the design was finding the appropriate innovative materials. The team spent three weeks hunting down scrap materials, furnishings, and finishes. The only brand new materials used are hardware and fasteners. The designers used some salvaged materials that were reused for their intended purpose, while some materials were transformed into another purpose in an innovative way.

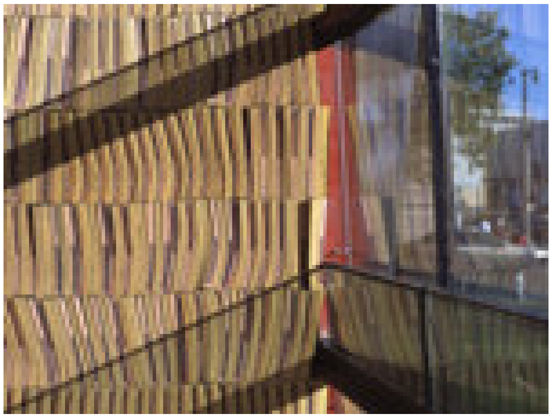
PRECEDENT ANALYSIS – SCRAP HOUSE

Street and traffic signs were transformed into a siding material that covers one exterior wall. The signs were donated by the San Francisco department of public works.

All of the scrap sheet metal used as shingles were collected from Nustar Metal Fabricators, which they donated. This represented only two weeks worth of scrap.

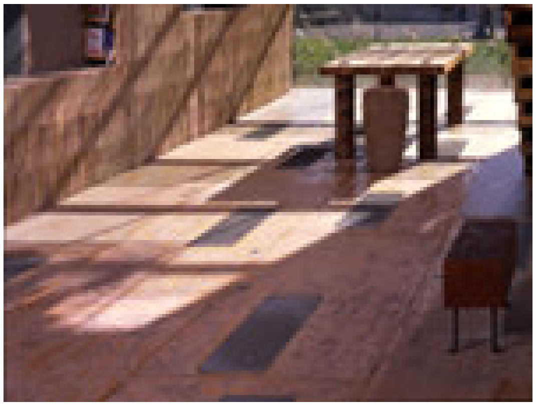
The steel stud roof trusses were composed of surplus steel studs from local construction sites. Steel studs are an unusual material for structures. The designers set two mocked up trusses to be tested for deflection as code required.

Four exterior walls were composed of glass. "Tempered, double pane windows were shingled into a steel racking system designed to accommodate the mismatched sizes."



The phonebook wall was made of 1,500 phonebooks stacked vertically and held together by being affixed to the sheet metal wall covering with two self-tapping screws drilled through the books. The phonebook wall was well suited for an insulation wall and acoustical wall to divide the main space and private space.

The traffic light chandelier was designed by an area artist, Simon Ceffins. This colorful chandelier is made of old traffic light lenses.



Solid core doors from a school were reclaimed in scrap house as a flooring system. The penetrations of the solid core doors were filled with quick set concrete.

Another interesting wall in the scrap house was composed of computer keyboards which were donated by Alameda County Computer Resource Center. The keyboard wall was coated with in-tumescent fire retardant paint to accommodate the fire code.

Designed by Runberg Architectural Group

Built in 2006

Located in Seattle, Washington

Denny park Apartments is 50 units of affordable housing and mixed-use with commercial, community, and retail spaces at first level, along with parking space on the first level and the ground level.

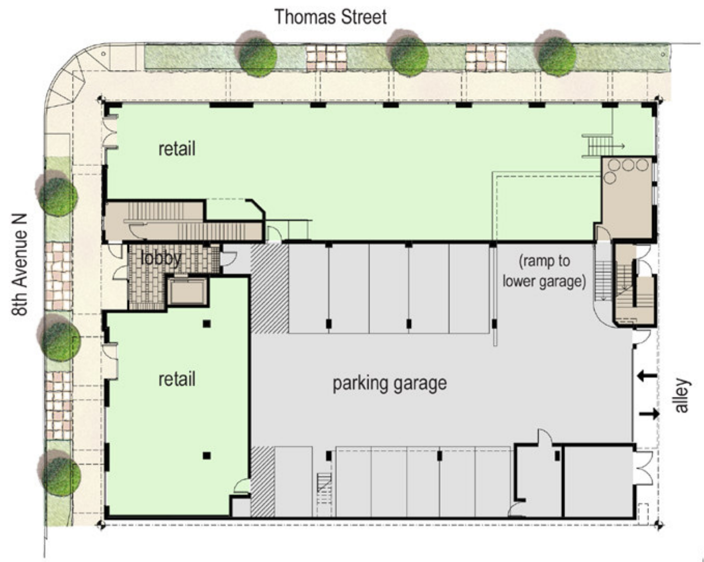
Denny Park Apartments is six-story, and provides studios, one, two, and three bedroom apartments. The developer, Low Income Housing Institute is planning to set 20 units for special needs residents.

Green Elements:

1. Storm water detention through the landscaping planters to hold the rain water.
2. Durable exterior material: metal roofing and Siding
3. Maximizing natural light
4. Continuous ventilation of bathrooms
5. Low maintenance for landscape
6. Recycling 85% percent of the existing building when demolished

Sustainable Elements Illustration

Plans



STREET LEVEL PLAN

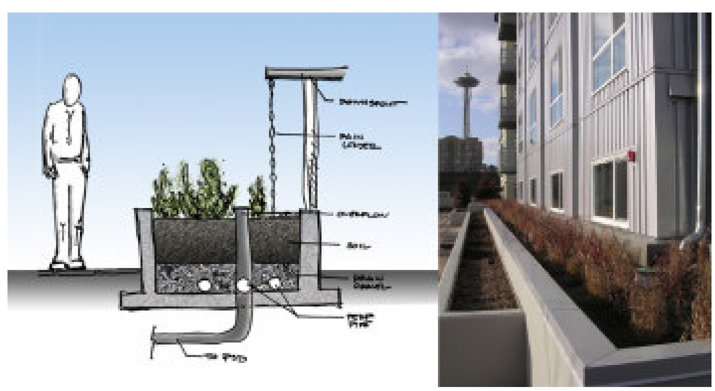
LEVEL 2 PLAN

LEVEL 3-6 PLAN

North Elevation

North-South Building Section

Planters Detail



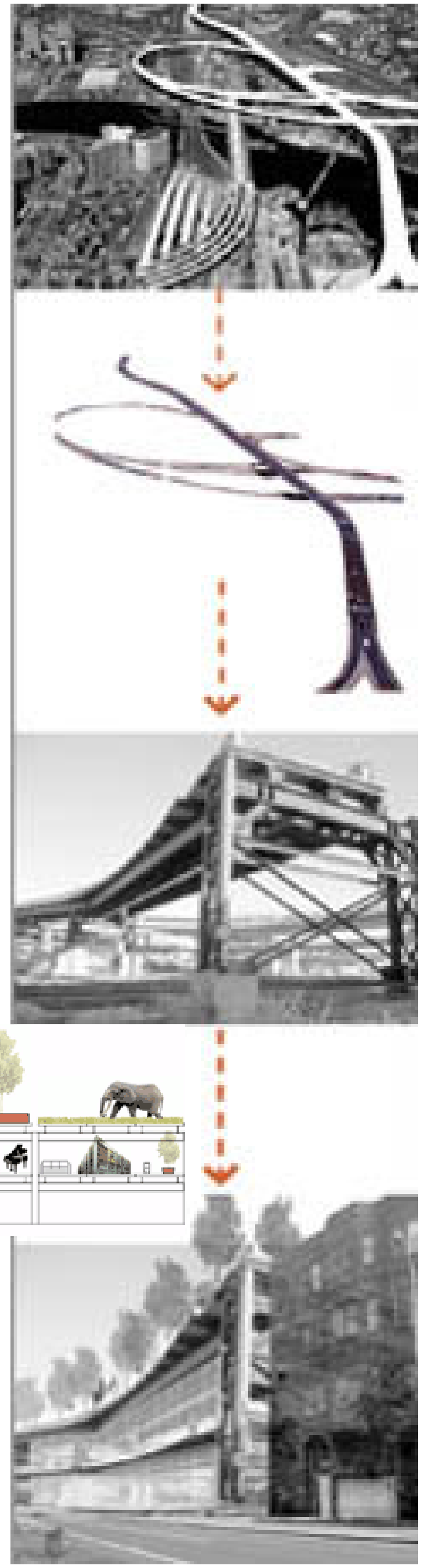
Photos

PRECEDENT ANALYSIS – BIG DIG BUILDING

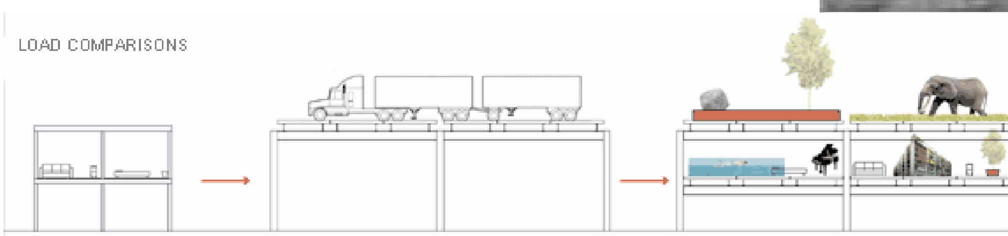
Designed by SINGLE speed DESIGN

Proposed in 2005

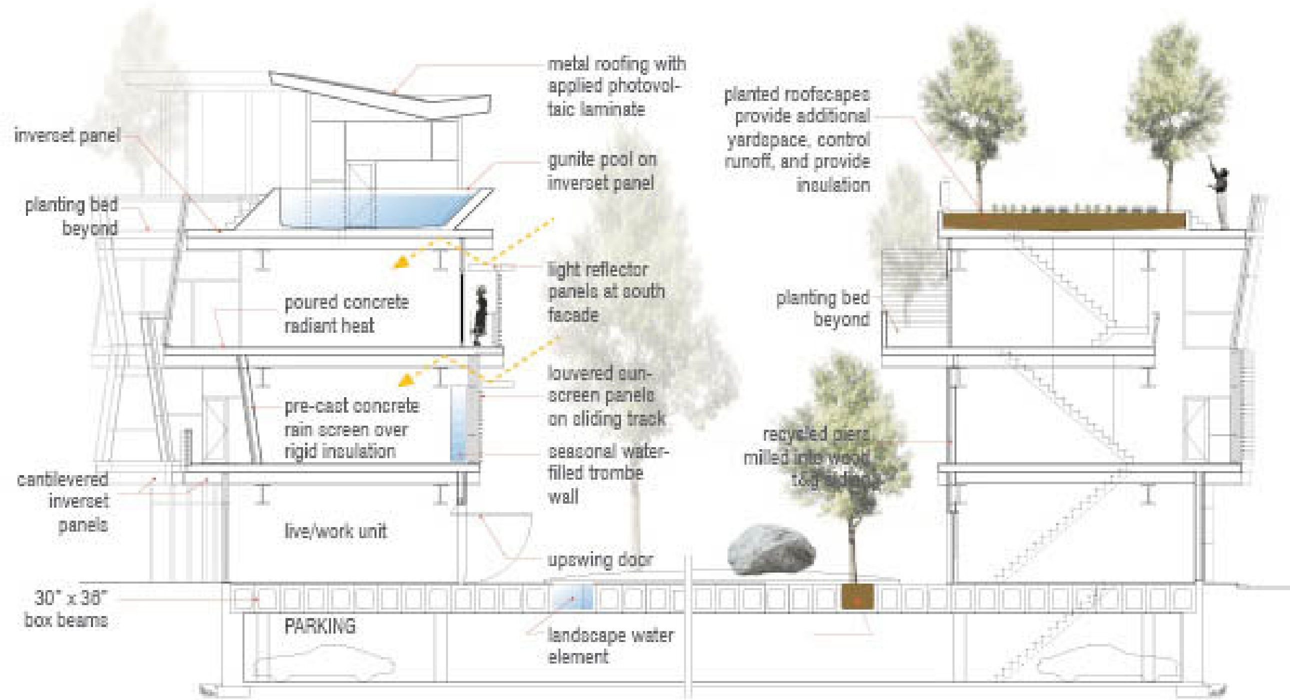
Located in Cambridge, Massachusetts

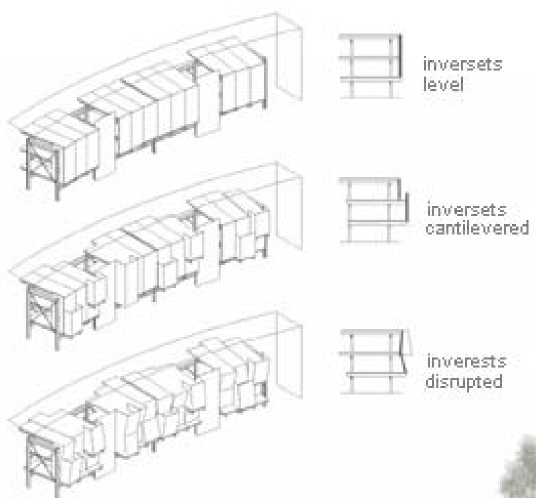


Boston's Big Dig project output a massive amount of infrastructural materials from the dismantling of the existing and temporary roadways. Big Dig Building Proposed by Single Speed Design relocates and reuses these infrastructural materials as building components, and adapts them to uses from structural members to exterior cladding.



These reused infrastructural materials from Big Dig can stand much higher loads than conventional building elements.





inverset panels are shifted to create a facade that reads as a 'vertical landscape' accentuating upper level plantings

Designed by Meyer, Scherer & Rockcastle

Built in 2003

Located in Minneapolis, Minnesota

“Rather than completely erase the existence of the former flour-processing plant that was destroyed by fire in 1991, the new museum was constructed within the remaining outer walls, now jagged and ragged but still intact.(4)”

The architects kept the remaining outer walls of the former flour-processing plant to express the differences of the old and the new. It makes sense for the museum it self to have some memorable elements that can remind visitors that the new Mill City Museum was a flour-reprocessing plant, and the historic value of such a building should not be taken away by the new Mill City Museum Project.

Designed by Rural Studio

Built in 1995

Located in Sawyerville, Alabama

Students built the walls of the chapel out of recycled tires.

The tires were filled and compacted with dirt which had been excavated from the site, and then stuccoed over. A nearby tire dealer had donated the tires to the project, since the tire dealer would get charged to dispose them. The roof of the chapel is covered with tin, and the roof beams were salvaged from an old house. Rock covers the floor of the chapel, which was taken from a nearby riverbed. Probably the only cost to build this chapel is the labor.

Designed by Rural Studio

Built in 1994

Located in Mason's Bend, Alabama

The 24-inch thick walls are stacked with hay bales that were stuccoed over with concrete, providing excellent and inexpensive insulation.

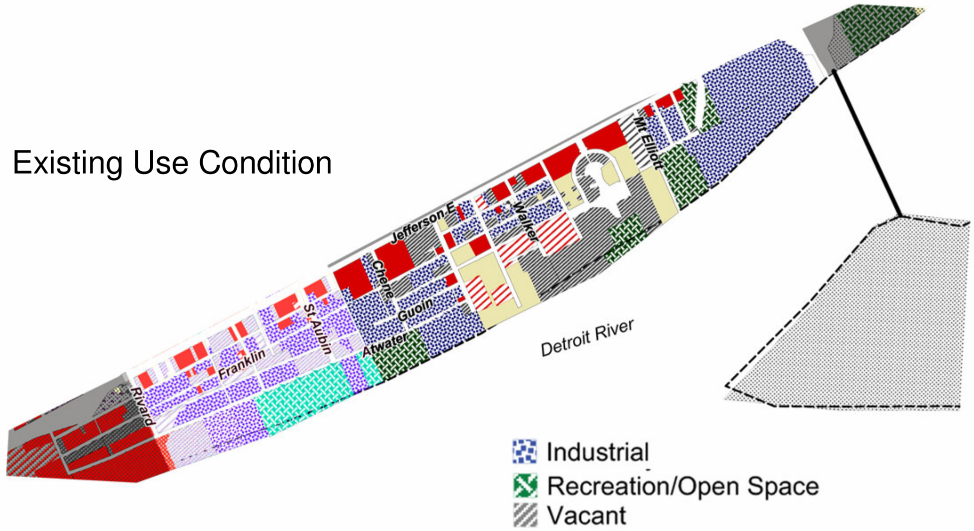
One wood-burning stove located in the center of the house heats the entire structure, and the awning windows in the front of the house provide natural ventilation throughout the summer. The house has a large front porch which was covered with an acrylic roof that can provide shading in the summer when the family spends most of their time on the porch.

The site chosen for this proposal is located on Atwater Street, and Orleans Street, in downtown Detroit. This site is occupied by an abandoned building, and the existing condition of the building is very deteriorated. The surrounding buildings were mostly industrial buildings which are now vacant. This site shows a direct connection to the state park across the street. This site provides a clear view to the heart of downtown Detroit, and also provides a clear view to Canada across from the river.

This Site offers an opportunity that will be suitable for many program types, uses, and developments. The site is right by the river which makes it possible to have a water transportation system. Like in New York City, they have a subway system and they also have water taxi transportation system. The site is also near many interstate express ways, like I-94,I-75, etc. The existing building on the site also adds historical value to the site.

The existing building known as The Detroit Globe Trading Company Building has been standing by the Detroit riverfront for over 145 years. Most building materials are deteriorated to a point that they no longer can be salvaged, except for the primary structural elements which are still salvageable. The floor plates, roofs, stairs, windows, doors, and slabs are basically gone due to deterioration. The bricks and CMU blocks in the interior space can be salvaged and reused again. The Globe Trading Building has historical significance for two reasons. It was one of the early industrial buildings that used the steel frame construction method with a brick curtain wall system. Secondly, from 1867 to 1925 the building was used for manufacturing and repairing marine steam engines and boilers for Great Lake Freighters and passenger vessels.

Existing Use Condition



Current Master Plan

MASTER PLAN

The City's future goal for the river front is to invite more dense residential development along the river. Some residential developments are on the way to the river front. Detroit City Council also wants to encourage some public uses by the river to preserve the great views for the public.

DEVELOPMENT

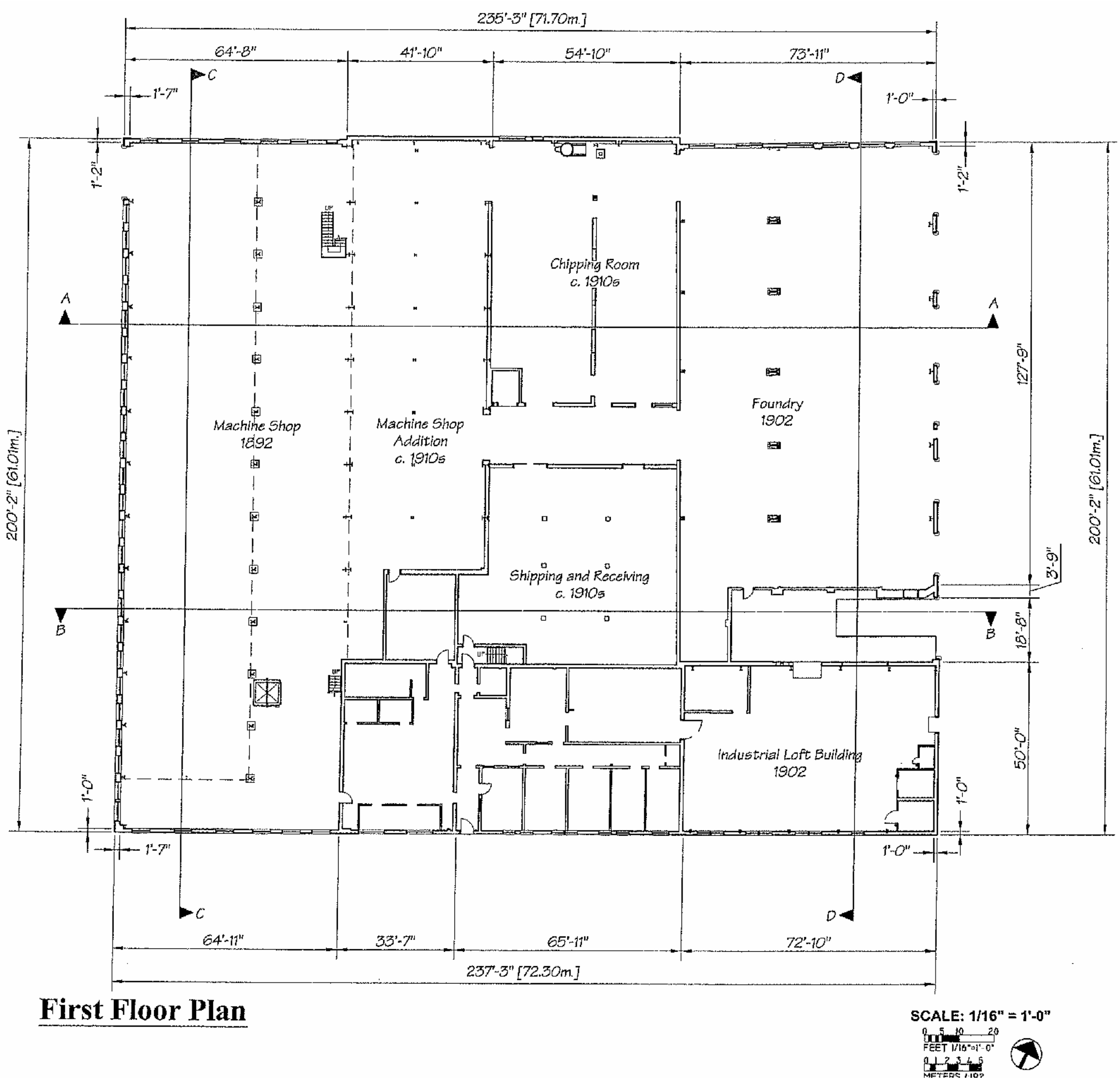
There are two condominium projects being proposed along the riverfront so far. These two projects are high density residential condominiums, also the use of the sites are in compliance with the Detroit City Council's master plan. These two proposed projects can attract more and more high dense residential and mixed-use development. According to the site analysis, the mixed-use of commercial and residential will be appropriate for the chosen site.

SURROUNDING BUILDINGS

EXITSING EXTERIOR BUILDING CONDITIONS:

EXITSING INTERIOR BUILDING CONDITIONS:

EXITSING BUILDING PLAN:



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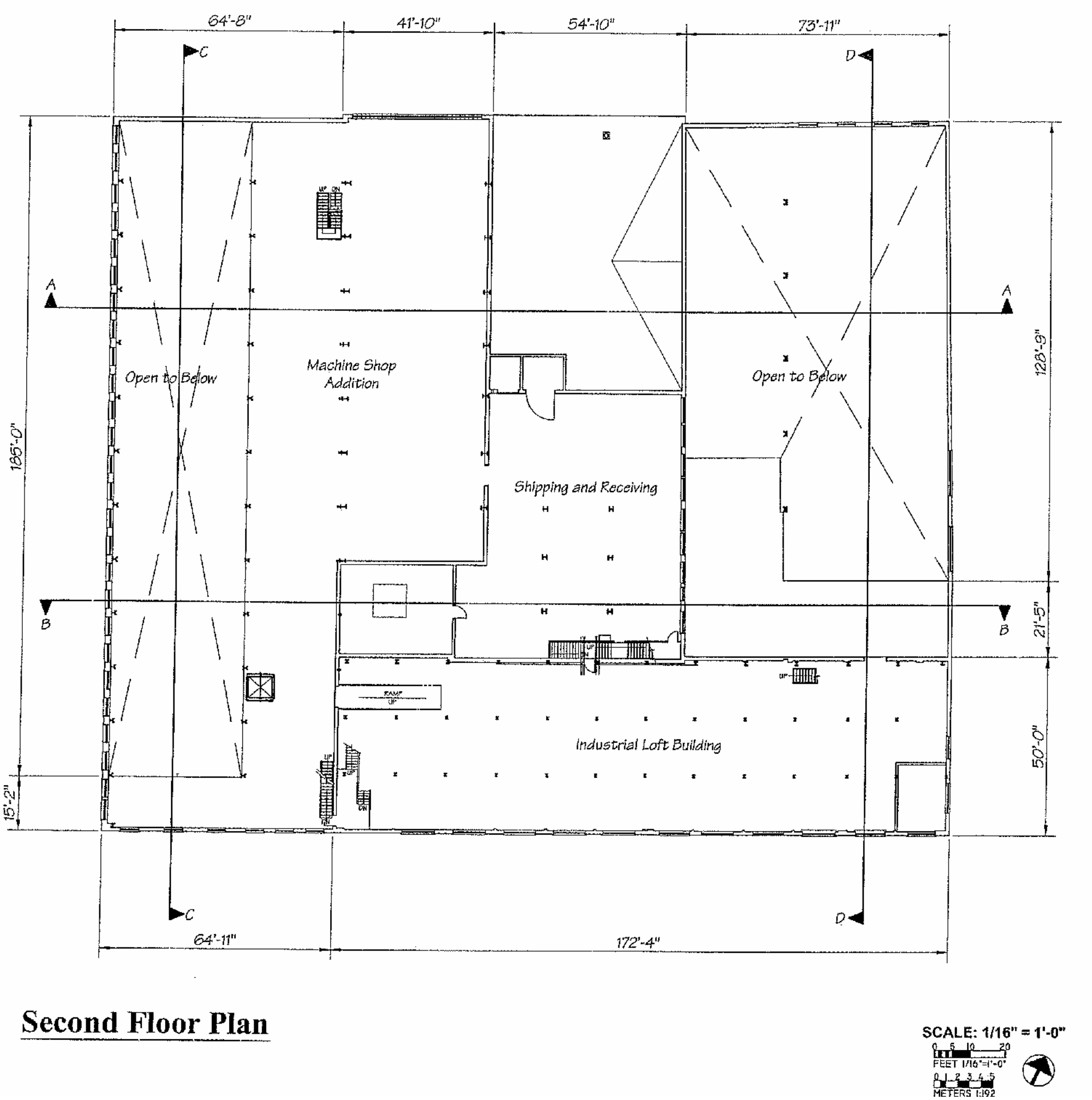

