



Alliance of the Ports of Canada, the Caribbean, Latin America and the United States

# Preparing Infrastructure for Cargo: Inside The Gates Sustainable Planning, Design, & Construction of A Marine Cargo Handling Terminal of The Future

AAPA HNE Seminar: June 6,  
2006



# Our Participants Are:

- Joe Monaco: Port Authority of New York and New Jersey: Moderator/MC
- Wayne Grotheer, P.E: Port of Seattle: Moderator/MC
- Jay Jahangiri: Weston Solutions, Inc/TRE Consulting, Inc: as the Busy Port USA Environmental Director
- Jack Word, PhD: Weston Solutions, Inc As Beneficial Reuse/Sediments Management Service Provider to Busy Port USA
- Peter R. Vandermat, Ing: JWD Group, a Division of DMJM Harris | AECOM
- Christine Papageorgis, PhD: EA Engineering and Science

# Ladies and Gentlemen: Welcome to "BUSY PORT USA"



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# The Environmental Director's Office:

- Meet Jay Jahangiri, M.S., REM, REA, CESM, REEW, RIAQM, RMT, CUO, CIPS, he is the Environmental Director of Busy Port USA:



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# Busy Port USA Location of Marine Cargo Handling Terminal of Future



# The Assigned Challenges Are:

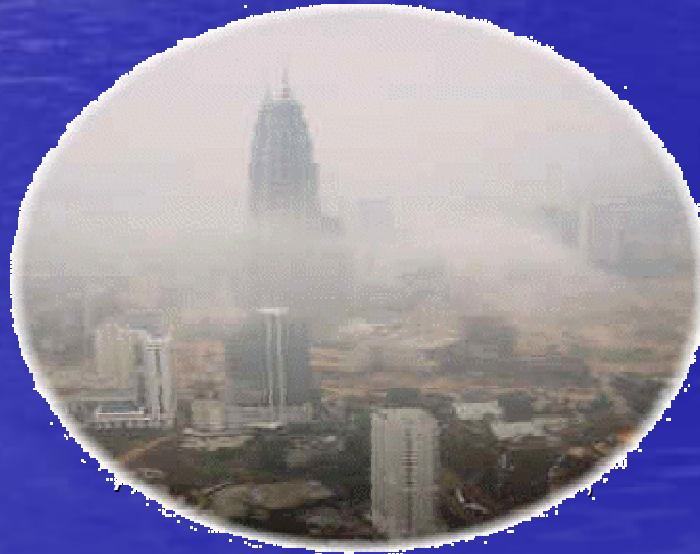
- Jay received a call from his superiors and is challenged with the following:
  - Develop a "Sustainability Program and Policy"
  - Ensure that all present and future port development are done in a sustainable way for the port. The assigned challenges are to develop sustainability features for:
    - Planning
    - Design
    - Construction

Of all future cargo handling terminals at Busy Port, USA



# Sustainability Definition:

- Sustainability” means protecting and managing our resources to meet current needs without sacrificing the needs of future generations and natural systems.
- Sustainability means meeting the needs of current generations without impairing the ability of future generations to meet their own needs, and is an important strategy for the long-term health of the state’s environment, economy, and citizens.”
  - -- Former Washington Governor Gary Locke, 2004



# National Goals Toward Sustainable

**Development** (Extracted from the President's Council on Sustainable Development's report, *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment* of February 1996)

