IPRO 307: Intermodal Container Facility Innovations for the Chicago Area- Focus on Kankakee County

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Thanks to Jack Lanigan Sr.

Chairman of the Board

Pete Mirabella

Vice President

Introduction

What were our goals?

- To design an intermodal facility utilizing the ATMS system
- Unlike past projects– for a wholly "new" facility, Possibly on a Greenfield Site
- To plan parallel transportation enhancements in the Kankakee area

What is an Intermodal Facility?

- Truck to Train and Train to Truck
  - ATMS – ***A Proprietary Design with Limited Release***

Our tools…

Architects, Civil, Architectural, Aerospace & Mechanical Engineers.

- Google SketchUp
- Google Earth
- Auto Desk Products

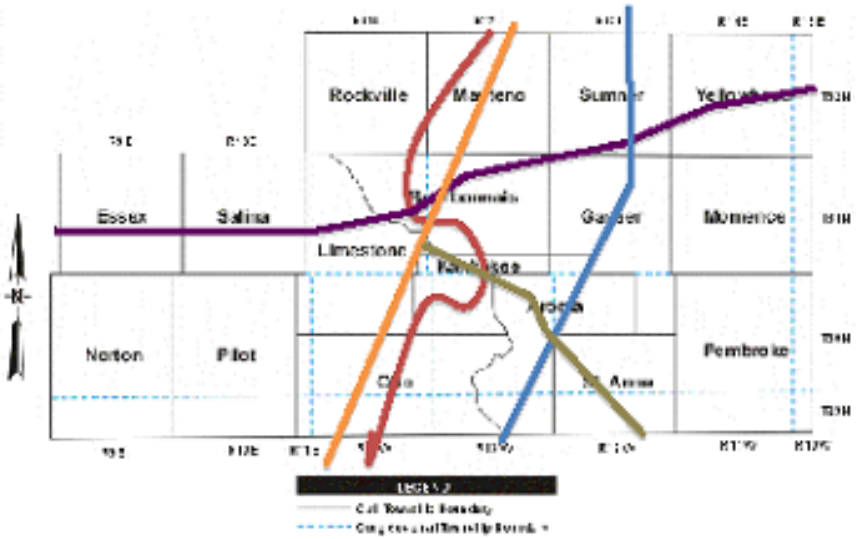
Where is this going to be?

Kankakee County is located in central Illinois. The current population of Kankakee County is 113,449 people with 60% of the population residing in Bourbonnais and Kankakee townships. Kankakee County has the 18th largest population in the state. The county has a total area of 677 square miles which is ranked 28th in the state out of 102 counties.

Kankakee County's 10 top employers are as follows:

- Riverside Medical Center
- Shapiro Developmental Center
- Northfield Square Mall
- Provena St. Mary's Hospital
- Cigna Healthcare
- Baker & Taylor (Publisher)
- CSL Behring L.L.C (Medical)
- Kankakee Community College
- Olivet Nazarene University
- Sears Logistics Services, Inc.

Three railroads pass through Kankakee County which are shown below:



Norfolk Southern Railroad

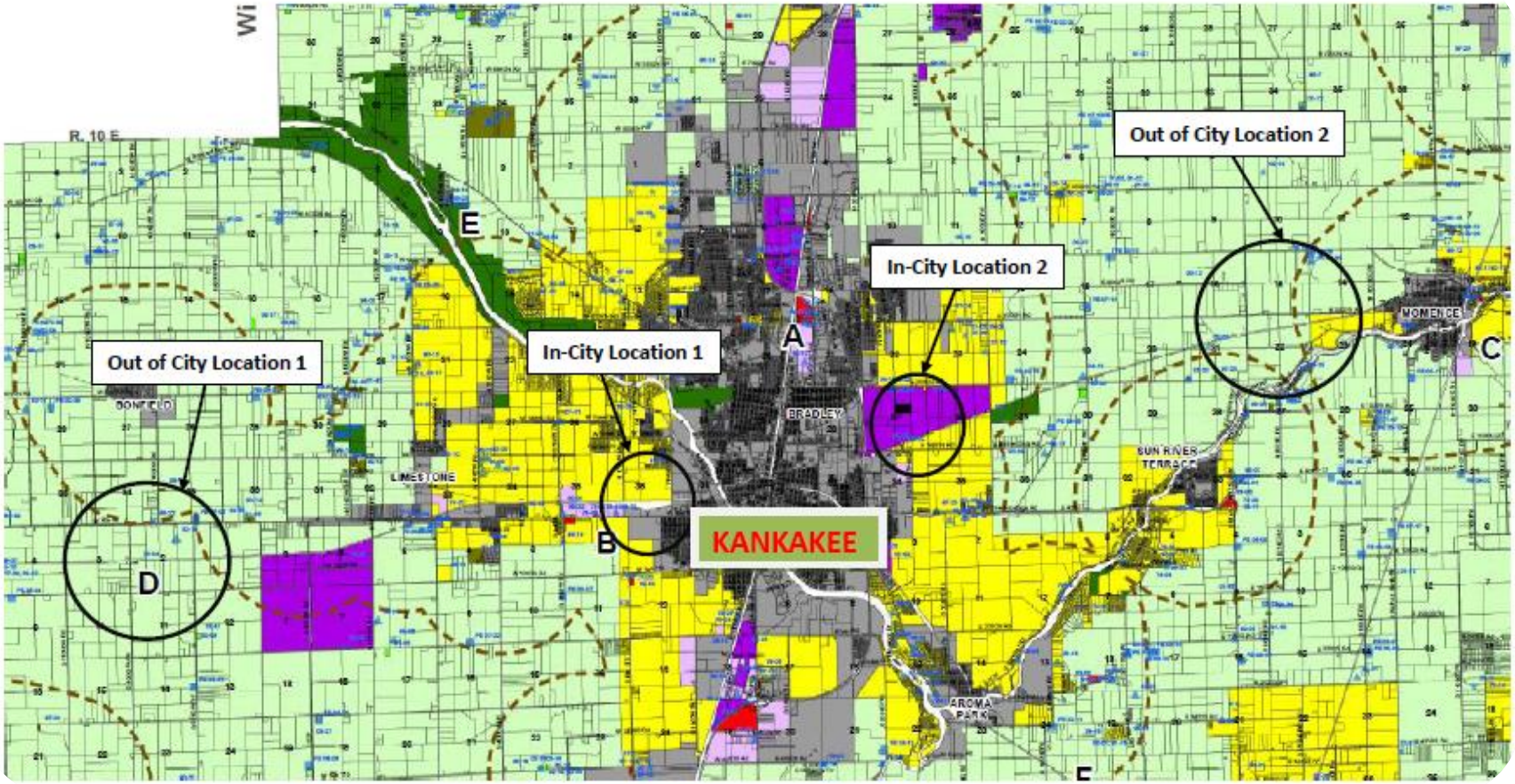
Canadian National Railroad

Union Pacific Railroad

Kankakee Beaver and Southern

Interstate 57

Possible locations for Intermodal facility



- There were 4 sites that were chosen as possible locations for the Intermodal Facility:
  - 2 In-City Locations
  - 2 Out-of-City Locations

(Capstone) Criteria for In-City Location

- Located in Kankakee, Il
- Requires total of 90 Acres
- Would only contain the Intermodal Facility
- Have to locate sites with Industrial Zoning
- Minimize Impact with residential areas
- Would be located approximately 30 miles from I-55 and I-65

In-city Location 1

- Currently a small NS storage yard
- Would have to purchase 45 acres of additional land
- Will accommodate for a 5000 ft ATMS

In-city Location 2

- Currently used for agriculture purposes
- Zoned for Industrial

- Will accommodate for 8000 ft ATMS
- Located on NS Railroad

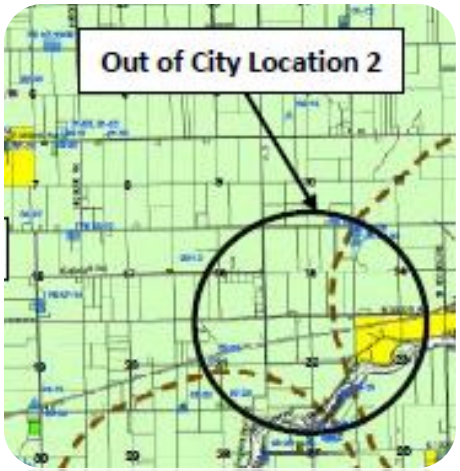
Criteria for Out-of-City Location

- Requires a total of 3,500 acres
  - Compared to UP facility North of Joliet
- Close to Kankakee, Il
- Would contain the following:
  - Intermodal Facility
  - Residential Area
  - Industrial Area (Warehouses)
    - 20 One million sq ft facilities
- Would require the rezoning of Agricultural Zone to Industrial, Commercial, and

