

I PRO 307
Intermodal Container Facility
Innovations for the Chicago
Area - Focus on Kankakee
County

Sponsored By: Mi-Jack Products
Hazel Crest, IL

The Problem

- The Intermodal Facility (Train to Truck/Truck to Train)
 - Property/Land
 - ATMS (Automated Transfer Management System)
 - Warehouses and Housing
- Transportation Enhancement
 - Illiana Exway & Kankakee Connector
 - Viaduct Enhancement
 - High Speed Freight Rail

Goals

- To design an intermodal facility utilizing the ATMS system
 - In-City
 - Out-of-City
- To plan transportation enhancements in the Kankakee area

The Teams

(6-Civil, 5-ArchE, 5-Arch, 1-Mech, 1-Aero)

Capstone

- Intermodal Facility
 - Site Selection
 - Greenfield/Brownfield Development
 - Site Planning
 - Housing
 - Warehouses
- Transportation Enhancement
 - Kankakee Connector
 - Viaduct
 - High Speed Freight Rail

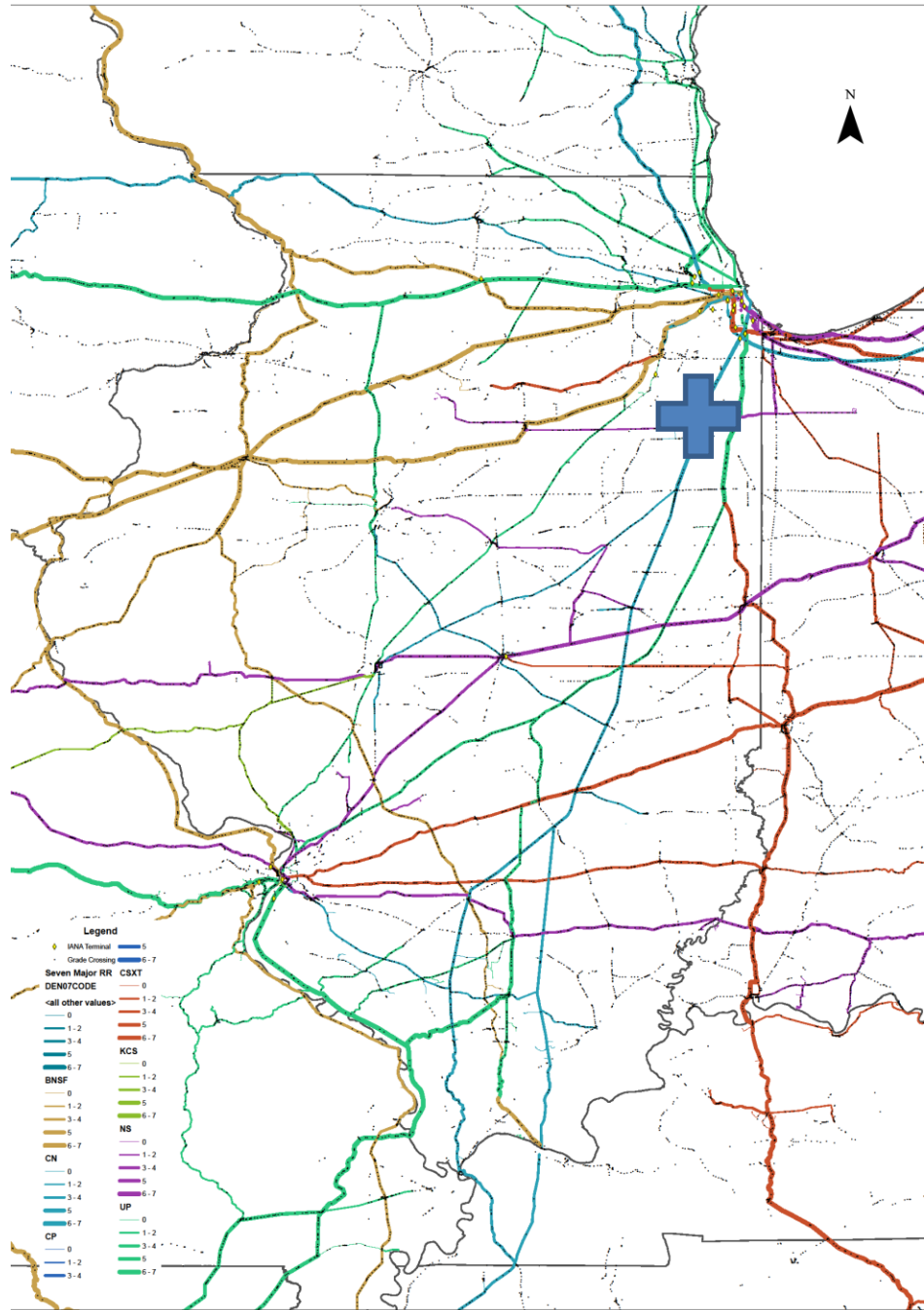
Part 1

The Proposed Intermodal Facilities

ATMS

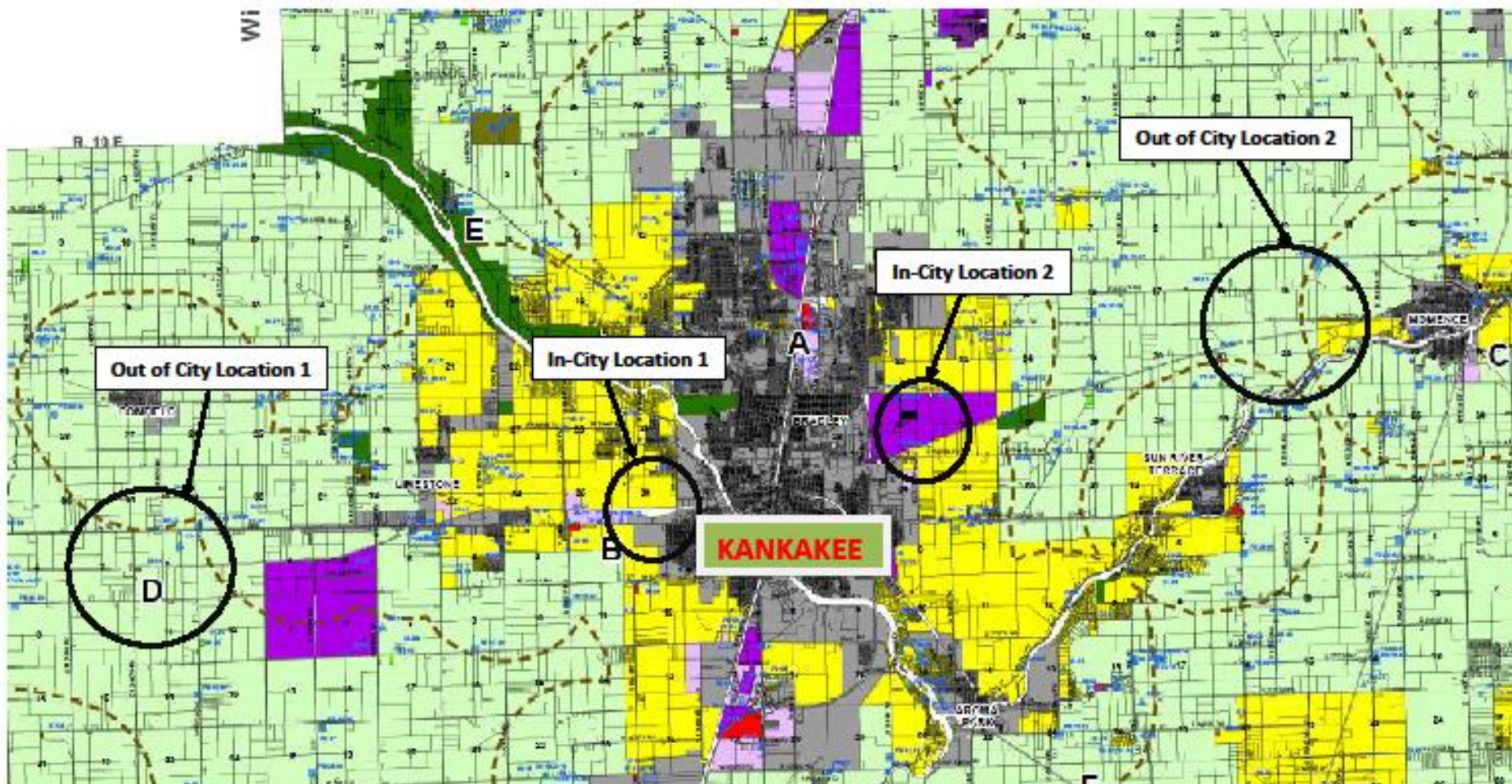
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RR YARDS and GRADE CROSSINGS in ILLINOIS and MISSOURI



