

Metro East Sanitary District Authorized Level Project Summary Report

Preliminary Design Phase

Prepared for



Prepared by



August 13, 2015

Table of Contents

1. General Information / Background1

 Authorized Level Project1

 Metro East Sanitary District (MESD) Levee System.....1

 USACE Authorized Level Project Decision Segments1

2. Recommended Plan4

 Integral Determination Report (IDR)4

 Recommendation4

 Development of Bid Packages4

3. Schedule.....5

4. Risk in Moving Forward5

Appendix 1 – Bid Package / Design Reach Exhibits

Appendix 2 – Design Process Flow Charts

1. General Information / Background

Authorized Level Project

Following the Southwestern Illinois Flood Prevention District Council's (FPD Council) design and construction of levee improvements that are required for accreditation in accordance with 44 CFR 65.10 criteria (FEMA criteria), the FPD Council desires to advance the implementation of the U.S. Army Corps of Engineers' (USACE) Authorized Level Project. The USACE Authorized Level Project further protects the region from a flood in excess of a 100-year FEMA flood event; specifically, the USACE Authorized Level project protects the many residents and businesses throughout southwestern Illinois against an approximately 500-year flood event (the actual Authorized Level Flood Event is defined as 52 feet on the Mississippi River St. Louis, Missouri gage with 2 feet of freeboard, also called the 52+2 Flood Event).

The USACE requires a 35% local sponsor match of the total estimated engineering and construction costs. The Council and the Corps have executed a Memorandum of Understanding that will allow 30% of those costs to be applied through work-in-kind credits, pending the approval of an Integral Determination Report (IDR) and a revised Partnership Agreement (PPA) between the USACE and the FPD Council. Work-in-kind credits are applied when the local sponsor performs work that would otherwise be part of the Authorized Level Project. Work performed by the local sponsor that is not part of the USACE Authorized Level Project is not eligible for work-in-kind credit. To date, the only project eligible for work-in-kind credit that is part of the Southwestern Illinois Levee Certification Design projects (FEMA certification projects) is Bid Package 7B – Lower Cutoff Wall, which is the deep cutoff wall along the Lower Wood River Levee segment. No work-in-kind credit projects have been completed along the Metro East Sanitary District (MESD) Levee System.

Amec Foster Wheeler was tasked with reviewing the U.S. Army Corps of Engineers' Authorized Level Project decision segments and evaluating cost effectiveness of the most vulnerable improvements of which the FPD Council could begin engineering and construction.

Metro East Sanitary District (MESD) Levee System

This report covers the MESD Levee System only. The Summary Report for the Prairie du Pont/Fish Lake Levee will be submitted at a later date under a separate cover, while the Wood River Levee Summary Report was submitted on June 17, 2015. Vulnerable reaches along the MESD Levee System are located both north and south of the Chain of Rocks system. The Chain of Rocks system is the segment of the levee system that is operated and maintained by the USACE. No work is proposed along the Chain of Rocks segment.

USACE Authorized Level Project Decision Segments

The USACE St. Louis District has provided Amec Foster Wheeler and the FPD Council a list of decision segments that require improvements before those segments of levee can adequately protect against the Authorized Level Flood Event. A decision segment is a length of levee, which typically has a length of 330 feet (or some multiple of 330 feet, such as 660 feet). The USACE split the entire levee into individual decision segments to analyze each segment of levee with the available subsurface (boring) information; borings were conducted generally every 330 feet along the MESD Levee System, excluding the Chain of Rocks Levee System. After each decision segment was evaluated for protection against underseepage, a decision was made regarding what underseepage improvements, if any, were needed to correct deficiencies of the particular segment. Underseepage improvements generally consist of seepage berms, fill, relief wells, pump stations, and cutoff walls. Decisions about underseepage improvements were based on factors such as constructability, land use, and cost. Table 1 lists the decision segments provided by the USACE St. Louis District. Each decision segment was evaluated by the USACE as part of the *Credit for Work-In-Kind Contributions, East St. Louis, Illinois, Flood Protection Project Design Deficiency Corrections, May, 2015* (The IDR). The USACE developed the rankings in Table 1, based on their Factor of Safety (FS) against failure at the Authorized Level Flood Event. The "FS Rank w/o AMEC" Column in Table 1 refers to the FS rank before the FEMA

Improvements were constructed; The FEMA improvements are nearly complete as of this report. The “Average FS with AMEC” column in Table 1 refers to the factor of safety for the particular reach of levee after accounting for the FEMA Improvements that are currently underway. The seepage control improvements recommended by USACE are based on evaluations performed as part of the 2011 USACE Limited Reevaluation Report for the MESD Levee System (LRR). It is important to point out that at the time the LRR was completed, none of the FPD Council’s FEMA Improvements were installed; therefore, the USACE has noted which reaches have had work done by the FPD Council and Amec Foster Wheeler subsequent to the initial underseepage analysis as part of the LRR in 2011. Currently, the USACE St. Louis District is reevaluating the decision segments which have had improvements completed as part of the FPD Council’s FEMA improvement projects, which the USACE designates as “AMEC Solution”. Ideally, the extent of the improvements in those reaches would be reduced, or eliminated altogether, thus reducing the overall USACE Authorized Level cost estimate for engineering and construction.

Table 1 – MESD Design Segments

Table 1 – MESD Design Segments						
<u>Abbreviations List:</u> AMEC: Amec Foster Wheeler / FPD Council FS: Factor of Safety (higher is better, lower is more vulnerable)				COW: Cutoff Wall PS: Pump Station RW: Relief Well(s)		
Designer Recommended Rank	FS Rank w/o AMEC	Levee Reach Station		Average FS with AMEC	USACE Recommended Plan	AMEC Solution
		From	To			
1*	3	1207+00	1348+90	0.63	Bedrock COW and Clay Cap	AMEC Wells
2	1	781+10	794+30	0.37	Bedrock COW	No New Features
3	2	962+80	972+70	0.40	Seepage Berm	No New Features
4	13	987+50	1018+90	0.89	Shallow COW, 12 RW, PS	No New Features
5	4	1477+60	1497+40	0.61	Bedrock COW & 12 RW	AMEC Wells
6	5	860+60	863+30	0.63	6 RW	No New Features
7	7	773+03	784+50	0.72	20 RW	No New Features
8	6	1114+60	1137+70	0.76	40 RW	AMEC Wells
9	8	791+10	804+60	0.79	20 RW	No New Features
10	9	890+20	893+50	0.83	4 RW	No New Features
11	10	45+60	48+90	0.85	Seepage Berm	No New Features
12	11	1474+30	1477+60	0.88	10 RW	No New Features
13	12	1190+50	1193+80	0.88	2 RW	No New Features
14	14	1203+70	1207+00	0.90	3 RW	No New Features
15	16	844+00	860+60	0.97	Riverside Clay Trench, 19 RW	No New Features
16	18	1098+10	1104+70	1.02	6 RW	No New Features
17	19	982+60	985+90	1.05	4 RW	No New Features

Table 1 – MESD Design Segments

Abbreviations List: AMEC: Amec Foster Wheeler / FPD Council FS: Factor of Safety (higher is better, lower is more vulnerable)							COW: Cutoff Wall PS: Pump Station RW: Relief Well(s)
Designer Recommended Rank	FS Rank w/o AMEC	Levee Reach Station		Average FS with AMEC	USACE Recommended Plan	AMEC Solution	
		From	To				
18	20	1022+20	1038+70	1.06	26 RW	No New Features	
19	21	194+10	197+40	1.10	Seepage Berm	No New Features	
20	22	174+30	177+60	1.11	Seepage Berm	No New Features	
21	23	204+00	217+20	1.14	Seepage Berm	No New Features	
22	24	1065+10	1068+40	1.15	4 RW	No New Features	
23	25	804+60	824+20	1.16	14 RW	No New Features	
24	26	1193+80	1203+70	1.18	6 RW	No New Features	
25	27	223+80	233+70	1.19	Seepage Berm	No New Features	
26	17	863+80	890+20	1.21	38 RW	AMEC Wells	
27	28	929+80	936+40	1.25	5 RW	No New Features	
28	15	255+90	262+25	1.26	5 RW	AMEC Wells	
29	29	824+20	844+00	1.27	Riverside Clay Trench, 12 RW	No New Features	
30	30	1071+70	1078+30	1.32	5 RW	No New Features	
31	31	240+30	243+60	1.39	Seepage Berm	No New Features	
32	32	1081+60	1088+20	1.39	3 RW	No New Features	
33	33	68+70	72+00	1.44	Seepage Berm	No New Features	
34	34	1144+30	1180+60	1.45	13 RW and Lift Station	No New Features	
35	35	1091+50	1098+10	1.45	2 RW	No New Features	
36	36	1048+60	1051+90	1.46	3 RW	No New Features	
37	37	956+20	959+50	N/A	Landside Clay Fill	No New Features	
38	38	903+40	913+30	N/A	Landside fill may eliminate need for underseepage controls	No New Features	

2. Recommended Plan

Integral Determination Report (IDR)

On May 13, 2015, the FPD Council and Amec Foster Wheeler received a draft copy of the IDR (draft dated May 7, 2015). The USACE has estimated the total cost of the project to be \$152,300,000. The draft IDR estimated the total cost of work items proposed for work-in-kind credit at \$128,200,000. Of the \$128,200,000, \$36,300,000 is the total for work-in-kind credit that the FPD Council can perform as part of the Authorized Project. In other words, the FPD Council can fund engineering and construction for \$36,300,000 and supply an additional \$7,615,000 in cash to the USACE, and the requirements for the local match to the federal project will have been met. Note that the FPD Council already has a credit with the USACE for \$2,635,000 resulting from cash contributions previously made.

Recommendation

It is recommended that the FPD Council proceed with the following work:

Subsurface investigations for:

- All required relief wells
- All required seepage berms
- All required pump stations
- Cutoff walls (as needed)

Design and Construction for:

- All required relief wells
- All required pump stations
- Seepage berms (as needed)

Those items noted 'as needed' will be performed only if the cost estimates for the initial portions of work fall short of the 30% match figure (\$36,300,000). The USACE estimated the total cost for design and construction of all relief wells and pump stations to be approximately \$34.3 Million. By the FPD Council taking on this work, it will be possible for the design and construction of those levee improvements to occur sooner than if the USACE were to perform the design and construction.

Should the FPD Council accept the recommended plan, the only work the USACE will have left to perform as part of the USACE Authorized Level Project is the design and construction of the cutoff walls and, potentially, the seepage berms.

Development of Bid Packages

Amec Foster Wheeler has reviewed the USACE decision segments and has determined that four construction bid packages will appropriately subdivide the decision segments. By splitting the work into four bid packages, the FPD Council has the ability to cancel any one bid package if the remaining bid package(s) approach the work-in-kind credit contribution limit of \$36,300,000. While there is nothing stopping the FPD Council from constructing improvements in excess of \$36,300,000, the USACE will require Section 408 approval for any work over and above the \$36,300,000 limit, whereas any work done as work-in-kind, as agreed upon in the final IDR, which is still in development, does not require Section 408 approval. The four bid packages have been named Bid Packages 11, 12, 13, and 14, a continuation of the numbering from the FEMA Certification Design and Construction packages. The packages were divided primarily by pump station tributary area. The resultant bid packages are as follows:

- ▶ Bid Package 11 is comprised of ten USACE decision segments and spans from Levee Station 255+90 to 913+30, less the Chain of Rocks system. This package includes the construction of 150

relief wells, 144 of which are tributary to existing pump stations and 5 of which drain naturally into the environment.