Out of City Location 1

- South of Bonfield, IL
- 44 Miles from Roselawn, IN (I-65)
- 13 Miles from Kankakee (I-57)
- 17 Miles from Dwight (I-55)
- Located on NS Railroad

Out of City Location 2



- West of Momence, Il
- 22 Miles from Roselawn, IN (I-65)
- 11 Miles from Kankakee, Il (I-57)
- 43 Miles from Dwight, Il (I-55)
- Located on NS Railroad

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*3500 = $35,600

INCLUDES

NATURAL RESOURCE INVENTORY

LAND EVALUATION & SITE ASSESSMENT
BASE FEE: $400 FOR 0-5 ACRES
$15 FOR EACH ADDITIONAL ACRE
$400 + $15*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
COST PER ACRE = $28

REZONING PROCESS FOR WILL COUNTY

APPLICATION
3500 ACRES SITE
$15,325 + $15*3000 = $60,325

NATURAL RESOURCE INVENTORY
$400 + $15*3495 = $52,825

APPROXIMATE TOTAL COST = $125,000
COST PER ACRE = $35

REZONING PROCESS FOR LAKE COUNTY, IN

APPLICATION
3500 ACRES SITE
$400 + $25*3500 = $87,900

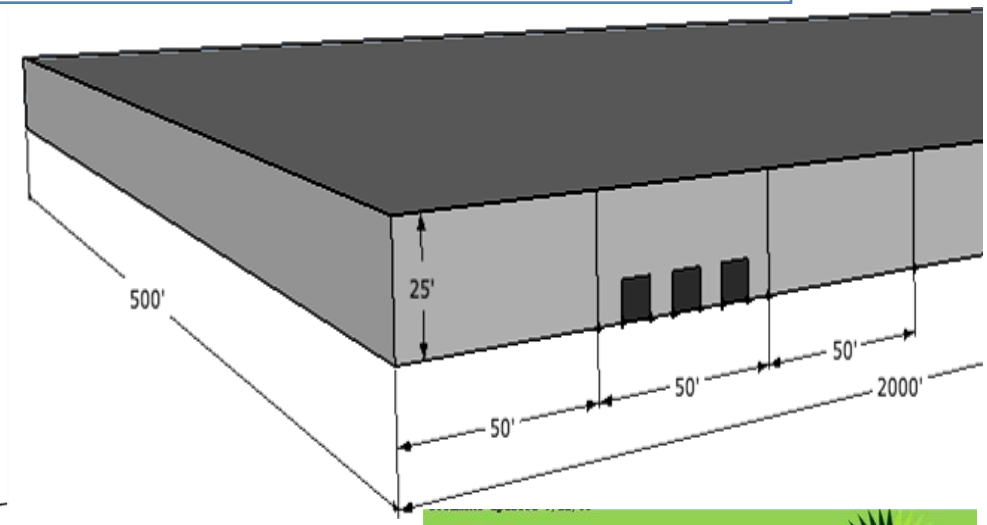
NATURAL RESOURCE INVENTORY
$400 + $15*3495 = $52,825

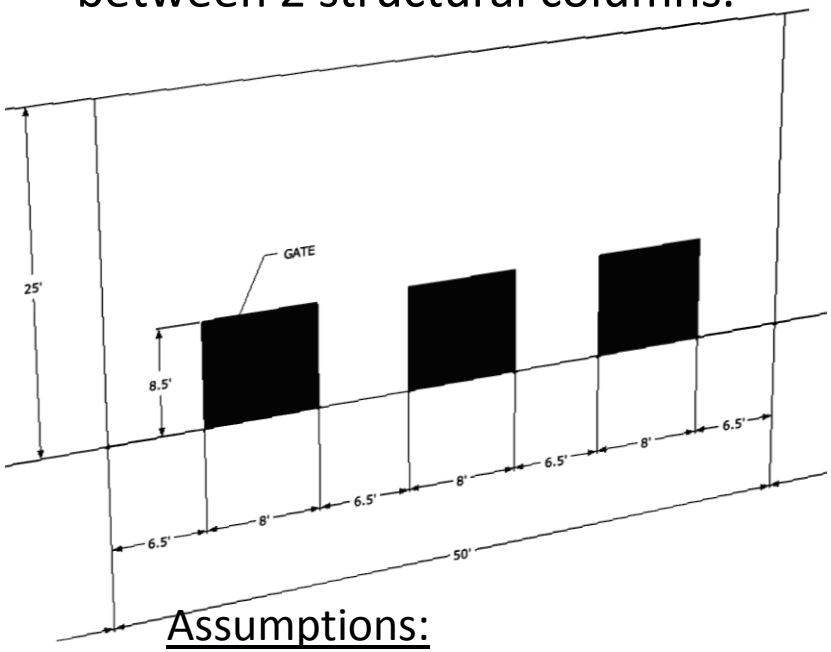
APPROXIMATE TOTAL COST = $150,000
COST PER ACRE = $42

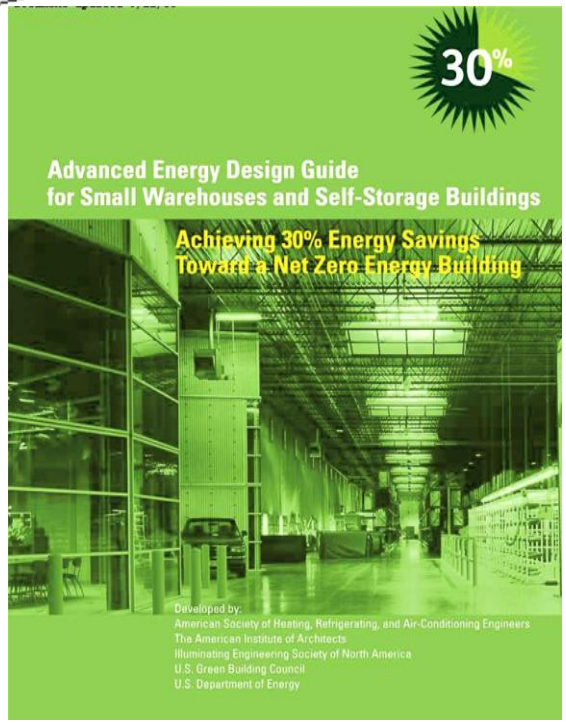
COUNTY	COST/ACRE
KANKAKEE	$28
WILL	$35
LAKE, IN	$42

(Capstone) Energy Efficient Warehouses

<u>Dimensions of the warehouse:</u>
Area 1,000,000 ft^2
L 2,000 ft x W 500 ft x H 25 ft
<u>Dimensions of the loading gate:</u>
H 8.5 ft x W 8 ft
50 ft span, 3 gates can be placed between 2 structural columns.





