

# **I PRO 307**

INTERMODAL TRANSPORT SYSTEM SOLUTION IN  
CRETE ILLINOIS



## **Project Plan**

September 10<sup>th</sup>, 2010

## I. Team Information

There are eleven students in this semester's IPRO 307, below is information regarding everyone's Major, Needs/Expectations for the IPRO and their Strengths that they will bring to the IPRO.

	<b>Name</b>	<b>Major</b>	<b>Needs/Expectations, Strengths</b>
1	Williams, Gabriel	Architecture	<i>Needs/Expectations:</i> To be challenged and use original design. Incorporate what he knows as a mechanical engineer to design, test and validate the group proposals. <i>Strengths:</i> Organization, intelligence, communication.
2	Woods, Bryan	Architecture	<i>Needs/Expectations:</i> Learn more about Intermodal Transportation and learn a new skill. <i>Strengths:</i> Project Management industry experience and good team player.
3	Radzik, Izydor	Biomedical Engineering	<i>Needs/Expectations:</i> To be challenged, stay focused and works effectively with the group to accomplish goals. <i>Strengths:</i> Works well with teams, responsible, leadership.
4	Levin, Jeremy	Mechanical Engineering	<i>Needs/Expectations:</i> Would like to get team oriented engineering experience and learn more about railroad systems. <i>Strengths:</i> Good team player and CAD experience.
5	Anca, Gruita	Architecture	<i>Needs/Expectations:</i> Learn about Intermodal Transportation and achieve goal as a group. <i>Strengths:</i> AutoCAD and design skills.
6	Davis, Aaron	Mechanical Engineering	<i>Needs/Expectations:</i> To learn more about the transportation industry. <i>Strengths:</i> Team orientated and good time management.

7	Roth, Jessica	Civil Engineering	<i>Needs/Expectations:</i> Successfully create a professional level project. <i>Strengths:</i> Always prepared and extensive experience in research.
8	Allen, John	Architectural Engineer	<i>Needs/Expectations:</i> To work in a group to accomplish large scale project. <i>Strengths:</i> Leadership, communication and computer skills.
9	Pollack, Aaron	Architecture	<i>Needs/Expectations:</i> Achieving goals as a group. <i>Strengths:</i> Team and time management skills.
10	Bajzek, Sasha	Civil Engineering	<i>Needs/Expectations:</i> To obtain engineering design experience. <i>Strengths:</i> Work experience in the industry and a good team player.
11	Ahmadu, Jibril	Architecture	

Advisors:

Laurence Rohter

Peter Mirabella

## II. Purpose and Objective

I PRO 307 is following the path of its predecessors in order to help improve the shipping transportations and facilities in the immediate region, specifically Crete, IL. While there has been other I PRO teams that have contributed to the modernization of the intermodal system at My-Jack Shipping Company, our sponsor is now calling upon us again to further their research in this field.

The now updated and faster facilities save a great deal of retail space that can be used for further developing. One of our tasks is to design the destination and configuration of these free lots in the conjunction with the intermodal system running by them. As technology evolves our next concern is that these new intermodal schemes might be overcome by newer resources. For that, our team needs to foresee the future of the intermodal linked to high speed rail and high speed trains. Also the track capacity might change and we should look for adaptations in the system as well as redesign for new technology like ATMS.

The purpose of this document is to provide a list of steps and goals as well as the teams' members' role in providing the deliverables. A list of the facts gathered so far and the parts that need to be further researched will also be provided in order to ensure better planning and organization of the team.

### **III. Background**

Intermodal freight is the movement of containers and trailers by rail, truck or water carriers is the fastest growing segment of the US freight rail industry. It stands as one of the most utilized ways to transport large shipments of cargo across the country. Most of this intermodal traffic is moved in containers. As mentioned above, Chicago is the third largest intermodal port in the world and as a result, there are currently 19 intermodal yards in the Chicago region. These 19 intermodal yards allow for approximately 700 miles of loading and unloading tracks over 2200 acres of land. Unfortunately, these intermodal yards often waste space and provide an influx of traffic to the surrounding area. As a result, intermodal yards can be inefficient, costing money to both rail road and trucking companies.

As a result of how fast intermodal freight is growing, container movement through intermodal freight is expected to double within 10 years. Instead of trying to expand the intermodal yards to allow for the increased amount of freight, the current approach is to make improvements to the intermodal yards that can optimize performance with low cost and positive environmental benefits. Additionally, solutions are being explored that can utilize current transportation systems and stimulate industrial development.

IPRO 307 is sponsored by Mi-Jack Products based in Hazel Crest, IL (<http://www.mi-jack.com>). Mi-Jack Products is the largest manufacturer and operator of intermodal equipment and produces products that increase the efficiency of intermodal yards around the country. Because of the interest Mi-Jack Products have in the efficiency of intermodal yards, the company could benefit from proposals provided by IPRO 307 on improving accessibility to the intermodal yard.

### **IV. Team Values Statement**

All team members are expected to:

- Treat all other team members with respect.
- Be on team for meetings.
- Come prepared to meetings.
- Present information either as PowerPoint presentation or in handout form.
- Provide updates weekly on their project tasks.
- Actively participate within the team.