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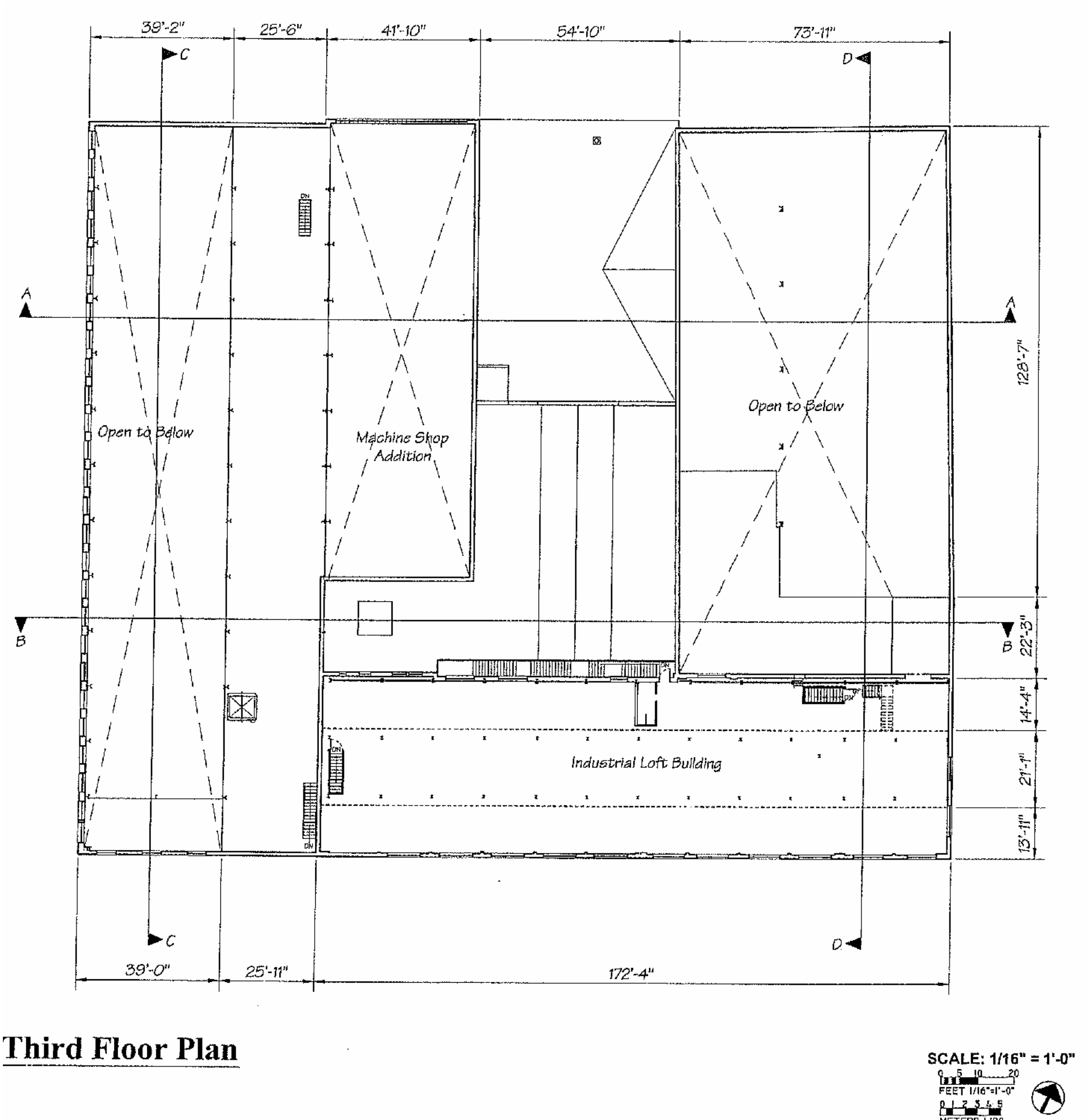
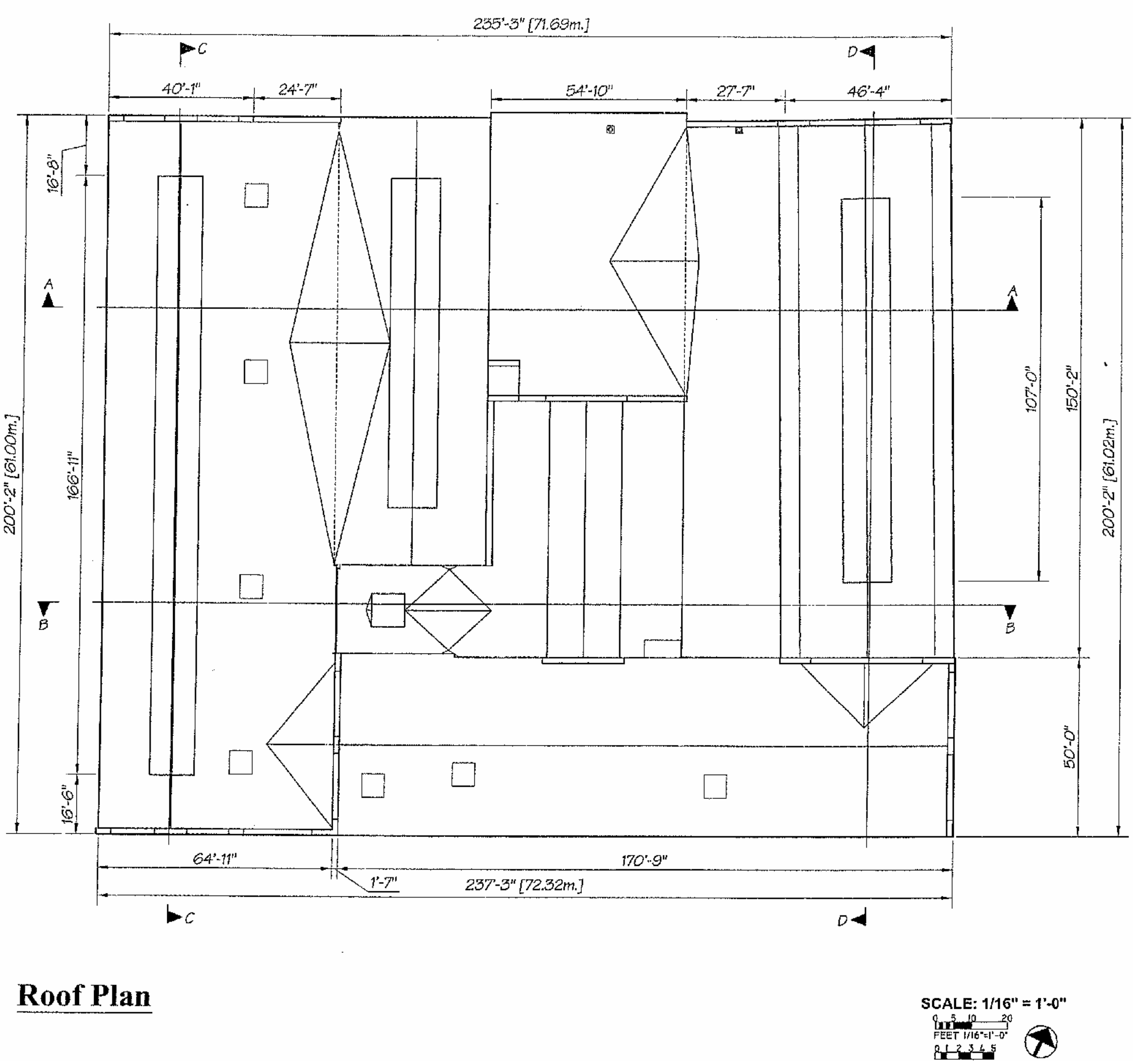
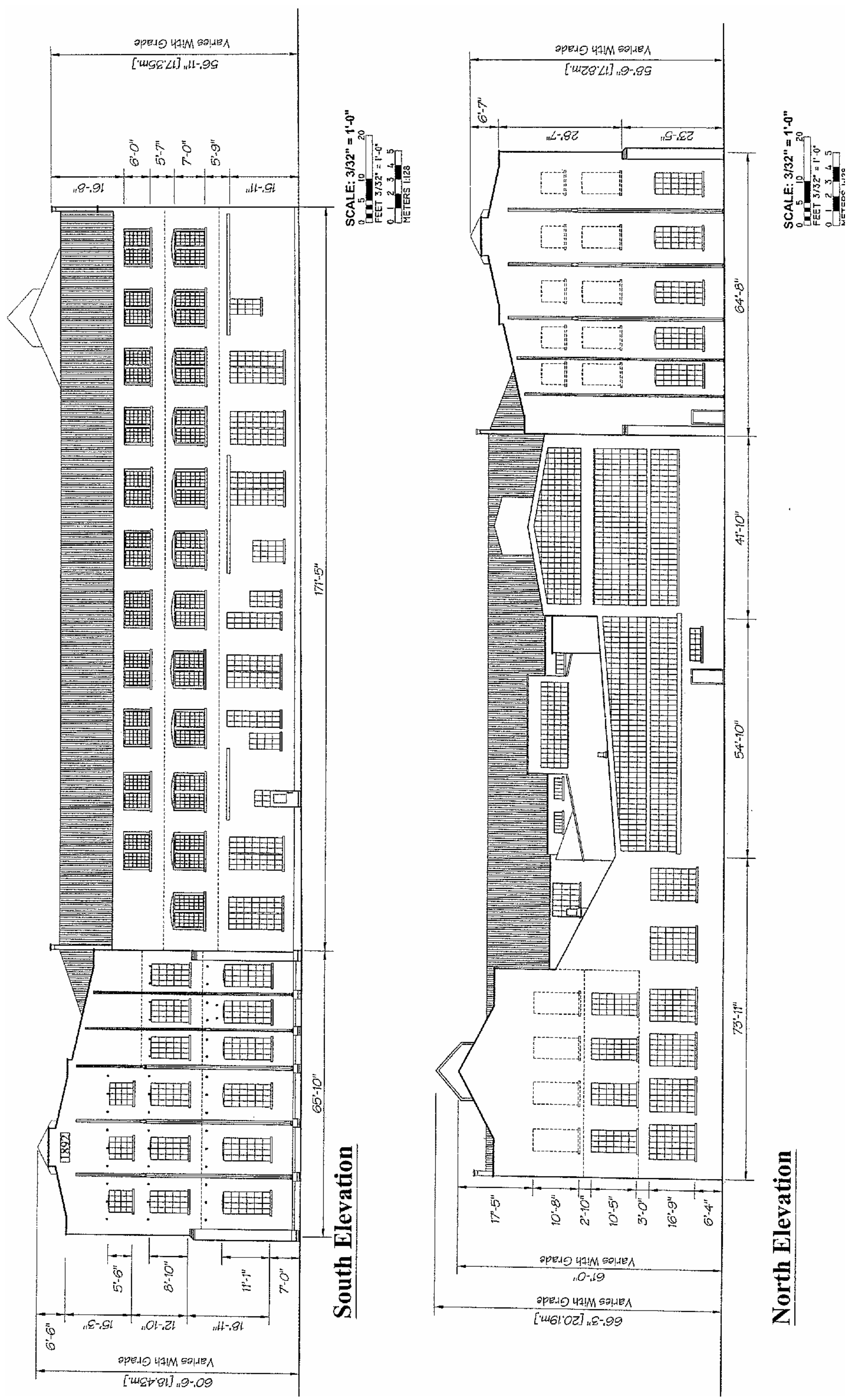


Third Floor Plan

EXITSING BUILDING PLAN:



EXITSING BUILDING ELEVATIONS:



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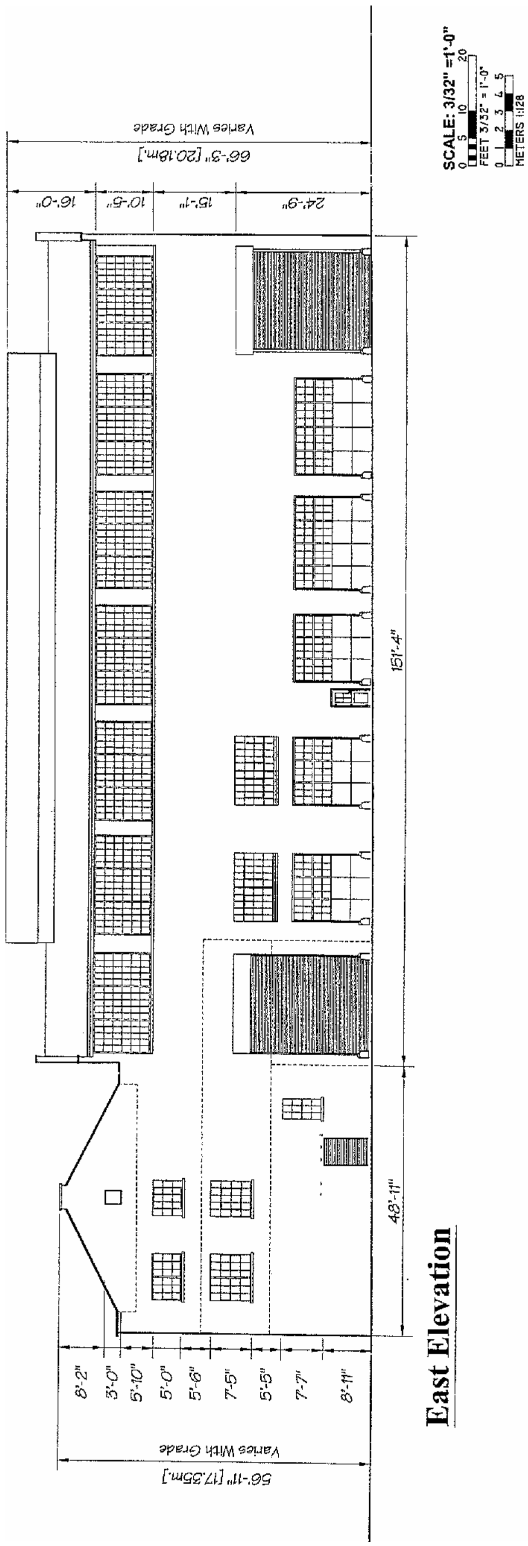
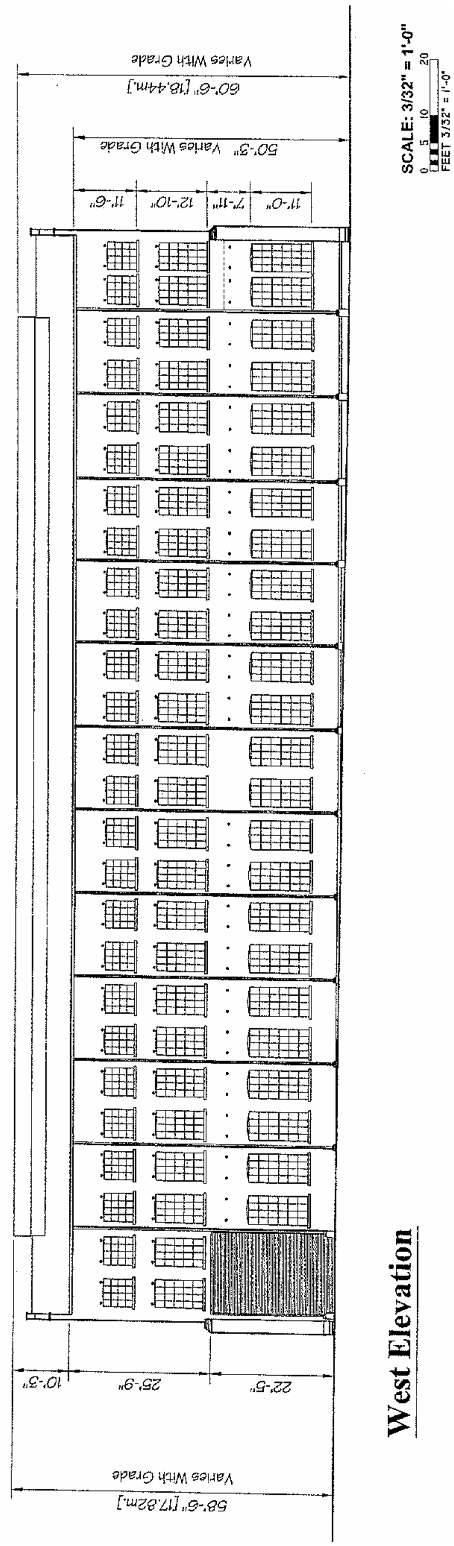
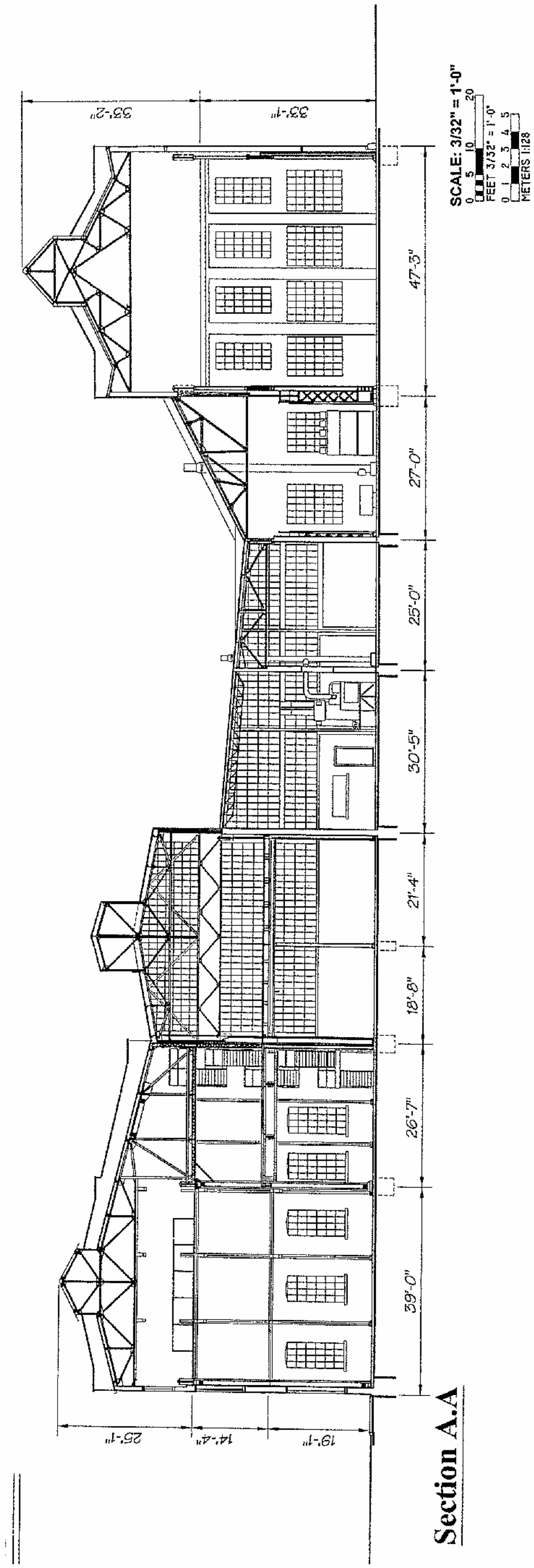
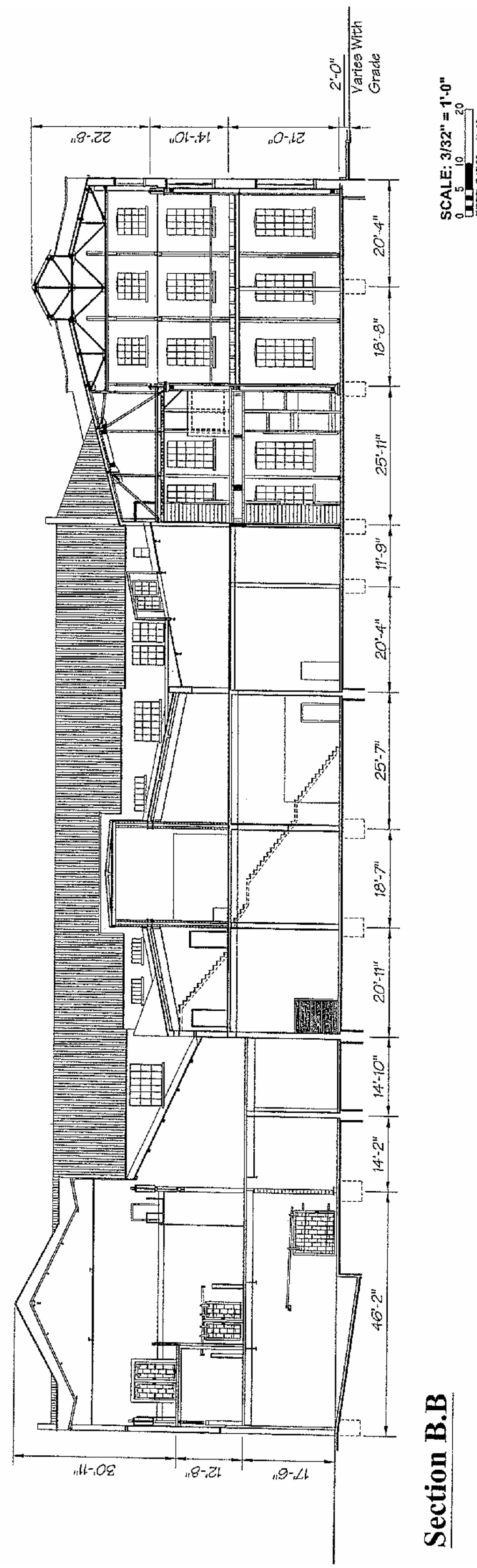




EXITSING BUILDING SECTIONS:





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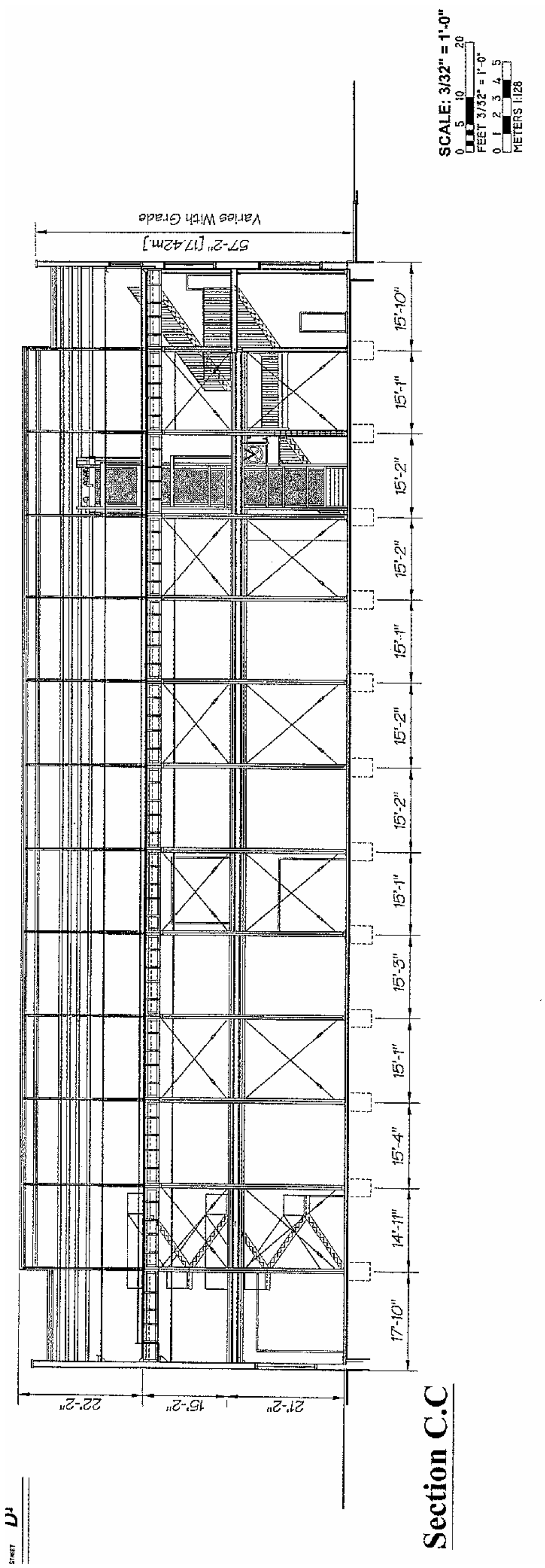
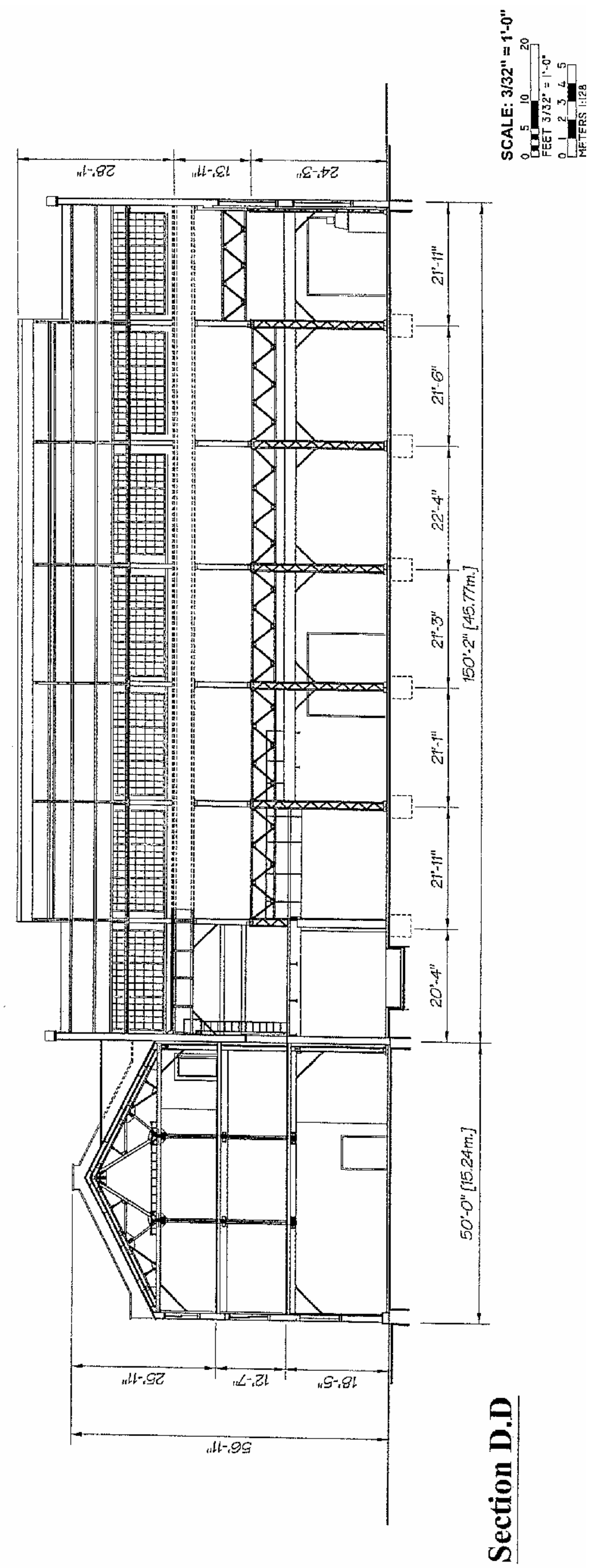


Section C.C



Section D.D

The first part of the programmatic equation is the residential space. The City of Detroit is currently encouraging high density residential use along the lower east side of the Detroit Riverfront to attract more residents. Subsequently, parking space is required to accommodate the residents' daily basic needs. The second and third floors of the existing Global Building will be devoted to residential space and roughly calculated gross area is 40,000 S.F. All proposed residential spaces will be located on the second and third floors of the building. The common area may be developed into a courtyard that serves the residents and neighborhoods.

A second part of the programmatic proposal is commercial uses. This may include offices, restaurants, retail, and a shopping plaza. The intention of theses programs is to serve the nearby surrounding communities and to encourage social interaction with the perimeter of the site. The roughly calculated area for commercial use is 30,000 S.F. which will be located on the main floor of the building.

The third component of the programmatic proposal is a public space. This involves devoting a portion of the main floor area to a community center. This community center is mainly used by the neighborhoods and the public during some events. The community center needs to be adaptable in order to hold different events that arise from time to time. For example, the community center may be used for a small concert hall during some events, and may be used as a meeting space for the residents. The total area devoted to the community center is about 15,000 S.F.

Circulation is the final component of the program. Circulation is how occupants move through the space horizontally and vertically. Circulation is also an indication of the transition between two distinctive spaces. Circulation will occupy a fair amount of the overall program since the initial program consists of many complex and distinctive spaces that require coordination to interweave them together. In common practice, designers may use 10 percent of the overall area as circulation during the initial programming, but in this case 15 percent may be used instead. From the 15 percent of overall area calculation, the total area needed for circulation will be about 12,750 S.F.

1. Office Space-- 13,750 SF

2. Retail Space -- 16,000 SF

3. Restaurant ---5,000 SF

4. Lobby / Public Restrooms ---1,000 SF

5. Vertical Circulation ---240 SF

6. Residential Space:

One Bedroom Unit -- (8) 1,500 SF

Two Bedroom Unit --------------------------------------- (10) 2,000 SF

Three Bedroom Unit -------------------------------------- (6) 2,500 SF

Four Bedroom Unit -- (4) 3,000 SF

Subtotal = 61,000 SF

7. Courtyard/Community Center (Outdoor Space) -------------20,000 SF

Indoor Space: Net = ***96,990 SF***

Outdoor Space: Net = ***20,000 SF***

9. Allowance (Mech./Ele./Cir.) 20% of Indoor Net Space -----***19,400 SF***

GROSS = 136,390 SF

TOTAL AREA: 13,750 SF **Space Capacity:** 90 Occupants

Number of Spaces: To Be Determine by Tenants

Purpose / Function: The purpose of this place is to be leased out for office uses. The number and size of units will depend on the tenant's needs. This space provides a good opportunity for the residents to work in the same building.

Spatial Relationships: The office space will be located on the first level of the east building. The existing east building has window openings that are spaced at equal distance, which makes it well suited for office space. The floor to floor height is taller in the first floor level, that is another reason to place the office space in the first level.

Activity: The only time this space will stay active is during typical working hours. Outside of typical working hours, the office space will stay vacant.

Special Consideration: A typical office space is like a cubic room with no natural light. In this case, a huge amount of natural light is being introduced at both the courtyard side and the street side.

Behavioral Considerations: Both exterior and interior spaces should be well renovated due to long term vacancy, and poor existing condition.

Equipment / Furnishing: Any necessary equipment and furniture will be designed and installed by the tenants.

Structural Systems: The existing structure will remain, refinished and reused.

Mechanical / Electrical Systems: A VAV Mechanical System will be used to achieve good air quality and to accommodate a high air return rate.

Site / Exterior Environment Considerations: The design provides a social relationship between the Office Space and Courtyard Space.

TOTAL AREA: 16,000 SF **Space Capacity:** 105 Occupants

Number of Spaces: To Be Determine by Tenants

Purpose / Function: This place is to be leased out for retail uses. The number and size of units will depend on the tenant's needs. This space provides a good opportunity for the residents to work and shop in the same building.

Spatial Relationships: The retail space will be located on first level of the west and south building. The floor to floor height is taller in the first floor level, which makes it more effective to devote these space for retail.

Activity: The times that these spaces will stay active will depend on the tenants and their specific use. The preferred physical activity of the space will be shop places, small markets, and other stores that are appropriate for daily needs.

Special Consideration: The relationship and experience through the Courtyard is very specifically designed. Retail Space has clear visibility on the street side to attract customers through the visibility of displayed items. However the entrances to the Retail Spaces are on the Courtyard side, so the customers have to walk through the Courtyard to get into the Retail Stores.

Behavioral Considerations: Both exterior and interior spaces should be well renovated due to long term vacancy, and poor existing condition.

Equipment / Furnishing: Any necessary equipment and furniture will be designed and installed by the tenants.

Structural Systems: The existing structure will remain, refinished and reused.

Mechanical / Electrical Systems: A VAV Mechanical System will be used to achieve good air quality and to accommodate a high air return rate.

Site / Exterior Environment Considerations: The design provides a social relationship between the Retail Space and Courtyard Space.

TOTAL AREA: 5,000 SF **Space Capacity:** 100 Occupants

Number of Spaces: 1

Purpose / Function: The purpose of this space is to be leased out for restaurant use. This space provides a good opportunity for the residents to work and enjoy the food service in the same building.

Spatial Relationships: The Restaurant space will be located on first level of the south building. The south building provides a magnificent view toward the park, the river, and Canada.

Activity: The Restaurant space provides a very nice space for residents and neighbors to relax and enjoy the food.

Special Consideration: The restaurant has clear visibility on the street side to attract customers. However the entrance to the Restaurant is through the lobby.

Behavioral Considerations: Both exterior and interior spaces should be well renovated due to long term vacancy, and poor existing condition.

Equipment / Furnishing: Any necessary equipment and furniture will be designed and installed by the tenants.

Structural Systems: The existing structure will remain, refinished and reused.

Mechanical / Electrical Systems: A VAV Mechanical System will be used to achieve good air quality and to accommodate A high air return rate.

Site / Exterior Environment Considerations: The design provides a social relationship between the restaurant and Courtyard Space.

TOTAL AREA: 11,000 SF **Space Capacity:** 50 Occupants

Number of Spaces: 4

Purpose / Function: The purpose of this space is to serve as a connector between the courtyard, and the street. One of these lobbies is indoor, one is semi-indoor, and two are outdoor lobbies. These spaces allow the inhabitants to have a place to pause before they enter into a different environment.

Spatial Relationships: The lobbies serve as a transition from street to courtyard, or from courtyard to street.

Activity: The main activity in the lobbies is socializing.

Special Consideration: None

Behavioral Considerations: Both exterior and interior spaces should be well renovated due to long term vacancy, and poor existing condition.

Equipment / Furnishing: Benches, tables, and a fountain will be provided.

Structural Systems: The existing structure will remain, refinished and reused.

Mechanical / Electrical Systems: Naturally Ventilated.

Site / Exterior Environment Considerations: These Lobbies are between the Courtyard, Street, and Buildings.