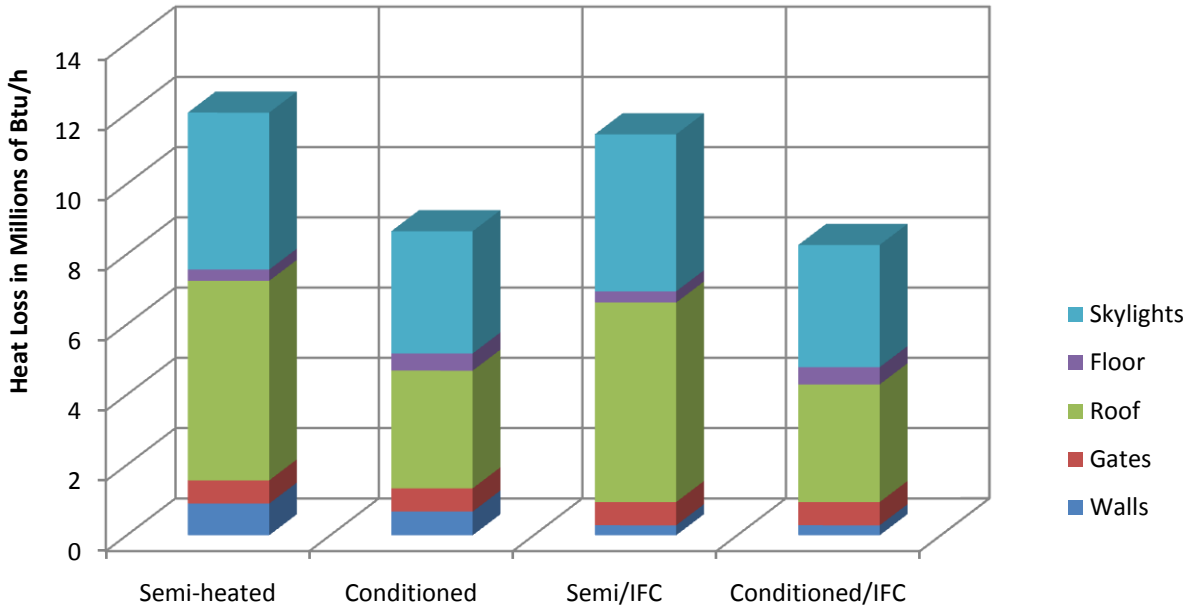


<u>Assumptions:</u>

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

Heat Loss Charts

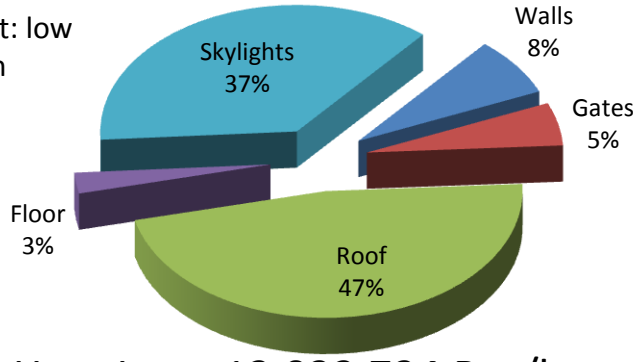
(Calculated for the worst weather condition, $T_{outside}$=-1.6°F)



Percentage of Heat loss
Semi-Heated Warehouse

Initial Construction cost: low
Maintenance cost: high

Natural gas cost: 47,000 $

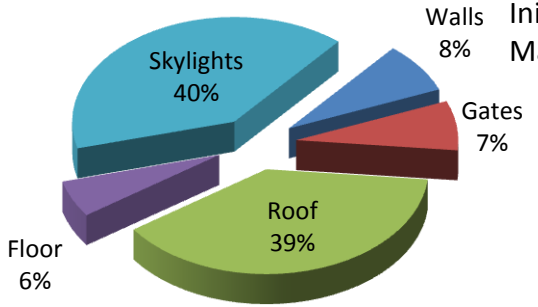


Total Heat Loss: 12,032,734 Btu/hr

Percentage of Heat loss
Conditioned Warehouse

Initial Construction cost: high
Maintenance cost: low

Natural gas cost: 20,000$



Total Heat Loss: 8,656,231 Btu/hr

Future Avenues

Bike.
Shop.
Live.
All year 'round.

With access to the Pathway to the Future.

Housing for 1200 families

The Pathway to the Future

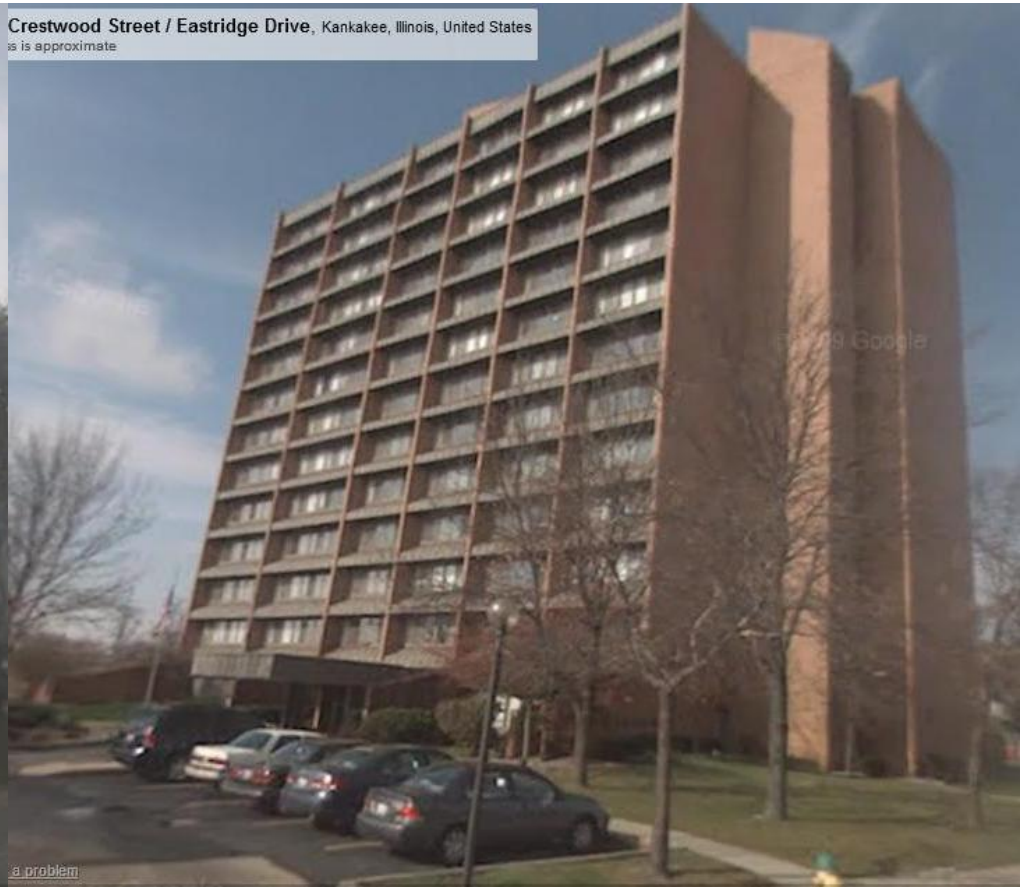
Provides a safe environment for exercise, while connecting the residents to shops and the Intermodal Facility.

A Community for Work and Play.

Current Kankakee Housing

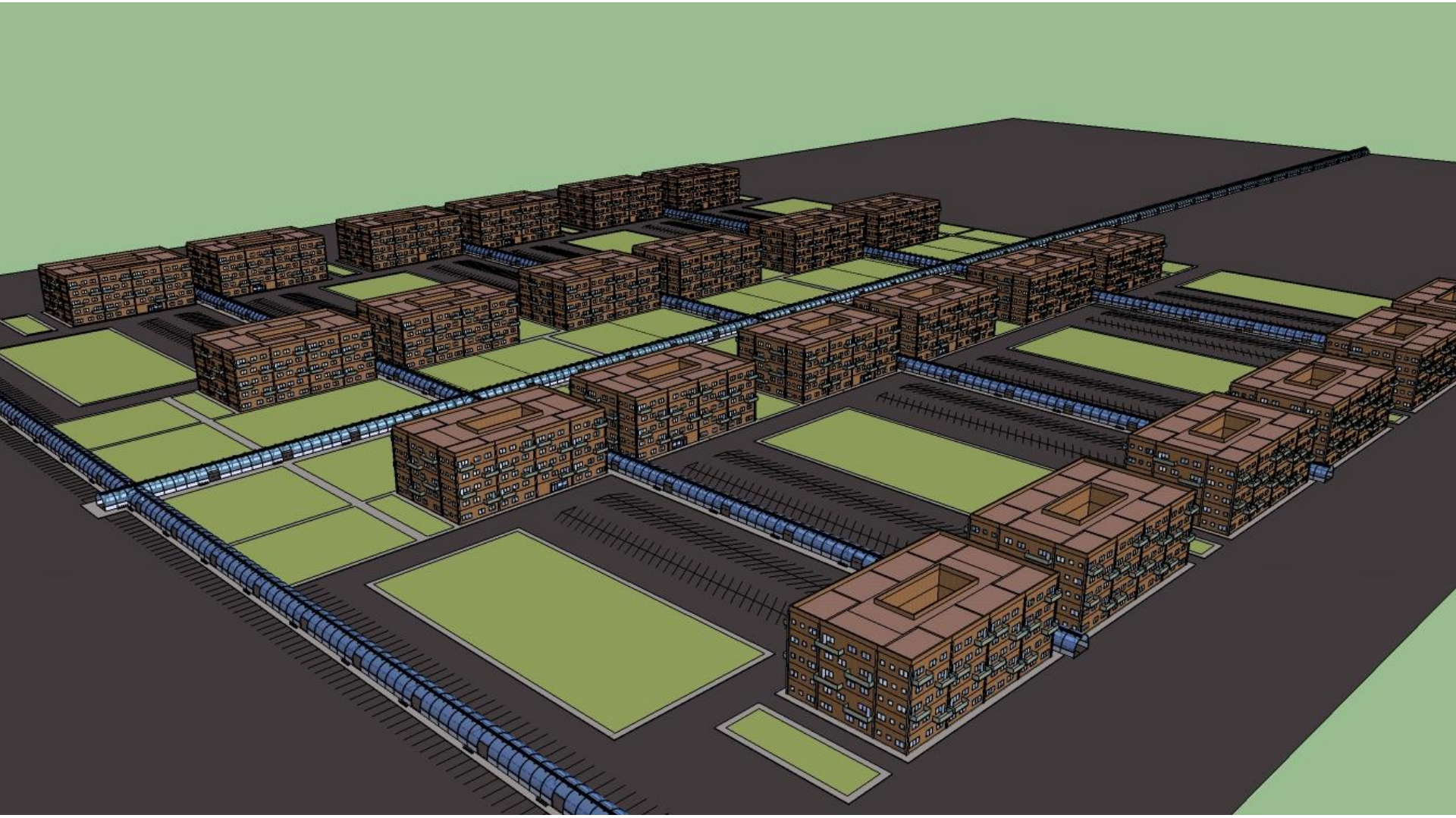
Previous Intermodal Facility Designs have not included the residential component

