

I PRO 339 PROJECT PLAN

Designing Affordable Housing out of Shipping Containers for Ciudad Juarez, Mexico and Chicago, Illinois

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John Sullivan-Fedock

Maribel Valdez

Aubrey Vander Heyden

Jacquelin Villa

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1.0 Abstract

Currently there are several countries throughout the world that have a large need for affordable housing. Our IPRO is currently dealing with solutions for Juarez, Mexico and Chicago, Illinois. These two places are very different in climate, culture, as well as economy. Our IPRO this semester will focus on applying the prototype from last semester to these two regions, while making adjustments as needed. We will continue the research into systems which will be advantageous to each situation and develop them accordingly. Once we get a better understanding as to how we can apply our prototype to these situations we will be better able to apply the prototype to various other countries throughout the world.

2.0 Background

- A. The sponsor for IPRO 339 is Mr. Brian McCarthy, President of PFNC Global Communities in Corrales, New Mexico. His company strives to create affordable housing for those areas in the world where there is none or not an adequate amount for the working population.
- B. Workers of Maquiladoras factories in Juarez, Mexico face daily struggles with wages of less than two dollars an hour. Owning even a very basic home with no electricity or plumbing is out of reach for most people. If they do wish to purchase one, they must go in with several other families for one home. Workers therefore have little choice but to create squatter settlements. They construct the homes themselves out of wooden palettes, and boxes. Sometimes there is a makeshift foundation or metal roof. The majority of these settlements do not have running water, sewage systems, or electricity for heating and air conditioning. Because the job turnover at the factories is sometimes over one hundred percent a year, the communities are often transient as well. By providing homes that are affordable for their income and which they can own themselves, we hope that people will be able to stay longer and feel a better sense of entitlement to the land and community there. The slums of Juarez face many social problems as well. There is a huge problem with gangs and violence, and there have been hundreds of murders and rapes of young women in the last couple of years. In Chicago much of the government provided housing has failed over the years and now is in such a state of disrepair that many of them are being closed and people are left homeless. There are very little affordable housing solutions left in the city of Chicago therefore a need for this type of housing is incredibly great. In order to ensure that our solution does not fail like previous attempts at social housing we must design it to fit into the typical Chicago lot and so that it resembles the architecture and character of homes around it.
- C. The situation calls to mind previous attempts at public housing, which have often led to social problems in regards to crime, isolation from the rest of the community, and dependency on the government for income. In Chicago alone there are many examples of failed government provided housing developments which today are being torn down at a rapid rate, and many people are being

- displaced with no where to go. In order to not repeat previous mistakes we must integrate the housing into communities that are already successful so that the community is a mix of retail, high, medium, and affordable housing solutions. Affordable housing should not cost more than thirty percent of a household's gross income. Reusing shipping containers for another occupiable use has been done many times before. Portakabin is one example, in which the units can be moved as well. They have been successfully converted into youth centers, classrooms, office space, artists' studios, live / work space, nurseries and retail space. Often these are more trendy projects, however, rather than basic housing like our project. We are therefore working on ways to make these containers still inviting and a place to call home. Habitech is another company which manufactures affordable housing technologies. Homes can be assembled in anywhere from one day or one week and cost about thirty to fifty percent less. But overall, there is not enough affordable housing for many areas of the world.
- D. Last semester IPRO 339 produced a prototype for a generic site in Juarez, Mexico. This included floor plans, elevations, sections, and 3d renderings of what a community in Juarez could look like. The IPRO tackled this by dividing into subgroups and creating several design development studies which eventually became one final design development that was presented at IPRO day. Various amounts of research was also done to determine what a community like this would need. The culture is very different from ours therefore there was a need to understand what exactly was needed in everyday life, as well as basic cultural needs that needed to be implemented into the design. All of these things went into the final development study.
- E. In investigating the problem at hand, the team must be careful of any assumptions they make with the way people live and what resources they need or want. Just because they are from a poorer area than us, we must not forget that they have similar goals and desires for the way they live. We need to therefore provide them with appropriate resources. We also should not be blinded by the fact that there is violence and social problems; our solutions need to be appropriate and not stifling or worse than what is there now. Ethically we are obligated to be sensitive to each situation in which we are implementing our prototype. If needed the prototype should be adapted to meet each condition in a unique way so that it is beneficial to the people using it.