- Legend**
- ◆ INA Terminal
 - ◆ Grade Crossing
 - Seven Major RR
 - DENOTCODE
 - <all other values>
 - BNSF
 - CN
 - CP
 - CSXT
 - KCS
 - NS
 - UP
- Color key for DENOTCODE values (0, 1-2, 3-4, 5, 6-7):
- 0: Light Blue
 - 1-2: Medium Blue
 - 3-4: Dark Blue
 - 5: Teal
 - 6-7: Green

Possible Locations for Intermodal Facilities in Kankakee, IL



In City

90 Acres

Intermodal Only

Out City

Intermodal

Warehousing

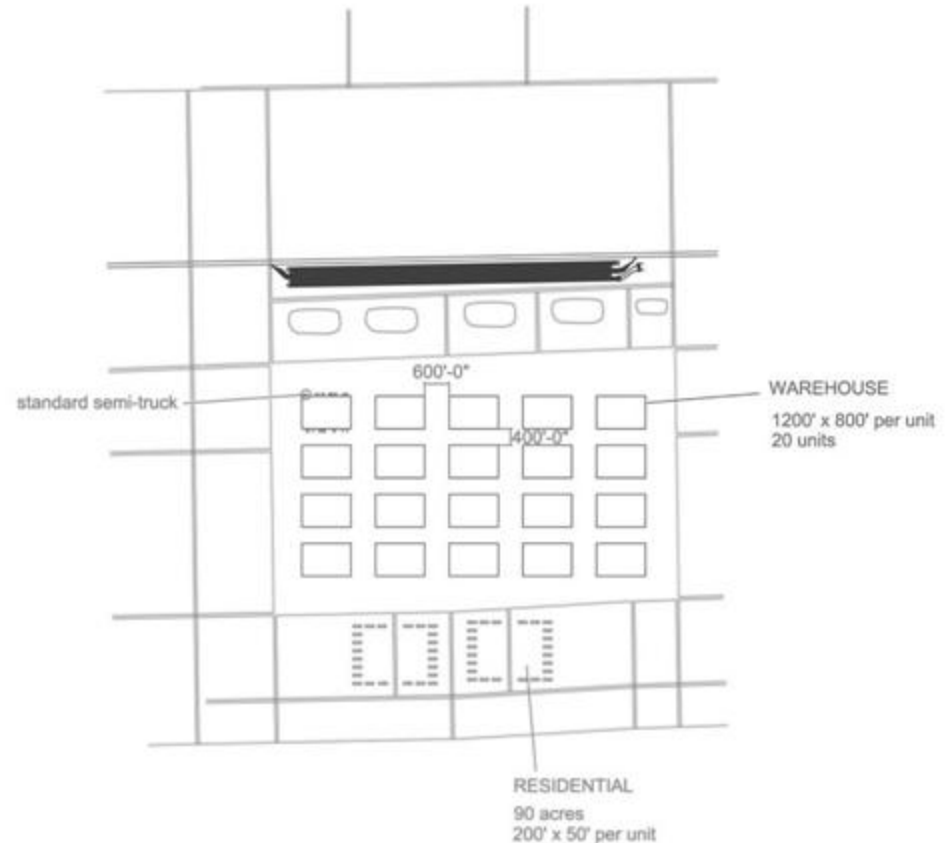
Residential

Total: 3,500 Acres

Estimated Job Creation: 12,000

Residential = 10%

Acres required for housing in apartments: 90
(including circulation)



REZONING PROCESS FOR KANKAKEE COUNTY

APPLICATION

BASE FEE: \$600
PER ACRE: 0-50 \$30 PER ACRE
51-100 \$20 PER ACRE
101+ 10\$ PER ACRE
3500 ACRES SITE
 $\$600 + \$10 \times 3500 = \$35,600$

NATURAL RESOURCE INVENTORY

INCLUDES →

LAND EVALUATION & SITE ASSESSMENT
BASE FEE: \$400 FOR 0-5 ACRES
\$15 FOR EACH ADDITIONAL ACRE
 $\$400 + \$15 \times 3495 = \$52,825$



ECOCAT

ECOLOGICAL COMPLIANCE ASSESSMENT TOOL
DETERMINE IF PROPOSED ACTION IS IN THE
VICINITY OF ANY PROTECTED NATURAL RESOURCES
FREE OF CHARGE



ATTORNEY FEE

APPLICATION CHECKLIST

SITE/PLOT PLAN
PLAT OF SURVEY/FLOODPLAIN SURVEY
AERIAL PHOTOGRAPH
NATURAL RESOURCE INVENTORY REPORT
ECOCAT REPORT

APPROXIMATE TOTAL COST = \$100,000

Warehouse Design (20 – 1 million sq ft buildings)

Program

- storage space
- office space
- loading docks
 - rail
 - trucks
- light industrial space
- 30% refrigerated space

- 4'-4" docks for trucks

Materials

- steel structure
 - extra structural capacity to handle future additions
- (corrugated) metal siding
- batt insulation (R-Value: 3.25 per inch)
- (reflective) radiant barrier (R-Value: 3.85 per inch)

- concrete floor with epoxy coating
 - hardened for heavy industrial vehicles

- truss
 - 72" deep and 50'-69' span
 - Supermegatruss- 128' span

Dimensions of the warehouse:

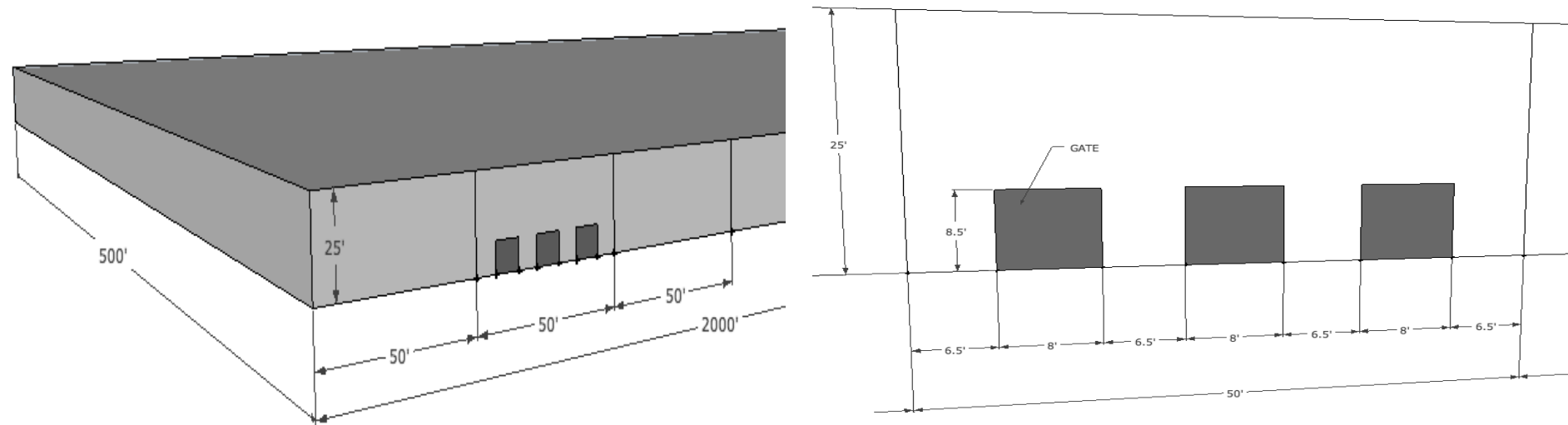
Area 1,000,000 ft²

L 2,000 ft x W 500 ft x H 25 ft

Dimensions of the loading gate:

H 8.5 ft x W 8 ft

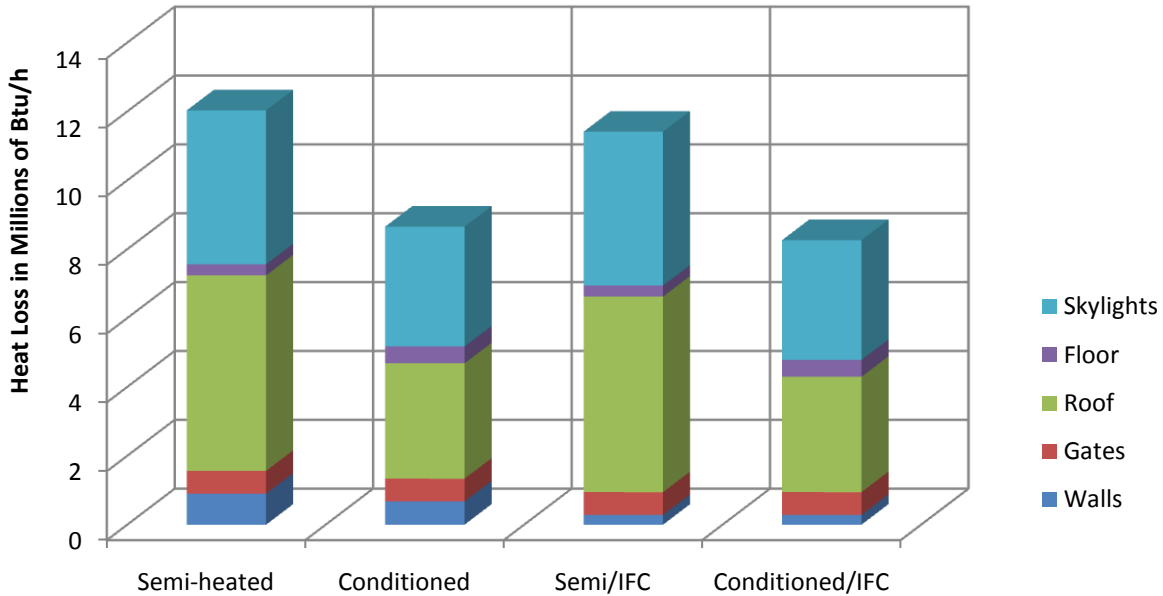
50 ft span, 3 gates can be placed between 2 structural columns.



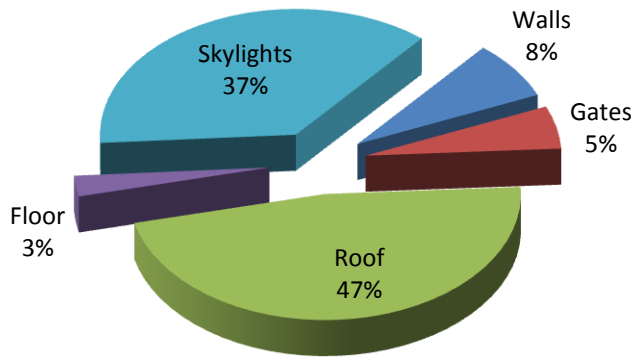
Assumptions:

Midway Airport Outdoor Design Conditions
Zone 5 of ASHRAE Recommendation Guide.

