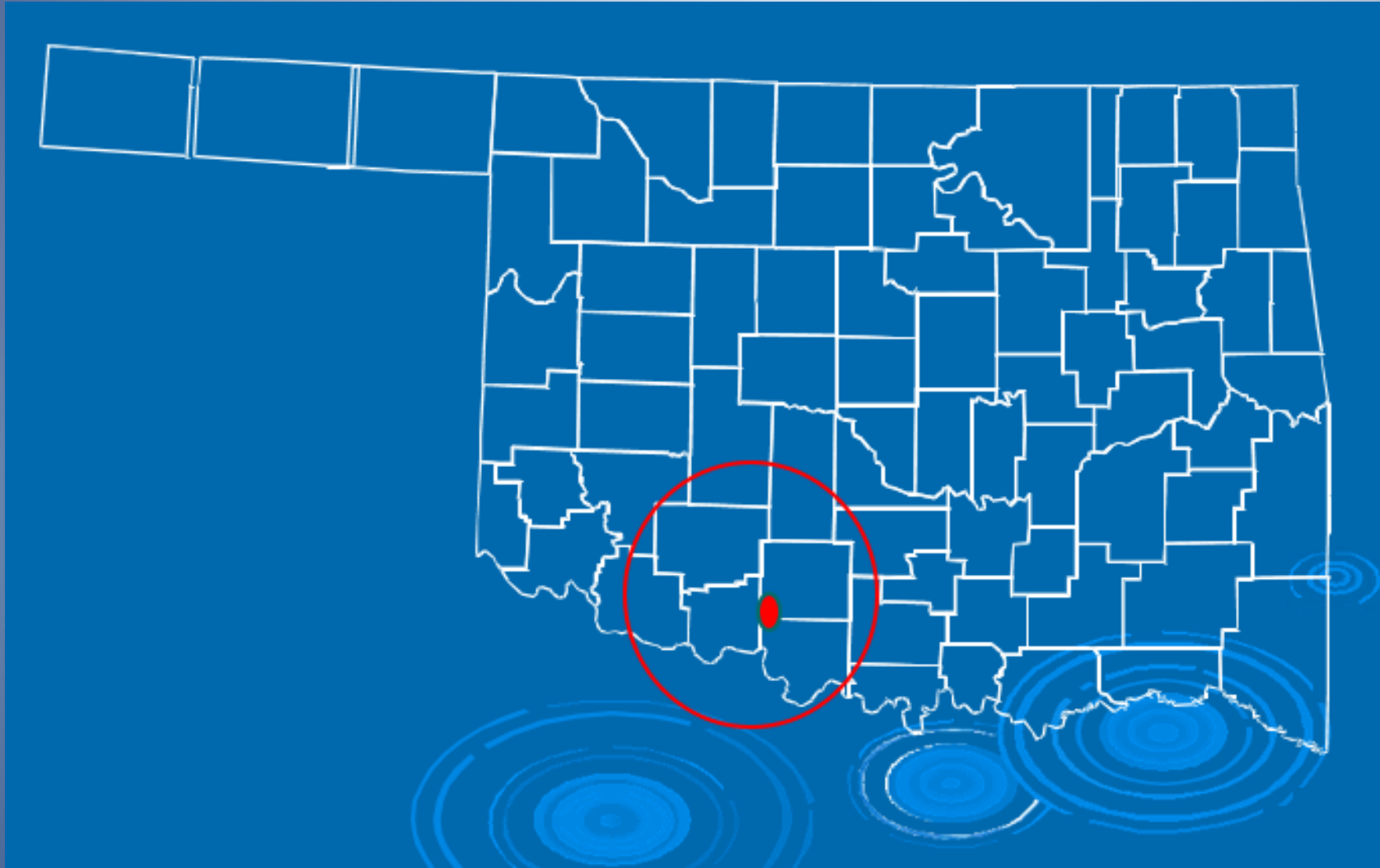


RESTORING OKLAHOMA'S WAURIKA LAKE TO A RESILIENT WATER SUPPLY

PROJECT BRIEFING

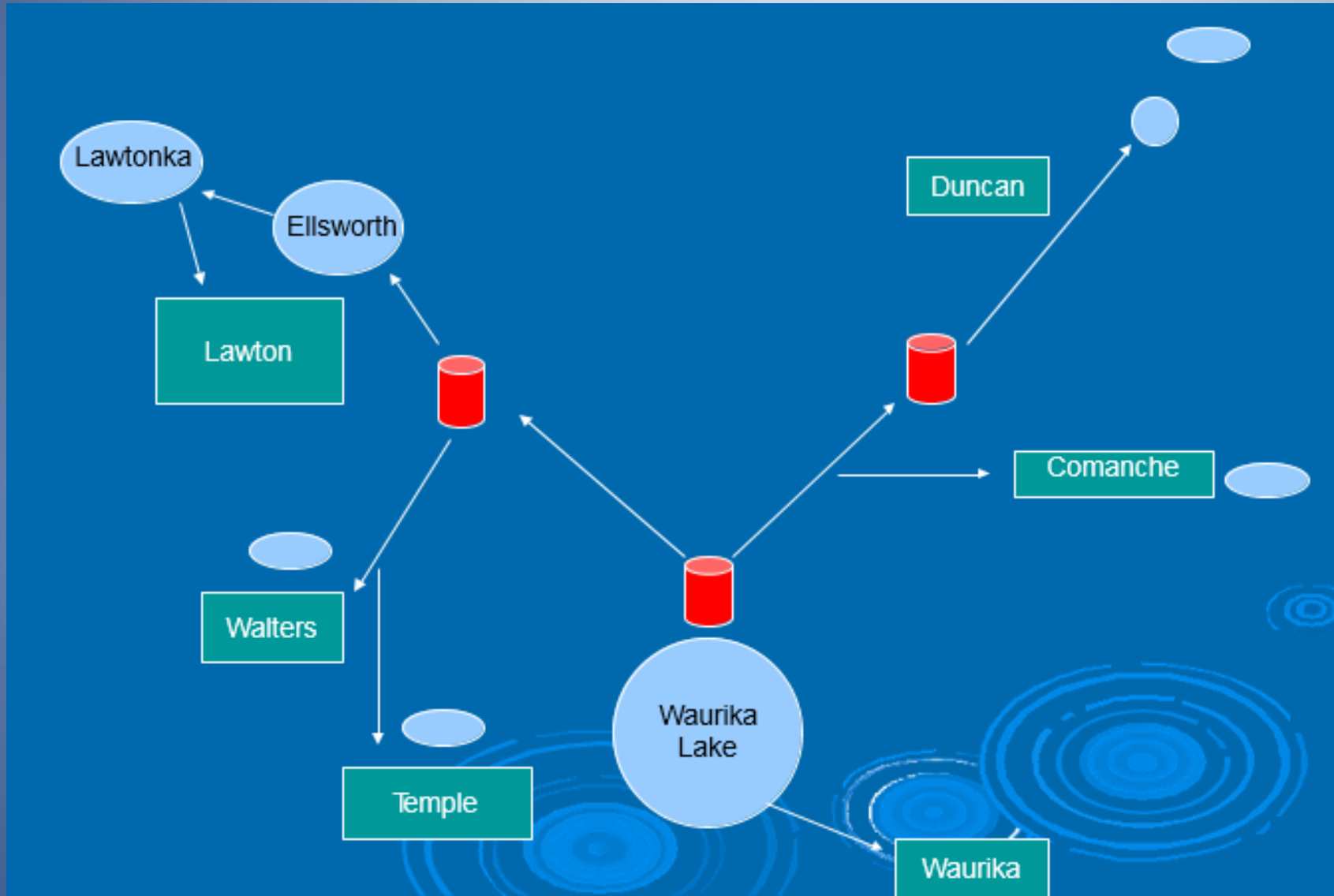
- PHASE 1.0 - RECONNAISSANCE AND SCOPING STUDY
- PHASE 2.0 - PRELIMINARY DESIGN REPORT
- PHASE 3.0 - FUNDING, PERMITS, AND CONTRACTORS
- PHASE 4.0 - DISPOSAL SITE AND PROCEDURES
- PHASE 5.0 - PLANS, SPECIFICATION, AND PROPOSAL
- PHASE 6.0 - ADVERTISE-BIDDING-AWARD SERVICES
- PHASE 7.0 - CONSTRUCTION AND GENERAL/INSPECTION DURING CONSTRUCTION
- PHASE 8.0 - POST-CONSTRUCTION OPERATION AND CLOSURE

Waurika Project Location

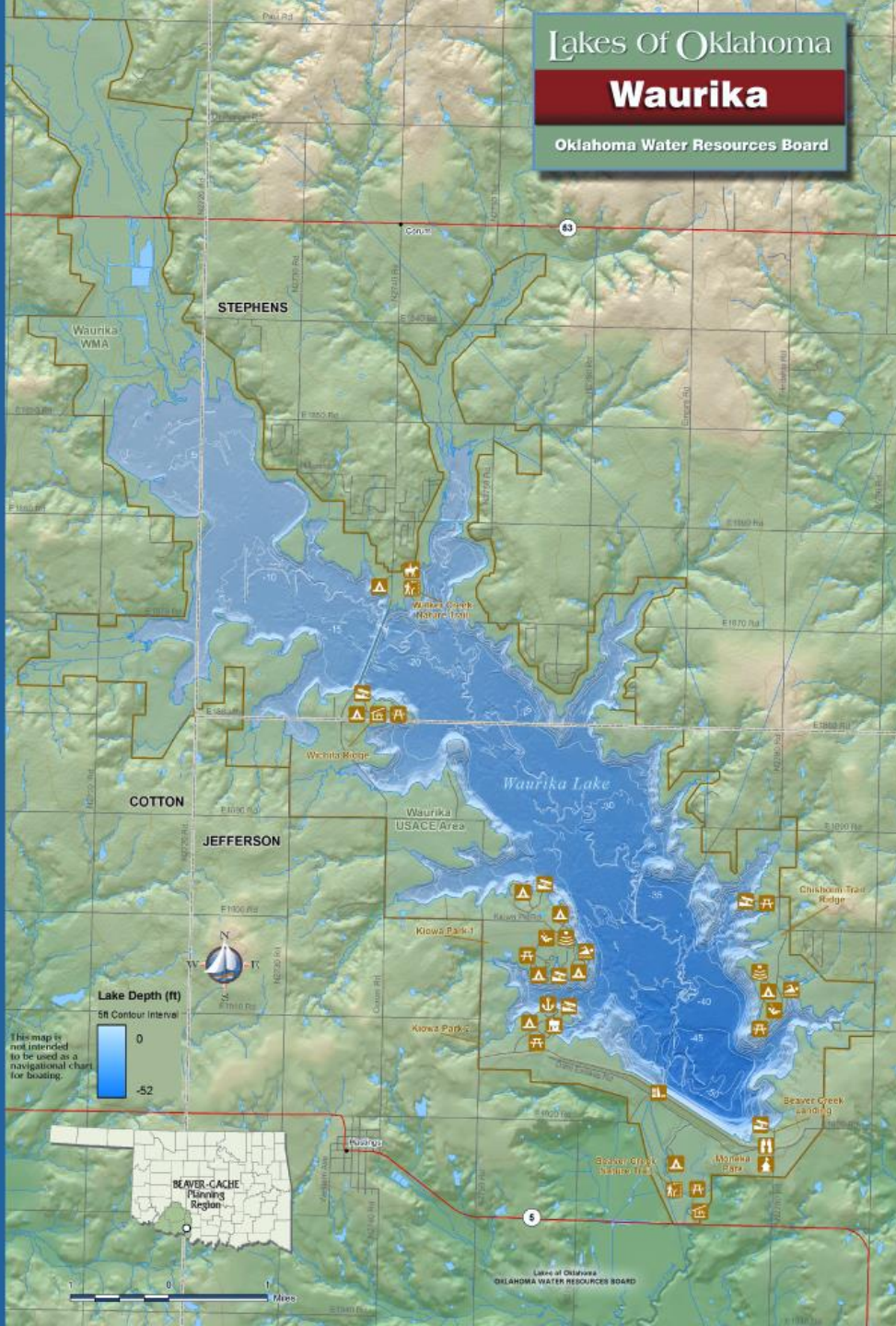


- 1) Lake located 27 River Mile on Beaver Creek
- 2) 10,100 Acre Lake
- 3) Construction Completed Aug 1977
- 4) Storage of 187,000 ac-ft
- 5) Lake is 39 years old
- 6) Purpose:
Flood Control
Irrigation
Water Supply
Water Quality
Recreation
Fish & Wildlife
- 7) WLMCD conveys 10 to 34 mgd 24/7/365

Waurika Lake Water Conveyance



- 1) Five (5) Member Cities and Townes
- 2) 275,000 people
- 3) 8% of State Population
- 4) Fort Sill is a water customer
- 5) Services 4 Counties
Comanche
Cotton Wood
Jefferson
Stephens



WAURIKA LAKE WATER INTAKE CHANNEL MAINTENANCE PROJECT

“FIRST INLAND DREDGING PROJECT IN THE NATION SINCE SECTION 408 APPROVAL & REQUEST WERE INTRODUCED IN 2005 TO COMPLY WITH 33 U.S.C. SECTION 408”



ASSESSMENT OF CONDITIONS

NORMAL OPERATIONS - The underwater intake supply channel depth is 46.0 feet at normal pool of El 951.4 with a storage capacity of 187,000 ac-ft

- 1) DROUGHT – On 4th May 2015 the lake was **19.54** feet below normal pool at an El 931.85 with a storage capacity of 53,233 ac-ft.
- 2) NOT ACCESSIBLE - Transported sediment and local surface erosion sediment had filled in the lower section of the underwater intake channel **18** feet from El 905.0 to El 923.0 at 28,000 ac-ft lake storage NOT accessible.
- 3) ACCESSIBLE - Middle **8.46** feet section of the conservation pool with a storage capacity of 25,233 Ac-Ft available or 14 % of the conservation pool was accessible.
- 4) A decrease in quantity and quality of water available for water district conveyance.
- 5) Waurika Lake entered LEVEL 4 DROUGHT conditions 19th Feb 2015.



