

# PROJECT RESEARCH

## CASE STUDIES

### INFLUENTIAL PUBLIC HOUSING BUILDINGS

## Monterrey Housing

**Architect:** ELEMENTAL

**Location:** Monterrey, Mexico

**Program:** 70 low-income homes

**Area:** 6591 Square Meters

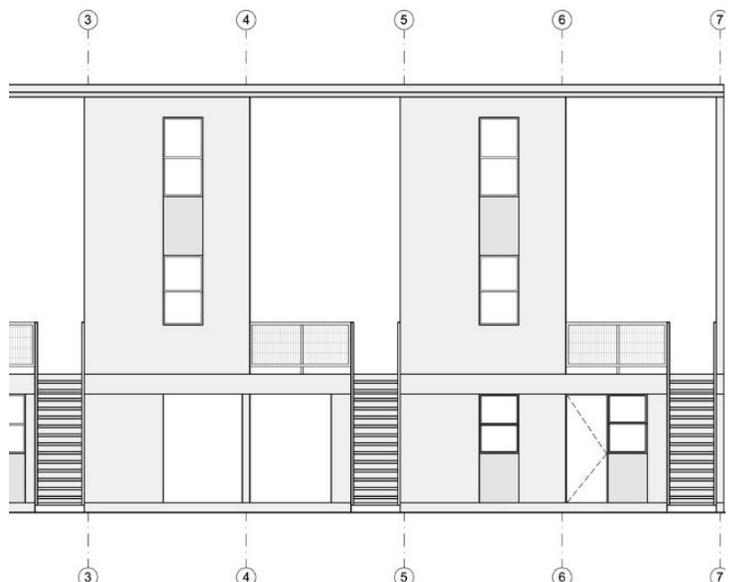
**Completed:** 2010

**Cost:** \$20,000 per dwelling

**Materials:** Concrete

This building encompassed the idea of individuality between housing units. The open spaces within each of the units are meant to allow the residents to add to their apartments if needed. They can be used as either outdoor space as provided or added to make extra space. This gives the adaptability in the building so that it can be adapted for future use and can allow for families to expand. This building also incorporates the idea of low-rise housing to eliminate issues that have emerged from high rise buildings. Another aspect of this project that I have been focusing on is parking. In areas such as this where most residents will have access to vehicles it is important to include parking spaces. The unique way this building incorporated those spaces is simple. Two small concrete slabs that rest in the “front yard” of each unit give an area that can be used for parking as well as other uses if the family happens to not have a vehicle.

First floor is a single home with a two story apartment located on the second and third floors. Only kitchen, bathrooms, stairs, and dividing walls are provided in 40 m<sup>2</sup>, but the extra 58m<sup>2</sup> for the house and 76m<sup>2</sup> for the apartment are meant for expansion. The open public space centralized between the rental units was used because the architect found that many public spaces in social housing were not well taken care of because residents didn't have direct access. This design allows all residents to have direct access to a large public space and in hopes that they will keep the area taken care of.



## Sint Agatha Berchem Sustainable Social Housing

**Architect:** Buro II and Archi+I

**Location:** Sint-Agatha-Berchem, Belgium

**Completed:** 2012

**Program:** 75 Units

**Materials:** Wood and Concrete

This building also uses the idea of low-rise housing. The idea that I had that relates well to this building is that it houses fewer units than most. The idea here is that with fewer units, the residents can have a stronger sense of community and will be able to connect better between themselves and the surrounding area.

Another reason why I chose this example is because it spans over an 8 block area which gives the residents access to many public and outdoor spaces. A large centralized common area gives residents easy access to outdoor recreation or leisure space.

The building uses solar panels, water collection, local and environmentally friendly materials, and insulation with optimized ventilation to ensure a sustainable design. Various floor plans give individuality to apartments and offer different sizes to accommodate many different families. A goal of this project was to have excellent energy performance as well as exceptional architectural quality. Parking on the site was well designed by placing it under second floor units and providing canopies from the units overhead. These units are an addition to a previous social housing project that was built in 1925 and the design adds to the modernist forms of the previous buildings.



## Social Housing Poljane

**Architect:** Bevek Perovic

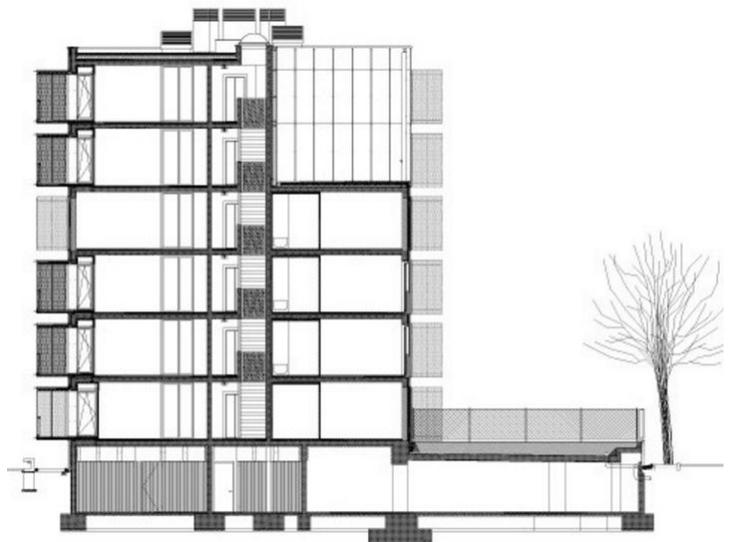
**Location:** Maribor, Slovenia

**Program:** 130 Social and Non-profit units

**Completed:** 2007

**Materials:** Concrete, Steel

The reason that I chose this building is because it uses the idea of having many public areas throughout the building. There are many areas inside where residents can connect and there are also areas on the roof and on the exterior site. The idea of having multiple public areas also gives the residents a stronger sense of community and can help to connect neighboring residents. These apartments show their individuality through the balconies that extend off of the façade. The color shows where apartments are located and give an accent to the building and the character. The way that this building tackles parking is by locating parking in the basement level of the building. Underground parking keeps cars off of the street but can also involve wasted space in case residents don't use all of the spots provided. The interior public areas were a result of the rigid urban plan of the area. These areas are either covered open air or roof gardens oriented toward the sun. The complex contains 4 separate buildings. Two slab buildings and two towers and encompasses a total of 130 units. The materials on the facades show how the location of each floor on the inside by using undulated cement on the spaces where apartments are located and a smooth metal panel where the floor plates sit.



