IPRO 307 MIDTERM REPORT
Spring 2008

Intermodal Container Transport System Solutions for Chicago Region

Advisor: Laurence Rohter

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1.0 REVISED OBJECTIVES

This IPRO team will produce a design which will reduce the impact of intermodal facilities on the existing urban and rural, ecological infrastructure. Intermodal facilities use substantial amount of land which needs to be paved and used for warehouses or railroad tracks. This Intermodal infrastructure creates many negative environmental aspects which range from air quality, noise pollution, drainage, to water contamination. Due to these negative environmental effects, Intermodal yards are often looked at as detrimental to their surroundings and property values. It is this IPRO's goal to devise a plan which will address the negative aspects of Intermodal facilities making them ecologically sensitive.

The scope of this IPRO is to provide a manifesto of good practices that will improve intermodal transportation to be environmentally conscious and friendly. The IPRO team will produce a book containing good practices in the design of an intermodal facility. The team will also implement the methods by producing a build-out. The team will also focus on the Clark Road bridge design from previous semester to help improve the commerciality of Gary, Indiana.

There is a growing concern today to be more environmentally conscious and friendly. Cities like Chicago are introducing green roofs to help the environment by reducing carbon dioxide therefore lessening the green house effects. The challenge for this IPRO team is to improve intermodal yard efficiency while maintaining the highest environmental and ethical standards. Some of the environmental issues the team is dealing with include noise, water, air and land quality. The ethical issues involve the effect on the individual and the community. How would a neighborhood feel about having an intermodal facility in their back yard, and what can be done to make the facility as unobtrusive as possible to the neighborhood? The team will research and find solutions for these issues and write up a report to publish in the book.

To implement the research into actual practice, the team will provide a build-out containing a generic layout of a 7000 to a million lifts per year site. The build-out will reuse a brown site or green site, provide buffers that are environmentally friendly and give back to the community. The team will also produce a design for a warehouse that is energy efficient and environmentally friendly. The previous IPRO team provided a design for Clark Road in Gary, Indiana to prevent the growing congestion of trucks parked adjacent to Clark Road. The trucks not only produced congestion but sitting idling on the road also produce fumes that hinders the air quality in the surrounding areas. The bridge would not only provide access to commercial areas but also recreational areas such as the lakefront. The bridge will be accessible via pedestrian and vehicular while architecturally pleasing.

The IPRO is sponsored by Mi-Jack Products, Inc. based in Hazel Crest, Illinois that produces special cranes utilized in intermodal facilities to move containers to and from train and trucks.

2.0 RESULTS TO DATE

THE IPRO DELIVERABLES TEAM

Thus far the team has been on task with every IPRO deliverable to date. The team has delivered a syllabus, a project plan, code of ethics, midterm report as well as the midterm presentation to the IPRO office on Thursday 6th of March. The team has also composed deliverable task lists, and is continuously updating the 307 team on important dates and events regarding IPRO office requirements. The team will continue to do so in order to ensure that the remaining IPRO deliverables i.e. meeting minutes, website, posters, final report, etc. are presented to the IPRO office on time.

THE BUILD-OUT TEAM

The build out team began their work this semester by researching a few intermodal yards in the vicinity of Chicago. The research included yards such as Bedford Park, Joliet, Crete, and La Porte in order to develop an understanding of the interaction between the intermodal yard and its context. The team then went on to develop a schematic design of Bedford Park assessing the square footages of different functions within the yard. The team then used the information to develop a strategy for water drainage based on paved and unpaved percentages of the yard. In addition to the drainage issue the team has also began to develop buffer zone solutions for yards located in residential and urban settings. The goal of this team will be designing a layout for an intermodal yard which will address the above stated issues in an urban and a rural setting.

THE BOOK DESIGN TEAM

The book design team has developed a power point presentation demonstrating the different options and solutions to water drainage and purification. The slides include wet and dry pond design schematics as well as engineered wetlands layout. The team has also researched permeable paving by Ozinga, possible onsite energy production strategies, and air and noise pollution. The team is investigating wind, solar, and natural gas means of harvesting energy in order to reduce pollution while making the yard less reliant on the power gird for its electricity. To better understand the issue of noise pollution the team has sought outside reference from IIT staff. Currently the team is developing a strategy which will reduce and possibly eliminate this inconvenience. The team is also working on the final format in which the information is going to be distributed.