MAY 2015 PROJECT UPDATE during Bidding

May/June 2015

- 1) 20 inches of rainfall occurred, raising lake levels from EL 931 to 951+/- (normal conservation pool)
- 2) LATE SPRING RAINS – On 3rd June 2015 the lake was 1.70 feet above normal pool at an El 953.1 with a storage capacity of 207,871 ac-ft.



Project Goals

- 1) Increase amount of water available for conveyance, **increase dependable yield**
- 2) Lowering the intake channel by maintenance dredging to **access lower elevations of conservation pool**
- 3) Installing HDPE pipe from lower gates along intake channel to allow continued access during **future sediment deposits**
- 4) Keithline Engineering retained to investigate permitting and dredging of the channel or other alternatives
 - 4.1) Develop long-term solution to **reduce, minimize, stop or mitigate** continue sediment deposits from interfering with water supply operations in the future
 - 4.2) Investigate **Alternate Solutions**



USACE Project Oversight – Bi-Weekly Meetings Sept 2013 thru Aug 2015



Project Phasing

Phase 1.0 – Reconnaissance & Scoping Study

- ▶ Sediment fill was 18' thick at intake structure
- ▶ Sediment fill was at least 7' thick the entire 4,000 foot length of the channel
- ▶ Sediment determined non-toxic non-hazardous

Phase 2.0 – Preliminary Design Report

- ▶ Replace gates and investigate current pumps
- ▶ Dredge Channel, then install 42" HDPE pipe along intake channel bottom
- ▶ Dewater dredged material

▶ Schedule of Project Phases

- | | |
|---|---|
| ▶ Phase 1.0 - Reconnaissance and Scoping Study | Completed December 2013 |
| ▶ Phase 2.0 - Preliminary Design Reports | Completed October 2014 |
| ▶ Phase 3.0 - Procure Funding/Permits/Prospective Contractors | Completed June 2015 |
| ▶ Phase 4.0 - Permit Disposal Site | Completed June 2015 |
| ▶ Phase 5.0 - Develop Final Plans, Specifications and Proposal | Completed May 2015 |
| ▶ Phase 6.0 - Advertise-Bidding-Award Services | Adv: Apr 29 Prebid: May 21 Bid: Jun 23 2015 |
| ▶ Phase 7.0 - Construction and General/Inspection during Construction | August 2015 to July 2016 |

Phase 3.0 – Funding, Permits

- ▶ 35% Section 408 Permit filed with USACE on November 12, 2014
- ▶ 95% Section 408 Permit filed with USACE on April 8, 2015*
- ▶ 408 Approval expected June 2015
- ▶ Complete funding - June 2015
- ▶ City/County permits not required
- ▶ ODEQ NPDES discharge permit to be issued in conjunction with 408 Approval

TASK 1 - Maintenance Prep., Monitoring & Management	\$2,160,000
TASK 2 - Maintenance Dredging & Related Activities	\$3,740,000
TASK 3 - Lower Gate Extension	\$5,800,000
TASK 4 - Post Maintenance Operations	\$300,000
Total Project Estimate	\$12,000,000

* Included all soil, sediment, elutriate, cultural surveys

Phase 4.0 – Disposal Site and Procedures

- ▶ Dewatering of dredged material on Site performed in Confined Dredged Material Storage Area (CDMSA)
- ▶ Decant free water off
- ▶ Dried material will remain on-site
- ▶ Indigenous background was established
- ▶ Dredged material monitored for toxicity, heavy metals and pesticides constituents



Phase 5.0 – Plans, Specification, and Proposal

- ▶ 95% Plans submitted to USACE January 6 2015 – “no comments”
- ▶ 100% Plans completed May 2015
- ▶ Project divided into 4 ‘Tasks’
 - ▶ Task 1 – Maintenance Preparation, Monitoring, and Management
 - ▶ Task 2 – Maintenance Dredging & Related Activities
 - ▶ Task 3 – Intake Structure Repair & Lower Gate Extension
 - ▶ Task 4 – Post Maintenance Operations
- ▶ Total construction time of 330 days.



Phase 6.0 & 7.0

Phase 6.0 – Advertise-Bidding-Award Services

- Advertising: April 29 2015 (Lawton, Duncan, Waurika, national plan rooms)
- Mandatory Pre-Bid: May 21 2015. **Ten (10) contractors attended.**
- Bid Opening: June 23 2015; **three (3)** bidders
- Contract awarded to Wynn Construction Company Inc, Oklahoma City, in the amount of \$8,734,535.00 on July 7 2015
- Contract executed July 7 2015 for TOTAL BASE BID plus Additive Alternates 2 and 3
- **Pre-Construction Conference: August 18 2015**
- Project Notice-to-Proceed: August 14 2015 w/ 10 days to proceed. Day 1 is Aug 24 2015.

Phase 7.0 – Construction and General Inspection during Construction

- August 2015 thru July 2016 (330 days)
- Intake Structure will be fully operational throughout project; however, one wetwell closed during gate replacement.
- Keithline Engineering will provide a 3/4-time time professional engineer inspector.
- Water supply interruptions are not anticipated; however, contingencies are in-place



Phase 6.0 Permit Approvals

<u>33 USC Section 408</u> (alter/occupy/use Waurika Lake)	July 2015
<u>USACE “Findings of No Significant Impact” FONSI</u>	July 2015
<u>USACE NWP-12</u> (authorizes repairs/construction)	July 2015
<u>USACE NWP-16</u> (approval to discharge CDMSA decant into Waurika Lake)	July 2015
<u>USACE Real Estate Early-Right-of-Entry</u>	Aug 2015
<u>USACE Real Estate Land and Water Easements</u>	Sept 2015
<u>ODEQ SWP3 Erosion and Sediment Control</u>	Mar 2015
<u>ODEQ 401</u> (Oklahoma Authorizes CDMSA discharge to Waurika Lake using USACE BMPs)	July 2015



Phase 6.0 Funding Approvals

Project fully funded

- 1) Oklahoma Water Resources Board - \$ 10.2 Million Loan - Approved June 16, 2015
- 2) US Bureau of Reclamation - \$ 0.3 Million Grant
- 3) FEMA Grant \$\$\$ disappeared when drought was over



TSS and pH Monitoring at Intake Structure and CDMSA discharge

Conducted daily when inspector on-site

WAURIKA LAKE WATER INTAKE CHANNEL MAINTENANCE PROJECT Dredging, Gate Extensions Gate Replacements Daily Water Sampling Log

Date-Time and Inspector			NW Corner North CDMSA					SE Corner South CDMSA				CDMSA Outfall				Outside Curtain of CDMSA Outfall				Lake Water - West of Intake Str			
DATE	DAY	INSP INITIALS	Northern CDMSA (Across from DM Inlet Outfall, NWC)					Southern CDMSA - Cell 3 (SEC)				CDMSA Outfall in Lake (LITC)				50' Outside Turbidity Curtain (LOTIC)				Lake Water West of Intake Structure (Lake)			
			pH	Water Temp (°F)	TSS (mg/L)	Turbidity (NTU)	Sludge Level (feet)	pH	Water Temp (°F)	TSS (mg/L)	Turbidity (NTU)	pH	Water Temp (°F)	TSS (mg/L)	Turbidity (NTU)	pH	Water Temp (°F)	TSS (mg/L)	Turbidity (NTU)	pH	Water Temp (°F)	TSS (mg/L)	Turbidity (NTU)
2/21/2016	Sun																						
2/22/2016	Mon	MM	8.2	69	1193	785	7	8.7	65.3	69	43.9	8.8	63.1	57	38.8	8.6	59	24	14.5	8.4	58.6	26	18.3
2/23/2016	Tue	MM	8.5	48.5	210	133	7	8.5	52.9	131	85.5	8.7	49.7	35	22.5	8.7	48.8	35	24.3	8.5	48.1	37	23.5
2/24/2016	Wed	MM	8.4	58.3	282	183	7.5	8.5	54.9	84	53.6	9	56.2	48	30.5	8.9	58.4	47	27.5	8.3	57.6	32	20.3
2/25/2016	Thur-AM	MM	8.4	50.1	477	325	8	8.5	48.4	67	45.5	8.8	47.9	42	24.6	8.6	47.6	30	18.2	8.4	48.3	31	19.3
2/25/2016	Thur-PM	MM	8.5	48.6	205	136		8.7	48.7	60	40.5	8.9	55.1	27	18.5	8.7	49.4	25	14.3	8.5	50	26	15.6
2/26/2016	Fri-AM	MM	8.1	50.1	756	550		8.5	49.1	57	37.3	8.6	47.1	24	15.2	8.7	46.9	22	13.5	8.3	48.8	24	15.3
2/26/2016	Fri-PM	MM	8.2	55.5	217	162		8.5	54	52	35.8	9	54.9	52	36.5	9	54.7	82	55.2	8.6	55.7	29	19.3
2/27/2016	Sat-AM	RSV	8.11	51.5	865	622		8.53	48.6	54	34.1	8.82	49.5	78	37.8	8.77	50.5	43	24	8.45	54.3	34	20.1
2/27/2016	Sat-PM	RSV	8	61.2	1419	1059		8.54	59.4	52	35.4	8.76	59.9	173	111	8.64	58.5	109	75.3	8.69	58.7	174	110

Note 1: TSS and turbidity are always high during windy days. Note elevated readings on Wed 2/24, Friday-PM 2/26, and Sat-PM 2/27.

Note 2: No CDMSA discharge entered the lake from Tuesday 2/23 onward due to the CDMSA batterboards being raised to allow only two feet of freeboard for the duration of dredging.

Note 3: A pH of 9 was noted in the lake in the vicinity of the outfall on Wednesday 2/24 and Friday 2/26 PM; however, no CDMSA discharge was entering the lake on that day.

HANDHELD TSS, SLUDGE LEVEL, pH METERS



Logging Geotechnical Measurements

Soil Densities and Constituent Sampling – Terracon OKC

Soil Sampling – Terracon & Accurate Labs - OKC

Dredged Material Sampling – Environmental Testing Inc &
Accurate Labs - OKC



Health-Safety-Environmental and Work Plans

Each Project Task is accompanied by:

- Safety Plan *
 - Medical Emergencies
 - Weekly Safety Toolbox Talks
 - Safety Inspections
- Equipment Safety Plan *
 - Equipment Accidents
 - Submerged Equipment
- Environmental Plan *
 - Oil Spills
 - Fuel Storage Areas
- Work Plan
 - Means/Methods/Procedures

* references 2014 EM 385-1-1 USACE Safety and Health Manual



Arc Welding and Fire Safety

If properly installed and used, the arc welder is very safe. If used improperly, the unit can expose welders to fire, explosion, and retinal burns.

Here is an Example

Ben was working from an aerial lift in a factory, welding angle iron supports to a steel joist. The area directly below Ben contained magnesium shavings and cuttings. Welding sparks and slag from the welding operation landed in the magnesium shavings, causing a violent fire that engulfed Ben. He sustained severe burns, fire and smoke inhalation, asphyxia and was killed.

1. Why did this accident happen?
2. Have you known or heard of anyone who was injured or killed while welding?
3. If so, what happened?