- ▶ Bid Package 12 is comprised of five USACE decision segments and spans from Levee Station 929+80 to 1051+90. This package includes the construction of a new pump station, between Stations 987+50 to 1018+90, and 50 relief wells, 45 of which are tributary to an existing or proposed pump station and 5 of which drain naturally into the environment.
- ▶ Bid Package 13 is comprised of ten USACE decision segments and spans from Levee Station 1065+10 to 1497+40. This package includes the construction of a new lift station, between Stations 1144+30 and 1180+60, and 106 relief wells, 84 of which are tributary to an existing pump station or newly proposed lift station and 22 of which drain naturally into the environment.
- ▶ Bid Package 14 is comprised of eleven USACE decision segments and spans from Levee Station 45+60 to 972+70. This package consists of all earthwork which includes 8 seepage berms, 1 fill area, and a clay cap spanning from Station 824+20 to 860+60. This package will only be executed if additional work-in-kind credit is available after the costs of the preceding bid packages is better defined.

Exhibits are appended to this report which depict the approximate location of each improvement as part of the recommended plan; see Appendix 1.

3. Schedule

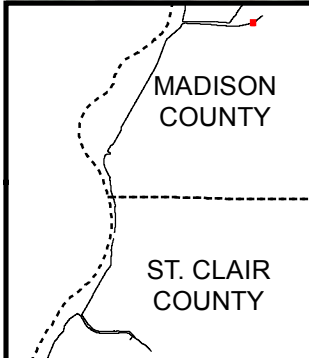
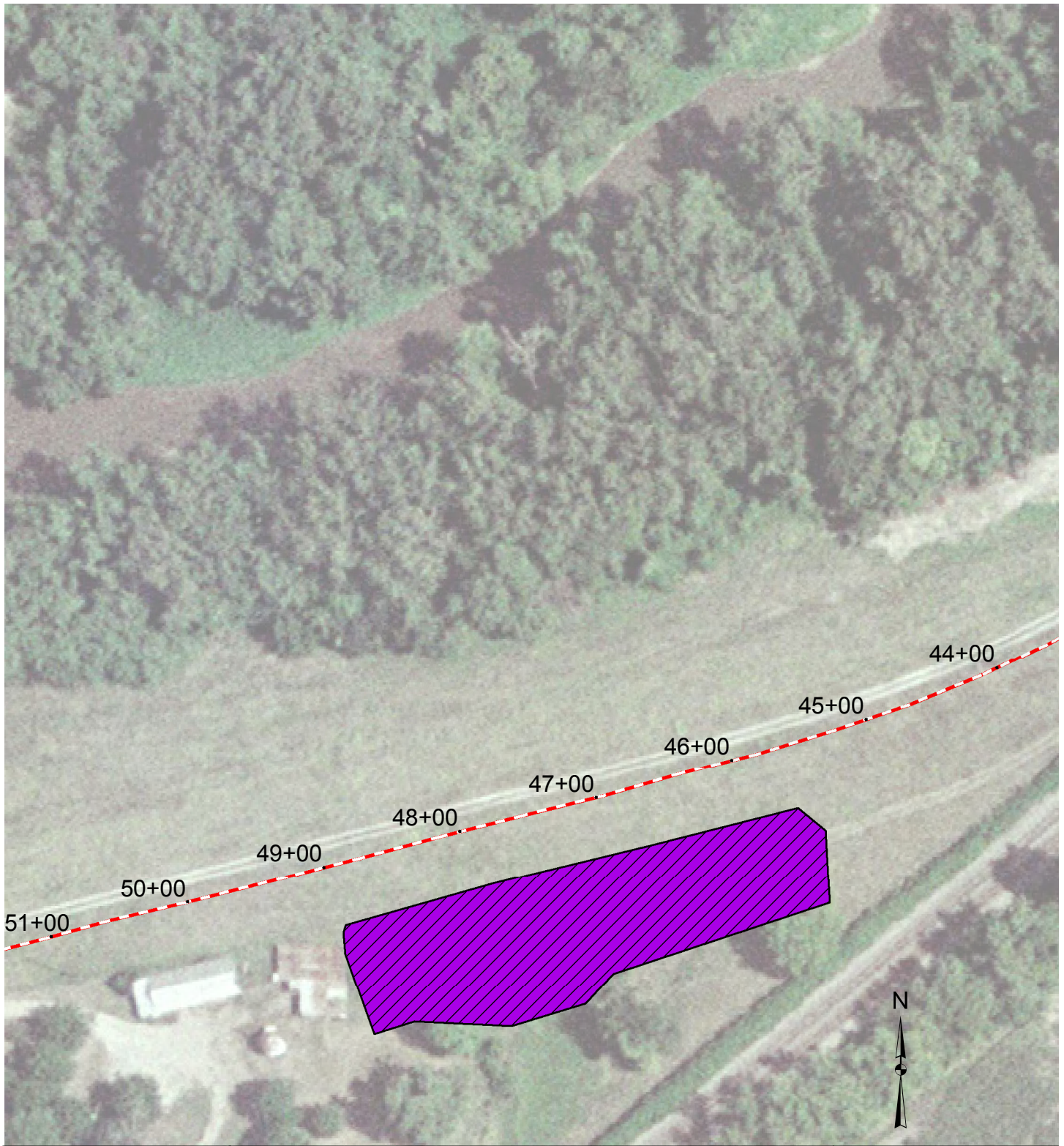
Upon Board approval of this Plan, Amec Foster Wheeler will develop a scope and budget for the completion of field activities and design for the Bid Packages referenced herein. Work on a boring plan for subsurface investigations throughout MESD is already underway, as USACE approval is estimated to be at least 45-60 days once the plan is submitted. If desired, the scope, schedule, and fee for preliminary field work (drilling), and engineering and coordination with USACE, will be presented at the September 2015 FPD Council board meeting, assuming all costs are received by USACE in sufficient time.

AMEC Foster Wheeler, the FPD, and the USACE St. Louis District have worked together to develop the role and responsibilities for each party in the design process. Flow charts outlining the responsibilities through the design process are included as Attachment 2.

4. Risk in Moving Forward

Should the FPD Council accept this recommended plan and move forward with field investigation, conceptual engineering, and drilling of relief well pilot holes, the FPD Council should understand the risk associated in doing so. There is risk associated with moving forward with these activities without an approved IDR and revised PPA. Risk decreases substantially after IDR approval, and risk of not receiving work-in-kind credit is eliminated after the revised PPA is approved. While the IDR for MESD was originally anticipated to be approved in September, 2015, we have been informed by USACE that approval has been delayed due to the Water Resources Reform and Development Act of 2014 (WRRDA 2014) implementation guidance not being issued. Once issued, the approval process is estimated to take four months. Therefore, the earliest we can expect approval of the IDRs is probably December, 2015. The IDRs, which identify the work that will be eligible for Work-In-Kind Credit, reduce the risk of not receiving credit for work performed. All risk is eliminated after approval of the revised Project Partnership Agreements (PPAs), which take approximately a year to complete after approval of the IDRs.

Appendix 1 – Bid Package / Design Reach Exhibits



USACE Authorized Level of Protection Planning and Analysis

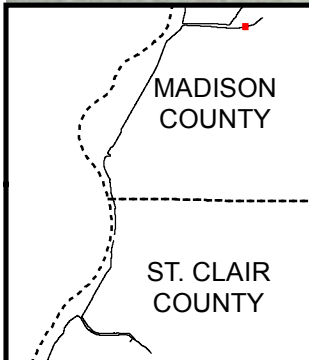
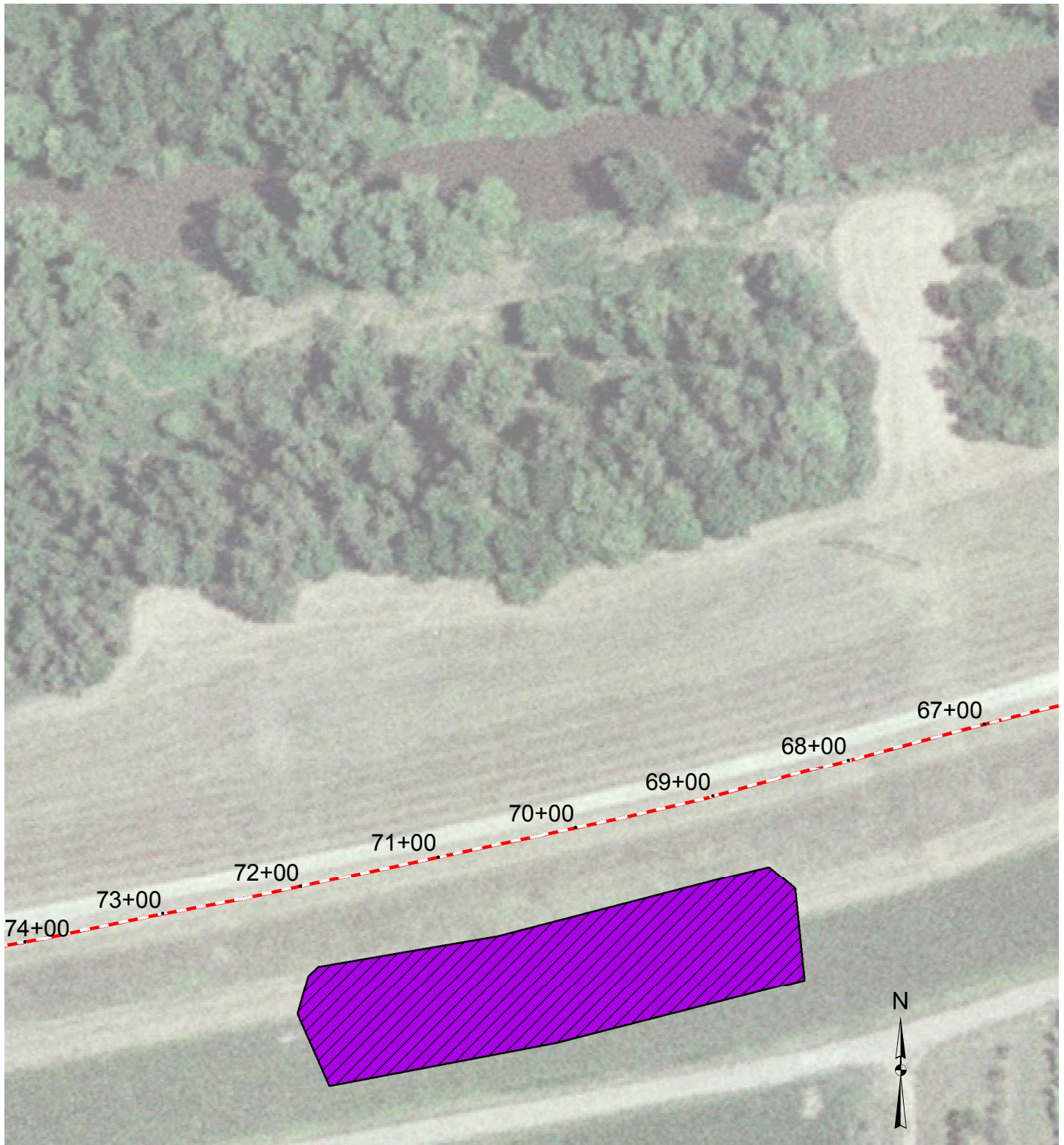
BID PACKAGE 14

