Final Report

IPRO 307: Advanced Shipping Container Transportation System Solutions
Spring 2007

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1.0 Introduction

IPRO 307 this Spring 2007 semester has shifted its focus to creating a design of an Intermodal yard in Gary, Indiana. Intermodal actively transports and delivers containers via trains and trucks. Intermodal yards are necessary and essential to facilitate the picking up and dropping off of containers meant for a specific destination. Introducing an Intermodal yard in Gary is one of several solutions to Chicago's capacity problem and will have the potential to stimulate economic growth in Gary.

2.0 Background

With nineteen Intermodal yards covering more than 2,200 acres, Chicago is the third largest Intermodal port in the world. Despite the already staggering number of containers passing through Chicago each year, the number is expected to double over the next decade. For this reason, Chicago and its surrounding areas require modern, efficient yards in order to maximize capacity.

Many facilities in the area are already attempting to address this problem. In our recent visit to the Bedford Park, Illinois, facility, we saw how RF technology is making an impact in the industry by allowing train and container movement to be tracked in real-time. The system notifies the company that their container has arrived and tells the trucker exactly where in the yard to pick it up. RF technology has drastically cut the amount of time trucks and containers sit in the yard, clearing space for additional trucks and containers.

Over several semesters, IPRO 307 has analyzed many possible solutions to Chicago's capacity problem. Mi-Jack Products, a manufacturer of Intermodal equipment such as cranes and side loaders, has sponsored the team in this endeavor. The first proposed solution was the Grid-Rail (GRail) system. Essentially, an elevated grid was spread across the entire yard and devices capable of lifting and transporting containers, called shuttles, were attached below. The fully automated shuttles could access any point on the grid, transporting containers and loading or unloading trains along the way.

This idea evolved into Mi-Jack's Thru-Port system. This was a system of cranes with two double-grapplers, allowing up to four containers to be loaded or unloaded simultaneously. The system was designed to quickly and efficiently organize containers based on their destinations and shuffle them to the correct train.

The focus has now shifted to Gary, Indiana, where the Chamber of Commerce desires an Intermodal yard to create jobs and spur economic growth. A high density of freight travels through the city each year, large amounts of land are available from old steel mills, and several major highways are easily accessible, making Gary an ideal location for Intermodal operations.

This semester we focused on deciding on the ideal location in Gary for an Intermodal yard. Our IPRO developed a site design for this Intermodal yard as well a corresponding cost analysis to build the yard. This IPRO group also addressed zoning, and environmental issues that would impact Gary and the Intermodal yard. We have also created a tour of the potential facility on Google Earth as well as Gary Wide Area Network system (GWAN) program to facilitate container drop off and pick up within the yard and truck congestion within Gary.

3.0 Purpose

The purpose of the IPRO 307 team this Spring 2007 semester has been to design a modern Intermodal yard for the city of Gary, Indiana. The completed Intermodal yard site design has the potential of handling the forecasted increase in container movement over the next decade while decreasing the demand placed on existing Intermodal facilities in the Chicago and northwest Indiana areas.

Several objectives have been met in order to accomplish this project. First and most importantly, was to select the best site possible in Gary taking into account all area zoning issues. Next, was planning the physical layout of the Gary yard to maximize efficiency and minimize any negative effects on the surrounding areas. This also entailed a design that would accommodate the planned Gary airport expansion, and made sure the structures in the yard comply with FAA height regulations. The planned layout also had to account for the proposed Greenlinks Bicycle path and the natural preserves located near the proposed site. Lastly, the layout had to provide entry and exit pathways that would not impede traffic, for example, running the railway underneath a bridge, thus allowing vehicle traffic to move unimpeded.

The completion of the project also involved making recommendations concerning the appropriate number, size, and type of cranes capable of handling the predicted yard capacity. It also involved developing a software program capable of tracking containers and trucks both within the yard and regionally. This included determining the impact of emissions from the yard equipment as well as from the truck traffic on Gary, as well as the reduced emissions overall from diverting thousands of trucks and trains from the Chicago area directly to Gary.

The final and most interesting component of this project was creating a Google Earth tour of our proposed site design. This tour includes the design layout as well as area landmarks and a proposed bridge design. The tour has been an ideal method of demonstrating how the proposed Intermodal yard fits into the existing Gary area.

4.0 Research Methodology

The problem IPRO 307 has faced is that the capacity for Intermodal operations in the Chicagoland area cannot keep up with the demand. In order to meet the expected demand over the next decade, current facilities need to be reworked to increase efficiency or new yards need to be designed and built.

The first step in addressing this problem was visiting an existing Intermodal yard located in Bedford Park, Illinois. The team met with a manager who gave an in depth explanation concerning how the yard operated. This was followed by a tour of offices and then a ride around the entire facility. The visit provided the team with a first-hand idea of the layout and large amount of land and equipment needed for these types of facilities, as well as the substantial amount of work required to keep it running smoothly.

Keeping what they learned from the Bedford Park facility in mind, the team has designed a new Intermodal yard, recommended the number and types of equipment that would best suit the site, and created a demonstration program that illustrates how technology can be used to track containers and communicate with truckers over an entire region. This required research into all aspects of container movement.

It was also important for the team to learn about GIS, or geographic information systems, which displays geographically-referenced information in the form of data layers on a map. Team members have familiarized themselves with GIS software in order to create and display data layers necessary to develop a tour of the proposed yard in Google Earth.

Research into zoning was also carried out, which included the general types of zones common in many municipalities and also those specific to Gary, Indiana. Additionally, it was necessary to determine the current land ownership of the proposed Intermodal yard location.

Finally, the equipment needed for Intermodal operations was fully researched. The team studied how cranes operate mechanically as well as alternate methods of powering them. This information was needed to make recommendations as to the number and type of equipment required in the yard capable of handling the estimated capacity.

Once the research, design, and recommendations were completed, the team analyzed the proposed solution. The proposed Intermodal yard should be capable of handling a predetermined number of lifts annually, meet all standards set by Gary's zoning ordinances, and minimize pollution and any other negative effects on the surrounding area. Once it was determined that the solution satisfied all of these requirements work was started on the deliverables outlined in Section 7.0.

IPRO deliverables, however, were generated as the semester progressed. It was a collaborative effort, with each sub-group reporting any relevant information to the individual responsible for a particular deliverable. These individuals were responsible for organizing the given information in a logical order and ensuring that the style was consistent throughout.

5.0 Assignments

The team decided to use a design process similar to a charrette. A charrette is an intense design process in which the main group is divided into subgroups that meet for several sessions. The subgroups then combine and present their part of the solution, which can be refined by the main group and integrated into the overall plan. Basically, a charrette is a way of quickly designing a solution to a problem that requires knowledge on a number of different subjects.

After gaining an understanding of the charrette process, the team identified the subgroups that would be necessary to address the main problem.

- Design Team: The design team was responsible for the physical layout of the proposed Intermodal yard. They improved upon what they saw at existing facilities and applied it to the site in Gary, Indiana. The major objective for the design team was to design the physical layout of the proposed advanced Intermodal yard in Gary, Indiana. This included the overall layout of the site, moving or changing of existing structures on the proposed site, cost estimate of the Intermodal yard, and a preliminary bridge design for car, truck, and pedestrian use over the inbound tracks. All members of the design team contributed to the preliminary site design.

- Mechanical Team: The mechanical team made recommendations as to the number and types of equipment the yard will require. They researched the mechanical operation of common types of cranes, different methods of powering them, as well as emissions information. They were also responsible for calculating the environmental impact on the region due to introducing an Intermodal yard in Gary. The Environmental Group grew from both the mechanical group and the design group needing to find positive environmental impacts in the construction and operation of the Intermodal facility. This included the need to accommodate the proposed bicycle path along one edge of the facility, and also to show that the level of pollutions emitted could be lowered greatly thru the use of mechanical systems and alternative fuel.

