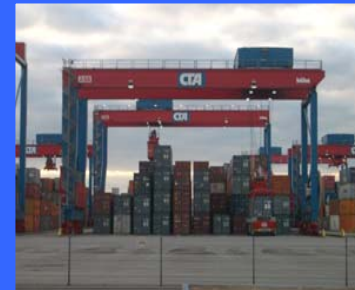
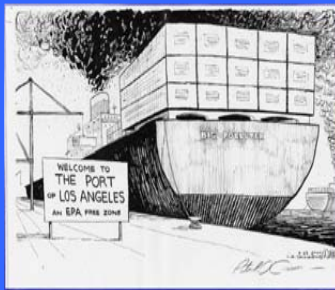


# Panel I: “An Automated Terminal is a Green Terminal”



## “Is the Semi-Automated or Automated Rail Mounted Gantry Operation a *Green Terminal*?”



Milan B. Lazic



January 11 – 13, 2006  
Jacksonville, Florida

**“A conference is a gathering of important people who singly can do nothing, but together can decide that nothing can be done.” \***

**\* Fred Allen, quoted in the Johannesburg Business Day**



# Present Situation at US Ports

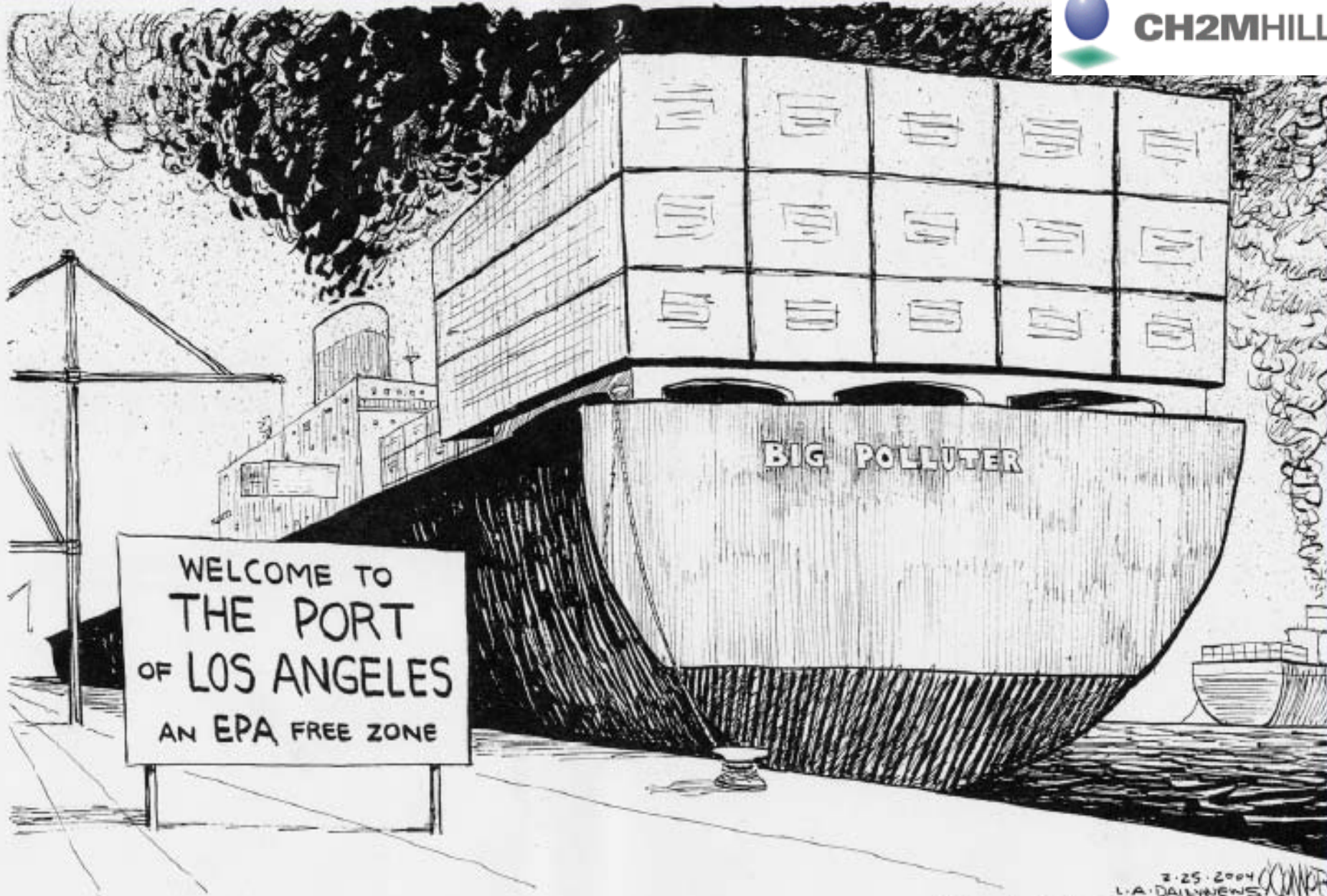
- Container cargo volume is constantly growing
- Ports experiencing growth in the double digits
- No land for expansion - No lateral expansion, only vertical