MESD

DESIGN STA: 45+60 TO 48+90

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill








USACE Authorized Level of Protection Planning and Analysis

BID PACKAGE 14

MESD

DESIGN STA: 68+70 TO 72+00

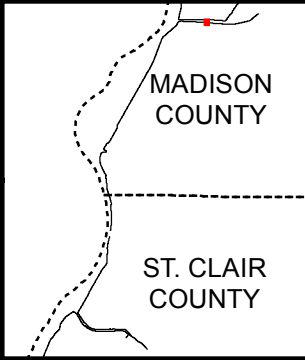
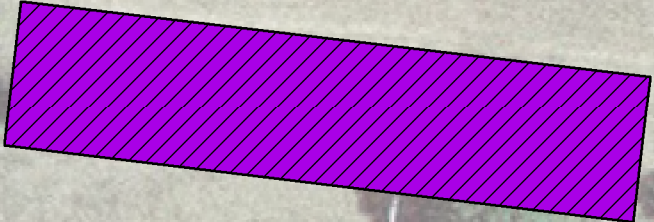
Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



CAHOKIA CREEK DIVERSION CHANNEL

179+00 178+00 177+00 176+00 175+00 174+00 173+00








USACE Authorized Level of Protection Planning and Analysis

BID PACKAGE 14

MESD

DESIGN STA: 174+30 TO 177+60

- Legend**
-  New Pump Station
 -  New Relief Well
 -  Clay Cap
 -  New Seepage Berm
 -  New Fill

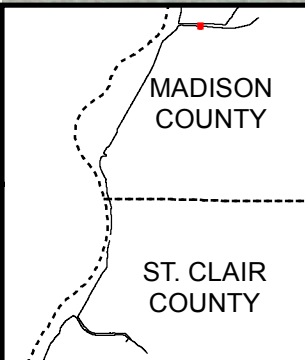
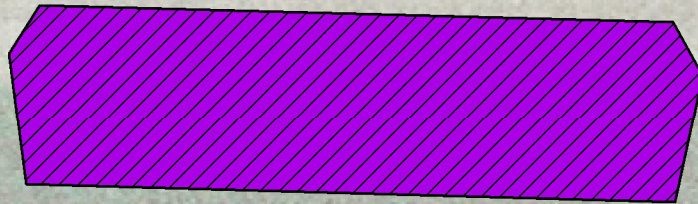
08/05/2015

SHEET

3 OF 23



199+00 198+00 197+00 196+00 195+00 194+00 193+00








USACE Authorized Level of Protection Planning and Analysis

BID PACKAGE 14

MESD

DESIGN STA: 194+10 TO 197+40

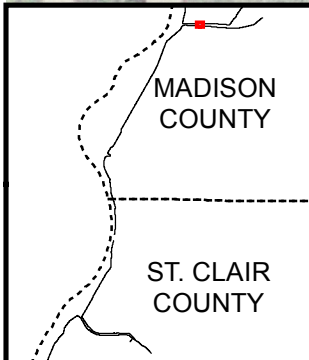
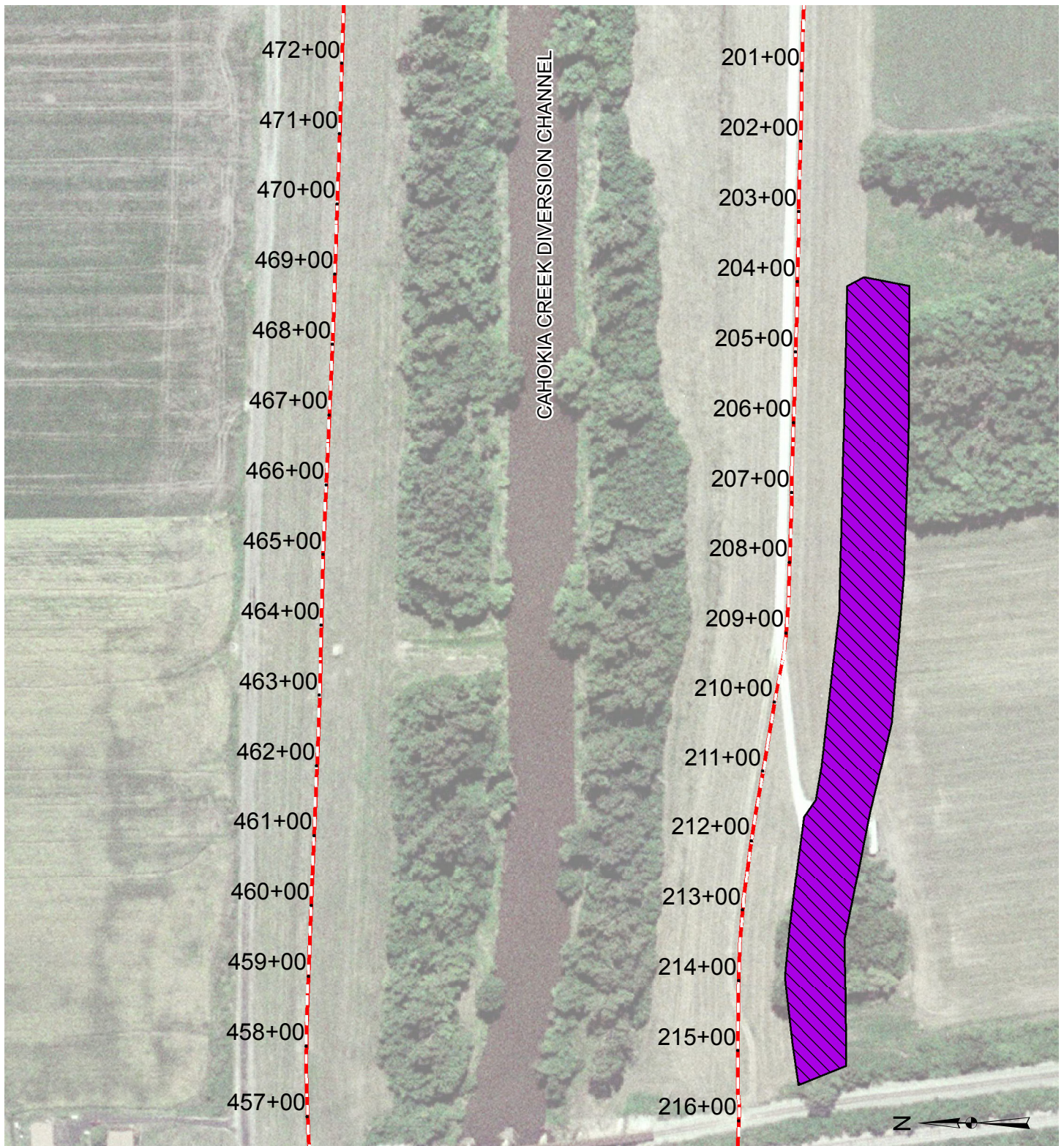
Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill

08/05/2015

SHEET






4 OF 23

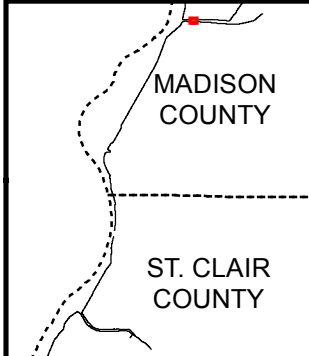
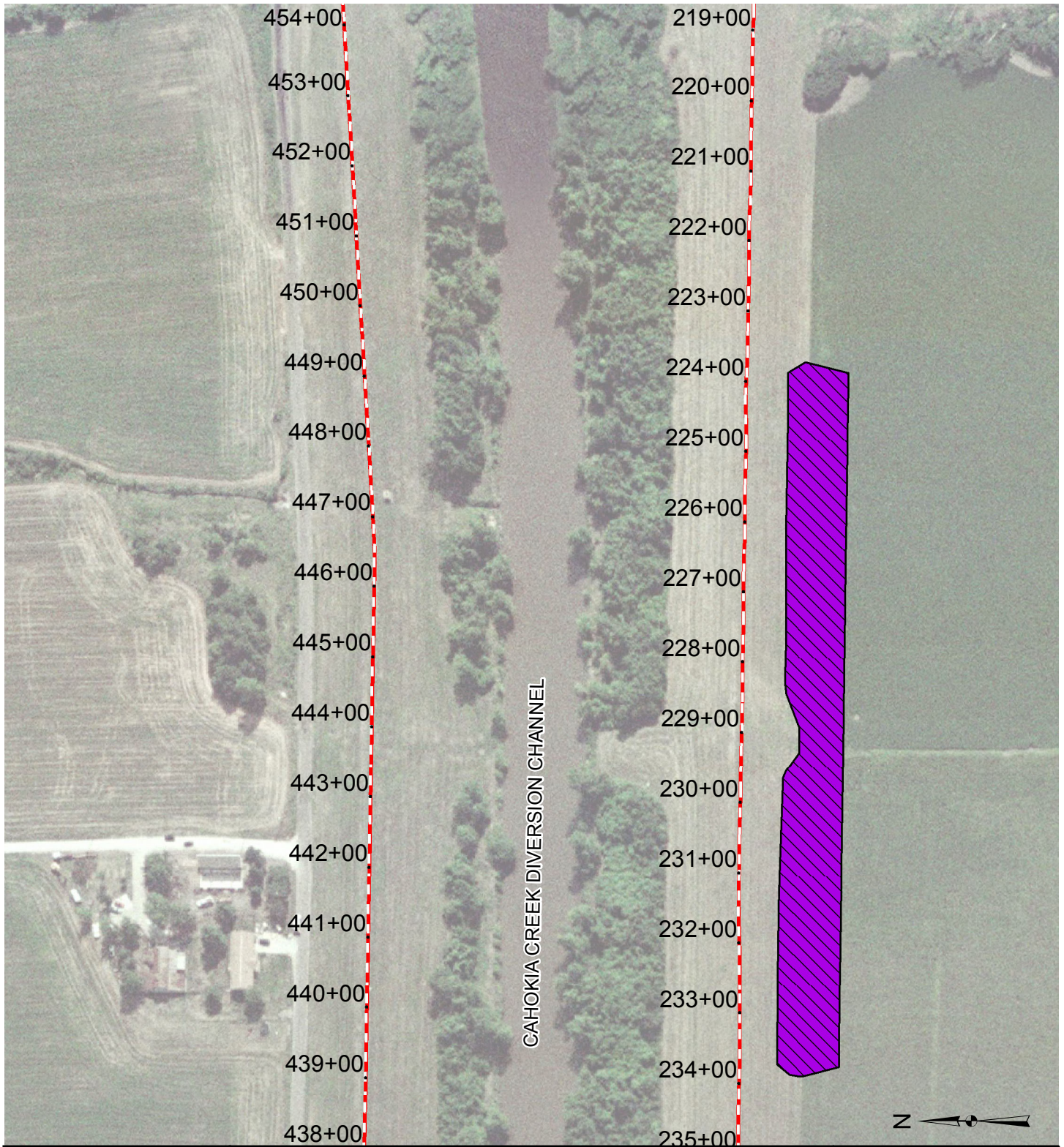


