

Twin-40 Container Operations ... The Landside Part of the Equation

AAPA Facilities Engineering Seminar
San Diego, CA November 2007
Robert S. Johansen, P.E.

- Quay planning issues with Twin-40 cranes
 - Quay crane configuration, wheel loads & rail gage
 - Transporter type, aisles, and alignment
 - IBC operations
- Container yard planning issues
 - Alternative transporter configurations
 - Twin-40 yard cranes?
 - Aisle configurations

Bigger Ships, More Capacity

DMJM HARRIS | AECOM



- Single hoist - one container per cycle
- Twin-20 spreaders - 2 TEU per cycle
- Dual hoist cranes to break the cycle into semi-independent segments and increase productivity with two separate sets of controls and operators – dual cycles w/ 2 TEU/cycle
- Twin-40 cranes - 4 TEU per cycle with single set of controls and operator

Conventional Twin-20 Spreader

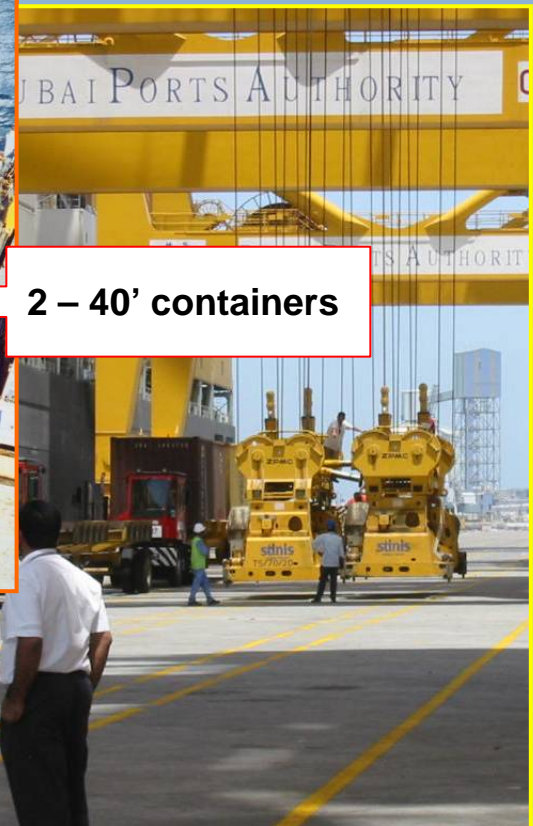
DMJM HARRIS | AECOM



Twin-40 / Quad-20 Spreaders

DMJM HARRIS | AECOM

- Multi-box handling – increased productivity!



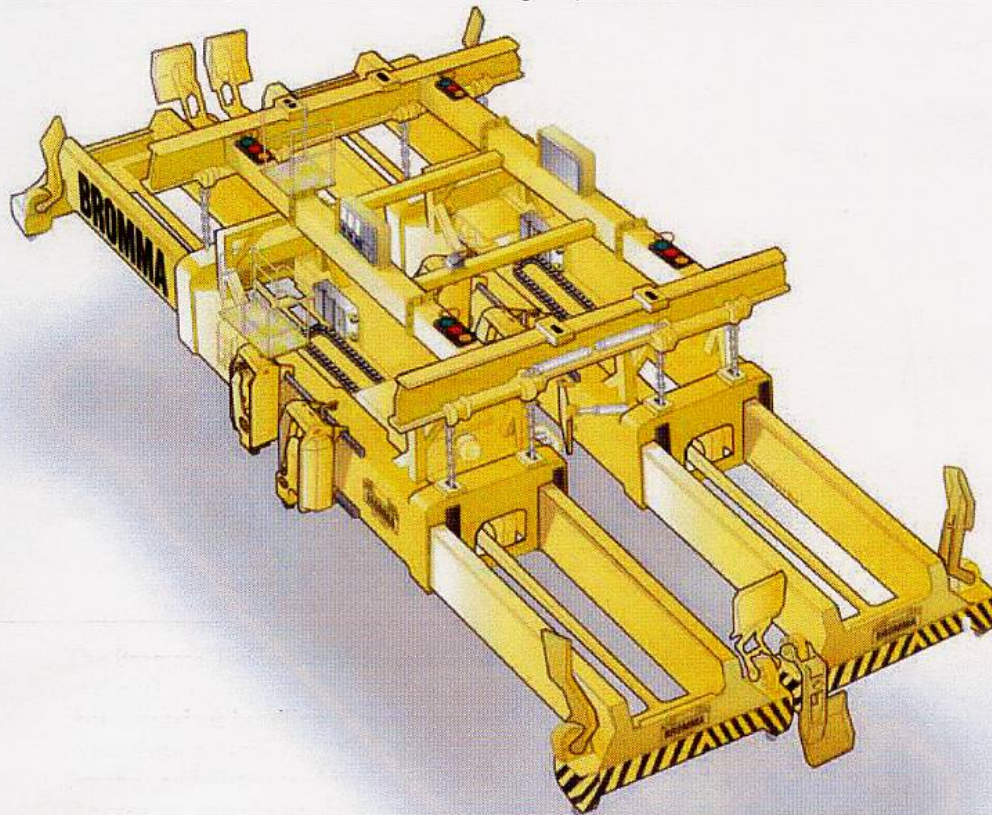
2 – 40' containers



4 – 20' containers

Advantages of Twin-40 Cranes

DMJM HARRIS | AECOM



- Heavier crane and transport wheel loads
- Greatly increased requirement for yard transport vehicles to maintain uninterrupted productivity
 - Sequencing of transporters
 - Alignment of multiple transporters under crane
- IBC handling, especially for quad 20' operation
- Impact on yard handling equipment

