

Global Reach. Local Benefit.

Great Lakes Perspective Sediment Choreography

Jim White Director, Sustainable Infrastructure Program AAPA H&N 15 SEPTEMBER 2015





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



Cleveland: a critical part of G/L Maritime commerce





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





Economic Measures

- Regular deliveries of 800 -900 freighter trips up river per year from a fleet of 14 "river-class" cargo vessels, operated by eight companies.
- Typical length: 630 to 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



Sediment

- Each year 200,000 to 250,000 Cubic yards must be dredged.
- Effects of urban run-off and associated latent toxicity required that sediments be placed in Confined Disposal Facilities (CDFs)
- CDFs are nearing capacity and are very costly to develop.



Era of CDFs in the Great Lakes is ending

Since the 1970's USACE has built 45 Great Lakes CDFs at a cost of \$900 million.

These CDFs have enabled removal of 90 million CYs of contaminated sediments

There are currently 22 active CDFs which are cumulatively 80 percent full.

New alternatives for managing sediment need to be developed- and quickly



Current Dredged Material Placement Methods



Great Lakes CDFs



Cleveland CDFs









Sustainability as Asset Management

Assets: Things on which we rely:

- to promote our prosperity
- to **solve problems** or overcome obstacles

Sustainability grows the value of our assets



Examples of Civic Asset Management

- Increased community livability and appeal
- Reduce risk of loss
- Restoration of damaged assets
- Business and job formation



Asset Management increases Resilience

Ability to adapt, endure or prosper during inevitable, periodic, oscillations of:

Supply (e.g. food, energy, temperature, water)

Demand (e.g. predation, exploitation)

<u>Stressors</u> (e.g. pollutants, simplification, disruptions)

Strong Balance sheets are Resilient



Port of Cleveland's Sediment Plan: Promote Resilience through Asset Management

- Change the method of operation: Provide new, cost effective air space capacity at existing CDFs
- 2) Commoditize Sediment:

With Private sector partner, develop market consumption plan for reuse & recapture air space

3) Reduce Dredging-

Upstream bed load interception and marketing



1) Increase CDF Air Space Capacity

USACE historic practice relied on hydraulic placement into CDFs

Limits capacity to "brimful" levels

USACE Projected costs for a new CDF: \$150-300 million Which is deemed unaffordable by all parties



Port plan for CDF Airspace Capacity

Port engaged its own engineers to develop a plan to optimize total capacity at the existing CDFs

- 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-30 years of additional lifespan in the existing CDF's (without any repurposing of material)

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	4.8	22.5 / 39
CDF 12 -Full	2.3	9.2	29 / 64
CDF 10-B	1.5	6	36 / 72
CDF 9	1.3	5.2	72 / 83
CDF 12 –Optional	.8	3.2	71 /117
Totals	7.6	30.4	



B) Treat sediment as a commodity

 A) Port's strategy also calls for an operations plan for regular market uses Convert CDF into a Sediment Repurposing Center

B) Sort and grade material as part of its movement onto the CDF: Expected to produce 60-80,000 Cyds (dry) harvested material per year (from 250,000 dredged)

Extends CDF capacity to 40 years

Initial Site preparations - \$1,800,000 capital costs. (Ohio Healthy Lake Erie Grant provided \$1.45 million



Sediment Processing Center on CDF 12





Constructed in 8 weeks: Mid-April to Mid-June



Hydraulic delivery underway >

< North sluiceway ready for material





62,000 CYs delivered to Port's Center

Filled sluiceway- end of June



Dewatering trough End of July





Harvested material stacked for load out - Mid August



3) Reduce dredging through Bed load Interception

Sediment migrates downstream as <u>suspended</u> or as <u>bed load</u>:

Suspended Sediments-

Fines, silts 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 :

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 natural energy of the river
- Minimal disruption to stream ecology



Intercepting Cuyahoga Bed load Sediments

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 suitable for <u>unrestricted upland purposes</u>

Port received \$1.2 Million in State Capital Funds for full scale, 2-year pilot project- First in Great Lakes



In-river unit being installed April 1.





System operational June 1st for 2 year Pilot Study

Dewatering sand auger >



Stacker piling bed load

30-35,000 CYs expected



Close up view of material >





July 2015 1400 CYs





Bed load harvest is self funding

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

Dredging	@ <u>~</u>	\$ 7.20 cost per cubic yard
CDF placement	@ _	\$10.00 cost per cubic yard
		ttl \$ 17.20 cost per cubic yard

VS

Bed load harvested for use @ \$2.00 Net Income per cubic yard

Pumping, dewatering, maintenance, stacking, loading, admin. Out of the river and on the truck to the market; **self funding**.

Avoids \$600,000 per year in dredging costs



Consumption Curve – Civic benefit from harvested sediments

- Bed load sands sold for concrete mix and pipe bedding
- Fill for basements of vacant and abandoned homes. Land bank wants 100,000 CYs per year / 2 million total
- ODOT road projects- Needs 54,000 CY this year
- Landfill cap and other Brownfields- One site needs 90,000 CYs.
- Silts used as a component for compost
 Using all 32,000 from 2015
 Helping city start a yard waste-to-compost program



Port of Cleveland's sediment management strategy:

- Provides new, cost effective, available air space capacity- extending CDF capacity to <u>~</u> 45 years
- Develops a market plan and civic benefit for material, including a public private partnership with skilled soil producer.
- Reduces total dredging requirement through cost effective upstream interception
- Port's Plan attracted \$2.65 million in important funding from State of Ohio for innovation for sediment and nutrients affecting lake Erie.
- Designed, built and brought to operational status in less than one year.
- Provides an alternative model for Sediment Choreography



Shifting Sands:

Old Terms	New Baseline
Spoils	Dredged material
Solid Waste	Commodity
Disposal	Harvest
Disposal Facility	Re-purposing Center
Sediment Management	Sediment Choreography





Cat Island at Green Bay

The Cat Island Chain project developed out of the 1988 Lower Green Bay Remedial Action Plan (RAP) and was the top priority project for habitat restoration.

Cost less than expected ! Pre-design Estimated Cost of Construction- \$33M Post Design Estimated Cost of Construction- \$26M Post Construction Cost Estimate-\$17.2M



Cat Island 1938





Cat island at Green Bay





Cat Island at Green Bay

Project Outcomes

30-50 years worth of disposal capacity
2.5 mile wave barrier and re-establishment of
272 acres of islands
Wave barrier will protect 1,225 acres and provide critical
habitat for birds, fish and mammals
Improved water clarity increasing weed grown for fish
spawning and serve as a nursery and improved migratory bird
sanctuary/lay over



Need to promote innovation

New Ohio law bans open lake placement beginning in 2020. Ohio's ban is a challenge for Toledo and 800,000 CYs dredged each year.

Pilot projects have been designed, but need access to sophisticated, big dredgers that can move material inland long distances.

USACE practice of using Great Lakes as an outlet for required small business set aside, is seen as limiting access to biggest and best options.





Thank you !



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

