PORT CLEVELAND

Global Reach. Local Benefit.

Sediment Management

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Maritime and the Economy

The Port of Cleveland spurs job creation and helps our region compete globally by connecting local businesses to world markets through the most cost-effective, method of freight transportation in the region.

- 13 Million tons of cargo
- 18,000 jobs
- $112 million in annual local/state taxes
- $1.8 billion in annual economic activity

Environmental Stewardship: A Green Port on a Great Lake

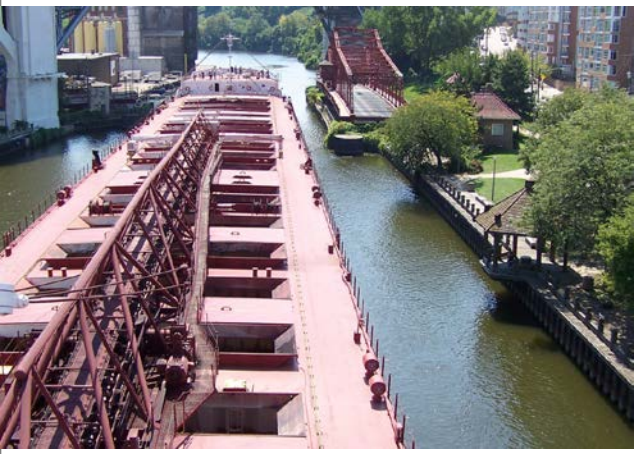
- Keeping the river and lakefront free of floating debris
- 88-acre Port of Cleveland Lakefront Nature Preserve
- Maritime transportation has a lower carbon footprint, greater fuel efficiency, and reduces roadway congestion

The Port of Cleveland helps improve the quality of life in our region and helps safeguard two of our greatest natural assets – the Cuyahoga River and Cleveland's Lake Erie shoreline.

Development Finance

Stimulating economic development by connecting private investors with landmark projects throughout our region

- 70+ projects totaling nearly $2 billion in private investment since 1993
- Employed 16,000+ people
- 9.3 million + square feet of new office, industrial, retail, health-care and cultural space
- 1st Port in the country to help make the New Markets Tax Credits available to in our region