- Zoning: The team researched Gary's zoning ordinances and determined if the current zoning of potential sites allowed for an Intermodal yard. They also determined the current land ownership for the site of the proposed yard. The research from the zoning group demonstrated that the proposed site is a great site for what we have planned to do; it benefits the landowners and the city as a whole. It implements what the city of Gary and other initiatives had in mind and it adds to everything they already wanted to do.

- GIS: Accurate maps and data for the site and its surroundings were essential. Those working with GIS have learned to use the necessary software and have combined several data layers, such as municipal boundaries, national parks, and rail densities, onto one map. The GIS team, Cesar Sotelo, has gained knowledge of the software in order to gather information and consolidate all the data done by the team for final presentation.

- Demo Program: The Bedford Park facility illustrated how computers and RF technology can greatly increase efficiency and accuracy for Intermodal operations. The demo program has shown how this idea can be expanded to cover an entire region rather than being bound by the confines of the yard. Zachary Borschuk was assigned the task of creating a program, GWAN that would simulate Bedford Parks Radio Frequency technology for tracking containers within their facility. Zachary was able to expand this concept to include all of Gary. He also did not have any RF technology available, and therefore created a program that updated container locations using wireless internet as opposed to RF.

Generally, the team filled the subgroups based on each individual's academic major. This ensures that team members can usually work in areas in which they are interested and the most knowledgeable. A complete list of team members, their majors, and their responsibilities can be found below in Table 5.1 Team Assignments and Responsibilities.

Table 5.1 Team Assignments and Responsibilities

Responsibilities	Name	Major
Design Team	Jonathan Kohler Nathaniel Roth Benjamin Russo Mary Sisay Yousef Zaatar	Civil Engineering
Mechanical Team	Michael Grilley Axita Patel Josie Truong	Mechanical Engineering
Zoning	Maria Aguirre Joanna Ruiz	Architecture
GIS	Cesar Sotelo Joanna Ruiz	Architecture
Demo Program	Zachary Borschuk	Computer Science

6.0 Obstacles

Complications are a part of any project. The following paragraphs define what these complications were for this IPRO group and how they affected the team and the progress of the design.

6.1 Design Team

The design team faced a few barriers and obstacles that slowed the beginning of the design process. Finding the site for the Intermodal facility was the first obstacle. The original site designated by the group was found to be a park reserve. All the design that had been done up to this point was discarded. There was some time where no site had been designated, and this slowed the design process. Without a site, dimensions of the Intermodal facility could not be established. Also, at the onset of the project, the design team was unclear of each member's roles. Once objectives were established throughout the design process, roles became clearer. In future semesters, the major obstacles for the site design may include land ownership and traffic flow. The actual implementation of the site will be up to the land owners, and the project is at their mercy. As far as the layout, the traffic flow is something that needs to be researched for the area, and the design will need to be adjusted. Please see Figure A6.1a Existing Site of Proposed Intermodal Yard Location in Appendix A.

There were problems encountered during the process of estimating costs. The main problem was relying on the contactors and their word. Since only some of the information is available online (i.e. labor rates and equipment rental rates), I had to liaise with contractors to get manpower (i.e. crew sizes) and the time required to complete construction. This was a problem since I had to try different contractors and almost all of them did not want to help.

6.2 Mechanical Team

The major obstacle that arose was finding the information pertinent to our research. There is a lot of information out there. However, the more that is out there the harder it is to determine what is relevant and what is not. Another barrier that was faced was the wall that we hit when relevant information was found. When pertinent information was found there was limited background of the information presented. For example, the attainment information was not hard to find but what attainment referred to and what the different categories of attainment represented was difficult to discern and needed to be further explored. These types of research obstacles are not uncommon and usually expected but also lead to the other major barrier, time. Research takes time especially clear, concise fully developed research on an unfamiliar area and subject. These obstacles were overcome by delegating a broad area of research into the most applicable research between team members. Even with overlapping areas of research there was plenty to go around. Each mechanical team member took a part of the subject that need to be explored and produced an analysis of that subject shown in the results section.

6.3 Zoning

The zoning group had the responsibility of researching the area that would permit the building of such facility. Very little data was available out there in regards to zoning laws in the city of Gary or at least data that was available to us. The maps found pertaining to zoning gave a broad scope of plans that were to be implemented through out the city. Eventually we were able to use these maps to determine the boundaries of our proposed site.

6.4 GIS

The only obstacles the group encountered were technical; as we able to work together in an effective way. Upon further research we were able to resolve our technical issues. Our only remaining barriers that need to be addressed before the team can successfully complete the planned work is to come to decision on how the IPRO day presentation should look. Our final product has left us great satisfaction, because it reflects the hard work we have done.

6.5 Demo Program

One of the obstacles that needed to be overcome was how to store the container data. Another obstacle was how to password protect the administrator side of the program. It was decided that an array of classes would be best suited for storing the data. It was decided that for the password protection, simply comparing the entered string to a predetermined string was sufficient. A barrier that remains is incorporating RF technology with the program. This can be resolved with access to RF technology and research into how it interacts with the machine.

7.0 Results

7.1 Design Team

The design team's major goal outlined in the project plan was to design the physical layout of the proposed advanced Intermodal yard in Gary, Indiana. The team visited the CSX Intermodal facility in Bedford Park, Illinois. This Intermodal yard is one of the largest and advanced facilities of its kind in the United States. The Gary, Indiana site was to be modeled after this Intermodal facility. The site in Gary was found to contain sufficient space for an advanced Intermodal facility. The site also contains an existing railroad storage yard, and a parking lot for the steel mill north of the proposed site. The design team was able to include the following necessary attributes into the proposed site in Gary:

- Trackside, 109 acres (entrance to site, unloading and loading space for trains)
- Container on chassis, 100 acres (space for container on chassis storage)
- Chassis yard, 15 acres (space for chassis storage)
- Empty container yard, 15 acres (space for empty container storage)
- Gates, repairs, administration 15 acres (Space for entry and exit gates, repair and maintenance buildings, and administration buildings)

These attributes are necessary for the proposed Intermodal site, and total to 250 acres. Also completed by the design team, was the moving of the existing railroad storage yard, and the parking lot on the proposed site. Both of these areas are equivalent to what is on the current proposed site. The proposed site is ready to be presented in Google Earth. The site also contains a tower used for controlling the activity in the Intermodal facility. A bike path proposed by the City of Gary also runs near the west end of the proposed Intermodal facility. A bridge next to the Intermodal site for this bike path has also been designed. Please see Figures B7.1a Proposed Site Design & A7.1b Color Codes and Dimensions: Proposed Site in Appendix B.

Cost Estimation

The cost for the building of the new inter modal yard at Gary, Indiana, which would occupy an area of 500 acres is estimated to be $149,254,186.00. This estimation is based on the current cost of labor and materials and does not take inflation into account.

The labor cost was calculated based on the size of the different areas within the yard and also on the manpower required to complete the task. The time and manpower required for the construction was calculated based on the average time and manpower required to construct structures of similar sizes.

Labor cost was calculated using the mean hourly wages of current construction workers in Indiana. These rates were taken from the Indiana Department of Labor and Statistics.

The material cost was calculated using data from contractors within the Chicago-land/Indiana region. These estimates include the prices of concrete, asphalt, lumber, steel and other construction materials. It also includes the price of stripping the existing rail tracks in the site. Equipment cost was calculated using the weekly rental rates for construction equipment, and the overall construction time. Please see the itemized cost analysis given in Tables B7.1a – B7.1j in Appendix B.