USACE Authorized Level of Protection Planning and Analysis
BID PACKAGE 14
MESD
DESIGN STA: 204+00 TO 217+20

08/05/2015 SHEET 5 OF 23

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



USACE Authorized Level of Protection Planning and Analysis






BID PACKAGE 14

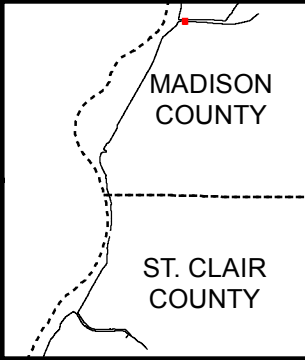
MESD

DESIGN STA: 223+80 TO 233+70

08/05/2015 SHEET 6 OF 23

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



**USACE Authorized Level of
Protection Planning and Analysis**






BID PACKAGE 14

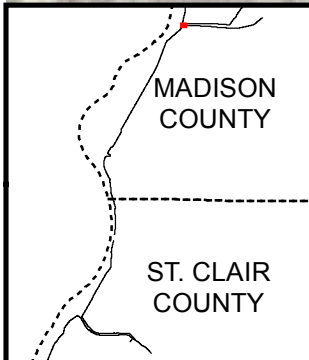
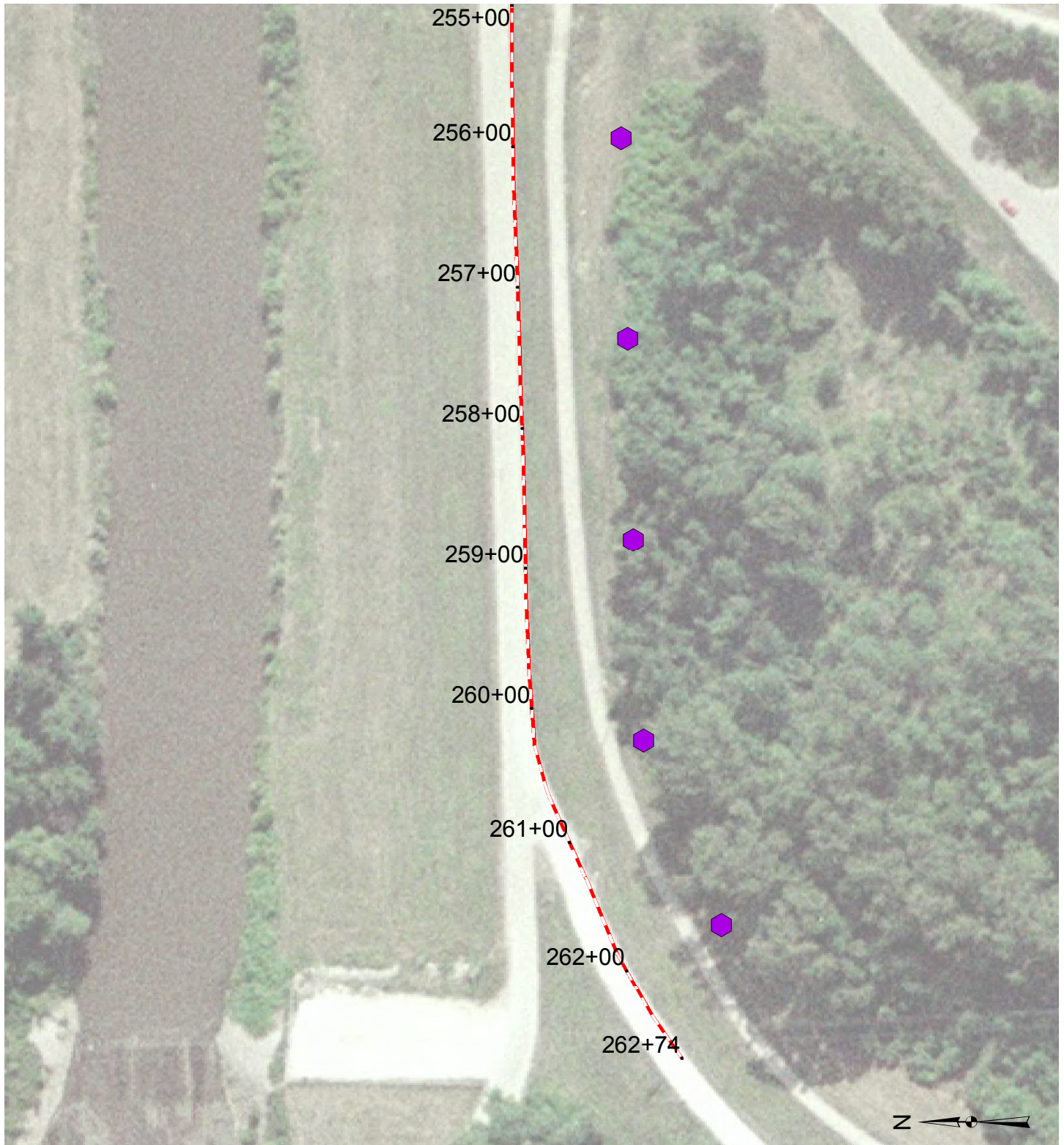
MESD

DESIGN STA: 240+30 TO 243+60

08/05/2015 SHEET 7 OF 23

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill







USACE Authorized Level of Protection Planning and Analysis

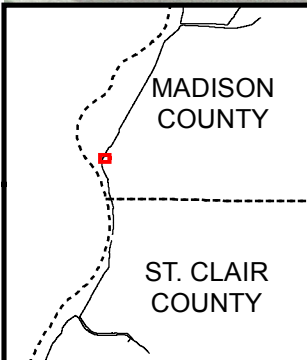
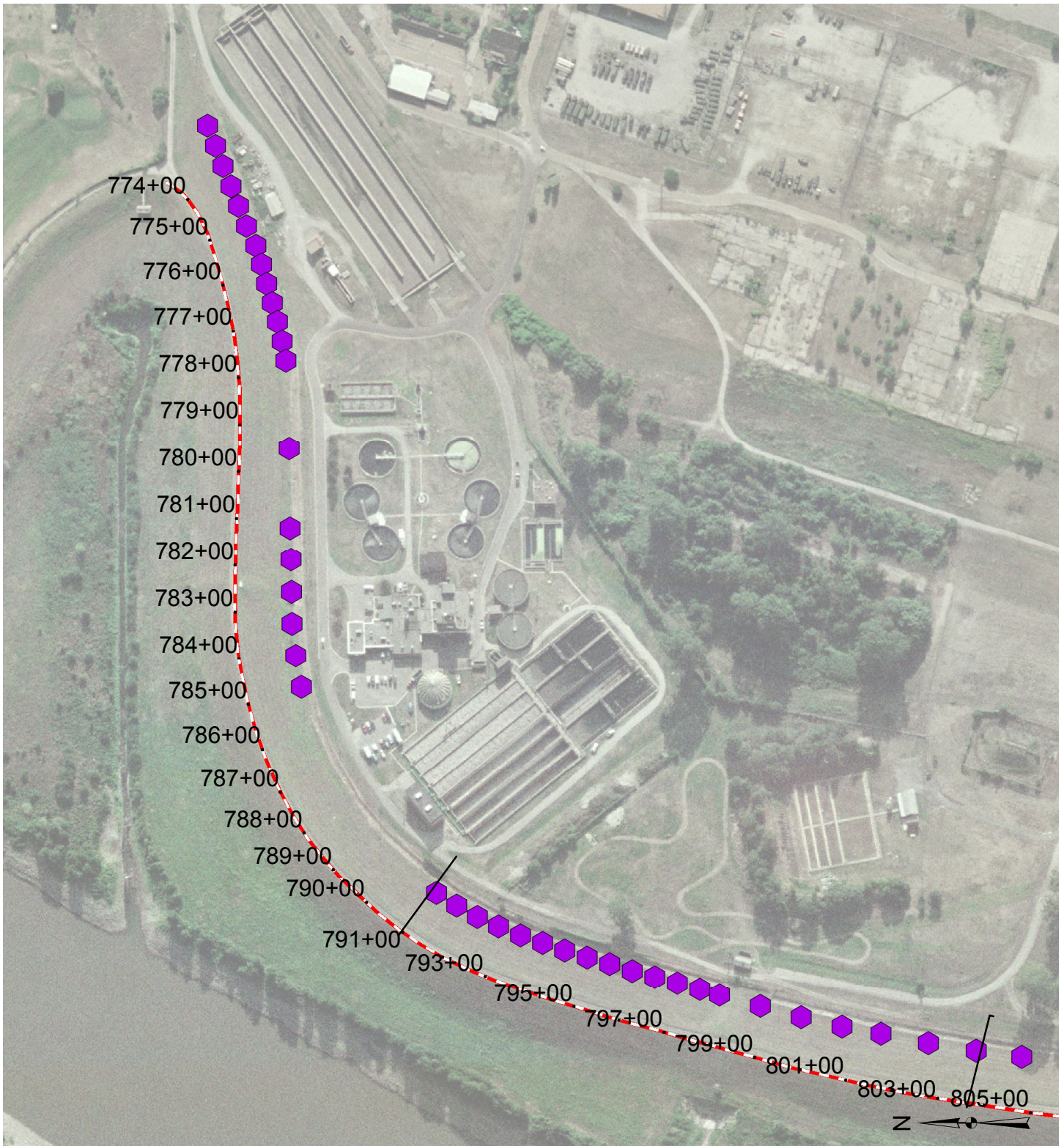
BID PACKAGE 11