BRIDGE/WAREHOUSE DESIGN TEAM

The team has investigated and ruled out green roofs as the primary warehouse roof solution due to structural cost and therefore feasibility of the design. The team is still very enthusiastic about the idea and plans on implementing this green friendly alternative where structurally feasible. The team also began work on a zero-excavation warehouse design for brown or contaminated sites. This would allow for the use of this virtually unusable land which is well qualified for intermodal yards and their related uses. The bridge is also making progress with design development which is now attempting the incorporation of water purification and retention. There is also work being done on the three dimensional model which will be used to make the animation for the final IPRO presentation. The goal of this team will be to develop presentation boards describing in detail the zero excavation warehouse design as well as an animation presenting the new bridge design. In addition to these deliverables the team will develop civil blueprints for the warehouse design.

ADDRESSING THE SPONSOR'S NEEDS

The sponsor of this IPRO, MiJack, is a leading supplier of intermodal cranes and lifts. As such, MiJack is always trying to stay ahead of the curve in the industry. With the industry expanding drastically, there is more of a necessity for the creation of intermodal yards but there is great opposition to the ecological footprint associated with it. All of the above topics deal directly with the primary issues facing the intermodal industry, and having a dedicated IPRO team to examine these issues allows MiJack a first glance at what could be done to encourage better intermodal development. As an intermodal facility is an industrial type land usage, the general public looks at it as blight on the surrounding area. By coming up with environmentally positive solutions to typical intermodal design issues, the team is changing the outlook on intermodal from dirty to environmentally conscious. By doing so it may be possible to overcome opposition facing yard construction in urban areas where the community may oppose development of industry.

3.0 REVISED TASK/ EVENT SCHEDULE

SUMMARY TASKS DEFINED

- Produce book for “Good Practices/ Current Events” Intermodal Yards
- Produce a feasible bridge/warehouse design
- Produce Build-out for intermodal yard
- Submit IPRO deliverables

INDIVIDUAL TASKS DEFINED

This IPRO will be producing a book on “Good Practices/Current Events” on the design of an intermodal facility. IPRO 307 will also produce a Build-Out of an intermodal facility. This semester the IPRO will also follow-up and finalize the bridge design for the Clark Road in Gary Indiana.

THE BOOK TEAM WILL NEED TO

- Research and gather information on green-sites, brown-sites and recycling existing yards
- Research and gather information on noise control, water-retention, air-pollution
- Research and gather information on zoning and possible buffers
- Research and gather information on alternative excavations of brown-sites

TO PRODUCE A FUNCTIONAL BRIDGE/WAREHOUSE THE TEAM WILL NEED TO

- Research the previous semester’s bridge concept and design
- Research on warehouse construction
- Brainstorm on addition to the concept of the bridge & warehouse
- Determine feasibility of the design with structural engineer
- Create drawings, reports and deliverables

TO PRODUCE A BUILD-OUT THE TEAM WILL NEED TO

- Research on current site and current practices
- Brainstorm ideas and concepts for an intermodal facility
- Determine concept to pursue
- Create drawings, reports, and deliverables

THE FOLLOWING IPRO DELIVERABLES WILL BE SUBMITTED

- Project Plan
- Midterm Presentations
- Code of Ethics
- Midterm Report
- Meeting Minutes
- Website
- Abstract, Posters
- IPRO Day Powerpoint Presentation
- Final Report
- IKNOW Uploads
- IPRO Day Exhibit

DELIVERABLES DESCRIBED

BOOK DESIGN DELIVERABLES

• Overview of what is Intermodal
• Current events in the field of intermodal
• Issues pertaining to intermodal (Ethical / Financial)
• Provide best solution (Environmentally Friendly)

BRIDGE / WAREHOUSE DESIGN DELIVERABLES

• Produce 3-Dimensional rendering of bridge
• Produce working drawings of the design
• Animation of design
• Posters of detailed warehouse design
• Civil drawings of warehouse design

BUILD-OUT DELIVERABLES

• Produce a 3-Dimensional map for a design of an intermodal yard
• Locate designed warehouse within yard
• Locate water drainage solution
• Locate possible buffers
• Posters

KEY MILESTONES IDENTIFIED

• March 6, 2008 Midterm report and presentation
• April 4, 2008 Sub-project deliverables accomplished
• May 2, 2008 IPRO Day

