

IPRO 339: AFFORDABLE SHIPPING CONTAINER HOUSING - JUAREZ, MEXICO

Problem

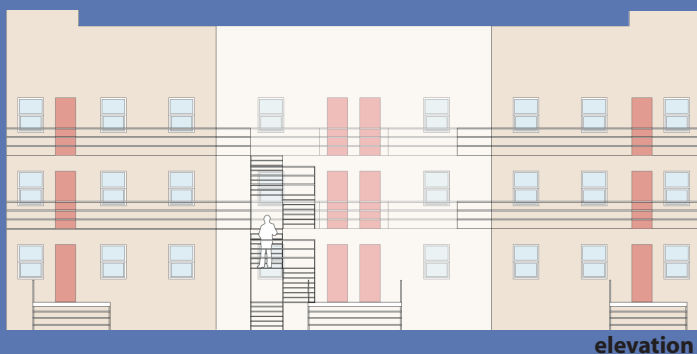
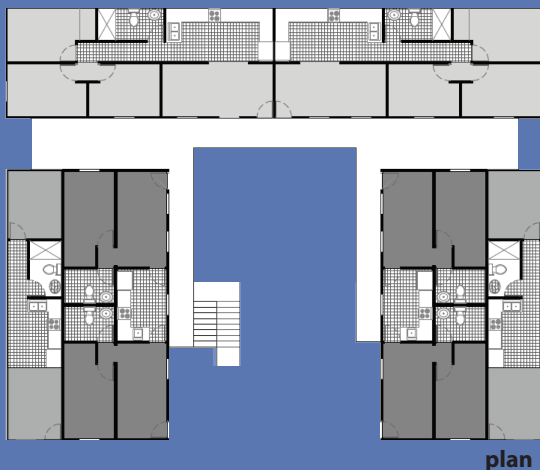
- The demand for reasonably priced housing worldwide.
- Dealing with previous breakdowns in social housing.
- Using each housing strategy to resolve each situation.
- Adjusting the prototype to reach better solutions.
- Concentrating on the solution for Juarez, Mexico.

Goals

- Provide a safe and healthy community for the workers in Ciudad Juarez, Mexico.
- Provide a variety of unit types to meet the varying needs of the workers in Juarez.
- Encourage and promote a sense of community.
- Provide a housing solution that is affordable for the workers, while still increasing their standard of living.
- Create prototypes that could be applied to other third world sites.
- Decrease energy consumption by providing more passive manners of heating and cooling.
- Streamline production to make an easier and faster method to get the containers ready for living purposes.
- Improve on the plan made last semester for better efficiency.

Obstacles

- One of the major obstacles was inter-group communications.
- Fulfilling our goals that we set forth with minimal change in the floor plans.
- Decreasing the cost as much as possible.
- Using the energy modeling software, specifically ensuring model integrity and finding and correcting errors in the model that prevented successful simulation.



SUB GROUP ACCOMPLISHMENTS

ENERGY

A well-rounded understanding of the implications of many energy systems were determined for our specific requirements and location. This group familiarized the IPRO team with energy modeling software and how to create a building model. More specifically, using this program, we all learned how to control the cost, how to specify heating and cooling systems, how to specify usage patterns and how to interpret modeling results. Recognizing the advantages and disadvantages of using energy modeling software we were able to use it for the betterment of the IPRO. The last and very important job was to cost estimate the energy usage of our buildings.

HOUSING

Housing design group was very interested in shade design specific to Juarez. The vision for the window's design was to embrace natural ventilation while rejecting the heat of the sun. Void spaces were looked into as a cost effective alternative to adding unnecessary containers and a research was done to see if the idea was feasible. The floor plans were adjusted throughout the semester as each subgroup's needs changed. As this was changing, we were updating our cost analysis to stay in budget.

EXTERIOR ENVELOPE

Materials for use on the external wall, internal insulation, soundproofing and foundation for building have been closely researched for cost and quality and effectiveness in a hot, dry environment such as Juarez. Papercrete - a spray insulation - will be used on the external wall giving us an R-value of 40. This is more expensive than the straw bale insulation we considered last semester, but it is less maintenance and we believe it will be of higher quality in the long run. The insulation will also act as soundproofing and will help create a peaceful experience inside each apartment. Juarez building codes were translated and analyzed and all requirements were met, including fire safety issues. As for the foundation of the construction, pier foundation was chosen as it is the most conducive method and inexpensive.

INFRASTRUCTURE

We established a solid contact with a large RV manufacture company (Jayco of Middlebury, Indiana) to outfit the shipping containers with electrical and plumbing components. A small mechanism has been implemented in the design to connect the containers to the foundation but also to each other. A suitable rainwater collection system was supplied to allow for the conservation of water, while at the same time, does not force us to drastically change our structure.