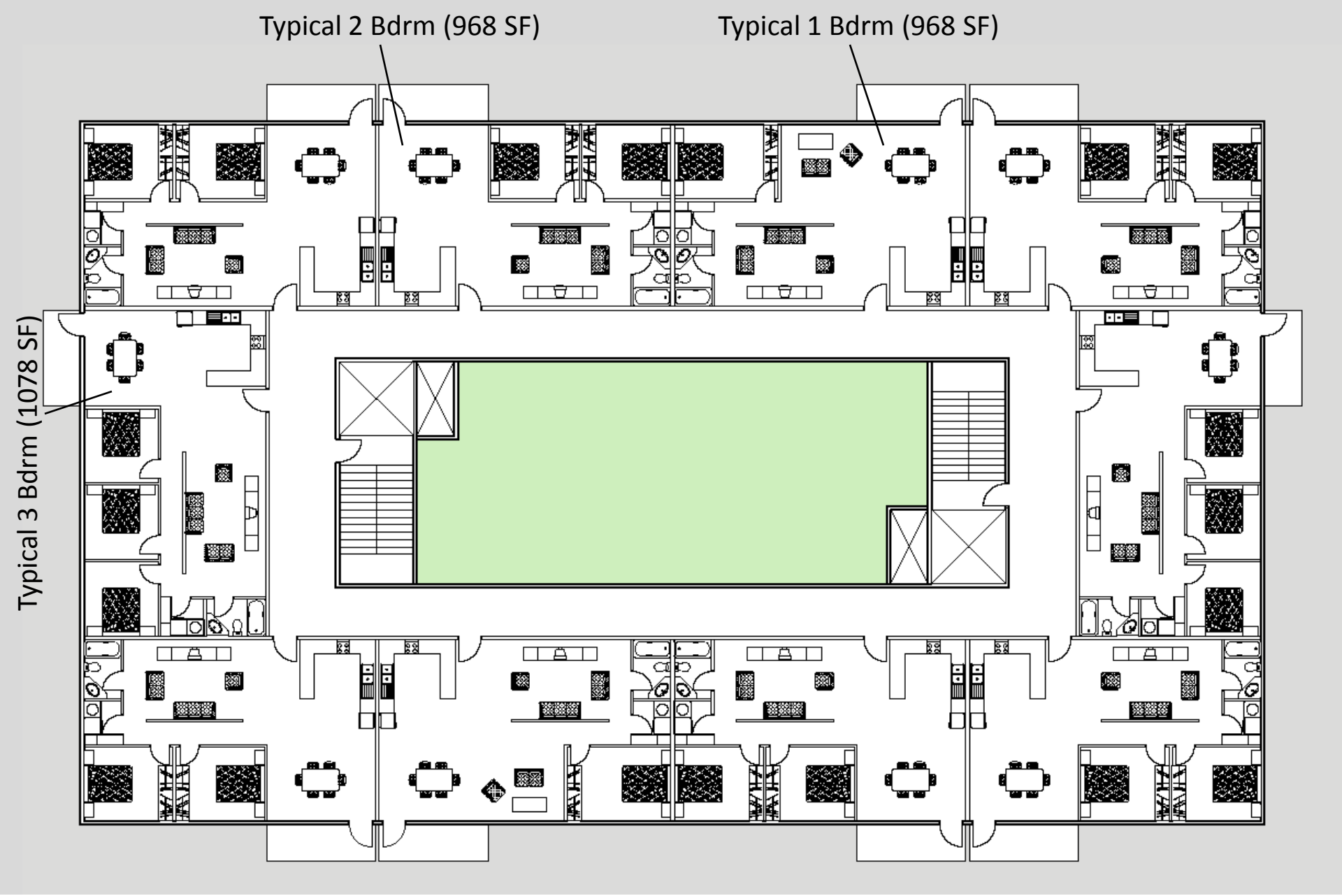
Riverwoods Apartments



Eastcourt Apartments

(Proposed) Site Bird's Eye View





Typical Floor

Pathway

Pathway to the Future

Bike. Shop. Live.
All Year Round.

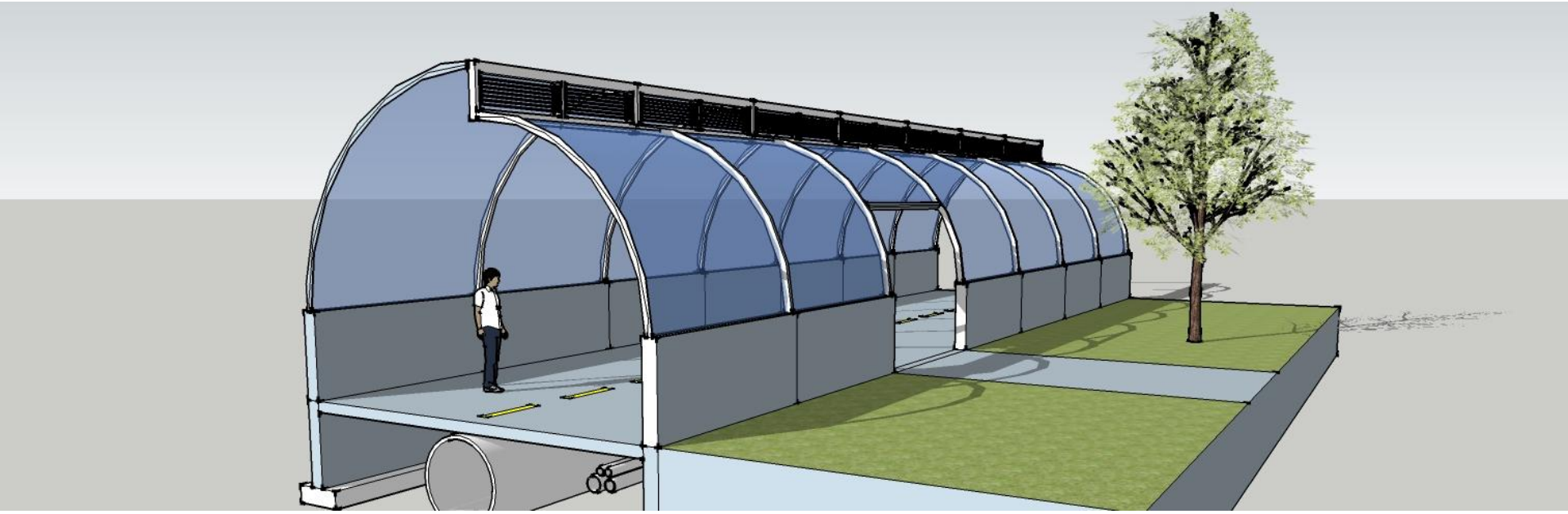
(Capstone) Construction

Crude	Better
• Polycarbonate panels	• Double glazing low e
• Brick 4” w/o ins.	• Concrete 8” w/ ins.
• Concrete floor	• Super ins. floor