HOURS ESTIMATED FOR TASKS

TASK NAME	ESTIMATED HOURS
IPRO DELIVERABLES	**340**
Project Plan	25
Midterm Report	20
Code of Ethics	20
Midterm Presentation	10
Meeting Minutes	10
Website	15
IPRO Day Presentation and Rehearsal	100
IPRO Day Poster	10
IPRO Day Map	100
Final Report	30
BOOK DESIGN	**150**
Research and gather information on location	25
Research and gather information on environmental issues	25
Research and gather information on zoning and buffers	20
Research and gather information on excavation	30
Make deliverables	50
BRIDGE / WAREHOUSE DESIGN	**160**
Research bridge/warehouse design	10
Brainstorm on the concept of the bridge/warehouse	60
Determine feasibility of the design with structural engineer	40
Make deliverables	50
BUILD-OUT	**100**
Research on current site and current practices	25
Brainstorm ideas and concepts for an intermodal facility	50
Determine concept to pursue	5
Make deliverables	20

As can be seen, approximately 750 hours have been delegated. IPRO-307 has 11 weeks to finalize the project, there are 15 members and each member is expected to commit 6 hours outside of class per week. This yields 11wks *15 members*6 hours = 990 hours total. The 240 hours not yet accounted for will be used for meetings, correspondence, peer reviews, etc.

4.0 CHANGES IN TASK ASSIGNMENTS AND DESIGNATION OF ROLES AND TEAM ORGANIZATION

TASK NAME	START DATE	FINISH DATE
IPRO DELIVERABLES	**2/14/2008**	**5/02/2008**
Project Plan	2/14/2008	2/22/2008
Midterm Presentation	2/26/2008	3/06/2008
Code of Ethics	2/28/2008	3/07/2008
Midterm Report	3/06/2008	3/14/2008
Meeting Minutes	4/03/2008	4/18/2008
Website	4/01/2008	4/29/2008
Abstract, Posters	4/17/2008	4/25/2008
IPRO Day Presentation	4/08/2008	4/25/2008
Final Report	4/15/2008	5/02/2008
IKNOW Uploads	2/14/2008	5/02/2008
IPRO Day Exhibit		5/02/2008
BOOK DESIGN	**1/28/2008**	**4/25/2008**
Research phase	1/28/2008	2/28/2008
Generate materials for book	2/21/2008	3/04/2008
Check over materials	3/04/2008	3/11/2008
Generate generic layout	3/06/2008	3/25/2008
Layout materials for book	3/25/2008	4/01/2008
Produce deliverables	4/01/2008	4/25/2008
BRIDGE / WAREHOUSE DESIGN	**1/28/2008**	**4/25/2008**
Research phase w/ structural engineer	1/31/2008	2/21/2008
Generate alternative design	2/21/2008	2/28/2008
Produce estimate of design	2/21/2008	2/28/2008
Produce deliverables	4/01/2008	4/25/2008
BUILD -OUT	**1/28/2008**	**4/25/2008**
Research site	2/14/2008	2/21/2008
Produce conceptual design for yard	2/21/2008	2/28/2008
Check zoning and possible buffers	2/21/2008	4/03/2008
Finalize design	4/03/2008	4/25/2008
Produce deliverables	4/01/2008	4/25/2008
MILESTONES		
Midterm report and presentation		3/06/2008
Sub-project deliverables completed		4/04/2008
IPRO Day		5/02/2008

SUB TEAMS (*denotes team leader)

BOOK TEAM

Responsible for researching and gathering information for the book

- Tom
- Sebastian
- Matt
- Matthew
- Joseph
- Algirdas
- Ryan*
- Lukas
- Anthony
- Jac

BRIDGE / WAREHOUSE TEAM

Responsible for design, research, and deliverables for bridge & warehouse

- Marek*
- Peter
- Lukas
- Matt
- Daniel

BUILD-OUT TEAM

Responsible for organizing and designing an intermodal facility

- Renee*
- Arnold
- Ryan
- Anthony
- Matthew
- Sebastian
- Tom
- Matt

IPRO DELIVERABLES TEAM

Responsible for organizing, delegating and compiling IPRO Deliverables

- Renee*
- Arnold

INDIVIDUAL TASK AND DELIVERABLES ASSIGNED:

KEY
- Tasks
* Deliverables

Matthew A.:
* Website with Tony
- Buffer Zones and Zoning Issues and GWAN with Arnold

Renee B.:
* Deliverables Monitor with Arnold
* Project Plan with Arnold
* Meeting Minutes
- Build Out with Arnold

Peter B.:
* Midterm Power Point Presentation with Marek
* Midterm Report with Marek
- Bridge Design with Marek, Lukas
- 3D Animation with Marek

Algirdas B.:
* Final Report
- Air Pollution/ Quality

Anthony C.:
* Website with Matthew A.
- Linear Connections (Bike Paths and Parks)

Daniel F.:
* Midterm Presenter with Jac
- Zero- Excavation & Warehouse Design with Matt S.