Preventing Injuries from Arc Welding

- Inspect the arc welder before starting any operation.
- Read all warning labels and instruction manuals for the welder.
- Remove all potential fire hazards from the welding area for at least 35 feet.
- Use fire tarps to prevent sparks coming in contact with flammable or combustible materials or liquids.
- Have a fire extinguisher ready for immediate use.
- Don't strike an arc without proper eye protection is nearby.

PROJECT PLANS

WAURIKA LAKE MASTER CONSERVANCY DISTRICT

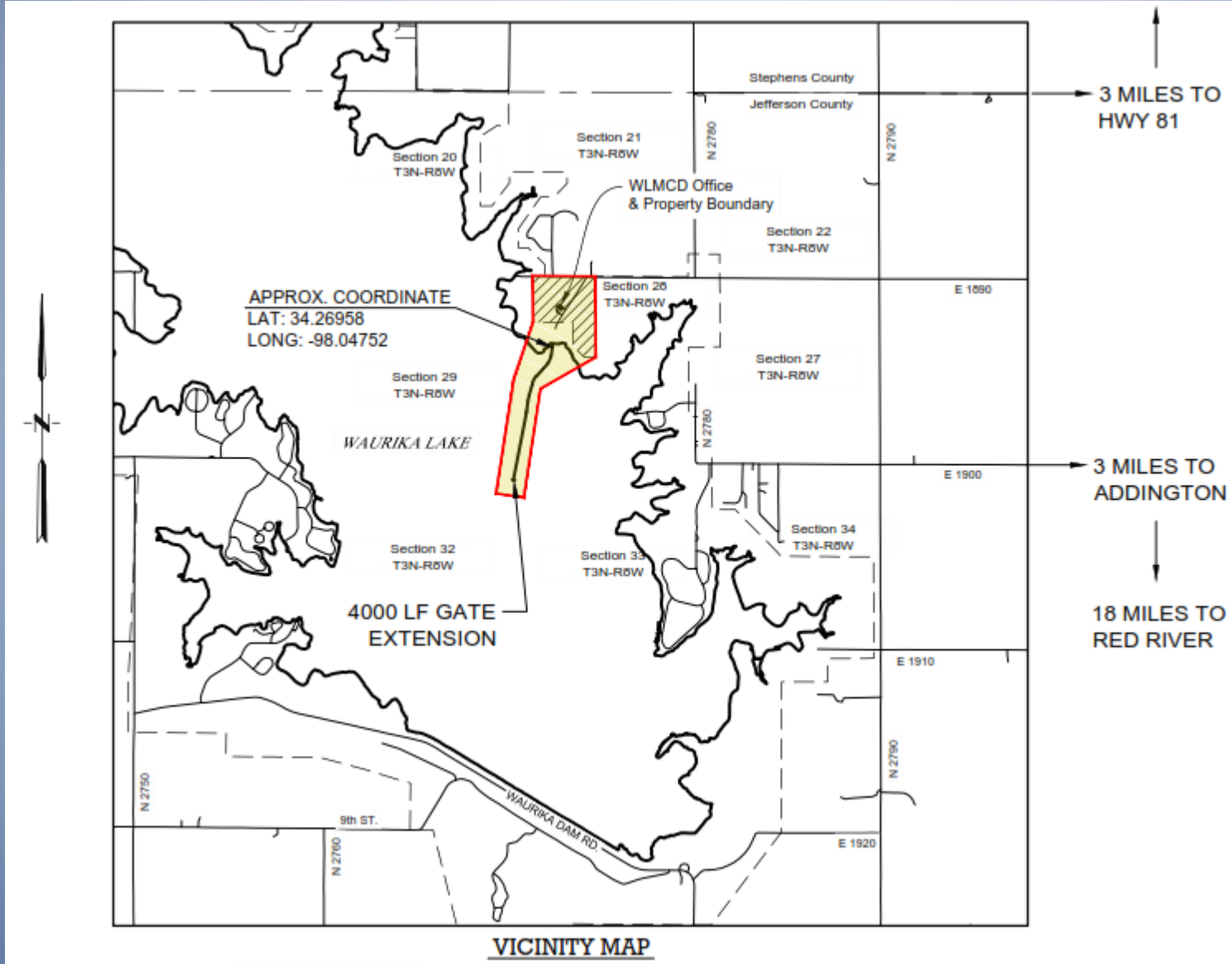


**WAURIKA LAKE WATER INTAKE CHANNEL
MAINTENANCE PROJECT**

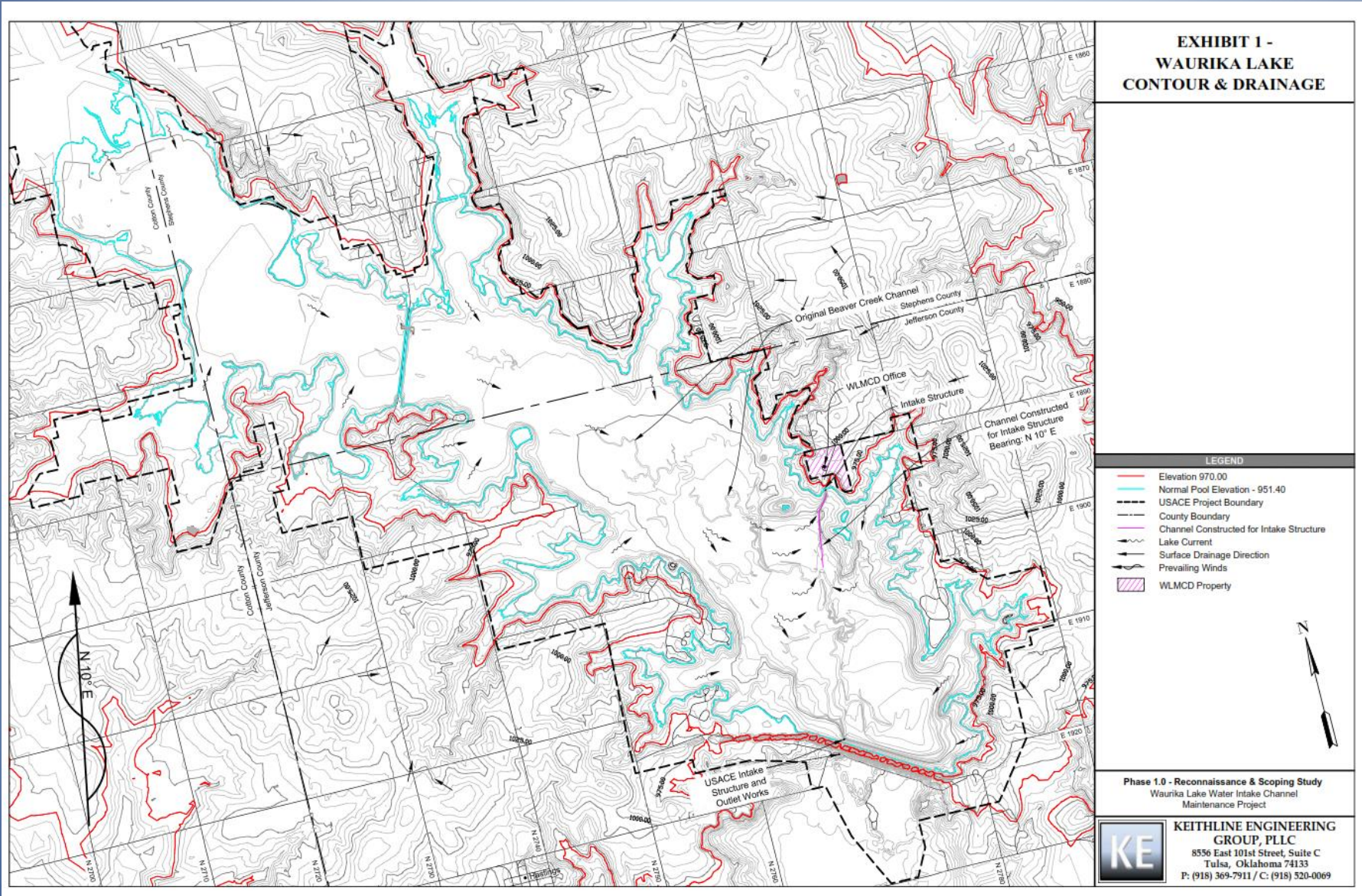
PLAN OF PROPOSED

**DREDGING, GATE EXTENSIONS & GATE
REPLACEMENTS**

VICINITY MAP



CONTOURS AND DRAINAGE



LAKE AERIAL



EXHIBIT 2 - WAURIKA LAKE AERIAL

GENERAL INFORMATION

Year:	1977
Dam ID:	OK 10039
Dam Elevation (feet):	995.00
Owner:	
Stream:	Beaver Creek
Streambed Elevation (feet):	889.00
Purpose:	FC, IR, WS, WQ, R, FW
County:	Jefferson
Drainage Area (sq. miles):	562
Water Supply Storage (acre-feet):	151,400
Water Supply Yield (acre-feet):	40,549
Normal Pool Elevation (feet):	951.40
Normal Pool Area (acres):	10,100
Normal Pool Capacity (acre-feet):	203,100
Shoreline (miles):	80
Flood Pool Elevation (feet):	962.50
Flood Pool Area (acres):	15,000
Flood Pool Capacity (acre-feet)	343,500

LEGEND

- Normal Pool Elevation 951.40 (white)
- - - County Boundary (white)
- Improved Road (white)
- Improved Road
- Park Boundary
- - - USACE Project Boundary (white)
- ⊗ Lagoon possibly causing lake contamination
- ▨ OWRC Management Area (white)
- ▨ WLMCD Property

PUBLIC USE AREAS

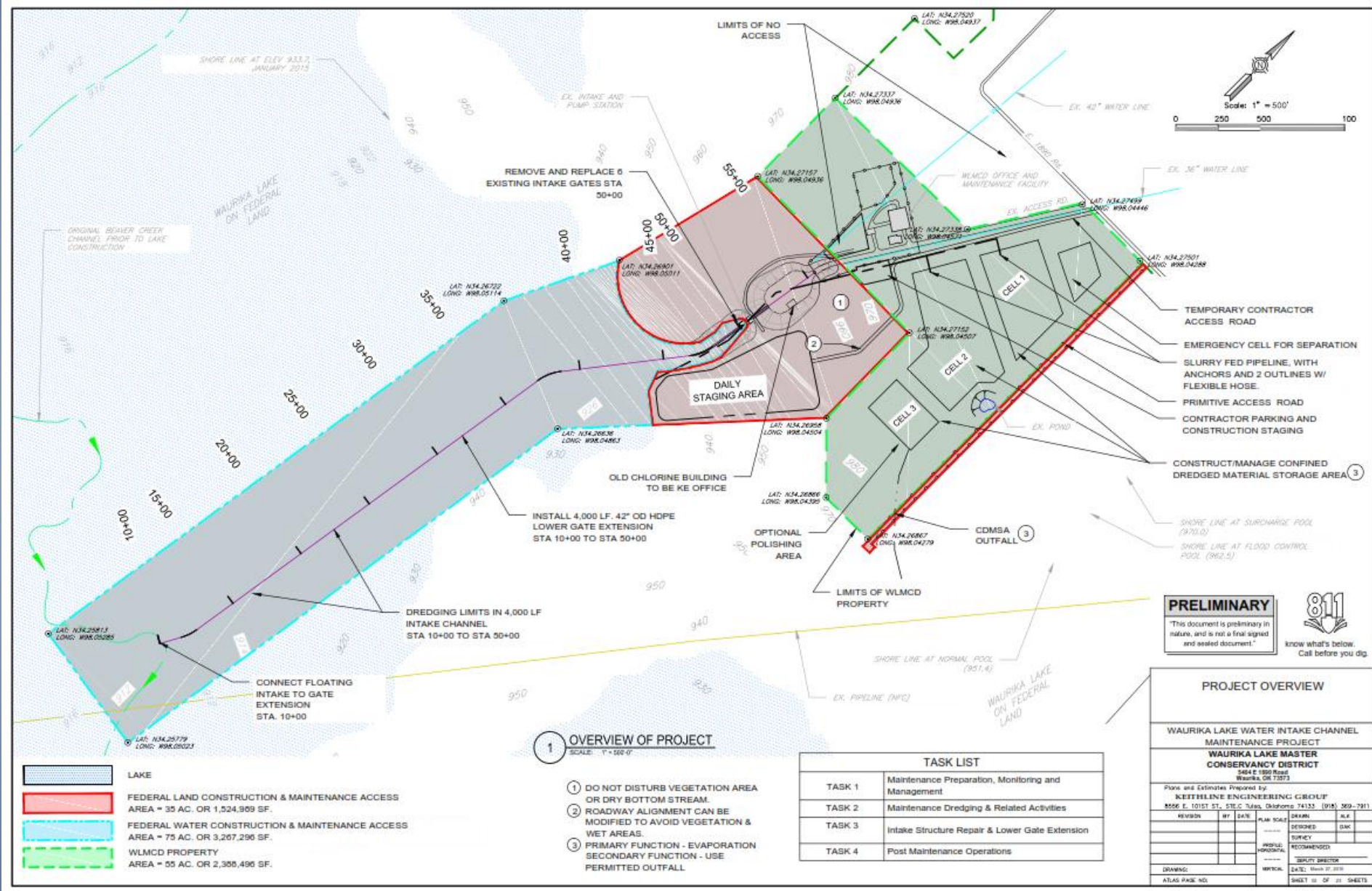
- Moneka Park
- Beaver Creek Landing
- Chisholm Trail Ridge
- Wichita Ridge
- Kiowa Park I
- Kiowa Park II



