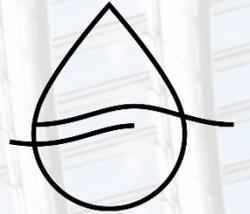




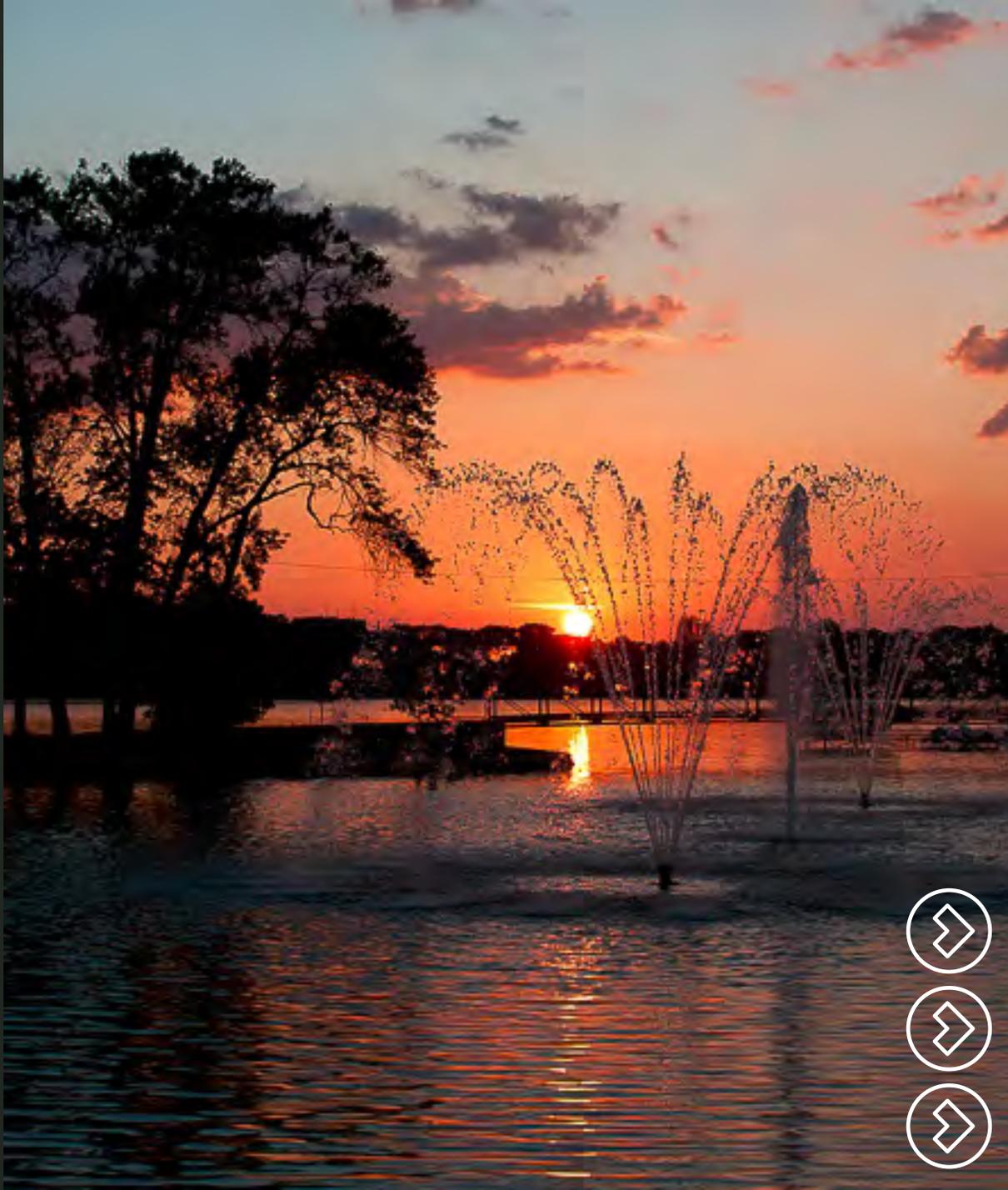
**Natural
Resource
Technology**
AN OBG COMPANY



Fountain Lake Restoration Project

Andrew Millspaugh, PE – WEDA Dredging Summit & Expo, June 26-29, 2017





OUTLINE

Project History

Lake Modeling & Dredging Plan

Upland Confined Disposal Facility

Agency Permitting

Project Status



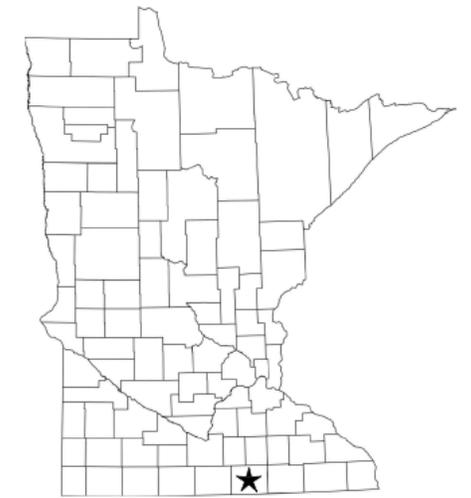
Shell Rock River Watershed District (SRRWD)

Established in 2003, governed by a Board of Managers, and accountable to the MN Board of Water and Soil Resources

