# *"Erie Pier Process Re-use Facility Cost Analysis"*

- Rodger Brannan and James Skurla
- UMD Labovitz School of Business and Economics (LSBE)
- September 26, 2008

Labovitz School
OF BUSINESS AND ECONOMICS
Bureau of Business and
Economic Research

**Great Lakes Maritime Research Institute**
*A University of Wisconsin - Superior and University of Minnesota Duluth Consortium*

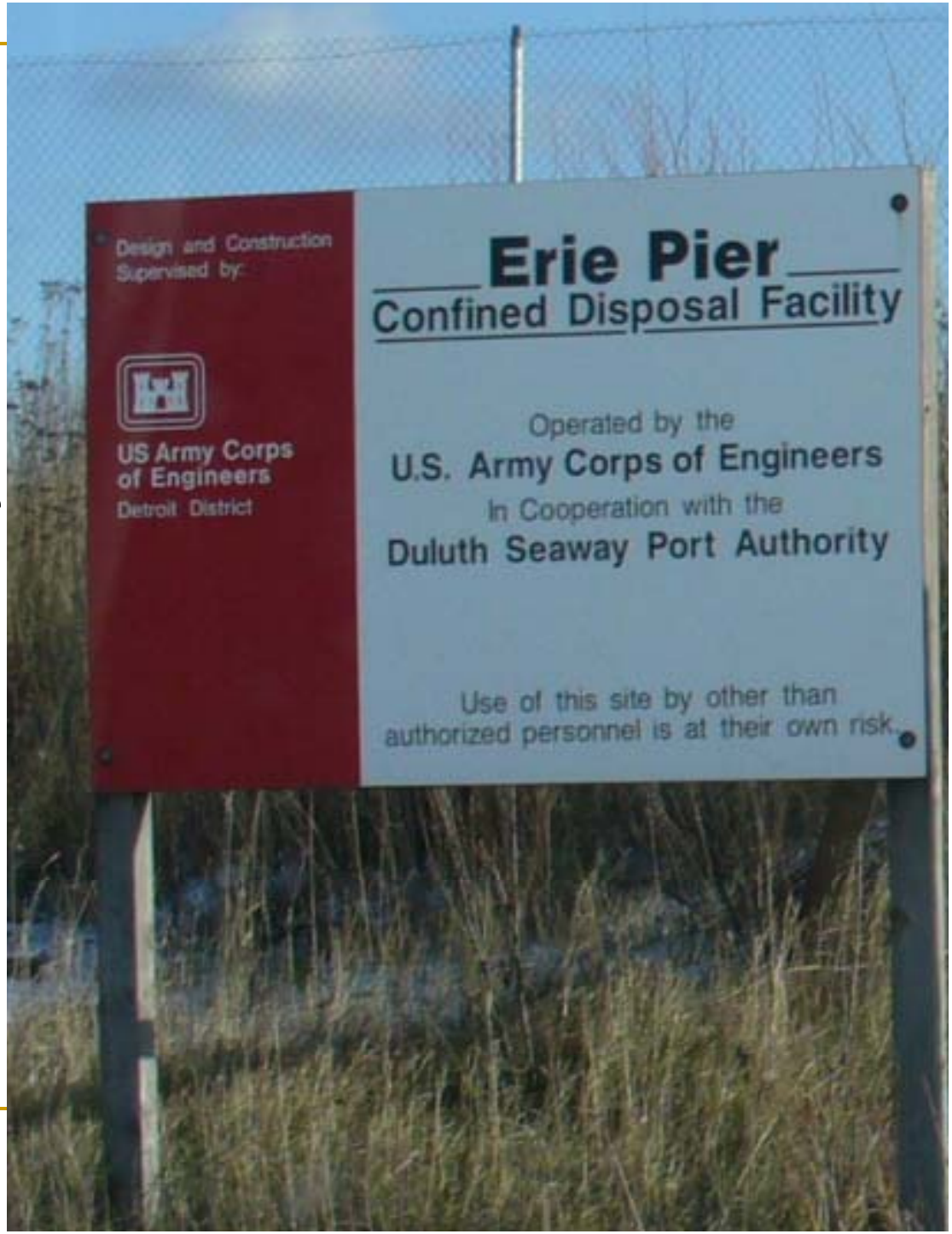
## In this presentation

- Project background
- Marketing and Cost Analysis
- Recommendations

## Background:

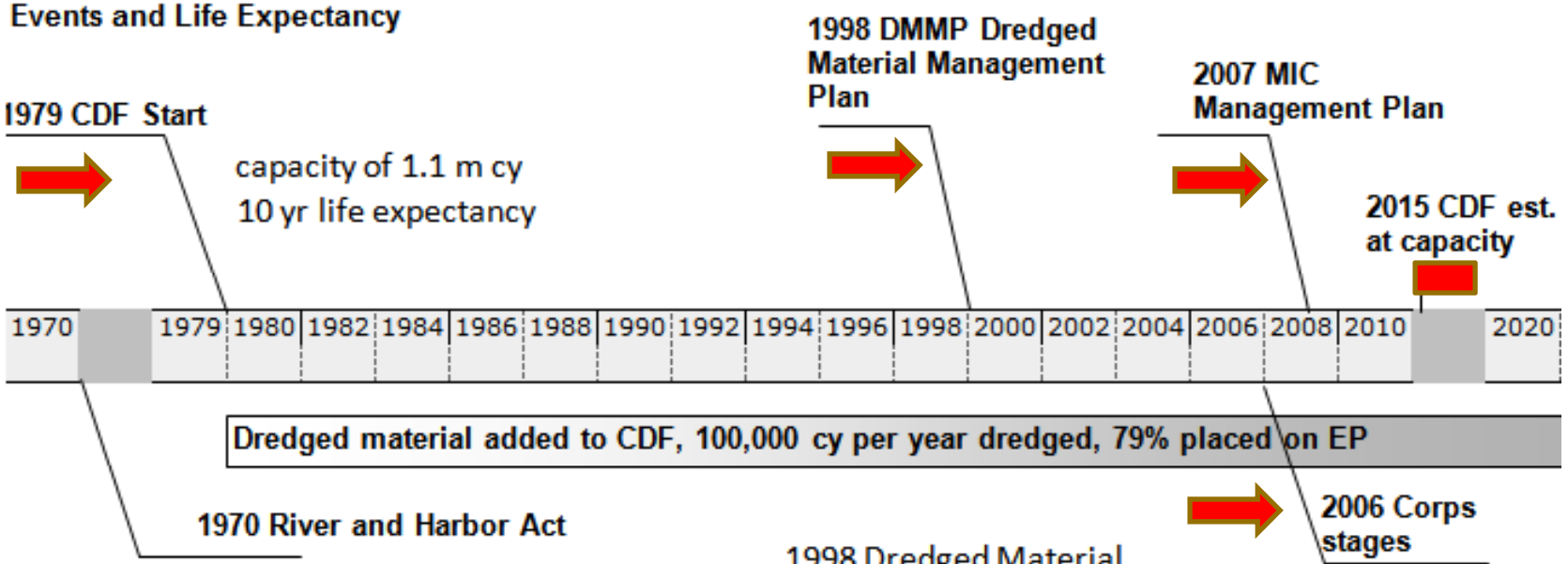
- Growing constraints on options for placing dredged materials at the Erie Pier CDF has urged action on a plan for re-cycling material currently being placed at the pier.

- This GLMRI project was proposed to determine cost accounting and capital budgeting for a proposed Process Re-use Facility (PRF).



## Erie Pier Time Line

**Events and Life Expectancy**




1998 Dredged Material Management Plan (DMMP) needs and management for 20 yrs. Base plan: 1)beach nourishment, 2) continue Erie Pier CDF, 3) use deep holes in harbor.

100,000 fine material staged for future removal, material staging to higher elevation allows material to drain and become stable. Material placed where rail and truck transfer would be convenient.