MESD

DESIGN STA: 255+90 TO 262+25

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



**USACE Authorized Level of
Protection Planning and Analysis**






BID PACKAGE 11

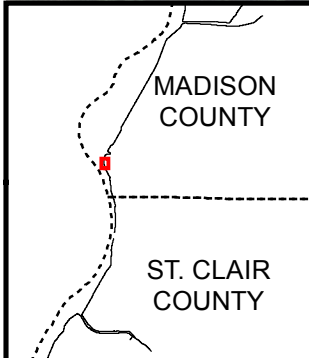
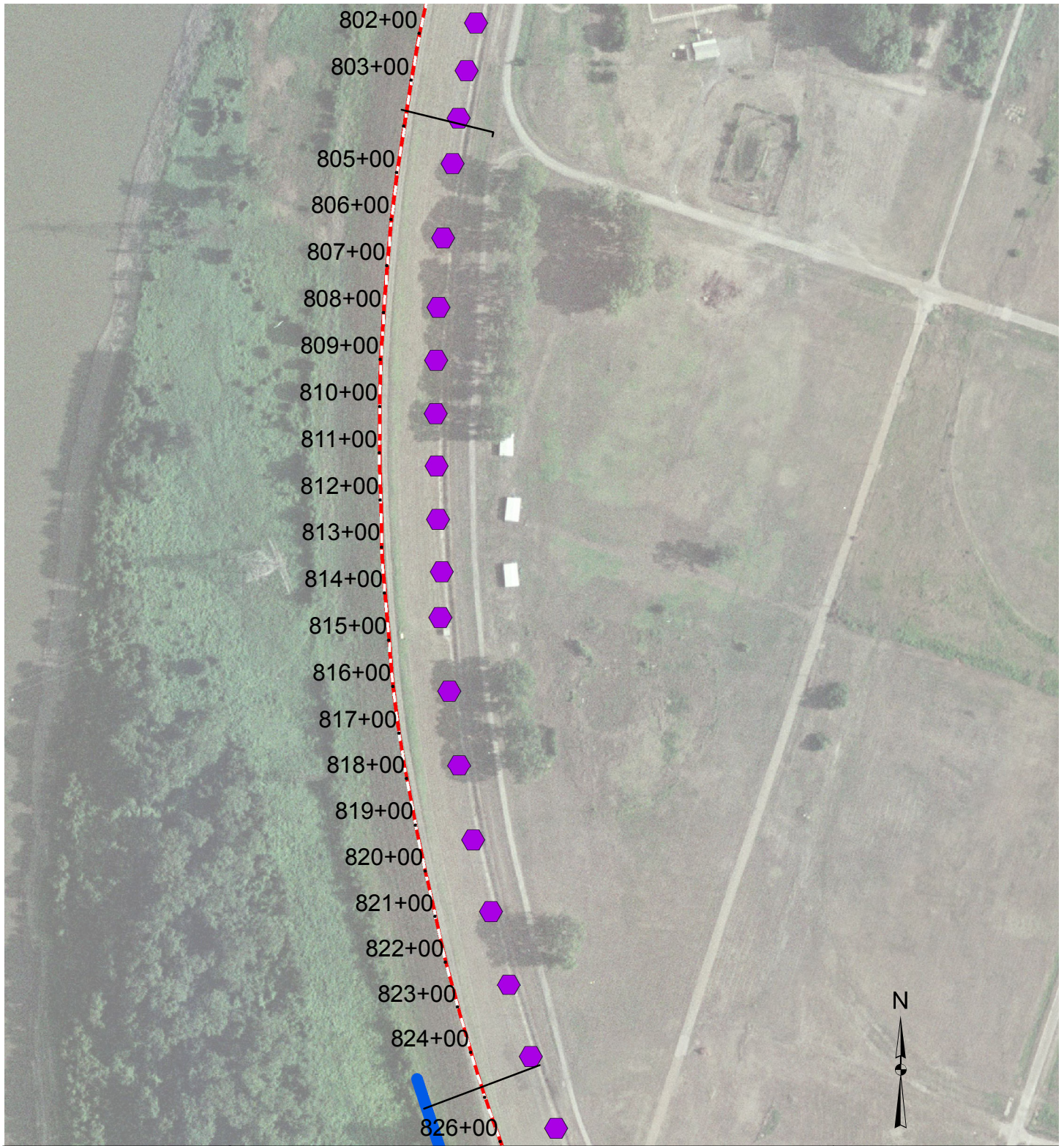
MESD

DESIGN STA: 773+03 TO 824+20

08/05/2015 SHEET 9 OF 23

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill








USACE Authorized Level of Protection Planning and Analysis

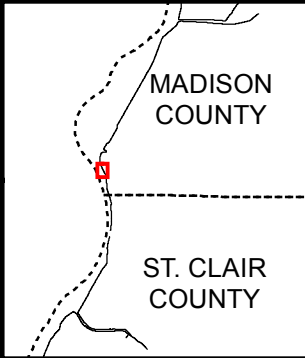
BID PACKAGE 11

MESD

DESIGN STA: 804+60 TO 824+20

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill








USACE Authorized Level of Protection Planning and Analysis

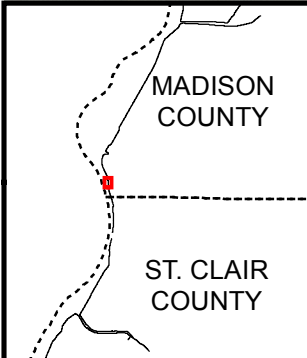
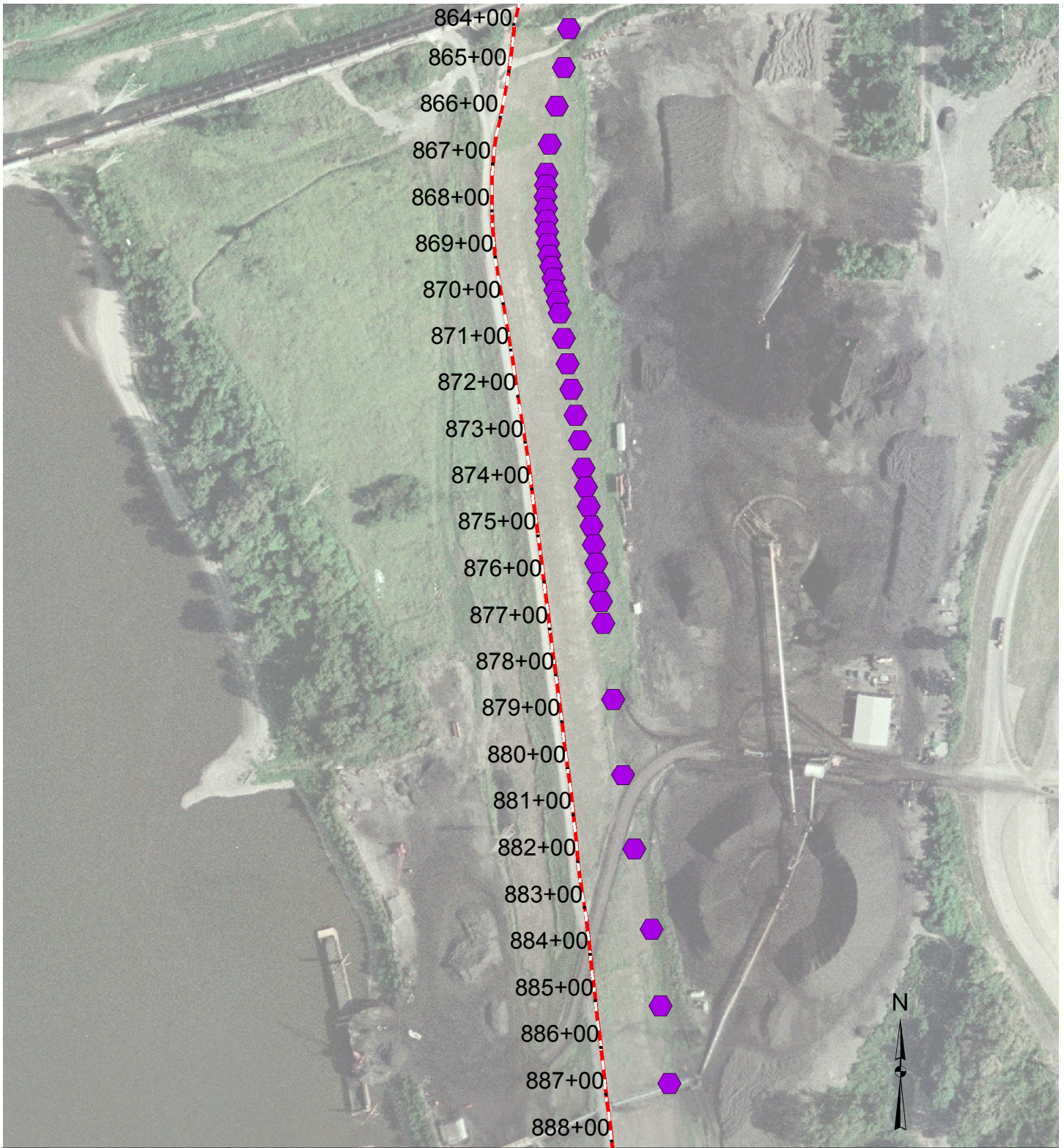
BID PACKAGE 11

MESD

DESIGN STA: 824+20 TO 863+30

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill







**USACE Authorized Level of
Protection Planning and Analysis**

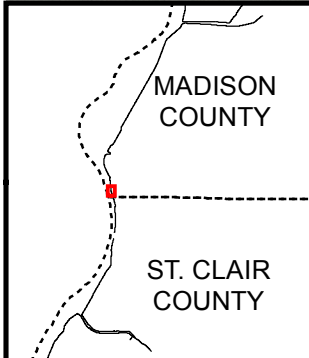
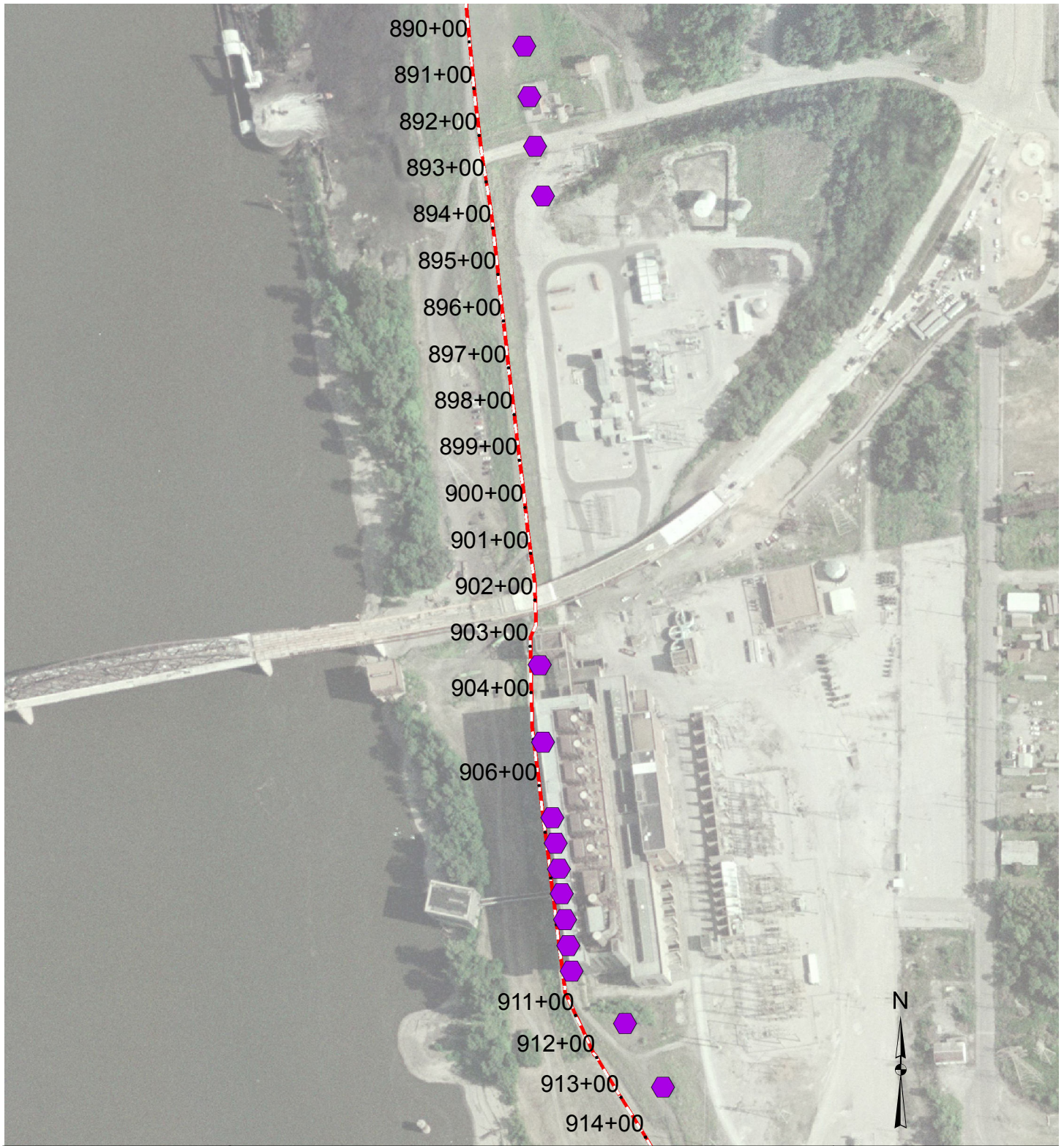
BID PACKAGE 11