Watershed covers 246 square miles in Freeborn County including 11 shallow lakes

Guided by a Water Management Plan to conserve and restore water resources

Funds come from property tax, 0.5% local sales tax (since 2005), and grants (\$7.5M for dredging appropriated from MN General Fund in 2014)

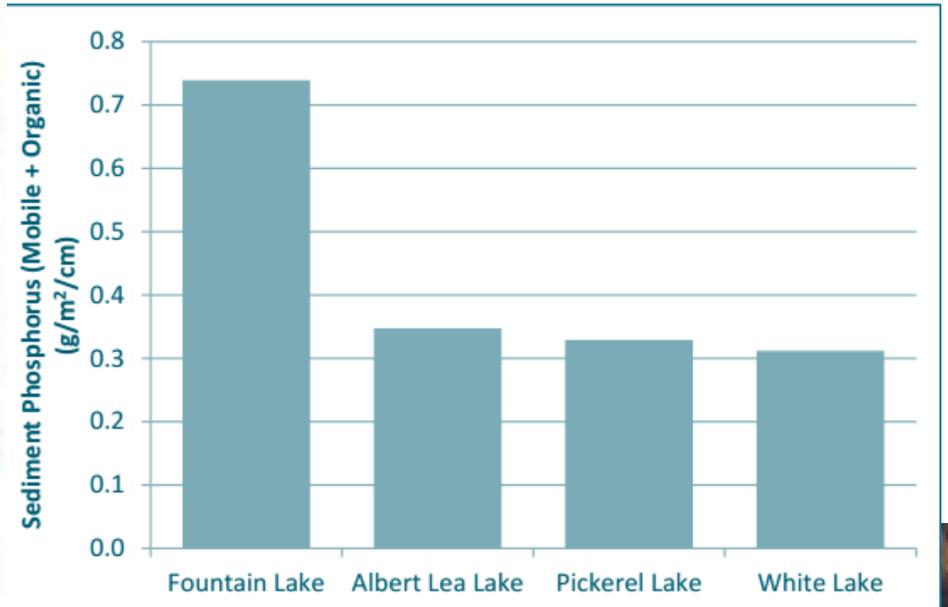


MINNESOTA

“SRRWD Mission is to implement reasonable and necessary improvements to the water-related and other natural resources of the district.”



Location
Albert Lea



Fountain Lake Restoration Project

GOAL 1 Improve Lake Water Quality

Dredge accumulated
sediment
Reduce nutrient loads

GOAL 2 Enhance Aquatic Habitat

Increase water depth
and clarity for
improved fish habitat

GOAL 3 Improved Recreational Opportunities

Improve water
clarity for swimming
Increase water depth
for boating



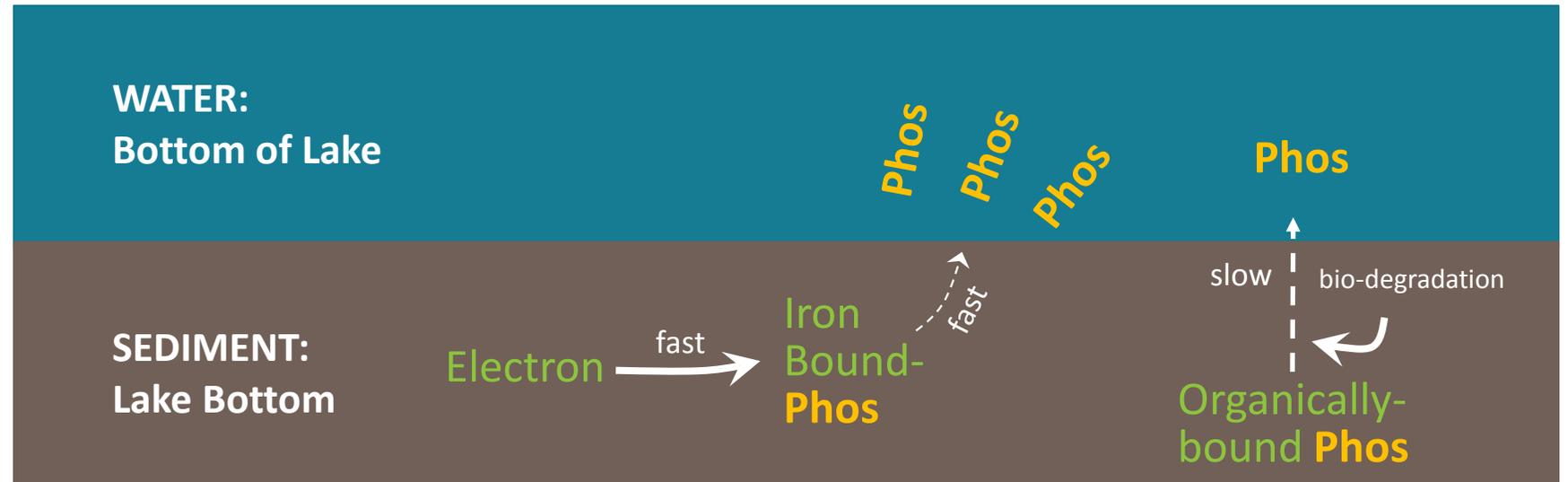
Phosphorous Loading

Mobile phosphorus (iron-bound)