MIC— "Erie Pier Management Plan," produced by the Metropolitan Interstate Council

## GLMRI Research Project Objectives

Estimating the costs:

1) To upgrade the CDF to a Process Re-use Facility (PRF)

   (adjusting to more demand pull)

2) To extend the life of the existing Erie Pier CDF and to get the Erie Pier CDF dredged material off-site

   (landed cost)

3) To situate the recycle center as financially break-even

   (break even for the Port Authority involves gov. subsidies, minimal operating costs, where the largest cost is transportation)

4) To determine least-cost alternative

   (transportation costs compared)

## Marketing: Commodity Assumptions

- Physical composition of dredged material at Erie Pier:

  **Coarse material (sand).** Commodities include: concrete mix, backfill, bituminous mix, mortar.

  **Fines material (clay and other materials, 5-7% sand)** Commodities include: backfill, unclassified fill, daily cover for landfill, soil, soil for habitat uses.

- Volume of dredged material at Erie Pier 1980–2006 in cubic yards:
  - **Material recurring yearly**

    Coarse material = 48,000 cy

    Fines material = 50,000 cy

    Total in this analysis rounded to 100,000 cy
  - **Total accumulation of removable fines** to date = 1,250,000 cy

Source: Duluth-Superior Metropolitan Interstate Council (MIC), Harbor Technical Advisory Committee (HTAC), Dredging Subcommittee

## Erie Pier Fines Short-term Potential Customers and Feasible Customers

| *Industry sector* | *Potential Customers* | *Contact* | *Possible Criteria* |
|---|---|---|---|
| Compost | WLSSD (compost) | Hamel | no current interest |
| | Green Bay (compost) | Meyers | distance too great |
| Topsoil | WI | | regulation, small quantities, market needs development, competition |
| | MN | | small quantities, market needs development, competition |
| Construction Fill | MNDOT (project by project) | Garver | close, and can be sizable |
| | WisDot (project by project) | King, Hanzel | no imminent projects |
| Soil Enrichment | NRRI Tree culture project | Berguson | too preliminary, needs more research |
| | Farming, alfalfa, St. Louis Co., MN | Dykhuis | close, additive for sandy soil appropriate |
| | Farming, alfalfa, Carlton Co., MN | Salzer | good additive |
| Land Fill | WI landfill (Superior) | Reichhoff | using waste paper by-product |
| | Canyon landfill | Downing | using waste paper by-product |
| | Elk River landfill | Downing | distance too great |
| Mine Reclamation | UTAC (United Taconite) | DNR, NRRI, Jordan, Kanski | using biosolids |
| | Keewatin Taconite | DNR, NRRI, Dewars | using biosolids |
| | Other mines: MINNTAC, Hibbing Taconite Co., USX Corporation, U S Steel Corp., Arcelor Mittal Minorca Mine, Northshore Mining Co (Cleveland-Cliffs Inc), Millal Steel USA- minorca mine | no contact | no current interest |