2.0 Objectives

- A. • Research and understand the users of our product by looking at the social, economic, and physical factors in Juarez, Mexico and in the Maquiladoras where they work.
- Research solutions to make the shipping container prototype resemble Chicago vernacular housing.
 - Research the most cost efficient and sustainable ways of incorporating plumbing, HVAC, and electricity into the homes.
 - Research the structural aspects of building these homes with the structural container.
 - Develop additional site plans, floor plans, and sections as different solutions and options to the previous semester.
 - Using our research and previous designs to continue to develop multiple solutions for our sponsor, considering the client at hand.
 - Using our prototypes to implement our solution to other places around the world.

- B. IPRO 339 is focused on providing an affordable housing option for the working poor in Juarez, Mexico as well as low income families in Chicago, Illinois. This semester we will continue to research the technologies involved in reusing shipping containers for this housing. We will continue to design a prototype housing unit which will relate to other units in an overall community, with services such as commerce, open spaces for activity, and community centers to support them. We wish to design a housing community that embodies the ideals of humanity, affordability, functionality, opportunity, sustainability, durability, safety, culture, and neighborhood.

This semester our IPRO is also focusing on producing an affordable solution for people located in the Chicago land area. In doing this we must examine what makes affordable housing successful and then implement this into our design. We must also be respectful to what people believe is an actual home; therefore we must make our solution resemble typical Chicago housing.

Our team plans to have a large base on information on the user we are aiming our houses at and take their specific social, economical, and physical needs into account with our design. We will look at the climate and geography of the area and use this to influence the design of our HVAC and structural systems. By the end of the semester, we will integrate all these spatial, cultural and physical investigations to create a suitable housing unit. We will come up with a marketing plan focused on the companies in Juarez, who will then be able to sell them to their workers at very affordable prices.

4.0. Methodology

WBS Level 1: Affordable Shipping container housing

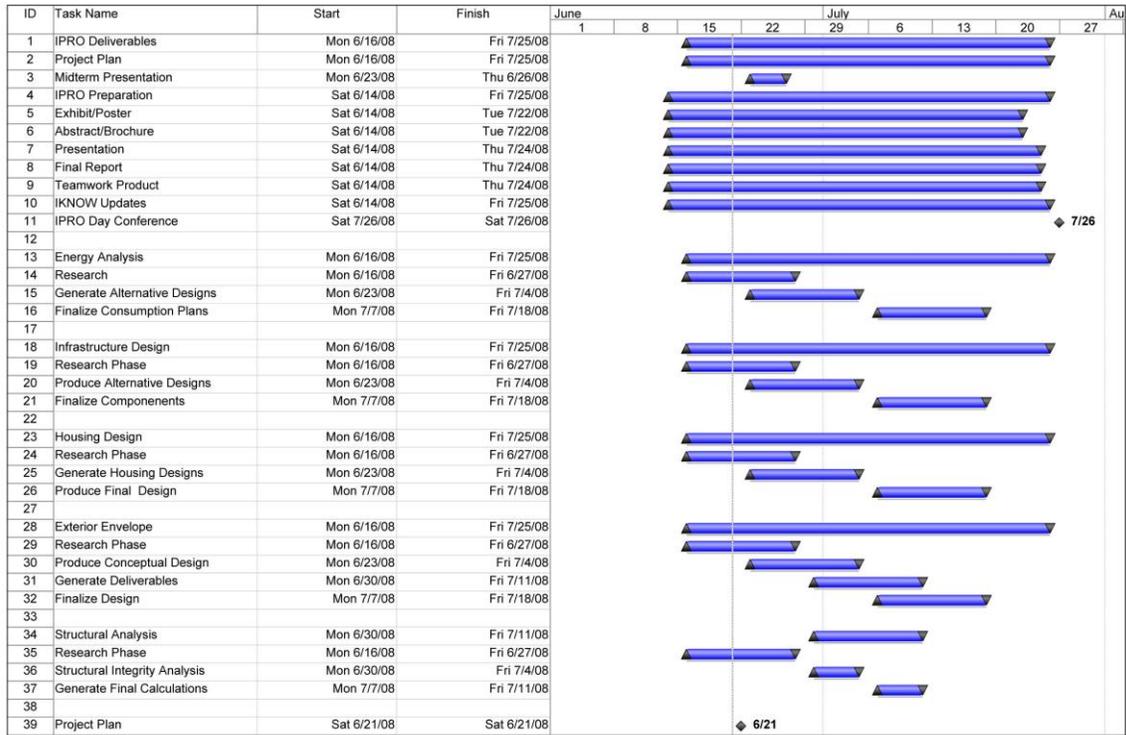
WBS Level 2:

- 1.1- Energy (20)
- 1.2- Infrastructure (22)
- 1.3- Exterior Envelope (20)
- 1.4- Structural Design (15)
- 1.5- Housing Design (23)

WBS Level 3:

- 1.1- Energy
 - 1.10- Solar Power (4)
 - 1.11- Zero Energy (4)
 - 1.12- Hybrid Systems (4)
 - 1.13- Cost Analysis (4)
 - 1.14- LEED Certification (4)
- 1.2- Infrastructure
 - 1.20- Electrical (4)
 - 1.21- Plumbing (4)
 - 1.22- System Sizing (3)
 - 1.23- Infrastructure Components (5)
 - 1.24- Passive Systems (4)
 - 1.25- Solar Heating (2)
- 1.3- Exterior Envelope
 - 1.30- Foundation (6)
 - 1.31- Skirting (4)
 - 1.32- Crawl Space (3)
 - 1.33- Insulation and Infiltration Control (5)
 - 1.34- Cladding Systems (2)
- 1.4- Structural Design
 - 1.40- Structural Strength (3)
 - 1.41- Strengthening Alternatives (4)
 - 1.42- Connection Sizing (3)
 - 1.43- Cutting Methods (3)
 - 1.44- Process for obtaining Containers (2)
- 1.5- Housing Design
 - 1.50- Vernacular Housing in Chicago (4)
 - 1.51- External Appearances, Arrangements, and Dimensions (5)
 - 1.52- Roofing Systems (6)
 - 1.53- Visual Appeal (4)
 - 1.54- Painting Options (4)

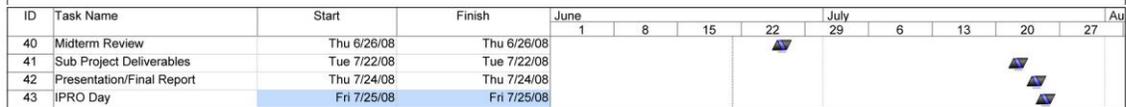
Gantt Chart



Project: Project1
 Date: Sat 6/21/08

Task Milestone External Tasks
 Split Summary External Milestone
 Progress Project Summary Deadline

Page 1



Project: Project1
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Page 2

5.0. Project Budget

Item	Price	QTY	Price	Purpose
Models	\$25.00	2	\$50.00	Developing prototypes of our designs for review and further study.
Printing	\$5.00	10	\$50.00	Printing of renderings, floor plans, site plans for in class presentations
I PRO day	\$250.00	1	\$250.00	Poster and Presentation materials (Including models)
TOTAL:			\$350.00	

6.0. Team Structure and Assignments

Name: Muhammad Darwish

Year: 4th year

Major: Chemical and Biological Engineering

Experience, Skills, Strengths: Energy and renewable applications. Experience in hydrogen and renewable energy research and biological technology research.

Roles: Energy sub-group and part of the Chicago sub-group

Name: Shreyas Shrikar Dole

Year: 4th year

Major: Mechanical Engineering

Experience, Skills, Strengths: Problem Solving, experience in thermodynamics and designing machine parts.

Roles: preliminary research, worked in initial Exterior Envelope sub-group and a member of the Juarez Design Team.

Name: Ruth Droscher

Year: 4th year

Major: Architecture

Experience, Skills, Strengths: Experience in design, knowledge of energy and environmental policies, experience in space planning.

Roles: preliminary research, member of Energy research sub-group, member of Juarez/Third world design team.

Name: Fabian Escobar

Year: 4th year

Major: Architecture

Experience, Skills, Strengths: AutoCAD, Photoshop, Illustrator, 3D Max.

Roles: Housing Design and part of the Chicago sub-group

Name: John Sullivan-Fedock

Year: 5th year

Major: Architecture

Experience, Skills, Strengths: Various CAD Software, Construction, Adobe

Roles: Housing Design and part of the Chicago sub-group

Name: Ja Young Kim

Year: 5th year

Major: Architecture

Experience, Skills, Strengths: working in an architecture & interior design firm during summer as an intern, design and computer skills.

Roles: research, member of exterior envelope group, member of Chicago sub-group

Name: Mariusz Klemens

Year: 4th year

Major: Architecture

Experience, Skills, Strengths: 3D Software, AutoCAD, Graphic Design, Architectural Practice

Roles: In housing design sub-group, part of Chicago sub-group

Name: Joshua Lebak

Year: 5th year

Major: Architecture

Experience, Skills, Strengths: Has worked in an urban planning office for four years, experience in design, space planning, and problem solving.

Roles: preliminary research, worked in initial infrastructure research sub-group, and is a member of the Chicago Design sub-group

Name: Michael Martinez

Year: 4th year

Major: Humanities

Experience, Skills, Strengths: Problem Solving, Organization, and Research

Roles: Part of housing design and the Chicago sub-group

Name: Harry Michael

Year: 4th year

Major: Mechanical Engineering

Experience, Skills, Strengths: Experience with working in a team environment and knowledge of renewable efficient energy

Roles: preliminary research, member of Energy research sub-group, member of Juarez/Third world design team.