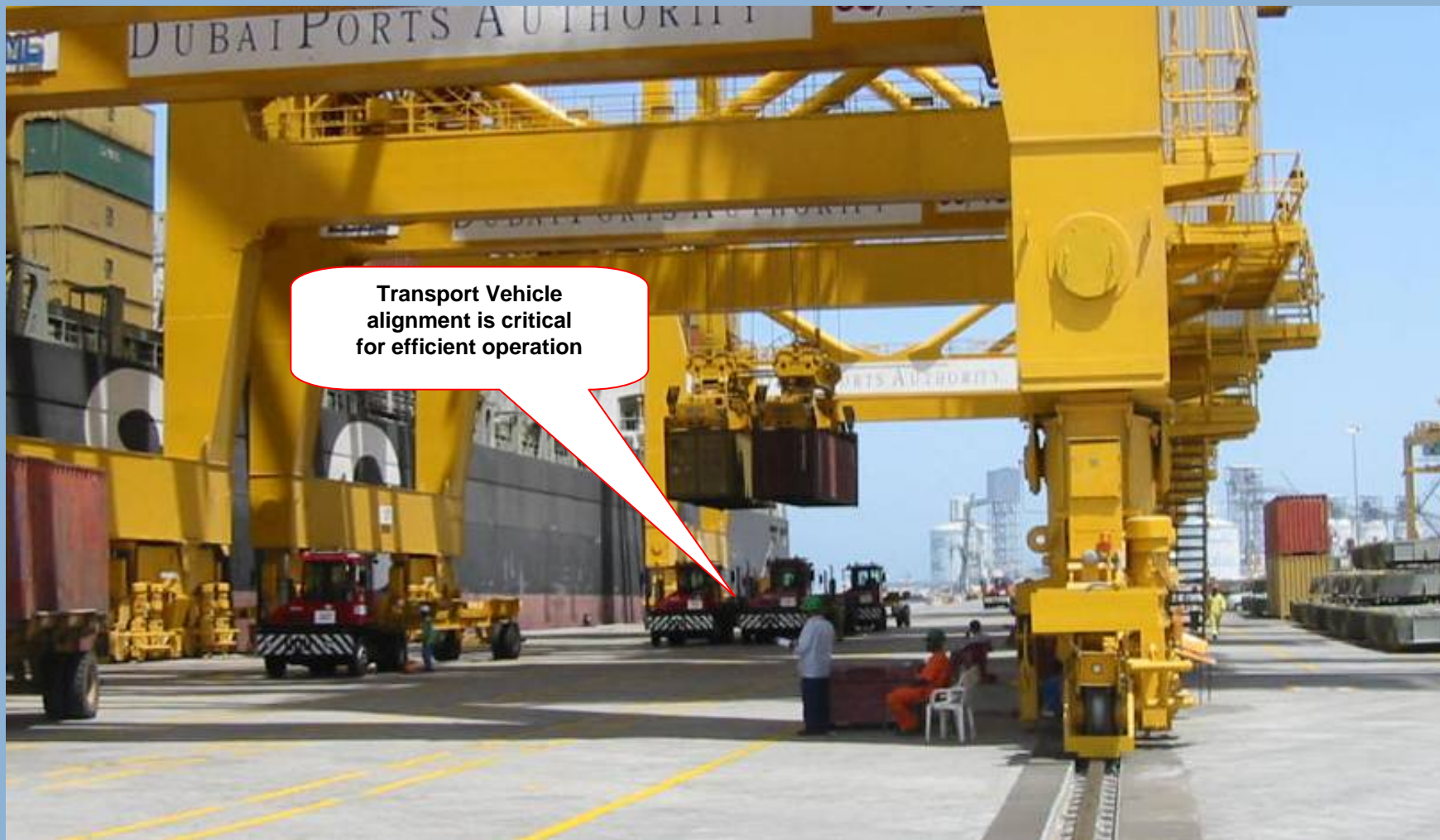
Twin-40 Cranes - Dubai

DMJM HARRIS | AECOM



Alignment of Transport Vehicles

DMJM HARRIS | AECOM



Alignment under the quay crane

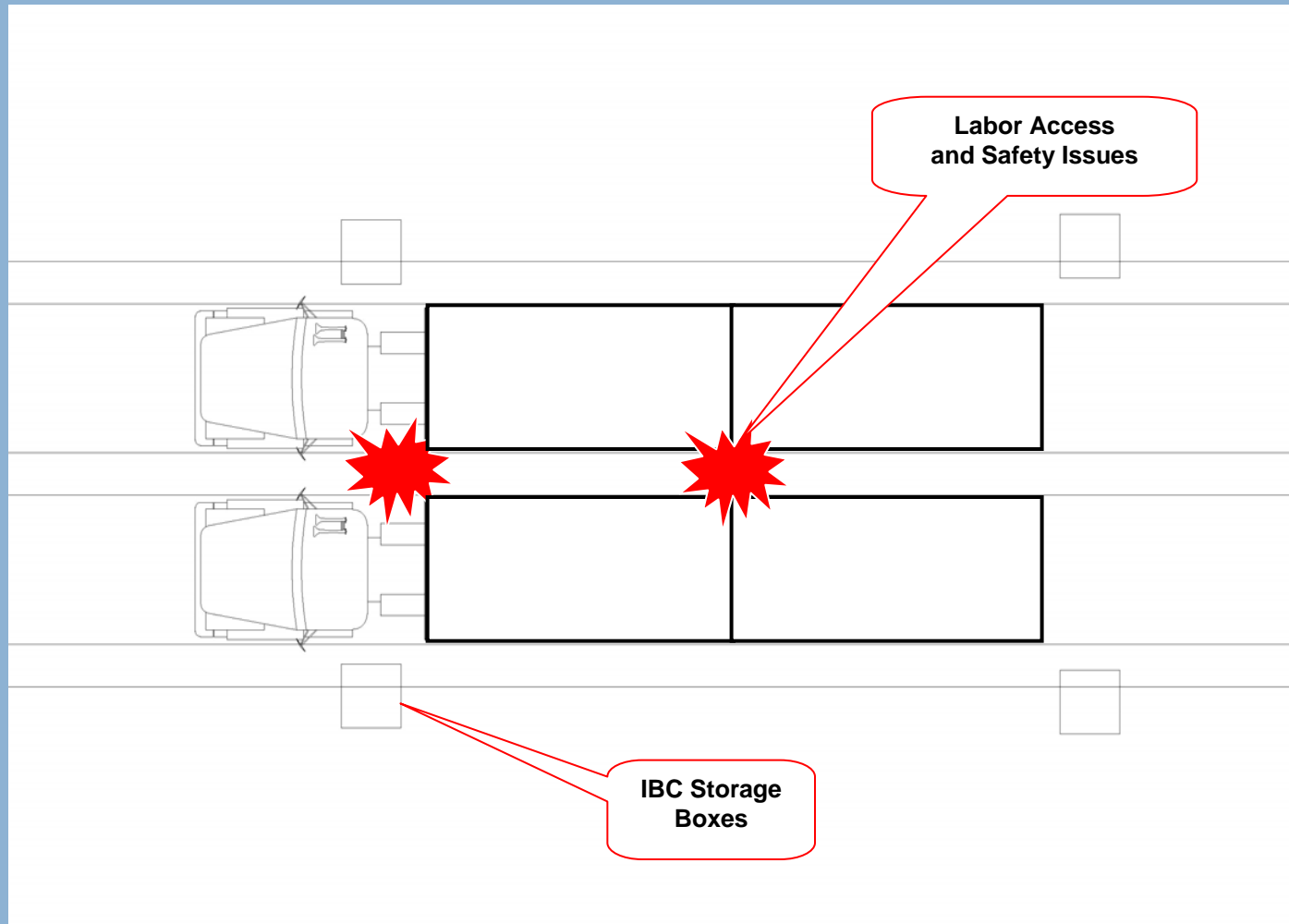
DMJM HARRIS | AECOM



- IBC Operations
 - IBC operations in lanes beneath crane
 - IBC operations on elevated platform
 - IBC operations upstream/downstream of cranes
- Hatch cover operations
 - In the back reach
 - Between the legs
- Transport vehicles have different operational implications
 - Yard chassis operations
 - Shuttle carrier operations
 - AGV operations

