





# Agenda

- Background on Brennan
- EMP from a Contractor's Perspective
  - Design and Specification Criteria
  - Environmental Considerations
  - Payment Criteria

MARINE PROFESSIO

- Other Innovative Technologies
  - Dredging Equipment
  - Transport Systems
  - Sediment Segregation & Dewatering
  - Other Excavation Systems
  - Sub-bottom Profiling



# HISTORY

Brennan Founded in 1919 by James Brennan
Owned and Operated by Anthony Binsfeld -Maternal Grandson
Much of Workforce is 2nd & 3rd Generation
Total Focus of Brennan is Marine Construction and Marine Transportation Services



# VISION

The Vision of Brennan is:

To Demonstrate a Stewardship of the Waterways by providing the Highest Quality Work throughout a wide range of Marine Services





# MISSION

Mission of Brennan is:

To be the Leader in the Marine Services Industry by providing creative solutions to our customer's needs while demonstrating responsibility to our Employees, Shareholders, Business Partners and the Environment





# MARKETS

- Government Agencies
- Utilities
- Railroads
- Pulp & Paper
- Agricultural
- Mining

Engineering Firms

- Floating Casinos
- Industrial
- Contractors
- Barge Terminals



# **BRENNAN'S SERVICES**

- Transportation of Solids hydraulic & mechanical dredging & dewatering
- Diving inspections, repairs and mussel removal
- Concrete Repairs Lock & Dams
- Millwright Lock & Dams
- Deep Foundations sheet, timber and pipe piling
- Erosion & Scour Protection



# **SERVICES** (Continued)

- Pressure Grouting void filling/scour protection and soft soil stabilization
- Emergency Salvage
- Demolition
- Marine Equipment Support

E PROFESSIOI



#### **Design Criteria:**

- EMP Island Construction:
  - Borrow site:
    - Volume availability
    - Sediment characterizations & locations accurately
    - Distance to alternate available borrow sites
    - Identify obstructions more clearly

# Cross-sections of island & dredge cut Does not reflect dredge equipment capabilities Accuracy – utilize RTK-GPS positioning

#### Materials specified

- Clearly identify strength & cohesiveness of substructure and structural sediments
- Use of geotubes for island perimeter



Additional Design Criteria:
 Island Construction:
 Site access and staging area

- Site access and staging areas for equipment mob & demob
- Access from shore to dredge cut areas for dredges
   Access from shore to final location for barges, etc.
- Standardize on either metric or standard measurement
- Define & enforce work areas





**Contractor Challenges on EMP – HREP Projects** Additional Design Criteria: Island Construction: Make sure design of project is constructable before letting documents and specs which after award are revised to accommodate actual site conditions or contractor's equipment capabilities Ensure adequate island rip-rap protection especially before planting takes hold Ensure design of rip-rap takes into account amount of settling into bottom substructure

**Environmental Considerations:** 

Specifications should clearly communicate project mission & purpose as well as potential impacts on schedule

#### > Water Quality:

- Specifications should dictate equipment requirements:
  - Dredge type & size or max flow rates
  - Sediment Segregation & Dewatering equipment

Enforcement of water quality standards & environmental protection – not just spec





Consideration of New Technologies: > Equipment Selection – Hydraulic dredges versus mechanical excavation

- Dredging equipment
  - Hydraulic swinging-ladder, self-propelling cutterhead dredges
  - Cutterhead designs
  - Cranes with buckets and backhoes off work barges
  - Amphibious equipment
    - Backhoes

E PROFESSI

- Transport vehicles
- Cutterhead dredges



Consideration of New Technologies:
Alternate systems
Transport Systems
Long-distance pumping – remote controlled boosters
HDPE pipeline
Amphibious trucks and personnel transport





**Contractor Challenges on EMP – HREP Projects Consideration of New Technologies:** > Alternate systems Dewatering Systems to achieve design speces & water quality specs ID&D® Integrated Dredging and Dewatering Sediment segregation Dewatering Control of water quality Sand can be used for island base and fine-grain sediment dewatering for planting layer Geotubes for island construction and dewatering

E PRO

**Contractor Challenges on EMP – HREP Projects Consideration of New Technologies:** Alternate systems Positioning systems – RTK-GPS + 2" accuracy Hypak/Dredgepak® - dredge/bucket guidance systems > As-builts from dredge documentation Sub-bottom Profiling Borrow site sediment characterization Volume Capacity > Output integrates with Hypak®/Dredgepak® dredge equipment MARINE PRO