MESD

DESIGN STA: 863+80 TO 890+20

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



USACE Authorized Level of Protection Planning and Analysis

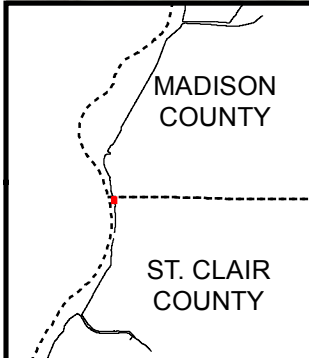
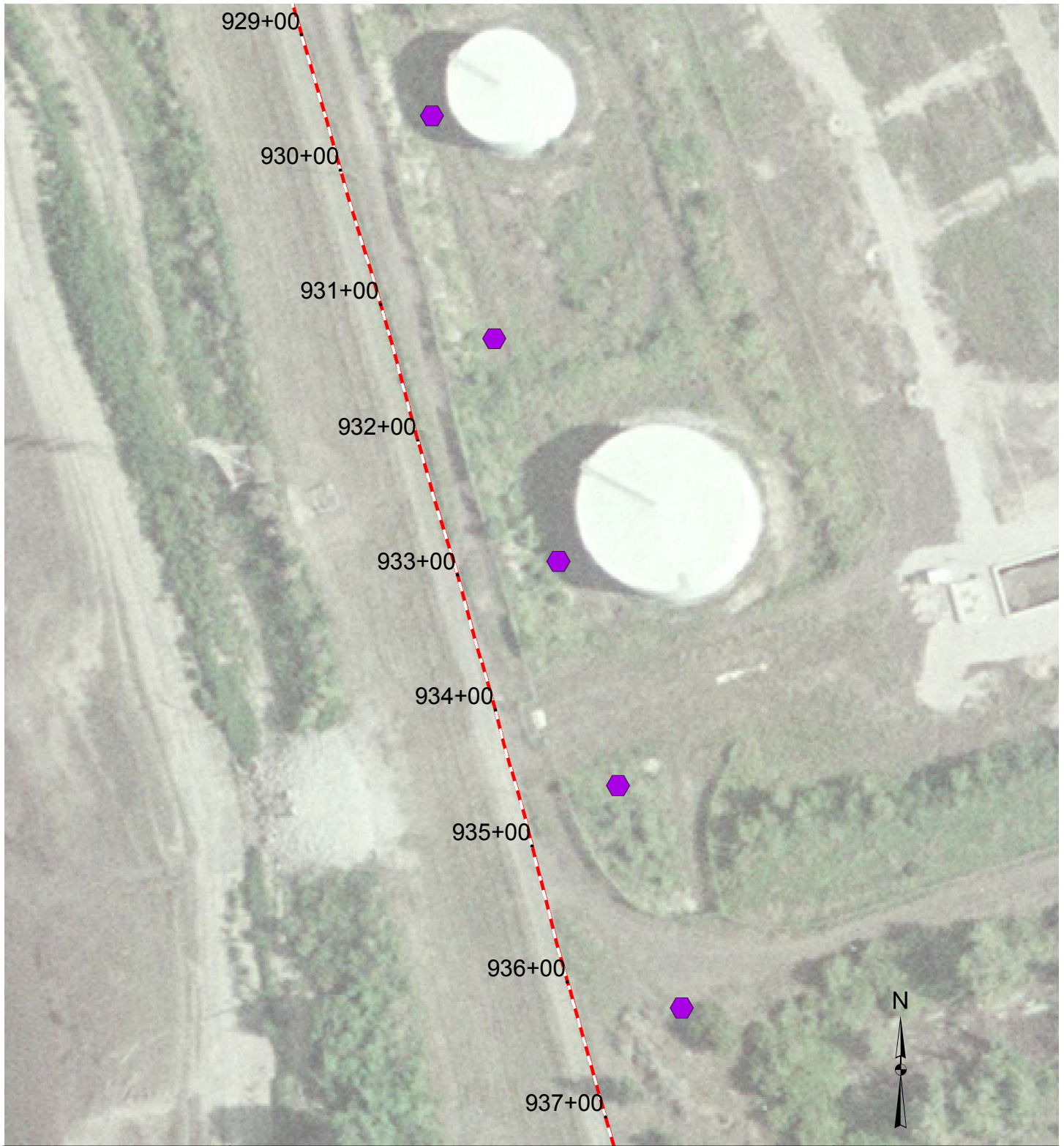
BID PACKAGE 11

MESD

DESIGN STA: 903+40 TO 913+30

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill







**USACE Authorized Level of
Protection Planning and Analysis**

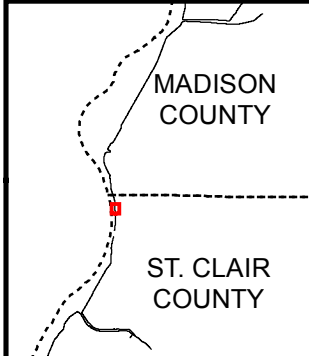
BID PACKAGE 12

MESD

DESIGN STA: 929+80 TO 936+40

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



**USACE Authorized Level of
Protection Planning and Analysis**






BID PACKAGE 14

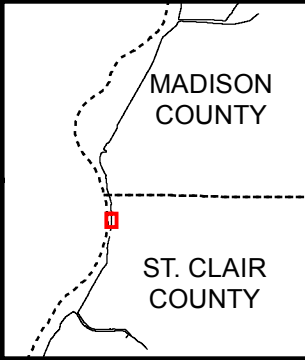
MESD

DESIGN STA: 956+20 TO 972+70

08/05/2015 SHEET 15 OF 23

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill








USACE Authorized Level of Protection Planning and Analysis

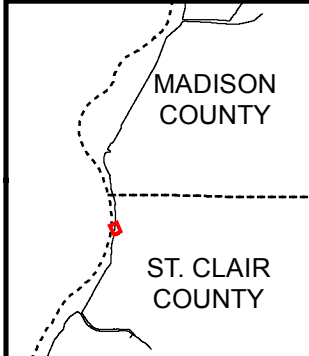
BID PACKAGE 12

MESD

DESIGN STA: 982+60 TO 1014+00

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill







**USACE Authorized Level of
Protection Planning and Analysis**

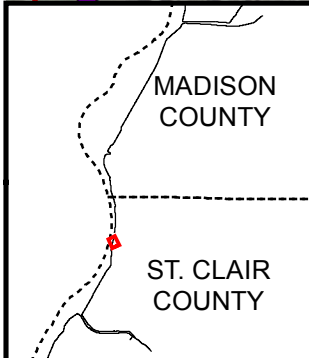
BID PACKAGE 12

MESD

DESIGN STA: 1022+20 TO 1038+70

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill







**USACE Authorized Level of
Protection Planning and Analysis**

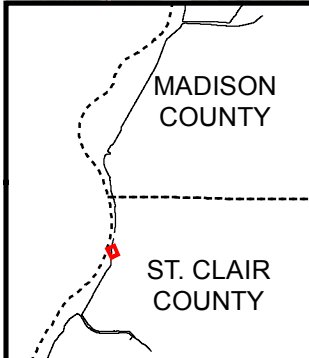
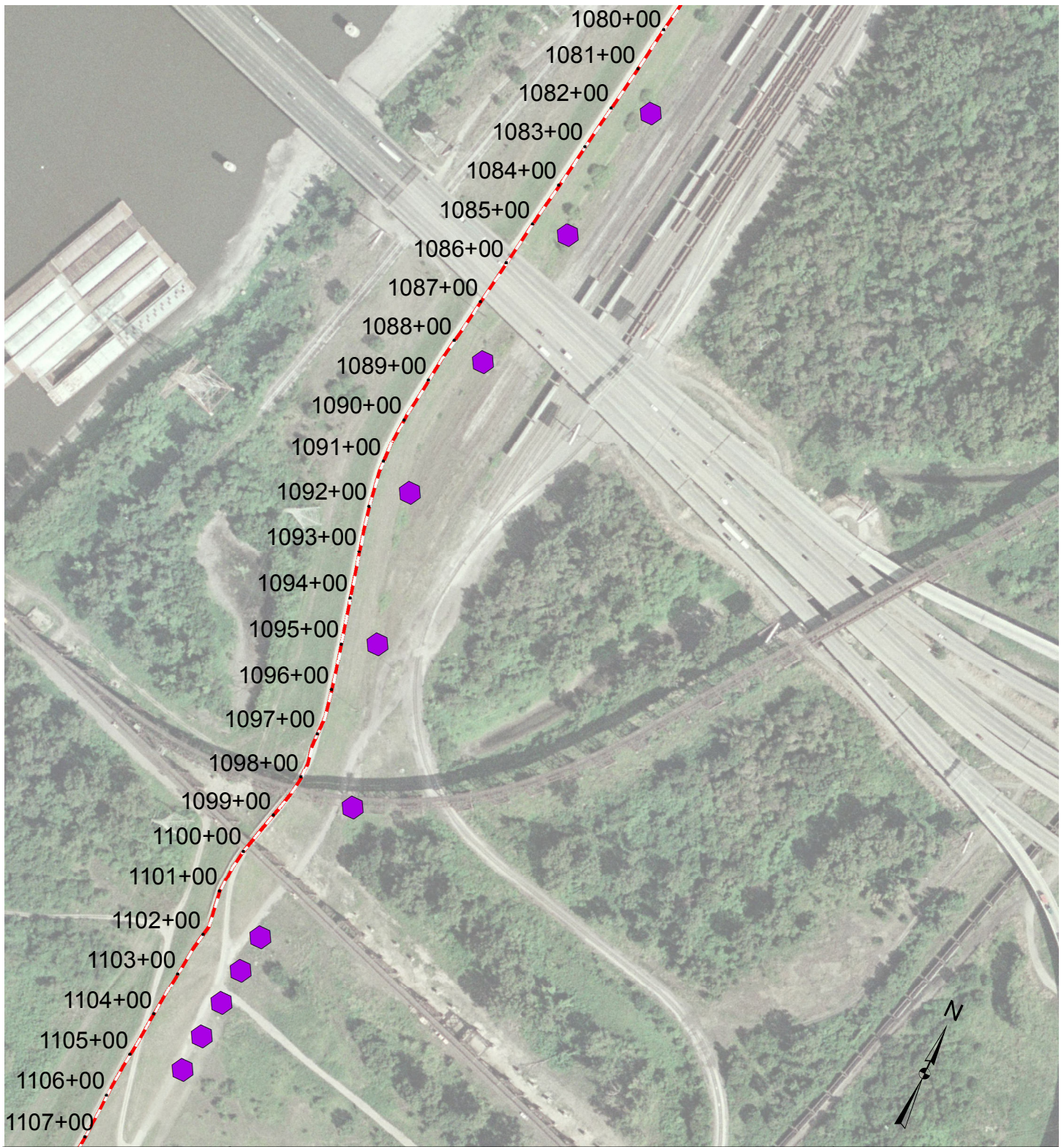
BID PACKAGE 12, 13