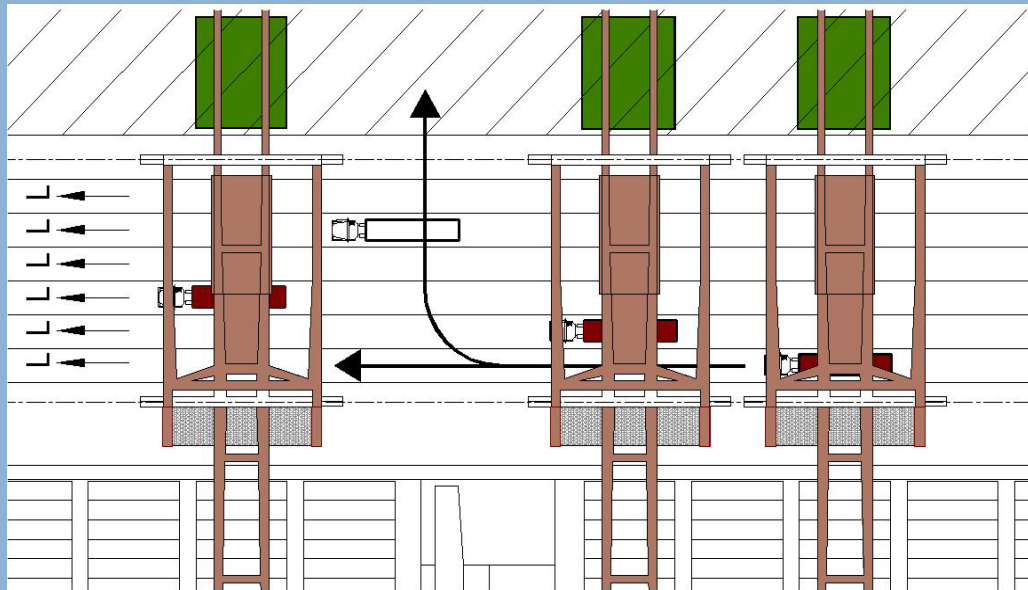
Tandem-40/Quad-20 IBC Handling

DMJM HARRIS | AECOM



1: Single / Chassis / In Lanes

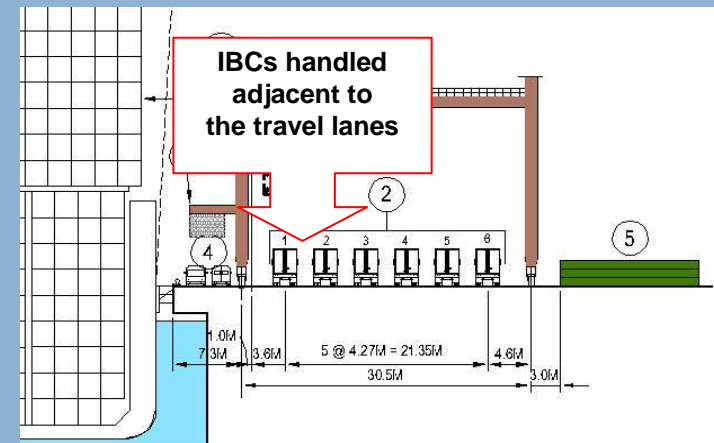
DMJM HARRIS | AECOM



OPTION 1: SINGLE LIFT - TRUCKS - CONING IN LANES

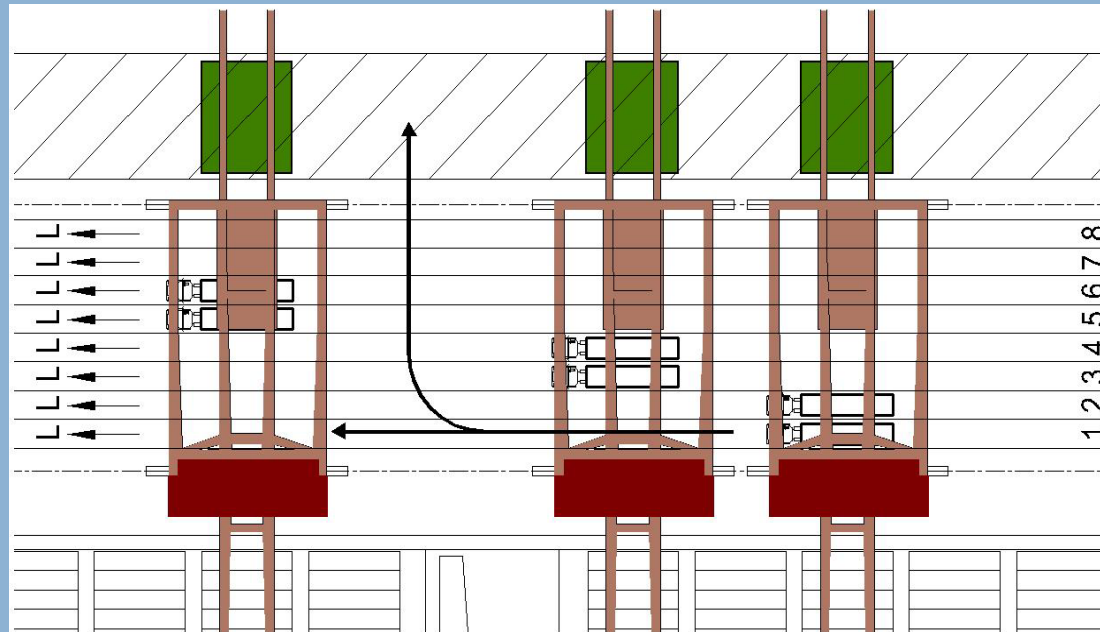
1:400

- 30.5M GAGE CRANE
- 6 WORKING LANES