## Le Lorrain – Brussels, Belgium

- Built from an old Iron Dealer Facility was completed in 2011
- Consists of Multi-unit apartments and three terraced maisonette homes each with its own private garden.
- Has a large, open communal space for residents
- MDW Architecture
- 835 Square Meters
- 4 flats connected by a large common open space to 3 maisonettes at rear of site
- Garage at street level

The main parts of this design that relates strongly to my project are the use of a central open space for residents to interact with each other and also the addition of the 3 separate homes. Including homes into the design might help to create a larger variety of families that are able to live in this building. This design also incorporates a great sense of place into the design by using metal cladding on the exterior to play back to when the building use to house a sheet metal factory. The 4 Flats are lifted off of ground level in order to let the street side breathe and create opportunities for more light to enter the units. The building incorporates vegetation through creeping plants along the street front and party walls, planted common space including a tree, and private gardens and green roofs.



## Elmas Social Housing/ 2+1 officina architettura

-09030 Elmas Province of Cagliari, Italy

-977.72 Square Meters

-Completed in 2010

-Includes an office and also housing units

-Entrance to housing units is achieved through the inner courtyard

-Exterior mesh covered staircase

-Sleeping areas are placed on north side and living areas are placed on south side

-A brise soleil balcony protects the southern windows against strong summer sun

-Stair and walkway balconies are all external creating cohabitation and social integration

The entrance to the private units is through an inner courtyard that creates a space between the road and the building itself. The exterior staircase and the exterior walkways are helpful in creating more open spaces where residents can interact with one another. The walkways also double as shading from the sun during the summer months and shutters on the north façade protect against the cold northern winds.



## Social Housing in Sa Pobra

- Mallorca, Spain
- Architects – RIPOLLITIZON
- 2498.7 sqm
- Completed in 2012
- Includes an interior courtyard-plaza that organizes the circulations and public areas

Once again the building is located around a central courtyard providing residents with open space. The units include a mixture of apartments and maisonettes that can have either two or three bedrooms in each home. In order to create a sense of place the wooden shutters and doors are a reinterpretation of the fenestration found on other buildings that surround the site. The design is based off of a modular system where bedrooms, bathrooms, and storage, are added onto the main core elements comprising of living, dining, and kitchen spaces. Holes in walkways are punched out of the exterior walls in order to frame meaningful views both inside and outside of the complex.



## L'Astrolarbre

- Paris, France
- Designed by KOZ Architects
- Completed in 2007
- Part of the design incorporates a tree that was on site before construction began, purpose was to infuse the urban residential development with nature.
- Front gardens on the ground floor add a break between the road and apartments
- Eco-friendly rainwater harvesting system incorporated over the entire development.
- Houses 12 Units

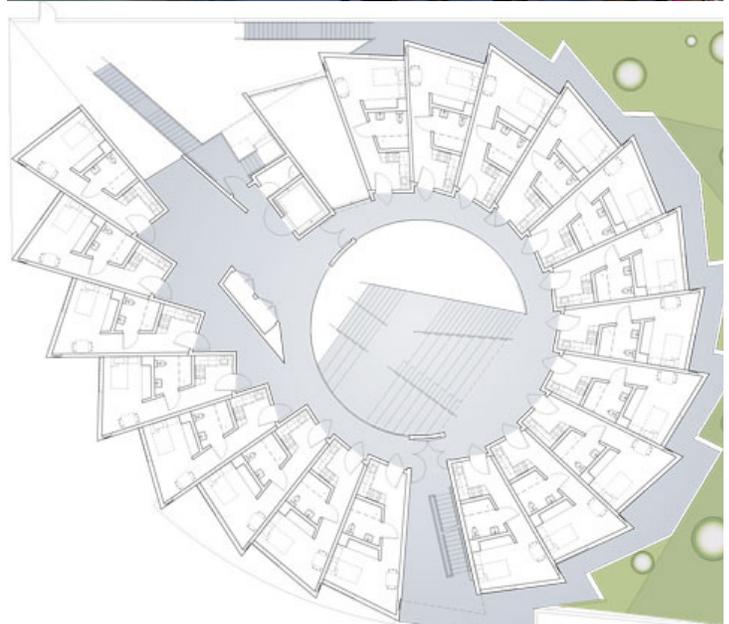
On an area of 1256 square meters the building consists of a small courtyard with small gardens throughout and 12 housing units. An all glass base level connects the building to the sidewalk on one side of the site while the courtyard and garden connects to the opposite street. The building uses an open air entrance into the site with open walkways spanning across the entrance. The walkways also serve as deck space giving the residents views of both the city in one direction and the courtyard and gardens in the other.



## New Carver Apartments, Los Angeles, California

- Architect – Michael Maltzan Architecture
- 53,000 Square feet
- Completed in 2009
- Located at 1624 S. Hope St. LA 90015
- Cost 18.4 Million to construct
- Labeled as special needs and elderly housing
- Homeless older adults and homeless adults with chronic disease/disabilities

Located next to Interstate 10, this public housing building is designed as a “beacon” for the homeless people of Los Angeles. This was built by the Skid Row Housing Trust in purpose to help keep people off of Skid Row when they are dismissed from Jail, Hospitals, or other facilities and situations. The units are only efficiency but they come furnished and have a total of 97 within the building. The circular design helps to quiet the noise from the freeway and comes with a sky deck, open community room, gardens, communal spaces and sites for medical and social service’s needs. The circular shape provides an open air community space at the center providing the residents with an area in the building to get fresh air and sunlight. Pathways of interior streets within the building connect to the exterior streetscape. The Kitchens, dining areas, and other common spaces are located directly adjacent to the medical and social spaces creating a connection of the residents within the building and the community outside of the structures walls.