# Ports Business Objectives

- Improve container capacity per acre
- Densify their terminals
- Deployment of hi-density operations
  - Rubber Tired Gantry (RTG)
  - Rail Mounted Gantry (RMG)
  - Overhead Bridge Cranes (OBC)

# Present Environmental Encounter at Ports

- Ports are considered to be one of the biggest polluters
- Public and community challenges - fighting over impact of terminal growth and operations
- CA Environmental organizations delaying marine and intermodal terminals - *“Ports haven’t been doing enough!”*



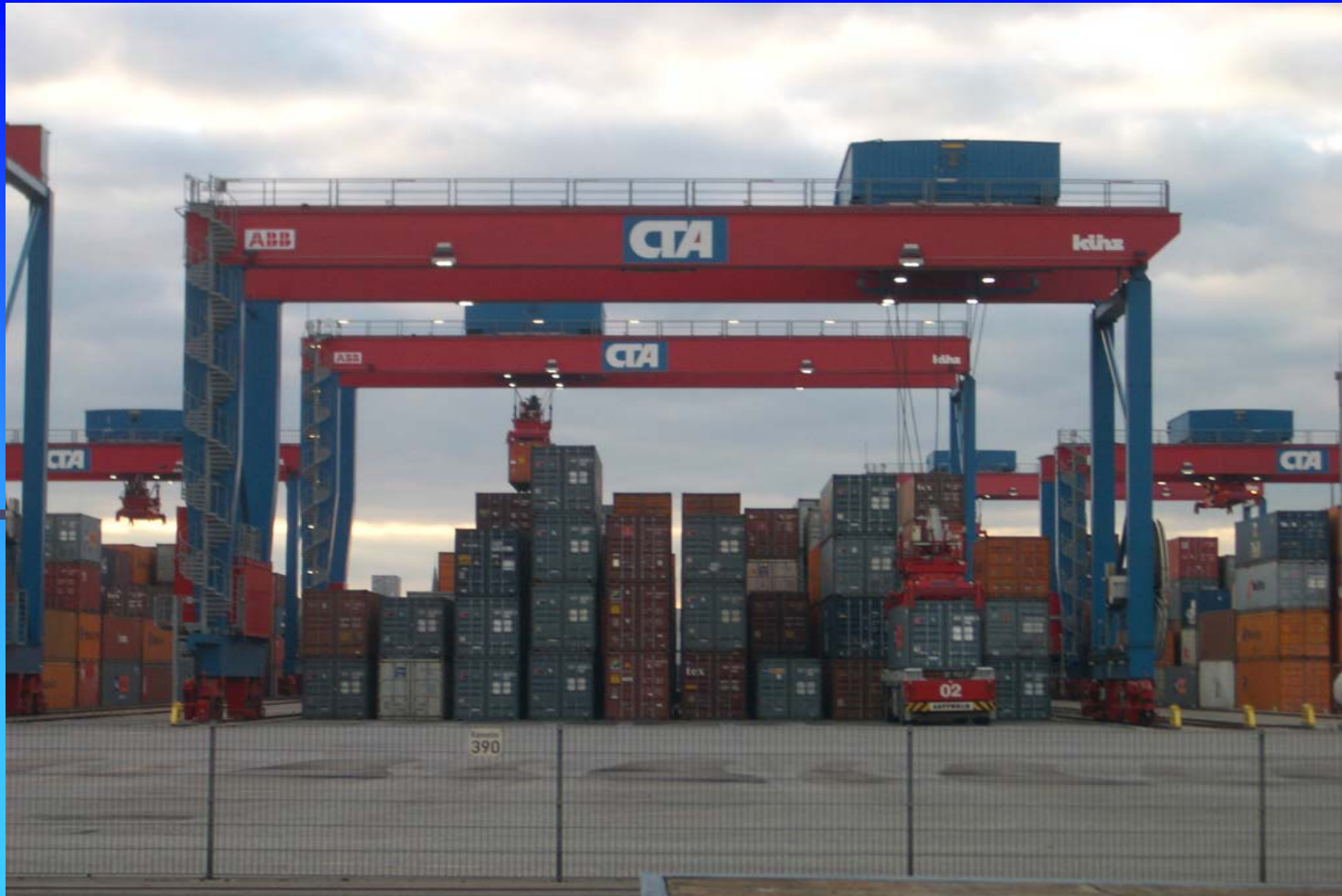
T. Shore, Bluewater Network - Air and Waste Management Association  
West Coast Region Conference on Port Air Quality Impacts, April 2004,  
Seattle, WA, USA

# Ports Investment into Green Initiatives

-  Protect communities from harmful port operation impacts
-  Distinguish themselves as a leader of environmental stewardship
-  Engage and educate the community and activists groups



# Rail Mounted Gantry Cranes (RMG) Operation





**Advantages of the  
Rail Mounted Gantry  
automated or semi-automated  
terminal operation over  
conventional ones from the  
environmental perspective**

# Why RMG

- Electrically powered
  - Efficient operation
  - Land utilization
  - Less travel distance for street trucks at terminals
- 
- Deployment: Semi-automated or automated
  - **Environmentally friendly**

# Matson Facility – California

(1981)



Courtesy of D. Reiss, Automated Terminal Systems, Inc.