Orientation of pathway: North/South

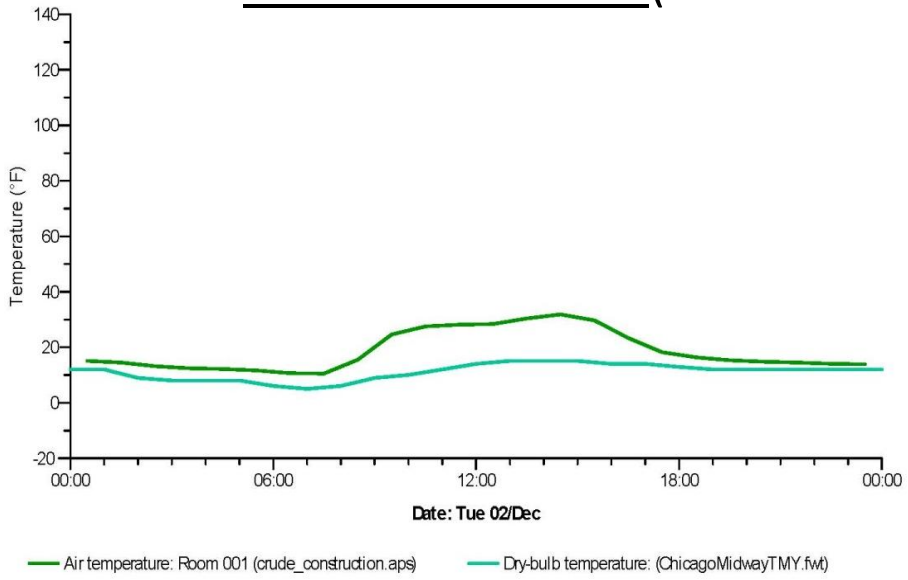
Integrated Environmental Solutions Ltd

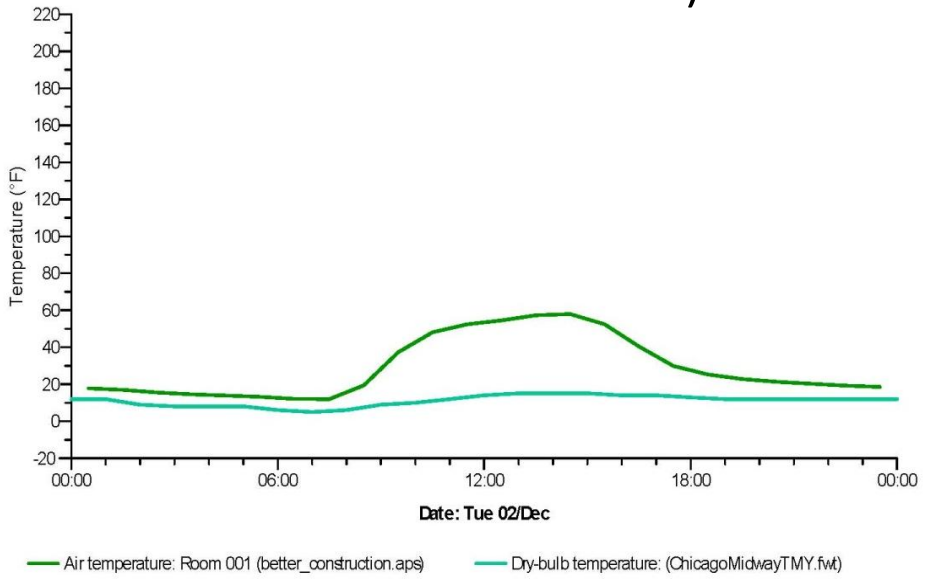
Model simulated on IES software



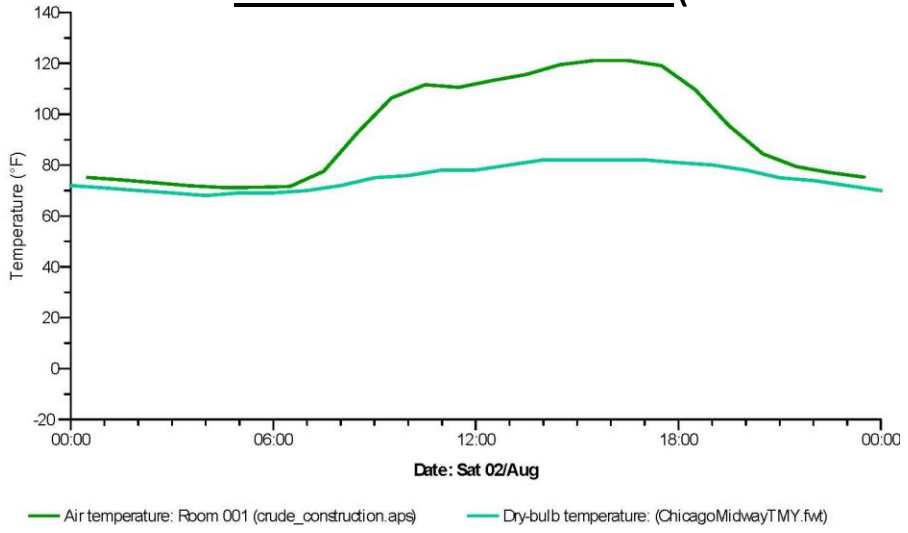
Solar Heat Gain Calculations

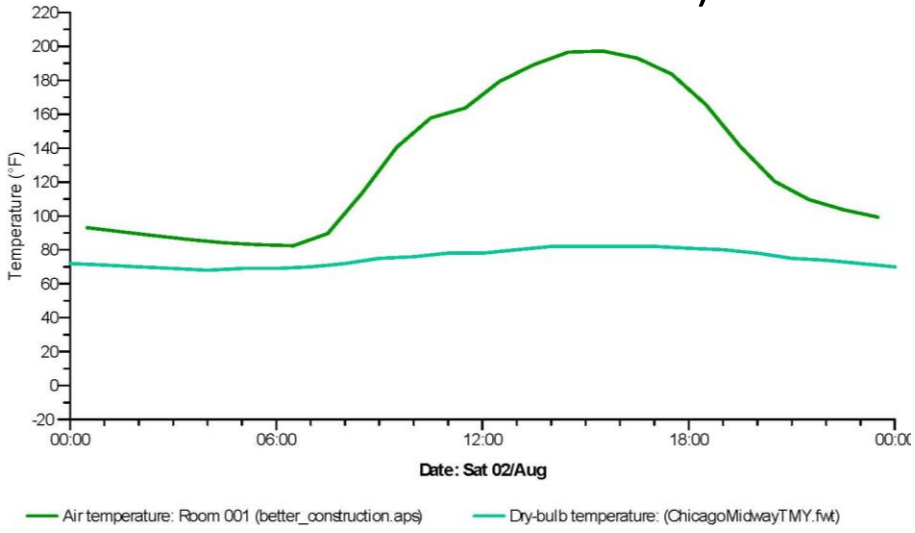
Winter Conditions (Crude and Better construction unventilated)





Summer Conditions (Crude and Better construction unventilated)



