# IPRO 307: Spring 2006

## Advanced Shipping Container Transport System Implementations

IPRO It takes a team
INTERPROFESSIONAL PROJECTS PROGRAM

ILLINOIS INSTITUTE OF TECHNOLOGY

# US Railroad Industry Fast Facts

| | 1980 | 2004 |
|---|---|---|
| • Carloads Originated | 22.22 million | 30.09 million |
| • Trailers/Containers | 3.05 million | 10.99 million |
| • Avg. Length of Haul | 615.8 miles | 901.5 miles |
| • Avg. Tons/Train | 2,222 | 3,126 |
| • Ton Miles/Gallon Fuel | 235 | 410 |
| • Cap Ex | $3.23 billion | $6.24 billion |
| • Revenues | $28.2 billion | $40.5 billion |
| • Cap Ex/Revenues | 11.4% | 15.4% |

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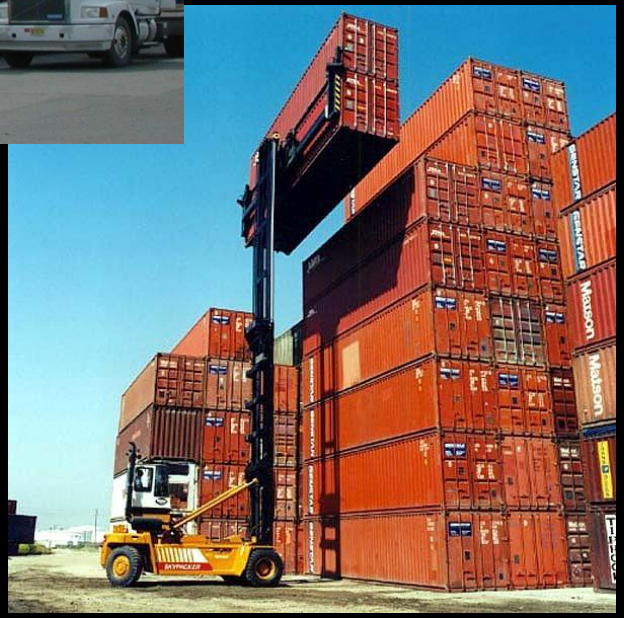
MI-JACK PRODUCTS

# IPRO 307 - Automated Shipping Containers

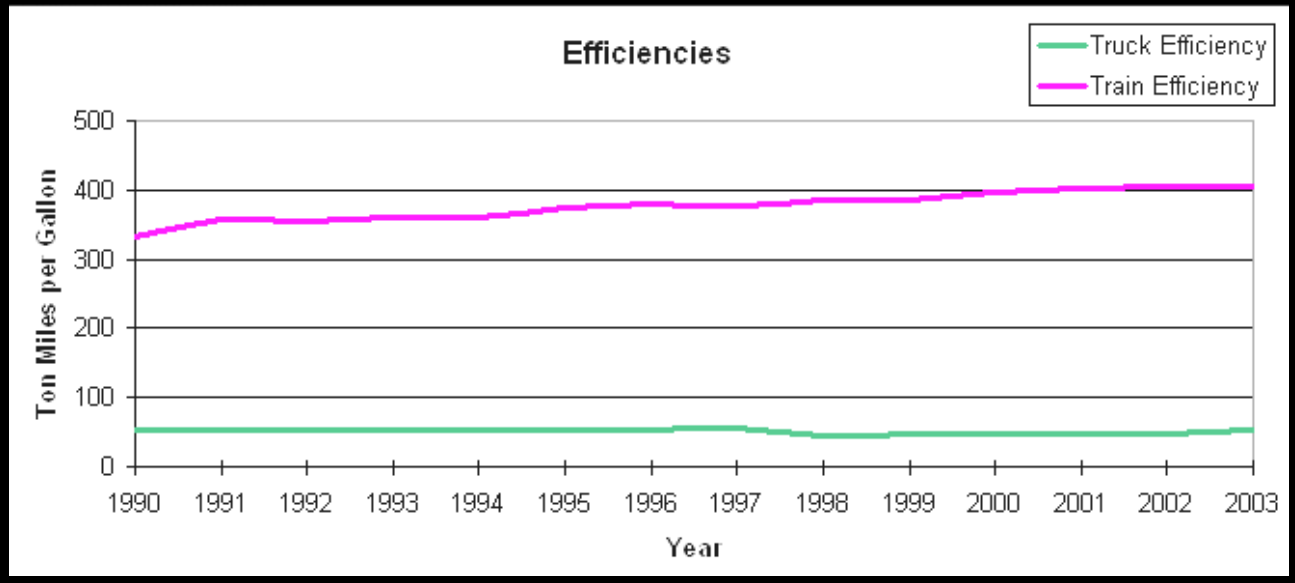





**BNSF, CP, UP, CSX, NS, CN**


Relying on trucks for transportation of containers is risky and inefficient

# Truck vs. Train




- From 2003 data, semi-trucks use one gallon of fuel to transport one ton of freight about 53 miles. A train can move about one ton of freight about 405 miles using only one gallon of fuel. Thus, the rail industry is seven times more efficient.