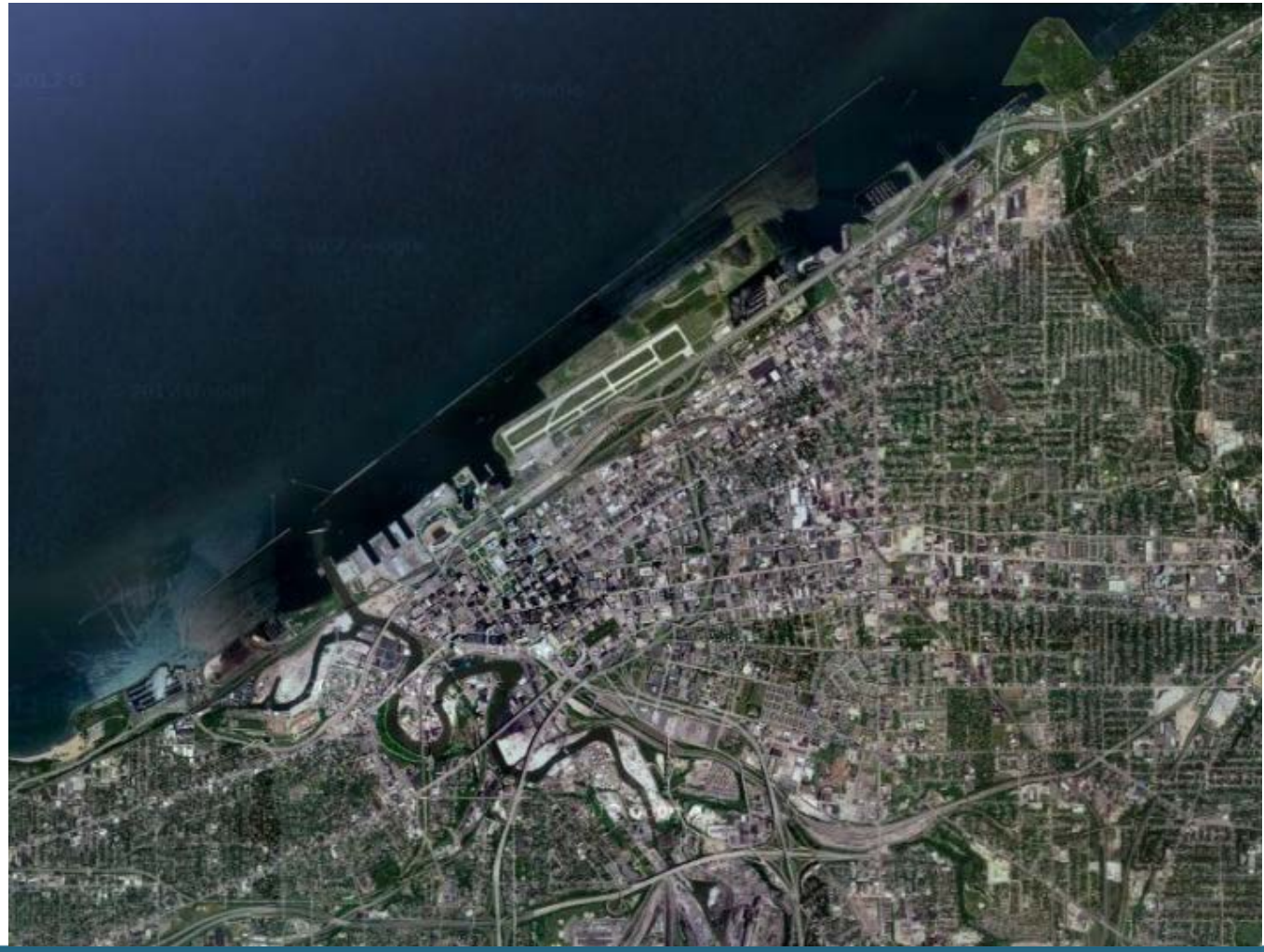
The **Port** is a **partner** in **community development** - creating **public spaces**, **protecting our waterways**, and helping to **reinvigorate our region**.