Arnold I.:
* Deliverables Monitor with Renee
* Project Plan with Renee
- Buffer Zones and Zoning Issues and GWAN w/ Matthew A.
- Build Out with Renee

Lukas J.:
- Current Events
- Bridge Design with Marek and Peter

Sebastian J.:
* IKNOW Uploads
- Urban Design

Tom L.:
- Rural Design

Ryan M.:
* IPRO Day Power Point Presentation
- Water Retention

Joseph R.:
* Abstract, Poster
- Noise Control

Matt S.: * Code of Ethics
- Zero- Excavation & Warehouse Design with Daniel

Jac S.: * Midterm Presenter with Daniel
- Industrialized Neighborhood Friendly Green Sites
- Alternative Energy Issues

Marek W.: * Midterm Power Point Presentation with Peter
* Midterm Report with Peter
- Bridge Design with Peter, Lukas
- 3D Animation with Peter

IPRO OFFICE DELIVERABLES ASSIGNED TO INDIVIDUALS

- The tasks associated with the book, bridge design and build-out all will be assigned to sub teams (SEE 4.0 SUB TEAMS)

- IPRO Deliverables will be managed by the IPRO Deliverables team and will organized into sub teams

*****Project Plan (week 5)- 2/22- Arnold and Renee
* Midterm Presentations (week 7&8)-3/6- (Power point): Peter and Marek
* Midterm Presenters 3/6 430pm- Jac and Dan
* Code of Ethics (week 7)- 3/7- Matt S.
* Midterm Report (week 8)- 3/14- Peter and Marek
* Meeting Minutes (week 12)- 4/18- Renee
* Website - (content, layout , codes)- Matthew A. and Anthony
* Abstract, Posters (week 13)- 4/21- 4/25- Joseph
* IPRO Day Powerpoint Presentation (week 13)- 4/21-4/25- Ryan
* Final Report (week 14)- 5/2- Algirdas
* IKNOW Uploads (week 14)-5/2- Sebastian
* IPRO Day Exhibit (week 14)- 5/2- Everyone

GANTT CHART (Refer to Gantt chart at the end of the report)

Organizing

Team Members

Name	Major	Skills & Strengths	Roles & Tasks
Matthew Allen allemat@iit.edu	Computer Science 4th year	Software Engineering, Web-Design	Book Team, Bufferzones and Zoning
Renee Bartosik rbartosi@iit.edu	Architecture 5th year	Skilled with AutoCad, 3D Max, Sketchup, Adobe Illustrator and Photoshop	Project plan, Build-out, Bufferzones and Zoning
Peter Beran berapet@iit.edu	Architecture 5th year	Experienced with construction documentation and permits	Bridge design, 3D animation
Algirdas Bielskus bielalg@iit.edu	Mechanical Engineer 3rd year	Skilled with google earth pro, image overlays and render video scenes	Book Team, Air Pollution/ Quality
Anthony Carfang carfant@iit.edu	AerospaceEngineer/ Computer Science 5th year	Skilled with Logistics, Business & Compueters	Book Team, Linear Connections (Bike Paths and Parks), Web-Site, Intermodal
Daniel Fuentes dfuente1@iit.edu	Architecture 5th year	Skilled with AutoCad, 3D Max, Photoshop, Revit, Viz, MS-Office and Laser Cutter	Zero-excavation research & Warehouse Design
Arnold Ibardaloza Ibaram@iit.edu	Architecture 5th year	Skilled with AutoCad, 3D Max, Sketchup, Adobe Illustrator and Photoshop	Project plan, Build-out, Bufferzones and Zoning
Lukas Janulis ljukas1@iit.edu	Civil Engineer 4th year	General understanding of structures	Book Team, Current events, Bridge Design, Warehouse Design
Sebastian Jaromin Jaroseb@iit.edu	Architecture 5th year	Skilled with AutoCad, 3D Max, Sketchup, Adobe Illustrator and Photoshop	Book Team, Urban Design research
Tom Lis tls@iit.edu	Architecture 5th year	Skilled with AutoCad, 3D Max, Sketchup, Adobe Illustrator and Photoshop	Book Team, Rural Design research
Ryan Maas rmaas@iit.edu	Civil Engineer 2nd year	Skilled with Autocad, Knowledgeabe with railroads and logistics	Book Team, Water Retention & Quality research
Joseph Russell russjos@iit.edu	Aerospace Engineer 4th year	Skilled with 3D Design, Pro Engineering, Matlab	Book Team, Noise Control research, Images of South Suburbs
Matt Schulz schumat3@iit.edu	Civil Engineer 5th year	Real-world construction cost estimation experience	Zero-excavation research & Warehouse Design
Jac Selinsky seljac@iit.edu	Architecture 5th year	Skilled with Autocad, Adobe CS3 and making models	Industrialized neighborhood friendly green-sites
Marek Wisniewski wisnmar@iit.edu	Architecture 5th year	Skilled with Autocad, software consultant, experience with design build/construction documentation	Bridge design, 3D animation