## *GOALS* FOR THE SEMESTER:

Sub Teams:

1. Traffic Flow Analysis: national and local level
2. Environmental studies: trucks, rail yards, trains
3. Site Analysis: five sites
4. Deliverables: animations, brochure, movie, aerial GIS photography, website

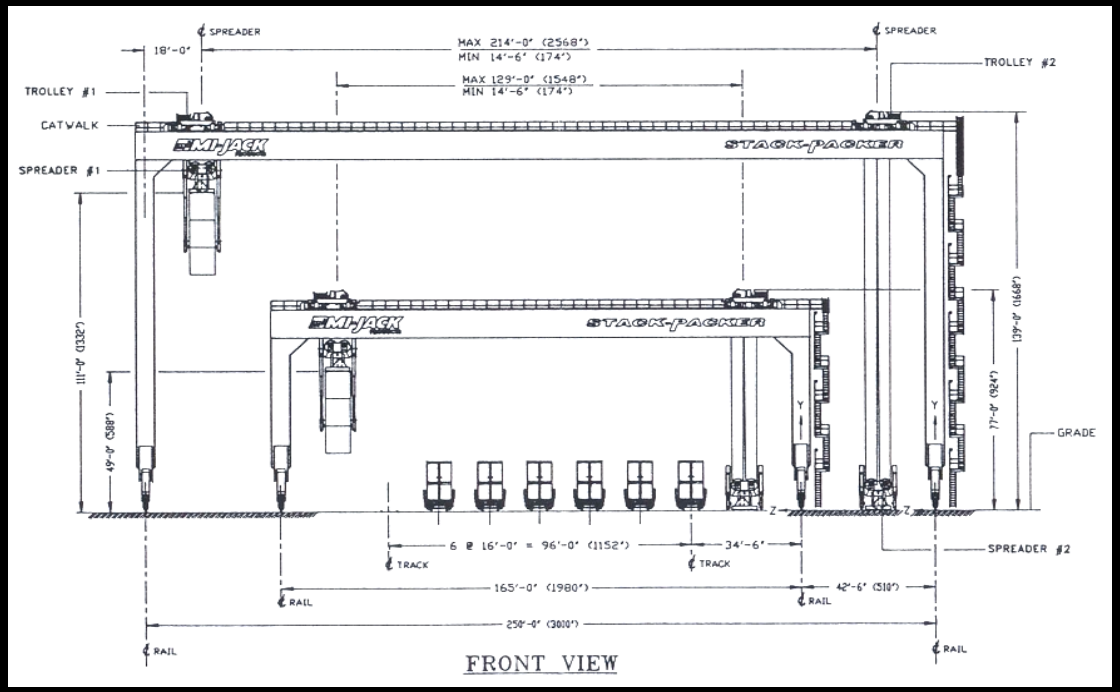
# What? Thruport

The Thruport concept is a rail yard operated by computer controlled gantry Mi-Jack cranes for intermodal container transfer between the major rail road companies.