Heat Loss Charts

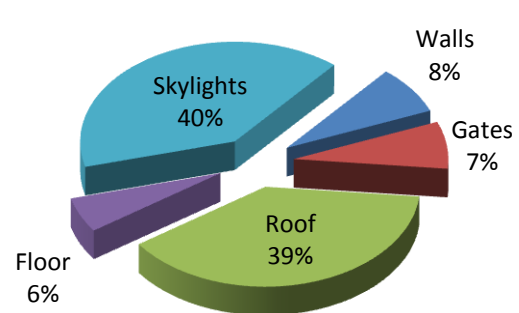


**Percentage of Heat loss
Semi-Heated Warehouse** Min: 45 F



Total Loss: 12,032,734 Btu/h

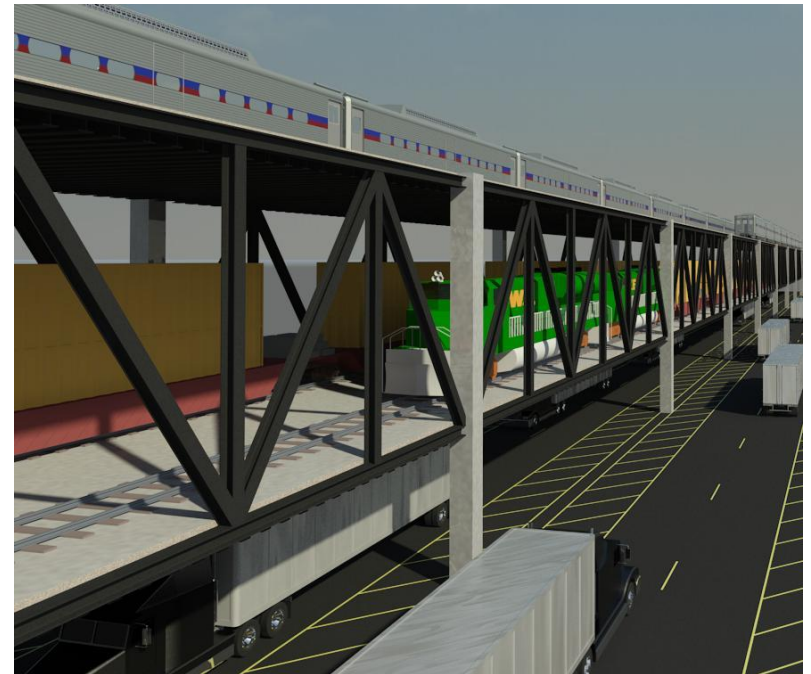
**Percentage of Heat loss
Conditioned Warehouse** Temp = 70 F