7.2 Mechanical Team

The mechanical team has been responsible for making recommendations as to the number of equipment the yard will require. This team has also been researching the mechanical operation of common types of cranes, different methods of powering them, as well as emissions information. Evaluating the environmental impact on the region and surrounding areas by introducing an Intermodal train yard in Gary is another task of the mechanical team.

The results are that the facility being design has to potential to bring about a positive change for the environment. This will be done by reducing pollution by using alternative fuels, and more stringent exhaust filters, as well as streamlining the flow of trucks in and out of the facility to reduce smog produced as trucks sit idle. Please see the B7.2a Diversion Analysis Report, B7.2b Slide Presentation on Advance Shipping Containers Solutions, and B7.2c Pollution Research in Appendix B.

7.3 Zoning

The zoning group had the responsibility of researching the area that would permit the building of such facility. Very little data was available out there in regards to zoning laws in the city of Gary or at least data that was available to us. The maps found pertaining to zoning gave a broad scope of plans that were to be implemented through out the city. One plan found was the SWOT plan by the Northwest Initiative which broke down the area into three main components: Shoreline Analysis, Urban Analysis and Kankakee Analysis. Gary fell onto the shoreline analysis which as a **s**trength denoted skilled labor and hospitality to industry, two key factors to our plan. As a **w**eakness it pointed out lack of State focus to Northwest Indiana in relevance to environment, technology and commerce. Our plan addresses such issues. The **o**pportunities it mentioned were shoreline availability and opportunity for land reuse. The main **t**hreat consisted of steel legacy cost; however, the steel plant has not been in use for years.

We also came across the empowerment plan that calls for construction and consequently jobs for the people of Gary. The initiative came from a comprehensive redevelopment program that affords cities throughout the country the opportunity to revitalize aging infrastructure, strengthen communities, attract new businesses and industries, and create new jobs. Our site is inside such empowerment plan and following exactly what their city plan calls for.

The zoning group also looked into parcel data and landownership of the proposed site. We found out that the land in our proposed site consisted of 3 owners, E. J. & E. being the primary owner. We believe the plan is also to the advantage of E. J. & E. since it is land that is currently being unused and could be rented out.

The research from the zoning group demonstrated that the proposed site is a great site for what we have planned to do; it benefits the landowners and the city as a whole. It implements what the city of Gary and other initiatives had in mind and it adds to everything they already wanted to do. Please See B7.3 Zoning Report in Appendix B.

7.4 GIS

The major part of our objective is already completed. All of our information has been consolidated and incorporated into Google Earth. The purpose for incorporating our data into Google Earth is so we can be able to share our information with our employer through the internet.

This is the process that was taken to reach our objective:

All the information regarding our site was taken and traced on to Google Earth as kmz files. These kmz files contain information regarding the layout for our proposed Intermodal yard, along with what is surrounding our site, such as, wetlands, environmental zones, scenic viewing areas, bike path, proposed bridge, and important city buildings. To make our project more clearer, 3D models of the most important elements in our design were created and implemented onto Google Earth.

7.5 Demo Program

The Gary Wide Area Network (GWAN) program is being tested and finalized and is ready for demonstration. Program runs smoothly and testing has helped to remove problems in using the program. GWAN will help to reduce errors in the facility as well as keep a better record of the status of containers. Currently the program works and provides basic functioning, and is nearly finished and ready for presentation as a prototype for future programs similar to it. The current results address the basic problem and with further development has great potential in eliminating the problem entirely. The current state of the program will be used as a basis to monitor containers within Gary, Indiana for the new train yard being built.

8.0 Recommendations

Recommendations that can be made are for the furthering of this specific project in the future. These recommendations include finalizing a design of the proposed tower or developing plans for other administrative facilities. Also recommended is finalizing a bridge design to facilitate a bike path proposed by the City of Gary that runs near the west end of the proposed Intermodal site. A basic but complete design had been included in the deliverables of this project, however a design that is more cosmetic or visually appealing is recommended for final implementation. Implementing the use of yard equipment and trucks associated with Intermodal that run on bio-diesel or other low emission alternative fuels is recommended. Another recommendation is to contact E.J. & E. to determine the possibilities of brokering an agreement for the use of their land or for purchasing this land outright. The recommendation from the zoning team is to further develop a proposal for the site to clearly define the benefits of the yard to the landowners and to the City of Gary and to clearly indicate that the proposed site will not impact the initiatives that the City of Gary already has in mind. Perhaps even making a presentation that can be targeted toward the City of Gary audience. It is also recommended that the data incorporated into Google Earth be used to better share and communicate information and ideas with our employer through the internet. Lastly, we recommend that the demo program GWAN be eventually adapted to be used with Radio Frequency (RF) technology to potentially further increase the ease of container location and updateability.

9.0 References

Google Earth

California Air Resource Board - http://www.arb.ca.gov/homepage.htm

Gary Greenlinks Plan - http://www.wildlifehc.org/indiana/programs/

Sun's documentation - http://java.sun.com/

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U.S. EPA, Locomotive Emission Standards, Regulatory Support Document, April 1998.

U.S. EPA, Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel, June 29, 2004.

10.0 Acknowledgments

The 307 IPRO team would like to thank the following people for their contributions and assistance in this project.

- **Laurence Rohter**, Team instructor and advisor, for his guidance and patience with us misguided and trying students.
- **Peter Mirabella**, Mi-Jack representative – project sponsor, for providing us with background resources, information and awesome Mi-Jack shirts.
- **Doug Daun**, CSX- Bedford Park Manager, for providing us with key information on which a significant portion of our recommendations and design parameters are based.
- **Chuck Allen**, Norfolk Southern representative, for watching our preliminary project presentation and providing essential feedback and suggestions on which our final project design and deliverables are based.

11.0 Appendix

11.1 Appendix A

Figure A6.1a Existing Site of Proposed Intermodal Yard Location

11.2 Appendix B

Figure B7.1a Proposed Site Design

Color Codes and Dimensions: Proposed Site

Color Code	Proposed Site Area	Dimensions Area 1	Area 2	Area 3	Acres (Goal)	Acres (Designed)
Red	Trackside	9500' x 500'			100	109
Purple	Container on Chassis	4000' x 652'	2500' x 700'		100	100
Blue	Chassis Yard	242' x 2700'			15	15
Navy	Empty container Yard	242' x 2700'			15	15
Dark grey	New Parking Lot	2000' x 275'			=12.63	=12.63
Light grey	Gates, Repairs, & Administration	200' x 470'	0.5(2300' x 350')	0.5(700' x 450')	15	15
Green	New EJ&E Rail Yard	7500' x 900'			155	155
				Totals	412.63	421.63

Note1, all proposed goals are based on 800,000 lifts per year

Note2, New EJE rail yard goal is based on existing rail yard

Figure B7.1b Color Codes and Dimensions: Proposed Site

Table B7.1a Labor Cost

Labor			
Office Building: Cost	$1,140,464		
approx 5000sq ft			
Crew (5 men)	Hourly Wage,$	# of hrs/wk	Cost/wk
Foreman	30	40	1200
2 Carpenters	19.2	40	1536
2 Laborers	20.63	40	1650.4
			4386.4
Takes 26 wks to complete			
Total man hours/wk	260		
Total crew cost	**1140464**		