- 1ST AND 7TH CRANES SHARE



3: Twin / Chassis / IBC Platform

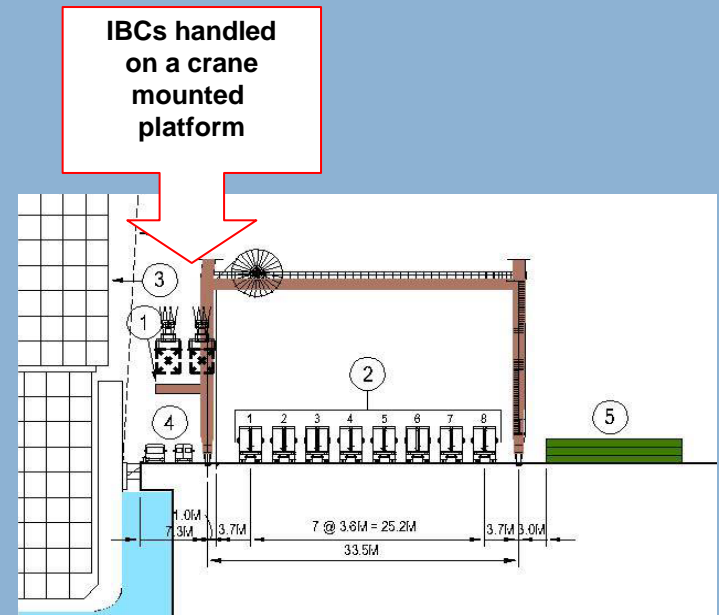
DMJM HARRIS | AECOM



OPTION 3: TANDEM LIFT - TRUCKS - CONING ON PLATFORM

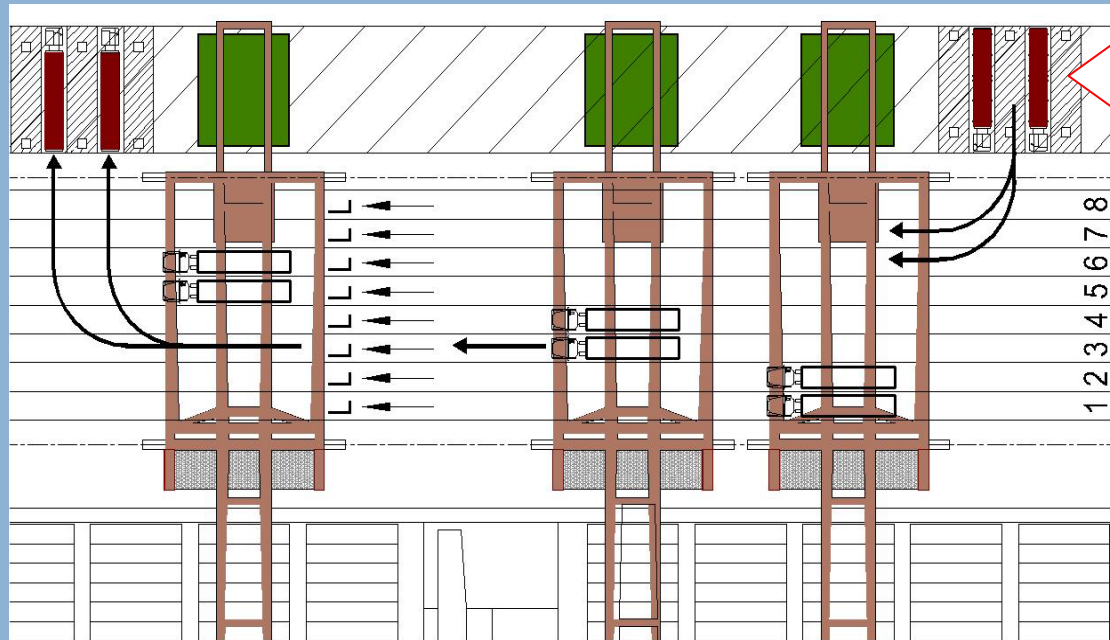
1:400

- 33.5M GAGE CRANE
- 8 WORKING LANES
- 1ST AND 5TH CRANES SHARE



4: Twin / Chassis / IBC Downstream

DMJM HARRIS | AECOM

