Planning

1 Problem and Background

1.1 Problem Described

The Chamber of Commerce of Gary, Indiana is looking for ways to use a plot of land featuring existing railroad track. This presents an opportunity to develop an intermodal transportation yard in the Gary area. The problem presented to this IPRO team was to design features of the yard and to provide a business plan for its development. First, some background information:

What is intermodal transportation?
According to William De Witt and Jennifer Clinger, intermodal transportation is defined as, "the use of two or more modes to move a shipment from origin to destination. An intermodal movement involves the physical infrastructure, goods movement and transfer, and information drivers and capabilities under a single freight bill."[1] The modes of transportation can vary and include air, ocean, rail, road, etc., but this IPRO will focus primarily on rail and road systems. Intermodal transportation is made possible by containerization, which is the use of a standardized container that can be loaded, sealed, and then transferred between transportation media without involving the contents of the container itself.

Why is intermodal transportation important?
Intermodal transportation increases efficiency in moving products. Time is saved because individual products do not need to be transferred between transportation modes. This results in money saved, both because more products can be shipped in less time and because less labor is required at the transfer sites. As the containers remain intact throughout their journey, there is a lower probability of losing products or confusing cargo.

Intermodal transportation eliminates some of the logistical limitations of shipping cargo, allowing for innovation in other areas of business. "For example, a true intermodal hub would be the kind of place where it would be possible to deliver same-day turnaround on emergency orders—even if those orders came at the eleventh hour—because there are so many shipping alternatives. Such flexibility is especially important for medical device and equipment manufacturers, for whom a delay of a day in shipping an item such as a replacement part could

[1] Clinger, Jennifer and DeWitt, William. *Intermodal Freight Transportation*. <http://onlinepubs.trb.org/onlinepubs/millennium/00061.pdf>

mean, for instance, the loss of thousands of dollars in diagnostic services, not to mention valuable customer goodwill."[2]

What is the scope of this IPRO?
The overarching goal of this IPRO is to combine past work done on this project with new design and planning ideas to produce a deliverable for the Gary Chamber of Commerce that details our proposed intermodal yard. The location and layout of the site was already determined by IPRO 307 in Spring 2007, so the deliverable incorporated that existing framework.

Clark Road is a two lane road that provides access to the lakefront, other industrial sites, and the rail yard itself, but crosses eleven railroad tracks at grade level. This presents safety concerns as trucks can get stuck in the middle of tracks and the angle of the road limits truck drivers' ability to see approaching trains. Furthermore, there is no pedestrian path, and the narrowness of the road would not be able to handle the volume of trucks necessary for an intermodal yard.

A visitor's center is essential to appeal to the local community and to visitors, and to portray the rail yard as an attraction as opposed to a hindrance. The team focused on integrating the visitor's center with the local wilderness, accentuating preserves in the area, the lake, and the yard.

One challenge to intermodal transportation yards is the congestion of trucks coming to pick up cargo or leaving the yard with fresh cargo. In addition, scheduling conflicts, miscommunication, and delays can result in idle trucks and containers clogging flow lines around the yard. To combat this problem, the IPRO team developed a web-based program that allows truck drivers to check the status of their containers from local rest stops, keeping them miles away from the yard while they wait. The skeleton of the program (called the Gary Wide Area Network, or GWAN) was developed by IPRO 307 in Spring 2007, but the Fall 2007 team refined it and turned it into something deliverable.

1.2 Ethical Issues Raised

The primary ethical issue raised by this IPRO was how to integrate the intermodal yard with the surrounding wilderness. The site lies next to a reserve that features a pond and tall grass, as well as a pedestrian path. Furthermore, the site lies between the main city of Gary and Lake Michigan. Locals would surely be opposed to an intermodal yard if it compromised their enjoyment of these areas. The team therefore tried to incorporate the surrounding nature into the designs for the bridge and visitor's center, aiming to accentuate these

[2] Dixon, Russ and Pettit, Bill. Medical Device & Diagnostic Industry magazine. 1999. <http://www.devicelink.com/mddi/archive/99/09/005.html>

features as opposed to impose upon them. Also, GWAN helps to reduce the amount of truck disruption and pollution that would otherwise be brought to the area.

The team also had to make sure to abide by all local and federal building codes and zoning ordinances.