Table B7.1b Chassis Yard

Chassis Yard			
Crew (8)	Hourly Wage,$	# of hrs/day	Cost/day
Foreman	30	8	240
Operator	15.97	8	127.76
2 Roller Operator	15.97	8	255.52
3 Asphalt raker	15.97	8	383.28
Laborer	20.63	8	165.04
			1171.6
Daily rate for Labor	**$1,171.60**		
SqY x 0.0575 * thickness=Tonnes			
653400/9 = 72600 Sq Y			
72600x0.0575x4 = 16698 tons			
Daily Production rate for Asphalt=3500 tons			
16698 / 3500 = 5 days			
Labor cost for whole operation		**5858**	

Table B7.1c Container on Chassis

Container on Chassis			
Crew (8)	Hourly Wage,$	# of hrs/day	Cost/day
Foreman	30	8	240
Operator	15.97	8	127.76
2 Roller Operator	15.97	8	255.52
3 Asphalt raker	15.97	8	383.28
Laborer	20.63	8	165.04
			1171.6
Daily rate for Labor	**$1,171.60**		
SqY x 0.0575 * thickness=Tonnes			
4358000/9 = 539222.2 Sq Y			
539222.2x0.0575x4 = 124021.1 tons			
Daily Production rate for Asphalt=3500 tons			
124021.1 / 3500 = 36 days			
Labor cost for whole operation		**42177.6**	

Table B7.1d Paved Parking Lot Cost

Paved Parking Lot (300LFx100LF)			
Crew (4 men)	Hourly Wage,$	# of hrs/wk	Cost/wk
Foreman	30	40	1200
2 laborers	20.63	40	1650.4
Operator	24.47	40	978.8
			3829.2
Takes 3 wks to complete			
Total man hours/wk	12		
Total crew cost	**45950.4**		

Table B7.1e Paved Trackside Cost

Paved Trackside			
Crew (8)	Hourly Wage,$	# of hrs/day	Cost/day
Foreman	30	8	240
Operator	15.97	8	127.76
2 Roller Operator	15.97	8	255.52
3 Asphalt raker	15.97	8	383.28
Laborer	20.63	8	165.04
			1171.6
Daily rate for Labor	**$1,171.60**		
SqY x 0.0575 * thickness=Tonnes			
4750000/9 = 527777.78 Sq Y			
527777.78x0.0575x4 = 121388.89 tons			
Daily Production rate for Asphalt=3500 tons			
121389 / 3500 = 35 days			
Labor cost for whole operation		**41006**	

Table B7.1f Empty Container Yard

Empty Container Yard			
Crew (8)	Hourly Wage,$	# of hrs/day	Cost/day
Foreman	30	8	240
Operator	15.97	8	127.76
2 Roller Operator	15.97	8	255.52
3 Asphalt raker	15.97	8	383.28
Laborer	20.63	8	165.04
			1171.6
Daily rate for Labor	**$1,171.60**		
SqY x 0.0575 * thickness=Tonnes			
653400/9 = 72600 Sq Y			
72600x0.0575x4 = 16698 tons			
Daily Production rate for Asphalt=3500 tons			
16698 / 3500 = 5 days			
Labor cost for whole operation		**5858**	

Table B7.1g Guard Booths

Guard Booths (2)			
30 sq ft			
2 Crews (3 men each)	Hourly Wage,$	# of hrs/wk	Cost/wk
1 Carpenters	19.2	40	1536
2 Laborers	20.63	40	1650.4
			3186.4
Takes 1wk to complete			
Total man hours/wk	156		
Total crew cost	**497078.4**		

Table B7.1h Maintenance Depot & Total Labor Cost

Maintenance Depot			
(approx 654000 Sq ft)			
Crew (7 men)	Hourly Wage,$	# of hrs/wk	Cost/wk
Foreman	30	40	1200
2 laborers	20.63	40	1650.4
Operator	24.47	40	978.8
3 Iron workers	27.05	40	1082
			4911.2
Takes 20 wks to complete			
Total man hours/wk	140		
Total crew cost	**687568**		
Total Labor Cost $	**2423782.8**		
		149254185.8	

Table B7.1i Total Building Equipment Cost

Equipment	Daily rate $	Weekly rate $
Backhoe	310	935
Motorgrader	725	2175
Roller(Vibr. Asphalt)	360	1050
Roller(Sindle drun Conc.	555	1610
Compactors	340	1010
Forklifts	250	650
Wheel Loaders	450	1345
Water Trucks	1570	4815
Estimated time for completion is 52 weeks		
Total cost of equipment =	**706680**	

Table B7.1j Total Cost of Materials

		Quantity(Sq ft)	Quantity(cyd)	Unit price	Total
Bridge					
-?					
Trackside					
-Pavement		4750000	87962.96296	70	6157407.4
-Rock		4750000			
-Track					
-Rail		76000	14.39393939	2000000	28787879
-Ties					
-Stone					
-Spikes					
Container on Chassis					
-Pavement		4358000	80703.7037	70	5649259.3
-Rock		4358000			
-Pavement Marking		4000		0.15	600
Chassis Yard					
-Pavement		653400	12100	70	847000
-Rock		653400			
-Pavement Marking		2700		0.15	405
Empty container Yard					
-Pavement		653400	12100	70	847000
-Rock		653400			
-Pavement Marking		2700		0.15	405
New Parking Lot					
-Pavement		550000	10185.18519	70	712962.96
-Rock		550000			
-Pavement Marking		2000		0.15	300
Gates, Repairs, Administration					
-Guard Booths		4			
-Pavement		654000	12111.11111	70	847777.78
-Rock		654000			
-Pavement Marking (Gates)					
-Admin. Building					
-Repair Building					
New EJ&E Rail Yard					
-Track					
-Rail		270000	51.13636364	2000000	102272727
-Ties					
-Stone					
-Spikes					
					15061407
Total cost for concrete					**1710**
Total cost for striping					**131060606**
Total cost for new tracks					
Total cost of Materials					**146123723**

Appendix B7.2a Diversion Analysis Report

Diversion Analysis

Introducing an Intermodal train yard in Gary, Indiana has many advantages. The most obvious advantage is that a large portion of the containers that are handled in Chicago will be diverted to Indiana. This will reduce the number of trucks carrying containers between Chicago train yards and Indiana vendors and customers. This in turn, will reduce traffic congestion between Chicago and Indiana. Ultimately, this reduction of truck travel will reduce the amount of pollutants released into the air. The following analysis shows the estimated amount by which emissions are reduced by introducing an Intermodal train yard in Gary, Indiana.

The distance between the largest Chicago based Intermodal train yard, Bedford Park, and Gary, Indiana's downtown area is approximately 40 miles. Assuming that most containers currently coming from Indiana vendors and or going to Indiana customers are handled at Bedford Park the current volume of truck emissions can be calculated. Table 1 below shows the values used to determine truck emissions between Bedford Park and Gary for the three most common types of freight trucks.

Current Given Values of Emission Factors for Trucks

	Local Road Emission Factors (grams/mile)			
Truck Type	**VOC**	**CO**	**NOx**	**PM-10**
Single-Unit Gasoline Truck	7.06	144.07	5.94	0.13
Single-Unit Diesel Truck	1.18	6.86	14.95	0.42
Combination Diesel Truck	1.22	7.64	16.07	0.41
	Urban Freeway Emission Factors (grams/mile)			
Single-Unit Gasoline Truck	1.31	51.39	8.12	0.13
Single-Unit Diesel Truck	0.42	2.21	22.69	0.42
Combination Diesel Truck	0.43	2.48	25.65	0.41
	Rural Freeway Emission Factors (grams/mile)			
Single-Unit Gasoline Truck	1.31	75.87	8.84	0.13
Single-Unit Diesel Truck	0.41	2.8	30.39	0.42
Combination Diesel Truck	0.41	3.13	33.96	0.41

Table 1: Current Given Values of Emission Factors

Mapping the route a freight truck would take to travel from Bedford Park and Gary, Indiana shows that 3.25 miles are travel on local roads and 36 miles are traveled on urban freeways. Using these values, Table 2 below shows the current amount of freight truck emissions between these two points.

