PROJECT EVALUATION AND FINAL REPORT

KINKAID LAKE TMDL BEST MANAGEMENT PRACTICES IMPLEMENTATION

FINANCIAL ASSISTANCE AGREEMENT NO. 3190521

PROJECTS FUNDED THROUGH ASSISTANCE FROM THE NONPOINT SOURCE POLLUTION CONTROL PROGRAM, SECTION 319(h)

Program Administered by the
Illinois Environmental Protection Agency
Division of Water Pollution Control
Springfield, Illinois 62794-9276

Report Submitted by:
Kinkaid-Reed's Creek Conservancy District
1763 Water Plant Road
Murphysboro, Illinois 62966

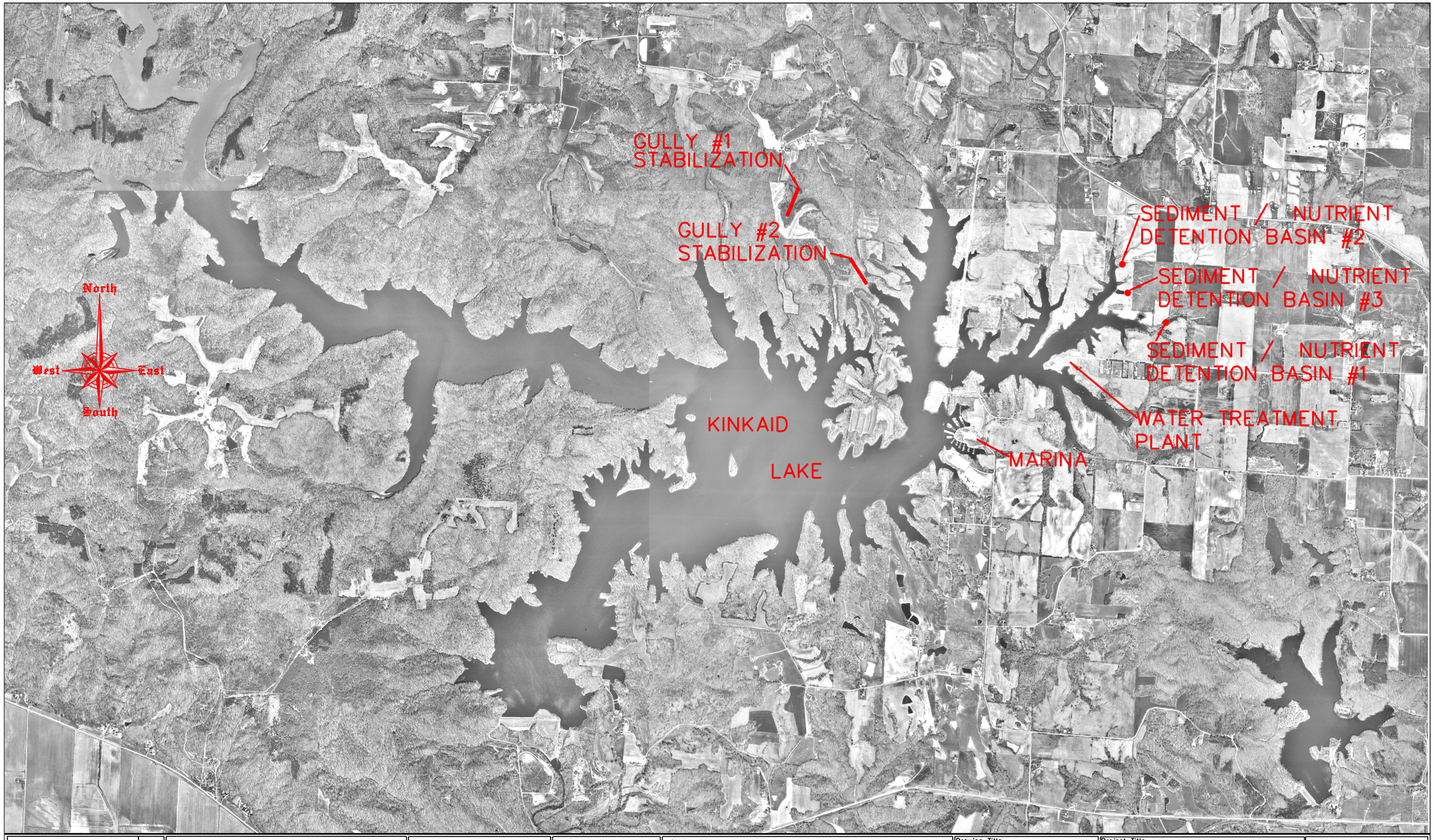
Prepared by:
HDR | Cochran & Wilken, Inc.
1339 Walnut Street
Murphysboro, Illinois 62966

August 2007

This report was prepared using U.S. Environmental Protection Agency funds under Section 319 of the Clean Water Act distributed through the Illinois Environmental Protection Agency. The findings and recommendations herein are not necessarily those of the funding agencies.

TABLE OF CONTENTS

ATTACHMENT 1
PROJECT LOCATION MAP



Revisions / Date	**Cochran & Wilken, Inc.** Consulting Engineers & Scientists 5201 South Sixth Street Road, Springfield, Il 62703-5143 1339 Walnut St. Murphysboro, IL 62966 Ph. (217) 585-8300 Ph. (618) 684-5808			Approved:	Drawing Title: PROJECT LOCATION MAP	Project Title: SEDIMENT/NUTRIENT DETENTION BASINS, GULLY STABILIZATION, LAKE SHORELINE STABILIZATION Location: JACKSON COUNTY, ILLINOIS Date: FEBRUARY 01, 2006 Checked: Drawn: JAZ Project No. 05078-002 Building Number – DRAWING NO. C2 Dwg. 2 of 14

ATTACHMENT 2
CONSTRUCTION COST DETAIL SHEETS

Cochran & Wilken, Inc.
Consulting Engineers & Scientists

5201 South Sixth Street Road, Springfield, IL 62703-5143
1339 Walnut Street, Murphysboro, IL 62966

Project: Kinkaid Lake Section 319 Projects
Shoreline Stabilization
319 funded areas only
Client: KRCCD-2006 & 2007
Phase: Final **Client Proj #:**
By: GWR **CWI Project #:** 05078
Date: 08/14/07

SUMMARY OF FINAL PROJECT COST				
ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	TOTAL COST
Stone Riprap, Gradation RR 4 (delivered cost)	8,525.8	Tons	$13.09	$111,586.19
Filter Fabric & Hold Down Pins	7,495.0	Feet	$1.00	$7,495.00
Loading-unloading area maintenance (per ton of riprap basis)	8,525.8	Tons	$0.36	$3,069.56
Shoreline Stabilization, including mobilization, labor, equipment, bonding, overhead and profit (per ton of riprap basis)	8,525.8	Tons	$33.51	$285,717.95
SUBTOTAL				$407,868.70
TOTAL PROJECT COST				**$407,868.70**

8525.72

Cochran & Wilken, Inc.
Consulting Engineers & Scientists

5201 South Sixth Street Road, Springfield, IL 62703-5143
1339 Walnut Street, Murphysboro, IL 62966

Project: Kinkaid Lake Section 319 Projects
Sediment / Nutrient Detention Basin #1

Client: KRCCD
Phase: Final **Client Proj #:**
By: GWR **CWI Project #:** 05078
Date: 01/05/06

SUMMARY OF FINAL PROJECT COST

ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	TOTAL COST
Equipment Operator-Laborer (S. Christy)	588.3	Hours	$34.66	$20,390.48
Equipment Operator-Laborer (J. Wohlstadter)	588.3	Hours	$35.57	$20,925.83
Crawler Tractor-Dozer, Cat D-4 XL	326.0	Hours	$48.65	$15,859.90
Crawler Tractor-Dozer, Cat D-6 RXL	150.4	Hours	$77.90	$11,716.16
Crawler Tractor-Dozer, Fiat 11B	259.2	Hours	$62.30	$16,148.16
Crawler Loader, Cat 943	105.5	Hours	$48.65	$5,132.58
Sheepsfoot Compactor, towed unit	22.5	Hours	$31.60	$711.00
Hydraulic Excavator, Gradall	181.5	Hours	$82.01	$14,884.82
Farm Tractor, New Holland 45 H.P.	15.0	Hours	$11.45	$171.75
Farm Tractor, John Deere 33 HP	1.0	Hours	$9.00	$9.00
Farm Tractor, J.D. 5410 & Ford 6610, 70 H.P.	3.0	Hours	$16.55	$49.65
Dump Truck	21.0	Hours	$25.00	$525.00
Service Truck	432.0	Hours	$20.92	$9,037.44
Material, Sch. 80 Stl Pipe, 30"	120.0	Feet	$110.00	$13,200.00
Material, Sch. 40 PVC Pipe, 10"	160.0	Feet	$28.00	$4,480.00
Material, 10" Gate Valve	1.0	Each	$1,250.00	$1,250.00
Materials, seed and fertilizer		Total		$492.44
Equipment Mobilization and De-mobilization	1450.0	Miles	$1.00	$1,450.00
SUBTOTAL				$136,434.20
Surveying and Engineering				$10,699.88
TOTAL PROJECT COST				**$147,134.08**

Cochran & Wilken, Inc.
Consulting Engineers & Scientists

5201 South Sixth Street Road, Springfield, IL 62703-5143
1339 Walnut Street, Murphysboro, IL 62966

Project: Kinkaid Lake Section 319 Projects
Sediment / Nutrient Detention Basin
No. 2 & Shared Borrow Area Completion
Client: KRCCD
Phase: 95% **Client Proj #:**
By: GWR **CWI Project #:** 05078
Date: 11/14/06

SUMMARY OF PROJECT COST at 11/14/2006

ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	TOTAL COST
Equipment Operator-Laborer (S. Christy)	256.0	Hours	$34.66	$8,872.96
Equipment Operator-Laborer (A. Robison)	256.0	Hours	$34.66	$8,872.96
Crawler Tractor-Dozer, Cat D-4 XL	160.0	Hours	$48.65	$7,784.00
Crawler Tractor-Dozer, Int TD 15	11.0	Hours	$62.30	$685.30
Crawler Tractor-Dozer, Fiat 11B	107.0	Hours	$62.30	$6,666.10
Crawler Loader, Cat 943	28.0	Hours	$48.65	$1,362.20
Sheepsfoot Compactor, towed unit	28.0	Hours	$31.60	$884.80
Hydraulic Excavator, Gradall	52.0	Hours	$82.01	$4,264.52
Farm Tractor, New Holland 45 H.P.	14.0	Hours	$11.45	$160.30
Farm Tractor, J.D. 5410 & Ford 6610, 70 H.P.	7.0	Hours	$16.55	$115.85
Dump Truck	91.0	Hours	$25.98	$2,364.18
Service Truck	185.0	Hours	$20.92	$3,870.20
Material, Anti-seep collars	10.0	Each	$111.52	$1,115.20
Material, Sch. 40 PVC Pipe, 10"	200.0	Feet	$10.00	$2,000.00
Material, 10" Gate Valve	2.0	Each	$1,127.42	$2,254.84
Material, connectors	2.0	Each	$31.04	$62.08
Material, geofabric	300.0	Feet	$1.33	$399.00
Material, silt fence	400.0	Feet	$0.74	$296.00
Materials, seed and fertilizer	1.0	L Sum		$778.59
Material, straw mulch	60.0	Bales	$2.00	$120.00
Equipment Rental	1.0	L Sum		$189.10
Labor, in-kind by Boy Scouts of America	42.0	Hours	$10.00	$420.00
Equipment Mobilization and De-mobilization	800.0	Miles	$1.00	$800.00
Note: work remaining consists of:				
A. Corrective erosion repair, seeding and mulching				
B. Silt fence removal				
C. Excess earth material removal				
D. Stone riprap at pipe outlet				
SUBTOTAL				$54,338.18
TOTAL PROJECT COST				**$54,338.18**

Cochran & Wilken, Inc.
Consulting Engineers & Scientists

5201 South Sixth Street Road, Springfield, IL 62703-5143
1339 Walnut Street, Murphysboro, IL 62966

Project: Kinkaid Lake Section 319 Projects
GULLY STABILIZATION

Client: KRCCD
Phase: 95% **Client Proj #:**
By: GWR **CWI Project #:** 05078
Date: 11/14/06

SUMMARY OF PROJECT COST at 11/14/2006

ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	TOTAL COST
MATERIAL COST (RECEIPTS ON FILE)				
Materials, lumber products (Wright's Building Ctr)				$1,070.89
Stone riprap, 50# size, Kinkaid Stone				$1,842.00
Chainsaw chains, maintenance				$57.98
Hand tools, fastening materials, Rural King				$498.99
Materials, fastenings, True Value Hardware				$7.98
Wire, fastenings, hardware, Rural King				$51.96
Materials, lumber products (Wright's Building Ctr)				$451.36
Materials, geo textile fabric, Energy Culvert Company				$800.00
EQUIPMENT				
Equipment, Bobcat with Hydrocutter, operator	6.5	Hours	$110.00	$715.00
Equipment, Rubber tired backhoe, endloader	75.5	Hours	$60.00	$4,530.00
Equipment, truck and lowboy, equipment mobilization	120.0	Miles	$4.50	$540.00
Equipment, pickup truck with 16' trailer	120.0	Miles	$1.00	$120.00
Equipment, Tractor and bush hog mower	16.0	Hours	$18.50	$296.00
LABOR				
G. Baird, KRCCD, foreman, laborer	95.5	Hours	$23.80	$2,272.90
M. Dietz, IDNR, foreman, operator	95.5	Hours	$23.80	$2,272.90
S. Wilmouth, KRCCD, operator	75.5	Hours	$31.35	$2,366.93
LABOR, Illinois Dept. of Corrections Personnel	480.0	Hours	$23.80	$11,424.00
Note: remaining work consists of:				
A. Corrective erosion repair, seeding, mulching				
B. Construction of one additional stabilization structure,				
stone construction type 4				
SUBTOTAL				$29,318.89
TOTAL PROJECT COST				**$29,318.89**

ATTACHMENT 3
OPERATIONS AND MAINTENANCE PLAN

OPERATIONS AND MAINTENANCE PLAN

FOR

SEDIMENT / NUTRIENT DETENTION BASINS
GULLY STABILIZATION
SHORELINE STABILIZATION

CONSTRUCTED WITH COOPERATION OF THE
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
NONPOINT SOURCE POLLUTION CONTROL PROGRAM
SECTION 319(H)

KINKAID-REED'S CREEK CONSERVANCY DISTRICT
1763 WATER PLANT ROAD
MURPHYSBORO, ILLINOIS 62966

Prepared by

Cochran & Wilken, Inc.
1339 Walnut Street
Murphysboro, Illinois 62966
March 30, 2006

SEDIMENT / NUTRIENT DETENTION BASINS

1. Impoundment basins are designed to remove sediment and nutrients from concentrated sheet runoff from the watershed area flowing to the basin. This removal process occurs through the storage of such runoff for a period of time sufficient to allow natural settling of such particles prior to discharge of the water which transports these materials. The life of the impounding structures (dam and spillway(s)), should be indefinite with proper maintenance. The expected life of the overall structure as an effective sediment and nutrient removal system will vary, dependent on the management within the watershed and other factors. While it is expected that such basins will perform for at least ten years without sediment removal, it is inevitable that periodic sediment removal will be required.