# How RMG Operation Benefits Environmental Perspective

- Emissions are not produced
- Very low operating noise levels
- Low light requirements

# Air Emissions

- Electrically powered - no diesel emissions like with present operating equipment
- Improves air quality in ports

# Noise Pollution

- Electric powered operation much quieter than any diesel powered operation
- Automated operation considered - almost noiseless operation



# Light Pollution

- Light fixtures mounted under the frame
- Bright light used only when required
- No light poles throughout yard
  - Only perimeter for security reasons
  - At client's delivery side

Speaker's statement:

# The Rail Mounted Gantry Operation is the *Green Terminal* !



# RMG Operational Benefits Compared to RTG

- Regenerate power back to the network - cost savings in energy consumption
- No diesel engine and related maintenance requirements
- Gantry speed (10 – 13 ft/sec)
- Accurate movements - Locate box in any given time, no GPS required
- RMG can be manned but can be easily fully automated if required or permitted

# Additional Facts To Be Considered

- Infrastructure cost higher (electrification)
- Unit price of RMG is a bit higher than same span RTG (operation cost reduction - over compensate the additional cost)
- Fixed terminal design - fixed and fine tuned planning well before ordering cranes
- Equipment maintenance cost savings (diesel vs. electrical)

# Rail Track Requirements

## Rail track support

-  Piling
-  Concrete “sleepers” in gravel bed

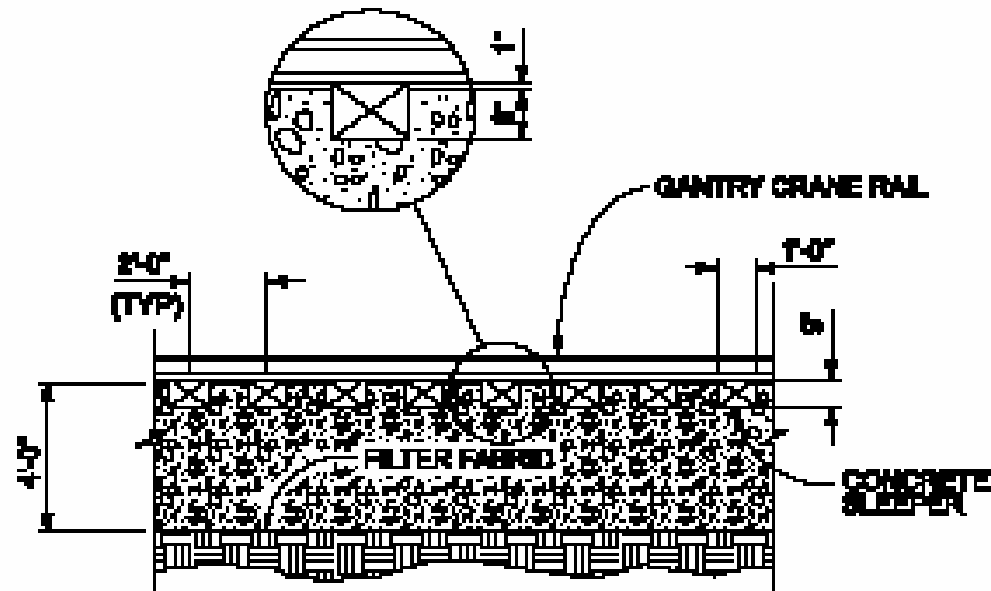
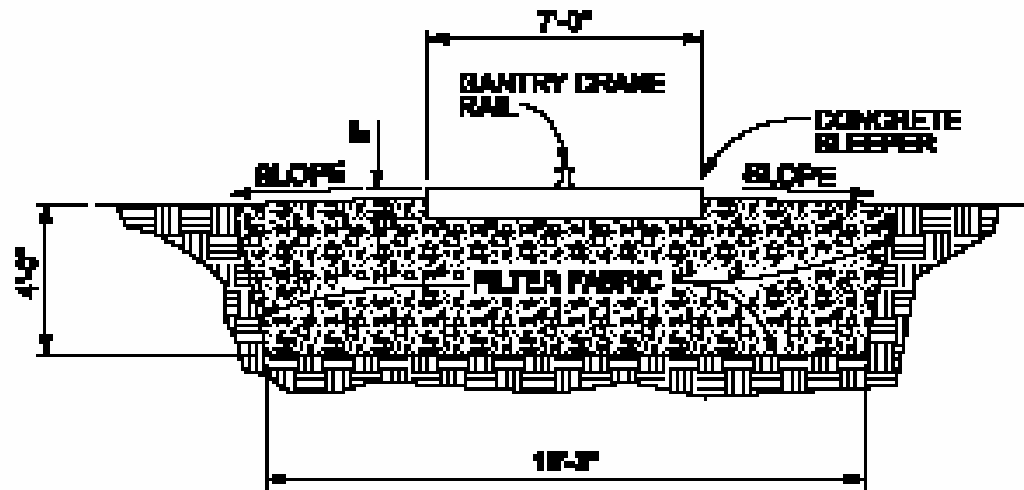
## Stringy manufacturer specified rail