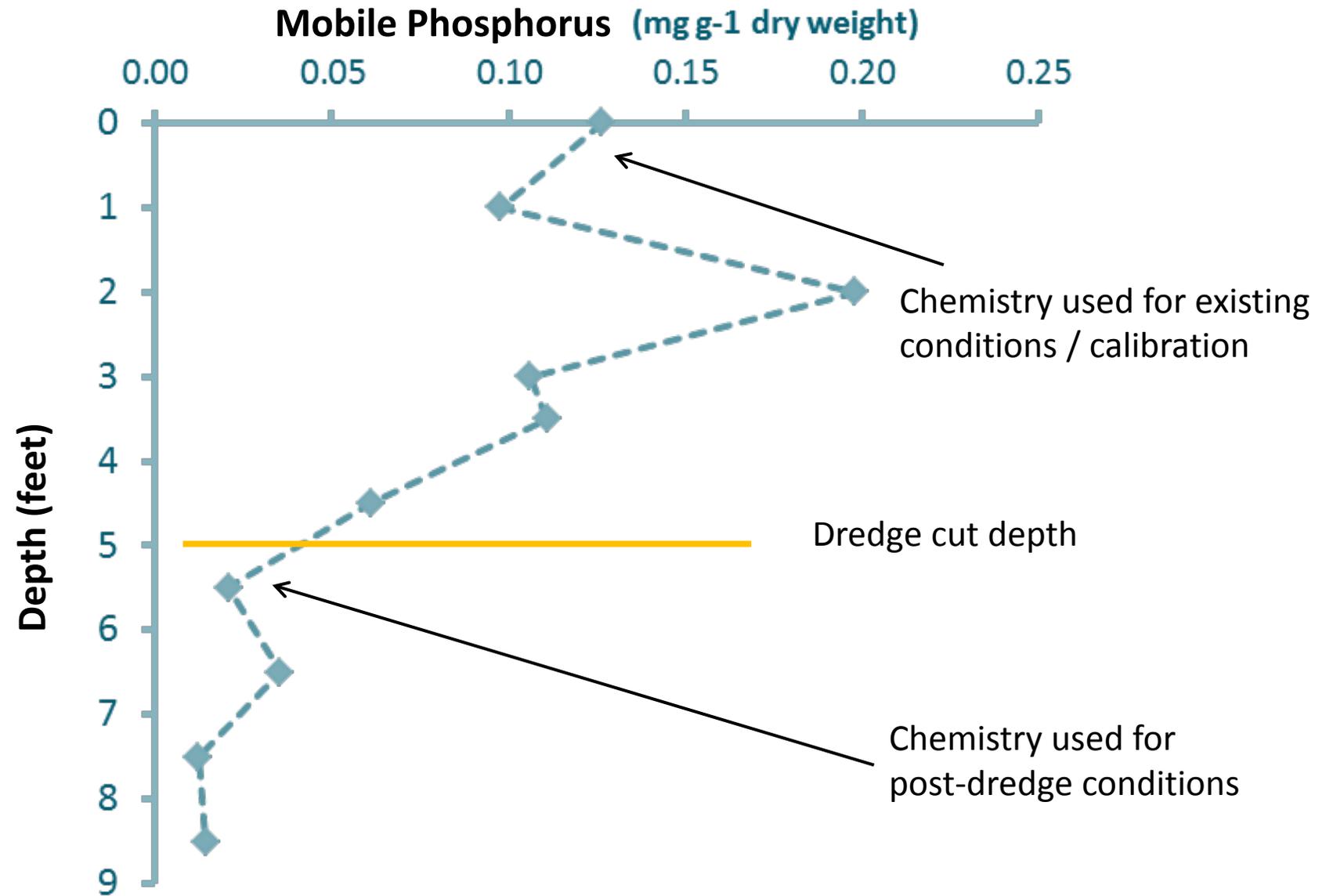
- Loosely bound and redox sensitive
- Released under anaerobic conditions
- **Primary source for internal loading**

Organically-bound phosphorus

- Released during biodegradation of organic phosphorus in sediment
- **Secondary source for internal loading**



Dredge Design – Sediment Chemistry

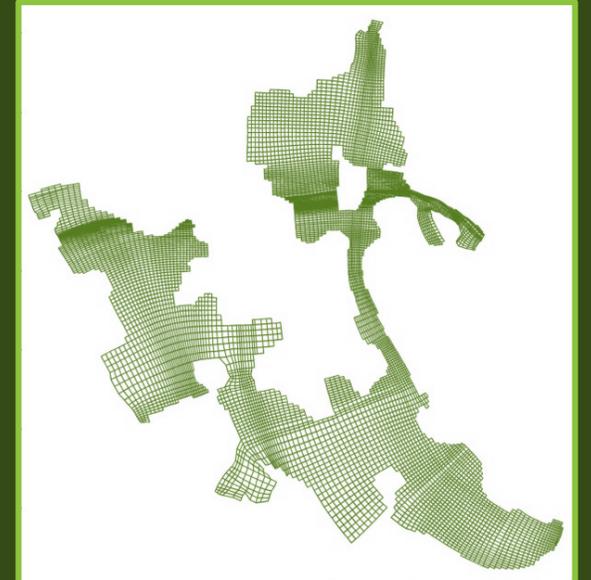


Lake Modeling – Delft 3D

Calibrate hydrodynamics and sediment transport

Calibrate water quality model – solids, nutrients, phytoplankton, DO, temperature