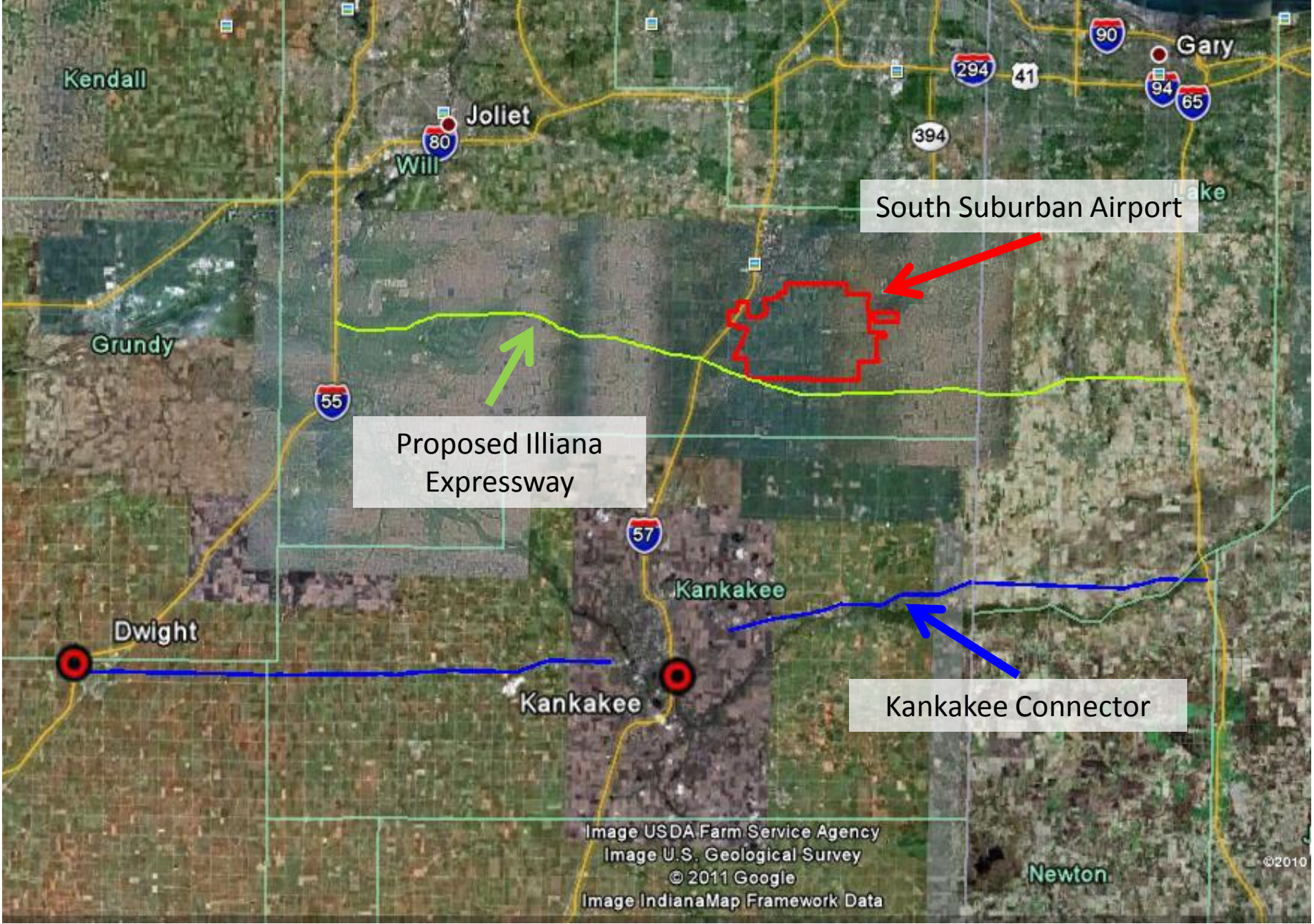


Total Loss: 8,656,231 Btu/h

Part 2

Transportation Enhancements





South Suburban Airport

Proposed Illiana Expressway

Kankakee Connector

Image USDA Farm Service Agency
Image U.S. Geological Survey
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Image IndianaMap Framework Data

