Intermodal Container Transport System Solutions for the Chicago Region

Illinois Institute of Technology
Fall 2010

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Sponsored by Mi-Jack
Objectives

- To integrate High Speed Rail and Intermodal Freight systems
- To design a space in Crete, Illinois, that would support an Intermodal Freight rail yard that will undergo one million lifts per year
- To design a viaduct system that stacks and includes three different modes of transport (high speed passenger rail, freight rail, and automobile highway)
- To incorporate these three preceding objectives in order to create a newer and more efficient mode of transporting and shipping using an ATMS system
Team Structure

- Site Design
- Integrated Design Team
- High Speed Rail
- Viaduct Design
• ATMS utilizes a crane that spans over 4 lanes of track
• Lining the 4 lanes of track are container storage racks that stack 2 high like the trains
• ATMS reduces inefficiencies in crane lifting by making sure each lift has a container
• Reduces footprint of unloading and storage areas for containers waiting to be picked up
• Reduces confusion in finding your container to pick up and speeds up the process of dropping a new container off
Site Redesigned With ATMS

Old 2008 Site
Area Around Site
Preliminary Viaduct Design

External Highway | 2-Lane Viaduct | Access Road

Note:
- 2 ft Clearance on Exiting Lane
- 12 ft Lanes

Span Length

Viaduct Preliminary Design

Dimensions and annotations illustrating the design details.
## Square Foot Cost Estimate Report

**Estimate Name:** Crete site  
**Building Type:** Factory with Concrete Block / Bearing Walls  
**Location:** CRETE, IL  
**Story Count:** 3  
**Story Height (L.F.):** 24  
**Floor Area (S.F.):** 45000  
**Labor Type:** Union  
**Basement Included:** No  
**Data Release:** Year 2010 Quarter 3

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly. Parameters are not within the ranges recommended by RSMeans.

**Cost Per Square Foot:** $107.24  
**Building Cost:** $4,826,000

<table>
<thead>
<tr>
<th>Item</th>
<th>% of Total</th>
<th>Cost Per S.F.</th>
<th>Cost</th>
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<tbody>
<tr>
<td>A Substructure</td>
<td>12.00%</td>
<td>$9.60</td>
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<td>B Shell</td>
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<td>C Interiors</td>
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<td>$11.83</td>
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<td>D Services</td>
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<td>E Equipment &amp; Furnishings</td>
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<td><strong>SubTotal</strong></td>
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<td><strong>$107.24</strong></td>
<td><strong>$4,826,000</strong></td>
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**Factory Cost Estimate Report**
High Speed Rail Routes and Funds Allocated

U.S. Announces First Investments in High-Speed Rail

High Speed Rail Routes and Funds Allocated

- Double stacked containers in HSR (Intermodal)
- Wrapping double stacks (reducing drag)
- Modeling is a bit more complex than anticipated
- Inter-car aerodynamic relationship
- Aerodynamics of crosswinds
- Both passenger and freight specifications are difficult to pinpoint in U.S.
- Track spacing for HSR needs to be sufficient to prevent turbulence
- Time/Space and String diagrams need to be produced
- Adding Intermodal Freight routes to Amtrak Illinois/Missouri Corridor route at times when no trains are in use
• Using Kankakee Beltline rail to connect Amtrak IL-MO corridor and Crete Intermodal site (CenterPoint)
- Use of new composite beams in viaduct
- Use of interiorly modulated buildings that allow for ease of retrofitting
- Wind breaker wall in viaduct
- Consider site expansion for 2020-2030
• What is ATMS? What does it stand for?
• Could you explain the innovative composite beam in more detail?
• How are we going to research in order to make sure that each design task will integrate and work smoothly?
• How much of this design and information is from the previous IPROs?