Phase 1.0 - Reconnaissance & Scoping Study
Waurika Lake Water Intake Channel
Maintenance Project

KE KEITHLINE ENGINEERING GROUP, PLLC
8556 East 101st Street, Suite C
Tulsa, Oklahoma 74133
P: (918) 369-7911 / C: (918) 520-0069

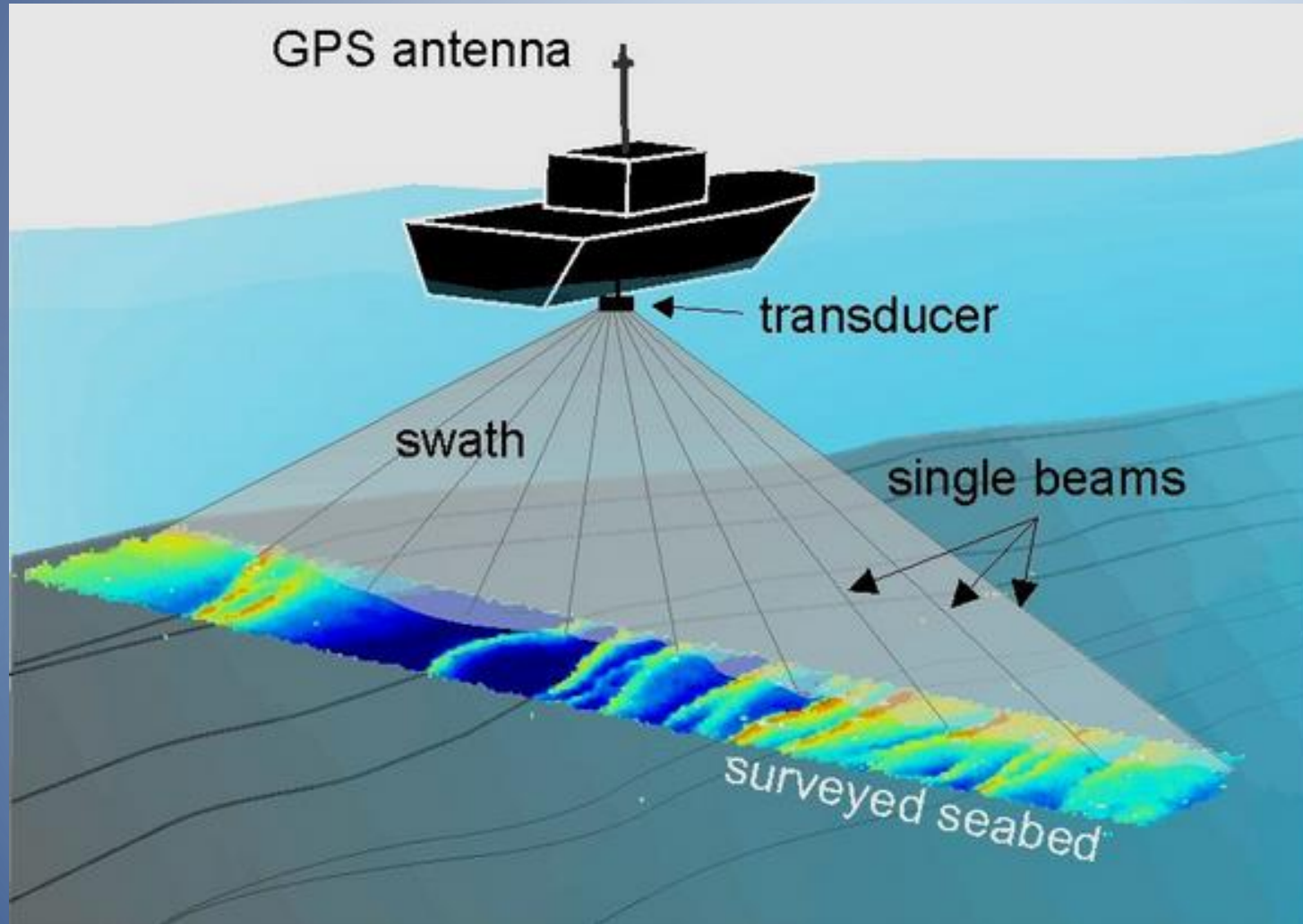
USACE PROJECT LAND AND WATER EASEMENTS



TASK 1 – PREPARATION BID ITEMS

		TASK 1 - Maintenance Preparation, Monitoring and Management
1	01 71 13	Mobilization
2	35 51 00	Temporary Access to Lake
3	01 71 15	Initial Purchases for WLMCD
4	01 57 19	Environmental Barrier, Instrumentation and Monitoring
5	02 21 13	Oklahoma Water Resources Board (OWRB) Pre-Dredge Bathymetric Survey
6	02 21 13	OWRB Mid-Dredge Bathymetric Survey
7	02 21 13	OWRB Post-Dredge Bathymetric Survey
8	35 20 10.1	Remove/Replace Two (2) 4'x8' High-Level Slide Gates
9	35 20 10.2	Remove/Replace Two (2) 4'x8' Mid-Level Slide Gates
10	35 20 10.3	Remove/Replace Two (2) 4'x8' Low-Level Slide Gates And Install Diffuser
11		Engineering Surveying During Construction As Directed By Engineer
12		Field and Sampling Testing During Construction As Directed By Engineer

PRE- MID- POST-BATHYMETRY (OWRB)



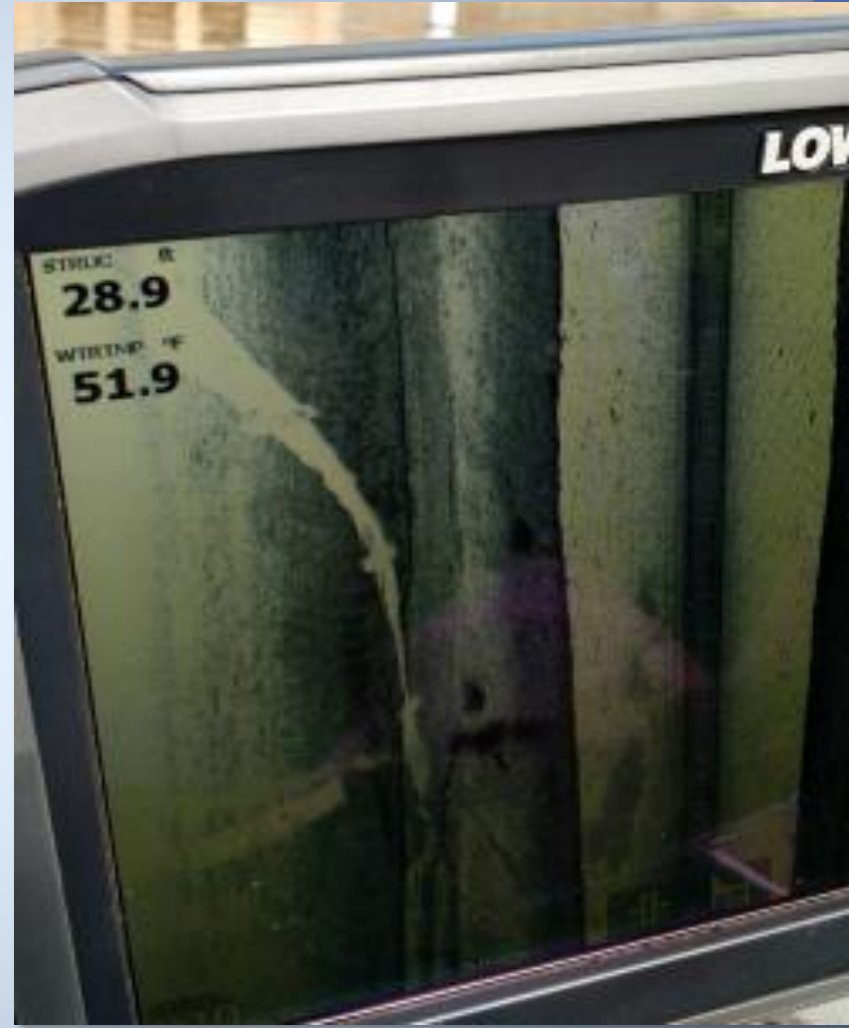
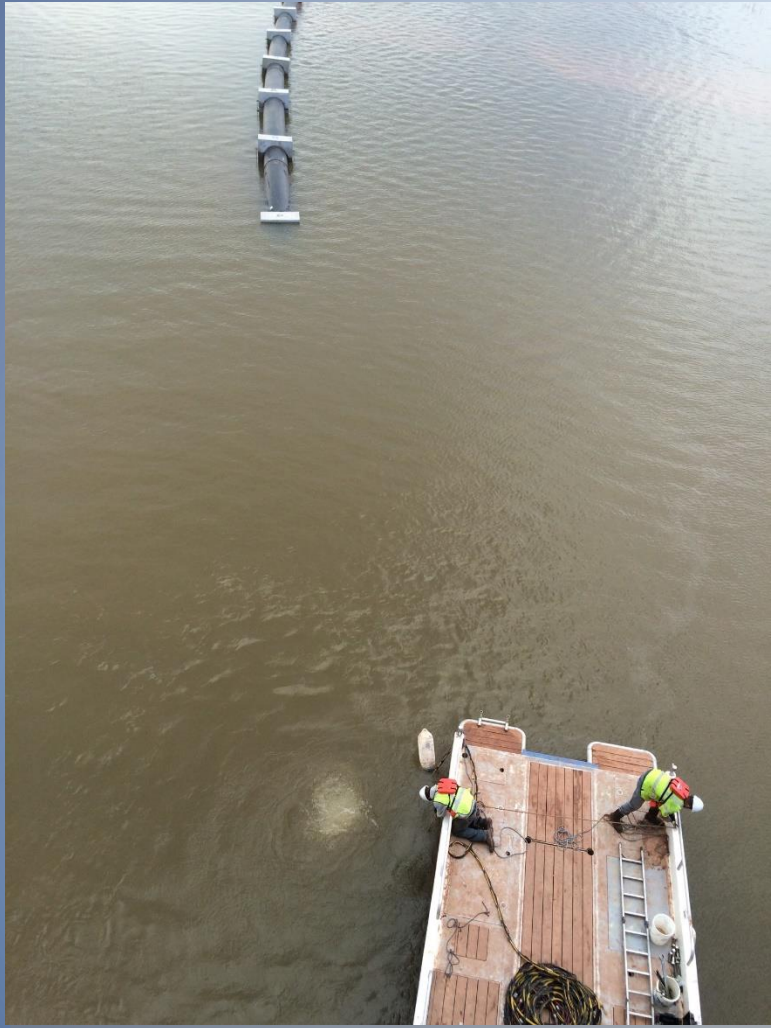
LOWRANCE HDS GEN 3 SIDE-SCAN SONAR