### Payment criteria for island construction:

Contractor should be paid in cut not based on final island configuration

- Muck displacement & mud waves
- Settling characteristics of sediment
- Work limits should be established and verified







#### Payment criteria for island construction:

Settling plates used for determining sediment settling
 Plates do not work – plates either deflect up or tip over
 Plates are a waste of time – mud wave from dredging defeats the purpose of using them
 Plates do not reflect displacement characteristics of sediment
 Result is contractor bids higher dredge quantities
 To assure a firm structural slope, additional dredged sand needed to establish a firm foundation





**Contractor Challenges on EMP – HREP Projects Contracting:** Best Value –  $\succ$  IF focus is still on low cost – don't put contractor through the hoops - BUT result may not be the best project IF focus is on true Best Value including: Past Performance & Experience Work Plan – Project Approach > Safety Partnering Alliance THEN – many of the contractors concerns cited above go away. CONTRACTOR INVOLVED DURING THE DESIGN STAGES -Design / Build ???

#### **Contracting (continued):**

Financial impacts to Contractor due to Lack of full funding

 Max contractor revenues should be discontinued in favor of unrestricted – What happens when \$1.6 billion of contracts is let – NO CONTRACTORS
 Partnering Alliance – Committed Stakeholders
 Mission, Goals, Objectives, Measurements
 Regular Evaluation Meetings
 Improved Communications
 Issue Resolution & Conflict Resolution Procedures
 Put it in the Specs as a requirement





#### EMP Projects – Brennan Constructed

- Wilds Bend/Polander Lake
- Pool #11/Sunfish Lake
- Pool #11/Mud Lake
- Bertom McCartney Lake
- Big Timber Slough
- Bussey Lake Stage 1

- Pool 8 Islands
- Indian Slough
- Trempeleau Wildlife Refuge
- Lake Manawa
- Potter's Marsh
- Bank Stabilization Pools 6,8,9,10



# **Complexity of the EMP Designs of** the projects **Sensitivity to the Environment Innovative Approaches New Systems, Equipment & Processes**







## **Bertom & McCartney Lake**

**Project Type:** 

**EMP (Environmental Management Project)** 

MARINE PROFESSIONALS

**Project Location:** 

Mississippi River, Cassville, Wisconsin

**Material Dredged:** 

**Quantity:** 

Cassville, wiscor

Silt and Sand

400,000 cubic yards

**Pipeline Length:** 

**10,000 lineal feet** 



#### **Bertom McCartney Lake - (EMP)**



MARINE PROFESSIONALS

## **Potters Marsh**

**Project Type:** 

**Project Location:** 

**Material Dredged:** 

**Quantity:** 

**Pipeline Length:** 

**EMP (Environmental Management Project)** 

Mississippi River, Thompson, Illinois

Silt and Sand

600,000 cubic yards

13,000 lineal feet



#### **Potters Marsh - (EMP)**



#### rempeleau National Wildlife Refuge **EMP** (Environmental **Project Type: Management Project)**

**Project Location:** 

**Trempeleau National Wildlife** Refuge, Trempeleau, WI, off **Mississippi River**,

MARINE PROFESSIONALS

**Material Dredged:** 

Sand

**Quantity:** 

260,000 cubic yards

**Pipeline Length:** 

8,000 lineal feet



#### Trempeleau National Wildlife Refuge - (EMP) - Dike



## Pool #8 Phase II Islands

**Project Type:** 

EMP (Environmental Management Project)

**Project Location:** 

Pool #8 - Mississippi River, Stoddard, WI,

MARINE PROFESSIONALS

**Material Dredged:** 

Constructed

Sand & Silt

Series of barrier & seed Islands plus rock groins

## **Pool # 8 - Stoddard EMP Project - Overview**



## **Pool # 8 - Stoddard EMP Project - Overview**



## Pool # 8 - Stoddard EMP Project -Other Equipment Used



## **Pool # 8 - Stoddard EMP Project -**Island Construction





## **Pool # 8 - Stoddard EMP Project -Fines Recovery & Water Quality Control**


# "Adaptive Management"

#### Better Ways Of Solving the Problems of the Past

# The Long Term Implications of Fines Recovery





#### Wilds Bend / Polander Lake - EMP Project



#### Wilds Bend - Polander



### Sunfish Lake EMP Project -



### Mud Lake EMP Project -





Innovations in **Sediment Removal, Transport** and **Dewatering Mechanical Dredging Hydraulic Dredging** 