Use model to estimate effects of dredging – mobile and organic phosphorus concentrations; greater lake volume and depth



Dredging Plan

Based on sediment phosphorus chemistry

Modified for constructability

Dredging ~50% of Lake surface area

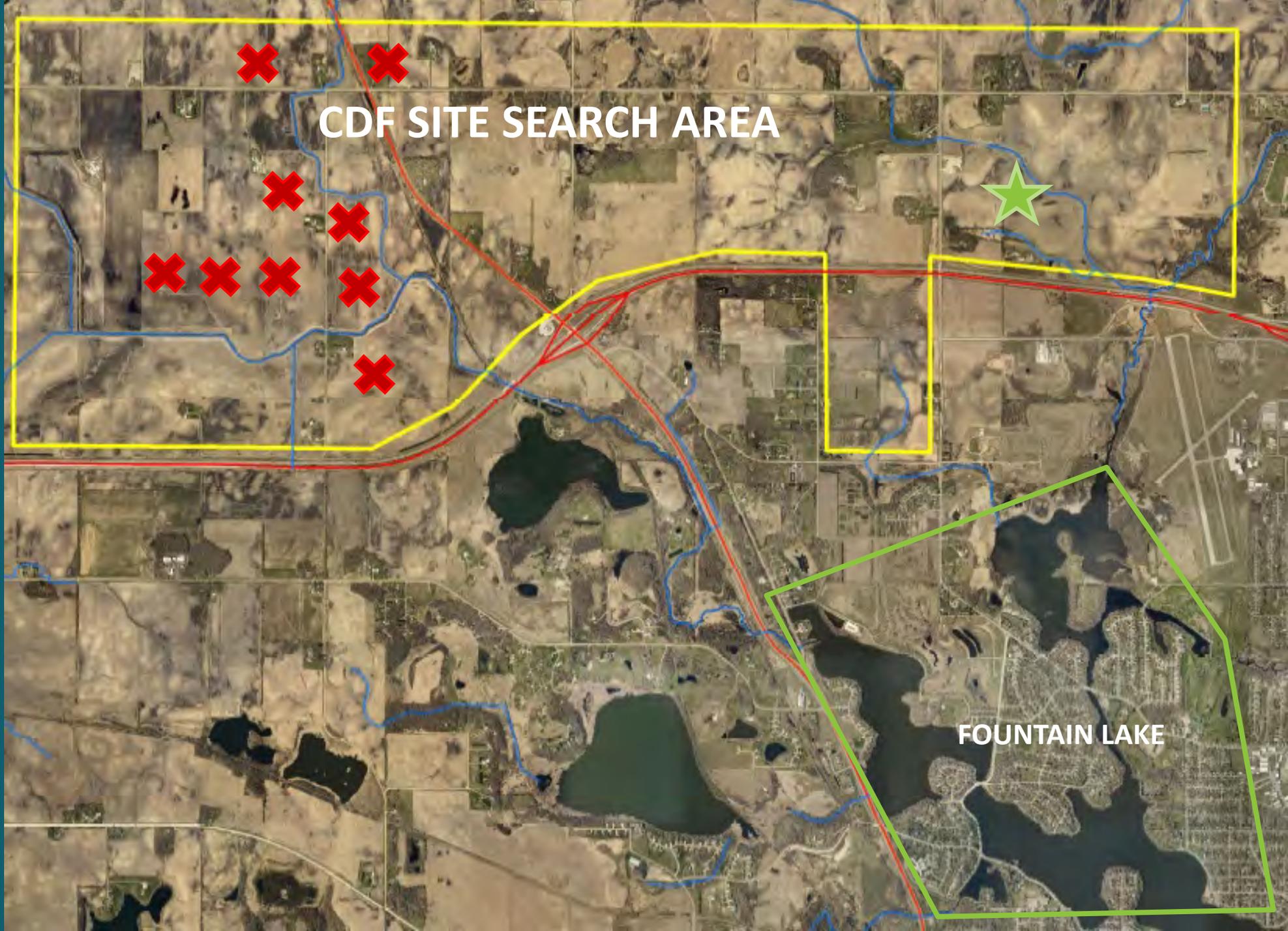
Total project volume of approximately
1.2 million CY

Average dredge cut ~3 ft

Design in permit review and subject to change



Sediment Placement Site



Sediment Placement Site

*Evaluated 9 parcels over 6 months in mid-2015 –
all were removed from consideration*

Presence of buried utilities

Unfavorable terrain

Difficult dredge pipeline route logistics

Unwilling landowners

Proximity of residences (high hazard dam classification)