Cleveland Harbor

6 miles of breakwater

5.9 mile Ship Channel on the Cuyahoga River + 1 mile on the Old River Channel

Depths of 28 feet in outer harbor and 23 feet in the River



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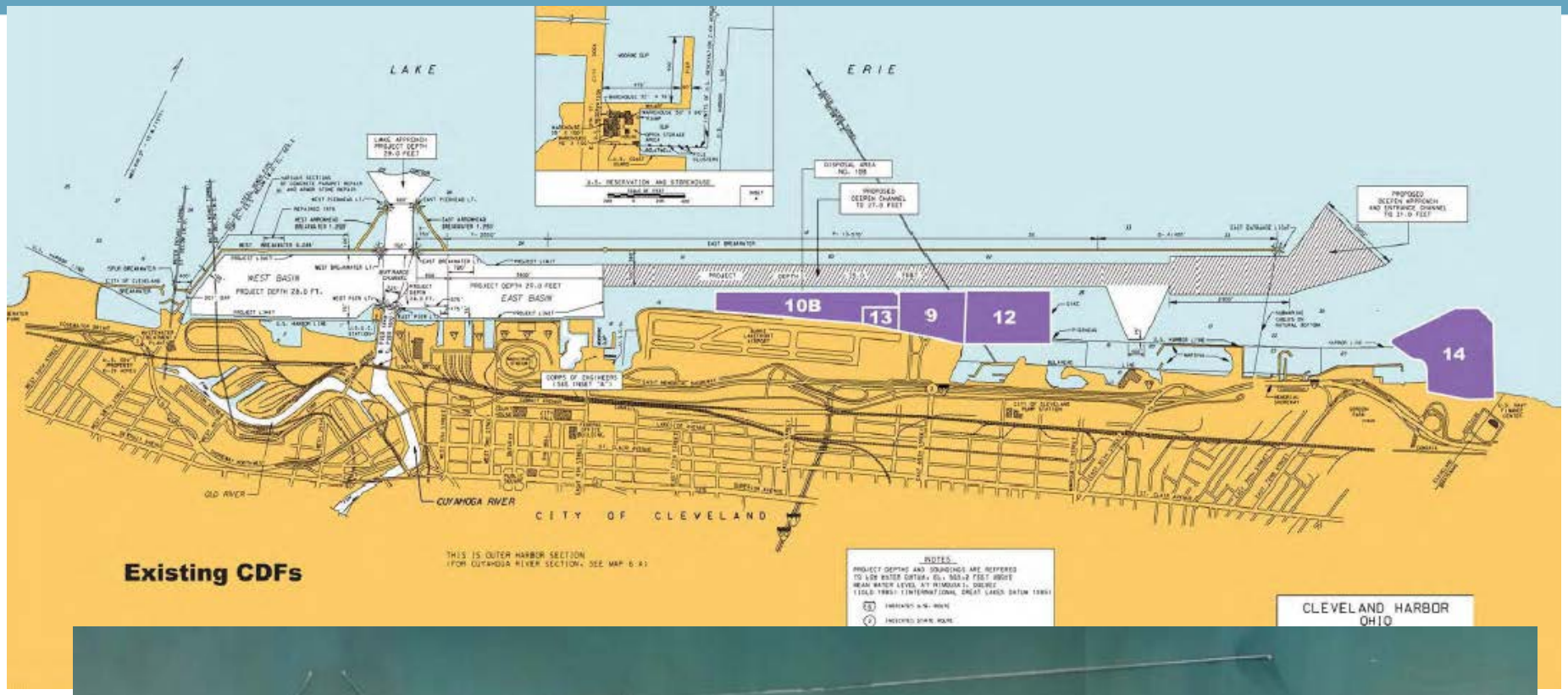
Economic Measures

- 800 -900 freighter trips up river per year average
- Regular deliveries from a fleet of 14 “river-class” cargo vessels, operated by eight companies.
- Average length of 630-711 ft.
- 12.5 million tons of cargo delivered up river
  - Primarily iron ore, limestone, cement, salt
- Dredged depth of 23 ft. allows 20,000-23,000 tons per delivery
- Ship channel acts as a natural sediment settling area
- 1” of loss of draft = 110 tons of cargo

Sediment Management is Critical for our regional economy

- **Each year 200,000 to 250,000 Cubic yards must be dredged.**
- **Effects of urban run-off and associated latent toxicity require that sediments be placed in Confined Disposal Facilities (CDFs)**
- **CDFs are nearing capacity and are very costly to develop.**
- **New alternatives for managing sediment needed to be developed**



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Port of Cleveland's multi-faceted approach to sediment:

1) **Provide new, cost effective air space capacity at existing confined disposal facilities- change the method of operation**

2) **Commodize sediment- develop market consumption plan for reuse & recapture air space**

3) **Reduce dredging- Upstream bed load interception**

1) CDF Air Space Capacity

USACE historic practice relied on hydraulic placement into CDFs

- **Limits capacity to “brimful” levels**

A new CDF- $150-300 million was considered - Unaffordable

Future Capacity needs led to Dredge Material Task Force with local stakeholders

USACE developed a 4 yr. Interim DMMP for 1 million cu yds.

- **Based on mechanical placement and stacking**

1) Port plan for CDF Airspace Capacity

Port engaged its own engineers to develop a plan to Optimize Total Capacity at the existing CDFs- look beyond 4 years.