Source: MIC, HTAC, BBER interviews

## Erie Pier Fines Short-term Potential Customers and Feasible Customers

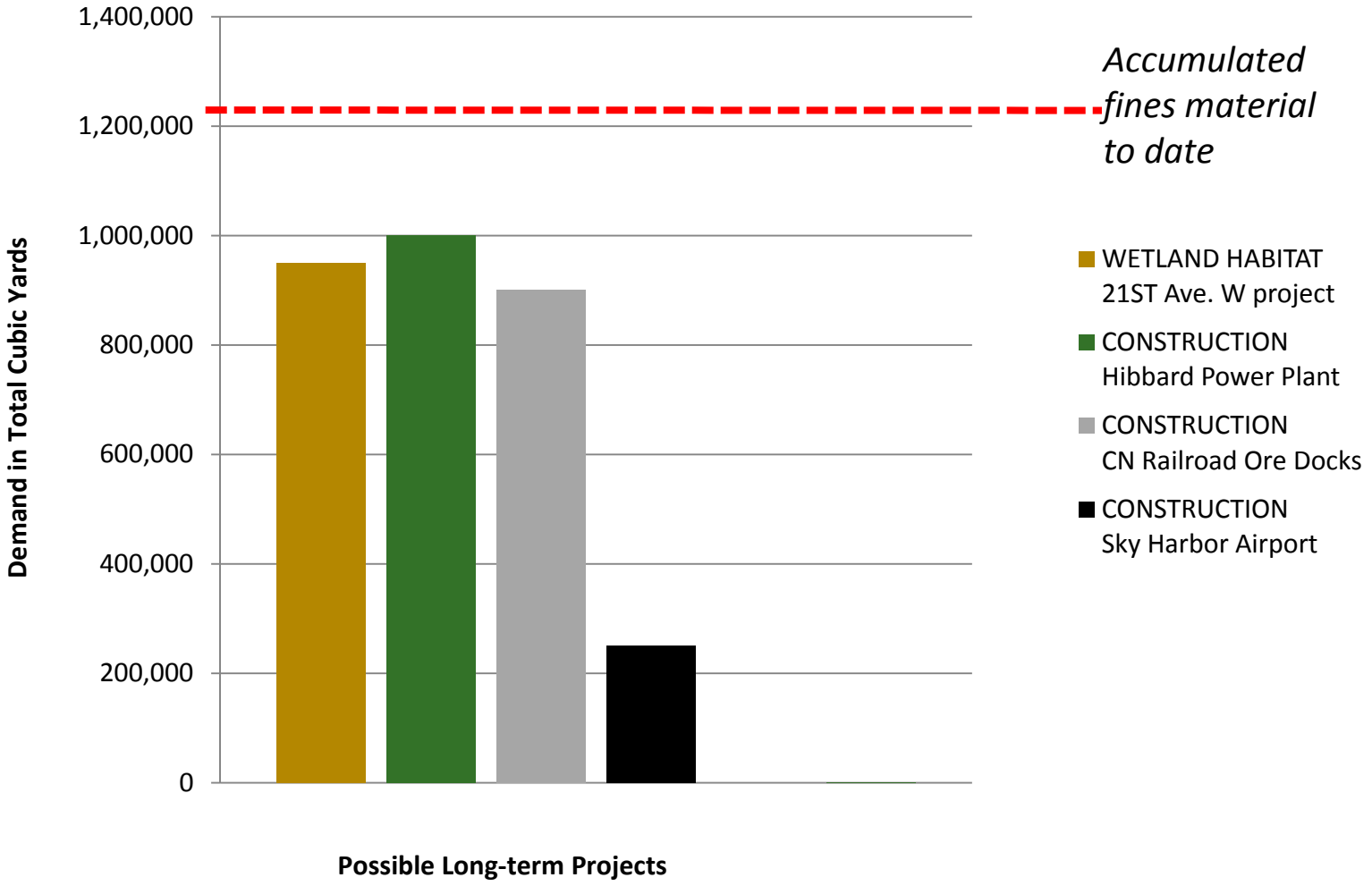
| *Industry sector* | *Potential Customers* | *Contact* | *Possible Criteria* | *Feasible customers* |
|---|---|---|---|---|
| Compost | WLSSD (compost) | Hamel | no current interest | |
| | Green Bay (compost) | Meyers | distance too great | |
| Topsoil | WI | | regulation, small quantities, market needs development, competition | |
| | MN | | small quantities, market needs development, competition | |
| Construction Fill | MNDOT (project by project) | Garver | close, and can be sizable | ✓ |
| | WisDot (project by project) | King, Hanzel | no imminent projects | |
| Soil Enrichment | NRRI Tree culture project | Berguson | too preliminary, needs more research | |
| | Farming, alfalfa, St. Louis Co., MN | Dykhuis | close, additive for sandy soil appropriate | ✓ |
| | Farming, alfalfa, Carlton Co., MN | Salzer | good additive | ✓ |
| Land Fill | WI landfill (Superior) | Reichhoff | using waste paper by-product | |
| | Canyon landfill | Downing | using waste paper by-product | ✓ |
| | Elk River landfill | Downing | distance too great | ✓ |
| Mine Reclamation | UTAC (United Taconite) | DNR, NRRI, Jordan, Kanski | using biosolids | ✓ |
| | Keewatin Taconite | DNR, NRRI, Dewars | using biosolids | ✓ |
| | Other mines: MINNTAC, Hibbing Taconite Co., USX Corporation, U S Steel Corp., Arcelor Mittal Minorca Mine, Northshore Mining Co (Cleveland-Cliffs Inc), Millal Steel USA- minorca mine | no contact | no current interest | |