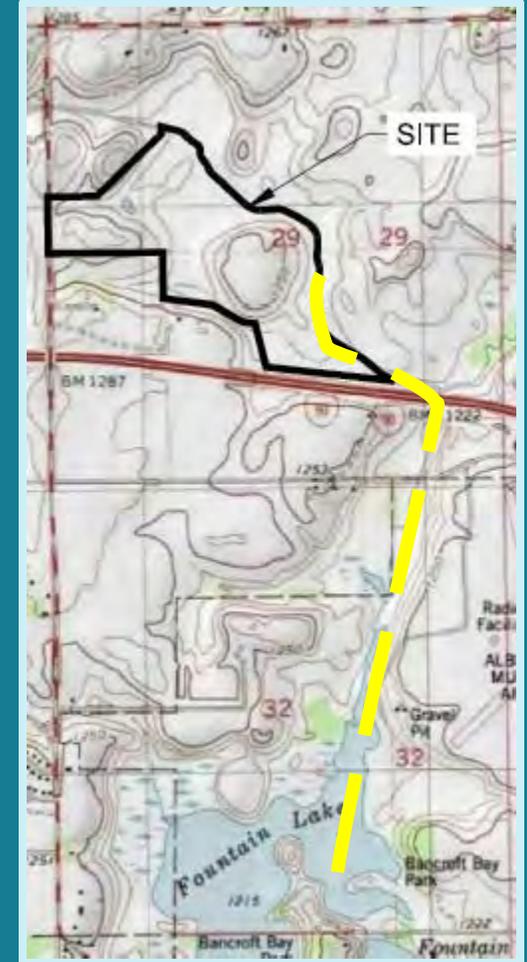
Located suitable site in late 2015 with interested and cooperative landowner

Within 3 miles of farthest dredge area in Fountain Lake

Located along existing drainage features for gravity flow of return water to Fountain Lake

Usable topography

Willing landowner



Sediment Placement Site



Geotechnical Investigation

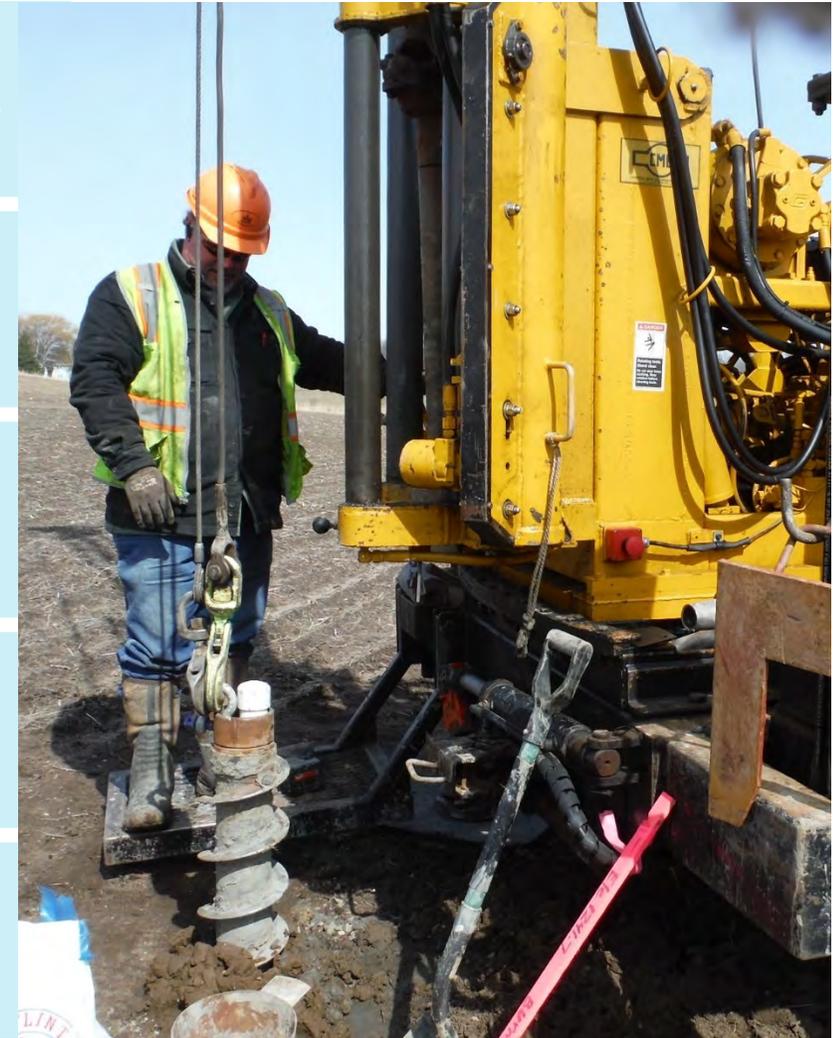
35 standard penetration test (SPT) borings to 15 to 25 ft in berm alignments, borrow areas, and general footprint

Collected undisturbed Shelby tube samples and bulk samples off the hollow stem augers

11 temporary wells to assess seasonal water table

Additional 5 borings and 7 backhoe test pits to further characterize soft organic soils in mapped wetland