2. Periodically, and particularly following heavy rainfall, inspect the spillway(s) for possible debris accumulation and erosion. Erosion of the grass-lined emergency spillways should be repaired by filling eroded channels and reseeding. Erosion immediately downstream of the spillway outlets also will require close monitoring. Repair such erosion as soon as possible after occurrence.

3. Maintain vigorous growth of desirable vegetation coverings (sod) in the emergency spillways and on embankments. This includes reseeding, fertilizing, and controlled herbicide applications as required. Periodic mowing should also be done. Time mowing after nesting birds have hatched (about August 15).

4. Maintain a grass filter strip around the perimeter of the basins.

5. Check for and repair damage to embankments by rodents or burrowing animals.

6. Remove woody vegetation from embankments. Prevent trees and brush from growing on embankments, abutments, or in the spillway areas. Control trees and brush by hand cutting, mowing, or chemicals. Avoid grass damage by herbicides and do not burn.

7. Monitor for possible settlement or cracks in the embankment section. Repair as necessary.

8. Inspect the downstream toe of the embankment annually. If there are wet areas or seeps at the downstream toe of the embankment, it could indicate a serious problem. In the event such seepage is present, seek professional assistance to evaluate the seep.

9. Fill all rills and gullies that occur on the embankments and vegetated spillway. Reseed the filled areas.

10. Pipe inlet maintenance: periodically, and especially after periods of heavy rainfall, inspect the principal spillway pipe inlet and the section of the dam on the upstream end of the pipe. Remove all accumulated debris at the pipe inlet and repair any erosion or soil loss on the dam at the upstream pipe entrance. Upon lake drawdown for fish harvest or sediment removal maintenance, inspect the drawdown pipe inlet end for debris or sediment accumulation. Remove all such debris or sediment accumulation to assure this pipe will function at the next lake drawdown.

11. Drawdown pipe valve maintenance: the purpose of this valve is to allow total or partial reduction in lake water level for purposes such as shoreline vegetation management, sediment removal, and fish harvest. Periodically (no less often than once per year) operate this valve to assure the valve will open, close and seat as designed. Repair or replace this valve as necessary.

GULLY STABILIZATION: GRADE STABILIZATION STRUCTURES

1. Grade stabilization structures are designed to reduce gully erosion by reducing the overall gradient of the gully flow line to slow flow velocities to levels that are not erosive to the native soil materials. The structures are designed of materials that can be transported and placed within the active gullies with as little disturbance to the surrounding forested areas as possible. No effort has been made to regrade the eroded gully sections between structures. It is intended that these portions of the gully will stabilize by the deposition of transported soil material and through natural succession of plant life.

2. The estimated life of these structures is at least ten years. The service of these structures can be extended and improved by the development and implementation of an operation and maintenance program.

3. Periodically, and particularly following periods of heavy rainfall, inspect the various structures for signs of damage and failure. Repair or replace damaged structures or portions of structures as required.

4. Type 2 structures constructed of posts, welded wire fabric, and brush may require replenishment of the brush material. It is to be expected that such material may be displaced by heavy flow rates and will consolidate with time due to decay and rotting of the native materials.

5. Remove any blockage or obstruction to the weir (spillway) sections of the various structures.

6. Pay particular attention to the areas immediately downstream of the structures. A certain amount of scouring due to water flow can be expected in the immediate downstream areas, but erosion or scouring that may threaten the integrity of the structures will require repair.

SHORELINE STABILIZATION

1. Shoreline stabilization utilizing off-shore breakwaters constructed of stone riprap functions by dissipation of wave energy and the elimination of wave contact with the erosive shoreline soils. No effort is made to regrade or shape the eroded shoreline in the installation process. It is intended that the previously-eroded areas will stabilize through natural processes, including natural succession of plant life, after the construction of the breakwaters.

2. The estimated life of these structures is indefinite with proper monitoring and maintenance.

3. Periodically inspect the installations, paying particular attention to areas of possible damage by wave action or manipulation. Damage may be subtle, and indicated only by a reduction in height of the structure by displacement of the upper surface over time. Such possible reduction in structure height will, however, lead to eventual failure of the section, and must be repaired by the placement of additional stone.

4. Damage may also occur to such structures by deadfall (eroded trees). Such deadfall should be removed, and the displaced stone replaced to original configuration.

5. Damage can also occur due to vandalism or removal of stone for boat access or hunting or fishing access. Such areas will also need to be replaced.

MANAGER'S CERTIFICATION

I, David Fligor, Manager of the Kinkaid-Reed's Creek Conservancy District, do hereby certify that this document is to be considered an official part of the commitment made by the District to the Illinois Environmental Protection Agency in conjunction with the receipt of funding through the Nonpoint Source Pollution Control Program, Section 319(h). These funds, combined with matching funds from other District sources, have been used in the construction of the improvements referenced herein, and the operation and maintenance of these improvements is to be considered an obligation by the District which commences upon the completion of the construction of these improvements.

David Fligor, Manager Date
Kinkaid-Reed's Creek Conservancy District

ATTACHMENT 4
ESTIMATED LOAD REDUCTION SPREADSHEETS, SEDIMENTS AND NUTRIENTS

Bank Stabilization

Please fill in the gray areas below. If estimating for just one bank, put "0" in areas for Bank #2.
Once you have successfully estimated the sediment and nutrient load reductions, please print a copy of this worksheet and attach it to the "BMP Application Form" for submittal to the Illinois EPA.

If you have any questions, please contact the Illinois EPA's Nonpoint Source Unit at 217/782-3362.

		Example
BMP Number:	3190521-005	**3199802001**

Please select a soil textural class:

○	Sands, loamy sands	○	Silty clay loam, silty clay
○	Sandy loam	○	Clay loam
○	Fine sandy loam	○	Clay
○	Loams, sandy clay loams, sandy clay	○	Organic
●	Silt loam		

Parameter		Lake Shore Mod.	Lake Shore Sev.	**Example**	
Length (ft)		5529	11227	**10000**	
Height (ft)		4.5	8	**6**	
Lateral Recession Rate (ft/yr)*		0.4	0.5	**1**	
Soil P Conc (lb/lb soil)**	DEFAULT	0.0005	0.0005	**0.0005**	**
Soil N Conc (lb/lb soil)**	DEFAULT	0.001	0.001	**0.001**	**

*Lateral Recession Rate (LRR) is the rate at which bank deterioration has taken place and is measured in feet per year. This rate may not be easily determined by direct measurement. Therefore best professional judgement may be required to estimate the LRR. Please refer to the narrative descriptions in Table 1.
** indicates default values for P and N soil concentrations

Table 1

LRR (ft/yr)	**Category**	**Description**
0.01 - 0.05	Slight	Some bare bank but active erosion not readily apparent. Some rills but no vegetative overhang. No exposed tree roots.
0.06 - 0.2	Moderate	Bank is predominantly bare with some rills and vegetative overhang.
0.3 - 0.5	Severe	Bank is bare with rills and severe vegetative overhang. Many exposed tree roots and some fallen trees and slumps or slips. Some changes in cultural features such as fence corners missing and realignment of roads or trails. Channel cross-section becomes more U-shaped as opposed to V-shaped.
0.5+	Very Severe	Bank is bare with gullies and severe vegetative overhang. Many fallen trees, drains and culverts eroding out and changes in cultural features as above. Massive slips or washouts common. Channel cross-section is U-shaped and streamcourse or gully may be meandering.

Source: Steffen, L.J. 1982. Channel Erosion (personal communication), as printed in "Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual," June 1999 Revision; Michigan Department of Environmental Quality - Surface Water Quality Division - Nonpoint Source Unit. EQP 5841 (6/99).

Estimated Load Reductions

	Lake Shore Mod.	**Lake Shore Sev.**	**Example**
Sediment Load Reduction (ton/year)	423	1909	**2400**
Phosphorus Load Reduction (lb/year)	423	1909	**2400**
Nitrogen Load Reduction (lb/yr)	846	3817	**4800**

Gully Stabilization

These may include:

Grade Stabilization Structure
Grassed Waterway
Critical Area Planting in areas with gullies
Water and Sediment Control Basins

Please fill in the gray areas below. Once you have successfully estimated the sediment and nutrient load reductions, please print a copy of this worksheet and attach it to the "BMP Application Form" for submittal to the Illinois EPA.

If you have any questions, please contact the Illinois EPA's Nonpoint Source Unit at 217/782-3362.

		Example
BMP Number:	31905521-004	**3199802001**

Please select a soil textural class:

○ Sands, loamy sands	○ Silty clay loam, silty clay
○ Sandy loam	○ Clay loam
○ Fine sandy loam	○ Clay
○ Loams, sandy clay loams, sandy clay	○ Organic
◉ Silt loam	

Parameter	Gully	Example	
Top Width (ft)	18	**15**	
Bottom Width (ft)	4	**4**	
Depth (ft)	6	**5**	
Length (ft)	1100	**20**	
Number of Years	10	**5**	
Soil P Conc (lb/lb soil)* DEFAULT	0.0005	**0.0005**	*
Soil N Conc (lb/lb soil)* DEFAULT	0.001	**0.001**	*

* indicates default values for P and N soil concentrations

Estimated Load Reductions

	Gully	Example
Sediment Load Reduction (ton/year)	309	**10**
Phosphorus Load Reduction	309	**8**
Nitrogen Load Reduction (lb/yr)	617	**16**

Ponds and WASCBs

Please fill in the gray areas only and select which BMP applies.
Additionally a gully stabilization sheet should be completed if applicable.

If you have any questions, please contact the Illinois EPA's Nonpoint Source Unit at 217/782-3362.

		Example
BMP Number:	3190521-001	**3199802001**

Please check which BMP applies:

- (●) Ponds
- ( ) WASCBs

RUSLE	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Rainfall-Runoff Erosivity Factor (R)	220					
Soil Erodibility Factor (K)	0.43					
Length-Slope Factor (LS)	0.35					
Cover Management Factor (C)	0.27					
Support Practice Factor (P)	1					
Avg Annual Soil Loss (ton/acre/year)	8.94	0.00	0.00	0.00	0.00	0.00
Contributing Area (acres)	105					

Total Annual Soil Loss (tons)	939
Total Acres	105
Weighted Annual Soil Loss (ton/ac/yr)	8.94
Sediment Delivery Ratio	52.65%
Sediment Delivery (ton/year)	494
Sediment Trap Efficiency	90%
Sediment Load Reduction (ton/year)	445

Gully Sediment Load Reduction	89
Gully P Load Reduction	89
Gully N Load Reduction	179

Total Sediment Load Reduction	534
Total P Load Reduction	89
Total N Load Reduction	179

Ponds and WASCBs

Please fill in the gray areas only and select which BMP applies.
Additionally a gully stabilization sheet should be completed if applicable.

If you have any questions, please contact the Illinois EPA's Nonpoint Source Unit at 217/782-3362.

		Example
BMP Number:	3190521-002	**3199802001**

Please check which BMP applies:

- (●) Ponds
- ( ) WASCBs

RUSLE	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Rainfall-Runoff Erosivity Factor (R)	220					
Soil Erodibility Factor (K)	0.43					
Length-Slope Factor (LS)	0.35					
Cover Management Factor (C)	0.27					
Support Practice Factor (P)	1					
Avg Annual Soil Loss (ton/acre/year)	8.94	0.00	0.00	0.00	0.00	0.00
Contributing Area (acres)	13					

Total Annual Soil Loss (tons)	116
Total Acres	13
Weighted Annual Soil Loss (ton/ac/yr)	8.94
Sediment Delivery Ratio	68.36%
Sediment Delivery (ton/year)	79
Sediment Trap Efficiency	90%
Sediment Load Reduction (ton/year)	71

Gully Sediment Load Reduction	2
Gully P Load Reduction	2
Gully N Load Reduction	4

Total Sediment Load Reduction	74
Total P Load Reduction	2
Total N Load Reduction	4

Ponds and WASCBs

Please fill in the gray areas only and select which BMP applies.
Additionally a gully stabilization sheet should be completed if applicable.