**Hardware**

**Operating Plan**

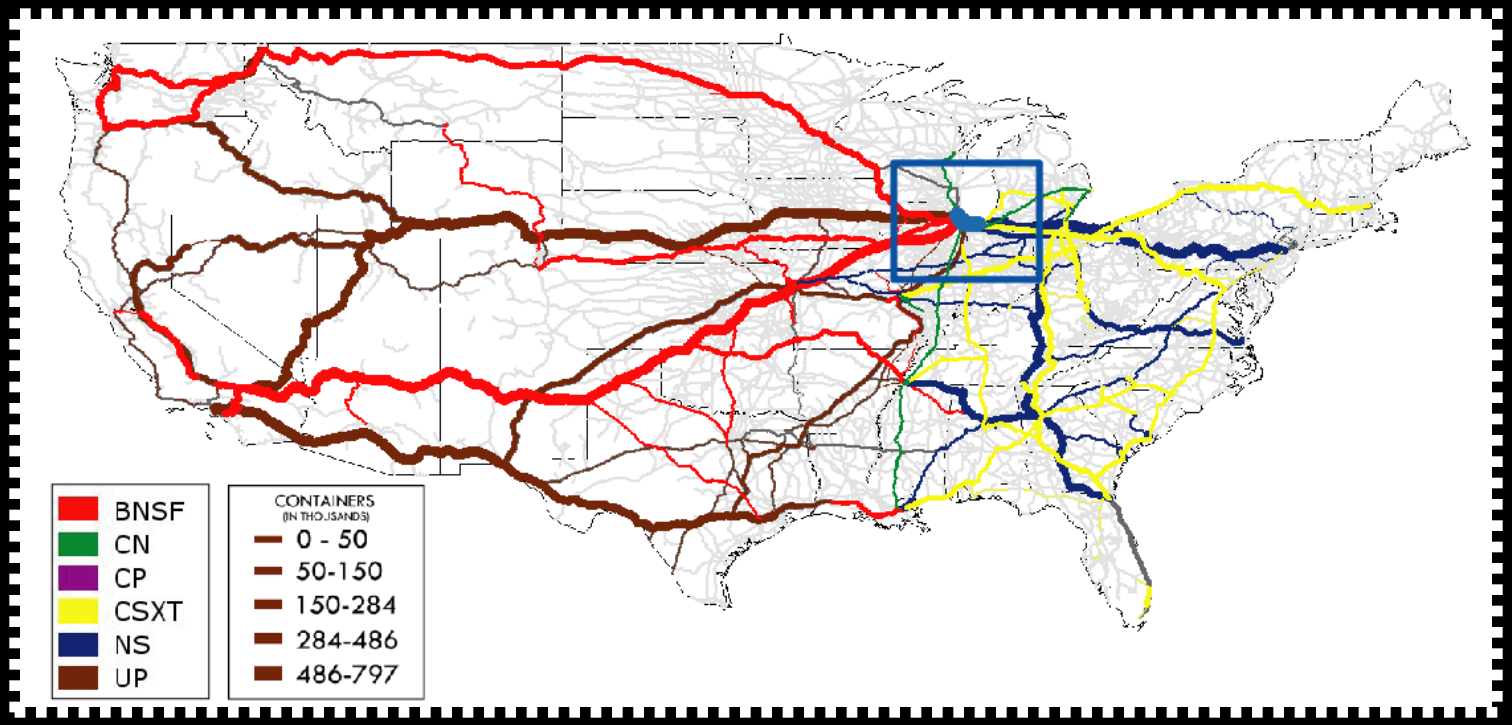
# What? Thruport




–Thruport uses conventional technology that allows the cost of the hardware to remain low. The trains come to a central facility to exchange containers, like a shuffling hub. Rail capacity will be increased due to faster transfer rate. ThruPort will decrease the amount of standing time.

# **Where?** Operating plan:

- Chicago is the third largest intermodal hub in the world
- About 2,000 rubber tire transfers take place every day, in Chicago burning roughly 15,000 gallons of fuel in one day.
- All six major rail lines must through Chicago daily