TOTAL AREA: 61,000 SF **Space Capacity:** 85-100 Occupants

Number of Spaces: 28

Purpose / Function: The purpose of these spaces are to be leased or sold as residential apartments. The ultimate function of these apartment units is to bring back more residents to downtown, Detroit.

Spatial Relationships: All residential units will be placed on the second and third floor levels of the buildings.

Activity: Sleep, rest, eat and other daily activities.

Special Consideration: The residents are a major user of the Courtyard Space. The Courtyard provides a pubic and yet a private space for the residents.

Behavioral Considerations: Both exterior and interior spaces should be well renovated due to long term vacancy, and poor existing condition.

Equipment / Furnishing: All new fixtures will be installed, and partition walls will be constructed out of salvaged pallets. Chair leg furniture units will be constructed out of salvaged chair legs and translucent panels that are recycled from plastic.

Structural Systems: The existing structure will remain, refinished and reused.

Mechanical / Electrical Systems: A VAV Mechanical System will be used to achieve good air quality and to accommodate a high air return rate.

Site / Exterior Environment Considerations: The courtyard space is surrounded by the residential units.

TOTAL AREA: 20,000 SF **Space Capacity:** 100 Occupants

Number of Spaces: 1

Purpose / Function: The purpose of this place is to serve the residents, inhabitants, and surrounding neighborhoods. The courtyard space will provide a different environment, space, and views for the inhabitants. The Courtyard is designed to have a place for the inhabitants to socialize, and interact with each other. The Courtyard is open to anybody from the community.

Spatial Relationships: The courtyard will consist of a garden, a community center, and path ways.

Activity: The courtyard space can be treated as a mini-park, where people can do exercise, socialize, relax, and other activities.

Special Consideration: Even the Courtyard space contains some reused materials. The salvaged CMU wall was designed as a spatial divider, which defines the boundary of each space within the Courtyard. Also salvaged brick was used as pavement in some areas to define the socializing area.

Behavioral Considerations: Native vegetation will be brought into the Courtyard environment.

Equipment / Furnishing: Fixed furniture will be designed to stay.

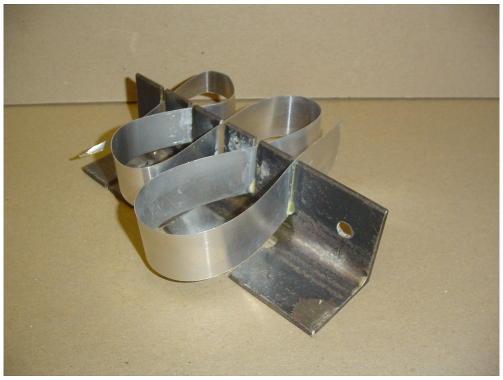
Structural Systems: New pavement will be required for the Courtyard space.

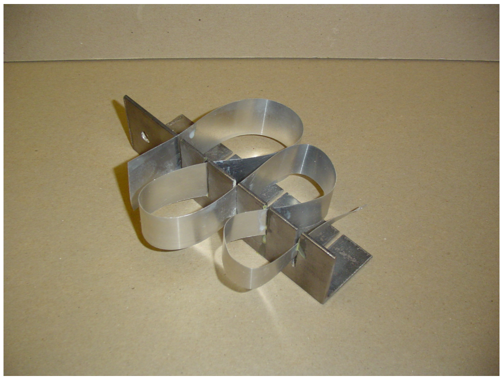
Mechanical / Electrical Systems: Open space will provide natural ventilation for the space.

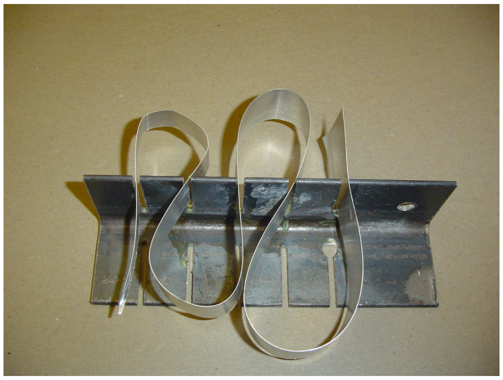
Site / Exterior Environment Considerations: The courtyard will be located in the core among the buildings.

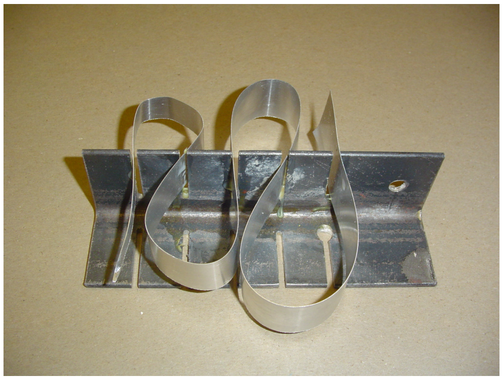
Abstract Model:

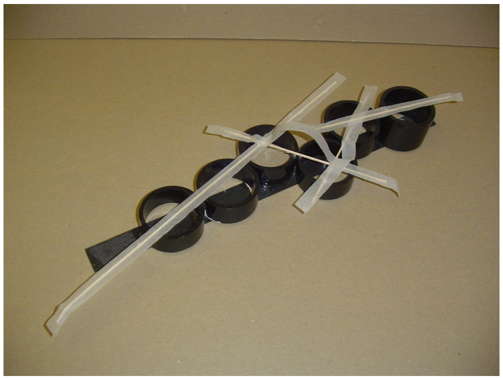
This is one of the earliest ideas toward the design of the project. This abstract model illustrated the idea that the proposed wall that can be functional in both exterior and interior spaces. The new proposed walls can interweave through the existing brick wall to embrace it. The existing building is constructed out of brick veneer and a steel structure. The existing brick façades need a fair amount of improvement work on particular areas where the bricks are badly deteriorated. The idea here as illustrated is to repair the area where the existing bricks are badly deteriorated by inserting a new wall system that can be seem from the outside, but also can be seen from the inside while the existing brick wall is totally covered in the middle.





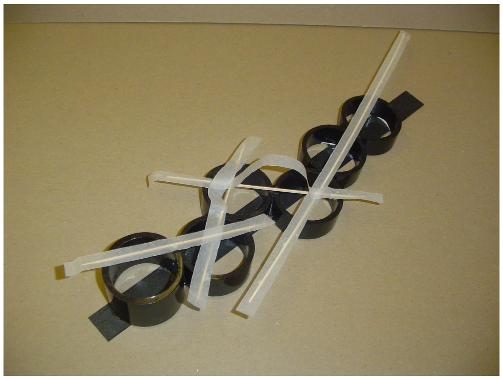


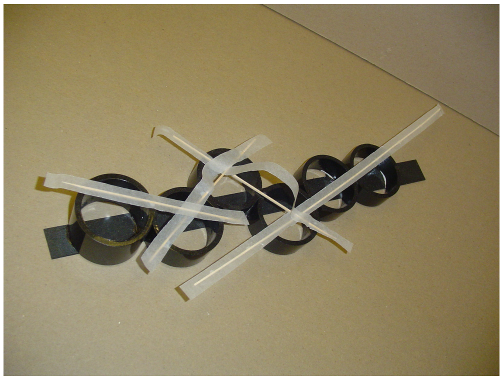


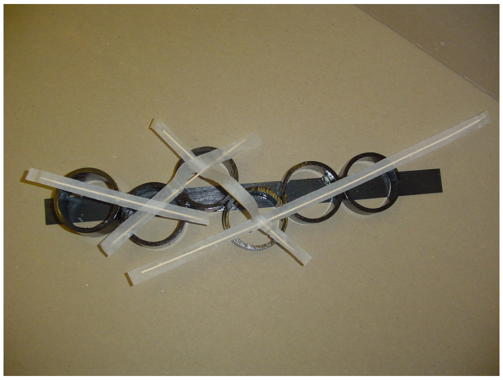


Abstract Model:

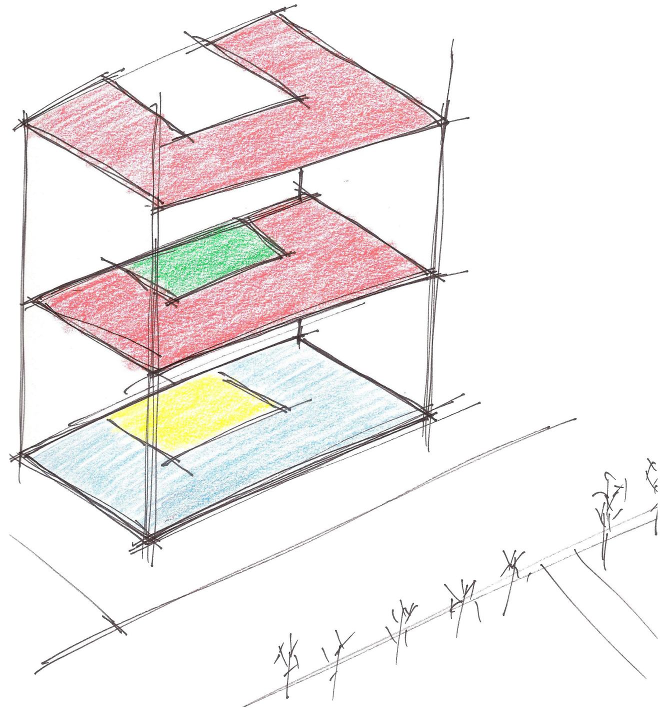
This is one of the earliest ideas addressing the circulation issues for a project that consists of variety functions. Each black cylinder in the abstract model represent a unique function, and they are all connected by the black strip underneath. The black strip can be interpreted as the building which contains the many different functions within it. The white skinny strips represent circulation for those functions that should be linked together. The proposed program for the project consist of many different functions, such as: residential apartments, office space, retail, restaurant, and outdoor space. These functions need to be designed with proper circulation in order to be functional. The circulation means may include: ramp, stair, corridor, and elevator.



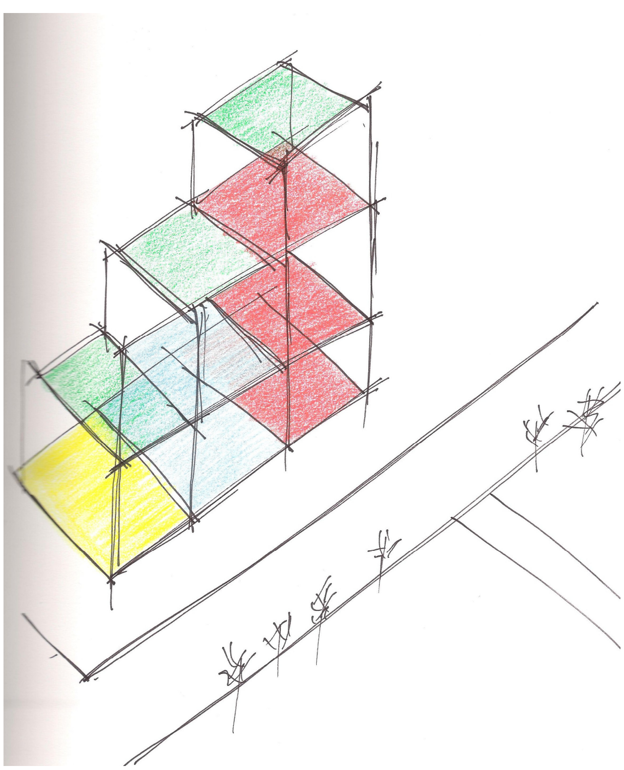


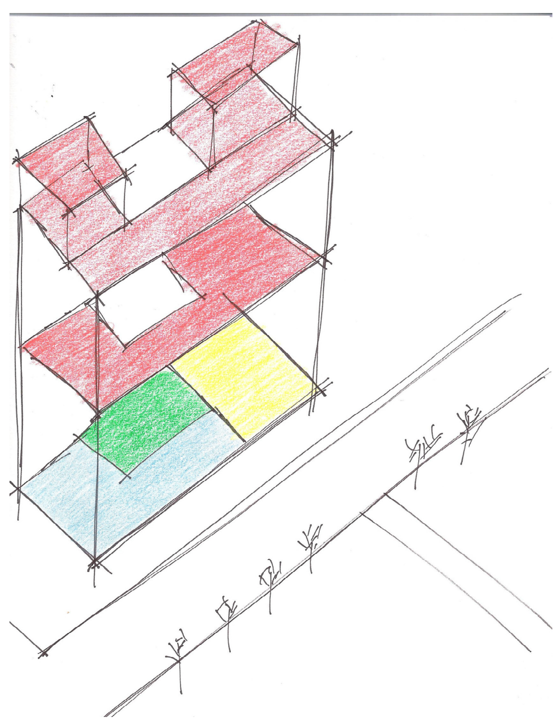


Program Diagrams:

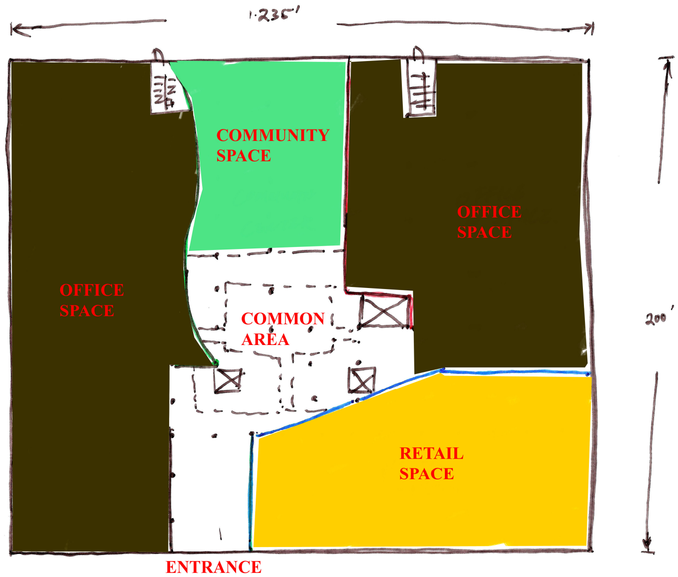


These are the initial program diagrams, where the red represents the residential apartments, green represents the green space, yellow represents the outdoor space, and blue represents the commercial space. The most logical and efficient diagram is the one on upper right corner.

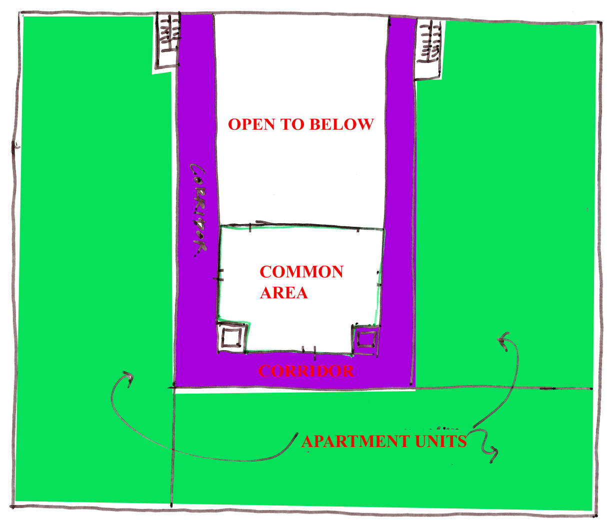




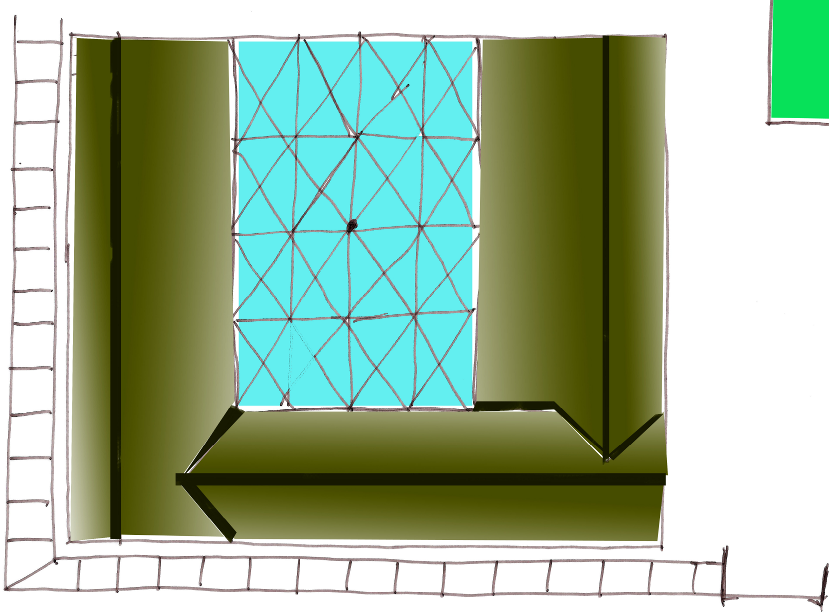
First Building Plan Sketch:



First Level Plan

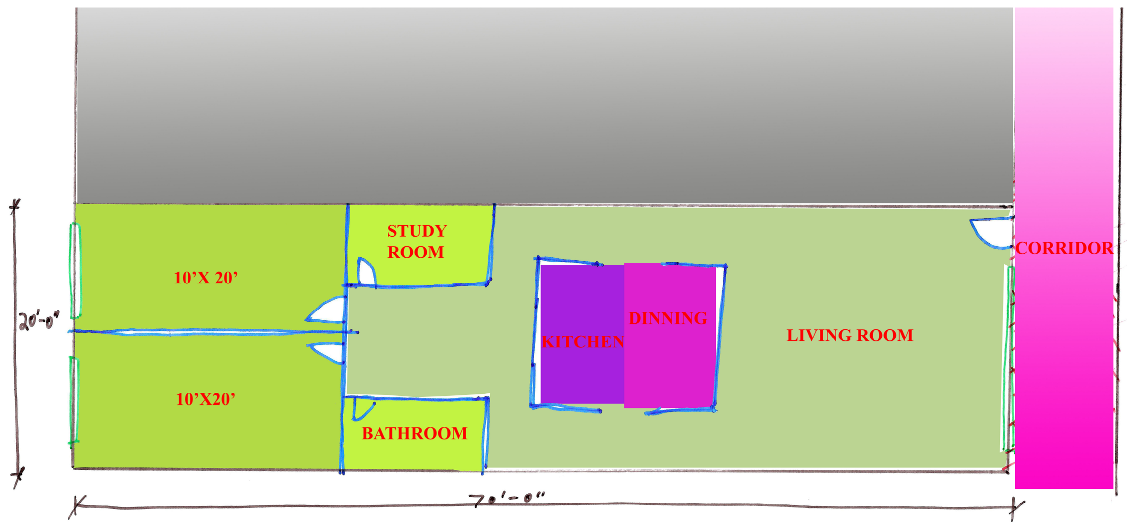


Second & Third Level Plan

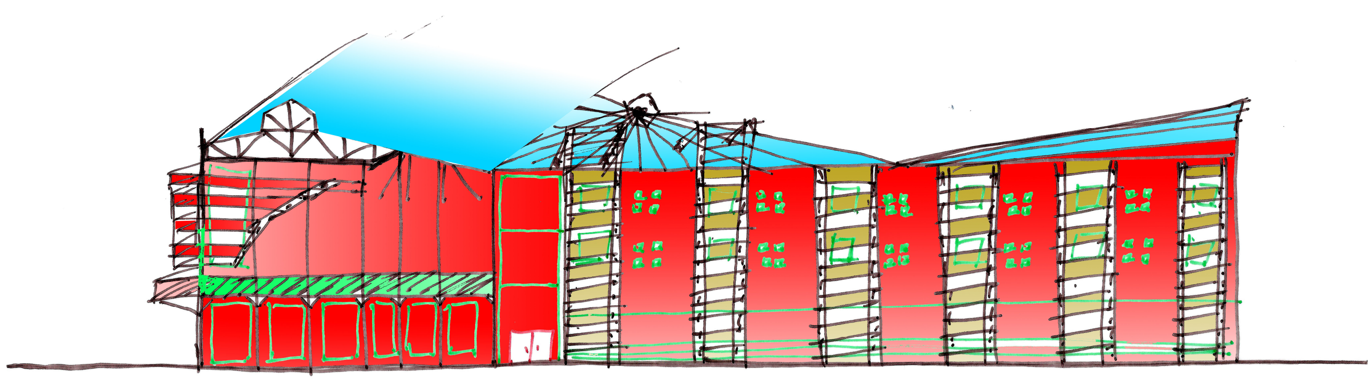


Roof Plan

First Building Plan & Elevation Sketch:

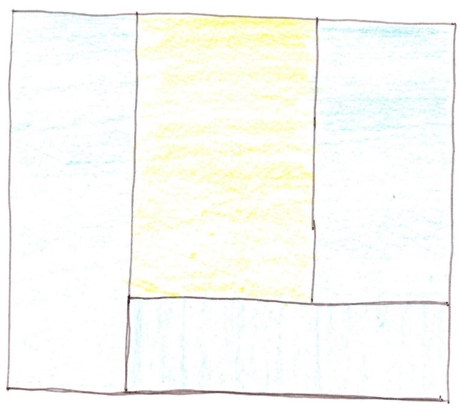


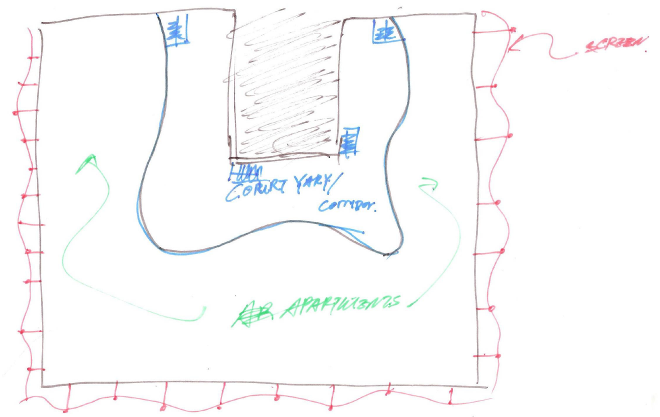
Apartment Unit Layout

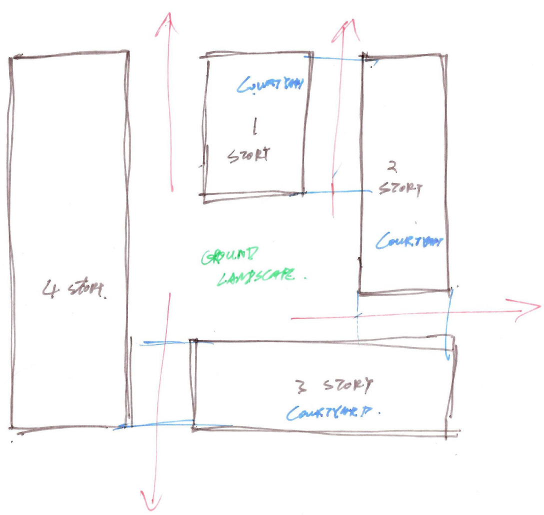


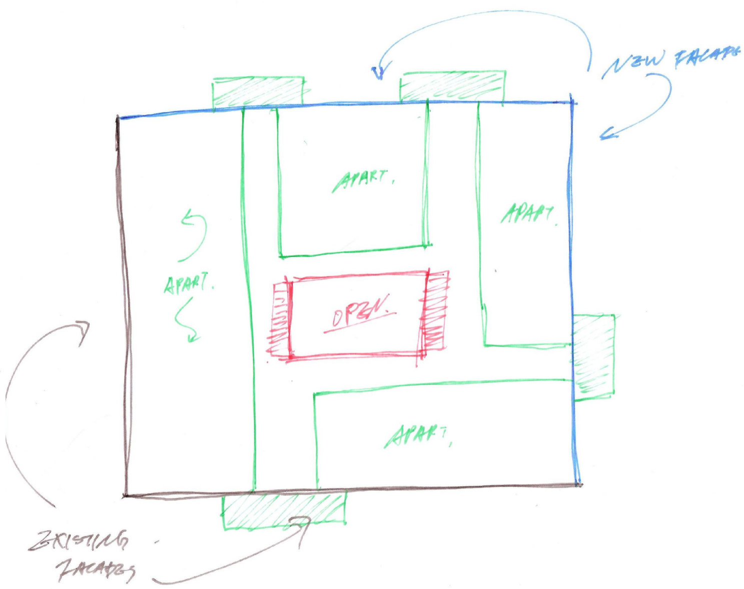
South Elevation

Sketches:

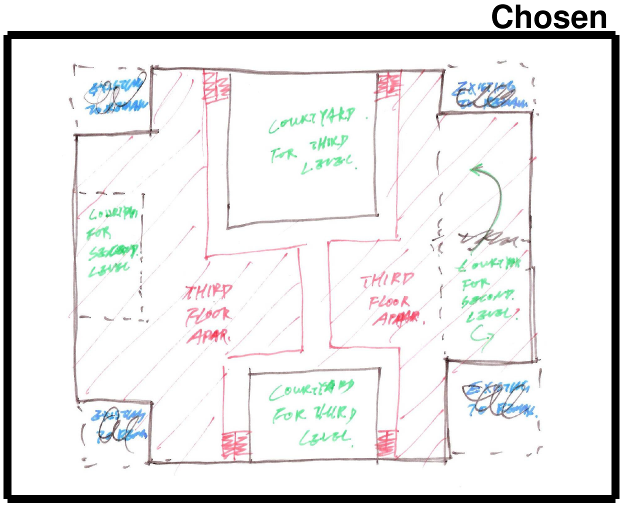








Chosen



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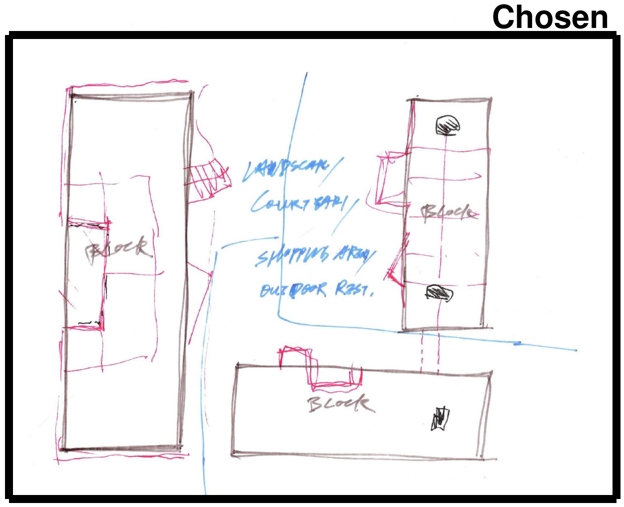
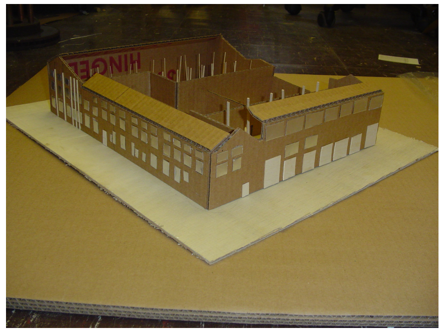
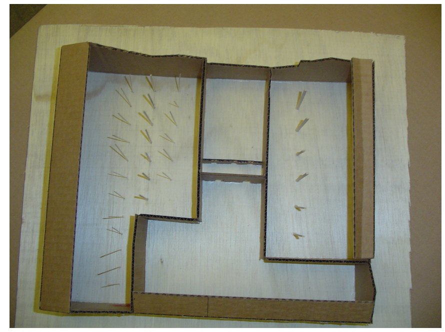


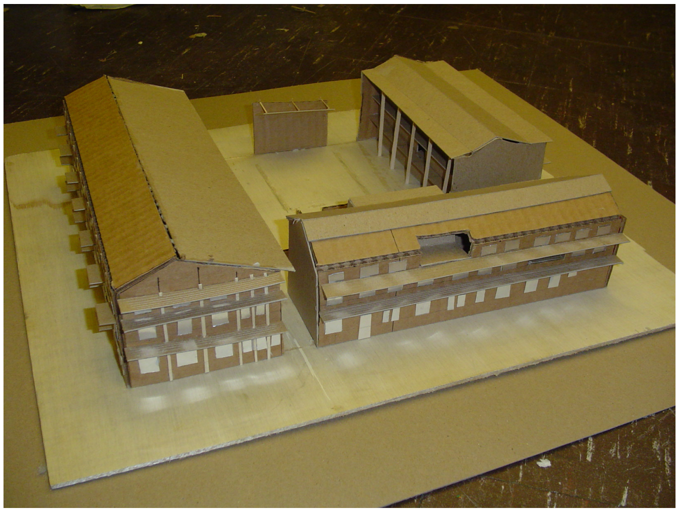
Sketch Model in Progress:

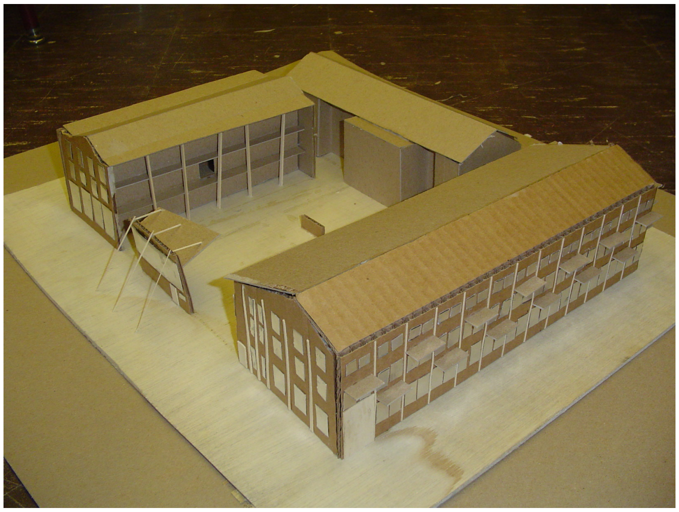
Existing Building Condition Model


This model is modified from the above model based on the chosen sketches from the previous page. Basically the three main structures are to remain, and the rest of the structures in the middle part are to be torn out. The middle part will be developed into outdoor space for the neighborhood.