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Viaduct Enhancement



Figure 1: Viaduct Model

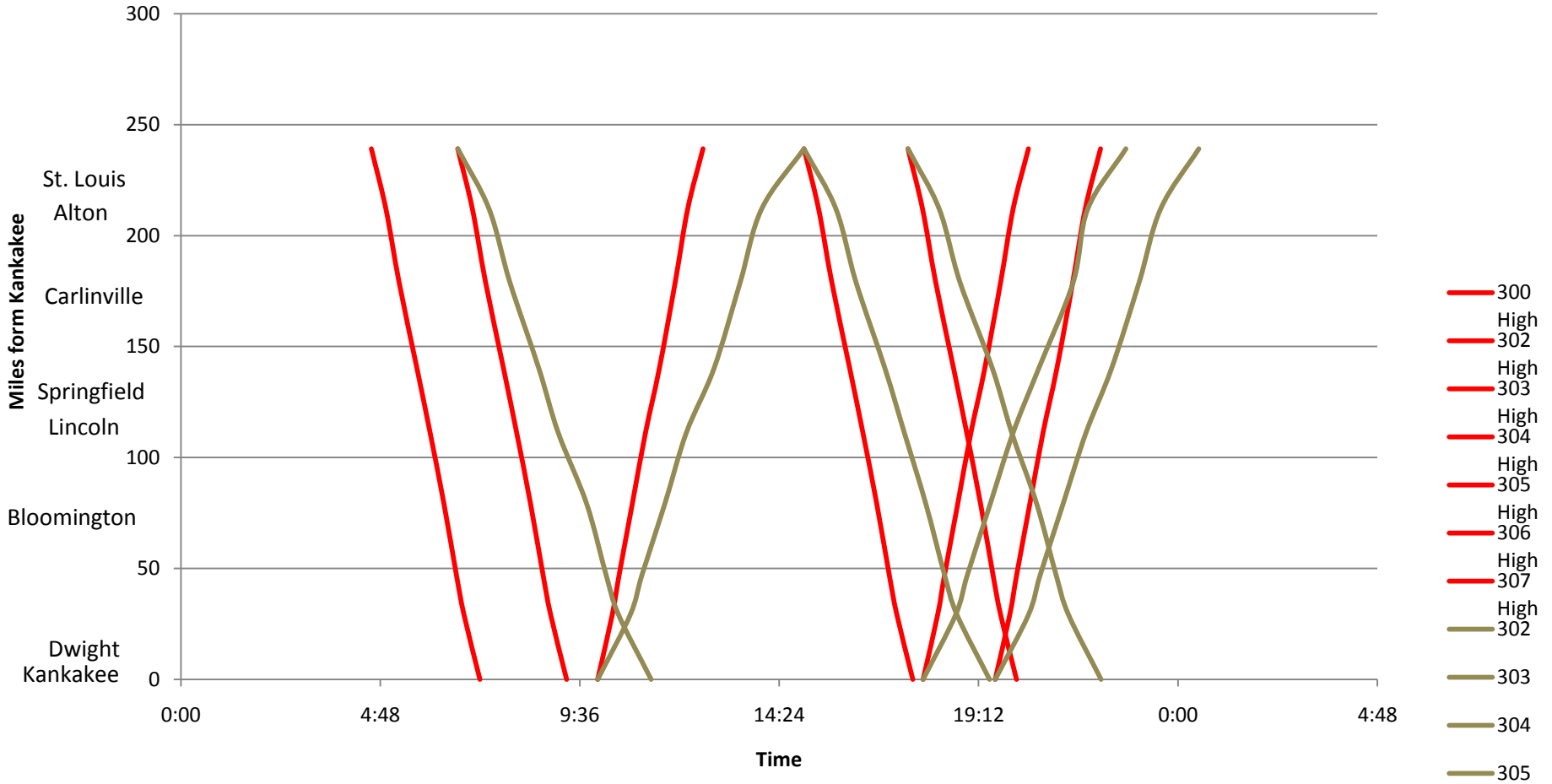


Figure 2: All-Level View



Figure 3: Viaduct Model from Angle

Time Space from St. Louis to Kankakee



Results

- Total weight of the train is roughly 27 million lbs
- The aerodynamic drag force is negligible in comparison
- The locomotives can easily overcome this force

	Velocity (mph)	Drag Force (lbf)
8000 ft Train	60	116820
	90	262845
10000 ft Train	60	145165
	90	326622