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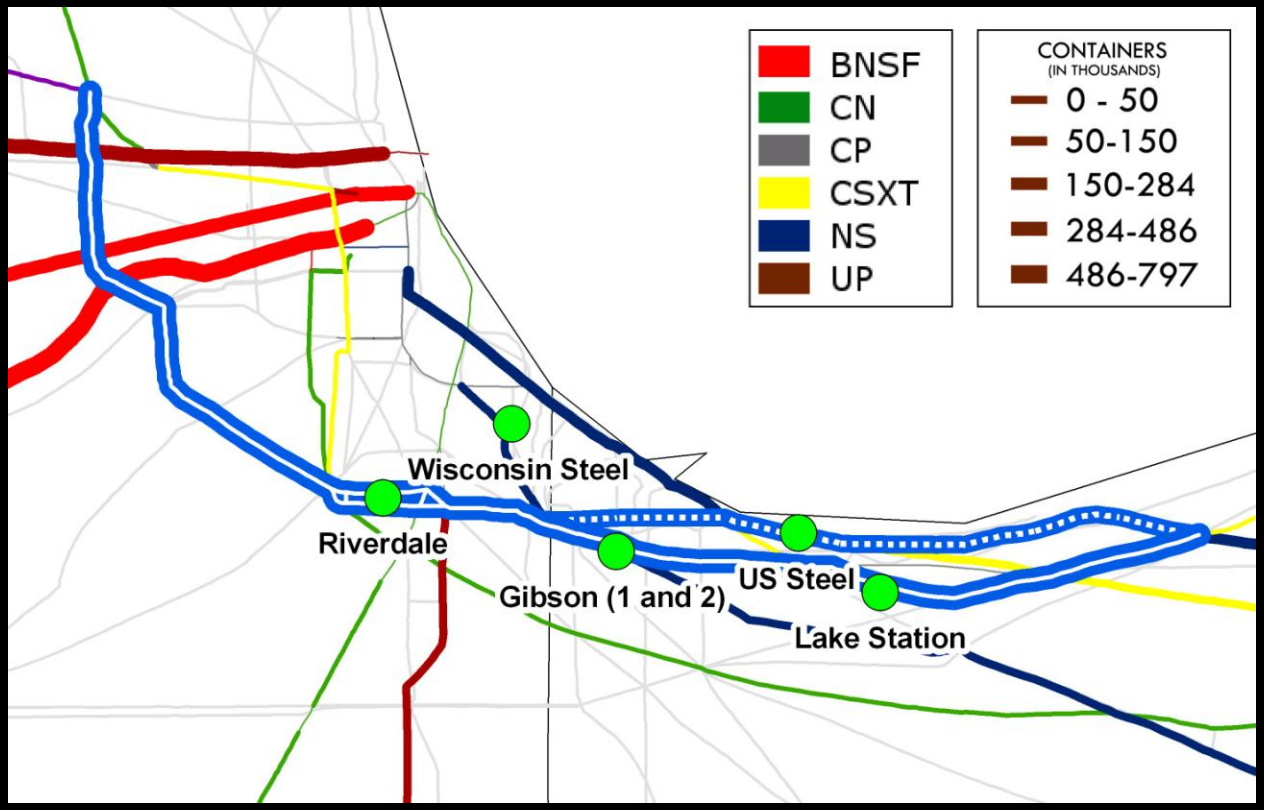
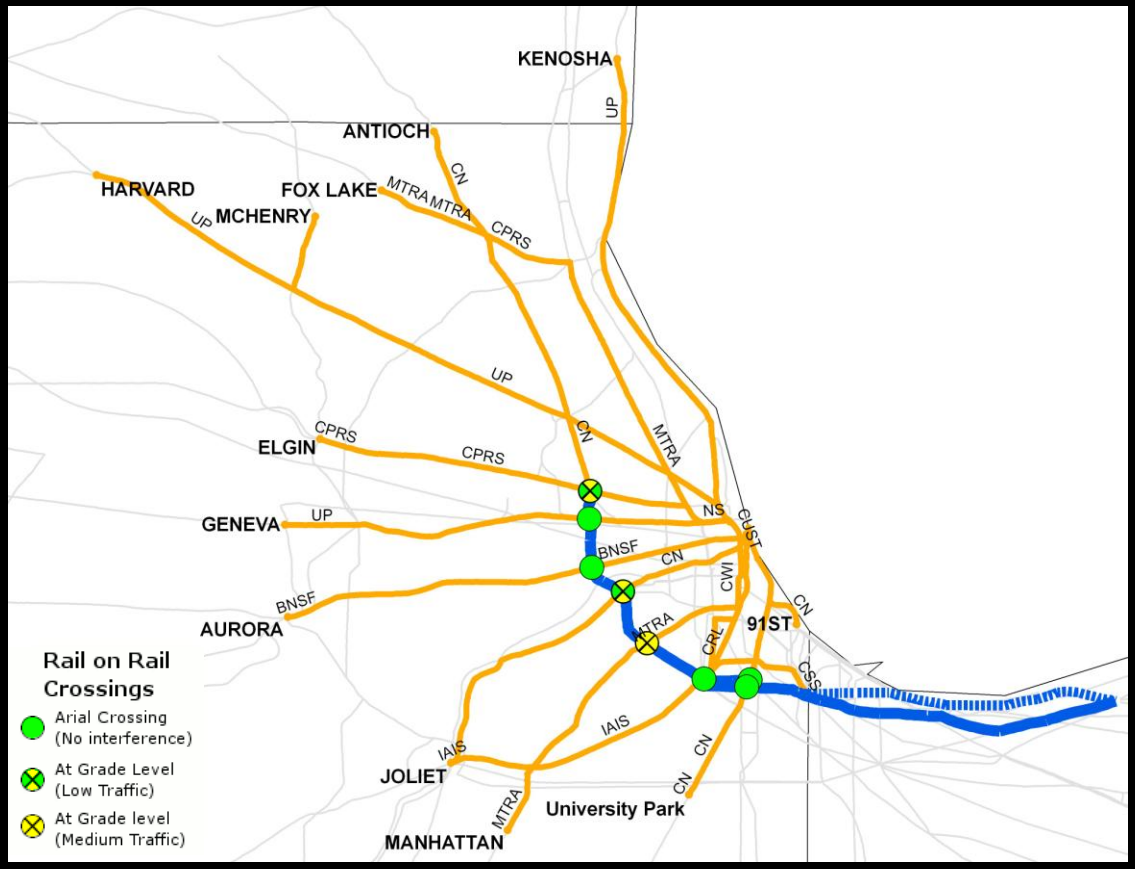