## V. Methodology

### 1. Define the problems:

#### *a. Design for new technology at Crete*

- i. site design (container storage, railroad yard, environmental, buildings, circulation, expansion)
- ii. ATMS (given)
- iii. larger trains (10000 ft or greater) (given)
- iv. new building types

#### *b. High-speed Intermodal*

- i. aerodynamics,
- ii. wheel-rail interface; difference in weight between passenger trains and freight trains
- iii. force string diagrams

#### *c. Viaduct*

- i. produce alternative designs
- ii. estimate cost
- iii. list of codes (TBD)
- iv. soil characteristics (TBD)

### 2. Describe how your team will go about solving the problems:

#### a. The group will be divided into sub-groups with three major areas of focus.

- i. One group will be taking care of the overall outlook of the complex, that including site placement and development, new buildings on site with layout and purpose and future expansion proposals
- ii. The second subgroup will focus on the possible usage of high speed tracks and high speed trains as well, the impact and optimal plan of implementation

- iii. The third subgroup will take the intermodal viaduct design to a further expansion and link it as well to the newer needs created by the first two teams
- 3. Explain how the potential solutions will be tested:
  - a. The potential solution will be tested through a series of designs and visualizations covering the large area of interest.
  - b. There are three main solutions to focus on:
    - i. Multiple maps of the traffic and a regional impact plan.
    - ii. Drawings and maps of the site, the new buildings and surrounding area.
    - iii. Details and drawings of the proposed viaduct systems.
- 4. Describe how results of research and testing will be conducted:
  - a. Each solution's findings will help develop the research. To that regard, the findings about the high speed intermodal will later change the final design and costs of the viaduct systems proposals. The new shape of the intermodal will then be the basis for the site development. And in the end all ideas will create an end product proposal.
- 5. Define how analysis of the test results will be conducted:
  - a. Results of the visuals will be discussed within our team and with outside industry advisors. This will help up us gather feedback on the feasibility issues of the project.

6. Explain how the IPRO deliverable reports will be generated:
  - a. The deliverables will be assigned to teams and/or individuals. They will then be submitted to iGroups for peer review and final submission.
  - b. Individual research and presentations will be prepared and presented at specific dates established by the group. They will be reviewed and discussed by the group as a whole.
  - c. Assignments of deliverables will be decided by the IPRO group as a whole.

**VI. Expected Results**

Maps and diagrams regarding site proposal and design of the complex at different scales  
 Maps and analysis of high speed rail  
 Diagram and map of site and its link to the high speed web  
 Details of the viaduct systems tested on the new intermodal facility proposed above

**VII. Project Budget**

Item Description	Expected Cost
Models for Wind tunnel Analysis	\$ 500
GIS Data	\$ 500
Code: CH 8 Concrete Structures and Foundations	\$ 275
Code: CH 17 High Speed Rail Systems	\$ 275
<b>Total</b>	<b>\$ 1,550</b>

## VIII. Schedule of Tasks and Milestone Events

<b>Task</b>	<b>Start Date</b>	<b>End Date</b>	<b>Team Members Needed</b>	<b>Hours Needed</b>
Research Crete Site	08/26/2010	08/26/2010	1	12
Research Local Intermodal Yards	08/26/2010	08/26/2010	1	12
Identify problems and solutions	08/31/2010	08/31/2010	1	12
Propose teams needed and tasks	09/07/2010	09/07/2010	1	12
Project plan draft	09/09/2010	09/09/2010	1	12
<b>Project Plan</b>	09/10/2010	09/10/2010	2	20
Research Feasibility of Wind Tunnel	09/14/2010	09/14/2010	1	12
Research the 8mil Rail Investment	09/21/2010	09/21/2010	1	12
<b>Midterm Review</b>	10/24/2010	10/24/2010	2	24
Maps and diagrams of high speed traffic	10/10/2010	10/10/2010	1	40
Site development proposal	10/2/2010	10/2/2010	2	8
<b>Abstract/Brochure</b>	11/20/2010	11/20/2010	1	12
<b>Exhibit / Poster</b>	11/20/2010	11/20/2010	2	16
Details of proposed viaduct designs	11/10/2010	11/10/2010	3	400
Draft of final report	11/30/2010	11/30/2010	6	240
<b>Final Oral Presentation</b>	12/08/2010	12/08/2010	3	40
<b>Final Report</b>	12/17/2010	12/17/2010	3	32
<b>Deliverables CD</b>	12/21/2010	12/21/2010	1	2
			Contingency Time	60
<b>Bold=IPRO Deliverable</b>				
			Total Hours	978

## IX. Team Assignments

After initial research has been completed the team has acquired a greater understanding of the project and the required deliverables. In order to successfully produce the deliverables the team has decided to create three subgroups:

*Design for new technology, High Speed Intermodal, Viaduct Design*



	<b>Team Name</b>	<b>Tasks</b>
1	Design for new technology	Revise site design taking in consideration larger trains, ATMS and existing surroundings Conceptualize new building types on site
2	High Speed Intermodal	Calculate the aerodynamics costs and optimal usage Analyze train operations, both passenger and intermodal Produce a depiction of train forces in both cases
3	Viaduct Design	Take soil considerations into calculations Produce alternative designs Estimate costs

## X. Designation of Roles

Teamwork is an important part of the process required to achieve our final goal. The necessary skills needed to become a leader for a project in the future will be learned during the various tasks assigned in this IPRO. To implement this learning process the assigned meeting role positions will be rotated through every member of the group each meeting session. Please refer to the below information for specific details regarding designation for roles.

Design for new technology: Gabriel Williams, Aaron Pollack, Anca Gruita, Bryan Woods

High Speed Intermodal: Jeremy Levin, John Allen, Izydor Radzik

Viaduct Design: Aaron Davis, Sasha Bajzek, Jessica Roth