Sketch Model in Progress:



This model is another modification of the previous model. Where the new walls on the courtyard (middle portion of the model) side are completely changed. Most of the exterior walls on the outer edge are existing old brick walls. The façades toward the courtyard will be designed with a lot of freedom. A suggestion of these freedoms are expressed on the model. One of the blocks has a residential corridor, and one block has a curved façade, and the other block is has zigzag walls toward the courtyard side.



Possible Found Materials:

Pallets

Pallets are being thrown away by many market stores just because part of the pallets are broken, while many people don't realize the possible value of these broken pallets.

Chair Legs

Chair Legs generally come from schools and other assembly facilities. These facilities can generate a large amount of waste when they are ready to replace the old chairs for the facilities. The replaced chairs will be disassembled, then certain components maybe recycled. Recycling is good strategy for sustainability, but a better strategy is direct reuse.

Highway Signs

Highway Signs are replaced when they are damaged by people, tornado, or other factors. The most convenient place for disposal is a metal recycling facility, but again there may be an opportunity for direct reuse.

Possible Found Materials:

Steel Plates

Steel Beams

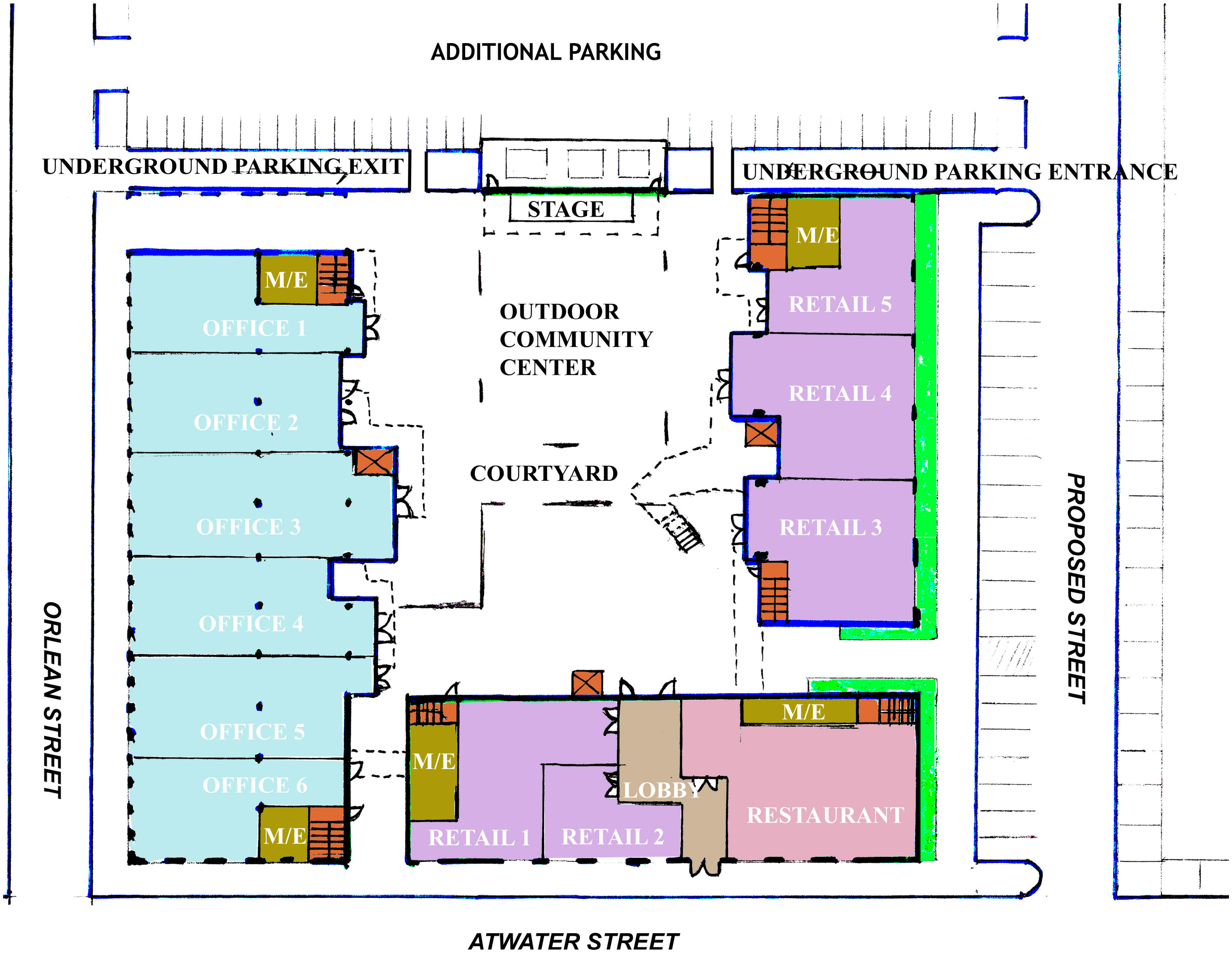
Fence

Aluminum Scraps

Automobile Rim

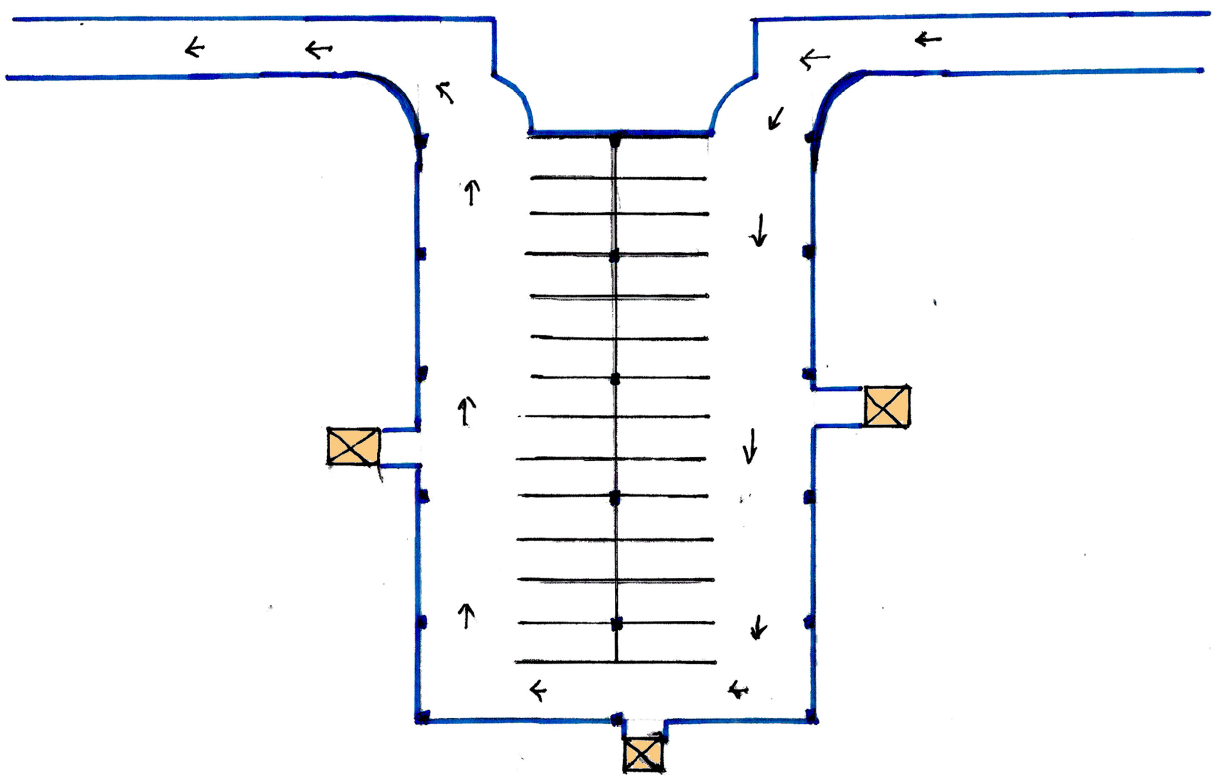
Steel Barrels

FIRST FLOOR PLAN

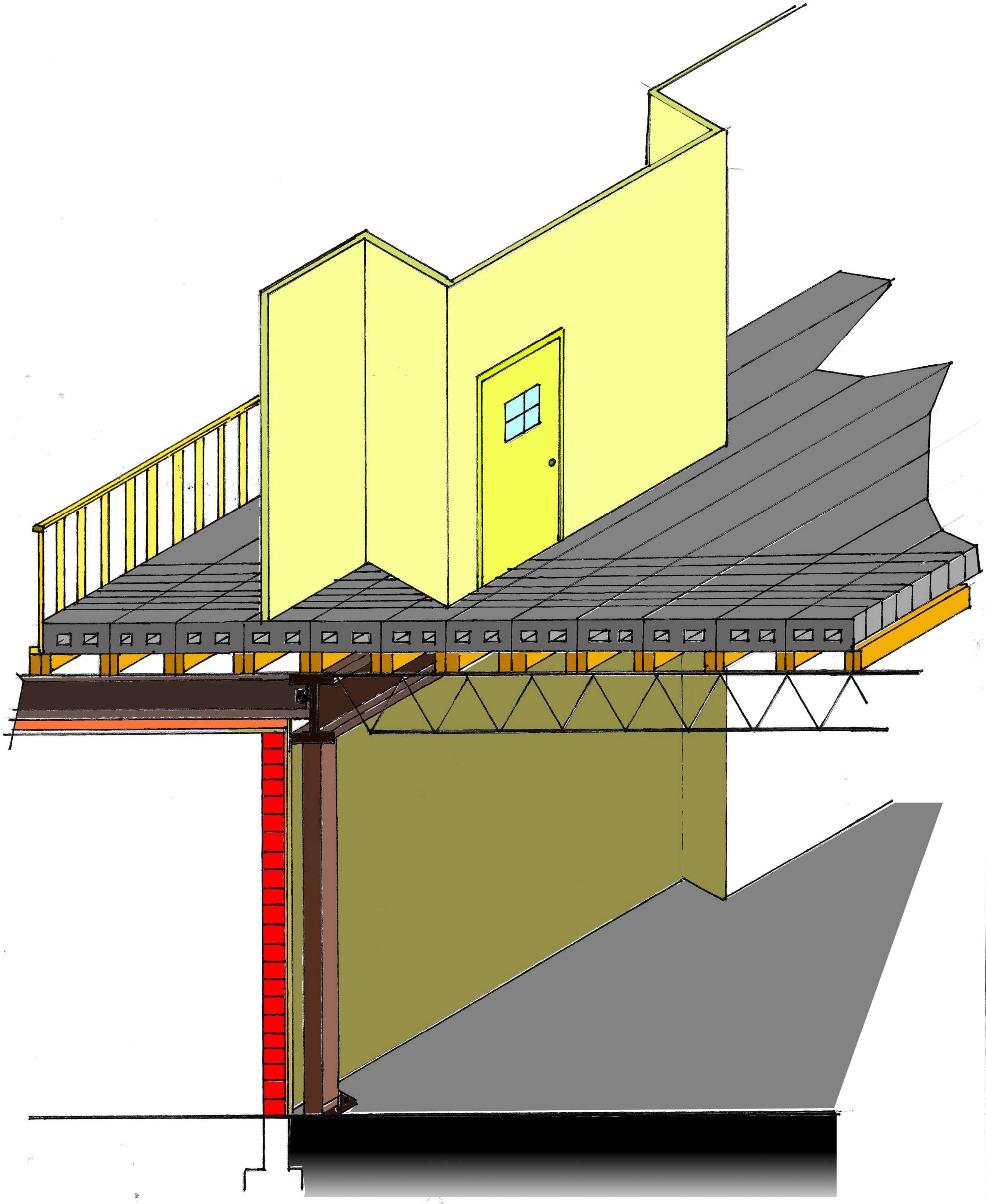


SECOND & THIRD FLOOR PLAN

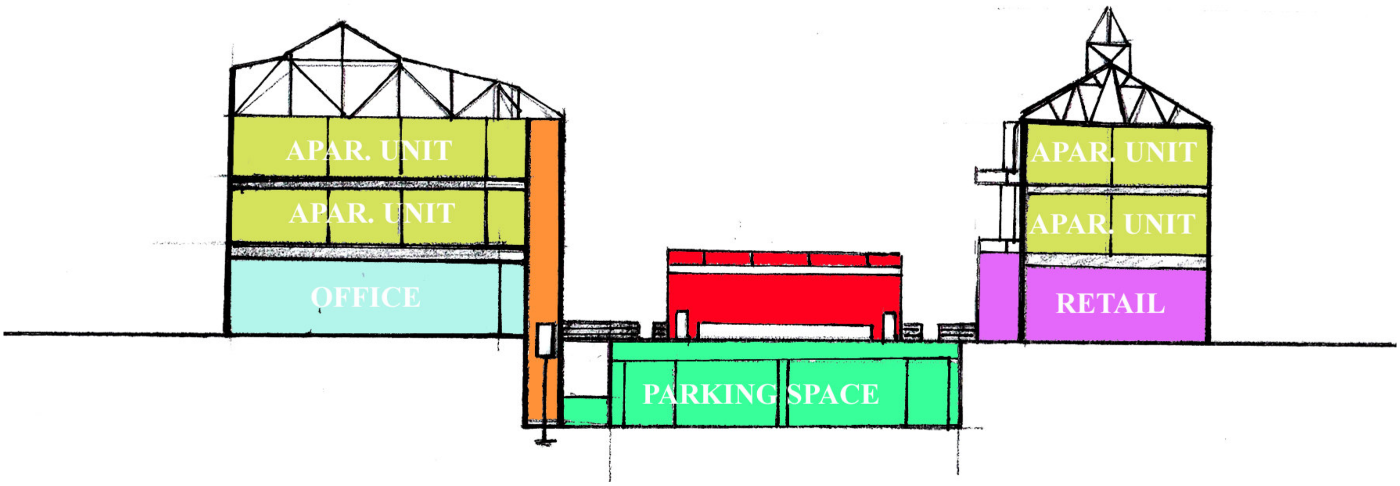
UNDERGROUND PARKING PLAN



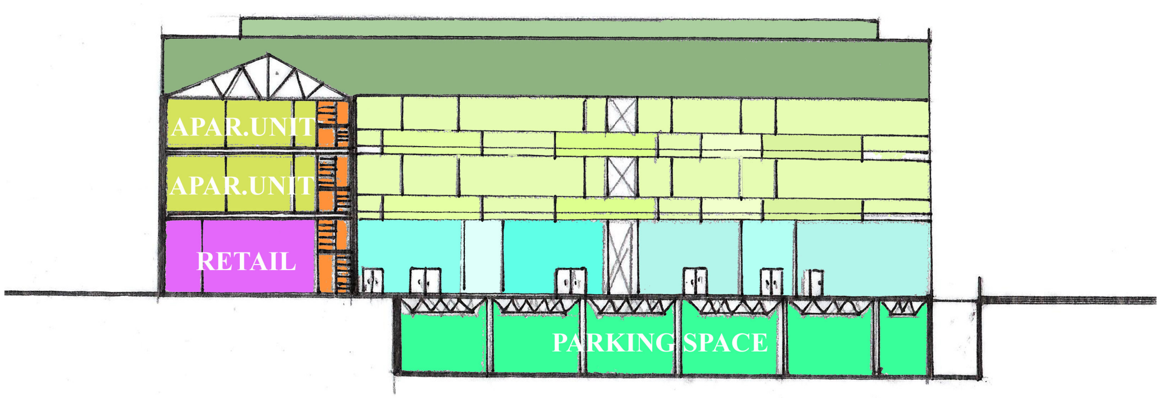
WALL SECTION

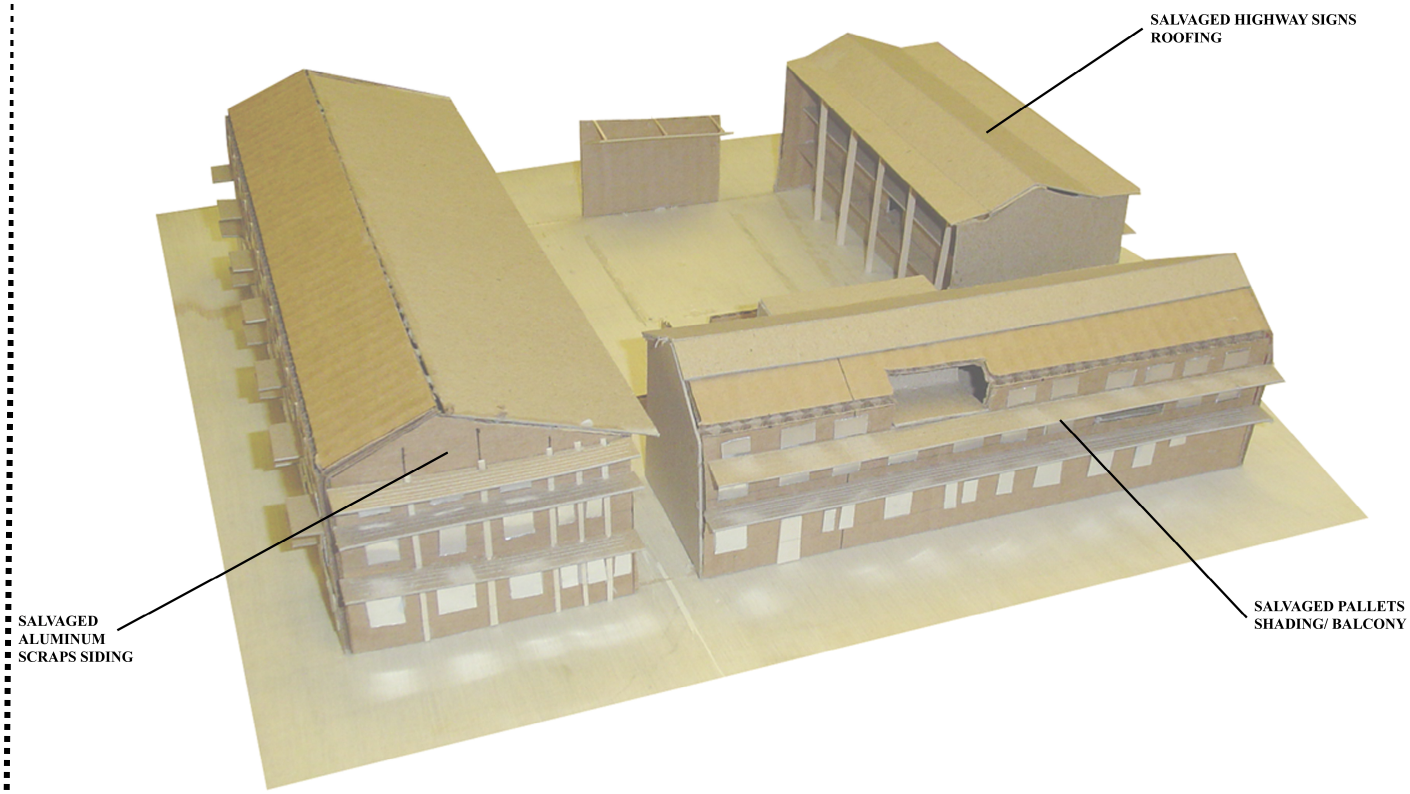


EAST – WEST BUILDING SECTION

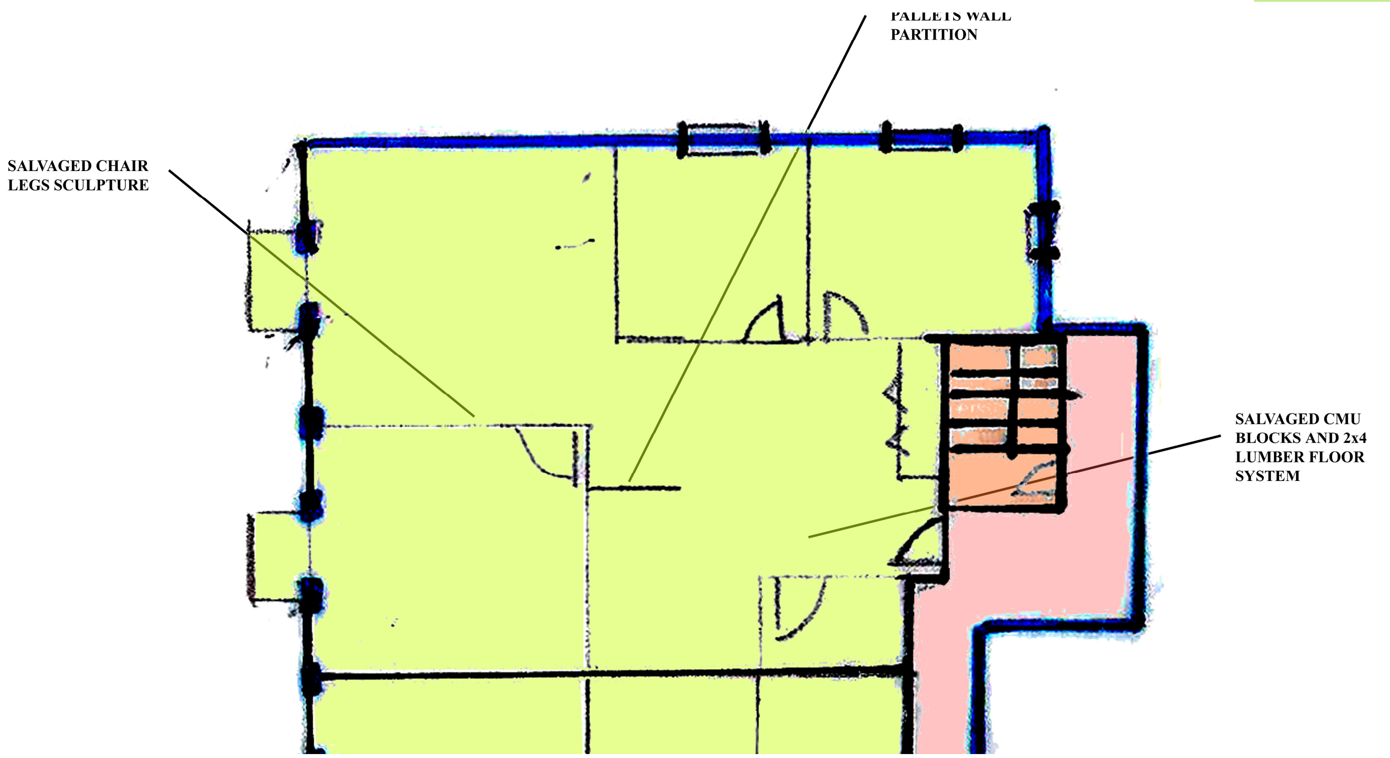


SOUTH - NORTH BUILDING SECTION




SALVAGED HIGHWAY SIGNS
ROOFING
SALVAGED
ALUMINUM
SCRAPS SIDING
SALVAGED PALLETS
SHADING/ BALCONY

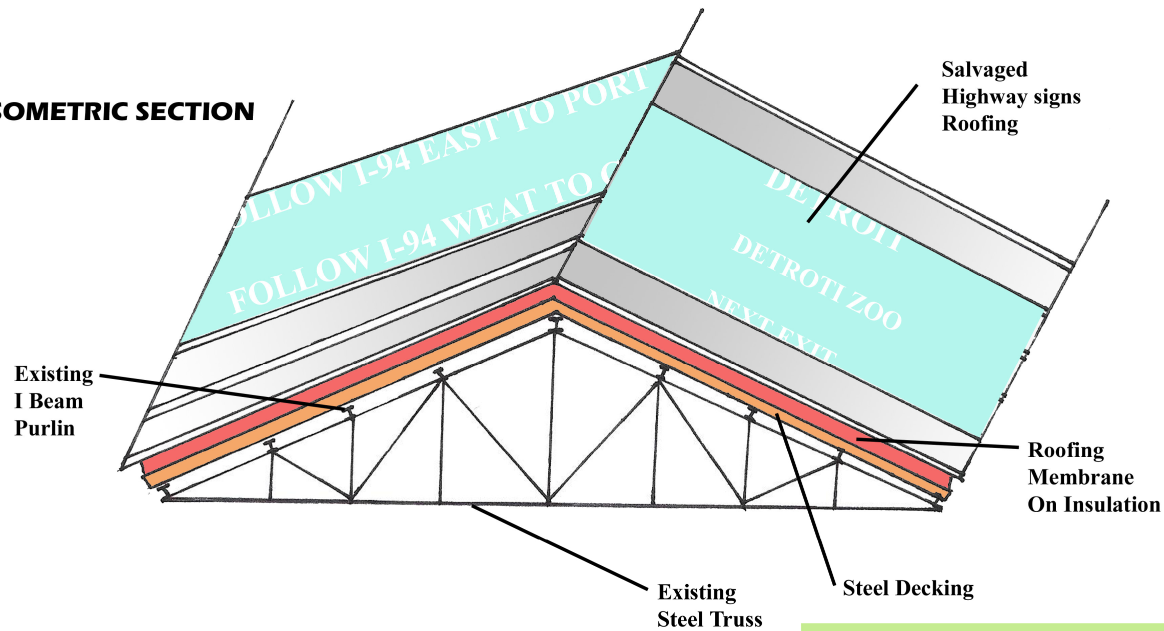
"JUNK"


PALLETS WALL
PARTITION
SALVAGED CHAIR
LEGS SCULPTURE
SALVAGED CMU
BLOCKS AND 2x4
LUMBER FLOOR
SYSTEM

"JUNK"

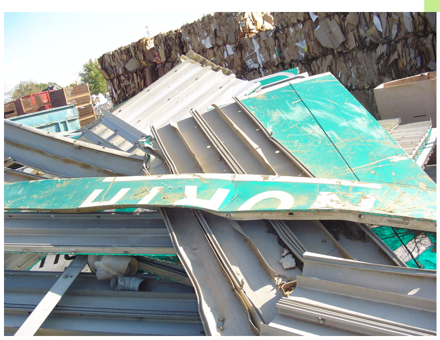
ROOF PLAN

ISOMETRIC SECTION

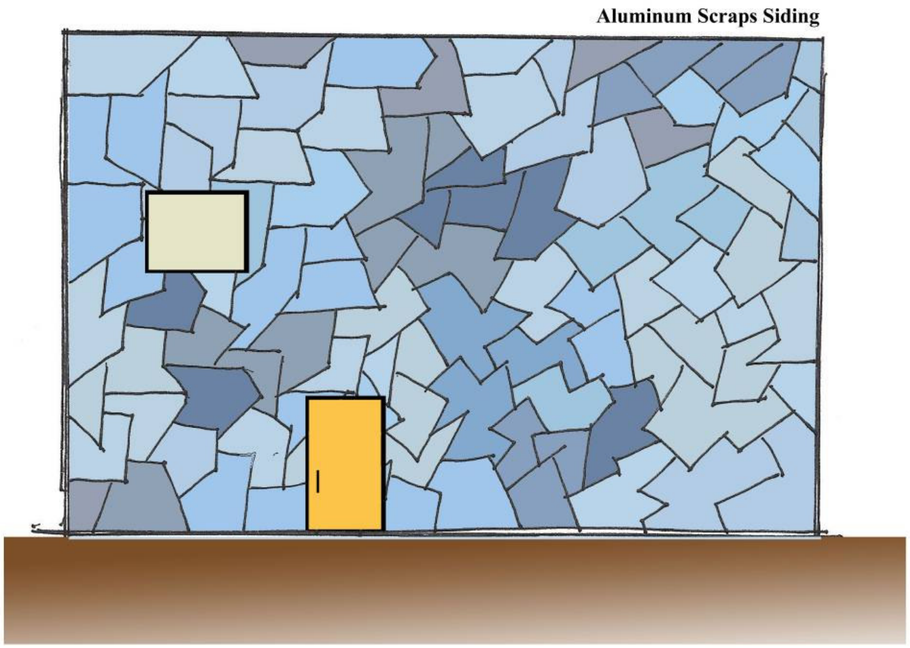


HIGHWAY SIGNS ROOF

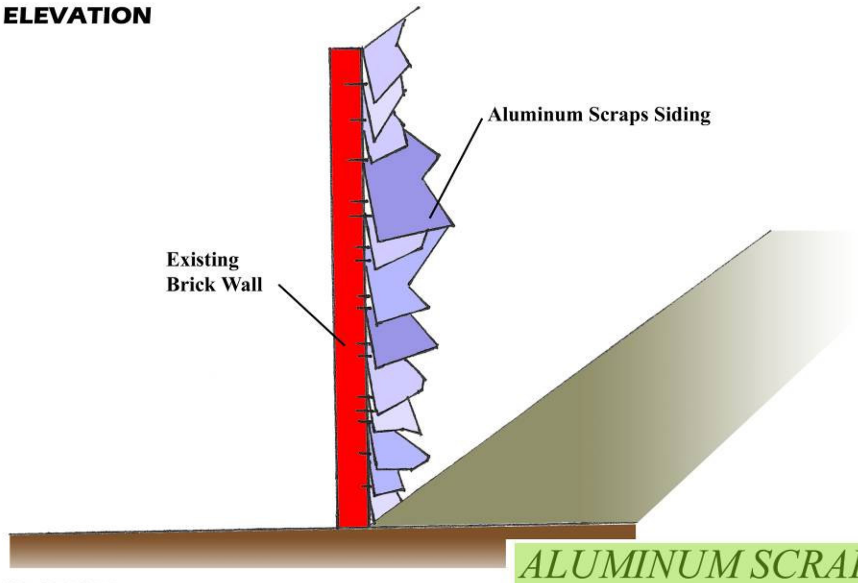
"JUNK"