Calculated Values for Truck Emissions Traveling from Bedford Park to Gary

Truck Type	Truck Emissions Bedford Park to Gary (grams)			
	VOC	**CO**	**NOx**	**PM-10**
Single-Unit Gasoline Truck	70	2,318	312	5
Single-Unit Diesel Truck	19	102	865	16
Combination Diesel Truck	19	114	976	16
All Freight Trucks	109	2,534	2,153	38

Table 2: Calculated Values for Truck Emissions Traveling from Bedford Park to Gary

These values, shown in Table 2, double when travel from Gary back to Bedford Park is taken into account.

VOC represents emissions called volatile organic compounds, CO represents carbon monoxide, NOx represents Nitrogen dioxide and PM-10 represents particle matter emissions with aerodynamic diameter smaller than 10 micrometers. Both VOC and NOx are emitted by transportation and industrial sources, together with sunlight react to form O_3, Ozone. Ozone at ground level is a major health and environmental concern. Carbon monoxide is a colorless, odorless and poisonous gas produced by incomplete burning of carbon in fuels. Seventy-seven percent of the nationwide CO emissions are from transportation sources. Particulate matter emissions include dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. High concentrations of particle matter include effects on breathing and respiratory symptoms.

Freight trains also produce emissions. By introducing a train yard in Gary, the freight truck travel between Bedford Park and Gary will be significantly reduced if not eliminated. Assuming we consider freight train travel to be the same distance as that considered for truck travel, approximately 40 miles, we can estimate the amount of emissions produced by train travel from Bedford Park to Gary. Table 3 shown below illustrates the current given values for train emissions.

Current Given Values of Emission Factors for Trains

Emission Factors for Locomotives		
	Emissions (grams/hp-hr)	
Tier 0 (1973 - 2001 model years)	**NOx**	**PM-10**
Line-haul duty-cycle	9.5	0.6
Switch duty-cycle	14	0.72
Tier 1 (2002 - 2004 model years)		
Line-haul duty-cycle	7.4	0.45
Switch duty-cycle	11	0.54
Tier 2 (2005 and later model years)		
Line-haul duty-cycle	5.5	0.2
Switch duty-cycle	8.1	0.24

Table 3: Current Given Values of Emission Factors for Trains

Freight Train travel in terms of emissions is given in grams of emissions per horsepower and hours. Locomotive engines primarily used for long distance freight train operations have up to 4000 horsepower and travel about 50-60 miles per hour. The distance of travel is 40 miles and traveling at speed of 50 miles per hour, using these values we can determine the current amount of freight train produced emissions between Gary and Bedford Park. Table 4 given below shows the calculated values for freight train emissions traveling from Bedford Park to Gary.

Calculated Values for Freight Train Emissions Traveling from Bedford Park to Gary

Emission Factors for Locomotives		
	Emissions (grams)	
Tier 0 (1973 - 2001 model years)	**NOx**	**PM-10**
Line-haul duty-cycle	7.6	0.48
Switch duty-cycle	11.2	0.576
Tier 1 (2002 - 2004 model years)		
Line-haul duty-cycle	5.92	0.36
Switch duty-cycle	8.8	0.432
Tier 2 (2005 and later model years)		
Line-haul duty-cycle	4.4	0.16
Switch duty-cycle	6.48	0.192

Table 4: Calculated Values for Freight Train Emissions Traveling from Bedford Park to Gary

The values for produced emissions for freight train travel are significantly less than those produced by freight truck travel. These values suggest that the environment would benefit from this change. It also suggests, indirectly, that the health of local residents of Chicago and Gary would be improved by this change simply because of reduced emissions.

The introduction of an Intermodal train yard in Gary is ultimately beneficial to the environment surrounding these two areas. However, effects of freight trucks now being introduced to Gary instead of Bedford Park are unforeseeable. Assuming these trucks would have had to travel through Gary anyway to get to or back from Bedford Park suggests that the train yard is still valuable in respect to emissions. Emissions from new trucks being introduced to the area as well as emissions produced from idling can not be determined as of yet. Overall, the anticipated amount of reduced emissions is a definite advantage of an Intermodal train yard in Gary and Chicago.

Attainment Information

The term attainment refers to any area that meets the national primary or secondary ambient air quality standard for specific pollutants. Areas of nonattainment are therefore, any areas that do not meet (or that contribute to ambient air quality in a nearby areas that do not meet) the national primary or secondary ambient air quality standard for certain pollutants. Nonattainment areas can be designated into about eight different categories. Table 5 below displays these categories and the design value designations for each.

Categories of Nonattainment

Category	Design Value (ppm)	Years to Attain
Extreme	≤ 0.280	N/A
Severe 17	0.190-0.280	17
Severe 15	0.180-0.190	15
Serious	0.160-0.180	N/A
Moderate	0.138-0.160	N/A
Marginal	0.121-0.138	N/A
Sub Marginal	0.121≤	N/A
Incomplete (or No) Data	unknown	N/A

Table 5: Categories of Nonattainment

The design values are based on a value of detected emissions on units of parts per million (ppm). Table 6 below shows the attainment information for Lake County, Indiana in which the City of Gary is located.

Lake County, Indiana Attainment/Nonattainment Information

Pollutant	Area Name	Nonattainment in Year	Redesignation	Classification	County NA	Pop (2000)
1-Hr Ozone	Chicago-Gary-Lake County, IL-IN	92 93 94 95 96 97 98 99 00 01 02 03 04 05 06	/ /	Severe-17	Whole	484,564
8-Hr Ozone	Chicago-Gary-Lake County, IL-IN	04 05 06	/ /	Moderate	Whole	484,564
CO	East Chicago, IN	92 93 94 95 96 97 98 99	3/20/2000	Not Classified	Part	5,088
PM-10	East Chicago, IN	92 93 94 95 96 97 98 99 00 01 02	3/11/2003	Moderate	Part	209,913
PM-2.5	Chicago-Gary-Lake County, IL-IN	05 06	/ /	Nonattainment	Whole	484,564
SO2	Lake County, IN	92 93 94 95 96 97 98 99 00 01 02 03 04 05	10/26/2005	Primary	Part	484,564

Table 6: Lake County, Indiana Attainment/Nonattainment Information

Table 6 shows that Lake County as of 2006 still had nonattainment issues regarding pollutants that affect the ozone. Specifically one hour and eight hour ozone refers to the maintenance and provisions for obtaining attainment in nonattainment areas. Specific pollutants are not an issue for Lake County and therefore Gary, Indiana as of 2005. This data tell us that an Intermodal train yard will not have a significant impact on attainment issues as long as EPA emission standards are enforced.

References

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http://www.epa.gov/oar/oaqps/greenbk/

http://www.epa.gov/oar/oaqps/greenbk/ancl3.html

http://www.dieselnet.com/standards/us/hd.html

U.S. EPA, Locomotive Emission Standards, Regulatory Support Document, April 1998.

U.S. EPA, Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel, June 29, 2004.