## CASE STUDIES

### SKID ROW HOUSING TRUST

- Total of 25 buildings
- Supporting formerly homeless individuals with permanent homes

-Buildings close to my site location

- St. George Hotel
- Boyd Hotel
- New Genesis Apartments
- New Pershing

-Buildings similar in size to my project

- San Pedro House
- Hart Hotel Apartments
- The Six (52 Apartments)

**San Pedro House**

- 647 S. San Pedro Street
- 19 Special needs/efficiency apartments
- Completed in 1999
- Designed by Matlin, Duoretzky, and Partners

**The Six**

- 811 S. Carondolet Street
- 52 Apartments
- Designed by Brooks + Scarpa Architects
- Specifically for homeless veterans
- The six means “I’ve got your back”
- Leet platinum certified
- The open lobby lets lots of light in - aiming to help with PTSD

**Hart Hotel Apartments**

- 508 East 4th Street
- Completed in 1992
- 39 SRO apartments
- 2 Commercial Spaces
- Designed by Killefer, Flammang, and Purtill

**Star Apartments**

- Prefabricated construction
  - First pre-fab for multi-unit housing in 50 years
- Contains gardens, kitchen, basketball court, and a jogging track
- Pre-fab resulted in poor detailing, bad joints, uneven surfaces, and unintentionally exposed surfaces
- Uses exterior walkways

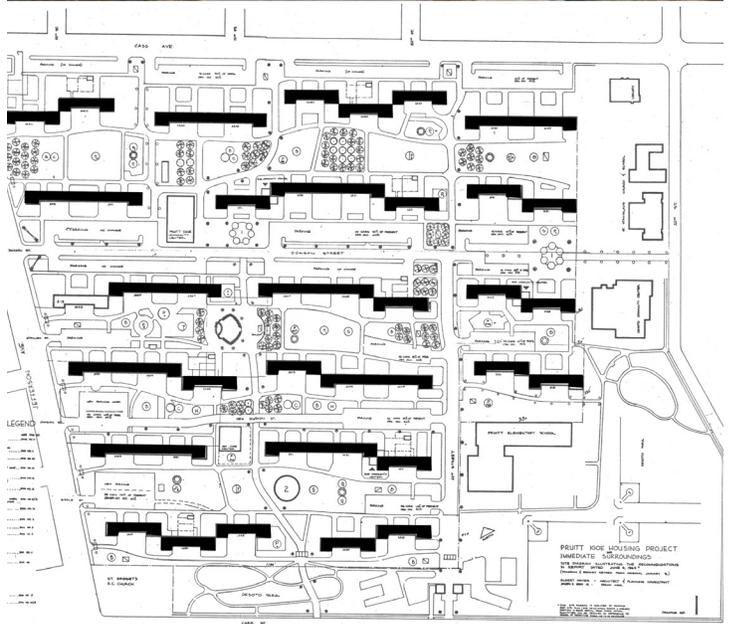


— CASE STUDIES —

FAILED PUBLIC HOUSING BUILDINGS

## Pruit-Igoe, St. Louis MO

Designed by architect, Minoru Yamasaki, the same man to design the world trade centers, designed this complex that consisted of 33 eleven story buildings. The complex was built to house segregated sects of young, middle-class blacks and whites, but ended up becoming mostly inhabited by African Americans as the white population largely relocated into the suburbs. The use of skip stop elevators, that only made stops every 3 floors, caused crime in stairwells as people would wait around corners for people to make their ways to their floor. The complex only lasted for 20 years having been completed in 1956, half of the buildings were destroyed in 1971 and half were demolished later in 1976



## Robert Taylor Homes, Chicago IL

These homes were once the largest public housing buildings in the United States. Completed in 1962, the development was named after the first African American to enroll at the Massachusetts Institute of Technology in 1888. The complex had 24 sixteen story high rises including 4,415 units. These homes housed some of the poorest residents in the entire country. 95% of the 20,000 residents were unemployed, only using public assistance as their income. The Poverty in this complex caused some of the highest rates of crime and gang activity in Chicago.



## Jordan Downs, Watts CA

These public housing units were constructed for the purpose of being temporary housing for war workers during WWII but were converted in the 1950s. The complex began as a partially integrated development but later became majority African American by the 1960s because of LA's restrictive covenants and large migrations of African Americans after the war. Police Brutality and a lack of employment began to contribute to great hostility among African Americans living in the complex. The resulting actions eventually lead to the 1965 Watts riot and the large amount of gang violence in the 80's and 90's.



## Cabrini Green, Chicago IL

At the peak of Cabrini green, originally named the Frances Cabrini Row houses, it housed more than 15,000 residents with only 3,607 Units. In the 1950s a large factory nearby closed down leaving many of the residents without jobs. Resulting poverty and crime began to make its way throughout the Cabrini Green Development. The crime rates and conditions have been documented more than any other housing development in Chicago. Cabrini Green has been described by the USA Today as “a virtual war zone, the kind of place where little boys were gunned down on their way to school and little girls were sexually assaulted and left for dead in stairwells.” Cabrini Green was shut down and closed in 2010.



## —CONCLUSIONS—

This portion of the research was conducted in order to better understand the environment that I will be designing for and how I can best design for that environment. Multiple case studies were done to find the optimum number of residents to house and to find design aspects that have been shown to create interaction between individuals in the past. Public housing buildings of the past were also analyzed for the purpose of understanding negative design aspects and which of those should be avoided during design. Case studies of buildings around the world as well as case studies from the neighborhood of my site location allowed for proper knowledge in regards to scale, density, and design strategies that provide a solution to this thesis.