Advisors

Laurence Rohter rohter@iit.edu	Adjunct Professor for the Department of Civil & Architectural
Peter Mirabella pmirabel@cssales.com	MI-Jack representative

5.0 BARRIERS AND OBSTACLES

OBSTACLES ENCOUNTERED

The obstacles which the 307 team has faced thus far are drainage, brown sites, existing urban conditions, and the intermodal stigma. The apparent issue when dealing with intermodal is its stigma of pollution. An intermodal yard creates air and water pollution as well as auditory and visual irritants. These issues make intermodal yards virtually impossible to build in urban communities which are trying to avoid this stigma. It is this IPRO's goal to research and develop environmentally sensitive solutions which would relieve the stigma associated with intermodal facilities, thus making them more attractive to urban environments. One of the means in which the 307 team has identified this issue is alternate energy sources and fuel generation methods.

Drainage is a major issue at an intermodal facility due to necessity for large amounts of paved surfaces and warehouse structures. Both of these aspects limit the amount of pervious surfaces and contribute greatly to the amount of runoff generated by a facility. Runoff water needs to be directed into a water management system; otherwise flooding will occur, causing property damage to both the intermodal facility and the neighboring properties. To solve this issue the 307 team has investigated local, state and federal flood loads for major storms and calculated square footage requirements to manage the onsite runoff. Currently the team is looking into methods of improving site runoff management through pervious paving, onsite retention, and onsite treatment.

A brown site can be defined as derelict property usually with an industrial history and a likelihood of soil contamination. While dealing with runoff on a brown site one must contain all the water on the site (prevent it from running back in to the water table). This proves to be a large obstacle in an intermodal facility because of the large amount of runoff generated due to the paved surfaces, and storage warehouses. While investigating the problem the 307 team has come up with onsite water treatment options and runoff retention ponds.

6.0 MIDTERM PRESENTATION SLIDES

Slide 1

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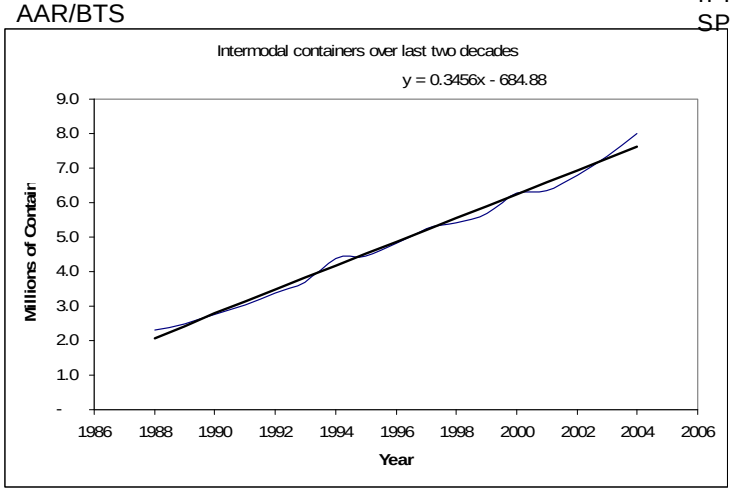
AAR/BTS



-INTERMODAL CONTAINER TRAFFIC OVER THE LAST TWO DECADES
-(18 MILLION CONTAINERS WORLDWIDE)
FEBRUARY, 2008: 225,000 ORIGINATED PER WEEK.