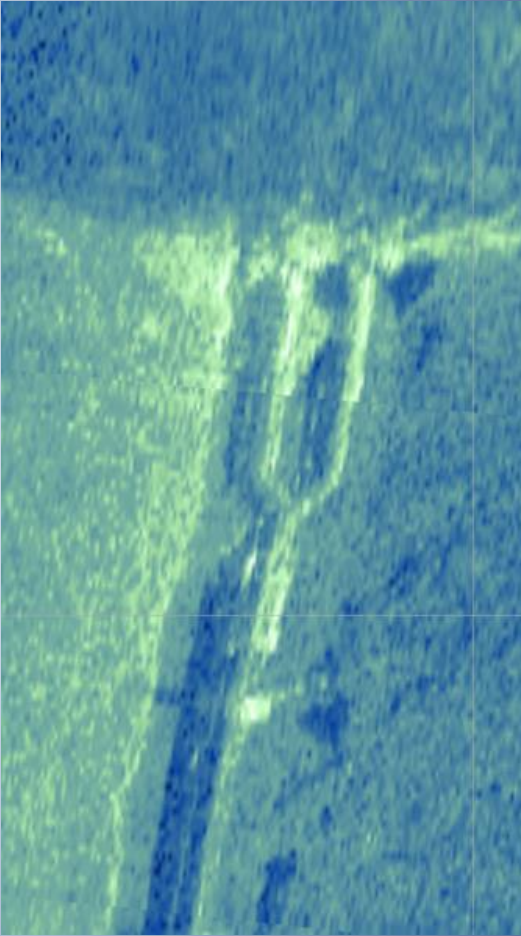
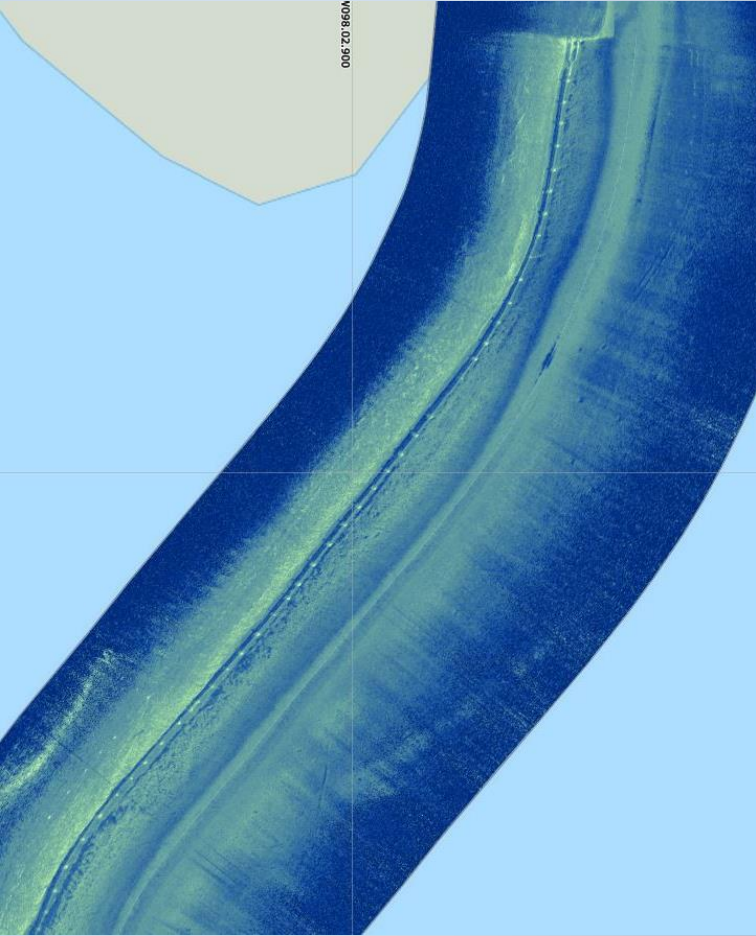
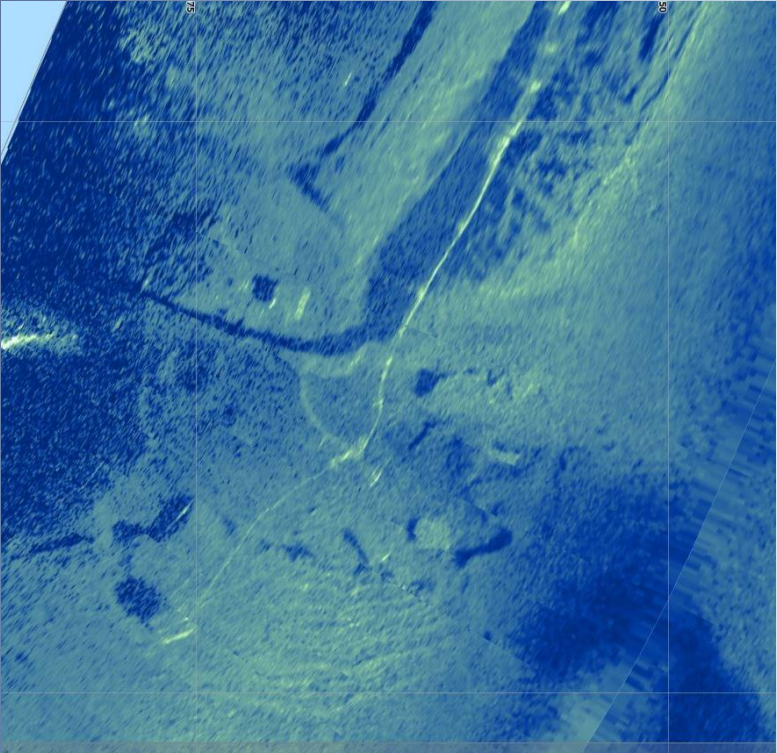
LOWERING 800 FT SECTION OF 42" HDPE INTO DREDGED CHANNEL



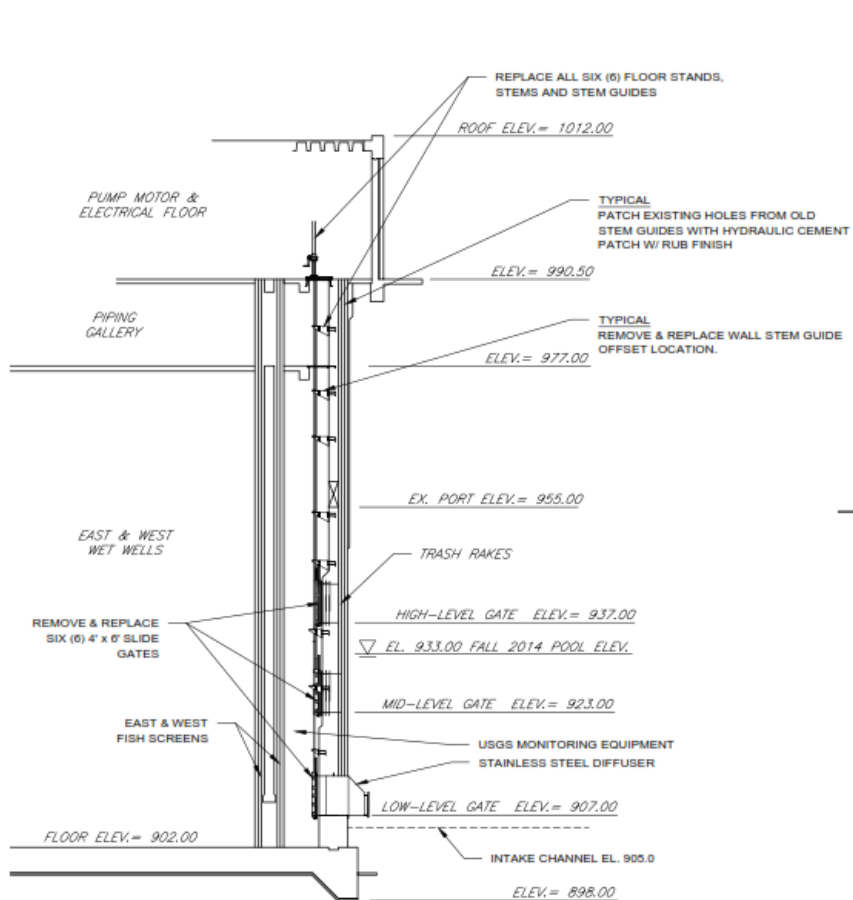
SIDE-SCAN IMAGES



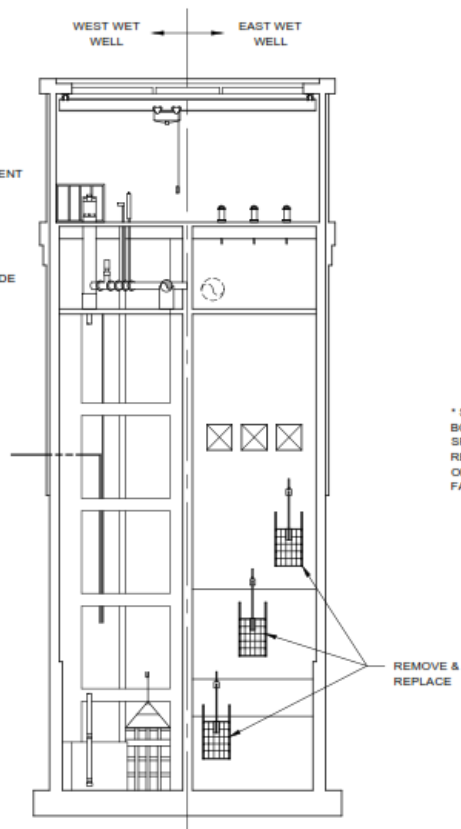
UNDERWATER IMAGES



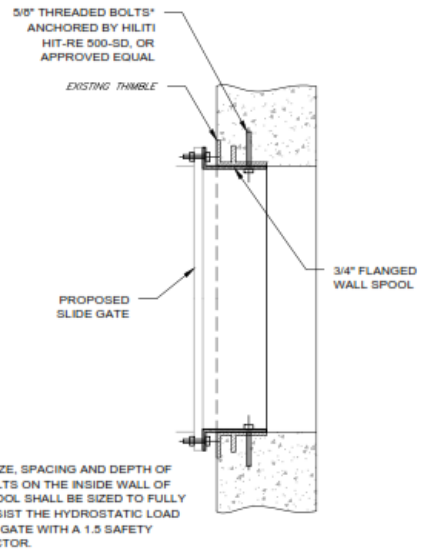
TASK 1 - GATE REPLACEMENT



1 INTAKE STRUCTURE SLIDE GATE SECTION
SCALE: NTS



2 INTAKE STRUCTURE SLIDE GATE ELEVATION
SCALE: NTS



3 UPPER/MID-LEVEL GATES STAINLESS STEEL FLG WALL SPOOL
SCALE: NTS
BID ITEM 8 & 9

PRELIMINARY
"This document is preliminary in nature, and is not a final signed and sealed document."
know what's below. Call before you dig.

TASK 1 - GATE REPLACEMENT IN INTAKE STRUCTURE

WAURIKA LAKE WATER INTAKE CHANNEL MAINTENANCE PROJECT
WAURIKA LAKE MASTER CONSERVANCY DISTRICT
3844 E 100th Road
Waurika, OK 73753

Plans and Estimates Prepared by:
KEITHLINE ENGINEERING GROUP, P.C.
8556 E. 101ST ST., STE. C, Tulsa, Oklahoma 74133 (918) 369-7911

REVISION	BY	DATE	PLAN SCALE	DRAWN	C.K.
				DESIGNED	DAK
				SURVEY	
				APPROVED	RECOMMENDED
				VERTICAL	QUALITY INSPECTOR
					DATE: March 07, 2018
					SHEET 10 OF 20 SHEETS



REMOVE / REPLACE SIX SLIDE GATES



- 1) Cast Iron Tuberculation
- 2) Tuberculation restricts movement of slide gates
- 3) Restriction breaks other components of slide gates
- 4) Key factor is lake water characteristics
- 5) Ductile Iron gate versus stainless