If you have any questions, please contact the Illinois EPA's Nonpoint Source Unit at 217/782-3362.

		Example
BMP Number:	3190521-003	**3199802001**

Please check which BMP applies:

- (●) Ponds
- ( ) WASCBs

RUSLE	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Rainfall-Runoff Erosivity Factor (R)	220					
Soil Erodibility Factor (K)	0.43					
Length-Slope Factor (LS)	0.35					
Cover Management Factor (C)	0.27					
Support Practice Factor (P)	1					
Avg Annual Soil Loss (ton/acre/year)	8.94	0.00	0.00	0.00	0.00	0.00
Contributing Area (acres)	22					

Total Annual Soil Loss (tons)	197
Total Acres	22
Weighted Annual Soil Loss (ton/ac/yr)	8.94
Sediment Delivery Ratio	64.01%
Sediment Delivery (ton/year)	126
Sediment Trap Efficiency	90%
Sediment Load Reduction (ton/year)	113

Gully Sediment Load Reduction	4
Gully P Load Reduction	4
Gully N Load Reduction	9

Total Sediment Load Reduction	118
Total P Load Reduction	4
Total N Load Reduction	9

ATTACHMENT 5
PROJECT PICTURES

ENDLOADER LOADING RR 4 RIPRAP ON MECHANICAL BOAT

CREW PLACING FILTER FABRIC IN ADVANCE OF RIPRAP PLACEMENT

RIPRAP PLACEMENT ON INSTALLED FILTER FABRIC

RIPRAP PLACEMENT USING MECHANICAL BOAT

SAME PROCESS, DIFFERENT PERSPECTIVE

FINISHED PRODUCT: OFFSHORE BREAKWATER USING RR 4 RIPRAP

EXAMPLE OF FINISHED WORK

SEDIMENT / NUTRIENT DETENTION BASIN #1: STRAW MULCH APPLICATION

SEDIMENT / NUTRIENT DETENTION BASIN #1: BASIN AND UPSTREAM FACE OF DAM PRIOR TO FILLING

SEDIMENT / NUTRIENT DETENTION BASIN #2: UPSTREAM SLOPE OF DAM

SEDIMENT / NUTRIENT DETENTION BASIN #2: PRIOR TO FILLING

SEDIMENT / NUTRIENT DETENTION BASIN #2: DOWNSTREAM SLOPE OF DAM

GULLY STABILIZATION – STRUCTURE TYPE 1

GULLY STABILIZATION – STRUCTURE TYPE 2

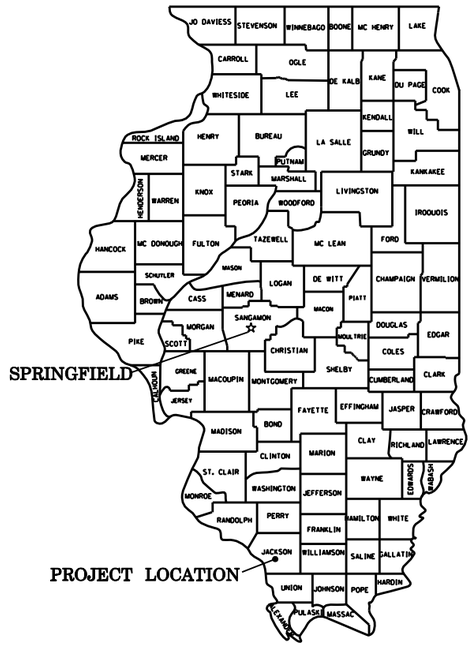
GULLY STABILIZATION – STRUCTURE TYPE 3

GULLY STABILIZATION – STRUCTURE TYPE 4

ATTACHMENT 6
AS-BUILT DRAWINGS

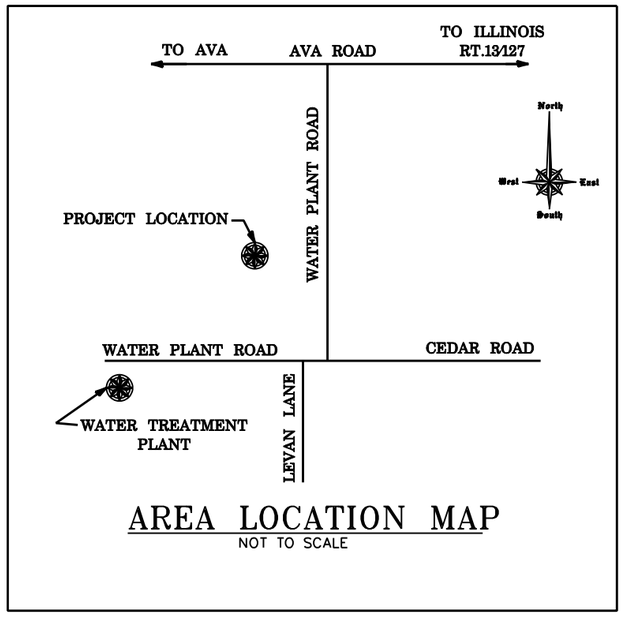
PROPOSED POND CONSTRUCTION
FOR KINKAID–REED'S CREEK CONSERVANCY DISTRICT
JACKSON COUNTY, ILLINOIS

INDEX OF SHEETS



STATE LOCATION MAP

NOT TO SCALE



AREA LOCATION MAP

NOT TO SCALE

KEY NOTES :

1. ALL WORK TO BE IN ACCORDANCE WITH USDA, NRCS STANDARDS.
2. COORDINATES INDICATED ARE TO BE CONSIDERED A LOCAL COORDINATE SYSTEM. ELEVATIONS INDICATED ARE BASED ON 1983 N.A. VERTICAL DATUM.

Revisions	Date

Cochran & Wilken, Inc.
Consulting Engineers & Scientists
5201 South Sixth Street Road, Springfield, Il 62703–5143
1339 Walnut St. Murphysboro, IL 62966
Ph. (217) 585–8300
Ph. (618) 684–5808

Approved:

DAVID FLIGOR, MANAGER
KINKAID–REED'S CREEK COVSERVANCY DISTRICT

Drawing Title: COVER SHEET

Project Title: PROPOSED POND CONSTRUCTION– AS BUILTS

Location: JACKSON COUNTY, ILLINOIS

Date: JANUARY 04, 2007

Checked:

Drawn: JAZ

Project No.:

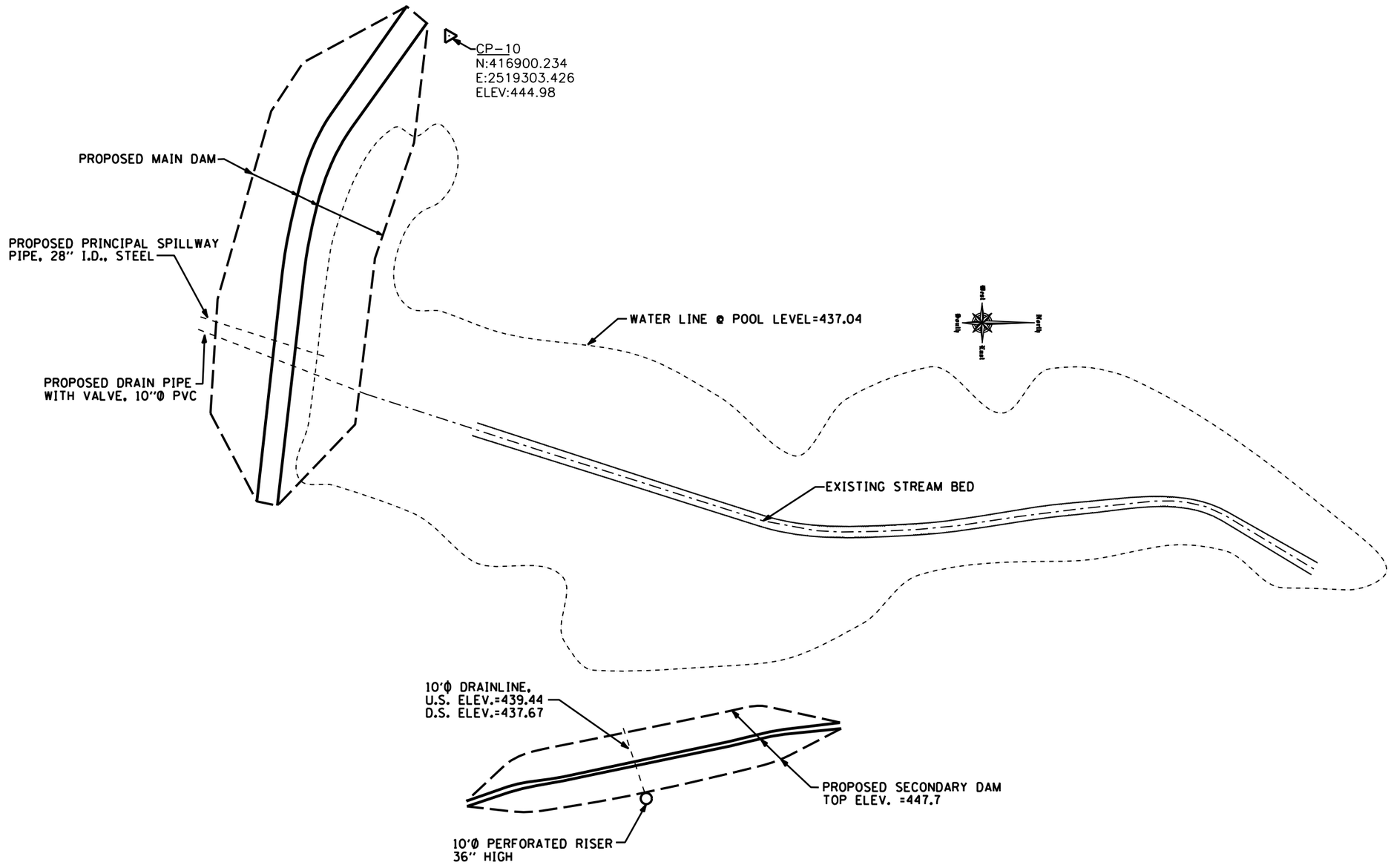
Building Number: –

DRAWING NO. C1

Dwg. 1 of 3

...\05078\AS BUILTS\C-SURVEY1.dgn 8/14/2007 5:57:27 PM

KEY NOTES :



Revisions	Date

Cochran & Wilken, Inc.
Consulting Engineers & Scientists
5201 South Sixth Street Road, Springfield, Il 62703-5143
1339 Walnut St. Murphysboro, IL 62966
Ph. (217) 585-8300
Ph. (618) 684-5808

Approved:

DAVID FLIGOR, MANAGER
KINKAID-REED'S CREEK COVSERVANCY DISTRICT

Drawing Title: SITE PLAN POND #1 CONSTRUCTION

Project Title: PROPOSED POND CONSTRUCTION-AS BUILTS

Location: JACKSON COUNTY, ILLINOIS

Date: JANUARY 04, 2007 | Checked | Drawn: JAZ

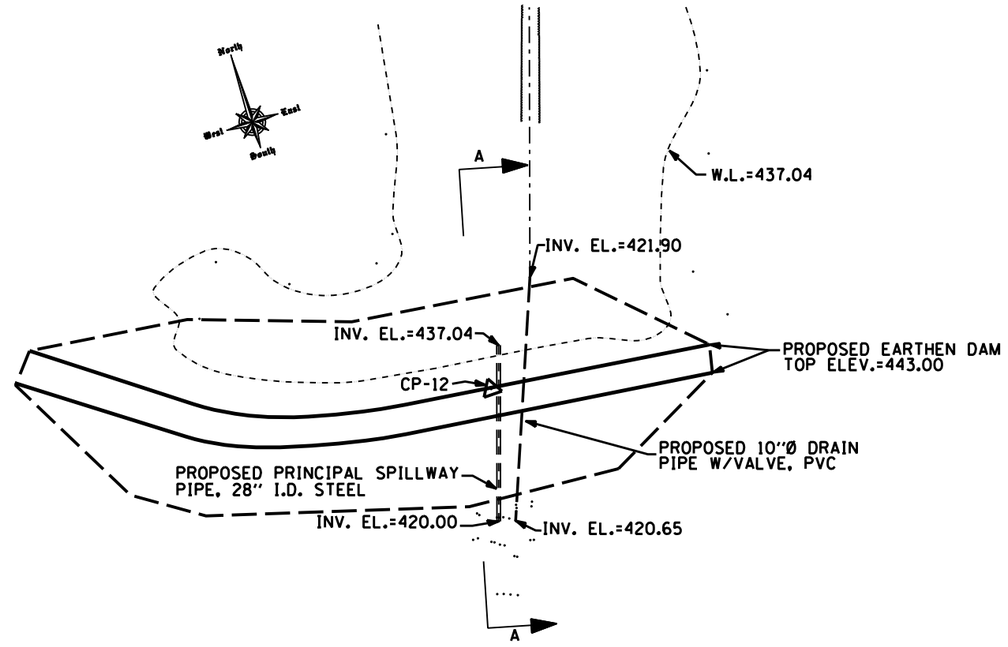
Project No.