Appendix B7.2b Slide Presentation on Advance Shipping Containers Solutions

IPRO 307

Advancement Shipping Containers Transportation System Solutions

Reducing Air Pollution from Nonroad Engines

- Regulators have imposed a set of requirements for cutting emissions
- Technology Forcing - Nonroad diesel engines will become progressively cleaner over the next decade
- The idea comes from the EPA, which has set four "tiers" of emissions standards governing nonroad diesel engines. Each tier allows for a phase-in period of several years based on engine size

The Four Tiers

- Tier 1 standard, phased in from 1996 to 2000, set the first limits on emissions of carbon monoxide, non-methane hydrocarbons, oxides of nitrogen, and particulate matter
- Tier 2 has more stringent standards, the phase-in period began in 2001 and will conclude in 2006
- Tier 3 standards still have more stringent for engines from 37 kW (50HP) to 560 kW (750HP), the phase-in period will extend from 2006 to 2008
- Tier 4, with a phase-in period extending from 2008 to 2015, entails a 90% reduction in oxides of nitrogen and particulates from the Tier 3 level – a major challenge for engine manufacturers. Their research will yield solutions almost as diverse as those the automotive world experienced early in the 20th century, when diesel, electric, and steam propulsion systems vied for dominance with those powered by gasoline

Standard going forward

- Meeting the Tier 4 diesel – engine standards likely will require catalytic after treatment technologies that sulfur can contaminate, Tier 4 also mandates major reductions in the sulfur content of nonroad diesel fuels and lubricants beginning in 2007
- The EPA's standards apply only to engines that are new as of the effective date for each tier and engine size, but on many jobs older equipment may not be used

Regulation of New Nonroad Diesel Emissions

- EPA recently finalized regulations for nonroad diesel engines
- 1994, EPA set emissions standards for large nonroad engines for NOx, HC, CO and PM phased in 2 tiers
- 1998, EPA finalized Tier 1 and 2 NOx, HC, PM and Co standards for small nonroad diesel engines
- 2004, EPA finalized regulations requiring much tighter NOx and PM emission limits for nonroad diesel for different sized engine classes
- EPA estimates that these standards will enventually reduce new engine nonroad emissions of PM by 95% and of NOx by 90%

Fuel Alternatives

- Bio-diesel
  Works in any diesel engine with few or no modifications
- Electric
  Greater economy transmission

Biodiesel

- **Made by chemically reacting alcohol with vegetable and soy bean oils and animal fats**
- **A very good sulfur free lubricant that aids in loosening and dissolving sediments throughout the diesel engine system**

Biodiesel

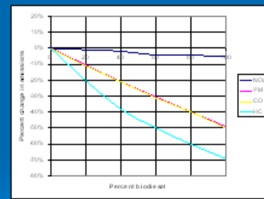
Indiana Stateside Onroad Emissions and Criteria Air Pollutant Effect of B20 Use Statewide (Tons per Year From All Onroad Diesel Sources)

	Total VOC	Total NOx	Total PM	Total SO2
Baseline Fuel (100% conventional petroleum-based gasoline	120,806	111,511	1,408	6,650
E85 (Percentage Change inEmissions)	-15%	-10%	-20%	-80%
E85 (Effect in Tons per Year)	-18,121	-11,151	-282	-5,320
Indiana Statewide Mobile Emissions (Including Onroad and Nonroad Sources) (Tons per Year)	178,483	318,122	11,591	18,893
Indiana Statewide Total Emissions (All source categories in Tons per Year)	369,759	715,688	152,116	1,014,160

Biodiesel

Pollutant	B20 Approximate Reductions
NOx	+2%
PM	10%
SO2	20%
VOC	21%

Biodiesel



Basic Emission Correlation. Average emission impacts of biodiesel for heavy-duty highway engines

Electric

- Terminal Systems Inc., TSI, are researching the use of hybrid power engines for rubber tire gantry cranes.
- Run off of diesel and electric power
- Fuel savings estimated at 60 - 80% with a an estimated emission reduction of 75 - 90%.

Our Goal

- Reduce emissions with diesel engines
- Alternative fuel source
- Environmental studies: trucks, rail yards, trains
- Finding ways to reduce fuel emissions in all operations to help minimize pollution.
- Testing latest technology in hopes to find solutions that will decrease our impact on the environment.

Diversion Analysis

Bedford Park to Gary
(and Back Again)

Introducing a Intermodal Yard in Gary…

Results in:

Reduction in Freight Truck Travel

Less Traffic Congestion

Reduction in Emissions

Less Pollutants Released into Air

Current Emission Factors for Trucks

	Local Road Emission Factors (grams/mile)			
Truck Type	VOC	CO	NOx	PM-10
Single-Unit Gasoline Truck	7.08	144.07	5.94	0.13
Single-Unit Diesel Truck	1.18	6.86	14.95	0.42
Combination Diesel Truck	1.22	7.64	16.07	0.41
	Urban Freeway Emission Factors (grams/mile)			
Single-Unit Gasoline Truck	1.31	51.39	8.12	0.13
Single-Unit Diesel Truck	0.42	2.21	22.89	0.42
Combination Diesel Truck	0.43	2.48	25.85	0.41
	Rural Freeway Emission Factors (grams/mile)			
Single-Unit Gasoline Truck	1.31	75.87	8.84	0.13
Single-Unit Diesel Truck	0.41	2.8	30.39	0.42
Combination Diesel Truck	0.41	3.13	33.98	0.41

Table 1: Current Given Values of Emission Factors

Travel from Bedford Park to Gary, Indiana

- Approximately 40 Miles
  - 3.25 Miles on Local Roads
  - 36 Miles on Urban Freeways

Using these values…

Calculated Truck Emissions from Bedford Park to Gary

Truck Type	Truck Emissions Bedford Park to Gary (grams)			
	VOC	CO	NOx	PM-10
Single-Unit Gasoline Truck	70	2,318	312	5
Single-Unit Diesel Truck	19	102	895	16
Combination Diesel Truck	19	114	976	16
All Freight Trucks	109	2,534	2,183	38

Table 2: Calculated Values for Truck Emissions Traveling from Bedford Park to Gary

Freight Trains Instead of Freight Trucks

- Still Produce Emissions

Current Emission Factors for Trains

Emission Factors for Locomotives		
	Emissions (grams/hp-hr)	
Tier 0 (1973 - 2001 model years)	NOx	PM-10
Line-haul duty-cycle	9.5	0.6
Switch duty-cycle	14	0.72
Tier 1 (2002 - 2004 model years)		
Line-haul duty-cycle	7.4	0.45
Switch duty-cycle	11	0.54
Tier 2 (2005 and later model years)		
Line-haul duty-cycle	5.5	0.2
Switch duty-cycle	8.1	0.24

Table 3: Current Given Values of Emission Factors for Trains

Travel from Bedford Park and Gary, Indiana

- Travel by Rail
  - Approximately 40 Miles
  - 4000 Horsepower
  - 50 miles per hour

Using these values…

Calculated Freight Train Emissions from Bedford Park to Gary

Emission Factors for Locomotives		
	Emissions (grams)	
Tier 0 (1973 - 2001 model years)	NOx	PM-10
Line-haul duty-cycle	7.6	0.48
Switch duty-cycle	11.2	0.576
Tier 1 (2002 - 2004 model years)		
Line-haul duty-cycle	5.92	0.36
Switch duty-cycle	8.8	0.432
Tier 2 (2005 and later model years)		
Line-haul duty-cycle	4.4	0.16
Switch duty-cycle	6.48	0.192

Table 4: Calculated Values for Freight Train Emissions Traveling from Bedford Park to Gary

Emissions

- VOC's
  - Volatile Organic Compounds
    - Indirectly Produces O_3
- NOx
  - Nitrogen Oxide
    - Indirectly Produces O_3
- CO
  - Carbon Monoxide
    - Colorless, Odorless Poisonous Gas
- PM-10
  - Particle Matter (10μm)
    - Effects Respiratory Systems
- Produced emissions
  - Trains Produce Less Emissions
  - Trains Produce Fewer Types of Emissions