Slide 2

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LAYOUT OF THE BEDFORD PARK FACILITY SHOWING PAVED AND UNPAVED AREAS

Slide 3

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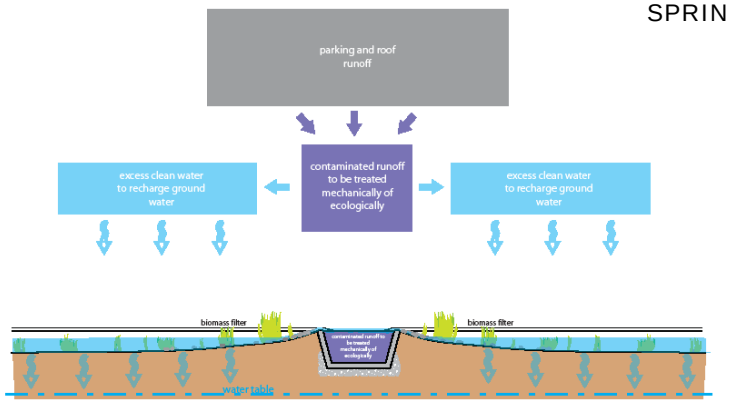

WATER MANAGEMENT OPTION COMBINING DRY AND WET SYSTEMS OF RETENTION FOR A GREEN FIELD SITE

Slide 4

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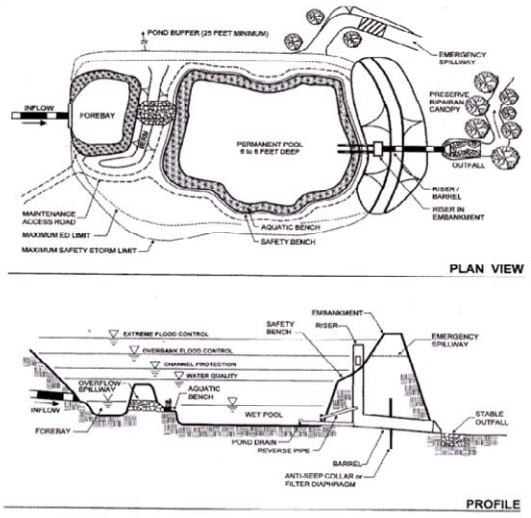

WET POND- NEVER DRY

Slide 5

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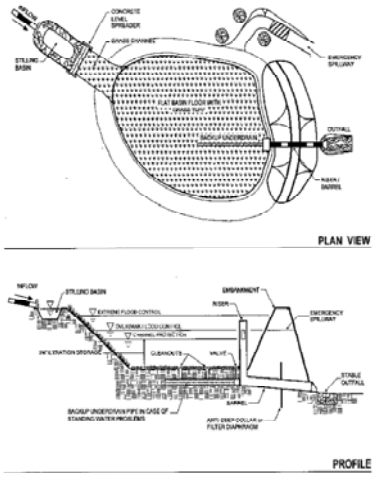
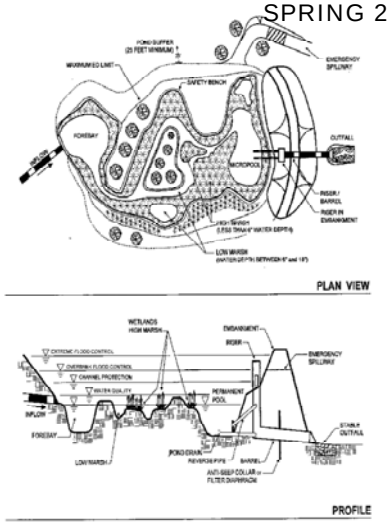


DRY POND



WETLAND STRATEGIES

Slide 6

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NOISE IMPACT AREA SURROUNDING THE PROPOSED CRETE INTERMODAL SITE

Slide 7

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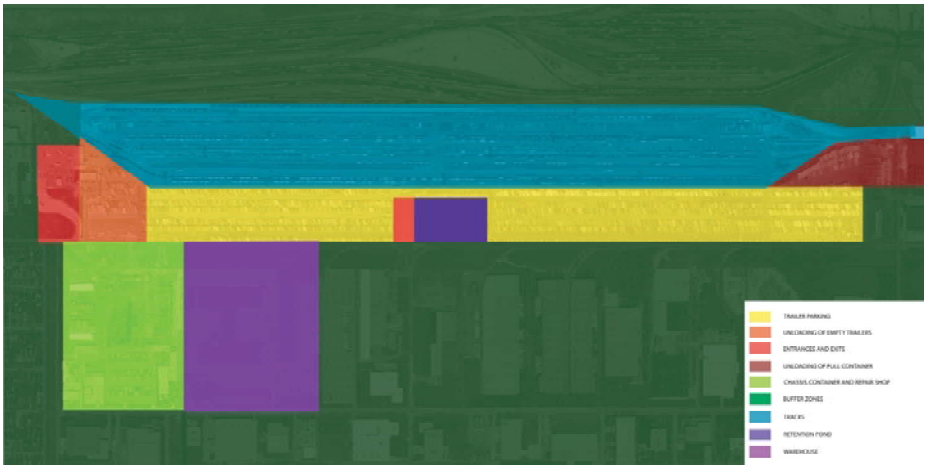