Important aspects that were found to introduce connection between residents are public spaces, exposed circulation areas, and open courtyards. Public spaces provide spaces for residents to get out of their own apartments to engage in meetings, conversations, or gatherings. This allows residents to have a neutral meeting place that can encourage interaction between residents.

Exposed circulation areas create interaction in two ways. First, they cause individuals to slow down as they move about the building. Second they provide deck space to the residents, creating unlimited meeting areas throughout the length of the walkways.

Open courtyards give residents an area to get outside of the building while not having to leave the safety of the building itself. This area of the building provides a space for the residents to get outside, get exercise, or to interact with other residents.

All three of these aspects have shown to improve the experiences and the time that these individuals live in public housing. Creating a community within the walls of these building is crucial because it creates important bonds between residents that give these individuals the opportunity to be a part of something that can improve not only their lives, but also the lives around them.

— STRUCTURE —

MODULAR PREFABRICATION

## Modular Systems

These are complete buildings or sections of a building and are brought complete and whole to the site and are then connected together on site.

### Advantages

- Faster construction speeds
- Indoor construction avoids weather delays
- Low waste materials (50-75% Less)
- Environmentally friendly construction process
- Flexibility allows for easy additions
- Safer for taller buildings
- Cuts back on noise in neighborhood during construction
- Everyone works together on construction causing less errors.

### Common Materials

- Steel and Wood are used most often

Must be designed stronger than standard construction because each unit has to make it through the transportation process to the site

Insulated concrete forms are a type of prefab and have an acceptable ductility to be used in high seismic risk zones

Roof and building skin can be applied after assembled on site

High cost of living in the West coast could give the lower cost and advantage

The buildings are 90-95% complete when arrived on site

Quality control allows for proper examination to avoid mistakes that may cause problems over time.



## Materials

### Wood

-Mostly used for single family and low-rise multifamily buildings

#### Rules of thumb

- Maximum width 16'
- Maximum length 64'
- Maximum height 12'
- Maximum building height 3-4 stories
- Estimated depth of floor mate line 2'
- Limited to type III or type V construction



### Steel

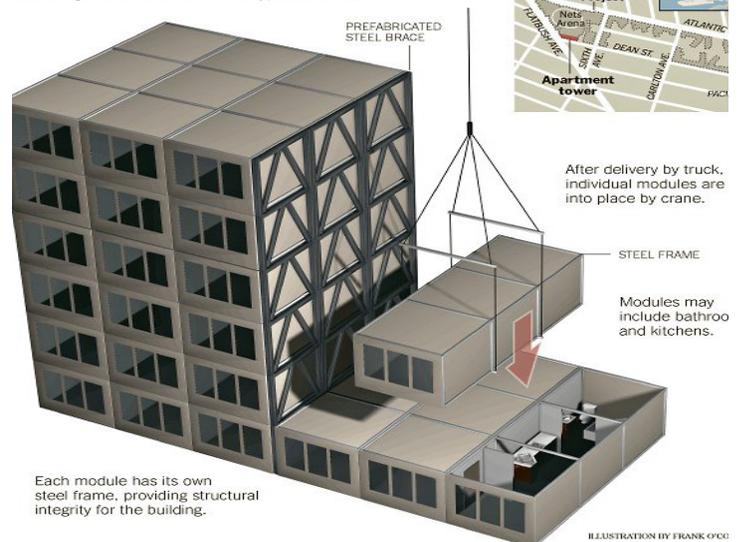
-Used for taller, higher performance or seismic designed buildings  
-May not have to be over structured for transport

#### Rules of thumb

- Maximum width + Length using concrete deck
  - 12'x46'
  - 14'x30'
  - 16'x35'
- Maximum width + length using cement board
  - 12'x65'
  - 14'x58'
  - 16'x50'
- Maximum height 12'
- Maximum building height 5-12 Stories
- Estimated depth of floor mate line 1'6"
- Type I or II construction
- Steel floor joists 16" on center with 4.5" concrete deck
- Can install finishes, appliances, and fixtures in factory

### Modular High-Rise

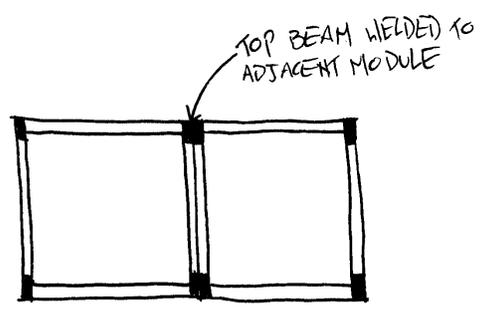
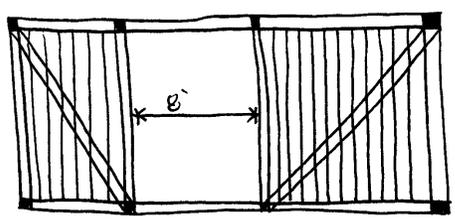
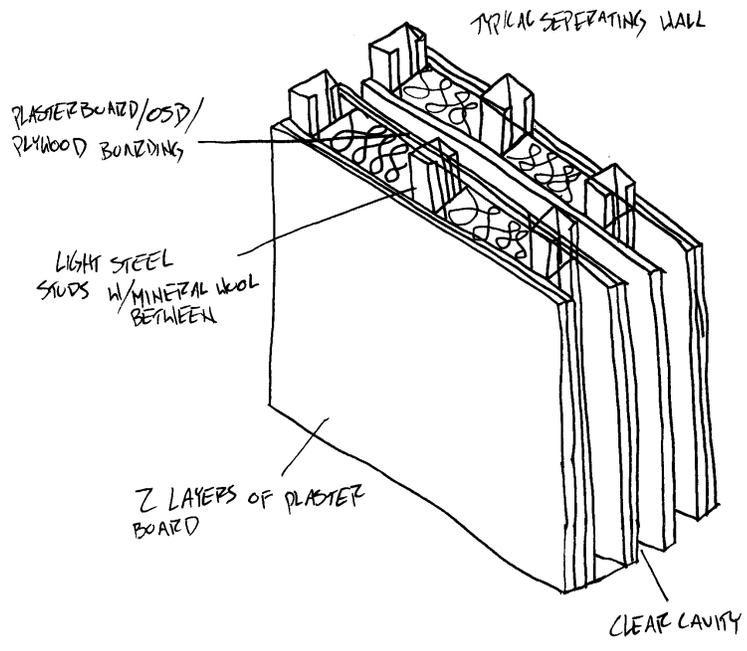
Developer of Atlantic Yards in Brooklyn is exploring plans to build what would be the tallest prefabricated steel structure in the world, a 10-story apartment building. The "modules" could be built in a factory bolted together on-site, as in this hypothetical section:



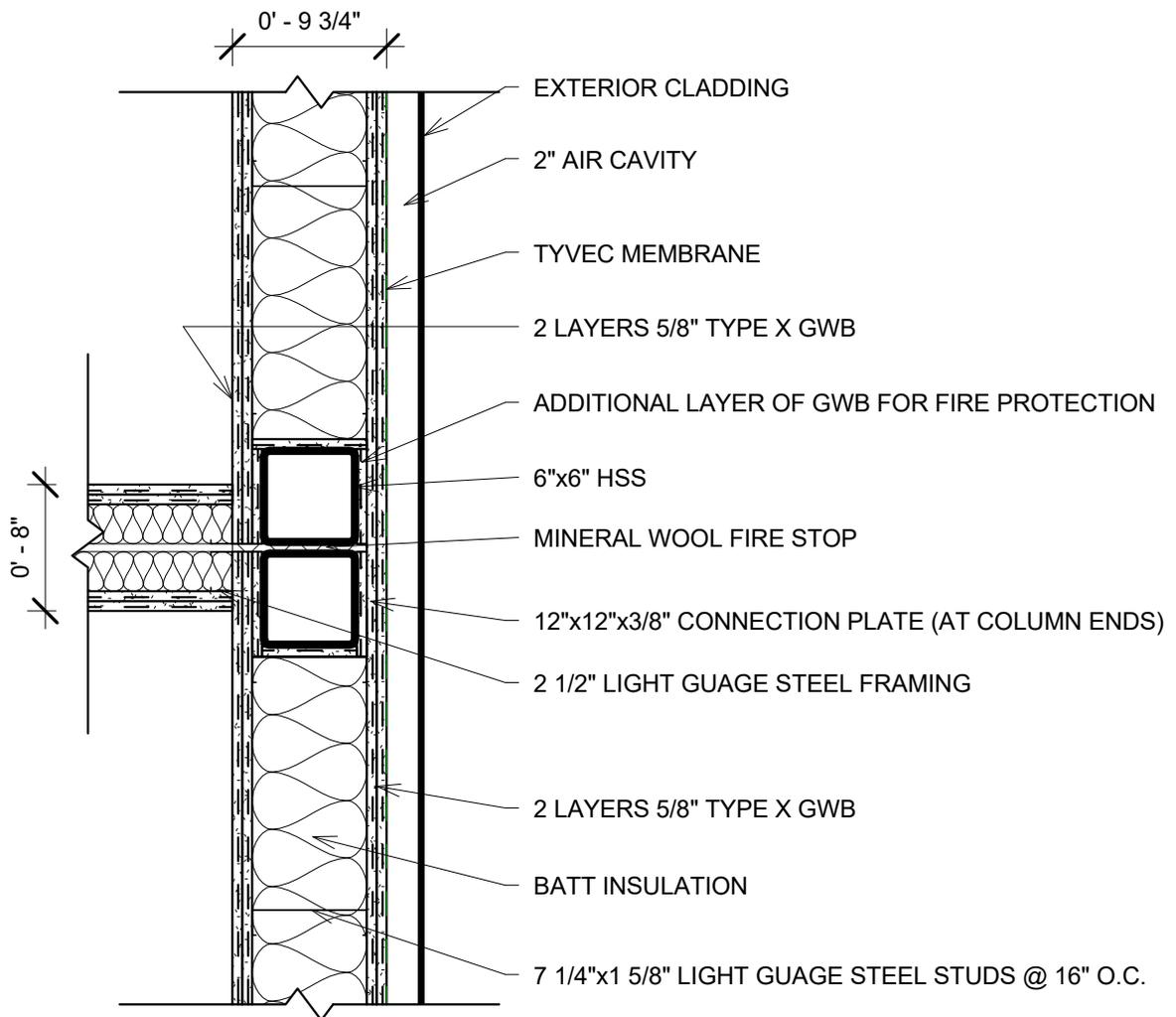
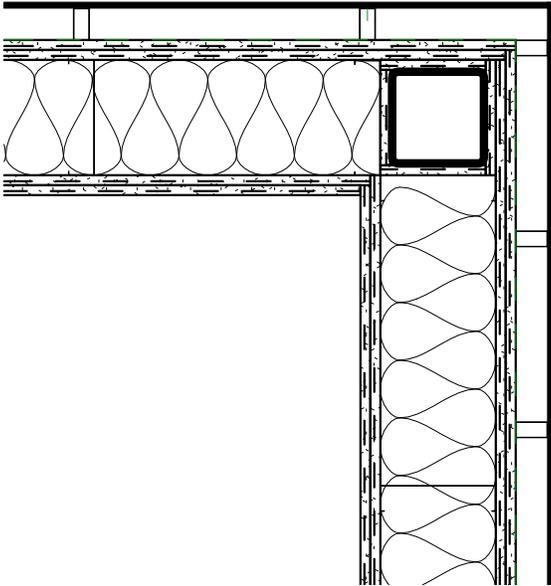
STRUCTURE DETAILS