Geotechnical laboratory testing program



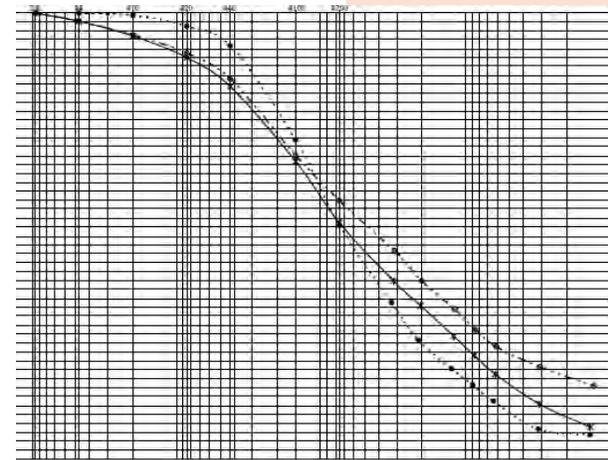
Geotechnical Testing

INDEX TESTS

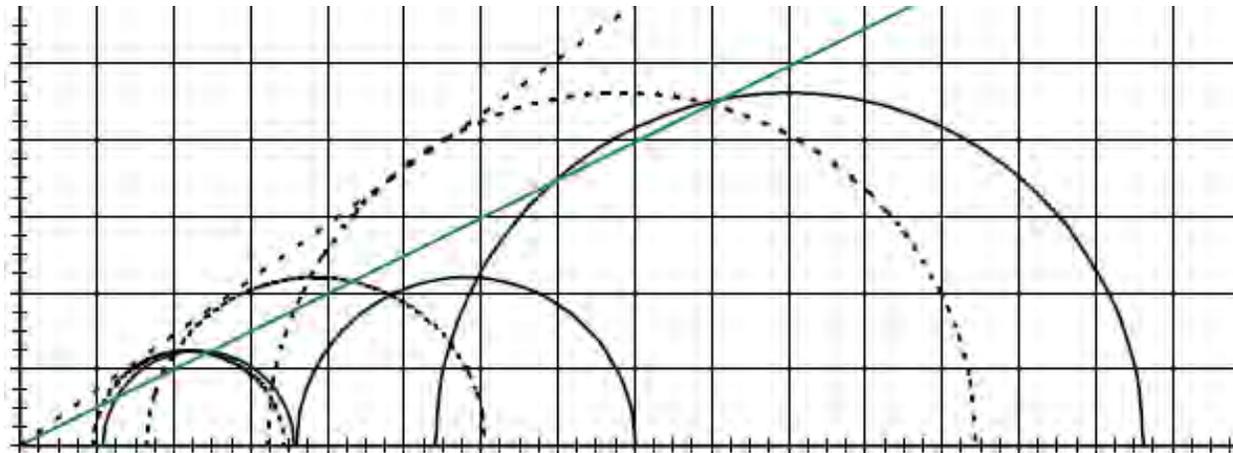
Moisture, Grain Size
Atterberg Limits
Loss-on-Ignition
Moisture-Density

STRENGTH TESTS

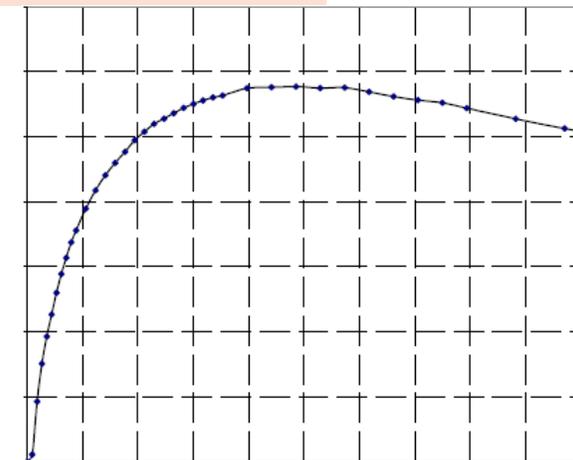
Unconfined Compression
Direct Shear
Triaxial Shear (UU & CU)
CONSOLIDATION TESTS