BEDFORD PARK BUFFER ZONE BUILD OUT PROPOSAL

Slide 8

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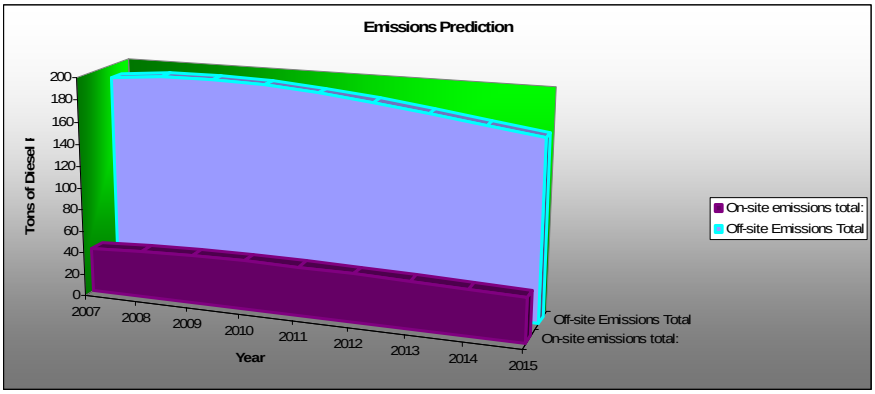

EMISSION PREDICTIONS FOR 2016 SHOWING ON-SITE AND OFF-SITE EMISSIONS

*SCENARIO WHERE CONTAINER USAGE CONTINUES TO GROW.

Slide 9

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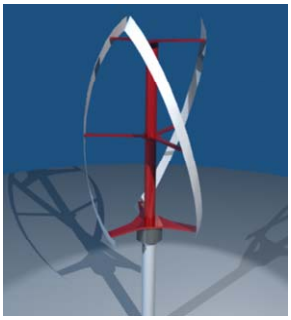
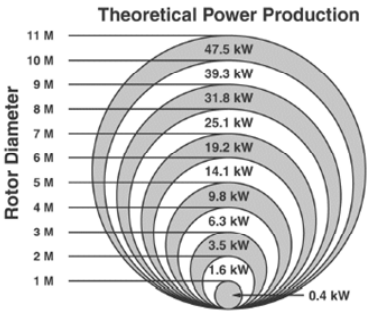
WIND POWER





VERTICAL OR HORIZONTAL AXIS TURBINES FOR ONSITE POWER PRODUCTION

Slide 10

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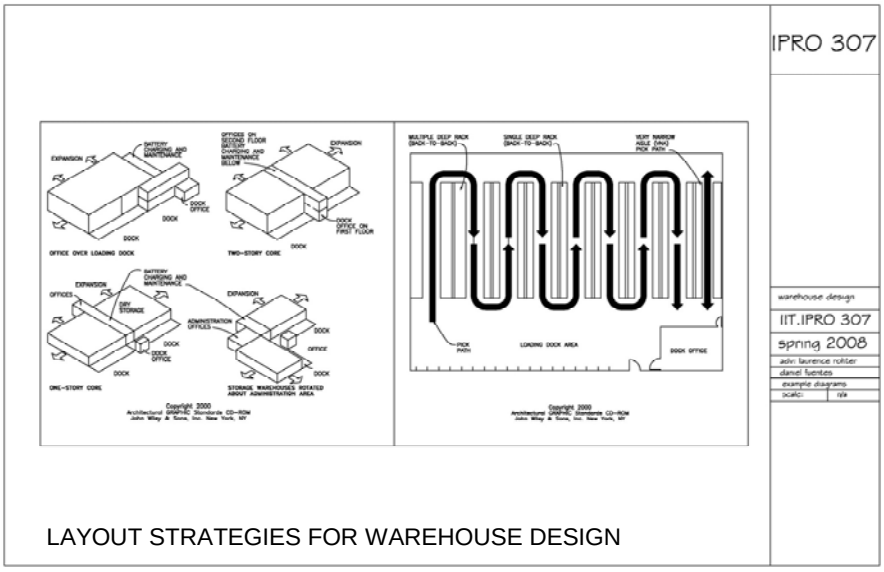