**tolerances** (CTA – requested that RMG allow for 10 times limitation set in standard)

# Concrete Sleepers



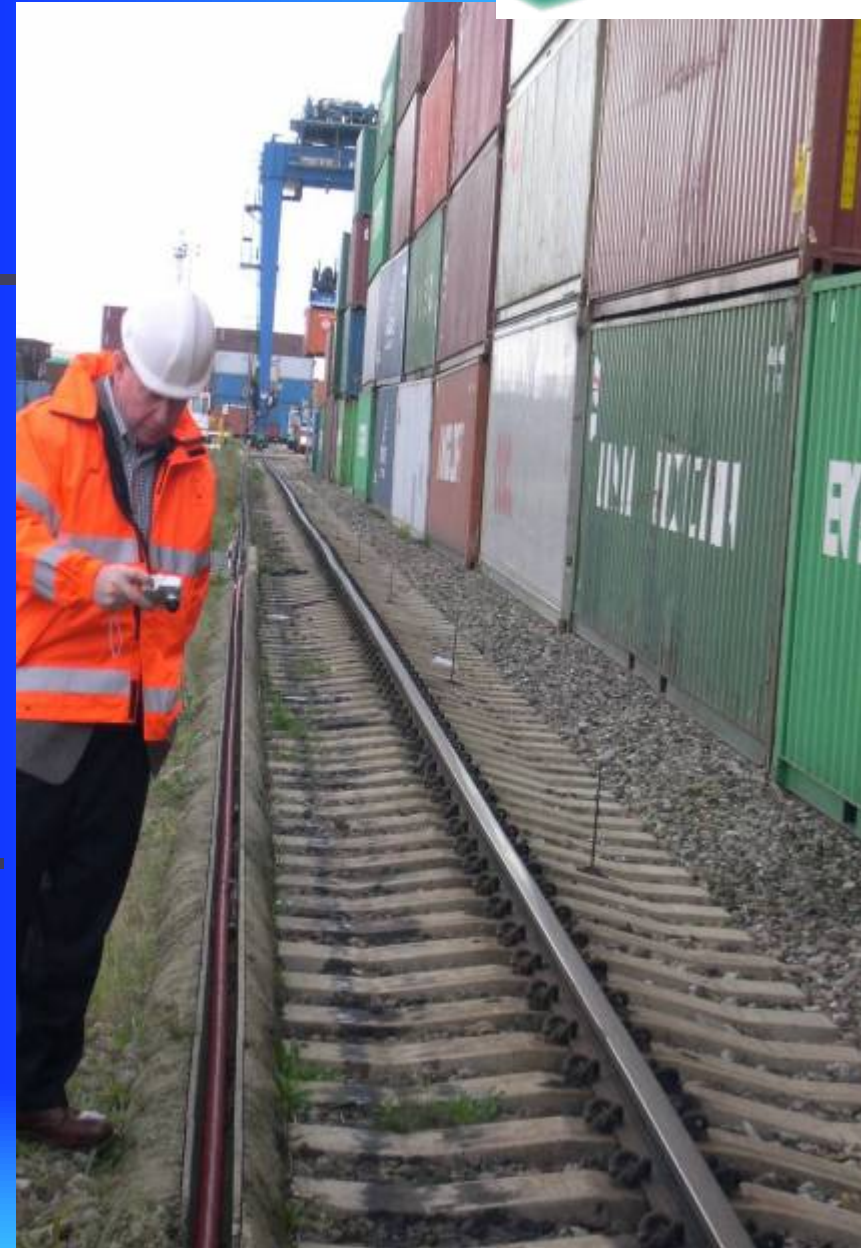




**RMG TRACK ANALYSIS  
RAIL SLEEPER SYSTEM**

# Rail Tolerances

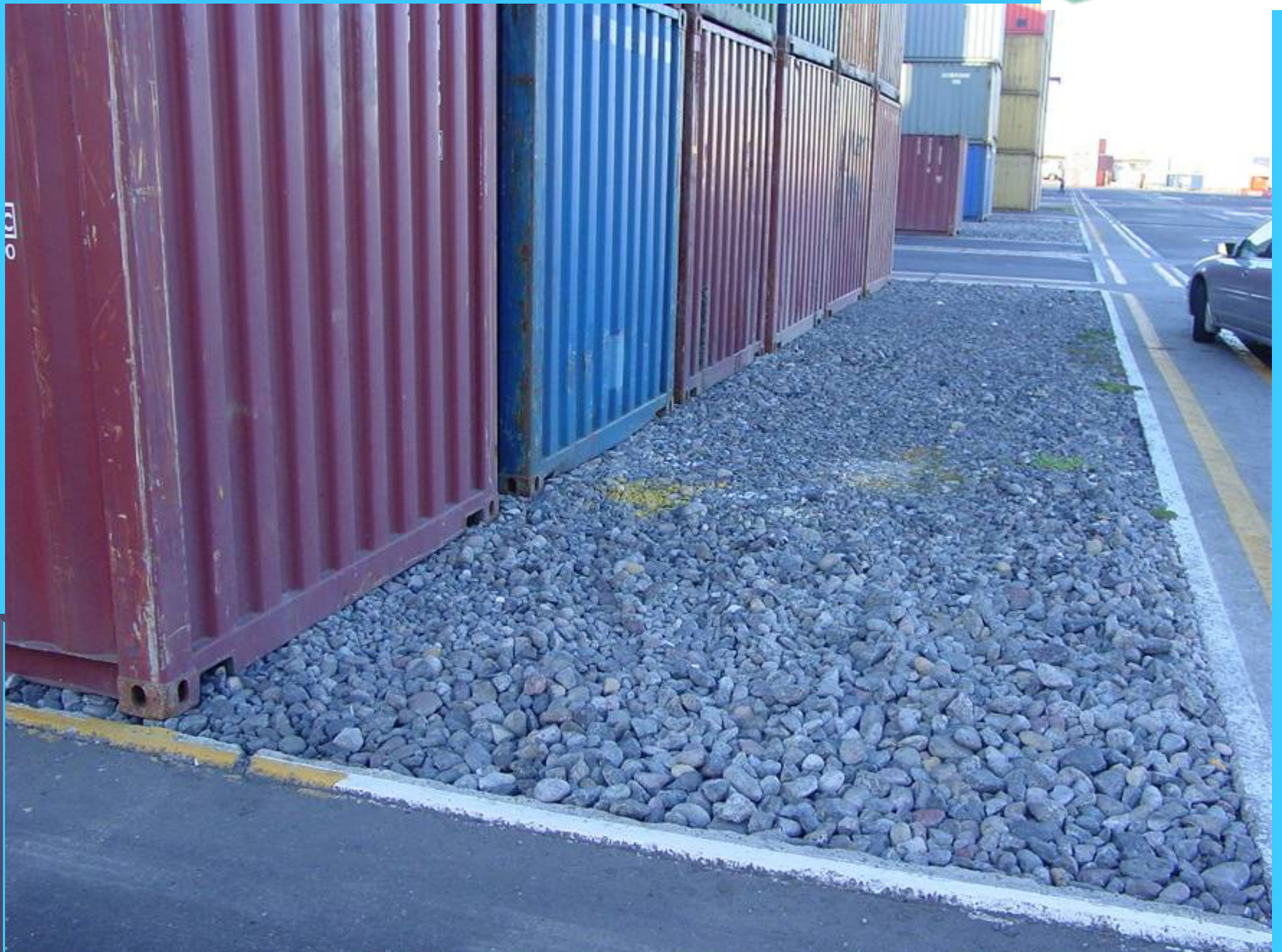
Rail grade can be adjusted over time, as necessary, by raising the sleepers and compacting additional ballast under them.



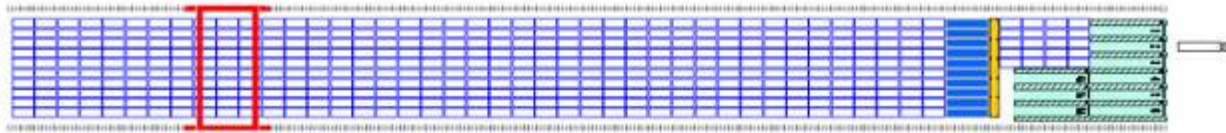
# Container Blocks Area

- Containers grounded on gravel or crushed stone curbed bed
- Reduces development cost - minimal maintenance cost
- Improved drainage with under drain system within the gravel bedding