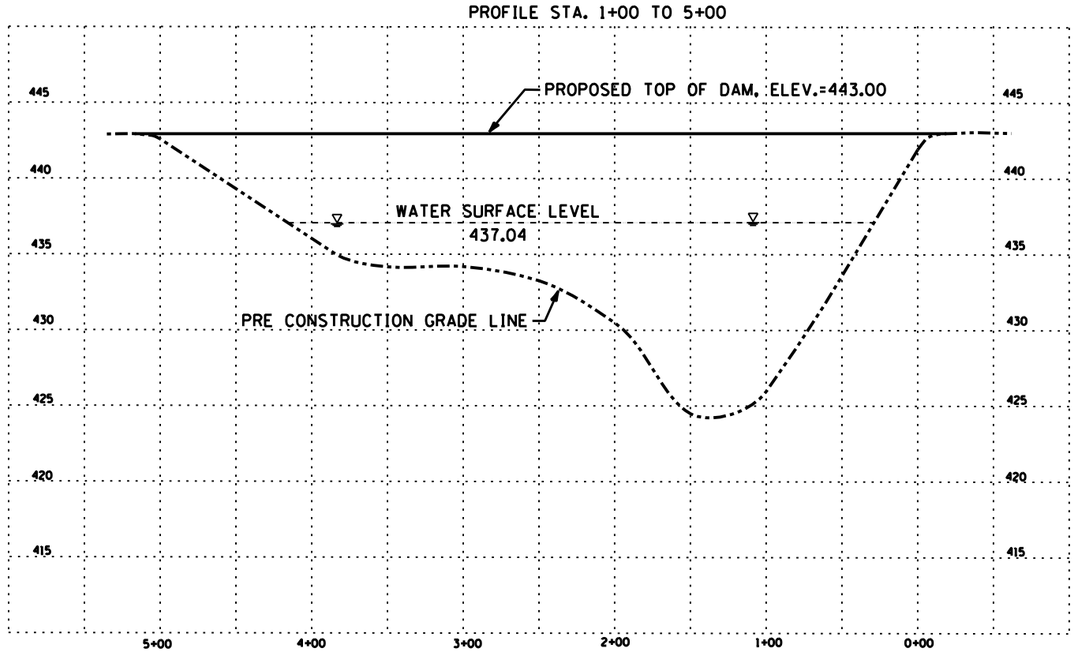
Building Number: -

DRAWING NO. C2

Dwg. 2 of 3

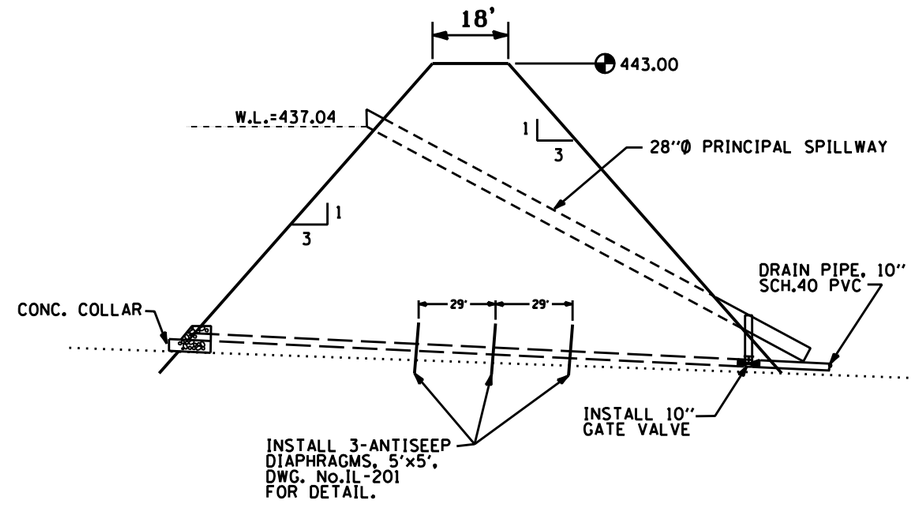
...\05078\AS BUILTS\C-SURVEY1.dgn 8/14/2007 5:58:13 PM





KEY NOTES :

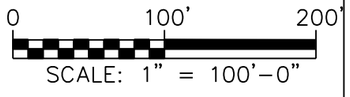
NOTE: DAM CONFIGURATION TYPICAL FOR ENTIRE LENGTH



SECTION A–A
N.T.S.

LEGEND

- DAM SLOPE TOE
- TOP OF DAM
- WATER SURFACE



SCALE: 1" = 100'–0"

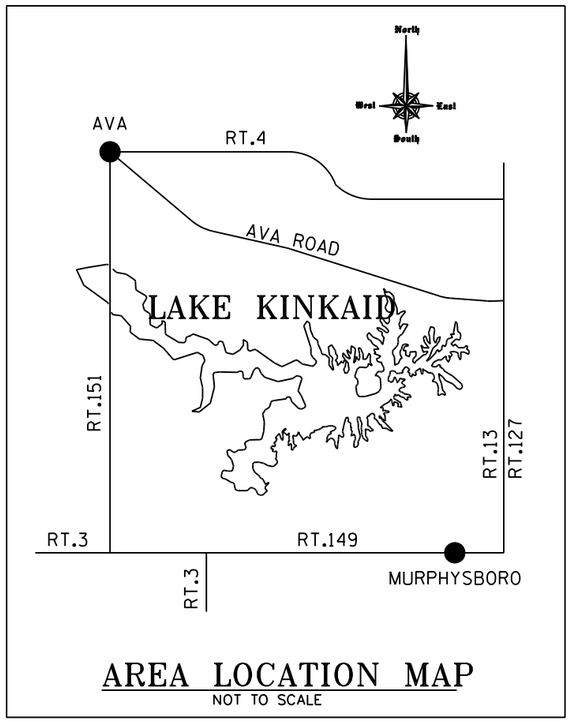
Revisions / Date	**Cochran & Wilken, Inc.** Consulting Engineers & Scientists, 5201 South Sixth Street Road, Springfield, Il 62703-5143, 1339 Walnut St. Murphysboro, IL 62966, Ph. (217) 585-8300, Ph. (618) 684-5808			Approved: DAVID FLIGOR, MANAGER KINKAID-REED'S CREEK COVSERVANCY DISTRICT	Drawing Title: PLAN-PROFILE/ TYPICAL CROSS SECTION	Project Title: PROPOSED POND CONSTRUCTION- AS BUILTS; Location: JACKSON COUNTY, ILLINOIS; Date: JANUARY 04, 2007; Checked; Drawn: JAZ; Project No.; Building Number: –	DRAWING NO. C3, Dwg. 3 of 3

...\05078\AS BUILTS\C-SURVEY1.dgn 8/14/2007 5:59:26 PM

PLANS FOR CONSTRUCTION OF SEDIMENT / NUTRIENT DETENTION BASINS, GULLY STABILIZATION and LAKE SHORELINE STABILIZATION FOR KINKAID–REED'S CREEK CONSERVANCY DISTRICT JACKSON COUNTY, ILLINOIS

INDEX OF SHEETS

STATE LOCATION MAP
NOT TO SCALE



AREA LOCATION MAP
NOT TO SCALE

NOTE:
SEE SHEET C2 FOR DETAILED PROJECT LOCATION MAP

KEY NOTES :

1. ALL WORK TO BE IN ACCORDANCE WITH USDA, NRCS STANDARDS.
2. COORDINATES INDICATED ARE TO BE CONSIDERED A LOCAL COORDINATE SYSTEM. ELEVATIONS INDICATED ARE BASED ON 1983 N.A. VERTICAL DATUM.
3. SEE SHEET 2 FOR PROJECT LOCATION MAP.
4. ALL CONSTRUCTION IS TO BE IN ACCORDANCE WITH THE USDA, NRCS NATIONAL ENGINEERING HANDBOOK (NEH), PART 642, CHAPTERS 2 & 3, CONSTRUCTION & MATERIAL SPECIFICATIONS.
5. CROSS SECTIONS NOT INCLUDED IN "AS BUILT" SET.

Revisions	Date

Cochran & Wilken, Inc.
Consulting Engineers & Scientists
5201 South Sixth Street Road, Springfield, Il 62703-5143
1339 Walnut St. Murphysboro, IL 62966
Ph. (217) 585-8300
Ph. (618) 684-5808

Approved:

DAVID FLIGOR, MANAGER
KINKAID–REED'S CREEK COVSERVANCY DISTRICT

Drawing Title: COVER SHEET

AS BUILT

Project Title: SEDIMENT/NUTRIENT DETENTION BASINS, GULLY STABILIZATION, LAKE SHORELINE STABILIZATION

Location: JACKSON COUNTY, ILLINOIS

Date: JANUARY 04, 2007

Checked:

Drawn: JAZ

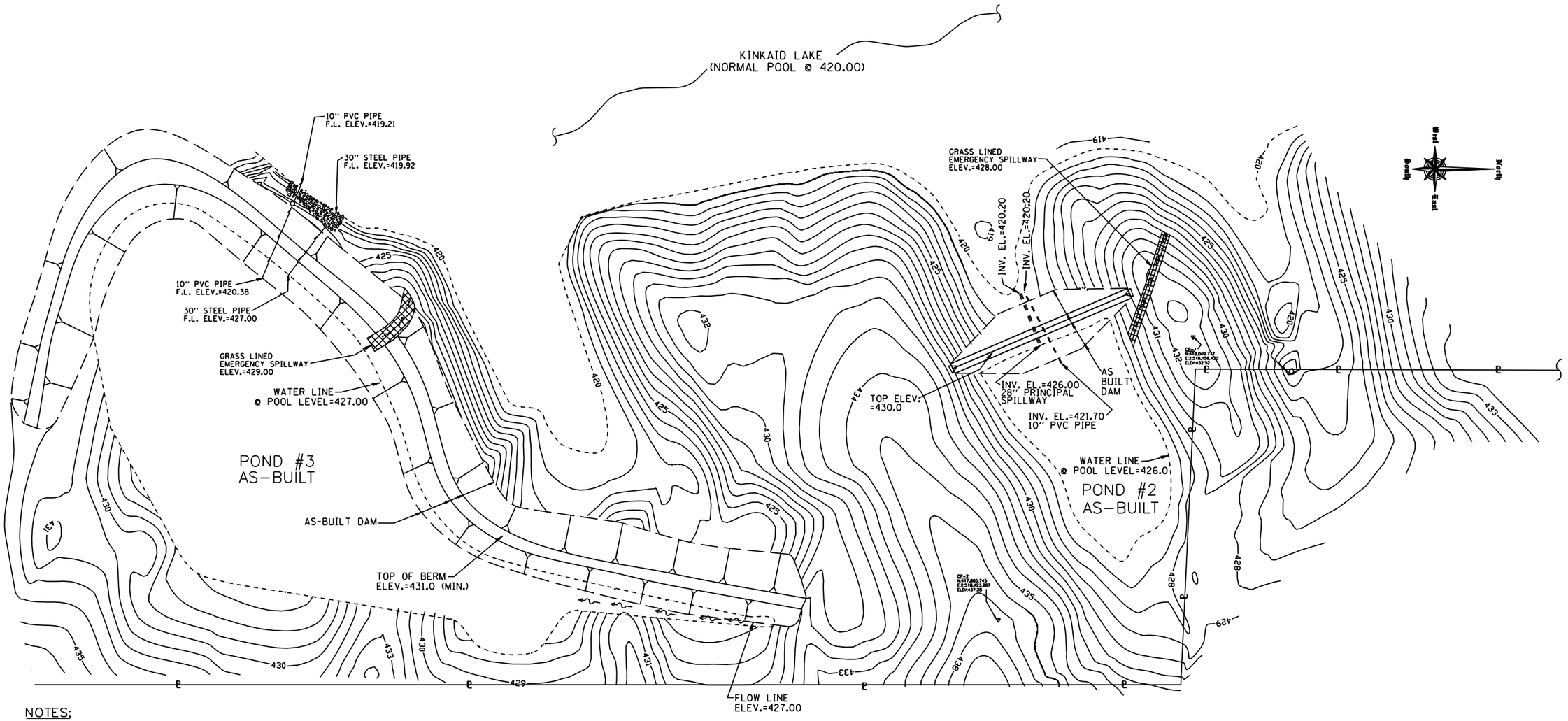
Project No.:

Building Number: –

DRAWING NO. C1

Dwg. 1 of 14

...\AS-BUILT_092806\TOPO-ADJ.dgn 8/14/2007 6:01:50 PM



NOTES;

1. DIVERSION CHANNEL MINIMUM CROSS SECTION: 6.0' FLAT BOTTOM, 3.0'H:1.0'V SIDE SLOPES, 3.0' MINIMUM DEPTH. FORM CHANNEL BERM ON LAKE SIDE TO ACHIEVE MINIMUM DEPTH.
2. VEGETATE CHANNEL WITH TALL FESCUE; DESIGN VELOCITY=3.4 fps @ DESIGN STORM.

LEGEND

- DAM SLOPE TOE
- TOP OF DAM
- WATER SURFACE
- PROPERTY LINE
- STONE RIPRAP

Revisions	Date

Cochran & Wilken, Inc.
Consulting Engineers & Scientists
5201 South Sixth Street Road, Springfield, Il 62703-5143
1339 Walnut St. Murphysboro, IL 62966
Ph. (217) 585-8300
Ph. (618) 684-5808

Approved:

Drawing Title: SEDIMENT /NUTRIENT DETENTION BASINS, STORMWATER POLLUTION PREVENTION PLAN

AS-BUILT POND #2 and POND #3

Project Title: SEDIMENT/NUTRIENT DETENTION BASINS, GULLY STABILIZATION, LAKE SHORELINE STABILIZATION

Location: JACKSON COUNTY, ILLINOIS

Date: AUGUST 10, 2007 | Checked | Drawn: JAZ

Project No.