Name: Brett Monroe

Year: 5th year

Major: Architecture

Experience, Skills, Strengths: Experience in design, space planning, and problem solving, has worked in an architectural firm.

Roles: preliminary research, worked in initial infrastructure research sub-group, and is a member of the Juarez infrastructure sub-group.

Name: Lauren Mordecai

Year: 5th year

Major: Architecture

Experience, Skills, Strengths: worked in 2 architecture firms over the last 4 years, currently working for rendering and animation firm, building programming experience as well as familiarity with working drawings and construction documents

Roles: preliminary research, building envelope group member, Chicago site group member.

Name: Sumayya Nikhat

Year: 4th year

Major: Electrical Engineering

Experience, Skills, Strengths: IPRO Blind swimmer project. Build a sonar active and passive device)

Roles: Group A- Energy

Name: Thales Ramier

Year: 4th year

Major: Civil Engineering

Experience, Skills, Strengths: Structural design in steel and concrete, energy transmission, and building enclosure experience

Roles: Structural Design and part of the Chicago sub-group

Name: Adie Rios

Year: 5th year

Major: Architecture

Experience, Skills, Strengths: Worked in various architectural firms, spent a lot of time developing details and doing space plans. Proficiencies in AutoCAD, Rhino, 3D max, Revit, Adobe creative programs, Corel Paint, Excel and other word document systems.

Roles: Working within the Exterior Cladding and ground connection group on research and developing details, member of the Chicago Design sub-group.

Name: Vince Rivera

Year: 4th year

Major: Humanities

Experience: Writing, editing and formatting documents; document design: brochures, flyers and presentations. I have taken two CRP classes and I have an interest in the field. In addition, I can use a wide range research tools and I am able to bring a non-technical perspective to the project. Roles include the infrastructure subgroup and the Chicago group.

Name: Andrew Seo

Year: 4th year

Major: Mechanical Engineering

Experience, Skills, Strengths: Research, Design Problem Solving, Organization

Roles: Mexico Housing Design subgroup

Name: Maribel Valdez

Year: 4th year

Major: Mechanical Engineering

Experience, Skills, Strengths: Experience in process selection engineering for large-scale energy production plant design. Experience in mathematical optimization of theoretical engineering design. Experience in user interface and controller development using lab view software. Experience in aero elasticity theory applied to military aircraft design.

Roles: Juarez sub-group and part of the energy sub-group

Name: Jacqueline Villa

Year: 5th year

Major: Architecture

Experience, Skills, Strengths: Experience with marketing and web design.

Roles: Juarez sub-group and energy sub-group

Name: Allisyn Williams

Year: 5th year

Major: Architecture

Experience, Skills, Strengths: architecture intern summer 2006, strengths in research and planning

Role: Research, Juarez, Mexico group and the Design sub-group

Name: Aubrey Vander Heyden

Year: 3th year

Major: Architectural Engineering

Experience, Skills, Strengths: architecture intern summer 2006, strengths in research and planning

Role: Research, Infrastructure Sub-Group, Juarez Sub-Group

Sub-group Name	Juarez, Mexico	Chicago, Illinois
Group Members	Shreyas Dole	John Sullivan-Fedock
	Ruth Droescher	Vince Rivera
	Harry Michael	Adriana Rios
	Brett Monroe	Thales Ramier
	Sumayya Nikhat	Lauren Mordecai
	Andrew Seo	Michael Martinez
	Maribel Valdez	Joshua Lebak
	Aubrey Vander Heyden	Mariusz Klemens
	Jacquelin Villa	Ja Young Kim
	Allisyn Williams	Fabian Escobar
	Michael Glynn (Prof)	Muhammad Darwish
		Blake Davis (Prof)

Sub-group Name	Energy	Infrastructure	Exterior Envelope	Structural Considerations	Housing Design
Sub-group Leader					
Group Members	Harry Michael	Aubrey Vander Heyden	Adie Rios	Thales Ramier	Allisyn Williams
	Ruth Droescher	Brett Monroe	Lauren Mordecai		Fabian Escobar
	Muhammad Darwish	Vince Rivera	Jayoung Kim		Mariusz Klemens
	Sumayya Nikhat	Josh Lebak	Shreyas Shrikar Dole		Michael Martinez
	Maribel Valdez				Andrew Seo
	Jacqueline Villa				John Sullivan-Fedok