FINAL GATE INSPECTION - 1



FINAL GATE INSPECTION - 2

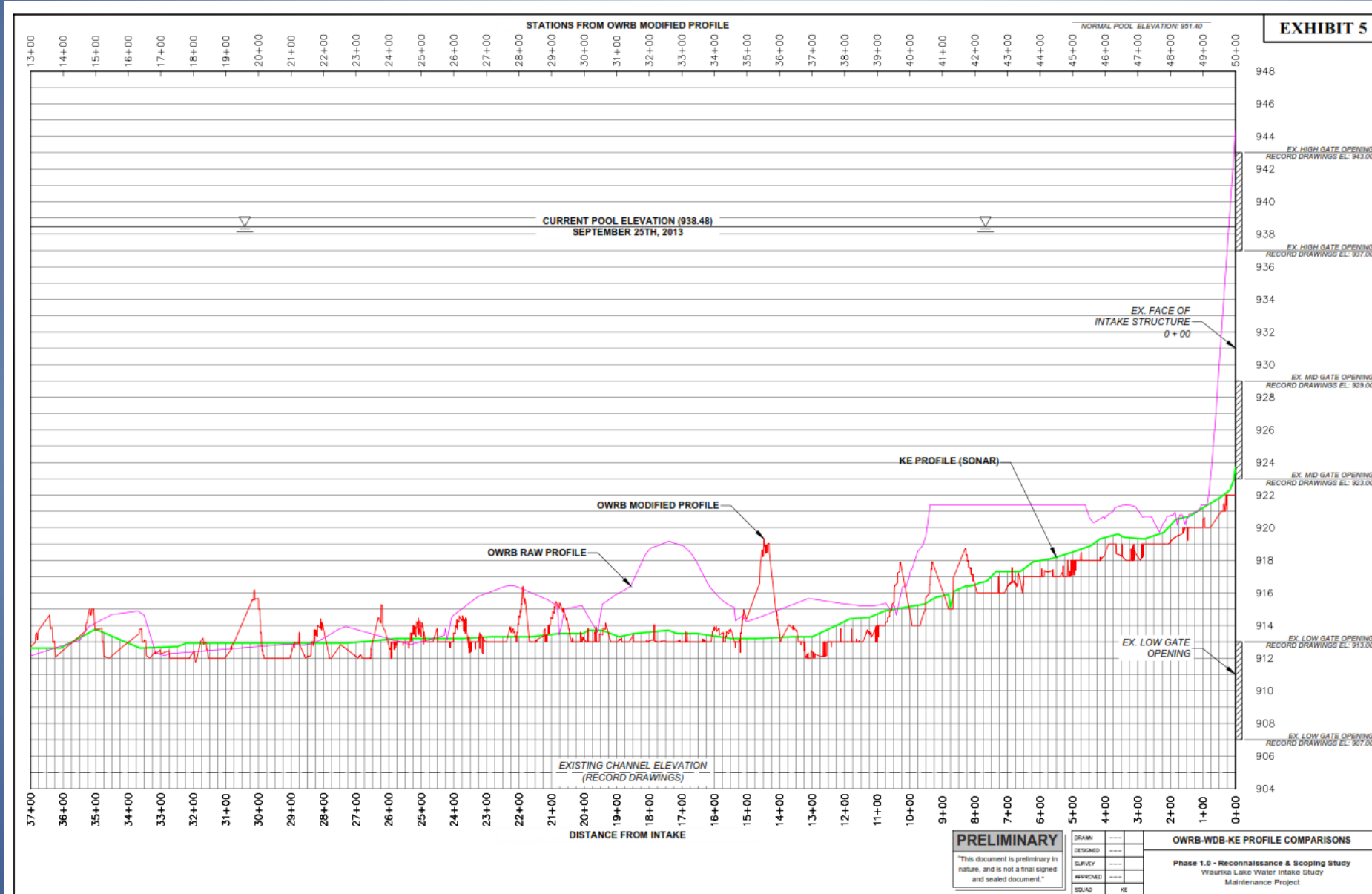


TASK 2 – DREDGING BID ITEMS

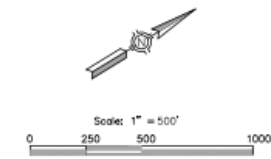
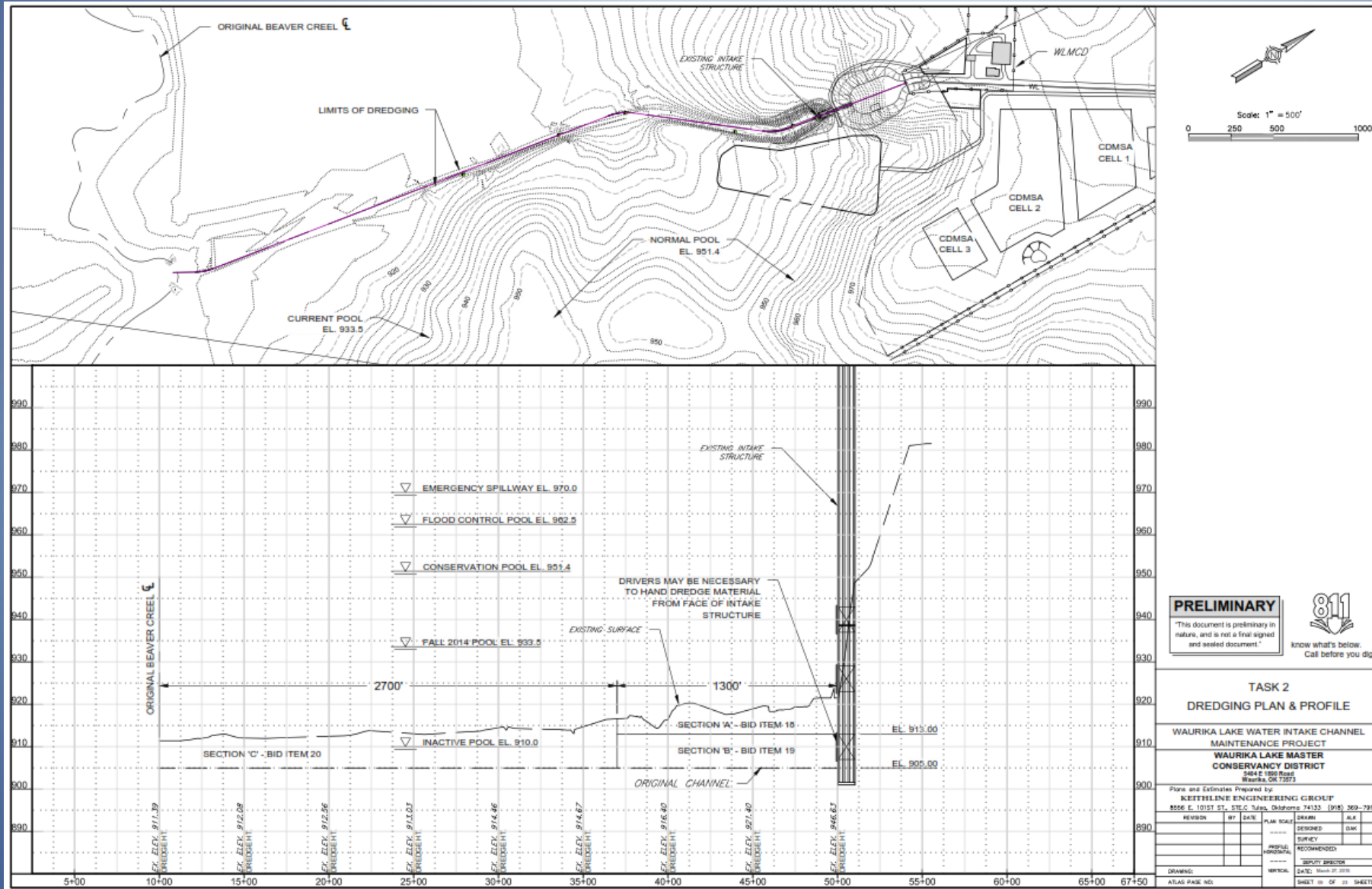
TASK 2 - Maintenance Dredging & Related Activities		
13	01 71 13	Mobilization
14	41 01 50	Construct Confined Dredge Material Storage Area (CDMSA) - Cell 1
15	41 01 50	Construct Confined Dredge Material Storage Area (CDMSA) - Cell 2
16	41 01 50	Construct Confined Dredge Material Storage Area (CDMSA) - Cell 3 & Starter Cell
17	01 51 36	Maintain Water Supply and Quality for Pump Station Conveyance
18	35 20 23	Section A Dredging
19	35 20 23	Section B Dredging
20	35 20 23	Section C Dredging
21	02 71 00	Dewater, Treatment, Manage Water Volume and Release for CDMSAs
22		Remove Submerged Riprap and Stockpile
23	31 25 13	Erosion and Sediment Control for Field Operations



TASK 2 – EXISTING INTAKE CHANNEL PROFILE



TASK 2 - DREDGING PLAN AND PROFILE



PRELIMINARY
 "This document is preliminary in nature, and is not a final signed and sealed document."
811
 know what's below.
 Call before you dig.

TASK 2
DREDGING PLAN & PROFILE

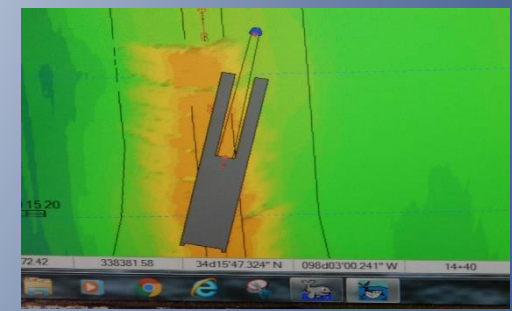
WAURIKA LAKE WATER INTAKE CHANNEL
 MAINTENANCE PROJECT
 WAURIKA LAKE MASTER
 CONSERVANCY DISTRICT
 344 E. 100th Road
 Waurika, OK 73757

Plans and Estimates Prepared by:
KEITHLINE ENGINEERING GROUP
 8556 E. 101ST ST., STE. C Tulsa, Oklahoma 74133 (918) 369-7911

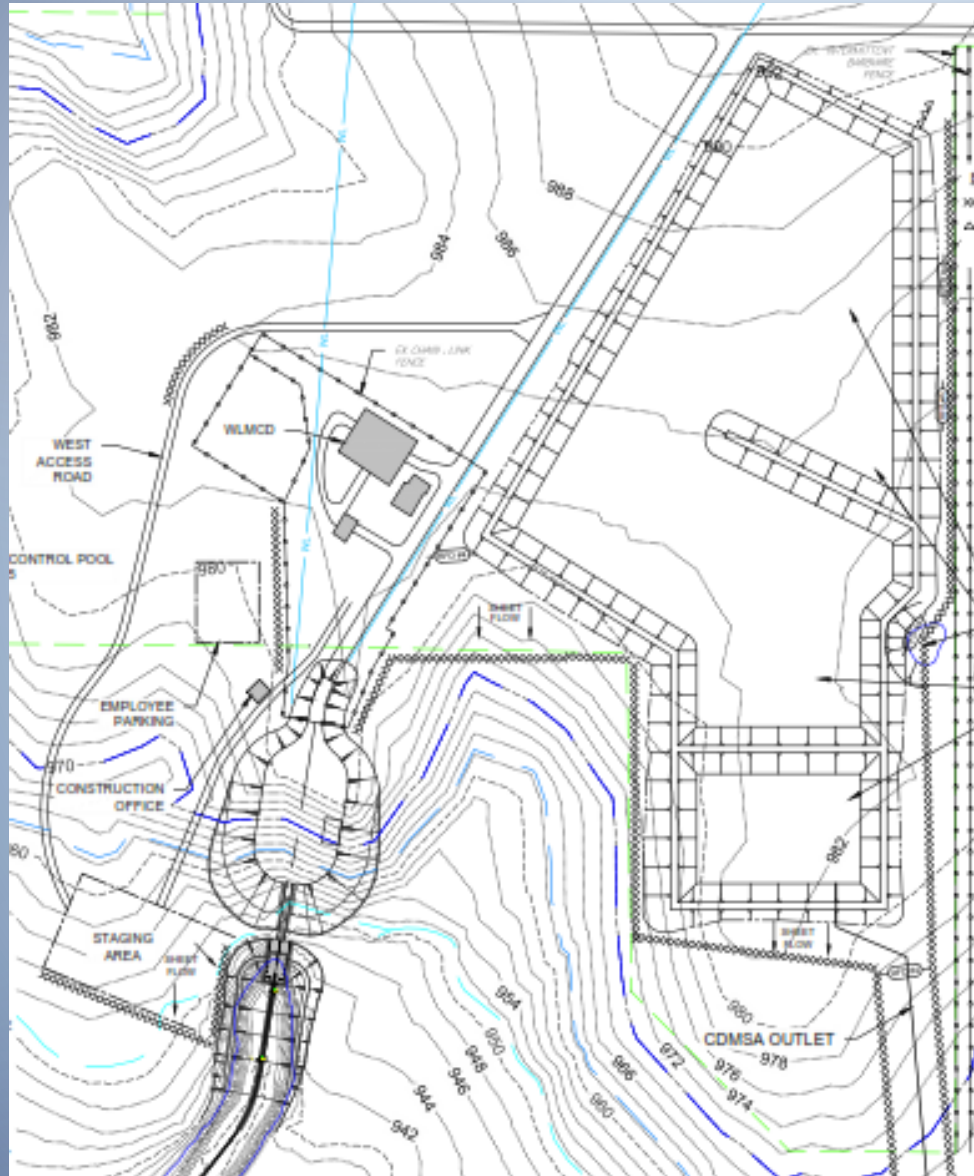
REVISION	BY	DATE	PLAN SCALE	DRAWN	CHK

PROPOSED	DRAWN	
REVISIONS	DESIGNED	
	SURVEY	
	RECOMMENDED	
	CHECKED	
	DATE	

SHEET 10 OF 22 SHEETS



TASK 2 - EROSION CONTROL



TASK 2 - STORMWATER MANAGEMENT PLAN

STORMWATER MANAGEMENT PLAN

ODOT 2009 SPECIFICATIONS

SITE DESCRIPTION

PROJECT LIMITS: A AREA SOUTH OF COUNTY ROAD E, 1890 RD IN JEFFERSON COUNTY, ALL LOCATED ON WAURIKA LAKE MASTER CONSERVANCY DISTRICT LAND

PROJECT DESCRIPTION: DREDGE THE EXISTING INTAKE CHANNEL FOR (MLMCD) INTAKE STRUCTURE, DE-WATER AND DISPOSE OF DREDGED MATERIAL, REPLACE EXISTING INTAKE GATES, AND EXTEND BOTTOM GATES TO ALLOW FOR DROUGHT RESILIENCE.