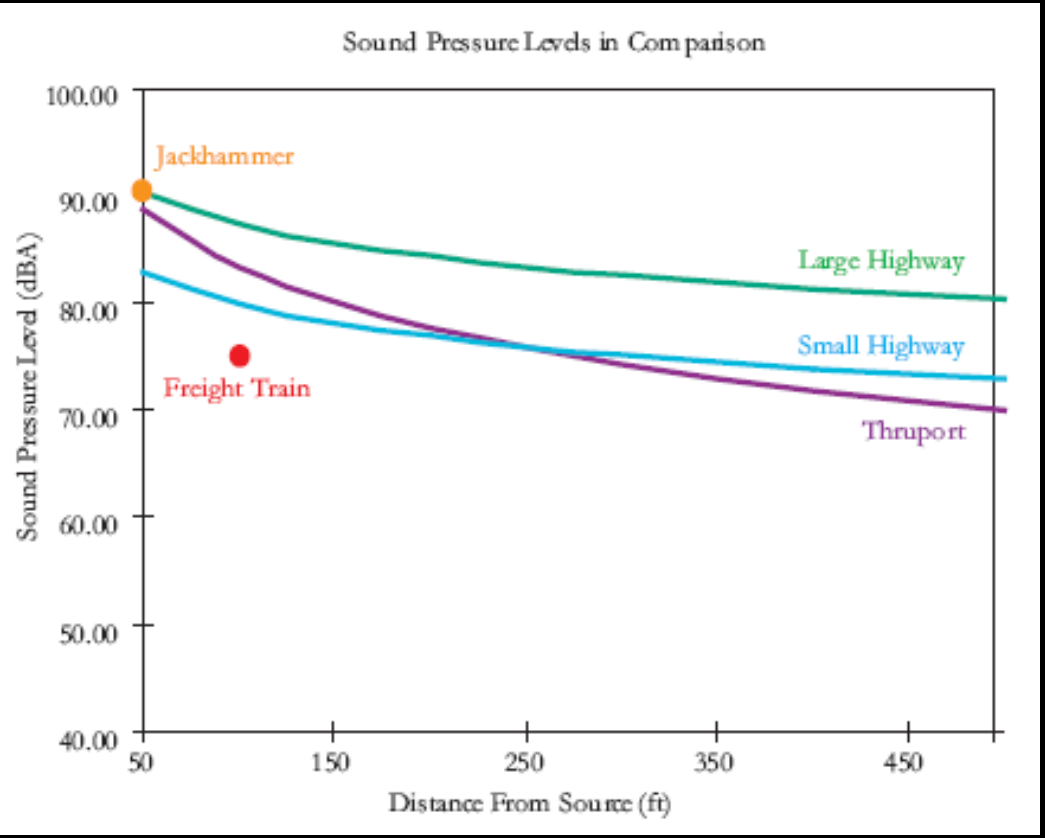

After analyzing rail capacity, a "blue corridor" was created that would be able to handle increased intermodal traffic. (Corridor represents IHB)

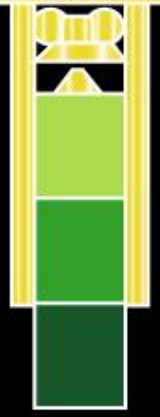
# **Where?** Operating plan:




There are only three above grade crossings, causing minimal interference with Metra suburban lines.