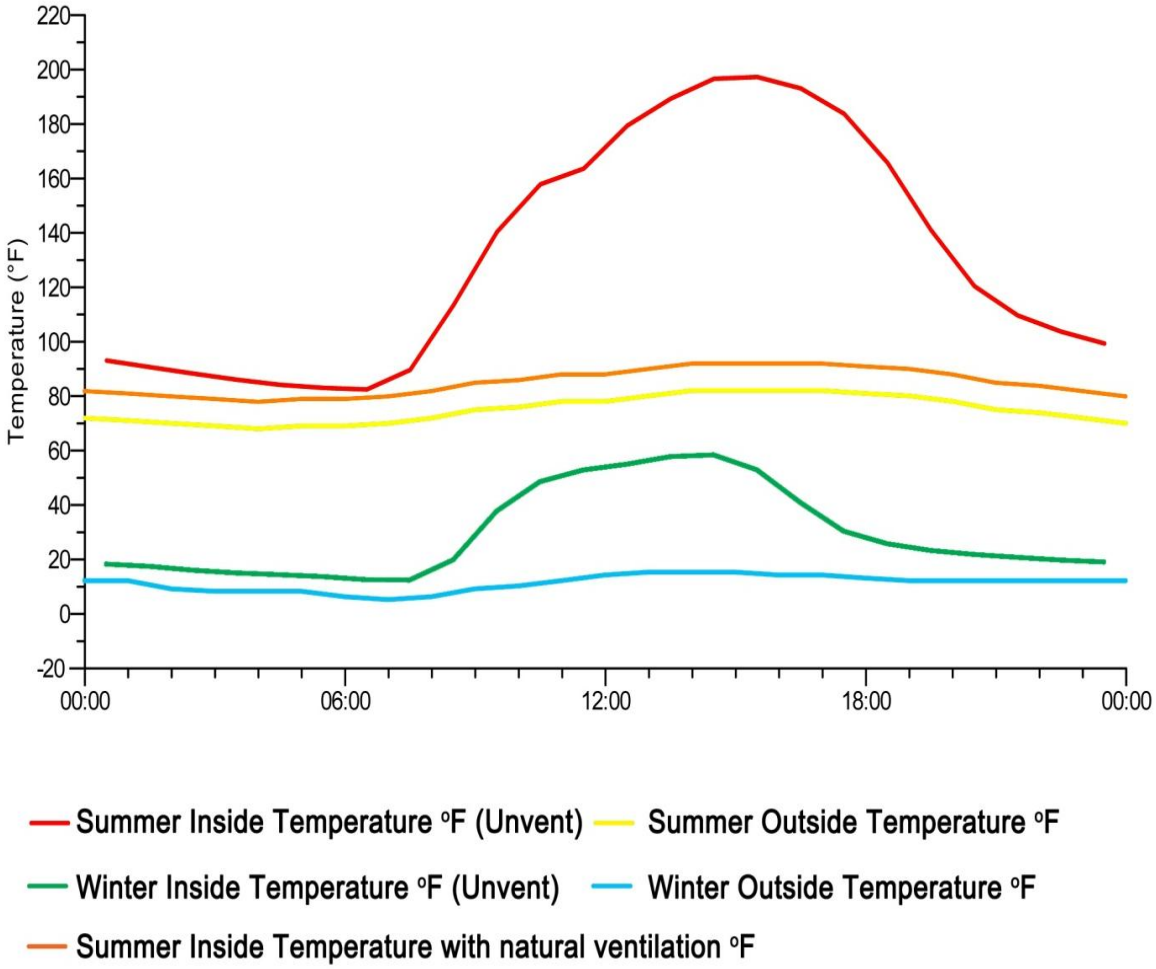


Proposal

Better Construction:

For Winter (Green line),
•Scheduled ventilation during night (~2 hours).
•Use of electronic sensors to activate ventilation when needed during day.

For Summer (Orange line),
•Vents fully open 24 hours/day.
•Operable louvers mounted on the bottom of the side doors to force natural ventilation.

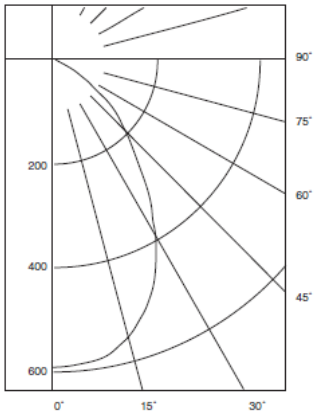


LED Pathway Lighting

- Operation Temperature: -40 F up to 85 F
- Less energy consumption
- Up to 50,000 hours of operation
- Dimmable up to 20%
- 5 year Warranty

Photometry

LR6 -DR1000 Based on OnSpex 30012426-F



Intensity (Candlepower) Summary

ANGLE	MEAN CP
0°	597
5°	593
15°	559
25°	463
35°	329
45°	207
55°	120
65°	61
75°	32
85°	7
90°	0

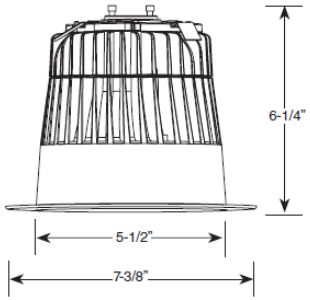
Zonal Lumen Summary

ZONE	LUMENS	%LAMP	%FIX
0°- 30°	424	42.42	42.42
0°- 40°	629	62.89	62.89
0°- 60°	897	89.71	89.71
0°- 90°	1000	100.00	100.00

LR6C-DR1000

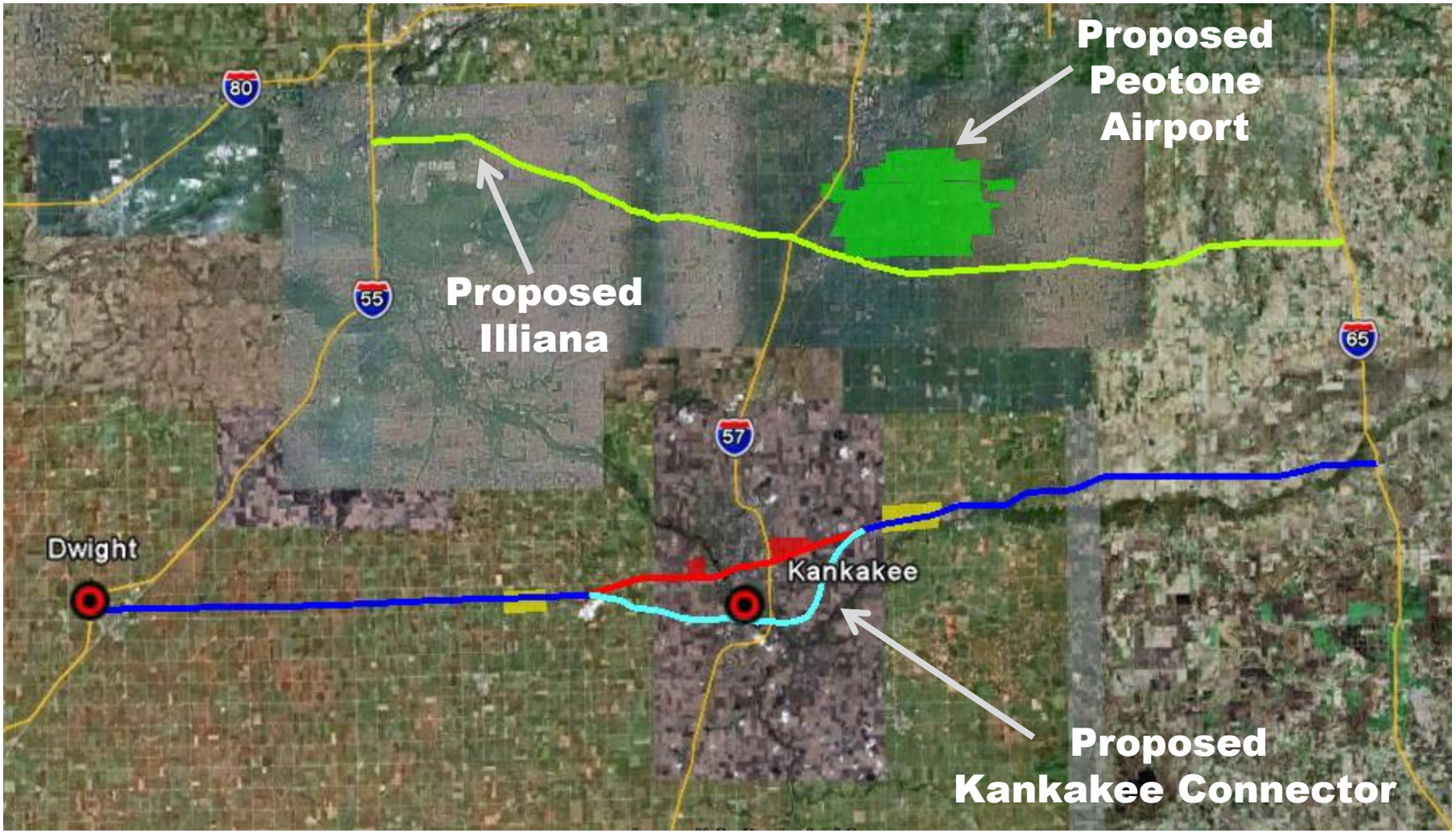
Performance Summary

- Utilizes Cree TrueWhite® Technology
- Delivered Light Output = 1,000 lumens
- Input Power = 12.5 Watts
- CRI = 90
- CCT = 2700K or 3500K
- Dimmable to 20%
- Five Year Warranty



LED LR6-DR100 Luminaire installed every 20 ft

Transportation Enhancements (Capstone) Kankakee Connector



Comparison

Option 1	Option 2
• Length of 13.3 miles	• Length of 15.5 miles
• Runs through Kankakee	• Runs outside of Kankakee (to the south)
• Runs on along existing NS track	• Necessary acquisition of land (approx. 659 acres)
• 16.4 miles south of Illiana	• 19.2 miles south of Illiana
• 3 possible exits	• 4 possible exits

RECOMMENDED
Combination of Option 1 & 2

3 level (Hi-speed, Freight, Highway)