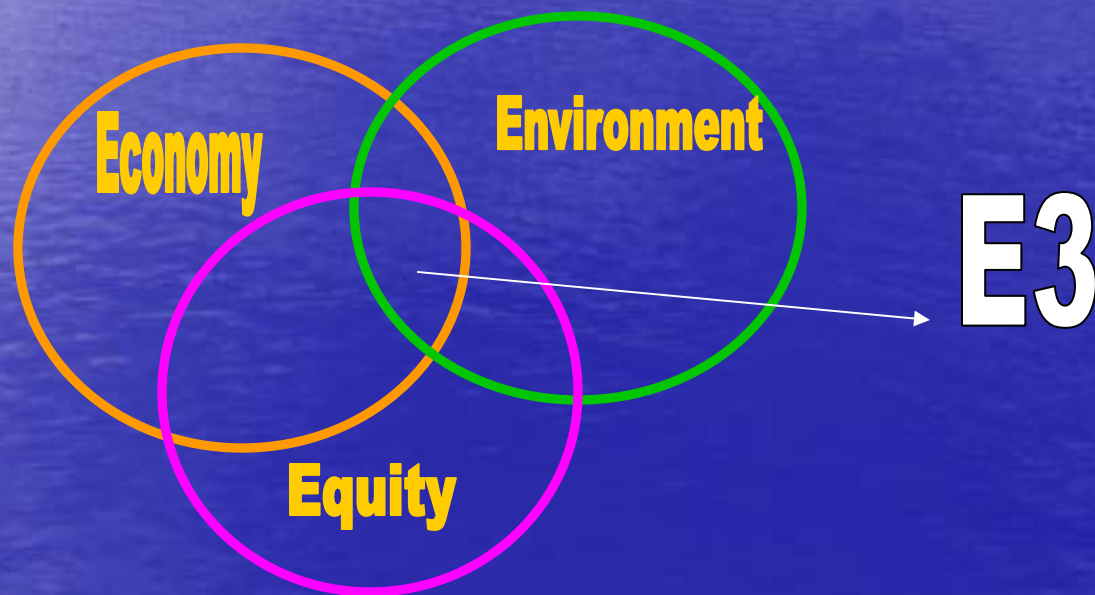
- National Goals: Seek economic prosperity, environmental protection, and social equity together.
- Goal 1: Health and the Environment
- Goal 2: Economic Prosperity
- Goal 3: Equity
- Goal 4: Conservation of Nature
- Goal 5: Stewardship
- Goal 6: Sustainable Communities
- Goal 7: Civic Engagement
- Goal 8: Population
- Goal 9: International Responsibility
- Goal 10: Education





# What is Sustainability?

- Sustainability Trinity: Economy, Environment and Equity (Society): E3



# What is Sustainability About?

- Sustainability is about developing a culture, then policy and programmatic goals, objectives, and targets that the planning, design and construction activities adhere to
- Programmatically: Need to Assemble a Multi-Disciplinary Team and Provide Sustainability Training/LEED Certification
- Develop Port wide sustainability forum and include the tenants
- Educate and empower the tenants to become aware of sustainable development



# PORT BUSY USA SUSTAINABILITY PROGRAM/POLICY DEVELOPEMENT

- **Busy Port USA: sustainability policy: "triple bottom line": E3**
- Economic vitality, Social Equity and Environmental Responsibility
- Reducing energy (promote use of Domestic/Renewable source of energy) Consumption/Dependence
- Green Planning, Design, and Construction
- Promoting local/Regional Jobs
- Strengthen Community Relationships

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# Sustainability Policy Statement For Busy Port USA:

- It is the policy of Busy Port USA to incorporate sustainability principles and concepts in the planning, design, and construction of all facilities and infrastructure projects to the fullest extent possible, consistent with budget constraints and customer requirements. Busy Port USA has adopted the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Rating System as well as the Army Corp of Engineers SPiRiT as tools to apply sustainable principles and as a metric to measure the sustainability achieved through the planning, design and construction process.

# Sustainable Planning Goals/Objectives at Busy Port USA

- Increased energy conservation and efficiency
- Increased use of renewable energy resources
- Reduce Port wide air emissions
- Reduction or elimination of toxic and harmful substances in facilities and their surrounding environments
- Improvements to interior and exterior environments leading to increased productivity and better health
- Efficiency in resource and materials utilization, especially water resources (Water Quality: Storm water management, Waste water control and water consumption)
- Selection of materials and products based on their life-cycle environmental impacts
- Increased use of materials and products with recycled content
- Recycling of construction waste and building materials after demolition
- Reduction in harmful waste products produced during construction



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# Busy Port USA Sustainable Development Goals/Indicators Matrix