Grain Size Distribution



Triaxial Shear: CU with Pore Pressure



Unconfined Compression



CDF Design

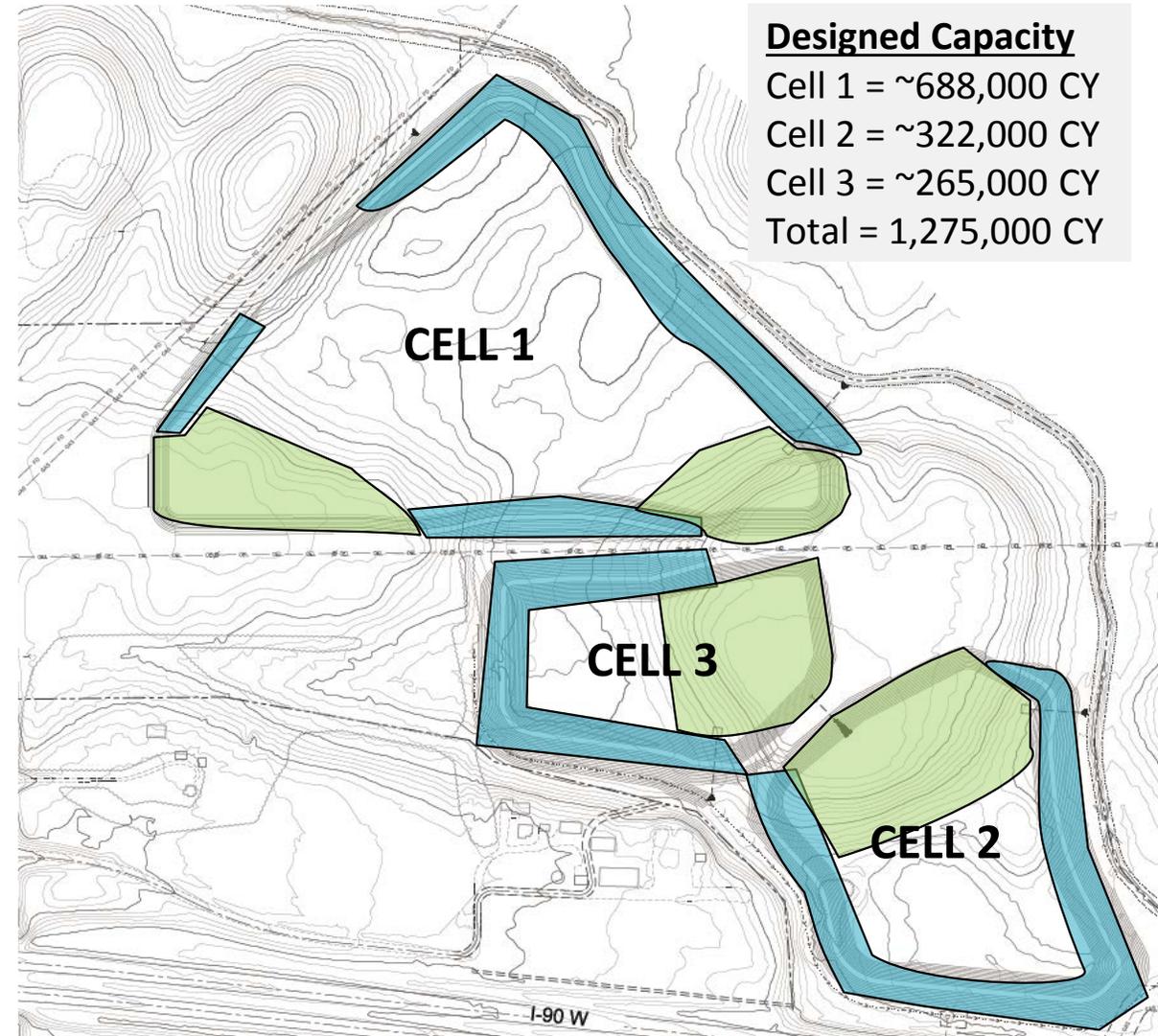
3-Cell system for phased permitting and construction