# Environmental Analysis:

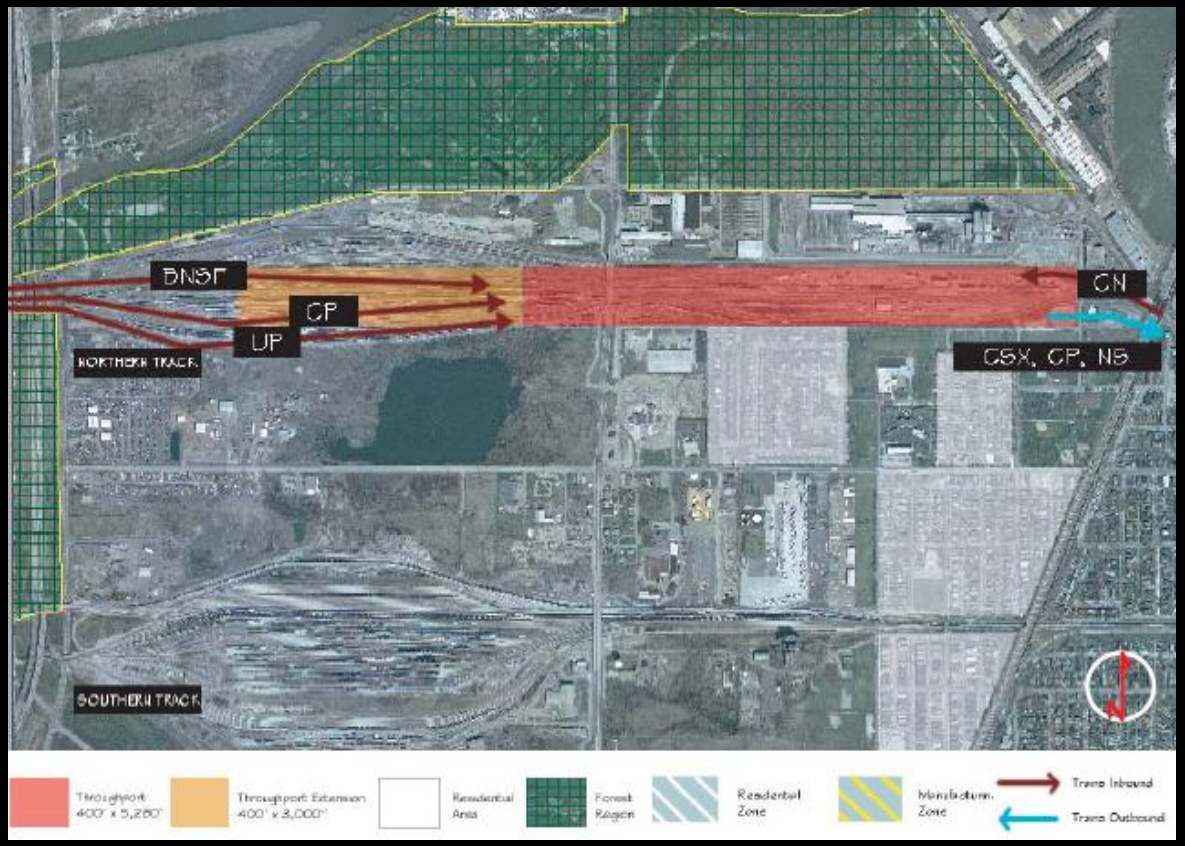




# Environmental Analysis:

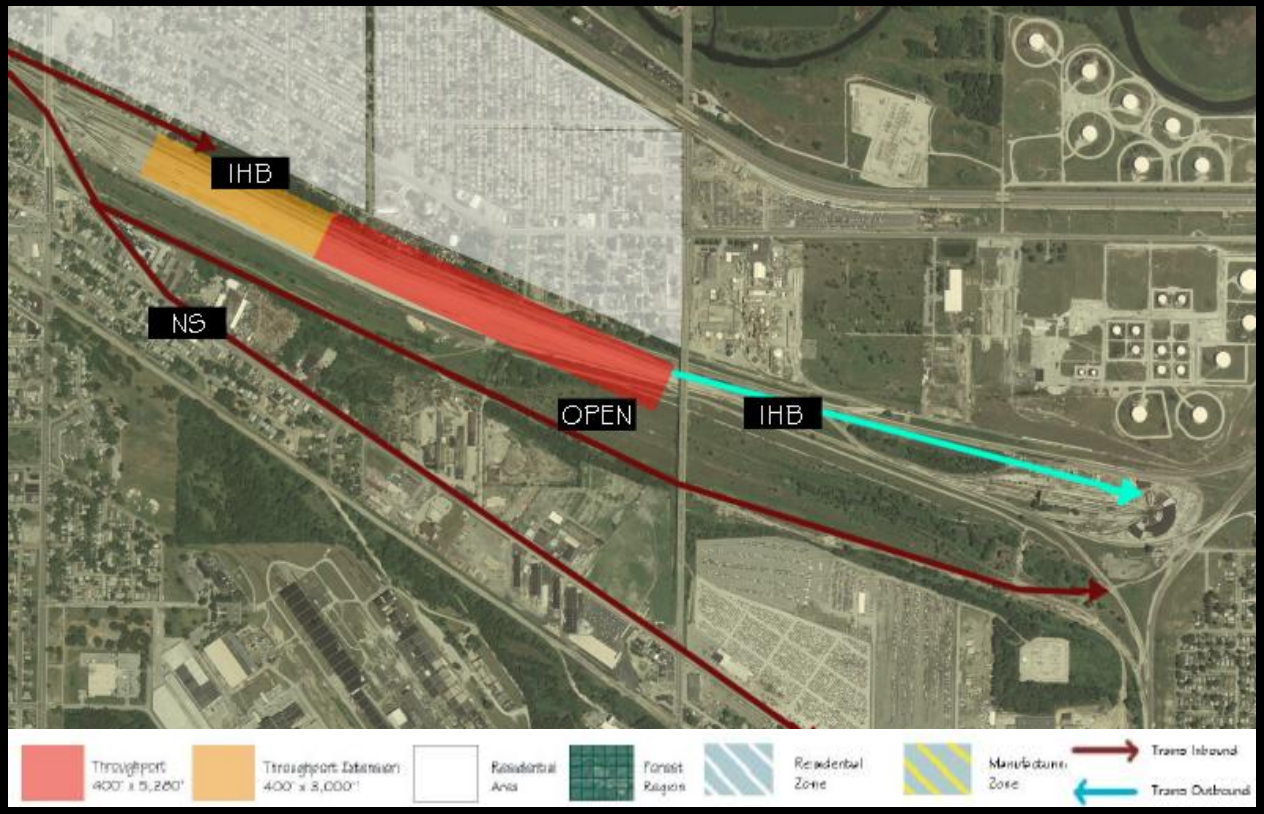
- Thruport only takes up 97 acres
- The amount of pavement will be minimal because all of the traffic will be on the rails which sits on natural base
- There will not be very much train noise because coupling and uncoupling of cars would be minimal. Most of the loud noise will come from the alarms on the cranes that give warning.
- Thruport will not have large amounts of equipment stored on the premises because of its mode of operation.
- Thruport will need a small 7040 cu yards of concrete. Compared to traditional intermodal yards, which may exceed 45,000 cu yards.
- Since most of the facility is just rail tracks, the material that will cover the ground would be crushed limestone. This drains water very well, especially when compared with the massive areas of concrete/asphalt that is normally associated with intermodal yards.