STEEL  
HALL

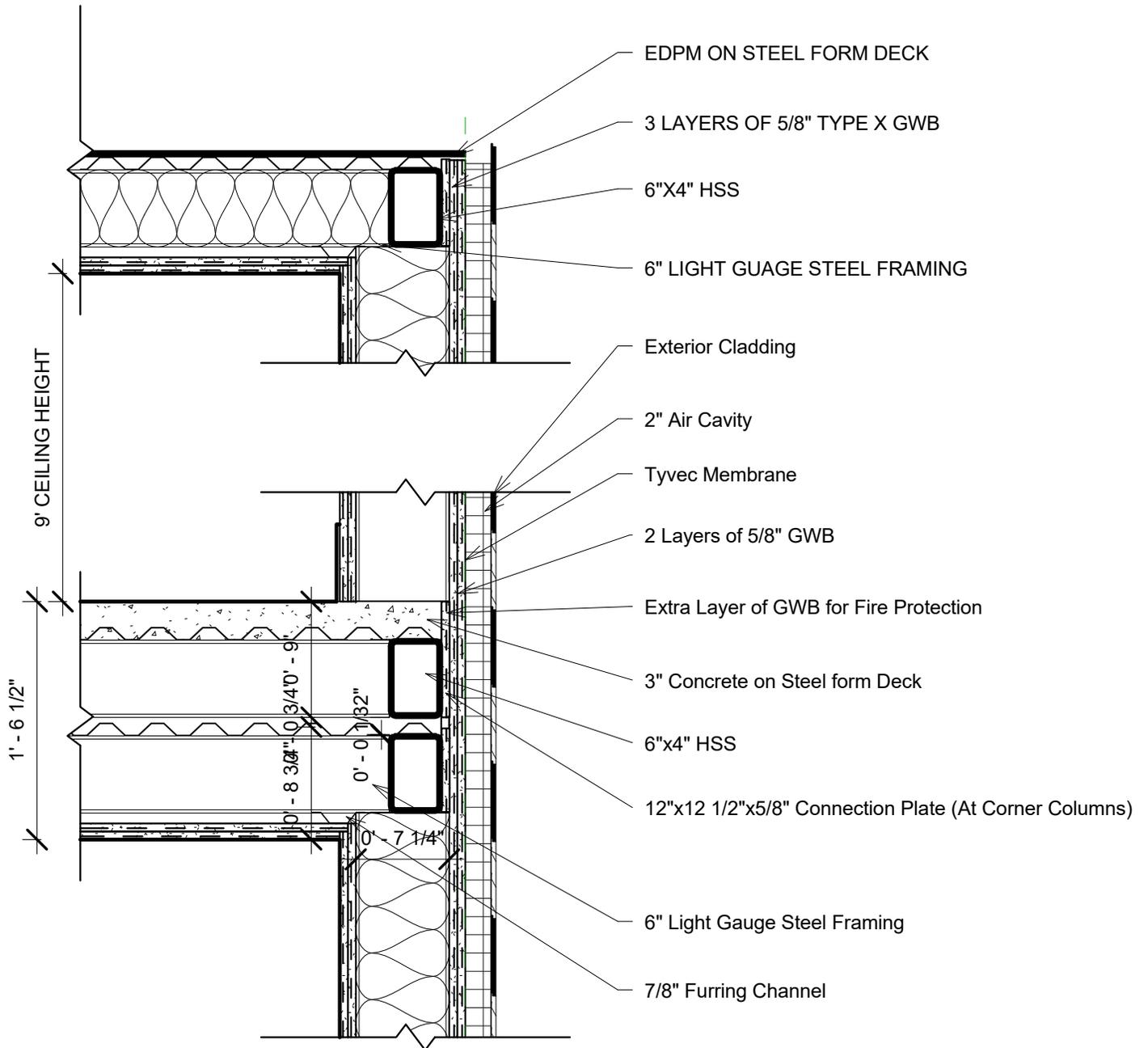
- INTERIOR ON A MAJEL-LINE: 8"
- EXTERIOR (W/O CLADDING, W/O MEMBRANE): 9 3/4"
- WHEN ADJACENT MODULES MEET THERE IS 1/2" GAP ON MAJEL-LINE
- INTERIOR WALLS NOT ON MAJEL-LINE USE TYPICAL PARTITION TYPES