# Mechanical Dredging

MARINE PROFESSIONALS





#### **Backhoe / Barge**

#### **Crane w/bucket**







#### **Other Excavation Capabilities**



# Hydraulic Transport of Solids And Dewatering Techniques



### Hydraulic Dredge - "Ultra" - 8"

#### **Features:**

- Type: Cutterhead
- Functions: Swinging Ladder or Conventional Mode
- Overall Size: 39'long, 10' wide in conventional mode, 16'6" in swinging ladder mode
  Draft: 2'6"
- Working Capacity: 17' depth of cut, 51'5" maximum swing width
  Pump Location: Below waterline

MARINE PROFESSION





### Hydraulic Dredge - "Michael B" - 12"

#### **Features:**

Type: Cutterhead
Functions: Swinging Ladder or Conventional Mode
Overall Size: 80' long, 23' wide
Draft: 3'
Working Capacity: 27' depth of

cut, 53' maximum swing width

Pump Location: Above waterline

MARINE PROFESSION





#### Hydraulic Dredge - "Mark Anthony II" - 16" Features:

Type: Cutterhead
Functions: Swinging Ladder or Conventional mode

Overall Size: 113'long,
29' wide, 3' draft

• Working Capacity: 26'deep (swing mode), 40' deep (conventional mode) depth of cut,

- Swing width: 150' max
- Pump Location: Above waterline

MARINE PRO









## **DREDGE - Shrouding**







 To reduce Resuspension, cutterheads can be reconfigured with an active shroud cover.

#### **Hydraulic Dredging - Boosters**







# Integrated Dredging Dewatering System

# Sediment Dredging, Segregation & Dewatering





#### **ID&D - FEATURES - BENEFITS**

- 1. CONTINUOUS PROCESS Dredging through segregation & dewatering in one integrated system.
- 2. NO NEED FOR SETTLING BASIN Eliminates berm and return water construction. Also no need to restore containment areas.
- 3. SMALL EQUIPMENT AREA FOOTPRINT Dewatering equipment requires only a minim 2500 s.f. footprint and can be barge mounted
- 4. ELIMINATES NEED FOR LONG PIPELINES WITH BOOSTERS Can locate dewatering equipment on shore adjacent to waterway or on barges on waterway.
- 5. HIGHLY AUTOMATED Due to computerization requires only two people for dewatering system.
- 6. ENVIRONMENTALLY SENSITIVE Low turbidity in return water plus all equipment, processes and polymer are environmentally sensitive.
- 7. DEWATERED CAKE IS AVAILABLE IMMEDIATELY ready for beneficial use, recycling, treatment, packaging, transport or disposal.
- 8. STREAMLINES AGENCY PERMITTING Eliminates groundwater mounding and return water quality issues.
- 9. ALTERNATE SOURCES AVAILABLE Equipment is available for purchase or lease. Competitive sources, i.e. Black & Veatch, Eagle America, Phoenix, Onyx, etc.

# Basic Systems: 1.ID&D® for Soft Sediments 2.ID&D® for Granular Sediments 3.ID&D® Portable Equipment







## DREDGE



 The ID&D® system begins with one of Brennan's swinging-ladder, cutter head swinging suction dredge.



## AUTOMATION

 The ID&D® <u>Computer Control Module</u> coordinates and controls the entire dredging, segregation and dewatering process and is continuously monitored.





### **SAND SCREW**

#### Separates and dewaters sand and trash materials

### **FLOATING DEBRIS - SCALPER**

#### Removes floating debris.



# THICKENER

The dredged material is pumped to the Thickener

 Polymer is injected into feed line to consolidate sediments

Clean water returned to waterbody





#### Polymer is injected into floc tank

 The belt presses dewater thickener underflow **BELT PRESSES** 



 Finished sediment
 cake















### DREDGE

#### The ID&D system begins with

- J. F. Brennan's 8" cutter head suction dredge.
- Projects requiring large volumes may dictate larger dredges & other supplemental dewatering equipment.












#### **Granular Conveyor**



#### **Sand Wheel Buckets**



## THICKENER

The dredged material is pumped to the Thickener

 Polymer is injected into feed line to consolidate sediments

Clean water returned to waterbody



#### **Thickened Soft Sediment Pumped to Geotubes**



# **Portable System ID&D®** Sediment Dredging, Segregation 8 Dewatering

MARINE PROFESSIONA







The ID&D system begins with J. F. Brennan's 8" cutterhead suction dredge. Projects requiring large volumes may dictate larger dredges & other supplemental dewatering equipment.