1) Aggressively dewater site-

800,000 Cu Yds remnant water found on site

2) Create and maintain positive drainage

3) Switch to mechanical unloading

4) Stack material vertically

Port plan added 7.6 million yards of new capacity- 37 years of additional lifespan in the existing CDF's

Area	Expected Dry Capacity (MCY)	Years Lifespan	Elevation (ft, lwd) West / East
CDFs Existing	.5	2	12.5 / 12.5
CDF 12 - Phase I	1.2	6	22.5 / 39
CDF 12 -Full	2.3	11.5	29 / 64
CDF 10-B	1.5	7.6	36 / 72
CDF 9	1.3	6.5	72 / 83
CDF 12 –Optional	.8	4	71 /117
Totals	**7.6**	**37.6**	

Port IDMMP is the cost effective alternative

Port is working closely with USACE to secure a 217 Agreement to operate the CDFs and receive a Tipping Fee.

Major feature	Port CDF 12 1 million Cu yds	USACE IDMMP Alt 2
CDF preparation/ expansion Net site Operations Unloading	$ 2,571,100 9,821,785 3,600,000	$ 8,637,818 9,378,132 3,067,337
Total CDF	**15,992,885**	**21,083,287**
Dredging	13,021,585	13,021,585
Total Projected costs	25,014,470	34,104,872
Unit cost ($ / CY)	$ 29.01	$ 34.10

2) Treat sediment as a commodity

A) Management Plan for regular market uses

B) Sort and grade material as part of its movement onto CDF

C) Develop consumption curve for qualified materials,

E.G.:

- **Brownfield redevelopment**
- **Blend for compost- urban garden soils**
- **Sand bags for Fracking pipelines**
- **Fill for basements of demos**

3) Reduce dredging through Bed load interception

Sediment migrates downstream as suspended or as bed load

- **Suspended Sediments-** Fines and organics.
  Moves mostly during higher discharge periods

- **Bed Load** – heavier material / larger grain sized / bounces along the bottom.
  Moves 24- 7- 365

Bed load interception is comprised of catching sediment in the natural flowing river before it enters and settles in the ship channel.

Bed load can be collected passively

- Patented technology (Streamside Systems)
- Relies on the Bernoulli principle and natural energy of the river
- Minimal disruption to stream ecology

Cuyahoga Bed load Sediments Interception and Sustainable Use

Three separate Port Sponsored studies document:

1) **Proof of Technology &**

   Confirmation that Cuyahoga River sediments are susceptible to bed load interception in all flow conditions

2) **Grain size distribution indicates material is suitable for a variety of engineering uses**

3) **OEPA confirmed harvested bed load is cleaner than background soils and suitable for unrestricted upland purposes**

Bed load Collector study- May 2012

Potential opportunities from bed load interception

- Modeling (underway) is confirming a significant percentage (20%+/-) of sediment can be ***routinely intercepted and harvested*** from the natural river.

  Reduces dredging requirements by approximately ***50,000 cubic yards per year.***

- Bed load sediments have significantly less latent toxicity (less impacted by the effects of urban run- off and discharge from CSOs)- ***suitable for unrestricted upland uses.***

Consumption Curve – Civic benefit from harvested bed load

Fill for basements of vacant and abandoned homes.

10,000 Homes slated for demo by land bank.

500 homes per year

Basements need an average of 175 cu yds fill.

= 87,500 cubic yards per year

Harvested bed load provides a clean and reliable, preferred material

Planned bed load harvest sites are within 8 miles of 85% of the targeted properties

Bed load harvest is cost competitive

Bed load interception is significantly less costly than dredging and placement in CDFs

Dredging	@ ~	$13.00 per cubic yard
CDF placement	@ ~	$16.00 per cubic yard

vs.

Bed load harvested for use ~ $6 Cubic yard

Out of the river and on the truck to the market.

An at- scale, multi- year pilot project planned to begin in late 2014

Summary

Port of Cleveland's sediment management strategy:

Provides new, cost effective, available air space capacity

Develops a market plan and civic benefit for material

Reduces total dredging requirement through cost effective upstream interception

Questions?

Thank you !

for letting us share our approach to sediment management at the Port of Cleveland

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Visit www.portofcleveland.com today.

Sign up for the Port of Cleveland's eNewsletter to keep up on what's happening On the Docks, Along the Water, and In the Community.

The Port of Cleveland is located at 1100 West 9th Street. Suite 300, Cleveland, OH 44113. Phone: 216.241.8004