MESD

DESIGN STA: 1048+60 TO 1078+30

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



**USACE Authorized Level of
Protection Planning and Analysis**

BID PACKAGE 13

MESD


DESIGN STA: 1081+60 TO 1104+70

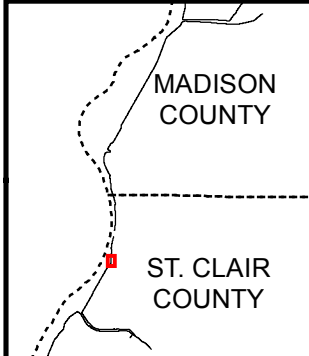
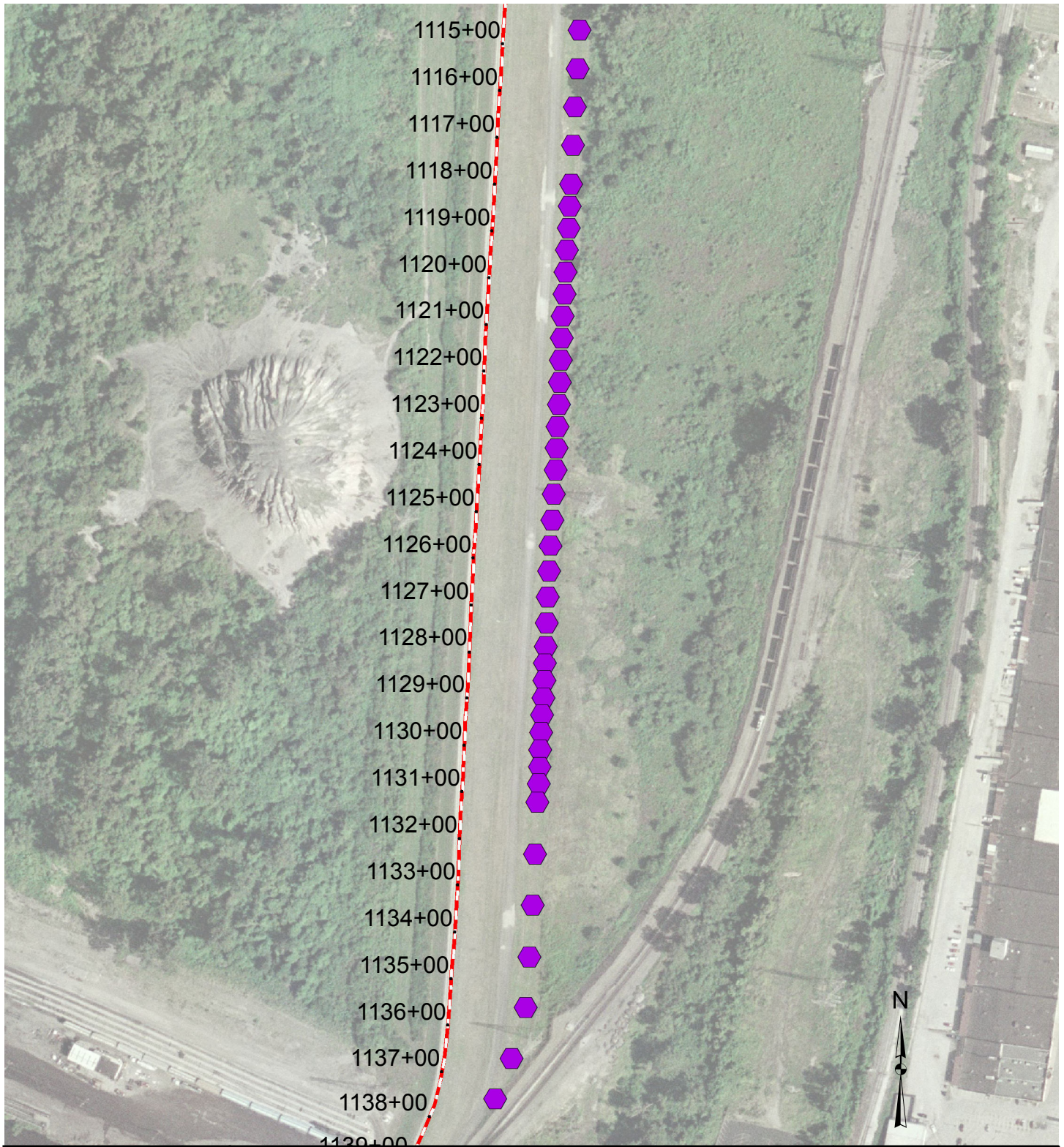
08/05/2015

SHEET

19 OF 23

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill




**USACE Authorized Level of
 Protection Planning and Analysis**

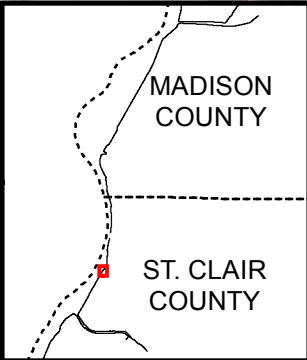
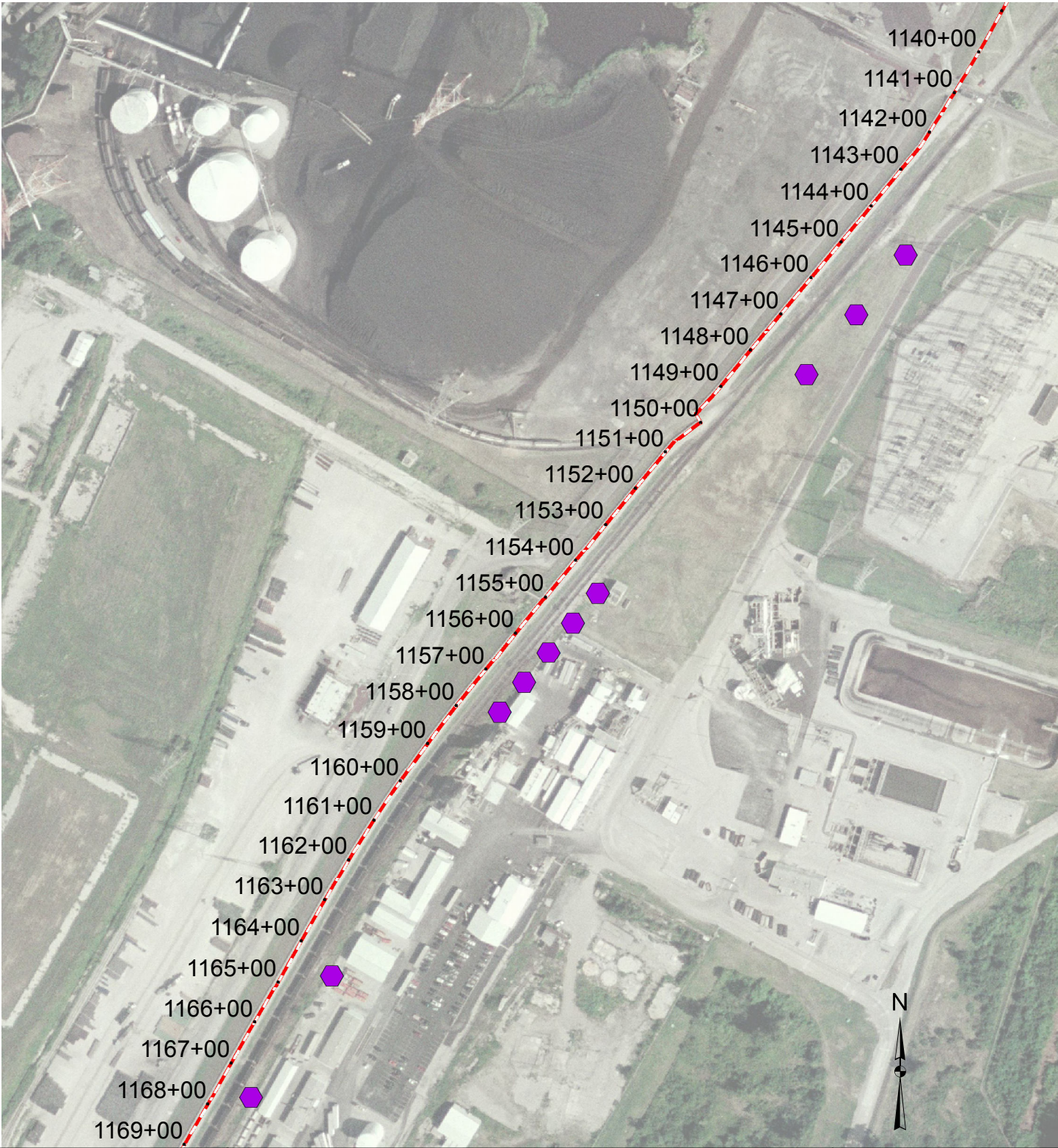
BID PACKAGE 13