#### ID&D® Mobile System For Segregation and Dewatering



### Clarifier









MARINE PROFESSIONALS





#### **ID&D®-FEATURES**

- 1. CONTINUOUS PROCESS dredging, segregation & dewatering
- 2. NO NEED FOR SETTLING BASIN
- 3. SMALL EQUIPMENT AREA FOOTPRINT
- 4. ELIMINATES NEED FOR LONG PIPELINES WITH BOOSTERS
- 5. HIGHLY AUTOMATED
- 6. ENVIRONMENTALLY SENSITIVE
- 7. DEWATERED CAKE IS AVAILABLE IMMEDIATELY
- 8. STREAMLINES AGENCY PERMITTING
- 9. EQUIPMENT FOR DREDGING & DEWATERING ARE AVAILABLE FOR RENT &/OR PURCHASE

Geomorph **Sub-Bottom Profiling RTK-GPS** Position System **Excellent approach for locating &** characterizing sediments accurately **Yields an exact RTK-GPS** guidance system for dredge

NE PROFESSION



## Key Elements of *GeoMorph*<sup>™</sup>

 Focused Investigation (Less Samples)

 Real-Time Analytical (One Mobilization)







## GeoMorph<sup>™</sup>- Benefits

#### Productive Use of Financial Resources



#### Enhanced Regulatory Acceptance

## **Sub-Bottom Profiling**



HARDWARE SPECIFICATIONS:	
FREQUENCY	*CTFM 10 - 30 kHz
	(*Continuous Transmission Frequency Modulation)
TRANSDUCER	Independent receive / transmit
TRANSDUCER BEAM WIDTH	90° Nominal Conical beam
DISPLAY RESOLUTION	10 mm – 100 mm (5 m – 50 m range scales)
MIN. DETECTABLE RANGE	500 mm
MAX. OPERATING DEPTH	1000 m
MAX. CABLE LENGTH	1000 m on typical twisted shielded pair
INTERFACE	RS-485 @ 115.2 kbps
CONNECTOR	Wet mateable, Impulse BH-4-MP-SS
POWER SUPPLY	22 – 48 VDC at 1 Amp max.
DIMENSIONS	564 mm (22.2") length x 166 mm (6.6") width x
	267 mm (10.5") height
WEIGHT: In Air	20 kg (44 lbs)
In Water	10 kg (22 lbs)
MATERIALS	6061-T6 Aluminum, 300 series stainless steel, PVC,
	Acetal Homopolymer, Epoxy
FINISH	Polyester powder coat

MARINE PROFESSIONALS



		ES Ov Range 20 M	verlay Start Gain 26 dB
			N/A N/A





HYPACK MAX®
Survey Program
RTK/GPS
Supports Sub-bottom profiling devices
Provides:

- area map
- data display
- direction indication
- boat profile

HYPACK<sup>®</sup> MAX screen with GeoTIFF background and multibeam sounding matrix. [Data courtesy USACE New England District]

MARINE PROFESSIONALS



### **RTK-GPS Basics:**

#### **DREDGEPACK®:**

- Positions the dredge in the cut
- Shows how deep you are dredging versus the design depth
- Shows profile views to show you what the bottom is doing
- Provides a history of digging operations



Geomorph **Sub-Bottom Profiling RTK-GPS** Positioning System **Benefits to EMP:** > Exact location & sediment gradation of borrow material Volume calculations for pay quantities removed > QC tool for removal of sediment





## **Complexity of the EMP Designs of** the projects **Sensitivity to the Environment Innovative Approaches New Systems, Equipment & Processes**





## So what does this mean for EMP – HREP? **SUMMARY - EMP from a Contractor's Perspective** Add to current performance specs equipment types, 1. processes and/or capabilities Get contractor's input early in the design 2. phases to ensure constructability as well as environmental compliance & sensitivity.





#### So what does this mean for EMP – HREP?

SUMMARY - EMP from a Contractor's Perspective

"If you keep doing things the way you have
always done them – You will get what you always
got."

Look at new technologies that enhance the probability of the successes of your projects. e.g. Equipment, processes, systems





#### So what does this mean for EMP – HREP?

SUMMARY - EMP from a Contractor's Perspective
4. Use contracting methodologies that ensure a true Best Value to the Client <u>not just lowest cost</u>.
e.g. Design/Bid or Design/Build, Best Value
Use Partnering Alliances to keep the project on task and conflict free

5. Ensure payment to the contractor is based on work accomplished not specs that are unrealistic and unconstructable without excessive dredging