HIGHWAY SIGN ROOF PROPOSAL



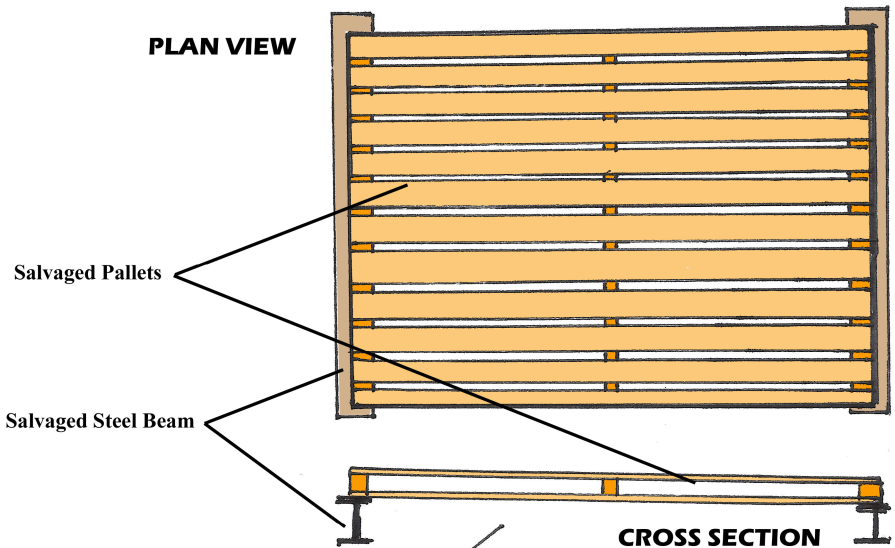
ELEVATION

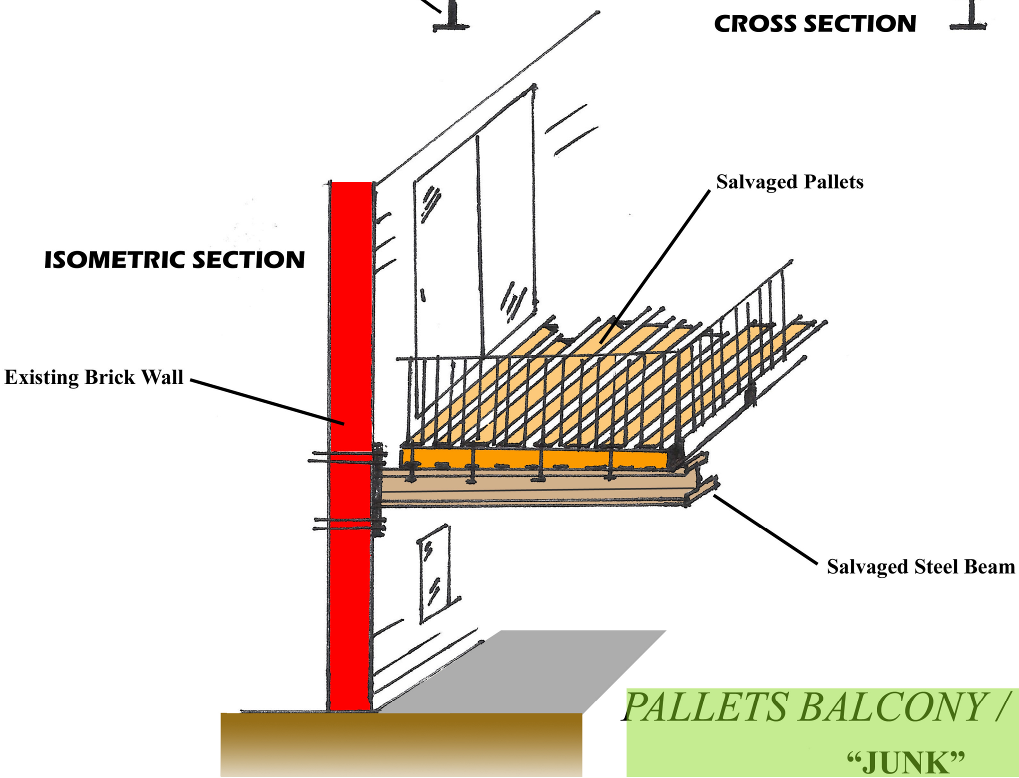


SECTION

ALUMINUM SCRAPS SIDING
"JUNK"

ALUMINUM SCRAP SIDING PROPOSAL

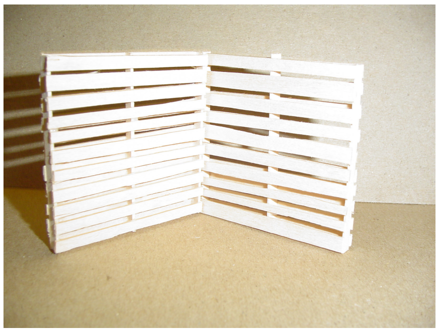




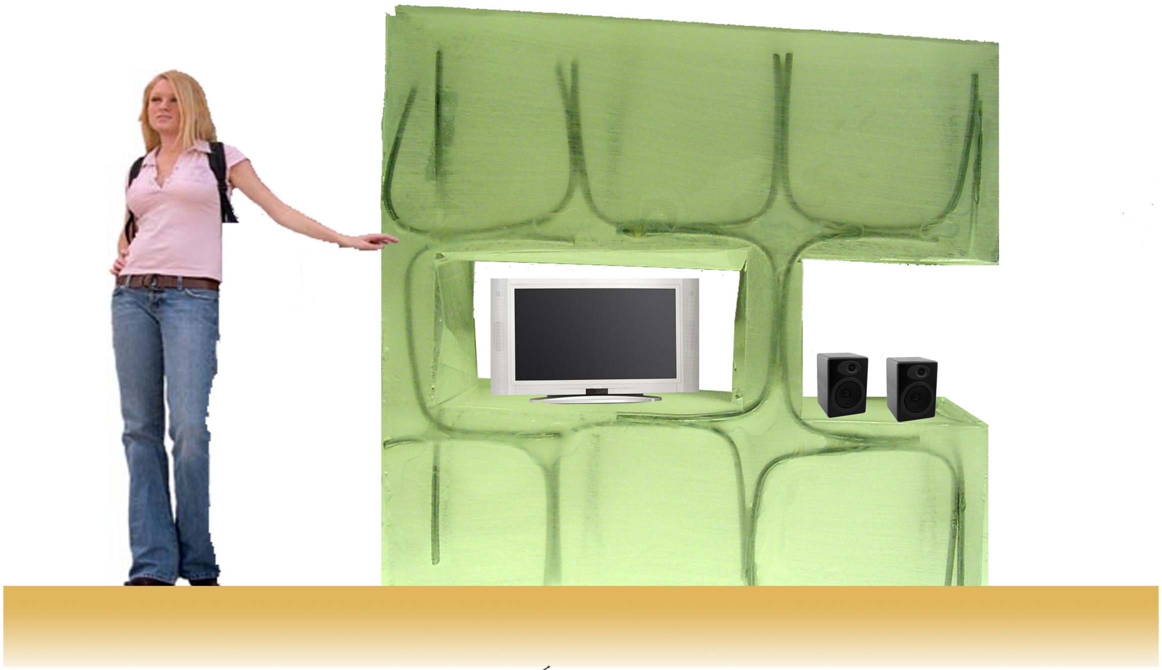
PALLETS BALCONY / SHADING

"JUNK"

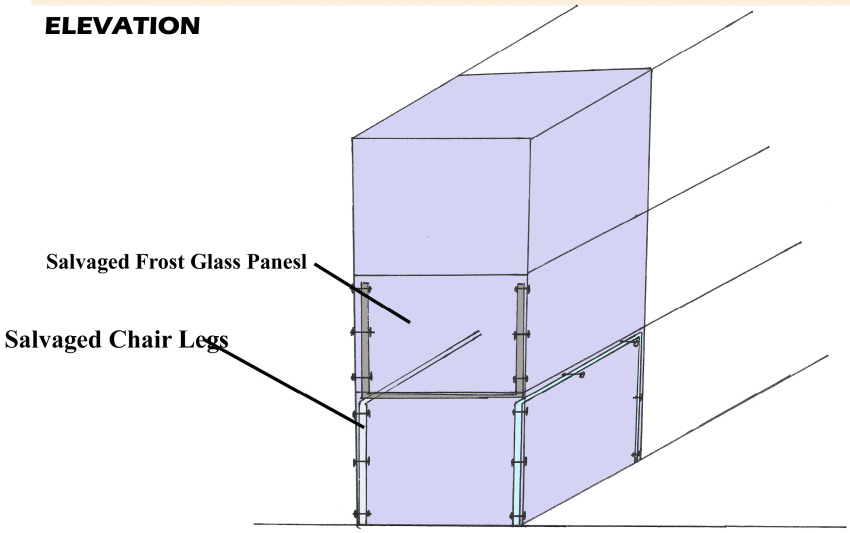
PALLET BALCONY PROPOSAL



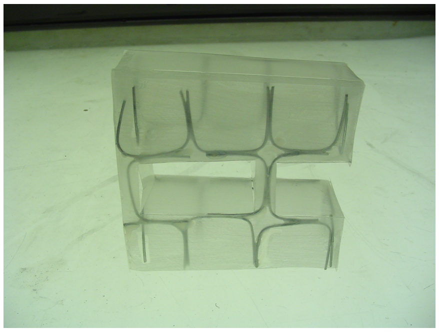
PALLET PARTITION WALL PROPOSAL



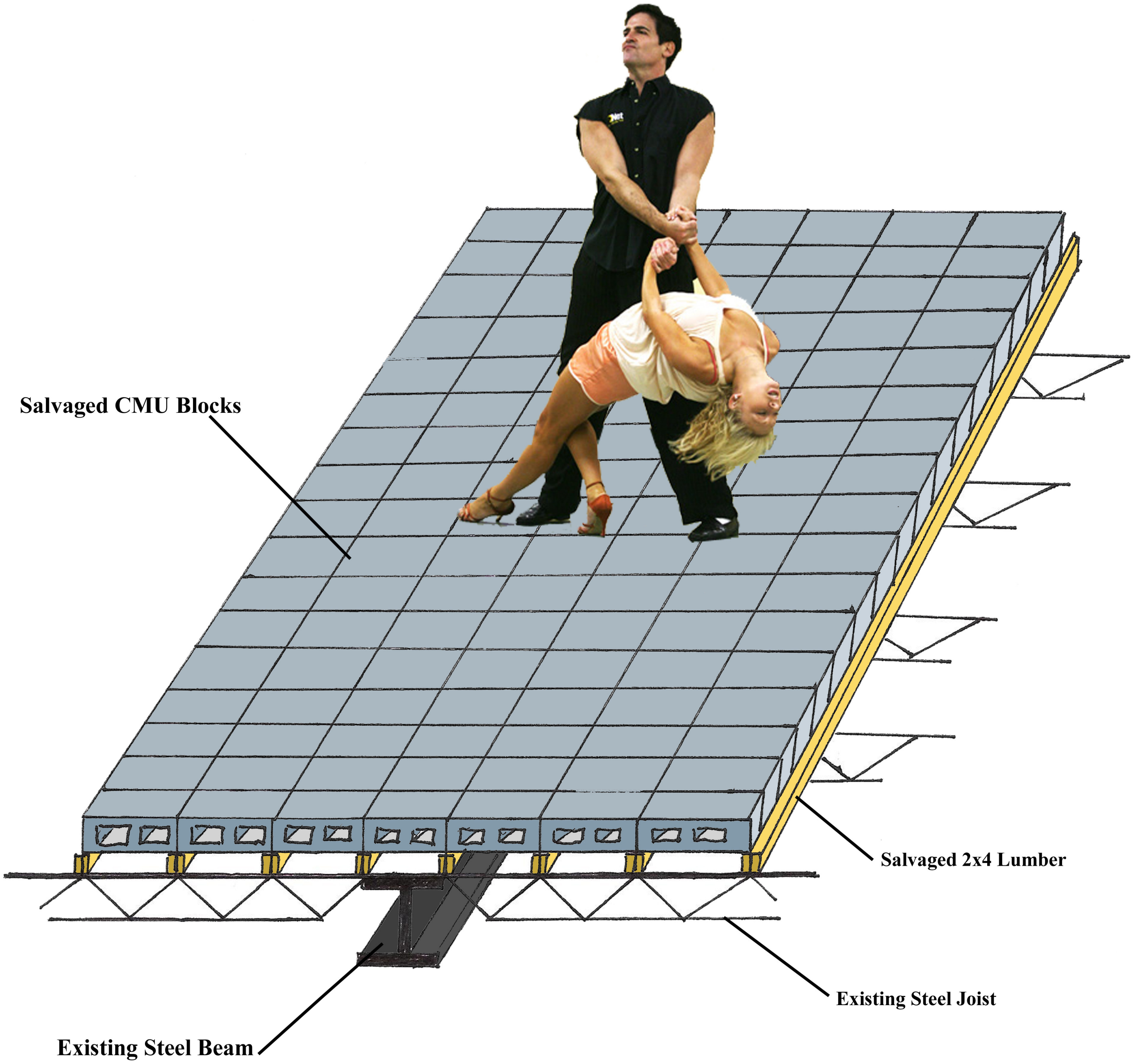
ELEVATION



DETAIL

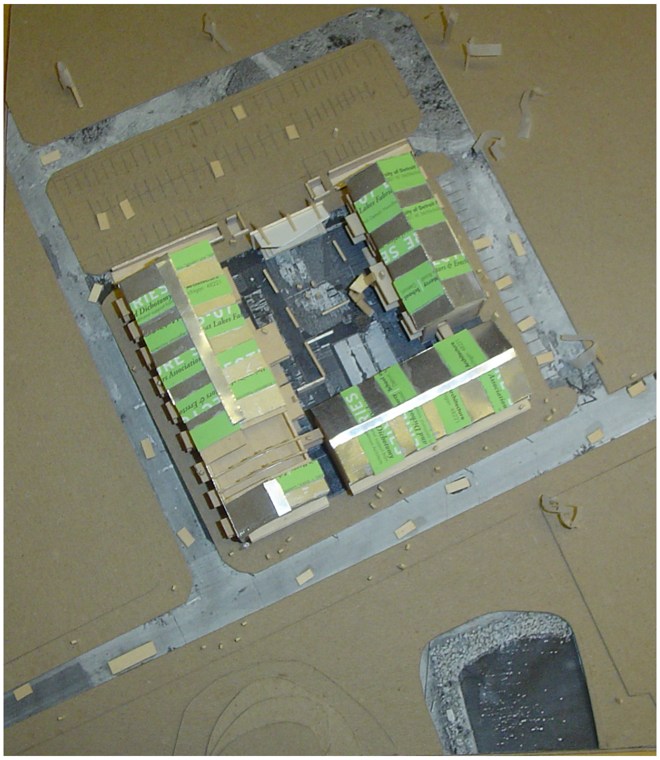


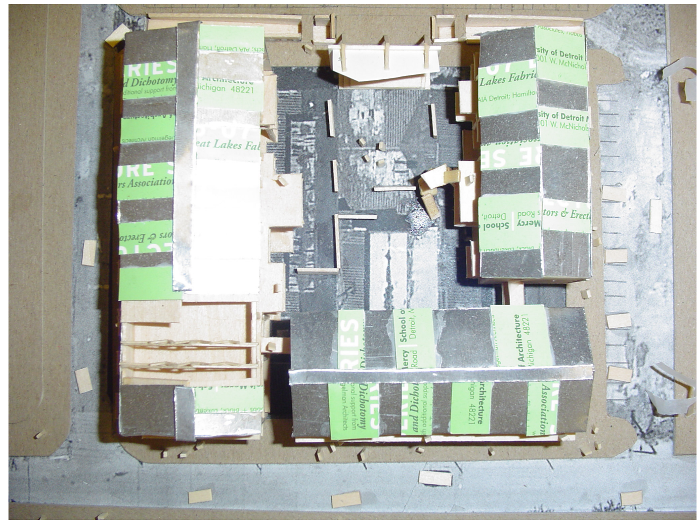
CHAIR LEG SYSTEM PROPOSAL

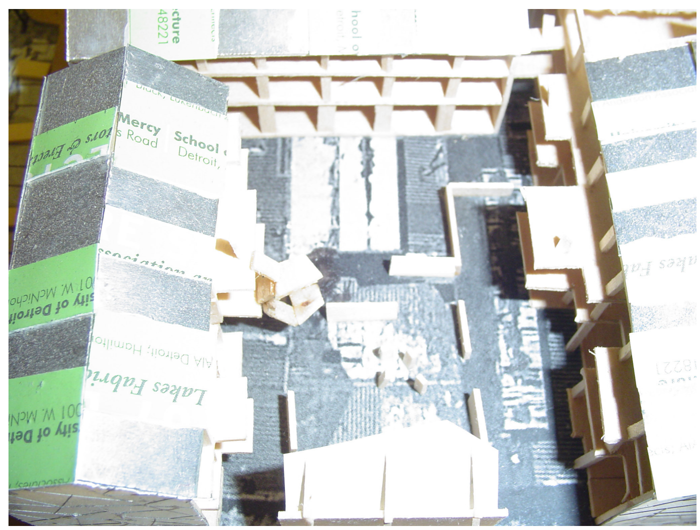


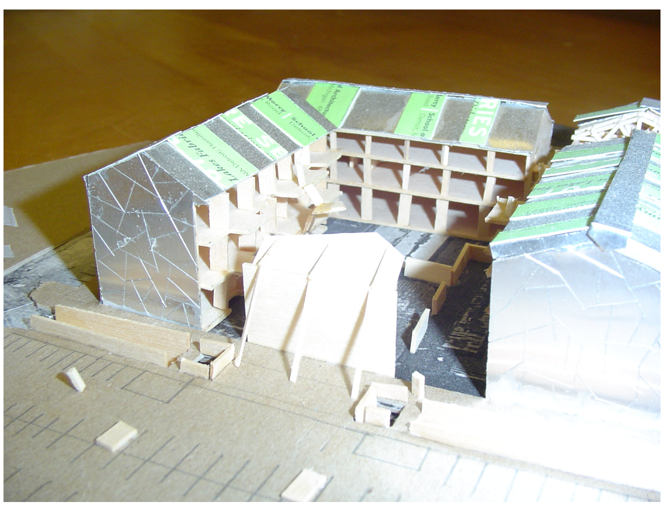
C.M.U FLOOR SYSTEM PROPOSAL

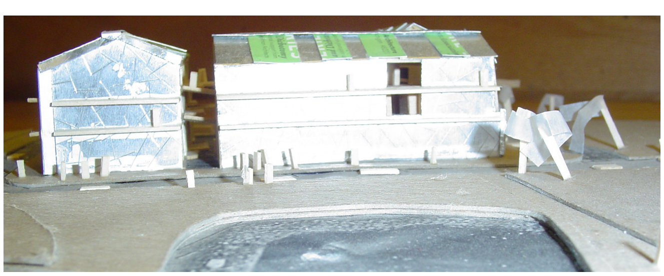
CONCEPTUAL BUILDING MODEL

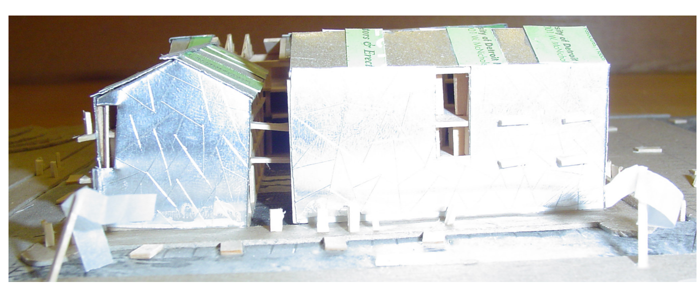








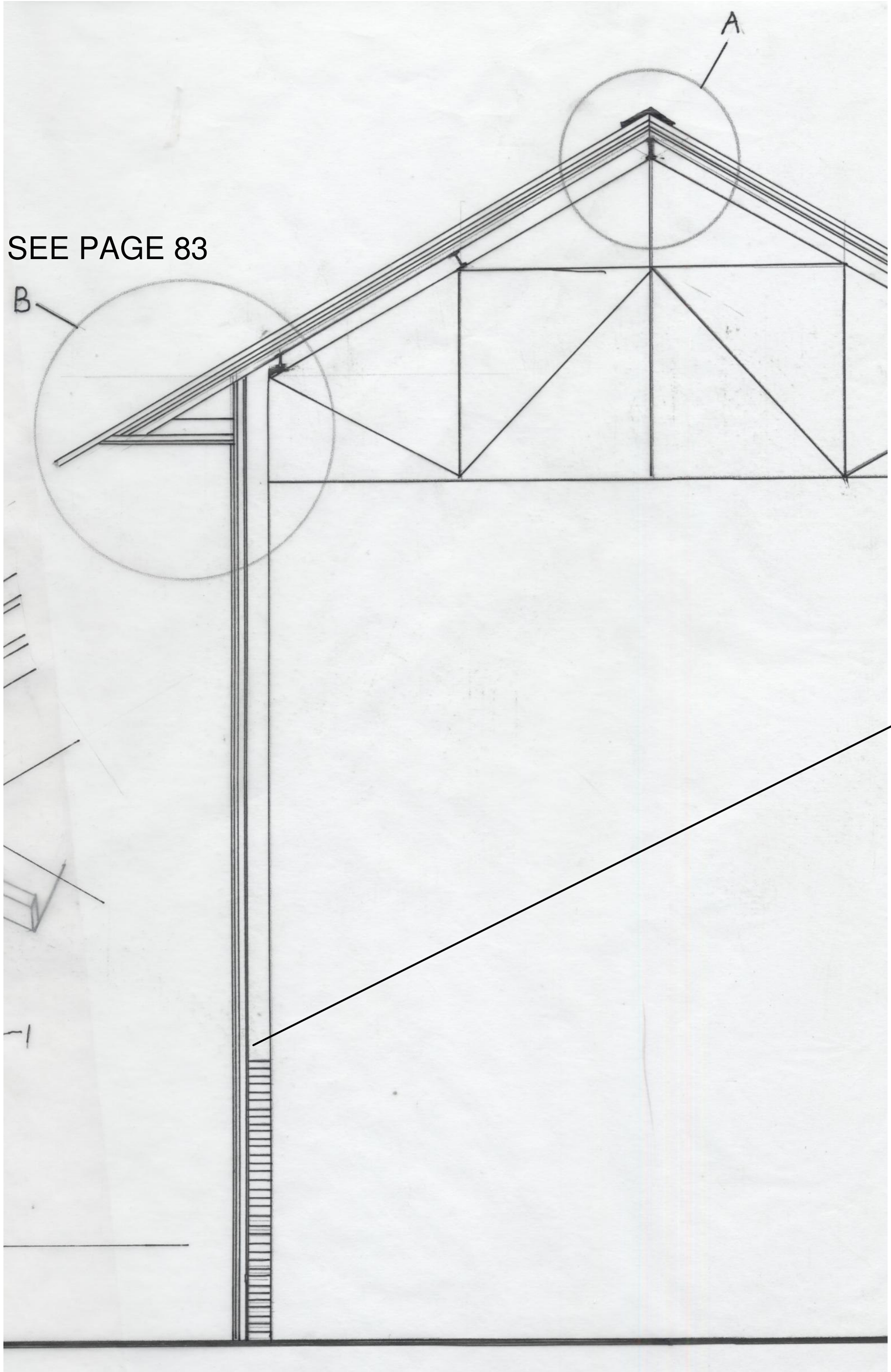




TYPICAL WALL SECTION

SEE PAGE 84

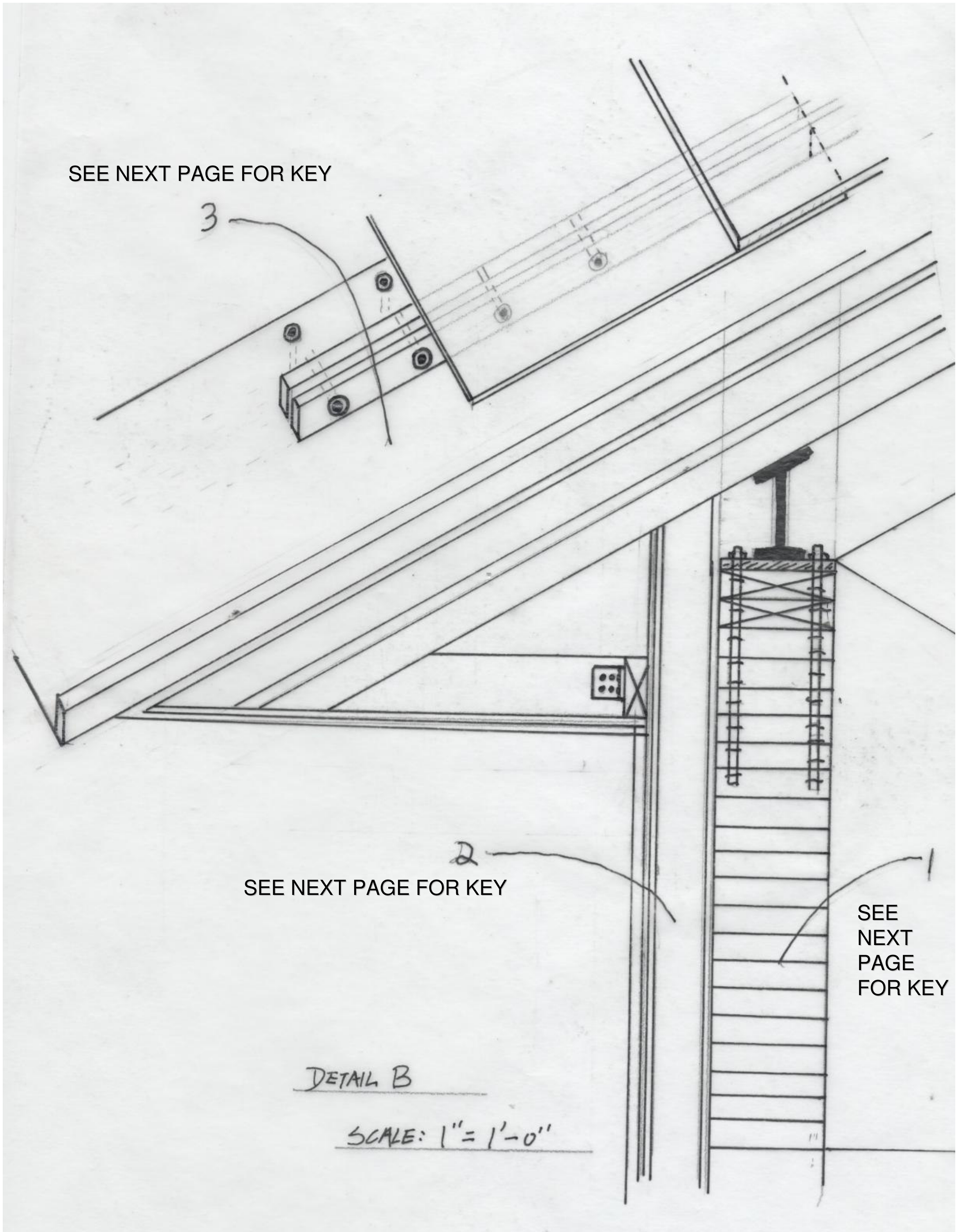
SEE PAGE 83



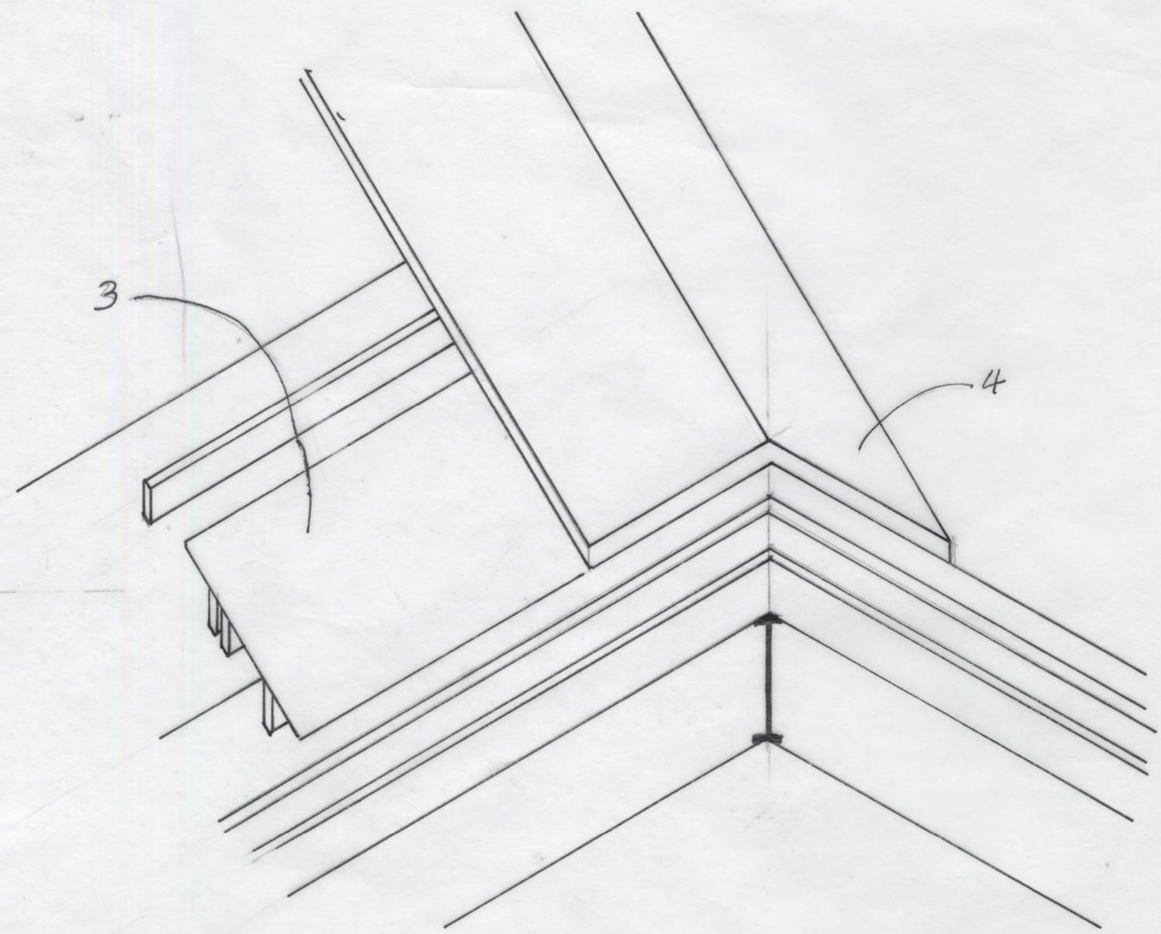
The purpose of this wall section is to refine the conceptual ideas on the Highway Sign Roof, and the Aluminum Scrap Siding.

The Aluminum scraps are attached to O.S.B sheathing with moisture barrier, on metal stud filled with cellulose insulation, on vapor barrier, on existing brick wall.