Building Number: –

DRAWING NO. C3

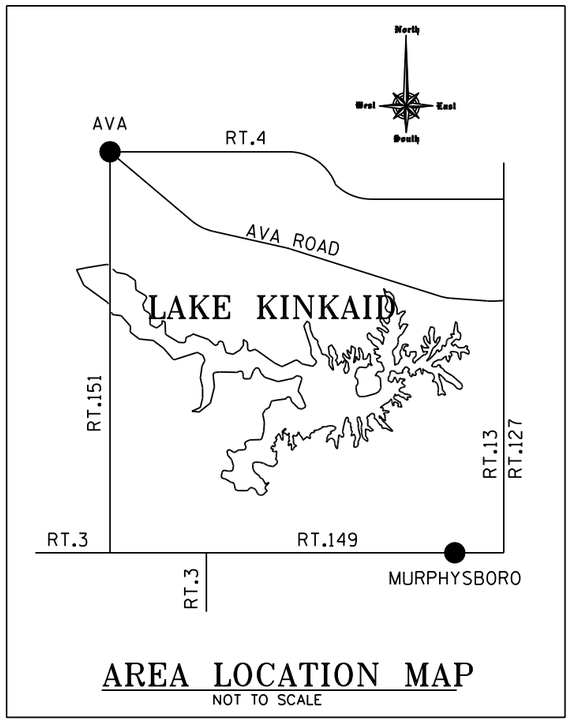
Dwg. 3 of 14

...\PONDS 2_3 AS-BUILTS.dgn 8/14/2007 6:07:35 PM

PLANS FOR CONSTRUCTION OF SEDIMENT / NUTRIENT DETENTION BASINS, GULLY STABILIZATION and LAKE SHORELINE STABILIZATION FOR KINKAID–REED'S CREEK CONSERVANCY DISTRICT JACKSON COUNTY, ILLINOIS

INDEX OF SHEETS

STATE LOCATION MAP
NOT TO SCALE



AREA LOCATION MAP
NOT TO SCALE

NOTE:
SEE SHEET C2 FOR DETAILED PROJECT LOCATION MAP

KEY NOTES :

1. ALL WORK TO BE IN ACCORDANCE WITH USDA, NRCS STANDARDS.
2. COORDINATES INDICATED ARE TO BE CONSIDERED A LOCAL COORDINATE SYSTEM. ELEVATIONS INDICATED ARE BASED ON 1983 N.A. VERTICAL DATUM.
3. SEE SHEET 2 FOR PROJECT LOCATION MAP.
4. ALL CONSTRUCTION IS TO BE IN ACCORDANCE WITH THE USDA, NRCS NATIONAL ENGINEERING HANDBOOK (NEH), PART 642, CHAPTERS 2 & 3, CONSTRUCTION & MATERIAL SPECIFICATIONS.
5. CROSS SECTIONS NOT INCLUDED IN "AS BUILT" SET.

Revisions	Date

Cochran & Wilken, Inc.
Consulting Engineers & Scientists
5201 South Sixth Street Road, Springfield, Il 62703-5143
1339 Walnut St. Murphysboro, IL 62966
Ph. (217) 585-8300
Ph. (618) 684-5808

Approved:

DAVID FLIGOR, MANAGER
KINKAID–REED'S CREEK COVSERVANCY DISTRICT

Drawing Title: COVER SHEET

AS BUILT

Project Title: SEDIMENT/NUTRIENT DETENTION BASINS, GULLY STABILIZATION, LAKE SHORELINE STABILIZATION

Location: JACKSON COUNTY, ILLINOIS

Date: JANUARY 04, 2007

Checked:

Drawn: JAZ

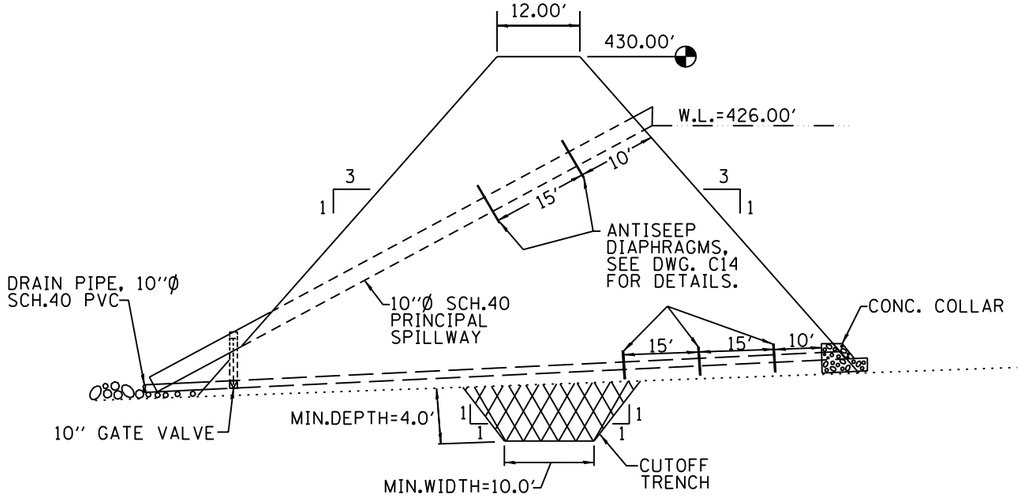
Project No.:

Building Number: –

DRAWING NO. C1

Dwg. 1 of 14

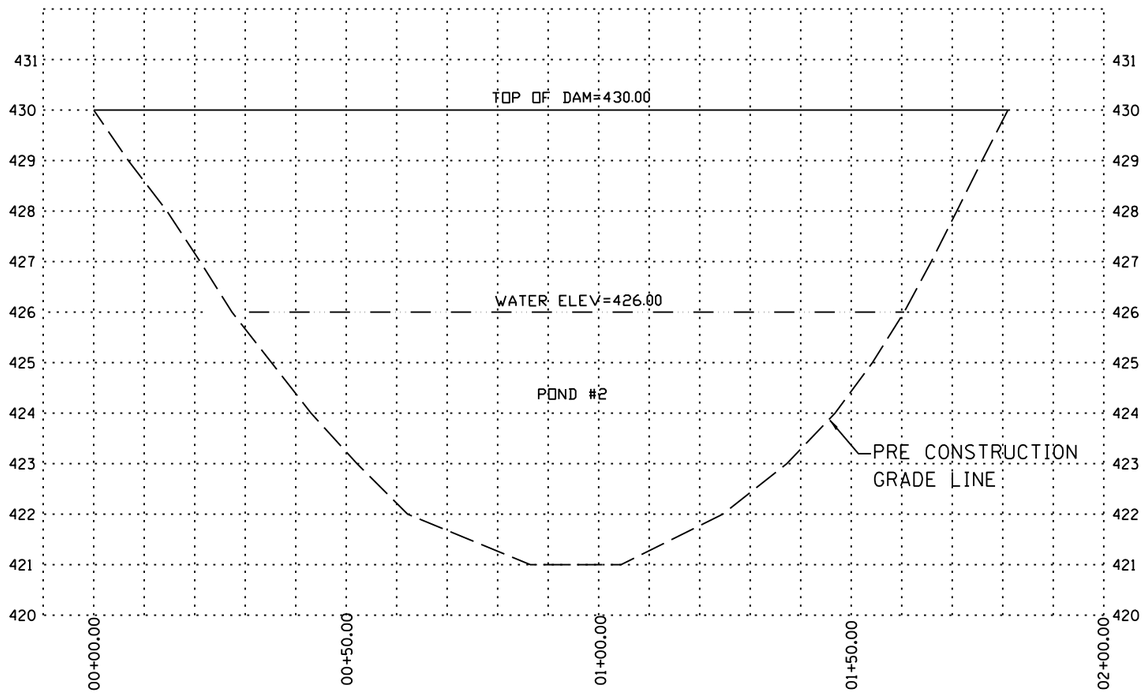
...\AS-BUILT_092806\TOPO-ADJ.dgn 8/14/2007 6:01:50 PM



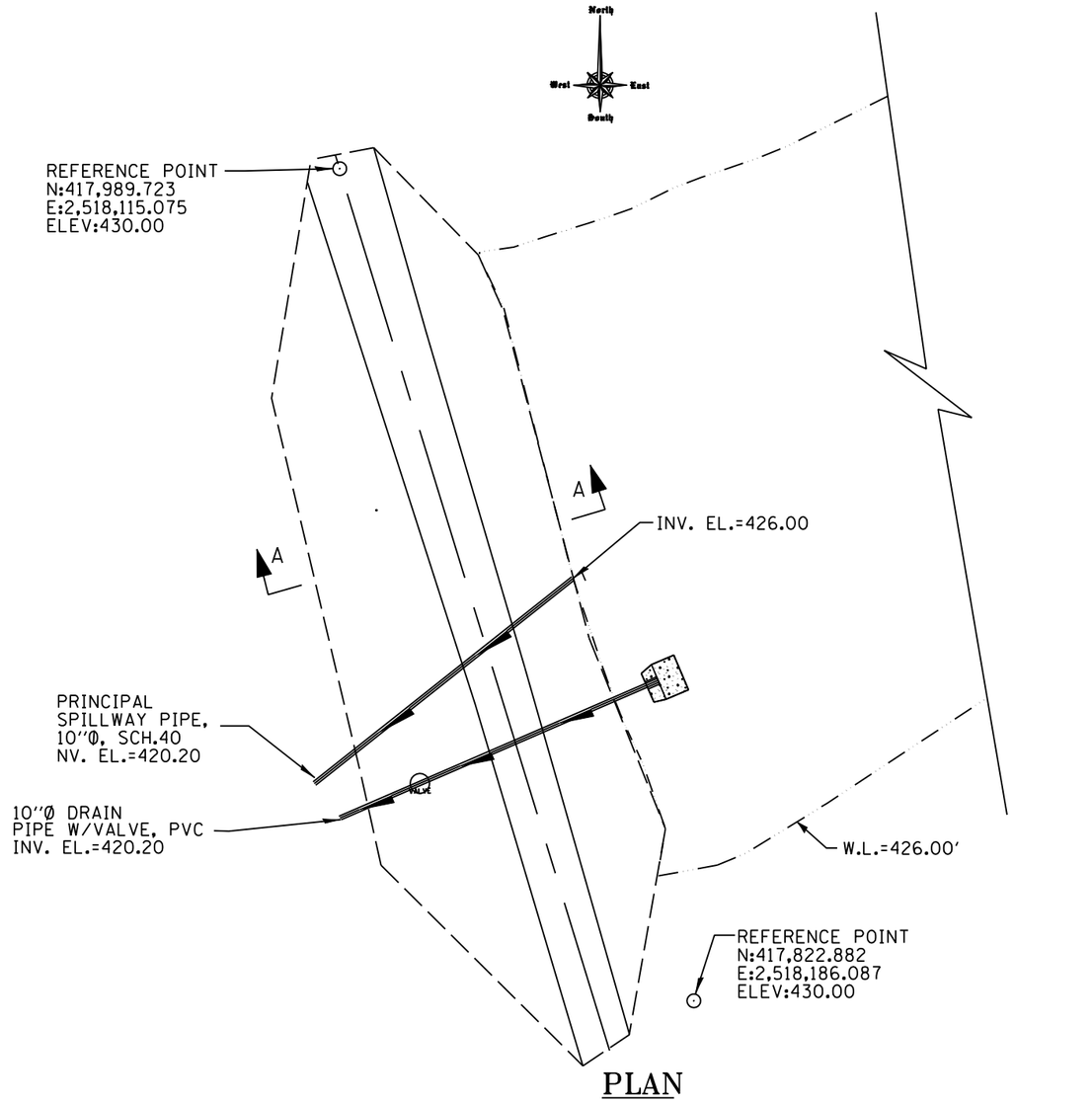
NOTE:

1. DAM CONFIGURATION TYPICAL FOR ENTIRE LENGTH

SECTION A–A
N.T.S.