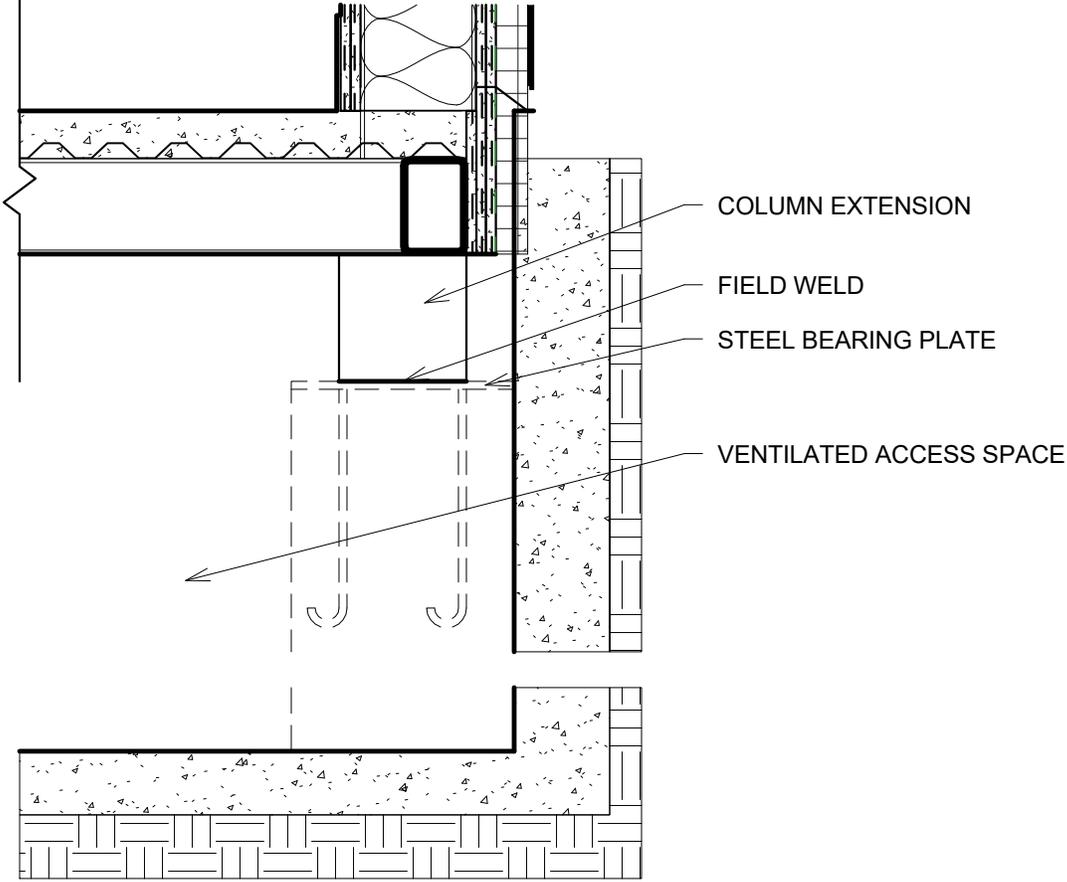
# Exterior Wall Plan Detail



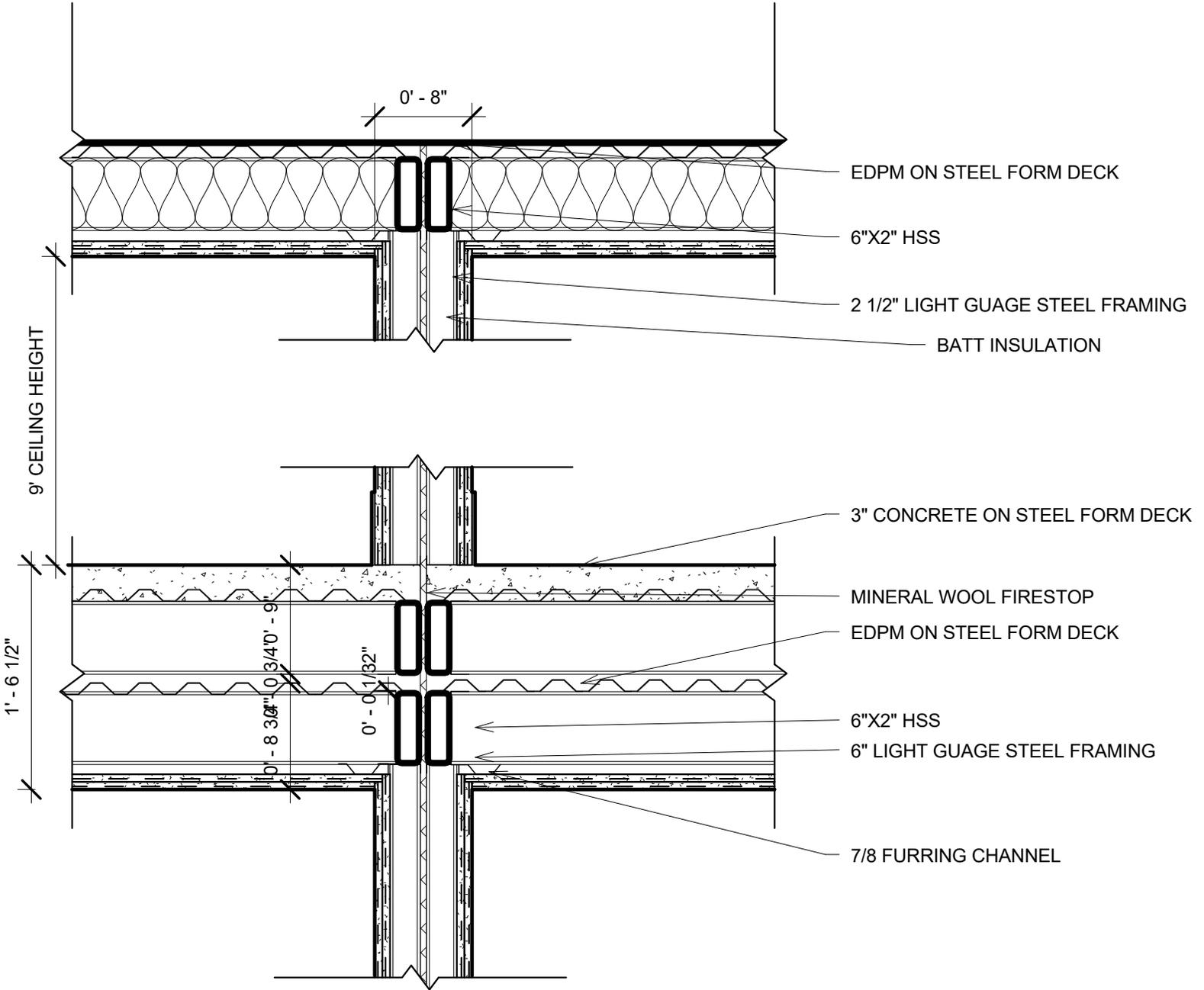
# Exterior Wall Section Detail



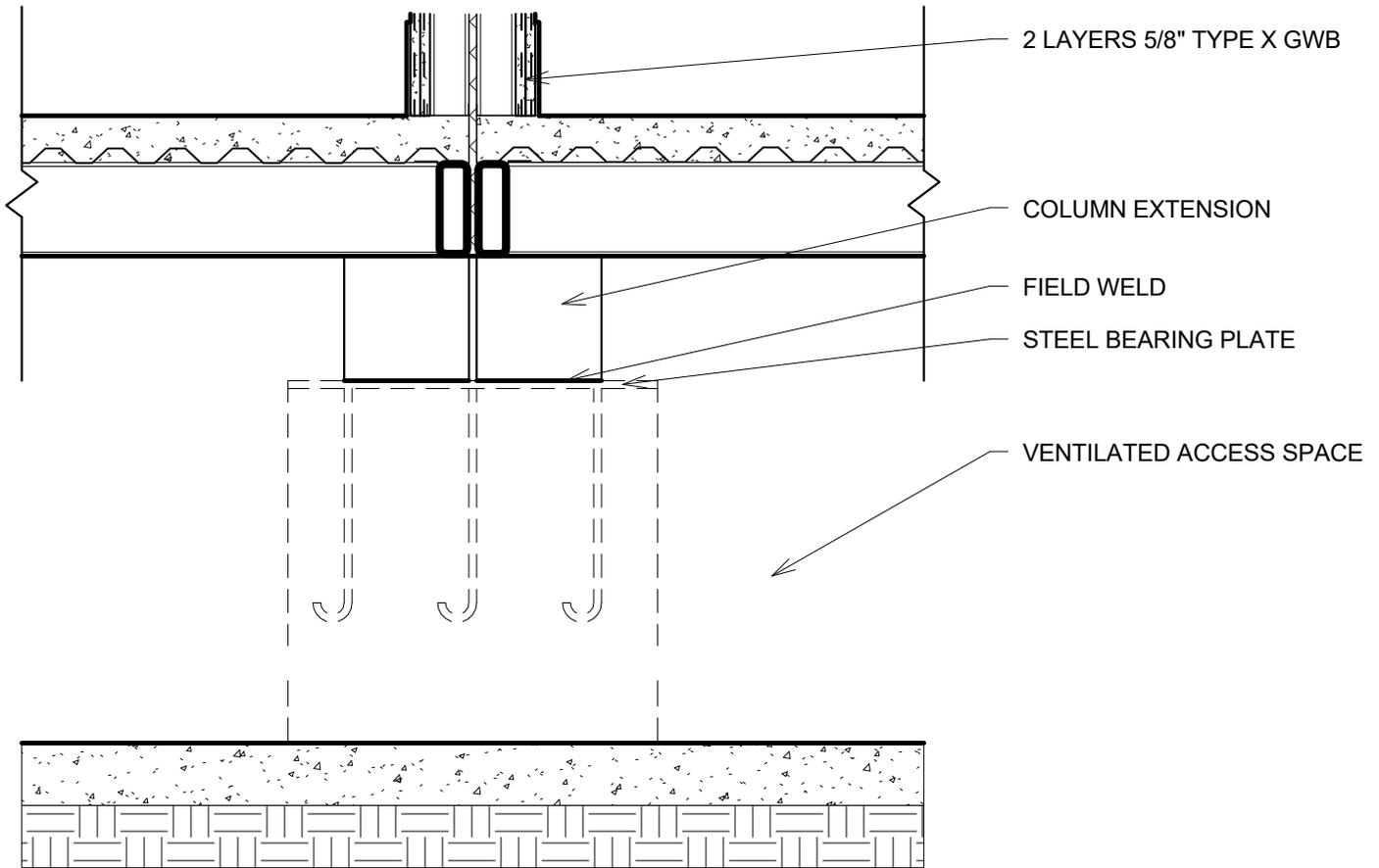
# Exterior Wall Section Detail



# Interior Mate-Line Wall Section Detail



# Interior Mate-Line Wall Section Detail



## —CONCLUSIONS—

The research portion of this project that focused on structure, lead to a deeper exploration into modular prefabrication for multiple main reasons. Because this project has such a high demand on cost, construction techniques were looked at for the ways that they are able to cut down costs of a project. Modular prefabrication was able to do this in many ways.

Materials can be minimized as well as mistakes in the job that need repairing in the future because workers learn the most efficient ways of construction when producing large numbers of the same units over time. Because of this, waste can be greatly decreased as well making modular prefabrication very environmentally friendly.

Another main aspect of this project was that it can serve as somewhat of a template to be recreated if the project proves to be successful. Using modular prefabrication lets this building do exactly that. By creating units that can simply be stacked on top of one another, these units can be used to construct other buildings around the city while still being able to make a building unique to its site and location.

Lastly, a large influential factor to this project is the construction time. Because the residents of this building are homeless, the need to create a building quickly and efficiently is hugely important.

Modular prefabrication allows for the construction of the building to be done alongside the site construction. Another benefit is that when the units of the building arrive on site they can already be 90-95% complete cutting down on site construction by a large factor while also cutting down on traffic disturbances.

Overall, modular prefabrication included every aspect of the construction process that I felt most beneficial to the purpose of this building and more. To better understand how these buildings were put together, the details were created which also set the template for how the building will be designed as a whole.

# — DEMOGRAPHICS —

## HOMELESS POPULATION

# Homeless population in Los Angeles

- 254,000 Men, women, and children are homeless sometime during the year
- 82,000 People on any given night
- Average age is 40
- Men make up 75% of the single population
- 42-77% Don't receive public benefits they are entitled to
- Estimated 20% are physically disabled
- 20-43% Are single families (typically by mothers)
- 16-20% Are employed
- 33-66% Have substance abuse
- 11% Are veterans

-4,700 Live downtown (more than any other area)

-Los Angeles pledged to end veteran homelessness last year but it only dropped by 41%

-Most of the homeless population in Los Angeles are working class adults between the ages of 25 and 54, totaling 60% of the homeless

-Since 2013 the homeless population has almost doubled from 26,000 to 43,000 in 2016 in the Los Angeles area alone



## RESOURCES

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