DETAIL SECTION B



DETAIL SECTION A



DETAIL A

SCALE: 1" = 1'-0"

KEY:

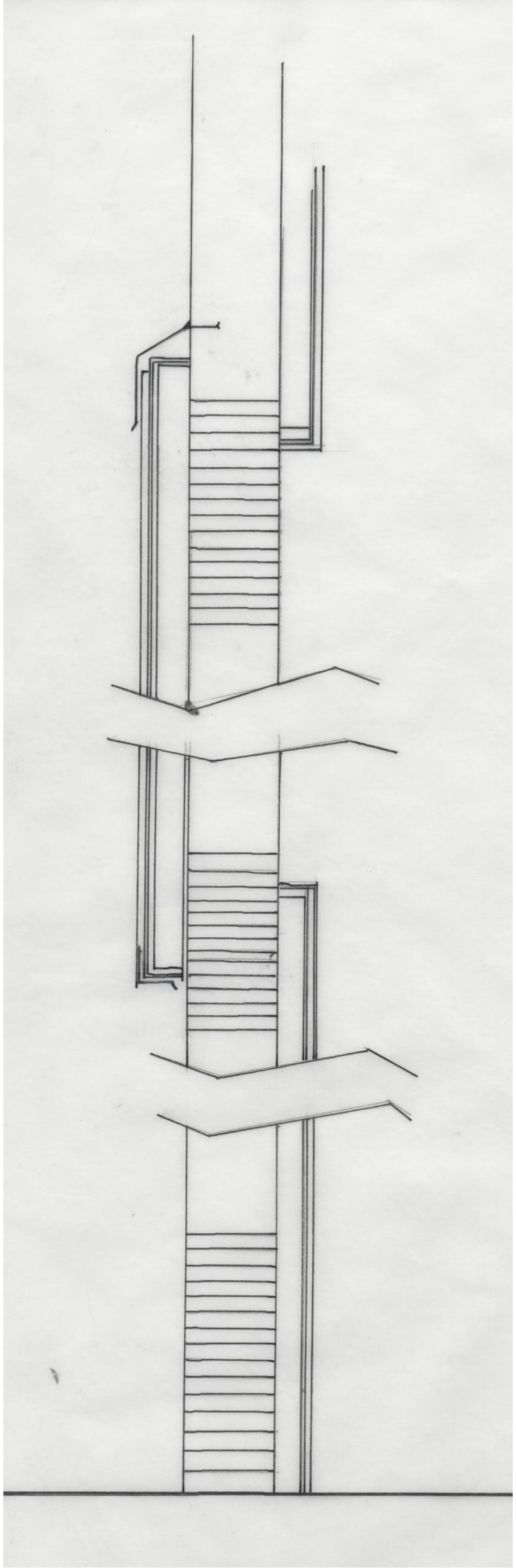
1 EXISTING BRICK WALL

2 ALUMINUM SCRAP ON WATER RESISTANT MEMBRANE ON 3/4" OSB SHEATHING ON 3-5/8" METAL STUD FILLED WITH CELLULOSE INSULATION ON VAPER BARRIER

3 SALVAGED HIGHWAY SIGN ON WATER RESISTANT MEMBRANE ON 3/4" OSB ON 3-5/8" METAL STUD FILLED WITH CELLULOSE INSULATION ON VAPOR BARRIER ON STEEL DECKING ON EXISTING STEEL STRUCTURE.

4 ALUMINUM RIDGE COVER.

WALL SECTION

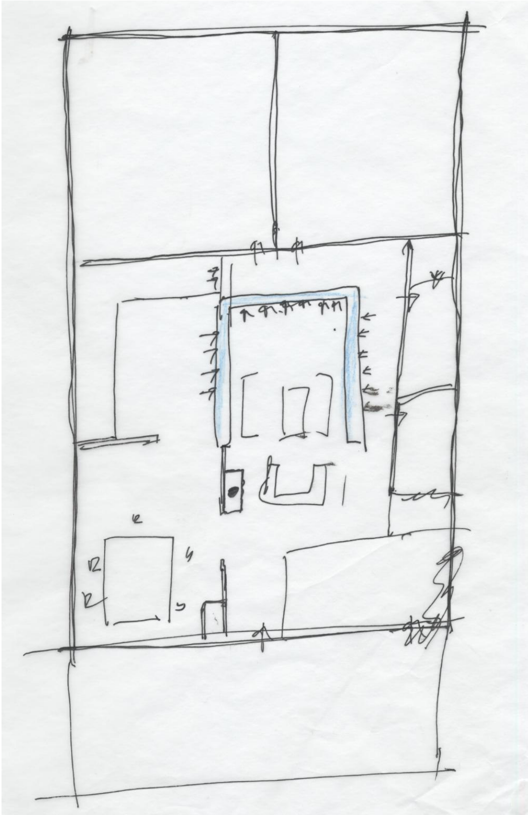


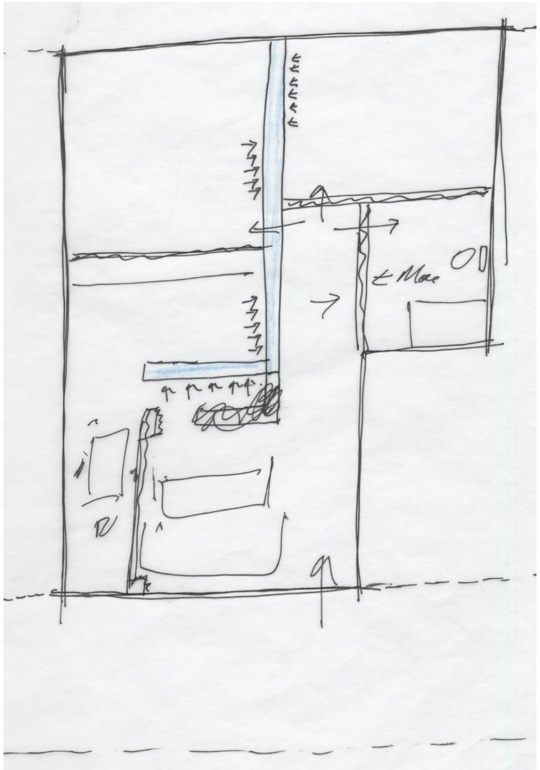
This wall section is detailing how the aluminum scraps are applied to the existing wall where the wall needs improvement. When ever the aluminum scrap siding is applied to the exterior of the existing brick wall, the interior finish for that portion of the wall will be existing brick finish. On the other hand, if some portion of the existing brick façade remains in good condition, and needs no additional improvement, then the interior finish for that portion of the wall will be gypsum board with paint finish fastened to metal studs, and filled with cellulose insulation.

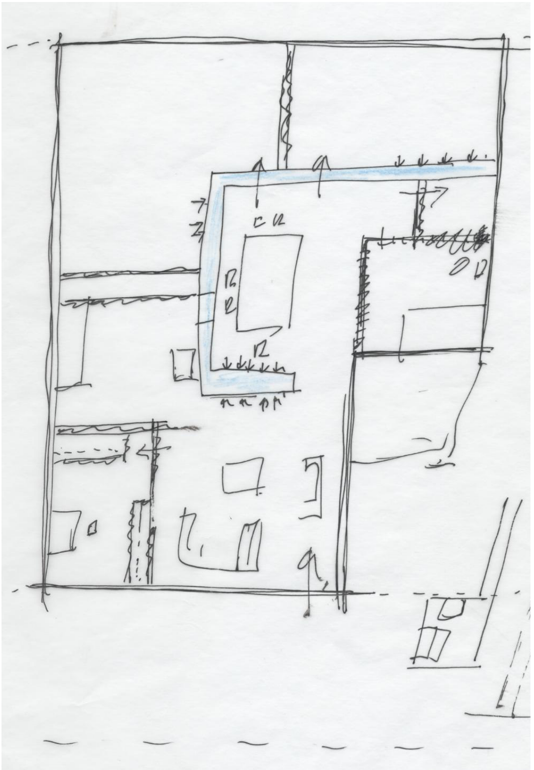
On the drawing, the overlap of the new applied materials is to prevent heat loss through the un-insulated existing brick wall.

APARTMENT UNIT LAYOUT SKETCHES

The concept of these apartment layout sketches is to design a chair leg system as the center point of the apartment units. The chair leg system serves as a piece of furniture, a space divider, and also a illuminated sculpture that sits in the center of apartment unit. The shaded blue object is the representation of the chair leg system. When the arrows are drawn toward it, this means it has a display or storage space that can be accessed from the arrow side.

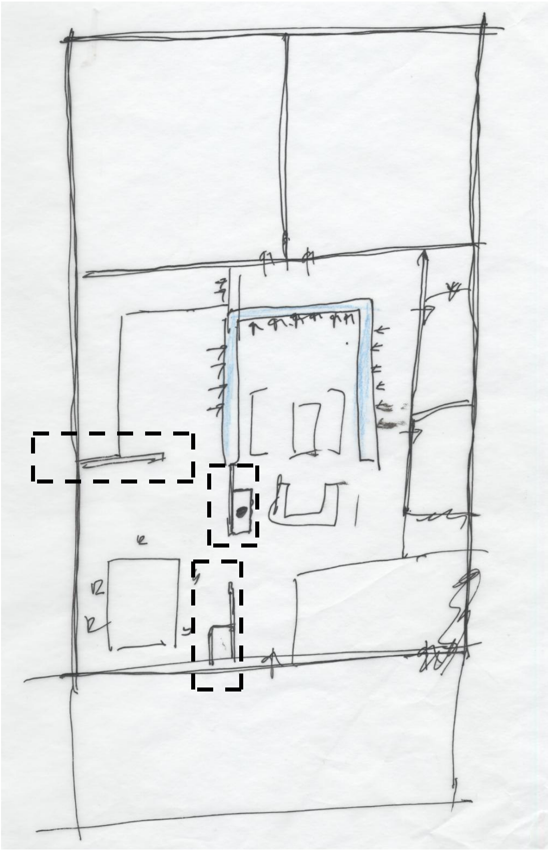






FULL SIZE MOCK-UP MODEL . 1

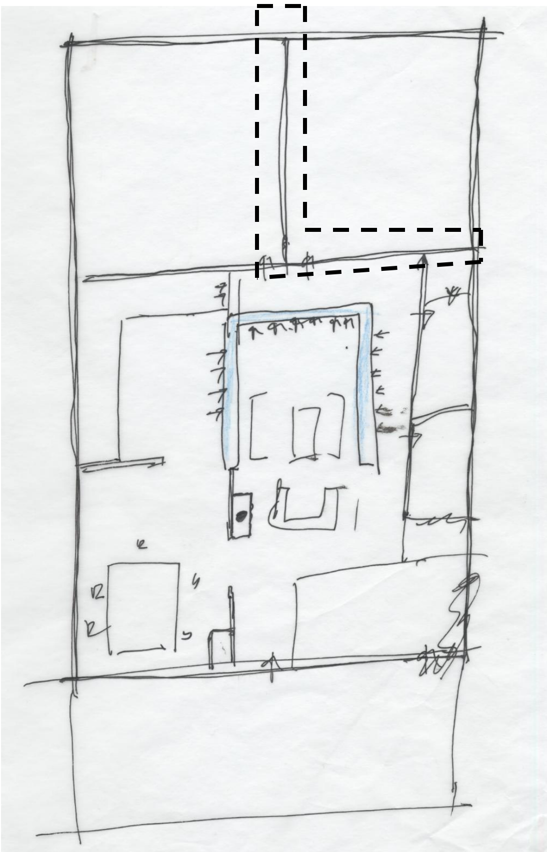
NON PRIVATE PALLET WALL

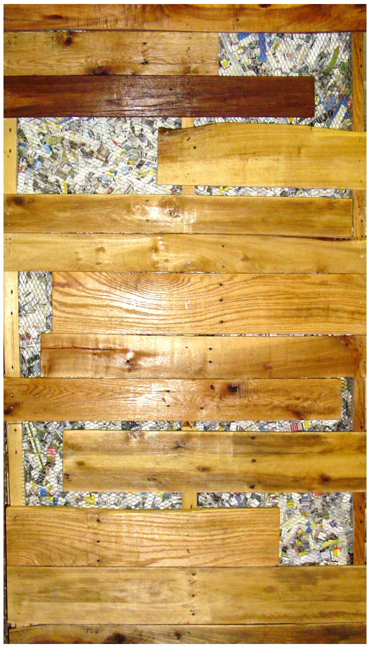


This wall is designed for a non-private or semi private space partition wall. This wall is not opaque, therefore it allows for sound transmission. The dotted rectangle in the above sketch indicates the appropriate location for it to be installed in a typical apartment unit. The panel in the mock-up model is design with flexibilities. These panels can be rotated according to personal preference of visibility level.

FULL SIZE MOCK-UP MODEL . 2

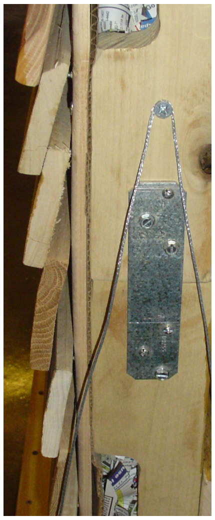
OPAQUE PALLET WALL



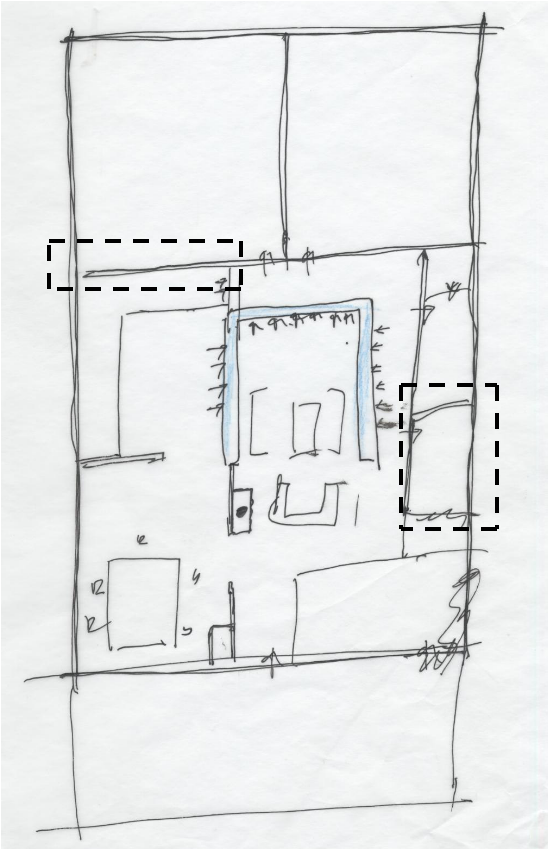


This wall is designed to be suitable for private spaces like bedrooms. This wall is opaque, therefore it is a good sound barrier and has good insulation value. The construction materials are salvaged pallets, salvaged wire mesh, and salvaged magazines. The dotted rectangle in the above sketch indicates the appropriate location for it to be installed in a typical apartment unit.

FULL SIZE MOCK-UP MODEL . 3

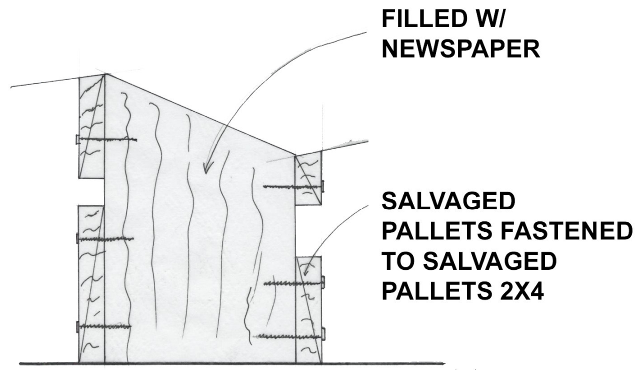


WATER RESISTANT PALLET WALL

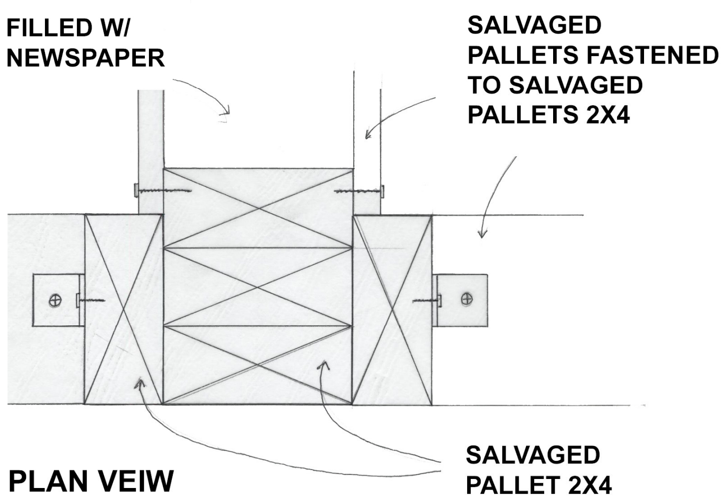


This wall is designed to be suitable for a space like a bathroom where moisture may present. This wall is also opaque and private, therefore it is a good sound barrier and has good insulation value. The construction materials are salvaged pallets, salvaged translucent panels, and salvaged magazines. The dotted rectangle in the above sketch indicates the appropriate location for it to be installed in a typical apartment unit.

PLAN DETAIL OF PALLET WALLS



SECTION VEIW



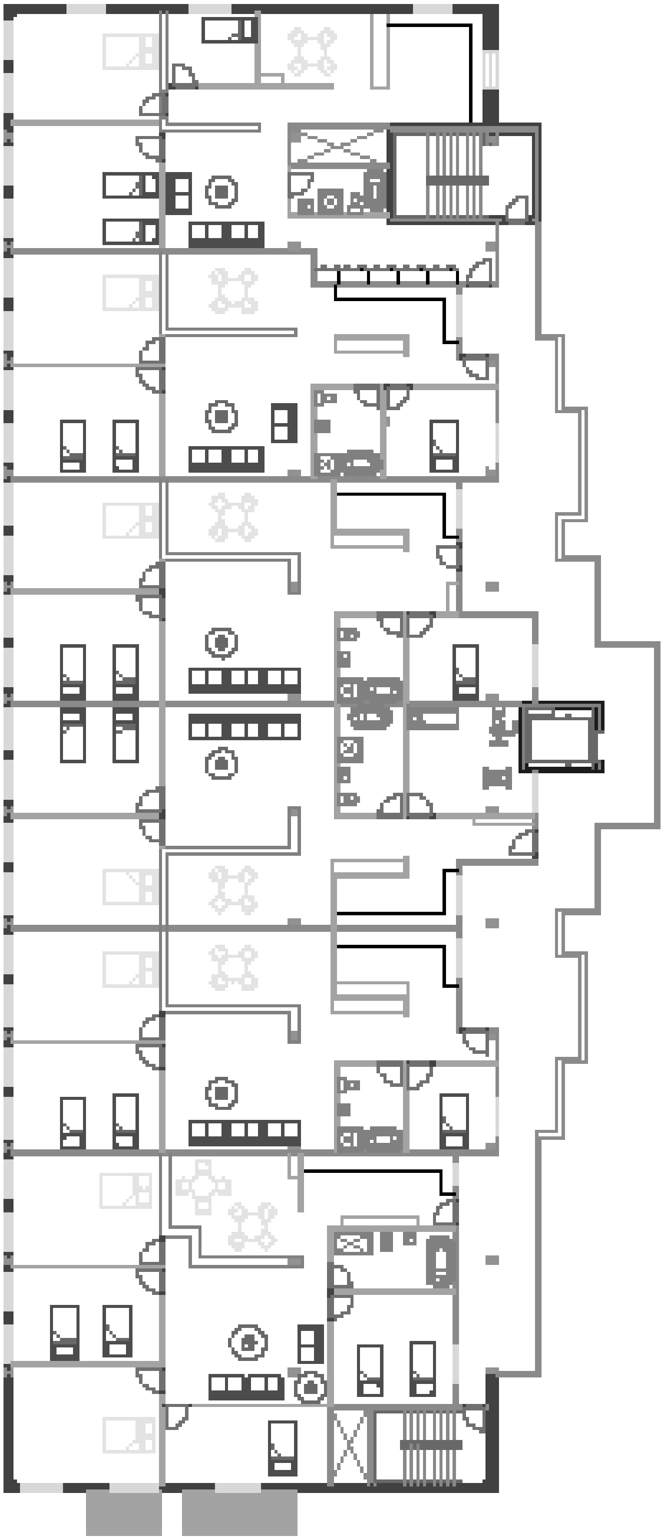
PLAN VEIW

FIRST LEVEL FLOOR PLAN

The first level is dedicated to commercial uses. The East building will mainly be used for office space. The specific size of the each office space will be finalized by the tenant's needs. The South building consist of a main indoor lobby, one restaurant (on the west of the building), and retail spaces (on the east of the building). The West building will be used for retail space. The size will be determined by the tenant's needs. All three buildings have the same arrangement for egress stairs and mechanical rooms. The egress stairs and mechanical rooms are located at both ends of each building.

SECOND & THIRD LEVEL FLOOR PLAN

East



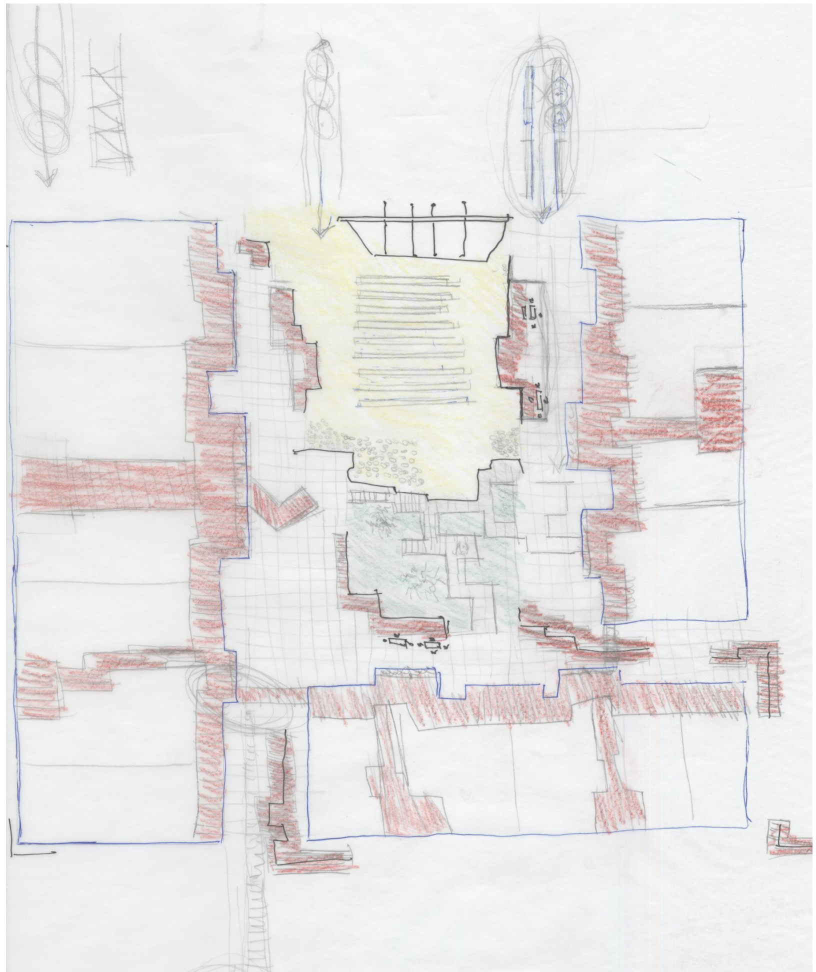
The second and third levels will mainly be occupied by residential units. The East building depth is about 70 feet, which is more suitable to develop into 3 or 4 bedroom units. The corridor is designed with zigzag shape in order to accommodate the salvaged steel from the demolished structures (middle part of the plan). The salvaged steel beams may come in different lengths. With the zigzag shape design in the corridor, it will utilize the maximum amount of salvaged steel from the torn down structures.

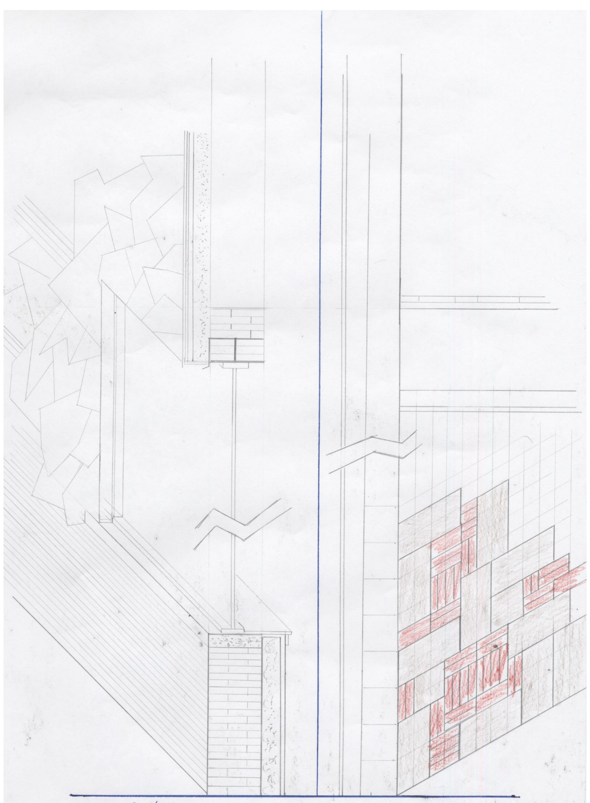
SITE PLAN

The middle part of the building is torn out, and converted into courtyard/community center space for the inhabitants and the neighborhood. The building is separated into three buildings. This design opens up the courtyard to the community. To the north of the site, the land will be paved for parking for users of the buildings. At this stage of development, underground parking was also proposed underneath the courtyard. The short dividers in the courtyard define different spaces and purposes.

SITE & PLAN MODIFICATION SKETCH

Shaded red area on the sketch is the area for the users to socialize. In the courtyard, there are four locations that are devoted to socializing. On the buildings, there are carved out areas that provide a common place for the residents to hang out.