DAM PROFILE



PLAN

0 30' 60'

SCALE: 1" = 30.00'

LEGEND

- DAM SLOPE TOE
- TOP OF DAM
- CENTERLINE TOP of DAM
- WATER SURFACE

Revisions	Date

Cochran & Wilken, Inc.
Consulting Engineers & Scientists
5201 South Sixth Street Road, Springfield, Il 62703-5143
1339 Walnut St. Murphysboro, IL 62966
Ph. (217) 585-8300
Ph. (618) 684-5808

Approved:

Drawing Title: PLAN–PROFILE/ TYPICAL CROSS SECTION

AS BUILT

Project Title: SEDIMENT/NUTRIENT DETENTION BASINS, GULLY STABILIZATION, LAKE SHORELINE STABILIZATION

POND #2

Location: JACKSON COUNTY, ILLINOIS

Project No. –

DRAWING NO. C4

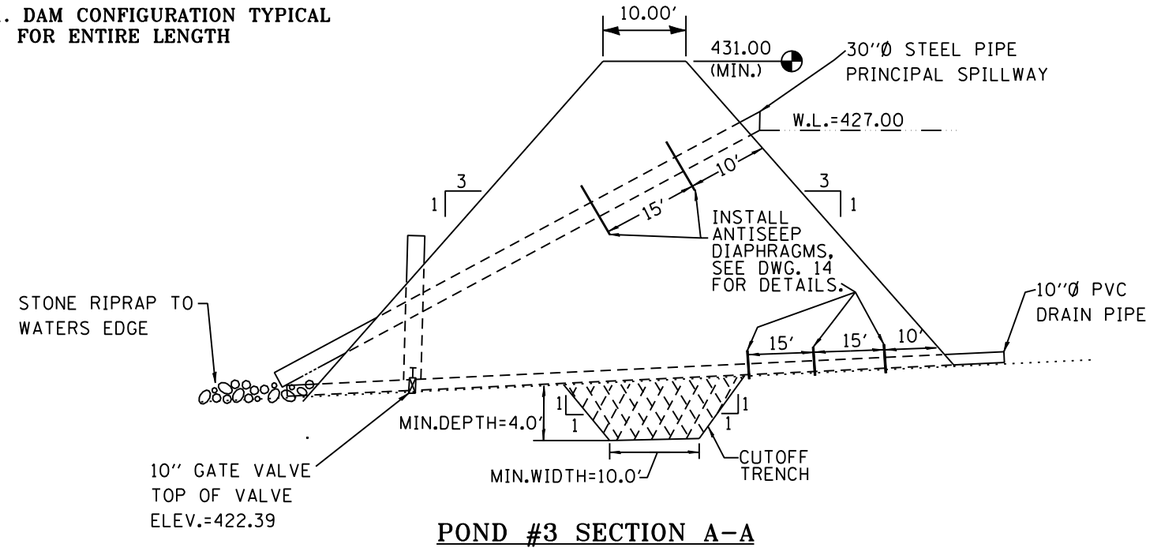
Date: JANUARY 04, 2007 | Checked | Drawn: JAZ | Building Number –

Dwg. 4 of 14

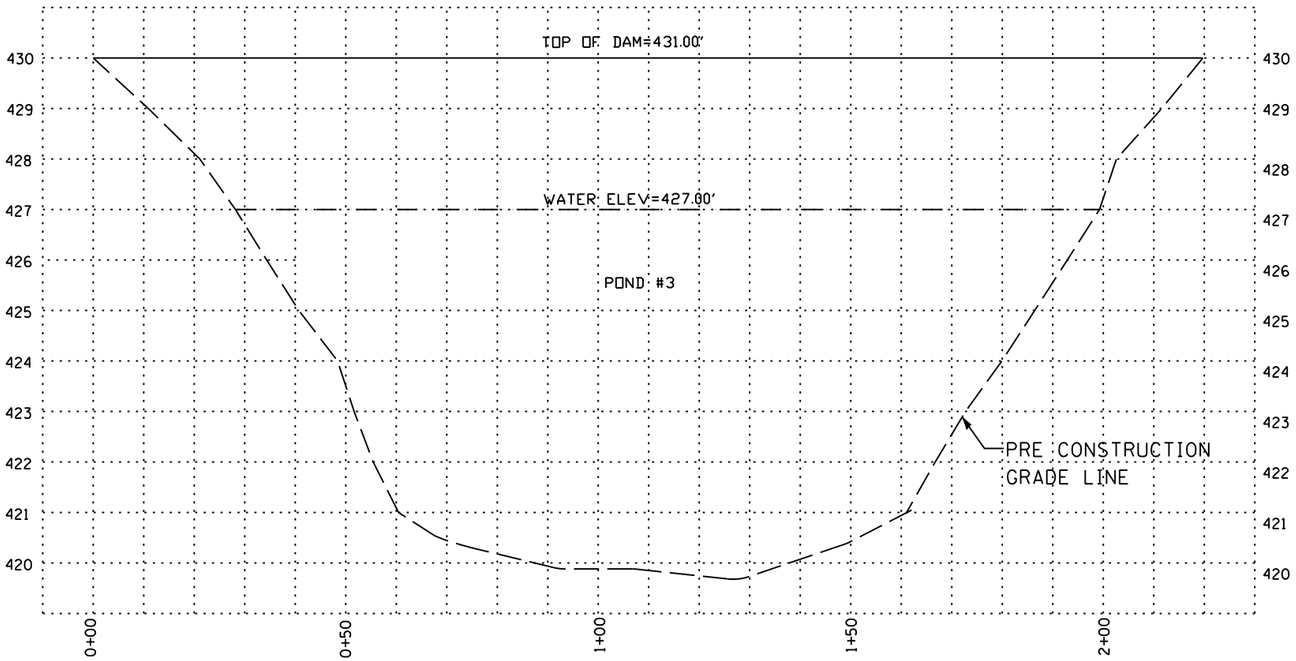
...\AS-BUILT_092806\TOPO-ADJ.dgn 8/14/2007 6:10:20 PM

NOTES:

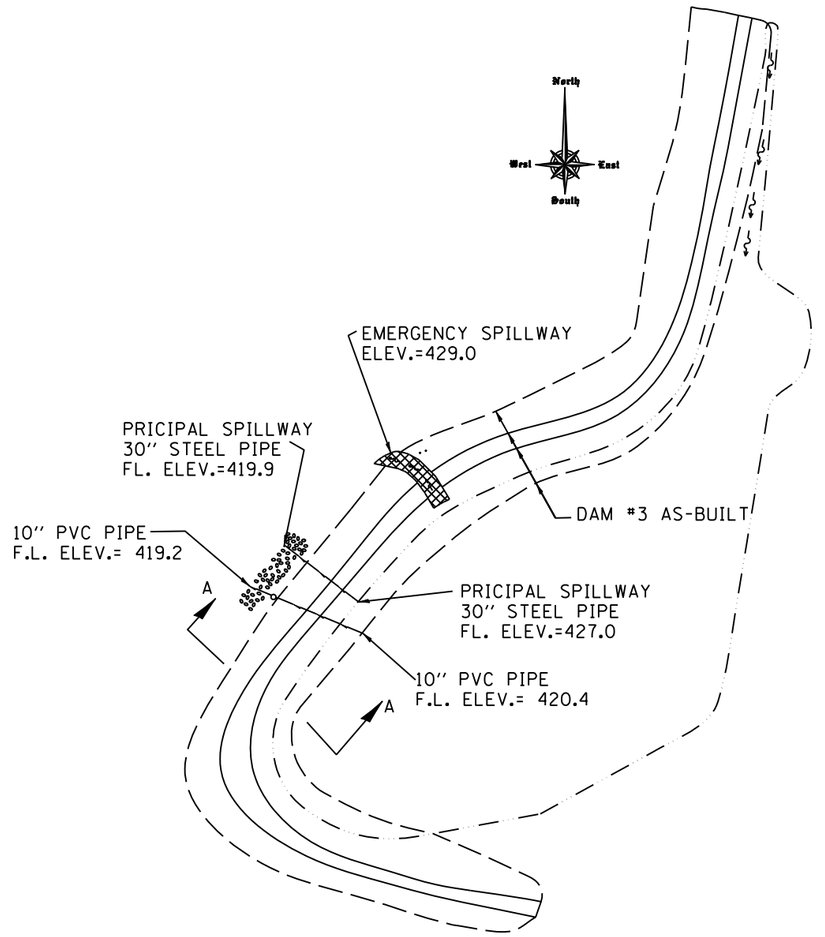
1. DAM CONFIGURATION TYPICAL FOR ENTIRE LENGTH



POND #3 SECTION A-A
N.T.S.



DAM PROFILE



PLAN-POND #3 AS-BUILT
N.T.S.

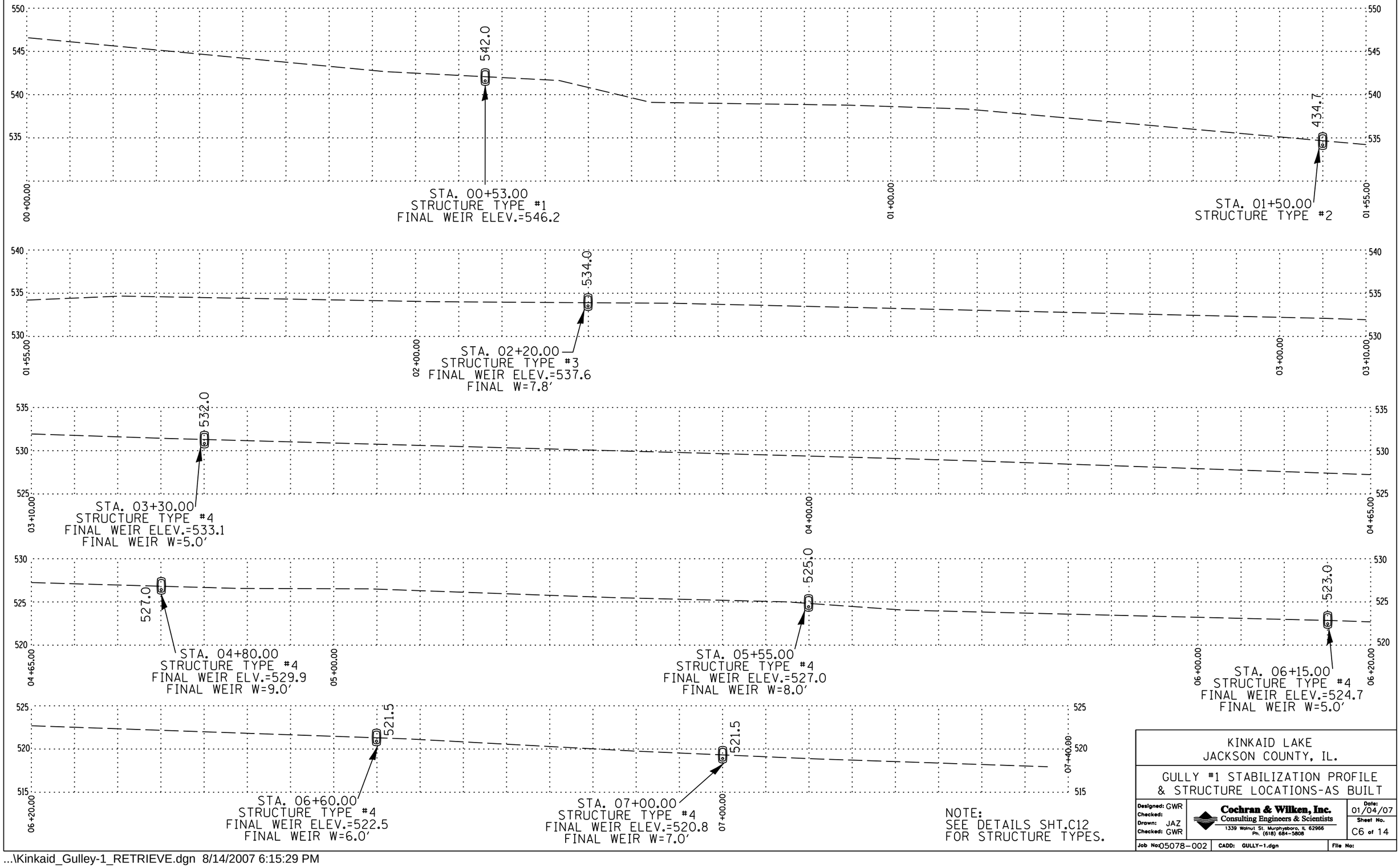
LEGEND

- DAM SLOPE TOE
- TOP OF DAM
- WATER SURFACE

0 30' 60'
SCALE: 1" = 30.00'

Revisions / Date	Cochran & Wilken, Inc. Consulting Engineers & Scientists, 5201 South Sixth Street Road, Springfield, Il 62703-5143, 1339 Walnut St. Murphysboro, IL 62966, Ph. (217) 585-8300, Ph. (618) 684-5808			Approved:	Drawing Title: PLAN-PROFILE/ TYPICAL CROSS SECTION	Project Title: SEDIMENT/NUTRIENT DETENTION BASINS, GULLY STABILIZATION, LAKE SHORELINE STABILIZATION	POND #3 AS-BUILT
						Location: JACKSON COUNTY, ILLINOIS	Project No. –
						Date: AUGUST 07, 2007 / Checked / Drawn: JAZ	Building Number –
							DRAWING NO. C5 Dwg. 5 of 14

...\PONDS 2_3 AS-BUILTS.dgn 8/14/2007 6:12:11 PM



NOTE:
SEE DETAILS SHT.C12
FOR STRUCTURE TYPES.

KINKAID LAKE
JACKSON COUNTY, IL.