MESD

DESIGN STA: 1114+60 TO 1137+70

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



**USACE Authorized Level of
Protection Planning and Analysis**






BID PACKAGE 13

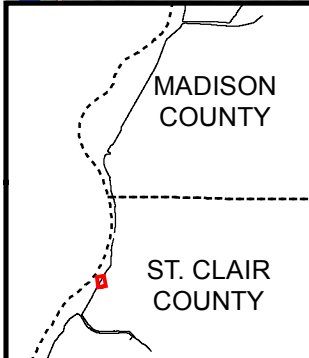
MESD

DESIGN STA: 1144+30 TO 1168+00

08/05/2015 SHEET 21 OF 23

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill








**USACE Authorized Level of
Protection Planning and Analysis**

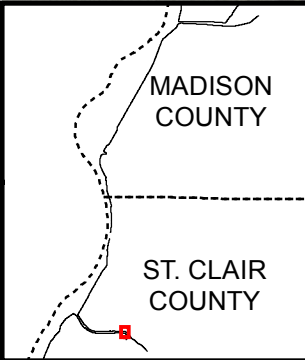
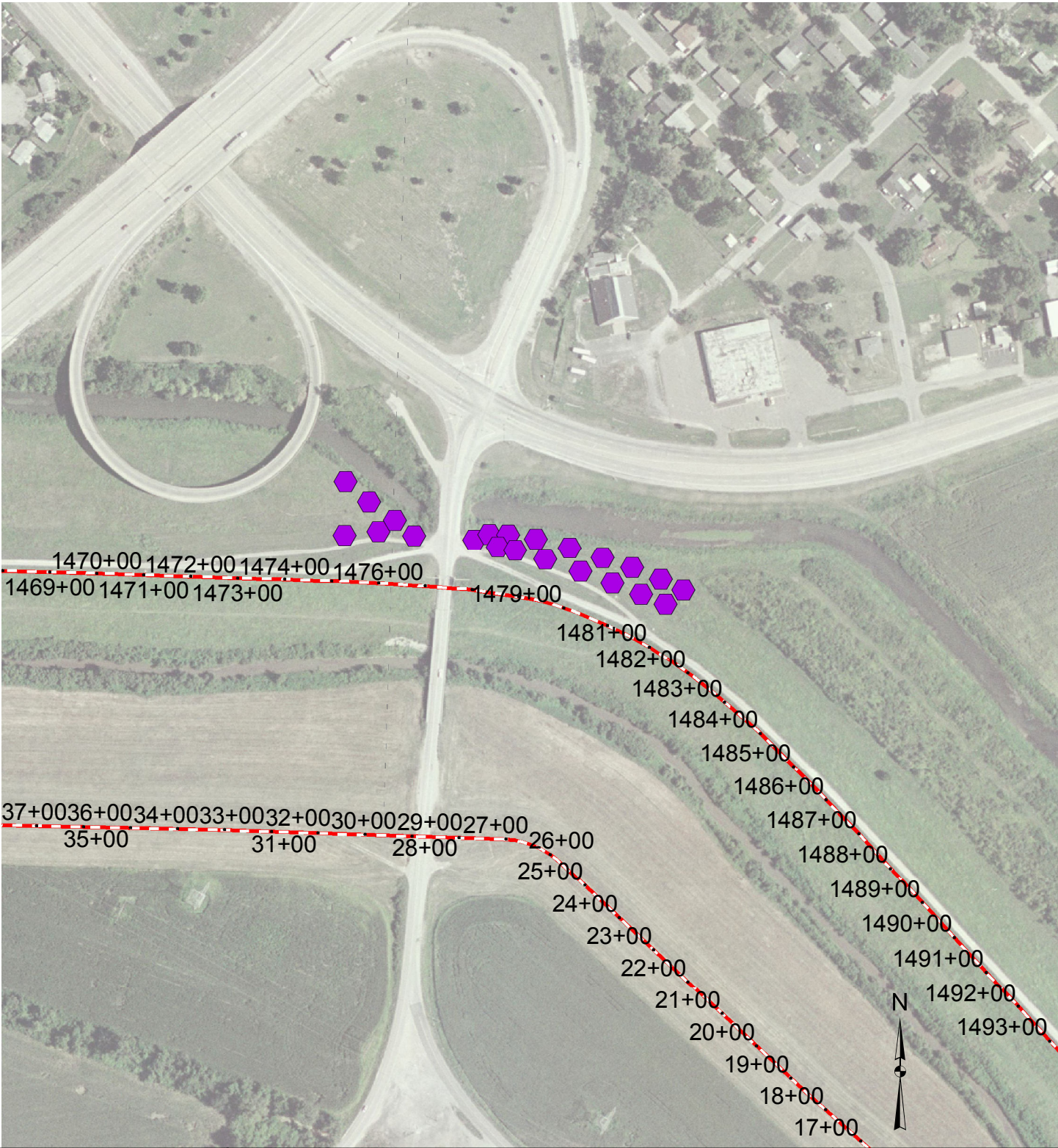
BID PACKAGE 13

MESD

DESIGN STA: 1170+70 TO 1207+00

Legend

-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill



**USACE Authorized Level of
Protection Planning and Analysis**






BID PACKAGE 26

MESD

DESIGN STA: 1474+30 TO 1497+40

08/05/2015 SHEET 23 OF 23

Legend

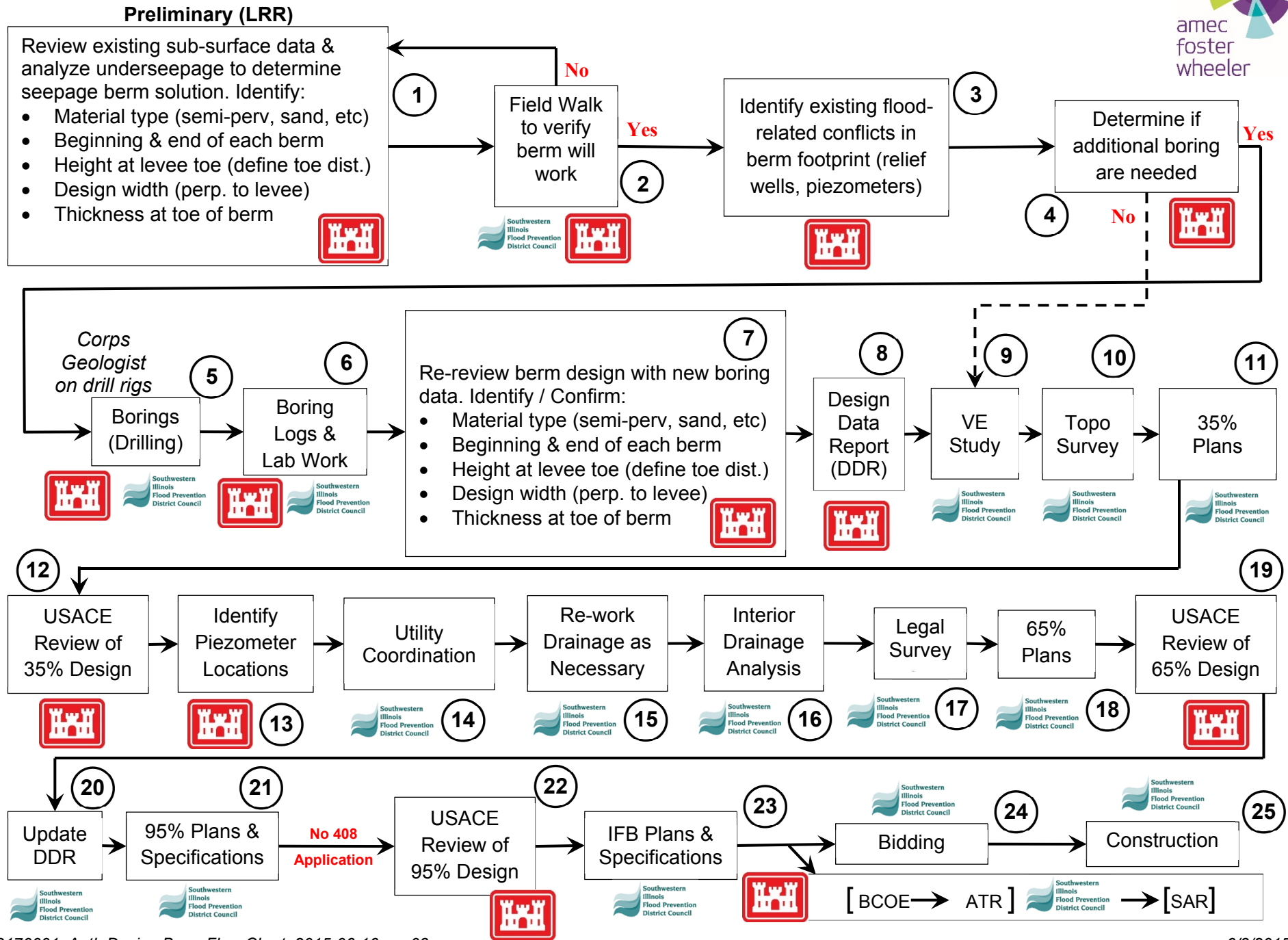
-  New Pump Station
-  New Relief Well
-  Clay Cap
-  New Seepage Berm
-  New Fill

Appendix 2 – Design Process Flow Charts

Authorized Level – Seepage Berm Design



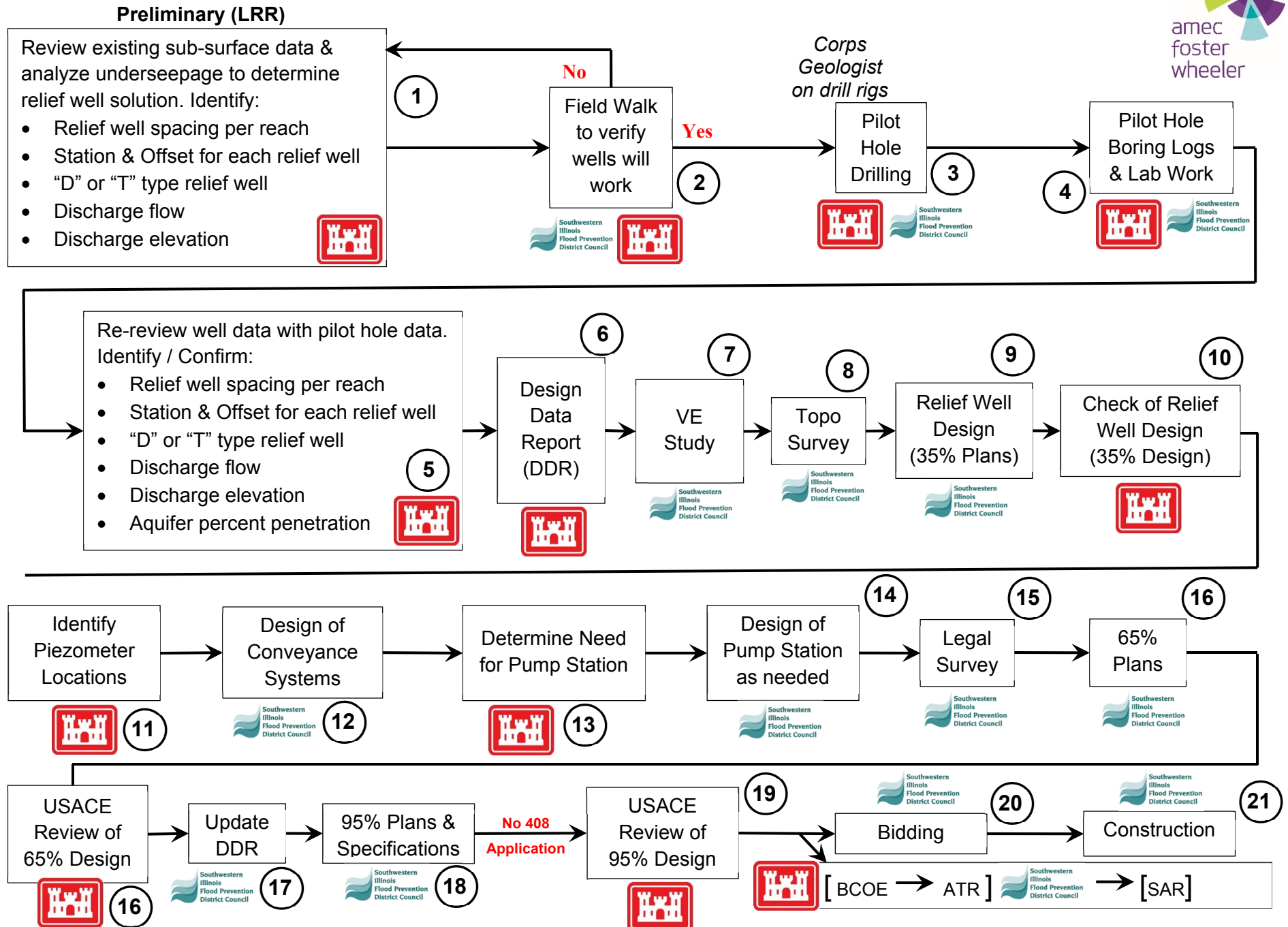
amec
foster
wheeler



Authorized Level – Relief Well Design



amec
foster
wheeler



Authorized Level – Pump Station Design