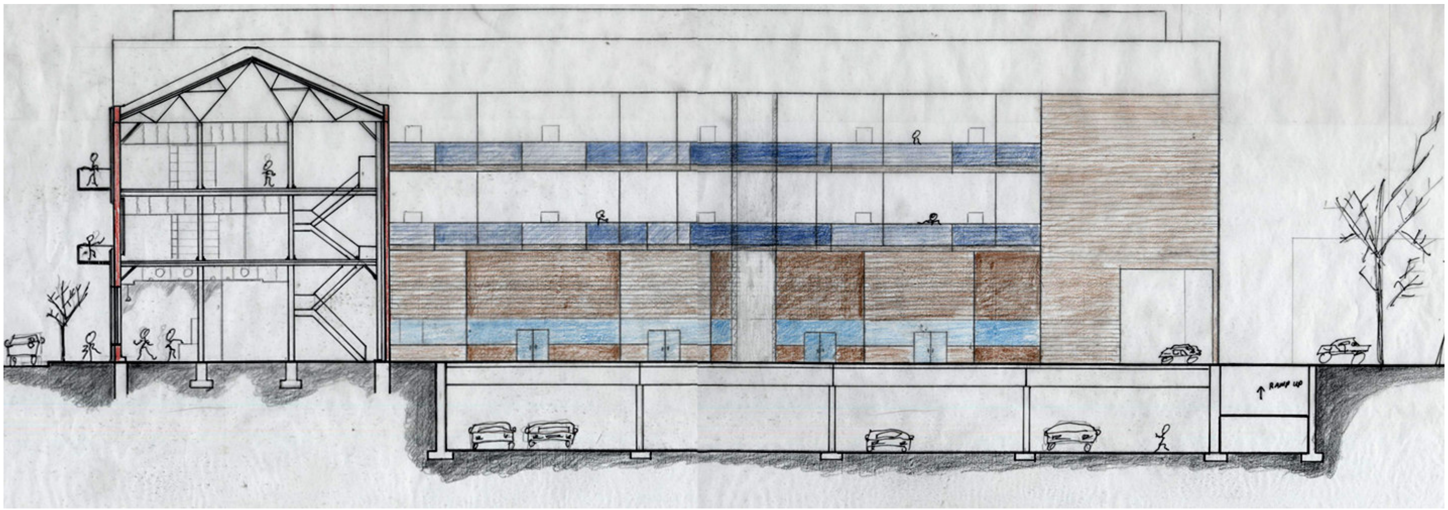


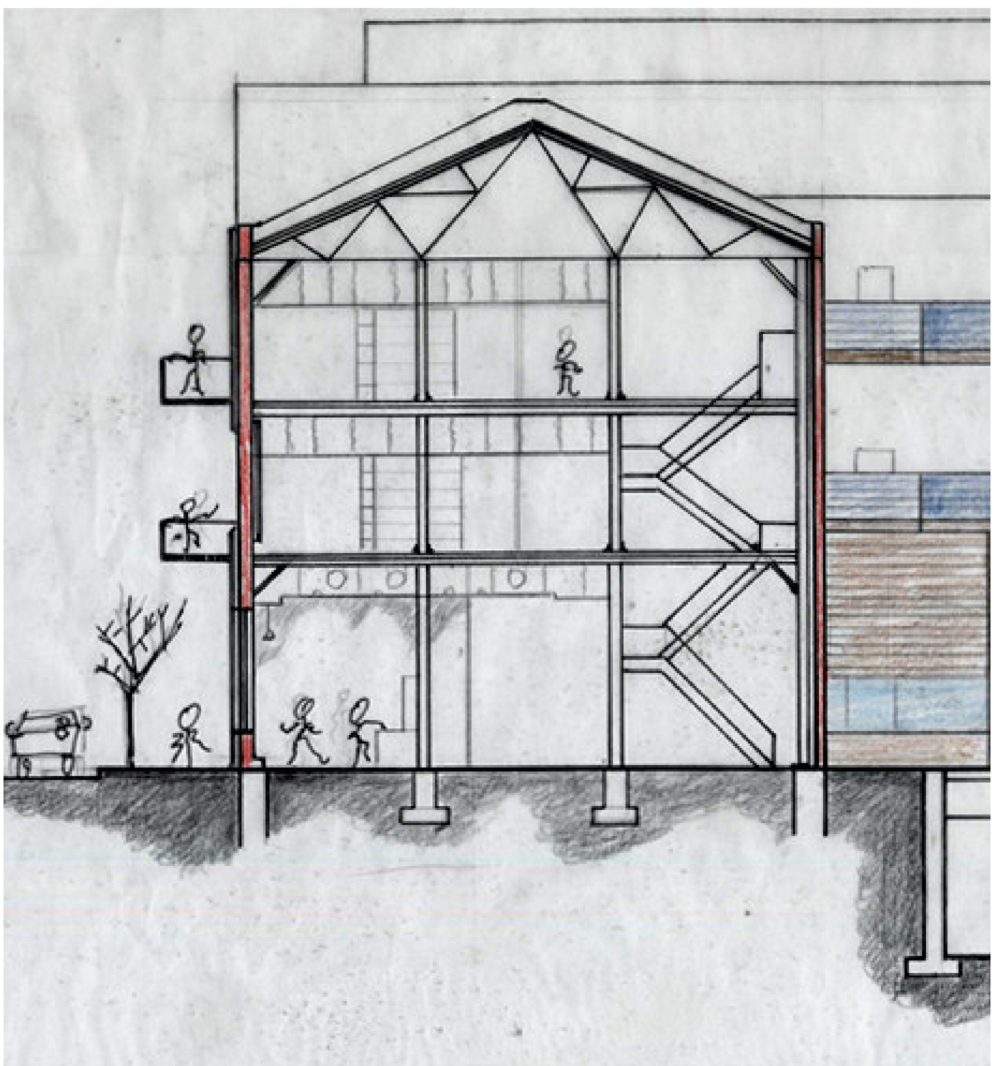


WALL SECTIONS

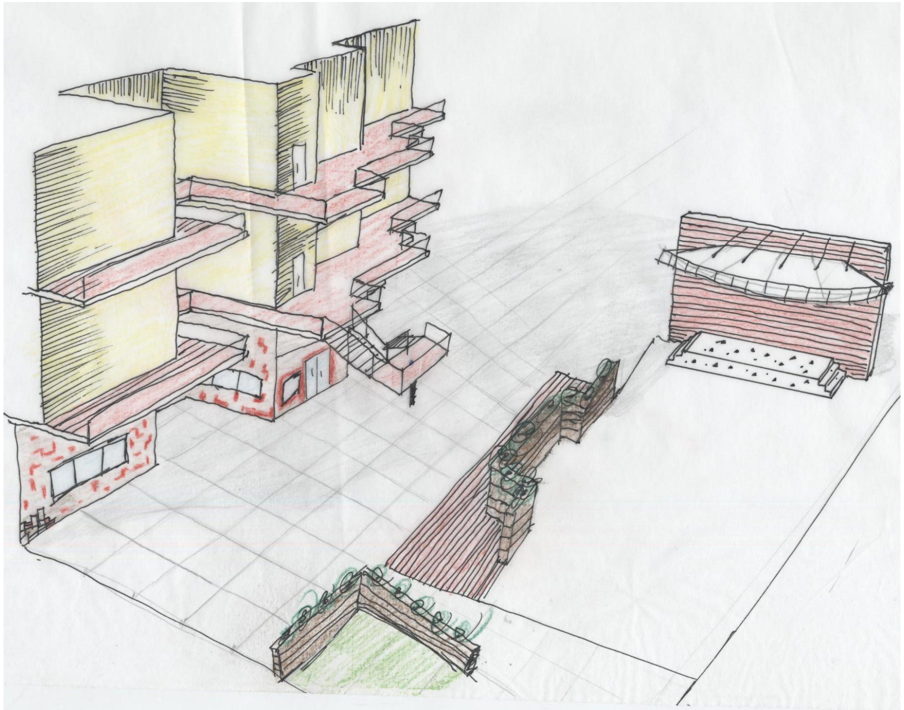
The section on the left side is describing the outer edge condition of the buildings, and the section on the right side is describing the inner edge condition of the buildings. On the inner edge of the buildings, the walls are to be constructed out of salvaged bricks, and C.M.U that are found in the existing building itself.

SOUTH – NORTH BUILDING SECTION



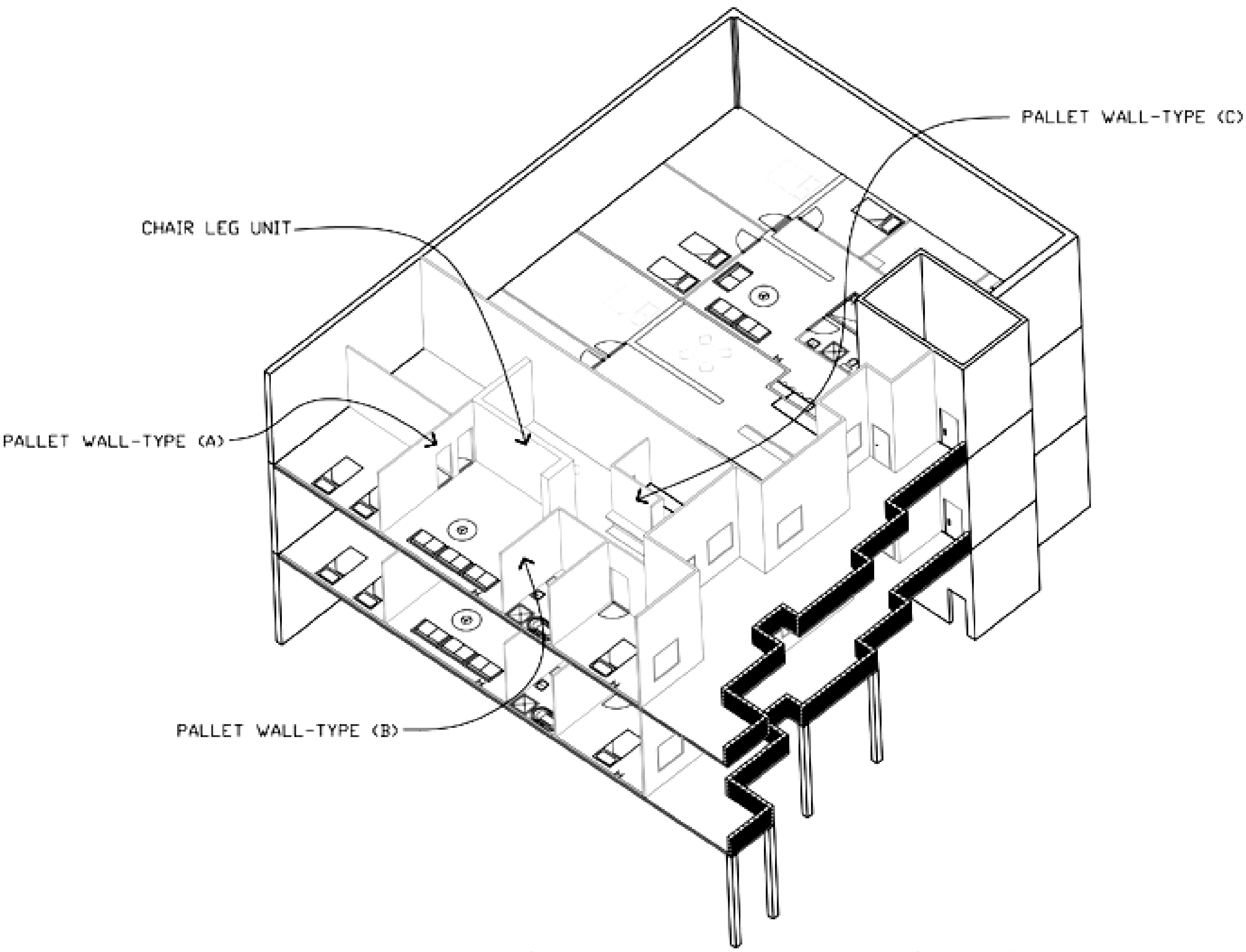


COURTYARD PERSPECTIVE SKETCH



The lower levels of the buildings are mainly used for commercial functions. The proposed materials used to design the walls are salvaged brick and salvaged concrete masonry units. On the second and third levels, which are design for residential apartments, the materials used to construct the walls are salvaged pallets. It is constructed in a way that will prevent moisture penetration and to provide good insulation value. The C.M.U will also be used for space dividers in the courtyard with vegetation planted on top of it. The free standing wall behind the stage is the existing brick wall that remains in the new scheme.

ISOMETRIC VIEW OF TYPICAL UNIT



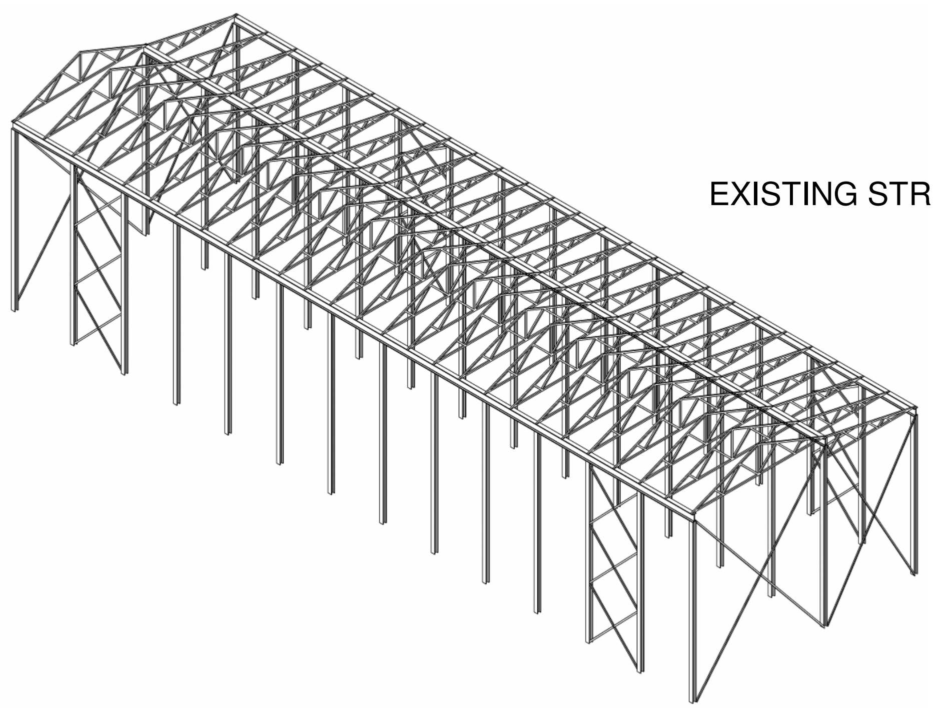
Additional structure will be required for the second and third level floors. The corridor will require additional structure also.

The pallet wall – type (A)

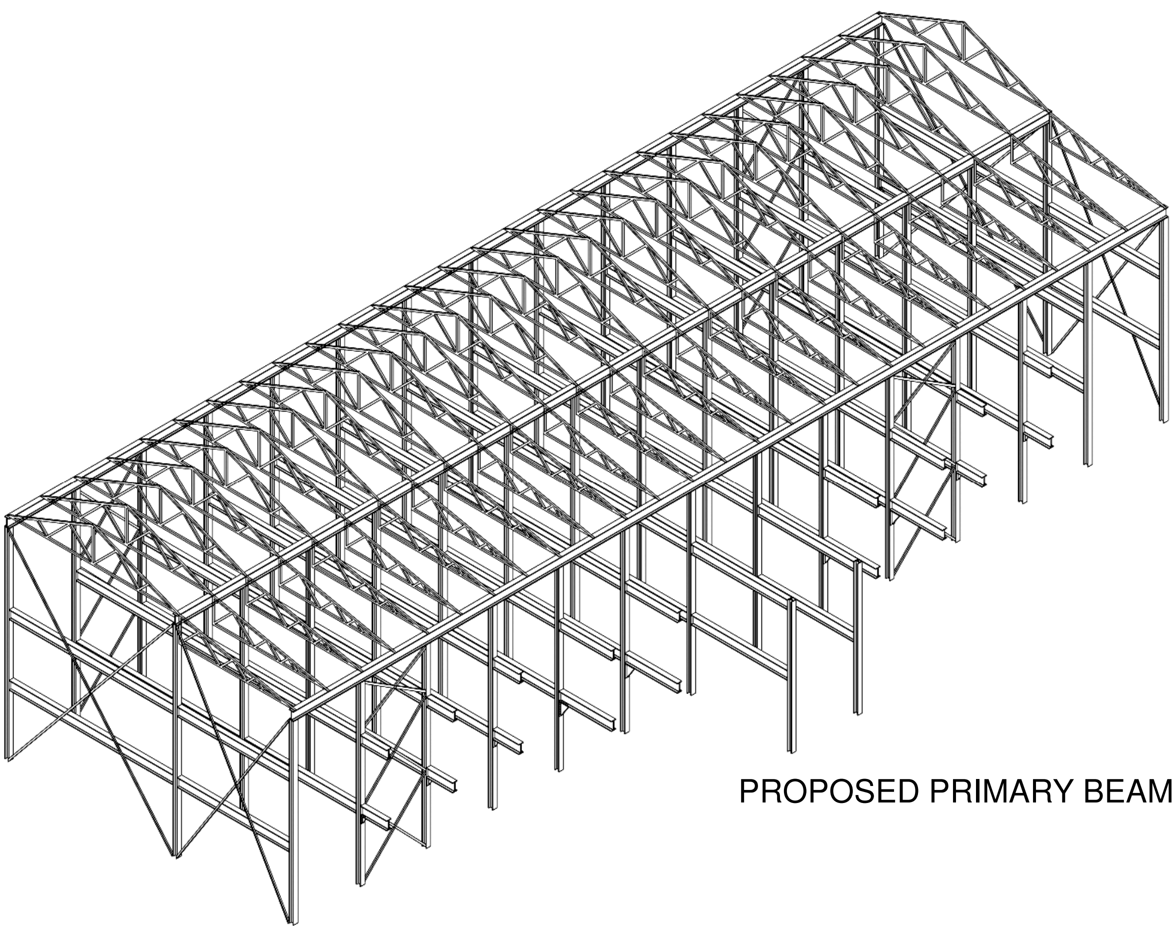
The pallet wall – type (B)

The pallet wall – type (C)