Source: MIC, HTAC, BBER interviews

| Erie Pier Fines Long-term Potential Customers and Feasible Customers | | | |
|---|---|---|---|
| *Industry sector* | *Potential Customers* | *Contact* | *Possible Criteria* |
| Construction Fill | CN Railroad Ore Docks | Brossart | large quantities, short distance |
| | Sky Harbor Airport | Brossart | large quantities, short distance |
| | Hibbard Power Plant | Brossart | large quantities, short distance |
| Soil Enrichment | Wetlands Habitat W. 21st Ave.W. project (Duluth) | Brossart | large quantities, short distance |
| Source: MIC, HTAC, BBER interviews | | | |

| Erie Pier Fines Long-term Potential Customers and Feasible Customers | | | | |
|---|---|---|---|---|
| *Industry sector* | *Potential Customers* | *Contact* | *Possible Criteria* | *Feasible customers* |
| Construction Fill | CN Railroad Ore Docks | Brossart | large quantities, short distance | ✓ |
| | Sky Harbor Airport | Brossart | large quantities, short distance | ✓ |
| | Hibbard Power Plant | Brossart | large quantities, short distance | ✓ |
| Soil Enrichment | Wetlands Habitat W. 21st Ave.W. project (Duluth) | Brossart | large quantities, short distance | ✓ |
| Source: MIC, HTAC, BBER interviews | | | | |

# Estimated Demand in Total Cubic Yards by Possible Long-term Project



Landed Cost Assumptions for Marketing
Accumulated Erie Pier Fines Material

| | *fixed costs* | *variable costs* |
|---|---|---|
| Truck Cost: | $100/hr assumed<br>85% fixed cost | fuel and operator<br>(15% of cost) |
| Removal to transfer station: | $100/hr assumed<br>85% fixed cost | fuel and operator<br>(15% of cost) |
| Loading Cost: | $110/hr assumed<br>85% fixed cost | fuel and operator<br>(15% of cost) |

## Estimated Landed Costs for Erie Pier Fines Material by Short-term Customer Application[1]

| *Feasible customer* | *Miles from Erie Pier* | *Mode* | *Transportation Costs*[2] | *Other costs*[3] | *Total cubic yards for application* | *Cost per cubic yard* |
|---|---|---|---|---|---|---|
| Examples of Short-term projects: | | | | | | |
| LAND FILL | | | | | | |
| Waste Management, Inc., Canyon, MN /yr | 29.8 | truck | $173,133 | $212,065 | 21,206 | **$18.16** |
| CONSTRUCTION FILL | | | | | | |
| MNDOT (High-end, volume and distance) | 50.0 | truck | $1,200,000 | $1,000,000 | 100,000 | **$22.00** |
| SOIL ENRICHMENT | | | | | | |
| Floodwood Farmers (6" over 80 acres) | 44.4 | truck | $774,720 | $645,600 | 64,560 | **$22.00** |
| MINE RECLAMATION | | | | | | |
| Keewatin Taconite (6" over 11 acres) | 81.6 | Railmate[4] | $150,841 | $58,564 | 8,873 | **$23.60** |
| MINE RECLAMATION | | | | | | |
| Keewatin Taconite (6" over 11 acres) | 81.6 | rail | $141,968 | $88,733 | 8,873 | **$26.00** |
| MINE RECLAMATION | | | | | | |
| Keewatin Taconite (6" over 11 acres) | 81.6 | truck | $162,800 | $88,733 | 8,873 | **$28.35** |

[1] Assuming commodity purchase price = $0.00

[2] Includes hauling and unloading.