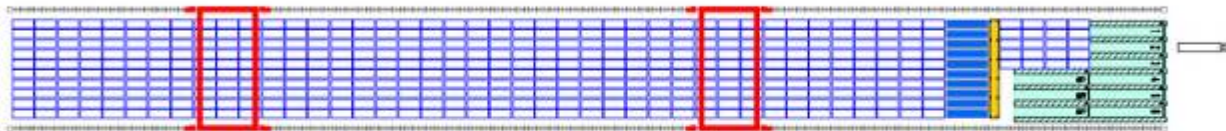




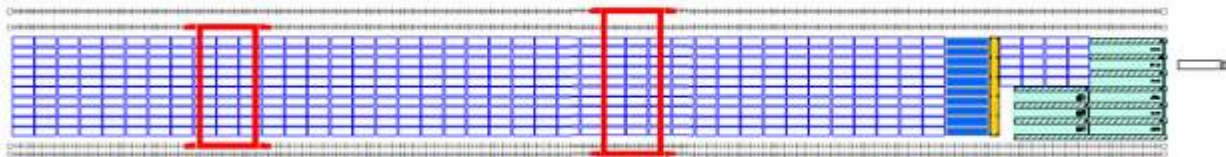
# RMG Operation Types



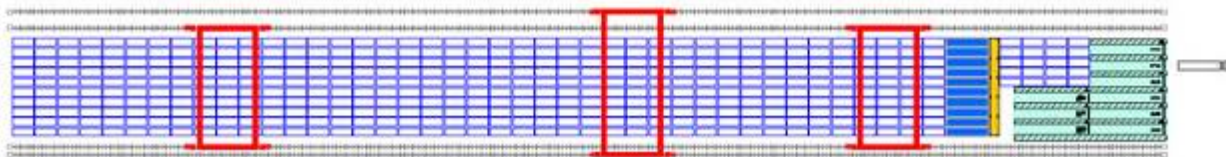
SINGLE RMG OPERATION



TWIN RMG OPERATION






CROSS OVER RMG OPERATION



TRIPLE RMG OPERATION

# CH2M HILL Projects Utilizing RMG as the Operational Scheme

-  APMT - Portsmouth, VA
-  New York Container Terminal - Staten Island, NY
-  Port of Tacoma – Tacoma, WA



# APMT



# NYCT - Parcel C







# NYCT – Parcel C Facts:

- Container Terminal: 36 acres
- RMG semi-automated operation
- Block size: 10W / 6H (1 / 5)
- Annual throughput: 435,000 TEU
- Lifts / Acre / Annually: 12,000 TEU / acre
- Estimated capital cost: \$ 210 M (includes cost of all operating equipment)
- ROIC (if completed by 2008): Year 2030

# Port of Tacoma

## Washington United Terminal Densification Study

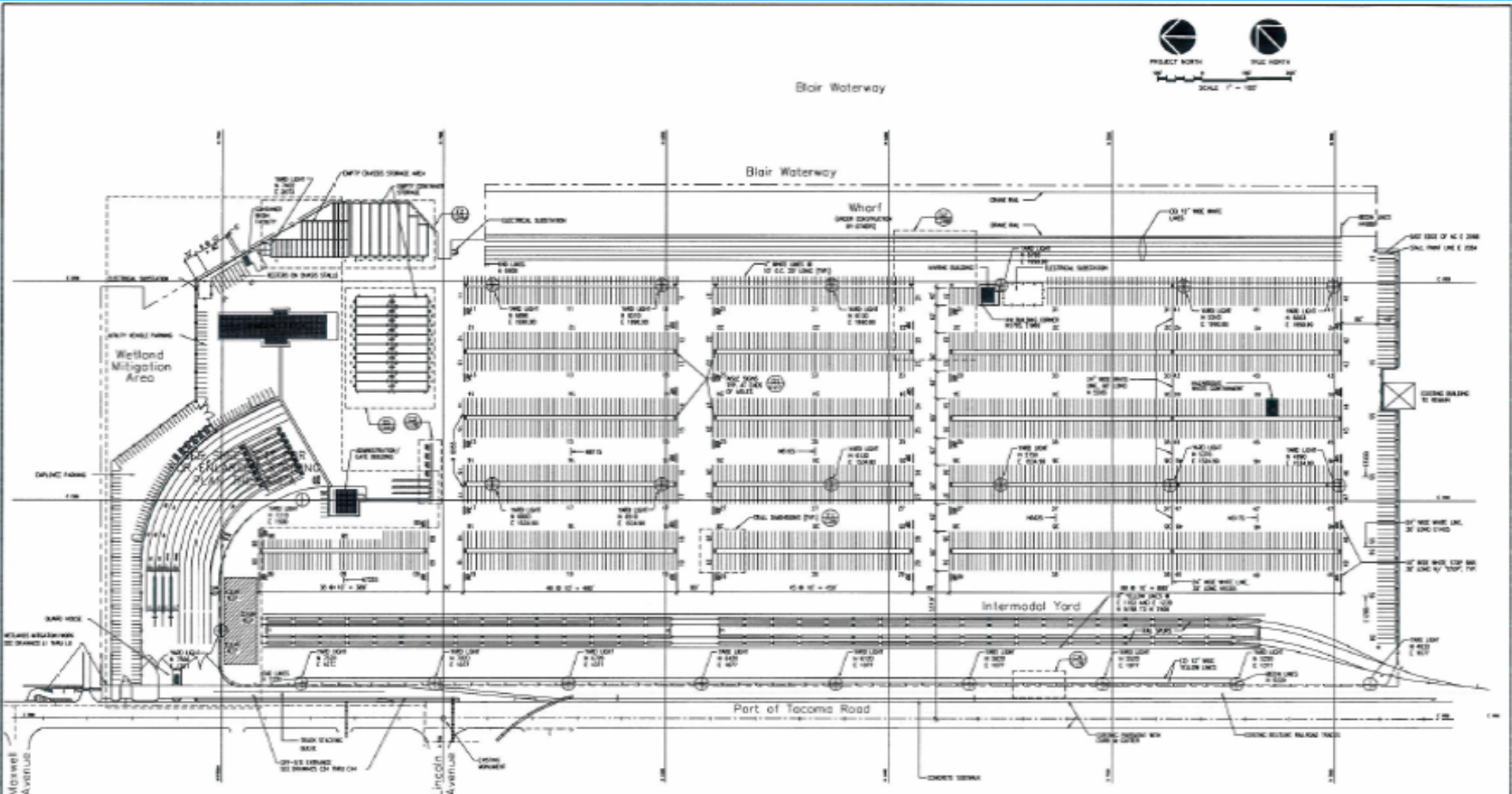
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### Deployment of RTG or RMG Operation