Conclusions

- Overall, the anticipated amount of reduced emissions is a definite advantage of an Intermodal train yard in Gary and Chicago.
- Attainment Information
- Lake County, Indiana Attainment/Nonattainment Information

Pollutant	Area Name	Nonattainment in Year	Redesignation	Classification	County NA	Pop (2000)
1-Hr Ozone	Chicago-Gary-Lake County, IL-IN	[illegible]	/ /	Severe-17	Whole	484,564
8-Hr Ozone	Chicago-Gary-Lake County, IL-IN	[illegible]	/ /	Moderate	Whole	484,564
CO	East Chicago, IN	[illegible]	3/20/2000	Not Classified	Part	5,088
PM-10	East Chicago, IN	[illegible]	3/11/2003	Moderate	Part	209,913
PM-2.5	Chicago-Gary-Lake County, IL-IN	[illegible]	/ /	Nonattainment	Whole	484,564
SO2	Lake County, IN	[illegible]	10/26/2005	Primary	Part	484,564

Table 8: Lake County, Indiana Attainment/Nonattainment Information

•This data tell us that an Intermodal train yard will not have a significant impact on attainment issues as long as EPA emission standards are enforced.

Appendix B7.2c Pollution Research

Pollution Research

The process by which nonroad diesel engines will become progressively cleaner over the next decade is a classic example of "technology forcing." Regulators have imposed a set of requirements for cutting emissions. Now engineers are figuring out how to meet the requirements. As they succeed, you'll be both pushed and pulled to adopt the new technology.The push comes from the EPA, which has set four "tiers" of emissions standards governing nonroad diesel engines. Each tier allows for a phase-in period of several years based on engine size.Tier 1 standard, phased in from 1996 to 2000, set the first limits on emissions of carbon monoxide, non-methane hydrocarbons, oxides of nitrogen, and particulate matter.For Tier 2's more stringent standards, the phase-in period began in 2001 and will conclude in 2006.For Tier 3, with standards still more stringent for engines from 37 kilowatts (50 horsepower) to 560 kilowatts (750 horsepower), the phase-in period will extend from 2006 to 2008.Tier 4, with a phase-in period extending from 2008 to 2015, entails a 90% reduction in oxides of nitrogen and particulates from the Tier 3 level—a major challenge for engine manufacturers. Their research will yield solutions almost as diverse as those the automotive world experienced early in the 20th century, when diesel, electric, and steam propulsion systems vied for dominance with those powered by gasoline.Because meeting the Tier 4 diesel-engine standards likely will require catalytic after treatment technologies that sulfur can contaminate, Tier 4 also mandates major reductions in the sulfur content of nonroad diesel fuels and lubricants beginning in 2007.The EPA's standards apply only to engines that are new as of the effective date for each tier and engine size, but on many jobs older equipment may not be used.

NON-ROAD DIESELS

Non-road sources are those diesels that do not typically travel on roads or highways. Examples of non-road sources include farm and construction equipment, recreational vehicles and airport service equipment. Non-road diesels represent an important share of NO_X emissions in the U.S. In 2002 non-road diesels released 1.6 million tons of NO_X, 6 percent of all U.S. NO_X emissions.

Regulation of New Non-road Diesel Emissions

EPA recently finalized regulations for *non-road* diesel engines that are similar to but for
some engines slightly less stringent than the 2007 *on-road* engine standards. There are many kinds of non-road engines and, in general, emissions requirements have been promulgated in stages ("tiers") relative to engine size/ power output (*e.g.* less than or greater than 50 hp). In 1994, EPA set emissions standards for large (> 50 hp) non-road engines (for example bulldozers) for NO_X, HC, CO and PM phased in 2 tiers—1996-2000 and 2001-2006.

In 1998, EPA finalized Tier 1 and 2 NO_X , HC, PM and CO standards for small (under 50 hp) non-road diesel engines (for example lawn tractors), phased in from 1999-

2000 and from 2001-06 respectively. The 1998 non-road rule also set stricter "Tier 3" limits for NO_x+ HC emissions from large non-road engines, phased in from 2006-08 and similar in stringency to the on-road 2004 HDE Rule. Tier 3 PM standards were deferred for a later rulemaking.

In 2004, EPA finalized regulations requiring much tighter NOx and PM emission limits for non-road diesels (the "Tier 4 Nonroad Rule") that are phased in between 2008 and 2015 for different sized engine classes. Overall, EPA estimates that these standards will eventually (2030) reduce new engine non-road emissions of PM by 95% and of NOx by 90%. The Tier 4 Nonroad Rule also requires a reduction of sulfur in nonroad (and marine and locomotive) diesel fuel in several phases: to 500 ppm in 2007 and to 15 ppm in 2010 for nonroad diesel engines (2012 for marine and locomotive diesel fuels).

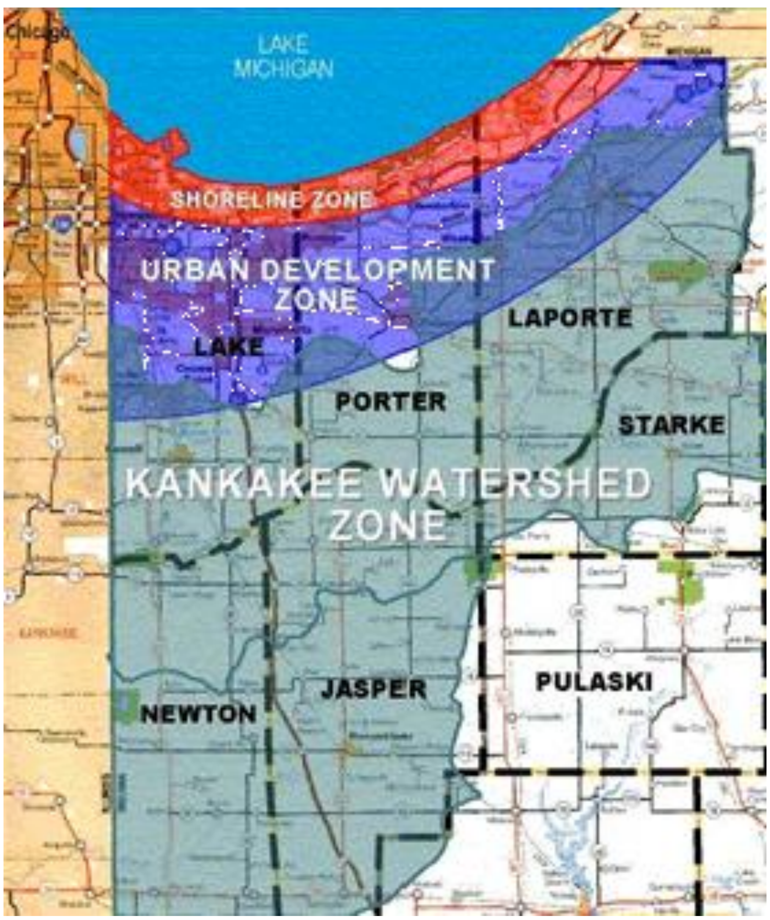
Non-Road Retrofit Programs

The D.C. Circuit Federal Court of Appeals has ruled that EPA does not have adequate general statutory authority to implement emissions standards (*e.g.,* federally mandated retrofit programs) from existing non-road diesel engines.