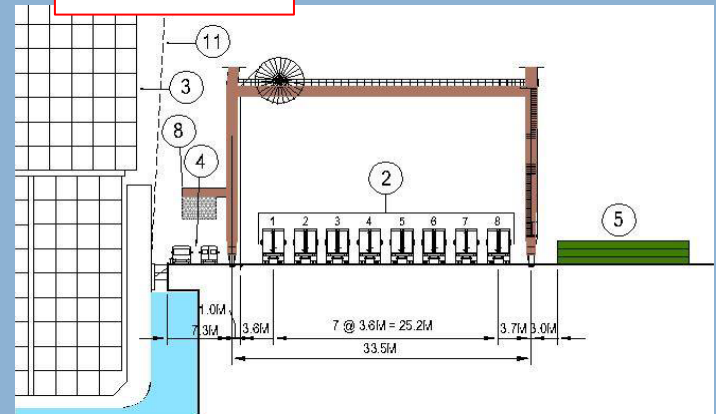


OPTION 4: TANDEM LIFT - TRUCKS - CONING OFF QUAY

1:400

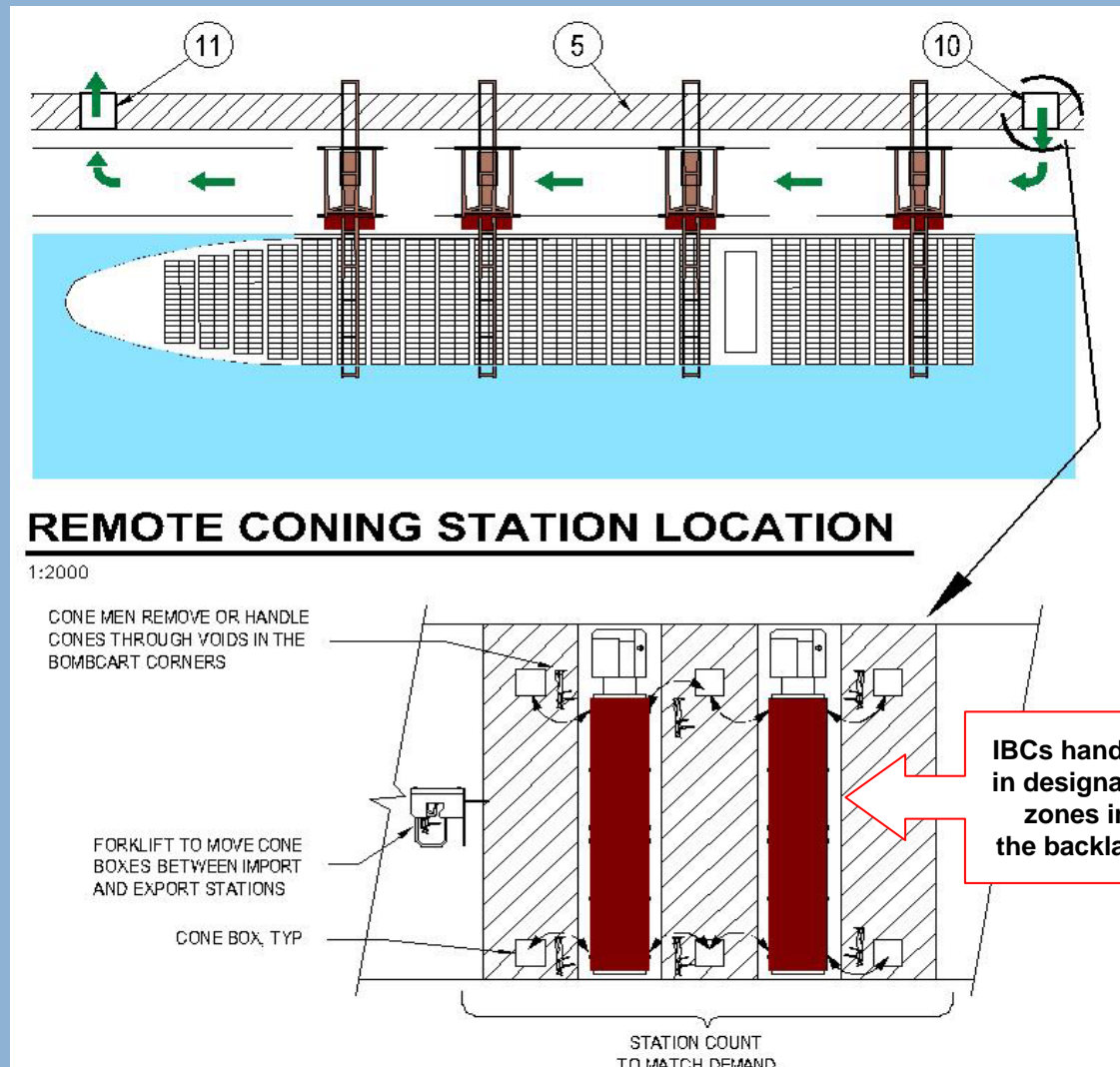
- 33.5M GAGE CRANE
- 8 WORKING LANES
- 1ST AND 5TH CRANES SHARE

IBCs handled
in designated
zones in
the backland



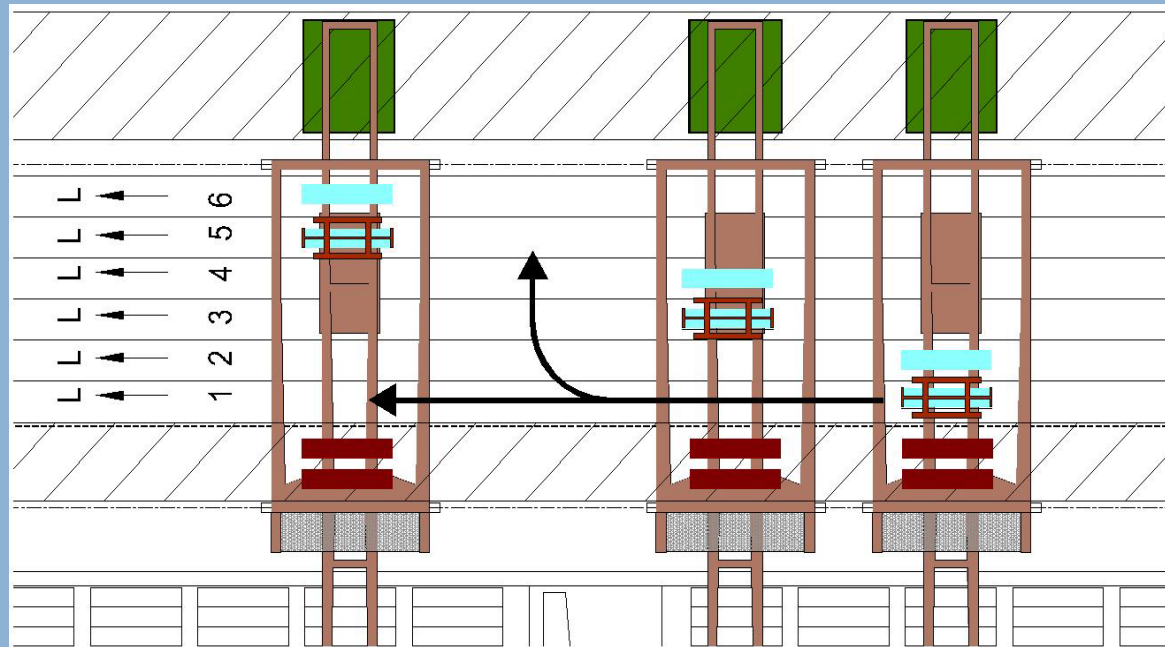
4: Twin / Chassis / IBC Downstream