- Maximum capacity
- Annual throughput
- Required infrastructure upgrade
- Capital cost requirements
- Construction phasing



# WUT – Existing Site Plan



15 DECEMBER 1998  
 RECORD DRAWING  
 Based on "Request for Construction" drawing dated 3/11/98  
 as shown on these recorded construction instructions  
 compiled by WA. Seigel, Inc. and the Port of Tacoma, U.S.A.  
 ISSUED FOR CONSTRUCTION 3/11/98



**PORT OF TACOMA**  
 P.O. BOX 1837 TACOMA, WASHINGTON 98401  
 (253) 383-1841

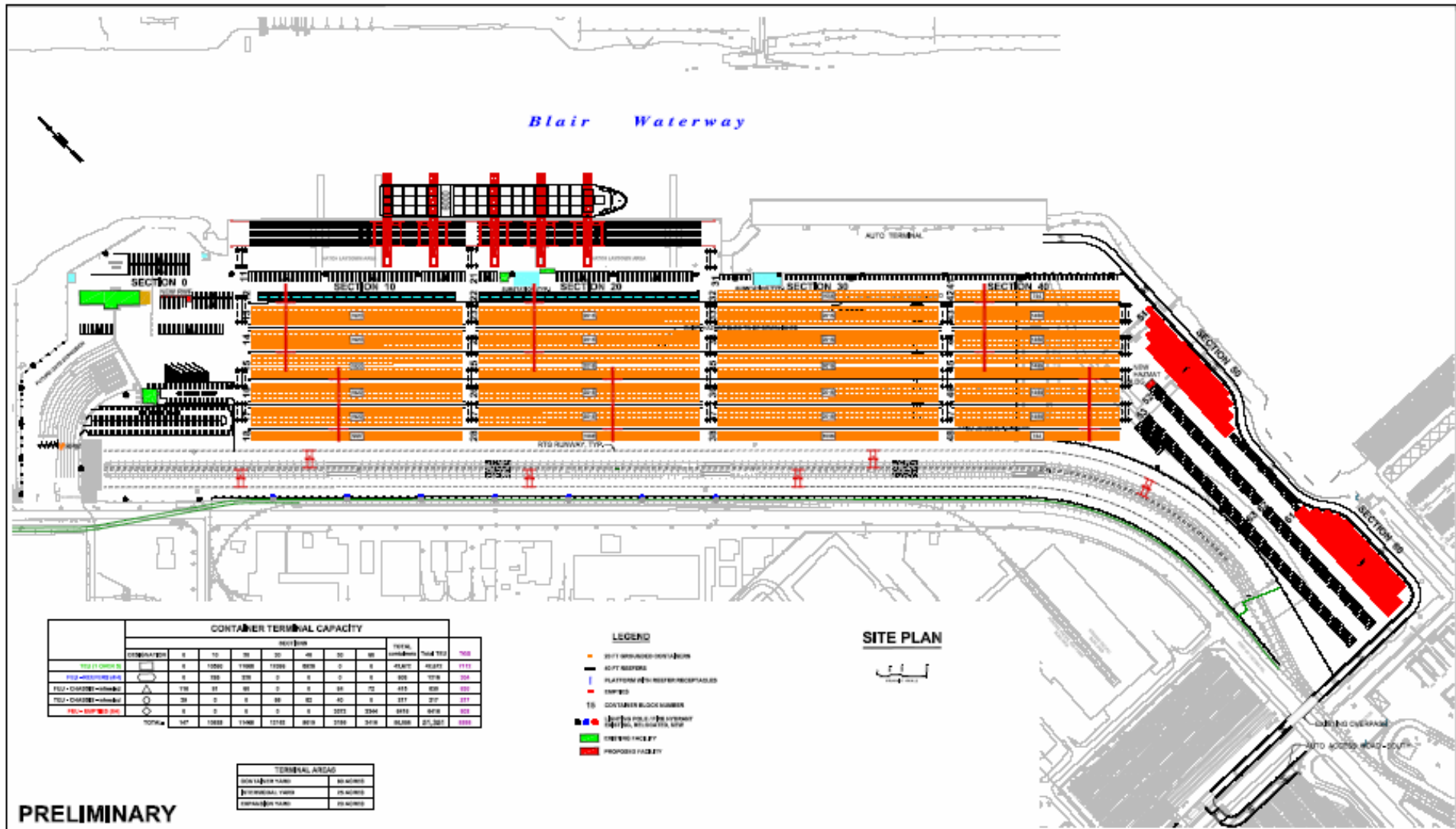
CONSULTANT  
**SITTS & HILL ENGINEERS, INC.**  
 CIVIL & STRUCTURAL ENGINEERING  
 1000 1st Avenue, Tacoma, WA 98401

|          |             |            |       |      |      |
|----------|-------------|------------|-------|------|------|
| DATE     | BY          | CHECKED BY | DATE  | BY   | DATE |
| 12/15/98 | AS-BUILT BY | DATE       | FILED | DATE |      |
|          |             |            |       |      |      |