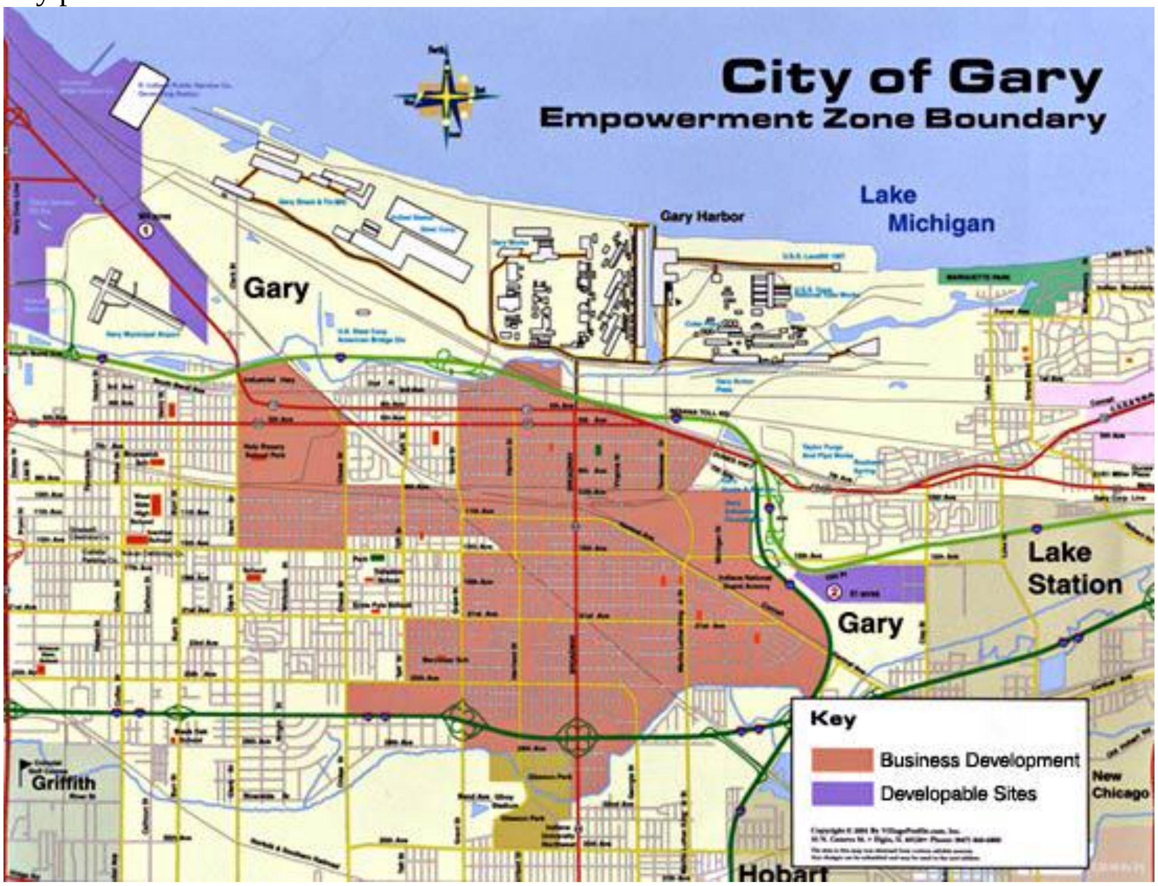
Appendix B7.3 Zoning Report

Zoning Report:

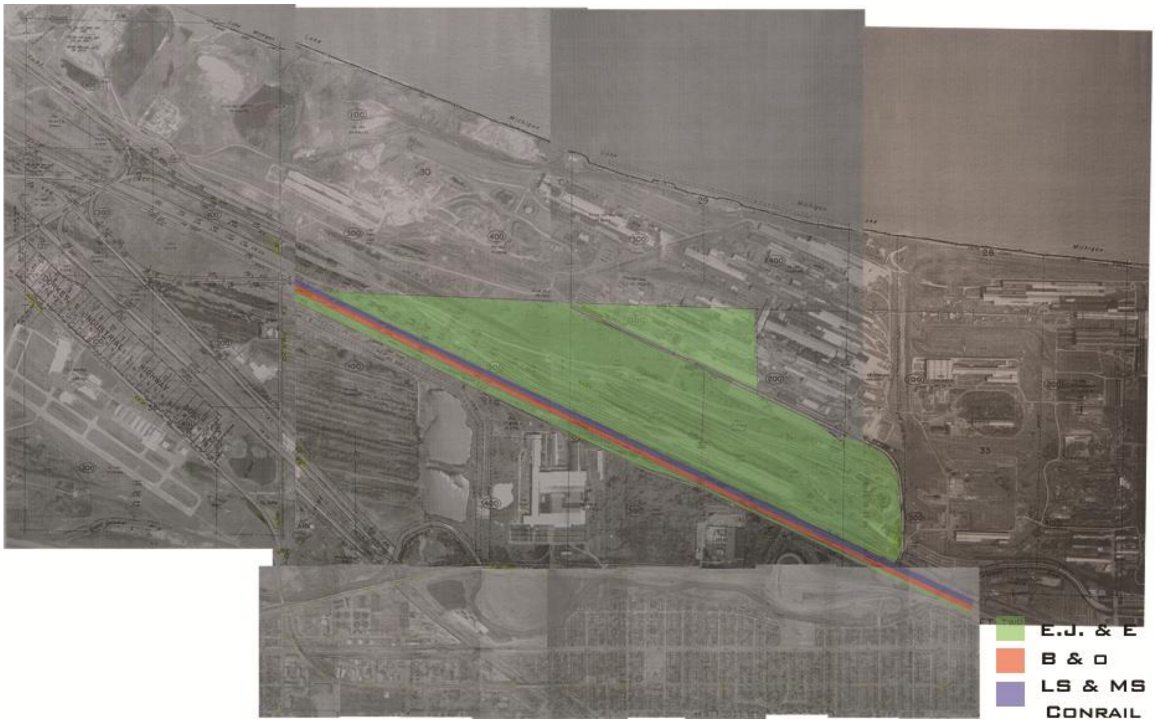
The zoning group had the responsibility of researching the area that would permit the building of such facility. Very little data was available out there in regards to zoning laws in the city of Gary or at least data that was available to us. The maps found pertaining to zoning gave a broad scope of plans that were to be implemented through out the city. One plan found was the SWOT plan by the Northwest Initiative which broke down the area into three main components: Shoreline Analysis, Urban Analysis and Kankakee Analysis. Gary fell onto the shoreline analysis which as a **s**trength denoted skilled labor and hospitality to industry, two key factors to our plan. As a **w**eakness it pointed out lack of State focus to Northwest Indiana in relevance to environment, technology and commerce. Our plan addresses such issues. The **o**pportunities it mentioned were shoreline availability and opportunity for land reuse. The main **t**hreat consisted of steel legacy cost; however, the steel plant has not been in use for years.



We also came across the empowerment plan that calls for construction and consequently jobs for the people of Gary. The initiative came from a comprehensive redevelopment program that affords cities throughout the country the opportunity to revitalize aging infrastructure, strengthen communities, attract new businesses and industries, and create new jobs. Our site is inside such empowerment plan and following exactly what their city plan calls for.



The zoning group also looked into parcel data and landownership of the proposed site. We found out that the land in our proposed site consisted of 3 owners, E. J. & E. being the primary owner. We believe the plan is also to the advantage of E. J. & E. since it is land that is currently being unused and could be rented out.



The research from the zoning group demonstrated that the proposed site is a great site for what we have planned to do; it benefits the landowners and the city as a whole. It implements what the city of Gary and other initiatives had in mind and it adds to everything they already wanted to do.