DMJM HARRIS | AECOM



7: Twin / Shuttle / In Buffer

DMJM HARRIS | AECOM

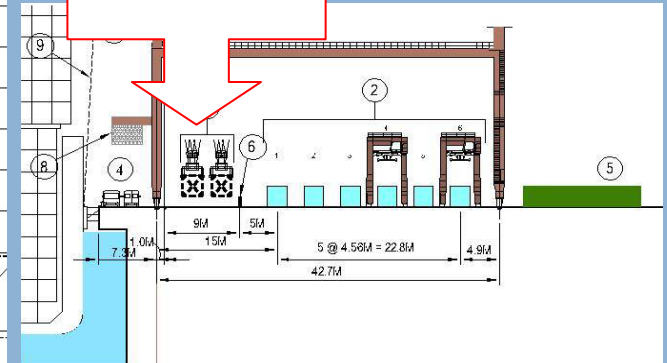


OPTION 7: TANDEM LIFT - SHUTTLE CARRIER - CONING IN QUAY BUFFER

1:400

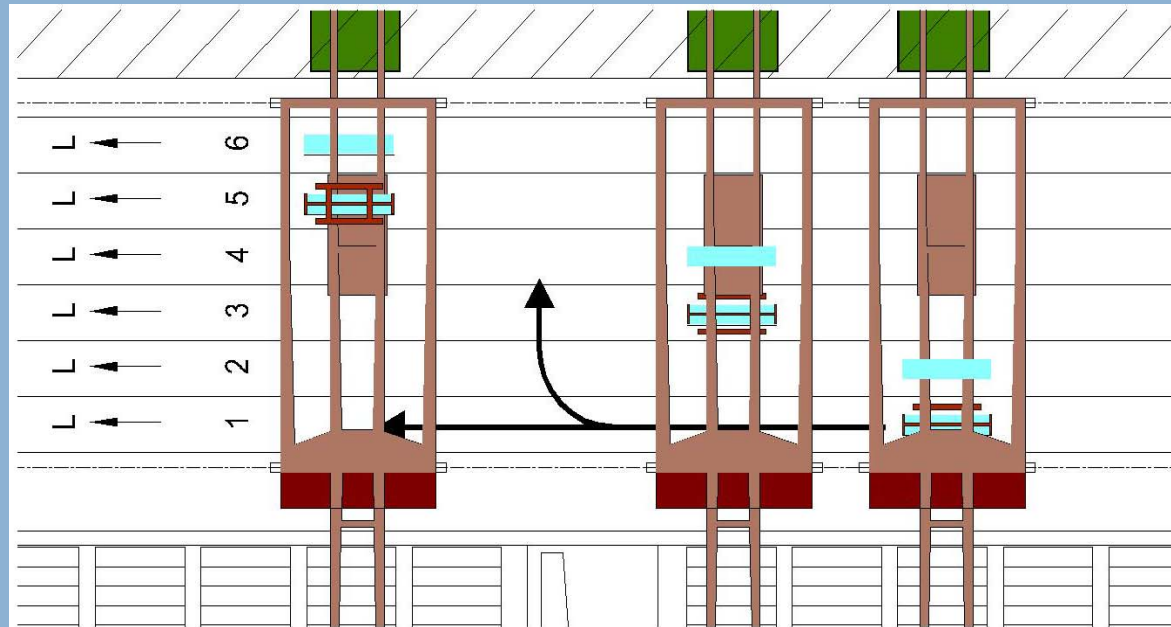
- 42.7M GAGE CRANE
- 6 WORKING LANES
- 1ST AND 4TH CRANES SHARE
- SHUTTLE CARRIERS SHARE LEG SPACE