[3] Includes loading and dredge removal.

[4] Connects multiple semi-trailers to a train to provide a point-to-point delivery of commodity products. Note: 80,000 lbs. is used as the maximum MN highway load restriction. 80,000 lbs. is also used for rail cars to provide direct comparison.

## Estimated Landed Costs for Erie Pier Fines Material by Long-term Customer Application[1]

| *Feasible customer* | *Miles from Erie Pier* | *Mode* | *Transportation Costs*[2] | *Other costs*[3] | *Total cubic yards for application* | *Cost per cubic yard* |
|---|---|---|---|---|---|---|
| Examples of Long-term projects: | | | | | | |
| WETLAND HABITAT | | | | | | |
| 21ST Ave. W project | 1.2 | truck[4] | $2,691,667 | $9,500,000 | 950,000 | **$12.83** |
| CONSTRUCTION | | | | | | |
| Hibbard Power Plant | 2.8 | truck | $3,000,000 | $10,000,000 | 1,000,000 | **$13.00** |
| CONSTRUCTION | | | | | | |
| CN Railroad Ore Docks | 2.2 | truck | $2,850,000 | $9,000,000 | 900,000 | **$13.17** |
| CONSTRUCTION | | | | | | |
| Sky Harbor Airport | 7.4 | truck | $1,250,000 | $2,500,000 | 250,000 | **$15.00** |

[1] Assuming commodity Purchase Price = $0.00

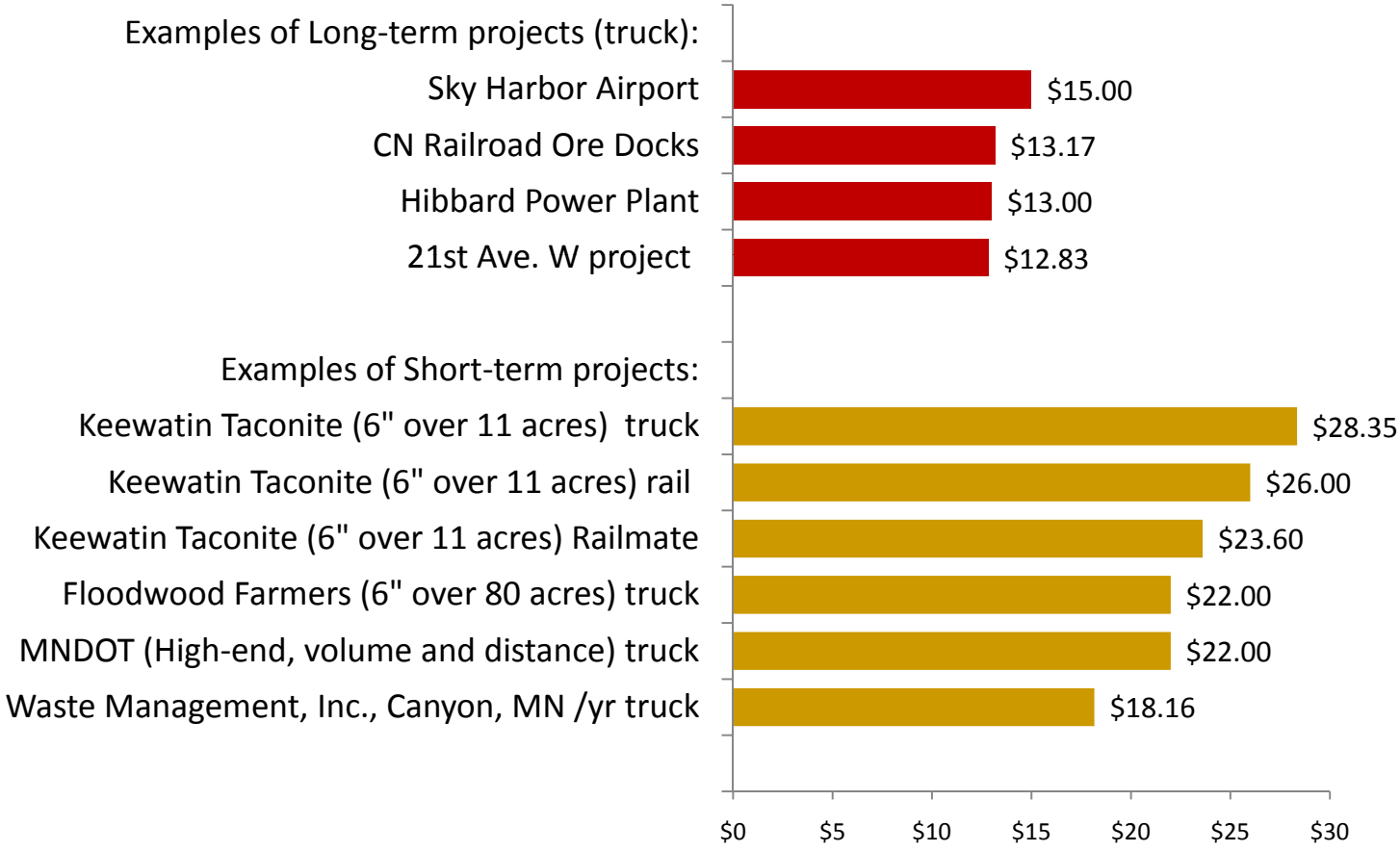
[2] Includes hauling and unloading.