Configuration restricted by utilities, drainage ditch, and property lines

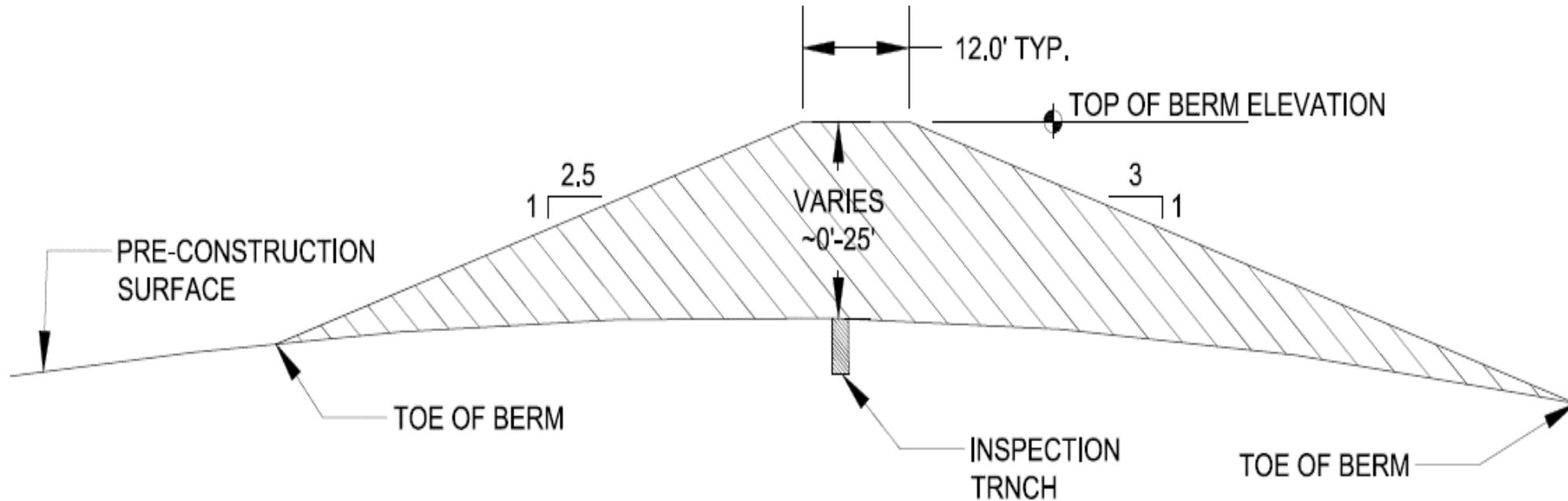
Make use of existing topography

Construct berms in low elevation

Tie into existing higher elevation



CDF Design



Conceptual Berm Cross Section

3H:1V Exterior Slope

12 ft Crest for Vehicle Access

6 ft Deep Inspection Trench

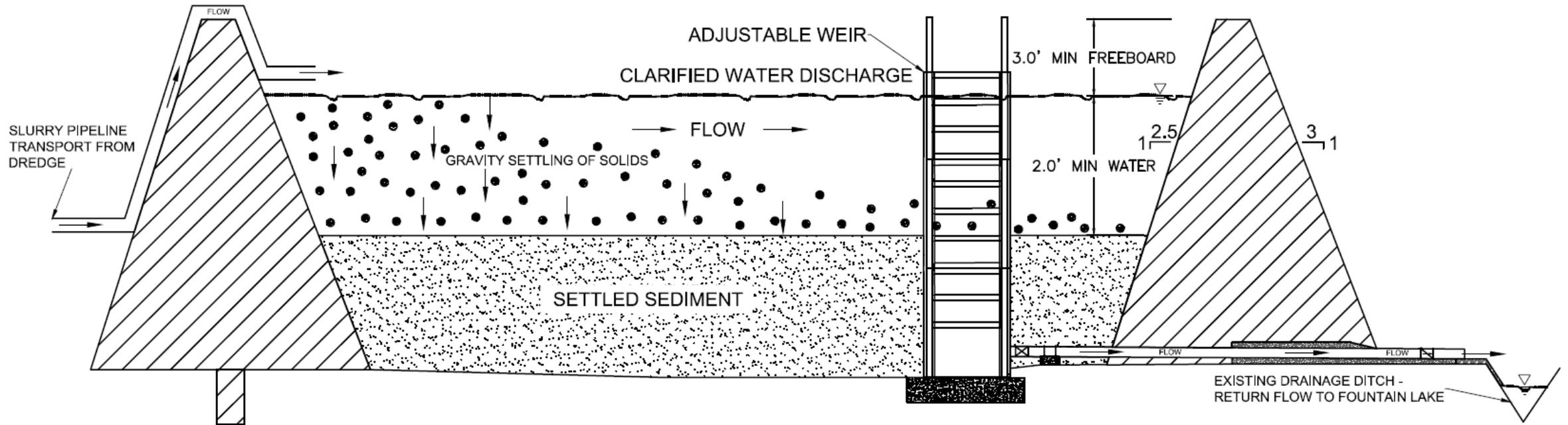
2.5H:1V Interior Slope

25 ft Max Height

Slopes Stabilized with Grass



CDF Process Flow Diagram





CDF Weir Box Riser

U.S. Army Corps of Engineers design

Controls discharge of CDF supernatant

Weir boards are added to the box riser structure to increase ponded water within CDF

Surrounding dock and gangway float and rise along box riser structure as water rises

Provides easy safe access to weir from perimeter berm

*Box Riser Weir design and pictures courtesy of
USACE Jacksonville District*



CDF Weir Box Riser

Weir overflow water flows out the base of the box riser structure via HDPE pipe through perimeter berm

Equipped with emergency flap gate to stop flow

Concrete foundation sized to prevent flotation



Box Riser Weir design and pictures courtesy of USACE Jacksonville District



Permitting Agencies

MN Department of Natural Resources	Freeborn County
Dam Safety Permit (CDF) RECEIVED	Conditional Land Use Permit RECEIVED
Public Waters Work Permit (dredging) UNDER REVIEW	Wetland Conservation Act RECEIVED
Water Appropriations Permit (dredging) UNDER REVIEW	ROW Work Permit (Dredge pipeline route) In Progress
Invasive Species Permit (dredging) RECEIVED	
MN Pollution Control Agency	MN Department of Transportation
Notification to Manage Dredged Material In Progress	ROW Work Permit (Dredge pipeline route) UNDER REVIEW
Section 401 CWA Water Quality Certification RECEIVED	
Construction Stormwater (NPDES) RECEIVED	
U.S. Army Corps of Engineers	City of Albert Lea
Section 404 CWA CDF Discharge RECEIVED	Access Agreements In Progress
Federal Aviation Administration	Private Citizens
Aeronautical Hazard Determination RECEIVED	Access Agreements (Dredge pipeline route) In Progress



Project Status

CDF Cell 1 construction is under construction with scheduled completion in August 2017

Dredging design of entire lake is complete and pending Agency review

Dredge Contract 1 (~635,000 CY) bid release expected in 2017

CDF Cells 2 and 3 construction, and Dredge Contract 2, in future years





Contractor Notice

www.questcdn.com Project No. 4897968

Description:

This **Pre-Solicitation Notice** is being issued by the Shell Rock River Watershed District (SRRWD) to inform interested/potential contractors of the District's intent to issue a Request for Bid Package. Issuance of the Bid Package is delayed while permitting requirements are being resolved.

PROJECT INFORMATION: This project involves hydraulic dredging up to approximately 635,000 cubic yards of sediment from Edgewater Bay, Fountain Lake, located in Albert Lea, MN. Project requirements include preparation and submission of work plans, survey control, site layout, bathymetric survey(s), hydraulic dredging and pipeline transport to CDF Cell No. 1, and operation and maintenance of CDF Cell No. 1. CDF Cell No. 1 will be constructed by others and made available for use by August 15, 2017. Potential bidders must be a responsible contractor as defined in Minn. Stat. § 16C.285 to qualify for bid submission.

Owner:

Shell Rock River Watershed District



ACKNOWLEDGEMENTS

Shell Rock River Watershed District

Natural Resource Technology, Inc., an OBG Company

Barr Engineering

Peterson, Kolker, Haedt & Benda, Ltd.

Jones, Haugh & Smith, Inc.

WSB & Associates, Inc.





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Technology**

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Questions?

Andrew Millspaugh | Andrew.Millspaugh@OBG.com