IBCs handled
in buffer zone
adjacent to
the travel lanes



8: Twin / Shuttle / WS Platform

DMJM HARRIS | AECOM

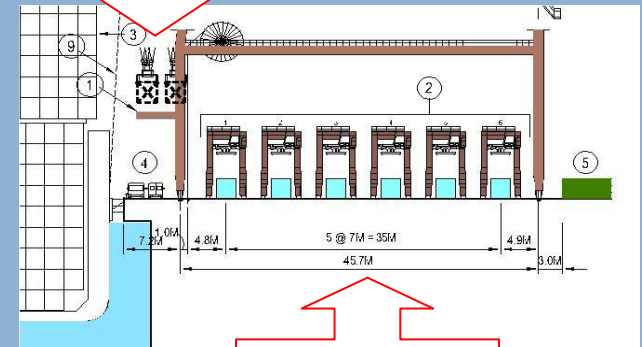


OPTION 8: TANDEM LIFT - SHUTTLE CARRIER - CONING ON PLATFORM

1:400

- 45.7M GAGE CRANES
- 6 WORKING LANES
- 1ST AND 4TH CRANE SHARE
- SHUTTLE CARRIERS IN INDEPENDENT LANES

IBCs handled
on a crane
mounted
platform



Implication is
wider crane gage

- On-crane IBC platforms have a lot of appeal
 - Safety
 - Space efficiency
 - Overhead protection for vessel service lanes
- Downstream IBC operations for tandem trucks is an option
- Downstream IBC operations may be the only option for Quad-20 operations
- Wider than 100' gage cranes have a lot of appeal with Twin-40 Operations

On-crane IBC Operations

DMJM HARRIS | AECOM



Transport Options for Twin-40 Cranes

DMJM HARRIS | AECOM

- Two single yard chassis/AGVs
- Twin-40 yard chassis/AGVs
- Straddle or Shuttle Carriers



– Pros

- Only one unit is required for the quay crane to execute a move
- Less expensive than strads
- Fewer drivers than with multiple single trailers

– Cons

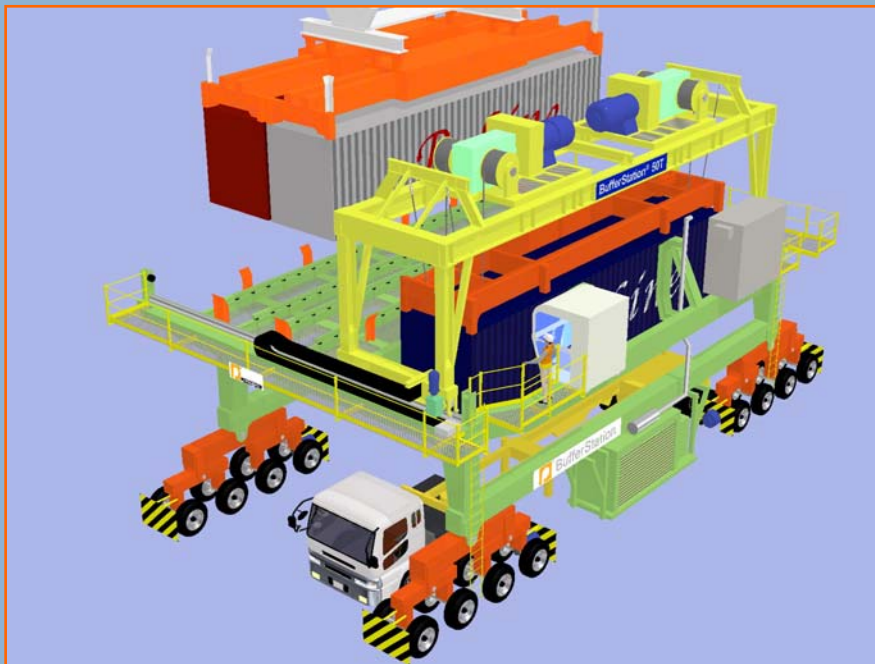
- Will not fit under a standard RTG
- More dangerous to drive – poor rear visibility; labor acceptance risk
- Quad 20s with four CY locations causes long cycle times
- IBC operations must occur on the crane