SUGGESTED SEQUENCE OF EROSION CONTROL ACTIVITIES: _____

- 1 - MAINTENANCE PREPARATION, MONITORING, AND MANAGEMENT
- 2 - PLACE SILT FENCE DOWNSTREAM OF AREAS TO BE DISTURBED. PLACE SILT DIKES IN DRAINAGE CHANNELS VERY 300'
- 3 - MAINTAIN ALL EROSION CONTROL ACTIVITIES
- 4 - SOD, MULCH, OR REHABILITATE ALL DISTURBED AREAS

SOIL TYPE: Zanella Loam/Powhuaka/Lucien (B,C,D)

TOTAL AREA TO BE DISTURBED: APPROX. 100 ACRES

OFFSITE AREA TO BE DISTURBED: _____
(FOR CONTRACTOR USE)

MAXIMUM ACRES TO BE DISTURBED AT ANY ONE TIME: _____
(FOR CONTRACTOR USE)

LATITUDE & LONGITUDE OF CENTER OF PROJECT: 34°16'10"N, 98°02'50"W

NAME OF RECEIVING WATERS: WAURIKA LAKE

SENSITIVE WATERS OR WATERSHEDS: YES NO

303(d) IMPAIRED WATERS: YES NO

NOTE: THIS SHEET SHOULD BE USED IN CONJUNCTION WITH A DRAINAGE MAP THAT ILLUSTRATES THE DRAINAGE PATTERNS, PATHWAYS AND RECEIVING WATERS FOR THIS PROJECT. THIS SHEET SHOULD ALSO BE USED WITH THE EROSION CONTROL SUMMARIES, PAY ITEMS, & NOTES.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- TEMPORARY SEEDING
- PERMANENT SODDING, SPRIGGING OR SEEDING
- VEGETATIVE MULCHING
- SOIL RETENTION BLANKET
- PRESERVATION OF EXISTING VEGETATION

NOTE: TEMPORARY EROSION CONTROL METHODS MUST BE USED ON ALL DISTURBED AREAS WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR OVER 14 DAYS. METHODS USED WILL BE AS SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.

STRUCTURAL PRACTICES:

- STABILIZED CONSTRUCTION EXIT
- TEMPORARY SILT FENCE
- TEMPORARY SILT DIKES
- TEMPORARY FIBER LOG
- DIVERSION, INTERCEPTOR OR PERMETER DITCHES
- DIVERSION, INTERCEPTOR OR PERMETER SWALES
- ROCK FILTER DAMS
- TEMPORARY SLOPE DRAIN
- PAVED DITCH W/ DITCH LINER PROTECTION
- TEMPORARY DIVERSION CHANNELS
- TEMPORARY SEDIMENT BASINS
- TEMPORARY SEDIMENT TRAPS
- TEMPORARY SEDIMENT FILTERS
- TEMPORARY SEDIMENT REMOVAL
- RIP RAP
- INLET SEDIMENT FILTER
- TEMPORARY BRUSH SEDIMENT BARRIERS
- SANDBAG BERMES
- TEMPORARY STREAM CROSSING

OFFSITE VEHICLE TRACKING:

- HAUL ROADS DAMPENED FOR DUST CONTROL
- LOADED HAUL TRUCKS TO BE COVERED WITH TARPULIN
- EXCESS DIRT ON ROAD REMOVED DAILY

ADDITIONAL INFORMATION:

DREDGING MATERIAL TO BE STORED AT CDMSA UNTIL Dewatered AND DISPOSED OF.

THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR FOLLOWING:

MAINTENANCE AND INSPECTION:

ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER FROM THE BEGINNING OF CONSTRUCTION UNTIL AN ACCEPTABLE VEGETATIVE COVER IS ESTABLISHED. INSPECTION BY THE CONTRACTOR AND ANY NECESSARY REPAIRS SHALL BE PERFORMED ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCH AS RECORDED BY A NON-FREEZING RAIN GAUGE TO BE LOCATED ON SITE. POTENTIALLY ERODIBLE AREAS, DRAINAGE WAYS, MATERIAL STORAGE, STRUCTURAL DEVICES, CONSTRUCTION ENTRANCES AND EXITS ALONG WITH EROSION AND SEDIMENT CONTROL LOCATIONS ARE EXAMPLES OF SITES THAT NEED TO BE INSPECTED.

WASTE MATERIALS:

PROPER MANAGEMENT AND DISPOSAL OF CONSTRUCTION WASTE MATERIAL IS REQUIRED BY THE CONTRACTOR. MATERIALS INCLUDE STOCKPILES, SURPLUS, DEBRIS, AND ALL OTHER BY-PRODUCTS FROM CONSTRUCTION PROCESS. PRACTICES INCLUDE DISPOSAL, PROPER MATERIALS HANDLING, SPILL PREVENTION AND CLEAN UP MEASURES. CONTROLS AND PRACTICES SHALL MEET THE REQUIREMENTS OF ALL FEDERAL, STATE, AND LOCAL AGENCIES.

HAZARDOUS MATERIALS:

PROPER MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE MATERIAL IS REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING MANUFACTURER'S RECOMMENDATIONS, STATE AND FEDERAL REGULATIONS TO ENSURE CORRECT HANDLING, DISPOSAL, SPILL PREVENTION AND CLEAN UP MEASURES. EXAMPLES INCLUDE BUT ARE NOT LIMITED TO: PAINTS, ACIDS, CLEANING SOLVENTS, CHEMICAL ADDITIVES, CONCRETE CURING COMPOUNDS AND CONTAMINATED SOILS.

GENERAL NOTES:

A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IS REQUIRED TO COMPLY WITH THE OKLAHOMA POLLUTION DISCHARGE ELIMINATION SYSTEM (OPDES) REGULATIONS. THIS PLAN IS INITIATED DURING THE DESIGN PHASE, CONFIRMED IN THE PRE-WORK MEETINGS AND AVAILABLE ON THE JOB SITE ALONG WITH COPIES OF THE NOTICE OF INTENT (NOI) FORM AND PERMIT CERTIFICATE THAT HAVE BEEN FILED WITH THE OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY (ODEQ). THE PLAN MUST BE KEPT CURRENT WITH UP-TO-DATE AMENDMENTS DURING THE PROGRESSION OF THE PROJECT. ALL CONTRACTOR OFF-SITE OPERATIONS ASSOCIATED WITH THE PROJECT MUST BE DOCUMENTED IN THE SWPPP, I.E., BORROW PITS, WORK ROADS, DISPOSAL SITES, ASPHALT/CONCRETE PLANTS, ECT. THE BASIC GOAL OF STORM WATER MANAGEMENT IS TO IMPROVE WATER QUALITY BY REDUCING POLLUTANTS IN STORM WATER DISCHARGES. RUNOFF FROM CONSTRUCTION SITES HAS POTENTIAL FOR POLLUTION DUE TO EXPOSED SOILS AND THE PRESENCE OF HAZARDOUS MATERIALS USED IN THE CONSTRUCTION PROCESS. THE INTERCEPTION OF SOIL EROSION, CONTAINMENT OF HAZARDOUS MATERIALS AND/OR THE INTERCEPTION OF THE POLLUTANTS BEFORE LEAVING THE CONSTRUCTION SITE ARE THE BEST PRACTICES FOR CONTROLLING STORM WATER POLLUTION.

THE FOLLOWING SECTIONS OF THE 2009 ODOT STANDARD SPECIFICATIONS SHOULD BE NOTED:

- 103.05 BONDING REQUIREMENTS
- 104.10 FINAL CLEANING UP
- 104.12 CONTRACTOR'S RESPONSIBILITY FOR WORK
- 106.08 STORAGE AND HANDLING OF MATERIALS
- 107.01 LAWS, RULES AND REGULATIONS TO BE OBSERVED
- 107.20 STORM WATER MANAGEMENT
- 220 MANAGEMENT OF EROSION, SEDIMENTATION AND STORM WATER POLLUTION PREVENTION AND CONTROL
- 221 TEMPORARY SEDIMENT CONTROL

IN ADDITION:

ODEQ GENERAL PERMIT (OKR10) FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES WITHIN THE STATE OF OKLAHOMA. ODEQ, WATER QUALITY DIVISION, SEPTEMBER 13, 2012

PRELIMINARY

"This document is preliminary in nature, and is not a final signed and sealed document."



know what's below.
Call before you dig.

TASK 2 STORMWATER MANAGEMENT PLAN

WAURIKA LAKE WATER INTAKE CHANNEL
MAINTENANCE PROJECT
WAURIKA LAKE MASTER
CONSERVANCY DISTRICT
584 E 1890 ROAD
JEFFERSON COUNTY, OK 74235

Plans and Estimates Prepared by:

KEITHLINE ENGINEERING GROUP
800 E. 101ST ST., TULSA, OKLAHOMA, 74116 (918) 963-7311

REVISION	BY	DATE	PLAN NO.	REASON	DATE

DRAWING: _____
SCALE: _____



KEITHLINE ENGINEERING
GROUP, PLLC

TASK 2 – DREDGE AMERICA CDMSA CONFIGURATION



CDMSA Considerations

- Real Estate – no wetlands, no groundwater conflicts, no cultural conflicts
- Suitable material to construct berms
- CDMSA to hold 4 times the volume of dredged material
- Dredged material should dewater easily
- Final destination of dewatered dredged material
- ODEQ BMP parameters on effluent decant water discharge
- Desiccation & native vegetation growth during final operations & monitoring



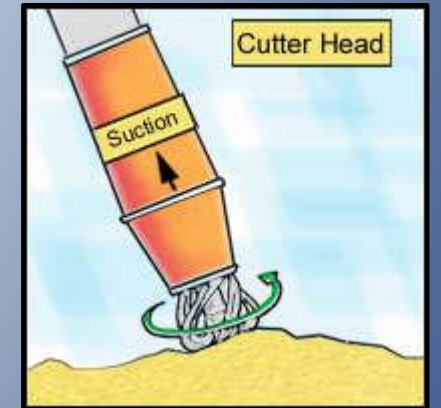
Waurika CDMSA Construction starting August 2015