STRUCTURAL PLAN



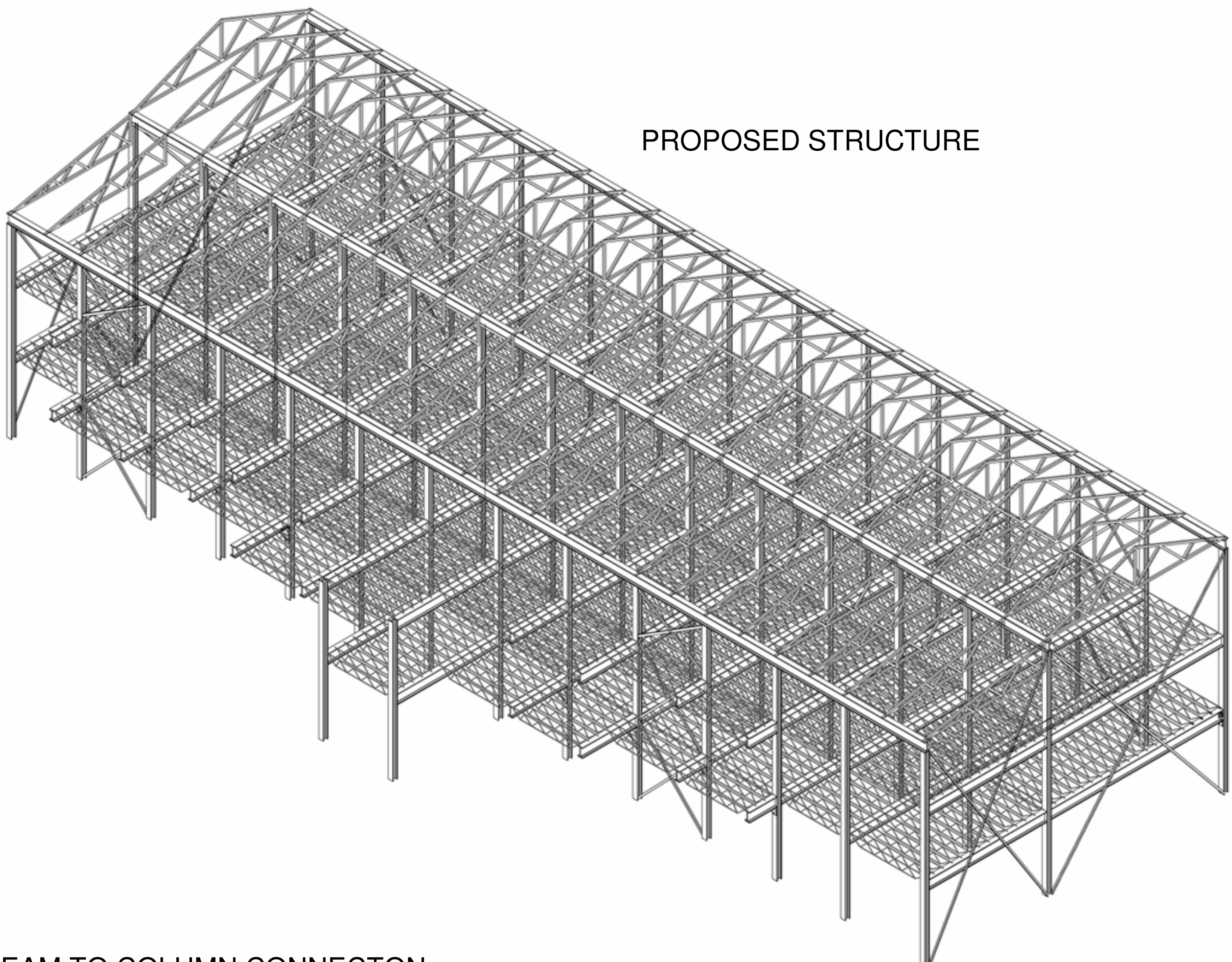
EXISTING STRUCTURE



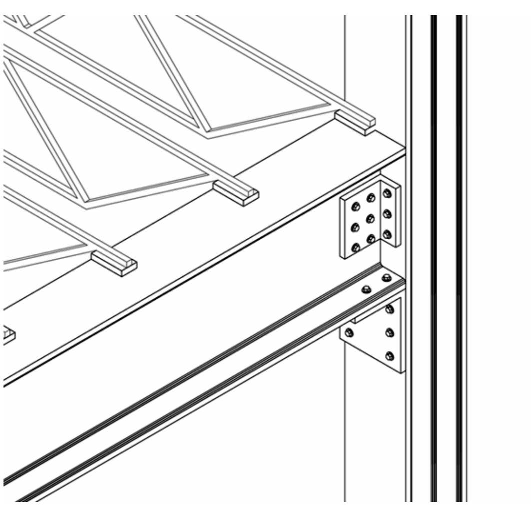
PROPOSED PRIMARY BEAMS

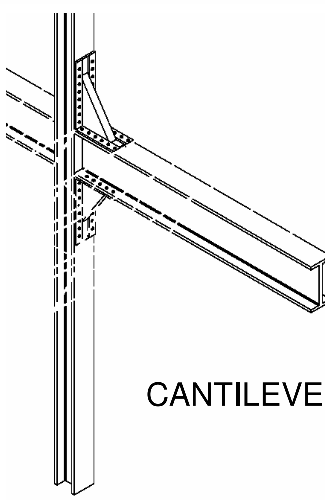
STRUCTURAL PLAN

PROPOSED STRUCTURE



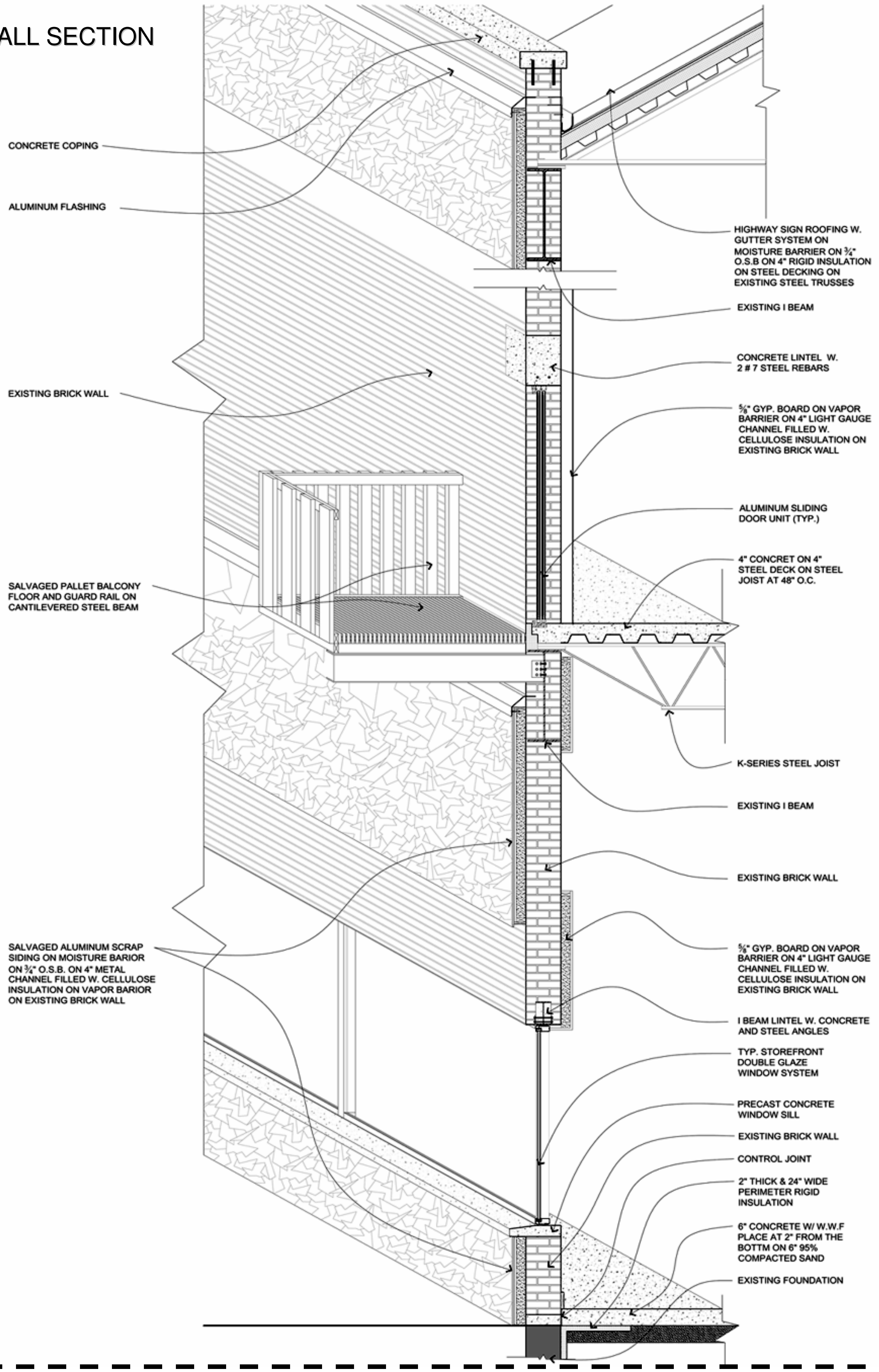
BEAM TO COLUMN CONNECTON



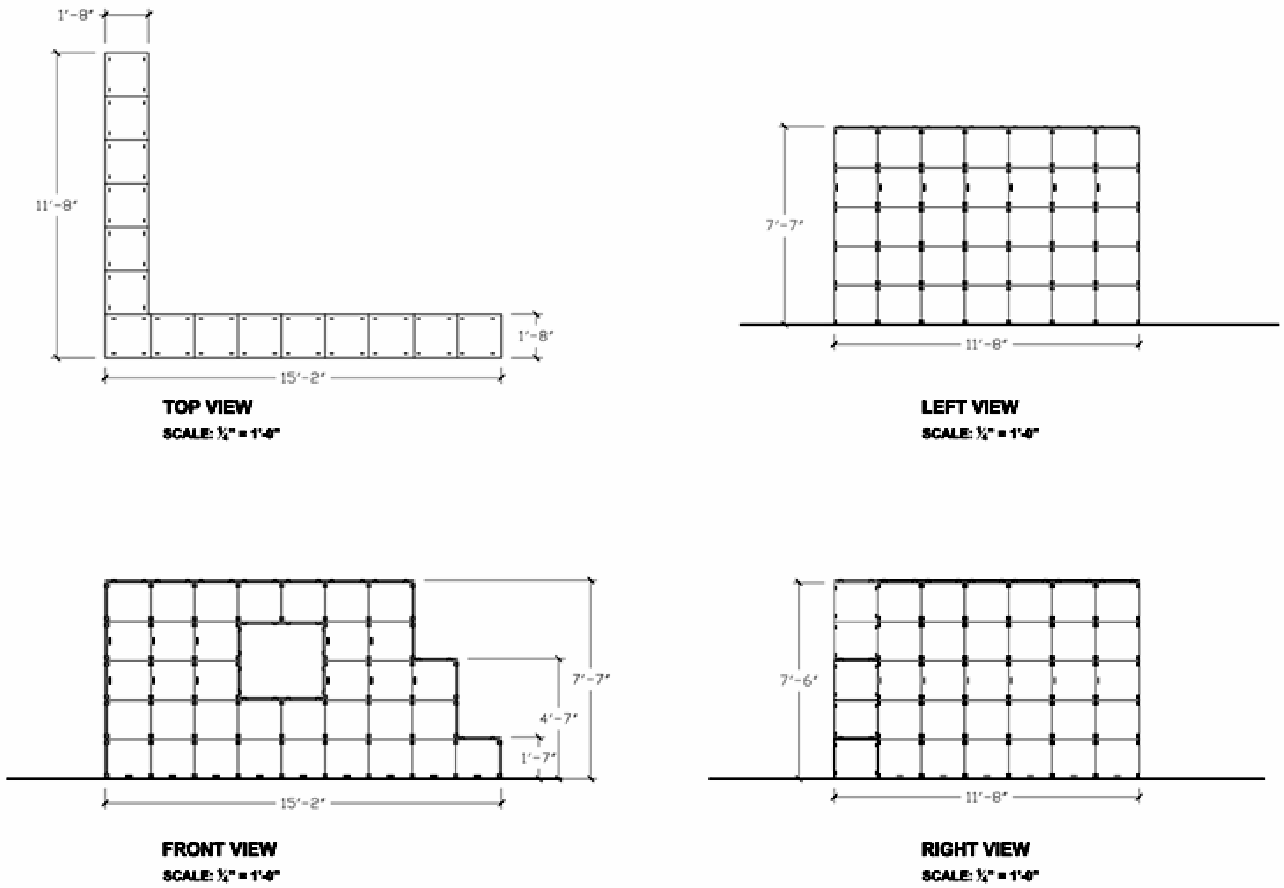


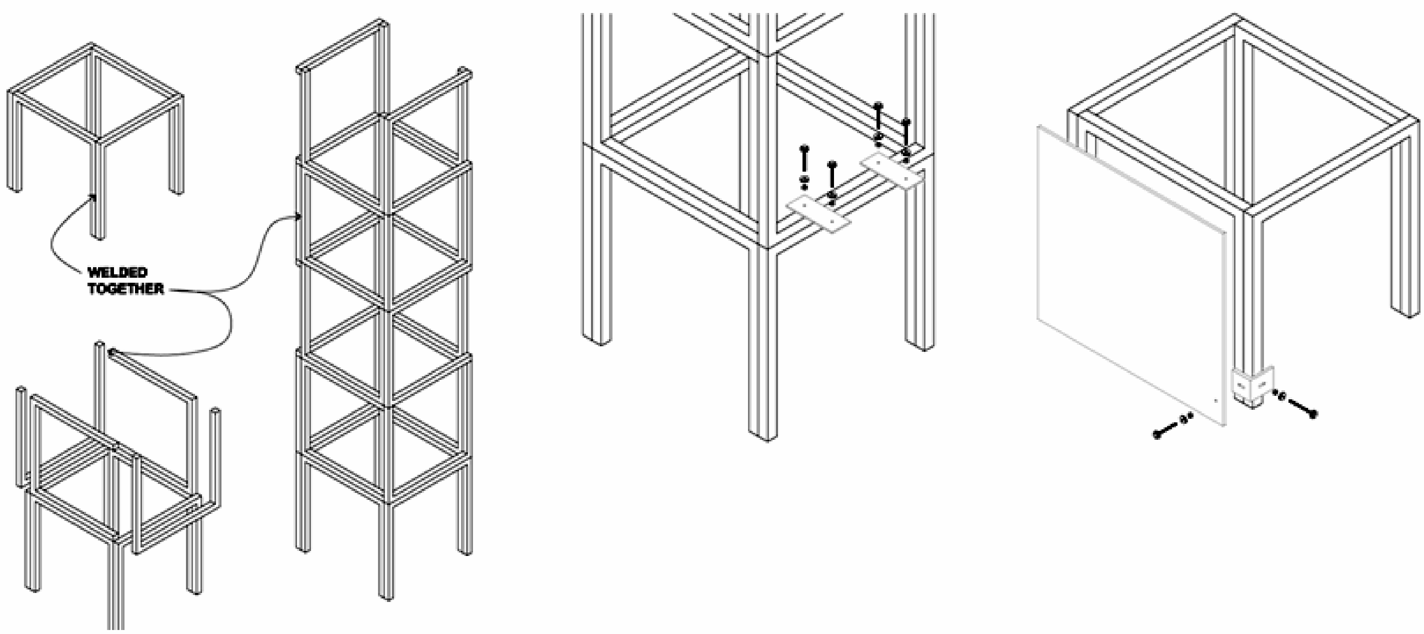
CANTILEVERED BEAM CONNECTION

WALL SECTION

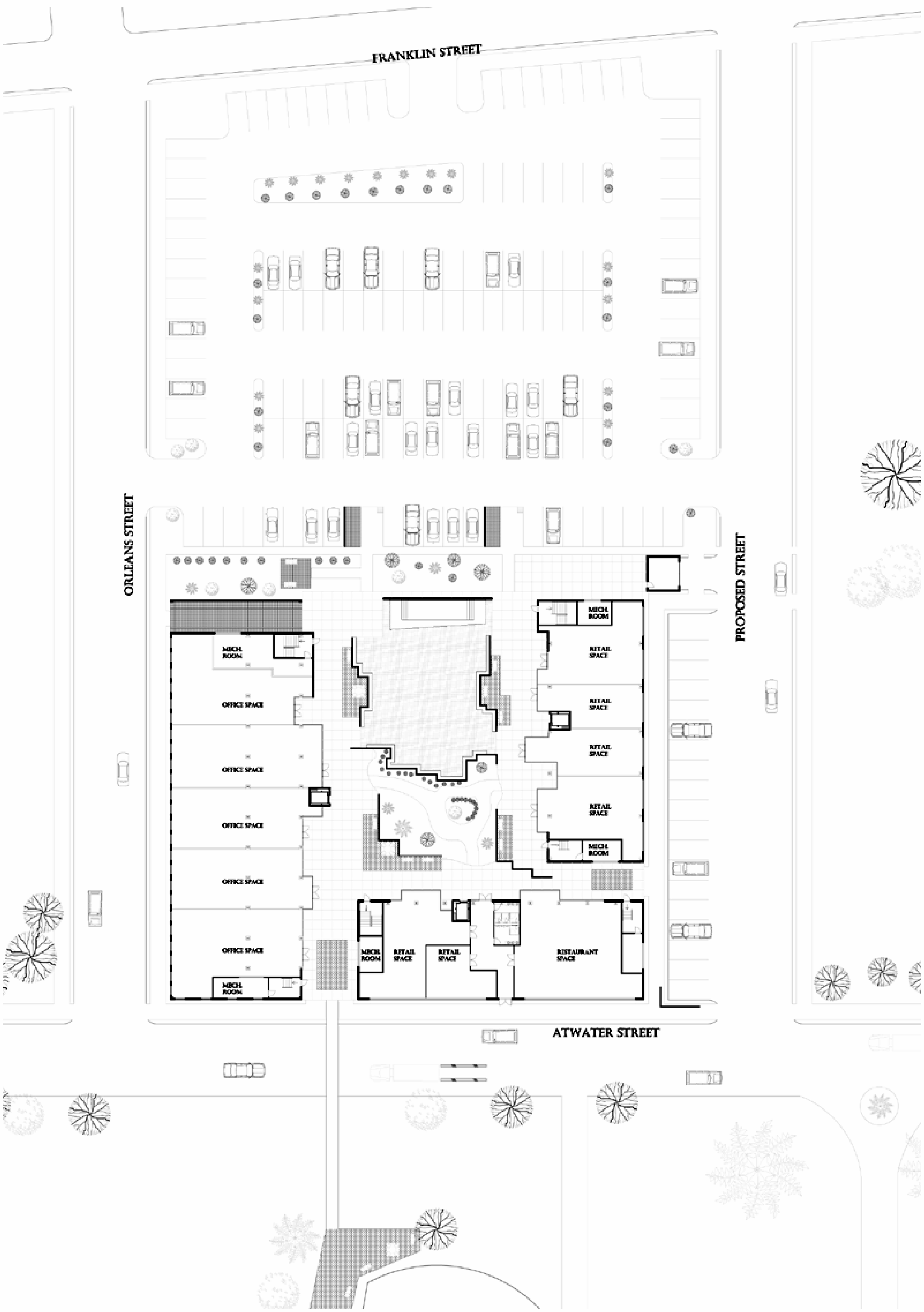


CHAIR LEG SYSTEM DETAILS





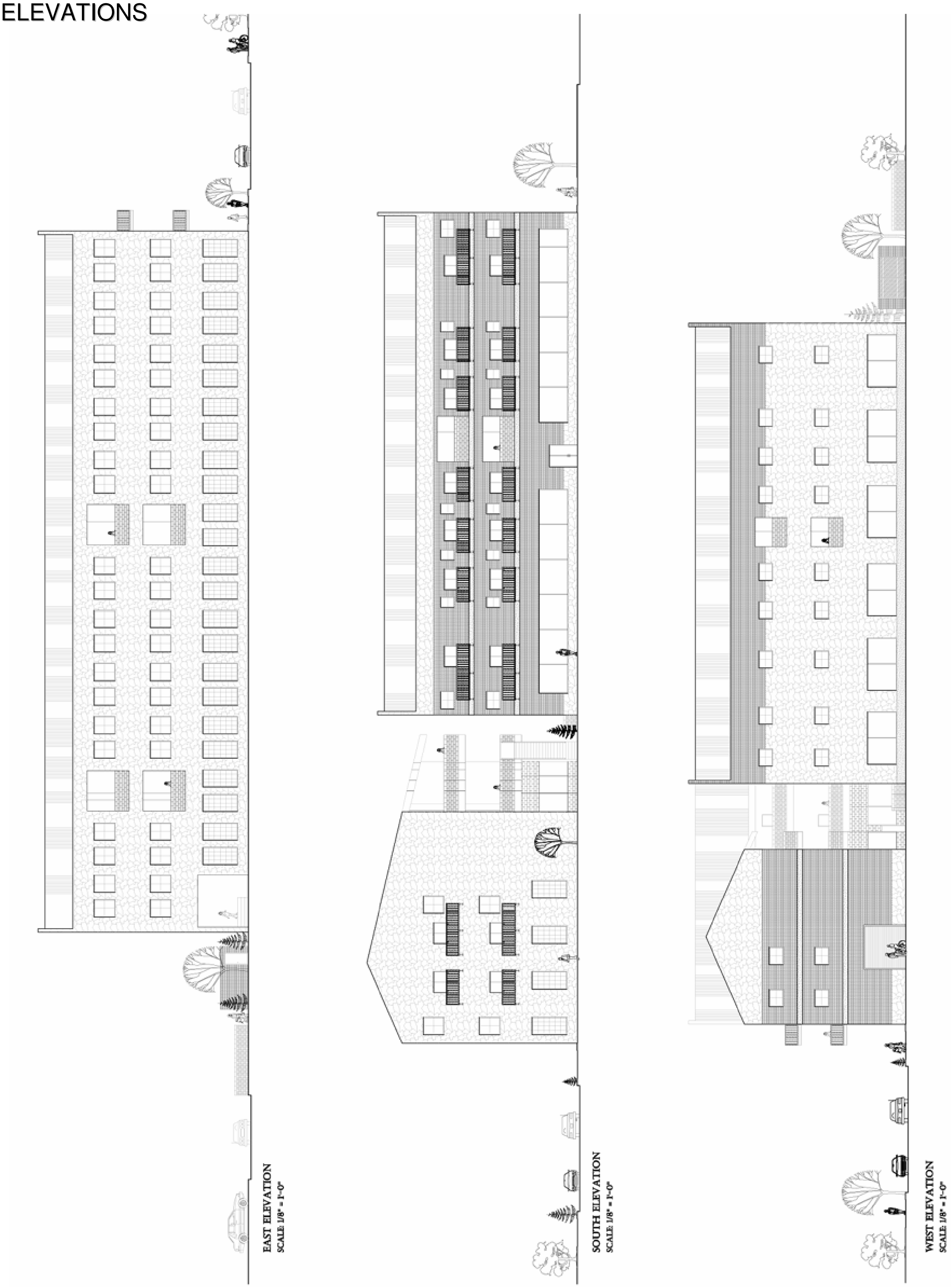
FINAL SITE PLAN



FINAL FIRST LEVEL FLOOR PLAN

FINAL SECOND & THIRD LEVEL FLOOR PLAN

ELEVATIONS


EAST ELEVATION
SCALE: 1/8" = 1'-0"
SOUTH ELEVATION
SCALE: 1/8" = 1'-0"
WEST ELEVATION
SCALE: 1/8" = 1'-0"

COURTYARD PERSPECTIVE

COURTYARD PERSPECTIVE

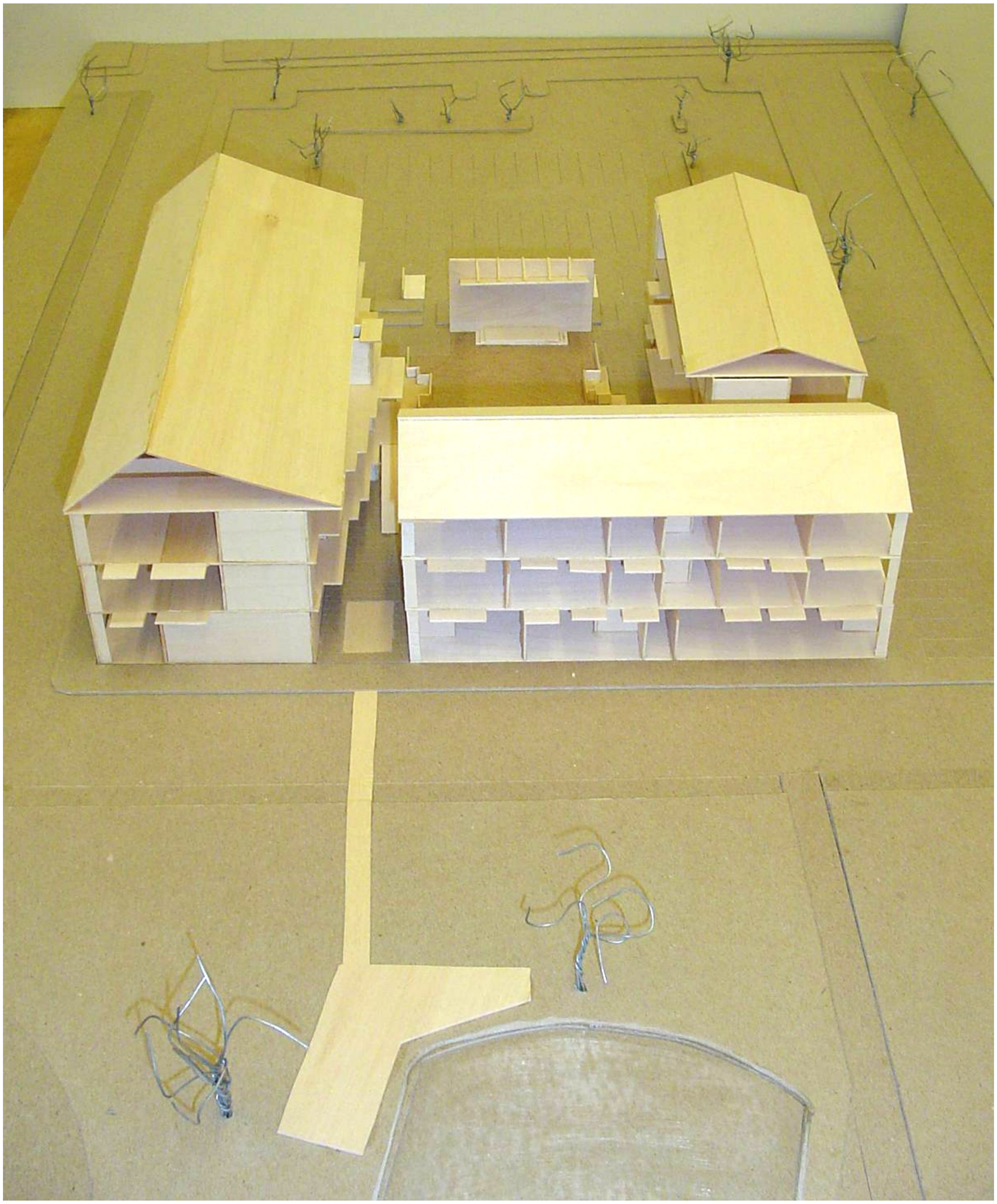
TYPICAL APARMENT UNIT - LAYOUT

TYPICAL APARMENT UNIT – ENTRANCE VIEW

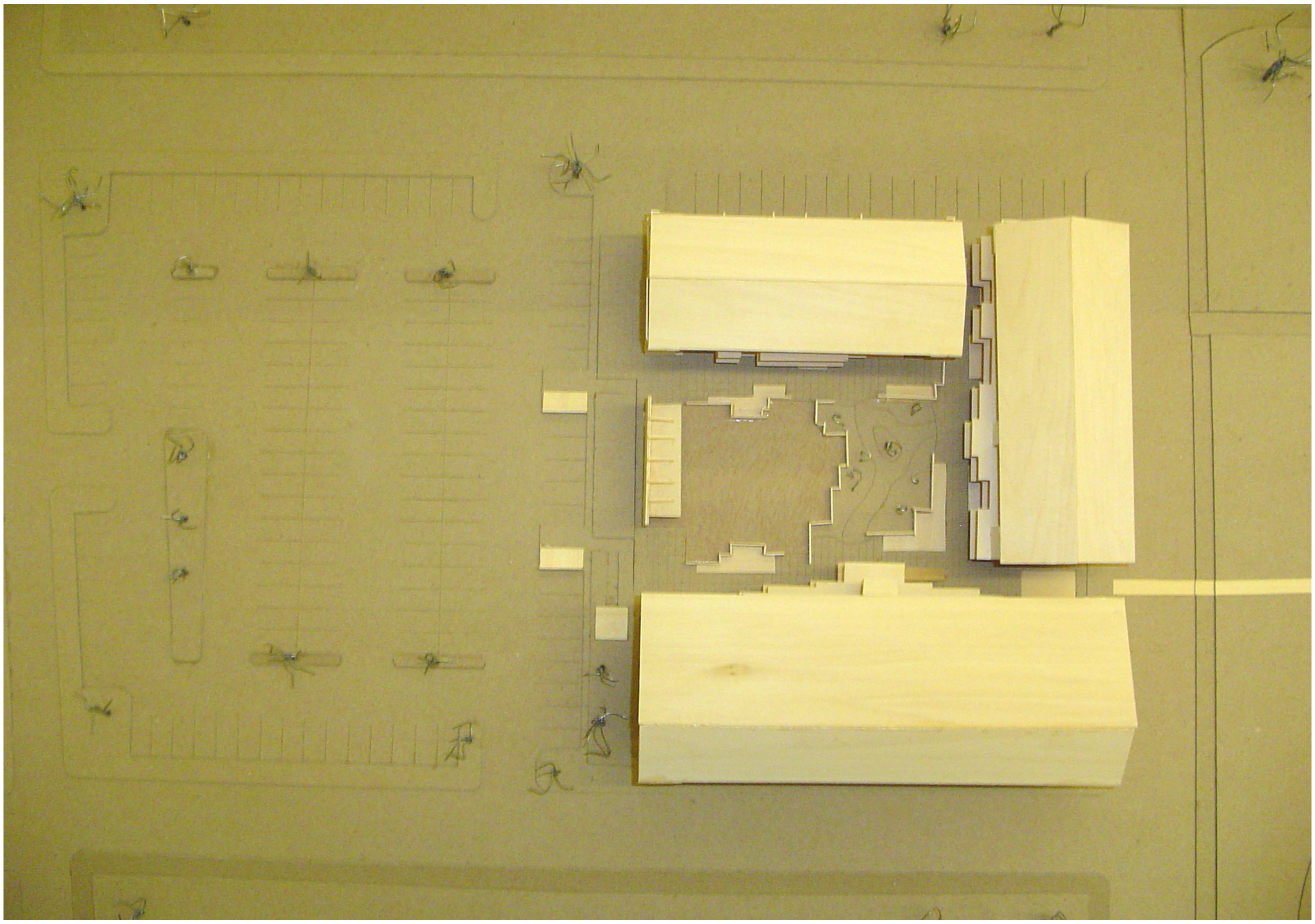
TYPICAL APARMENT UNIT – KITCHEN VIEW

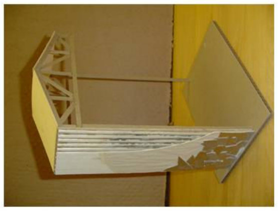
TYPICAL APARMENT UNIT – LIVINGROOM VIEW

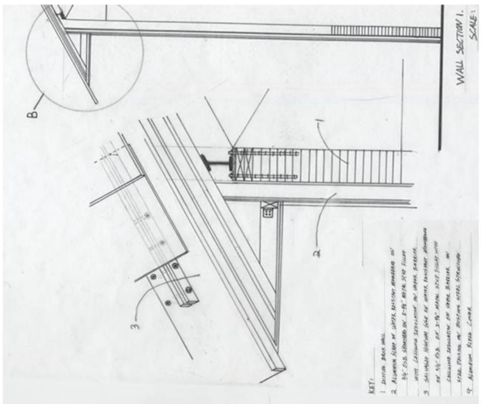
FINAL BUILDING MODEL

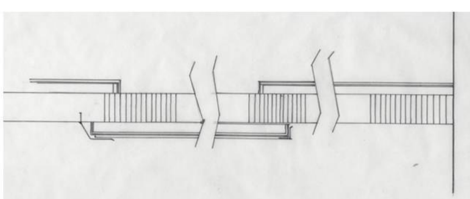


FINAL BUILDING MODEL

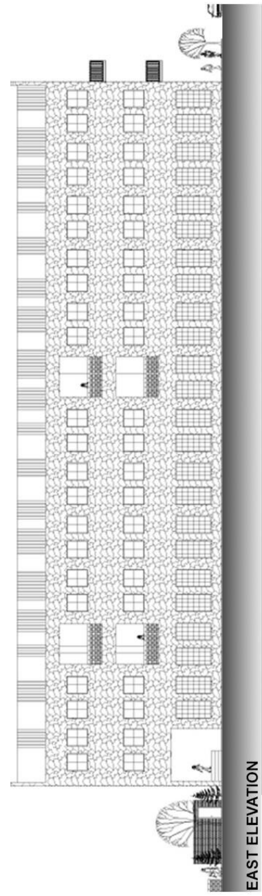








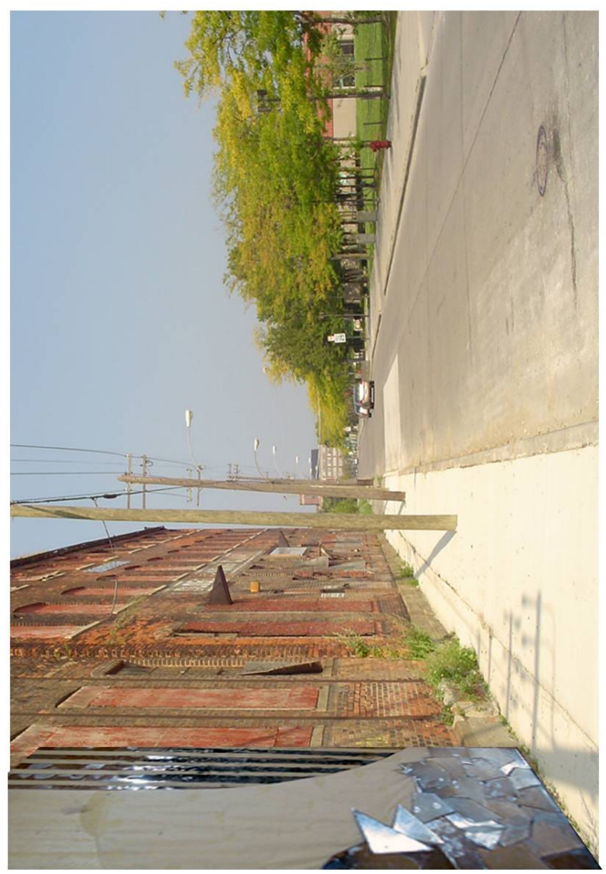
SALVAGED ALUMINUM SCRAPS



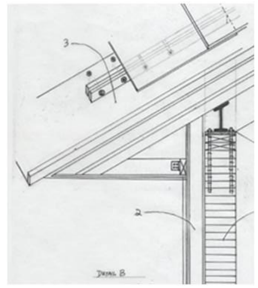
EAST ELEVATION

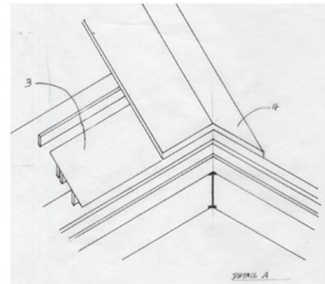
ALUMINUM SCRAPS SIDING

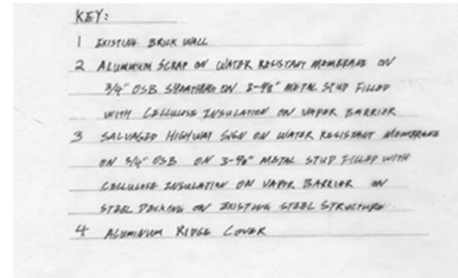
“JUNK”



SALVAGED HIGHWAY SIGNS



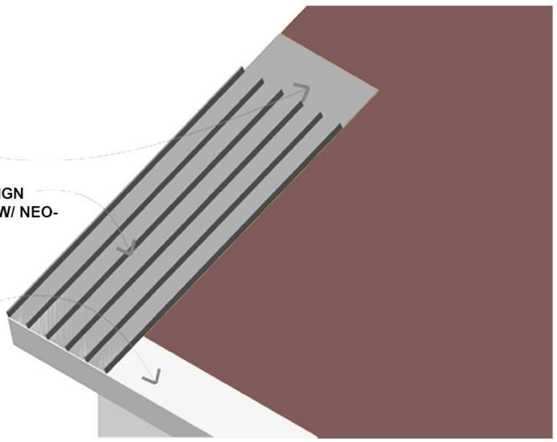


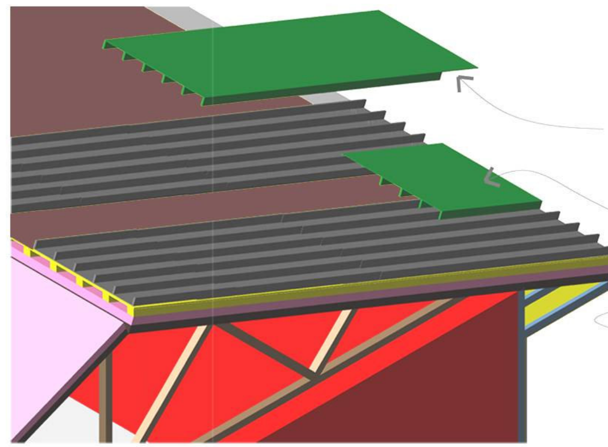


CUT OUT

SALVAGED HIGHWAY SIGN FASTERNED TO O.S.B. W/ NEO-PRENE WASHER

METAL FLASHING

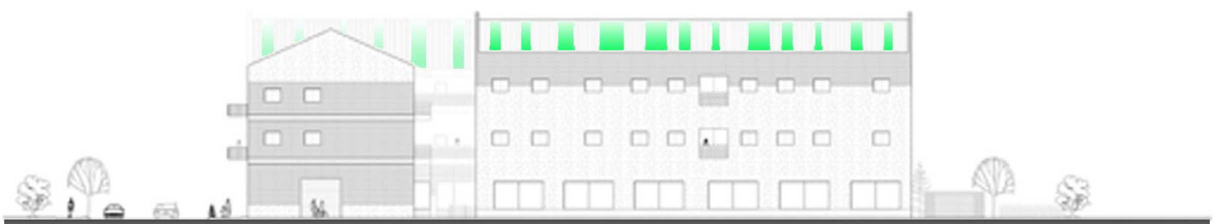




CUT OUT

SALVAGED HIGHWAY SIGN FASTENED TO FACE DOWN SIGNS

METAL FLASHING



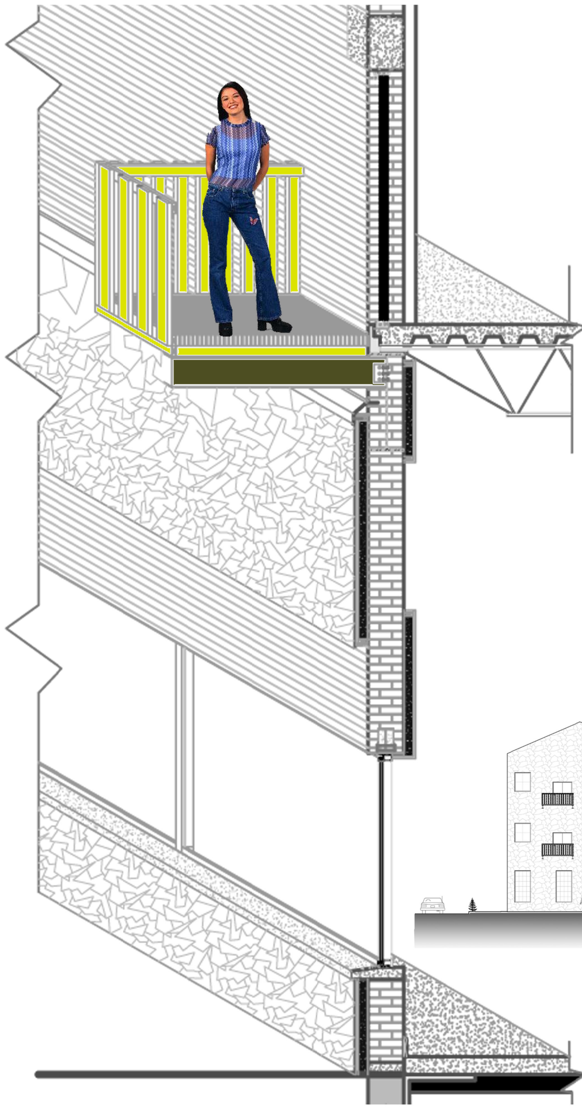
WEST ELEVATION

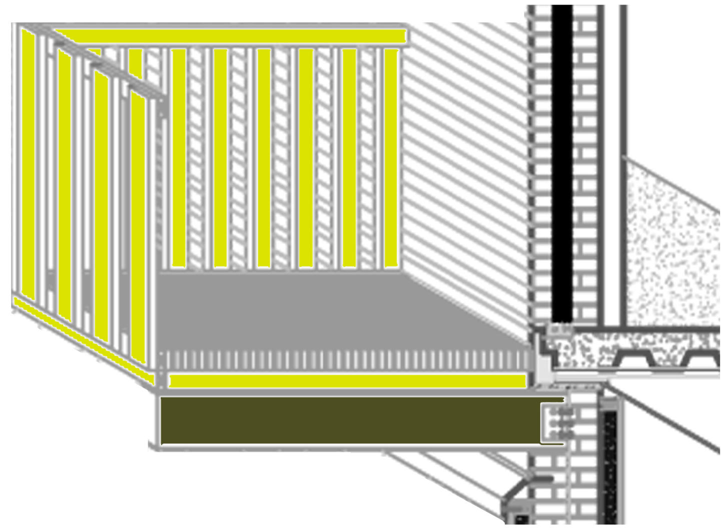
HIGHWAY SIGNS ROOF

"JUNK"

SALVAGED PALLETS

SALVAGED STEEL BEAMS





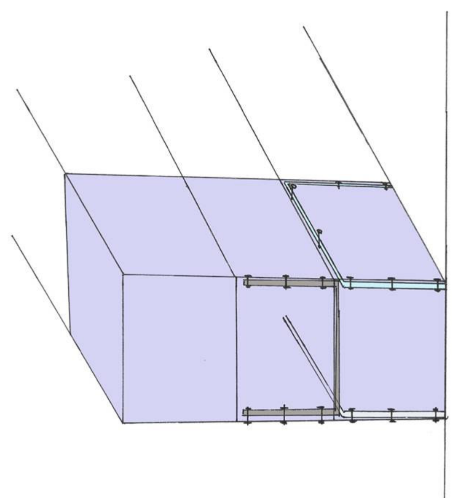
SOUTH ELEVATION

PALLETS BALCONY / SHADING

"JUNK"

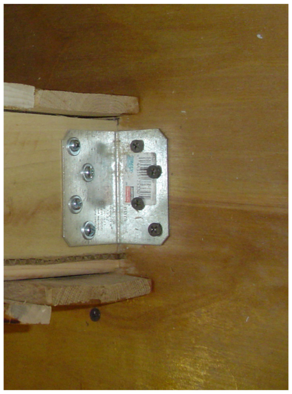
CHAIR LEGS SCULPTURE

"JUNK"



SALVAGED CHAIR LEGS

PALLET WALL PARTITION
“JUNK”

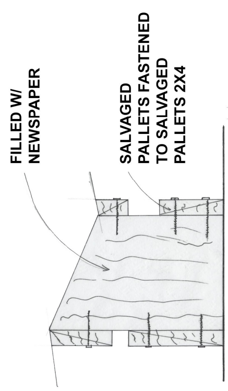


CONDTION C: FULL PRIVACY

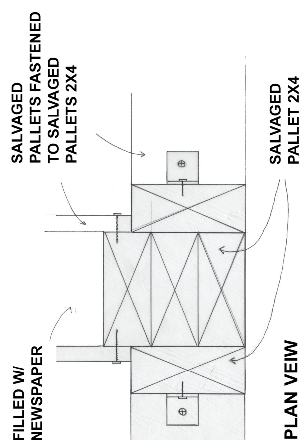
CONDITION B: FULL PRIVACY
PREVENT MOISTURE

CONDITION A: ADJUSTIBLE
NO PRIVACY

SALVAGED PALLETS



SECTION VEIW



PLAN VEIW

The intention of the final design is to reuse found materials in a very special way that can be directly applied to develop an existing building. The unconventional materials that are used in the project are: highway signs, aluminum scraps, pallets, and chair legs. Through the design process, there are a few challenges that may appear when using found materials as construction materials. When designing with found materials, the standard details don't work well for the most part, and it requires a extra mile to make things work.

What do you think of when people ask you what is JUNK? Junk typically is associated with something that has no value or very little value. The thesis here is to examine the actual value of JUNK. When people call something junk, it means that thing has no value, but it still contains tremendous amounts of potential value. For example, when one of the wood strips on the pallet is broken, then it is no good for stocking merchandise, therefore most people just toss it away or send it to be recycled. The potential of that broken pallet is still very rich. From the proposal, the broken pallet can be reconstructed into a partition wall. This proposal is one out of one million solutions. If one million solutions are available for one million forms of junks, this is a very large potential that is available and free the society and the environment.

HOW DO YOU FEEL ABOUT JUNK NOW?

ENDNOTES

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