HYUNDAI TERMINAL  
 SITE STRIPING PLAN

|                        |    |
|------------------------|----|
| AUTOCAD FILE NUMBER    | C9 |
| 5020                   |    |
| DRAWING NO. EP-5020-26 |    |
| CONTRACT NO. 97805H    |    |
| SHEET NO. 37 OF 105    |    |

# WUT – RMG Site Plan



**PRELIMINARY**

WASHINGTON UNITED TERMINAL  
RMG LAYOUT  
OPTION 2



PORT OF TACOMA, P.O. BOX 1007  
TACOMA, WA 98401 25488-0001

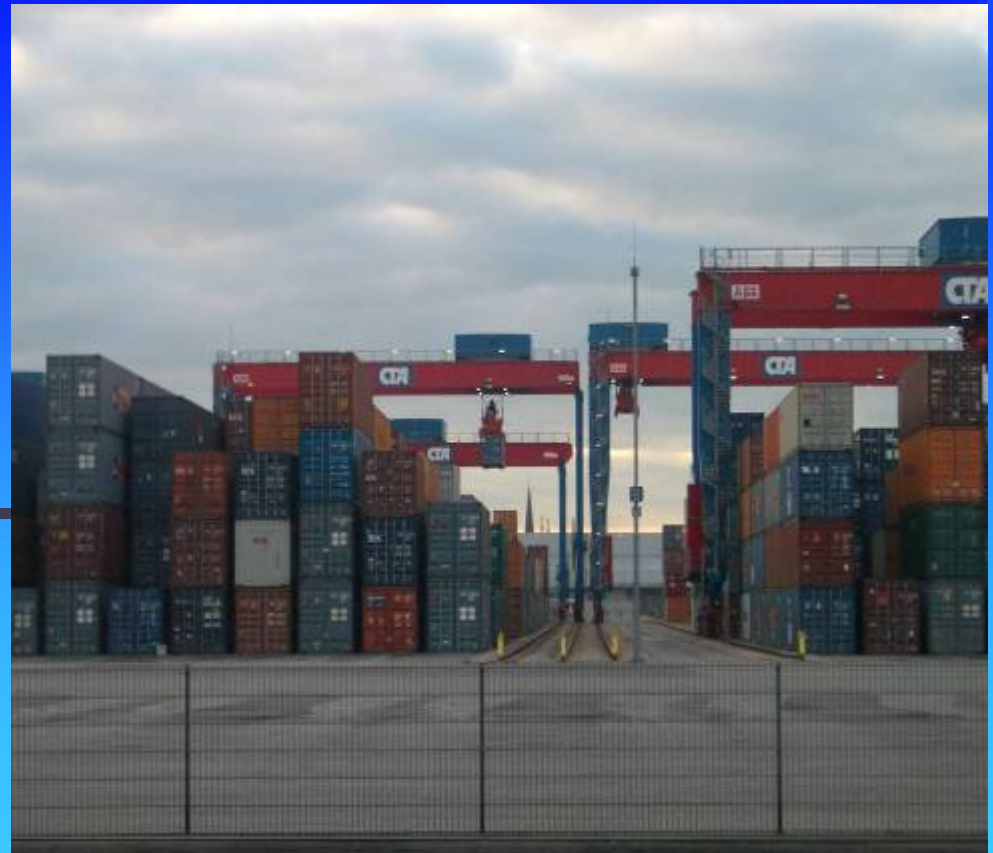
# WUT (80 acre CY) Facts

| Operating System | Capacity (TEU) | TGS (TEU) | Annual Throughput (TEU) - Yard |
|------------------|----------------|-----------|--------------------------------|
| Chassis          | 6,141          | 6,141     | 448,300                        |
| RTG              | 24,300         | 5,093     | 1,412,600                      |
| RMG              | 41,081         | 7,412     | 2,687,300                      |





# CH2M HILL Services to Clients for Assessment of Impacts

-  Technical
-  Economical
-  Environmental
  -  Emissions
  -  Pollutions





# Challenges for “Total Green Terminal”

## Trucks

-  Hustlers - container and rail yard
-  Street trucks




## Vessels

-  Integrate slow approach to ports into sailing schedules
-  Shore Power “Cold ironing”



Muuga Container Terminal - Estonia

# Conclusion

-  Do our best in the process to plan and build the greenest terminal possible
  -  Work together to make the environment safer for us and future generations
- 
-  *“What have you done today to make a green terminal?”*

# Thank You!



# Speaker Contact Information

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