GULLY #1 STABILIZATION PROFILE
& STRUCTURE LOCATIONS-AS BUILT

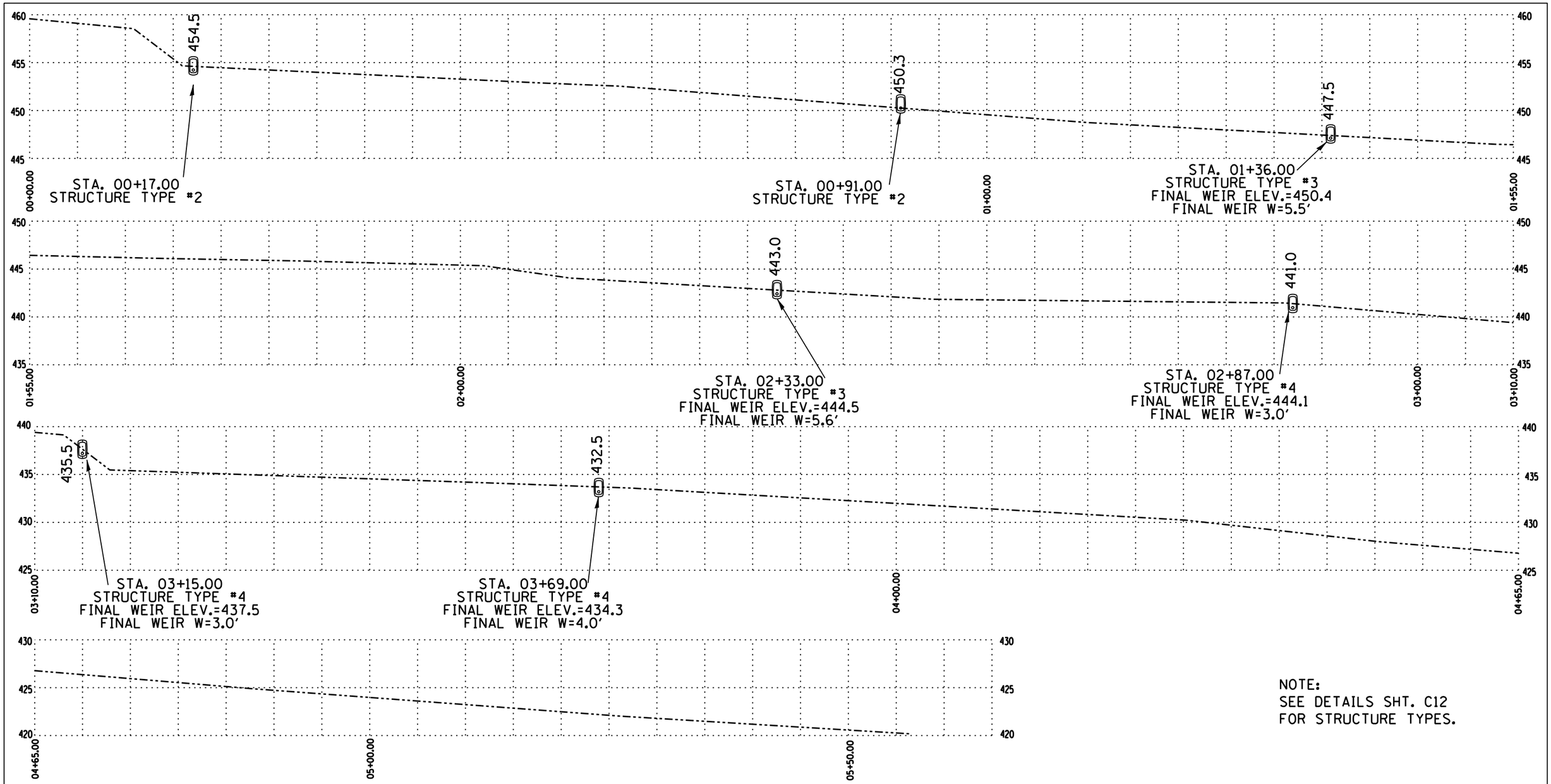
Designed: GWR
Checked:
Drawn: JAZ
Checked: GWR

Cochran & Wilken, Inc.
Consulting Engineers & Scientists
1339 Walnut St. Murphysboro, IL 62966
Ph. (618) 684-5808

Date: 01/04/07
Sheet No. C6 of 14

Job No: 05078-002 | CADD: GULLY-1.dgn | File No:

...\Kinkaid_Gulley-1_RETRIEVE.dgn 8/14/2007 6:15:29 PM



NOTE:
SEE DETAILS SHT. C12
FOR STRUCTURE TYPES.

KINKAID LAKE
JACKSON COUNTY, IL.

GULLY #2 STABILIZATION PROFILE
& STRUCTURE LOCATIONS-AS BUILT

Designed: GWR
Checked:
Drawn: JAZ
Checked: GWR

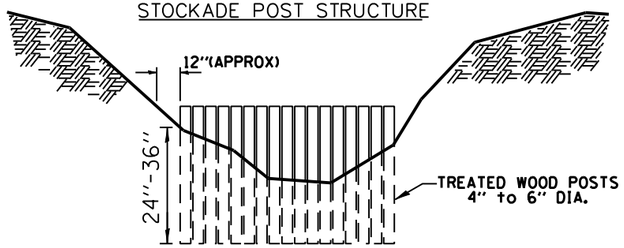
Cochran & Wilken, Inc.
Consulting Engineers & Scientists
1339 Walnut St. Murphysboro, IL 62966
Ph. (618) 684-5808

Date: 01/04/07
Sheet No. C9 of 14

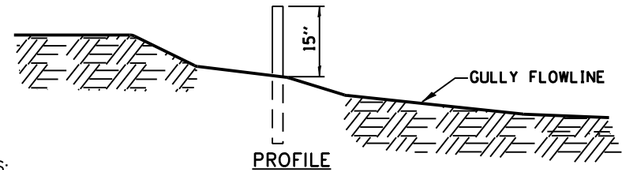
Job No: 05078-002 | CADD: GULLY-2.3d | File No:

...\Kinkaid Gully-2.dgn 8/14/2007 6:17:58 PM

STRUCTURE TYPE 1
STOCKADE POST STRUCTURE



SECTION



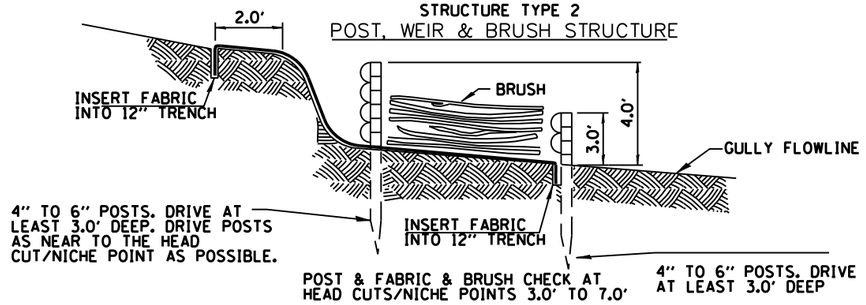
PROFILE

NOTES:
DRIVE ALL POSTS 24" TO 36" DEEP. TOPS OF POSTS SHOULD BE NEARLY LEVEL.
PLACE 4" TO 6" POSTS ON 6" TO 8" CENTERS.
PLACE POSTS ALL THE WAY ACROSS GULLEY, SUCH THAT END POSTS ARE WITHIN ONE FOOT OF BANK AT EACH END OF STCKADE CHECK.

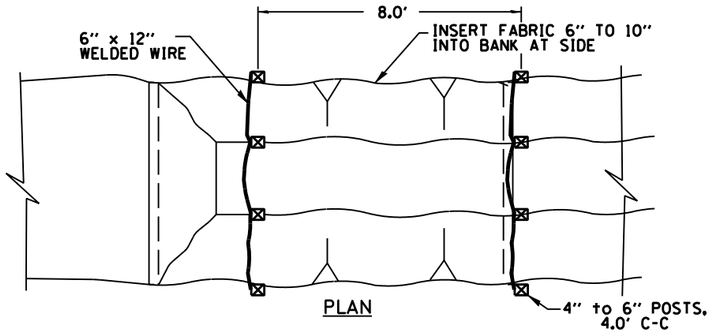
DESIGN NOTES:

*SEE PROFILE FOR SPECIFIC DIMENSION FOR EACH STRUCTURE TYPE

STRUCTURE TYPE 2
POST, WEIR & BRUSH STRUCTURE



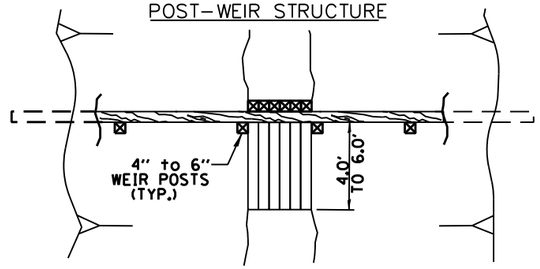
PROFILE



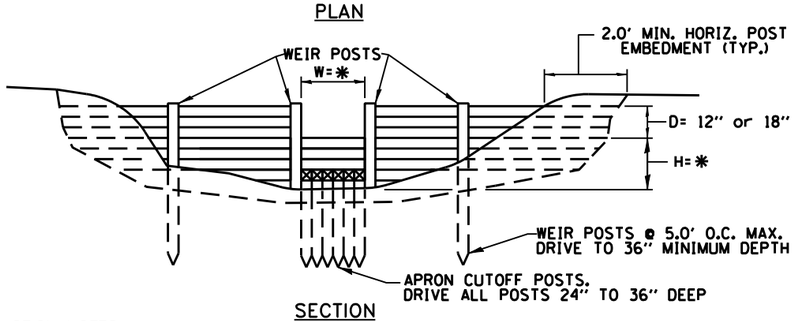
PLAN

NOTES:
DRAPE FABRIC TO MAKE CONTACT WITH GROUND. INSERT ENDS INTO TRENCHES.
SLIT FABRIC AT UPSTREAM POSTS, TO ALLOW DRIVING OF POSTS.

STRUCTURE TYPE 3
POST-WEIR STRUCTURE



PLAN



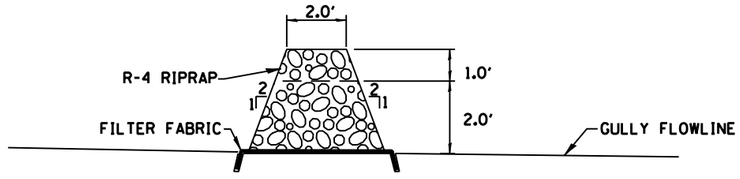
SECTION

CONSTRUCTION NOTES:
EXCAVATE TRENCH 12" TO 18" DEEP ACROSS THE GULLY. PLACE FILTER FABRIC ON UPSTREAM FACE OF TRENCH. EXTEND THE ENDS OF ALL HORIZONTAL (WIER) LOGS INTO TRENCH. PLACE HORIZONTAL POSTS FOR APRON. EXTEND TO APPROXIMATELY 6" TO 12" UPSTREAM OF WIER. SECURE DOWNSTREAM END OF APRON WITH CUTOFF POSTS. SECURE HORIZONTAL WIER LOGS TO WIER POSTS WITH GALVANIZED NAILS OR WIRE.

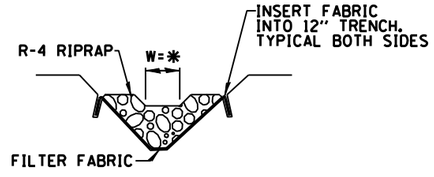
DESIGN NOTES:

*SEE PROFILE FOR SPECIFIC DIMENSION FOR EACH STRUCTURE TYPE

STRUCTURE TYPE 4
ROCK GRADE STABILIZATION STRUCTURE



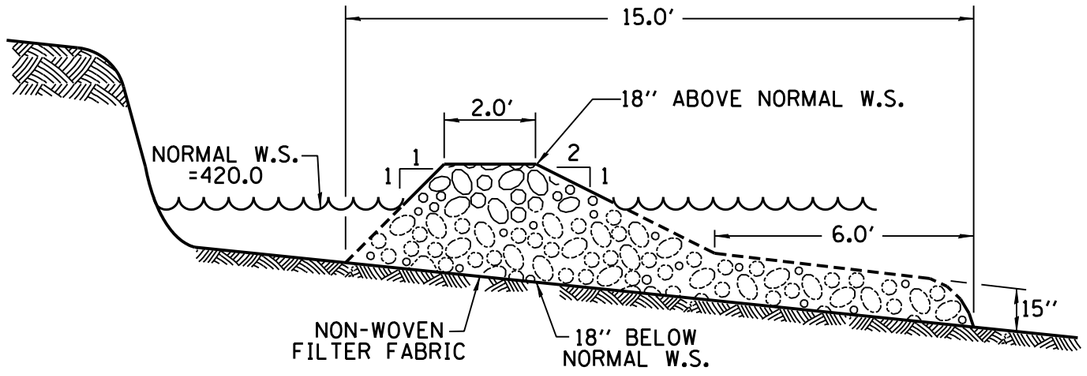
PROFILE



CROSS SECTION

Revisions / Date	Cochran & Wilken, Inc. Consulting Engineers & Scientists, 5201 South Sixth Street Road, Springfield, Il 62703-5143, 1339 Walnut St. Murphysboro, IL 62966, Ph. (217) 585-8300, Ph. (618) 684-8808			Approved:	Drawing Title: GULLY STABILIZATION STRUCTURE DETAILS — AS BUILT	Project Title: SEDIMENT/NUTRIENT DETENTION BASINS, GULLY STABILIZATION, LAKE SHORELINE STABILIZATION; Location: JACKSON COUNTY, ILLINOIS; Date: JANUARY 04, 2007; Checked; Drawn: JAZ	Project No. 05078-002; Building Number –; DRAWING NO. C12; Dwg. 12 of 14

...\EROSION_CNTRL.dgn 8/14/2007 6:19:02 PM

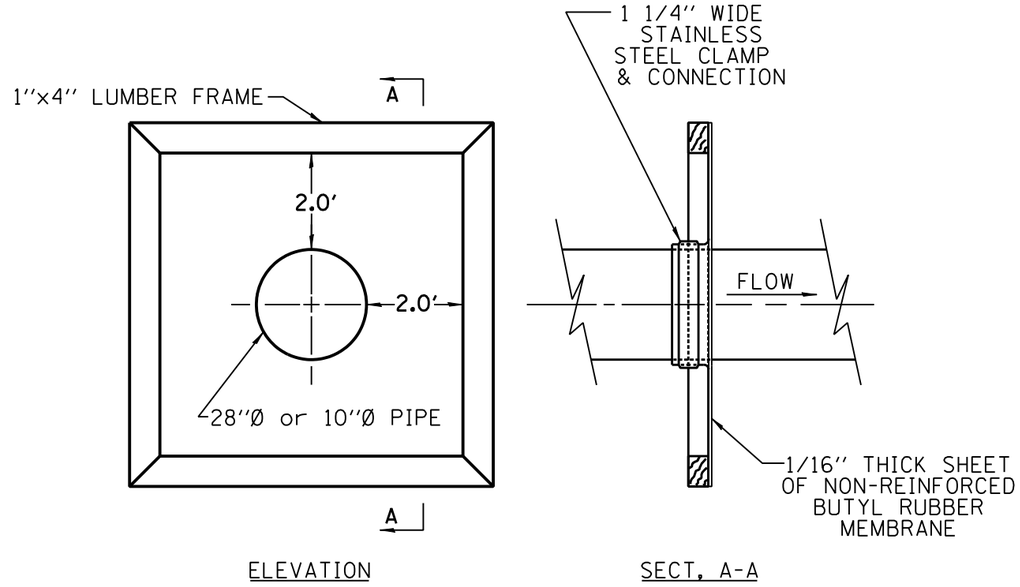


TYPICAL SECTION–BREAKWATER WITH TRANSITIONAL WETLAND

NOT TO SCALE

NOTE:

1. CROSS SECTIONAL AREA: 26 sq.ft.=1.3 TONS PER FOOT



BUTYL RUBBER MEMBRANE ANTISEEP COLLAR

NOTES:

1. COAT PIPE AT COLLAR LOCATION WITH BUTYL RUBBER PATCH CEMENT SEALER OR OTHER BUTYL RUBBER SEALER. (DO NOT USE ASPHALT ROOF PATCH)
2. COMPLETED INSTALLATION MUST BE WATERTIGHT.
3. FORCE BUTYL RUBBER SHEET OVER UPSTREAM END OF PIPE AND OVER BUTYL ROOF SEALER.
4. INSTALL A 1 1/4'' WIDE STAINLESS STEEL STRAP. CLAMP AROUND PIPE OVER BUTYL RUBBER SHEET AND TIGHTEN UNTIL SEALER IS FORCED OUT.
5. STAPLE BUTYL RUBBER SHEET TO LUMBER FRAME.
6. WOOD FRAME SHALL BE RIGID ENOUGH TO WITHSTAND BACK FILL OPERATIONS.
7. 1/16'' THICK SHEET OF NON -REINFORCED BUTYL RUBBER MEMBRANE AS SUPPLIED BY WATERSAVER CO., INC., 3560 WYNKOOP ST., DENVER, CO. OR EQUAL. ANTI SEEP COLLAR KIT INCLUDES BUTYL RUBBER MEMBRANE, BUTYL ADHESIVE, STAINLESS STEEL CLAMP AND CONNECTOR.