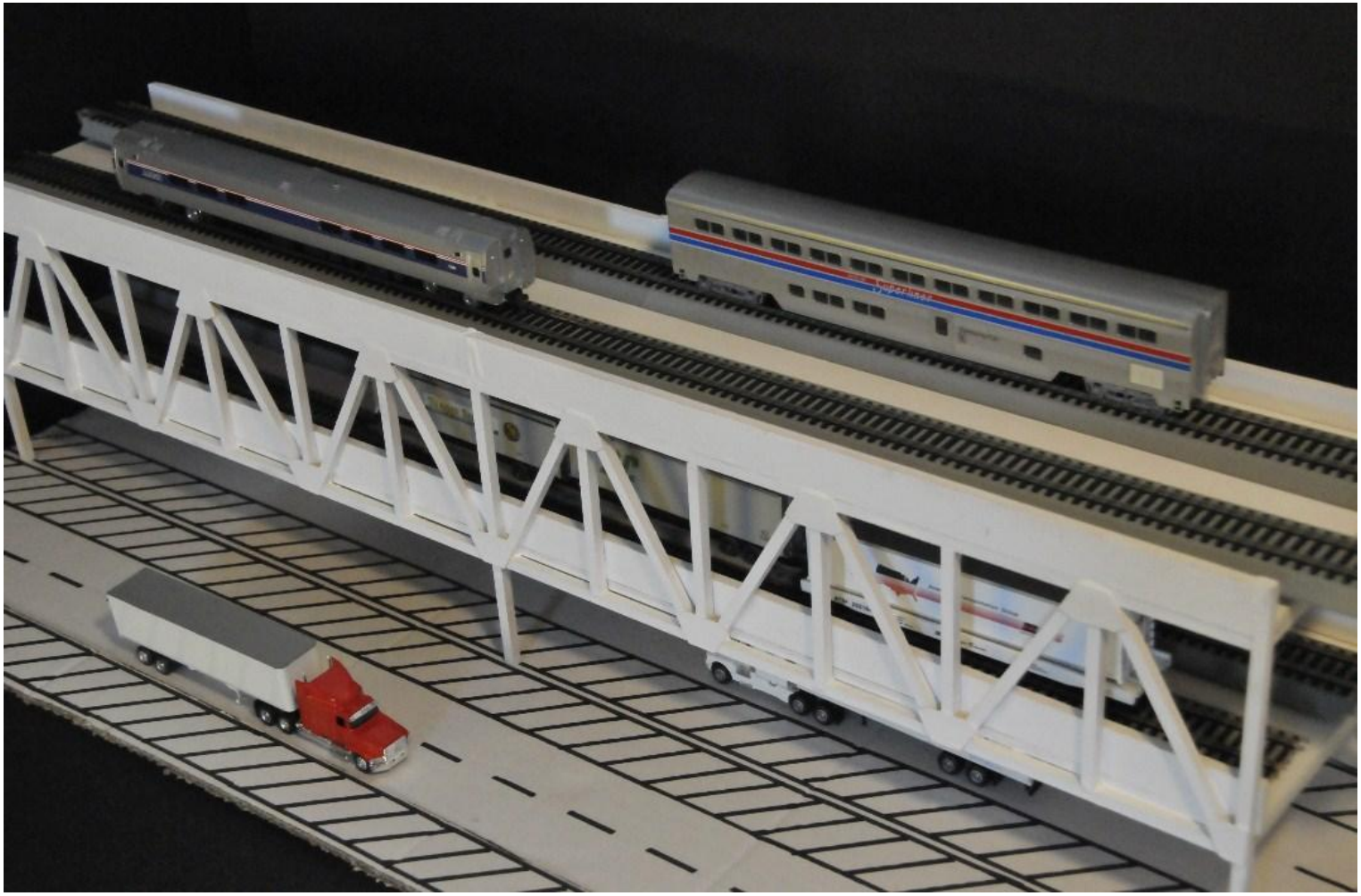
2 level (Freight, Highway)

1 level (Highway)

1 level (Freight)

2 level (Hi-speed, Freight)

1 level (Hi-speed)



3D Viaduct Model

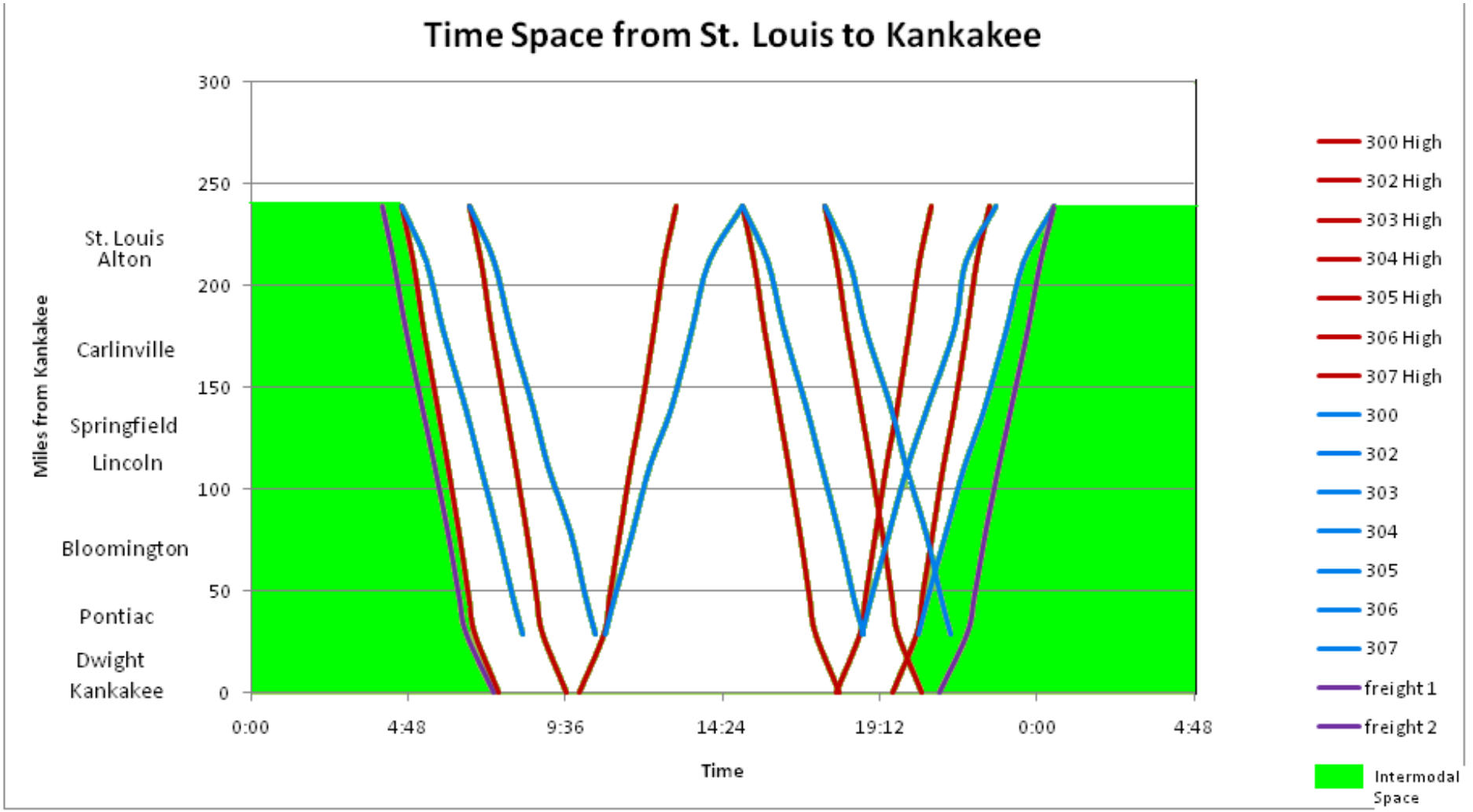
Top Level: High Speed Passenger Rail allows passengers the best view of surroundings, and has the lightest vehicle weight.