WAURIKA CDMSA IN OPERATION



DREDGE AMERICA "LIBERTY" CUTTERHEAD DREDGE



TASK 2 – FLASHBOARD RISER WEIR



CDMSA DISCHARGE INTO LAKE

12" Discharge Pipes



Turbidity Curtain

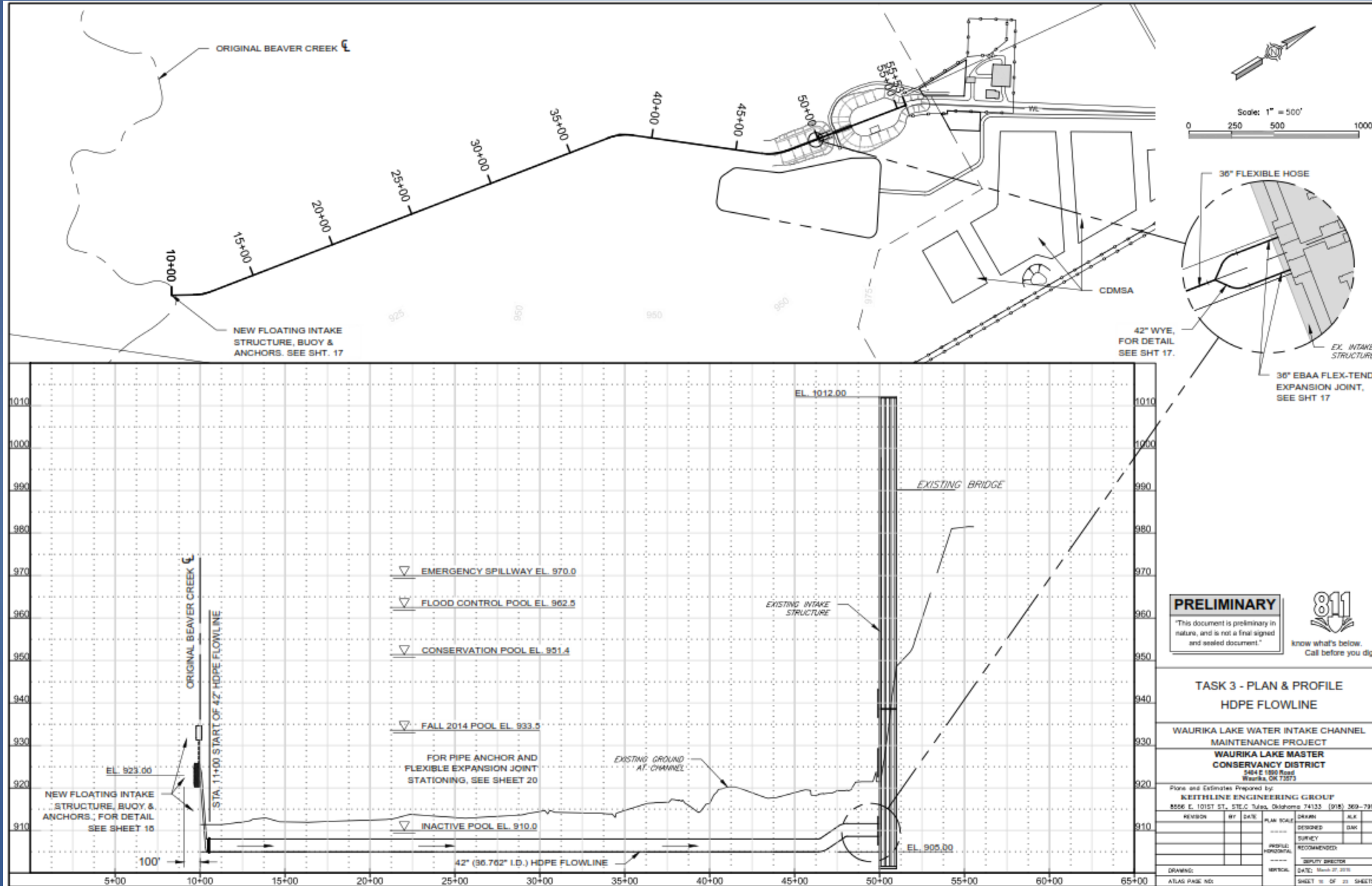
PROJECT AT PEAK OF CONSTRUCTION ACTIVITIES



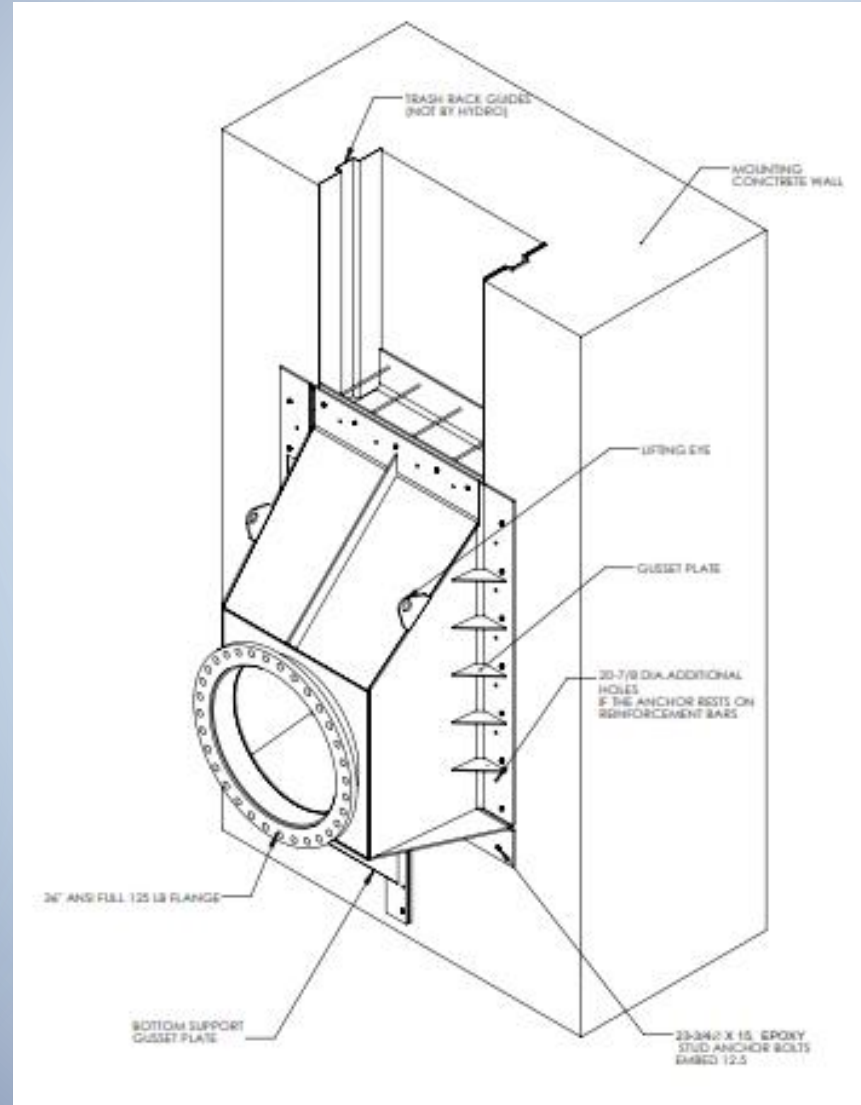
TASK 3 – EXTENDING LOWER GATES

		TASK 3 - Lower Gate Extension
24	01 71 13	Mobilization
25	05 05 19	Install Underwater Pipe Anchors
26	40 05 33.1	Install Fuzed 42" (42.41" OD/36.762"ID) PE4710 DR 17 125 psi HDPE Pipe
27	40 05 33.2	Install 36" Expansion Joints
28	40 05 33.3	Install 36" Flexible Expansion Joints
29	40 05 33.4	Install 42"x42"x42" DR 17 HDPE WYE
30	40 05 33.5	Install 100' (3 ea 20' sections) of 36" SBR Flexible Hose w/ molded Stainless Steel Class 125/150 Flanges
31	40 05 33.5	Install 60' (3 ea 20' sections) of 36" SBR Flexible Hose w/ molded Stainless Steel Class 125/150 Flanges
32	40 05 33.6	Install 20'x14'x1' Concrete Pad and Pipe Fasteners
33		Install 36" DR17 HDPE Flange Adapters
34		Install 36" IPS Class 125/150 316 Stainless Steel Back Up Rings
35		Install 42"x36" DR17 HDPE Concentric Reducer
36	35 01 41.1	Install 30 MGD Floating Intake Screen
37	35 01 41.2	Install Intake Screen Protective Enclosure
38	35 01 41.3	Install Navigation Buoy
39	35 01 41.4	Install Floating Intake Anchor System
40	35 01 41.5	Install Permanent 13" Spar Buoys with anchors
41	35 01 41.6	Install Temporary 30" Float Balls with anchors

TASK 3 – 42" HDPE PLAN AND PROFILE



TASK 3 - LOWER GATE DIFFUSER



TASK 3 – TYPICAL 42" HDPE SUBMARINE INSTALLATION



HDPE FUSING - QUALITY CONTROL

Operator Certification



Joint Datalogging



Task 3 – Intake Screen



TASK 4 – Post Maintenance Operations

TASK 4 - Post Maintenance Operations		
42	32 72 00	Construction and Staging Site Restoration and Closing CDMSAs
43	01 55 24	WLMCD Road Repairs
44	01 71 14	Demobilization

PROJECT CLEAN-UP

- 1) WLMCD and USACE Grounds – restore to pre-project condition, or better, as determined by WLMCD and USACE representatives
- 2) WLMCD frontage road – rehabilitated to pre-project condition
- 3) CDMSA Period 1 – Dredging Activities CDMSA receiving dredged slurry
CDMSA Period 2 – Facility is isolated to decant free water, dryout & settle
CDMSA Period 3 – Cover dry sediment, reclaim land back to original shape
encourage native vegetative species to grow back to area.



Waurika Lake Water Intake Channel Maintenance Project

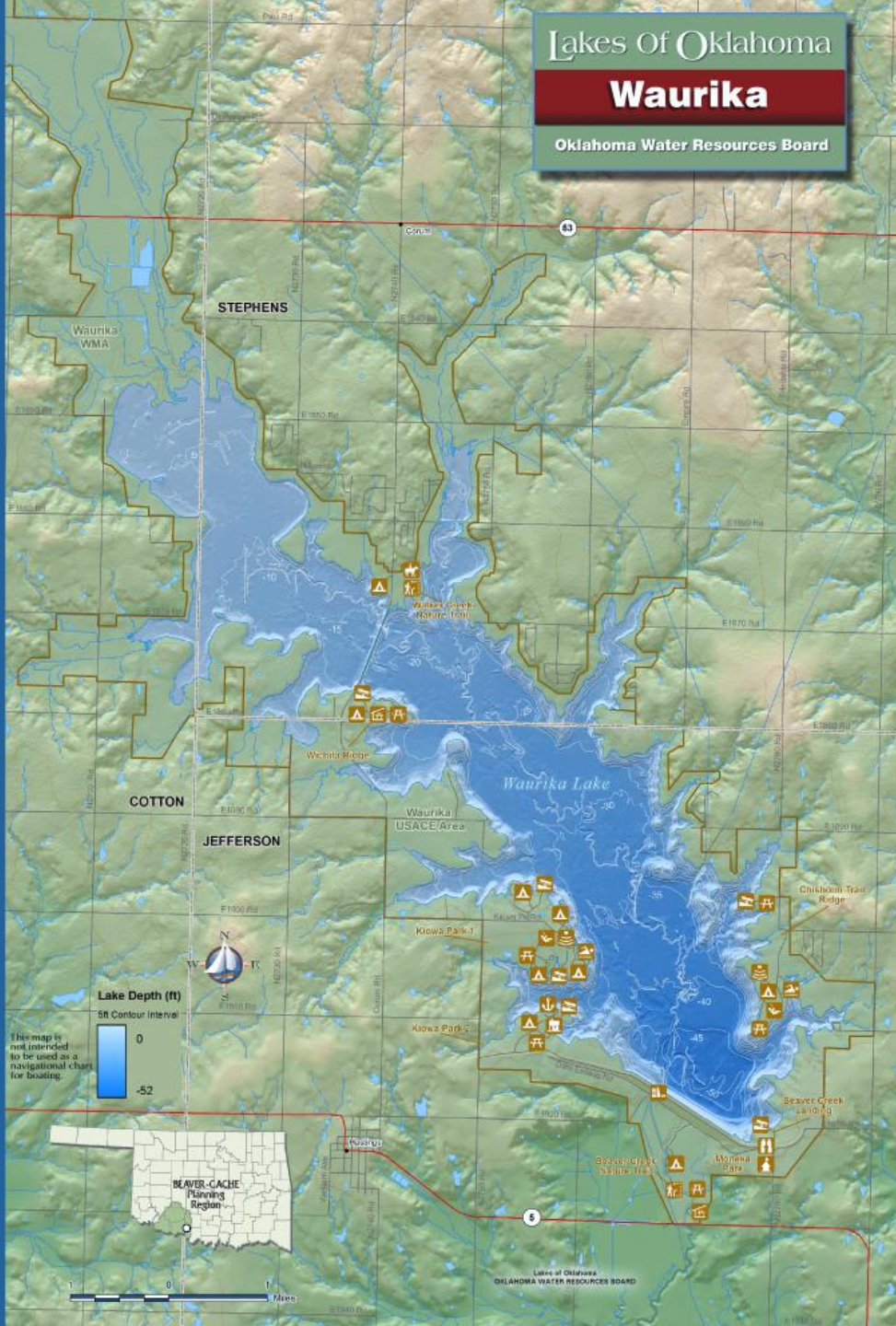
Talking Points for a Successful Project:

- 1). **ACCESS TO ALL DEPTHS** of the conservation pool is critical; especially when water reservoirs are lowered due to drought conditions regardless of the amount of sediment deposits.
- 2). Solutions to expensive infrastructure problems should be **JUSTIFIED** by **RISK BASED PRIORITIZATION/DECISION MAKING** with methodologies that includes cost to benefit analysis that includes a full cycle maintenance and future replacement cost for a comprehensive project funding model. For example; do we spend an extra million dollars to double the life of the project.
- 3). **POSITION THE PROJECT TO BE SUCCESSFUL BY DEVELOPING A COOPERATIVE EFFORTS WITH ALL STAKEHOLDERS, REGULATORS AND AGENCY REVIEWERS.** In other words, get everybody pushing and pulling in the same direction.
- 4). **ALWAYS KEEP IT SIMPLE** as possible.

Waurika Lake Water Intake Channel Maintenance Project

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QUESTIONS & COMMENTS

More Information on
www.KeithlineEngineering.com