LAYOUT STRATEGIES FOR WAREHOUSE DESIGN

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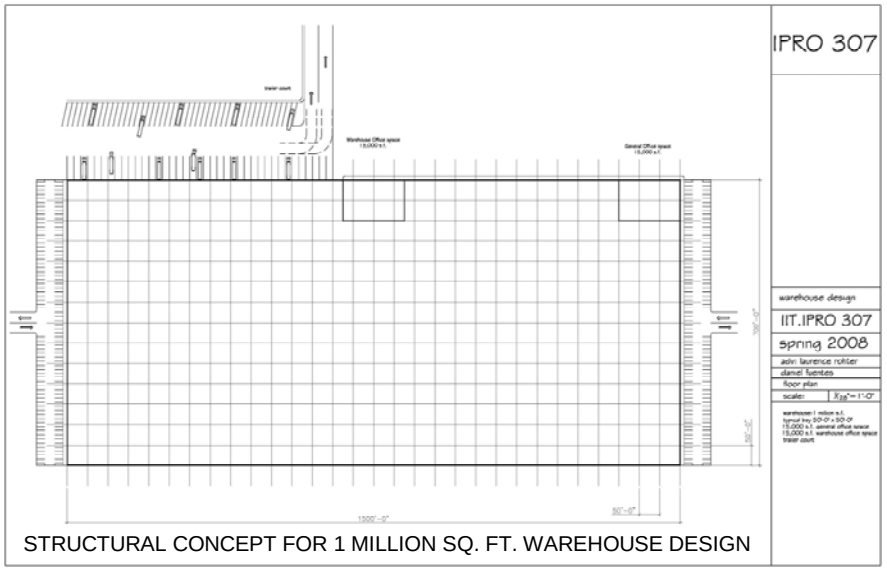

STRUCTURAL CONCEPT FOR 1 MILLION SQ. FT. WAREHOUSE DESIGN

Slide 12

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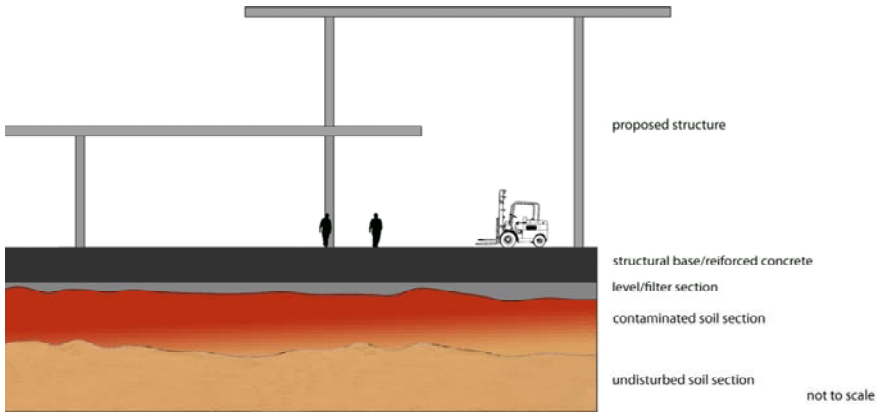
floating structure concept



SECTION FOR A ZERO-EXCAVATION WAREHOUSE DESIGN

IPRO 307

TASK	Start	End
IPRO Deliverables	2/14/08	5/2/08
Project Plan	2/14/08	2/22/08
Midterm Presentations	2/26/08	3/6/08
Code Of Ethics	2/28/08	3/7/08
Midterm Report	3/6/08	3/14/08
Meeting Minutes	4/3/08	4/18/08
Website	4/1/08	4/29/08
Abstract, Posters	4/17/08	4/25/08
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Research Phase	1/28/08	2/28/08
Generate Materials For Book	2/21/08	3/4/08
Check Over Materials	3/4/08	3/11/08
Generate Generic Layout	3/6/08	3/25/08
Layout Materials For Book	3/25/08	4/1/08
Make Deliverables	4/1/08	4/25/08
Bridge Design	1/28/08	4/25/08
Research Phase	1/31/08	2/21/08
Generate Alternative Design	2/21/08	2/28/08
Produce Estimate Of Design	2/21/08	2/28/08
Make Deliverables	4/1/08	4/25/08
Build-Out	1/28/08	4/25/08
Research Site	2/14/08	2/21/08
Produce Conceptual Design For	2/21/08	2/28/08
Check Zoning And Possible Buffers	2/21/08	4/3/08
Finalize Design	4/3/08	4/25/08
Make Deliverables	4/1/08	4/25/08
Milestones		
Midterm Report And Presentation	3/6/08	3/14/08
Sub-Project Deliverables Done	4/3/08	4/3/08
IPRO Day	5/2/08	5/2/08