[3] Includes loading and dredge removal.

[4] Trucking is used to provide comparisons. Least-cost would suggest use of barges.

# Cost to get the Erie Pier CDF dredged material off-site

## Estimated Landed Costs for Erie Pier Fines Material by Customer Application



# Transportation issues

- Need more rail cars
- Turnaround time is crucial
- Transfer station infrastructure and minimization of handling

# Summary

- To extend the life of Erie Pier we recommend a two-pronged approach: find customers for subsequent dredging, and draw down EP fines by identifying feasible short-term customers.
- Do long-term large projects, with defined quantities, and minimize transportation, within a set schedule. Erie Pier managers have an obligation to choose least cost solutions, which may involve rail and barge.
  - Customers will not pay more than market price (in many cases the price is $0.00)
  - Short-term projects have obstacles: customers have other options, and when these projects involve trucking they are not always least cost solutions.

# Recommendations

- Customer ranking (based on cost, potential demand, and feasibility):
  1. Habitat/wetlands, or waterfront construction
  2. Mine reclamation
  3. MNDOT (if it can become a “recommended source”)
  4. Farms (soil enrichment)
  5. Landfill cover
  6. WisDOT
  7. Compost/topsoil

## Usefulness of this study for other ports on the Great Lakes

- Transportation costs should be considered (almost) the entire cost.
- Feasible customers have competing suppliers. Dredged material may need to cost zero as a commodity to compete.
- Projects of most interest will be long-term projects near the PRF, and include using largest amounts of material (wetlands and habitat creation).
- Short-term projects such as reclamation projects, agriculture, soil enrichment, and soil amendment can be part of the on-going solution.
- The difference in planning long-term and short-term projects should be noted, with a need to think about both planning to re-use sand and also fines (possibly polluted). Testing has shown Erie Pier material to be within regulatory standards. A two-pronged approach can be suggested.
- Timing of opportunities can be crucial.

## Usefulness of this study for other ports on the Great Lakes

- However, Duluth is also a special case:
  - Dredged material is clean: applicability depends on how polluted the dredged material is and what state laws say you can do with it. Note the difference between MN and WI, and the difference between what state law allows. Erie Pier has a potential problem with the noxious weed purple loosestrife, however regulatory agencies and customers are confident this can be managed.
  - Possible projects are already studied and specified.

## For more information, please contact:

Rodger Brannan, Associate Professor, Department of Accounting
Jim Skurla, Acting Director, Bureau of Business and Economic Research

213 Labovitz School of Business and Economics
University of Minnesota Duluth
1318 Kirby Drive
Duluth, MN 55812
phone: 218 726-7895, 726-8614
fax: 218 726-6555
jskurla@d.umn.edu