# **Where?** Riverdale Site




The chosen positioning of the Thruport system utilizes the longest available length of track with room for expansion. While the shuffling of containers focusses on the North Track, the Southern Track allows for trains bypassing the Thruport hub, leaving it less congested.

# **Where?** Gibson Site (West)

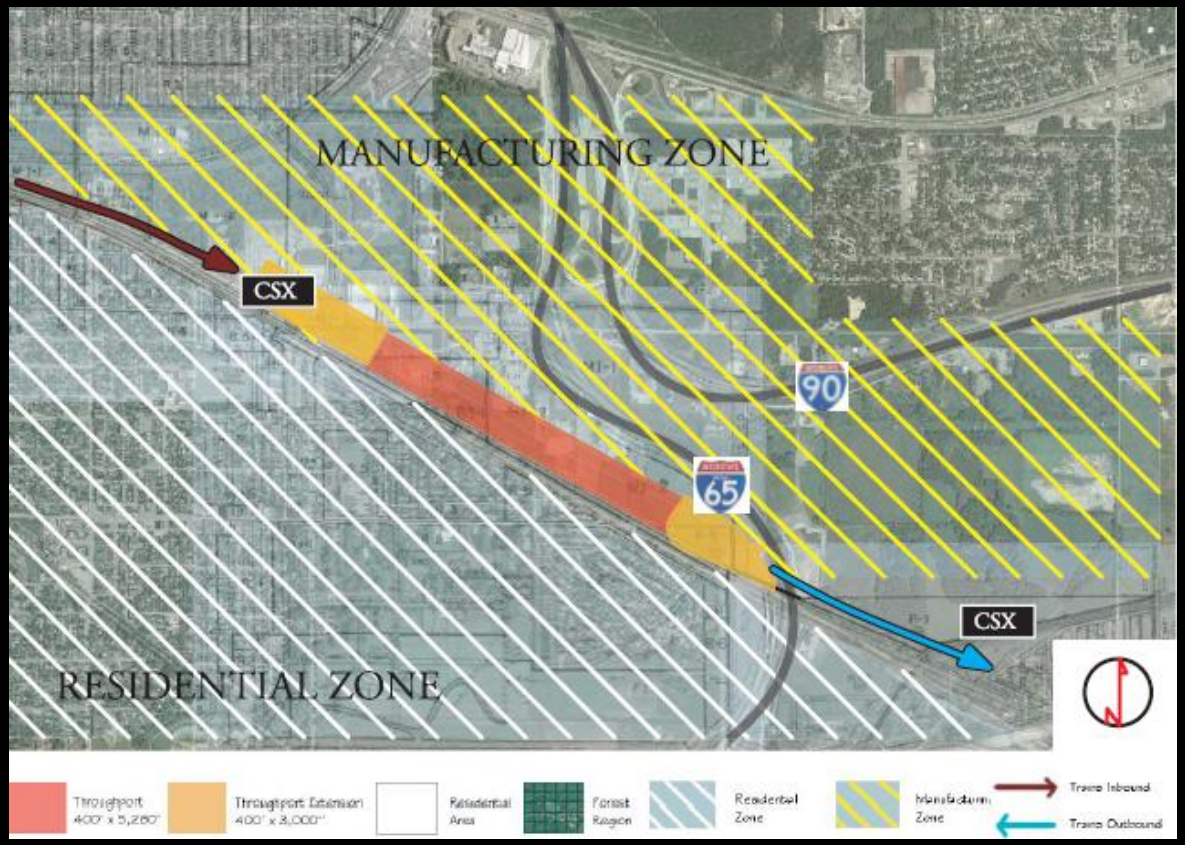



The Gibson West site is restricted by an overpass. Thus, Thruport cranes cannot travel underneath, which limits the facility to only one end of the Gibson West yard. One advantage is that residential housing only exists North of the IHB.