Programmatic Goals/Objectives	Program Feature: Sustainability Indicators	Sustainability Targets/Progress Indicators: baseline-YTD=Net	Time Table
1. Energy Efficiency	Decrease port wide energy consumption	30 %	2006-2014
2. Increase the use of domestic/renewable sources of energy/fuels	Wind, solar hydrogen cell technology, and other domestic fuels and energy sources	35 %	2006-2014
3. Efficiency in resource and materials utilization, especially water resources (Water Quality: Storm water management, Waste water control and water consumption)	3. Water Quality: 3.1. Storm Water 3.2. Waste water control 3.3. Water Consumption	3.1. Meet port municipal/industrials storm water requirements and recycle storm water 3.2. Recycle waste water by 46% 3.3. Decrease water consumption by 45 %	2006-2014
4. Port-wide emission reductions	4. Holistically reduce: 4.1. Nox 4.2. PM 4.3. Co2 4.4 Other contaminants	55%	2006-2014
5. Reduction or elimination of toxic and harmful substances in facilities and their surrounding environments	5. Utilize and remediate Portfields/Brownfields and environmentally challenged properties	45%	2006-2014
6. Improvements to interior and exterior environments leading to increased productivity and better health	6. Indoor Air Quality	30 % productivity index	2006-2014

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# Sustainable Planning: A Start

- Cradle of the Project: Begin the Environmental Review and Documentation Process:
- Environmental Impact Review (Federal: NEPA; State: SEPA/CEQA)
- Site sitting selection criteria:
- choosing and utilizing existing Brownfields/Portfields
- Choosing naturally deep and non-sediment building areas
- Choosing a location with upstream source controls on runoff and NPDES discharges so that sediment in harbor area is not contaminated by sources outside of its control

# Site Selection Criteria:

- Water side: Locate port in non-depositional environment to minimize maintenance dredging frequency
- Locate the site in area with sediment whose deepening material is easily dredged
- Select environments that allows easy maintenance (hard packed sediment basement layers – not rock or bogs)
- In areas that do not lend themselves to excessive sediment build up and self scowering
- Be aware of location with upstream NPDES discharges: TMDL issues



# Site Selection Criteria:

- Land side: Utilize existing environmentally challenged parcels: (Portfields/Brownfields)
- Land side: Co-locate next to either industries/port's industrial tenants that can potentially use each others by products, wastes, etc.





# Environmental Impacts:

- **Air Quality:** increased air emissions:
  - Land side: From cargo handling equipment
    - Trucks
    - Rail
    - Stationary sources
  - Water side:
    - Vessels
    - Dredging Barges/equipment
    - Other sources

# Water Quality

- **Water Quality:** impact to run off quality and quantity:
- Water side: contaminated sediments
- Land side: storm water management issues: industrial, municipal, and construction E&S: TMDLs
- Waste Water recycling and reuse
- Water Consumption

# Hazardous Waste:

- **Brownfields/Portfields clean up:**
- Remediation of existing contaminated sites: Water side and land side
- Management of contaminated sediments – minimize areas and collocate with industrial tenants or nearby industries that might be able to make use of waste products from another industry



# Energy (including fuels) Efficiency (E2) Issues:

- E2: for buildings,
- E2: for infrastructure & equipment:
- Energy efficiency issues for yard equipment
- Clean diesel/Alternative fuel truck issues
- Clean diesel/Alternative fuel rail issues
- Traffic decongestion strategies and smart roads
- SECA zone fuels For Vessels

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# Inside the Gates Traffic Management Issues:

- Rail, trucks, Vessels, etc: sustainable traffic management issues has a very close nexus with the air quality management issues.
- Common Goals: Any significant impacts will be addressed via mitigation measures that do not only address the above significant impacts but also take into account the E3 sustainability.
- Other Impacts: Light, Noise, Cultural/Archeological, etc

# Sustainability Reviews and Audits

- Sustainability Reviews/Audits: Adaptive Management strategy to improve sustainability based on results of audit.
- When to do it?
- How to do it? (let's go to Aston Hinds in our audience group)
- Making sure the planning process is in line with the sustainability metric goals and objectives
- Environmental Justice Vs. Social Justice/Equity
- Planning for a sustainable and LEED certified cargo handling terminal
- LEED Certification requirements: Both for Buildings and People
- Value of LEED certification: Need for Industry Specific certifications