Revisions	Date

Cochran & Wilken, Inc.
Consulting Engineers & Scientists
5201 South Sixth Street Road, Springfield, Il 62703-5143
1339 Walnut St. Murphysboro, IL 62966
Ph. (217) 585-8300
Ph. (618) 684-5808

Approved:

Drawing Title: **SHORELINE STABILIZATION STRUCTURE AND ANTISEEP COLLAR DETAILS**

AS BUILT

Project Title: **SEDIMENT/NUTRIENT DETENTION BASINS, GULLY STABILIZATION, LAKE SHORELINE STABILIZATION**

Location: JACKSON COUNTY, ILLINOIS

Project No. 05078-002

Date: JANUARY 04, 2007 | Checked | Drawn JAZ | Building Number –

DRAWING NO. **C14** Dwg.14 of 14

...\AS-BUILT_092806\BREAKWATER.dgn 8/14/2007 6:28:32 PM

ATTACHMENT 9
ABSTRACT FROM PRESENTATION BY JOHN SEVERSON

Wetland habitat enhancement and shoreline stabilization using rip rap breakwaters on Kinkaid Lake in southern Illinois

John Severson[1], Jack Nawrot[2], Michael Eichholz[3], and David Fligor[4]

ABSTRACT

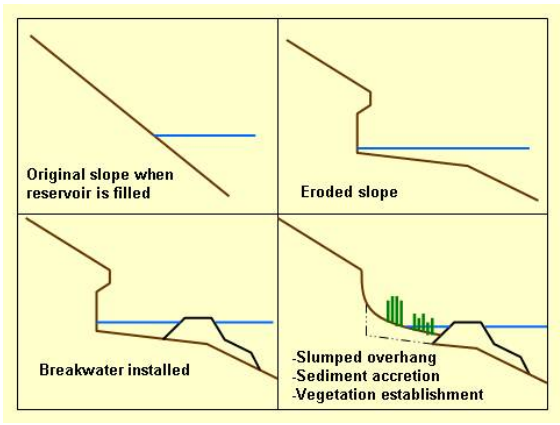
Reservoir shorelines are often impacted by severe erosion due to excessive slopes, saturated upland soils, and chronic wave action. Affected shorelines remain unvegetated, resulting in bare substrate, receding banks, and decreased water quality. Conventional bank rip rap effectively reduces erosion; however, habitat benefits are minimal. In contrast, rip rap placed ~10 – 40 feet from the eroded bank as a breakwater can reduce or eliminate wave energy, leading to habitat development through wetland and aquatic plant colonization.

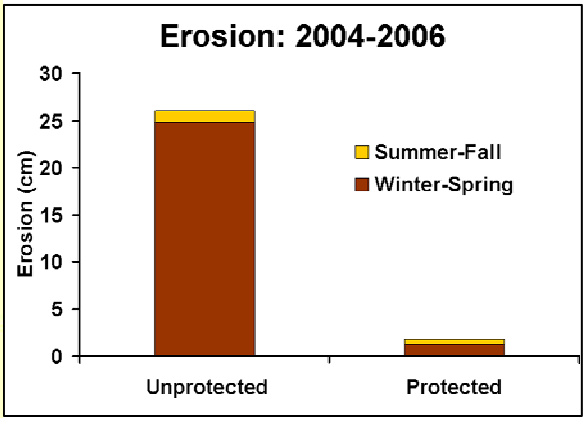
Kinkaid Lake, a 2,750-acre reservoir in Jackson County, Illinois, is approximately 13 miles long southeast to northwest and supports ~80 miles of shoreline. The main lake body has a 3,280 – 5,740 feet fetch that can generate large waves. Wave action has eroded >27 miles of shoreline (~34%), forming shallow underwater shelves and vertical banks. Banks have receded up to ~3 feet/year due to wave erosion. Eroded banks have deposited more than 527 acre-feet of sediment within the basin. From 1999 – 2003, approximately 6,000 feet of rip rap breakwaters were installed on shelves of the severely eroded shorelines to reduce wave erosion and sediment deposition within the lake and promote bank stability and wetlands establishment.

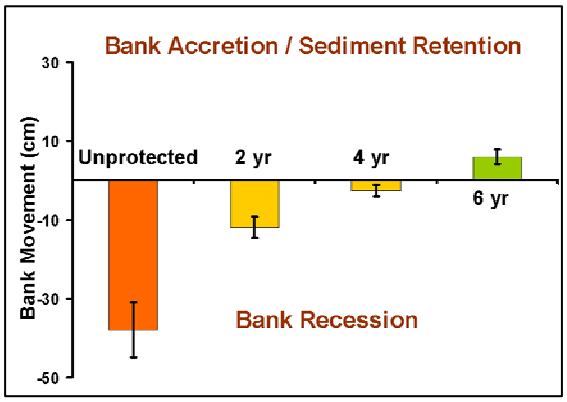
Breakwaters were monitored from 2004-2006. Breakwaters reduced wave energy within the protected areas leading to bank/littoral stabilization and natural vegetation establishment. This contributed to water quality, aesthetics, and habitat. Increased vegetative cover (6x) and richness (10x) were observed at protected sites (121 spp.) compared to unprotected sites (12 spp.). Numerous wildlife species were observed in the newly established habitat including mammals, birds, fish, reptiles, amphibians, and various invertebrates.

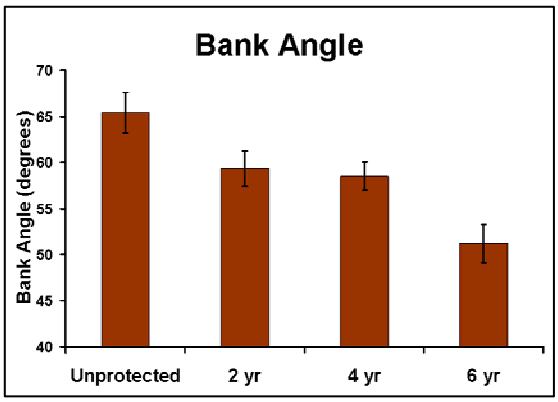
[1] Graduate Research Assistant, Cooperative Wildlife Research Laboratory Southern Illinois University, Carbondale, IL 62901 (618) 536-7766, severson@siu.edu
[2] Senior Scientist, Cooperative Wildlife Research Laboratory Southern Illinois University, Carbondale, IL 62901 (618) 536-7766, jnawrot@siu.edu
[3] Assistant Professor, Cooperative Wildlife Research Laboratory Southern Illinois University, Carbondale, IL 62901 (618) 536-7766, eichholz@siu.edu
[4] Manager, Kinkaid-Reed's Creek Conservancy District, 1763 Water Plant Road, Murphysboro, IL 62966 (618) 687-1722

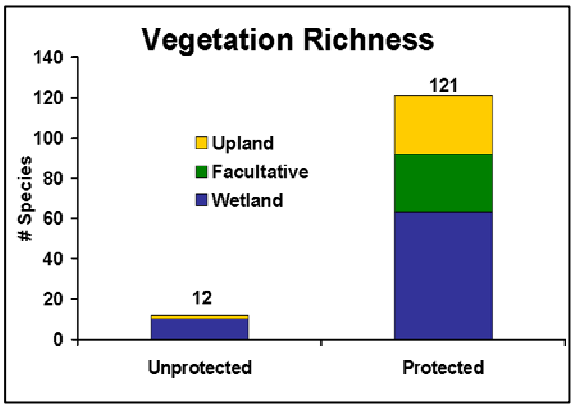
Presented at the 26th International Symposium of the North American Lake Management Society, Indianapolis, Indiana, 8-10 November 2006

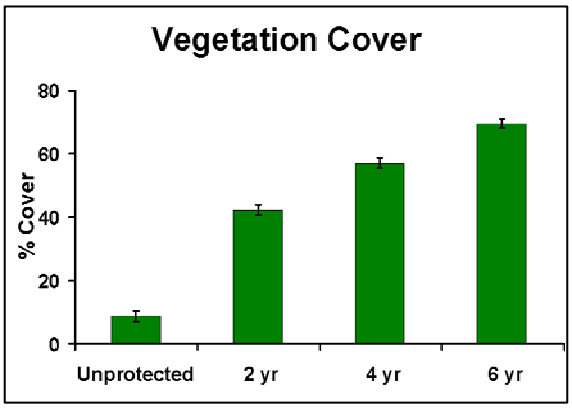




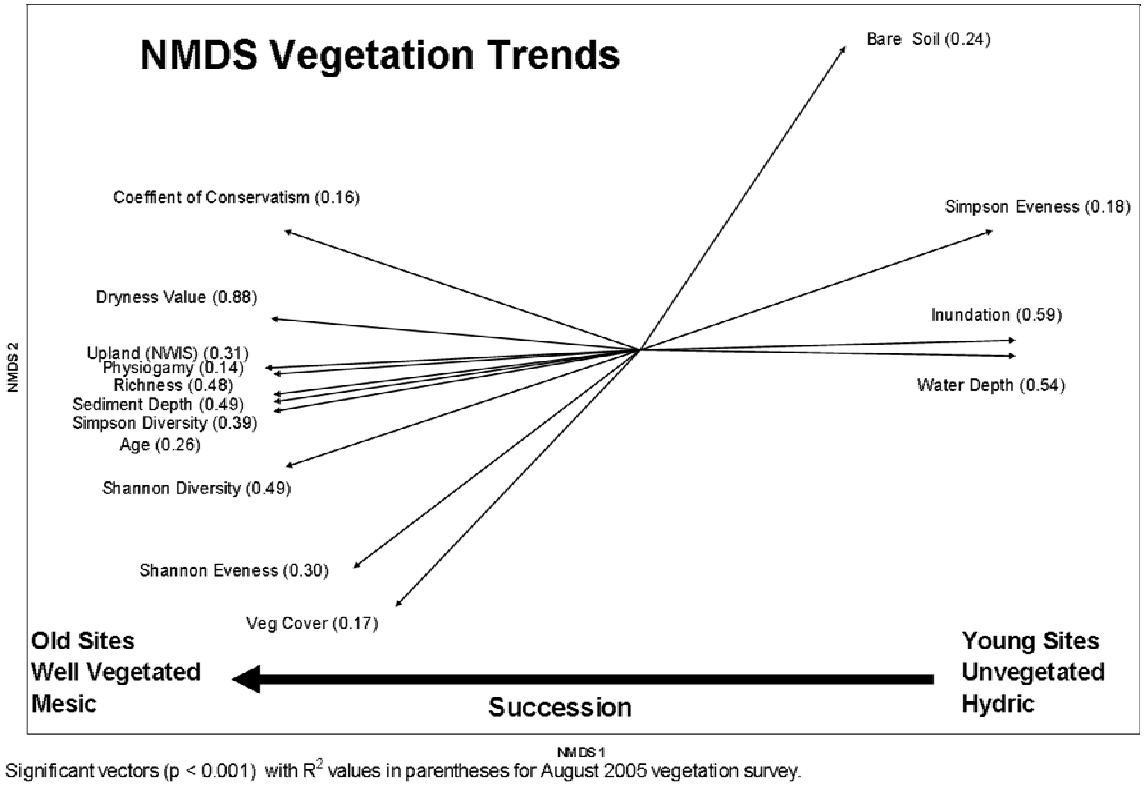








Protected Shoreline Succession



Significant vectors ($p < 0.001$) with R^2 values in parentheses for August 2005 vegetation survey.

Benefits and Conclusions

Reduced erosion/wave energy
Shoreline stabilization
Natural plant colonization
Succession of aquatic to terrestrial
Wetland vegetation habitat
Wetland wildlife habitat
Improved water quality
Decreased sedimentation
Improved aesthetics
No upland disturbance with barge
Overall healthier lake ecosystem