# **Where?** Gibson Site (East)

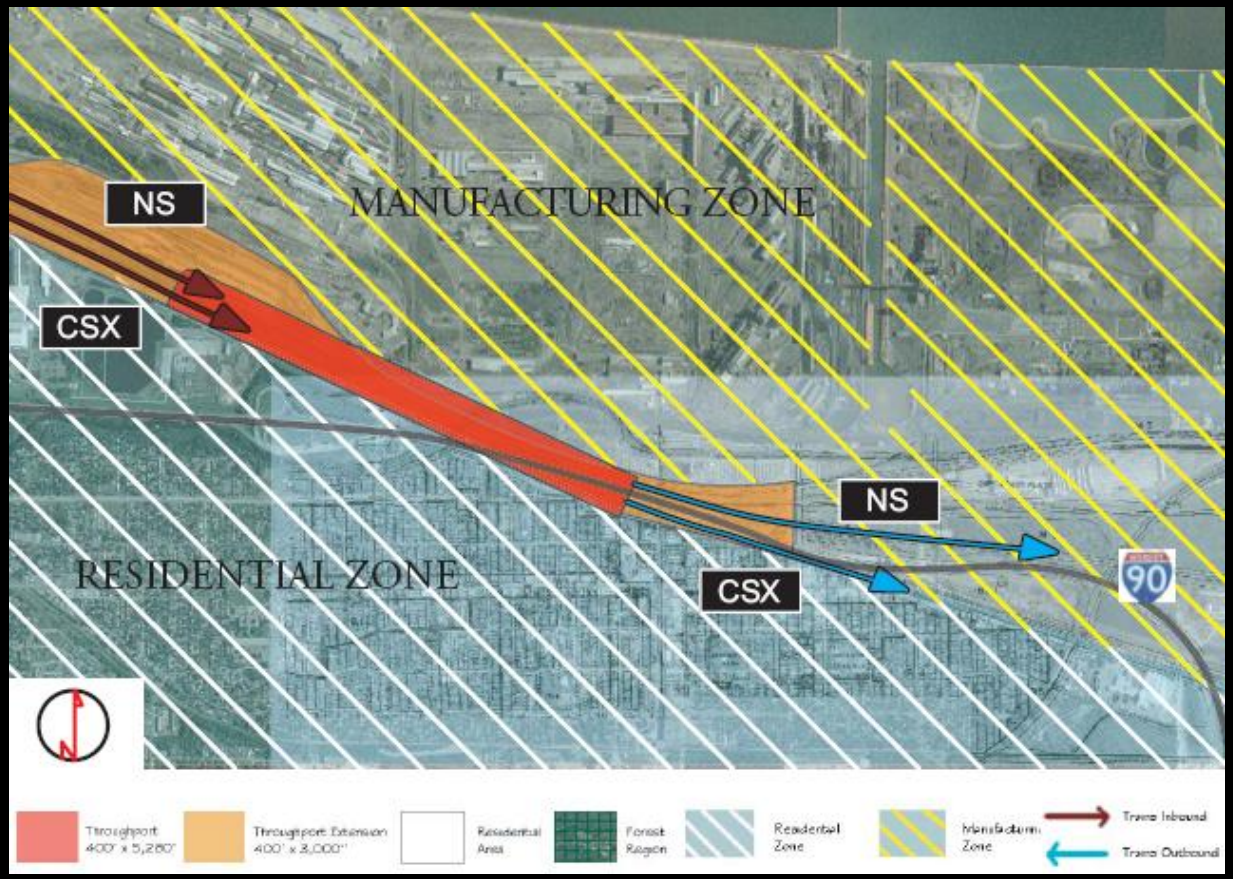

The Gibson East site meets all size requirements and has access to most of the major rail lines since it is on the Big Blue Line. Renovation cost are lower than other sites since it was formerly a rail yard, and there are no hazardous materials.

# **Where?** Gary Indiana Site

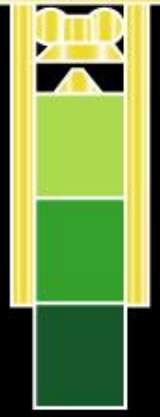



The largest benefit of the Gary site would be that is is located along the "Big Blue Line," and it is also located within one mile of I-90,94, 80 and 65. It is also a large manufacturing zone, thus additional footage is available within the site.

# **Where?** U.S. Steel Site




The U.S. Steel site is conveniently located within a large manufacturing zone, and with the infrastructure already built on the site, containing six tracks. It is also close to I-90, thus helping the growth of a community.



- After analyzing the hardware necessary to handle the estimated increased intermodal transportation and after studying rail capacity, we established a viable corridor in which Thruport can be implemented – as well as several possible sites that can accommodate this shuffling facility.

| | Riverdale | Gibson - W | Gibson - E | Gary, IN | U.S. Steel |
|---|---|---|---|---|---|
| | | | | | |
| Throughport 400' x 5,280' | YES | YES | YES | YES | YES |
| Throughport 400' x 9,000' | YES | *limited* | YES | YES | YES |
| Minimum Dist. to residence | 75' | 50' | 150' | 60' | 100' |
| Restricted Zones | Forest Region | N/A | N/A | Industrial | Industrial |
| | | | | Residential | |
| Rail lines involved | BNSF, CP, UP | IHB, NS | IHB, NS | CSX | CSS, SB |
| | CN, CSX, NS | | | | CSX, NS |
| Major Highways with in 1 mile | | | | I-90, I-94 | I-90 |
| | | | | I-80, I-65 | |

# IPRO 307

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**http://www.iit.edu/~ipro307s06/**