A constant conflict encountered by the team was whether to tailor efforts to appease the sponsor, Mi-Jack, or the IPRO office. In most cases, Mi-Jack was the first priority, but in some cases separate deliverables were produced for both.

2 Objectives and Goals

2.1 Project Objectives

The objectives of this IPRO were to produce the following deliverables:

- Designs for a bridge for Clark Road
- Designs for a visitor's center
- A zoning map for the surrounding area
- Functioning GWAN interface
- Business plan

2.2 Objectives Compared to Past Teams

According to the project plan of the Spring 2007 team:

> The main objective of the IPRO 307 team in the Spring 2007 semester is to completely design a modern intermodal yard for the city of Gary, Indiana. It will be capable of handling the forecasted increase in container movement over the next decade while decreasing the demand placed on existing intermodal facilities in Chicago and northwest Indiana. Several intermediate goals must be met in order to accomplish this objective, which include:
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> - Selecting the site and planning the physical layout of the Gary yard which maximizes efficiency and minimizes any negative effects on the surrounding areas,
> - Making recommendations concerning the appropriate number, size, and type of cranes capable of handling the predicted capacity, and
> - Developing a demonstration of software capable of tracking containers and trucks both within the yard and regionally.

As can be seen, past teams were more concerned with the overall layout and logistics of the yard, whereas this semester's team was concerned with specific features within the yard and with drawing up the business plan.

3 Methodology and Contributions

3.1 Project Methodology

In order to get a feel for intermodal yards, the team spent the first couple weeks of the semester researching other yards in the area and visiting the site. Power point presentations were given that detailed the Joliet Logistics Park and intermodal opportunities in Coal City, Crete, and Laporte County. The team also spent a class session visiting the Union Pacific Railroad Global One facility. Several members visited the actual site in Gary.

The team was split into the following sub-teams to maximize specialization, ensuring that talents and backgrounds were used efficiently:

Site Planning Team: Responsible for the site plan and especially the zoning map

- Arnold
- Matt W
- Christine
- Renee

Built Environment Team: Responsible for bridge and visitor's center designs, deliverables, and associated tasks

- Sabine
- Marek
- Peter
- Jac
- Matt W

Business Team: Responsible for business plan, GWAN development, and associated tasks

- Jack
- Jim
- Zack
- Matt S

IPRO Deliverables Team: Responsible for organizing, delegating, and compiling IPRO deliverables

- Christine
- Jack
- Sabine

Each team researched materials relevant to its specialty. For example, the Built Environment Team researched bridges in similar industrial areas, and the Business Team researched business plans for other rail yards.

Once the research was compiled, each sub-team came up with designs and concepts that were then presented and discussed in class sessions. By October 30th the designs were finalized and most deliverables were in finished form. This allowed the team to focus on reports, presentations, and compiling everything during the last few weeks.

3.2 Overview of Assignments

The individual assignments of this IPRO included:

- Create a package summarizing the state of the project at the beginning of the semester for the developer
- Research other intermodal yards to get ideas and better understand the subject matter
- Create a zoning map

To produce a functional and aesthetically pleasing bridge, the team had to:

- Research similar industrial-location projects to get ideas
- Determine the feasibility of widening the road to more than two lanes
- Brainstorm ideas and concepts for the bridge
- Determine which concept will be pursued
- Create drawings, a 3D virtual model, and other applicable deliverables

To produce a functional and aesthetically pleasing visitor's center, the team had to:

- Determine the optimal location
- Brainstorm ideas and concepts for the building itself
- Determine which concept will be pursued
- Create drawings, renderings, and other applicable deliverables

To submit a version of GWAN that will convey its potential advantages to the client, the team had to:

- Study the scalability of the program and brainstorm possible expansions and improvements
- Integrate new ideas into program through coding
- Roughly conceptualize the truck stop, including integration of wifi for GWAN accessibility

- Improve the aesthetics and interface of the program

As this IPRO is cooperating with a sponsor and attacks a financially relevant real-world problem, the team had to:

- Research business plans to gain knowledge in the field and prepare to create one
- Perform cost analysis on the proposed intermodal yard and determine fundraising opportunities
- Write a report featuring the business plan itself

The following IPRO Deliverables were submitted:

- Syllabus
- Project Plan
- Midterm Report
- Midterm Presentation
- IPRO day presentation
- IPRO day poster
- IPRO day model
- CD_ROM
- Final Report
- Meeting Minutes

3.3 Individual Contributions

Christine Atterberry, 5th year Architecture:

- Created Zoning Map
- Wrote Code of Ethics
- Contributed to Midterm Report and Final Report
- In charge of IPRO Deliverables deadlines
- Compiled and uploaded Meeting Minutes

Renee Bartosik, 5th year Architecture:

- Gave Joliet Logistics Park presentation
- Gave Midterm Presentation
- Contributed to Final Report
- Contributed to Zoning Map

Peter Beran, 5th year Architecture:

- Gave Coal City presentation
- Created Bridge concepts and deliverables

Zachary Borschuk, 4th year Computer Science:

- Did all code and functionality updates for GWAN
- Assisted with business planning and cost estimation

Jack Dobbin, 4th year Applied Mathematics:
- Wrote Project Plan
- Organized and contributed to Midterm Report and Final Report
- Gave Midterm Presentation
- Wrote Business Plan
- Attended Project Management Workshop and Presentation Workshop

Arnold Ibardaloza, 5th year Architecture:
- Gave Laporte County presentation
- Contributed to Zoning map
- Contribute to Code of Ethics
- Attended Ethics Workshop

Sabine Kollwitz, 5th year Architecture:
- Worked on nature trail design
- Assisted on Bridge Design
- Compiled Final Presentation
- Attended Project Management Workshop

James Meyer, 3rd year Electrical Engineering:
- Contributed to Project Plan, Midterm Report, and Final Report
- Contributed to Business Plan
- Created IPRO Abstract
- Made IPRO Day Presentation

Matt Schulz, 5th year Civil Engineering:
- Did all cost estimations
- Contributed to Final Report

Jac Selinsky, 5th year Architecture:
- Designed and produced deliverables for Visitor's Center
- Assisted with Bridge and pedestrian path plans
- Gave Midterm Presentation

Matt Walczuk, 5th year Architecture:
- Gave Crete, Illinois presentation
- Designed GWAN interface
- Created Bridge 3D model and animation
- Assisted with zoning research
- Attended Project Management Workshop

Marek Wisniewski, 5th year Architecture:

- Did bridge research
- Came up with bridge concepts and designs
- Created bridge deliverables

Organizing

4 Assignments

4.1 Major Task Assignments by Individual

Tasks that pertained to sub-teams were completed by the members of their respective sub-teams, as described in Section 3. Individual assignments were completed as seen in Section 3.3.

4.2 Major Team Roles

The site planning team went on two field trips to the site. Pictures were taken of the surrounding area. Research was done for the zoning map. Map and models were produced for IPRO Day. A PowerPoint presentation was produced for the developer. A topology study was done to help determine the location of the bridge and visitor's center.

The bridge design team also went on a field trip to the site. Research on bridge design was done. While producing conceptual drawings, determining the feasibility of widening the road was considered. The final design was chosen for the site.

The Visitor's Center Team took a trip to the site. A variety of conceptual drawings were proposed, along with the location of the center. A topography study was done to determine the appropriate location.

Last semester's version of GWAN was further developed, taking into consideration the field trip to an intermodal yard in Chicago.

The business plan team did research on other intermodal yards that were similar to our project and performed cost analysis on the proposed intermodal yard.

5 Acknowledgements

5.1 References and/or resources

- Len Pryweller
- Peter Mirabella
- Adrian Muhammad
- Earl Wacker
- Ted Shierk
- Union Pacific Railroad Yard, Chicago

5.2 Contributing Parties

- Gary, Indiana- zoning department
- Mi-Jack
- CSX Railway
- ASLA
- Union Pacific Railroad

The team benefited greatly from the contributions of Peter Mirabella of Mi-Jack as well as the members of the City of Gary Chamber of Commerce. Without their help the team would not have been able to come with a plan that met the needs of the City of Gary.

5.3 CD-ROM Table of Contents

Controlling

6 Assignments and Resource Control

6.1 Major Task Assignments by Individual

Christine Atterberry
Christine was head of the IPRO deliverables group and was in charge of communicating deadlines to the group and delegating responsibilities. Christine also was in charge of creating an ethics plan, making a poster for the zoning map, and helped with the final report. All deliverables were turned in on time and Christine was able to meet the team goal of doing eight hours a week outside class.