Middle Level: Intermodal Railroad

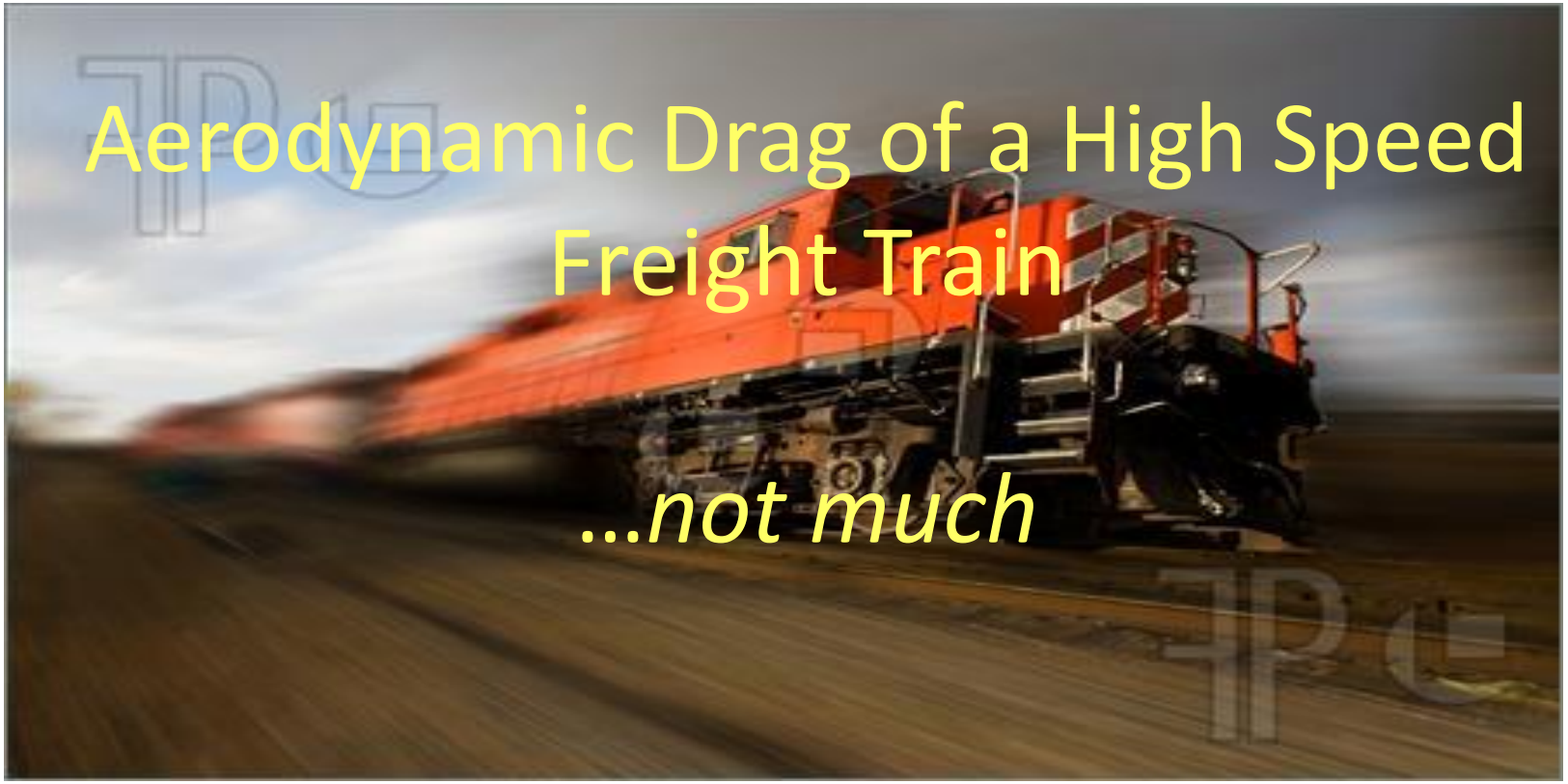
Lower Level: 4 Lane Expressway for Cars and Trucks, 2 Lanes under Viaduct and 2 Lanes outside ground level to facilitate street interchanges and frontage roads.

2 level model

High Speed Rail / IL Passenger 110mph; Freight 90mph



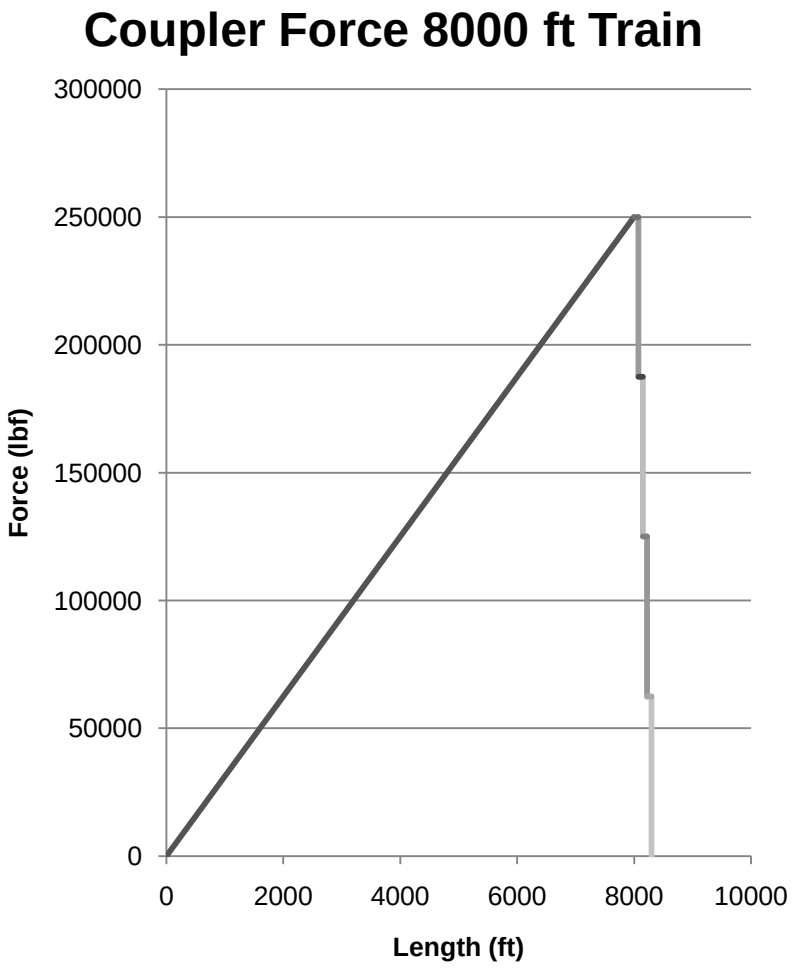
	Velocity (mph)	Aero Drag (lbf)	Total Drag (lbf)	Total Drag (.84% Grade) (lbf)	Total Weight of Train (lbf)
8000 ft Train	60	116,820	34,459,132	465,883,132	55,440,000
	90	262,845	34,891,132	466,315,132	
10000 ft Train	60	145,165	42,571,132	578,827,886	65,840,000
	90	326,622	43,003,132	579,259,886	



Stack Train Coupler Force -- *big issue*

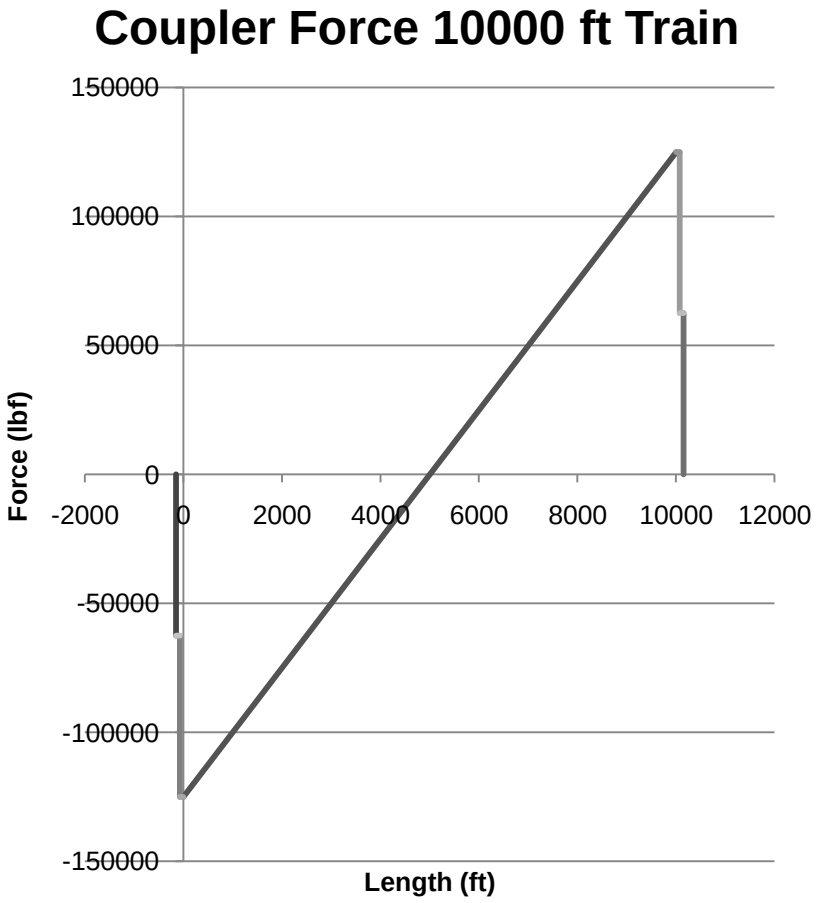
With Distributed Power

more & better…



Enclosed Area: 1,046,875,000 lbf·ft

105cars "pull"



Enclosed Area: 648,437,500 lbf·ft

135cars "push-pull"