Paceco Twin BufferStation

DMJM HARRIS | AECOM

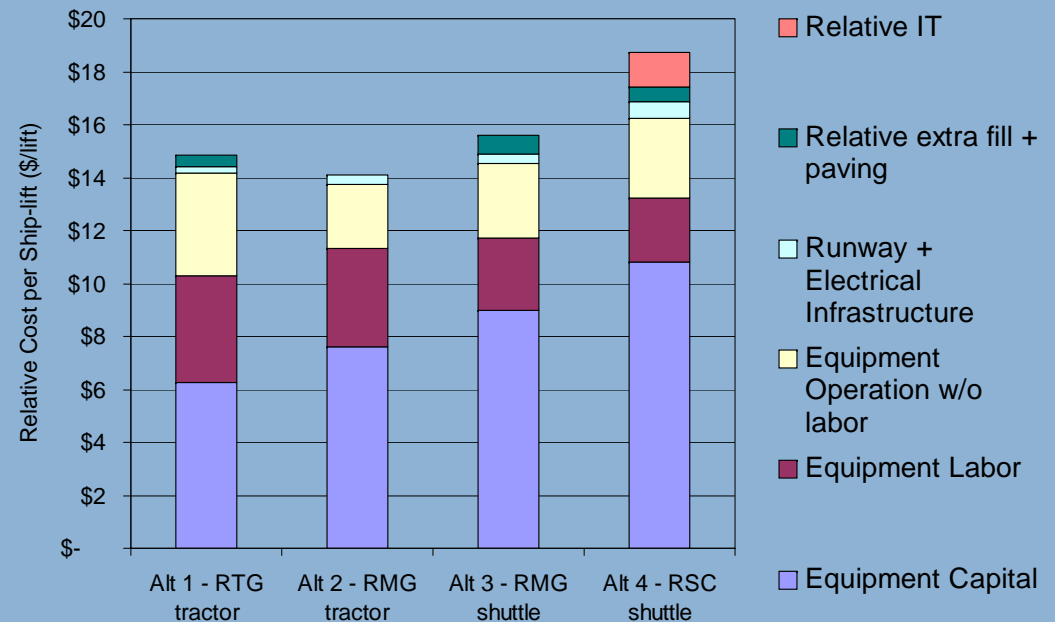
- Used to convert standard twin-40 lift crane to a dual hoist crane
- IBC operations on the BufferStation
- Separates tandem containers and spots them to single transporters

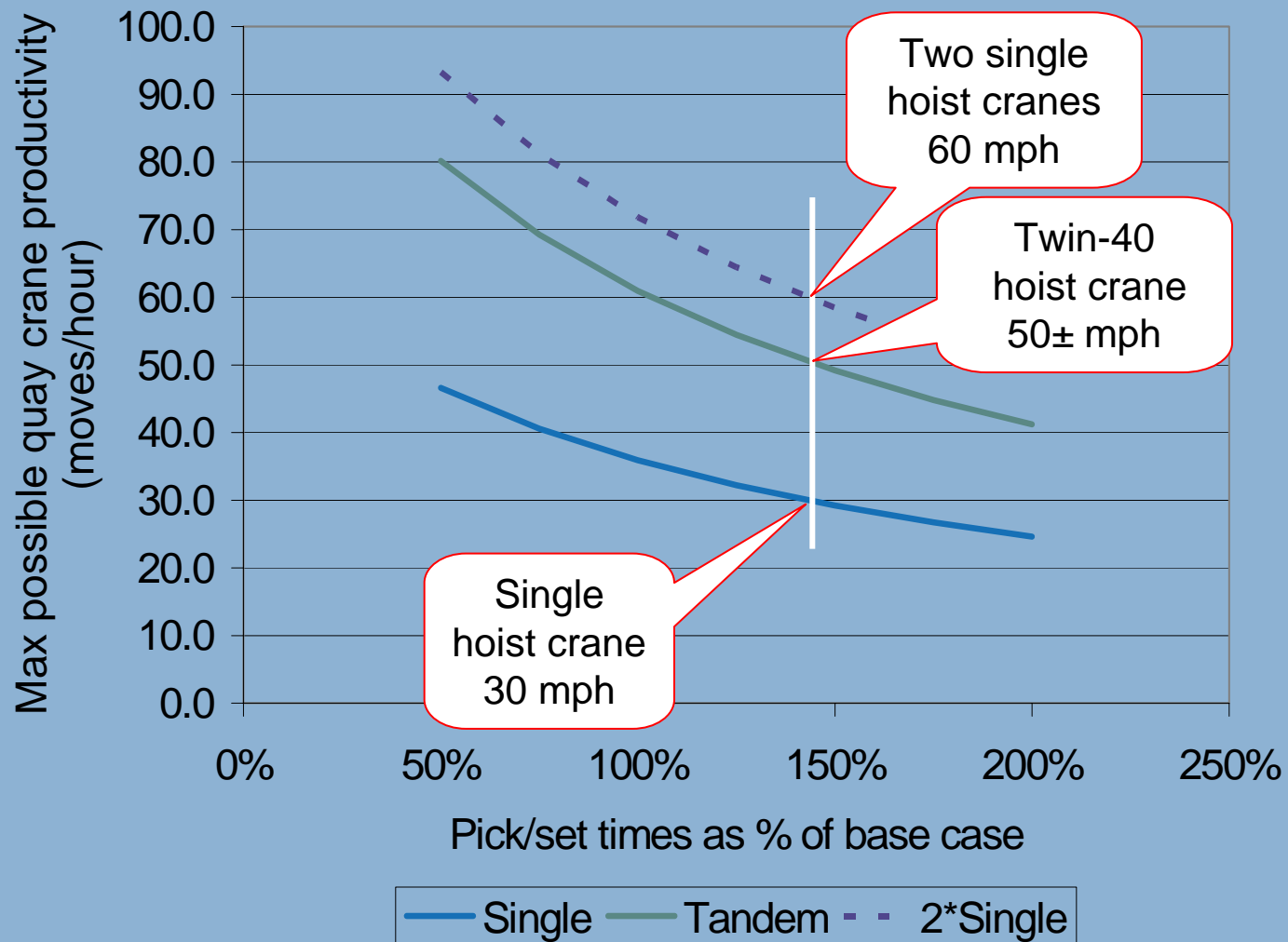


What is the actual productivity?

DMJM HARRIS | AECOM

- Simulation modeling is a great analysis tool
 - Spread Sheet Modeling
 - Discrete Event Modeling
 - Comparative data sets
- Decisions supported by statistical data





- Understand crane gage and wheel load implications
- Understand IBC operational options
- Understand yard transport system options
- Understand yard handling options
- Analyze the terminal as an overall system
- Analyze sensitivity to various storage strategies and equipment mixes
- Analyze expected productivity and cost per move

Is Twin-40 operations for you?

DMJM HARRIS | AECOM