# Sustainable Mitigation & Planning Measures: Water side & Landside:

- Building oriented to minimize solar heat gain
  - ✓ Building & parking area oriented and finish elevations set to minimize earthwork
  - ✓ Maximize use of native and other salt, wind & drought tolerant species
  - ✓ Impervious surfaces minimized to lower heat gain and enhance percolation of rainwater
  - ✓ Retention basin incorporated into the landscape to retain excess rainwater and allow percolation

# Sustainable Mitigation & Planning Measures Water side & Landside:

- ✓ Solar water heaters ; Green Grid
- ✓ Building management controls utilize a direct digital control (DDC) electronic system
- ✓ HVAC system uses non-CFC refrigerant, low face-velocity coils and filters, and a variable-air-volume distribution system
- ✓ HVAC system with high-efficiency motors with variable-speed drives



# Sustainable Air Quality Mitigation & Planning Measures: Water side & Landside:

- Consider use of electric or clean diesel dredges during the dredging process
- AMP Installation in docks
- Zero/Low emission cargo handling (electric, hydrogen cell, etc) infrastructure/Equipment: cranes, yard equipment, etc
- Consider solar and wind energy replacements or supplementation where appropriate to minimize air emissions
- Green lighting for Green buildings





# Sustainable Mitigation & Planning Measures

- Water side & Landside: Sustainable Water Quality Mitigation Measures:
  - Implement Innovative storm water management measures
  - Develop areas that mitigate runoff, remediate contaminants and create valuable environmental habitats/areas associated with the Port (e.g., Port of Oakland middle Oakland Harbor eel grass development).
  - Other beneficial use of sediments
  - Water Conservation: Water conserving plumbing fixtures

# Sustainable Mitigation & Planning Measures

- Traffic Management inside the gates (=Air Quality Benefits)
- Innovative gate management technology for trucks as sustainable mitigation measures
- Consider ship to rail transfer of containers
- Ship to barge and barge distribution to other river and ports near distribution centers: strategic alliance among ports



# Sustainable Mitigation & Planning Measures: E2 Mitigation Measures:



- Energy Efficiency (Cont) Green roofs: provide many advantages over traditional black or white reflective rooftops. Whether they are used for energy reduction, noise insulation, or stormwater management, for example, the appeal of green buildings is vast.
  - ✓ High-pressure sodium light fixtures for site and building exterior
  - ✓ Interior light fixtures used electronic ballasts, T-8 fluorescent tubes, & compact fluorescent lamps
  - ✓ Offices equipped with dual light switches to turn off selected lamps when sufficient daylighting
  - ✓ Larger rooms have zoned light switching
  - ✓ Work areas use modular furniture with integrated task lighting
  - ✓ **Consider using solar and wind energy replacements or supplementation**



# Sustainable Mitigation & Planning Measures: E2 Mitigation 7 Planning Measures:

- ✓ Daylighting and use of high light reflectance ceiling materials
- ✓ Walls & roofs are thermally insulated with air cavities, and a combination of rigid and blanket insulation
- ✓ Overhangs used to temper thermal gain on the glazing
- ✓ Limited East and West facing windows to reduce thermal gain
- ✓ Air locks at the two main entrances to reduce heat and humidity gain and to lower contaminants from foot traffic

# Indoor Air Quality Sustainable Mitigation & Planning Measures

- ✓ Externally insulated air conditioning ductwork used to minimize microbial growth within the ductwork
- ✓ Low VOC carpet tiles with an integrated anti-microbial feature
- ✓ Ceiling tiles treated to inhibit growth of mold and mildew
- ✓ Low VOC wall bases with low VOC adhesives
- ✓ Low VOC porcelain wall and floor tiles that do not support mildew or bacterial growth
- ✓ No VOC linoleum flooring with 100% solvent free adhesives
- ✓ Low odor, solvent free and 100% acrylic based interior paints