Renee Bartosik
Renee was part of the site planning team, presented for the midterm presentation, and helped with the final report. Renee was able to get everything done on time and was able to meet the team goal of doing eight hours a week outside class.

Peter Beran
Peter was in charge of the Bridge design team and was also part of the site planning team. He made sure that a final bridge design was done on time and was able to meet the team goal of doing eight hours a week outside class.

Zachary Borschuk
Zack was in charge of the GWAN development team and putting together the CD-ROM. Zack made sure a GWAN plan was complete on time and that the CD-ROM was turned in on time. Zack was able to meet the team goal of doing eight hours a week outside class.

Jack Dobbin
Jack was in charge of the business team and helping out the IPRO deliverables team. Jack put together and helped with the project plan and midterm and final reports. He was able to make sure everything was complete and turned in on time. Jack was able to meet the team goal of doing eight hours a week outside class.

Arnold Ibardaloza
Arnold was in charge of the site plan team and was responsible for making sure the final zoning plan was feasible and up to code. Arnold also helped with the

bridge design and design for the visitor's center. Arnold was able to meet the team goal of doing eight hours a week outside class.

Sabine Kollwitz
Sabine helped with the bridge design and made plans for a bike path. Sabine was part of the midterm presentations and helped with the midterm report. Sabine was able to meet the team goal of doing eight hours a week outside class.

James Meyer
Jim was part of the business team and helped put together the project plan, midterm report, and final report. Jim was also in charge of putting together an abstract in brochure form, as well as putting together a PowerPoint presentation for IPRO day. Jim was able to meet the team goal of doing eight hours a week outside class.

Matt Schulz
Matt was part of the business team and helped with cost estimations for the yard work and visitor's center. Matt helped with the final report and was able to meet the team goal of doing eight hours a week outside class.

Jac Selinsky
Jac was part of the visitor's center team and was in charge of coming up with a location and a design that met the location's needs. Jac was also a presenter for the midterm presentation, and was able to meet the team goal of doing eight hours a week outside class.

Matt Walczuk
Matt was part of the site planning team and helped with the bridge design and visitor's center design. Matt put together a model of the bridge and was able to get everything done in time. Matt met the team goal of doing eight hours a week outside class.

Marek Wisniewski
Marek helped with the bridge design and came up with possible plans for the bridge. Marek assisted in selecting the final bridge design, and was able to meet the team goal of doing eight hours a week outside class.

6.2 Team roles

IPRO Deliverables
The IPRO deliverables team was responsible for making sure everything was delivered to the IPRO office complete and on time. Tasks included putting together the Project Plan and Midterm Report, as well as putting together a presentation for Midterm. The team decided against making a website, feeling

that creating one would take up time better spent on improving the final presentation for IPRO day. The IPRO deliverables team was also responsible for making sure the posters and model were all ready for IPRO day, and that the final report was completed on time.

Site Plan
The site plan team was responsible for researching the Gary, IN site, as well as other potential intermodal yards. The team put together an overall site plan for the intermodal yard, including suggested zoning changes and improvements to the existing yard to bring it up to intermodal standards. The team was also responsible for making sure the site plan, bridge, and visitor center were all up to code. The team was able to complete all tasks on time and with no problems encountered.

Bridge design
The goal of the bridge design team was to elevate Clark Street in order to create a safe path for cars, trucks, and people crossing the intermodal yard. The team had to investigate similar projects, determine the exact location, and come up with a final design. The team ran into problems with determining the exact location and design, specifically because of the odd topology of the existing roads at the north end of the road. The team was able to solve this problem by deciding the intersection at the north should be elevated. The team lost no time working around this problem and was able to come up with an innovative design integrating both industrial and ecological elements.

Visitor's center design
The visitor's center design team produced a plan for a visitor's center that provided scenic views all around as well as informed people of the local history of the area. The team had to determine a good location and a design that integrated into the surrounding area. These challenges were overcome in a timely manner and everything was able to be completed.

GWAN development
The GWAN development team had to finalize an interface for the GWAN system and come up with a plan to allow truck drivers to access it anywhere. The team decided on an Internet based system that would allow drivers to log in from anywhere they had access. The team was able to get everything done with no problems encountered.

Business plan
The business plan team had to come up with a business plan to present to the Gary Chamber of Commerce. This task had no problems, and the team presented to the Chamber of Commerce on November 8th, 2007.

Concluding

7 Conclusions and Completion Activities

7.1 Obstacles

IRPO 307 encountered many obstacles throughout the past 15 weeks. The original site that was picked was sold by E J & E to CN. After this was done, the design concept's possibility of used grew. CN did not know what they wanted to do with their new purchase. IPRO 307 designed an Intermodal Yard as well as a bike and jogging path located around and through the Intermodal Yard to fit the Indiana DNR's plan as well as give CN a possible idea for the construction of the yard. The findings and results have changed throughout the project due to the uncertainty of what CN wanted to do with this yard.

7.2 Results

The conclusion that IPRO 307 included is that an Intermodal Yard would be placed in Gary, zoning would need changed to ensure proper warehouses and a nature trail from Lake Michigan to the Nature Preserve directly south of the yard would connect. Implications of the team's conclusions introduce a profitable Intermodal Yard on the north side of the City of Gary which has no impact on the Nature Preserves around it. Drawings of the design, cost analysis reports, and cost estimations are documents that support IPRO 307's beliefs.

7.3 Conclusion

IPRO 307 started with a set project with set goals. Due to current events, IPRO 307 molded itself into a team that has produced and researched an answer to a question that the City of Gary is asking itself currently. The main goal of IPRO 307 has remained current throughout, to design an Intermodal Rail Yard while bettering the areas around the site.

7.4 Equipment and Cost Accounting

The IPRO did not use any equipment besides personal computers. Some AV equipment will be requested for IPRO day. No money was spent.

8 Recommendations

Intermodal business plan is a growing concept around America these days. IPRO 307 not only has created a green environment around an Intermodal Rail Yard, but has also developed a state of the art Information System to ensure less traffic congestion throughout the City of Gary. The development of this system is still in the beginning phase; however, with the correct sponsors or development team, this program will be the next integral part of shipping as we know it. Recommended next steps would be to design the yard from grade to completion. After the design is complete, the project should be presented to a Rail Road for input as well as consideration into utilizing the concept and design.

The recommended next steps for this IPRO are to implement the findings of the team. It is recommended that the deliverables be presented to the Gary City of Commerce and other officials and that the designs be used at the existing site.

Learning

9 Teamwork

9.1 Teambuilding Activities of the Team

Teambuilding activities include multiple visits to the proposed site in Gary, Indiana and the different IPRO sponsored workshops.

9.2 Teamwork Effectiveness

This IPRO team was successful in that each member was responsible for a certain portion of the project. With this system, the team was able to efficiently and effectively provide results towards the final project. In doing so, the team as a whole worked together to achieve the goal of this IPRO.

9.3 Resolution of Teamwork Problems

Any issues that aroused throughout the semester were resolved through assessment and feedback from all members of the team, including sponsors and team moderator.

10 Communications

10.1 Communication Activities of the Team

The main communication activities of the team occurred through the use of iGroups, and through bi-weekly IPRO meetings.

10.2 Communication Effectiveness

Through the use of iGroups, the team was able to effectively communicate with one another. iGroups proved to be a very helpful tool in staying connected with the members, sponsors and moderator of this IPRO team.

10.3 Resolution of Team Communication Problems

When a communication problem occurred between the team, the problem would be resolved via iGroups or emails. Problems were also resolved in team meetings, where the team would discuss how to prevent communication problems from recurring.

11 Ethical Behavior

11.1 Ethical Issues Encountered in the Team and Semester

In meeting with the different sponsors of our IPRO team, we were fortunate to receive feedback, but obligated to keep it confidential as it was not public knowledge. We also faced ethical issues in the development of our business plan when we faced the issue of whether the construction of such a rail yard and warehouse would employ union or non-union workers.

11.2 Resolution of Team Ethical Issues

What was once confidential information became public knowledge while this IPRO was taking place. Upon further research, we came to the conclusion that because of the location of the rail yard, union workers were to be employed.

11.3 Reasons That These Critical Issues Arose

Given that this project could be developed, ethical issues would inevitably arise. As time progresses and this project moves forward, ethical issues will continue to appear given the scale and reality of this particular development.